

## HC900 Hybrid Controller

*When you need more than just discrete control*

### Product Note - Writing HC900 Data to Trendview Plus V5 Recorders

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#### Overview:

Recorders have historically been the primary visual aid on the shop floor for operators to view a recent history of process performance. The addition of data archiving, networking and computational features to these hardened instruments have expanded their role in plant operations, but the recorder's fundamental function remains unchanged.

When a separate control system like the HC900 is used to control the process, recorders are often used in combination to monitor process performance. As a general rule it is not recommended to have two measuring instruments directly connected to the same sensor, but in practice, due to implementation cost and complexity it is very commonly implemented.

Recorders are also used in control rooms to monitor process performance from a central location. This application allows scanning a large number of parameters from single or multiple processes without the need for operator action.

#### The problem:

A frequently identified problem with wiring two instruments to the same sensor is when the sensor is a thermocouple and both measuring instruments employ a pulse type thermocouple break detection circuit. The pulses often cause interaction between the two instruments' measuring circuits. The solution to this problem may require a compromise in the thermocouple failure detection in one or both of the instruments or dual element thermocouples. When recorders are installed in a control room in a central location, large quantities of wires are

required to connect the field sensors to the direct input circuits of the recorder. Where thermocouples are involved, in order to save on wiring costs, some installations revert to using remote reference junction compensation in a field mounted terminal box and copper wires to connect the remote terminal box to the control room. This type of installation compensates for the temperature measured at one location within a remote junction box, but rarely is this as accurate as would be achieved if compensated sensor wire were run directly to the recorder terminals.

A final issue that often surfaces when two instruments are used to measure data and present the results in digital form is that the numbers don't agree on the two instruments. The better the quality of the instruments used typically the closer they will track, but because of normal equipment tolerances, rarely do they always agree.

### **Solution:**

One solution to solve some of the interfacing issues above is to use the HC900 controller to measure and control the analog parameters of a process and serially transmit the measured values to a Trendview V5 recorder. Since the HC900 controller is intended to be mounted within an enclosure in an industrial environment, it can be mounted in the field close to the process under control. This saves on wiring and installation cost. By running communication cables to a HC900 Operator Interface and to a Trendview V5 recorder, these units can be located in areas that optimize operator efficiency.

This solution offers the following benefits:

1. No open thermocouple detection compromises since this function is performed in the HC900 controller and is independent from the recorder.
2. Connecting two instruments to one sensor is avoided, eliminating the potential for sensor loading, ground loops or other electrical interaction.
3. Mounting the HC900 in the field eliminates the need for remote reference junction compensation for thermocouples, improves measurement accuracy and saves on installation and wiring cost.
4. The digitally transmitted values from the HC900 controller to Trendview V5 recorder precisely match, eliminating any measurement differences between the two instruments.

### **Implementation:**

The following procedure outlines setup requirements to transmit from 8 to 40 analog values from the HC900 controller to a TrendView V5 recorder.

HC900 Controller Port configuration:

1. Install HC Designer software on the PC to be used for configuration and connect the PC to the HC900 controller. Verify the ability to communicate with the HC900 controller and complete the desired control configuration with the exception of the Modbus communication blocks.
2. Under the Utilities tab of HC Designer, select "Set Controller Serial Ports", select a port, (RS232 or RS485), and make the selections below:

Note: If a 559 or 1042 OI will be used with the HC900, the RS232 port must be selected. If the RS232 port is selected, an external RS232 to RS485 converted will be needed to interface the HC900 with the RS485 Modbus port of the Trendview V5 recorder.

- a. Select Modbus RTU Master
- b. Baud Rate: =19,200
- c. Stop bits = 1

- d. Parity = None
3. Select "SET" to write the selected parameters to the serial port.

Note: If the controller mode switch is in the RUN or Locked positions and you are using the RS232 port for connection to the PC, once the RS232 port protocol is changed to Modbus RTU Master, the PC will no longer be able to communicate with the controller. To re-establish communications the Mode switch must be placed in the "Program" Mode. If the baud rate was changed when the Modbus RTU Master selection was made, the PC port baud rate will need to be set to this rate to reestablish communications.

4. From the "Function Block" tab of HC designer, drag and drop one Modbus Slave function block onto the control diagram.
5. Drag five (5) Modbus Write blocks onto the control diagram and connect the Write blocks to the Slave block (see fig. 1.)

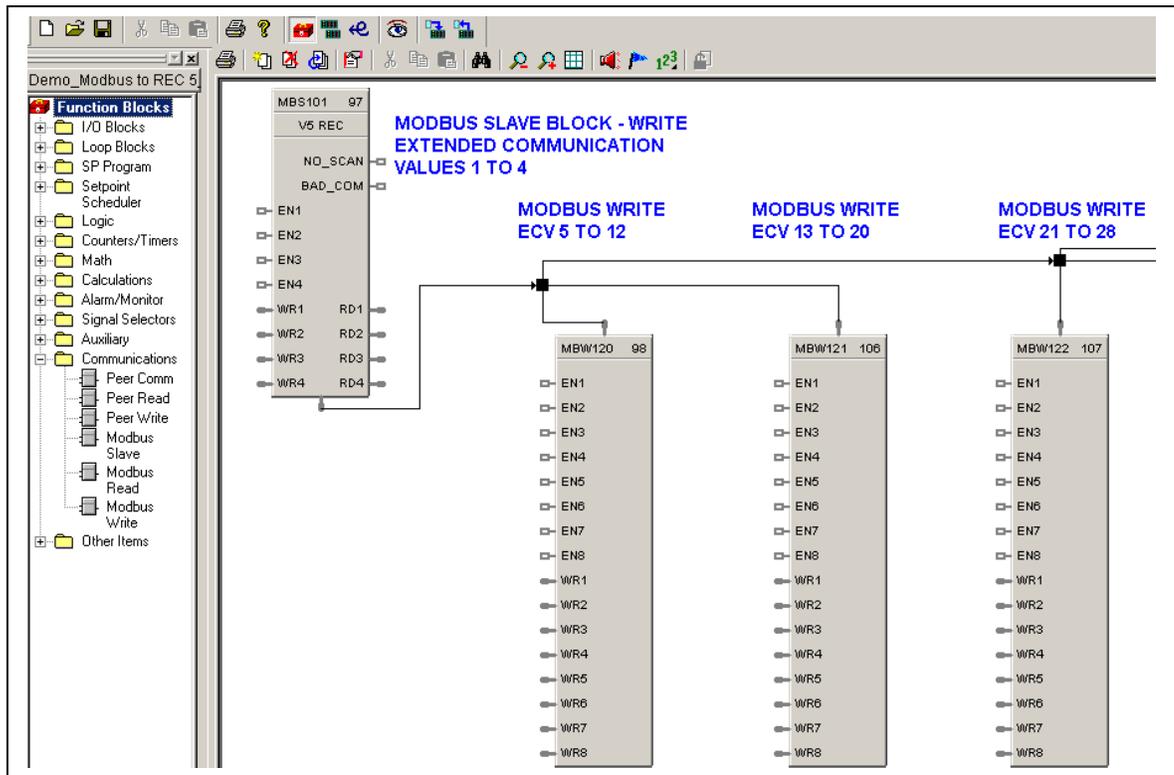


Figure 1

6. Access the Modbus Slave block and enter the following information:
  - a. Slave Tag Name XXXXXXXXX (application specific tag name)
  - b. Slave address (1 to 247)
  - c. Modbus Double Register Format: FP B (Big Endian, 4321)
  - d. Access the "Write" tab, check "Use Register" for each write function and enter the following addresses and "Register Data Type" for the recorder's "Extended Communication Values" (ECV),
    - (2400, float 32) = ECV1
    - (2402, float 32) = ECV 2
    - (2404, float 32) = ECV 3
    - (2406, float 32) = ECV 4

Accept (OK) the entries. Note that floating-point data requires 4 bytes or two consecutive addresses. See figure 2.

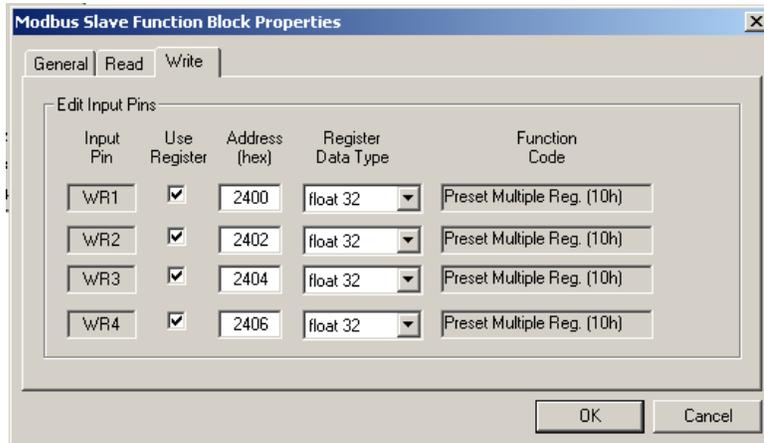


Figure 2

- Click on the Modbus Write block for the recorder Extended Communication Values\* 5 through 12, select a write channel (1 to 8) and enter the following for each channel: See figure 3.

Check "Use Register" for each channel and enter address:

- (2408, float 32) = ECV 5
- (240A, float 32) = ECV 6
- (240C, float 32) = ECV 7
- (240E, float 32) = ECV 8
- (2410, float 32) = ECV 9
- (2412, float 32) = ECV 10
- (2414, float 32) = ECV 11
- (2416, float 32) = ECV 12

- In Revision HG of the Trendview V5 Plus recorder the Modbus map was extended to include 32 communication channels linked to physical input pens and 32 virtual communication channels for a total of 64 Extended Communication Values (ECVs). The first 32 pens of the recorder may be assigned comm. Channels if there are physical input channels present in the recorder. Pens 33 through 64 may be assigned to any Extended Communication Channel.

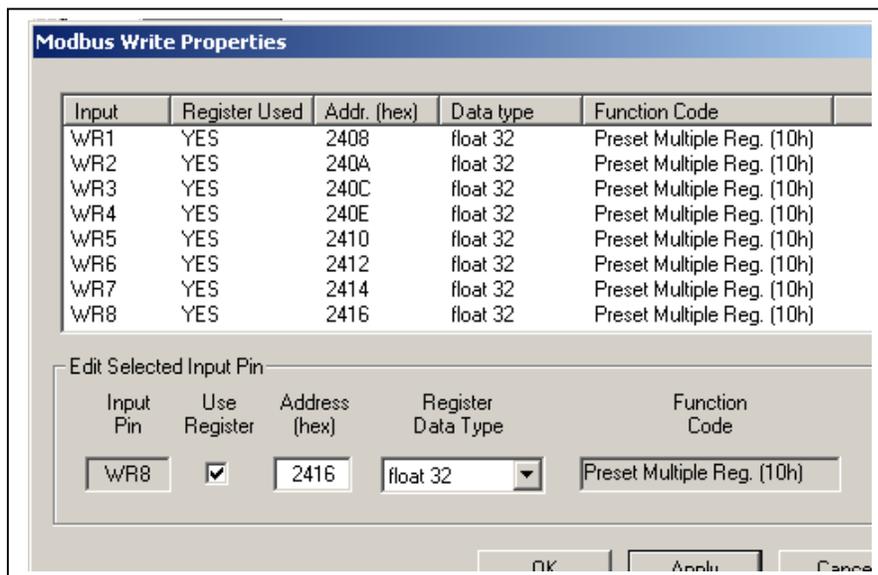


Figure 3

8. Complete the Modbus addresses and data types entries for the remaining recorder Extended Communication Values. The following addresses in HEX represent the remaining recorder extended register values:

HEX Address	ECV #	HEX Address	ECV #	HEX Address	ECV #
2418	13	2428	21	2438	29
241A	14	242A	22	243A	30
241C	15	242C	23	243C	31
241E	16	242E	24	243E	32
2420	17	2430	25	2440	33
2422	18	2432	26	2442	34
2424	19	2434	27	2444	35
2426	20	2436	28	2446	36

HEX Address	ECV #	HEX Address	ECV #	HEX Address	ECV #
2448	37	245C	47	2470	57
244A	38	245E	48	2472	58
244C	39	2460	49	2474	59
244E	40	2462	50	2476	60
2450	41	2464	51	2478	61
2452	42	2466	52	247A	62
2454	43	2468	53	247C	63
2456	44	246A	54	247E	64
2458	45	246C	55		
245A	46	246E	56		

#### Recorder Setup

9. Select Main Menu, Setup, Edit, General and COMMs. And enter the following parameters:

Baud rate= 19,200  
 Parity = None  
 Stop bits = 1  
 Modbus Protocol

10. Select PENS configurations and make the following assignments:

<b>Pen #</b>	<b>ECV #</b>	<b>Pen #</b>	<b>ECV #</b>	<b>Pen #</b>	<b>ECV #</b>
P1	ECV1	P39	ECV15	P53	ECV29
P2	ECV2	P40	ECV16	P54	ECV30
P3	ECV3	P41	ECV17	P55	ECV31
P4	ECV4	P42	ECV18	P56	ECV32
P5	ECV5	P43	ECV19	P57	ECV33
P6	ECV6	P44	ECV20	P58	ECV34
P7	ECV7	P45	ECV21	P59	ECV35
P8	ECV8	P46	ECV22	P60	ECV36
P33	ECV9	P47	ECV23	P61	ECV37
P34	ECV10	P48	ECV24	P62	ECV38
P35	ECV11	P49	ECV25	P63	ECV39
P36	ECV12	P50	ECV26	P64	ECV40
P37	ECV13	P51	ECV27		
P38	ECV14	P52	ECV28		

11. Setup recorder screens as desired using pens 1 through 8 and 33 through 64.

The above procedure describes using the standard 8 input channels to the recorder plus 16 virtual channels provided with the Math option plus an additional 16 channels available through a second option choice. Consult FTW Recorder Marketing for availability of virtual channels 17 through 32.

The method used in the HC900 to write data to the Trendview Multitrend V5 Plus recorder may also be used to write data to DPR 180 and DPR 250 recorder models.