

**CP1L-M to PV10 via Modbus Commands.**

**PURPOSE:**

This document will show how to configure the CP1L-M30DT1-D to Axiom Plus PV10 over Modbus commands (reading I/O, writing outputs, reading holding registers, writing RAM registers, and reading alarm / status information).

**REQUIRED EQUIPMENT:**

- |     |               |   |
|-----|---------------|---|
| 1.  | CP1L-M30DT1-D | Omron CP1L PLC                                |
| 2.  | CP1W-CIF01    | Omron RS232 Board                             |
| 3.  | S8VS-06024    | Omron 24VDC Power Supply                      |
| 4.  | 40-9709F      | Omron D-Sub 9-Pin Female Connector            |
| 5.  | XM2S-0911     | Omron D-Sub 9-Pin Shell (Quantity of 2)       |
| 6.  | 40-9709M      | Omron D-Sub 9-Pin Male Connector              |
| 7.  | PV10          | Tolomatic Axiom Plus Servo Controller / Drive |
| 8.  | 3600-6240     | Tolomatic Servo Motor                         |
| 9.  | 3604-0011     | Tolomatic Linear Slide                        |
| 10. | 3600-9084     | Tolomatic Over-Travel Sensors (Quantity of 2) |
| 11. | 3600-9090     | Tolomatic Home Sensor                         |

**REQUIRED SOFTWARE:**

- |    |   |                                |
|----|---|--------------------------------|
| 1. | CX-Programmer V9.11                                   | Omron PLC Programming Software |
| 2. | Axiom Plus Configuration & Programming Software V2.53 |                                |

**REQUIRED CABLES:**

1. USB Cable
2. Axiom Serial Communication Cable

**FILES:**

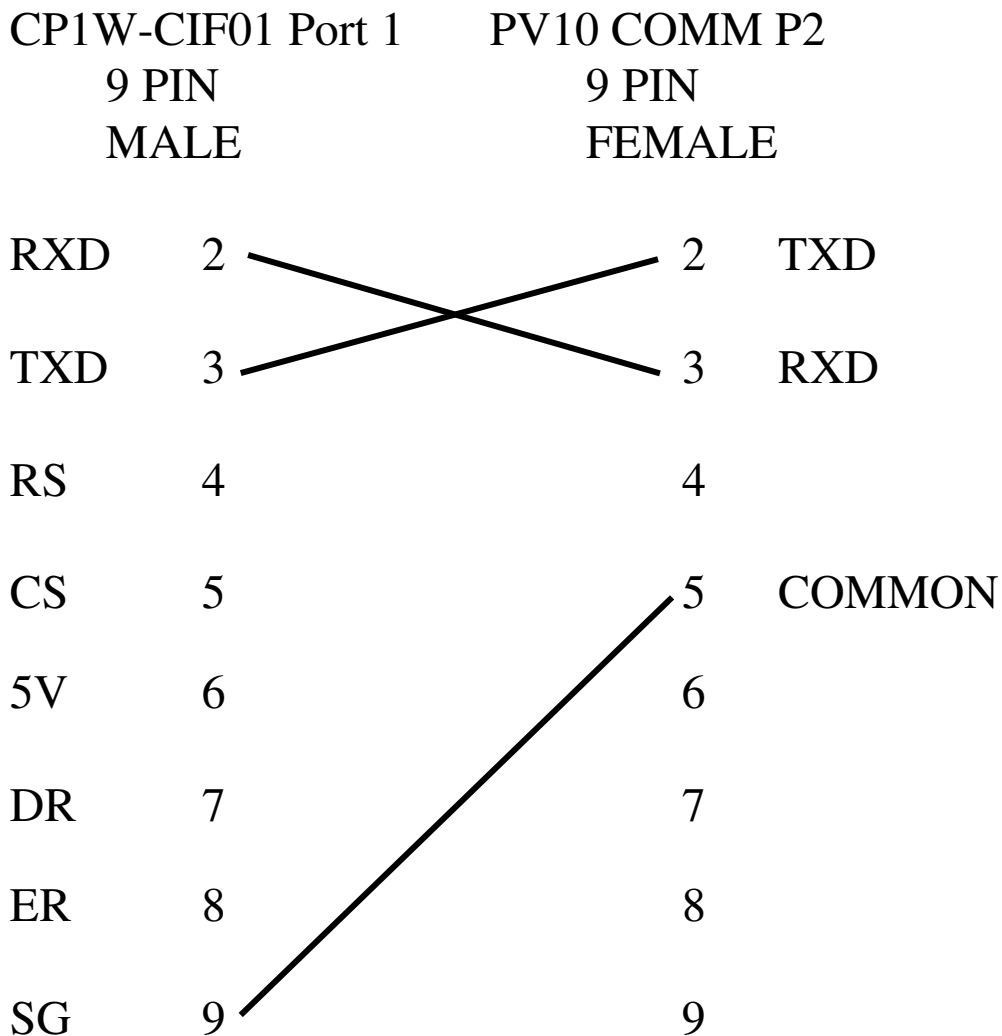
- |                                      |                              |
|--------------------------------------|------------------------------|
| • CP1L-M to Axiom Plus PV10.doc      | The file you are reading     |
| • AxiomPlusModbus-FunctionBlocks.cxp | CP1L PLC Program             |
| • AxiomPlusModbus.cxp                | CP1L PLC Program without FBs |
| • AxiomPlus.adp                      | Axiom Plus PV10 File         |
| • AxiomPlus.dat                      | Axiom Plus PV10 File         |
| • AxiomPlus.plc                      | Axiom Plus PV10 File         |
| • AxiomPlus.prg                      | Axiom Plus PV10 File         |

**HELPFUL MANUALS:**

- |                  |   |
|------------------|---|
| • W462-E1-06.pdf | CP1L Operation Manual                   |
| • 3600-4628.pdf  | Axiom Plus User Guide                   |
| • PI-MBUS-300    | Modicon Modbus Protocol Reference Guide |

**INSTRUCTIONS:**

1. Make cable that will go between the 9-pin D-SUB ports on the CP1W-CIF01 Port 1 to the Axiom Plus PV10 COMM P2.



2. Wire all components & items per the manuals listed. Place the CP1W-CIF01 in Port 1 on the PLC. Make sure all switches under the USB connection on the PLC are set to Off.
3. Open up CX-Programmer. Plug in the USB cable between the PLC & computer. Go online with the PLC. Place the PLC in Stop Mode. Download the PLC program as well.
4. Download the following Settings to the PLC. Place the PLC in Monitor Mode upon completion of downloading.

The screenshot shows the 'PLC Settings - NewPLC1' window with the following settings:

- Startup** tab selected.
- Communications Settings:**
  - ☐ Standard (9600 ; 1,7,2,E)
  - ☒ Custom
    - Baud: 19200
    - Format: 8,1,0
    - Mode: Serial Gateway
- Link Words:** 10 (default)
- Start Code:**
  - ☒ Disable
  - ☐ Set: 0x0000
- End Code:**
  - ☒ Received Bytes: 256
  - ☐ CR,LF
  - ☐ Set End Code: 0x0000
- PC Link Mode:**
  - ☒ ALL
  - ☐ Master
- Response Timeout:** 0 \*100 ms (default 5000ms)
- Unit Number:** 0
- Delay:** 0 \*10 ms
- NT/PC Link Max:** 0
- PC Link Unit No.:** 0

At the bottom right, the status is 'CP1L-M' and 'Offline'.

5. Open up Axiom Plus Configuration & Programming Software. Plug in the serial cable between the PV10 & computer. Download the files to the PV10. Make sure the PV10 communication settings match the PLC Settings (and the Modbus address is 1). Go offline & unplug the cable when complete.
6. Plug in the cable from step #1 between the CP1L-M PLC & PV10 Servo Amplifier.
7. Enable the PV10 & home / reference the servo unit.
8. Now for explanation of the PLC logic (function blocks were created for most Modbus commands).
9. Rungs 0 & 1 and rungs 2 & 3 go together with one another. Rung 0 will “force on” (#FF00) output 256 on the rising edge of the bit and run Program 1 & rung 1 will “force off” (#0000) output 256 on the falling edge of the bit and stop Program 1. Rung 2 will “force on” (#FF00) output 257 on the rising edge of the bit and run Program 2 & rung 3 will “force off” (#0000) output 257 on the falling edge of the bit and stop Program 2.
10. Rungs 4, 5, and 6 will read the status of the inputs on the PV10. The status of the inputs will be found in the H0 / W10 memory area (labeled in rung 6).
11. Rungs 7, 8, and 9 will read the status of the outputs on the PV10. The status of the outputs will be found in the H10 / W20 memory area (labeled in rung 9).
12. Rung 10 will read the status of the Absolute Actual Position of the servo. &4354 is the address of the current position of the servo. The current position will be found in memory area D0 (32-bit DINT in inches). For instance, if a value of &4000 is returned – it translates to 4.000 inches.
13. Rung 11 will read the status of the Actual Velocity of the servo. &4358 is the address of the current velocity of the servo. The current velocity will be found in memory area D2 (32-bit DINT in inches/second). For instance, if a value of &1000 is returned – it translates to 10.00 inches/second.
14. Rung 12 will read the status of the Actual Torque of the servo. &4360 is the address of the current torque of the servo. The current torque will be found in memory area D4 (32-bit DINT in percentage units). For instance, if a value of &20 is returned – it translates to 20% torque.

15. Rung 13 will preset the RAM Position Register of the servo. &0 is the address of the RAM Position Register. For instance, if a value of &2000 is entered – it translates to 2.000 inches. When changing this value, you will notice the change in the running of Program 1.
16. Rung 14 will preset the RAM Velocity Register of the servo. &2 is the address of the RAM Position Register. For instance, if a value of &500 is entered – it translates to 5.00 inches/second. When changing this value, you will notice the change in the running of Program 1.
17. Rungs 15, 16, and 17 will read the status of the PV10 (Report Slave ID). The status of the inputs will be found in the H20 / H21 / H22 / W20 / W21 / W22 memory area (labeled in rung 17).
18. Rung 18 is the trigger for sending / receiving of Modbus commands.