MOORE INDUSTRIES

August 2005
225-740-01B

HART® Concentrator System
HART-to-MODBUS RTU Converter

HCS

HCS *HART® Concentrator System*
HART-to-MODBUS RTU Converter

Table of Contents

Introduction 4

About this Manual 4

The HCS 4

Model and Serial Numbers 4

Inputs 4

Outputs 4

TX Power Supply 4

Specifications 5

Dimensions 6

Terminal Designation Table 6

Configuring the HCS 7

Installing the Configuration Software 7

Connecting the HCS to the PC 7

Necessary Equipment Table 7

PC Configuration Software Summary 8

Hooking-Up the HCS Using the TX Power Supply 9

Hooking-Up the HCS Using an External Power Supply 10

Menu and Tool Bar Legend 11

Configuration Screens **11**

HART 11

MODBUS 12

MODBUS Register Definitions **14**

Installation **20**

Mounting the HCS 20

Making the Electrical Connections 20

Recommended Ground Wiring Practices 20

CE Conformity 20

Power Sourcing Parameters for General Locations, Intrinsically Safe and Non-Incendive/Type N Applications 20

Operation **20**

Maintenance 20

Customer Support **20**

Introduction

This is the user's manual for the Moore Industries HCS HART® Concentrator System. It contains all of the information needed to configure, install, operate and maintain this instrument.

About this Manual

Pay particular attention wherever you see a "***Note***", "***Caution***" or "***WARNING***".

Note– Information that is helpful for a procedure, condition or operation of the unit.

Caution– Hazardous procedure or condition that could damage or destroy the unit.

WARNING– Hazardous procedure or condition that could injure the operator.

The HCS

The HCS HART® Concentrator System converts a HART digital signal to a serial (RS-485) MODBUS RTU communication protocol. This allows HART transmitters and valves to interface directly with MODBUS-based monitoring and control systems.

Model and Serial Numbers

Moore Industries uses the model and serial numbers of our instruments to track information on each unit that we sell and service. If a problem occurs with your HCS, check for a tag affixed to the unit listing these numbers. Supply the Customer Support representative with this information when calling.

Inputs

The HCS is equipped with one input channel. This handles up to 16 HART devices in multidrop mode.

In a digital multidrop HART network, up to 16 HART instruments digitally communicate on the same wires. The HCS can be set to monitor any or all instruments and/or valves within the network. Only one MODBUS address and one communication link is needed to send the process and diagnostic data from up to 16 HART devices to a MODBUS host.

The instrument is equipped with a READY LED to indicate the health of the unit and an INPUT LED to indicate status of HART communication to the attached HART devices.

Outputs

The HCS has a standard RS-485 port that supports the MODBUS RTU protocol.

TX Power Supply

A transmitter excitation power supply (regulated 23.2Vdc ±3%@24mA, maximum) is standard on the HCS. You may access it externally at the terminals shown in
Figure 3.

* HART is a registered trademark of the HART Communication Foundation

Specifications

Performance

Input Accuracy: Reflects the accuracy of the HART field device

Input Impedance: Transmit Mode: 150 ohms; Receive Mode: Less than 5 kohms

Input Over-Range Protection: ±5Vdc

Isolation: 1000Vrms between case, input, output and power terminals and will withstand 1500Vac dielectric strength test for one minute continuous with no breakdown

Power Supply: 24Vdc, nominal; 20-30Vdc maximum

+TX Power Supply: 23.2Vdc ±3%@24mA

Digital Response Time: Equals the combination of the HART response time and the MODBUS response time; the HART delay is defined by the HART protocol as 500msec in normal mode and 333msec in burst mode; the MODBUS response time depends on how fast and how often a MODBUS Master requests data from the HCS; the data request to response time is 50msec

Performance (Continued)

Output Type: Standard MODBUS RTU protocol interface over RS-485 (parameters as specified in U.S. Standard EIA-RS485)

Output Protection: Transient protection on output

Address Range: Configurable from 1 to 247. Unit will assume a MODBUS address of 1 by default

Baud Rate: Interface supports the following: 300, 600, 1200, 2400, 4800, 9600 and 19.2k. MODBUS interface will support even, odd and no parities. Unit will assume a baud rate of 9600 and no parity by default

Character Format: One start bit, 8 data bits and one stop bit

Data Format: User-selectable Standard LSW (Least Significant Word) or Swapped MSW (Most Significant Word). Unit will assume Standard LSW by default

Power Consumption: 1.5W, nominal; 2W@24Vdc maximum for units using transmitter excitation to supply loop power to a 2-wire instrument

Indicators

LED Type: Dual color red/green indicate:
INPUT LED: Input is present and normal (green); input signal is not found (red)
READY LED: Instrument is ready for operation and configuration (green); instrument has encountered an internal problem (red)

Ambient Conditions

Operating & Storage Range: -40°C to +85°C (-40°F to +185°F)

Relative Humidity: 0-95%, non-condensing

RFI/EMI Immunity (Standard): 10V/m@80-1000MHz, 1kHz AM, when tested according to IEC61326 with error of 0.5% of span or less

RFI/EMI Immunity (with -RF Option): 20V/m@80-1000MHz, 1kHz, when tested according to IEC61326 with error of 0.5% of span or less

Noise Rejection: Common Mode: 100dB@50/60Hz

Weight 290 g (10.2 oz)

Specifications and information subject to change without notice.

Figure 1. *HCS Dimensions*

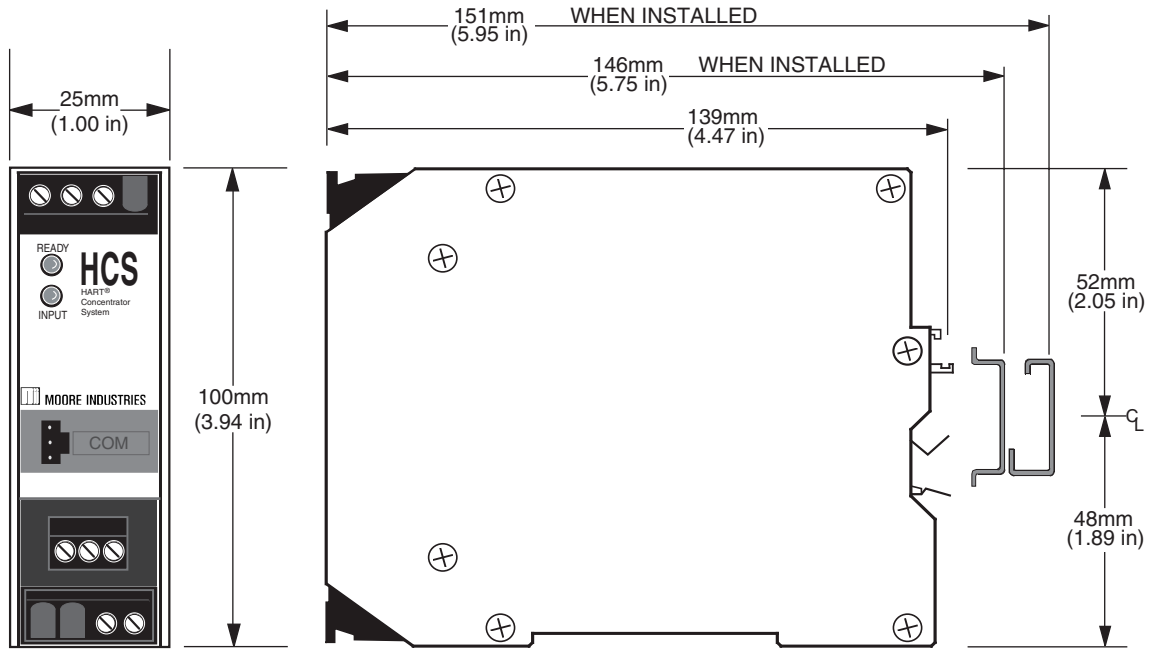


Table 1. *Terminal Designations*

	Top Terminals (Left to Right)			
	T1	**T2**	**T3**	**T4**
Input Type	+TX	+IN	–IN	Not Used

	Middle Terminals (Left to Right)		
	M1	**M2**	**M3**
MODBUS Output	A	B	S

	Bottom Terminals (Left to Right)			
	B1	**B2**	**B3**	**B4**
24Vdc Power	Not Used	Not Used	+	–

KEY:

+TX = Power for 2-Wire transmitter
+IN = Positive input
–IN = Negative input

A = A MODBUS
B = B MODBUS
S = S MODBUS
+ = Positive power input
– = Negative power input

NOTE:
1. Terminal blocks can accommodate 14-22 AWG solid wiring.
2. Tighten terminals to four inch-pounds (maximum).

Configuring the HCS

One of the benefits of the HCS is that there are no internal or external controls to adjust or settings to change. All operating parameters are set using the PC Configuration software.

Once these software settings are made, they are downloaded to the instrument in the form of a Configuration File and stored in the unit's nonvolatile memory. You can choose to save a backup copy of the file on your PC hard drive or external media. The HCS communicates with the PC through a proprietary communications cable to the PC's serial (COM) port.

Installing the Configuration Software

Refer to Table 2 for the equipment needed.

1. Insert the *Moore Industries Interface Solution PC Configuration Software* CD into the CD drive of the PC. Access the CD and open the "HCS PC Configuration Software" folder.
2. Double-click the installation program located in the folder. Follow the prompts to correctly install the program.

Once the Configuration Program is installed onto your PC, the HCS can be connected into a system and become operational.

Connecting the HCS to the PC

Connect the RS-232 end of the cable to the PC's COM port.

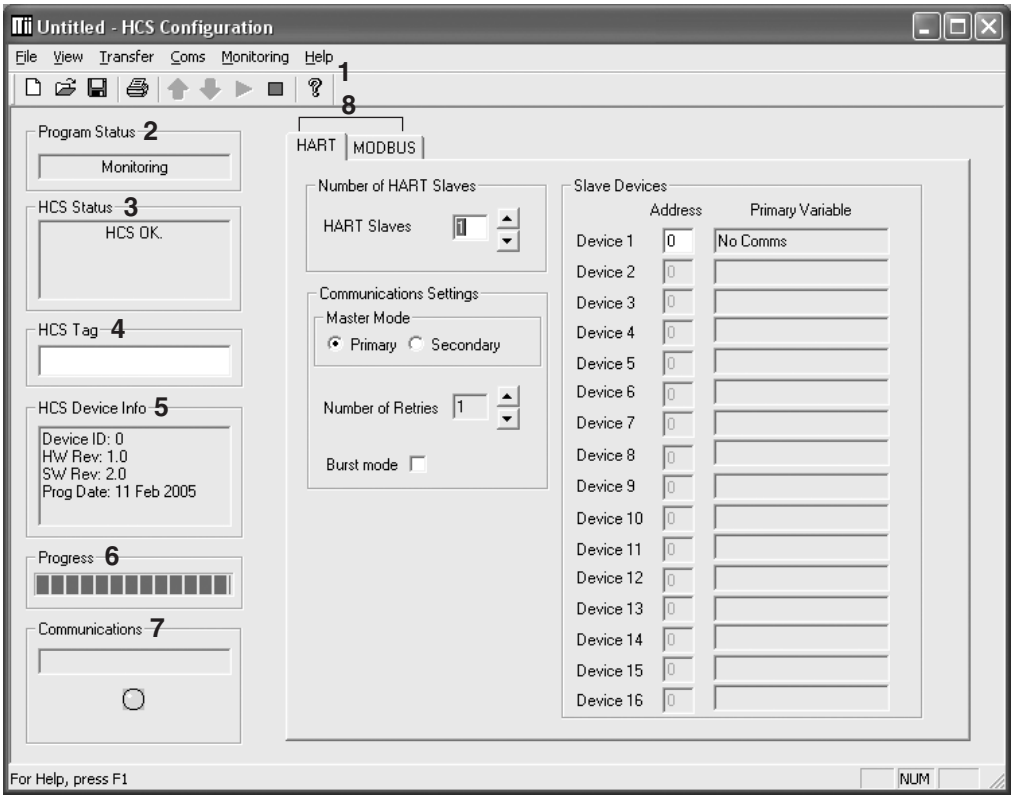
See Table 2 for information on the necessary equipment.

Table 2. *Necessary Equipment Table*

Device	Specifications
Power Supply	24Vdc, ±10%
Personal Computer	80386-based (or faster) IBM PC, or 100% compatible (Pentium recommended); CD Drive 4Mb free RAM; 16Mb recommended 20Mb free disk space on hard drive Microsoft Windows® 98, 2000, ME or NT with Internet Explorer 4.0+ or Microsoft Windows® NT with Service Pack 3 or greater 1 (one) serial port (COM 1, 2, 3 or 4)
Moore Industries PC Configuration Software	Version 1.0 or higher, successfully installed onto the hard drive
Communication Cable	Part# 803-053-26

PC Configuration Software Summary

Figure 2. *HCS PC Configuration Software Screen*



The HCS PC Configuration Software can be used to program all of the instrument's parameters. Once the default configuration has been saved to disk, it is safe to program other parameters.

The PC Software is composed of these sections:

1. Menu Bar/Tool Bar–Dropdown menus and corresponding icons allow you to perform various functions throughout the PC Configuration Program. *Refer to the Menu and Tool Bar Legend* section for a complete description.

2. Program Status–This portion of the program displays the activity (idle, monitoring, downloading, uploading) of the connected unit.

3. HCS Status–Notifies of any errors or conditions which are outside of the tolerance range. Displays *HCS OK* if the unit is operating normally.

4. HCS Tag–A phrase used to identify an HCS (eight alphanumeric characters, maximum).

5. HCS Device Info–Displays the individual characteristics of the attached HCS, such as the device ID, hardware and software revisions and the last date that the device was programmed.

6. Progress–This bar stays in motion any time the HCS is monitoring, uploading or downloading, to notify that a process is occurring.

7. Communications–Indicates current PC connection/communications status.

8. HART/MODBUS Tabs–These tabs change the right side of the screen to allow you to set the appropriate part of the HCS's configuration. See corresponding sections of this manual for additional information on these tabs.

Figure 3. *Hooking-Up the HCS Using the TX Power Supply*

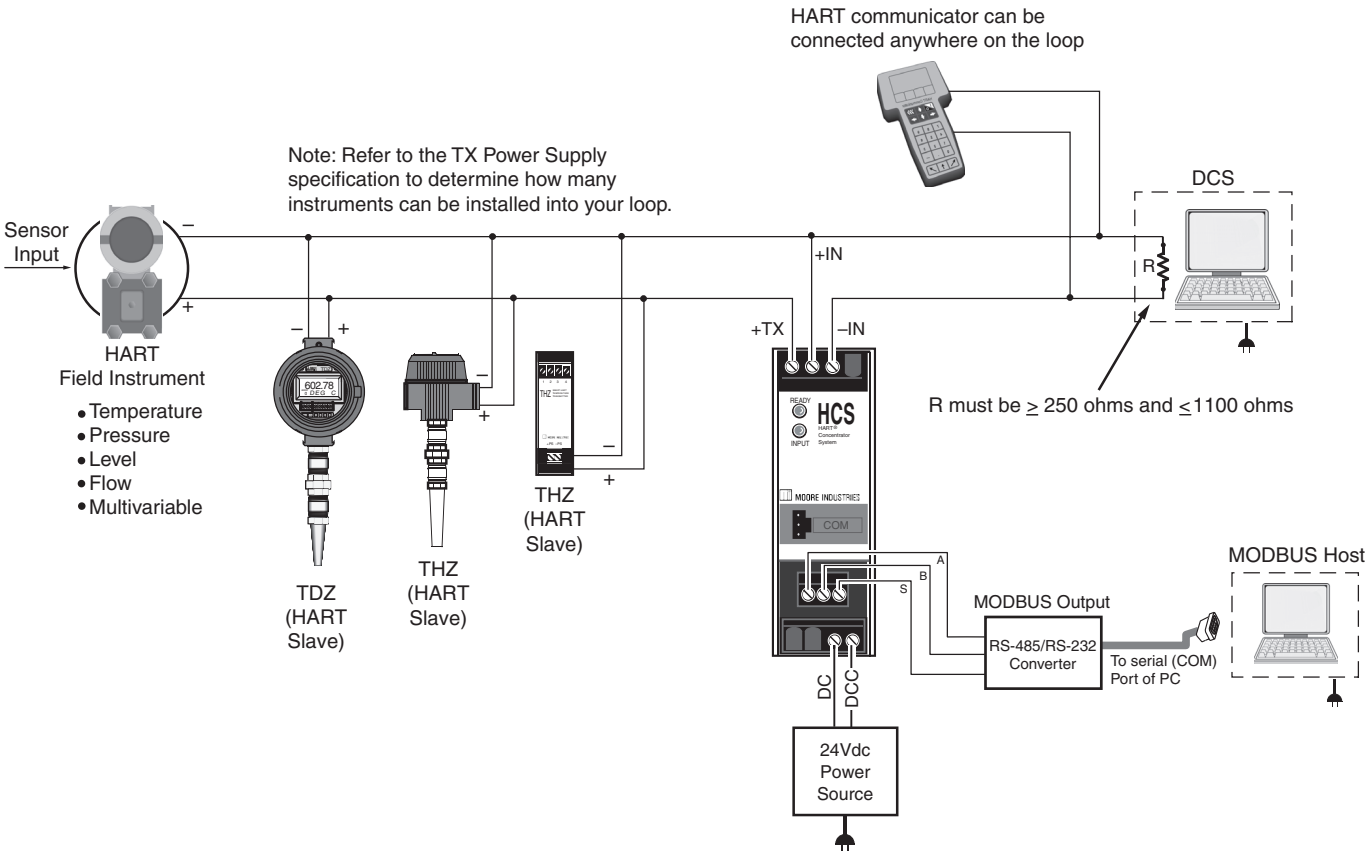
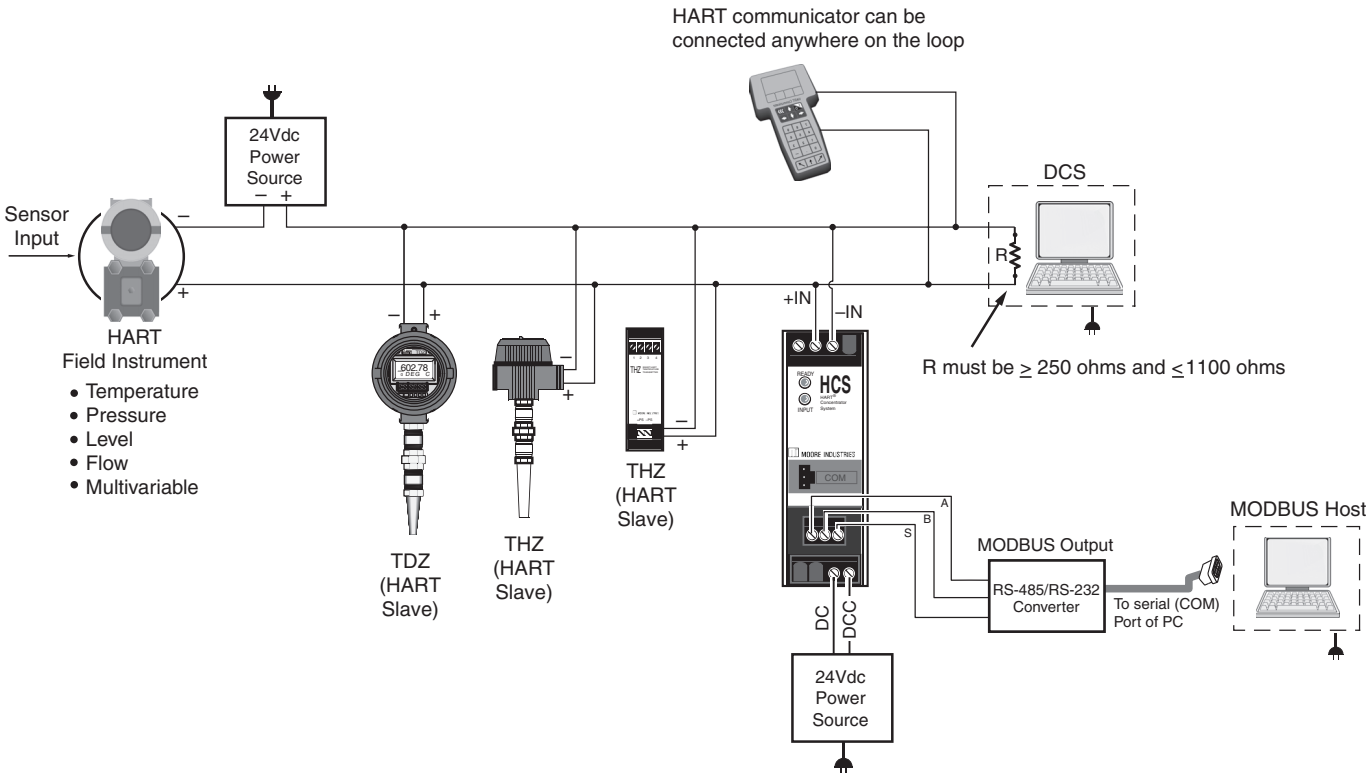


Figure 4. *Hooking-Up the HCS Using an External Power Source*



Menu and Tool Bar Legend

File — Allows such functions as New, Open, Save and Print

View — Controls whether Tool and Status Bars are viewed on the screen

Transfer — Allows you to Upload and Download configurations

Coms — Select the PC Port (Com Port) that you will use

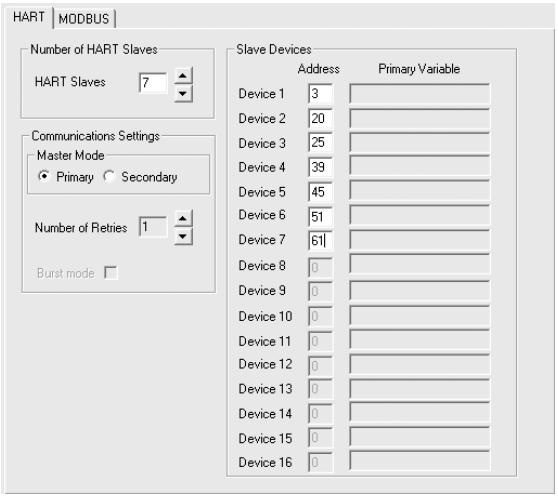
Monitoring — Allows you to Monitor and Stop monitoring processes

Help — Displays the version of the HCS Configuration Program

Configuration Screens

HART

Figure 5. *HART Tab*



Number of HART Slaves

Using the up and down arrows, select the number of HART slaves (16 maximum) that you will introduce into your loop. The number of slaves you have chosen will appear as enabled in the *Slave Devices* parameter.

Slave Devices

Once you have selected the number of HART slaves to be used in the loop, use this section to assign a specific address for each device. Ensure that the address matches the address of the slave you connected in the loop. Each must be a unique address between zero and 63. However, Address 0 is an analog address and is not used in HART multi-drop loops. Current readings at this address can vary from 3.6mA to 23.6mA.

Master Mode

The HART protocol allows for two communications masters on the loop: a Primary Master and a Secondary Master. Setting the HCS to function as the Primary HART Master in the application means that any other HART device in the loop must be configured either as a HART Secondary Master (1 per loop), or as a HART Slave (up to 16 per loop). Conversely, setting the HCS to function as the Secondary HART Master allows other HART devices to function either as a Primary Master, or as Slaves. Configuring more than one device on a single loop as a Primary or Secondary HART Master will cause a communications failure.

Note:
A HART hand-held communicator is typically a Secondary Master.

Number of Retries

The *Number of Retries* can be set between 1 and 3, and will determine how many times the HCS will attempt to poll the HART transmitter (without success), before it indicates a HART communication failure.

Burst Mode

Allows selection of Normal or Burst modes.

Burst mode may be enabled if there is only one slave in the loop.

The HCS can operate in one of two modes: *Normal* or *Burst*. In each of these modes the HCS attempts to find a HART transmitter.

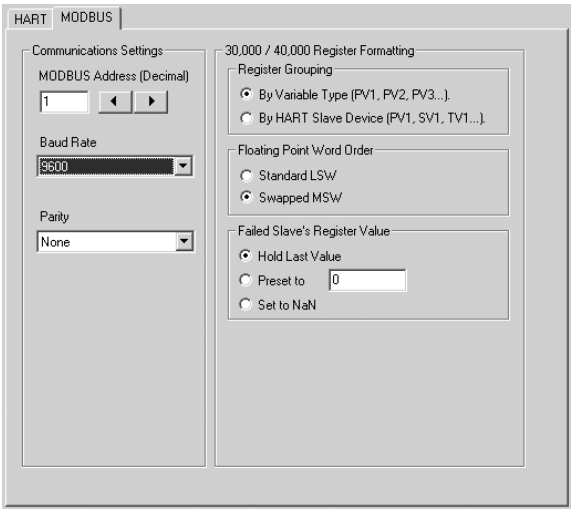
In *Normal* mode, the HCS polls the HART loop for a transmitter, then polls the HART instrument twice per second, requesting the current process status and the HART instrument's diagnostic status. The HART instrument responds with the requested data.

In *Burst* mode, the monitored HART instrument is programmed to continuously transmit its process variable and health status. The HCS samples the continuous HART data three times per second.

The instrument will operate in Normal Mode by default. Selecting the *Burst Mode* button will enable Burst Mode.

MODBUS

Figure 6. *MODBUS Tab*



The *MODBUS tab* allows you to set the MODBUS communications parameters.

Communications Settings
The Communications Settings include three areas:

MODBUS Address (Decimal)
The *MODBUS Address* is the number that the HCS monitor uses to identify itself on the MODBUS network. The MODBUS address is configurable from 1 to 247. By default, it will assume a MODBUS address of 1.

Baud Rate
The *Baud Rate* is the speed of MODBUS data transmission. It should be set to match the baud rate of the attached controller. The interface supports the following baud rates: 300, 600, 1200, 2400, 4800, 9600 and 19200.

Parity
The HART monitor supports even, odd and no *Parity.* The data format is one start bit, 8 data bits and one stop bit.

30,000 / 40,000 Register Formatting
This section includes the following areas:

Register Grouping
This allows you to select the manner in which to group the MODBUS registers.

Selecting *By Variable Type,* the registers are grouped in order of *variables*, i.e. all primary variables (PV) are grouped together, followed by secondary variables (SV), third (TV) and then fourth (FV).

Using *By HART Slave Device* grouping places your registers in order *numerically*. It groups a HART slave device's variables in contiguous registers. For example, your first HART device's primary, secondary, third and fourth variables (PV1, SV1, TV1 and FV1) are grouped together. Next in the order are your second HART device's primary, secondary, third and fourth variables (PV2, SV2, TV2 and FV2) and so on.

Floating Point Word Order
By default, the HART Concentrator will use the *Standard LSW* (least significant word) floating point word order format. This stores the most significant bits in the second register and the least significant bits in the first register. Selecting *Swapped MSW (most significant word)* will reverse the order, storing the most significant bits in the first register and the least significant bits in the second register.

Failed Slave's Register Value

You may select what would occur to a slave device's register value in the event that communication is lost with the HCS.

If selecting *Hold Last Value* and a failure is detected, the last measured value before the failure occurred is held.

Entering a user-set value in the *Preset to* text box recalls that value when a slave device failure is detected.

Selecting *NaN* (Not a Number–as put forth by the IEEE-754 standard) causes the floating point NaN value to be stored in the registers used for holding floating point values.

MODBUS Register Definitions

The following tables define the MODBUS input and holding register assignment.

KEY:
FV = Fourth Variable
LSB = Least Significant Bit
MSB = Most Significant Bit
PV = Primary Variable
SV = Secondary Variable
TV = Third Variable
*UOM = Unit of Measurement

*Moore Industries provides up to 169 HART Engineering Units listed in HART Communication Foundation document number: HCF-SPEC-183, Revision 14.0, Release Date 29 January 2004

Table 3. *Register ranges and descriptions when MODBUS registers are grouped by the "By Variable Type" parameter and only the PV and SV are being stored (when nine or more slaves are in the loop)*

Register Range	Description
32-47	HART Device 1-16 HART Status
48-63	HART Device 1-16 PV + SV UOM (PV UOM = MSB, SV UOM = LSB)
64	HCS Status
256-287	HART Device 1-16 PV floating point value stored in 2x16-bit registers per float
288-319	HART Device 1-16 SV floating point value stored in 2x16-bit registers per float

Table 4. *Register ranges and descriptions when MODBUS registers are grouped by the "By Variable Type" parameter and all dynamic variables are being stored (when eight or fewer slaves are in the loop)*

Register Range	Description
32-39	HART Device 1-8 HART Status
40-47	HART Device 1-8 PV + SV UOM (PV UOM = MSB, SV UOM = LSB)
48-55	HART Device 1-8 TV + FV UOM (TV UOM = MSB, FV UOM = LSB)
64	HCS Status
256-271	HART Device 1-8 PV floating point value stored in 2x16-bit registers per float
272-287	HART Device 1-8 SV floating point value stored in 2x16-bit registers per float
288-303	HART Device 1-8 TV floating point value stored in 2x16-bit registers per float
304-319	HART Device 1-8 FV floating point value stored in 2x16-bit registers per float

Table 5. *Register ranges and descriptions when MODBUS registers are grouped by the "By HART Slave Device" parameter (when nine or more slaves are in the loop)*

Register Range	Description
2	HART Device 1 HART Status
3	HART Device 1 UOM (PV UOM = MSB, SV UOM = LSB)
6	HART Device 2 HART Status
7	HART Device 2 UOM (PV UOM = MSB, SV UOM = LSB)
10	HART Device 3 HART Status
11	HART Device 3 UOM (PV UOM = MSB, SV UOM = LSB)
14	HART Device 4 HART Status
15	HART Device 4 UOM (PV UOM = MSB, SV UOM = LSB)
18	HART Device 5 HART Status
19	HART Device 5 UOM (PV UOM = MSB, SV UOM = LSB)
22	HART Device 6 HART Status
23	HART Device 6 UOM (PV UOM = MSB, SV UOM = LSB)
26	HART Device 7 HART Status
27	HART Device 7 UOM (PV UOM = MSB, SV UOM = LSB)
30	HART Device 8 HART Status
31	HART Device 8 UOM (PV UOM = MSB, SV UOM = LSB)
34	HART Device 9 HART Status
35	HART Device 9 UOM (PV UOM = MSB, SV UOM = LSB)
38	HART Device 10 HART Status
39	HART Device 10 UOM (PV UOM = MSB, SV UOM = LSB)
42	HART Device 11 HART Status
43	HART Device 11 UOM (PV UOM = MSB, SV UOM = LSB)
46	HART Device 12 HART Status
47	HART Device 12 UOM (PV UOM = MSB, SV UOM = LSB)
50	HART Device 13 HART Status
51	HART Device 13 UOM (PV UOM = MSB, SV UOM = LSB)
54	HART Device 14 HART Status
55	HART Device 14 UOM (PV UOM = MSB, SV UOM = LSB)
58	HART Device 15 HART Status
59	HART Device 15 UOM (PV UOM = MSB, SV UOM = LSB)
62	HART Device 16 HART Status
63	HART Device 16 UOM (PV UOM = MSB, SV UOM = LSB)
64	HCS Status
256-257	HART Device 1 PV floating point value stored in 2x16-bit register per float
258-259	HART Device 1 SV floating point value stored in 2x16-bit register per float
260-261	HART Device 2 PV floating point value stored in 2x16-bit register per float
262-263	HART Device 2 SV floating point value stored in 2x16-bit register per float
264-265	HART Device 3 PV floating point value stored in 2x16-bit register per float

Continued on next page

Table 5. *Continued*

266-267	HART Device 3 SV floating point value stored in 2x16-bit register per float
268-269	HART Device 4 PV floating point value stored in 2x16-bit register per float
270-271	HART Device 4 SV floating point value stored in 2x16-bit register per float
272-273	HART Device 5 PV floating point value stored in 2x16-bit register per float
274-275	HART Device 5 SV floating point value stored in 2x16-bit register per float
276-277	HART Device 6 PV floating point value stored in 2x16-bit register per float
278-279	HART Device 6 SV floating point value stored in 2x16-bit register per float
280-281	HART Device 7 PV floating point value stored in 2x16-bit register per float
282-283	HART Device 7 SV floating point value stored in 2x16-bit register per float
284-285	HART Device 8 PV floating point value stored in 2x16-bit register per float
286-287	HART Device 8 SV floating point value stored in 2x16-bit register per float
288-289	HART Device 9 PV floating point value stored in 2x16-bit register per float
290-291	HART Device 9 SV floating point value stored in 2x16-bit register per float
292-293	HART Device 10 PV floating point value stored in 2x16-bit register per float
294-295	HART Device 10 SV floating point value stored in 2x16-bit register per float
296-297	HART Device 11 PV floating point value stored in 2x16-bit register per float
298-299	HART Device 11 SV floating point value stored in 2x16-bit register per float
300-301	HART Device 12 PV floating point value stored in 2x16-bit register per float
302-303	HART Device 12 SV floating point value stored in 2x16-bit register per float
304-305	HART Device 13 PV floating point value stored in 2x16-bit register per float
306-307	HART Device 13 SV floating point value stored in 2x16-bit register per float
308-309	HART Device 14 PV floating point value stored in 2x16-bit register per float
310-311	HART Device 14 SV floating point value stored in 2x16-bit register per float
312-313	HART Device 15 PV floating point value stored in 2x16-bit register per float
314-315	HART Device 15 SV floating point value stored in 2x16-bit register per float
316-317	HART Device 16 PV floating point value stored in 2x16-bit register per float
318-319	HART Device 16 SV floating point value stored in 2x16-bit register per float

Table 6. *Register ranges and descriptions when MODBUS registers are grouped by the "By HART Slave Device" parameter and PV, SV, TV and FV are being stored (when eight or fewer slaves are in the loop)*

Register Range	Description
4	HART Device 1 HART Status
5	HART Device 1 PV & SV UOM (PV UOM = MSB, SV UOM = LSB)
6	HART Device 1 TV & FV UOM (TV UOM = MSB, FV UOM = LSB)
7	Not assigned
12	HART Device 2 HART Status
13	HART Device 2 PV & SV UOM (PV UOM = MSB, SV UOM = LSB)
14	HART Device 2 TV & FV UOM (TV UOM = MSB, FV UOM = LSB)
15	Not assigned
20	HART Device 3 HART Status
21	HART Device 3 PV & SV UOM (PV UOM = MSB, SV UOM = LSB)
22	HART Device 3 TV & FV UOM (TV UOM = MSB, FV UOM = LSB)
23	Not assigned
28	HART Device 4 HART Status
29	HART Device 4 PV & SV UOM (PV UOM = MSB, SV UOM = LSB)
30	HART Device 4 TV & FV UOM (TV UOM = MSB, FV UOM = LSB)
31	Not assigned
36	HART Device 5 HART Status
37	HART Device 5 PV & SV UOM (PV UOM = MSB, SV UOM = LSB)
38	HART Device 5 TV & FV UOM (TV UOM = MSB, FV UOM = LSB)
39	Not assigned
44	HART Device 6 HART Status
45	HART Device 6 PV & SV UOM (PV UOM = MSB, SV UOM = LSB)
46	HART Device 6 TV & FV UOM (TV UOM = MSB, FV UOM = LSB)
47	Not assigned
52	HART Device 7 HART Status
53	HART Device 7 PV & SV UOM (PV UOM = MSB, SV UOM = LSB)
54	HART Device 7 TV & FV UOM (TV UOM = MSB, FV UOM = LSB)
55	Not assigned
60	HART Device 8 HART Status
61	HART Device 8 PV & SV UOM (PV UOM = MSB, SV UOM = LSB)
62	HART Device 8 TV & FV UOM (TV UOM = MSB, FV UOM = LSB)
63	Not assigned
64	HCS Status
256-257	HART Device 1 PV floating point value stored in 2x16-bit register per float
258-259	HART Device 1 SV floating point value stored in 2x16-bit register per float
260-261	HART Device 1 TV floating point value stored in 2x16-bit register per float
262-263	HART Device 1 FV floating point value stored in 2x16-bit register per float
264-265	HART Device 2 PV floating point value stored in 2x16-bit register per float

Continued on next page

Table 6. *Continued*

266-267	HART Device 2 SV floating point value stored in 2x16-bit register per float
268-269	HART Device 2 TV floating point value stored in 2x16-bit register per float
270-271	HART Device 2 FV floating point value stored in 2x16-bit register per float
272-273	HART Device 3 PV floating point value stored in 2x16-bit register per float
274-275	HART Device 3 SV floating point value stored in 2x16-bit register per float
276-277	HART Device 3 TV floating point value stored in 2x16-bit register per float
278-279	HART Device 3 FV floating point value stored in 2x16-bit register per float
280-281	HART Device 4 PV floating point value stored in 2x16-bit register per float
282-283	HART Device 4 SV floating point value stored in 2x16-bit register per float
284-285	HART Device 4 TV floating point value stored in 2x16-bit register per float
286-287	HART Device 4 FV floating point value stored in 2x16-bit register per float
288-289	HART Device 5 PV floating point value stored in 2x16-bit register per float
290-291	HART Device 5 SV floating point value stored in 2x16-bit register per float
292-293	HART Device 5 TV floating point value stored in 2x16-bit register per float
294-295	HART Device 5 FV floating point value stored in 2x16-bit register per float
296-297	HART Device 6 PV floating point value stored in 2x16-bit register per float
298-299	HART Device 6 SV floating point value stored in 2x16-bit register per float
300-301	HART Device 6 TV floating point value stored in 2x16-bit register per float
302-303	HART Device 6 FV floating point value stored in 2x16-bit register per float
304-305	HART Device 7 PV floating point value stored in 2x16-bit register per float
306-307	HART Device 7 SV floating point value stored in 2x16-bit register per float
308-309	HART Device 7 TV floating point value stored in 2x16-bit register per float
310-311	HART Device 7 FV floating point value stored in 2x16-bit register per float
312-313	HART Device 8 PV floating point value stored in 2x16-bit register per float
314-315	HART Device 8 SV floating point value stored in 2x16-bit register per float
316-317	HART Device 8 TV floating point value stored in 2x16-bit register per float
318-319	HART Device 8 FV floating point value stored in 2x16-bit register per float

Table 7. *HCS Status Word Bits*

Status Word Bit	Type	Description
0	Error	Configuration data error
1	Error	No HART communications
2	Error	EEPROM blank
3	Error	EEPROM failure
4	Status	Slave device malfunction
5	Error	Burst mode failure
6	Error	Software watchdog failure
7	Error	COP watchdog failure
8	Status	Slave device analog output fixed
10	Error	Software fail
11	Status	Device offline
12	Not Used	N/A
13	Not Used	N/A
14	Not Used	N/A
15	Error	Configuration data area checksum error

Table 8. *Slave Device Status*

Status Bit	Description
0	Primary variable out of limits
1	Non-Primary variable out of limits
2	Analog output #1 saturated
3	Analog output #1 fixed
4	More status available
5	Cold start
6	Configuration changed
7	Field device malfunction

Installation

Installation consists of physically mounting the unit, grounding the instrument, and completing the electrical connections.

Mounting the HCS

The HCS is designed to snap easily onto 32mm, G-type (EN50035) or 35mm Top Hat (EN50022) DIN rails.

Making the Electrical Connections

After mounting, you are ready to connect the HCS to the loop. Each unit comes equipped with a transmitter excitation terminal which allows it to supply power to the monitored HART instrument, if necessary. Figures 3 and 4 shows the connection diagram for an HCS.

Recommended Ground Wiring Practices

Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The protective earth conductor must be connected to a system safety earth ground before making any other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to an earth or safety ground at the unit itself.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

CE Conformity

Installation of any Moore Industries' products that carry CE certification (Commission Electrotechnique) ***must*** adhere to the guidelines in *Recommended Ground Wiring Practices* (above) in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directives 89/336/EEC, EN 61326. Consult the factory for the most current information on products that have been CE certified.

Power Sourcing Parameters for General Locations, Intrinsically Safe and Non-Incendive/Type N Applications

In accordance with IEC 1010.1 Annex H (all models), the input terminals must be connected to and/or supplied from a certified energy limiting Class 2 or a Separate Extra Low Voltage (S.E.L.V.) power supply separated from all mains by double/reinforced insulation**.**

Operation

Once programmed, calibrated, installed, and supplied with the correct power, the HCS begins to operate immediately. Depending upon environmental conditions, it can be expected to operate unattended for extended periods of time.

Maintenance

Moore Industries suggests a check for terminal tightness and general unit condition every 6-8 months. Always adhere to any site requirements for programmed maintenance.

Customer Support

If service assistance is ever required for an instrument in your application, refer to the back cover of this manual for the telephone numbers to Moore Industries' STAR Center customer service department.

If possible, make a note of the model number of the offending unit before calling. For fastest assistance, have the following available: serial number and the job and purchase order number under which it was shipped.

Declaration of Conformity

EMC Directive 89/336/EEC

- **Manufacturer's Name:** Moore Industries-International, Inc.
- **Manufacturer's Address:** 16650 Schoenborn Street
  North Hills, CA 91343-6196
  USA

Declares that the product(s):

- **Product Name:** HCS

	MODEL /	INPUT /	OUTPUT /	POWER /	OPTIONS /	HOUSING
• Model Number(s):	HCS	*	*	*	*	*

* Indicates any input, output, power, option and housing as stated on the product data sheet.

- **Conforms to the following EMC specifications:**
  EN61326-1, 1998, Electromagnetic Compatibility requirements for electrical equipment for control use.

- **Supplementary Information:**
  None

11 February 2005
Date

Fred Adt
Quality Assurance Director

Robert Stockham
Moore Industries-Europe General Mgr.

European Contact: Your Local Moore Industries Sales and Service Office

RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

Warranty Repair –

If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

Non-Warranty Repair –

If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
   a) A note listing the symptoms that indicate the unit needs repair
   b) Complete shipping information for return of the equipment after repair
   c) The name and phone number of the person to contact if questions arise at the factory

3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.

4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

The Interface Solution Experts • **www.miinet.com**

MOORE INDUSTRIES

United States • info@miinet.com
Tel: (818) 894-7111 • FAX: (818) 891-2816

Australia • sales@mooreind.com.au
Tel: (02) 8536-7200 • FAX: (02) 9525-7296

Belgium • info@mooreind.be
Tel: 03/448.10.18 • FAX: 03/440.17.97

The Netherlands • sales@mooreind.nl
Tel: (0)344-617971 • FAX: (0)344-615920

China • sales@mooreind.sh.cn
Tel: 86-21-62491499 • FAX: 86-21-62490635

United Kingdom • sales@mooreind.com
Tel: 01293 514488 • FAX: 01293 536852