



**MM420-LR** Modbus Module

## Operation Manual

## **Warning**

**Use this product only in the manner described in this manual. If the equipment is used in a manner not specified by CTI, the protection provided by the equipment may be impaired. This equipment should be installed by qualified personnel.**

For technical support, contact:

### **CTI**

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### General Description

The MM420-LR Modbus Module is designed to allow communication between 4-20mA devices and a Modbus capable gas detection panel or PLC. It can be mounted directly or adjacent to a 4-20mA device using existing conduit.

Modbus communication allows the devices to be wired together in a daisy chain, reducing the need for individual sensors to be home run to the controller. 24Vdc power supplies may be added for devices where supply voltage drops below specified requirements.

The circuit board of the Modbus Module is potted inside the conduit body to prevent corrosion due to water or moisture, and is able to withstand harsh weather and wash-down environments. This allows the Modbus module to be used in any environment a 4-20mA device may be located.

### Modbus Communication

The MM420-LR converts analog signals to Modbus Protocol as commands and responses are passed between a gas detection panel, or PLC, and an attached 4-20mA device.

For system compatibility be aware that the MM420-LR communicates via 8-E-1 data format at 9600 baud.

## Installation

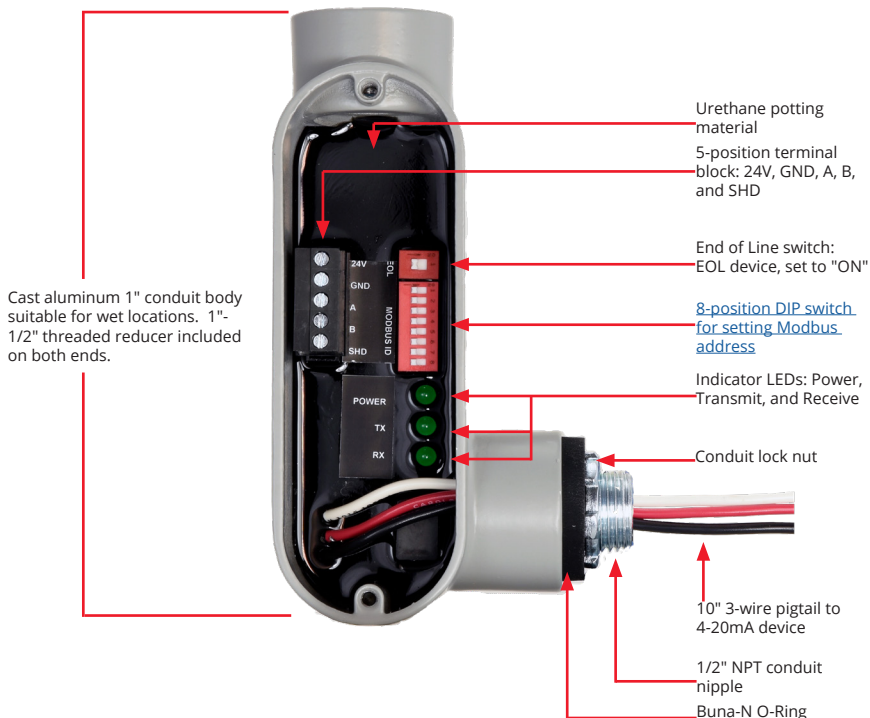
The Modbus Module should be installed near or adjacent to a 4-20mA device.

Installation should be performed by licensed and authorized personnel

- Mount the module where it is easily accessible for operating personnel.
- Mount the module directly to the same conduit leading to the 4-20mA device; using conduit fittings appropriate for the environment.
- May be mounted to either 1" or 1/2" conduit using threaded reducer.
- Avoid mounting near electromagnetic interference.
- Protect from physical damage.
- If module cannot be mounted next to the 4-20mA device, attach to junction box so that it can be serviced.



## Features



## Wiring

Electrical wiring must comply with all applicable codes.

Each MM420-LR Modbus Module has a single five terminal connector 24V, GND, A, B, and SHLD; to which both power and communications can be tied.

Use pigtails to tie to the 4-20mA device for 24V, Sig, and GND.

To prevent electrical interference do not pull MM420-LR wiring along with AC power cables.

## Communications Wiring:

Modbus communication requires all devices be wired in parallel. All 'A' terminals must be connected together and all 'B' terminals must be connected together respectively.

- Use RS-485 communication cable, 22-24 AWG, 2 conductor, twisted pair, stranded, with drain wire (Alpha 6460, or equivalent).
- 4,000 ft max per Modbus channel.
- Avoid splices and T-taps. All terminations should be made at network device wire terminals.
- Wire shields must be connected at all shield terminals, creating a continuous shield run from the controller to the device at the end of the line.

### **Device Power Wiring:**

It is recommended to use T-taps for 24Vdc power, the cables may be pulled with the communication cables.

These cables can share the same conduit.

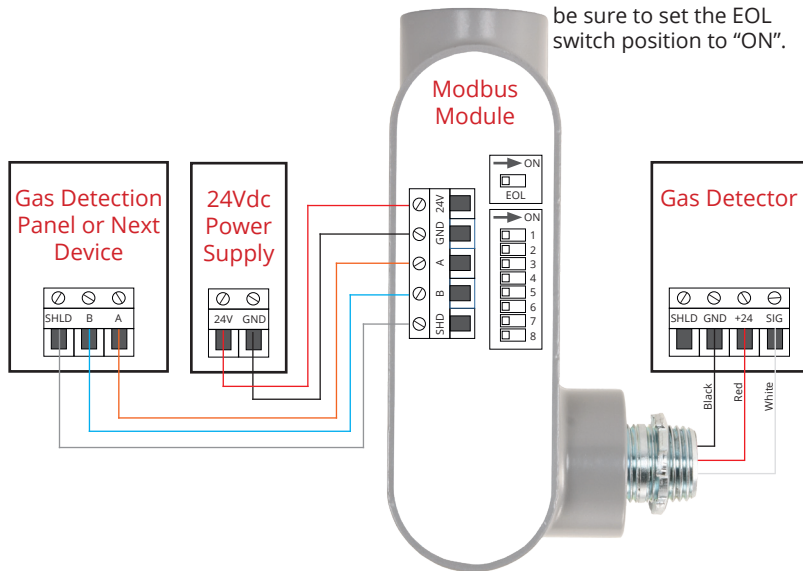
- Use 2-conductor 12 AWG stranded copper cable (General Cable C2410A or equivalent).
- Contact CTI for help with device wiring recommendations.

**Caution:** To prevent excessive voltage drops and/or power supply overloads, take into account all 24Vdc devices on each power supply. This includes gas detectors, horn-strobes, stack-lights, etc. Total current draw for all devices should not exceed the power supply rating.

**Note:** If additional power supplies are added, they must have their 24Vdc isolated from other supplies. Additional power supplies must have their grounds tied together.



## Wiring Diagram



## Modbus Address

The MM420-LR must be addressed to your Modbus control panel via the 8-position DIP switch located within the enclosure to allow the control panel to communicate. Each Modbus module may be addressed 1-255 depending on the sequence of the switch positions.

To ensure you are setting the switch to the correct address please use the [Modbus DIP Switch Tool](#) at ctigas.com.

**1****128****255**

## Modbus Register

Modbus communication requires the gas detection panel, or PLC, to be configured with appropriate register values for the MM420-LR to allow the signal from the 4-20mA device to be read by panel.

### Input Register Map

Input Reg	Register	Type	NR	Min	Max	Notes
91	Signal Value*	IR	1	-0.25	1.25	% FS (((0 to +15,000)-2,500)/10,000)

\*Any Signal equal to or below 625 should be considered a fault.

## Maintenance

After completing any maintenance, a review of the wiring and DIP switch should be completed to ensure that all connections are made and the device address is set properly.

The Modbus Module should be cleaned with a damp soft cloth. Do not use solvents or chemicals.

## Specifications

**Voltage:** 24VDC

**Device Current:** 25mA @ 24VDC

**Pass Through Current:** 2A Max @ 24VDC

**Analog Input:** 25mA Max

**Communication:** 4-20mA Analog to RS485 Modbus

**Data Format:** 8-E-1 @ 9600 baud

**Operating Temperature:** -49°F-120°F (-45°C-49°C)

**Humidity:** 5-100% Condensing

**Altitude:** 2000m (6561 feet)

**Enclosure:** Cast Aluminum conduit body suitable for wet locations (UL 514A)

**Warranty:** 2 years

## Limited Warranty & Limitation of Liability

Calibration Technologies, LLC. (CTI) warrants this product to be free from defects in material and workmanship under normal use and service for a period of two years (including the sensor element), beginning on the date of shipment to the buyer. This warranty extends only to the sale of new and unused products to the original buyer. CTI's warranty obligation is limited, at CTI's option, to refund of the purchase price, repair, or replacement of a defective product that is returned to a CTI authorized service center within the warranty period. In no event shall CTI's liability hereunder exceed the purchase price actually paid by the buyer for the product.

This warranty does not include:

- a) routine replacement of parts due to the normal wear and tear of the product arising from use;
- b) any product which in CTI's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling or use;
- c) any damage or defects attributable to repair of the product by any person other than an authorized dealer or contractor, or the installation of unapproved parts on the product.

The obligations set forth in this warranty are conditional on:

- a) proper storage, operation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of CTI;
- b) the buyer promptly notifying CTI of any defect and, if required, promptly making the product available for correction. No goods shall be returned to CTI until receipt by the buyer of shipping instructions from CTI; and
- c) the right of CTI to require that the buyer provide proof of purchase such as the original invoice, bill of sale or packing slip to establish that the product is within the warranty period.

THE BUYER AGREES THAT THIS WARRANTY IS THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CTI SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT OR RELIANCE OR ANY OTHER THEORY.



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