Instruction manual
MTL fieldbus networks

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INM MTL83xC PC Modbus Rev 4

CROUSE-HINDS SERIES

MTL83xC Modbus

PC software manual

Powering Business Worldwide

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CONTENTS

1 INTRODUCTION

The MTL83xC is a temperature (and mV) measuring system. It consists of an MTL838C or MTL838C-MBT and one or two MTL831C modules. See the datasheet EPS830C and installation manuals INM838C and INM831C for these modules for further details. The main interface on the MTL838C which concentrates the data from the MTL831Cs is Modbus® RTU (RS485). The MTL838C-MBT communicates Modbus TCP over the single RJ45 Ethernet connector. A separate document covers the MTL838C Modbus® implementation (INM MTL838C-MBF).
This document covers the operation of the PC software that is used to configure and monitor the system. For the remainder of this document MTL838C will refer to both the RTU and TCP versions unless stated otherwise.

1.1 PC Requirements:

The MTL83xC PC software will run on a Windows® 7, 8, or 10 computer.
This is a small application that doesn't require a lot of space, memory, or processor speed. A USB cable is used to connect to the MTL838C (USB-C) – not part of the MTL838C – purchase separately.

2 QUICKSTART GUIDE

This quickstart guide is written for an MTL83xC system based on an MTL831C temperature input multiplexer transmitter with an MTL838C multiplexer receiver.

Before the actual installation, it is recommended that new users initially set up a simple system on the bench to become familiar with the MTL83xC system. The minimum hardware required for a test system is as follows:

MTL831C Analog transmitter

MTL838C Receiver

MTL5553 Isolator (for hazardous area installations only).

In order to run a test the following equipment will be required:

A PC loaded with MTL83xC Configuration software, Power supply 20- 35V @ 500mA, together with suitable cabling for the following requirements:

Data highway connections (see INM831C / INM838C)

Power supply connections

USB cable

The user will also need the following documentation for wiring information:

INM831C - MTL831C Installation Manual

INM838C - MTL838C Installation Manual

INM838C-MBT - MTL838C-MBT Installation Manual

Connect at least one sensor to an MTL831C.

Refer to chapter 5 to configure and test the system.

3 BACKGROUND TO THE MTL838C

3.1 The analog-input multiplexer system

The MTL838C is an analog multiplexer receiver that is used with the MTL831C hazardous area millivolt input multiplexer transmitter. The status of up to 32 analog inputs may be communicated from the hazardous area to the safe area via a data highway, comprised of a simple twisted pair- over distances up to 2000m.

Each data highway must be protected by an MTL5553 digital isolator when the inputs are located in a Zone 0,1 hazardous area. The MTL831C is typically used with thermocouple and RTD inputs and is intrinsically safe. It can be mounted in a Zone 0,1 hazardous area and will accept 16 inputs. For systems that do not require Zone 0 or Zone 1 installation, the MTL5553 can be eliminated.

Up to two MTL831C transmitters can be combined on a single MTL838C receiver input- up to a total of 32 analog inputs- as shown in Figure 1.

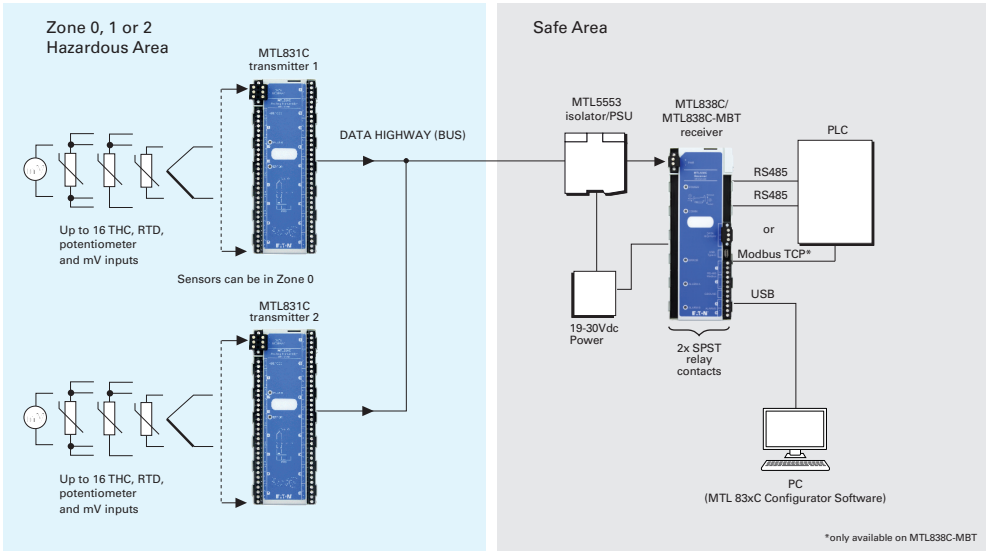


Figure 1- MTL838C/MTL831C System Diagram

The MTL838C acts as a Modbus slave. It may be connected into any standard Modbus network, with up to 31 MTL838C slaves on each network. If each unit has its full complement of 32 analog inputs, the status of a total of 992 analog inputs may be passed to a Modbus master using a single RS485 network. For the MTL838C-MBT the single Ethernet connection allows for up to 32 analog inputs.

3.2 Configuring the MTL838C

The MTL838C must first be configured using software on a PC and the USB connection. This configures things such as the slave address and communication parameters. After the initial configuration, the MTL838C is ready to communicate with the Modbus host. At this point, the remaining configuration may be done in one of two ways:

- on-line via the Modbus link, direct from the host
- off-line using the PC software and USB connection

Using the PC software is required for initial configuration and recommended for first time configuration of the measuring channels.

3.3 On-line Configuration

Configuring the unit via the Modbus master and the network might seem to be the simplest method at first sight, but there are a number of practical difficulties with this configuration technique. This approach means that the user must deal with a number of complex aspects which require a significant investment of the configurer's time before they are understood fully. A further difficulty may be a lack of the necessary memory space within the Modbus master. If the configuration is likely to be changed frequently it could even be necessary for the system designer to design specific 'user interface' screens, such as those used by the PC software, to allow changes to be made by operators. This would be a time consuming and costly task.

For most users, the attraction of being able to use the Modbus master to configure the unit is that the configuration can be re-sent if the slave's memory becomes corrupted. Whilst this is true, it is not possible to avoid the difficulties (and costs) outlined earlier and the decision to adopt a strategy of configuring via the Modbus master should be arrived at only after due consideration.

A cost effective compromise would be to perform the initial configuration via the PC software, and then read the configuration parameters stored in the MTL838C via the host. The stored parameters could then be re-written to the MTL838C should the configuration database ever become corrupt.

If a user intends to adopt the on-line configuration method, the calculation of configuration parameters for storage in the master can be simplified, and the possibility of 'human error' reduced, by using the PC software to input the required data and data format, and then reading the stored values (encoded correctly in the required data format) back from the MTL838C via Modbus. The user should still realize that any subsequent alterations of the parameters will require further use of the PC software.

3.4 Off-line Configuration

Off-line configuration requires the use of the PC software briefly described below. Once configured, the configuration parameters are stored in non-volatile memory within the unit.

3.5 The PC software

By far the simplest method of configuring the MTL838C is using the PC software. This software has been specifically designed to perform all of the complex calculations that must be carried out, in order to configure the unit. These calculations are transparent to the user, and this method provides a convenient and time efficient method.

Alternatively, as explained before, the master could read the configured parameters after initial off-line configuration and these may then be stored within the host for use in the event of a database failure.

3.6 Interconnection of the MTL838C

The MTL838C may be connected to a Modbus host in a number of ways.

Two RS485 outputs, Link 1 and Link 2, are provided on the MTL838C. As there are two outputs the unit can either be connected to a single Modbus master, with dual redundancy, or connected to two separate Modbus hosts.

The MTL838C will respond on whichever RS485 connection the query is received, and there is no restriction placed on the simultaneous use of both interfaces. The Modbus addresses for each Link may only be set by using the PC software.

For the MTL838C-MBT there is only one Ethernet connection over which all Modbus TCP traffic flows to/from the MTL838C-MBT at it's given IP address. Connect the Ethernet port to your Modbus TCP network using a standard Ethernet cable (RJ45 connections). Section 7 will cover the configuration of the Ethernet module.

3.7 Initialization mode

The MTL838C has two distinct modes of operation - normal and initialization.

It will always enter initialization mode during power-up. It can also be triggered by the detection of internal hardware or software faults, or after receiving an instruction from the host to reset some or all of the configuration registers.

During initialization, the unit will ignore all commands from the master.

The initialization period will take several seconds to complete all the necessary operations and calculations. Following successful initialization, the unit will automatically enter, or return to, normal operation mode.

If a corrupted configuration database is detected during initialization the unit will revert to a set of default values, and on entering normal operation mode, will issue exception responses when requested by the host to read input values. Exception responses will continue to be issued until the unit is re-configured. The need to re-configure the unit will remain even if the MTL838C is powered down and back up.

If a corrupted configuration is detected, the slave address may be reset. If this occurs, the user must use the PC software to set the slave address.

Also, when the PC software is communicating with the MTL838C, Modbus communications are disabled. This is to prevent the possibility of writing to the configuration database simultaneously from two sources.

3.8 Slave, Transmitter and Input addressing

The following discusses the allocation of addresses to the slaves on the Modbus network- including the MTL838C - and the allocation of addresses for the transmitters and inputs connected to each MTL838C.

3.8.1 Addressing MTL838C slaves

Modbus allows slave addresses in the range 1 to 247. JBUS allows slave addresses in the range 1 to 255. This is the only difference between the two protocols. The MTL838C will accept addresses in the range 1 to 255 for each Link. Care should be taken when setting the addresses for each Link using the PC software. For example, if both Links are connected to the same Host, the addresses should probably be different.

The Modbus address for each MTL838C slave is set via the PC software. For reasons of security, it is not possible to set the address of the slave via the Modbus host.

Modbus TCP (Ethernet) does not allow multiple slaves on the same IP address. For this reason the address becomes somewhat unimportant except that it is still used. The address on the MTL838C-MBT which is set using the PC software must match what the Master is using.

3.8.2 Addressing the transmitters of each MTL838C

Each MTL831C transmitter accepts up to 16 sensor inputs and there can be one or two MTL831C transmitters connected to a single MTL838C. The address of the MTL831C as seen by the MTL838C is determined by whether a jumper wire is installed on the MTL831C. A jumper wire not installed gives the MTL831C an address of '1' and a jumper installed gives it an address of '2'. The following shows the sensor numbers used by the MTL838C for a given MTL831C address.

MTL831C Address	Sensor Numbers
1	0 - 15
1	32 CJC
2	16- 31
2	33 CJC

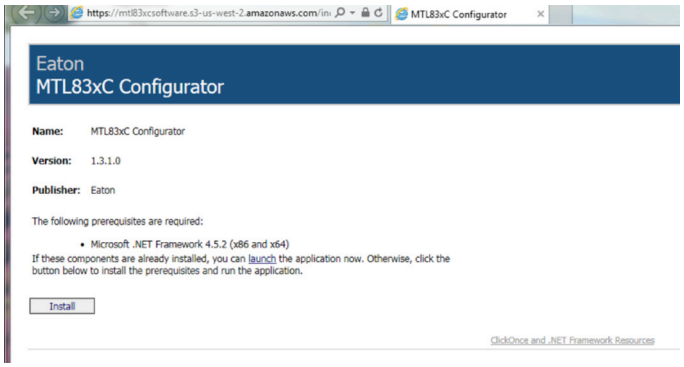
Addressing of the MTL831C transmitters affects which sensor is given which address in the MTL838C. For example, if only one MTL831C is connected to the MTL838C but its address jumper is installed, it will be at transmitter address '2' and the sensor range will be 16 – 3, 1, 33.

It is also important that with two MTL831Cs connected to a single MTL838C, that one and only one of them has the jumper installed. Otherwise they will both be at the same address and communication between the MTL831s and the MTL838C will fail. Likewise, there can be no more than two MTL831Cs connected to a single MTL838C.

CJC stands for Cold Junction Compensation and reports the average temperature of the MTL831C circuit board. This is an average of two temperature sensors and should not be used by the Modbus Host to cold junction compensate thermocouples. Instead the thermocouple channels should be compensated by the MTL831C by selecting the correct Input Type.

4 PC SOFTWARE INSTALLATION

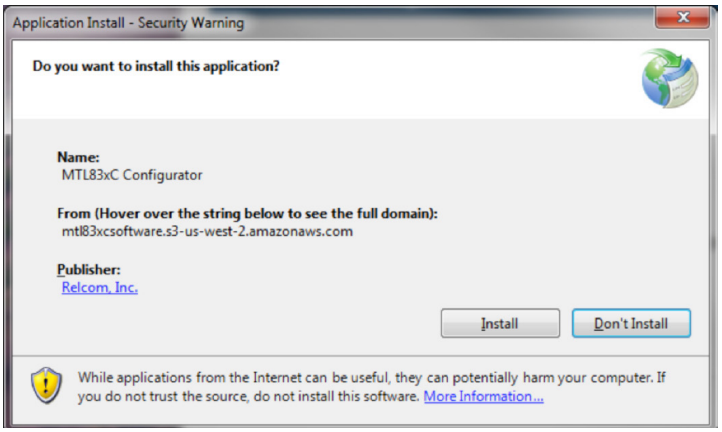
The MTL83xC Configuration Software is only available from the Eaton (MTL) website. Direct your browser to www.mtl-inst.com and then locate the MTL83xC product page. There will be a link on that page to download and install the software. The following window should then pop up:



When you click on the link, your computer will likely warn about the file (setup.exe) as it is an executable. Allow it to Run the file.

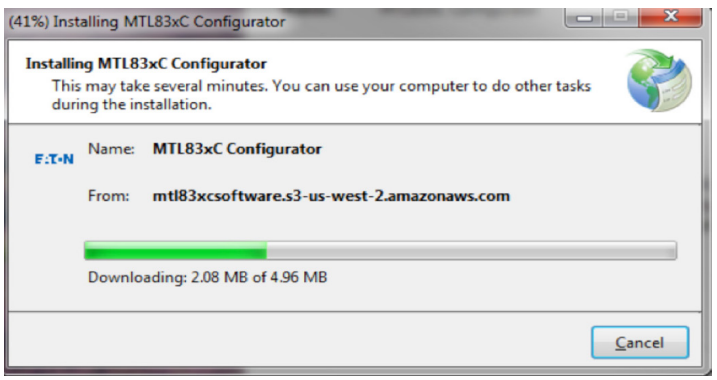
Anti-virus software on your computer may also complain about not knowing whether the file is safe or not. Tell it to Allow the execution of the file.

Finally, Windows will want confirmation that you want to install the application. The following is a sample screen shot of the warning. Notice that Relcom, Inc. is the publisher of the software as they wrote it for Eaton (MTL).



Allow the installation to proceed.

The application will be downloaded, installed, and will start running.



5 SOFTWARE OPERATION

This section covers the operation of the MTL83xC Configurator software. For detailed operation of the hardware, please see the relevant installation manuals.

The following is the screen that appears when the software opens:

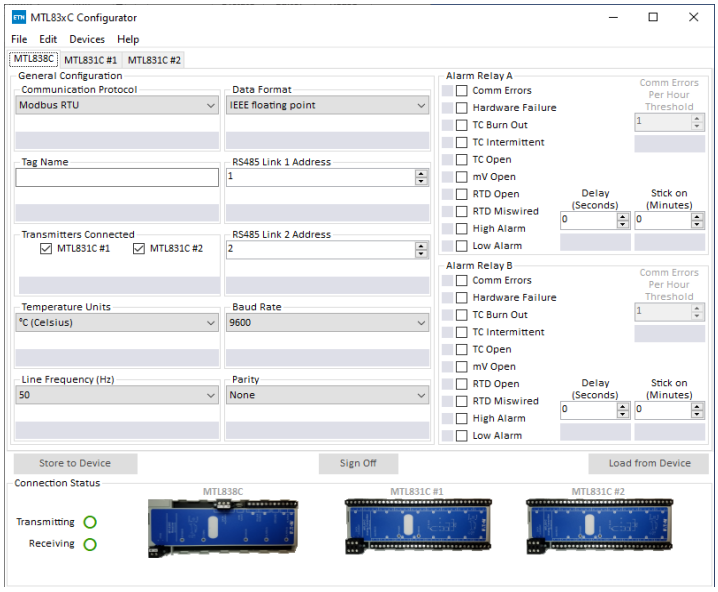


Figure 2 - The MTL838C Tab

This is a standard Windows application that incorporates a typical Menu system and Tabs to organize the information. The three Tabs cover the three possible pieces of hardware in an installation (seen in the images at the bottom of the screen). Data relevant to the associated piece of hardware is on that Tab. For example, information specific to the MTL838C is on the MTL838C Tab.
It should be noted, however, that the configuration data for the entire system is actually stored on the MTL838C. This allows an MTL831C to be replaced without requiring re-configuration. When an MTL831C powers up, the MTL838C recognizes it and sends it the correct configuration.

The Connection Status section at the bottom is below the tabs and provides visual information on the status of the components. In the image above, the PC software is not communicating with the MTL838C. This is indicated by the Transmitting and Receiving LEDs being OFF and the MTL838C word being grayed out.

After connecting a USB cable to the MTL838C and providing it power, the Connection Status changes to:

Figure 3 - Connection status

This Connection Status indicates that the PC software is communicating over the USB cable with the MTL838C – both LEDs are ON and the MTL838C word is green. The MTL838C is not communicating with the MTL831Cs in the above image.

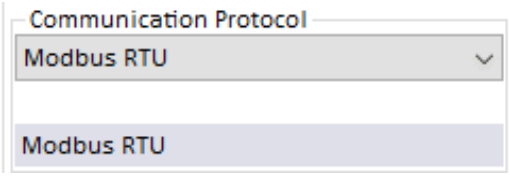
Once MTL831Cs are connected to the MTL838C, then their titles will turn green as well.

As explained in the Background section for the MTL831C, #1 means Address 1 (no address jumper on terminals 7 & 8) and #2 is Address 2 (a wire jumper between terminals 7 & 8). There can be one or two MTL831Cs connected to a single MTL838C and if there are two, they MUST have different address settings. The address determines which MTL831C belongs to which Tab in the software. Mixing them up or changing the jumpers may result in an unexpected configuration.

5.1 Configuration Overview

It's worth taking a minute to understand to overall philosophy of the MTL83xC Configurator software.

To allow offline configuration (not being connected to the MTL838C while entering the configuration data), we created two fields on the screen for every configuration point. One of the fields is editable and the other is the displayed value from the unit the PC software is communicating with. If it is not communicating with a unit, then that field is blank. An example field is shown below. The dropdown is the PC software setting and the gray box below it is the value read back from the connected MTL838C. Not all tabs use the same color scheme but the principle is the same.



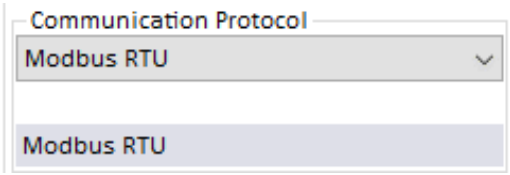
There is a way to load and store configuration settings to your computer (see the Menu Command section). With this capability, configurations can be carried out ahead of time and stored until the units are installed and ready to program. The configuration is then loaded from your computer and downloaded to the unit.

When a small change needs to be made to an already configured unit, you can first connect to the unit and Upload its configuration, make the necessary modifications, and then Download the updated configuration to the unit.

5.2 The MTL838C Tab

The items on this tab allow you to configure the MTL838C. Some of these parameters affect the entire system – others only specific aspects of the MTL838C. We will cover them in detail below:

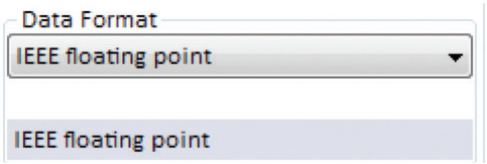
5.2.1 Communication Protocol



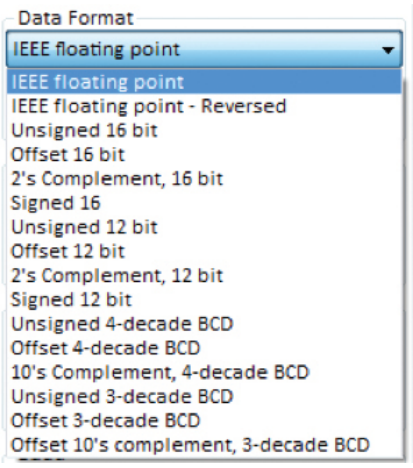
Two communication protocols for the RS485 Links are supported by the MTL838C (Modbus RTU and LLMUX). This manual does not cover the LLMUX protocol which is Honeywell specific. Please see the INM MTL83xC LLMUX manual for that protocol. The other Modbus protocol (Modbus TCP) is only supported on the MTL838C-MBT and is covered in this manual. Note that attempting to download to the MTL838C when an incorrect protocol is selected will result in an error since the protocols are hardware dependent.

The protocol is selected by using the dropdown. Make sure the Modbus RTU or Modbus TCP protocol (whichever is appropriate for your hardware) is selected and programmed into the unit. Modbus RTU is the default value for this field.

5.2.2 Data Format



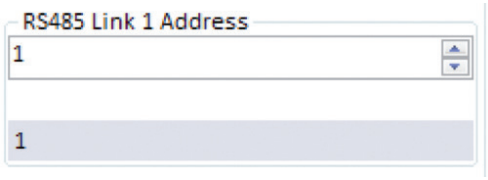
Several different formats for the data in the Modbus Registers are supported by the MTL838C. The list is indicated below. Select the format desired with the dropdown. Note that changing the Data Format results in several parameters being reset to their defaults on the MTL831 tabs. Further details on the Modbus implementation may be found in the document INM838C-MBF. The default Data Format is IEEE floating point.



5.2.3 Tag Name

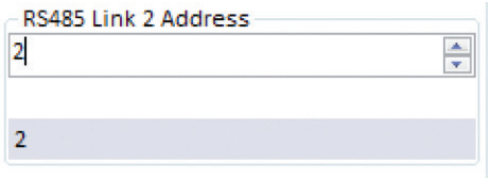
This field is user defined. When properly filled in it may be used to identify this particular MTL838C in the plant. It is available via the Modbus interface as well. Up to 24 alphanumeric characters may be entered in this field. The field is blank by default.

5.2.4 RS485 Link 1 Address



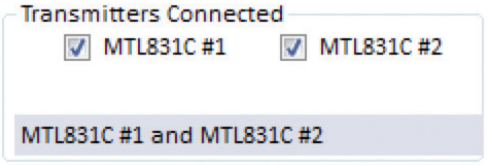
The Modbus address for Link 1 is selected or entered in this field. Use the up or down arrows to increment or decrement the number, or type in the desired number. Valid entries are in the range 1 through 255 and the default value is 1.

5.2.5 RS485 Link 2 Address (Modbus RTU only)



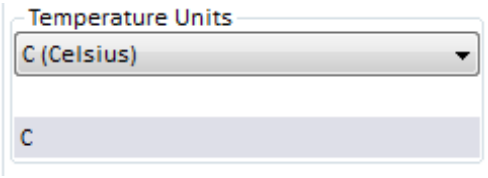
The Modbus address for Link 2 is selected or entered in this field. Use the up or down arrows to increment or decrement the number, or type in the desired number. Valid entries are in the range 1 through 255 and the default value is 2.

5.2.6 Transmitters Connected



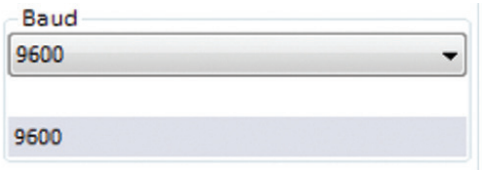
This pair of checkboxes tell the MTL838C what is supposed to be connected to it. There are three possibilies. #1, #2, or both #1 and #2. You cannot unselect both checkboxes as it makes no sense to have a system with no MTL831C in it. This information is used to report an error condition to the Modbus Host if an MTL831C is not connected but is supposed to be. The default condition is that two MTL831Cs are connected to the MTL838C.

5.2.7 Temperature Units



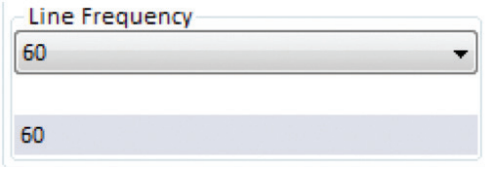
Select the Units that should be used to report temperature. The dropdown allows for Celsius (the default), Fahrenheit, or Kelvin.

5.2.8 Baud Rate (Modbus RTU only)



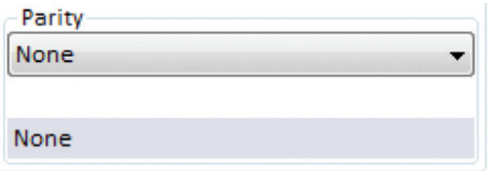
Select the Baud rate for the two RS485 Links. 9600 is the default.

5.2.9 Line Frequency



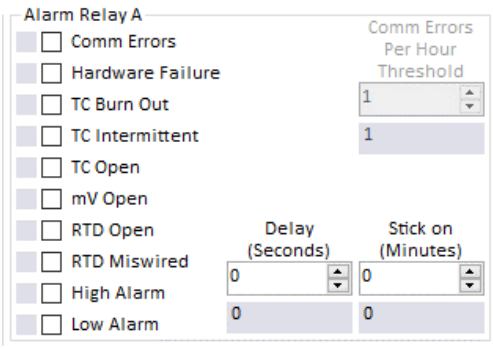
The line frequency where the MTL83xC system is installed should be correctly selected from this dropdown box. It may be either 50 or 60 Hertz. The default is 50 Hertz. This is to allow the system to improve the rejection of line frequency noise.

5.2.10 Parity (Modbus RTU only)



The Parity for the two RS485 Links is selected with this dropdown. The choices are None, Odd, and Even with the default being None. The MTL838C always uses 1 Stop bit.

5.2.11 Alarm Relay A



There are 10 alarm conditions that can be used to trigger the alarm relay. If multiple conditions are selected, then they are logically OR'd together. Check the checkbox of the condition(s) that you want to trigger the alarm. The gray box to the left of the checkbox indicates the way the currently connected MTL838C is configured.

If the "Comm Errors" condition is selected, the "Comm Errors Per Hour Threshold" is enabled. Once programmed, the MTL838C will turn the relay ON when the selected number of Comm Errors Per Hour is exceeded.

Use the "Delay" field to require that the alarm condition must exist for this number of seconds BEFORE the alarm will be triggered. If "Comm Errors" or "Hardware Failure" is checked and one of these occurs in the unit, the alarm will trip immediately (the Delay is ignored for these error conditions).

The "Stick on" parameter forces the relay to stay ON this number of minutes AFTER the alarm condition has cleared.

The following table describes the different alarm conditions:

Comm Errors	Comm Errors are caused by the MTL838C getting CRC errors in transmissions from the MTL831C(s) or the MTL831C(s) miss responding to a command 3 times in a row (this triggers a Comm re-initialization with that MTL831C).
Hardware Failure	Two possible conditions will cause this condition. First, every minute the 838C verifies that the CRC of the configuration data is good. A difference causes the error to be set – it is never reset. Secondly, there are two board temperature sensors that are used for cold junction compensation (CJC) for thermocouples. If they are different by more than 5°C, the error is set – otherwise it is reset.
TC Burn Out	If a thermocouple (TC) has increased in resistance by 50 ohms, it is considered close to burning out and this error is set. See the diagnostic tab to see what the TC resistances are.
TC Intermittent	A thermocouple is intermittently opening (could be a bad connection or it is broken).
TC Open	A channel configured as thermocouple is open.
mV Open	A channel configured as mV is open.
RTD Open	A channel configured as RTD (2 wire, 3 wire, or 4 wire) is open.
RTD Miswired	A 3 wire or 4 wire RTD is not wired correctly. Note that some ways of miswiring 3 and 4 wire RTDs cannot be detected (typically read near zero ohms in this case).
High Alarm	A channel reading exceeds the High Alarm threshold (see MTL831C #1 or #2 tabs).
Low Alarm	A channel reading is below the Low Alarm threshold (see MTL831C #1 or #2 tabs).

5.2.12 Alarm Relay B

See the explanation for Alarm Relay B. The possible settings for both alarm relays are the same. However, you can set each relay differently to get different errors to trip the two relays.

5.2.13 Action Buttons

At the bottom of the channel area, there are three (3) buttons.

When there is a connected MTL838C the Store to Device and Load from Device buttons are active (blue). Pressing the Store to Device button would send the configuration on the screen to the MTL838C and pressing the Load from Device button would bring the configuration in the MTL838C into the PC software.

The Sign Off button is not active. This means that the configuration is considered valid. A configuration becomes invalid when the Data Format on this tab is changed and downloaded to the unit. The sign-off must then be initiated by this button in the PC software or by the Modbus Host via a Coil Write. See the COIL STATUS FLAGS section of the INM838C-MBF document for more information.

5.3 The MTL831C #1 Tab

This tab contains the configuration for the MTL831C at address #1 (the unit without the address jumper). Below is what the tab looks like when not connected to the PC.

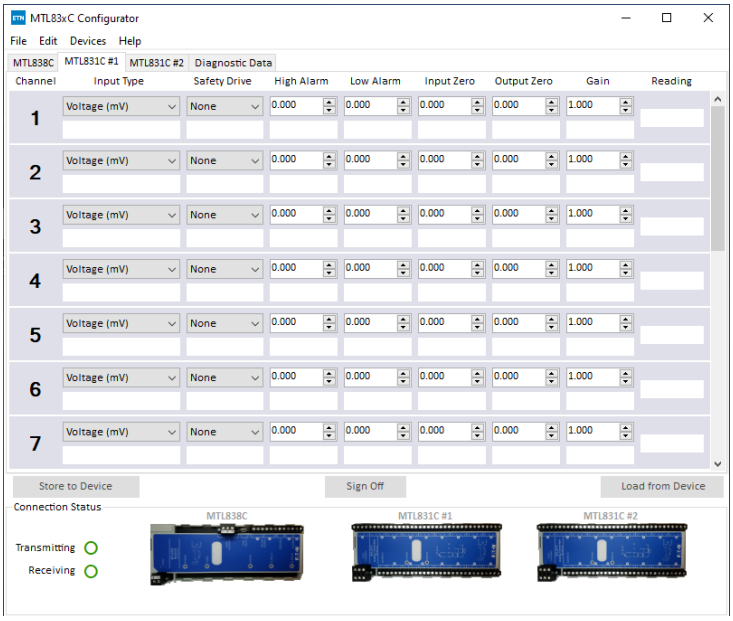


Figure 3 - Configuration for 831C at Address #1 screen

This tab is arranged in rows and columns. Each row is a different channel – ranging from 1 through 16 plus a 17th row labeled BT (average Board Temperature). Each numbered row corresponds to that numbered channel on the MTL831C unit. The following explains the column items for channels. In each row, the white rectangular boxes would contain the current setting in the unit that is being communicated with. They are blank because no unit is currently connected.

5.3.1 Input Type

This dropdown is used to select the type of sensor that is connected to the channel. The following are the different options available.

mV		
2W Ω	3W Ω	4W Ω
2W RTD Cu50	3W RTD Cu50	4W RTD Cu50
2W RTD Cu53	3W RTD Cu53	4W RTD Cu53
2W RTD Ni100	3W RTD Ni100	4W RTD Ni100
2W RTD PT100	3W RTD PT100	4W RTD PT100

TC, B, Temp, CJC	TC, E, Temp, CJC	TC, K, Temp, CJC	TC, R, Temp, CJC	TC, T, Temp, CJC
TC, B, Temp, no CJC	TC, E, Temp, no CJC	TC, K, Temp, no CJC	TC, R, Temp, no CJC	TC, T, Temp, no CJC
TC, B, mV, CJC	TC, E, mV, CJC	TC, K, mV, CJC	TC, R, mV, CJC	TC, T, mV, CJC
TC, C, Temp, CJC	TC, J, Temp, CJC	TC, N, Temp, CJC	TC, S, Temp, CJC	TC, XK, Temp, CJC
TC, C, Temp, no CJC	TC, J, Temp, no CJC	TC, N, Temp, no CJC	TC, S, Temp, no CJC	TC, XK, Temp, no CJC
TC, C, mV, CJC	TC, J, mV, CJC	TC, N, mV, CJC	TC, S, mV, CJC	TC, XK, mV, CJC

Definitions:

2W – 2 wire (RTD)
3W – 3 wire (RTD)
4W – 4 wire (RTD)
TC – Thermocouple.
CJC – Cold Junction Compensated

5.3.2 Safety Drive

Safety Drive specifies what value should be returned (to the Modbus Host) if the sensor reading is out of range. The options are None, Upscale, and Downscale. See the chapter on HOLDING REGISTERS in the INM838C-MBF manual for more information.

5.3.3 High Alarm

The number in this field will determine when a High Alarm is triggered (current reading is above the High Alarm setting). This can be used for the MTL838C alarm relays and is available to the Modbus Host.

5.3.4 Low Alarm

A current reading below the value in this box triggers a Low Alarm. Like the High Alarm, this data is available for the MTL838C alarm relays and the Modbus Host.

5.3.5 Input Zero, Output Zero, Gain

These three fields are used to scale the reading that is made available via Modbus. These fields are normally used with non-IEEE data formats. See the chapter on SCALING in the INM838C-MBF manual for more information.

Numbers may be directly entered in these fields or you may use the Input Calculator to do some calculations for you and transfer the results to these fields for the selected channel. The Input Calculator will be covered in a later section.

5.3.6 Reading

This field shows the current reading from a unit if one is connected and properly communicating. The reading status will be shown below the box (OK, Open, Miswired, etc.).
If the Input Zero, Output Zero, and Gain (Scaling Factors) are changed from the default (0, 0, 1 respectively) the Reading will be affected by those Scaling Factors. The units (mV, °C, etc.) shown after the reading are before any Scaling Factors are applied.
For non-IEEE Data Formats, the Reading will be shown as an integer and limited to the range of the Data Format. Readings that are out of range will be shown in red text. The intent is that the Reading should match the value available via Modbus.

5.3.7 The BT Channel

The BT row displays the average temperature of the MTL831C board (there are 2 temperature sensors on the board).

5.3.8 Moving around the Channel List:

A scroll bar is provided on the right side which allows you to scroll through all 16 channels plus the "BT" row. You can also use the mouse wheel to scroll the list of channels.

Channels may be "selected" by clicking anywhere within the rectangular area that defines the row. A selected row is highlighted blue. Several standard Windows features are implemented to facilitate working with the channels. These things are:

Copy	-	Ctrl C
Paste	-	Ctrl V
Select All	-	Ctrl A
Toggle Row selection	-	Ctrl Click
Update Row Range selection	-	Shift Click

In addition, right clicking on a row will pop up a menu that allows you to select Copy, Paste, or launch the Input Calculator. The Edit Menu may also be used to select some of these features.

5.4 Action Buttons

At the bottom of the channel area, there are three (3) buttons.

The following figure (4) shows what the tab would look like when communicating with an MTL838C that has one MTL831C connected to it that has been configured with all channels as "TC, K, Temp, CJC". Notice that no channels are connected (the Open status and high invalid reading). The Calibration status of the MTL831C is shown below it and should always be "Good" as they are factory calibrated. Channel 1 is the only selected channel as it is highlighted (blue).

Now that there is a connected system the Store to Device and Load to Device buttons are active (blue). Pressing the Store to Device button would configure all of the channels on the MTL831C as mV – and pressing the Load from Device button would bring the configuration in the MTL838C (for the MTL831C #1) into the PC software. See the results of pressing these buttons in figures 5 and 6 respectively.

The Sign Off button is not active. This means that the configuration is considered valid. A configuration becomes invalid when the Data Format on the MTL838C tab is changed and stored to the unit. The sign-off must then be initiated by this button in the PC software or by the Modbus Host via a Coil Write. See the COIL STATUS FLAGS section of the INM838C-MBF document for more information.

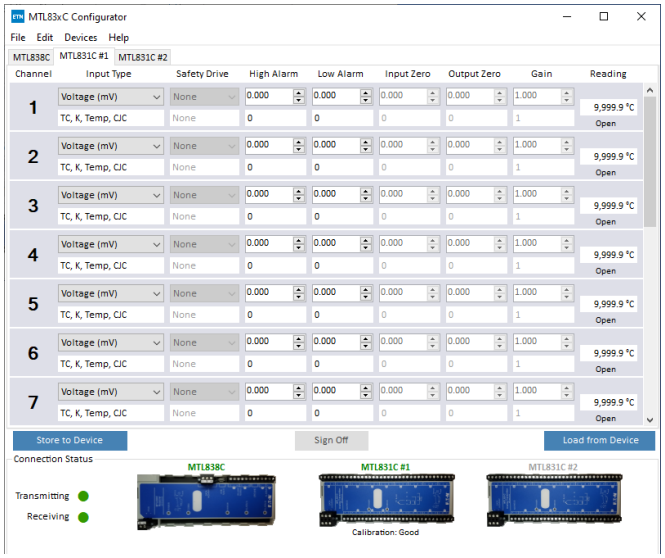


Figure 4 - MTL838C with one MTL831C connected configured TC, K, Temp, CJC

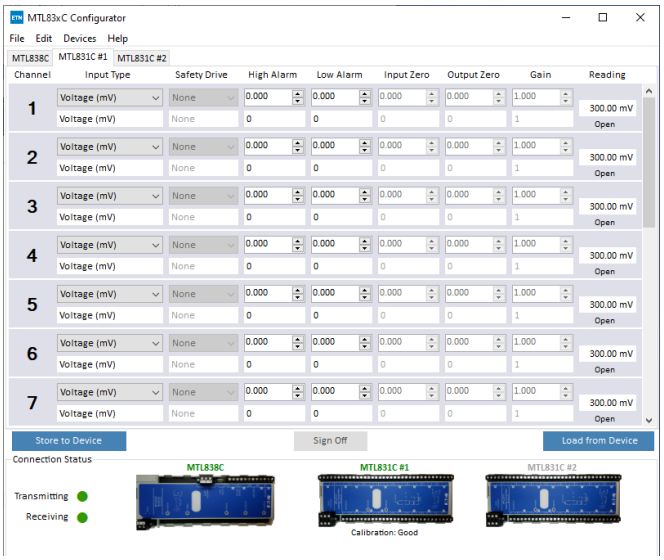


Figure 5

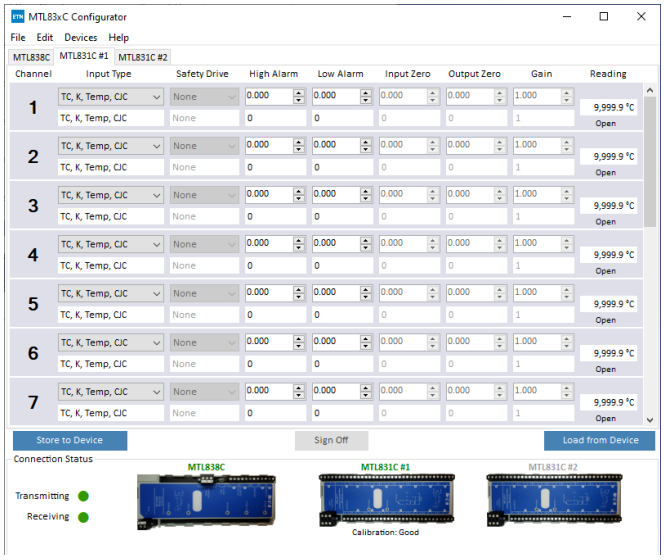
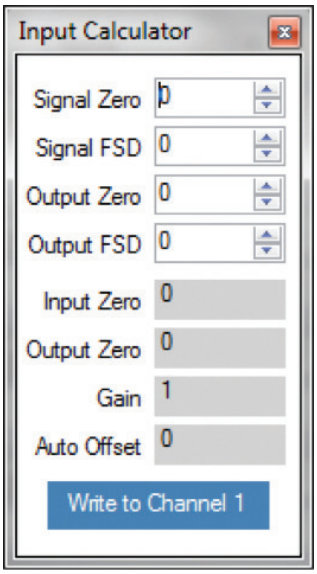


Figure 6

5.5 Input Calculator

The Input Calculator is used to assist in calculating the Input Zero, Output Zero, and Gain values. The calculator is shown below:



Enter the appropriate data in the top 4 fields. As you do this and tab or move from one field to the other, the values in the gray boxes are updated. When finished, click the blue button to write to the indicated channel. Note that if multiple channels are selected when you bring up the Input Calculator, only one of them will actually be written to. If you have multiple channels that have similar configuration, it is best to configure one channel then copy the entire channel to the other similar channels.

NOTE

Changing the Data Format on the MTL838C tab will reset the Input Zero, Output Zero, and Gain back to defaults.

See the chapter on SCALING in the INM838C-MBF manual for more information.

5.6 The MTL831C #2 Tab

This tab functions exactly the same as the MTL831C #1 tab. The only difference is that it contains the configuration data for the #2 MTL831C. The channel numbers are different so the Modbus system can distinguish the two units. MTL831 #1 shows up as channels 1-16 and MTL831 #2 shows up as channels 17-32. So the channel numbers in the tabs are identified by their Modbus channel number. To make it easier to identify the channel on the physical unit, we have put a number in parenthesis under the channel number which corresponds to the physical channel on the MTL831C #2(1-16).

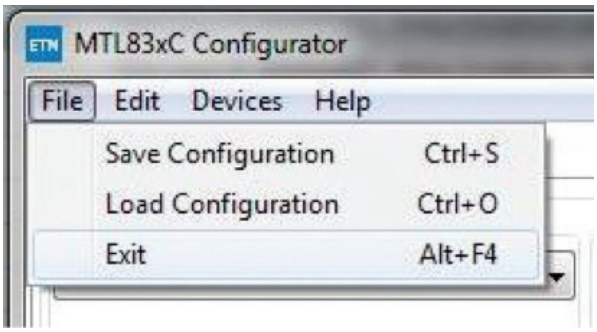
The figure below shows what the MTL831C #2 tab looks like when connected to an MTL838C and MTL831C #1. Notice that there is no Reading because there is no MTL831C #2 connected. However, the live configuration data is populated in the white rectangles because it is stored in the MTL838C and downloaded to the MTL831C when the MTL838C detects it.

Figure 7 - MTL831C#2 tab connected to an MTL838C and MTL831C #1

6 THE MENU

At the top of the MTL83xC Configurator window is a menu that contains the following items: File, Edit, Devices, and Help. Click on the menu name to drop its menu down and then click on the menu item to execute that function. The Menu items are explained below. Notice that the menu also shows the shortcut keys to access the function without using the menu.

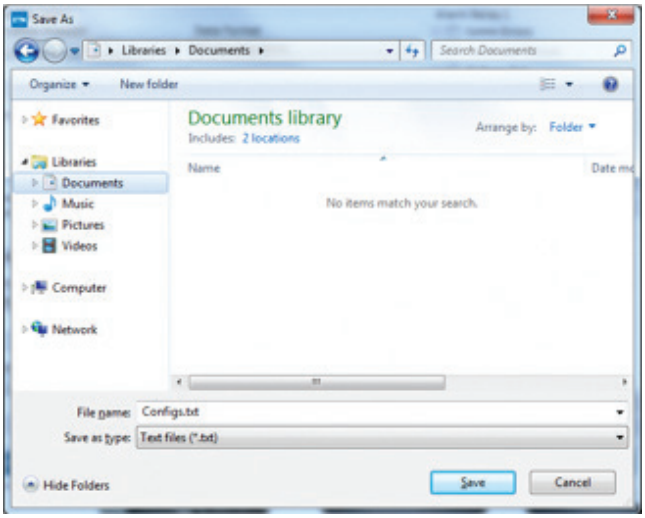
6.1 File



The File menu allows you to Save and Load the current configuration as well as Exit the program.

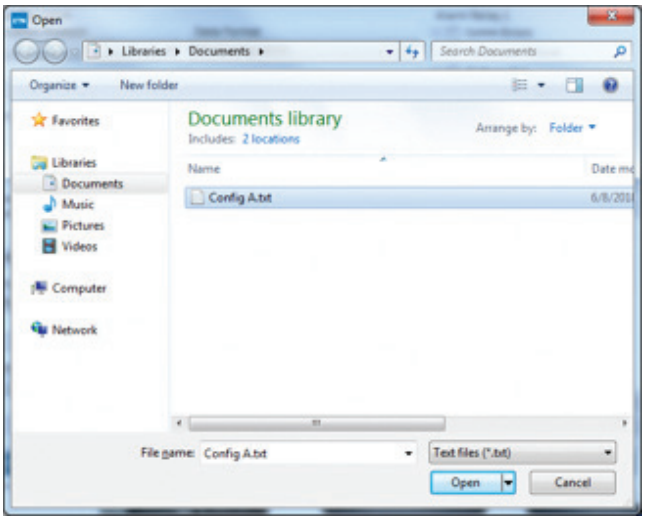
Saving and loading the MTL83xC configuration is very useful. It allows you to pre-configure systems and save that configuration to your computer. When the systems are then installed the configuration can be loaded from the computer disk and downloaded to the units. This also allows you to keep a backup of the configuration of a system in case an MTL838C needs to be replaced or for some reason gets inadvertently altered. Note that all configuration data is stored in the MTL838C, so replacing MTL831Cs does not require downloading of the configuration. It is a good idea to consider where the configurations will be stored on the computer and how they will be named so they may easily be identified with a particular system.

The following window appears when you select "Save Configuration"



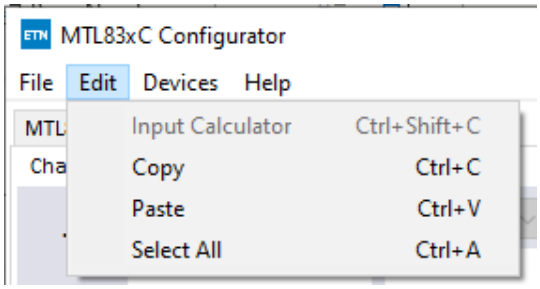
The default file name is "Configs.txt". Change its name to something more meaningful and press the Save button. We recommend keeping the ".txt" file type so the program can easily access the files. Also, although these are text files which are easily viewed and manipulated by standard Windows software, we do not recommend altering them in this manner. It is likely that text files may already exist on your computer. For this reason it is recommended that a new folder be created to save MTL83xC configurations in.

When you select "Load Configuration", the following window appears.



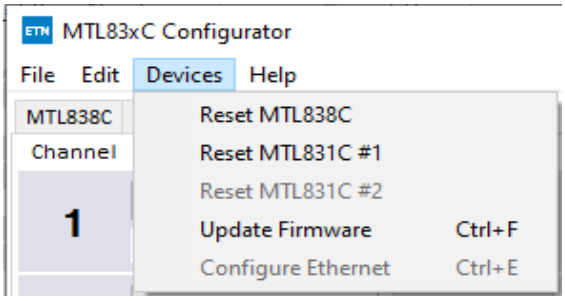
Using the window features, browse to the location of the configuration data you are looking for and select the appropriate file. Press the Open button to load the configuration. This populates the configuration data on all 3 tabs. It may then be downloaded to the MTL838C.

6.2 Edit



The Edit menu is shown above. The functions of all of the items listed have been covered in the MTL831C #1 Tab section.

6.3 Devices



The Devices menu contains functions specific to the MTL83xC devices. The first three are commands to reset the respective pieces of hardware and the fourth item launches the window allowing firmware updates of the connected devices.

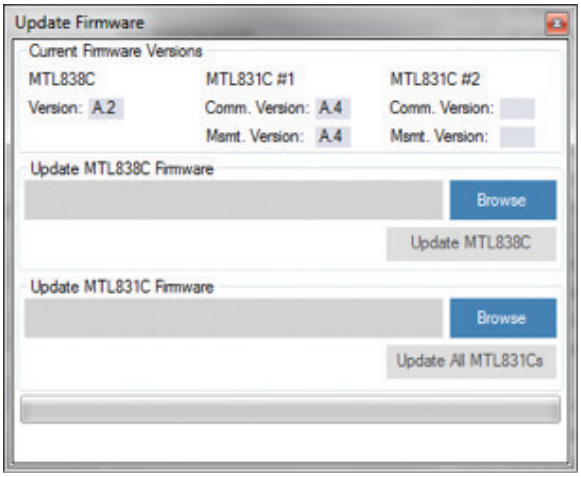
All three Reset functions send a command to the selected device that tells it to reset itself (firmware reset). This will only work if the devices are functioning well enough to receive and execute the command.

A Reset MTL838C command not only causes the MTL838C to reset (assuming it is successful), **but it also may reset the connected MTL831Cs.** If the MTL831Cs are powered by the MTL838C (non-hazardous installation), then reseting the MTL838C will also reset the connected MTL831Cs. However, if the MTL831Cs are powered by an isolator such as the MTL5553, then a reset to the MTL838C will not reset the MTL831Cs.

The other two reset commands are for the MTL831C #1 and MTL831C #2 respectively. Again, assuming the MTL838C is functioning properly the command will be routed to the appropriate MTL831C. Then if that MTL831C is also functioning well enough, it will reset itself.

The reset commands may be used if you feel that a unit is not functioning correctly and it may save a trip into the field.

Selecting the Update Firmware option brings up the following window:



CAUTION

Updating firmware will cause the units to reboot which disrupts data transmission from the units.

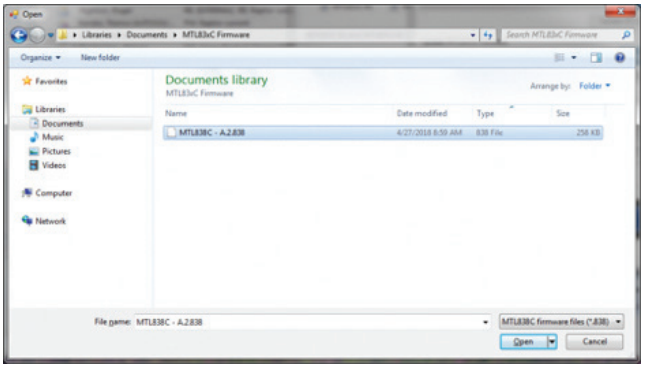
At the top of the window the current firmware versions are displayed for the units. If a unit is not connected, then the version information is blank (as is the case above with the MTL831C #2). The latest firmware will be available on the Eaton (MTL) website **www.mtl-inst.com.** If you suspect that the unit has become corrupted (functionally – not just configuration data), then it may make sense to reload the same version of firmware. Otherwise it's only recommended to update firmware when a newer version is available.

NOTE

Calibration and configuration data are not disturbed by a firmware update.

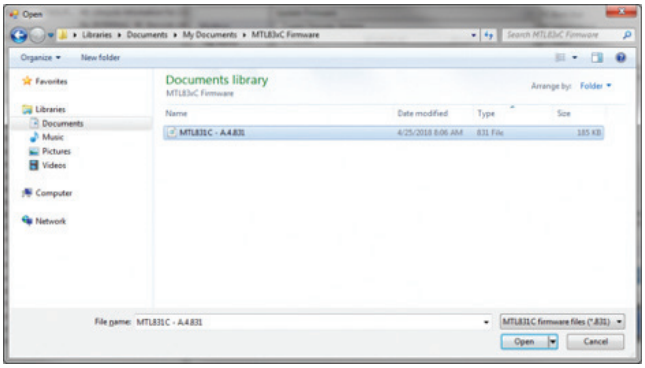
The recommended procedure is to download and save the newer firmware on your computer. You will download a single compressed ZIP file that contains both firmware files. Extract the files from the compressed file into a folder on your computer. Files that end in ".838" are firmware files for the MTL838C and files that end in ".831" are firmware files for the MTL831C. The file name will contain the product name followed by the firmware version. We recommend that you don't rename the files.

When you are ready to update the firmware for the MLT838C, click on the Browse button in the Update MTL838C Firmware box. The following file selection window will appear:



Select the firmware version you wish to update your unit to and click on Open. The gray box next to the Browse button will be populated with the filename (with its full path). This will also cause the Update MTL838C button to become active (blue). Press the Update MTL838C button to start the firmware update process. This will take a minute or so and a progress bar with status messages will update at the bottom of the window. When complete, the version at the top of the window should update to the version just applied to the unit. If any errors occur, they will be displayed at the bottom of the window. If you get an error, try again. If that is unsuccessful, contact Eaton (MTL) for assistance.

A similar process is used for the MTL831C firmware update. There is a separate box labeled Update MTL831C Firmware that contains the same Browse and Update buttons. Use the same procedure to select a file and update the MTL831Cs. The following window is displayed after selecting the Browse button for updating MTL831C firmware:

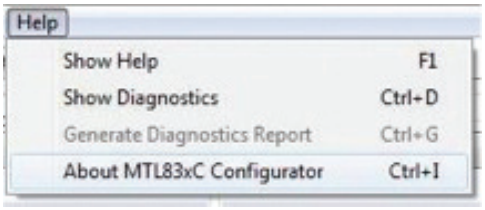


As with the MTL838C, select the file you wish to use for the firmware update and click the Open button. The gray box next to the Browse button will be populated with the filename (with its full path). This will also cause the Update All MTL831Cs button to become active (blue). Press the Update All MTL838Cs button to start the firmware update process. This will take up to 6 minutes and a progress bar with status messages will update at the bottom of the window. When complete, the version at the top of the window should update to the version just applied to the unit. If any errors occur, they will be displayed at the bottom of the window. If you get an error, try again. If that is unsuccessful, contact Eaton (MTL) for assistance.

Notice that update process for the MTL831C will update ALL MTL831Cs connected to the MTL838C.

The last item in the Devices Menu is Configure Ethernet. This option is grayed out unless the Communication Protocol is Modbus TCP. Section 7 covers the configuration of the Ethernet Port.

6.4 Help

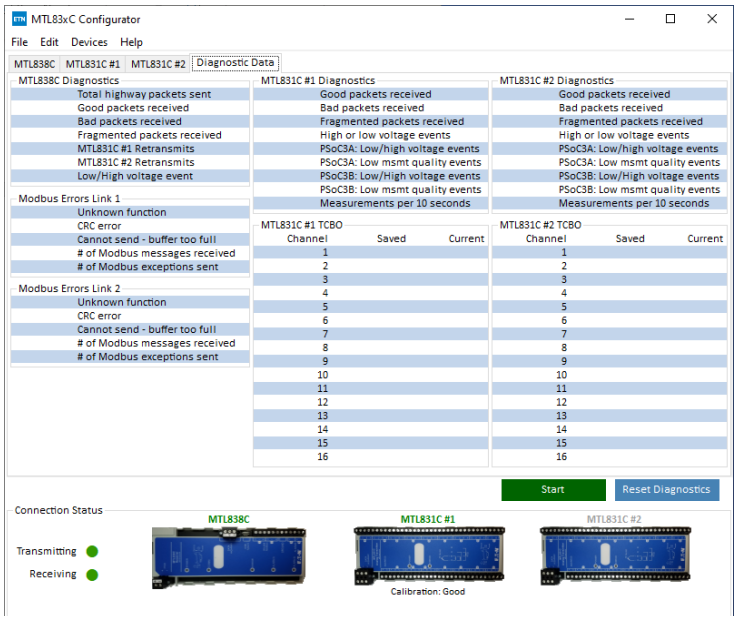


The last menu is the Help menu. Selecting Show Help or pressing F1 opens the instruction manual for the PC software (this document). This will open the PDF document for the mode that the software is currently in (Modbus RTU, Modbus TCP, etc.). If you get the wrong document, change to the mode you wish the documentation for on the MTL838C tab and try again.

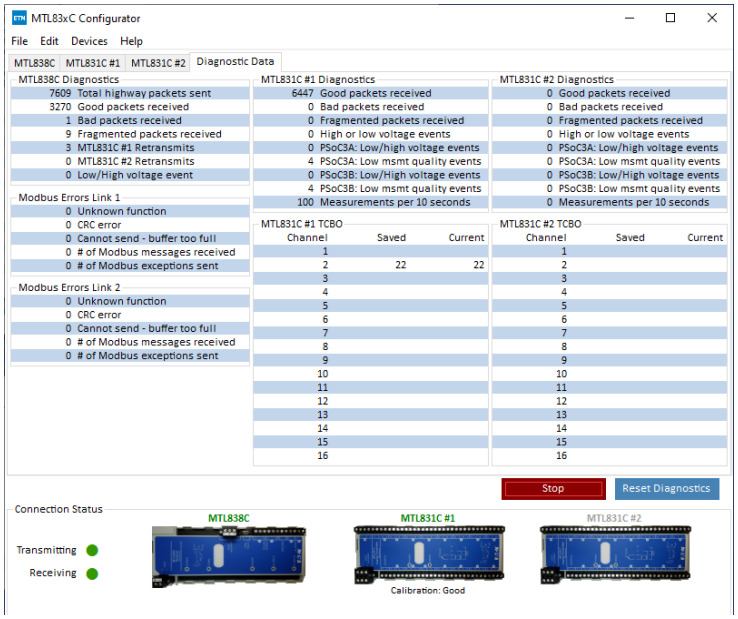
The About MTL83xC Configurator option brings up the following window:

This is where you can find the version of the PC software that you are currently running. As long as you are connected to the internet, the software will automatically download and install any updates.

The last two options have to do with diagnostic information. The first option "Show Diagnostics" causes a fourth (4th) tab to appear that contains diagnostic information. When the Diagnostic Data tab is displayed, then the menu option changes to "Hide Diagnostics". Clicking on this will remove the diagnostic tab. The following is what the Diagnostic Data tab looks like when it is first opened:



Initially the request for diagnostic data from the MTL83xC system is OFF as indicated by the green Start button and no diagnostic data (numbers) being listed. To begin receiving diagnostic data, press the Start button. It will change to a red color and data from the units will be received. Note that even when diagnostic data is not being requested, it is being collected by the units any time they are powered up (if they are rebooted the data is lost). The following shows the screen when diagnostics are being requested and updated live:



Notice that there are several fields where non-zero information is a good thing. These are:

Total highway packets sent	A running total of the number of packets of data sent to either MTL831C
Good packets received	Tracked on each unit and is useful when comparing to Bad or Fragment packets to see what percentage of errors there are.
Measurements per 10 seconds	This is a count of the number of measurements received by the MTL838C from the given MTL831C. It should be 100 as the MTL838C requests measurements from both MTL831Cs every 100ms.

The MTL831C #1 TCBO and MTL831C #2 TCBO tables are also not considered errors. They contain resistance measurements of any Thermocouple channels. TCBO stands for ThermoCouple Burn Out and is when a thermocouple has increased in resistance by 50 ohms or more. The Saved value is the resistance measurement of the thermocouple when the MTL831C was power up or rebooted, a Thermocouple was connected to a channel configured as a thermocouple after previously being open, or a channel was configured as a Thermocouple when previously configured as mV or RTD. This saved value is then compared to a periodic measurement of the thermocouple resistance (shown in the Current column). If the resistance difference is greater than 50 ohms, then the Thermocouple status is set to "Burn-Out". This burnout status is also available via Modbus (not the resistance measurements). In the example above, only one thermocouple is connected and it is on channel 2 of the MTL831C #1. Its Saved and Current readings are both 22 ohms.

There are some errors shown in the example above. This is because the MTL831C #1 was disconnected from the Data Highway and then re-connected. It is typical in this case to see a few errors. The Bad and Fragment packets received at the MTL838C are due to Data Highway transitions due to unplugging and plugging in the MTL831C #1. Similar things can occur if the MTL831C is reset via the PC Software as described in the Devices section. Retransmits occur when an MTL831C is disconnected from the Data Highway. A few of the Low msmt (measurement) quaility occur on the MTL831C whenever it is powered up. The following table provide details on the diagnostic items:

MTL838C Diagnostics

Total highway packets sent	A running total of the number of packets of data sent to either MTL831C.
Good packets received	Number of good (no CRC error) packets received from the MTL831Cs.
Bad packets received	The number of packets that had a CRC error. Caused by connecting or disconnecting MTL831Cs or by noise.
Fragmented packets received	A count of the number of incomplete packets received. This is usually noise or connect/disconnect of an MTL831C.
MTL831C #1 Retransmits	Number of times the MTL831C did not respond to a command (the MTL838C is the bus master) and the command had to be retransmitted. After 3 consecutive missed responses the MTL831C is 'dropped' and must go through re-initialization if it starts communicating again.
MTL831C #2 Retransmits	Same as above but for the MTL831C with the Address Jumper (#2).

MTL831C #x Diagnostics (x = 1 or 2)

Good packets received	Number of good (no CRC error) packets received from the MTL838C or other MTL831C if connected..
Bad packets received	The number of packets that had a CRC error. Caused by connecting or disconnecting MTL831Cs or by noise.
Fragmented packets received	A count of the number of incomplete packets received. This is usually noise or connect/disconnect of an MTL831C.
High or low voltage events	High or low voltage events detected by the main microprocessor. Multiple events can be recorded for a single voltage event.
PSoC3A: Low/high voltage events	High or low voltage events detected by the A measurement microprocessor. Multiple events can be recorded for a single voltage event.
PSoC3A: Low msmt quality events	The main microprocessor detected a low number of measurements per second from the A microprocessor.
PSoC3B: Low/high voltage events	High or low voltage events detected by the B measurement microprocessor. Multiple events can be recorded for a single voltage event.
PSoC3B: Low msmt quality events	The main microprocessor detected a low number of measurements per second from the B microprocessor.

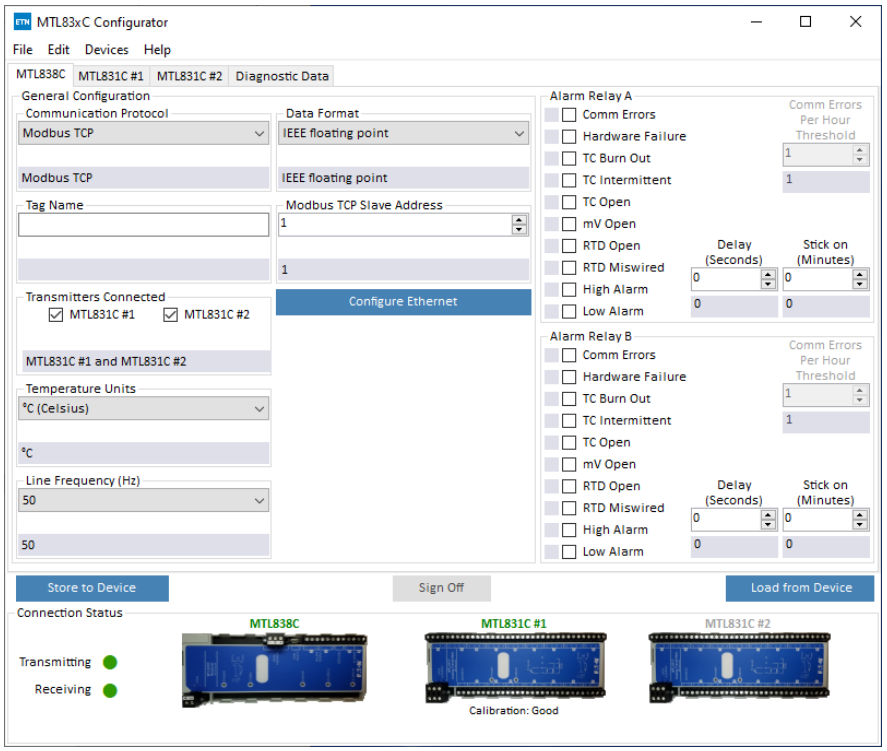
Modbus Errors Link 1 (or 2)

Unknown function	The Modbus Host sent a function code not supported by the MTL838C
CRC Error	A CRC error occurred on a Modbus packet.
Cannot send – buffer too full	Data is put in a buffer while waiting for the UART to transmit to the Modbus Host. More data was ready to go in the buffer but there was not room for it. This should not normally happen.
# of Modbus messages received	Number of Modbus messages received from the Modbus Host.
# of Modbus exceptions sent	Number of Modbus exception messages sent to the Modbus Host by the MTL838C.

7 ETHERNET MODULE CONFIGURATION – MTL838C-MBT only

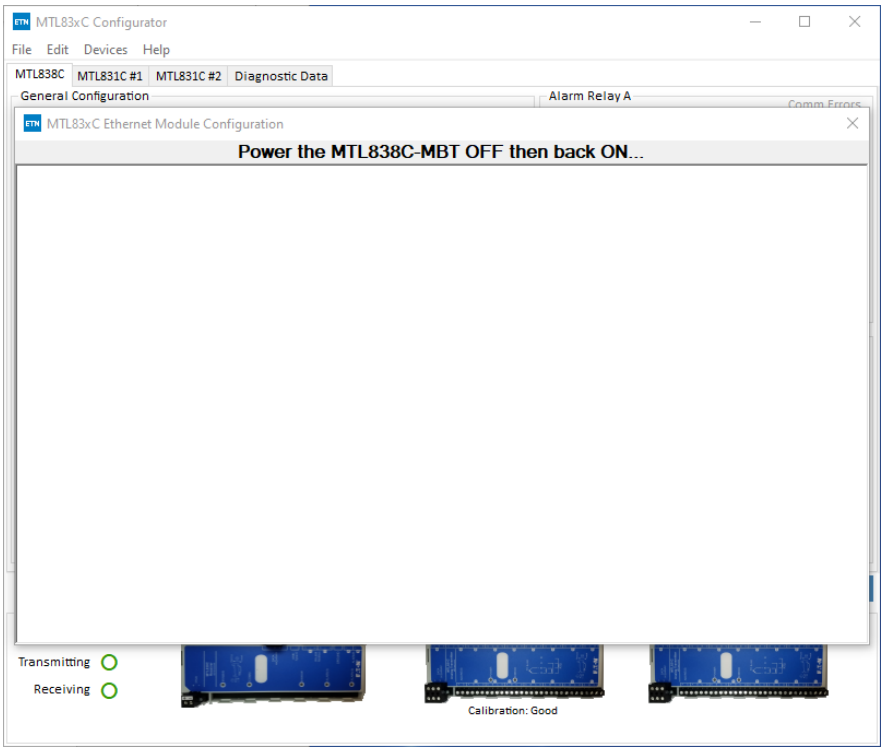
Initially, the MTL838C-MBT is configured to get its IP address from a DHCP server. For most installations, the IP address will need to be set to a known value so that it may be easily identified on the network.

The following is what the MTL838C tab looks like when the Communication Protocol is Modbus TCP:



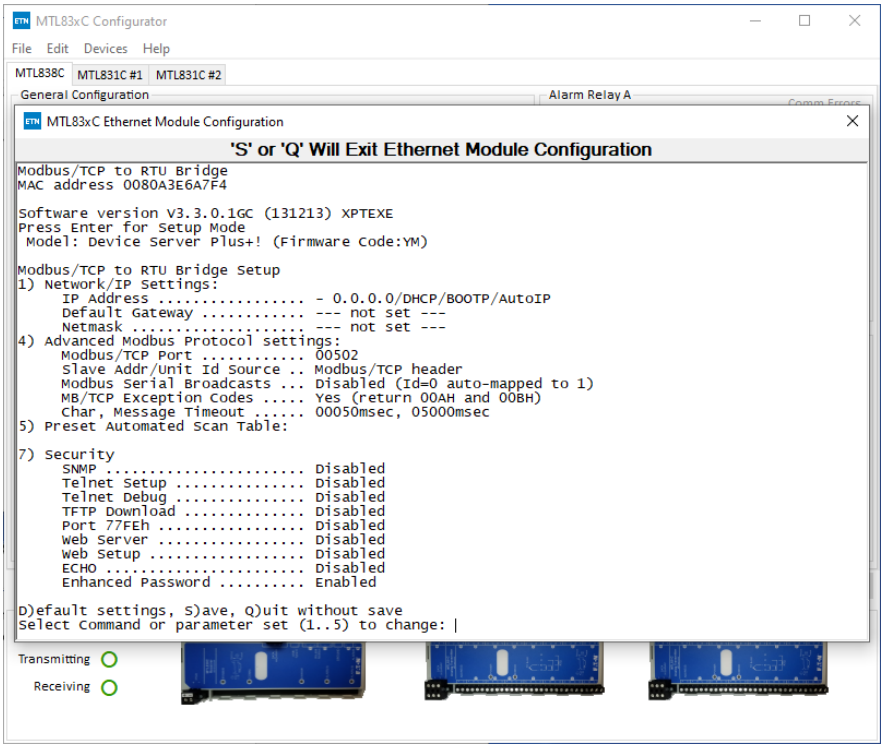
Refer to section 5.2 for information on how to work with the various fields. The Modbus TCP Slave Address has been renamed when in Modbus TCP mode, but functions as in section 5.2.4.

The Ethernet port is configured using the blue Configure Ethernet button, or with the Device/ Configure Ethernet menu item. Selecting either of these causes the screen to change to:



The Ethernet port can only be configured during power up, so at this point we are being instructed to power the unit off and then back on. If you wish to exit the Configure Ethernet mode, you can click the "X" in the upper right of the center window.

Powering the unit off and back on results in the following:



Notice that the module MAC address is displayed as well as some firmware version information for the Ethernet Port. After this there are four sections numbered 1, 4, 5, and 7. This is the main menu and these are the 4 optional areas to configure.

This is a text-based interface to the Ethernet Port and the menu item is selected by typing the item number. It then will ask one question at a time and give an opportunity for entering the necessary data.

The above information is the default setting of the port. Notice that it comes set up for DHCP which means it would be looking for the network to supply it an IP address. Most likely you will want to change this to a fixed IP address. It is not likely that changes will be needed for options 4 or 5. In most cases the defaults work. For security reasons the Ethernet port has been locked down to prevent bad actors from accessing the device. This is seen by all of the Disabled settings in menu item 7. **We do not recommend enabling any of these options.** We have set an Enhanced Password even though all ports are disabled. There is no need for you to know the password as you can change it using this software. It is only needed for accessing the ports from the network – but they are disabled by default.

Here is an example of setting the IP address to 10.0.0.62, Gateway to 10.0.0.254, and Netmask to 255.255.255.0:

```
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..5) to change: 1

IP Address (000) 10
.(000)
.(000)
.(000) 62

Set Gateway IP Address (N) ? Y
Gateway IP Address : (010)
.(000)
.(000)
.(001) 254

Set Netmask (N for default) (N) ? Y
(255)
.(255)
.(255)
.(000)

Change Telnet/Web config password (N) ?


Modbus/TCP to RTU Bridge Setup
1) Network/IP Settings:
     IP Address ................. 10.0.0.62
     Default Gateway ............ 10.0.0.254
     Netmask .................... 255.255.255.0
```

Notice we typed "1" to select Network / IP Settings and were then asked for the IP Address – one byte at a time. The default value is in parenthesis, so we entered '10' and pressed <Enter>. Then since zero is what we wanted for the second byte, we just press <Enter> - likewise for the third byte. Finally we enter "62" for the fourth byte. In a similar fashion we entered the Gateway and Netmask. We did not enter a password because it is a weak password. The Enhanced Password in the Security section is better. After pressing <Enter> for the password the port repaints the menu with the updated information.

Note: Setting the IP Address to 0.0.0.0 will cause the Ethernet port to get its IP address from a DHCP server.

Menu option "4" contains settings for Modbus TCP. We recommend using the defaults, but they may be changed if needed for your environment. Below is a capture of the questions and options where <Enter> was pressed to accept the default for each option:

```
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..5) to change: 4

Modbus/TCP Port (502)

Slave address (0 for auto, or 1..255 fixed otherwise) (0) ?

Allow Modbus Broadcasts (1=Yes 2=No) (2) ?

Use MB/TCP 00BH/00AH Exception Responses (1=No 2=Yes) (2) ?

Disable Modbus/TCP pipeline (1=No 2=Yes) (1) ?

Character Timeout (0 for auto, or 10-6950 msec) (50)

Message Timeout (200-65000 msec) (5000)

Serial TX delay after RX (0-1275 msec) (0)

Swap 4x/0H to get 3x/1x (N) ?
```

As we have already said we do not recommend enabling any of the settings in the security section.

When you have completed making the changes you required for the Ethernet port, press the "S" key to Save your changes. This will cause the Ethernet Port to reboot. The Ethernet Configuration screen will automatically close.

If you wish to exit without saving changes press the "Q" key. This too causes the Ethernet module to reboot and the Ethernet Configuration screen to close.

APPENDIX A

EATON CORPORATION END USER LICENSE AGREEMENT FOR [MTL83xC Configurator]

This End User License Agreement (the "**Agreement**") is a legal agreement between you and the Contracting Entity (as defined below). For the purposes of this Agreement, any reference to "Eaton" shall include the Contracting Entity, its holding company, its affiliates and subsidiaries. This Agreement, and any other terms or conditions notified to you, governs your access to and use of MTL83xC Configurator (the "**Product Software**").

Your use of the Product Software is subject to the terms of this Agreement as set out below which includes our Privacy Statement https://www.eaton.com/content/eaton/us/en-us/company/policies-and-statements/privacy-cookies-and-data-protection.html/ , Cookie Statement https://www.eaton.com/content/eaton/us/en-us/company/policies-and-statements/privacy-cookies-and-data-protection.html/ and any other terms or conditions of the Product Software which may be notified to you from time to time.

By using the Product Software, you agree to us collecting and using anonymised technical information about the devices you use the Product Software on and related software, hardware and peripherals to improve our products and to provide any services to you.

By using the Product Software, you agree to the terms of this Agreement. Your right to use the Product Software is expressly conditioned on acceptance of this Agreement.

1 INFORMATION ABOUT US

1.1 Eaton Electric Ltd is registered in England (No. 4617032) and has its registered address at PO Box 554, Abbey Park, Southamptom Road, Titchfield, PO149ED, United Kingdom, VAT Reg. No. 806555720 (the "**Contracting Entity**").

1.2 If you have any questions about this Agreement, the Privacy Statement or any other terms or conditions in connection with the Product Software, please contact us at dataprotection@eaton.com.

2 DEFINITIONS

2.1 In this Agreement the following expressions shall have the following meanings:

"Arbitrator"	has the meaning as defined in Clause 28.2;
"Business Day"	means a calendar day other than a Saturday, Sunday, Bank Holiday or other statutory holiday in the jurisdiction in which the Contracting Entity is registered;
"Contracting Entity"	has the meaning as defined in Clause 1.1;
"Credentials"	has the meaning as defined in Clause 3.7;
"Dispute"	means any claim, dispute or difference arising under or in connection with this Agreement;
"Documentation"	means any tutorials, user guides and other documents accompanying or made available with the Product Software solely for your own internal business purposes;
"Eaton Hardware"	means the Eaton product provided by Eaton to you, which may include Product Software within it;
"Eaton Open Source Components"	has the meaning as defined in Clause 10.1;
"Eaton Website"	has the meaning as defined in Clause 16.1;
"Effective Date"	means the date upon which you agree to abide by the terms and conditions of this Agreement;
"Export Laws"	has the meaning as defined in Clause 27.1;
"Fees"	has the meaning as defined in Clause 11.1;
"Feedback"	has the meaning as defined in Clause 21.2;
"Force Majeure Event"	has the meaning as defined in Clause 25.1;
"GDPR"	has the meaning as defined in Clause 19.1;
"Indemnified Parties"	has the meaning as defined in Clause 15.1;
"Intellectual Property Rights"	means any ideas (whether or not patentable), inventions, discoveries, processes, works of authorship, marks, names, know-how, and any and all rights in such materials throughout the world, whether existing under statute, common law or equity, now or hereinafter recognized, including but not limited to (i) patents, designs, inventor's certificates, utility models, copyrights, moral rights, trade secrets, mask works, trade names and marks, service marks, trade dress, domain names, confidential information and know-how; (ii) any application or right to apply for any of the rights referred to in section (i); and (iii) all renewals, extensions, and restorations, now or hereafter in force and effect for any of the rights referred to in section (i);
"**Materials**"	has the meaning as defined in Clause 21.4;

"Product Software"	means the software provided by Eaton to you, which includes any applications, firmware and/or platforms provided to you from time to time;
"Support Services"	has the meaning defined in Clause 12.1;
"Term"	means [●];
"Third Party Licensors"	has the meaning as defined in Clause 9.1;
"Third Party Links and Ads"	has the meaning as defined in Clause 23.1;
"Third-Party Providers"	has the meaning as defined in Clause 21.5;
"Updates"	has the meaning as defined in Clause 6.1.

3 GRANT AND SCOPE OF LICENSE

3.1 In consideration of you agreeing to abide by the terms of this Agreement, Eaton hereby grants to you, a limited, non-exclusive, non-transferable, non-sub-licensable, and revocable license to access and use the Product Software with MTL83xC products, which is provided to you for your own internal business purposes, solely for your use as permitted in these terms.

3.2 Subject to the limited rights expressly granted above, Eaton and its licensors or suppliers reserve all right, title and interest in and to the Product Software, its underlying technology and all Intellectual Property Rights therein. You acknowledge that no licenses or rights are granted to you by implication or otherwise in respect of the Product Software, other than those expressly set forth in this Agreement. You agree not to remove, change or obscure any Intellectual Property Rights notices incorporated in or accompanying the Product Software. You agree to abide by all applicable national and international laws in connection with the use of the Product Software, including those related to cybersecurity and piracy, data protection, privacy, international communications and the transmission of technical or personal data.

3.3 Eaton may make services available to you that are provided, in whole or in part, by other parties. Although Eaton may offer this opportunity, you acknowledge that any third party services that you use in connection with the Product Software are not part of the Product Software. You further acknowledge that these terms do not apply to any third party service providers and that your use of those services may require you to agree to additional terms with the third party service provider.

3.4 You shall as soon as reasonably practicable notify Eaton if you become aware of any use of the Product Software other than in accordance with this Agreement and all applicable laws, rules and regulations. Without limiting the generality of the foregoing, you shall notify, and shall promptly notify, Eaton if you become aware of any third party that does or attempts to: (i) de-compile or reverse engineer the Product Software; (ii) sell, re-license, distribute or commercially exploit the Product Software; (iii) except as expressly permitted by this Agreement, make the Product Software available through any means or media without the prior written approval of Eaton; (iv) except as expressly permitted by this Agreement, copy, modify, publish, transmit, participate in the license or re-license, transfer or sale of, reproduce, create derivative works from, distribute, perform, display or in any way exploit the Product Software, in whole or in part, without the prior written consent of Eaton; and (v) engage in any activity that interferes with or disrupts the Product Software (or the servers and networks connected to the Product Software).

3.5 You shall not make more than **one** copy of the Product Software and such copy is to be made solely for backup and/or archival purposes. You shall account for and number any such copy. All titles, trademarks, copyright and restricted rights or proprietary notices included in the Product Software shall not be removed and must be reproduced in such copy.

3.6 You shall not make more than **one** copy of the Documentation for use by you in connection with the authorized use of the Product Software and you shall account for and number any such copy. All titles, trademarks, copyright and restricted rights or proprietary notices included in the Documentation shall not be removed and must be reproduced in such copy.

3.7 You may be required to register to use the Product Software. If so, you must have a valid account with a username and password ("**Credentials**"). You may register for such Credentials at the direction(s) provided with the Product Software or by an authorized Eaton representative. The date of registration shall be the Effective Date of this Agreement. You are responsible for maintaining the confidentiality of your Credentials, and for ensuring that each password is only used by employees granted access to the Product Software on your behalf. You are liable for all transactions and other activities carried out under your Credentials. You agree to promptly notify Eaton if any password is lost, stolen, disclosed to an unauthorized party, or otherwise may have been compromised. You agree to immediately notify Eaton of any unauthorized use of your account or any other breach of security in relation to the Product Software known to you. Eaton shall have no liability for any loss or damage arising from your failure to comply with these requirements or any other losses arising from such unauthorized access. If Eaton suspends or terminates your account under this Agreement, you acknowledge that all information and content associated with such account will no longer be available to you.

4 LOCATION DATA

4.1 The Product Software may make use of location data sent from your devices. Where applicable, you can turn off this functionality at any time by turning off the location services settings for the Product Software on the device. If you use the Product Software, you consent to us and our affiliates' and licensees' transmission, collection, retention, maintenance, processing and use of your location data and queries to provide and improve location-based and road traffic-based products and services.

4.2 You may stop us collecting such data at any time by turning off the location services settings on your device.

5 NECESSARY EQUIPMENT

5.1 Full use of the Product Software is dependent upon your use of a device with Internet access and the purchase of Eaton Hardware in which it is installed or to which the Product Software pertains as described in the Documentation.

5.2 In order for the Product Software to operate fully, your device may need to be connected to certain wireless and/or communication based technologies. There may be delays, limitations and other problems inherent in the use of the Internet and wireless and/or communication based technologies. Eaton is not responsible for any delays, failures or other damages resulting from such problems and/or the costs/charges associated with internet data usage.

5.3 The maintenance and security of this equipment may affect the performance of the Product Software and it is your responsibility to ensure the equipment's functionality is compatible and for making all arrangements necessary for you to have access to the Product Software.

5.4 Internet transmissions are never completely private or secure. Any message or information you send using the Product Software may be read or intercepted by others, even if there is a special notice that a particular transmission is encrypted.

6 UPDATES

6.1 You are solely responsible for the maintenance and upkeep of the Product Software. Eaton has no obligation to provide updates or maintenance to the Product Software. You agree to install or allow automatic installation of all corrections of substantial defects, security patches, minor bug fixes and updates, including any enhancements ("**Updates**"), for the Product Software in accordance with the instructions and as directed by Eaton.

6.2 The provisions of this Agreement shall govern any Updates provided by Eaton, unless such Updates are accompanied by, or references, a separate license agreement in which case the terms of that license agreement shall prevail.

6.3 We reserve the right, without notice to you, to update, change, and discontinue (temporarily or permanently) any feature or component of the Product Software. Alternatively, we may ask you to update the Product Software. By continuing to use the Product Software you accept the updates and changes to the Product Software including any changes to or removal of features or components. You agree that your obligations are neither contingent upon the delivery of any future functionality or features nor dependent upon any oral or written comments made by us with respect to future functionality or features. Eaton is not liable to you or to any third party for any update, change, suspension, discontinuance of any feature or component of the Product Software. Eaton reserves the right to determine the timing and content of software updates, which may be automatically downloaded and installed by the Product Software without your notice. If you chose not to install such updates or if you opt out of automatic updates you may not be able to continue using the Product Software.

7 TRANSFER AND ASSIGNMENT RESTRICTIONS

7.1 You agree not to sell, resell, assign, lease, sub-license, encumber or otherwise transfer your interest in this Agreement or in the Product Software and/or Documentation, in whole or in part, or allow any other person or entity, including any of your parent or subsidiaries or other subsidiaries of your parent, to copy, distribute, or otherwise transfer the Product Software without the prior written consent of Eaton.

7.2 You may transfer the Product Software directly to a third party only in connection with the sale of the Eaton product in which it is installed or to which the Product Software pertains as described by Eaton in the Documentation. In the event of such a sale, you may not keep any copies of the Product Software or any portion thereof and you undertake to ensure the third party to whom you transfer the Product Software is made aware of, agrees to and complies with all of the provisions of this Agreement. Any transfer of the Product Software is deemed to be a transfer with the sale of the Eaton product and is subject to the provisions of this Agreement.

8 RESTRICTED USES

8.1 In relation to the Product Software, you warrant, represent and undertake that you shall:

(i) only use the Product Software with the license key, if the Product Software is subject to the use of a license key;

(ii) not use the Product Software with any other third party hardware and/or software;

(iii) not license, sell, rent, lease, transfer, assign, distribute, host, or otherwise commercially exploit the Product Software, whether in whole or in part, or any content displayed on the Product Software;

(iv) not copy (except as expressly permitted by this Agreement), enhance, decompile, modify, make derivative works of, disassemble, reverse compile or reverse engineer, attempt to derive the source of code of any part of the Product Software;

(v) not copy (except as expressly permitted by this Agreement), reproduce, distribute, republish, download, display, post or transmit the whole or any part of the Product Software in any form or by any means, except as expressly permitted in this Agreement;

(vi) not use any part of the Product Software to establish any independent data files, databases, compendiums or any other reference materials except to the extent such foregoing restriction is prohibited by applicable laws or applicable open source license to, and only to, any open source software component that is incorporated into the Product Software (if any). Any attempt to do so is a violation of the rights of Eaton;

(vii) not access or view Product Software in order to build a similar or competitive product or service to the Product Software;

(viii) not provide false data including false names, addresses, contact details and fraudulent credit card/debit card details;

(ix) not enter into fraudulent or deceptive interactions or transactions with Eaton (which shall include entering into interactions or transactions purportedly on behalf of a third party where you have no authority to bind that third party or you are pretending to be a third party);

(x) not use the Product Software in any way that is unlawful, fraudulent or deceptive, or has any unlawful, fraudulent or deceptive purpose or effect;

(xi) not use the Product Software except in conjunction with the operation of Eaton products to which the Product Software pertains or other products described by Eaton in the Documentation;

(xii) not sell any products or services purchased through Eaton, without Eaton's express permission;

(xiii) not intercept communications transmitted by way of a telecommunications system and/or information society service;

(xiv) not to distribute, or otherwise provide to any third party any registration code algorithms, registration codes, or encryption keys, where applicable, used by or in connection with the Product Software without the prior written consent of Eaton;

(xv) not attempt to create any registration codes or passwords, where applicable, to allow unauthorized activation of the Product Software, nor shall you assist others in doing so;

(xvi) not use any registration code algorithms, registration codes or encryption keys, where applicable, that have not been purchased from Eaton or an authorized representative of Eaton;

(xvii) not execute any form of network monitoring which will intercept data not intended for you;

(xviii) not install the Product Software on multiple devices or in multiple locations without purchasing a separate license from Eaton or a third party authorized by Eaton;

(xix) use of the Product Software must at all times comply with all applicable laws, rules and regulations and be strictly in accordance with this Agreement;

(xx) not use the Product Software to transmit, or procure the sending of, any unsolicited or unauthorized advertising, promotional material, chain letters, mass mailings or any other form of similar solicitation (spam) or of any material that is illegal, offensive, abusive, indecent, defamatory, obscene, menacing or in breach of proprietary rights, confidence, privacy or any other right, or is injurious to third parties.

(xxi) not attempt to gain unauthorized access to the Product Software, its facilities and/or services or any accounts, databases, computer systems, servers and networks connected to the Product Software and the server on which our site is stored. You shall not attack the Product Software via a denial of service attack. You will not misuse the Product Software by knowingly or recklessly introducing viruses, Trojans, worms, logic bombs, harmful data or other materials which is malicious or harmful;

(xxii) not use the Product Software to harvest or otherwise collect by any means any program material or any information whatsoever (including without limitation email addresses or other personal details of other users);

(xxiii) provide Eaton with accurate and complete information and acknowledge that Eaton's ability to deliver the Product Software is dependent upon your cooperation, as well as the accuracy and completeness of any information you provide to Eaton. Eaton shall not be liable for any costs, expenses or liabilities resulting from your failure to cooperate or to provide such information;

(xxiv) not access the Product Software through the use of any mechanism other than through the use of an authorized connection;

(xxv) not use any automated technology such as a robot, spider or scraper, to access, scrape or data mine the Product Software;

(xxvi) not modify the paper or digital copies of any Materials you print or download in any way, and you must not use any illustrations, photographs, video or audio sequences, or any graphics separately from any accompanying text;

(xxvii) not, without Eaton's prior express written permission, "mirror", screen-scrape or frame by any other similar method, any Materials contained on this Product Software on any other server;

(xxviii) not use any part of the Materials for commercial purposes without obtaining permission from our licensors or us. If you are in breach of these terms of use, your right to use the Product Software will cease immediately and you must, at our option, return or destroy any copies of the Materials you have made;

(xxix) use reasonable endeavours to prevent any unauthorized access to, or use of, the Product Software and, in the event of any such unauthorized access or use, immediately without delay notify Eaton in writing by email to the relevant email address provided in the "contact us" section below and shall immediately without delay telephone Eaton to ensure the email communication has been received.

8.2 By breaching Clause 8.1 of this Agreement, you could potentially commit a criminal offence. We will report any such breach to the relevant law enforcement authorities, and we will co-operate with those authorities by disclosing your identity to them. In the event of such a breach, your right to use the Product Software will cease immediately.

8.3 We will not be liable for any loss or damage caused by a distributed denial of service attack, viruses or other technologically harmful material that may infect your computer equipment, computer programs, data or other proprietary material due to your use of the Product Software or to your downloading of any material posted on it, or any website linked to it.

9 THIRD PARTY SOFTWARE

9.1 The Product Software may contain components (including, notwithstanding Clause 10 of this Agreement, open source software components) that are owned by third parties ("**Third Party Licensors**") and are provided with, incorporated into, linked to, or embedded in, the Product Software pursuant to license arrangements between Eaton and any such third parties. Third Party Licensor components in the Product Software are not licensed or warranted under the terms of this Agreement, but are instead subject to any license arrangements between Eaton and any such third parties.

9.2 You agree not to modify, delete or obfuscate any copyright or other Intellectual Property Rights notices of Third Party Licensors contained in the Product Software.

9.3 To the extent there are any conflicts between the terms of this Agreement and any license arrangement between Eaton and any such third party license corresponding to Third Party Licensor components or additional obligations by such Third Party Licensors that are not set forth in this Agreement, the terms of the license arrangement between Eaton and any such Third Party Licensor or the corresponding open source license will prevail.

9.4 This Product Software contains the known third party software (including third party open source software components) as set out in Appendix 1A.

10 OPEN SOURCE SOFTWARE

10.1 The Product Software may contain certain components owned by Eaton that are provided with, incorporated into, linked to, or embedded in the Product Software that are subject to open source licenses ("**Eaton Open Source Components**"). To the extent there are any conflicts between the terms of this Agreement and any open license corresponding to Eaton Open Source Components or additional obligations by any such open source license that are not set forth in this Agreement, the terms of the open source license shall prevail.

10.2 This Product Software contains the known Eaton Open Source Components as set out in Appendix 1B.

11 FEES

11.1 Where applicable, Eaton may charge you fees for access to the Product Software, any fees are as provided in Appendix 2. You agree to pay all fees and charges, within the agreed upon billing period, including taxes, incurred through your account at the rates in effect for the billing period in which such fees and charges are incurred, including but not limited to, charges for any products or services offered for sale through the Product Software by Eaton (such fees, charges and taxes shall collectively be referred to as "**Fees**"). Eaton reserves the right to change the amount of, or basis for determining, any Fees, and to institute new Fees, effective upon prior notice to you.

12 SUPPORT SERVICES

12.1 Eaton or its suppliers and distributors may provide you with support services related to the Product Software (the "**Support Services**"). Use of Support Services is governed by the terms and conditions for the applicable service offering (if any), the policies and programmes described in the Documentation, and/or other Eaton-provided Materials.

12.2 Any additional supplemental Materials provided to you as part of the Support Services shall be considered part of the Product Software, as applicable, and subject to the provisions of this Agreement. .

13 DISCLAIMER OF WARRANTY

13.1 To the extent permitted by applicable law, you expressly acknowledge and agree that use of the product software is at your sole risk and that the entire risk as to satisfactory quality, performance, accuracy and effort of the product software is with you.

13.2 To the fullest extent permitted by applicable law, the Product Software, the Material and any information and any services performed or provided by or in connection with the Product Software are provided on an "as is" and "as available" basis, with all bugs and faults and without warranty of any kind. Eaton, its affiliates, subsidiaries, and authorized representatives hereby disclaim all warranties and conditions of any kind with respect to the product software and any services, either express, implied, statutory, or otherwise, including, but without limitation, any implied warranties and/or conditions of merchantability, of satisfactory quality, of fitness for a particular purpose, security, completeness, timeliness, accuracy, quiet enjoyment, title, freedom from computer viruses, and of non-infringement of third party rights. Neither Eaton, nor any of its affiliates or subsidiaries, warrant that the functions or services contained in, accessed from, performed by, displayed on, linked to/from, or provided by, the product software will meet your requirements, that the operation of the product software or services will be uninterrupted, error-free, timely, secure, or that defects or errors in the product software or services will be corrected, or that the product software will be compatible with any system, or that the product software will be free from worms, viruses, malware, Trojan horses, or other harmful or disabling components.

13.3 No oral or written information or advice given by Eaton, its affiliates, subsidiaries, or any of their respective authorized representatives shall create a warranty. You assume the entire cost of any and all necessary repairs in the event you experience any loss or damage arising from the use of the product software or any related goods or services. If you are dissatisfied with the product software and/or any related goods or services, your sole and exclusive remedy is to discontinue using the product software.

14 LIMITATION OF LIABILITY

14.1 Nothing in this agreement shall exclude or limit Eaton's liability for death or personal injury resulting from its negligence or of its officers, representatives their servants, agents, affiliates, employees or any other liability which may not be limited or excluded under applicable law. In no event shall Eaton nor any of its officers or other representatives be liable for any loss or damages arising out of or in connection with your use, inability to use or reliance on any facilities, services, products and/or content offered through or from the product software, including, but not limited to, direct loss, loss of data, work stoppage, service interruption, computer failure, system failure, device damage or malfunction, loss of income, profit or opportunity, loss of or damage to property and claims of third parties or for any indirect or consequential loss whatsoever, even if Eaton has been advised of the possibility of such loss or damages, or such loss or damages were reasonably foreseeable.

14.2 To the fullest extent permitted by law, Eaton, its affiliates, suppliers, licensors, and any other party involved in creating, producing or delivering the product software makes no warranties, either express or implied, about the product software. The product software is provided "as is" and "as available".

14.3 Except for your indemnification obligations pursuant to Clause 15 of this agreement, in no event will the aggregate liability (whether arising out of liability under breach of contract, tort (including but not limited to negligence), misrepresentation, breach of statutory duty, breach of warranty or claims by third parties arising from any breach of this agreement) of Eaton or its employees or agents to you or to any third party for damages, direct or otherwise, arising out of or in connection with this agreement exceed the lower of $100 (one hundred United States dollars) or the cost of the product software, regardless of the cause or form of action, and whether such claims are grounded in contract, tort, strict liability or any other legal theory, notwithstanding any failure of essential purpose of any limited remedy.

14.4 Nothing in this agreement shall exclude or limit your liability under Clause 11 for any failure to pay any fees due hereunder or for any breach, misuse or infringement of Eaton's intellectual property rights under Clause 21.

14.5 If you use the Product Software for commercial, business or resale purpose we will have no liability to you for any loss of profit, loss of business, business interruption, or loss of business opportunity.

14.6 Each provision of this Clause 14 excluding or limiting liability shall be construed separately, applying and surviving even if for any reason one or the other of these provisions is held inapplicable or unenforceable and shall remain in force notwithstanding the termination of this agreement, however arising.

15 INDEMNIFICATION

15.1 You agree to indemnify, defend, and hold harmless Eaton, including its officers, directors, employees, affiliates, subsidiaries, agents, licensors, authorized representatives, attorneys, business partners, and respective successors and assigns (the "Indemnified Parties") from and against any and all claims, demands, actions, liabilities, judgments, awards, losses, damages, costs and expenses (including reasonable legal fees, costs of defense, and direct, indirect, punitive, special, individual, consequential, or exemplary damages), Eaton or any of the Indemnified Parties suffer in relation to, arising from, or from the purpose of avoiding, any claim or demand from a third party that relates to your: (a) breach or violation of this Agreement; (b) infringement, misappropriation or any violation of the rights of any other party from use of the Product Software in violation of this Agreement; (c) violation or non-compliance with any applicable law, rule, guideline, acts, decrees, orders or regulations; (d) use, alteration or export of the Product Software (or any component thereof) in violation of this Agreement; and (e) the use of the Product Software by you or any person using your account.

15.2 Eaton and its affiliates reserve the right to assume the exclusive defense and control of any claims or actions subject to indemnification by you and all negotiations for its settlement or compromise, and you agree to fully cooperate with Eaton and its affiliates upon request by Eaton.

16 AMENDMENTS TO THIS AGREEMENT

16.1 Eaton reserves the right to amend, modify, update or substitute any of the provisions of this Agreement at any time. Any such amendment, modification, update or substitution shall be notified to you either by email or when you next login to your Product Software account or published on our website at https://www.mil-inet.com/product/md830c_temperature_multiplexer_system (the "Eaton Website"), as appropriate. You have the right to withdraw from this Agreement if you do not accept any amendments, modifications, updates or substitution of any of the provisions of this Agreement and in such an event you must cease all access and use of the Product Software immediately. By continuing to use the Product Software after Eaton posts or otherwise notifies you of any changes, you accept and agree to the terms and conditions, as modified.

17 FOR AUTHORIZED PARTIES IN CALIFORNIA

17.1 In compliance with California Civil Code §1789.3, if you reside in California you have the right to contact Eaton with any complaints or to seek additional information. You may email Eaton at dataprotection@eaton.com.

17.2 If you reside in California and have any questions or complaints about the use of the Eaton provided Product Software you may also contact: The Complaint Assistance Unit of the Division of Consumer Services of the California Department of Consumer Affairs through writing at 400 R Street, Suite 1850, Sacramento, CA 95814, or by telephone at (916) 445-1254 or (800) 952-5210. Hearing impaired persons may call (916) 928-1227 or (800) 326-2297 via TTY device. For further details, please visit https://www.dca.ca.gov/about_us/contactus.shtml.

17.3 You acknowledge and agree that this Clause 17 shall only apply to you if you are resident in California.

18 ENFORCEMENT RIGHTS

18.1 Eaton are not obligated to monitor the access or use of the Product Software, but Eaton reserves the right to do so for the purpose of operating the Product Software, to ensure compliance with these terms, and to comply with applicable law or other legal requirements. Eaton may consult with and disclose unlawful conduct to law enforcement authorities; and pursuant to valid legal process, Eaton may cooperate with law enforcement authorities as part of an investigation and/or to prosecute users who violate the law. In addition to any of its other rights or remedies, Eaton reserves the right to suspend or terminate your access to all or a portion of your Product Software account, without any liability, if Eaton reasonably suspects that your use of the Product Software is harming or threatening to harm Eaton's systems, or in Eaton's reasonable opinion you have violated your responsibilities. Eaton reserves the right to investigate any violation of these terms and any conduct that affects the Product Software.

19 DATA PROTECTION

19.1 For the purposes of this Clause, personal data, data processor and data controller shall have the meanings given to them in the General Data Protection Regulation (the "GDPR"). You agree to comply with your obligations as a controller in respect to any processing of personal data and Eaton agrees to comply with its respective obligations under GDPR.

19.2 Eaton is the data controller in relation to any personal data which you have provided to it in order to receive its services. For information on the use of any personal data which you have provided to Eaton please see https://www.eaton.com/us/en-us/company/policies-and-statements/terms-and-conditions.html

19.3 Eaton will at all times take all appropriate technical and organisational measures against unauthorized or unlawful processing of personal data and against accidental loss or destruction of, or damage to, personal data. Although Eaton has undertaken these measures and the requirements set out in GDPR, Eaton cannot guarantee that your personal data is secure when it is sent or transferred by unsecured means.

20 CONFIDENTIAL INFORMATION

20.1 All information provided via the Product Software is Eaton's confidential information. You agree to protect Eaton's confidential information, using the same degree of care used to protect your own confidential or proprietary information, but in any case, using no less than a reasonable degree of care.

20.2 You agree to only use Eaton's confidential information for the purposes of obtaining the benefit set out in this Agreement and for no other purpose. You agree not to use or disclose Eaton's confidential information without the prior written consent of Eaton, except to share it with your employees who have a need to know the information and are bound by a duty of confidentiality covering the information that is at least as restrictive as the obligations in this Agreement. You agree not to otherwise disclose such information to any third party without the prior written consent of Eaton. You shall be liable to Eaton for any breach of the confidentiality obligations in this Clause 20 of this Agreement by your employees.

20.3 Except for personally identifiable information/personal data, the use and disclosure of which is addressed in the Privacy Statement for the Product Software, any and all information and content provided by you to Eaton is provided on a non-proprietary and non-confidential basis, regardless of whether the information or content is marked or otherwise identified as confidential or proprietary. You agree that Eaton has a royalty-free, perpetual, irrevocable, worldwide, non-exclusive right and license to use, reproduce, modify, adapt, publish, translate, create derivative works from, distribute, perform, and display any provided information or content for the purpose of operating and/or marketing the services or any related services rendered by Eaton. This license includes any right of publicity rights that may be present in the provided information or content.

20.4 The provisions of this Clause 20 shall survive the expiration or termination of this Agreement.

21 INTELLECTUAL PROPERTY OWNERSHIP

21.1 This Agreement does not transfer any Intellectual Property Rights from Eaton to you. Except for the express licenses granted herein, all right, title and interest (including Intellectual Property Rights) in and to any intellectual property owned, created or independently developed by Eaton, including, but not limited to, the Product Software and any derivative work, customisation, modification or enhancement thereof (including all Intellectual Property Rights in any of the foregoing), whether developed prior to, during, or after this Agreement, will remain solely with Eaton and its licensors. Eaton grants no implied licenses hereunder.

21.2 You may provide suggestions, comments or other feedback ("**Feedback**") relating to the Product Software. Your Feedback, even if designated as confidential, shall not, absent a separate written agreement, create any confidentiality obligation for Eaton. Eaton shall be free to use, disclose, reproduce, license or otherwise distribute and exploit such Feedback as it sees fit, entirely without obligation or restriction of any kind on account of intellectual property rights or otherwise.

21.3 You may print off one copy, and may download extracts, of any page(s) of the Materials solely for internal business purposes only. Any paper or digital copies of any Materials which you have printed off or downloaded in any way must not be modified, and you must not use any illustrations, photographs, video or audio sequences or any graphics separately from any accompanying text.

21.4 The content on the Product Software, including all information, text, graphics, images, hyperlinks, illustrations, designs, icons, photographs, documents, products, computer programs, services and written and other materials (collectively, the "**Materials**"), and such information is for general guidance purposes only.

21.5 Unless otherwise noted, all Materials are copyrights, trademarks, trade dress and/or other intellectual properties owned by, controlled by or licensed to Eaton or third parties (hereinafter, the "**Third-Party Providers**").

21.6 Except as stated herein, and to the extent permitted by law, none of the Materials may be copied, reproduced, distributed, republished, downloaded, displayed, posted or transmitted in any form or by any means, including, but not limited to, electronic, mechanical, photocopying, recording, or otherwise, without the prior express written permission of Eaton or the Third-Party Provider.

21.7 Any use of these Materials on any other website or networked computer environment for any purpose is prohibited. Any unauthorized use of any Materials contained on this Product Software may violate copyright, trademark, and other laws, including but not limited to laws of privacy and publicity, and may result in severe civil and criminal penalties.

22 TERMINATION OR SUSPENSION

22.1 This Agreement and the license granted hereunder, shall come into force on the creation of your Product Software account and shall continue in full force and effect unless this Agreement is terminated in accordance with its terms.

22.2 Eaton reserves the right, in its sole discretion and without notice to you, to suspend, terminate, modify or delete an account or access to the Product Software or parts thereof, if you are, or Eaton reasonably suspects that you are, failing to comply with any of the provisions of this Agreement or for any actual or suspected illegal or improper use of the Product Software. If you use multiple accounts, if Eaton does take action against you, you may have action taken against all your accounts.

22.3 For the avoidance of doubt, any wilful unauthorized use, copying, modification, reverse engineering, disclosure, distribution or sublicensing of the Intellectual Property Rights in the Product Software or any related methods, algorithms, techniques or processes by you, your employees, agents, representatives, officers or directors will be deemed a material breach of this Agreement that cannot be cured, and termination may be immediate.

22.4 Upon termination for any reason:

(i) all rights and licenses granted to you under this Agreement shall cease;

(ii) you must cease all activities authorized by this Agreement, including your use of the Product Software;

(iii) you must immediately delete, remove and cease access to the Product Software from all devices on which the Product Software has been installed and all copies of the Product Software then in your possession, custody or control. Eaton may also require that you provide it with evidence of compliance with this provision;

(iv) you must immediately return or destroy all confidential information of Eaton in your possession, provided that you shall not be required to delete Eaton's confidential information that is and remains stored solely on backup storage pursuant to your standard backup retention procedures if only persons of advanced information technology knowledge and ability would be able to locate and access such information (but such information shall nonetheless remain subject to confidentiality obligations contained herein);

(v) we may remotely access your devices and remove the Product Software from them and cease providing you with access to the Product Software.

23 LINKS

23.1 The Product Software may contain links to third party websites, services and/or display advertisements for third parties (together, "**Third Party Links and Ads**"). Such Third Party Links and Ads are not under Eaton's control. Eaton disclaims all liability and responsibility for any Third Party Links and Ads and you acknowledge and agree that Eaton is not responsible or liable for: (a) the availability or accuracy of such Third Party Links and Ads; or (b) the contents, products or services on or available from such Third Party Links and Ads. Your use of Third Party Links and Ads is at your own risk and is subject to the terms and conditions of the applicable third party. Eaton provides Third Party Links and Ads for your convenience and does not review, approve, monitor, endorse, warrant, or make any representations with respect to Third Party Links and Ads. You will need to make your own independent judgement about whether to use any such independent sites, including whether to buy any products or services offered by them.

24 REPRESENTATIONS, WARRANTIES, COVENANTS AND DISCLAIMERS

24.1 You undertake, represent and warrant that:

(i) you shall comply, at your own expense, with all applicable present or future laws, statutes, instruments, regulations, orders, directives, enactments, including any amendment, extension or replacement thereof which is in force from time to time and which in any way relates to this Agreement and/or the provision of the Product Software or results from your obligations under this Agreement. Without limiting the foregoing, you shall comply with all contracting and procurement regulations associated with the Product Software;

(ii) you have full power and authority to enter into this Agreement;

(iii) you shall conduct your business in a manner that reflects favourably at all times on the Product Software and the name and goodwill of Eaton;

(iv) you shall make no representations, warranties, or guarantees on behalf of Eaton;

(v) you shall from refrain from amending or varying this Agreement.

24.2 Eaton makes no representations or warranties of any kind regarding the Product Software, the Material, information or any other matter, either express or implied, including, but not limited to implied warranties of fitness for a particular purposes, merchantability, title, accuracy/freedom from error, non-infringement or otherwise. You are not authorized to make any warranty commitment on Eaton's behalf, whether written or oral. You understand that the Product Software may include hyperlinks to other websites or content or resources. Eaton has no control over any websites or resources which are provided by companies or persons other than Eaton. You acknowledge and agree that Eaton is not responsible whatsoever for any harm suffered by you on or in any way due to any third party websites or resources, even where they are accessed from or referred or linked to such sites by the Product Software. You acknowledge and agree that Eaton is not responsible for the availability of any such external sites or resources, and does not endorse any advertising, products or other materials on or available from such websites or resources. You acknowledge and agree that Eaton is not liable for any loss or damage which may be incurred as a result of the availability of those external sites or resources, or as a result of any reliance placed by you on the completeness, accuracy or existence of any advertising, products or other materials on, or available from, such web sites or resources.

25 FORCE MAJEURE

25.1 Notwithstanding anything else contained in this Agreement, Eaton shall not be liable for any delay in providing the Product Software or support for the Product Software if such delay arises from or is attributable to acts, events or omissions beyond its reasonable control, including (but not limited to) pandemics, epidemics or endemics, nuclear accident, acts of God, war or terrorist activity, riot, civil commotion, malicious damages (excluding malicious damage involving your employees or your sub-contractors), compliance with any law or governmental order or regulation, accident, industrial action by employees of any provider of electrical power, breakdown of plant or machinery, fire, flood or storm (a "**Force Majeure Event**") subject to Eaton promptly notifying you in writing of the reasons for the delay and the expected duration of the delay.

25.2 The performance of Eaton shall be suspended during the period that the Force Majeure Event persists and Eaton shall be granted an extension of time for performance equal to the period of the delay arising as a result of the Force Majeure Event.

25.3 If a Force Majeure Event continues for more than sixty (60) calendar days, Eaton may terminate this Agreement immediately by notice in writing and neither shall be liable to the other by reason of this termination.

26 MISCELLANEOUS

26.1 If a term is found unenforceable or invalid, that term will be enforced to the maximum extent permissible and the remaining provisions of the Agreement will remain in full force and effect and an enforceable term will be substituted reflecting our intent as closely as possible. You may not assign or transfer any of your rights under this Agreement, and any such attempt will be void. Eaton may freely assign or transfer its rights to any of its affiliates or subsidiaries, or to any successor in interest of any business associated with the Product Software. Subject to the foregoing, this Agreement will bind and ensure to the benefit of the parties, their successors and permitted assigns. Eaton's failure to enforce a term of this Agreement is not a waiver of its right to do so later. No failure or delay by Eaton or its affiliates to exercise any right or enforce any obligation shall impair or be construed as a waiver or ongoing waiver of that or any other right or power. Waiving one breach will not be construed to waive any succeeding breach. All waivers must be in writing and signed by the party waiving rights.

27 REGULATORY MATTERS

27.1 The Product Software, Documentation and Materials as well as parts of any of these (e.g. new versions, releases, updates, upgrades, patches, fixes or correction of the Product Software) are subject to export laws of various countries, including, without limitation, the laws of the United States, the EU and Ireland ("Export Laws"). You agree that you will not submit the Product Software, Documentation or other Materials or parts of any of these to any government agency for licensing consideration or other regulatory approval without the prior written consent of Eaton, and that you will not export, re-export or import any Product Software, Documentation and/or Materials to countries, persons or entities prohibited by any applicable Export Law. You represent and warrant that you are not located within an embargoed nation and that you are not otherwise prohibited under the Export Laws from receiving access to or using the Product Software, Documentation or other Materials. In that context, you are responsible for complying with all applicable Export Laws. If Eaton wants to deliver and/or grant access to the Product Software, Documentation, Materials, or parts of any of these directly to you, you will support Eaton in obtaining any required authorization, approval or other consent from the competent authorities, by providing any necessary or useful declarations or other necessary or useful information, e.g. end user certificates, as may be requested by Eaton. You acknowledge that the delivery of and/or granting of access to the Product Software, Documentation and Materials as well as parts of any of these may be subject to the prior obtaining of export or import authorizations or both from the competent authorities and that this process may (i) considerably delay or prevent the delivery of and/or granting of access to the Product Software, Documentation and Materials or part of any of these, (ii) impact Eaton's ability to provide services and (iii) lead to Eaton having to limit, suspend or terminate your access to any services.

27.2 Eaton assumes no responsibility or liability:

(i) For any delay caused in the delivery and/or granting of access to the Product Software, Documentation and Materials or parts of any of these due to export or import authorizations or both having to be obtained from the competent authorities;

(ii) If any required authorization, approval or other consent for the delivery of and/or granting of access to Product Software, Documentation and Materials or parts of these cannot be obtained from the competent authorities; and

(iii) If the delivery of and/or granting of access to the Product Software, Documentation and Materials or parts of any of these is prevented due to applicable Export Laws; and

(iv) If access to any services has to be limited, suspended or terminated due to applicable Export Laws.

27.3 Eaton may terminate this Agreement with thirty (30) days' prior written notice if Eaton may not deliver or grant access to the Product Software, Documentation and Materials to you due to an embargo or other comparable trade sanction, which is expected to be in place for six (6) months or longer

27.4 If the Product Software is licensed to agencies of the U.S. Government, the Product Software is a "commercial item" as that term is defined at 48 C.F.R. § 2.101, consisting of "commercial computer software" and "commercial computer software documentation", as such terms are used in 48 C.F.R. § 12.212, and is provided to the U.S. Government only as a commercial end item. Consistent with 48 C.F.R. § 12.212 and 48 C.F.R. §§ 227.7202-1 through 227.7202-4, all U.S. Government End Users acquire the Product Software with only those rights set forth herein. Contractor/manufacturer is Eaton Corporation, 1000 Eaton Boulevard, Cleveland, Ohio 44122.

28 GOVERNING LAW AND JURISDICTION

28.1 [This Agreement and any dispute or non-contractual obligation arising out of, or in connection with, it shall be governed by, and construed in accordance with, the laws of Ireland. You agree that the courts of Ireland are to have exclusive jurisdiction to settle any dispute (including claims for set off and counterclaims), claims, actions, suits or other proceedings which may arise in connection with the creation, validity, effect, interpretation or performance of, or the legal relationships established by, this Agreement or otherwise arising in connection with this Agreement and for such purposes irrevocably submit to the jurisdiction of the Irish courts. You acknowledge and agree that you must initiate a cause of action for any claim(s) arising out of or relating to this Agreement and its subject matter within one (1) year from the date when you knew, or should have known after reasonable investigation, of the facts giving rise to the claim(s).

28.2 Notwithstanding the foregoing, any dispute or non-contractual obligation arising out of, or in connection with the Agreement, may be resolved by arbitration in accordance with the UNCITRAL Arbitration Rules. The parties shall seek to jointly appoint a single arbitrator. If they fail to reach an agreement to the name of the arbitrator within a period of fifteen (15) Business Days from the time when either party proposes the name of an arbitrator to the other party, then either party may apply to the Chairman of the Chartered Institute of Arbitrators in Ireland to nominate an arbitrator and that nominated person shall be the sole arbitrator for the purposes of this Agreement (the "Arbitrator"). The Arbitrator shall take its decision under Irish law and not in equity, and the decision of the Arbitrator shall be final and binding (save for fraud or manifest error). The place of arbitration shall be Dublin and the language of the arbitration shall be English.]

28.3 [To the extent not prohibited by law, You agree that this Agreement and all disputes, claims, actions, suits or other proceedings arising hereunder shall be governed by, and construed in accordance with, the substantive law of the State of Ohio applicable to contracts wholly made and to be performed within the State of Ohio, and to irrevocably submit to the sole and exclusive jurisdiction of the courts of Ohio or the Federal courts of the Northern District of Ohio,

and to irrevocably consent to the exercise of personal jurisdiction by such courts and waive any right to plead, claim or allege that Ohio is an inconvenient forum.]

29 AGREEMENT

29.1 This Agreement (and any associated order form or other agreements referenced herein) constitutes the entire and exclusive agreement between you and Eaton with respect to the subject matter of this Agreement, and supersedes and replaces any other prior or contemporaneous agreements, or terms and conditions applicable to the subject matter of this Agreement. No provisions in your purchase orders, or in any other business forms employed by you, will supersede the terms and conditions of this Agreement.

30 CONTACT US

Any questions regarding this Agreement should be directed to Eaton at:

Eaton

Attn: IP Law Group

1000 Eaton Boulevard

Mail Code 4N

Cleveland, OH 44122

Eaton

Attn: Global Data Protection and Privacy Office

1000 Eaton Boulevard

Cleveland, OH 44122

Email: dataprotection@eaton.com

APPENDIX 1A

Third Party Software

None

APPENDIX 1B

Eaton Open Source Components

1) Nlog

2) Syroot.KnownFolders

APPENDIX 2

Fees – No Fees. We offer this software when the customer buys the product

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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

Powering Business Worldwide

Eaton Electric Limited,
Great Marlings, Butterfield, Luton
Beds, LU2 8DL, UK.
Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283
E-mail: mtlenquiry@eaton.com
www.mtl-inst.com

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

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

ASIA-PACIFIC:
+65 6645 9888
sales.mtlsing@eaton.com