PYTHIA TECHNOLOGIES
data transformation solutions

User Guide
CM03A Universal IO Module

Version 1, 11/2016

Contents

Change History

Date	Version	Change
Nov, 2016	1	New

1. INTRODUCTION

1.1 About this manual

The purpose of this manual is to provide instructions to simply and quickly install and operate the Contact Module 3A. The manual begins with a general description of the product followed by the instructions for correct hardware installation. Its configuration and operation of the device are described in detail later in the manual.

1.2 General Description

The CM03A is a general-purpose input module. The CM03A provides convenient termination for field devices and interfacing to your HVAC, lighting, temperature sensors, and other typical building automation applications. Each of the analog inputs can be configured via Modbus for either 0-5V, 0-10V, 4-20mA, thermistor or dry contact. The modules are slave devices that can be easily controlled via the RS485 serial or Ethernet interface using the industry standard Modbus Protocol. Standard DIN-rail mounting allows for a wide variety of mounting options.

Highlights:

- Surge-Protected Analog Inputs with 12-bit Resolution
- High Impact Plastic Enclosure provides durability in commercial environments
- Standard Modbus Protocol allows for up to 254 unique devices on one RS485 Network

1.3 Technical Data

22 Analog Inputs:	0-5V, 0-10V, 4-20mA, 10K Thermistor or Dry Contacts
Operating Temperature:	-30~70°C (-22~158°F)
Supply Voltage:	15~24VAC/DC ±10%, 50-60Hz
Power Consumption:	100mA at 12VDC
Ambient Humidity:	10-90 %Rh

Plastic Housing Flammability Rating: UL 94V0 File E194560
Enclosure Rating: IP31

1.4 Standard Operation

The CM03A ships from the factory with Modbus RTU (EIA-485, 2-wire) and Modbus TCP enabled. Both protocols can be used to monitor the device, or change device properties. Refer to the remaining sections of this document for instructions on how to connect to the module for monitoring and configuration.

1.5 Accessing Modbus via Ethernet Communications

The CM03A has a built-in network interface for communication over an Ethernet Network. Communication is currently implemented using Modbus TCP Protocol. A static IP address is defined by default, however DHCP is and an available option once enabled. (See explanation for register 40062). In order to change the IP address of the CM03A module, the user must write the new IP address parameters to registers 40063 – 40074. Once writing is completed, then write to register 40077 to save the settings and reboot the module. Change your IP to the valid IP address for access.

1.5.1 Modbus TCP default network parameters

- 169.254.254.1 (IP address)
- 255.255.255.0 (subnet)
- 169.254.0.1 (gateway)
- 2 = Modbus Slave ID

Note: Your PC will need to have a static address assigned on the same subnet in order to access the module. For example, set your PC to: 169.254.254.10 / 255.255.255.0 / gateway is not necessary when directly connected.

1.6 Accessing Modbus via Serial Communications

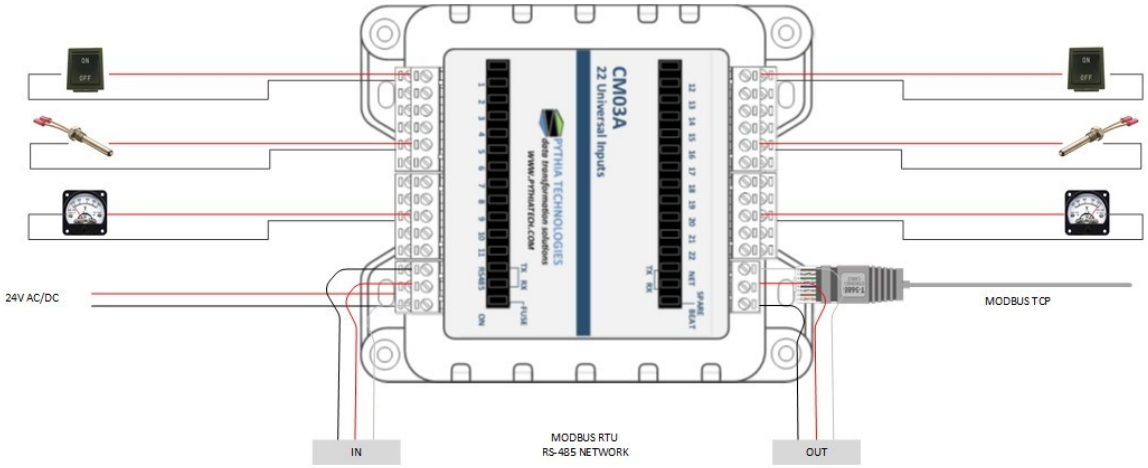
The CM03A has a built-in serial interface for communication over an RS485 Network. Communication is implemented using Modbus RTU Protocol. EIA-485 ports exist on both sides of the module to allow for easy daisy-chaining. The ports are “bussed” together so either port will work for your application.

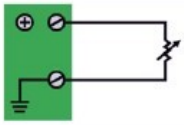
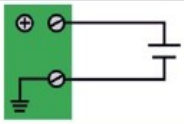
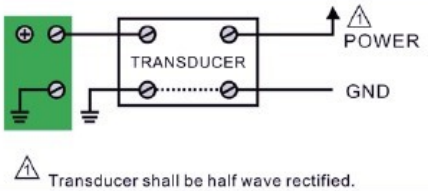
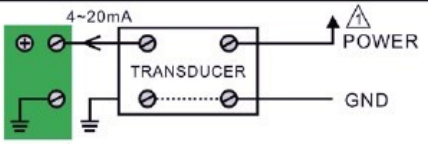
1.6.1 Modbus RTU (EIA-485) serial parameters

- 2-wire @ 19200, 8, N, 1
- Slave ID = 2

1.7 Wiring Terminations

The CM03A can be connected to a computer via the RJ-45 Ethernet jack (Modbus TCP) or a Modbus 485 via RS-232/USB to RS-485 converter. Follow the wire termination example below for sensors and contact connectivity.



Title	Typical Wiring Diagram
Thermistors	
Dry Contacts	
Transducer Signal 0-10V 0-5V	 ⚠1 Transducer shall be half wave rectified.
Transducer 4-20mA	 ⚠1 Transducer shall be half wave rectified.

2. MODBUS REGISTER DETAILS

To configure the CM03A module, Modbus WRITE to the following registers.

2.1 Set Modbus Address

REGISTER	VALUE	NOTES
40007	2	Sets Modbus address to 2 (default) Values 1-254

2.2 Set Modbus Baud Rate

REGISTER	VALUE	NOTES
40016	1	Sets Modbus baud rate to 19,200bps (default) • Value 0 = 9600bps • Value 1 = 19200bps • Value 2 = 38400bps • Value 3 = 57600bps • Value 4 = 115200bps

2.3 Set IP Address

To configure the IP address to the CM03A module, WRITE to the following registers. Once registers 40062 thru 40074 are complete, write to register 40077 to save the new settings. The CM03A will reboot.

REGISTER	VALUE	NOTES
40062	0	0 Turns DHCP off
40063	169	sets IP address to 169.254.254.1 (default)
40064	254	
40065	254	
40066	1	
40067	255	sets netmask to 255.255.0.0 (default)
40068	255	
40069	0	
40070	0	
40071	169	sets gateway to 169.254.0.1 (default)
40072	254	
40073	0	
40074	1	
40077	1	updates GHOST IP settings and reboots module

2.4 Set Input Types

By default, all inputs will be configured for dry-contacts and digital values (ex. TYPE 12 and DIGITAL 0). Write to Modbus registers 40226 – 40247 to change the sensor type based on the table below. You must also write to registers 40270 – 40291 to change from digital to analog value types.

SENSOR DESCRIPTION	TYPE	DIGITAL / ANALOG	NOTES
10K Thermistor Deg.C	3	1	degrees C x 100
10K Thermistor Deg.F	4	1	degrees F x 100
0-5VDC	11	1	raw 0-5VDC value x 100
Dry Contact	12	0	0=OFF/OPEN, 1 = ON/CLOSED
4-20ma	13	1	raw 4-20ma value x 100, ex. 2000 = 20.00ma
4-20ma	18	1	0-100% value x 100, ex. 10000 = 100%
0-10VDC	19	1	raw 0-10VDC value x 100

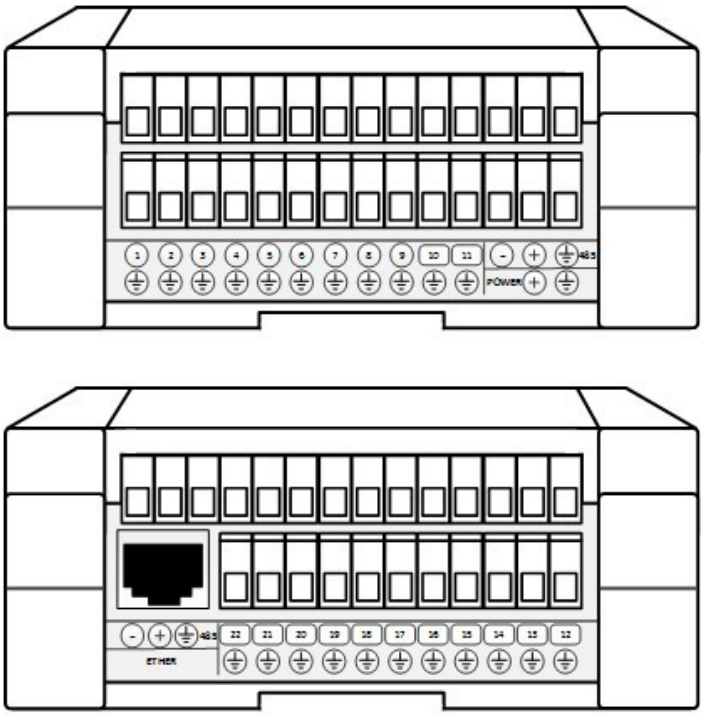
REGISTER	VALUE	REGISTER	VALUE	DESCRIPTION	NOTES
40226	12	40270	0	Input 1	factory default for all input type registers
40227	18	40271	1	Input 2	ex. 4-20ma sensor reading as 0-100%
40228	11	40272	1	Input 3	ex. 0-5VDC
40229	12	40273	0	Input 4	ex. dry-contact
40230	12	40274	0	Input 5	
40231	12	40275	0	Input 6	
40232	12	40276	0	Input 7	
40233	12	40277	0	Input 8	
40234	12	40278	0	Input 9	
40235	12	40279	0	Input 10	
40236	12	40280	0	Input 11	
40237	12	40281	0	Input 12	
40238	12	40282	0	Input 13	
40239	12	40283	0	Input 14	
40240	12	40284	0	Input 15	
40241	12	40285	0	Input 16	
40242	12	40286	0	Input 17	
40243	12	40287	0	Input 18	
40244	12	40288	0	Input 19	
40245	12	40289	0	Input 20	
40246	12	40290	0	Input 21	
40247	12	40291	0	Input 22	

2.5 Read Modbus Registers (All registers are INT32 regardless of sensor type)

REGISTER	# of REGISTERS	TYPE	DESCRIPTION
40101	2	Integer	Input 1
40103	2	Integer	Input 2
40105	2	Integer	Input 3
40107	2	Integer	Input 4
40109	2	Integer	Input 5
40111	2	Integer	Input 6
40113	2	Integer	Input 7
40115	2	Integer	Input 8
40117	2	Integer	Input 9
40119	2	Integer	Input 10
40121	2	Integer	Input 11
40123	2	Integer	Input 12
40125	2	Integer	Input 13
40127	2	Integer	Input 14
40129	2	Integer	Input 15
40131	2	Integer	Input 16
40133	2	Integer	Input 17
40135	2	Integer	Input 18
40137	2	Integer	Input 19
40139	2	Integer	Input 20
40141	2	Integer	Input 21
40143	2	Integer	Input 22

3. INSTALLATION

3.1 Terminal Block Connections



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