



Interchange™ Comm Control Module MX5-R2 Series

Operations Manual

For Models with Date Codes S8 or Higher

Warranty - A limited warranty on materials and workmanship is given with this FW Murphy product.
A copy of the warranty may be viewed or printed by going to <http://www.fwmurphy.com/warranty>



**BEFORE BEGINNING INSTALLATION OF THIS FW MURPHY
PRODUCT:**

- Please read the following information before installing the MX5-R2 Module. This installation information is intended for MX5-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 50-08-0104 (MX5-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 97°C 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 50-08-0104 (MX5-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 MX5-R2 expansion module provides input/output capability to the Centurion and future generations of FW Murphy Controllers using CAN proprietary communication with enhanced diagnostics. Two serial RS485 ports, an RS232 port and 2 Ethernet ports also provide communication methods to work with any Modbus RTU or TCP/IP client device. MX5-R2 is backward compatible to the MX5, MX5-A and MX5-D. Load Rockwell IO Application for EtherNet/IP (CIP) Protocol function.

Accessories

MX5-R2 Plug Kit (00032657) Printed Terminal Plugs for MX5-R2 Expansion I/O Module

Specifications

- Operating temperature: -40° to 185° F (-40° to 85° C)
- Power input: 16.5 W max 10-30 VDC
- 10* Analog inputs:
 - 0-24 mA or 0 – 5 VDC, 15-bit hardware
 - 4 channels may be selected to read linear resistive sensor (3kΩ to 30kΩ selectable range)
- 24* Digital inputs**:
 - NO or NC (active high/active low) intrinsically safe
 - Optically isolated with LED indicators
 - Polarity sense / wire fault detection on normally closed systems
 - Approved for use with general purpose switches in hazardous areas
- One magnetic pickup input*:
 - 30 Hz to 10 kHz
- 16 Digital outputs**:
 - LED indicators
 - FET (sink)
- 4 Analog outputs:
 - 4-20 mA, 16-bit hardware
- 6 Communication ports
 - Two Serial RS485:
 - Protocol: Modbus RTU (server)
 - One Serial RS232:
 - Protocol: Modbus RTU (server)
 - One 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 MX5-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:
 -  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 X
 - IECEx UL 18.0072X
 - -40°C ≤ Tamb ≤ +85°C

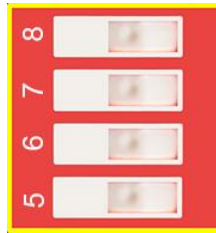
* Non-incendive. (Digital Inputs and Analog Inputs are intrinsically safe and non-incendive.)

** Applies only to Centurion™ Custom and Rockwell Automation® Processor Configurations.

Dip Switch and LED Codes

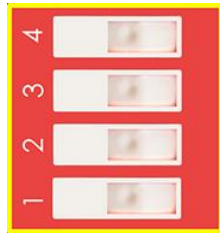
DIP Power-up Functions

- **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.

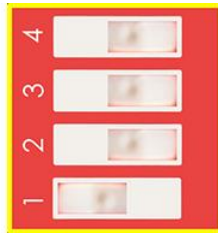


5-8 CLOSED

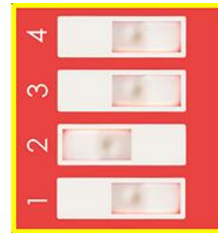
- 1-4 CLOSED: Load factory defaults to non-volatile settings – restores serial baud rate, Ethernet address and channel configurations to default values.
- 1 OPEN, 2-4 CLOSED: Load Rockwell IO Application.
- 2 OPEN, 1, 3, 4 CLOSED: Load Standard IO Application.



1-4 CLOSED



1 OPEN, 2-4 CLOSED

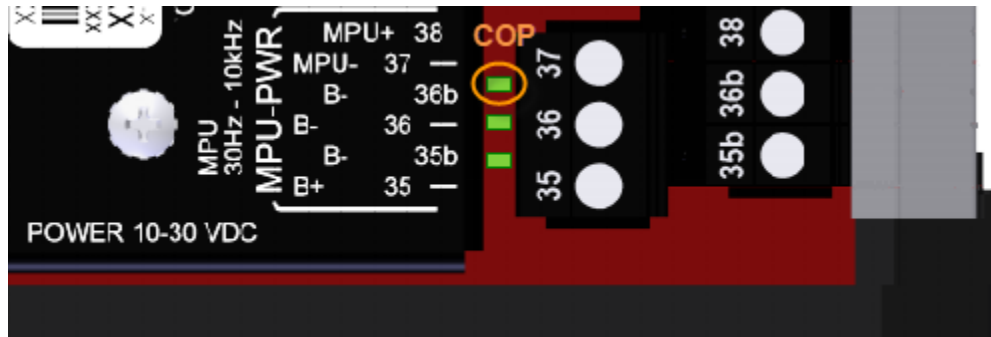


2 OPEN, 1, 3, 4 CLOSED

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 $\frac{1}{4}$ second ON and $\frac{1}{4}$ second OFF.
- Pauses will be $\frac{3}{4}$ second OFF.
- The separator will be a 2 $\frac{1}{2}$ -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 $\frac{3}{4}$ 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 Applications (default)

Physical Layer: The MX5-R2 module features two Ethernet ports, two RS485 serial communication ports, one RS232 serial 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 Interconnects: 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 61/62, and “B” terminal 80/81. 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 at 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 64, and “LOW” terminal 65.

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 serial RS485 or RS232 connection and Modbus RTU client software. A serial interface converter that can convert USB to RS485 would be needed for a RS485 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 MX5-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	33	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
400021	Digital Input 1-16 Boolean Status	R	0 - 65535	Bitmap	0=Open, 1=Closed Bit 0 = DI1, Bit 15= DI16
400022	Digital Input 17-24 Boolean Status	R	0 – 255	Bitmap	0=Open, 1=Closed Bit 0 = DI17, Bit 7= DI24
400023	System Voltage	R	0 - 65535	Vdc x10	0 = 0.0 VDC, 320 = 32.0 VDC
400024	Analog input 1	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA
400025	Analog input 2	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA
400026	Analog input 3	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA
400027	Analog input 4	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA
400028	Analog input 5	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA
400029	Analog input 6	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA
400030	Analog input 7	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA 0 = 0%, 19660 ≈ 100% resistance range
400031	Analog input 8	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA 0 = 0%, 19660 ≈ 100% resistance range
400032	Analog input 9	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc

Modbus Holding Register Description Used With Standard IO Application Mode					
Modbus Register	Description	Read/Write	Data Range	Data Units	Definitions / Sample Data
					0 = 0mA, 32768 = 25mA 0 = 0%, 19660 ≈ 100% resistance range
400033	Analog input 10	R	0 – 32768	A/D count	0 = 0Vdc, 32768 = 5Vdc 0 = 0mA, 32768 = 25mA 0 = 0%, 19660 ≈ 100% resistance range
400034-400037	Not used				
400038	Frequency input	R	0 – 10,000	Hz	
400039-400046	Not used				
400047	Analog output 1 signal	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400048	Analog output 2 signal	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400049	Analog output 3 signal	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400050	Analog output 4 signal	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400051-400052	Factory Use-Legacy AO range	R/W			
400053	RTC Time - seconds	R/W	0 - 59	Seconds	
400054	RTC Time - minutes	R/W	0 - 59	Minutes	
400055	RTC Time - hours	R/W	0 - 23	Hours	
400056	RTC Day of week	R/W	1 - 7	Day Of Week	
400057	RTC Date - day	R/W	1 - 31	Day	
400058	RTC Date - month	R/W	1 - 12	Month	
400059	RTC Date - year	R/W	2000 - 3000	Year	
400060	Clock set enable	R/W	0 - 1	Enable/Disable	1 = set above values into the real-time clock
400061	Digital outputs 1-16	R/W	0 - 65535	Bitmap	Bit 0 = DO1, Bit 15 = DO16
400062	Not Used	R			
400063	Digital output 1-16 status on power-up	R/W	0 - 65535	Bitmap	Bit 0 = DO1, Bit 15 = DO16
400064	Digital output 1-16 status on comm. failure	R/W	0 - 65535	Bitmap	Bit 0 = DO1, Bit 15 = DO16
400065	Analog output 1 status on power-up	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400066	Analog output 2 status on power-up	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400067	Analog output 3 status on power-up	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400068	Analog output 4 status on power-up	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400069	Analog output 1 status on comm. failure	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400070	Analog output 2 status on comm. failure	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400071	Analog output 3 status on comm. failure	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400072	Analog output 4 status on comm. failure	R/W	0 - 65535	D/A count	0=0mA, 65535=24mA 4mA=10485 20mA=52428
400073	Communication timeout	R/W	0 – 65535	Seconds	Lost comm for this duration will revert outputs to comm fail configuration
400074	Analog input 1 type	R/W	0 - 1	mA enable	0 = 0-5VDC , 1=0-25mA

Modbus Holding Register Description Used With Standard IO Application Mode					
Modbus Register	Description	Read/Write	Data Range	Data Units	Definitions / Sample Data
400075	Analog input 2 type	R/W	0 -1	mA enable	0 = 0-5VDC , 1=0-25mA
400076	Analog input 3 type	R/W	0 -1	mA enable	0 = 0-5VDC , 1=0-25mA
400077	Analog input 4 type	R/W	0 -1	mA enable	0 = 0-5VDC , 1=0-25mA
400078	Analog input 5 type	R/W	0 -1	mA enable	0 = 0-5VDC , 1=0-25mA
400079	Analog input 6 type	R/W	0 -1	mA enable	0 = 0-5VDC , 1=0-25mA,
400080	Analog input 7 type	R/W	0 -2	mA enable	0 = 0-5VDC , 1=0-25mA, 2=5kΩ Resistive, *3=3kΩ Resistive, *4=10kΩ Resistive, *5=30kΩ Resistive,
400081	Analog input 8 type	R/W	0 -2	mA enable	0 = 0-5VDC , 1=0-25mA, 2=5kΩ Resistive, *3=3kΩ Resistive, *4=10kΩ Resistive, *5=30kΩ Resistive,
400082	Analog input 9 type	R/W	0 -2	mA enable	0 = 0-5VDC , 1=0-25mA, 2=5kΩ Resistive, *3=3kΩ Resistive, *4=10kΩ Resistive, *5=30kΩ Resistive,
400083	Analog input 10 type	R/W	0 -2	mA enable	0 = 0-5VDC , 1=0-25mA, 2=5kΩ Resistive, *3=3kΩ Resistive, *4=10kΩ Resistive, *5=30kΩ Resistive,
400084	Factory use	R/W	1/3		
400085	Serial port baud rate	R/W	1-5	Enumeration	1=9600, 2=19.2k, 3=38.4k, 4=57.6k, 5=115.2k
400086	Digital Input 1-2 Polarity	R	0 - 65565	2 bytes	MSB = DI1,LSB =DI2 0 = Closed DC- 1 = Closed DC+ 2 = Open
400087	Digital Input 3-4 Polarity	R	0 - 65565	2 bytes	MSB = DI3,LSB =DI4 0 = Closed DC- 1 = Closed DC+ 2 = Open
400088	Digital Input 5-6 Polarity	R	0 - 65565	2 bytes	MSB = DI5,LSB =DI6 0 = Closed DC- 1 = Closed DC+ 2 = Open
400089	Digital Input 7-8 Polarity	R	0 - 65565	2 bytes	MSB = DI7,LSB =DI8 0 = Closed DC- 1 = Closed DC+ 2 = Open
400090	Digital Input 9-10 Polarity	R	0 - 65565	2 bytes	MSB = DI1,LSB =DI2 0 = Closed DC- 1 = Closed DC+ 2 = Open
400091	Digital Input 11-12 Polarity	R	0 - 65565	2 bytes	MSB = DI3,LSB =DI4 0 = Closed DC- 1 = Closed DC+ 2 = Open
400092	Digital Input 13-14 Polarity	R	0 - 65565	2 bytes	MSB = DI5,LSB =DI6 0 = Closed DC- 1 = Closed DC+ 2 = Open
400093	Digital Input 15-16 Polarity	R	0 - 65565	2 bytes	MSB = DI7,LSB =DI8 0 = Closed DC-

Modbus Holding Register Description Used With Standard IO Application Mode

Modbus Register	Description	Read/Write	Data Range	Data Units	Definitions / Sample Data
					1 = Closed DC+ 2 = Open
400094	Digital Input 17-18 Polarity	R	0 - 65565	2 bytes	MSB = DI1,LSB =DI2 0 = Closed DC- 1 = Closed DC+ 2 = Open
400095	Digital Input 19-20 Polarity	R	0 - 65565	2 bytes	MSB = DI3,LSB =DI4 0 = Closed DC- 1 = Closed DC+ 2 = Open
400096	Digital Input 21-22 Polarity	R	0 - 65565	2 bytes	MSB = DI5,LSB =DI6 0 = Closed DC- 1 = Closed DC+ 2 = Open
400097	Digital Input 23-24 Polarity	R	0 - 65565	2 bytes	MSB = DI7,LSB =DI8 0 = Closed DC- 1 = Closed DC+ 2 = Open
400098 - 400115	Factory use				
*400116	Digital Outputs High Resolution Pulse Enable	R/W	0 - 65565	Bitmap	Bit 0 = DO1, Bit 15 = DO16
*400117	Digital Output 1 Pulse On Time	R/W	0 – 255	x50mS	Time on w/ pulse enabled
*400118	Digital Output 1 Pulse Off Time	R/W	5 – 255	x50mS	Minimum off time w/ pulse enabled, rounded to nearest 250mS, use multiples of 5
*400119	Digital Output 2 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400120	Digital Output 2 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400121	Digital Output 3 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400122	Digital Output 3 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400123	Digital Output 4 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400124	Digital Output 4 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400125	Digital Output 5 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400126	Digital Output 5 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400127	Digital Output 6 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400128	Digital Output 6 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400129	Digital Output 7 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400130	Digital Output 7 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400131	Digital Output 8 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400132	Digital Output 8 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400133	Digital Output 9 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400134	Digital Output 9 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400135	Digital Output 10 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400136	Digital Output 10 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400137	Digital Output 11 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400138	Digital Output 11 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400139	Digital Output 12 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400140	Digital Output 12 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400141	Digital Output 13 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400142	Digital Output 13 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400143	Digital Output 14 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400144	Digital Output 14 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400145	Digital Output 15 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400146	Digital Output 15 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above
*400147	Digital Output 16 Pulse On Time	R/W	0 – 255	x50mS	See #1 above
*400148	Digital Output 16 Pulse Off Time	R/W	5 – 255	x50mS	See #1 above

Modbus Holding Register Description Used With Standard IO Application Mode					
Modbus Register	Description	Read/Write	Data Range	Data Units	Definitions / Sample Data
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		
*requires firmware 4.4.10111 or newer (date code U10 or newer)					

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 33.

Digital Input 1-16 Status (400021)

Register 400021 is a read-only register. The value returned in this register is unsigned 16-bit data, assigned to digital inputs 1-16. The channel's bit position is 1 input bitmapped where bit 0 = digital input 1.

Digital Input 17-32 Status (400022)

Register 400022 is a read-only register. The value returned in this register is unsigned 8-bit data, assigned to digital inputs 17-24. The channel's bit position is 1 input bitmapped where bit 0 = digital input 1. The additional upper bits for digital inputs 17-24 will remain at 0 and serve as padding to make a proper 16-bit word to comply with Modbus RTU specifications.

Analog Input Status (400024 - 400033)

Registers 400024 – 400033 are read-only registers. The values returned in these registers are signed 16-bit raw data counts for analog inputs from 0 - 32768 for a full 0VDC to 5VDC input reading. Enabling the mA option (Registers 400074-400083) converts the input to a 0-24mA range where 0 = 0mA, and 32767 = 24mA. Typical expected counts for 4-20mA input would be 4mA=5243 counts and 20mA=26214 counts. For channels 7 thru 10, resistance ranges offer relative range of the selected resistance. 0 = zero ohms, 19660 will be approximately full selected resistance range.

Analog Output (400047 - 400050)

Registers 400047 – 400050 are read/write registers. The values returned in these registers are unsigned 16-bit data, assigned to analog outputs driver. The output can drive from 0-24mA where 0=0mA and 65535=24mA. For example to set the output at 4mA, write 10485. For 20mA, write 52428.

Digital Output (400061)

Register 400061 is a read/write register. The values returned in these registers are unsigned 16-bit data, assigned to digital outputs 1 through 16. The channel's bit position is 1 input bitmapped where bit 0 = digital output 1.

Digital Outputs at Powerup (400063)

Register 400063 is a read/write register. Set the digital outputs, 1-16 state as on or off on initial powerup of the module — before it receives any communication from the client controller. This setting is stored on the module and retained on power loss.

Digital Outputs at Communication Failure (400064)

Register 400064 is a read/write register. Set the digital outputs 1-16 state as on or off if communication to the client controller is lost based on the communication timeout setting in register 400073. This setting is stored on the module and retained on power loss.

Analog Outputs at Powerup (400065 - 400068)

Registers 400065 – 400068 are read/write registers. Set the analog output values on initial powerup of the module, before it has received any communication from the client controller. This setting is stored on the module and retained on power loss.

Analog Outputs at Communication Failure (400069 - 400072)

Registers 400069 – 400072 are read/write registers. Set the analog output values on if communication to the client controller is lost based on the communication timeout setting in register 400073. This setting is stored on the module and retained on power loss.

Communication Timeout (400073)

Register 400073 is a read/write register. Set the timeout to signal communication lost from the client controller, and this will set the outputs to their communication failure state. All ports are sensed for communication timeout. So, any client talking on any port will reset the communication timer and keep normal operation.

Analog Input Channel Type (400074 - 400083)

Registers 400074 – 400083 are read/write registers. Choose the input type as 4-20mA if this setting is written to “1”. If it is left at “0”, the input will be a 0-5VDC input. This setting is stored on the module and retained on power loss. For channels 7 thru 10, a value of 2 = 5k Ω max resistance, 3 = 3k Ω max resistance, 4 = 10k Ω max resistance, 5 = 30k Ω max resistance,

Digital Input 1-24 Polarity Status (400086 - 400097)

Registers 400086 – 400097 are read-only registers. Each register contains a pair of digital input polarity status information stored as 2 bytes of information. The status can be DC-, DC+, or OPEN for each digital input. The most significant byte in each register is the odd-numbered channel. The least significant is the even-numbered channel.

***High Resolution Digital Output Pulse Enable (400116)**

Register 400116 is a read/write register. Use high resolution pulsing when the ON time of a pulse must be less than 250mS, and when communication latency would not guarantee ON time duration. For pulse times not needing this resolution, the pulse engine should not be used, and use writes to digital outputs register 400061. Bit 0 is pulse enable for digital output 1, bit 1 is output 2, etc. Once enabled, the ON and OFF time registers below are used to govern the pulse characteristics overriding the value in 400061. Upon communication loss, the pulsing will be automatically disabled.

***High Resolution Digital Output ON Time (400117, 400119, 400121, 400123, 400125, 400127, 400129, 400131, 400133, 400135, 400137, 400139, 400141, 400143, 400145, 400147)**

Registers listed are read/write registers. Set the ON time in 50mS intervals for the desired output. A value of 0 will leave output OFF. 1 will pulse ON for 50mS then turn OFF for minimum time of the OFF time before turning ON again.

***High Resolution Digital Output OFF Time (400118, 400120, 400122, 400124, 400126, 400128, 400130, 400132, 400134, 400136, 400138, 400140, 400142, 400144, 400146, 400148)**

Registers listed are read/write registers. Set the minimum OFF time in 50mS intervals for the desired output. This will be rounded to the nearest 250mS. Settings of 0-5 = 250mS. 6-10 = 500mS, etc. The output will be turned back ON once this time is reached.

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