Interchange™ Comm Control Module, MX4-R2 Series

Operations Manual

For Models with Date Codes S8 or Higher

WARNING

BEFORE BEGINNING INSTALLATION OF THIS FW MURPHY PRODUCT:

- Please read the following information before installing the MX4-R2 Module. This installation information is intended for MX4-R2 Module only.

- Visually inspect the product for any damage during shipping.

- Before proceeding, please visit our website and review our support documentation including Wiring the Murphy Way www.fwmurphy.com/uploaded/WIR_Murphy_Way.pdf

- Disconnect all power and be sure machine is inoperative before beginning installation.

- Installation is to be done only by a qualified technician of the Responsible Body.

- Observe all Warnings and Cautions at each section in these instructions.

- Device shall be wired in accordance with NEC, CEC or other local code, as applicable.

- Please contact FW Murphy immediately if you have any questions.

For Class I, Division 2:

THIS EQUIPMENT IS AN OPEN-TYPE DEVICE AND IS MEANT TO BE INSTALLED IN AN ENCLOSURE SUITABLE FOR THE ENVIRONMENT SUCH THAT THE EQUIPMENT IS ONLY ACCESSIBLE WITH THE USE OF A TOOL.

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D OR NON-HAZARDOUS LOCATIONS ONLY.

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN REMOVED OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

WARNING – EXPLOSION HAZARD – DO NOT REPLACE BATTERIES UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

TEMPERATURE CODE OF T4 FOR ALL MODELS.

PROVIDES NONINCENDIVE FIELD WIRING OUTPUTS/INPUTS WHEN WIRED ACCORDING TO DRAWING 50-08-0103 (MX4-R2-X).

For AEX/EX Class I, Zone 2:

THE EQUIPMENT SHALL ONLY BE USED IN AN AREA OF POLLUTION DEGREE 2.

THE EQUIPMENT SHALL BE INSTALLED COMPLETELY WITHIN AN ENCLOSURE THAT PROVIDES A MINIMUM INGRESS PROTECTION OF IP 54 IN ACCORDANCE WITH UL60079-0 AND ONLY ACCESSIBLE BY THE USE OF A TOOL.

THE WIRE SIZE, TORQUE RATING OF 12-24 AWG, 0.37-0.44 ft. lbs.(0.4-0.5 Nm), AND SUITABLE
SUPPLY WIRE TEMPERATURE RATING OF 97ºC MINIMUM SHALL BE PROVIDED FOR THE INPUT POWER TERMINAL BLOCK.

ALL MARKING INFORMATION EXCEPT FOR SERIAL NUMBER/DATE CODES SHALL BE REPEATED.

PROVIDES NONINCENDIVE FIELD WIRING OUTPUTS/INPUTS WHEN WIRED ACCORDING TO DRAWING 50-08-0103 (MX4-R2-X).

SPECIAL CONDITIONS FOR USE IECEx/ATEX Zone 2:

THE EQUIPMENT SHALL ONLY BE USED IN AN AREA OF NOT MORE THAN POLLUTION DEGREE 2, AS DEFINED IN IEC/EN 60664-1.

THE EQUIPMENT SHALL BE INSTALLED IN AN ENCLOSURE THAT PROVIDES A DEGREE OF PROTECTION NOT LESS THAN IP 54 IN ACCORDANCE WITH IEC/EN 60079-0 AND ONLY ACCESSIBLE BY THE USE OF A TOOL.

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FW Murphy Interchange Comm Control Module Series

The MX4-R2 expansion module provides temperature and frequency input capability to the Centurion and future generations of FW Murphy Controllers using CAN proprietary communication with enhanced diagnostics. A serial RS485 port and 2 Ethernet ports also provide communication methods to work with any Modbus RTU or TCP/IP client device. MX4-R2 is backward compatible with MX4. Load Rockwell IO Application for EtherNet/IP (CIP) Protocol function.

Accessories

MX4-R2 Plug Kit (00032656) Printed Terminal Plugs for MX4-R2 Expansion I/O Module

Specifications

- Operating temperature: -40° to 185° F (-40° to 85° C)
- Power input: 14.1 W max 10-30 VDC
- All input options individually software selectable.
- 18* temperature inputs:
    - J or K Type Thermocouples (ungrounded)
    - Cold junction compensation
- 9* 3-wire 100Ω Pt RTD temperature inputs**
- Open circuit, short DC-, short DC+ wire fault detection
- One magnetic pickup input*/AC run signal
    - 30 Hz to 10 kHz
- 4 Communication ports:
    - Serial RS485
        - Protocol: MODBUS RTU (server)
    - CAN
        - Protocol: Proprietary for FW Murphy hardware
    - Two Ethernet 10/100 (DLR), Single MAC ID:
        - Protocol: Modbus TCP/IP (server) standard or Ethernet/IP (CIP) in Rockwell IO Application Mode
- Third-party approvals for MX4-R2:
    - Class I, Div 2, Grps A,B,C,D Haz. Loc. T4
    - Class I, Zone 2, AEx ec [ic] IIC T4 Gc
               Ex ec [ic] IIC T4 Gc X
    - ATEX Zone 2:
        - ⟨Ex⟩ II 3G Ex ec [ic] IIC T4 Gc
        - DEMKO 18 ATEX 1926X
            - -40°C ≤ Tamb ≤ +85°C
    - IECEx Zone 2:
        - Ex ec [ic] IIC T4 Gc
        - IECEx UL 18.0072X
            - -40°C ≤ Tamb ≤ +85°C

* Non-incendive. Temperature Inputs are intrinsically safe and non-incendive.

** RTD=Resistive Temperature Device, American RTD Standard, TCR 0.00392, units Ohms/Ohm / deg. between 0-100 C.

NOTE: For each channel that is selected as RTD, 2 thermocouple channels are used and no longer available as thermocouple channels.

DIP Switch and LED Codes

DIP Power-up Functions

- **DIP Power-up Functions:** There is a special feature for switching module operation mode that is activated by setting specific switch positions at power up. Change will only occur if the following switches are set CLOSED at power up. All other times, these switches behave as address selections.

  - DIP switches 5-8 CLOSED at power up activates special mode to change the module behavior based on switches 1-4 position.
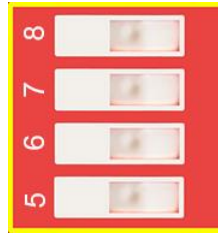
5-8 CLOSED

  - 1-4 CLOSED: Load factory defaults to non-volatile settings – restores serial baud rate, Ethernet address and channel configurations to default values.

  - 1 OPEN, 2-4 CLOSED: Load Rockwell IO Application.

  - 2 OPEN, 1, 3, 4 CLOSED: Load Standard IO Application.
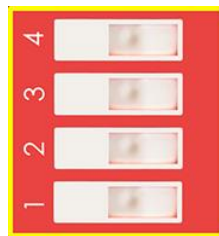
1-4 CLOSED   1 OPEN, 2-4 CLOSED   2 OPEN,1, 3, 4 CLOSED

Controller Operating Properly (COP) LED Codes

Blink codes will be 2 digits separated by pauses with each blink code further separated by a rapid blink event.

- Blink codes will be ¼ second ON and ¼ second OFF.
- Pauses will be ¾ second OFF.
- The separator will be a 2 ½-seconds pause.
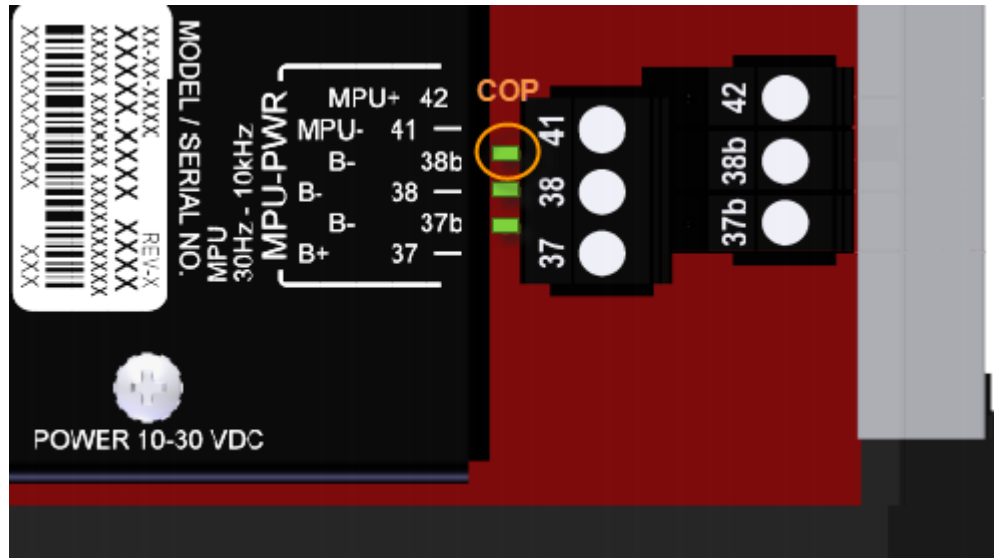
Blink Codes *	Code Description
1, 1	Startup Error
4, 1	Rockwell Automation IO Application Mode
4, 2	Standard IO Application Mode
4, 3	Custom Application Mode
* There will be a ¾ second pause between the digits.	

NOTE: A fast flash (100ms on/off) = Running in bootloader mode. Bootloader is the mode used for switching applications or module reprogramming via external CAN tools.

Communications for Standard IO Application Mode (default)

Physical Layer: The MX4-R2 module features two Ethernet ports, one RS485 serial communication port and one CAN bus 2.0B communication port.

Ethernet Interconnect: Two RJ45 jacks with single MAC ID. This connection may require setting the IP address of the module to the desired network configuration. Ethernet port settings can be changed by modifying Modbus registers. Default setting is 192.168.0.100 IP, 255.255.255.0 network mask, 0.0.0.0 Gateway.

Ethernet Protocol: Modbus TCP/IP server. Refer to the Modbus RTU map provided in this manual for a detailed mapping of the available data and data scaling.

Serial RS485 Interconnect: Screw terminals. Typically, this connection uses twisted shielded pair cable with 120-ohm impedance. RS485 networks are 2-wire, half-duplex and feature an "A" terminal 49 and "B" terminal 50. The A terminal is the + or non-inverting signal, and the B terminal is the – or inverting signal. These signal lines will take turns transmitting and receiving depending on the device using the RS485 network at any given instant.

Serial Baud Rate: Default 9600, adjustable up to 115.2k.

Serial Stop Bits: The module will respond with 1 stop bit for Modbus RTU addresses 1 through 31 and 2 stop bits for addresses 32 through 239. This maintains flexibility for systems requiring 2 stop bits.

Serial Protocol: Modbus RTU server. The module may be polled by the Modbus RTU Client without any additional timing delays and response times will be < 100mS. This may vary depending on the amount of data requested. Modbus RTU timeout settings should be set to >= 400mS.

Refer to the Modbus RTU map provided in this manual for a detailed mapping of the available data and data scaling.

CAN bus Interconnect: Screw terminals. Typically, this connection uses twisted pair cable with 120-ohm impedance to connect to a FW Murphy Controller. CAN bus networks are 2-wire with a "HI" terminal 52 and "LOW" terminal 53.

CAN bus Baud Rate: 250kbit/500kbit/1000kbit auto sense.

CAN bus Protocol: Proprietary for FW Murphy Controllers.

PC Connection: Reading data from the module into a PC may be done with an Ethernet connection and Modbus TCP/IP client software or RS485 connection and Modbus RTU client software. A serial interface converter that can convert USB to RS485 would be needed for a serial connection. (FW Murphy MConfig™ Software and P/N 53702325 may be used for this purpose.)

Communications for Rockwell Automation IO Mode

Physical Layer: The MX4-R2 module features two Ethernet ports.

Ethernet Interconnect: Two RJ45 jacks with Single MAC ID. This connection may require setting the IP address of the module to the desired network configuration. Ethernet port settings can be changed by modifying Modbus registers. Default setting is 192.168.0.100 IP, 255.255.255.0 network mask, 0.0.0.0 Gateway.

Ethernet Protocol: CIP for use with Rockwell Automation IO.

Modbus Holding Register Description (Standard IO Application Mode)

All data will be contained in 16-bit Modbus Holding Registers. Following the Modbus RTU and Modbus TCP/IP specification, the Most Significant Byte in a 16-bit word is broadcast first, followed by the Least Significant Byte. The module responds to Modbus Function Code 03 (Read Holding Registers), Function Code 06 (Preset Single Holding Register) and Function Code 16 (Preset Multiple Holding Register). Polling invalid/non-existent data will result in Modbus Exception Code response from the module.

Modbus Holding Register Description Used With Standard IO Application Mode					
Modbus Register	Description	Read/ Write	Data Range	Data Units	Definitions / Sample Data
400001	Hardware Type	R	32	ID	Module name
400002 – 400004	Factory Use	R			
400005	Bootloader Build Version	R	0 – 65535		Version number
400006	Not Used	R			
400007	Firmware Number	R	0 – 65535		Version number
400008	Firmware Build Version	R	0 – 65535		Version number
400009	Firmware Checksum MSW	R	0 – 65535		
400010	Firmware Checksum LSW	R	0 – 65535		
400011	Firmware Major Version	R	0 – 65535		Version number
400012	Firmware Minor Version	R	0 – 65535		Version number
400013	Bootloader Major Version	R	0 – 65535		Version number
400014	Bootloader Minor Version	R	0 – 65535		Version number
400015 – 400020	Factory Use	R			
400021	System Voltage	R	0-65535	Vdc x10	0 = 0.0 VDC, 320 = 32.0 VDC
400022	Raw Channel 1	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400023	Raw Channel 2	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400024	Raw Channel 3	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400025	Raw Channel 4	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400026	Raw Channel 5	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400027	Raw Channel 6	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400028	Raw Channel 7	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400029	Raw Channel 8	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400030	Raw Channel 9	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400031	Raw Channel 10	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400032	Raw Channel 11	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400033	Raw Channel 12	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400034	Raw Channel 13	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400035	Raw Channel 14	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV

Modbus Holding Register Description Used With Standard IO Application Mode					
Modbus Register	**Description**	**Read/ Write**	**Data Range**	**Data Units**	**Definitions / Sample Data**
400036	Raw Channel 15	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400037	Raw Channel 16	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400038	Raw Channel 17	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400039	Raw Channel 18	R	-32767 – 32768	mV x100	0 = 0.00 mV, 7500 = 75.00 mV
400040	Raw Cold Junction Input	R	0 – 65535	A/D count	
400041	Not Used	R			
400042	Frequency input	R	0 – 10,000	Hz	
400043	Factory Use	R			
400044	Not Used	R			
400045	Filtered Temperature Channel 1	R	-2000 to +25000	deg F X10	
400046	Filtered Temperature Channel 2	R	-2000 to +25000	deg F X10	
400047	Filtered Temperature Channel 3	R	-2000 to +25000	deg F X10	
400048	Filtered Temperature Channel 4	R	-2000 to +25000	deg F X10	
400049	Filtered Temperature Channel 5	R	-2000 to +25000	deg F X10	
400050	Filtered Temperature Channel 6	R	-2000 to +25000	deg F X10	
400051	Filtered Temperature Channel 7	R	-2000 to +25000	deg F X10	
400052	Filtered Temperature Channel 8	R	-2000 to +25000	deg F X10	
400053	Filtered Temperature Channel 9	R	-2000 to +25000	deg F X10	
400054	Filtered Temperature Channel 10	R	-2000 to +25000	deg F X10	
400055	Filtered Temperature Channel 11	R	-2000 to +25000	deg F X10	
400056	Filtered Temperature Channel 12	R	-2000 to +25000	deg F X10	
400057	Filtered Temperature Channel 13	R	-2000 to +25000	deg F X10	
400058	Filtered Temperature Channel 14	R	-2000 to +25000	deg F X10	
400059	Filtered Temperature Channel 15	R	-2000 to +25000	deg F X10	
400060	Filtered Temperature Channel 16	R	-2000 to +25000	deg F X10	
400061	Filtered Temperature Channel 17	R	-2000 to +25000	deg F X10	
400062	Filtered Temperature Channel 18	R	-2000 to +25000	deg F X10	
400063	Cold Junction Temperature	R	-400 to +1850 F	deg F X10	
400064	Factory Use	R			
400065	Factory Use	R			
400066	Factory Use	R			
400067	Unfiltered Temperature Channel 1	R	-2000 to +25000	deg F X10	
400068	Unfiltered Temperature Channel 2	R	-2000 to +25000	deg F X10	
400069	Unfiltered Temperature Channel 3	R	-2000 to +25000	deg F X10	
400070	Unfiltered Temperature Channel 4	R	-2000 to +25000	deg F X10	
400071	Unfiltered Temperature Channel 5	R	-2000 to +25000	deg F X10	

	Modbus Holding Register Description Used With Standard IO Application Mode				
Modbus Register	**Description**	**Read/ Write**	**Data Range**	**Data Units**	**Definitions / Sample Data**
400072	Unfiltered Temperature Channel 6	R	-2000 to +25000	deg F X10	
400073	Unfiltered Temperature Channel 7	R	-2000 to +25000	deg F X10	
400074	Unfiltered Temperature Channel 8	R	-2000 to +25000	deg F X10	
400075	Unfiltered Temperature Channel 9	R	-2000 to +25000	deg F X10	
400076	Unfiltered Temperature Channel 10	R	-2000 to +25000	deg F X10	
400077	Unfiltered Temperature Channel 11	R	-2000 to +25000	deg F X10	
400078	Unfiltered Temperature Channel 12	R	-2000 to +25000	deg F X10	
400079	Unfiltered Temperature Channel 13	R	-2000 to +25000	deg F X10	
400080	Unfiltered Temperature Channel 14	R	-2000 to +25000	deg F X10	
400081	Unfiltered Temperature Channel 15	R	-2000 to +25000	deg F X10	
400082	Unfiltered Temperature Channel 16	R	-2000 to +25000	deg F X10	
400083	Unfiltered Temperature Channel 17	R	-2000 to +25000	deg F X10	
400084	Unfiltered Temperature Channel 18	R	-2000 to +25000	deg F X10	
400085 - 400087	Factory Use	R			
400088	Channel 1 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	Strict option enables advanced wire fault detection for DC-/DC+ mV leak/temperature shift.
400089	Channel 2 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400090	Channel 3 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	
400091	Channel 4 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400092	Channel 5 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	
400093	Channel 6 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400094	Channel 7 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	
400095	Channel 8 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400096	Channel 9 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	
400097	Channel 10 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400098	Channel 11 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	

Modbus Holding Register Description Used With Standard IO Application Mode					
Modbus Register	Description	Read/ Write	Data Range	Data Units	Definitions / Sample Data
400099	Channel 12 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400100	Channel 13 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	
400101	Channel 14 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400102	Channel 15 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	
400103	Channel 16 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400104	Channel 17 type	R/W	0 - 9	0 = J, 1 = K, 2 = 100Ω Pt RTD, 8 = J Strict, 9 = k Strict	
400105	Channel 18 type	R/W	0 – 9	0 = J, 1 = K, 8 = J Strict, 9 = k Strict	
400106	Cold junction offset	R/W	-32768 to +32767	deg F	Modify this value to offset the cold junction reading
400107	Not Used	R			
400108	Not Used	R			
400109	Communication Timeout	R/W	0 – 65535	time in seconds	
400110	Serial Port Baud Rate	R/W	1-5	Enumeration	1=9600, 2=19.2k, 3=38.4k, 4=57.6k, 5=115.2k
400111-400140	Factory Use	R			
400141	Channel 1 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400142	Channel 2 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400143	Channel 3 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400144	Channel 4 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400145	Channel 5 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+

Modbus Holding Register Description Used With Standard IO Application Mode					
Modbus Register	**Description**	**Read/ Write**	**Data Range**	**Data Units**	**Definitions / Sample Data**
400146	Channel 6 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400147	Channel 7 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400148	Channel 8 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400149	Channel 9 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400150	Channel 10 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400151	Channel 11 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400152	Channel 12 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400153	Channel 13 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400154	Channel 14 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400155	Channel 15 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400156	Channel 16 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
400157	Channel 17 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+

Modbus Holding Register Description Used With Standard IO Application Mode					
Modbus Register	Description	Read/Write	Data Range	Data Units	Definitions / Sample Data
400158	Channel 18 Status	R	1 –7	enumeration	1 = TC OK, 2 = RTD OK, 3 = OPEN, 4 = MINOR SHORT DC-, 5= MAJOR SHORT DC-, 6 = MINOR SHORT DC+, 7 = MAJOR SHORT DC+
465197	IP Address Part 1	R/W	0-255	octet	Ethernet setting
465198	IP Address Part 2	R/W	0-255	octet	Ethernet setting
465199	IP Address Part 3	R/W	0-255	octet	Ethernet setting
465200	IP Address Part 4	R/W	0-255	octet	Ethernet setting
465201	Network Mask Part 1	R/W	0-255	octet	Ethernet setting
465202	Network Mask Part 2	R/W	0-255	octet	Ethernet setting
465203	Network Mask Part 3	R/W	0-255	octet	Ethernet setting
465204	Network Mask Part 4	R/W	0-255	octet	Ethernet setting
465205	Gateway Address Part 1	R/W	0-255	octet	Ethernet setting
465206	Gateway Address Part 2	R/W	0-255	octet	Ethernet setting
465207	Gateway Address Part 3	R/W	0-255	octet	Ethernet setting
465208	Gateway Address Part 4	R/W	0-255	octet	Ethernet setting
465209	DNS1 Address Part 1	R/W	0-255	octet	Ethernet setting
465210	DNS1 Address Part 2	R/W	0-255	octet	Ethernet setting
465211	DNS1 Address Part 3	R/W	0-255	octet	Ethernet setting
465212	DNS1 Address Part 4	R/W	0-255	octet	Ethernet setting
465213	DNS2 Address Part 1	R/W	0-255	octet	Ethernet setting
465214	DNS2 Address Part 2	R/W	0-255	octet	Ethernet setting
465215	DNS2 Address Part 3	R/W	0-255	octet	Ethernet setting
465216	DNS2 Address Part 4	R/W	0-255	octet	Ethernet setting
465217	Ethernet IP Options	R/W	0-4	Bitmap	0=static ip / no auto IP 1= DHCP enabled / no auto IP 2 = static ip / use Auto IP if no DHCP or IP 3 = DHCP enabled / use Auto IP if no DCHP or IP
465218	MAC Address word 1	R	0 – 65535		
465219	MAC Address word 2	R	0 – 65535		
465220	MAC Address word 3	R	0 – 65535		

Register 400001 Value Description

Register 400001 is a read-only register. This register holds the model number of the hardware. If you are using multiple Comm modules, it is sometimes helpful to confirm that you are communicating with the expected module type. In this case, it will return 32.

Unfiltered Temperature Readings (400045 – 400064)

Registers 400045 – 400064 are read-only registers. The values returned in these registers are signed 16-bit data. These channels are the actual readings from the connected sensor. Channels are shown in degrees F x 10. For example, a read value of 1200 means 120°F is being read.

> **NOTE**: These values are not averaged. The device reading these values may need additional software filtering to remove noise in the readings.

Filtered Temperature Readings (400067 – 400084)

Registers 400067 – 400084 are read-only registers. The values returned in these registers are signed 16-bit data. These channels are filtered internally with a median value of 3 samples and then running average of last 4 readings. This will require approximately 400ms for an accurate reading on initial powerup. Thermocouple channels are shown in deg F x 10. For example, a read value of 1200 means 120°F is being read.

> **NOTE**: These values are generally more desirable to use by a controller. Software filtering has been internally applied by the module and no additional filtering is necessary by the controller.

Channel Type (400088 – 400105)

Registers 400088 – 400105 are read/write registers. This will allow you to configure what type of sensor is attached to each channel. *Only odd-numbered channels may be configured as RTD type. When configured as RTD, the adjacent even-numbered channel is not available for use, and the type data will be ignored. Use the list below to determine what value you should write based on the sensor installed.

> 0 – Type J thermocouple
> 1 – Type K thermocouple
> 2 – 100Ω Pt 3-wire RTD
> 8 – *Type J thermocouple with advanced (strict) wire fault detection enabled.
> 9 – *Type K thermocouple with advanced (strict) wire fault detection enabled
> *Applies to firmware version 3.1.10113 or higher.

Channel Status (400141 – 400158)

Registers 400141 – 400158 are read-only registers. The values between 1-7 show channel status. The MX4-R2 can detect shorts to DC-, shorts to DC+ and open circuit for the thermocouple and RTD wiring.

It also detects leaking current to DC- or DC+ which will start causing errors in readings. This is generally due to breakdown of insulation. As this condition worsens, the status may change to indicate a short.

Notes

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