Quest Controls
Smart Control Solutions for Buildings

TELSEC® MP2x

User Guide

Rev 2.1 10/21/21

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This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Rev 2.1 10/21/21

Revision History

Date	Rev #	Modifications	By:
10/21/21	2.1	Changed MP2x images	K. Nickel
10/18/21	2.0	Updated Modbus register map and added sections 5 & 6	K. Nickel
1/27/21	1.0	Initial release	K. Nickel

Table of Contents

1 Overview

The TELSEC® MP2x is an expansion module that can be added to an MP2 to increase the number of points available for monitoring and controlling a facility. Up to fifteen MP2x units can be connected to an MP2 using an RS485 network. The MP2x is a Modbus device that can be queried for data from any Modbus primary polling device using Modbus RTU protocol. The MP2x has 32 universal inputs for monitoring temperature, humidity, contact closures and any 0-6 VDC or 0-20 mA sensors. Each individual input may be scaled and displayed in the proper engineering units. Additionally, there are four Form C outputs that can be used for controlling devices based on commands from the primary Modbus device or remotely enabled by a user. This user guide is intended to provide basic operational information for programming and status review of the MP2x System. Please contact Quest for additional information and or questions about the operation of the system.

1.1 Getting Started

The TELSEC® MP2x is simple to setup and program which allows you to start monitoring your facility quickly. The basic steps are listed below along with a chapter reference for this manual:

1. Mount the MP2x in the desired location (section 3.1)
2. Power the system. (Section 3.2.1)
3. Connect the inputs to be monitored to the system. (Section 3.3)
4. Connect the serial port to the MP2. (Section 3.4)
5. Wire the digital outputs. (Section 3.7)

2 Product Specifications

Part number: 151088-32

- Inputs: 32 universal inputs supporting 0-5 VDC, 4-20 mA, thermistor & contact closure
- Outputs: 4 form C digital outputs. Contact rating: 0.5 A @ 60 VDC
- Serial interface: RS485 serial port
- Serial Protocols Supported: Modbus RTU read and write
- I/O terminal: removable screw terminals support up to 12 AWG wire
- Power: dual feed 24-48 VDC, 3.7 W max.
- Ambient operating temperature: 23° to 131°F (-5° to 55°C), 0-95% RH Non-condensing
- Dimensions: 13.15 W x 4.15 L x 1.63 H in. (334 x 105 x 41 mm)
- Weight: 1 lb. (454 g)
- Warranty: 1 Year

Specifications subject to change without notice

3 Installation

All local and national electrical safety codes (NESC®) must be followed when installing the MP2x. If there is any contradiction in this manual and those standards, then the installer must follow the local and national codes. Use copper conductors only. The TELSEC® MP2x is designed for mounting on a wall or within a rack. Rack mounting is accomplished by using the optional (not included) mounting ears for a 19 or 23" rack. Contact your Quest representative to order the Rack Mounting Ear kit (PN 150989).

3.1 Mounting the MP2x

Install the MP2x in the desired location using #8 hardware to connect the two mounting tabs to the wall. For mounting in a 19" rack, use the optional mounting ears Quest p/n 150989.

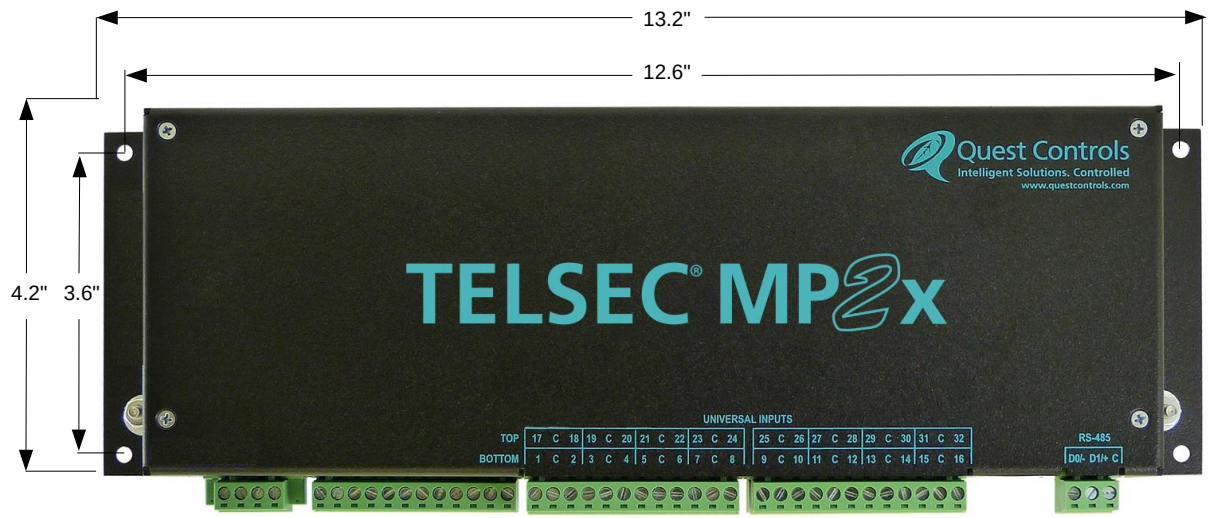


Figure 1 - TELSEC® MP2x Dimensions

3.2 Powering and Grounding

3.2.1 Powering the MP2x

Follow all national and local electrical codes when powering the MP2x. Quest recommends a minimum of 18AWG conductor for powering. The TELSEC® MP2x will operate from 18-65 VDC power (50 mA max at 48 VDC). The power input is isolated from the rest of the system and will work on either a positive or negative DC system. The MP2x supports power from a dual (A & B) feed DC power system to provide redundancy in case one of the feeds is lost. Connect the power source A and B (optional) to the MP2x observing the polarity markings on the enclosure. Quest recommends fusing each power source at 1 A. Reverse polarity will not damage the unit, but it will not operate until corrected. It is recommended that all input wiring be completed with no power to the system. Turn on power once all wiring is verified.

3.2.2 Grounding the MP2x

There is a ground post on the left and right side of the chassis. Place a ground wire using a minimum 12 AWG conductor from the Electrical panel ground bus (or other approved grounding point) to the ground terminal on the MP2x. Follow national and local codes and practices for properly grounding the system.

3.3 Wiring inputs

Wire each input to be used between the input terminal (1-32) and a common terminal (C). There is a common terminal available for every two inputs available for termination. The MP2x does not provide power for sensor operation thus any device requiring power will need an external power source to operate properly. Refer to the silkscreen on the enclosure for location of each input and common terminal. The inputs will support any sensor that is a 10k Type III thermistor: 0-6 VDC or 0-20 mA analog sensors. In addition, the system accepts dry contact closures or wet contact closures up to 65 VDC.

3.3.1 Thermistors

Thermistors are resistive devices and do not have polarity. Connect one lead to the input terminal of the desired input and the second lead to a common terminal. Quest recommends using shielded and stranded cable for all analog sensors. Connect the shield of the cable to chassis ground on the MP2x. Cut the drain wire and isolate the shield at the sensor end of the cable.

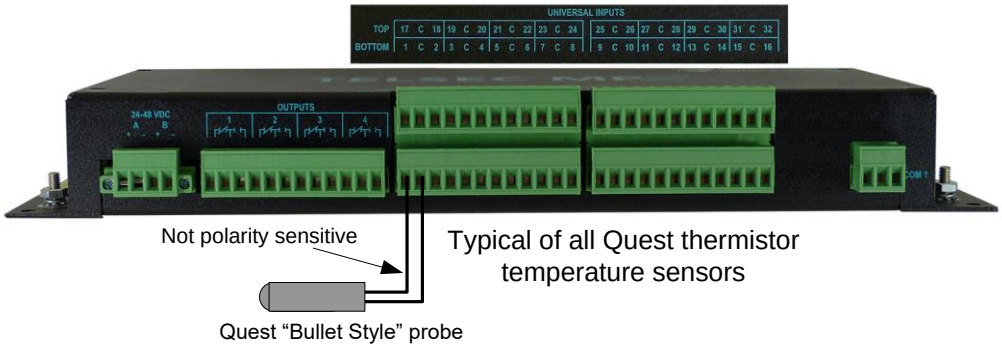


Figure 2 - Thermistor Temperature Sensor Wiring

3.3.2 Voltage Sensors

The TELSEC® MP2x can read and scale any linear voltage input from 0 to 6 VDC. Sensors requiring power must be externally powered. Contact Quest for the Input Scaling spread sheet to determine the correct number for the Low and High Custom scale factors.

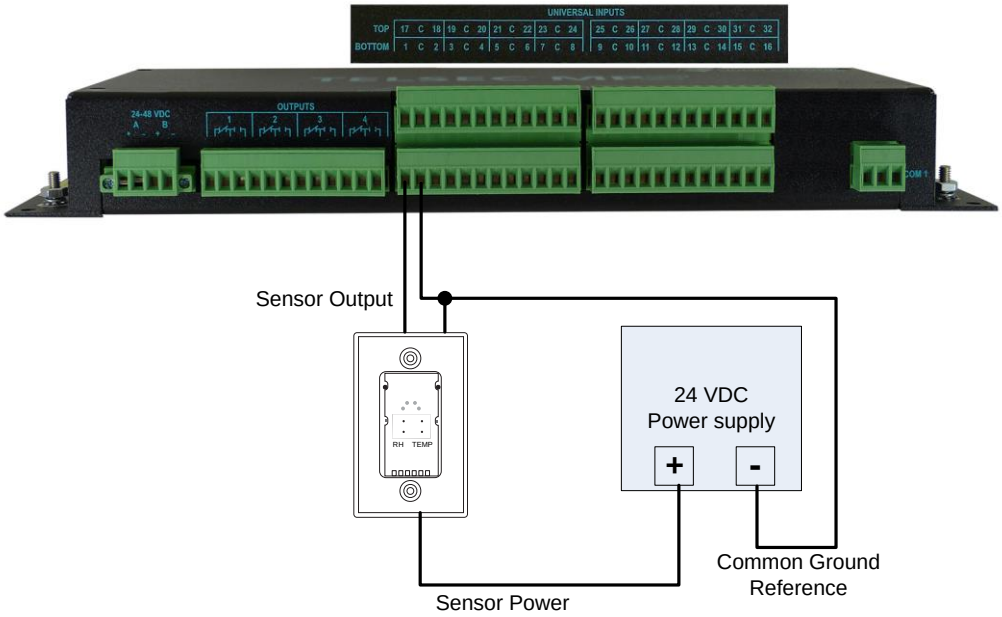


Figure 3 - Wiring Voltage Sensors

3.3.3 Current Sensors

The TELSEC® MP2x can read and scale any linear current input from 0 to 20 mA. An external 249-ohm resistor (recommend 1% tolerance) is required to convert the signal to voltage and will require an external voltage source to power the sensor. Contact Quest for the Input Scaling spread sheet to determine the correct number for the Low and High Custom scale factors.

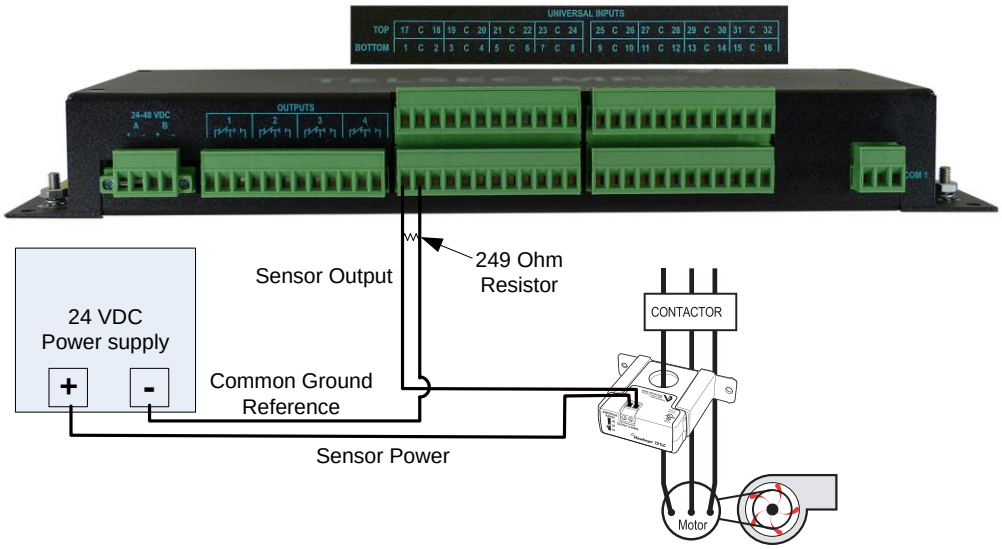


Figure 4 - Wiring a 4-20mA Sensor

3.3.4 Contact Closures

The TELSEC® MP2x supports dry contact closures or wet contacts up to 65 VDC. A *wet* contact is an input where there is an external voltage present. A *dry* contact has no voltage present and the MP2x provides the sensing voltage. The detection points for determining ON/OFF status are greater than 2.8 VDC and less than 0.8 VDC. There is no transition when the voltage is between these two values. Both wet and dry input types are connected between the input terminal and a common terminal. For Wet inputs the voltage must be between 0VDC and up to +65VDC. Negative voltages are not supported.

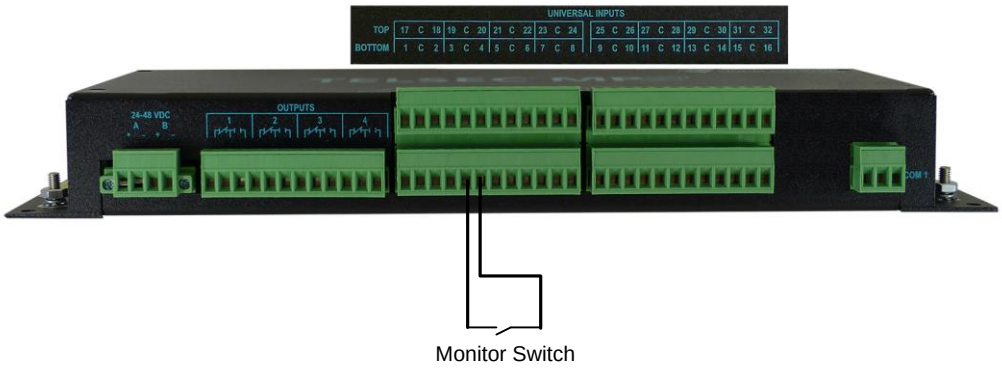


Figure 5 - Wiring Contact Closures

3.4 Wiring for Modbus

The MP2x has a serial port labeled COM 1 which is used to connect this device to a Modbus primary polling device. The MP2x will listen for request and respond with the data being requested.

1. Connect no more than 32 Modbus devices per Modbus serial port
2. The maximum overall Modbus cable network length is 3,000 feet.
3. For normal applications, use Belden Cable #8102 or equivalent. This cable has two twisted pairs and a separate foil shield. For applications requiring a more mechanically robust cable, use Belden Cable #9842. This cable has two twisted pairs, a separate shield and a separate braided shield.
4. Use one of the twisted pairs for the D0 (-) and D1 (+) connections and use the second twisted pair for the C/Common connections. The cable shields must never be used for the C/Common connections.
5. All the D0 (-) pins from every Modbus device on the network must be connected together. The same is true with the D1 (+) pins, and the C/Common pins.
6. Connect the Modbus devices together in a daisy-chain configuration only. In this configuration, the cable from the first Modbus device connector goes directly to the connector of the second Modbus device, then from that connector directly to the connector of the third Modbus devices, and so on. No star, ring or tree cabling network configurations, or additional cable stubs are allowed.
7. Connect all the cable shields together so that they form one continuous connection from one end of the Modbus cable network to the other. If a braided shield is also included in the cable, then connect all of them together as well. If there is a mix of braided and non-braided shields in the cabling network, then connect the braided shields together and then to the foil shields of the nearest non-braided cable. At no time are any shields to be left floating.

8. At the MP2, connect the cable shield to the protective (protected) earth ground. The cable shields must not be connected to earth ground anywhere else in the cabling network except at this point.

Figure 6 - Modbus Wiring MP2 to MP2x

3.5 Line Termination

1. At each end of the Modbus cable network daisy-chain, there must be an end of line termination resistor. Connect a 1/2W 120-ohm resistor across the D0 and D1 conductors of the end devices.
2. If the MP2x is at one end of the Modbus cable network, then use the built in End of Line resistor. Remove the cover of the MP2x and locate DIP switch in the front right corner of the board. SW3 is for COM1. Press switch number 2 down (middle switch) to enable the end of line terminating resistor. If the MP2x is not the last device on the Modbus cable network, then move switch 2 to the up position. No more than two-line terminations are allowed per Modbus cable network.

3.6 Line Polarization

When there is no data activity on an RS-485 balanced pair, the lines are not driven and, thus susceptible to external noise or interference. To ensure the receiver line stays in a constant state, when no data signal is present, some devices need to bias the network. Polarization of the pair must be implemented **at one location for the entire Serial Bus**. Generally this is at the primary device such as the MP2. Other devices must not implement any polarization. Refer to the manual of the device you are monitoring to determine if line biasing is required.

Line polarization should be accomplished (if needed) from the Primary polling device. Leave switches 1 & 3 in the up position on the MP2x. Refer to Figure 7.

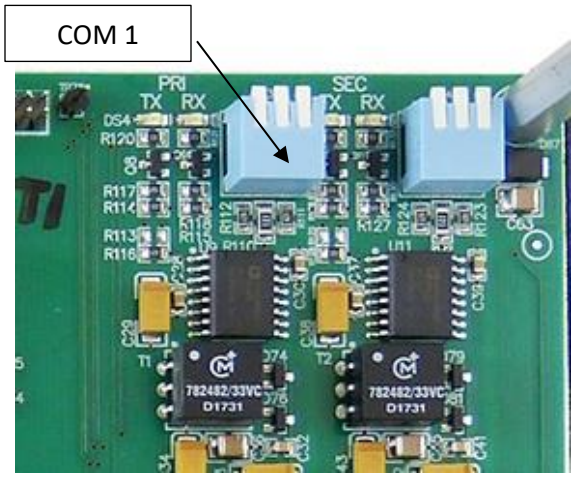


Figure 7 - Modbus End of Line and Line Polarization Jumpers

3.7 Wiring Outputs

There are four form C relays available for control of external devices based upon alarm conditions or time schedules. Place wire between the common and normally open or normally closed terminals for each output on the MP2x. The relays are designed for Class 2 wiring and are rated for a maximum of 1 amp at 24VAC or 30VDC, 0.3 A @ 60VDC.

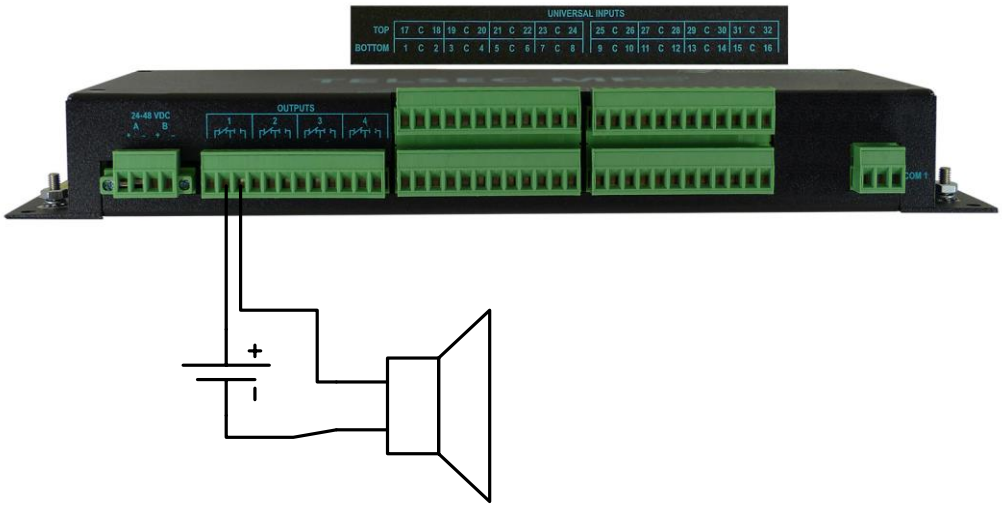


Figure 8 - Wiring Outputs

4 Local Operation

4.1 Power LED

Once the TELSEC® MP2x is installed and powered, the system will start operating. Under normal operation the green Power LED will flash at one second intervals to indicate the system is operating properly. Occasionally there may be a pause in this operation if the system is saving data to flash memory. If the LED is off for longer than one minute, then check the power connection and cycle power to the unit. If the LED is constantly on longer than a minute, then cycle power to the system to see if it goes back to normal operation of flashing the LED.

4.2 Relay Outputs

The normally open/normally closed terminations on the unit refer to when the output is de-energized. Outputs can be operated by sending Modbus RTU write commands to turn on/off the outputs. See the register map in section for further details.

4.3 Restoring to Factory Defaults

The TELSEC® MP2x has a small access hole on the right side for the cold start switch. Holding this switch in for approximately 15 seconds during a power up (cycle power off then back on) will cause the system to erase all programmed settings and go back to the factory defaults. During the Cold Start process, you

will see both the power LED and Alarm LED flash simultaneously every second. After a few seconds, the alarm (red)LED will be illuminated solidly. Release the cold start switch once the alarm LED is on solid.

5 Configuring the MP2x

The MP2x is designed to work without any programming requirements. Though there are a few settings that can be changed via Modbus RTU if needed. For example, the default address of the MP2x is 247. If you want to change the address of the MP2x because you have multiple units then you would connect the MP2x to a Modbus polling software such as "Modbus Poll" or use the MP2 to change the address. The following registers can be changed to meet your application:

Control Registers

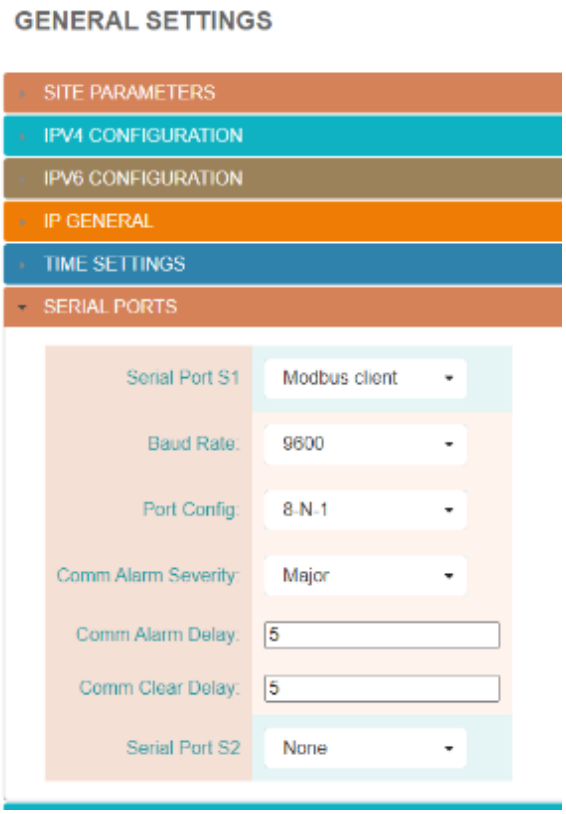
Function Code	Register	Description	Read/Write	Notes	
Holding Register (FC3/FC6) (FC16) for write multiple	0	Slave Address	R/W	1-247	Default 247
	1	Baud Rate	R/W	Enumerated: 0 – 300, (not supported) 1 – 600, (not supported) 2 – 1200, 3 – 2400, 4 – 4800, 5 – 9600, 6 – 19200, 7 – 38400, 8 – 57600, 9 – 115200	Default 9600
	2	Data Mode	R/W	Enumerated: 0 – 8N1, 1 – 8E1, 2 – 8O1, 3 – 8N2, (not supported) 4 – 8E2, 5 – 8O2	Default 8N1
	3	Product ID	RO	1	
	4	Firmware Revision	RO	convert to hex to get Kernel version and Filesystem versions. Initial build 1542 (hex 0606)	
	5	Reset	WO	Must write 57005 to data register for reset	

5.1 Using the MP2 to Make Changes

As mentioned, the MP2 can be used to make changes to the default settings of the MP2x. Below is a brief description of how to use the MP2. Please review the MP2 user manual for information on the product.

1. Connect the MP2x to the MP2 at either Com 1 or Com 2 serial port.
2. Log into the MP2 web server and configure the unit to use Modbus. Go to Settings/General/Serial Ports. Select the serial port you want to use on the MP2 and configure it

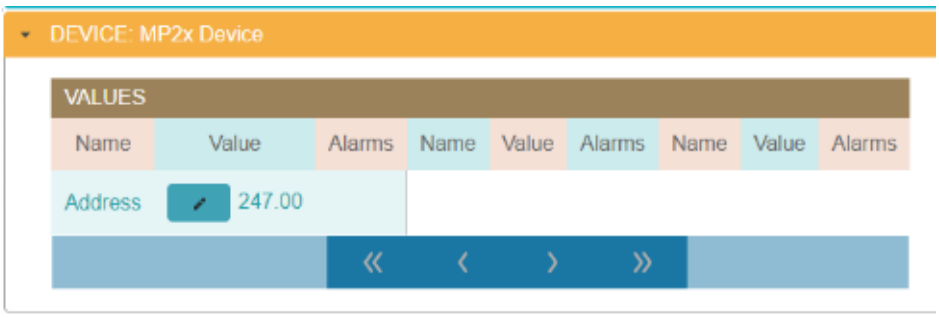
for Modbus, 9600 baud and 8-N-1 (these are the MP2 defaults). Press Save Settings and wait for the system to restart.



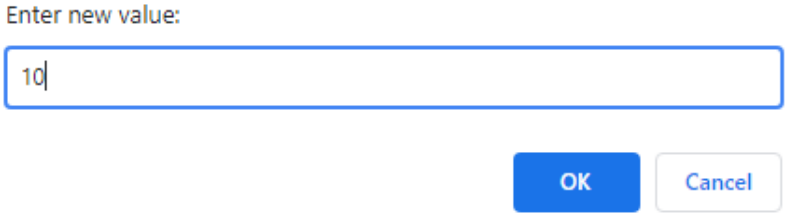
3. Go to Program/Modbus (Port #) where # is the port number you just configured.
4. Create a new Device by clicking on the Add new device button. Enter the address of 247 and give the device a name. Click on the Done button.

5. The new device will be added to the list. Click on the down arrow for the device and then the Add new point button.
6. Enter a 4-character ID this is used for reference in the system. This value can be what every you want. I.e. TMP1 for temporary 1 point. Enter a display name, function code will be 3- Holding register, and then enter the register number and format (use Word). Press the Done button and then Save Settings. Note the system will automatically save if you do not press the save button within 120 seconds.

7. Repeat step 5 for any additional registers you want to change such as baud rate or data mode. These settings typically don't need to be changed unless you have other devices on the Modbus 485 network that need to operate at different settings. Note: all devices must have the same baud rate and data mode setting but have a unique address.
8. Go to Status/Modbus Status (Port #) where # = the port number used. The system should be displaying the created point with the current value of 247 (the default address).



9. Click on the write button and change the address to the desired value which will be stored in non-volatile flash memory.



10. The MP2x will now respond at the new address.

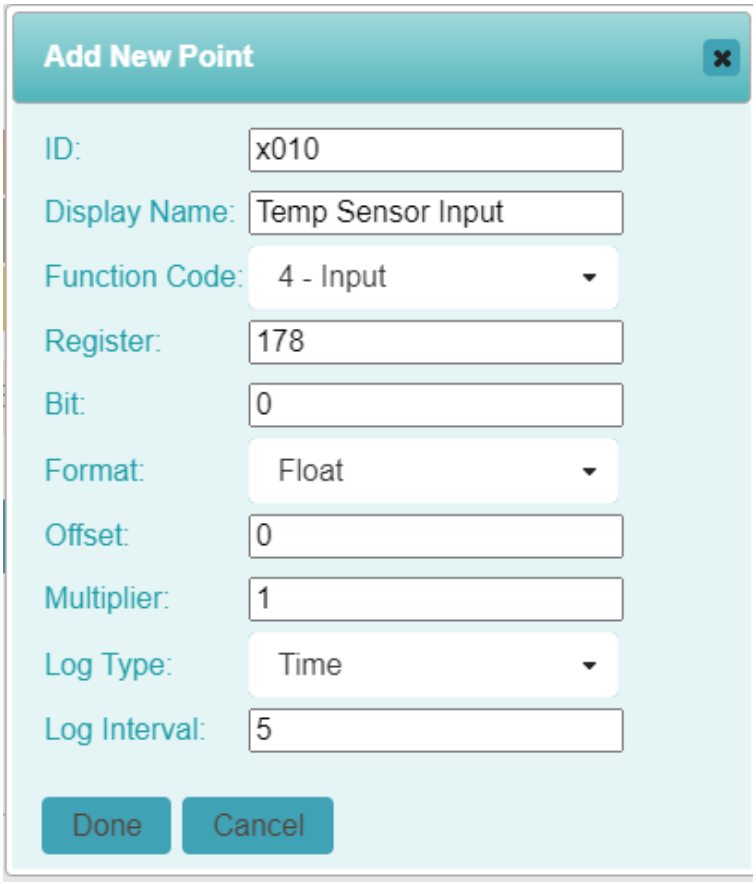
If you have multiple MP2x units, you can repeat these steps turning them on (or connecting them to the MP2) one at a time and change the address. After completion, you can remove address 247 from the system if it is not going to be used.

6 Input Register Map

The MP2x inputs are universal meaning they can support Thermistors (10K Type III), 0-6VDC or 0-20 mA transducers, Dry Contact closures or Wet Contact closures. To eliminate program requirements on the MP2x, we provided 10 different registers for each input. Select the appropriate register to poll based on the type of sensor connected to the input. The complete register map can be found in Appendix A – Modbus Register Table.

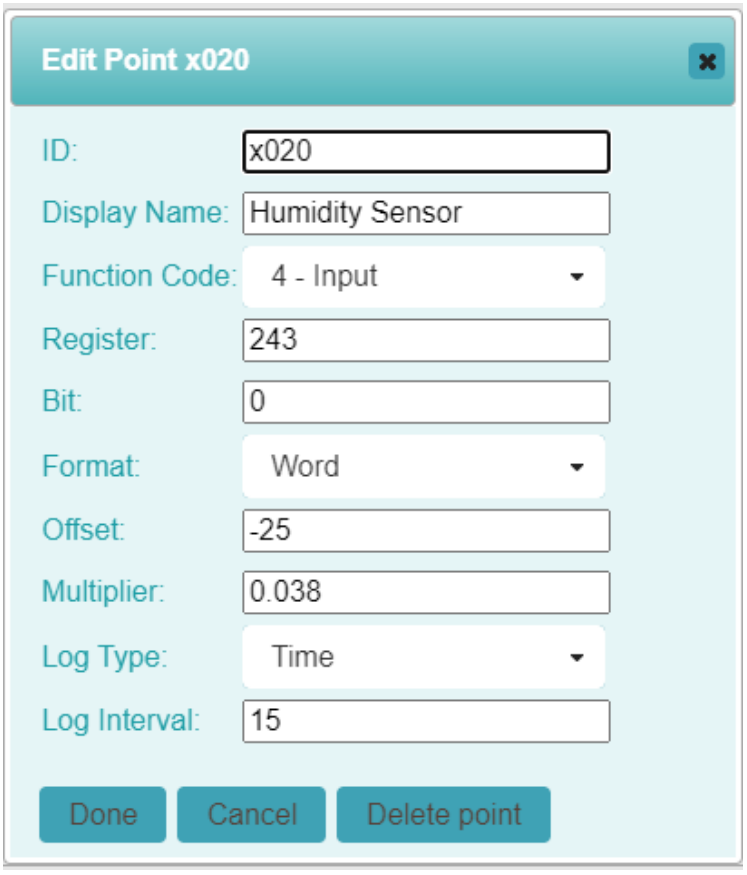
6.1 Thermistor Inputs

Connect a 10K type III thermistor to the desired input and then define the input in the MP2. Reference the Modbus map for temperature sensors and select the desired reading. The example below shows defining a Modbus point in the MP2 to look at input 10 on the MP2x and display the data in Celsius using the floating-point register.



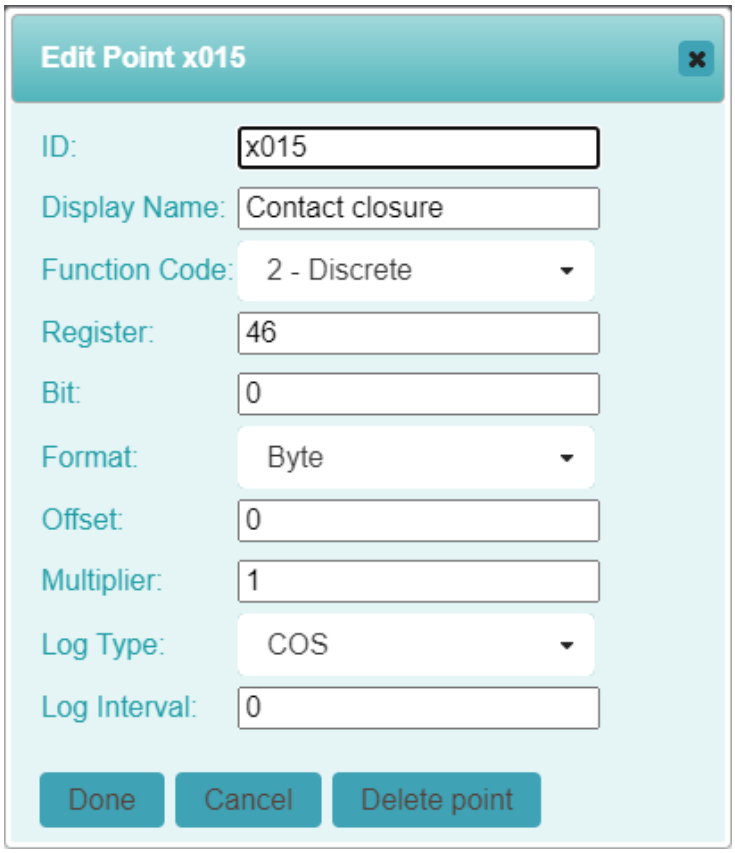
6.2 Voltage and Current Transducers

Connect the voltage or current transducer to the MP2x and then define the Modbus point in the MP2 using the Modbus register map for **"Input values as counts from the adc output**. See the notes section where the number of counts vary based upon the type of transducer and load resistor (for mA sensors) used. Example: defining a humidity sensor that reads 0-100% over 4-20mA output using a 249-ohm load resistor. The register map shows to use a multiplier of 163 per mA when using a 249-ohm resistor. The input reading would then be from 652 counts at 0%RH (4mA) and 3,260 counts at 100%RH (20mA). The range would be 2608 counts (3,260-652) over 0-100% which would be a multiplier of 0.038 (100%RH/2608 counts). The last step would be to add an offset since the range starts at 4mA instead of 0mA. The MP2 applies the offset after the multiplier so the offset would be in the desired engineering units of %RH which in this case would be -25. The definition using input 20 on the MP2x would be as follows:



6.3 Digital Inputs

Inputs on the MP2x that are digital inputs whether they are dry contact closures or wet can be connected to the unit and then defined for polling in the MP2x. Digital inputs can be either dry normally open, dry normally closed, wet normally open or wet normally closed. Wet contacts mean there is an external voltage being used. This voltage can be 0-60VDC. Refer to the register map and select the appropriate register based on the type of input being monitored. For example, if you connect a dry normally closed contact to input 15 of the MP2x and want it to show a 1 (ON) when open and a 0 (OFF) when closed then define the Modbus point as follows:



Appendix A – Modbus Register Table

Analog Input Table

To read the raw output of the A to D converter in Thermistor Mode

Function Code	Register	Description	Read/Write	Notes
Input Register (FC4)	0	Input 1 Raw Thermistor	RO	raw counts 0-4095 Thermistor mode
	1	Input 2 Raw Thermistor		
	2	Input 3 Raw Thermistor		
	3	Input 4 Raw Thermistor		
	4	Input 5 Raw Thermistor		
	5	Input 6 Raw Thermistor		
	6	Input 7 Raw Thermistor		
	7	Input 8 Raw Thermistor		
	8	Input 9 Raw Thermistor		
	9	Input 10 Raw Thermistor		
	10	Input 11 Raw Thermistor		
	11	Input 12 Raw Thermistor		
	12	Input 13 Raw Thermistor		
	13	Input 14 Raw Thermistor		
	14	Input 15 Raw Thermistor		
	15	Input 16 Raw Thermistor		
	16	Input 17 Raw Thermistor		
	17	Input 18 Raw Thermistor		
	18	Input 19 Raw Thermistor		
	19	Input 20 Raw Thermistor		
	20	Input 21 Raw Thermistor		
	21	Input 22 Raw Thermistor		
	22	Input 23 Raw Thermistor		
	23	Input 24 Raw Thermistor		
	24	Input 25 Raw Thermistor		
	25	Input 26 Raw Thermistor		
	26	Input 27 Raw Thermistor		
	27	Input 28 Raw Thermistor		
	28	Input 29 Raw Thermistor		
	29	Input 30 Raw Thermistor		
	30	Input 31 Raw Thermistor		
	31	Input 32 Raw Thermistor		

To read the inputs in Fahrenheit as an integer

Function Code	Register	Description	Read/Write	Notes
Input Register (FC4)	32	Input 1 tempF	RO	Rounded to nearest integer
	33	Input 2 tempF		
	34	Input 3 tempF		
	35	Input 4 tempF		
	36	Input 5 tempF		
	37	Input 6 tempF		
	38	Input 7 tempF		
	39	Input 8 tempF		
	40	Input 9 tempF		
	41	Input 10 tempF		
	42	Input 11 tempF		
	43	Input 12 tempF		
	44	Input 13 tempF		
	45	Input 14 tempF		
	46	Input 15 tempF		
	47	Input 16 tempF		
	48	Input 17 tempF		
	49	Input 18 tempF		
	50	Input 19 tempF		
	51	Input 20 tempF		
	52	Input 21 tempF		
	53	Input 22 tempF		
	54	Input 23 tempF		
	55	Input 24 tempF		
	56	Input 25 tempF		
	57	Input 26 tempF		
	58	Input 27 tempF		
	59	Input 28 tempF		
	60	Input 29 tempF		
	61	Input 30 tempF		
	62	Input 31 tempF		
	63	Input 32 tempF		

To read the inputs in Fahrenheit as a floating-point number

Function Code	Register	Description	Read/Write	Notes
Input Register (FC4)	64	Input 1 tempF	RO	IEEE754 Floating point (32 bits)
	66	Input 2 tempF		
	68	Input 3 tempF		
	70	Input 4 tempF		
	72	Input 5 tempF		
	74	Input 6 tempF		
	76	Input 7 tempF		
	78	Input 8 tempF		
	80	Input 9 tempF		
	82	Input 10 tempF		
	84	Input 11 tempF		
	86	Input 12 tempF		
	88	Input 13 tempF		
	90	Input 14 tempF		
	92	Input 15 tempF		
	94	Input 16 tempF		
	96	Input 17 tempF		
	98	Input 18 tempF		
	100	Input 19 tempF		
	102	Input 20 tempF		
	104	Input 21 tempF		
	106	Input 22 tempF		
	108	Input 23 tempF		
	110	Input 24 tempF		
	112	Input 25 tempF		
	114	Input 26 tempF		
	116	Input 27 tempF		
	118	Input 28 tempF		
	120	Input 29 tempF		
	122	Input 30 tempF		
	124	Input 31 tempF		
	126	Input 32 tempF		

To read the inputs in Celsius as an integer

Function Code	Register	Description	Read/Write	Notes
Input Register (FC4)	128	Input 1 tempC	RO	Rounded to nearest integer
	129	Input 2 tempC		
	130	Input 3 tempC		
	131	Input 4 tempC		
	132	Input 5 tempC		
	133	Input 6 tempC		
	134	Input 7 tempC		
	135	Input 8 tempC		
	136	Input 9 tempC		
	137	Input 10 tempC		
	138	Input 11 tempC		
	139	Input 12 tempC		
	140	Input 13 tempC		
	141	Input 14 tempC		
	142	Input 15 tempC		
	143	Input 16 tempC		
	144	Input 17 tempC		
	145	Input 18 tempC		
	146	Input 19 tempC		
	147	Input 20 tempC		
	148	Input 21 tempC		
	149	Input 22 tempC		
	150	Input 23 tempC		
	151	Input 24 tempC		
	152	Input 25 tempC		
	153	Input 26 tempC		
	154	Input 27 tempC		
	155	Input 28 tempC		
	156	Input 29 tempC		
	157	Input 30 tempC		
	158	Input 31 tempC		
	159	Input 32 tempC		

To read the inputs in Celsius as a floating-point number

Function Code	Register	Description	Read/Write	Notes
Input Register (FC4)	160	Input 1 tempC	RO	IEEE754 Floating point (32 bits)
	162	Input 2 tempC		
	164	Input 3 tempC		
	166	Input 4 tempC		
	168	Input 5 tempC		
	170	Input 6 tempC		
	172	Input 7 tempC		
	174	Input 8 tempC		
	176	Input 9 tempC		
	178	Input 10 tempC		
	180	Input 11 tempC		
	182	Input 12 tempC		
	184	Input 13 tempC		
	186	Input 14 tempC		
	188	Input 15 tempC		
	190	Input 16 tempC		
	192	Input 17 tempC		
	194	Input 18 tempC		
	196	Input 19 tempC		
	198	Input 20 tempC		
	200	Input 21 tempC		
	202	Input 22 tempC		
	204	Input 23 tempC		
	206	Input 24 tempC		
	208	Input 25 tempC		
	210	Input 26 tempC		
	212	Input 27 tempC		
	214	Input 28 tempC		
	216	Input 29 tempC		
	218	Input 30 tempC		
	220	Input 31 tempC		
	222	Input 32 tempC		

Input values as counts from the adc output - Use for 0-6VDC or 0-20mA Transducers

Function Code	Register	Description	Read/Write	Notes
Input Register (FC4)	224	Input 1 Raw Counts	RO	0-4095 Counts. 667 counts per 1VDC. <u>For 0-20mA transducers</u> 196 counts per mA with 301-ohm load resistor 163 counts per mA with 249-ohm load resistor 147 counts per mA with 225-ohm load resistor 66 counts per mA with 100-ohm load resistor *Load resistor to be installed between input and ground
	225	Input 2 Raw Counts		
	226	Input 3 Raw Counts		
	227	Input 4 Raw Counts		
	228	Input 5 Raw Counts		
	229	Input 6 Raw Counts		
	230	Input 7 Raw Counts		
	231	Input 8 Raw Counts		
	232	Input 9 Raw Counts		
	233	Input 10 Raw Counts		
	234	Input 11 Raw Counts		
	235	Input 12 Raw Counts		
	236	Input 13 Raw Counts		
	237	Input 14 Raw Counts		
	238	Input 15 Raw Counts		
	239	Input 16 Raw Counts		
	240	Input 17 Raw Counts		
	241	Input 18 Raw Counts		
	242	Input 19 Raw Counts		
	243	Input 20 Raw Counts		
	244	Input 21 Raw Counts		
	245	Input 22 Raw Counts		
	246	Input 23 Raw Counts		
	247	Input 24 Raw Counts		
	248	Input 25 Raw Counts		
	249	Input 26 Raw Counts		
	250	Input 27 Raw Counts		
	251	Input 28 Raw Counts		
	252	Input 29 Raw Counts		
	253	Input 30 Raw Counts		
	254	Input 31 Raw Counts		
	255	Input 32 Raw Counts		

Digital Input Table

Inputs that are dry contact closures wired normally open

Function Code	Register	Description	Read/Write	Notes
Discrete Input (FC2)	0	Input 1 DryNO Status	RO	0 = open and 1 = closed
	1	Input 2 DryNO Status		
	2	Input 3 DryNO Status		
	3	Input 4 DryNO Status		
	4	Input 5 DryNO Status		
	5	Input 6 DryNO Status		
	6	Input 7 DryNO Status		
	7	Input 8 DryNO Status		
	8	Input 9 DryNO Status		
	9	Input 10 DryNO Status		
	10	Input 11 DryNO Status		
	11	Input 12 DryNO Status		
	12	Input 13 DryNO Status		
	13	Input 14 DryNO Status		
	14	Input 15 DryNO Status		
	15	Input 16 DryNO Status		
	16	Input 17 DryNO Status		
	17	Input 18 DryNO Status		
	18	Input 19 DryNO Status		
	19	Input 20 DryNO Status		
	20	Input 21 DryNO Status		
	21	Input 22 DryNO Status		
	22	Input 23 DryNO Status		
	23	Input 24 DryNO Status		
	24	Input 25 DryNO Status		
	25	Input 26 DryNO Status		
	26	Input 27 DryNO Status		
	27	Input 28 DryNO Status		
	28	Input 29 DryNO Status		
	29	Input 30 DryNO Status		
	30	Input 31 DryNO Status		
	31	Input 32 DryNO Status		

Inputs that are dry contact closures wired normally closed

Function Code	Register	Description	Read/Write	Notes
Discrete Input (FC2)	32	Input 1 DryNC Status	RO	0 = closed and 1 = open
	33	Input 2 DryNC Status		
	34	Input 3 DryNC Status		
	35	Input 4 DryNC Status		
	36	Input 5 DryNC Status		
	37	Input 6 DryNC Status		
	38	Input 7 DryNC Status		
	39	Input 8 DryNC Status		
	40	Input 9 DryNC Status		
	41	Input 10 DryNC Status		
	42	Input 11 DryNC Status		
	43	Input 12 DryNC Status		
	44	Input 13 DryNC Status		
	45	Input 14 DryNC Status		
	46	Input 15 DryNC Status		
	47	Input 16 DryNC Status		
	48	Input 17 DryNC Status		
	49	Input 18 DryNC Status		
	50	Input 19 DryNC Status		
	51	Input 20 DryNC Status		
	52	Input 21 DryNC Status		
	53	Input 22 DryNC Status		
	54	Input 23 DryNC Status		
	55	Input 24 DryNC Status		
	56	Input 25 DryNC Status		
	57	Input 26 DryNC Status		
	58	Input 27 DryNC Status		
	59	Input 28 DryNC Status		
	60	Input 29 DryNC Status		
	61	Input 30 DryNC Status		
	62	Input 31 DryNC Status		
	63	Input 32 DryNC Status		

Inputs that are wet contact closures (external voltage 0-60VDC) wired normally open

Function Code	Register	Description	Read/Write	Notes
Discrete Input (FC2)	64	Input 1 WetNO Status	RO	0 = no VDC and 1 = VDC > 5vdc
	65	Input 2 WetNO Status		
	66	Input 3 WetNO Status		
	67	Input 4 WetNO Status		
	68	Input 5 WetNO Status		
	69	Input 6 WetNO Status		
	70	Input 7 WetNO Status		
	71	Input 8 WetNO Status		
	72	Input 9 WetNO Status		
	73	Input 10 WetNO Status		
	74	Input 11 WetNO Status		
	75	Input 12 WetNO Status		
	76	Input 13 WetNO Status		
	77	Input 14 WetNO Status		
	78	Input 15 WetNO Status		
	79	Input 16 WetNO Status		
	80	Input 17 WetNO Status		
	81	Input 18 WetNO Status		
	82	Input 19 WetNO Status		
	83	Input 20 WetNO Status		
	84	Input 21 WetNO Status		
	85	Input 22 WetNO Status		
	86	Input 23 WetNO Status		
	87	Input 24 WetNO Status		
	88	Input 25 WetNO Status		
	89	Input 26 WetNO Status		
	90	Input 27 WetNO Status		
	91	Input 28 WetNO Status		
	92	Input 29 WetNO Status		
	93	Input 30 WetNO Status		
	94	Input 31 WetNO Status		
	95	Input 32 WetNO Status		

Inputs that are wet contact closures (external voltage 0-60VDC) wired normally closed

Function Code	Register	Description	Read/Write	Notes
Discrete Input (FC2)	96	Input 1 WetNC Status	RO	0 = VDC > 5 and 1 = no VDC
	97	Input 2 WetNC Status		
	98	Input 3 WetNC Status		
	99	Input 4 WetNC Status		
	100	Input 5 WetNC Status		
	101	Input 6 WetNC Status		
	102	Input 7 WetNC Status		
	103	Input 8 WetNC Status		
	104	Input 9 WetNC Status		
	105	Input 10 WetNC Status		
	106	Input 11 WetNC Status		
	107	Input 12 WetNC Status		
	108	Input 13 WetNC Status		
	109	Input 14 WetNC Status		
	110	Input 15 WetNC Status		
	111	Input 16 WetNC Status		
	112	Input 17 WetNC Status		
	113	Input 18 WetNC Status		
	114	Input 19 WetNC Status		
	115	Input 20 WetNC Status		
	116	Input 21 WetNC Status		
	117	Input 22 WetNC Status		
	118	Input 23 WetNC Status		
	119	Input 24 WetNC Status		
	120	Input 25 WetNC Status		
	121	Input 26 WetNC Status		
	122	Input 27 WetNC Status		
	123	Input 28 WetNC Status		
	124	Input 29 WetNC Status		
	125	Input 30 WetNC Status		
	126	Input 31 WetNC Status		
	127	Input 32 WetNC Status		

Outputs Registers

Function Code	Register	Description	Read/Write	Notes
Read coil/output (FC1)/(FC5) (FC15) for write multiple	0	Output 1 Status	RW	0 off, 1 on
	1	Output 2 Status		
	2	Output 3 Status		
	3	Output 4 Status		

Control Registers

Function Code	Register	Description	Read/Write	Notes	
Holding Register (FC3/FC6) (FC16) for write multiple	0	Slave Address	R/W	1-247	Default 247
	1	Baud Rate	R/W	Enumerated: 0 – 300, (not supported) 1 – 600, (not supported) 2 – 1200, 3 – 2400, 4 – 4800, 5 – 9600, 6 – 19200, 7 – 38400, 8 – 57600, 9 – 115200	Default 9600
	2	Data Mode	R/W	Enumerated: 0 – 8N1, 1 – 8E1, 2 – 8O1, 3 – 8N2, (not supported) 4 – 8E2, 5 – 8O2	Default 8N1
	3	Product ID	RO	1	
	4	Firmware Revision	RO	convert to hex to get Kernel version and Filesystem versions. Initial build 1542 (hex 0606)	
	5	Reset	WO	Must write 57005 to data register for reset	

Appendix B – SD Card Update

Overview

The TELSEC® MP2x can be upgraded using a standard SD memory card. Use this procedure when you need upgrade the system. Please contact Quest prior to performing the upgrade if you have any questions or concerns regarding the upgrade files and or process.

Items needed:

1. SD memory card 2-8 GB in size formatted for use with Windows file format FAT32. (Cards typically come this way)
2. PC or laptop with an SD card reader to allow transfer of files

Process:

1. Obtain the appropriate files from Quest
2. The program files are in a zip file (compressed) format. Open the file with "File Explorer" and copy the "update" folder with its contents to the SD card.
3. When completed, your SD card should have a file folder with the name "update" on it and in that folder will be all the files necessary to perform the update.
4. Remove the card from your PC and insert it into the SD slot on the front of the MP2x. Make sure it clicks into place.
5. The system will take approximately 10-15 seconds to shut down the current processing and then look for the update information.
6. The system will then reboot and rapidly flash the power LED to indicate it is performing the update.
7. The system will reboot again after the update is completed and begin operating with the new parameters.
8. Remove the SD card by pressing on it to unlatch the spring-loaded connection.

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