Instruction manual
MTL intrinsic safety solutions

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INM MTL838C Rev 3

CROUSE-HINDS
SERIES

MTL838C

Receiver

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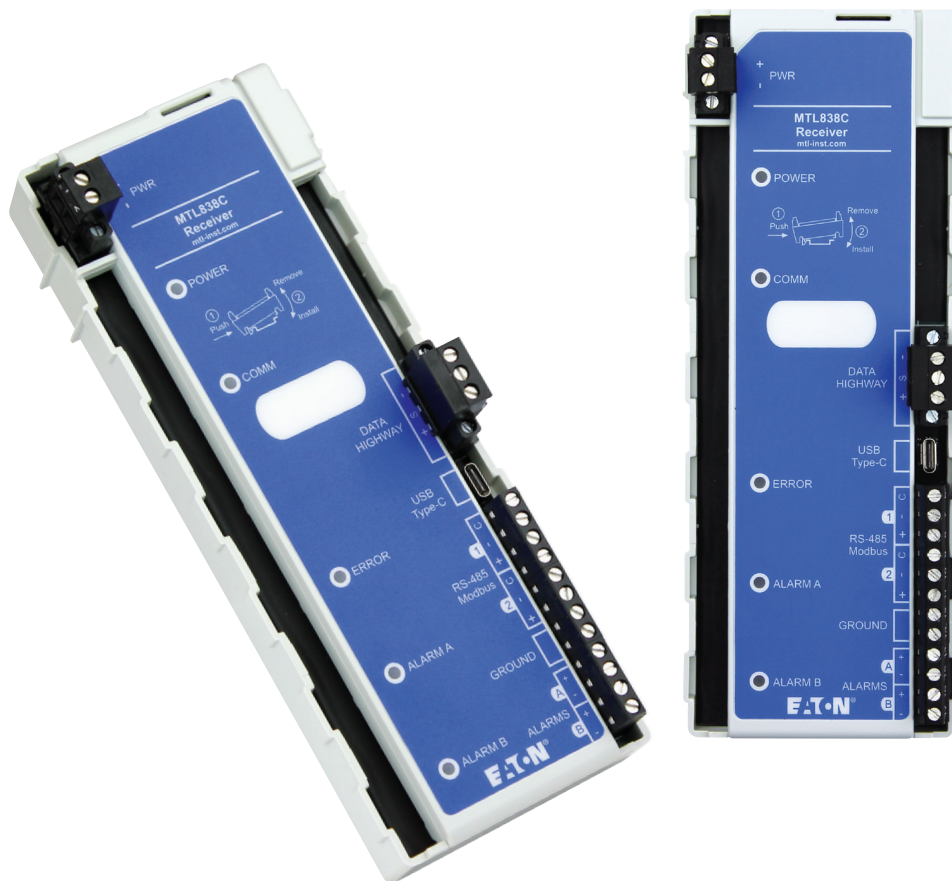## DECLARATION OF CONFORMITY

A printed version of the Declaration of Conformity has been provided separately within the original shipment of goods. However, you can find a copy of the latest version at -

http://www.mtl-inst.com/certificates

CONTENTS

GENERAL SAFETY INFORMATION

The following methods are used in this manual to alert the user to important information:-

⚠️	**WARNING !** **Warnings are provided to ensure operator safety and MUST be followed.**

CAUTION Cautions are provided to prevent damage to the instrument.

NOTE These are used to give general information to ensure correct operation.

SAFETY INSTRUCTIONS FOR INSTALLATION AND OPERATING PERSONNEL

The operating instructions provided here contain **essential safety instructions** for installation personnel and those engaged in the operation, maintenance and servicing of the equipment.

⚠️	**WARNING !** **Failure to comply with these instructions can endanger the lives or health of personnel and risk damage to the plant and the environment.**

⚠️	**WARNING !** **The responsibility for planning, installation, commissioning, operation and maintenance, particularly with respect to applications in explosion-hazard areas, lies with the plant operator.**

Before commencing installation or commissioning:

- Read and understand the contents of this manual and the product datasheet

- Ensure installation and operating personnel have received adequate training for this task

- Ensure that any operating instructions are fully understood by the personnel responsible.

- Observe national and local installation and mounting regulations (e.g. IEC 60079-14).

- **During operation:**

- Make the relevant instructions available at all times to the operating personnel.

- Observe safety instructions.

- Observe national safety and accident prevention regulations.

- Operate the equipment within its published specification.

- Servicing, maintenance work or repairs not described in this manual must not be performed without prior agreement with the manufacturer.

- Any damage to this equipment may render its explosion protection null and void.

- No changes to any of the components that might impair their explosion protection are permitted.

If any information provided here is not clear:

- Contact Eaton's MTL product line or one of its representatives.

NOTE Improper installation and operation of the enclosure can result in the invalidation of the guarantee.

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**MTL838C
Receiver**

Figure 1.1 - MTL838C Receiver

1 ABOUT THIS MANUAL

The purpose of this manual is to provide the user with information on the installation, connection, and hardware configuration of the MTL838C Receiver.

1.1 Related documents

This manual does NOT cover the connection or configuration of the MTL831C Analog Transmitter. For details of this item consult:

- **INM831C**

Additional documents for the MTL838C are:

- **Introduction to Modbus**
- **INM838C-MBF – MTL838C Modbus Implementation**
- **MTL838C PC Software Manual**
- **INM5500 for installation instruction for MTL5553 Isolator/Power Supply module.**

1.2 Product description

The MTL838C Receiver may be connected to one or two MTL831C Analog Transmitters. It holds the configuration for the transmitters and receives measurement data from up to 32 sensors (16 from each transmitter). The data is then made available via Modbus or for the LLMUX. The MTL838C must be installed in a safe area. However, by using the MTL5553 Isolator/Power Supply, the MTL831C's may be installed in Zone 0, 1, or 2.

The MTL831C can monitor up to 16 inputs from THC or millivolt sources or 2, 3 or 4-wire RTDs.

The MTL838C, MTL5553, and MTL831C are connected by a data highway consisting of a single shielded, twisted-pair cable.

The data highway carries both signal and power over distances up to 2km, depending on the application, the cable, and the (noise) environment- see Section 4.4. The data highway cables can be simple twisted-wire pairs or pairs of wire within an IS multi-core cable.

Modbus® is a registered trademark of Schneider Automation Inc.

2   GETTING STARTED

Installation of the MTL838C multiplexer transmitter is divided into three main topics.

- **Mechanical Installation -** how to mount the MTL838C and how it may be fitted into an enclosure.

- **Electrical Connections -** power, data highway, RS-485, and alarm connections. If units are installed in our enclosures, it details any special wiring arrangements.

- **Configuration -** all configuration is either over a Modbus® link or via a USB connection to software on a PC and is covered in separate documents.

NOTE
A new user might find it helpful to set up the system, or a simple version of it, in an indoor test area to gain familiarisation before undertaking installation on site.

3   MECHANICAL INSTALLATION

3.1   Location

The MTL838C must be installed in a safe area.

3.2   Mounting options

The unit can be mounted on T-section DIN-rail. Eaton has a range of enclosures - ENC8, ENC8-SS, ENC83 or ENC83-SS- to provide suitable IP67 protection if the Receiver is located in an exposed area.

3.2.1   Mounting on T-section DIN-rail

To install, tilt the MTL838C to the left and hook to the left side of the standard 35mm DIN46277 T-section rail. Push to the right and allow the unit to rotate down to sit flat on the DIN Rail. Allow it to spring back to the left and the right side will hook to the DIN Rail.

To remove, push the MTL838C to the right and tilt the right side away from the DIN Rail. While tilted, allow it to spring back to the left and remove from the DIN
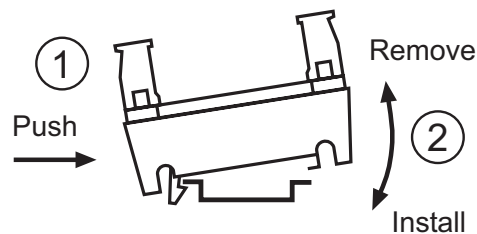
4   CONNECTIONS

The connection terminals are along the edges of the Receiver, as shown in Figure 5. The various connections are detailed in the following sub sections.

4.1   General wiring recommendations

Use of ferrules and a torque screwdriver is recommended to guarantee proper wire termination. All wire terminals should be torqued to 0.5N-m. The retaining screws on the two pluggable connectors should be tightened to 0.3N-m.

4.2   Input Power

A nominal 24VDC power supply should be wired to the 2 pin pluggable connector labeled "PWR". An SELV rated power supply is recommended. The cable from the supply to the MTL838C should be less than 30m in length. The 24VDC power supply negative lead should be grounded to a clean instrument ground.

4.3   Data Highway

The Data Highway connects the MTL838C to the MTL831C (and MTL5553 if installed). It supplies power to as well as communication with the MTL831C's. A shielded, twisted-pair cable should be used for this set of 3 terminals. Connect the two wires to the "+" and "-" terminals in a way that will ensure that polarity is maintained when connected to the MTL831C. The shield is connected to the "S" terminal which is also internally wired to the "GROUND" terminals.

The Data Highway cable is usually long and 16 gauge Foundation Fieldbus cable that has been checkmarked as meeting the FF standard for cables is recommended. This will help ensure that the maximum cable lengths can be achieved with successful communication in the presence of noise.

The maximum data highway length will depend upon two key factors: the type and quality of the cable used, and the level of electrical interference present in the environment.

Typically a user might expect: IS applications- 1km

Non-IS applications- 2km.

⚠	**WARNING !** When connecting the MTL838C directly to one or two MTL831C's (non-IS application), do not ground the shield at either MTL831C as this may cause a ground loop which can adversely affect communication.

4.4   Electrical connections

The Power and Data Highway connectors are pluggable. The Ground and Alarm terminals are fixed screw terminals. The terminals can accept the following conductor sizes:

Type	Conductor size
Pluggable screw terminals	0.2 to 2.5mm2 12-24 AWG
Fixed screw terminals	0.14 to 1.5mm2 16-26 AWG

NOTE A *torque screwdriver* set between 0.5 - 0.6Nm is recommended for tightening all terminal screws.
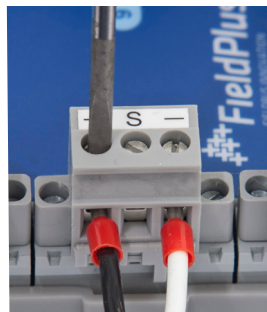
Screw Terminal

4.5   USB Type-C

This connection is used to temporarily connect the MTL838C to a PC to configure the system, verify its operation, and diagnose issues. This connection is not intended to be permanent. When the unit is connected to a PC and the MTL83x Configuration software is communicating with the MTL838C, the RS-485 ports are disabled. This is to prevent an attempt to configure the device from two sources at the same time.

4.6   RS-485 Modbus

The MTL838C has two RS-485 ports that may be configured with the Modbus Protocol – see the software manuals for more information.

NOTE

By default the MTL838C RS-485 ports are configured to communicate with the LLMUX. The PC Software MUST be used to configure it to communicate using the Modbus protocol.

Each port contains three terminals. The "+" and "-" terminals are the differential pair for bidirectional communication (transmit and receive). The "C" terminal is the common ground between the Modbus Host and the MTL838C. The "C" terminal is common on both RS-485 ports, so if both ports are connected to two different hosts, they must be at the same 'ground' potential. The RS-485 ports are isolated from the rest of the circuitry in the MTL838C to prevent ground loops.

There is no internal termination on either RS-485 port. If termination is required, it must be provided by the user.

For some applications (long cables, high ambient noise) the user may elect to use shielded cable for the RS-485 ports. We recommend grounding the shield at one end of the cable only. Also, do not connect the shield to the "C" common terminal.

4.6.1   Multi-drop RS-485 Modbus

If multiple MTL838C's are connected to the same host, the cables must be daisy chained from one MTL838C to the next. Because the two RS-485 ports on the MTL838C operate independently of one another, daisy chaining is done by putting two wires into each RS-485 terminal on the MTL838C (terminal numbers 6, 7, and 8 for Link 1 or 9, 10, and 11 for Link 2). The terminals are rated to support 2 wires from 26AWG (0.14mm2) to 18AWG (0.75mm2). If ferrules are used, the maximum wire gauge is limited to 2 wires at 20AWG (0.5mm2). The recommended ferrule crimp length is 8mm.

4.7   Ground

The two MTL838C GROUND terminals must be grounded to a clean instrument ground. This is to protect the unit from electromagnetic interference. The "S" shield terminal on the Data Highway port is internally connected to this point.

4.8   Alarms

There are two sets of dry alarm contacts (A and B) that are available on the MTL838C. These contacts can be programmed to activate on various conditions of the unit, system, or sensors. See the PC software manuals for more details.

NOTE

The "+" and "-" do not imply polarity as these are literally dry contacts.

CAUTION

Do not apply power directly across these contacts as they may become damaged. Observe the voltage and current limitations on the contacts.

4.9   IS applications

Please see INM831C for installation information for intrinsically safe applications.

5   ROUTINE MAINTENANCE

Check the general condition of the installation periodically to make sure that no deterioration has occurred. At least every two years (and more frequently for particularly harsh environments) check that:

• cable, wire connections, terminations, and screens are in good condition
• the green Power LED is lit
• Red Error LED is not lit
• no signs of damage or corrosion are present

6   CONFIGURATION

There is no hardware configuration required for the MTL838C. All configuration is done using the PC software with a USB cable (not supplied) connected to the MTL838C. Please see the PC software manuals for more information.

NOTE

The MTL838C and the MTL831C support firmware updates using the PC software. Please see the PC software manuals for more information.

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7   LED INDICATORS

There are 5 LEDs to indicate the health and status of the system. The following are their meanings:

POWER: This green LED indicates that there is adequate 24VDC power.

COMM: When lit (green), this indicates that data is being received from an MTL831C. If it blinks it means communication is intermittent.

ERROR: Red illumination means that there was a CRC error in a packet received from the MTL831C, or the MTL831C failed to respond to a request for data. This LED goes off after 1/4sec without an error.

ALARM A: When illuminated (red), alarm contact A is open indicating there is an active alarm condition.

ALARM B: When illuminated (red), alarm contact B is open indicating there is an active alarm condition.

7.1   Power up behavior

The POWER LED is on and stays on so as long as the input voltage is adequate. Immediately after power is applied, the remaining 4 LEDs should come on for about 1 second and then go off.

Shortly thereafter, the LEDs should function as indicated above.

7.2   Firmware Update

During the Firmware update which is initiated from the PC software, the COMM and ERROR LEDs alternately blink. When the firmware update is complete, the unit restarts.

8   FAULT-FINDING IN THE MTL838C

Use the following tips to resolve issues when the system does not seem to be functioning correctly. If you are still unable to solve the issue, please contact Eaton Technical Support for assistance.

The POWER light is not ON

- The unit is not receiving power. Use a Voltmeter to verify there is adequate input voltage at the PWR connection.   Make sure the polarity is correct.

The COMM light is not ON

- The unit is not receiving any response to its queries to the MTL831Cs. Make sure all wiring is correct and that the MTL831Cs are receiving power (for non-IS applications they are powered from the MTL838C). See also this same topic in the Installation manual for the MTL831C.
- Use the PC software to check the diagnostic information.
- Try power cycling the unit to see if it recovers.

The COMM light blinks

- This indicates poor communication with the MTL831Cs (not enough good packets are being received).
- Use the PC software to check the diagnostic information.
- Try power cycling the unit to see if it recovers. The issue may be with one of the MTL831Cs. Try power cycling them as well.

The ERROR light comes on periodically

- This is likely a CRC error on packet receipt (bad packet).
- An extreme noise source is affecting the data highway cable. This could include VFDs, welders, etc.
- Check all wiring terminations to see that they are tight and there are no unintended shorts.
- Verify that the data highway shield is grounded at only one location.
- Verify the integrity of the data highway cable.
- Use the PC software to check the diagnostic information.
- Try power cycling each device connected to the data highway one at a time.

The COMM and ERROR lights alternately turn on and off

- This is an indication that the unit is being updated with new firmware. However, if a firmware update fails to complete properly, the unit can get stuck in this mode. Try performing the firmware update again to correct the situation. Contact Eaton for assistance if the unit fails to properly update.

9 APPENDIX A

9.1 Maintenance

It is advisable to check the general condition of the installation from time to time to make sure no deterioration has occurred, and that no unauthorized modifications have been made. The following should be checked at intervals of not more than two years, and more frequently for systems used in particularly harsh environments.

Check that ......

a. units are of the types specified in the relevant documentation.

b. unit labelling and tagging is clearly legible, and the details given comply with the relevant documentation.

c. units and enclosures are securely mounted.

d. there are no signs of damage or corrosion affecting the installation.

e. interconnecting cables are of the specified type and ratings, correctly routed and segregated, and not frayed or otherwise damaged.

f. all connections are properly made.

g. the locations in which the units are mounted have not been degraded by the introduction of harmful materials.

h. access lids and doors to protective enclosures and cabinets are correctly secured.

9.2 Disposal

Product - End of Life

Eaton's MTL product line sells products world-wide that must meet the environmental and regulatory requirements of different countries and regions.

European directives on Waste Electronic and Electronic Equipment (WEEE) define the requirements on a producer to provide for the end-of-life recovery and recycling of electronic products when they become waste at the end of their life.

Eaton's MTL838C is marked with the 'crossed out wheelie-bin" symbol which indicates that the item is electronic or electronic equipment, and must be disposed of in the appropriate manner.

Other countries and regions may have their own environmental regulatory requirements regarding recovery and recycling of electronic products at the end of their life.

For more detailed information about take-back and equipment recycling please contact your local Eaton MTL representative.

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AUSTRALIA
Eaton Electrical (Australia) Pty Ltd,
10 Kent Road, Mascot, New South Wales, 2020, Australia

Tel: +61 1300 308 374 Fax: +61 1300 308 463
E-mail: mtlsalesanz@eaton.com

BeNeLux
MTL Instruments BV
Ambacht 6, 5301 KW Zaltbommel
The Netherlands

Tel: +31 (0) 418 570290 Fax: +31 (0) 418 541044
E-mail: mtl.benelux@eaton.com

CHINA
Cooper Electric (Shanghai) Co. Ltd
955 Shengli Road, Heqing Industrial Park
Pudong New Area, Shanghai 201201

Tel: +86 21 2899 3817 Fax: +86 21 2899 3992
E-mail: mtl-cn@eaton.com

FRANCE
MTL Instruments sarl,
7 rue des Rosiéristes, 69410 Champagne au Mont d'Or
France

Tel: +33 (0)4 37 46 16 53 Fax: +33 (0)4 37 46 17 20
E-mail: mtlfrance@eaton.com

GERMANY
MTL Instruments GmbH,
Heinrich-Hertz-Str. 12, 50170 Kerpen, Germany

Tel: +49 (0)22 73 98 12- 0 Fax: +49 (0)22 73 98 12- 2 00
E-mail: csckerpen@eaton.com

INDIA
MTL India,
No.36, Nehru Street, Off Old Mahabalipuram Road
Sholinganallur, Chennai- 600 119, India

Tel: +91 (0) 44 24501660 /24501857 Fax: +91 (0) 44 24501463
E-mail: mtlindiasales@eaton.com

ITALY
MTL Italia srl,
Via San Bovio, 3, 20090 Segrate, Milano, Italy

Tel: +39 02 959501 Fax: +39 02 95950759
E-mail: chmninfo@eaton.com

JAPAN
Cooper Industries Japan K.K.
MT Building 3F, 2-7-5 Shiba Diamon, Minato-ku
Tokyo, Japan 102-0012

Tel: +81 (0)3 6430 3128 Fax:+81 (0)3 6430 3129
E-mail: mtl-jp@eaton.com

NORWAY
Norex AS
Fekjan 7c, Postboks 147,
N-1378 Nesbru, Norway

Tel: +47 66 77 43 80 Fax: +47 66 84 55 33
E-mail: info@norex.no

RUSSIA
Cooper Industries Russia LLC
Elektrozavodskaya Str 33
Building 4
Moscow 107076, Russia

Tel: +7 (495) 981 3770 Fax: +7 (495) 981 3771
E-mail: mtlrussia@eaton.com

SINGAPORE
Eaton Electric (Singapore) Pte Ltd
100G Pasir Panjang Road
Interlocal Centre
#07-08 Singapore 118523
#02-09 to #02-12 (Warehouse and Workshop)

Tel: +65 6 645 9888 ext 9864/9865
Fax: 65 6 645 9811
E-mail: sales.mtlsing@eaton.com

SOUTH KOREA
Cooper Crouse-Hinds Korea
7F. Parkland Building 237-11 Nonhyun-dong Gangnam-gu,
Seoul 135-546, South Korea.

Tel: +82 6380 4805 Fax: +82 6380 4839
E-mail: mtl-korea@eaton.com

UNITED ARAB EMIRATES
Cooper Industries/Eaton Corporation
Office 205/206, 2nd Floor SJ Towers, off. Old Airport Road,
Abu Dhabi, United Arab Emirates

Tel: +971 2 44 66 840 Fax: +971 2 44 66 841
E-mail: mtlgulf@eaton.com

UNITED KINGDOM
Eaton Electric Limited,
Great Marlings, Butterfield, Luton
Beds LU2 8DL

Tel: +44 (0)1582 723633 Fax: +44 (0)1582 422283
E-mail: mtlenquiry@eaton.com

AMERICAS
Cooper Crouse-Hinds MTL Inc.
3413 N. Sam Houston Parkway W.
Suite 200, Houston TX 77086, USA

Tel: +1 800-835-7075 Fax: +1 866-298-2468
E-mail: mtl-us-info@eaton.com

EUROPE (EMEA):
+44 (0)1582 723633
mtlenquiry@eaton.com

THE AMERICAS:
+1 800 835 7075
mtl-us-info@eaton.com

ASIA-PACIFIC:
+65 6 645 9888
sales.mtlsing@eaton.com

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