Introduction to SmartMod

Step by Step Guide 1

Setting up and connecting an HE359DIQ512 to an XLt MJ2 port

Cscape:

1. Open **Cscape** and create a new program file.
2. Select: **Program/Protocol Configuration** (Fig.1)

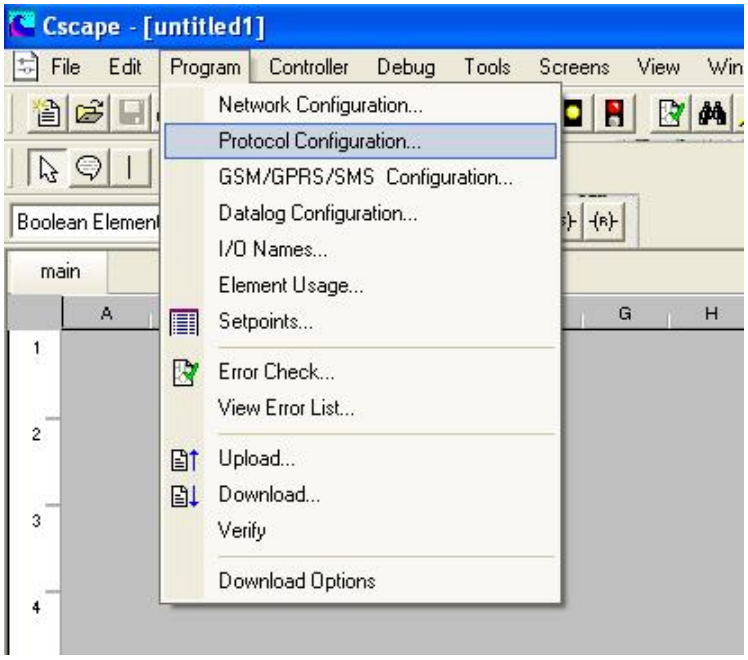


Fig.1

3. Select **Modbus Master** protocol from the dropdown list (Fig.2)

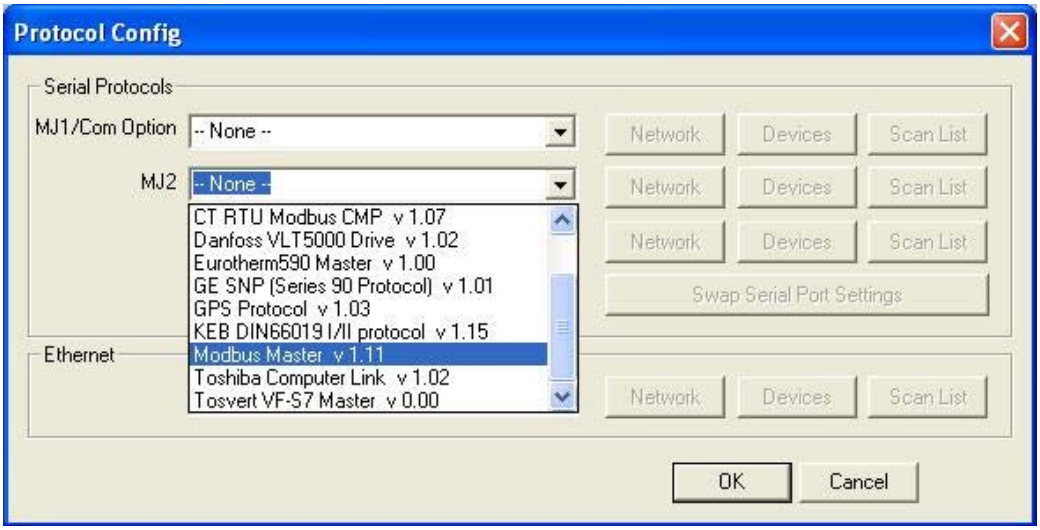


Fig.2

4. Select **Network** button and setup (Fig.3).

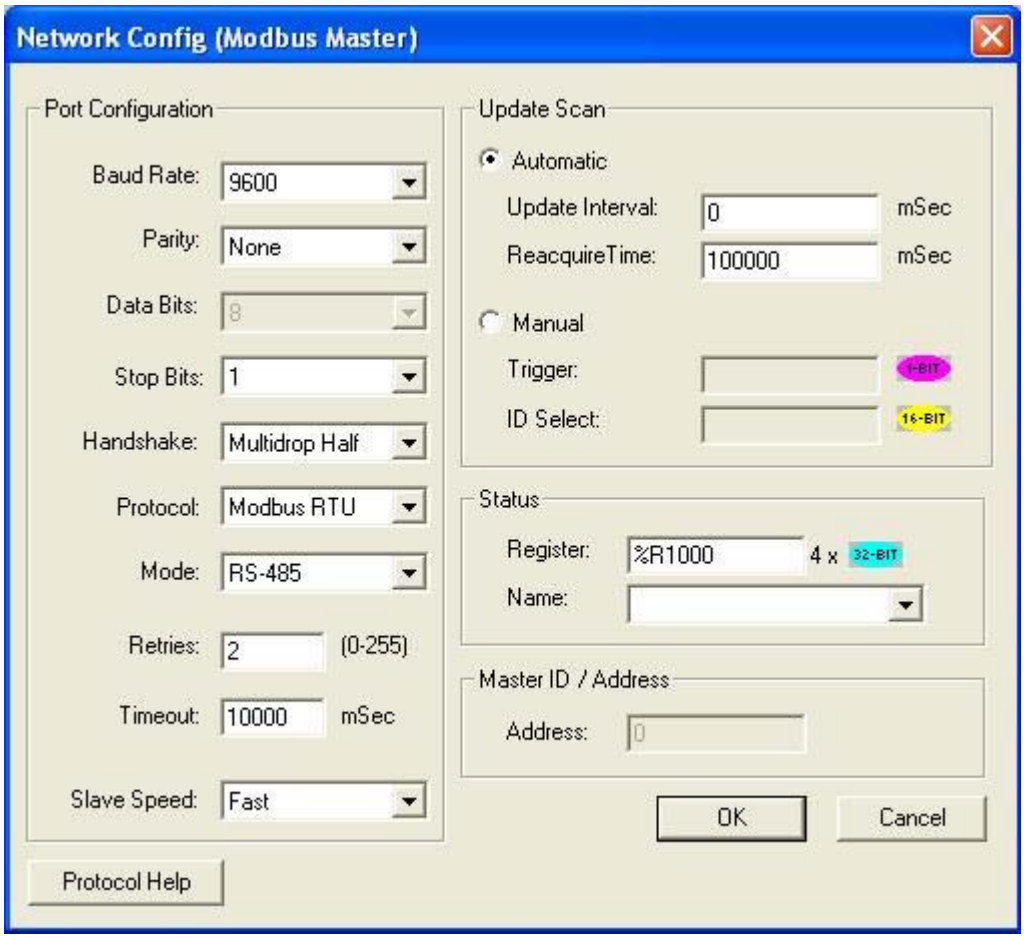


Fig.3

5. Select **Ok** and then Select **Device** button

6. Setup the device (Fig.4).

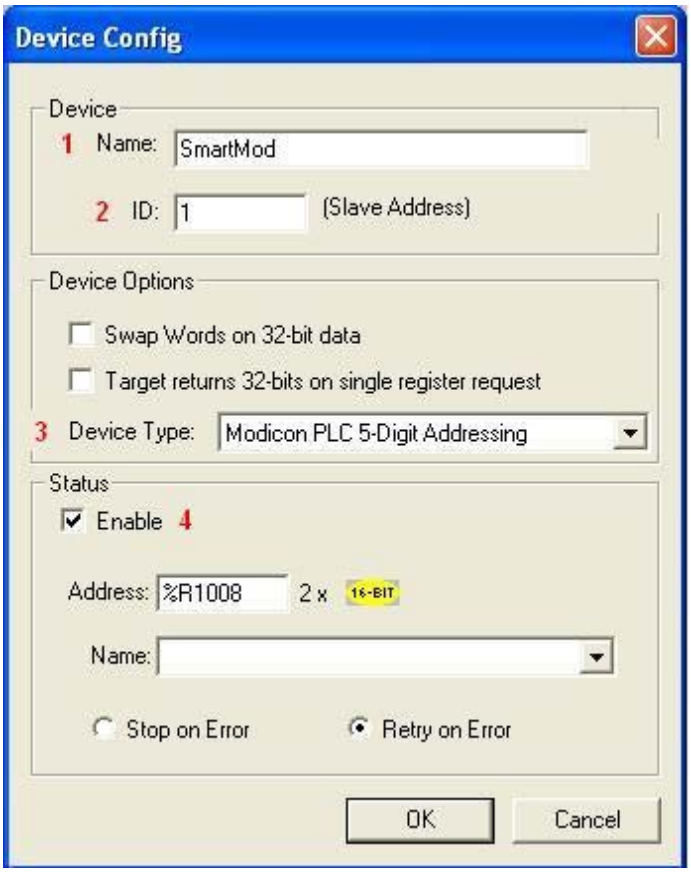


Fig.4

1. A descriptive name for the attached device
2. Modbus ID for Smartmod. 1 is correct for initial communication
3. 5-digit Addressing for SmartMod
4. Enabling the Status register provides feedback (see troubleshooting the connection below).

7. Select **Ok** and then select **Scan List** button

8. Click **Add** and setup (Fig. 5).

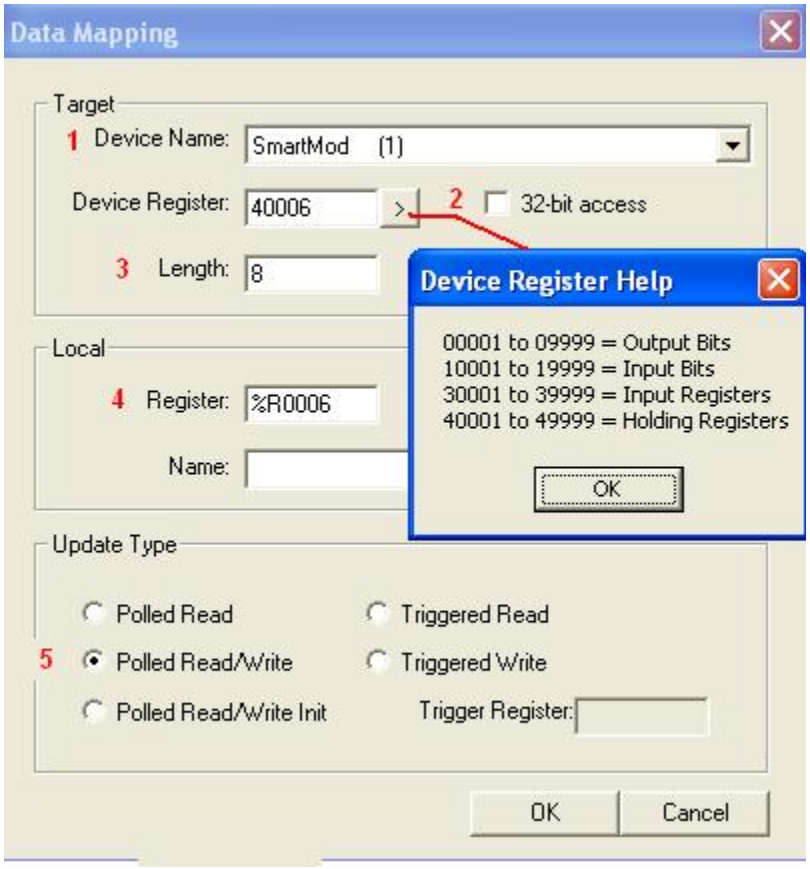


Fig. 5

1. Select device from drop down list. Bracketed number indicates Node ID.
2. Starting register. (Holding registers are appropriate)
3. Up to 8 registers are required for the HE359DIQ512
4. The starting register (%R) in the XLt where the data will be mapped.
5. Polled Read/Write as changes can be made to settings in the SmartMod

9. Select **OK, OK, OK** to return to **Cscape** main window

10. Select Screens/View edit Screens (Figs. 6&7).

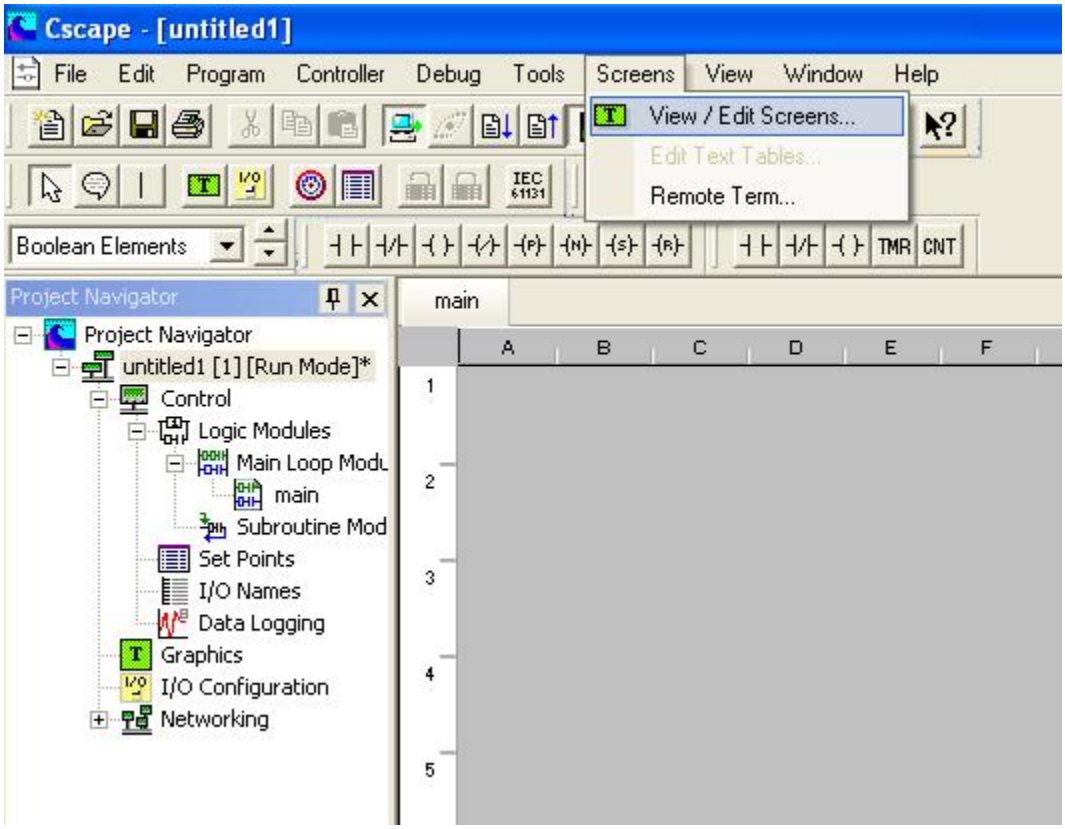


Fig.6

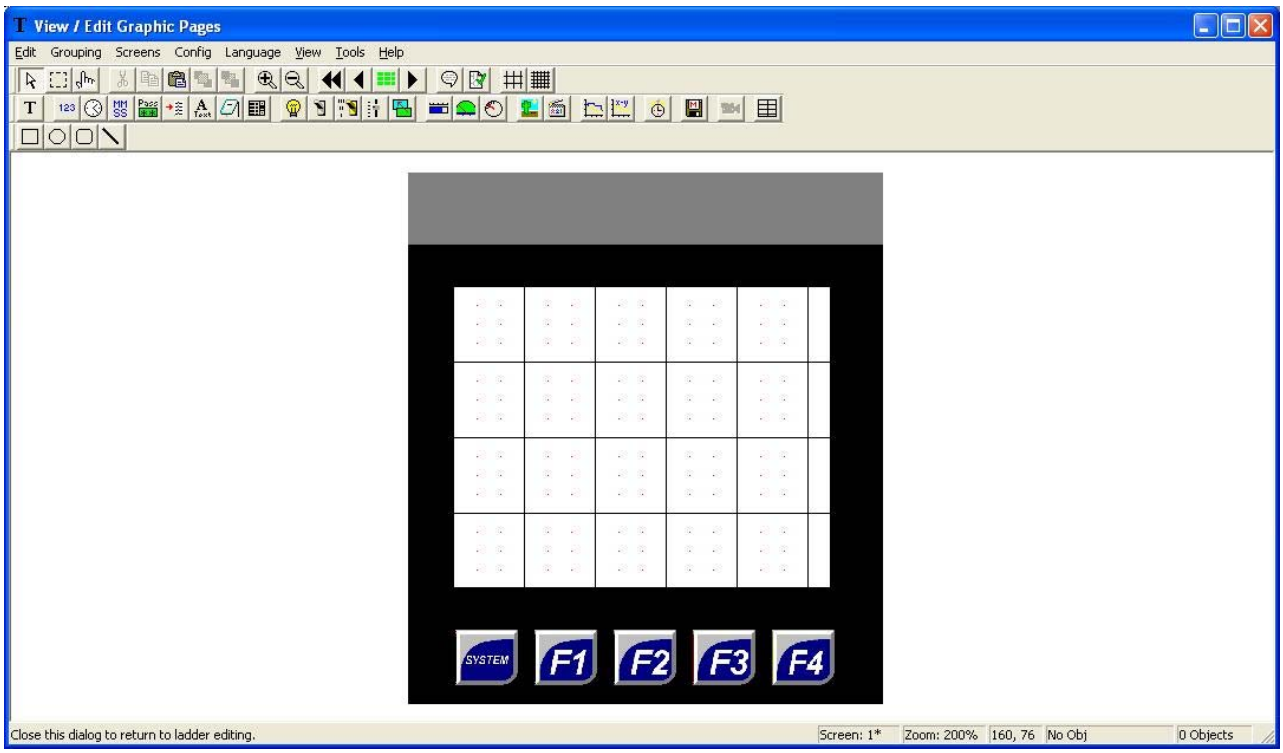


Fig.7

11. Select Numeric Data button  then click and drag an area on the XLt screen. Double click the field and set up the data (Fig.8)

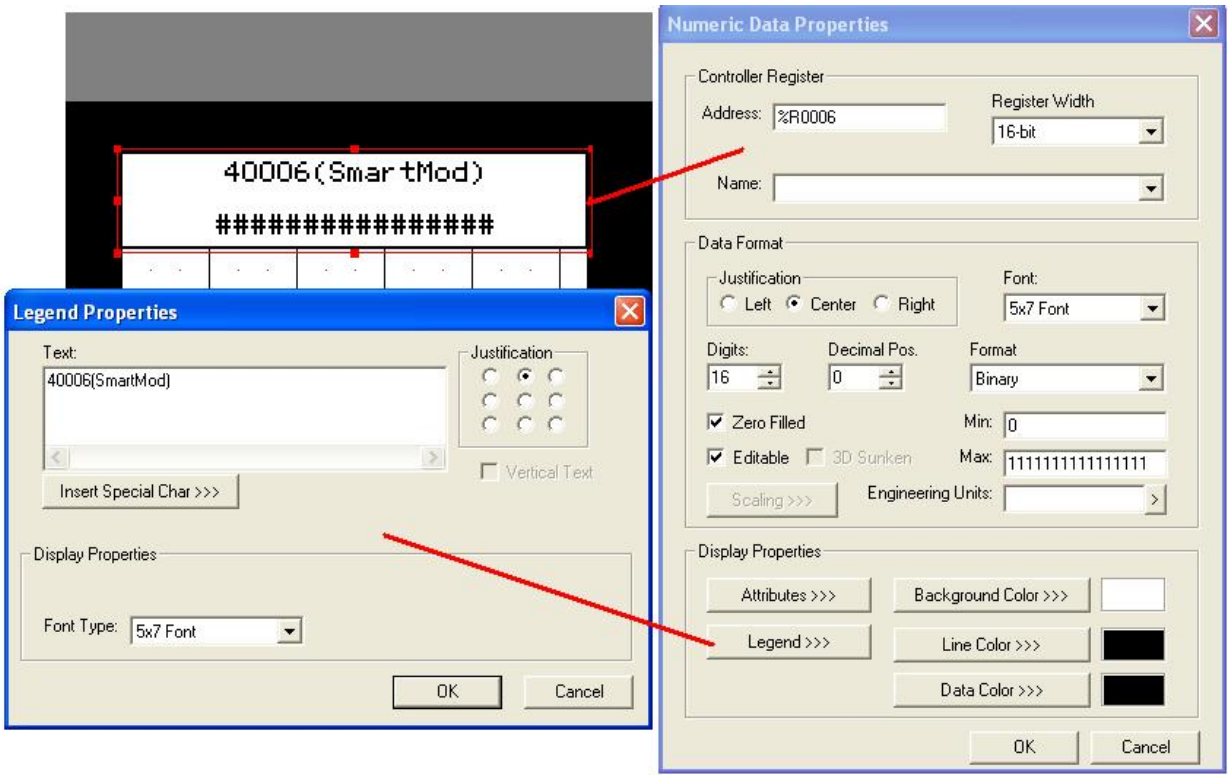


Fig.8

12. Add a second similar data field to the screen. Use **Controller Register** %R0007 (40007 SmartMod) and use 3 digits, Decimal Format/Editable (Fig. 9).

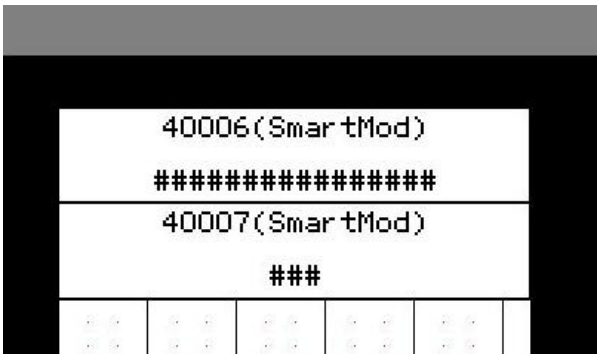
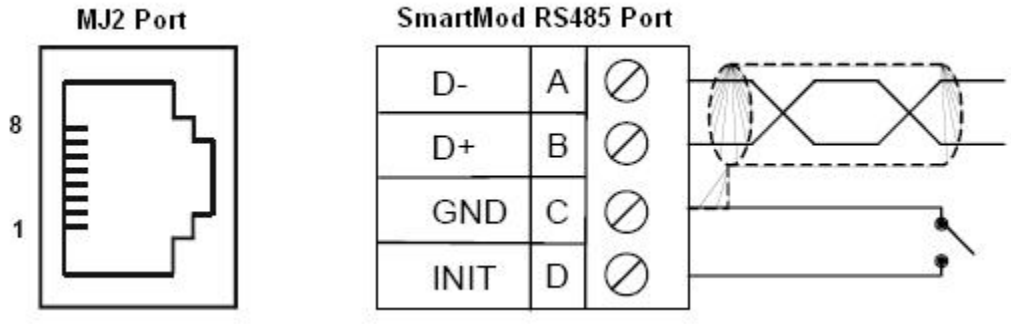


Fig. 9

13. Download to XLt.

14. Assemble the communications cable. Port details as per Fig 10.



Note: These are the onboard MJ2 connections and not the cable connector.

Fig.10

Connect:

XLt MJ2 port (Half Duplex Mode)	SmartMod Comm. Port
Pin 1 (Tx+/Rx+)	B (D+)
Pin 2 (Tx-/Rx-)	A (D-)
Pin 6 (0V)	C (GND)

For Initialisation settings connect:

SmartMod Comm. Port	SmartMod Comm. Port
C(GND)	D(INIT)

15. When the cable is assembled connect the RJ45 end to MJ2 on the XLt. Connect the Smartmod 4-way terminal block to the HE359DIQ512 comm. port.

16. Power-up the HE359DIQ512 SmartMod. The Initialisation settings (INIT connected to GND at power-up) will cause the SmartMod to start in the following mode: **Baud Rate 9600, No parity, 1 Stop Bit and as Modbus Node ID 1.** This is to allow communications so the SmartMod can be configured for alternative settings, if necessary. See Fig. 3 above for Cscape/XLt equivalent settings.

17. If communications is established then the green Power LED on the front of the HE359DIQ512 will flash (may not be visible at higher baud rates) and the XLt screen will display a binary sequence of 0's and 1's in the first data field '40006(SmartMod)' and a decimal value of between 1 and 247 in the second data field '40007 (SmartMod)'.

18. Take note of the value displayed at 40006 and compare it to the following table (Fig. 11) to discern the actual communication settings in the unit.

<table>
<tr><th colspan="8">Register 40006 (Communications Parameters) Bit Definition</th></tr>
<tr><th>Bits 7-15</th><th>Bit 6</th><th colspan="2">Bit 5</th><th>Bit 4</th><th>Bit 3</th><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th></tr>
<tr><td>Unused</td><td>Mode</td><td colspan="2">Parity</td><td>Data Bits</td><td colspan="3">Baud Rate</td></tr>
<tr><td rowspan="6"></td><td rowspan="2">0 = ASCII Mode</td><td>Value</td><td>Meaning</td><td rowspan="2">0 = 7 Data Bits</td><td>Value</td><td colspan="2">Meaning</td></tr>
<tr><td>0</td><td>Mark</td><td>0</td><td colspan="2">1200 baud</td></tr>
<tr><td rowspan="2">1 = RTU Mode</td><td>1</td><td>Even</td><td>1</td><td colspan="2">2400 baud</td></tr>
<tr><td>2</td><td>Odd</td><td rowspan="3">1 = 8 Data Bits</td><td>2</td><td colspan="2">4800 baud</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Space</td><td>3</td><td colspan="2">9600 baud</td></tr>
<tr><td>4</td><td colspan="2">19200 baud</td></tr>
<tr><td></td><td></td><td>5-7</td><td colspan="2">38400 baud</td></tr>
</table>

Fig. 11

19. For example, a displayed value of: 0000000001011111 would indicate the following: Bits 0-2 added to give Baud Rate:

    Bit 0 On = decimal 1
    Bit 1 On = decimal 2
    Bit 2 On = decimal 4

    The sum of these three bits gives a value of 7 indicating a **Baud Rate** of **38400**

    Bit 3 On = **8 Data Bits**

    Bit 4 On = decimal 1
    Bit 5 Off = decimal 0

    The sum of these two bits gives a value of 1 indicating **Even Parity**

    Bit 6 On = **Modbus RTU Mode**

    Bits 7-15 are unused.

20. The second data field, 40007 will indicate the Node ID of the attached SmartMod.

21. Using the XLt touchscreen/keypad, edit the fields to suitable values for your application.

22. Any changes that are made to the SmartMod settings MUST also be reflected in the Cscape/XLt setup. Otherwise communications may be lost when the INIT to GND connection is disconnected and the SmartMod reset.

TROUBLESHOOTING THE CONNECTION

1. There are several status registers that can be assigned to give an indication of the health of the Network and of individual Modbus Nodes (SmartMods)
2. In **Cscape/Protocol Configuration/Network settings**, assign a register as in Fig. 12. The registers are defined below.

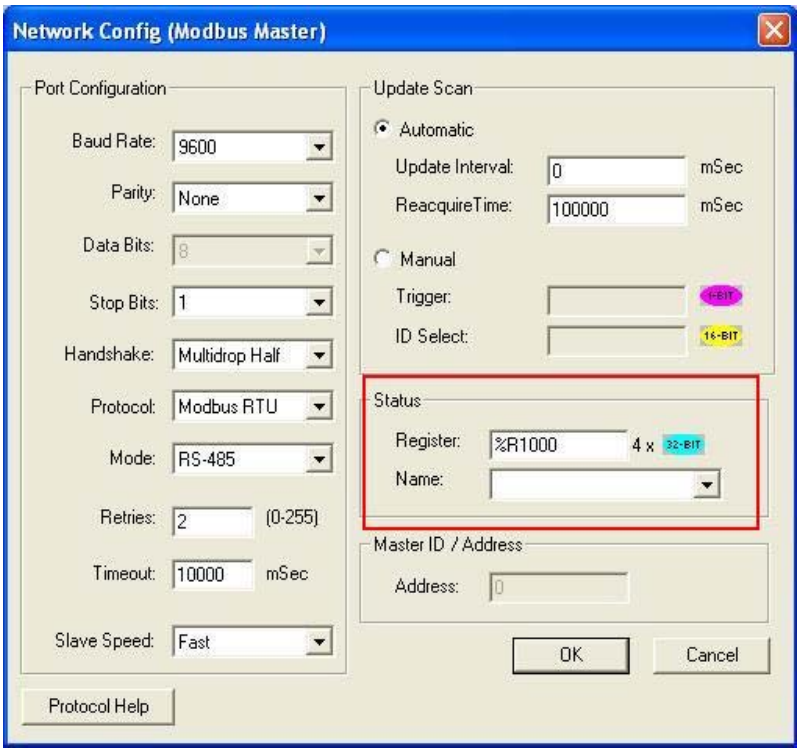


Fig. 12

Update interval Exceeded Count [%R1000+%R1001] (32 bit) – Number of times that the actual transaction scan time to complete all transactions exceeded specified update interval. Generally used as an indicator that an excessive number of triggered transfers or failed communication retries are occurring that is lengthening the expected transaction scan time. If the Update interval is set to zero (update as fast as possible), this 32-bit register alternately specifies the actual transaction scan time in mSec resolution.

No Response Count [%R1002+%R1003] (32 bit) – Number of times that a device(s) did not respond to a transaction. This includes ALL failed transaction, not just those after the retry count is exceeded.

Corrupt Response Count [%R1004+%R1005] (32 bit) – Number of times that a device(s) returned an invalid or failed response to a transaction. This includes ALL failed transaction, not just those after the retry count is exceeded.

Valid Response Count [%R1006+%R1007] (32 bit) – Total number of valid responses.

3. If communications is established and good then expect to see the value in %R1006(7) increase.
4. If communications is established and bad then expect to see the value in %R1004(5) increase. Check the cable connections and or register addressing in **Cscape/Protocol Configuratiuon/Scanlist**
5. If there is no communications then %R1002 will increment. Check cable is connected/XLt and SmartMod are powered and configured and that the XLt is in RUN mode
6. For individual Modbus Nodes (SmartMods) another register can be enabled at **Cscape/Protocol Configuration/Device settings** as per Fig. 13

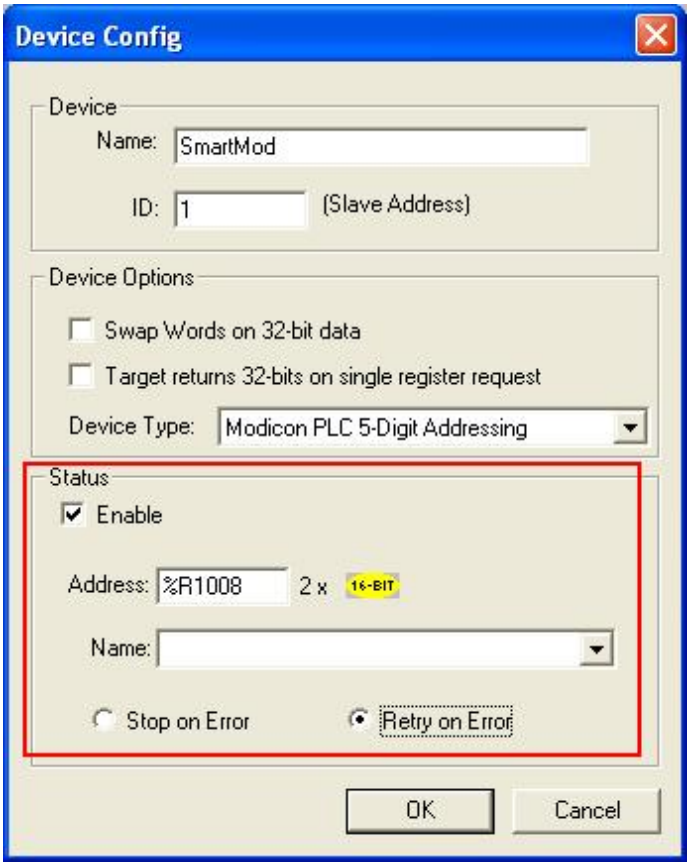


Fig. 13

7. This register value gives feedback for the specific Modbus Node.
    - 129 - Slave Timeout
    - 130 - Bad Checksum (corrupted incoming data)
    - 131 - No response
    - 197 - Slave does not support this function.
    - 198 - PLC Reference type doesn't match data type
    - 200 - Specified data length exceeds Modbus frame size

8. All of the appropriate registers can be added and their values viewed live in Cscape when the XLt is connected by using the **Controller/Datawatch** window (Fig. 14).

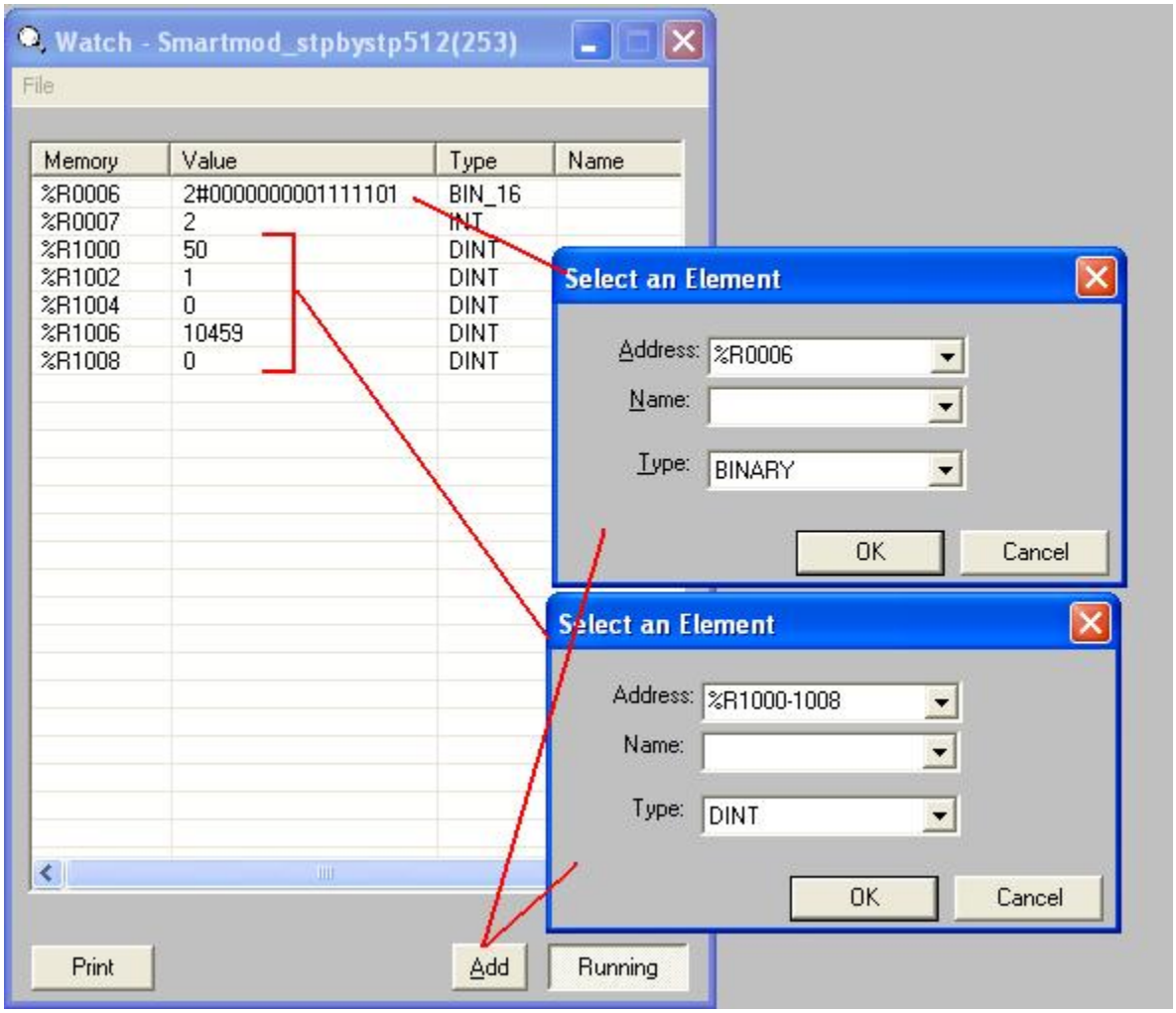


Fig. 14

Other Checks	
SmartMod PWR LED Off	Check power to SmartMod
SmartMod PWR LED not flashing	Has communication been established? Is the Baud rate set for 9600 or lower?
Cannot edit data on Xlt screen	Ensure Editable box is ticked for Data Field.
SmartMod does not retain settings and will only communicate at 9600 baud	Ensure GND and INIT jumper is disconnected.
No Communications between XLt and SmartMod	Check cable. Check SmartMod GND and INIT Pins are connected? Power cycle SmartMod. Check that Network Settings in Cscape/Protocol configuration are appropriate. Check program is downloaded to XLt. Check cable is connected to MJ2
No communications between Cscape and XLt	Check PC serial connection to MJ1. Check Cscape Local and Target addresses are identical. Ensure protocol configuration is loaded to MJ2