Interfacing M-series PLCs To Maple System OIT

A. Communication Cable:

Getting the right communication cabling between the OIT and the PLC is the most important step and may have accounted for 70% of the potential problems. The Maple Systems OIT Model 520M may be connected to either the RS485 port or the RS232 port of the T100MD+ PLCs. We present here both methods of wiring the HMI to the PLCs. Note that you have to select the correct serial I/F option in the "System Parameters" setup using the EasyBuilder software.

(a) RS485 (recommended)

We initially encountered some difficulties interfacing the OIT to the RS485 port. The OIT has a 4-wire RS485 interface whereas the PLC has a two-wire interface. The User's manual suggested connecting the TX+ and RX+ together and TX- and RX- together and connect to the "+" and "-" terminals of the two-wire RS485. However, we could not get it to work on the HMI-520M that we tested using EasyBuilder software version 2.3.0(R).

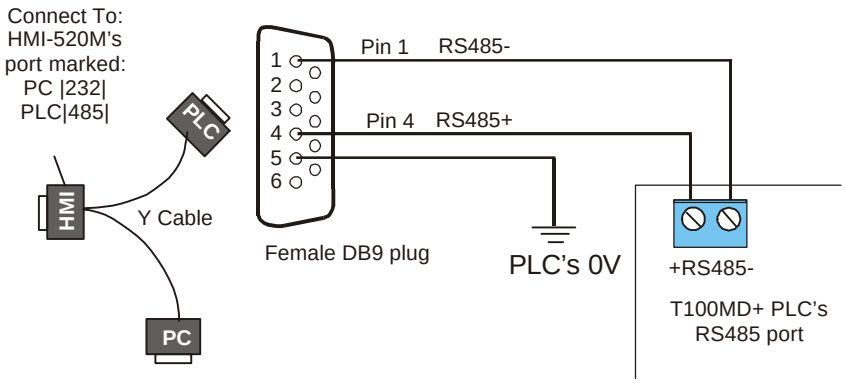
Maple System tech support suggested the two-wire connection shown in the diagram to the right which works great with the PLC. However, if your OIT model is an older version you will have to call Maple System to find out if the OIT actually supports two-wire connection.

Note: If your OIT does not support two-wire RS485, you can still use its RS-232 port with an Auto485 converter to connect to the PLC's RS485 port. We tested this and it works great.

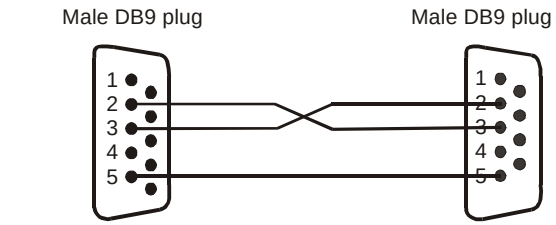
(b) RS232

This should work quite easily using a simple "null modem" cable between the HMI520 and the PLC as shown in the attached diagram.

(a) RS485 – Make a cable with a single Female DB9 plug and wire up the pin 1 to the PLC's RS485 (-) terminal and pin 4 to the PLC's RS485(+) terminal. Pin 5 is to be connected to the PLC's 0V power terminal to provide common ground (this is not needed if the PLC and HMI share the same power supply). The Female DB9 plug is to be connected to the HMI's **Y** cable at the end marked "PLC", as shown below:



(b) RS232 - Make a cable where both ends are DB9 male plug. Connect pin 2 to pin 3, pin 3 to pin 2, and pin 5 to pin 5 as shown below.



Connect To HMI-520M
Female DB9 socket
marked as **PLC | 232 |**

Connect To: T100MD+
COMM1 (RS232)

Note: If you are using RS232 port for **T100MX**+ PLC, you need to connect an external +9V power to pin 4 of the DB9 plug at the PLC end to power the opto-isolated interface. This is not needed in T100MD+ PLC. We recommend using RS485 for T100MX+.

B. Set System Parameters in Maple System EasyBuilder Software.

1. Controller/PLC Type

Modicon MODBUS RTU (485 2W) will work for both RS232 and RS485 connection.

2. Serial port I/F

If you are using the HMI's RS485 port with the T100MD's COMM3 port, then select either: "RS485" or "RS-485 2W". Otherwise select the "RS232" option.

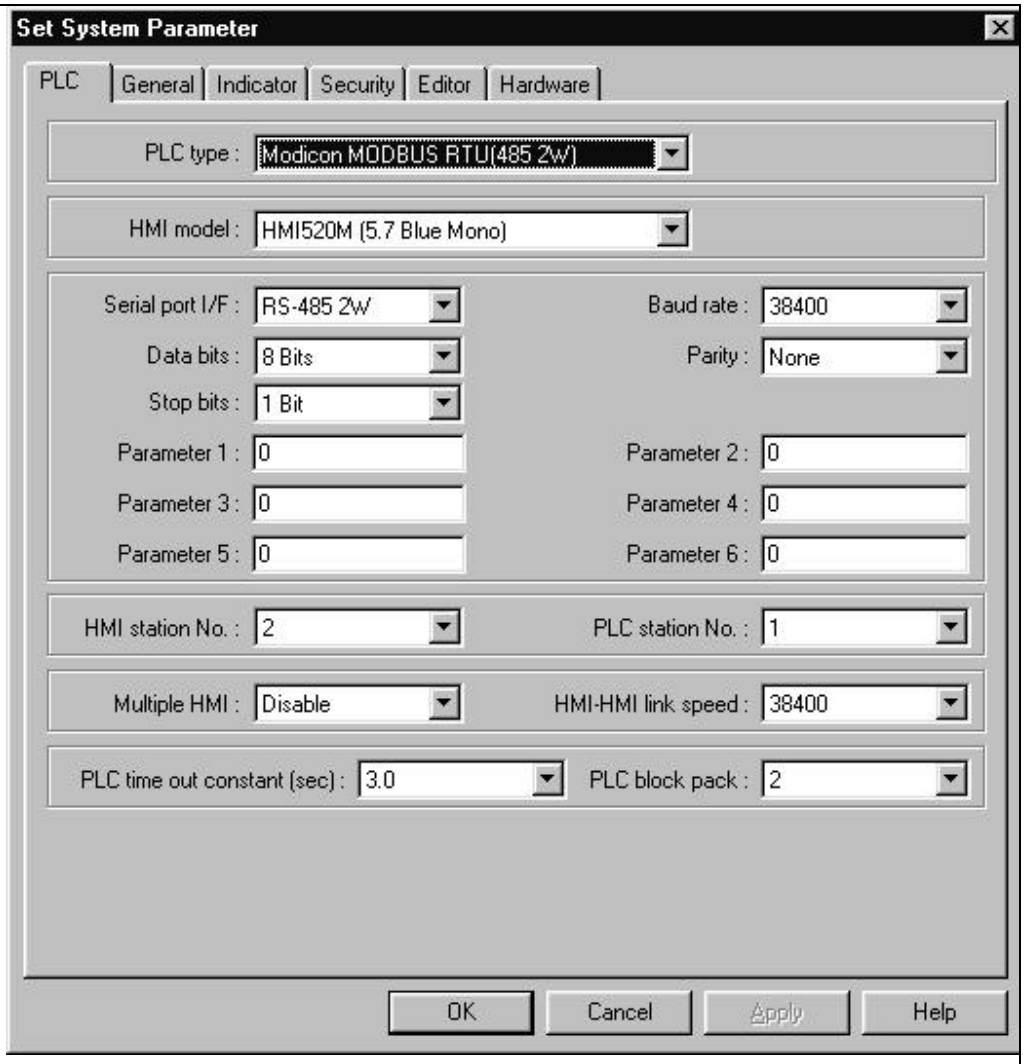
3. Comm. Parameters.

Set to PLC's default of 38400 bps, 8 data bits, no parity and 1 stop bit.

4. PLC Station ID.

It is assumed that the PLC is defined with ID = 01 (factory default) If the PLC has a different ID, then enter the correct ID number in the "PLC station No:" field.

Note: the ID should be between 1 and 255 (or 01 to FF hex). Never use 0 as the station ID for MODBUS because that ID is reserved for MODBUS broadcast command.



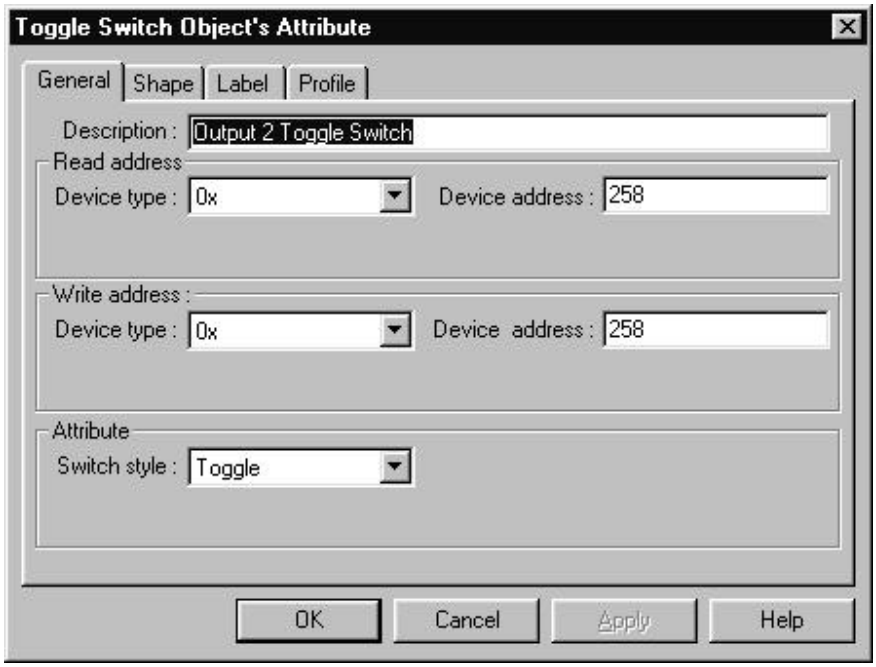
5. I/O Channel Mappings (16-bit per channel)

I/O Variable	MODBUS PLC Word Addr (4 *x*)
Input[1] – [16]	40001 - 40016
Output[1] – [16]	40017 – 40032
Timer[1] –[4]	40033 – 40036
Counters [1]–[64]	40049 – 40052
Relay[1] – [32]	40065 - 40096

6. I/O Bit Mappings

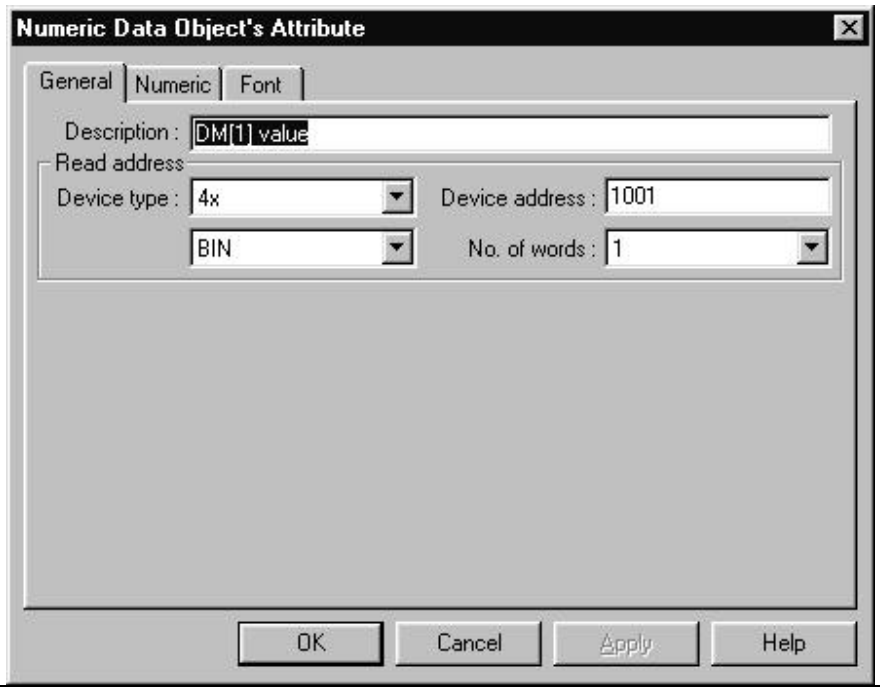
I/O Type	MODBUS PLC Bit Addr (0 *x*)
Inputs 1–256	1 – 256
Outputs 1–256	257 – 512
Timers 1–64	513 – 576
Counters 1–64	769 – 832
Relays 1-512	1025-1536

E.g. for Output #2, “Device Type” is 0x and address is 258.



7. Data Memory Mappings

DM[1]-DM[4000]	41001 – 45000
E.g. DM[3991]	3991+41000 = 44991
E.g. DM[1]	1 + 41000 = 41001



8. Other Variable Mappings	I/O Variable	MODBUS PLC Word Addr (4*x*)
	TimerPV[1]–[64]	40129 – 40192
	CtrPV[1]–[64]	40257 – 40320
	TIME[1] – [3]	40513 – 40515
	DATE[1] –[4]	40517 – 40520

C) Example HMI Project : "TRimodbus232.epj" & "TRimodbus485.epj"

Please transfer a **blank** program to your PLC before running this test file so that the HMI can have control of the output #1 and #2.

Push button	Output 1
Toggle SW	Output 2
Lamp	Input 1
Numeric display	TIME[1]: TIME[2]: TIME[3] DM[1]
Rotating dial	Short-hand – TIME[2] Long-hand – TIME[3]
Numeric entry	DM[1]

If you click on the :Change DM[1] button, a pop up window keypad will appear for you to change the value of DM[1].

You will have to touch on the display in order to activate it and allow the keypad to function.

After you have changed the value of DM[1], press the "Ent" key and set the value, then press the "Close" button to close the keypad windows and observe the new value of DM[1] appearing on the base screen.