Honeywell

ControlEdge HC900
Utilities User Guide

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Honeywell Process Solutions

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About This Document

Abstract

The **Process Control Utilities** program operates on a PC with Windows™ 7 (32-bit and 64-bit), Windows™ 8.1 (32-bit and 64-bit), Windows™ 10 (32-bit and 64-bit), Windows Server 2016, and Windows Server 2019. It lets you view and monitor ControlEdge HC900 Controller control strategy configurations and view your Operator Interface menu, screen and button configurations. It uses graphic symbols and line drawing connections to represent control strategies. Completed configurations are loaded into the control system using a dedicated communication port in the controller. Editing of configurations must be done with Process Control Designer software.

References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title	Doc ID
ControlEdge HC900 Controller Technical Overview	51-52-03-31
Legacy ControlEdge HC900 Controller Installation and User Guide	51-52-25-107
ControlEdge HC900 Operator Interface User Guide	51-52-25-108
ControlEdge HC900 Controller Function Block Reference Guide	51-52-25-109
ControlEdge HC900 Controller Communications User Guide	51-52-25-111
900 Control Station For use with ControlEdge HC900 Controller	51-52-25-148
ControlEdge HC900 Process & Safety Controller User & Installation Manual	51-52-25-154
ControlEdge HC900 Controller Safety Manual	51-52-25-153

Contacts

World Wide Web

The following lists Honeywell's World Wide Web sites that will be of interest to our customers.

Honeywell Organization	WWW Address (URL)
Corporate	*http://www.honeywell.com*
Honeywell Process Solutions	*http://www.hpsweb.honewell.com/ps*
Technical tips	*http://hpsweb.honeywell.com/Cultures/en-US/Products/Instrumentation/hybrid/hc900/TechnicalTips/documents.htm*

Telephone

Contact us by telephone at the numbers listed below.

Area	Organization	Phone Number	
United States and Canada	Honeywell Inc.	1-800-343-0228	Customer Service
		1-800-423-9883	Global Technical Support
Global Email Support	Honeywell Process Solutions	Email: (Sales) **FP-Sales-Apps@Honeywell.com** or (TAC) **hfs-tac-support@honeywell.com**	

Symbol Definitions

The following table lists those symbols that may be used in this document to denote certain conditions.

Symbol	Definition
⚠ DANGER	This **DANGER** symbol indicates an imminently hazardous situation, which, if not avoided, **will result in death or serious injury**.
⚠ WARNING	This **WARNING** symbol indicates a potentially hazardous situation, which, if not avoided, **could result in death or serious injury**.
⚠ CAUTION	This **CAUTION** symbol may be present on Control Product instrumentation and literature. If present on a product, the user must consult the appropriate part of the accompanying product literature for more information.
CAUTION	This **CAUTION** symbol indicates a potentially hazardous situation, which, if not avoided, **may result in property damage**.
⚡	**WARNING** **PERSONAL INJURY:** Risk of electrical shock. This symbol warns the user of a potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 Vdc may be accessible. **Failure to comply with these instructions could result in death or serious injury.**
⚠	ATTENTION, Electrostatic Discharge (ESD) hazards. Observe precautions for handling electrostatic sensitive devices
⏚	Protective Earth (PE) terminal. Provided for connection of the protective earth (green or green/yellow) supply system conductor.
⏚	Functional earth terminal. Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to protective earth at the source of supply in accordance with national local electrical code requirements.
⏚	Earth Ground. Functional earth connection. NOTE: This connection shall be bonded to Protective earth at the source of supply in accordance with national and local electrical code requirements.
⏚	Chassis Ground. Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.

Table of Contents

1. Software Overview and Introduction

The ControlEdge HC900 recipe management, setup functions and routine maintenance activities are performed using ControlEdge HC900 Utilities software on a PC operating with Windows™ 7 (32-bit and 64-bit), Windows™ 8.1 (32-bit and 64-bit), Windows™ 10 (32-bit and 64-bit), Windows Server 2016, and Windows Server 2019.

Easy-to-use Windows™-based software, operable over Ethernet or via a Serial port or modem connection, simplifies routine setup operations. It provides advanced monitoring functions for debug, uploads the complete, annotated graphic controller and operator interface configuration, and supplies an array of printouts for enhanced documentation.

Once a configuration is installed into the controller and operator interface, the software may be used to develop or change recipes, edit data storage schedules, monitor areas of the configuration to verify proper operation, or perform calibration functions.

Features

- Configuration upload that includes graphic configuration to recreate the function block diagram and OI assignments
- View OI data storage
- Configures recipes (Variables only), SP profiles, SP schedules, sequences with on-line operation, provides easy file generation for media transfer to ControlEdge HC900 OI's locally and file management. Items are configurable only if not part of a configuration.
- Configuration partitioning using "Worksheets"
- Extensive monitoring tools including watch windows, concurrent detailed block parameter windows, digital/logic power flow via color coding, live data at block pins, and a signal traceback facility
- Use Ethernet or Serial port to access controller
- Perform I/O Calibration
- Analyze Diagnostic Information

Worksheets

Worksheets are a logical partition of a configuration and selected by tabs that appear on the Main Window.

A configuration is built using four main elements (or Worksheets) of configuration.

The configuration originator may apply additional security to specific worksheets to prohibit access to proprietary operations while allowing other users to view unprotected worksheets or generate recipe and data storage files.

Monitoring

On-line monitoring tools allow quick analysis of execution problems. These include:
- Multiple function blocks monitor access on a single display from multiple worksheets. Most internal parameters are available for read/write. Major blocks such as PID, Setpoint Programmer and Sequencers have dialog boxes to allow operation and test. Stored profiles or sequences may also be selected on-line.
- User-selected Watch Window lists allow access to digital and analog I/O, Signal Tags, and Variables (for write actions). A user-defined watch window provides custom association of parameters for a debug session. Watch windows also allow write capability.
- Logic power flow indication using color-coded soft wiring for digital connections to and between block pins including signal tags and connectors

- Live data at block pins (analog floating point or digital status) on a complete block or pin basis.
- Signal Trace-back, for any input to a block, for finding the signal sources for quick identification of potential errors.
- A Forced Blocks window shows all forced outputs.
- Data update selection as fast as 250 ms.

The user-selected, dockable Watch Window lists and Signal Trace-back finds the signal sources and provides a clear view of the configuration operation allowing quick identification of potential faults.

A FIND function allows location of multiple instances of specific tags, variables, and function blocks across all worksheets. A right click on any signal tag also allows selection of a "Find Where Used" listing for fast access to tag destinations and return to the tag source.

Configuration Download

Configuration download capability allows the user to re-install a configuration after system maintenance or to install configuration changes made with HC Designer software.

Additional Software Functions

Documenting your configuration is supported through a variety printable presentation formats. A few of these include a summary of the controller I/O, the graphic configuration diagram, function block properties, recipe groups, setpoint profile groups, Operator Interface display and point selections, among others.

Recipe/Data Storage File Generation

Recipes and data schedules may be created as files (via File New) for external file transfer to ControlEdge HC900 operator interfaces via storage media (floppy disk or ZIP disk) or for file management.

Reports

Documenting your configuration is supported through a variety of report formats. Each can be print-previewed. A few of these include a summary of the controller I/O used, function block worksheet selection (each page of diagram worksheet printed as 8.5 x 11" sheet), function block properties, variable and tag parameters, Modbus addresses, Data Storage Settings, recipe listings, setpoint profile listings, sequencer listings, setpoint scheduler listings, OI display groups, Alarm and Event Groups, and controller setup.

New Features for 6.1 release

This section provides the new features introduced in 6.1 release.

- Configure Modbus/Peer Write Access: This feature is used for enabling the controller to allow only selected devices to write to the controller.
- Password Configuration: This feature protects the controller from unauthorized users accessing the controller. It allows the user to set a password for the controller.
- Boundary Item: Helps to create modular groupings in the control logic for a better understanding of the functionality.
- Configuration Access Status function block: The CASTA label stands for Configuration Access Status Monitor.

Function Block Configuration development

You can double-click on a block and open a Properties page in which you can view the specific parameters of that block.

Signal flow connections from icon to icon form the flow of the control strategy by using either softwire connections or named tags to complete the controller configuration.

You can display up to 20 graphic diagrams, 1 page high by 20 pages wide. The completed diagram may be printed on 20 pages of 8.5" x 11" paper. Completed configurations may also be saved on a 3.5" floppy disk and loaded into the controller through a 3.5" floppy disk drive in the operator interface unit, thus eliminating the need for a direct connection of a PC to the controller.

Hardware and software requirements

Specification	Description
PC Requirements	CPU: 1.5 GHz minimum (2.5GHz recommended)
Operating System:	Windows™ 7 (32-bit and 64-bit), Windows™ 8.1 (32-bit and 64-bit), Windows™ 10 (32-bit and 64-bit), Windows Server 2016, and Windows Server 2019.
Display Color:	Minimum resolution (256 color x 1024 x 768 resolution)
Pointing Device:	Mouse, Trackball or compatible device
RAM:	> 1GB (2GB preferred)
Removable Disk Drive:	CD Drive
Ports:	USB, Ethernet

System Interconnection

If connected to the controller through its Serial Port using PC Port (COM1 - COM8)

Maximum Distance between Controller File and PC:	50 Feet
Cable Type:	Standard 9 Pin null modem to USB
Cable Termination:	9-pin "D" connector·

If connected to the controller through its Ethernet Port:

Maximum Distance between Controller File and PC:	100 meters (368 feet) w/o repeaters
Cable Type:	CAT 5 shielded twisted pair IEEE 802.3
Cable Termination:	10/100 baseT RJ45

Configuration:	On-line Monitoring allows the user to test the developed configuration.

Modem Support

PC Interface: Supports Microsoft Windows™ Telephony API (TAPI) device independent modem communications. Baud rate = 9600, 19200, 38400.

Controller Interface: Connects to the controller RS-485 configuration port. Some commercially available modems with equivalent specifications to those validated should function with the ControlEdge HC900 controller. For validated Modems, see document 51-52-25-107 ControlEdge HC900 Controller and Installation Guide.

How To Use This Help

To request Help on any area of the application, use one of the following methods:

- **HELP MENU**

This is the last item on the menu bar. Choose a Help topic from the Help menu.

Help Topics

From the Help menu, click "Help Topics". The Help Contents tab appears. This is a list of all Help topics available including Menus, Configuration Parameters, and Toolbar. Selecting a topic causes information about that topic to be displayed. If the information about a topic exceeds the height of the window, a vertical scroll bar will be displayed.

About Honeywell Process Control Utilities

Copyright or version information about the application.

- **RIGHT-CLICK FOR HELP TOPICS**

Right-click on any Function Block to access topic help for that particular Block.

Help navigation

When you finish reading about a topic, you can choose one of the commands along the top of the help window to navigate through the help system.

Help Topics	View the top-level Help Contents page.
Back	Return to previously viewed information. When you choose the Back button, you retrace your path through the help topics you have already viewed.
Print	Prints Help topic.
<<	Move forward one help screen.
>>	Move back one help screen.

What to Know Before You Start

Rack, Module, and Channel Assignments

The controller contains one or more racks. Each rack contains I/O modules and each I/O module contains a number of channels. Each rack, module and channel is assigned a number in the configuration that corresponds to a physical location in the installed racks.

Refer to the Honeywell Controller Installation and User Guide 51-52-25-107 for your Rack, Module, and Channel addresses for I/O Function Blocks in the Function Block Diagram configuration.

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2.Implementation

Starting the Application

When the application is started, the only viewable part is the File Browser.

Go to the **Main Toolbar** or the **File Menu** and select:

□ or NEW - Displays a "Choose a New File Type" dialog box with three tabs.

New Recipes:
Select the "**Recipe**" tab. On the tab, click on a radio button to select one of the following:
Recipes (Variables)
Setpoint Profile
Setpoint Schedule
Sequence

Click OK. The associated "Editor" dialog box will appear and a new "Opened Recipe File" is listed in the File Browser. Refer to the specific Recipe type for specifics.

New Data Storage:
Select the "**Data Storage**" tab. On the tab, click on a radio button to create a new Data Storage File

or

📂 or OPEN. - Displays the *"Open"* dialog box.
From the "Files of Type" drop-down menu, select a file type.
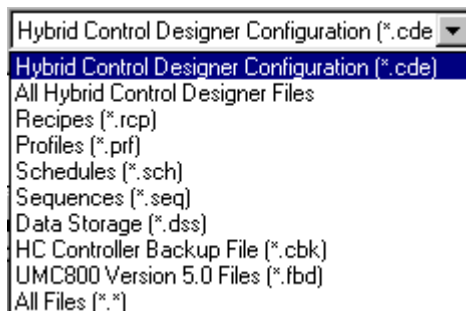
```
Hybrid Control Designer Configuration (*.cde ▼
Hybrid Control Designer Configuration (*.cde)
All Hybrid Control Designer Files
Recipes (*.rcp)
Profiles (*.prf)
Schedules (*.sch)
Sequences (*.seq)
Data Storage (*.dss)
HC Controller Backup File (*.cbk)
UMC800 Version 5.0 Files (*.fbd)
All Files (*.*)
```

Navigate to folder where the file is stored.
Click on the desired file name, then click "OPEN".

or

📊 or Upload (Configuration) - The Upload File dialog box will appear. A temporary file name will be place in the "File Name" box.
Check the current connection. This will indicate over which communications port the upload will occur.
Change the current connection, if necessary, prior to beginning the upload.
Press "START". The dialog box will show "Percent Complete".
The Uploaded Configuration File (.cde) will appear with a temporary file name.
From the "File" menu, select Save or Save As and enter a file name and path in the appropriate fields.

Connecting the PC to the Controller

The PC can be connected to the Controller by:

Direct Serial RS-485 connection with a USB to RS-485 converter

Modem connection via Remote Access.

Direct Ethernet connection

Networked Ethernet connection

For details refer to the ControlEdge HC900 Controller Installation and User Guide, document 51-52-25-107 (legacy) or 51-52-25-154, section "Connecting the ControlEdge HC900 Controller to a PC with the Process Control Designer Software."

3.User Interface

User Interface Overview

The main components of the User Interface are:

> Main Menu
>
> Main Toolbar
>
> Worksheet Window(s)
>
> File Browser
>
> Status Bar
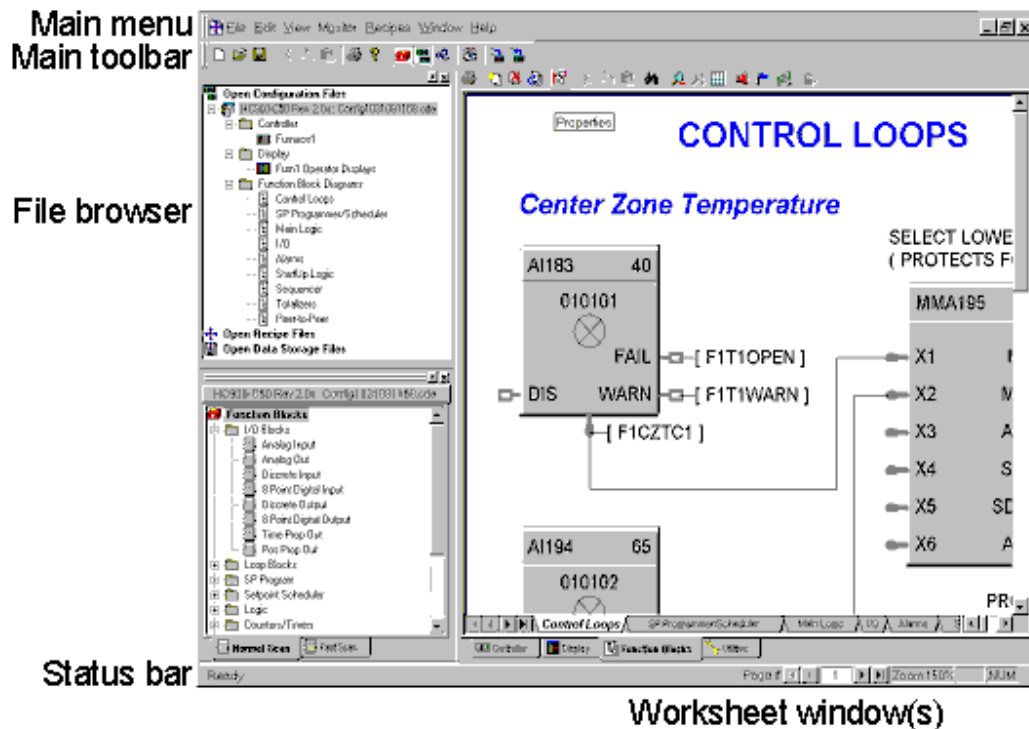
General Terminology

Term	Definition
Browser	Defaults to the top left side of the Worksheet is a dockable window listing opened files. It allows you to move quickly between files and worksheets.
Configuration Files	A Configuration File contains a Control Strategy that you have created best suited for your application. All Open Configuration Files appear in the Browser Window
Recipe File	A Recipe File refers to one of 4 types of user files – a "Recipe" file consisting of Variables only, a Setpoint Profile, a Setpoint Schedule, or a Sequence.
Data Storage File	A Data Storage File contains a data storage schedule for loading at the operator interface via storage media.

Term	Definition
Function Blocks	A <u>Function Block</u> is a unit of software that performs a set of operations on its *Input Signals* and *Function Block* parameters and produces *Output Signals.* These output signals can be configured as inputs to other blocks, whose output parameters can be configured as inputs to other function blocks, and so on.
Main Window	The <u>Main Window</u> contains Menus, toolbars and worksheet window plus other items that help you navigate through the application.
Menu	The Main Menu is a top-level menu for this application. You <u>select (highlight) a menu</u> and then choose a command from the drop-down menu. Choosing the command carries out the action.
Status Bar	The <u>status bar</u> is located along the bottom of the window. It indicates information about the current window, the time, the date, download, upload, monitoring and network information. This status bar can be displayed or not displayed from the "View" menu.
Tab	A configuration is built using three main worksheet types: Controller, Display, and Function Blocks. Select the desired <u>tab</u> , located at the bottom of the configuration window for type of worksheet. There are also Tabs in the Function Block Diagrams that allow you to navigate around the multiple <u>FBD Worksheets</u>.
Toolbox	The Worksheet Toolbox, located on the lower left side of the Worksheet, is a dockable window and lists all the function block by category separated by fast and normal scan tabs at the base of the toolbox. You can drag and drop function blocks onto FBD worksheets. A Configuration Tab lists all configured items. Click on any item to jump to it.
Trace Window	Helps you find problems with <u>soft-wire</u> and <u>signal connections</u> between Function Blocks.
Watch Summary Window	The <u>Watch Summary</u> window lets you monitor the following groups of data from the controller: Signal, Variables, I/O. OI Display Groups.
Worksheet	A Worksheet is a logical partition of a configuration. A configuration is built using three main <u>Worksheet</u>) types: Controller, Display, and Function Blocks. A fourth worksheet type (Utilities) included Maintenance functions for the controller. A fifth worksheet is visible when the user configures Custom Modbus Map.

File Browser Window
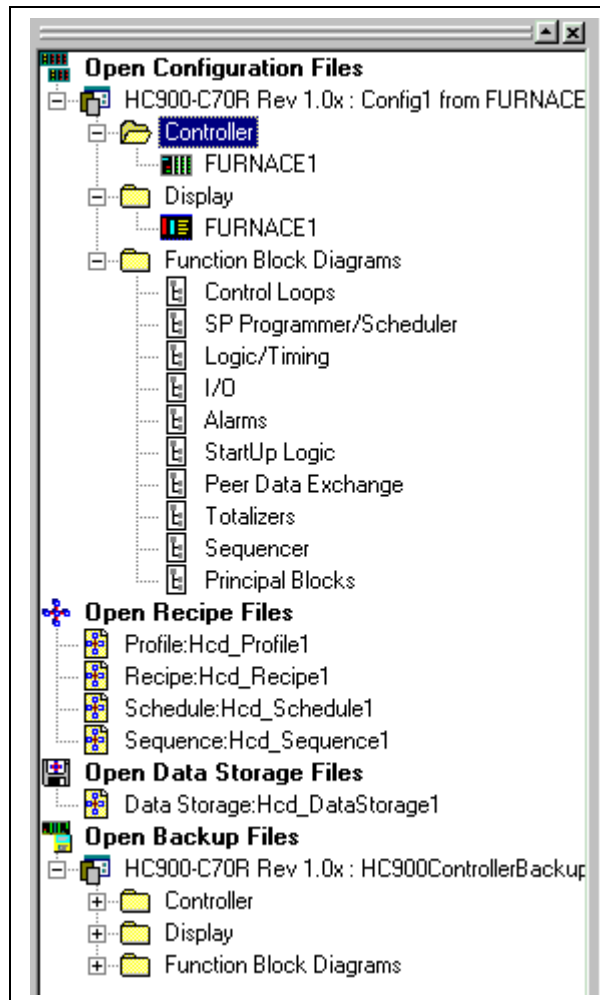
The File Browser is a dockable window listing open configuration files, open Recipe files, open Data Storage files and open Backup files.

It allows you to move quickly between open files and worksheets.

Double-click on a worksheet in the browser and it will make it the active view.

You can collapse or expand the tree and you can enlarge or shrink the size of the window.

It can be enabled or disabled from

The main menu (VIEW),

Main Toolbar button, or

Right click on the FBD white space (VIEW)

Right-click on a **Configuration Name** to close the configuration or view the File Properties.
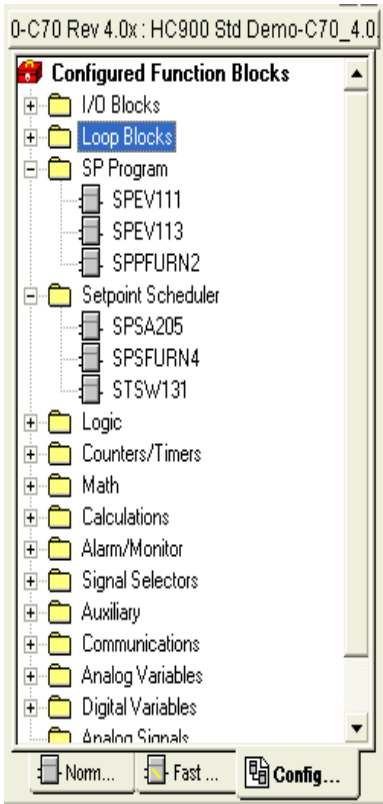
Right-click on the **Controller** worksheet to view its properties. The "Controller's Identification" dialog box will appear. You can view the controller's name and the controller type and revision.

Right-click on a **Function Block Diagram** worksheet to view its properties.

Protected Worksheets will show a lock symbol in the worksheet Icon.

Right-click on any open file name to close it.

Worksheet Toolbox Window

The Config tab shows all configured function blocks being used in the active configuration.

Click on a folder to expand or collapse it.

Right-click on a configured function block for the following options:

Properties – shows the properties of the block

Find – jumps to that block in the configuration

Execution Order – lets you change the execution order of the block

Help

Traceback Window

Overview

This feature helps you find problems with soft-wire and signal connections between Function Blocks.

For Example:

If you are testing a configuration that you've built and want to know why a Digital Output is ON when it should be OFF, you can search for the source of the Input Signal.

Traceback is useful for finding the analog or digital source signal.

Trace Window

Access the Trace Window from the Main Menu Toolbar

Or, from the View Menu on the main menu.

It is a dockable, sizeable window.

The Trace Window provides a list of all blocks/pins you have traced and lists :
> Block ID
> Tag Name
> I/O Pin Name
> Worksheet name

Trace Window Update

Each time you perform a Trace, the window will update with a new pair of block/pins.
The *first item* is the *signal source*, the *second item* is the *signal destination*.

Select any of the rows in the Traceback window to recall the diagram to display the selected block.

The last trace is on the top of the list.

Right Mouse Click Procedure to Trace Signals

Select a Function Block of interest.

Right Mouse click on any INPUT pin.

Select "TRACE". Traceback will "find" the source of the connection you selected and refresh the FBD view with that block visible (Highlighted) - even if the other side of the connection is on a *different* worksheet.
> The Output pin of the block (the signal source) will be displayed in RED.

From that block, repeat the traceback to another block and another block, etc.

Use the Traceback list to view your Traceback history.

You can clear the Trace List by pressing the bar at the top of the window.

Watch Summary Window

Overview

 accesses the Watch Summary Window from the Monitor Toolbar

Or, the menu item "Watch Summary" from the Monitor Menu on the main menu.

This is a view of the Watch Summary Window. It is a Dockable (movable), sizable window.
[Press and hold the CTRL key down to prevent Docking when moving the window]
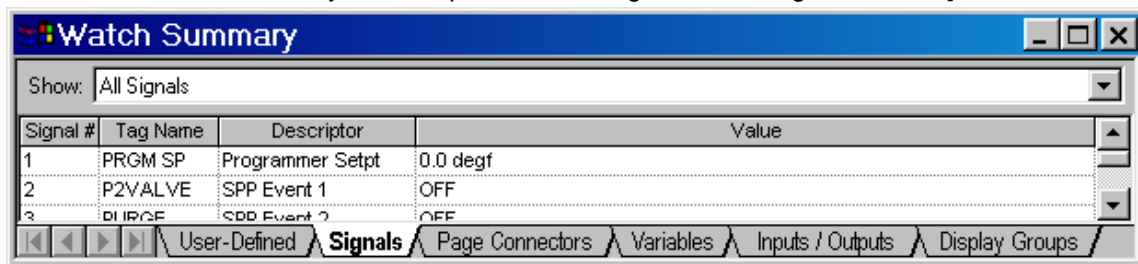
There are five tabs at the bottom of the window that lets you monitor the following groups of data from the controller. Click on any of the tab titles below **to view an example** of the selected data for that tab. All parameter listings may be **sorted** by column.

   User Defined (Customized list of Variables, Signal Tags, Page Connectors)

   Signals (can be filtered by type - All, Analog, Digital)

   Page Connectors (can be filtered by type - All, Analog, Digital)

   Variables (can be filtered by type - All, Analog, Digital)

   I/O (can be filtered by type - AI, AO, DI, DO)

   OI Display groups (Overviews, Panel Meters, Alarms, Trends, etc)

Docking and Undocking the Window

Double clicking in the Title Bar area of the Watch Summary Window will toggle its docked state. If the window is docked, double clicking in the title bar area will undock the window.

If the window is Undocked
   - double-clicking in the title bar area will dock the window at it last docked position
   - Dragging the window to the top, bottom, left, or right edge of the main viewing area of the application will dock the window at that location

[Press and hold the CTRL key down to prevent Docking when moving the window]

Hot Links

You can click on any I/O function block or Signal on the Controller Worksheet or any I/O function block, Signal, or Variable in the Watch Window and that item will be located on the Function Block Diagram.

As you move the mouse over a HOT LINK, the text changes to <u>Underlined Blue</u> and the cursor changes to a Hand.

Writes or Forces

By clicking on the item in the Value column, you may write a value such as for a Variable or force a value for an analog input or digital input.   For I/O, a Forced column will indicate that the I/O point is forced.

Status Bar

The status bar is located along the bottom of the application's window. It indicates information about the current window. It can be turned on or off in the "View" Menu.

Menu Item Description - The text string at the far left on the status bar gives a brief description of the menu item in focus. If you pull down a menu list and position the cursor on a menu item, this field will describe the menu item.

Creates a new Controller document

Connected : Furnace1 ■ Page ▼ |◄| |◄| 1 |►| |►| Zoom 100% CAP NUM

Connected Field - To the left of the Page Number indicator are two fields that are visible when you are in Monitor Mode. One indicates "Connected" and the other is a green LED that flashes when communications is active between the PC and controller.

*Worksheet Page Number -*To the left of the Zoom indicator is a page number field. This will display the page number of the **current FBD Worksheet**. It is blank for other worksheet types (Display, Controller, and Utilities). There are scroll buttons to navigate through pages of the worksheet.

Zoom Level – indicates the level of Zoom active on the worksheet. (i.e 100%)

Active Keyboard Keys - Toward the far right, you will see indicators to alert the user that the Caps Lock key on the keyboard is active, the NUM lock on the keyboard is active, or the SCRL (Scroll Lock) key is active.

Menu Conventions

Menu conventions

The following menu conventions are used:

Menu Convention	Meaning
Dimmed command	You will not be able to use this command at the current time. (For example: You may need to select another item before using this command.)
An ellipsis (**...**) following a command	A dialog box will appear when you choose this command. The dialog box contains options you need to select before the command can be completed.
A check mark next to a command	The command is in effect. When you remove the check mark (by selecting the command), the command is no longer in effect.
A key combination next to a command	The key combination is a keyboard accelerator *shortcut* for this command. You can use this key combination to choose this command.
A triangle next to a command	When you choose this command, a cascading menu appears, listing additional commands.

Selecting a Menu

Selecting a menu

In this application, you select (highlight) a menu and then choose a command from that menu. Choosing the command carries out the action.

To choose an item from a selected menu:

Mouse

Using the mouse pointer, point to the name of the menu on the menu bar, and click the left mouse button. This opens the menu. To move directly to a menu item, drag the selection cursor down the menu until the desired item is highlighted, then release the button.

UP/Down Arrow Keys

Press the "ALT" key to highlight the menu bar then use the UP/Down arrow keys on the keyboard to select the item, then press "Enter".

Underlined Letter

If a name in the menu bar has an underlined letter you can press ALT and then type the letter that's underlined to open the menu.

For example: to open the FILE menu in the Process Control Utilities main window, press ALT+F.

Closing a Menu

To close a menu:
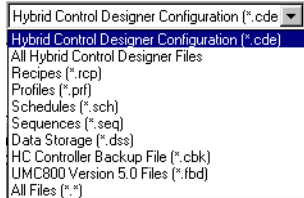
- Click the menu name or anywhere outside the menu, or
- Press ESC to close the menu but remain on the menu bar so that you can make another selection

Main Menu

The Main Menu is located across the top of the User Interface. The menus are:

File Menu
Edit Menu
View Menu
Monitor Menu
Recipes Menu
Window Menu
Help Menu

File Menu

Menu Selection	Function
New *Toolbar*: *Shortcut*: CTRL+N	Displays a "Choose a New File Type" dialog box with these tabs: ***New Recipes:*** Select the "**Recipe**" tab. On the tab, click on a radio button to select one of the following: Recipes (Variables) Setpoint Profile Setpoint Schedule Sequence Click OK. The associated "Editor" dialog box will appear and a new "Opened Recipe File" is listed in the File Browser. Refer to the specific Recipe type for specifics. ***New Data Storage:*** Select the "**Data Storage**" tab. On the tab, click on a radio button to create a new Data Storage File
Open … *Toolbar*: *Shortcut*: CTRL+O	Displays the *"Open"* dialog box. From the "Files of Type" drop-down menu, select a file type. Hybrid Control Designer Configuration (*.cde) Hybrid Control Designer Configuration (*.cde) All Hybrid Control Designer Files Recipes (*.rcp) Profiles (*.prf) Schedules (*.sch) Sequences (*.seq) Data Storage (*.dss) HC Controller Backup File (*.cbk) UMC800 Version 5.0 Files (*.fbd) All Files (*.*) Navigate to folder where the file is stored. Click on the desired file name, then click "OPEN". Opens files and converts UMC800 (*.FBD) configuration files.
Close	Closes the active document window. It will also close a minimized window if active. [It will not close an active dialog box.]
Save *Toolbar*: *Shortcut*: CTRL+S	Saves the active configuration. First time save displays the "*Save As*" dialog box.
Save As ...	Displays the *"Save As"* dialog box. Prompts user to name the active configuration and select the file in which the file is to be stored.
Download	Configuration Download transfers a saved configuration **FROM** the PC **TO** the controller. The Controller may be in either RUN or PROGRAM mode.
Upload Configuration	Configuration Upload transfers a configuration **FROM** the controller **TO** the PC including graphic function block pages, text annotations, stored recipes/profiles/schedules/sequences, OI display assignments, OI data storage setup. The uploaded file name, as a default, will include the controller name, alias name (if assigned) and network name (if assigned).

Menu Selection	Function
	The Controller may be in ANY mode. **No configuration file is required to be opened** prior to the Upload Request
Upload…	Opens the "Upload" dialog box that lists the type of recipes available to upload. Click on a radio button to select one of the following: Recipes (Variables) Setpoint Profile Setpoint Schedule Sequence Data Storage. Upload transfers a recipe **FROM** the controller **TO** the software.
Back up Controller…	Saves a controller's active configuration as a backup file with .cbk extension. Similar to saving an uploaded configuration except that the configuration *and* port settings are saved. You are prompted to specify the comm. link settings for the controller to be backed up. Backup files are read-only; to edit you must first save as .cde. See <u>Back Up Controller Information</u> for more details.
Hang Up Modem	When communicating with a controller via a Modem, select this to disconnect the Modem from the controller.
Proper<u>t</u>ies ...	Displays the *"<u>File Properties</u> "* dialog box. Tabs allow user to view Configuration **File properties**, read Configuration File **Statistics (**capacity usage).
<u>W</u>rite Protect File ...	Displays the *"Add Write Protection"* dialog box. Can enter and confirm a password for the selected file.
Print Report *Toolbar:* *Shortcut*: CTRL+P	Displays the "Print Report" Dialog box. Lets you choose <u>reports</u> for printing from 5 different categories: Controllers Function Block Diagrams Displays Recipes Alarms and Events
Print Report Pre<u>v</u>iew	Lets you choose a <u>report preview</u> (Print Preview) for printing from the 5 categories: Controllers Function Block Diagrams Displays Recipes Alarms and Events The selected report is displayed on the screen as it will look when printed.
Export Report	Lets you <u>export reports</u> as files in comma or tab separated format.
P<u>r</u>int Setup ...	Displays *"Print Setup"* dialog box. Allows user to select printer, paper type, and orientation.
Most Recent Files	Lists the most recent files that were open.
E<u>x</u>it	Exits the application.

Edit Menu

Menu Selection	Function
Worksheet Properties…	Opens the "Worksheet Properties" dialog box. Allows you to view the Title and Description of the worksheet. Type in a title (24 characters) and description (32 characters) for your Worksheet -.
Unlock Worksheets	Displays "Unlock Worksheets" dialog box. Enter password to unlock all protected worksheets. Click on "Unlock".

Block and Tag Order	Opens the " Block Execution Order" or the "Fast Block Execution Order" dialog box to let you view block execution order.
	Also available from FBD worksheet toolbar.
	
	Select "Tag Order" to re-arrange the tags order for:
	      Alternator Operates
	      Device Controls
	      HOA Switches
	      Loops
	      Ramp Operates
	      Sequencers
	      SP Programmers
	      SP Schedulers
	      Stage Operates

Alarms	Opens the "Alarm Group Configuration" dialog box. Lets you View alarm groups . Also available from FBD worksheet toolbar.
Events	Opens the "Configure Event List" dialog box. Allows you to view events. Also available from FBD worksheet toolbar.
Modbus Register Map…	Available for configuration revision 2.0 or higher. Lets you view but not edit "Edit Modbus Register Addresses " dialog box.
Trend Backfill Log Point Selection	Available for configuration revision 4.4 or higher. Lets you view but not select method for configuring points to be saved in the trend history buffer.
Find *Shortcut*: CTRL+F	Searches for an item on the "Find Item" dialog box. Select an item type from the "Show" drop-down menu to search, then select an Item from the "Item" drop down menu. The Tag, Variable, or Function Block will be highlighted on the Function Block Diagram.
Go To *Shortcut*: CTRL+G	Displays the *"Enter Page Number"* dialog box and allows you to enter the page number to which you want to go. (1-20)
Options	Options are: **Warning Level** Allows enable/disable of Open Input and Unassigned I/O warnings. Click on Box to select. **Export Delimiter** Allows setting of export report's default format (comma delimited or tab delimited).

View Menu

Menu Selection	Function
Toolbar	Displays or hides the <u>toolbar</u> in the top of the Main window. Gray box with √ mark indicates display.
Status Bar	Displays or hides the <u>status bar</u> at the bottom of the Main window. Gray box with √ mark indicates display.
File Browser	Displays or hides the <u>File Browser</u> at the top left of the Main window. Gray box with icon indicates display.
Trace Window	Allows you to view the <u>Traceback</u> list.
Localization	Allows you to switch between the languages.
Network Device List	Lets you setup a PC Network Port for interface to a specific controller. See <u>PC Network Port Set Up</u> .
PC Serial Port Setup	Lets you setup up to 8 PC Serial Comm ports for interface to a specific controller. See <u>PC Serial Com Port Setup</u> .
Grid	Displays or hides a Grid on the <u>FBD Worksheet</u>
Zoom <u>O</u>ut	Lets you Zoom in out to see more of a document. Zoom levels of 50%, 75%, 100%, 125%, and 150%. Also available from <u>FBD worksheet toolbar</u>.
Zoom <u>I</u>n	Lets you zoom in to return items to normal size. Zoom levels of 50%, 75%, 100%, 125%, and 150%. Also available from <u>FBD worksheet toolbar</u>.

Monitor Menu

Menu Selection	Function
Monitor Mode	Enters or exits monitor mode. **While in monitor mode, edits to the configuration cannot be made.** If entering monitor mode, selecting this menu item opens the "Enter Monitor Mode" dialog box.
Monitor Toolbar	The Monitor Toolbar toggles each monitor window.
Set Update Rate	You can specify the monitor update rate that determines how often data is collected from the controller during monitoring.
Watch Summary Window	Toggles the Watch Summary Window that lets you view groups of related data such as I/O and Signal Tags.
Controller Diagnostics	Toggles the Controller Diagnostics Window that lets you view the controller parameters and values.
Rack Diagnostics	Toggles the Rack Diagnostics window that lets you view the Rack Diagnostics, Expansion I/O Comm Diagnostics (except C30 CPU) and the I/O Module parameters and indicators.

Controller Ports Diagnostics	Toggles the Configuration Port Diagnostics window that lets you view the Configuration Port parameters and values.
	    Serial Port S1
	    Serial Port S2
	    Network Port
	    Expansion I/O Comm (except C30 CPU)
	    Master Connections
	    Peer to Peer Connections

Modbus Host Ports Diagnostics	Toggles the Modbus Host Port Diagnostics window that displays the status of the Modbus Host port.
Monitor Function Block *Shortcut*: CTRL+M	Toggles the Function Block Monitor Windows that lets you monitor all the parameters of the selected Function Block.
Forced Blocks	Toggles the Forced Block Summary Window that lets you see all the outputs that are being forced and permits release of the force condition for a selected output.
All Function Block Windows	Allows you toggle the function block windows that are open - On/Off.
All Pins	Lets you toggle monitoring values (numeric or On/Off state) at any input or output pin – Display or Hide.
All Monitor Windows	Allows you toggle the Monitor windows that are open - On/Off.
Redundancy…	Accesses Redundancy diagnostics. Redundancy System Redundancy Link Lead CPU Reserve CPU Scanner 2 Link

Recipes Menu

Accesses all recipe pools. To learn about the different recipe types read Recipe Overview.

Menu Selection	Function
Allocate Recipe Memory	Allocates the controller's memory for the four recipe types. This is the number of recipes that can be stored in the controller's four recipe pools. Recipes in these pools can be loaded and run by Recipe Selection Blocks, Programmers, Schedulers, and Sequencers. As recipe memory usage increases, less memory is available for other parts of your configuration (such as function blocks).
Setpoint Profiles…	Setpoint Program (Profile) configuration provides a quick and easy way to create, edit, and save different ramp/soak (setpoint) profiles for the Setpoint Programmer (SPP) control blocks in the configuration. This selection opens the Setpoint Profile Pool dialog box and allows viewing, adding, editing, and printing of Setpoint Profile details. You can save the selected SPP item to a file; open a SPP file and insert it into the pool; and download the selected SPP item to a controller's Setpoint Profiles pool.
Setpoint Schedules…	Setpoint Schedule configuration provides a quick and easy way to create, edit, and save different Setpoint Schedules for the Setpoint Scheduler (SPS) control blocks in the configuration. This selection opens the Setpoint Schedule Pool dialog box and allows viewing, adding, editing, and printing of Setpoint Schedules details. You can save the selected SPS item to a file; open a SPS file and insert it into the pool; and download the selected SPS item to a controller's Setpoint Schedule pool.
Sequences…	Sequence configuration provides a series of inter-related events used to start-up or shut-down a unit process, or a series of timed and process measurement dependent events that are executed to produce a final product. This selection opens the Sequence Pool dialog box and allows viewing, adding, editing, and printing of Sequence details. You can save the selected SEQ item to a file; open a SEQ file and insert it into the pool; and download the selected SEQ item to a controller's Sequence pool.

Window Menu

Menu Selection	Function
<u>C</u>ascade	Arranges windows so that they overlap making it easy to select a window.
Tile <u>H</u>orizontally	Arranges windows side by side. Each window is visible and none overlap.
<u>T</u>ile Vertically	Arranges windows over and under each other. Each window is visible and none overlap.
<u>A</u>rrange All	Arranges configuration Icons when configurations are minimized.
(Open window designations)	Lists all Function Block Diagrams, recipes, and data storage files that are open and checks the one that is active. Click any file to display it.

Help Menu

MENU SELECTIONS

<u>H</u>elp Topics

Calls up the top level Helps Contents page.

Selecting a **Topic** displays information about that topic. If the information about a topic exceeds the height of the window, a vertical scrollbar will be displayed.

Selecting the **Index** tab lets you type in the first few letters of the word you are looking for.

Selecting the **Find** tab lets you search for specific words and phrases in Help topics, instead of searching for information by category.

<u>A</u>bout Help

Displays copyright and software version, and user name and company name entered during software's installation.

ADDITIONAL HELP ACCESS

Right-click Help for Help Topics
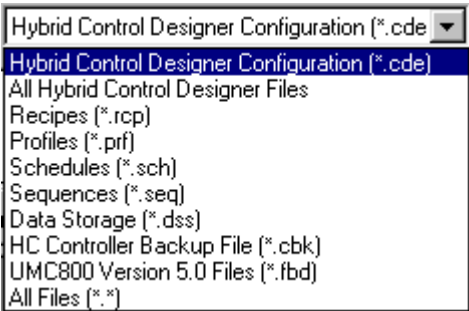
Right-click on any Function Block to access topic help for that particular Block

Hotspots

When the cursor is over a hotspot area on an image, it turns to a hand indicating that when clicked some sort of action occurs.

Main Toolbar Functions

Click on ICON to open a dialog box.

ICON	Function	Dialog Box Comments
	New	Displays a "Choose a New File Type" dialog box with these tabs. ***New Recipes:*** Select the "**Recipe**" tab. On the tab, click on a radio button to select one of the following: Recipes (Variables) Setpoint Profile Setpoint Schedule Sequence Click OK. The associated "Editor" dialog box will appear and a new "Opened Recipe File" is listed in the File Browser. Refer to the specific Recipe type for specifics. ***New Data Storage:*** Select the "**Data Storage**" tab. On the tab, click on a radio button to create a new Data Storage File
	Open	Displays the *"Open"* dialog box. From the "Files of Type" drop-down menu, select a file type. Hybrid Control Designer Configuration (*.cde) Hybrid Control Designer Configuration (*.cde) All Hybrid Control Designer Files Recipes (*.rcp) Profiles (*.prf) Schedules (*.sch) Sequences (*.seq) Data Storage (*.dss) HC Controller Backup File (*.cbk) UMC800 Version 5.0 Files (*.fbd) All Files (*.*) Navigate to folder where the file is stored. Click on the desired file name, then click "OPEN". Opens files and converts UMC800 (*.FBD) configuration files.
	Save	Saves the active configuration. First time save displays the "*Save As*" dialog box.
	Print	Displays the "Print Report" Dialog box. Lets you choose reports for printing from 5 different categories: Controllers Function Block Diagrams Displays Recipes Alarms and Events
	Help Topics	Opens Help Topics Table of Contents and Help information screen.
	File Browser	Displays or hides the File Browser Window.

ICON	Function	Dialog Box Comments
	Traceback Window	Displays or hides the Traceback Window.
	Monitor Mode	Enters/Exits Monitor Mode and allows On-line Monitoring and Diagnostics. ***When pressed***, the active configuration is in the Monitor mode (and cannot be edited). ***When not pressed***, the active configuration is in the edit mode.
	Upload	Opens the "Upload File" dialog box. Press start to Upload file selected from the controller.

Navigational Tools

Navigational Tools available:

Main Menus and Main Window Toolbar

File Browser Window

Worksheet Category Tabs

Worksheet Toolbars (Controller, Display, Function Block Diagram, Utilities)

Find / Go To

Function Block Help (right mouse click on block)

Connection Traceback Window

Finding an Item on the FBD Worksheet

Hot Links

Keyboard Navigation

Right Mouse Click

Shown below are the right-click menus. See also Right Click In Monitor Mode.

Right Click On Function Block Object (not pins)

Help - *Calls up Topic Help for Function Block selected*

Execution Order

 View Modbus Register Address

Properties

Right Click on Connected Function Block Input Pins

Trace

Right Click on Variable

Help - *Calls up Topic Help for Function Block selected*

Execution Order

 View Modbus Register Address

Properties

Right Click on Signal Tag

Help – calls up help

Find Where Used – Opens Find dialog box. Lets you locate any and all places where the signal tag is used.

View Modbus Register Address

Properties

Right Click on Page Connector

Help – calls up help

Find Where Used – Opens Find dialog box. Lets you locate any and all places where the page connector is used.

View Modbus Register Address

Properties

Click On FB Diagram White Space

Execution Order

Fast Logic Order

Find

Go To

View (displays the view menu)

Properties [File]

Right Click On Function Block in Worksheet Toolbox Configuration Tab

Properties [File]

Find

Execution Order

Help – calls up help

HC900-C70R Rev 4.0x : SampleConfig_4.0.CDE

Configured Function Blocks

- I/O Blocks
- Loop Blocks
  - TEMP LP1
    - Properties...
    - Find
    - Execution Order
    - Help
- S
- L
- Counters/Timers
- Math
- Calculations
- Alarm/Monitor
- Signal Selectors
- Auxiliary
- Communications
- Analog Variables
- Digital Variables
- Analog Signals
- Digital Signals

Normal ...   Fast Scan   **Configura...**
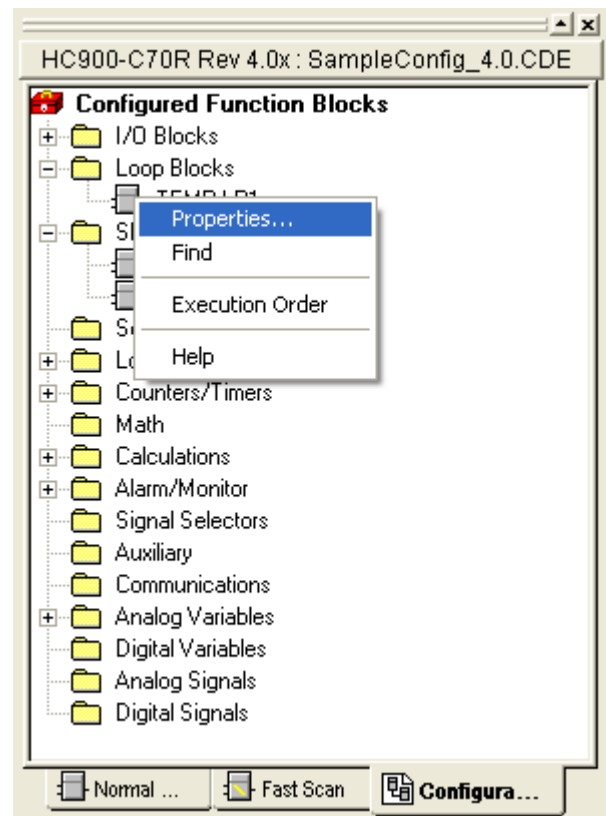
Keyboard Navigation

Press	To
LEFT ARROW	Scroll worksheet to the left
RIGHT ARROW	Scroll worksheet to the right
UP ARROW	Scroll worksheet up
DOWN ARROW	Scroll worksheet down
END	Go to the end of last page
HOME	Go to the beginning of first page
PAGE DOWN	Go to the next worksheet page
PAGE UP	Go to the previous worksheet page
CTRL+LEFT ARROW	Go to the end of last page
CTRL+RIGHT ARROW	Go to the beginning of first page
CTRL+UP ARROW	Go to the top of the page
CTRL+DOWN ARROW	Go to the bottom of the page
CTRL+PAGE DOWN	Go to the next worksheet tab
CTRL+PAGE UP	Go to the previous worksheet tab

Other keyboard functions

If necessary, you can use the standard keystroke conventions to move around.

ALT *used together with the underlined letter in text labeling an object lets you select that object.*

TAB *select next field or object in dialog boxes and configuration templates*

SHIFT+TAB *select previous field or object in dialog boxes and configuration templates*

UP ARROW *previous choice in the field*
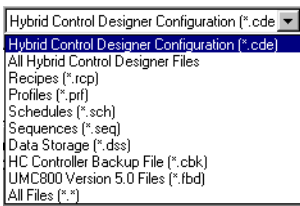
DOWN ARROW *next choice in the field*

ALT+DOWN ARROW *opens a drop-down list box*

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4.File Management

Opening an Existing File
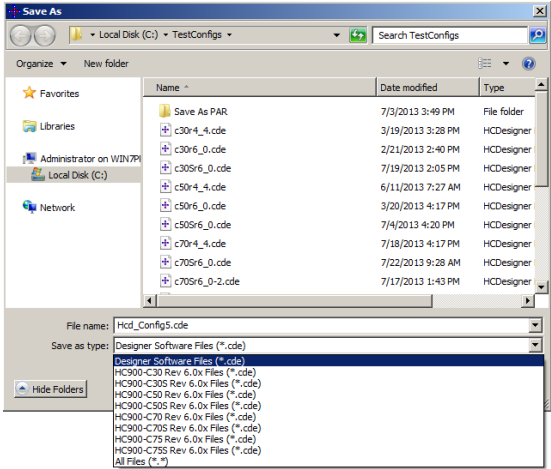
Select "Open" from the File Menu… or **from the Main Toolbar** *Shortcut*: CTRL+O	Displays the *"Open"* dialog box. Drop-down the "Files of Type' menu and select a file type. Hybrid Control Designer Configuration (*.cde ▼) Hybrid Control Designer Configuration (*.cde) All Hybrid Control Designer Files Recipes (*.rcp) Profiles (*.prf) Schedules (*.sch) Sequences (*.seq) Data Storage (*.dss) HC Controller Backup File (*.cbk) UMC800 Version 5.0 Files (*.fbd) All Files (*.*) Navigate to folder where the file is stored. Click on the desired file name, then click "OPEN".
or	From the "File" menu, select one of the most recently opened file listed above the "Exit" item.

Saving A Configuration File

To Save an Existing File

Step	Action
1	Click **SAVE** from the **FILE** menu or from the Main toolbar.
2	If there are no unconnected inputs that need to be set to OFF or 0, and there are no I/O blocks with unassigned I/O addresses, then the data is saved automatically, and the rest of the steps may be skipped.
3	If there are unconnected inputs that have not been previously set to OFF or 0, and/or there are I/O blocks with unassigned I/O addresses, the Process Control Designer will notify you of the situation and ask if you want to see a list of unconnected inputs and/or a list of unconfigured I/O blocks.
4	Click **Yes** to view the summary of unconnected inputs or unconfigured I/O blocks.
5	Click **Log File** to save the list to a text file, if required.

To Save a New File or Save the File as a New Name

Step	Action
1	Click **SAVE AS** from the **FILE** menu. The **Save As** dialog box appears.
2	Type in the new file name in that field.
3	From the drop-down menu in the **Save as Type** field, select the configuration type depending on the controller you have.
4	If there are no unconnected inputs that need to be set to OFF or 0 and no I/O blocks with unassigned I/O addresses, the data is saved automatically and the remaining steps can be skipped.
5	If there are unconnected inputs that have not been previously set to OFF or 0 and/or there are I/O blocks with unassigned I/O addresses, the Process Control Designer notifies you about the situation and prompts if you want to see a list of unconnected inputs and/or a list of unconfigured I/O blocks.
6	Click **Yes** to view the summary of unconnected inputs or unconfigured I/O blocks.
7	Click **Log File** to save the list to a text file, if desired.

To Save a File as a Different Device or Revision (that is conversion)

Step	Action
1	Select **SAVE AS** from the **FILE** menu. The **Save As** dialog box appears.
2	Type in the new file name in that field.
3	From the drop-down menu in the "Save as Type" field, select the configuration type and revision that you wish to convert to.
4	If there **are no** unconnected inputs that need to be set to OFF or 0, **and** there are no I/O blocks with unassigned I/O addresses, then the data is saved automatically, and the rest of the steps may be skipped.

5	If there **are** unconnected inputs that have not been previously set to OFF or 0, **and/or** there are I/O blocks with unassigned I/O addresses, the Process Control Designer will notify you of the situation and ask if you want to see a list of unconnected inputs and/or a list of unconfigured I/O blocks.
	Click **Yes** to view the summary of unconnected inputs or unconfigured I/O blocks.
	Click **Log File** to save the list to a text file, if desired.

ATTENTION: If you convert a safety-enabled configuration to a non-safety configuration, then all the safety worksheets in the configuration is converted to process worksheets. Conversely, if you convert a non-safety configuration to a safety-enabled configuration, then a blank safety worksheet will be added to the configuration.

Creating Other File Types

See sections for details.

Create/Edit Recipe (Variables)

Create/Edit Setpoint Profile

Create/Edit Setpoint Schedule

Create/Edit Sequence

Create/Edit Data Storage Settings

Back up Controller Information

Uploading a File from the Controller

Introduction

Upload transfers a file **FROM** the controller **TO** the PC. Uploadable files are configurations, recipes, and data storage.

The Controller may be in ANY mode.

No configuration file is required to be opened prior to the Upload Request.

Uploading Configuration

From the "File Menu" select Upload Configuration, or click on the Upload icon on the Main Toolbar ,or click on the Upload icon on the Utilities Worksheet Toolbar then select "Upload Configuration".

The Upload File dialog box will appear. A temporary file name will be place in the "File Name" box.

Under "Current CommLink Settings", select the port and address to communicate to a controller. Reference "Utilities_Worksheet_Overview" for configuring the PC Ports.

Press "START". The dialog box will show "Percent Complete".

The Uploaded File will appear with an automatic file name containing the controller name, its local name (or alias), and the network it is on.

From the "File" menu, select Save or Save As and enter a file name and path in the appropriate fields.

Uploading Recipe or Data Storage

From the "*File Menu*" select **Upload...** The Upload File dialog box will appear. A temporary file name will be place in the "File Name" box.

Under "Current" CommLink Settings", select the port and address to communicate to a controller. Reference "Utilities Worksheet" for configuring the PC Ports.

Press "START".

Select a file type to upload. If uploading a recipe, you'll be asked to choose which recipe in the controller's memory to upload.

The dialog box will show "Percent Complete". When the upload is complete, the Uploaded File will appear (with a temporary file name) in the editor for that file type.

From the "File" menu, select Save or Save As and enter a file name and path in the appropriate fields.

Downloading a File to the Controller

Introduction

Once a control strategy—configuration file—is opened, Configuration Download transfers a configuration **FROM** the PC **TO** the controller.

The Controller may be in either RUN or PROGRAM mode (not Run-Locked)

ATTENTION: **You cannot download a ControlEdge HC900-C50 configuration to a ControlEdge HC900-C30 and vice versa. You must first convert the configuration before doing a download. See "**Converting ControlEdge HC900 configurations **".**

Procedure

1. From the File Menu, select "Open" or Upload a file* from the controller.
2. Select the file (.cde) that is to be downloaded.

   The selected function block diagram will appear in the Active View window. **Only the active file window can be downloaded.**
3. From the "File Menu" select **Download** or

   click on the **Download icon** on the Main Toolbar ,or

   click on the **Download icon** on the *Utilities Worksheet* Toolbar then select "Download Configuration".
4. The "Download File" dialog box will appear. Check the Port and Address information for correctness.
5. Press "START" to download the configuration to the configuration buffer.
   The ***download will begin*** if the controller is in: PROGRAM mode or RUN mode.
   The ***download will be rejected*** if the controller is in: RUN/LOCKED mode or OFFLINE mode.
   The dialog box will show "Percent Complete".
6. After the database tables have been transferred to a configuration buffer, select one of the following commands to transfer from the buffer to the controller:

   i. **HOT START -** the controller will use the new or updated configuration in RUN Mode.

   ii. During a Hot Start:

   - Controller memory will not be re-initialized
     - Outputs will be held at their current value.
     - Controller will stay in RUN mode

     i. There are two possible actions with a Hot Start.

   - If the Hot Start will be completed within approximately 3 controller scan cycles, then the Hot Start will proceed automatically.

   - If the Hot Start requires longer than 3 controller scan cycles, a dialog box displays a) the estimated duration of the Hot Start and b) options to initiate or cancel the Hot Start.

     i. **COLD START** - the controller will transition through normal PROGRAM-TO-RUN mode transition
        - Controller memory will be re-initialized
        - Outputs will be turned off during re-start
        - Controller will return to RUN mode

     ii. **ABORT** - the controller will disregard the new configuration and continue to use the previous configuration.
7. The dialog box status line will state "Mode Change in Progress" then "Download Successful" when completed.

Downloading in Run Mode

⚠️ **WARNING**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the configuration in the application and the potential dangers of downloading a configuration while running.

Downloading in RUN Mode has the potential to create a hazardous situation. Changes to the configuration result in a short suspension of the control program followed by an immediate execution of the new configuration. It is the user's responsibility to ensure that configuration changes will not result in a hazardous situation.

It is the user's responsibility to assess this risk for his process. Failure to comply with these instructions could result in death or serious injury to people and/or property damage.

Downloading in Run Mode (Hot Start) is a means to make configuration changes and download them to the controller without taking the process off-line.

It is intended for **incremental changes to a running configuration**, such as:

Adding and Deleting Blocks
Modifying block configuration parameters
Adding/changing soft-wires, signals, variables
Adding OI displays, Data Storage
Adding Recipes, SP Profiles, SP Schedules, or Sequencers.
Adding, deleting, or modifying I/O (DI, DO, AI, AO).

IMPORTANT: If you intend to make a set of changes to a running configuration and wish to preserve the context of the current configuration parameters you should perform an upload from the controller first to assure that you have the current configuration, make the incremental changes, and then download.

Cautions

Configuration Change Transfer

Once the HOT START button is depressed, the configuration will be updated with the new changes. Note: During the time period required to perform the Hot Start, the controller will suspend the execution of its function blocks and hold its outputs at their current value. If you select Hot Start and the Hot Start will take longer than approximately three controller scan cycles, a popup window appears:

⚠️ This hot start will take about 10 seconds to complete.
During this time, the outputs will be held.
Do you wish to proceed with the hot start?

[Yes] [No]
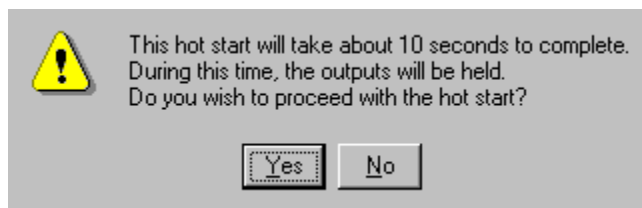
If this time period is acceptable, click Yes to begin the Hot Start. If this time period is not acceptable, press No.

Configuration Parameters

All Configuration Parameters are set to the value or state in the .cde file following a download. For example: *Tuning constants could be over written by a Download while in Run Mode*. The tuning constants are considered **part of the configuration**. If you DO NOT first upload the present configuration, you will overwrite the active parameters with the values in the configuration that are downloaded. The new download is an all or nothing proposition.

Data Storage Schedule

Assuming changes have NOT been made to an OI data Storage Schedule, the data storage will be interrupted only as long as it takes to transfer the configuration changes.

Download Firmware

Background

Code download provides a mechanism to upgrade the firmware in your ControlEdge HC900 Controller to a newer version without the need to replace the CPU card. This can be useful if you wish to upgrade your controller to take advantage of new features and functions as they are introduced, or in the event that a software bug requires field repair.

Getting Started

Before you begin the download, there are a few things you need to be aware of.

- Code Download can take from a couple of minutes using Ethernet to over one hour if using a Modem. Therefore, it is highly recommended that you do not start the code download procedure at a time when the likelihood of power failure is increased, such as during thunderstorms.
- The code download function is only available through the ControlEdge HC900 Utilities program connected to the controller via the CONFIGURATION port or Ethernet port on the ControlEdge HC900. Use the Utilities Worksheet to do the download.
- The controller will not allow the controller firmware download to begin if the battery is bad.
- Code download will destroy the configuration database in the controller. Therefore, before code download is started, either upload the configuration file via the operator interface and save on floppy, or upload and save to your PC via the software's Utilities Worksheet.

Firmware Files

Install these three files in the same directory:

IO File	*Version of file.bin*
Controller File	*Version of file .CPU*
Scanner File	*Version of file .SCN*
Loader File	*Loader.S19*

To obtain these files, go to http://content.honeywell.com/ipc/faq, Modular Control Systems, ControlEdge HC900. Version 1.03 or later must be used. It is recommended that both the controller and scanners be upgraded together.

Controller Mode

Before starting the Firmware Download, switch the controller to "Program Locked" " mode. Program Locked offers more security by requiring a key to change the mode switch position. See set controller mode.

Download Procedure

Step	Action
1	Backup the controller configuration either by uploading to floppy disk on the operator interface, or uploading and saving via the Process Control Utilities.
2	Make sure the controller's mode switch is in "Program" (locked) or "Run/Prog" position. If the switch is in "Run/Prog" position, go to set controller mode display and change mode to Program.
3	In Process Control Utilities select the Utilities Worksheet tab.
Controller Module	
4	From the "Controller Utilities Functions" select "Download to Controller". On the sub-menu, select "Firmware", then "**Controller Module**".
5	Use the "Look in:" drop down list in the "Open" dialog box to select the drive and folder you placed the files in.
6	Select and open the file "*Version*.**CPU**" displayed in the file list box.
7	Select the "Port" and "Address" on the "Download File" dialog box.
8	Click on the "Start" button in the "Download File" dialog box. The download will start, and progress is displayed. The download itself will take a few minutes, depending on the Port type and connection.
9	A "Download Succeeded" status will be displayed in the "Download File" dialog box.
	If a failure is detected, an error message will appear in the Status section of the "Download File" dialog box. See "Error Messages" for a list of possible messages and resolutions. Also see Failure Modes.
Scanner Module	
10	From the "Controller Utilities Functions" select "Download to Controller". On the sub-menu, select " Firmware", then "**Scanner Module**".
11	Use the "Look in:" drop down list in the "Open" dialog box to select the drive and folder you placed the files in.
12	Select and open the file "*Version*.**SCN**" displayed in the file list box.
13	Select the "Port" and "Address" on the "Download File" dialog box.
14	Click on the "Start" button in the "Download File" dialog box. The download will start, and progress is displayed. The download itself will take a few minutes, depending on the Port type and connection.
15	A "Download Succeeded" status will be displayed in the "Download File" dialog box.
	If a failure is detected, an error message will appear in the Status section of the "Download File" dialog box. See "Error Messages" for a list of possible messages and resolutions. Also see Failure Modes.
16	Restore the configuration from the backup copy you previously made.

IO Module	
17	From the "Controller Utilities Functions" select "Download to Controller". On the sub-menu, select "Firmware", then "**Io Module**".
18	Use the "Look in:" drop down list in the "Open" dialog box to select the drive and folder you placed the files in.
19	Select and open the file "***Version*.bin**" displayed in the file list box.
20	Select the "Port" and "Address" on the "Download File" dialog box.
21	Click on the "Start" button in the "Download File" dialog box. The download will start, and progress is displayed. The download itself will take a few minutes, depending on the Port type and connection.
22	A "Download Succeeded" status will be displayed in the "Download File" dialog box. If a failure is detected, an error message will appear in the Status section of the "Download File" dialog box. See "Error Messages" for a list of possible messages and resolutions. Also see Failure Modes.

Failure Modes

If there is a download failure indication on the "Download File" dialog box:
- DO NOT cycle the controller power and DO NOT remove the battery.
- Check the physical connections.
- Check for power failures.
- Restart the download from the beginning.

Download Firmware Error Messages

This is a list of possible error messages that could be displayed as the result of a Download Firmware failure:

Error Message	What to do
Instrument must be in PROGRAM LOCK mode to perform this operation	Put controller in program lock mode before starting code download.
Instrument's battery missing or dead	Replace controller battery before starting code download.
Missing loader binary file	Could not open the loader file. Make sure the "loader.s19" file is in the same directory as the firmware file to be downloaded.
Could not open firmware update file	Make sure the firmware file is present in the directory selected.
Programming is not required, the downloaded version matches the code in the controller	The version in the controller matches the version that was downloaded.
The downloaded file is corrupted	The firmware file was bad. Replace the

Error Message	What to do
	firmware file
Failed to complete file transfer	Could be caused by communication loss or controller power failure. Restart code download again.
Controller is not responding, code download failed	Could be caused by communication loss or controller power failure. Restart code download again.
Failed to put instrument into loader transfer mode	Could be caused by communication loss or controller power failure. Restart code download again.
Failed to get controller status	Could be caused by communication loss or controller power failure. Restart code download again.
Unexpected controller mode. Code download will abort. The controller will now reset	Could be caused by communication loss or controller power failure. Restart code download again.
Failed to get expansion rack status	Could be caused by communication loss or controller power failure. Restart code download again.
FLASH erase failure. Replace the controller card	The controller has a hardware problem. Replace the controller card.
FLASH programming failure. Replace the controller card	The controller has a hardware problem. Replace the controller card.
FLASH memory failure. Replace the Controller card	The controller has a hardware problem. Replace the controller card.
An incomplete code download has been detected. Do not remove controller power! Removing controller power could result in damage to the scanner card(s)	A previous code download was aborted or failed. Code download will proceed using the selected file.
An incomplete code download has been detected. Code download will proceed using the selected file	A previous code download was aborted or failed. Code download will proceed using the selected file.
No scanner racks detected	Most likely cause is no expansion racks connected to the main controller. It can also be caused by a failed scanner card. If a scanner is properly connected to the controller and this message is displayed, replace the scanner card.

Error Message	What to do
"Rack 1: SUCCESS, Rack 2: FAILED"	Completion report for scanner code download. There should be a SUCCESS status for each card connected to the main controller rack. A FAILED status could be caused by a communications problem between the main controller rack and the scanner racks or by a failed scanner card. Restart code download again.
Failed to get UIO Module status	Could be caused by communication loss or controller power failure. Restart IO code download again.
Failed to put instrument into IO mode	Could be caused by communication loss or controller power failure. Restart IO code download again.
Programming is not required, the downloaded version matches the code in the IO Module	The version in the IO Module matches the version that was downloaded.
IO Module is not responding, IO download failed	Could be caused by communication loss or controller power failure. Restart IO code download again.
"R1:M1: SUCCESS, ……………R1:M12 : FAIL …………………………………R12:M12: SUCCESS"	Completion report for IO code download. There should be a SUCCESS status for each UIO Module connected to the controller. A FAILED status could be caused by a communications problem between the controller and UIO Modules or by a failed IO card. Restart IO code download again.

File Properties

Lets you view the title and author of the file as well as view the file statistics (Number of Blocks, Inputs, and other items).

From the Process Control Utilities Window File menu, select "Properties". Or in the File Browser Window right-click on an open configuration.

The "File Properties" dialog box will appear.
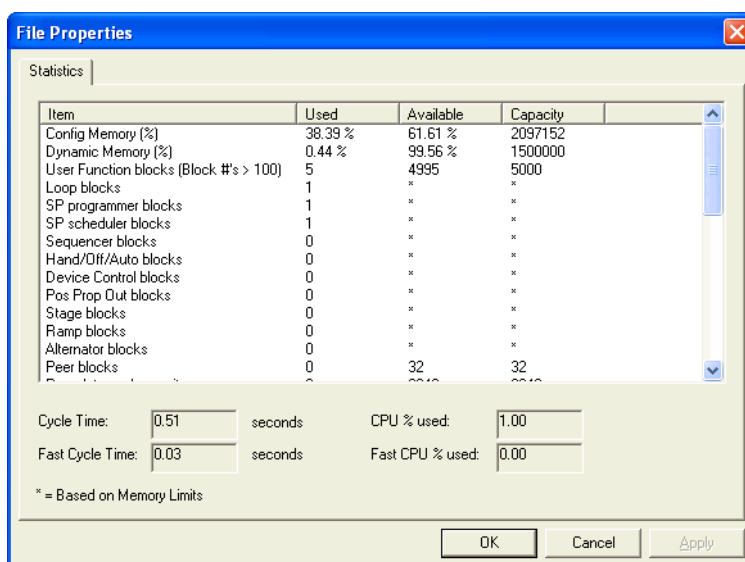
Select a tab:

General

Title and Author.

Read only: Path and file name, Date created and Last Modified, Schema #, Device information (CPU type, Revision number)

Statistics

Shows usages and capacities for all items in the configuration. Asterisk * indicates there is no specific limit for this item, its limit is determined by available memory.

Cycle Time and Fast Cycle Time increase (slow down) as the following increase: CPU % Used, Fast CPU % Used, Dynamic Memory, Config Memory. Also, extensive use of Free Form Logic blocks (as opposed to equivalent gate logic) can substantially increase Fast Cycle Time.

Be aware that deleted function blocks consume memory; this memory can be made available by defragmenting.

"Read Protection" - Indicates current protection.

"Worksheet Protection" - Indicates current protection.

File Read Protection

Protected files are password protected. You will be prompted for a password to open them.

Write Protect a File

Introduction

Optional configuration File Write protection is provided. This feature makes use of the disk general file "Read Only" attribute. All the files default to "No Protection". When set to "Read Only", the file is Write Protected, which means it cannot be over written or deleted.

Select "Write Protect File" from the FILE menu.

Use the Check Box on the dialog box that appears to turn the attribute On (selected) or Off (deselected).

5.PC Comm Ports and Connections

How to Manage PC Comm Ports and Connections

The middle and lower portions of the Utilities Worksheet contain the PC Comm Ports and Connections functions.

Setting up your PC Comm Ports consists of the following functions:

- PC Network Port Setup
- PC Serial Comm Port Setup
- PC to Controller Connection Settings
- Remote Loopback test
- Remote Access
- Communications Statistics

PC Network Port Set Up For Controller Access

The software lets you setup a PC Network Port and up to 8 PC Serial Comm ports for interface to a specific controller (serially via the controller's serial configuration port or over a network via the controller's Ethernet port, accessed by its IP address). You will need a Network Interface Card (NIC) in your PC for network connection. If there is a Modem on your PC, a symbol will appear on one of the Serial comm ports buttons.
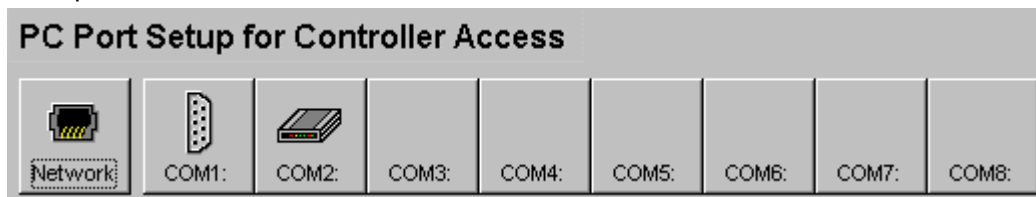
Setting Up a Network Port

Click on the Network Port setup button

The Network Port Dialog Box will Open

To ADD a Network Port:
Click on ADD and enter the properties in the Device IP Address fields.

To EDIT a Network Port:
Click a device, click on EDIT and enter the properties in the Device IP Address fields.

To Delete a Network address:
Click on a device in the Network address list, then click Delete button. The address will be deleted.

Note: Do not delete the network address selected in "Current PC to Controller Connection Settings"

To do a Loopback test for a specific address
Click on the Loopback button.
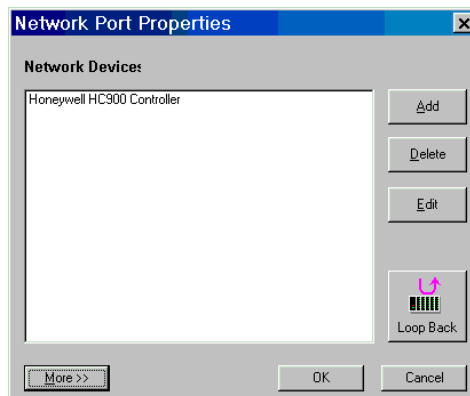
For **Advanced Network Setup**, click on the MORE>> button at the bottom of the "Network Port Properties" dialog box.
Number of Retries before Abort - Enter a decimal value
Retry Delay - Enter a value in milliseconds
Timeout - Enter a value in milliseconds
Note: It is not recommended that you set the values lower than those shown in the dialog box, since it may cause some communications operations to fail.
Press **Reset** button to reset these fields to their default values

PC Serial Com Port Setup

The software lets you setup a Network Port from 1 up to 8 Serial Comm ports. If there is a Modem on your PC, a symbol will appear on one of the Serial Comm Ports buttons. See Setting up a Serial Com Port with a Modem.

Setting Up a Serial Comm Port

1. Click on the Serial Comm Port setup button. When there is no port Icon above the comm port name, the port is currently disabled.	[COM1 button image]
2. The "Serial Comm Port Properties" Dialog Box will Open Click the 'Enable Port" box Manually select a Baud Rate from the "Speed" drop-down menu, or if a controller is currently connected to the ports, press the "Detect" button to detect the controller's baud rate. Click OK. Note: If the Detect process runs through all of the baud rates rapidly without appearing to actually check each baud rate, there may be a mismatch between the PC's serial port type and the controller's serial port type. If this behavior occurs, make sure that the DIP switches on the controller's CPU card are set correctly.	[Serial Comm Port Properties dialog: COM1, Enable Port checked, Serial 232, Use Modbus RTU unchecked, Speed (bps): 38400, Detect..., More >>, OK, Cancel] Note: The serial comm ports are configured to default to Honeywell ELN protocol, If a user configures a serial port to use Modbus RTU (device) protocol, the Serial 232 box may be checked for HC Designer to communicate via this protocol.
3. The Serial CommPort Button will now show an icon indicating that the port has been set up.	[COM1 button with port icon]
4. For **Advanced Network Setup**, click on the MORE>> button at the bottom of the "Serial Comm Port Properties" dialog box. *Number of Retries before Abort* - Enter a decimal value *Retry Delay* - Enter a value in milliseconds *Timeout* - Enter a value in milliseconds *Note: It is not recommended that you set the values lower than those shown in the dialog box, since it may cause some communications operations to fail.* Press **Reset** button to reset these fields to their default values.	[Advanced Network Setup: Retries: 1, Retry Delay: 10 mS, Timeout: 1500 mS, Reset]

Setting Up a Serial Comm Port with a Modem

Modems must be "Installed" in MS Windows™.

Click on the Serial Comm Port Setup button that contains an image of a Modem

The "Serial Comm Port Properties" Dialog Box will Open

Click the 'Enable Port" box

There is NO Baud selection because the speed is determined by the controller's modem.

Click OK,
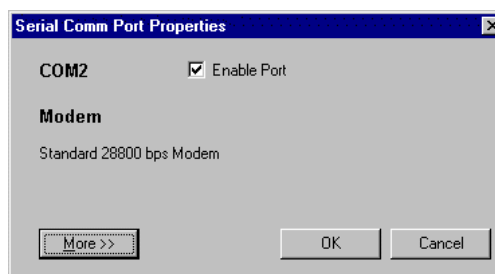
For **Advanced Network Setup**, click on the MORE>> button at the bottom of the "Serial Comm Port Properties" dialog box.
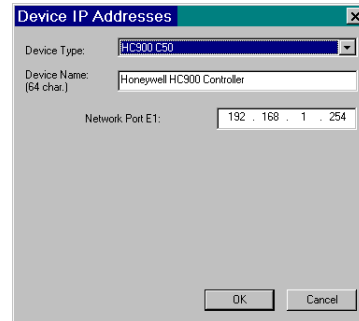*Number of Retries before Abort* - Enter a decimal value
Retry Delay - Enter a value in milliseconds
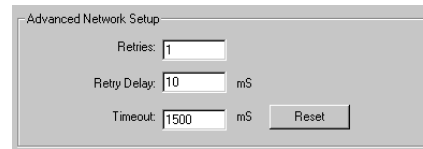*Timeout* - Enter a value in milliseconds
Note: It is not recommended that you set the values lower than those shown in the dialog box, since it may cause some communications operations to fail.
Press **Reset** button to reset these fields to their default values.
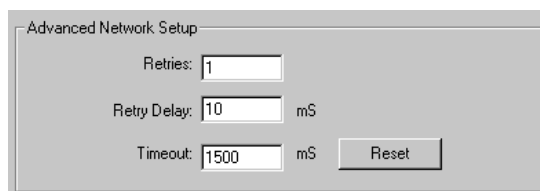
For **Telephony Settings**, click on the MORE>> button at the bottom of the "Serial Comm Port Properties" dialog box.
Click on a radio button to select one of the following two options:
No Timeout - No timeout is performed and the application will stay connected until you Hang Up
Connection Timeout - Enter in the active field (in minutes) how long the application will leave the line open before hanging up automatically.
The Modem will hang up if there is no communications activity for this amount of time.
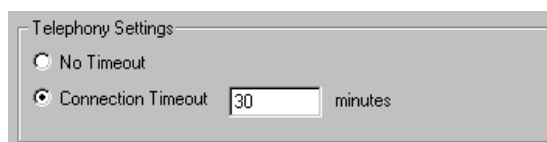
PC to Controller Connection Settings

After setting up your PC Network and PC Serial Comm Ports:

Select a Port from the drop-down menu

Current PC to Controller Connection Settings:

Port: Network
- Network
- COM1:
- COM2: MODEM
- COM5:
Address:
Protocol: Modbus(R) TCP
Speed (bps): N/A

Loop Back   Statistics
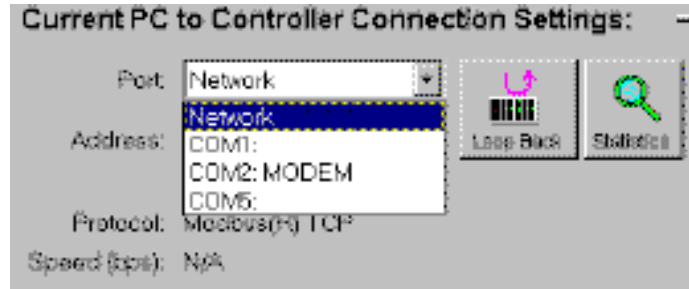
If you selected "Network" Select the Address of the controller from the drop-down menu.

Current PC to Controller Connection Settings:

Port: Network
Address:
- 122.222.222.222
- 164.145.185.57
Protocol: Modbus(R) TCP
Speed (bps): N/A

Loop Back   Statistics
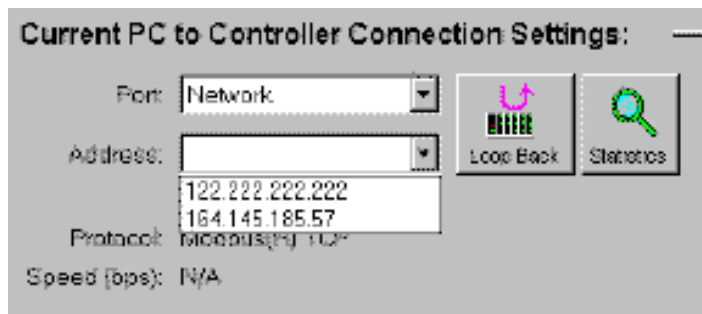
You can run a loopback test
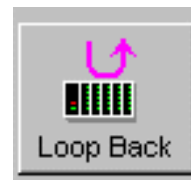
Loop Back

You can view and reset the communications statistics

Statistics
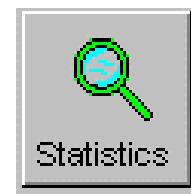
Remote Loopback Test

Remote Loopback tests the connection between the PC and the Controller.

Running the test

1. Click on the Loopback icon on the Utilities Worksheet Window.
   The "Remote Loopback Test" dialog box will appear.
2. Click "SEND". The Status line will read:
   Instrument Responded Correctly, or
   Instrument did not Respond - check the connections
3. Click "Close".

Remote Access

Overview

The Process Control Utilities software supports Remote Controller Access via dial-up modem. An external modem is required at the controller and is connected to the standard serial configuration port.

If a modem is already installed on the PC the Process Control Utilities will notify you that it exists.

Remote Access functions include on-line monitoring Live Monitor - Overview, Uploading and Downloading Configurations.

Procedure

Click on the Utilities tab.

Click on a Comm Port, under PC Port Setup, that indicates a Modem.

The Serial Comm Port Properties dialog box opens,
Click on the "Enable Port" box.

From the "Port" drop-down menu, select "COMx:MODEM".

 will appear next to the Statistics button.

Click the icon, and then the "**Provide the Modem Number to Call**" will appear.

To **Hang Up** a call, select **"Hangup Modem"** from the File Menu in the Main Menu. A message will ask you to confirm that you want to hang up.

Communications Statistics

The "Statistics" button on the "Current PC to Controller Connections Settings" will launch the "Communications Error Summary" dialog box. The summary statistics are shown below:
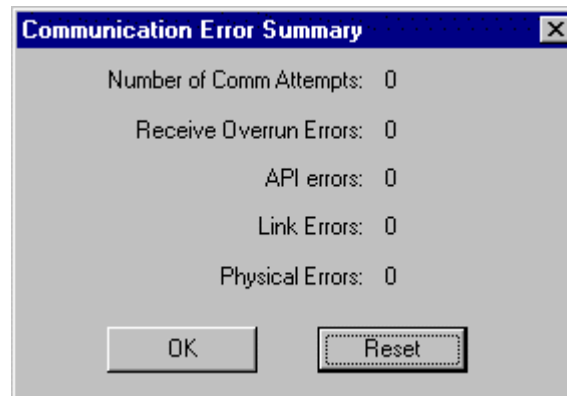
See the table below for corrective action for each communication error.

Click on "Reset" to change the statistics to "0".

Error	Reason
Number of Comm Attempts	Count of messages sent down to a Controller
Receive Overrun Errors	A count of Controller response messages that were longer than expected. Make sure you have the latest version of HC Utilities and that it is compatible with the Controller version. Contact Technical Support if the problem continues.
API Errors	The number of Application Errors are typically errors reported by the Controller. Common reasons for this error: Instrument responded to the wrong message. Check that there isn't more than one device with the same IP or Modbus address trying to communicate with the Controller. Controller communication port is in use by other device(s). Instrument responded with an error code. Take note of any error message dialog boxes that may popup while communicating with the Controller (e.g. While Monitoring). Attempt any corrective action based on the reported errors. Contact Technical Support if the problem continues.
Link Errors	Count of messages that could not be interpreted by HC Utilities. Typically, these occur when the response message contains garbled data. Check physical connections between the Controller and the PC. If you are using a modem or a serial cable, this error may be the result of "line noise".
Physical Errors	Count of hardware type errors. These typically occur when the Controller doesn't respond. Check cable and other hardware connections. If using a modem or a serial cable, verify the cable connections and baud rates of all pieces.

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6.Worksheets Overview

What is a Worksheet?

A Worksheet is a logical partition of a configuration file. Worksheets can be further categorized by function into 6 main categories. Each category is assigned a tab in the worksheet category tab control that makes up the main Worksheet Window of a configuration. There are restrictions on the number of individual worksheets that can exist in a given category and not all categories are available to all controller types and revisions of controller firmware. Below are the different worksheet categories:

Controller Worksheet	Displays the configuration of I/O modules
	1 per configuration
Operator Panel Worksheet	Display and configure Operator Interface displays
(Also referred to as Display Worksheets)	1 per configuration
	Not available in revision 6.0 and above
Function Block Diagram Worksheets	Display and configure control logic
(This category is sub-divided into)	
Process Worksheets	20 per configuration (for C30, C30S, C50, C50S)
	40 per configuration (for C70, C70S, C70R, C75, C75S)
Safety Worksheets	20 per configuration (for C30S, C50S)
	40 per configuration (for C70S, C75S)
	Only available for SIL-compliant controller types
	Only available in revision 6.0 and above
Modbus Map Worksheet	Only available in revision 4.0 and higher configurations using a Custom Modbus Address Map
	1 per configuration
Utilities Worksheet	Provides access to a variety of maintenance functions for the controller
	1 per configuration

Each Worksheet may have full or restricted access (Worksheet Protection).

Worksheet Category Tabs

A configuration is organized into categories shown as tabs at the bottom of the Main window:

> Controller
>
> Display
>
> Function Blocks (may also be shown as "Process" or "Safely")
>
> Modbus Map Worksheet – (1 per configuration. Visible only when using a Custom Modbus map)

An additional tab, Utilities, is provides access to a variety of useful functions that interact with the controller.

7.Controller Worksheet

Controller Worksheet Overview

There is one worksheet for the configuration. It displays the I/O in all configured racks.

Toolbar

The Controller Worksheet has a <u>Toolbar</u> to launch dialog boxes to configure:

Print Worksheet- Prints the I/O Summary as viewed on the worksheet.

Controller Identification:

- Controller Name - Enter a controller name. It will be displayed on the Operator Interface used for Peer Communications (16 characters).
  Important note: Controller name shall not have Chinese characters

- Controller Type - (Read Only)

- Controller Revision - (Read Only)

- Legacy Rack in System - Check the box when the system is having legacy rack (<= 4.4 version)

- Base Normal Scan Cycle Time - Choose 100ms / 500ms

- Controller Split Rack Redundancy - Check the box if the system is using split rack redundancy for controller.

<u>Controller E-Mail Notification</u>

<u>Unlock Worksheets</u>

I/O Summary

A summary of each addressed I/O point (as well as unassigned I/O points) in the configuration indicates:

- <u>Rack/Module/Channel</u>
- Block ID - a <u>hot link</u> when clicked finds the I/O block on the Function Block Diagram
- <u>Engineering Units and AI Input range</u>
- <u>Signal Tag</u> of primary output pin (if present) a <u>hot link</u> when clicked finds the signal tag on the Function Block Diagram
- Signal Descriptor of primary output pin (if present)
- Channel Properties: Click the required I/O function block ID on the list. The respective Input/Output properties dialog box appears in order to view the function block properties.

This assignment summary is built and updated dynamically on the worksheet body. It can be printed from the toolbar Icon.

Controller Configuration Toolbar

Click on ICON to open a dialog box.

ICON	Function	Dialog Box Comments
	Print Worksheet	Click to open the standard **_Print_** dialog box.
		Fill in appropriate fields
		Printed Output is the I/O Summary as viewed on the worksheet.
		To display each page, as it will look when printed, click Print Report Preview on the File menu.

	Controller Identification	Click to open the *Controller Identification* dialog box. Also indicates controller type and revision. (read only)
	E-Mail Notification	Click to open the *E-Mail Notification* dialog box. Two Tabs on Dialog Box: *General -* FROM name displayed for convenience (read only) and SUBJECT information - 31 character configurable text. *To List -* up to 3 configurable E-Mail addresses. For each Email address check an Alarm/Event priority *See* "E-Mail Notification"
	Unlock Worksheets	Click to open the "Unlock Worksheets" dialog box. Enter a password and click "Unlock" to unlock all worksheets.

E-Mail Notification

 opens the **E-Mail Notification** dialog box. It lets you view up to three E-Mail addresses per controller configuration for Alarm and Event notification.

There are two tabs on the dialog Box.

General Tab

FROM	The *Controller name* is configured by the builder of the Configuration file [Read Only]
SUBJECT	Event Subject (up to 31 characters) Alarm Subject (up to 31 characters)

To List Tab -

3 configurable E-Mail addresses (32 characters per address).
Each Email address has checked the Alarm/Event priorities you want the E-mail address to receive.

Events do not have multiple priorities like alarms because they are considered at a priority lower than all alarms.

Alarm priorities were set during "Alarm Group Configuration" under "Alarm Details"
    2 = Low Priority Alarm
    3 = Medium Priority Alarm
    4 = High Priority Alarms
    5 = Emergency Alarm

The priority of an event is always indicated as "1" - (see Event Configuration)

Attention: See "Set Controller Network Parameters" and follow the wizard to set up a SMTP mail server IP Address.

Examples:

Somebody@somewhere.com receives *only priority 5 Alarms*
    (only the check box for "5" is checked

Aperson@somewhere.com receives *all Alarms and Events*
    (all 5 boxes are checked)

People@somewhere.com receives *only Events*
    (only check box for "1" is checked)

Unlock the Worksheets

opens the "Unlock Worksheets" dialog box.
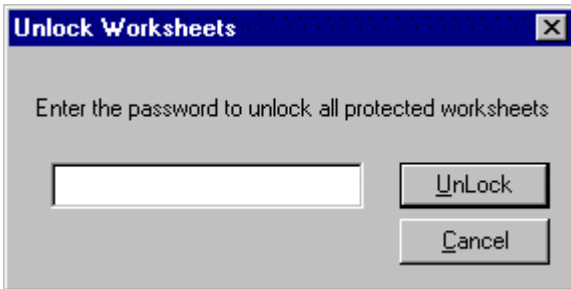
Enter the password in the field and then, press "UNLOCK".

How to add/change worksheet protection.

8. Data Storage

Note: This section applies to models 551, 552 and 1042 operator interfaces with floppy disk storage. It does not apply to the 900 Control Station. Please reference the Station Designer User Guide, 51-52-25-149 for support of the 900 Control Station.

Data Storage Overview

The Data Storage feature provides background storage of process information on a storage device for analysis by an off-line computer equipped with Honeywell data analysis software.

Data stored files cannot be reviewed from the operator interface. The instrument can support both continuous and discontinuous (batching) modes of the following storage types:

Trends - Two Trend groups of up to 12 points each can be stored. Floppy disk capacity for trends is inversely proportional to the number of trend points and the storage time interval (that is, the time between trend samples). For example, when storing 2 trend groups of 12 points each at a storage interval of 2 seconds, the storage device will be filled in a few hours. Conversely, when storing 1 trend group of 3 points at a storage interval of 30 minutes, the storage device could take several months to be filled.

Point Log (unit data samples) - A point log file to take a "snapshot" of process data for up to 12 points is also provided. Point log samples can be scheduled to occur at a user-specified time synchronized to the controller's Real Time Clock (RTC) or by a digital event in the controller. The maximum sample rate for point log data is 60 seconds per sample. The Point log file has a maximum capacity of between 2000 and 5000 records per file.

Alarms - Alarm recording is available to store on and off alarm actions. Alarm data includes the point tag, a 32-character point description, and the time and date of alarm occurrence. The Alarm file has a capacity of between 150 and 1500 records per file.

Events - Digital event recording is also available to store on and off transitions of digital events in the controller. Event data includes the point tag, a 32-character point description, and the time and date of event occurrence. An Event file has a capacity of between 150 and 1500 records per file.

Setpoint Programs/Schedules, instrument configurations, recipes, variables, diagnostics, and calibrations are not part of the Data Storage feature.

Associated Information

Data Storage Conventions
Data Storage Enable Conditions
Data Storage Configuration

Data Storage Conventions

Storage Modes

Trends, Point Log, and Alarms/Events can be stored in *Continuous* or *Batch* modes. In addition, Point Log can be stored in *On Command* mode.

Mode	Description
Off	No data will be collected
Continuous	Data is sampled at the storage interval
Batch	Data is sampled at the storage interval, but also a Batch Enable Signal separates the sampled data into numbered batches. Batch #1 begins when the Batch Enable Signal turns on, and ends when the signal turns off. Batch #2 begins when the Batch Enable Signal turns on, and ends when the signal turns off, etc. No batch mode data is collected while the Batch Enable Signal is off. The Batch Enable Signal does not affect data being stored as Continuous or On Command.
On Command	Point Log data is sampled on each off-to-on transition of the Point Log Enable Signal.

Storage intervals

When data storage is enabled, samples are taken at regular intervals known as the storage intervals. These intervals can be from a few seconds to 30 minutes. Each data type has its own storage interval. For example:

> **Trends** can be stored using one interval (like 5 seconds),
> **Point Log** using another interval (like 10 per day), and **Alarms/Events** (stored as they occur). Or, they can **all use the same interval**. It depends on how data storage has been configured.

In *Continuous and Batch modes*, the storage interval determines how often data is sampled and stored:

> For **trends**, data is first sampled when storage is enabled and again at equally spaced intervals thereafter. For example, if trend storage is enabled at 2:03 p.m. and the interval is 10 minutes, trend storage occurs at 2:03, 2:13, 2:23, etc. until storage is disabled.

For **Point Log**, data is first sampled after storage is enabled but not until the programmed Start Time. Data is sampled at equally spaced intervals after the Start Time. For example, suppose the Start Time is 3:00 p.m. and the storage interval is 10 minutes. If storage is enabled at 2:03 p.m., the first sample will occur at 3:00 and every 10 minutes thereafter. If storage is disabled at 3:35 and enabled at 3:42, storage will resume at 3:50. Notice that the interval is synchronized to the Start Time.

Alarm/Events are logged on occurrence with time and date (No interval)

In *On Command mode for Point Log*, there is no storage interval or Start Time. A single sample of Point Log data is taken when the Point Log Enable changes from off (disable) to on (enable).

How Storage is Enabled

Data collection may be started through key actions from the operator interface keyboard or from digital status signals from the controller. An "S" in the status line of the operator interface display indicates active storage*. [For detailed information refer to Data Storage Enable Conditions]*

Disk Capacity

The disk capacity (in time) is calculated and displayed once all storage initialization is complete. This eliminates the need for manual calculations and gives the operator the exact duration of the disk. All file types in the data storage feature may be configured to stop collecting data when the file is full or to continue in a circular storage mode (roll-over) where the oldest data is discarded as new data is collected. When roll-over is **not** selected, a disk full warning indication is provided in the status line of the display. The configurator, as required, may change the percent full limit. A storage buffer in the operator interface allows changing the disk media without the loss of process data.

Calculation for Data Storage Capacity

$$\text{Trend Capacity (In Hours)} = \frac{\text{Disk factor} * (R1)}{F1 + (F2 * (R1/R2)}$$

Where:
R1 and R2 are the storage rates (in seconds) for Trend 1 and Trend 2, respectively.
F1 and F2 are the point factors associated with the number of points per trend file.
Disk Factors:

398	Trends files only active
394	Trends files + Alarms and Events
347	Trend files, + alarms and Events + Point Log Files

Number of points in trend

1	2	3	4	5	6	7	8	9	10	11	12
14.00	20.16	26.53	33.60	38.77	45.82	50.40	56.00	63.00	72.00	84.00	84.00

Point Factor (F1 and F2)

File Extensions

The following File Extensions are used for the ControlEdge HC900 Controller's Data Storage output files:

LNT for **Trend** Files
LNP for **Point Log** Files
LNA for **Alarm** Files
LNE for **Event** Files

Data Storage Enable Conditions

How storage is enabled

Data Storage Enable/disable is an Operator Interface function. If a schedule is developed in the software, all storage is automatically enabled.

Enable controls

The figure below shows the controls that must be enabled for each storage mode and data type. The left side shows the three data types and their possible storage modes (only one storage mode is in effect for any data type). The arrows show the conditions required for that storage to take place.

For example, trend batch storage requires:

- The Trend Storage Control to be on (enabled at configuration – if any signal is selected for storage i.e. Signal Enable = NONE),
- The Batch Command Control to be on (enabled at configuration), and
- The Data Storage Control to be enabled (enabled at Operator Interface).
  Notice that the Batch Command Control applies only to batch storage mode.
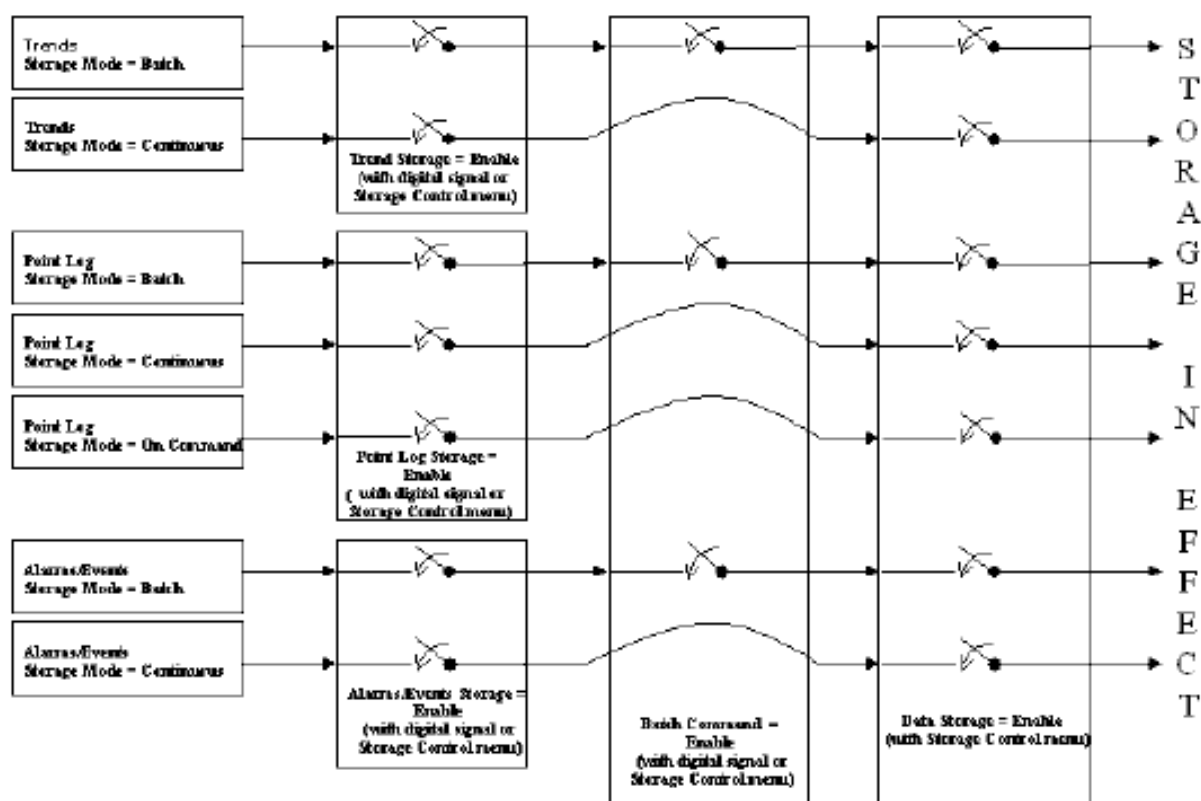
Three Levels of Enabling

There are three levels of Data Storage Enable:
   Data Storage Disable Signal (Operator Interface) – See Note 1.
   Data Type Enable Signals
   Batch Command Enable Signal

Note 1. *Since any storage schedules loaded into the system automatically enables storage, the operator interface can disable storage.*

Data Type Enable Signals

This level of control is the Data Type Enable Signal. Each data type (trends, point log, and alarms/events) has its own Enable Signal that can either be configured as a digital signal on the Process Control Designer, or if not configured as a digital signal (NONE selected on Process Control Designer Data Storage Configuration), it will appear on the Storage Control menu on the operator interface

For example, if the Trend Enable Signal is *configured as a digital signal in the* Process Control Designer Data Storage Configuration, it will **not** appear on the Storage Control menu on the operator interface. This is done to avoid having two conflicting sources for the enable signal.

When a *digital signal is not used*, the Trend enable signal is set to enable when the configuration is loaded. The Trends can then be disabled from the Operator Interface.

The Enable Signal has two functions for Point Log storage.

In Continuous and Batch modes, it enables Point Log storage to begin at the Start Time and at every storage interval thereafter.

In On Command mode, when it changes from off (disable) to on (enable), it causes a single sample of Point Log data to be stored at that moment. (*See Point Log Storage Enable Conditions*)

Batch Command Enable Signal

This level of control is the Batch Command. It is a single control signal that starts and stops storage for all data types configured for batch storage.

 It does not affect Continuous or On Command storage.

If the Batch Signal is *configured as a digital signal* in the Process Control Designer Data Storage Configuration, it will **not** appear on the Storage Control menu on the Operator Interface. This is done to avoid having two conflicting sources for the signal.

When a *digital signal is not used* and Batch storage has been selected, the Batch command signal is set to Stop. Batches can be started from the Operator Interface.

Storage Enable Conditions

Trend Storage Enable Conditions

The figure below shows examples of Trend Storage Enable Conditions.

Notice that **Continuous Trend** storage occurs unless *Trend Disable* or *Data Storage Disable* is selected.

For **Batch Trend** storage, notice that Trend enable/disable, Data Storage enable/disable must be set to enable and Batch command must be Start.
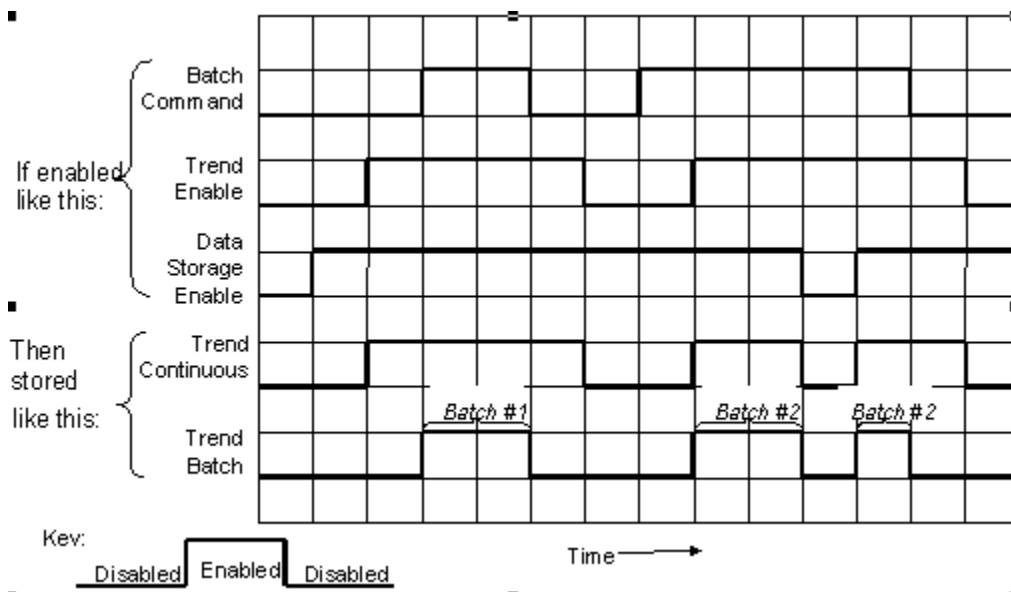
Point Log Storage Enable Conditions

The figure below shows examples of Point Log Storage Enable conditions.

Notice that it occurs unless *Point Log Disable* or *Data Storage Disable* is selected.

For **Batch Point Log** storage, notice that *all three enables must be on.*
The figure shows that storage does not actually occur until the Start Time occurs, and then at every Storage Interval thereafter.

For **On Command Point Log** storage, notice the samples are taken the instant Point Log Enable is enabled but not at intervals.
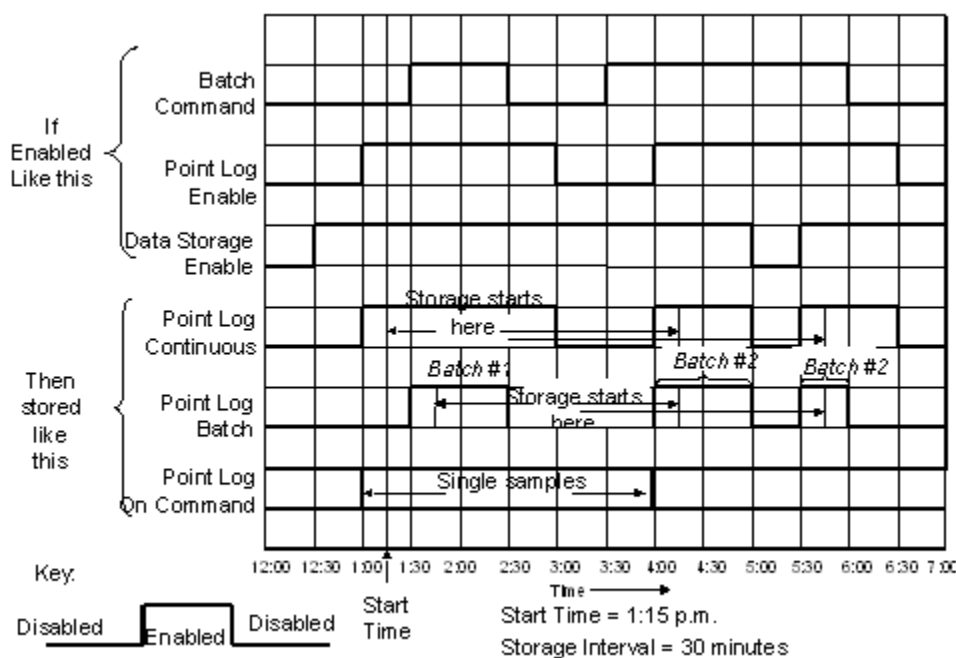
Alarm/Event Storage Enable Conditions

The figure below shows examples of Alarm/Event Enable conditions.

Notice that **Continuous Alarm/Event** storage occurs unless ***Alarm/Event Disable*** and ***Data Storage Disable*** is selected.

For **Batch Alarm/Event** storage, *all three enables must be on.*
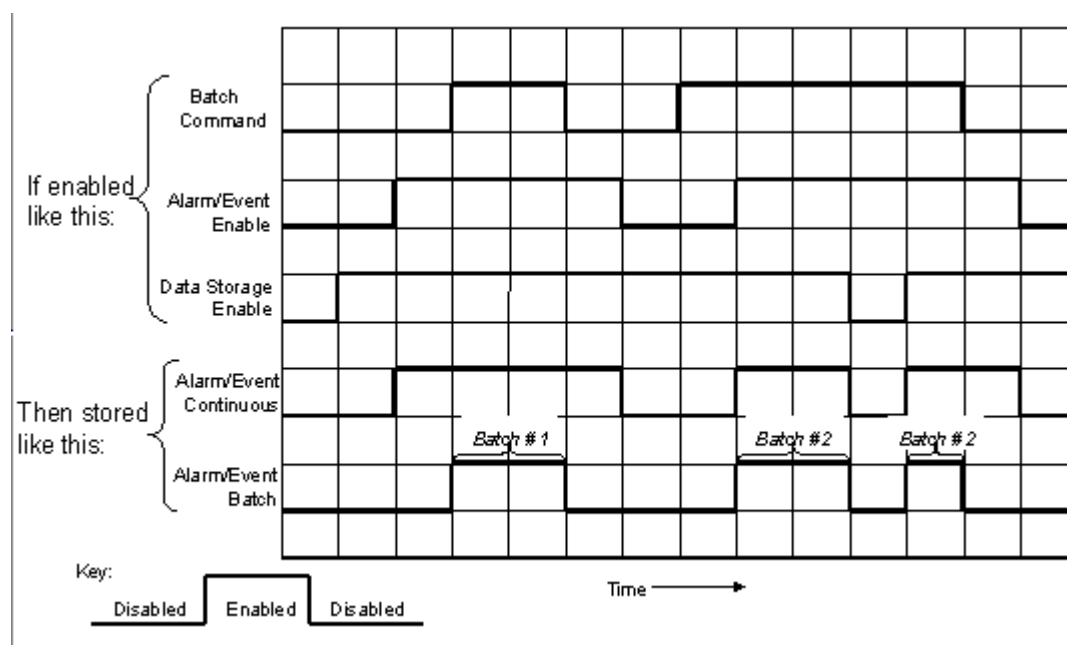
1: Although Alarm Storage is active during the specified time periods, Alarm records will only be saved on active transitions of the alarm status. If no alarm occurs during the active period, the data for that period will be blank.

Data Storage Configuration Access

 on the Operator Panel Worksheet Toolbar opens the **Data Storage Configuration** dialog box.

This facility allows you to view configured groups of data that will be stored to the Operator interface's data storage device. This process history can be a valuable source of information to analyze process operations quality and upsets.

The groups are configured in Process Control Utilities and downloaded as part of the configuration.

You can also create a new data storage file (.dss) separate from the configuration. On the File menu, select New, Data Storage.

Select a tab at the top of the dialog box to access a specific Data Storage Configuration dialog box.

Create/Edit Data Storage File

Creates/edits a data storage file (.DSS). File can be downloaded to the controller.

Step/Item	Action/Description
Select File, Open.	Lets you choose a .DSS file to edit. After selecting file the Data Storage Editor appears.
OR	
Select File, New.	"Choose a new file type" box appears.
Select Data Storage tab.	Data Storage button appears.
Select Data Storage.	The Data Storage Editor appears.
THEN	
Select a Reference Configuration.	A data storage file must have a configuration to give it context. Select an open configuration from the pull-down list. If none available, select Open Configuration to open one. The configuration will open. Click back to Data Storage Editor and select the reference configuration.
Trend	Trend setup.
Point Log	Point Log setup.
Alarm/Event	Alarms/Events setup.
Pre-initialize Disk	Prepares zip disk for data storage. Select this to avoid the long initialization time on the operator interface.
Print	Prints the data storage settings.
Save	Saves the data storage file as .DSS file.
Download	Downloads data storage file to the controller.

Trend Storage Configuration

Trend storage will provide the following:

Number of Files:	2 maximum
Points per Trend:	12 maximum, Analog or Digital
Storage Modes:	Off, Batch, Continuous
Storage Interval:	2, 5, 10, 20,30,40, 50 seconds 1, 2, 5, 10, 20, 30 minutes
External Control:	Digital Tagged Signal – Start/Stop of both Trends

Configuration Procedure

Select the "**TREND**" tab on the "Data Storage Editor" dialog box.

Active Field	Description
Batch Enable Signal	This signal starts and stops storage for Trends configured for "Batch" storage. It does not affect "Continuous" storage selection. From the pull-down menu, select: *NONE* – Batch is started/stopped only through the operator interface's Data Storage Control Menu (defaults to Stop on configuration download) *ANY DIGITAL TAG* – Batch is started/stopped only through the on/off state of the selected Digital Signal. It **will not** appear on the operator interface's data Storage Control Menu *For detailed information concerning Data Storage Enable, refer to "Data Storage Enable Conditions"*
Group	Use the pull-down menu and select a Trend Group for configuration.
Title	Enter a Group Title. There is a maximum of 24 characters *(Note: This is not displayed on the Operator Interface. It only serves as a reminder for the user.)*
File name	Enter a File Name. There is a maximum of 8 Alpha Numeric characters. (DOS File Name restrictions)
Tag List	From the Tag List drop-down menu, select the type of signals you want the tag list to display. Click on a Tag Name and click **ADD>>**. The tag name will be added to the "Selected Tags" list.
Selected Tag List	**Scaling Signals** Scale each tag selected for High and Low values for the Trend Display. Click on the "Scale High" and "Scale Low" fields and enter the value. To delete a signal tag, click on a tag and click **Delete**.
Storage Intervals	**Storage Interval** From the Storage Interval drop-down menu, select a storage interval of from 2 seconds to 30 minutes. When Data Storage is enabled, samples will be taken at the interval selected here. *Refer to Storage Intervals in Storage Conventions*

Data Type Enable Signals	This enable signal turns storage on and off for trends.
	From the pull-down menu, select:
	NONE – Trend Storage Enable is started/stopped only through the operator interface's Data Storage Control Menu (defaults to Enable on configuration download), or,
	ANY DIGITAL TAG – Trend Storage is started/stopped only through the on/off state of the selected Digital Signal. It **will not** appear on the operator interface's data Storage Control Menu
	For detailed information concerning Trend Storage Enable, refer to "Trend Storage Enable Conditions".
Storage Mode	From the pull-down menu, select a Storage Mode.
	Refer to "Data Storage Conventions" for mode definitions.
Rollover	**Click** this box to allow data storage to continue collecting data in a circular storage mode where the oldest data is discarded as new data is collected.
	Clear this box to allow data storage to stop collecting data when the file is full. You can configure a Warning Level for Disk Full %.
Warning Level	If you **do not select rollover**, enter a percent in the appropriate box.

Point Log Storage Configuration

Point Log storage will provide the following:

Number of Files:	One
Points per File:	12 maximum, Analog or Digital
Storage Modes:	Off, Batch, Continuous, On Command
Storage Interval: (all relative to start time)	1 to 59 minutes, one minute increments 1 to 23 hours, one hour increments 1 to 30 days, one day increments Once month, same day of each month
External Control:	Digital Tagged signal - start/stop storage to file - On Demand sampling

Configuration Procedure

Select the "**POINT LOG**" tab on the "Data Storage Editor" dialog box.

Active Field	Description
Batch Enable Signal	This signal starts and stops storage for Point Logs configured for "Batch" storage. It does not affect "Continuous" or "On Command" storage selections.
	From the pull-down menu, select:
	NONE – Batch is started/stopped only through the operator interface's Data Storage Control Menu (defaults to Stop on configuration download)
	ANY DIGITAL TAG – Batch is started/stopped only through the on/off state of the selected Digital Signal. It **will not** appear on the operator interface's data Storage Control Menu
	For detailed information concerning Data Storage Enable, refer to "Data Storage Enable

Active Field	Description
	Conditions"
File name	Enter a File Name. There is a maximum of 8 Alpha Numeric characters. (DOS File Name restrictions)
File Record Limit	Enter a File Record Limit number of between 2000 and 5000.
Tag List	From the Tag List drop-down menu, select the type of signals you want the tag list to display. Click on a Tag Name and click **ADD>>**. The tag name will be added to the "Selected Tags" list.
Selected Tag List	**Scaling Signals** Scale each tag selected for High and Low values for the Point Log Display. Click on the "Scale High" and "Scale Low" fields and enter the value. To delete a signal tag, click on a tag and click **Delete**.
Data Type Enable Signals	This enable signal turns storage on and off for Point Logs. From the pull-down menu, select: *NONE* – Point Log Storage Enable is started/stopped only through the operator interface's Data Storage Control Menu (defaults to Enable on configuration download), or, *ANY DIGITAL TAG* – Point Log Storage is started/stopped only through the on/off state of the selected Digital Signal. It **will not** appear on the operator interface's data Storage Control Menu *For detailed information concerning Trend Storage Enable, refer to "Point Log Storage Enable Conditions".*
Storage Mode	From the pull-down menu, select a Storage Mode. Refer to "Data Storage Conventions" for mode definitions.
Storage Interval	NOTE: *For On Command storage mode, there is no storage interval or start time.* (They are not used.) Click on "Change". The "Storage Interval" dialog box will appear. Click on the radio button for Minutes, Hours, or Days and select a storage interval from the Edit box. Or, click on the radio button for "Once a Month". Click OK *Refer to Storage Intervals in Storage Conventions*
Start Time	NOTE: For On Command storage mode, there is no storage interval or start time. (They are not used.) Click on "Change". The "Change Time" dialog box will appear. In the Edit box in each field, select a start time. Click OK. *Refer to Storage Intervals in Storage Conventions*
Rollover	**Click** this box to allow data storage to continue collecting data in a circular storage mode where the oldest data is discarded as new data is collected. **Clear** this box to allow data storage to stop collecting data when the file is full. You can configure a Warning Level for Disk Full %.
Warning Level	If you **do not select rollover**, enter a percent in the appropriate box.

Alarm/Event Storage Configuration

Alarm/Event storage will provide the following:

Number of Files:	One each
Records per File:	150 to 1500 records per file
Data Types:	All Alarms – Time/Date, On/Off All Events – Time/Date, On/Off
Storage Modes:	Off, Batch, Continuous
External Control:	Digital Tagged Signal – Start/Stop storage to file

Configuration Procedure

Select the "**Alarm/Event**" tab on the "Data Storage Editor" dialog box.

Active Field	Description
Batch Enable Signal	This signal starts and stops storage for Alarm/Events configured for "Batch" storage. It does not affect "Continuous" storage selections. From the pull-down menu, select: *NONE* – Batch is started/stopped only through the operator interface's Data Storage Control Menu (defaults to Stop on configuration download) *ANY DIGITAL TAG* – Batch is started/stopped only through the on/off state of the selected Digital Signal. It **will not** appear on the operator interface's data Storage Control Menu *For detailed information concerning Data Storage Enable, refer to "Data Storage Enable Conditions"*
Alarm File Name	Enter a File Name. There is a maximum of 8 Alpha Numeric characters. (DOS File Name restrictions)
Alarm File Record Limit	Enter an Alarm File Record Limit number of from 150 to 1500.
Event File Name	Enter a File Name. There is a maximum of 8 characters
Event File Record Limit	Enter an Event File Record Limit number of from 150 to 1500.
Data Type Enable Signal	This enable signal turns storage on and off for Alarm Events. From the pull-down menu, select: *NONE* – Alarm/Event Storage Enable is started/stopped only through the operator interface's Data Storage Control Menu (defaults to Enable on configuration download), or, *ANY DIGITAL TAG* – Alarm/Event Storage is started/stopped only through the on/off state of the selected Digital Signal. It **will not** appear on the operator interface's data Storage Control Menu. *For detailed information concerning Trend Storage Enable, to "Alarm/Event Storage Enable Conditions"*
Storage Mode	From the pull-down menu, select a Storage Mode. Refer to "Data Storage Conventions" for mode definitions.
Rollover	**Click** this box to allow data storage to continue collecting data in a circular storage mode where the oldest data is discarded as new data is collected. **Clear** this box to allow data storage to stop collecting data when the file is full. You can configure a Warning Level for Disk Full %.
Warning Level	If you **do not select rollover**, enter a percent in the appropriate box.

9.Function Block Information

Accessing Context Sensitive Help

While in a Controller configuration, right click on a function block to access the block's Topic Help, Monitor functions, Cut, Copy, Paste functions and Properties Dialog Boxes.

Right Mouse Click

See Right Mouse Click on page 25.

10.   Utilities Worksheet

Utilities Worksheet Overview

This **Utility Worksheet** has three areas the let you perform a variety of tasks for maintaining the ControlEdge HC900 Controller and setting up your PC's Communications Ports.

Controller Utility Functions

The upper part of the Utilities Worksheet contains the Controller Utility Functions. It has list of Icons that will launch dialog boxes for the following utilities:

- Diagnostics
- Uploads
- Downloads (Configuration, Controller Firmware, Scanner Firmware)
- Set Controller Serial Port
- Calibrate Modules
- Set Controller Mode
- Set Controller's Network Parameters
- Set Controller Time
- Data Storage Utility
- Back Up Controller Information or Restore Controller Information
- Manually Write Database to Flash

Current PC to Controller Connection Settings

Displays Comm Port and Address information. Lets you select a Port and Controller Network Address from the drop-down menus.

Allows you do a Loopback to check the communications connections.

Allows you view and reset the communications statistics.

Allows you to Dial/hang up the modem.
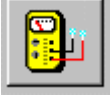
PC Port Setup

Lets you set up a Network Port and up to 8 Comm Ports or Modems.

Controller Utility Functions

The upper part of the Utilities Worksheet contains the Controller Utilities Functions. It has list of Icons that will launch dialog boxes for the following utilities:

ICON	FUNCTION	REFERENCE
	Controller Diagnostics*	Select from drop down menu: (options are only available in Monitor Mode) **Controller Diagnostics** **Rack Diagnostics** **Controller Ports Diagnostics** **Modbus Port Diagnostics** Modbus Host (Serial) Port Diagnostics Modbus/TCP Initiator Port Diagnostics **Forced Blocks** **Redundancy …** Redundancy System

ICON	FUNCTION	REFERENCE
		Redundancy Link Lead CPU Reserve CPU Scanner 2 Link
	Upload from Controller*	Configuration Upload transfers a configuration **FROM** the controller **TO** the PC. See page 32.
	Download to Controller*	Downloads a saved configuration, controller firmware, or scanner firmware from **FROM** the PC **TO** the controller. See page 33.
	Set Controller Port**	Menu selection lets you: Set Protocol for controller's configuration ports
	Calibrate Controller **	Click to open the *Calibrate* dialog box. Four Tabs on the Dialog Box: *AI Channel -* see "Calibrate AI Channel". *CJ Temp -* see "Calibrate CJ Temp". *AO Channel -* see "Calibrate AO Channel". **PPO Block** – see "PPO Block Calibration "
	Set Controller Mode**	Click to open the Set Controller Mode dialog box. Read the current mode, select a new mode, then write the new mode to the controller.
	Set Controller Network Parameters*	A Wizard interface guides you through connecting to a controller in order to view and edit the controller's network parameters In order to change the controller's network parameters, the controller must be in PROGRAM mode.
	Set Controller Time**	Click to open the Set Controller Time dialog box.
	Data Storage Utility	Click to open the Data Storage Utility dialog box. Note: Available only for software revision 4.4 and earlier. Select a Removable Disk Drive Group Number and Trend group number. Press "Initialize" to prepare the disk for storage.
	Back Up Controller Information	Backs up controller's configuration and port settings. See Back Up Controller Information.
	Restore Controller Information	This button visible for open backup files only. See Restore Controller Information.

ICON	FUNCTION	REFERENCE
	Manually Write Database to Flash	See Manually Write Database to Flash.

* These functions prompt you to select a PC port to which to connect.

** These functions communicate to a controller by using the PC Port displayed in " Current PC to Controller Connection Settings".

Set Controller Serial Ports

Use this feature to set the RS485 ports protocol.

 has two tabs—Serial S1 and Serial S2 —each with the following settings.

Honeywell ELN: Default protocol

Modbus RTU Host: Select to set controller up as a host.

Modbus RTU Host - Advanced: Provides enhanced data throughput for applications where the ControlEdge HC900 is being used in conjunction with a "Modbus-to-fieldbus" gateway device. See page 74 for details.

Modbus RTU Device: Select to set controller up as a modbus device.

Device Type:

Multidrop--select when using more than one device on the selected PC port.

Point to point--select for one device

Modem--select when using a modem between the host and device.

Device Address: Enter 1-247, or 255.

Modbus Device Double Register Format: Each IEEE 32-bit floating point number requires two consecutive registers (four bytes, MSB=4, LSB=1 in byte order below) starting with the register defined as the starting register for the information. The stuffing order of the bytes into the two registers differs among Modbus hosts. To provide compatibility, the Double register format is configurable. Selections are:

FPB Floating Point Big Endian Format Byte order - 4, 3, 2, 1 (Default)

FP LB Floating Point Little Endian with byte-swapped Byte order - 2, 1, 4, 3

FP BB Floating Point Big Endian with byte-swapped Byte order - 3, 4, 1, 2

FP L Floating Point Little Endian Format Byte order - 1, 2, 3, 4

Port Enable: Enables or disables port.

Speed (bps): Select Baud rate. All modbus devices on the same PC port must be the same.

Modbus parity: Odd or even. All modbus devices must be the same.

Modbus stop bits: 1 or 2. All modbus devices must be the same.

Set – Activates settings. If you changed the controller's Baud Rate via a PC Comm Port, your PC will no longer communicate with the controller. In this case, you are prompted to detect the controller's Baud Rate. This feature will synchronize the PC's Comm Port with the controller and set the PC Baud Rate to the correct Baud Rate.

Modbus RTU Host - Advanced Setup
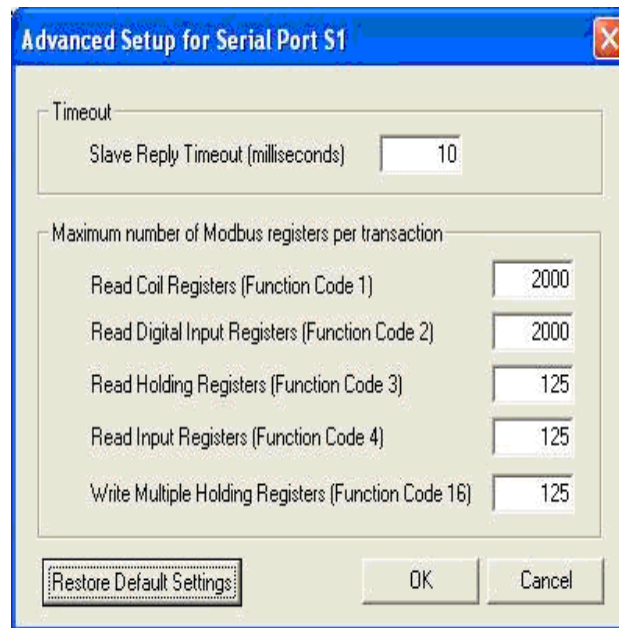
Overview

The Modbus RTU Host Advanced protocol provides enhanced data throughput for applications where the ControlEdge HC900 is being used in conjunction with a "Modbus-to-fieldbus" gateway device. In these applications the gateway acts as a Modbus device to the ControlEdge HC900 controller. The Modbus data is connected into the ControlEdge HC900 control strategy using the Modbus Read, Modbus Write, and Modbus Device function blocks.

In order to achieve the enhanced data throughput, the ControlEdge HC900 communicates with the gateway using large packets of contiguous Modbus register addresses. This packetization technique allows the ControlEdge HC900 to exchange data with the gateway at rates up to the analog cycle rate of the controller (depending on the operating characteristics of the gateway device). The packet sizes can be adjusted to match the specifications of the gateway device.

Differences from standard Modbus RTU

There are several important ways in which the Advanced protocol differs from the standard Modbus RTU Host protocol:

1. Under the Advanced protocol the Modbus register data is written to the modbus devices during every Modbus Host scan cycle. This behavior is different than the standard Modbus RTU Host protocol, where the data is written only when the device block's Enable pin is ON.

2. The Enable pins on the Modbus function blocks do not control when the register data is written to the modbus device. Instead, they control the value that is written to the block. For example, if a Modbus function block has the value 10 on its Write pin and the Enable pin is ON, then a value of 10 is written to the modbus device. If the Enable pin is changed to OFF, the ControlEdge HC900 controller will continue to write a value of 10 to the modbus device once every Modbus Host scan cycle. If the value on the Write pin is changed to 100 while the Enable pin is OFF, the controller will continue to write a value of 10 to the modbus device. The next time the Enable pin is changed to ON, the controller will write the value 100 to the modbus device.

3. Modbus Register write operations are performed using Modbus Function Code 16 (Preset Multiple Write). The number of registers written in a single transaction is based on the Advanced Setup settings for the serial port.

4. If there are "gaps" in the Modbus register addresses referenced within the ControlEdge HC900 configuration, the controller will write a value of zero to the "undefined" registers. For example, if

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Modbus Registers 1 and 10 are assigned to Modbus function blocks but Registers 2 through 9 are not, the controller will write zeroes to Registers 2 through 9.

The Advanced protocol can be used in any Modbus Host application that can accommodate these differences.

Factors affecting scan time

Using the Advanced protocol, the ControlEdge HC900 controller can potentially scan all of the Modbus registers on the serial link at a rate that is equal to the analog cycle time. The actual scan time for any given application is affected by the following factors.

1. Characteristics of the Modbus devices (e.g., the maximum baud rate, the message turn around time, support for Modbus packets, the maximum allowable packet size, etc.).

2. Configuration of the Modbus device blocks.

3. Programmed baud rate of the serial port.

The Modbus Host scan time is adjusted automatically by the ControlEdge HC900 at run-time; no user intervention required. The actual scan time of the link is displayed on the Modbus Communication Diagnostics display in Monitor Mode.

Configurable parameters

The parameters on this dialog can be used to match the behavior of the Advanced protocol to the characteristics of the modbus devices on the link. Please consult the documentation for your modbus devices to determine the best settings for your application. In general, the best overall performance of the Modbus Host Advanced link can typically be achieved by using the largest possible packet sizes.

Modbus Device Reply Timeout (milliseconds)

This parameter defines the Modbus message turnaround time for the link. It has a range of 10ms to 255ms. This parameter should be set to handle the modbus device that has the worst case turnaround time on the link. If there are modbus devices with turnaround times that are longer than 255ms, then the standard Modbus RTU Host protocol must be used.

Maximum Number of Modbus registers per transaction

Read Coil Registers (Function Code 1)

This parameter determines the maximum number of coil registers that can be read from the modbus devices in a single transaction.

Read Digital Input Registers (Function Code 2)

This parameter determines the maximum number of digital input registers that can be read from the modbus devices in a single transaction.

Read Holding Registers (Function Code 3)

This parameter determines the maximum number of holding registers that can be read from the modbus devices in a single transaction.

Read Input Registers (Function Code 4)

This parameter determines the maximum number of input registers that can be read from the modbus devices in a single transaction.

Write Multiple Holding Registers (Function Code 16)

This parameter determines the number of registers that will be written to the modbus devices in a single transaction. Note: if there are gaps in the Modbus register addresses referenced within the ControlEdge HC900 configuration, the controller will write a value of zero to the undefined address.

For example, if Modbus Registers 1 and 10 are assigned to Modbus function blocks but Registers 2 and 9 are not, the controller will write zeroes to Registers 2 and 9.

Restore Default Settings

This button allows you to restore the original default settings for the Advanced Setup parameters.

Note: you must click the Set button on the Set Protocol dialog to activate any changes that are made on this dialog.

Set Controller Mode

Set Controller Mode lets you set the controller mode. It can only be set when the controller's mode switch is in the center "Run Mode" position.

ATTENTION: If the controller's mode switch is in one of the "Locked" positions, the mode cannot be changed from this position. It can be changed only by changing the position of the switch.

opens the **Set Controller Mode** dialog box. Follow the steps on the dialog box

Select a new mode - RUN, PROGRAM, or OFFLINE
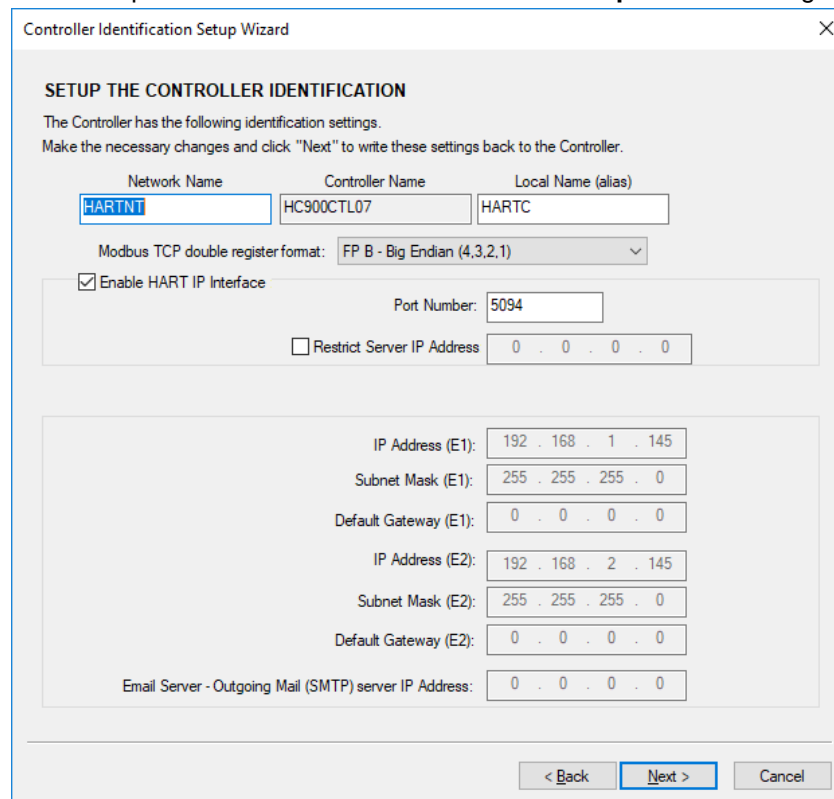
Write the new mode to the controller. Press "Set New Mode" button
    Program to Run takes some time. An Indicator on the dialog box shows the progress.

Set Controller Network Parameters

opens the "**Controller Identification Setup Wizard**" dialog box.

You can select a serial port or the Ethernet port over which the network parameters will be read/written.

The controller must be in PROGRAM mode to set the Network Parameters.

There are set up options on the wizard. The option you choose depends on how you are connected to a controller and what current knowledge you have of that controller.

Important: *before configuring your controller to work on a corporate LAN, consult with your Network Administrator regarding any corporate networking policies.*

Follow the Wizard instruction to set:

Network Name

User assigned name - can be different from controller name (16-character ASCII name. It is not part of configuration.)

It is required to uniquely define a Peer group if multiple processes, each with its set of peer controllers, are on the same physical cable. The controller binds the "Network name: Controller name" to the IP address of each of its peers at run-time.

Local Name (alias)

User assigned 16-character ASCII name [can be different from controller name]
It is not part of the configuration.

See Controller Identification for more info on names.

Modbus TCP Double Register format

Each IEEE 32-bit floating point number requires two consecutive registers (four bytes, MSB=4, LSB=1 in byte order below) starting with the register defined as the starting register for the information. The stuffing order of the bytes into the two registers differs among Modbus hosts. To provide compatibility, the Double register format is configurable. Selections are:

FP B Floating Point Big Endian Format Byte order - 4, 3, 2, 1 (Default)

FP LB Floating Point Little Endian with byte-swapped Byte order - 2, 1, 4, 3

FP BB Floating Point Big Endian with byte-swapped Byte order - 3, 4, 1, 2

FP L Floating Point Little Endian Format Byte order - 1, 2, 3, 4

Enable HART IP Interface

Enables the HART-IP protocol on HC900 controller for asset

manager to connect. If it is unchecked, asset manager can't discover hc900 in the

network.

Port Number

The default port number is 5094. The user may change the port number

based on his requirement.

Restrict Server IP Address

To allow HART-IP connection from specified IP address/machine.

IP Address

Controller Internet Protocol Address - Guaranteed unique address, assigned by the Internet Corporation of America for Assigned Names and Numbers (ICANN) IP Address includes four "Octets" (eight bits, translating to integers from 0 to 255, separated by periods). The manufacture default IP Address is 192.168.1.255.

Subnet Mask

Subnet Mask defines the *netid* (Network ID) and the *hostid* (Host ID) parts of an IP Address. The *netid* uniquely identifies a network, and the *hostid* uniquely identifies a computer on the network. The Subnet Mask can be used to partition the Network into sub-networks, using parts of the *hostid* to define new *netids*, or more correctly *subnetids*.
Portioning a network in this way enables switches and routers to use the subnetids to reduce collision domains and to promote security.

Gateway IP Address

Used to forward packets to other networks and subnets. The Network Administrator typically provides this address.

Email Server

Outgoing Mail (SMTP) server IP Address: If the controller is configured for E-mail notification, enter the IP Address of the (SMTP) E-mail server.

Controller Identification

The figure below shows how to uniquely identify multiple controllers on a network. Notice the controller names can be the same in both furnaces (Larry, Curly, Moe), but within the same network name they must be unique. To further distinguish controllers, use unique network names (Furnace #1 and Furnace #2). Network name: Controller name are bound to the IP address of each controller. Finally, use a local name (alias) to identify each controller to the end user. This local name is a convenient name such as for displays on the PC, it is not referred to for actual communication.

```
                    ┌─────────────────┐
                    │  PC monitoring  │
                    │  both furnaces  │
                    └─────────────────┘

┌──────────────────────────┐   ┌──────────────────────────┐
│ 3-stage furnace (Furnace #1). │   │ 3-stage furnace (Furnace #2). │
│ Each stage has its own controller. │ Each stage has its own controller. │
│                          │   │                          │
│  ┌────────────────────┐  │   │  ┌────────────────────┐  │
│  │  Stage 1 Controller │  │   │  │  Stage 1 Controller │  │
│  │ Network Name: Furnace#1 │ │  │ Network Name: Furnace#2 │
│  │ Controller name: Larry │ │  │ Controller name: Larry │
│  │ Local name: F1Stage1 │  │   │  │ Local name: F2Stage1 │  │
│  └────────────────────┘  │   │  └────────────────────┘  │
│                          │   │                          │
│  ┌────────────────────┐  │   │  ┌────────────────────┐  │
│  │  Stage 2 Controller │  │   │  │  Stage 2 Controller │  │
│  │ Network Name: Furnace#1 │ │  │ Network Name: Furnace#2 │
│  │ Controller name: Curly │ │  │ Controller name: Curly │
│  │ Local name: F1Stage2 │  │   │  │ Local name: F2Stage2 │  │
│  └────────────────────┘  │   │  └────────────────────┘  │
│                          │   │                          │
│  ┌────────────────────┐  │   │  ┌────────────────────┐  │
│  │  Stage 3 Controller │  │   │  │  Stage 3 Controller │  │
│  │ Network Name: Furnace#1 │ │  │ Network Name: Furnace#2 │
│  │ Controller name: Moe │  │   │  │ Controller name: Moe │  │
│  │ Local name: F1Stage3 │  │   │  │ Local name: F2Stage3 │  │
│  └────────────────────┘  │   │  └────────────────────┘  │
└──────────────────────────┘   └──────────────────────────┘
```

Set Controller Time

 opens the **Set Controller Time** dialog box. Screens differ according to the version of HC Utilities.

Version 4.0 and earlier

This window lets you set your controller's date and time.

Note: Use of Daylight Saving or Network Time Server requires Version 4.1.

Group	Item	Description	Action
PC Time	**Current Date Current Time Time Zone**	Indicates PC's date, time and time zone.	Read Only.
Controller Time	**Current Date Current Time**	Shows Controller's current date and time This is updated when you click on Set Controller Time button below.	Read only.
Select method for writing Time and Date to the Controller	**Set to PC Time**	PC's date and time, indicated here, will be used by controller.	Click radio button to select.
	Manually Override Time	Date and time entered here will be used by controller.	Click radio button and enter desired date and time.
	Set Controller Time	Writes PC or manual Date and Time to the controller. Current Controller Time (top of window) will be updated. A status message confirms the update.	Click to set time.

Version 4.1 and later

There are two tabs in this window.

Time and Date tab - Lets you set controller time to the PC time and assign a time zone to the controller.

Network Time Server and DST tab - Lets you assign a Network Time Server that periodically synchronizes the controller time. Lets you specify when controller time changes to Daylight Saving.

Version 4.1 Time and Date tab

Group	Item	Description	Action
Current PC Time	**Current Date Current Time Time Zone**	Indicates PC's date, time and time zone, including Standard or Daylight Saving.	Read Only.
Current Controller Time	**Current Date Current Time Time Zone**	Shows Controller's current date, time and time zone. Note: Daylight Saving, if applicable, is not shown unless Controller is in RUN mode.	Read only.
Set Controller Time and Date	**Date Time**	PC's date and time, indicated here, will be used by controller.	Read only.
	Use Controller Time Zone	Time zone entered here will be used by controller.	Click to select. Enter desired Time Zone.
	Use PC's Time Zone	Time zone displayed here will be used by controller.	Read only. Click to select.
	Set Controller Time	Click to write the above Date, Time and Time Zone to the controller. Current Controller Time (top of window) will be updated. A status message confirms the update.	Click to select.

Version 4.1 Network Time Server and DST tab

Use this tab to

- assign a Network Time Server that periodically synchronizes the controller time,

- specify when controller time changes to Daylight Saving.

Group	Item	Description	Action
Network Time Server	**Enabled** **Disabled**	Disabled - controller's time will not be synchronized with a network time server. Enabled - controller's time will be periodically synchronized to a network time server in Greenwich Mean Time. <u>Different time zone</u> or <u>Daylight Saving</u> must be configured separately. Disable or enable will take effect when you click on Write Time Server Settings to Controller.	Click to select.
Time Server IP Addresses	**Primary** **Secondary**	Primary - primary time server's IP address. Secondary - secondary time server address as a backup in case the primary can't be accessed.	Enter addresses. If using one server only, enter the same address as the primary.
Write Time Server Settings to Controller		Writes time server settings (enable or disable) to controller. Status will confirm the completed write. This button does not update the controller time, it just enables the connection. To see the current controller time, go to the <u>Time and Date tab</u>. Important: Network time servers use Greenwich Mean Time. Go to the <u>Time and Date tab</u> and set the time zone for your controller.	Click to write to the controller.
Daylight Saving Mode	**Adjust Clock for Daylight Saving Changes**	Lets you select one of the three Daylight Saving methods below.	Check box to enable one of the following options.
	Use DSTI Pin on Time and Date Function Block	Controller time will be in Daylight Saving when DSTI pin on the <u>Time and Date function block</u> is ON. Time will be in Standard when pin is OFF.	Click to select.
	One Year	Controller time will change to Daylight Saving, then to Standard, on the dates and times specified for a single year.	Click to select. Enter dates and times. Begin Daylight Saving Time setting must be earlier than Begin Standard Time setting.
	Every Year	Controller time will change to Daylight Saving, then to Standard, on the weekdays and times specified for every year.	Click to select. Enter dates and times. Last will be either 4th or 5th week, whichever is last.

Data Storage Utility

Note: The section does not apply to the 900 Control Station.

opens the **Data Storage Disk Initialization Utility** dialog box.

It is used to initialize ZIP disks offline. (It takes a long time to initialize a disk on the Operator Interface)

Pre-initializing ZIP Diskette

Step	Action
1	Insert the 100MB Zip disk into your PC drive.
2	Select the Data Storage Utility Icon on the Utilities toolbar.
3	The dialog box appears.
4	Select a Drive Letter from the drop-down menu to specify the drive on your PC.
5	Select the number of Trend Groups that the Operator Interface will need from the drop down menu .
6	Click on Pre-initialize to prepare the disk for storage.
7	Exit DSU.
8	Remove disk, insert it into the operator Interface, and initialize it. See Initializing Disk under this section entitled "Data Storage Operation".

Back Up Controller Information

Saves a controller's active configuration as a backup file with .cbk extension. Similar to saving an uploaded configuration except that in addition to the configuration the port settings are saved. Versions 4.1 and up saves time settings (time zone, DST, NTS IP addresses). You are prompted to specify the comm. link settings for the controller to be backed up. Backup files are read-only; to edit you must save as .cde.

Back up Controller
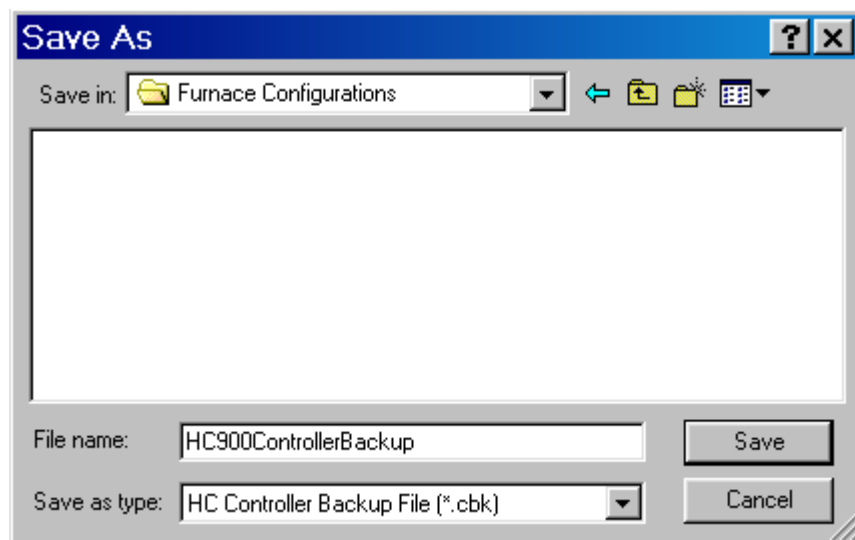
Restore Controller Information

This button is visible for currently open backup files (.cbk).

Choices:

Back Up Controller
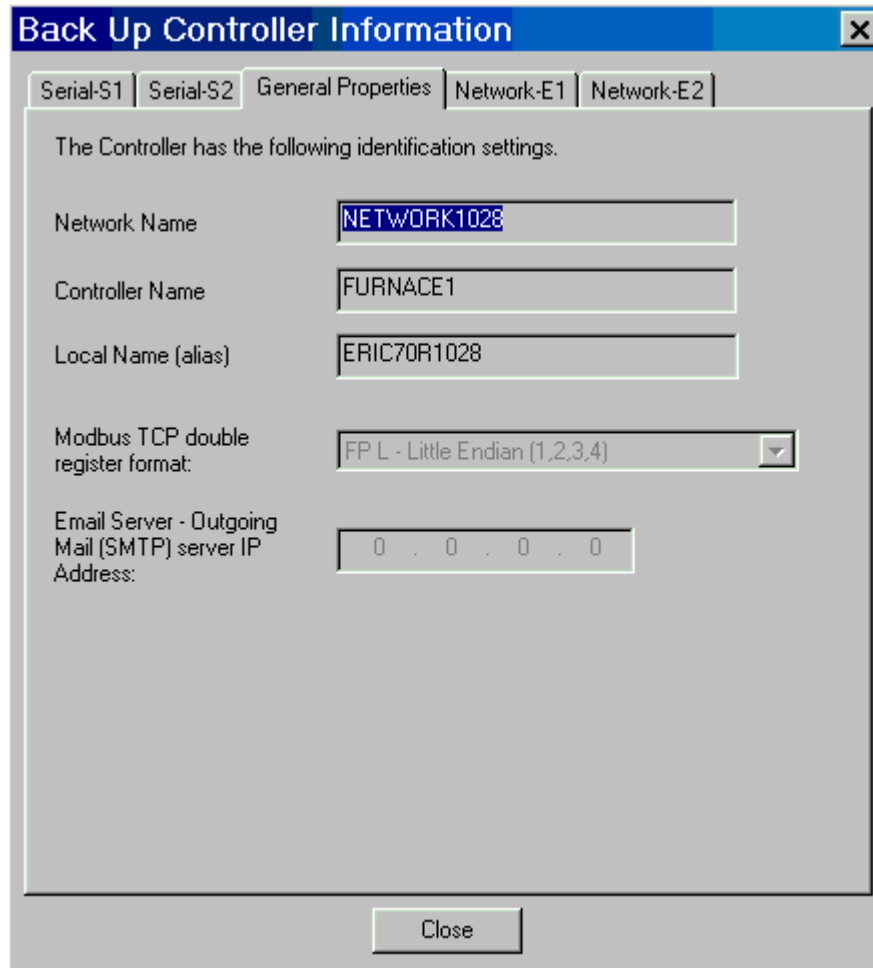
Restore Controller – Same as doing a download to controller except port settings are also downloaded.

View Port Settings – Shows all port settings in the backup file.

Serial S1/Serial S2 ports:

General properties:

Network E1, Network E2 ports:

Manually Write Database to Flash

Causes the configuration and user settings of a controller to be written (saved) to the controller's FLASH memory. User settings include, for example, PID tuning parameters, PP Output calibrations and changes to recipes (setpoint profiles, sequences, schedules). These settings are normally saved in battery-backed RAM, but if there is a power failure and the battery dies, these settings would be lost. By allowing an on-demand write of the database to FLASH, these settings will be retained and available immediately upon power-up.

If using redundant CPUs (C70R/C75) the database is saved to the FLASH of both Lead and Reserve controllers.

Configure Modbus/Peer Write Access

This feature is used for enabling the controller to allow only selected devices to write to the controller. The IP addresses of other controllers or Modbus TCP devices are entered to enable or disable the write operation.

IMPORTANT: This feature is available in ControlEdge HC900 controllers from revision 6.1 and later.

- **MODBUS TCP List**: List of devices (Modbus TCP Host devices) that can perform Modbus write operation on the ControlEdge HC900 controller.

- **Peer-to-Peer List**: List of devices (ControlEdge HC900 peer controllers) that can perform peer write operation on the ControlEdge HC900 controller.

IMPORTANT: *While accessing this feature the tool prompts for a password if the controller is password protected.*

See Password Configuration.
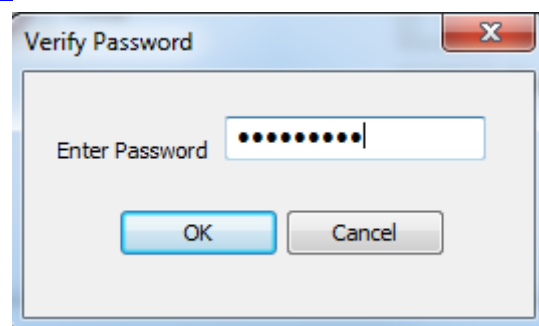
To configure Modbus/Peer write access:

1. Click the **Utilities** tab.

2. Connect to the controller by providing the network details. See Current_PC_to_Controller_Connection_Settings.

3. Click **Configure Modbus/Peer Write Access**. The Set Protocol for each Controller Port window appears.

---

4. Click the **MODBUS TCP List** tab or the **Peer-to-Peer List** tab and select one of the following:

- **Write Restricted**: Allows only the devices in the list to write to the controller.

- **Write Disabled**: Denies write operation from all external devices.

5. Type the IP addresses of the devices.

6. Click **Write**. The settings are transferred to the controller.

NOTE: Any device can read the values from the controller irrespective of the selections.

Network Interface selection for safety peer communication
1. Click the Peer-to-Peer List tab as shown below

2. Select option from the "Safety Interface" section.
   a. Select "Any" to allow Safety peer communication on both "Ethernet Port 1" and "Ethernet Port 2", i.e. the subscriber allows safety peer communication thru import signals (SAFPDE, ANAIMP & DIGIMP function blocks) from the peer controllers (publishers) appear on both networks.
   b. Select "E1" to allow Safety Peer communication only on Ethernet Port 1.
   c. Select "E2" to allow Safety Peer communication only on Ethernet Port 2.

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Note1: Network Selection option is available only on SIL variants.

Note2: Safety interface selection for C30S & C50S is fixed and defaulted to "E1".

Note3: Safety interface selection for C70S & C75S is defaulted to "Any"

Note4: "Peer Write" is not allowed thru safety peer communication

Click **Write.** The settings are transferred to the controller.
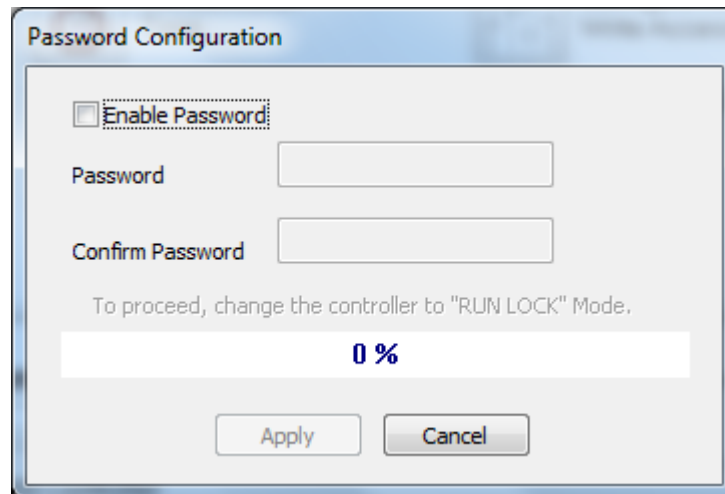
Password Configuration

This feature protects the controller from unauthorized users accessing the controller. It allows the user to set a password for the controller. This password must be provided while accessing the controller utility functions. By default, the controller is not protected with password.

IMPORTANT:

Password can be set only when the mode switch on the controller is set to the "Run/Pgm Mode" position.

To enable the controller password:

1. Click the **Utilities** tab.
2. Connect to the controller by providing the network details. See Current_PC_to_Controller_Connection_Settings.
3. Click the **Password Configuration** button. The **Password Configuration** window appears.

4. Select **Enable Password**.
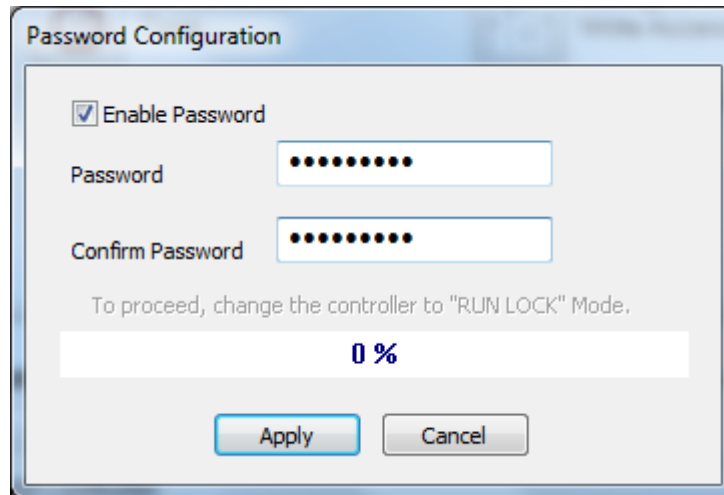
5. Type a password in the text boxes. ***NOTE***: *The password must contain a minimum of 8 characters and not exceed 32 characters.*

6. Set the controller to "Run/Pgm" mode.

7. Click **Apply**.
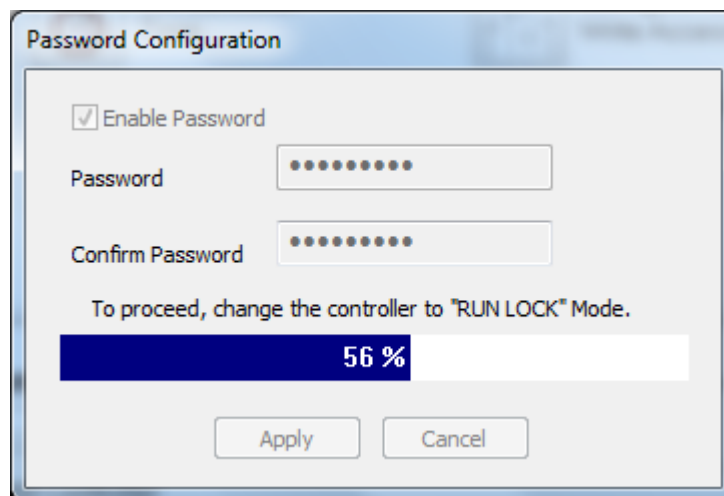
8. Change the controller mode to "Run Lock" mode. This step must be performed within 3 minutes. The password is enabled.

To disable the password:

1. Click the **Utilities** tab.

2. Connect to the controller by providing the network details. See Current_PC_to_Controller_Connection_Settings.

3. Click the **Password Configuration** tab. The **Password Configuration** window appears.
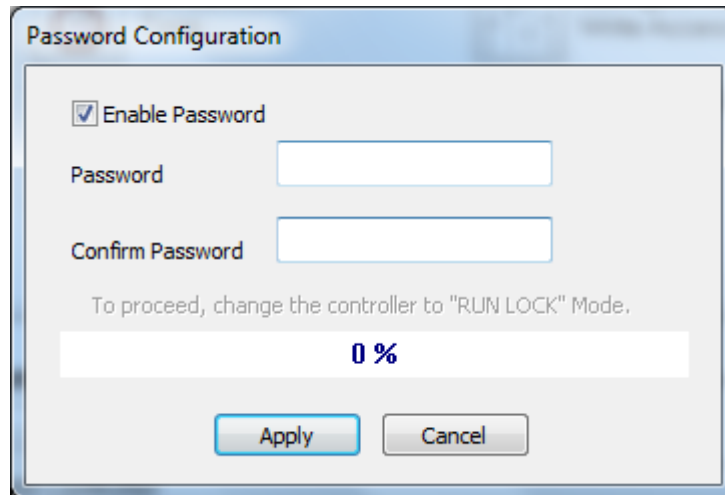
4. Clear **Enable Password**.

5. Set the controller to "Run/Pgm" mode.

6. Click **Apply**.

7. Change the controller mode to "Run Lock" mode to disable the password. The tool provides 3 minutes to perform this step. The password is disabled.

IMPORTANT:

-   *It is recommended to secure the physical access of the controller key switch for preventing unauthorized controller password modifications.*

-   *It is recommended to change the controller password after every 90 days.*

Diagnostics

has menu selections on a drop-down menu. It lets you select from a list of diagnostic windows for various controller connections.

The controller must be in "Monitor" mode. Select Monitor Mode from the Monitor menu or click on the Monitor mode icon on the Main toolbar.

Controller Diagnostics - displays controller status and diagnostic parameters.

Rack Diagnostics - displays the "Rack Diagnostic Summary" dialog box. Information is for Rack, I/O expansion (when applicaable), and Module diagnostics.

Controller Ports Diagnostics - select a port from the drop-down list.

> Serial Port S1
> Serial Port S2
> Network Port
> Expansion Rack Port (except C30 CPU)
> Master Connections
> Peer-to-Peer connections

Modbus Port Diagnostics - displays status of the Modbus ports.

> Modbus Host (Serial) Port Diagnostics
> Modbus/TCP Initiator Port Diagnostics

Forced Blocks.- displays a list of Function Blocks, by block ID, that have a forced output pin.

Redundancy – select from the drop-down list:

> Redundancy System
>
> Redundancy Link
>
> Lead CPU
>
> Reserve CPU
>
> Scanner 2 Link

Calibrate Modules

Overview

The controller I/O modules are factory calibrated to 0.1% accuracy. But, if greater accuracy is required, you can calibrate the **AI and AO modules** using the Process Control Utilities on-line connected to the controller.

You can also calibrate the **Position Proportional Output block**. The calibration of the PPO block is similar to that of the AI and AO except that the calibration values are stored as part of the block's configuration, not on the AI card itself.

opens the *Calibrate Modules* dialog box.

There are four tabs on the Dialog Box:

AI Channel - see "Calibrate AI Channel".

CJ Temp - see "Calibrate CJ Temp".

AO Channel - see "Calibrate AO Channel".

PPO Block – see "Calibrate Position Proportional Output "

Calibrate AI Channel

The Calibrate AI Channel tab allows you to calibrate the selected AI to ensure that the 0 and 100% values selected during configuration is correct.

ATTENTION: *You should not access the Utilities Calibrate Controller Analog I/O display while the OI calibration display is being displayed, or vice versa. Calibration can't be done as long as both displays are shown; user must exit either display to do a calibration.*

To calibrate an AI Channel:
1. Enter a Rack #, Module #, and Channel #.
2. Click on Select Input. The program will then poll the controller to see if the selected AI exists.
3. The Cal 0% button is now available. Connect a reference supply to the input pins of the AI.
   The reference supply must have the following characteristics:
   T/C, mV, Volts Inputs: 1 microvolt resolution
   Ohms, RTD Inputs: 0.1 Ohm resolution
   4-20mA inputs: 4 microamp resolution
4. Set the reference supply to the reference value shown. (The reference value is displayed below the Instrument Status section.) Click on "Cal 0%" to calibrate the low end of the AI.
5. The Instrument Status section of the dialog will display the results of the calibration.
6. If the 0% calibration was successful, the 100% button is now available. Set the reference supply to the reference value shown. Click on "Cal 100%" to calibrate the high end of the AI.
7. If the Cal 100% calibration was successful, the Save Cal button is then available. Click on "Save Cal" to save the current set of calibrations for the selected AI.
8. If either calibration fails,
   the *Instrument Status* section will display an AI Calibration Failed message - Check connections
   The *Reference section* will display a wrong Rack, Module, and channel - reenter Addresses.
9. Click on Close.
   Note: Click on "Restore Factory Calibration" button to do same.

NOTE: *Refer to the Calibration section in the ControlEdge HC900 Installation and User Guide for additional Hardware details.*

Calibrate CJ Temp

The Calibrate CJ Temperature tab allows you to ensure the Cold Junction calibration is correct.

To calibrate a CJ Temperature:
1. Enter a Rack #, Module #, and Channel #.
2. At CJ Temperature, enter the actual ambient temperature (measured at the AI pins).
3. Click on Select CJ Input. The program will then poll the controller to see if the selected AI exists. If the AI is found the Cal CJ button will then be available.
4. Click on the Cal CJ button to initiate the calibration. The status of the calibration is displayed in the Instrument Status section of the dialog. If the calibration is successful, the Save Cal button will be available.
5. Click on the Save Cal button to save the current CJ calibration.
6. If the calibration fails, a message will be displayed in the Instrument status section.
7. Click on Close to close dialog.
   Note: Click on "Restore Factory Calibration" button to do same.

NOTE: *Refer to the Calibration section in the ControlEdge HC900 Installation and User Guide for additional Hardware details.*

Calibrate AO Channel

The Calibrate AO Channel option allows you to calibrate the selected AO to ensure that the 0 and 100% values selected during configuration are actually correct.

ATTENTION: *You should not access the Utilities Calibrate Controller Analog I/O display while the OI calibration display is being displayed, or vice versa. Calibration can't be done as long as both displays are shown; user must exit either display to do a calibration.*

To calibrate an AO Channel:

1. Enter a Rack #, Module #, and Channel #.
2. Click on Select Output. The program will then poll the controller to see if the selected AO exists.
3. The Cal 0% button is now available. Measure the actual output of the AO at the terminal block with a meter and enter the measurement into 0% Measured. Click on Cal 0% button to calibrate the 0% measurement. The reference value is displayed below the Instrument Status section.
4. The Instrument Status section of the dialog will display the results of the test.
5. If the 0% calibration was successful, the 100% button is now available. Measure the actual output of the AO at the terminal block with a meter and enter the measurement into 100% Measured. Click on Cal 100% button to calibrate the 100% measurement.
6. If the Cal 100% was successful, the Save Cal button is then available. Click on Save Cal in order to save the current set of calibrations for the selected AO.
7. If either of the tests fail, the Instrument Status section will display an AO Calibration Failed message.
8. Click on Close.
    Note: Click on "Restore Factory Calibration" button to do same.

NOTE: *Refer to the Calibration section in the ControlEdge HC900 Installation and User Guide for additional Hardware details.*

Restore Factory Calibration

To restore the Factory Calibration:

1. Click on the Restore Factory Calibration button on the dialog box. The Restore Factory Calibration dialog is displayed.
2. Enter the Rack, Module, and Channel number for the desired calibration.
3. Click on Restore to initiate the task. The status of the restore will be displayed in the Instrument Status section of the dialog.
4. Click on Close to close the dialog when the restore is complete.

PPO Block Calibration Overview

Introduction

The Calibrate PPO Block tab allows you to calibrate the selected Position Proportional Output Block to ensure that the 0% and 100% Motor Positions are actually correct and to measure the true motor speed.

The calibration of the PPO Block is similar to that of the AI and AO. However, the calibration values are stored as part of the PPO block's configuration data; not on the AI card itself.

To retain these calibrated values, upload and save the configuration to disk.

The procedure is to move the motor first to its 0% position, wait until the position feedback signal has stabilized, and capture the 0% feedback value.

A similar procedure is done next for the motor's 100% position,

The third step is to measure the true motor speed by moving the motor a fixed period of time, measuring the position feedback delta, and computing a motor speed from this data.

The final step is to save the values in the block's configuration data. All previous calibration values will be overwritten.

Calibration Procedures

There are three methods for calibrating the PPO block. Click on one of the modes shown below for instructions.

> **AUTO** – Controller positions the motor and captures the positions.
>
> **SEMI-AUTO** – Controller positions the motor and the user captures the positions.
>
> **HAND** – User positions the motor by hand and captures the positions.

Auto Calibration Procedure

Controller automatically positions the motor and captures the positions.

NOTE: Put the controller in "Offline" or "Program" mode in order to perform calibration.

1. Select the **Utilities tab** at the bottom of the Main Window

2. Under the "Controller Utility Functions", select the **"Calibrate Controller"** icon.
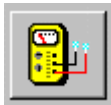
    The "Calibrate" dialog box will open.

3. Select the **"PPO Block" tab** at the top of the dialog box.

4. In the "Calibration Block" field, drop-down the list of PPO blocks and **select one**.

5. Under "Calibration Mode", select the **"AUTO" radio button**.

6. Under "Calibration Procedure", press **"Start"**.

Result:

The "Start" button is disabled and the Status indication at the top of the dialog box will change to indicate that the motor is moving to its 0% position.
> The "Feedback Value" area on the dialog will indicate movement and direction of the motor.
> The Progress Bar will indicate progress (Time Remaining) for this step.

The status will change to indicate that the motor is at its 0% position.
> The status will change to indicate that the 0% position has been captured.

The status will change to indicate that the motor is moving to its 100% position and the feedback area will indicate movement and direction of the motor.
> The progress bar will indicate progress (Time Remaining) for this step.

The status will change to indicate that the motor is at its 100% position.
> The status will change to indicate that the 100% position has been captured.

The status will change to indicate that the motor is currently undergoing speed calibration.
> The feedback area will indicate movement and direction of the motor.
> The progress bar will indicate progress (Time Remaining) for this step.

The status will change to indicate that the PPO Calibration has been saved.

A message box appears indicating that the calibration is complete.
Three choices will also appear. Select one.
> **Press F2 to Position Motor at 0%**
> **Press F3 to Position Motor at 100%**
> **Press F4 to Leave Motor at Current Position**

Semi-Auto Calibration Procedure

Controller automatically positions the motor and the user captures the positions

NOTE: Put the controller in "Offline" or "Program" mode in order to perform calibration.

1. Select the **Utilities tab** at the bottom of the Main Window.

2. Under the "Controller Utility Functions", select the **"Calibrate Controller" icon**
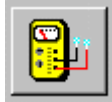
   The "Calibrate" dialog box will open.

3. Select the **"PPO Block" tab** at the top of the dialog box.

4. In the "Calibration Block" field, drop-down the list of PPO blocks and **select one**.

5. Under "Calibration Mode", select the **"SEMI-AUTO"** radio button.

6. Under "Calibration Procedure", press **"Start"**.
   The "Start" button is disabled and the Status indication at the top of the dialog box will change to indicate that the motor is moving to its 0% position.
   The "Feedback Value" area on the dialog will indicate movement and direction of the motor.
   The Progress Bar will indicate progress (Time Remaining) for this step.
   The status will change to indicate that the motor is at its 0% position.

7. Click the **Cal 0% button**, then the status will change to indicate that the 0% position has been captured.
   The status will change to indicate that the motor is moving to its 100% position.
   The feedback area will indicate movement and direction of the motor.
   The progress bar will indicate progress (Time Remaining) for this step.
   The status will change to indicate that the motor is at its 100% position.

8. Click the **Cal 100% button**, then the status will change to indicate that the 100% position has been captured.

9. Click the **Cal Speed button**.
   A dialog box will appear warning that the speed calibration will move the motor.
   Press **"OK"** to start or **"Cancel"** to abort.
   The status will change to indicate that the motor is currently undergoing speed calibration.
   The feedback area will indicate movement and direction of the motor.
   The progress bar will indicate progress (Time Remaining) for this step.

10. Click the **Save Cal button**.
    A dialog box will appear that confirms the Motor Calibration Values.

    Press **"OK"** to save the values or **"Cancel"** to abort.

    The status will change to READY and indicate that the PPO Calibration has been saved.

    A message box appears indicating that the calibration is complete.

    Three choices will also appear. Select one.
    > **Press F2 to Position Motor at 0%**
    > **Press F3 to Position Motor at 100%**
    > **Press F4 to Leave Motor at Current Position**

Hand Calibration Procedure

User positions the motor by hand and captures the positions.

NOTE: Put the controller in "Offline" or "Program" mode in order to perform calibration.

1. Select the **Utilities tab** at the bottom of the Main Window.

2. Under the "Controller Utility Functions", select the **"Calibrate Controller" icon**.
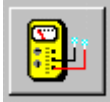
    The "Calibrate" dialog box will open.

3. Select the **"PPO Block" tab** at the top of the dialog box.

4. In the "Calibration Block" field, drop-down the list of PPO blocks and **select one**.

5. Under "Calibration Mode", select the **"HAND"** radio button.

6. Under "Calibration Procedure", press **"Start"**.
    The "Start" button is disabled and the Cal 0% button is enabled.

7. Move the motor **by hand to its 0% position**.
    The feedback area will indicate movement and direction of the motor when it is moving.

8. When ready, click the **Cal 0% button** and the 0% position of the motor is captured
    as indicated in the status.

9. Move the motor **by hand to its 100% position**.
    The feedback area will indicate movement and direction of the motor when it is
    moving.

10. When ready, click the **Cal 100% button** and the 100% position of the motor is
    captured as indicated in the status.

11. Click **the Cal Speed button**
    A dialog box will appear warning that the speed calibration will move the motor.
    Press **"OK"** to start or **"Cancel"** to abort.
    The status will change to indicate that the motor is currently undergoing speed calibration.
    The feedback area will indicate movement and direction of the motor.
    The progress bar will indicate progress (Time Remaining)

12. Click **the Save Cal button**.
    A dialog box will appear that confirms the Motor Calibration Values.
    Press **"OK"** to save the values or **"Cancel"** to abort.
    The status will change to READY and indicate that the PPO Calibration has been saved.

    A message box appears indicating that the calibration is complete.

11. Set Point Programming

Terms and Definitions

Term	Definition
Auxiliary Analog Value	In addition to the main ramp and soak output value, a second analog value is available for each step of the profile. This output is a fixed soak value, which may be used to provide a setpoint value for a secondary control loop in the process. An example would be a ramp and soak temperature program combined with pressure setpoints for each step of the profile.
Cycles	A portion of a profile or the entire program may be repeated up to 100 times or indefinitely as specified in the program **Cycles** count value.
Engineering Units	You must assign a descriptor consisting of up to 4 keyboard characters for the engineering units that the setpoint value represents. For example, **GPM** for gallons per minute, **NPS** for number per second, **RPM** for revolutions per minute, and **DEGF** for degrees Fahrenheit.
Guaranteed Hold Soak Limits	Limits High and Low (above and below the Setpoint value) can be configured in selected engineering units. If the PV is outside of configured limits just prior to entering the Soak segment, the soak timer will not be permitted to start. It will start when the PV is within the High and Low limits. Once the soak timer has started and then the PV goes outside of configured limits, the soak timer will halt. It will remain halted until the PV is again within the configured limits. A Guaranteed Hold High or Low limit setting of 0.00 is equal to no limit at all.
Number of Segments	Segments are timed ramp and soak subdivisions of a setpoint program. Consecutive ramps and soaks are allowed. The last segment must be a soak.
Power Loss	A **recovery ramp rate value** is provided in the event of a power loss while a program is running. The ramp rate value is used to return the process to the last operating setpoint prior to power loss. A power OFF digital input and separate timing block will abort the running program if power loss has been OFF for more than a specified time period.
Program	The term "Program" is used to identify the process for selecting and entering the individual ramp and soak segment data for a Setpoint Program function block (SPP) needed to generate a required setpoint versus time **profile** (also called a program).
Program Name	During configuration you must assign a name (descriptive reference) consisting of from 1 to 8 letters or numbers without spaces. Thus, a name can be a combination of letters and numbers. Note that lowercase letters are automatically converted to uppercase.
Program Number	This number is assigned when the software or the Operator Interface creates the profile. The program number is assigned in the "Setpoint Profile Pool" and is shown on the "Edit Setpoint Profile" dialog box.
Ramp Segments	A ramp segment is a starting setpoint and the time or rate to reach the setpoint of the following segment. Typically, segment #1 will be a ramp. Ramp time is determined in either: **TIME***—Hours or Minutes Range = 0.00 hr. to 999.99 hr. / 0.00 min. to 999.99 min. OR **RATE***—EU/MIN or EU/HR Range = 0 to 999.99 *This selection of time or rate is made when you configure properties. Make this selection before entering any Ramp during Profile Edit.

Term	Definition
	NOTE: When Ramp unit is configured for TIME, entering "0" will imply an immediate step change in setpoint to the next soak
Running a Profile	Setpoint profiles may be **started, held, advanced, jogged** to a predefined segment or reset from the operator interface or by digital inputs to the block. Programs may be started from a pre-selected segment number.
Segment	A segment is a ramp or soak function which together make up a Setpoint Profile.
Segment Events	You can configure 1 to 16 segment events to turn ON or OFF at the beginning of each segment. Segment events are digital switches that provide ON/OFF outputs through an SPEV control block. **When a segment event is turned ON, it remains ON until the end of the segment at which time it is turned OFF unless it is configured to turn ON in the next segment**. Note that segment events are not interrupted by soak time delays when the process variable is outside the guaranteed soak band. Events turn ON as soon as the previous segment is completed even if the process variable has not reached the soak setpoint. When the program completes, the events are held at current value until the programmer is returned to the ready state.
Setpoint Guarantee	There is a setpoint guarantee function provided that holds the program if a PV exceeds a predefined deviation from setpoint. Selections allow setpoint guarantee to be active for all segments, soak segments only, or for specified segments. Up to 3 Process Variables may be configured as inputs to the block for setpoint guarantee.
Setpoint Value	A setpoint value set for **Ramp** (starting Setpoint value) and Soak(soak setpoint value)segments
Soak Segments	A soak segment is a combination of soak setpoint (value) and soak duration (time). The last segment **must** be a Soak. The soak setpoint range value must be within the setpoint high and low range limits in engineering units. SOAK TIME is the duration of the soak and is determined in: **TIME***—Hours or Minutes Range = 0.00 hr. to 999.99 hr. / 0.00 min. to 999.99 min. *This selection is made when you configure properties.
Synchronizing Programs	Two setpoint programs operating on the same time base can be synchronized using the Synchronize (SYNC) function block. This block automatically starts the second program when the first program is started and maintains synchronization when either program is place in hold.

What is a Setpoint Program?

A Setpoint Program is really a **setpoint versus time profile** that establishes the setpoint values and how they are to vary with time.

Each setpoint profile consists of segments. Each segment of the profile may be a ramp or a soak except the last step that must be a soak.

In addition to the main ramp and soak output value, a second analog value (Aux. Output) is available for each step of the program. This output is a fixed soak value that may be used to provide a setpoint value for a secondary control loop in the process. An example would be a ramp and soak temperature program combined with pressure setpoints for each step of the program.

Each segment can turn on segment events to provide ON/OFF signals through a Setpoint Program Events (SPEV) control block that is used in conjunction with an SPP block.

Each Profile carries its own unique number and a name for identification. (The names are descriptive references [aliases] and uniqueness is not enforced.) Unique names are recommended to avoid operator confusion).

Using the software, you can set the setpoint values, soak times, guaranteed soak band, ramp rates, and event action for individual setpoint profiles in configuration and access the information through the Setpoint profile display in the operator interface. This means that an operator can adjust individual ramp and soak segment settings during operation, but the general profile configuration, including number and name, is under configuration control.

However, any changes made through the SPP Operate display to a program that is running in an SPP block will **not** be written as changes in the program configuration.

Associated Blocks

Setpoint Programmer Blocks

Setpoint Program Configuration Overview

Introduction

Setpoint Program (Profile) configuration provides a quick and easy way to create, edit, and save up to 99 different ramp/soak (setpoint) profiles for the Setpoint Programmer (SPP) control blocks in the configuration. An operator can interact with the configured profiles through the Setpoint Program Operate display at the operator interface or operation can be directed through integral actions connected by Softwiring functions.

Configuration Functions

Basic functions that you will use to configure a Setpoint Profile.

Create/Edit Setpoint Profile

Under File-New or File-Open you can access the Profile Editor to create or edit a setpoint profile.

Setpoint Profile Pool

 The SP Profile Pool lets you view and save the configuration's setpoint profile to disk.

Setpoint Profile Properties

Setpoint Profile Properties is information for the profile that is entered on five specific tabs. It includes Text, General, Loop/Jog, and Start/Restart.

Setpoint Profile Setup (EDIT)

Setpoint Profile Setup lets you view each segment of the profile, the ramps and soaks and associated information (Values, Time, Auxiliary output, Guaranteed Hold, and Events).

12.   Setpoint Schedulers

Setpoint Scheduler Overview

Setpoint Scheduler blocks may be configured for multi-setpoint control. Comprising the suite is a Master block (<u>SPS</u>), Auxiliary Setpoint block (<u>SPSA</u>), Event Decoder block (<u>SPEV</u>), State Switch Block (<u>STSW</u>), and State Flags block (<u>STFL</u>).

The Master block supports ramp or soak outputs operating on a common time base. It accepts one PV for each setpoint. Setpoint guarantee is provided for the master (SPS) block setpoints with a single symmetrical value for each setpoint output.

You can assign a Failsafe value for each setpoint.

The Auxiliary block supports soak only outputs.

The Event block supports event outputs.

A single schedule may include segments and auxiliary block data. The schedules are stored in the controller's memory.

Setpoint Schedules offer the same operating modes and digital controls as setpoint programs.

On-line editing of a running schedule is supported through dedicated operator interface displays

Setpoint Guarantee

Setpoint guarantee is provided for the master block setpoints with a single symmetrical value for each setpoint output. Actions for the guarantee soak may be set on a per segment basis for OFF, high setpoint deviation, low setpoint deviation or both high and low setpoint deviations.

Segments

Each segment of the Setpoint Scheduler allows entry of a next segment recycle location. This function allows unlimited recycle nesting and continuous recycle operation. A jog function allows a single jump to a designated segment number through a digital input to the State Switch block.

Labels

Main Output Labels
Eight character labels and four character engineering units are provided for each Setpoint plus a decimal point selection.
Auxiliary Output Labels
Eight character labels and four character engineering units are provided for each Setpoint plus a decimal point selection
Event Labels
Eight character labels are also provided for the Digital Event block.

<u>Assigning these labels first</u> will aid you in the setpoint schedule configuration process. These labels will appear in the configuration dialog boxes.

Associated Blocks

Setpoint Scheduler Blocks

Setpoint Programmer Blocks

Setpoint Schedule Overview

Introduction

Setpoint Schedule configuration provides a quick and easy way to create, edit, and save different Setpoint Schedules for the <u>Setpoint Scheduler (SPS) control blocks</u> in the configuration. An operator can interact with the configured schedules through the Setpoint Program Operate display at the operator interface or operation can be directed through integral actions connected by Softwiring functions.

Setpoint Scheduler Display Configuration

ATTENTION

Before you proceed with the Setpoint Schedule assign the appropriate labels for the Setpoint Scheduler displays.

Assigning these labels first will aid you in the schedule configuration process.
See <u>Setpoint Scheduler Function Block</u> configuration.
These labels will appear in the configuration dialog boxes.

Configuration Functions

Basic functions that you will use to configure a Setpoint Schedule.

<u>Create/edit Setpoint Schedule</u>

Under File-New or File-Open you can access the Schedule Editor to create or edit a setpoint schedule.

<u>Setpoint Schedule Pool</u>

The SP Schedule Pool lets you view a schedule on a list of configured schedules. Through this dialog box you will view the properties for each schedule.

<u>Setpoint Schedule Properties</u>

Setpoint Schedule Properties is information for the schedule that a Label, a Jog Segment, Time Units, and Guaranteed Hold Limits for each of the eight setpoints.

<u>Setup/Edit Setpoint Schedule</u>

Setpoint Schedule Setup or Edit consists of configuring each segment of the schedule and assigning starting values for all eight Setpoints of the segment and the Guaranteed Hold Type for each.
You can also set up to 16 events for each segment. Time Units, Recycle Segment, and Recycle Counts selections are included on this dialog box.

13. Sequencers

What is Sequence Control?

The need to control a sequence of operation is a very common control requirement in industrial equipment today. Sequence control can be a very rigid series of inter-related events used to start-up or shut-down a unit process, or it can be a series of timed and process measurement dependent events that are executed to produce a final product.

Sequences can be very simple with only timed or cascaded events that occur regardless of process feedback, or they can be very complex with multiple nested default sequences programmed to occur only if process feedback indicates a need to take alternate actions.

When sequence control is used to produce final product, sequence variations are often required to allow the same equipment to be used to produce multiple types of product. In these applications the sequence is often partitioned into logical units to allow operators and supervisors to monitor the progress of the process using familiar terminology. Heat-up, cool-down, filling, venting, mixing and other similar terms are often used to describe the particular phase the control equipment is executing.

Variations in the product being processed can require changes to the sequence where particular phases are bypassed, duplicated or executed in an alternate manner.

When all of these requirements are combined in a single control specification, developing a suitable control strategy can be a demanding and sophisticated endeavor.

Sequence Configuration Overview

The sequencer function block controls the output statuses of up to 16 digital outputs and one auxiliary vali. Each combination of outputs represents a state of the sequence such as Heat, Mix, or Cool, for example. The function block supports up to 50 states e.g. PURGE, FILL, HEAT, etc.

The sequence contains up to 64 steps. Each step enables a state, allowing for a state to be designated for several steps.

A pool of sequences, up to 64 steps each, may be stored in controller memory for quick recall and assignment to any of the 4 sequencers.

Each state supports two of digital events as inputs that can designate the end of the associated step.

Time in seconds or minutes, a manual advance, or a digital event can be used to terminate a sequencer step and cause the sequence to advance.

The operational sequence for the steps is retained in a separate sequence file in the memory pool of the controller that may be selected on-demand through a user interface or via a recipe (variables).

Configuration Functions

Basic functions that you will use to configure a Sequence.

Sequence Editor

Create/Edit a Sequence under the File-New or File-Open menus. Accesses the Sequence Editor.

Sequence Pool

When you select "Sequences" from the Recipe menu, the "Sequence Pool" dialog box will be displayed. Through this display, you will add a new sequence or delete an existing one and also enter the properties function and the "Edit Sequence" function to set up each sequence.

Sequence Properties

Sequence Properties is information for the sequencer: Label, Description, a Jog Step, and Time Units.

Sequence Setup (EDIT)

Sequence Setup or Edit consists of configuring each step of the Sequence with a State Number and Name, Time In Step, Time Next Step, Event 1 Next Step, Event 2 Next Step, Advance next step, and an Auxiliary value.

14.   Recipes

Recipe Overview

Multiple meanings of "recipe"

Loop control users apply the word "recipe" differently in different contexts. There is no industry standard for the word's meaning. In a broader sense, a recipe is any collection of data specific to a process setup that can be downloaded into and then run as part of controller's function block configuration. The following are recipe types:

Recipe (Variables)

Set Point Profile

Set Point Schedule

Sequence

Notice the first recipe type is also called a recipe. The two uses of the word "recipe" can get confusing. In this narrower sense, a recipe is a collection of data—specifically, variables. To distinguish it from the broader meaning HC Utilities calls it **"recipe (variables)"**.

To one user a recipe is a collection of variables; to another user a recipe is a set point profile; to another user a recipe is a set point schedule; to another it's a sequence. These different uses of the word "recipe" are all ok as long as you understand they are all recipes in the broader sense.

A recipe needs a configuration for context

A recipe by itself is useless; it must be associated with a specific controller configuration to give it context. Therefore when creating or opening a recipe you must specify by name which configuration the recipe applies to. Set Point Profiles are excluded from this requirement.

Recipe type	How linked to configuration
Recipe	Variable tag names
Setpoint Profile	Not linked to configuration
Setpoint Schedule	Event labels
Sequence	State Name, Event Signal #1, Event Signal # 2

Compatibility

It is up to you to understand how your recipes will work with your configurations. For example, when you download a recipe (variables) (.rcp) to a controller, the recipe's variables, sequential order and their values might make sense in one controller configuration but not another.

Recipe locations

Once created, a recipe can reside in several places. Be aware that having multiple copies of a recipe can cause mixups. For example, suppose you've created a recipe (any type) called COOKIES. It can reside in the following places.

COOKIES saved as a separate recipe file to disk or floppy. Recipe files can be added to a recipe pool. (See Recipe file types.)

COOKIES in the recipe pool of a configuration saved to disk as a .CDE file.

COOKIES in the recipe pool of a currently open configuration in the software. (See Recipes menu)

COOKIES in the recipe pool of your controller's running configuration. Here it is available to be loaded into the controller's function block configuration.

COOKIES actively loaded and running in your controller's function blocks.

This example applies to all recipe types (recipe (variables), schedules, sequences, profiles).

Recipe file types

Recipes saved as files have the following extensions.

Recipe (variables): .RCP

Set Point Profile: .PRF

Set Point Schedule: .SCH

Sequence: .SEQ

When part of a configuration's recipe pool, a recipe is not saved as a separate file but is saved in a "slot" in the pool as part of the configuration (.CDE). Any recipe can be accessed in the configuration's recipe pools and saved as its own recipe file if desired.

Recipes Menu

Accesses all recipe pools. To learn about the different recipe types read Recipe Overview.

Menu Selection	Function
Allocate Recipe Memory	Allocates the controller's memory for the four recipe types. This is the number of recipes that can be stored in the controller's four recipe pools. Recipes in these pools can be loaded and run by Recipe Selection Blocks, Programmers, Schedulers, and Sequencers. As recipe memory usage increases, less memory is available for other parts of your configuration (such as function blocks).
Recipes (Variables)…	A recipe (variables) is a list of Variables with settings that define the ingredients needed to make a product or run a particular batch. This selection opens the Recipe Pool dialog box and allows viewing, adding, editing, and printing of Recipe details. You can save the selected recipe item to a file; open a recipe file and insert it into the pool; and download the selected recipe item to a controller's recipe pool.
Setpoint Profiles…	Setpoint Program (Profile) configuration provides a quick and easy way to create, edit, and save different ramp/soak (setpoint) profiles for the Setpoint Programmer (SPP) control blocks in the configuration. This selection opens the Setpoint Profile Pool dialog box and allows viewing, adding, editing, and printing of Setpoint Profile details. You can save the selected SPP item to a file; open a SPP file and insert it into the pool; and download the selected SPP item to a controller's Setpoint Profiles pool.
Setpoint Schedules…	Setpoint Schedule configuration provides a quick and easy way to create, edit, and save different Setpoint Schedules for the Setpoint Scheduler (SPS) control blocks in the configuration. This selection opens the Setpoint Schedule Pool dialog box and allows viewing, adding, editing, and printing of Setpoint Schedules details. You can save the selected SPS item to a file; open a SPS file and insert it into the pool; and download the selected SPS item to a controller's Setpoint Schedule pool.
Sequences…	Sequence configuration provides a series of inter-related events used to start-up or shut-down a unit process, or a series of timed and process measurement dependent events that are executed to produce a final product. This selection opens the Sequence Pool dialog box and allows viewing, adding, editing, and printing of Sequence details. You can save the selected SEQ item to a file; open a SEQ file and insert it into the pool; and download the selected SEQ item to a controller's Sequence pool.

15.   Recipes (Variables)

Introduction

Each recipe consists of Variables, and carries its own unique recipe number and name for identification. (The names are descriptive references [aliases] and uniqueness is not enforced. Unique names are recommended to avoid operator confusion). The selected Variables were assigned during the Function Block Diagram Configuration.

It is possible to edit the setting of any recipe Variables through the Recipe Setup display at the operator interface. This means that an operator can adjust individual ingredient amounts in the recipe; but the ingredients (item's Variable Name), the order of the ingredients, and the recipe's number and name are under configuration control.

The recipe variable list is configured using the Process Control Utilities application. An operator will be able to change individual item values through the Operator Interface.

For automatic loading of a setpoint profile in addition to other variables, a variable representing a profile number may be included in the recipe. This would also apply to a schedule or sequence number.

Recipe Attributes

A recipe is a list of Variables with settings that define the ingredients needed to make a product or run a particular batch. The items represent Analog and/or Digital Points that were assigned in the Function Block Configuration and are identified by their Variable Names. Recipes have these basic attributes:

Recipe Number - A unique number must be assigned for each recipe that is configured. Numbers can be assigned in any sequence with gaps between numbers, but no two recipes can be given the same number.

Recipe Name - A descriptive name must be assigned consisting of letters or numbers with no spaces. Thus, a name can be any combination of letters and numbers without spaces. Note that lowercase letters are automatically converted to uppercase letters.

Recipe Variables - A list of Variables can be compiled for each recipe. A valid Variable and desired setting must be specified for each recipe item.

Adjustable Settings - The setting for an analog point can be any appropriate value from–99999 to 99999, and a digital point can be set in its ON or OFF state. It is possible to edit/change any recipe item/Variable Name setting through the "Edit Recipe" Setup dialog box during configuration.

Recipe (Variables) Configuration Overview

A recipe is a list of Variables with settings that define the ingredients needed to make a product or run a particular batch. The items represent Analog and/or Digital Points that are assigned in the Function Block Configuration and are identified by their Variable Names.

Configuration Functions

Basic functions that you will use to configure a Recipe:

Recipe Editor

Create/Edit a Recipe under the File-New or
File-Open menus. Accesses the Recipe Editor.

Recipe Pool

When you select "Recipes" from the Recipe menu, the "Recipe Pool " dialog box will be displayed. You can view Recipes in the pool. You can save a configuration's recipe to a file and then edit the recipe file. Allows you to view but not edit or create new recipes in the pool. You can save a configuration's recipe to a file and then edit that recipe file.

Recipe Properties

The Recipe Properties is merely a name assigned to the recipe, which will be added to the pool. You can also include a descriptor.

Recipe Setup (EDIT)

Recipe Set Up or Edit consists of selecting Variable names, assigning an analog value or digital state, and adding them to a list of Recipe items.

Create/Edit Recipe (Variables) File

Creates/edits a group of variables to be saved as a file (.RCP). File can be downloaded to the recipe pool. A recipe in the pool can later be edited or loaded into the controller's active configuration. The file assumes that the variables are in a certain order in the configuration. Make sure that this order is preserved when loading into a controller's active configuration. Changes to variables via deletions, renaming, or re-directing may affect the recipe content.

Step/Item	Action/Description
Select File, Open.	Lets you choose an .RCP file to edit. After selecting file the Recipe Editor appears.
OR	
Select File, New.	"Choose a new file type" box appears.
Select Recipes tab.	Recipe types appear.
Select Recipes (Variables).	The Recipe Editor appears.
THEN	
Select a Reference Configuration.	A recipe must have a configuration to give it context. Select an open configuration from the pull-down list. If none available, select Open Configuration to open one. The configuration will open. Click back to Recipe Editor and select the reference configuration.
Name and Description	Identify the recipe.
Variable Tag List	Lists all variable tags in the reference configuration. Click on a tag and click Add to add it to the recipe.

Recipe Items
  Name
  Value
	Lists all variables in the recipe.
	  Name of variable
	  Value/state of variable. If analog variable, enter a value in the value field. If digital variable, select ON or OFF.

Delete	Deletes selected item from recipe.

Step/Item	Action/Description
Print	Prints the recipe
Save	Saves the recipe as .RCP file.
Download	Downloads recipe to the controller's recipe pool where it can be edited or loaded into the controller's active configuration.

Recipe Pool

Introduction

This is the recipe (variables) pool. The Recipe Pool lets you view a Recipe on a list of configured Recipes.

Configuration

When you select "Recipes (Variables)" from the Recipes menu, the "Recipe Pool" dialog box will be displayed. From left to right the icons are:

PRINT a Recipe:
Click on a recipe name and then select the **Print** icon. The "Print" dialog box will appear.
Select OK.
A recipe report will be printed with all the information entered on the "Recipe Properties" dialog box. [Variable, Description, Value or State]

SAVE a Recipe:
To save a recipe as a .rcp file, click on a recipe name and then select the Save icon. The "Save As" dialog box will appear.

DOWNLOAD a Recipe:
To download a recipe to the controller's recipe pool, click on the Download icon.

Setup/Edit a Recipe in Pool

The "Edit Recipes" dialog box lets you viewa recipe listed in the "Recipe Pool."

Make sure you have clicked on "Properties " and have given that specific recipe a name and description. See RECIPE POOL before proceeding.

Procedure

Click on a recipe name in the active field and select "Recipe" or double click on the recipe name. The "Edit Recipe" dialog box will appear.

To ADD Variable to a Recipe:
Select a variable and click on ADD. A variable number will appear under "Recipe Items".

To DELETE a Variable from a Recipe:
Select a **variable number** from the "Recipe Items" field, then click "Delete".

To SET UP a Recipe Item
From the "Recipe Items" list, select a variable name from the list of recipe items.

If it is an **analog variable**, **enter a value** in the value field.

If it is a **digital variable**, **select ON or OFF**, from the drop-down menu in the Value field, as a digital state for the variable.

Repeat this procedure for each **recipe variable** desired for the recipe you are configuring.

Click "OK". The length of the Recipe (number of variables) will appear in the "Recipe Pool".

Click "CLOSE" on the "Recipe Pool' dialog box to complete the configuration.

Recipe Properties

The Recipe Properties dialog box contains fields for you to view:

- a recipe name.
- a descriptor of 16 characters.

16.   Setpoint Profiles

Create/Edit Setpoint Profile File

Creates/edits a setpoint profile be saved as a file (.PRF). File can be downloaded to the setpoint profile pool. A profile in the pool can be edited or loaded into the controller's active configuration.

Step/Item	Action/Description
Select File, Open.	Lets you choose a .PRF file to edit. After selecting file the Profile Editor appears.
OR	
Select File, New.	"Choose a new file type" box appears.
Select Recipes tab.	Recipe types appear.
Select Setpoint Profile	The Profile Editor appears.
THEN	
Name and Description	Identify the profile.
Properties	This function lets you set the properties for the profile. The information configured here will appear in the Edit SP Profile dialog box.
Ramp Type Eng. Units Time Units Aux. Out Units Guar. Hold Type Guar. Hold High Guar. Hold Low	Properties of the profile. You can change these under Properties.
Add	Adds a step.
Insert	Inserts a step.
Delete	Deletes selected step.
Type	Ramp or Soak. A ramp segment is a starting setpoint and the time or rate to reach the setpoint of the following segment. Typically, segment #1 will be a ramp.
SP Value	Setpoint value set for Ramp (starting Setpoint value) and Soak (soak setpoint value).

Step/Item	Action/Description
Time/Rate	Ramp time is determined in either: TIME*-Hours or Minutes Range = 0.00 hr. to 999.99 hr. / 0.00 min. to 999.99 min. OR RATE*-EU/MIN or EU/HR Range = 0 to 999.99 *This selection of time or rate is made when you configure properties. Make this selection before entering any Ramp. NOTE: When Ramp unit is configured for TIME, entering "0" will imply an immediate step change in setpoint to the next soak.
Aux. Out	In addition to the main ramp and soak output value, a second analog value is available for each step of the profile. This output is a fixed soak value, which may be used to provide a setpoint value for a secondary control loop in the process. An example would be a ramp and soak temperature program combined with pressure setpoints for each step of the profile.
Guar. Hold	OFF or ON. Choose ON to hold the program if a process variable exceeds a predefined deviation from setpoint.
Events	You can configure 1 to 16 segment events to turn ON or OFF at the beginning of each segment. Segment events are digital switches that provide ON/OFF outputs through an SPEV control block. When a segment event is turned ON, it remains ON until the end of the segment at which time it is turned OFF unless it is configured to turn ON in the next segment. Note that segment events are not interrupted by soak time delays when the process variable is outside the guaranteed soak band. Events turn ON as soon as the previous segment is completed even if the process variable has not reached the soak setpoint. When the program completes, the events are held at current value until the programmer is returned to the ready state.
Print	Prints the profile.
Save	Saves the profile as .PRF file.
Download	Downloads profile to the controller's Setpoint Profile Pool where it can be edited or loaded into the controller's active configuration.

Setpoint Profile Pool

Introduction

The SP Profile Pool lets you view a profile on a list of configured profiles. Through this dialog box you will view the properties for each profile and set up or edit the information for each segment that make up a profile.

Configuration

When you select "Setpoint Profiles" from the Recipes menu, the "Setpoint Profile Pool" dialog box will be displayed.

From left to right the icons are:

PRINT a Profile:
Select one or more profile names, and then click the **Print** icon. The "Print" dialog box appears for as many profiles as you have selected on the list.

Select OK. .
A profile report will be printed with all the information entered on the tabs of the 'Setpoint Profile Properties" dialog box.

SAVE a Profile:
To save a Profile as a .prf file, click on a recipe name and then select the Save icon. The "Save As" dialog box will appear.

DOWNLOAD a Profile:
Select one or more profile names, and then click the **Download** icon to download Profile(s) to the controller's Profile pool.

In the case of multiple profiles selection, a pop-up appears, that prompts the user to either click "Yes" to map each selected profile into the desired location in the controller's pool, or click "No" to load the selected profiles into the same location as given in the configuration.

Setup/Edit Setpoint Profile in Pool

Introduction

The "Edit Setpoint Profile" dialog box lets you view profile segments for the programs listed in the "Setpoint Profile Pool."

View a program

Click on a profile name in the active field and select the **Edit Item** Icon from the **Toolbar** on the dialog box   or double click on the profile name.

The "Edit Setpoint Profile Segments" dialog box will appear. It presents multiple segments at a time to view. Click on field for drop down menu to appear for some selections.

Edit Setpoint Profile Segments Dialog Box

The three main areas on the "Edit Setpoint Profile Segments" dialog box are:

Properties Information Area

This block of information was developed during "Properties" configuration. It lists the selection and values that were made on the "Setpoint Profile Properties" tab cards. These fields are read only; they are for reference only.

Profile Data Entry area

This data entry area lets you make selections.

Profile Segment Setup Buttons

View only.

Profile Setup/Edit Procedure

The Profile Setup/Edit Procedure consists of building a ramp/soak profile by entering a value or make a selection for each of the following fields. View only.

- adding or inserting segments to a list of segment
- selecting the type of segment—Ramp **or Soak** (drop-down menu)
- selecting Guaranteed Soak (On or Off) for soak segments, if desired (drop-down menu)
- entering the Setpoint value for the ramp or soak
- entering the value of the time or ratio for the segment
- selecting an Aux. Out value (if required) for the segment
- selecting the events (1 - 16) you want turned on or off at the beginning of the segment (drop-down menu)
- repeating the procedure for all the segments in the program

Setpoint Profile Properties

Introduction

This function lets you view the properties for the program selected in the Setpoint Profile Pool.

Parameters

Refer to the table below for properties.

Parameter	Parameter Description
TEXT	
Label	Profile Name
Descriptor	Description of Profile
Primary Output Label	Primary Output Descriptor Name.
Primary Output Engineering Units	Primary Output Engineering Units descriptor
Auxiliary Output Label	Auxiliary Output Descriptor name
Auxiliary Output Engineering Units	Auxiliary Output Engineering Units descriptor

GENERAL	
Ramp Type	
Rate	Each ramp segment's time specifies the RATE at which that profile's output will reach the next segment.
Time	Each ramp segment's time is the TIME allotted to the profile's output to reach the next segment's value in hours or minutes.
Guaranteed Hold Type	
None	No guaranteed hold if a PV deviates a specified amount above or below the profile output.
Per Segment	Lets you select specific segments for guaranteed soak where you set up the profile ramps and soaks.
All Soaks	All soaks will have a guaranteed soak.
All Segments	All segments will have a guaranteed soak
Time Units	
Hours	This selection assigns the time units of all segments in HOURS.
Minutes	This selection assigns the time units of all segments in MINUTES.
Guaranteed Hold High	A Number in Engineering Units above the setpoint outside of which the timer halts
Guaranteed Hold High	Enter a Number in Engineering Units below the setpoint outside of which the timer halts.
LOOP/JOG	
Jog Segment	Segment number jog will go to.
Loop	
Start Segment	This designates the number of the first segment of the loop.
End Segment	This designates the number of the last segment of the loop. The last segment of a program must be a soak segment. Last segment of a loop can be a ramp or soak.
Cycles	This number lets the program repeat (loop) a specified number of time from beginning to end. An entry of 0 will cause an indefinite loop.
START/RESTART	
Restart Rate	The Restart Rate value is used to return the process to the last operating setpoint prior to power loss when restart input is connected to power off timing block.

Click on the tab to access the properties for that tab.

Click on the profile name in the Setpoint Profile Pool and select the Edit Segments Icon (3rd from left) from the Toolbar on the dialog box.

17. Setpoint Schedules

Create/Edit Setpoint Schedule file

Creates/edits a setpoint schedule be saved as a file (.SCH). File can be downloaded to the setpoint schedule pool. A schedule in the pool can be edited or loaded into the controller's active configuration.

Step/Item	Action/Description
Select File, Open.	Lets you choose a .SCH file to edit. After selecting file the Schedule Editor appears.
OR	
Select File, New.	"Choose a new file type" box appears.
Select Recipes tab.	Recipe types appear.
Select Setpoint Schedule.	The Schedule Editor appears.
THEN	
Select a Reference Configuration.	A schedule must have a configuration to give it context. Select an open configuration from the pull-down list. If none available, select Open Configuration to open one. The configuration will open. Click back to Schedule Editor and select the reference configuration.
Name and Description	Identify the schedule.
Properties	Sets properties for the schedule, such as time units and guaranteed hold limits.
Time	Length of time for the segment.
SP1-SP8	Setpoint values. For ramp segments these are the starting values.
Events 1-16	Segment events are digital switches that provide ON/OFF output through an SPS function block. When a segment event is turned ON, it remains on until the end of the segment at which time it is turned OFF unless it is configured to turn ON in the next segment. Select from the drop-down menu which events you want to turn ON or OFF at the beginning of each segment.
Aux1-Aux8	The auxiliary block supports up to 8 soak only outputs. You can assign values to all eight Auxiliary Outputs for each segment.

Step/Item	Action/Description
GHold1-GHold8	Setpoint guarantee is provided for the master block setpoints with a single symmetrical value for each setpoint output. Actions for the guarantee soak may be set on a per segment basis for OFF, HIGH setpoint deviation, LOW setpoint deviation or both HIGH and LOW setpoint deviations. Click on an active field and select a GHOLD Type from Drop-down menu: OFF - No Guaranteed Hold HIGH setpoint deviation - The schedule will hold if a PV deviates above the Setpoint value set. LOW setpoint deviation - The schedule will hold if a PV deviates below the Setpoint value set on the "Setpoint Schedule Properties" dialog box. HIGH and LOW setpoint deviations - The schedule will hold if a PV deviates above or below the Setpoint value set on the "Setpoint Schedule Properties" dialog box.
Recycle Segment	The segment number at which a recycle will start. Enter a value 0 to 50
Recycle Count	This number lets the schedule repeat (loop) a specified number of times. Enter a value 0-999 or 0 for infinite.
Delete	Deletes selected item from schedule.
Print	Prints the schedule.
Save	Saves the schedule as .SCH file.
Download	Downloads schedule to the controller's schedule pool where it can be edited or loaded into the controller's active configuration.

Setpoint Schedule Pool

Introduction

The SP Schedule Pool lets you view a schedule on a list of configured schedules.

Configuration

When you **select "Setpoint Schedules" from the Recipe menu**, the "Setpoint Schedule Pool" dialog box will be displayed.

From left to right the icons are:

PRINT a Schedule:
Click on a schedule name and select the **Print** icon. The "Print" dialog box will appear.
Select OK.
A profile report will be printed with all the information entered on the tabs of the "Setpoint Schedule Properties" dialog box.

SAVE a Schedule:
To save a Schedule as a .sch file, click on a recipe name and then select the Save icon. The "Save As" dialog box will appear.

DOWNLOAD a Schedule:
To download a Schedule to the controller's Schedule pool, click on the Download icon.

Setup/Edit Setpoint Schedule in Pool

Introduction

The "Edit Schedule" dialog box lets you view a schedule from the schedules listed in the "Setpoint Schedule Pool."

Edit a Schedule

Click on a schedule name in the active field and select the **Edit Segments** Icon (3rd from left) from the **Toolbar** on the dialog box or double click on the schedule name.

The "**Edit Schedule Segments**" dialog box will appear with the selected Schedule indicated on the top banner. The Process Control Utilities presents multiple segments at a time to view.

Parameter	Parameter Description
Time	Length of time for the segment Time Units were selected in the "Setpoint Schedule Function Block Properties " Dialog Box
Setpoint Values	Setpoint 1 through Setpoint 8
Ghold Type [Ghold1 thru Ghold8]	Setpoint guarantee is provided for the master block setpoints with a single symmetrical value for each setpoint output. Actions for the guarantee soak may be set on a per segment basis for OFF, HIGH setpoint deviation, LOW setpoint deviation or both HIGH and LOW setpoint deviations.
	OFF - No Guaranteed Hold
	HIGH setpoint deviation The schedule will hold if a PV deviates above the Setpoint value set.
	LOW setpoint deviation The schedule will hold if a PV deviates below the Setpoint value set on the "Setpoint Schedule Properties" dialog box.
	HIGH and LOW setpoint deviations The schedule will hold if a PV deviates above or below the Setpoint value set on the "Setpoint Schedule Properties" dialog box.
Auxiliary Outputs [Aux1 thru Aux8]	The auxiliary block supports up to 8 soak only outputs. You can assign values to all eight Auxiliary Outputs for each segment.
Recycle Segment	The segment number at which a recycle will start
Recycle Count	This number lets the schedule repeat (loop) a specified number of times.
Events [Events 1 thru 16]	Segment events are digital switches that provide ON/OFF output through an SPS function block . When a segment event is turned ON, it remains on until the end of the segment at which time it is turned OFF unless it is configured to turn ON in the next segment.

Setpoint Schedule Properties

Introduction

This function lets you view the properties for the schedule selected in the Setpoint Schedule Pool. If you are adding a schedule, this dialog box will automatically appear. It will also appear if you select the **Worksheet Properties** Icon (2nd from left) from the **Toolbar** on the dialog box. The information configured here will appear in the "Edit Schedule Segment" dialog box.

Parameter	Parameter Description
General	
Label	Schedule Name
Descriptor	Description of schedule
Jog Seg	Logic input (JOG) on state switch block will cause the schedule to jump to the start of the segment designated then continue.
Time Units	This selection assigns the time units (hours *or* minutes) for all segments.
Hours	Time unit in Hours
Minutes	Time unit in Minutes
Guaranteed Hold Limit	The schedule will hold if a PV deviates above or below (or both) the Setpoint value set here. Select Guaranteed Hold Type on the "Setpoint Edit Schedule" dialog box.

18. Sequences

Create/Edit Sequence File

Creates/edits a sequence be saved as a file (.SEQ). File can be downloaded to the sequence pool. A sequence in the pool can be edited or loaded into the controller's active configuration.

Step/Item	Action/Description
Select File, Open.	Lets you choose a .SEQ file to edit. After selecting file the Sequence Editor appears.
OR	
Select File, New.	"Choose a new file type" box appears.
Select Recipes tab.	Recipe types appear.
Select Sequence.	The Sequence Editor appears.
THEN	
Select a Reference Configuration.	A sequence must have a configuration to give it context. Select an open configuration from the pull-down list. If none available, select Open Configuration to open one. The configuration will open. Click back to Sequence Editor and select the reference configuration.
Name and Description	Identify the sequence.
Properties	Sets properties for the sequence, such as jog step and time units.
Add	Adds a step to the sequence.
Time	Length of time for the segment.
SP1-SP8	Setpoint values at the start of the segment.
State	State number for each step of the sequence. A state may be selected multiple times in the sequence. Since time is an attribute of the sequence, the state may be activated for a different time period each time it is selected. (The order does not have to be sequential). Enter a State Number in each active field. States are numbered from 1 to 50.
State name	Name of current state. Enter a state name (12 character max.) Examples: Heating, Cooling, Mixing.

Step/Item	Action/Description
Time in Step	Time duration value for each step of the sequence. Time units can be changed under Properties.
Time in Next Step	Designates the step the sequence will advance to when the time expires. It can be any step in the sequence, including steps that have been previously executed. Enter 0 to stop the sequence after current step expires and to hold the outputs.
Event Signal #1	Click on the Event Signal #1 field and from the drop-down menu, select the event you want signal #1 to represent.
Event 1 Next Step	Each state of the sequence can also be configured to accept two different events to terminate the step. Whichever occurs first—an Off-to-On (rising edge) transition of either event signal OR elapsed step time—will cause the sequence to advance to the appropriate next step. Enter a value for Event 1 Next Step.
Event Signal #2	Click on the Event Signal #2 field and from the drop-down menu, select the event you want signal #2 to represent.
Event 2 Next Step	Each state of the sequence can also be configured to accept two different events to terminate the step. Whichever occurs first—an Off-to-On (rising edge) transition of either event signal OR elapsed step time—will cause the sequence to advance to the appropriate next step. Enter a value for Event 2 Next Step.
Advance Next Step	Allows you to select an appropriate action for the manual advance OI action or function block digital advance input. Enter a value.
Aux. Value	Enter an analog output value associated with each state.
Delete	Deletes selected step from sequence.
Print	Prints the sequence.
Save	Saves the sequence as .SEQ file.
Download	Downloads sequence to the controller's schedule pool where it can be edited or loaded into the controller's active configuration.

Sequence Pool

Introduction

The Sequence Pool lets you add or delete a Sequence on a list of configured Sequences and also enter the "Properties" function and the "Edit Sequence " function to set up each Sequence.

Configuration

When you **select "Sequences" from the Recipes menu**, the "Sequence Pool" dialog box will be displayed. From left to right the icons are:

PRINT a Sequence:
Click on a sequence name and then select the **Print** icon. The "Print" dialog box will appear. Select OK.
A sequence report will be printed with all the information entered on the "Sequence Properties" dialog box. [Label, Description, Jog Step, and Time Units in Hours or Minutes]

SAVE a Sequence:
To save a sequence as an .seq file, click on a recipe name and then select the Save icon. The "Save As" dialog box will appear.

OPEN a Sequence:
To open a previously saved .seq file and insert it into the pool, click on the Open icon.

DOWNLOAD a Sequence:
To download a sequence to the controller's sequence pool, click on the Download icon.

Setup/Edit Sequence in Pool

Introduction

The "Edit Sequence" dialog box lets you set up or edit a sequence from the sequences listed in the "Sequence Pool" dialog box.

Make sure you have clicked on "Edit Properties" toolbar icon and have configured the properties for that specific Sequence.

Edit a Sequence

Click on a Sequence name in the active field and select the **Edit Item** Icon (3rd from left) from the **Toolbar** on the dialog box or double click on the Sequence name.

The "**Edit Sequence**" dialog box will appear with the selected Sequence indicated on the top banner. Several Steps are shown for viewing and editing.

Each step contains the following Step attributes:

Parameter	Parameter Description	Entry Information
State Number	State number for each step of the sequence. A state may be selected multiple times in the sequence. Since time is an attribute of the sequence, the state may be activated for a different time period each time it is selected. (The order does not have to be sequential)	Enter a State Number in each active field. States are numbered from 1 to 50
State Name	Name of current state	N/A
Time in Step	Time duration value for each step of the sequence. Time Units are selected on the Sequence Properties dialog box	Enter values for all Steps in the appropriate fields.
Time Next Step	Designates the step the sequence will advance to when the time expires. It can be any step in the sequence, including steps that have been previously executed.	Enter a number for the next step when time expires on current step. Enter 0 to stop the sequence after current step expires and to hold the outputs.
Event Signal #1	The event signal is a digital signal defined in the sequencer block. When Event Signal #1 signal transitions from FALSE to TRUE the sequence will jump to the step defined in Event 1 Next Step.	N/A
Event 1 Next Step	An off-to-on (rising edge) transition of Event Signal #1 will cause the sequence to advance to the step specified here.	Enter a value for Event 1 Next Step.
Event Signal #2	The event signal is a digital signal defined in the sequencer block. When Event Signal #2 signal transitions from FALSE to TRUE the sequence will jump to the step defined in Event 2 Next Step.	N/A
Event 2 Next Step	An off-to-on (rising edge) transition of Event Signal #2 will cause the sequence to advance to the step specified here.	Enter a value for Event 2 Next Step.
Advance Next Step	Allows you to select an appropriate action for the manual advance OI action or function block digital advance input	Enter an "Advance Next Step" value.
Aux Value	Enter an analog output value associated with each state.	Enter an analog output value.

Sequence Properties

Introduction

This function lets you set the properties for the sequence selected in the Sequence Pool. If you are adding a Sequence, this dialog box will automatically appear. It will also appear if you select the **Worksheet Properties** Icon (2nd from left) from the **Toolbar** on the dialog box. The information configured here will appear in the "Edit Sequence" dialog box.

Configuration

Refer to the table below and enter the properties information in the appropriate fields in the dialog box, then click "OK" to return to the "Sequence Pool" dialog box.

Parameter	Parameter Description	Entry Information
General		
Label	Sequence Name	6 characters
Descriptor	Description of Sequence	16 characters
Jog Step	Logic input (JOG) on state switch block will cause the Sequencer to jump to the start of the step designated then continue.	Step number jog will go to
Time Units	This selection assigns the time units (hours or minutes) for all Steps.	
Hours	Time unit in Hours	Click on Radio button
Minutes	Time unit in Minutes	Click on Radio button

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19.   On-Line Monitoring

Overview

Process Control Utilities Monitoring provides the following:

Multiple, concurrent function block Monitor Windows

You can open as many Function Block monitor windows as you want until you run out of physical resources on the PC

You can open Function Block monitor windows concurrently for Function Blocks on *different* Function Block Diagram Worksheets

Function Block monitor window can be resized to better suit concurrent windows

Provides a Watch Window to view groups of related data such as I/O and Signal Tags

Allows Monitoring to cross all FBD worksheet boundaries

There are no boundaries

You can call up Function Block monitor windows from any or all FBD worksheets concurrently

The Watch Window implicitly crosses all worksheets

All other diagnostic windows can also be open concurrently

Select "Monitor Mode" from the "Monitor" menu or select the "Monitor" icon from the Main Toolbar ![icon].

You can specify the monitor update rate that determines how often data is collected from the controller during monitoring. This update rate can be set to either 1/4 second, 1/2 second, 1 second, or 5 seconds.

See "Monitor Toolbar" for the available Monitoring and Diagnostic Windows.

See "Visual Indicators for Monitor Mode" for on-line monitoring indicators.

Enter Monitor Mode

Select "Monitor Mode" from the "Monitor" menu or select the "Monitor" icon from the Main Toolbar. ![icon]

While in monitor mode, edits to the configuration cannot be made.

Procedure

1. Selecting this menu item opens the "Enter Monitor Mode" dialog box.
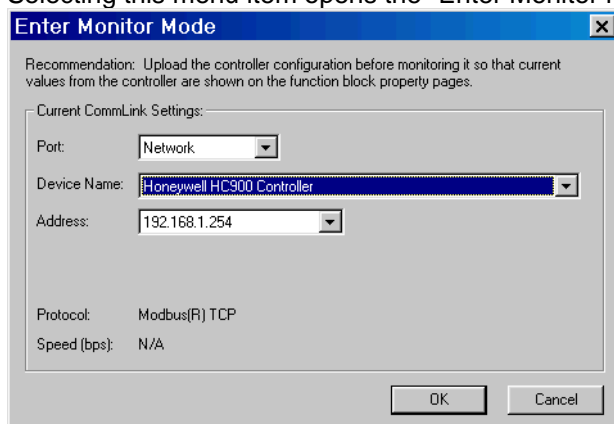
2. Select the controller to monitor using the Port and Address fields on this dialog. The dialog box also indicates the Protocol and Baud rate for the selected controller.

3. Click the OK button on this dialog to enter monitor mode for this configuration.

4. The background of the function block diagram worksheet changes to yellow and the cursor includes the Monitor icon [Eye} with the arrow.
See "Visual Indicators for Monitor Mode".

5. The Monitor Toolbar will appear, whose buttons you can use to toggle (show or hide) the various monitor windows. These windows can also be toggled using menu items on the Monitor menu.

6. When exiting monitor mode, any monitor windows still open will be closed and will be re-opened at their same positions when monitor mode is re-entered for this configuration.

Visual Indicators for Monitor Mode

When "Monitor Mode" is selected there are several indications that the configuration is in Monitor Mode.

- The "Connected" indicator on the Status Bar will blink to show that the controller, whose name appears next to it, is being monitored. `Connected : Furnace1  ▪ Page #  ⏮ ◀    1    ▶ ⏭`

- The cursor changes to include the Monitor icon [Eye] along with the arrow.

- The word **<Monitoring>** appears in the configuration Title Bar at the top of the diagram.

- The background color of the Function Block Diagram changes to **YELLOW.**
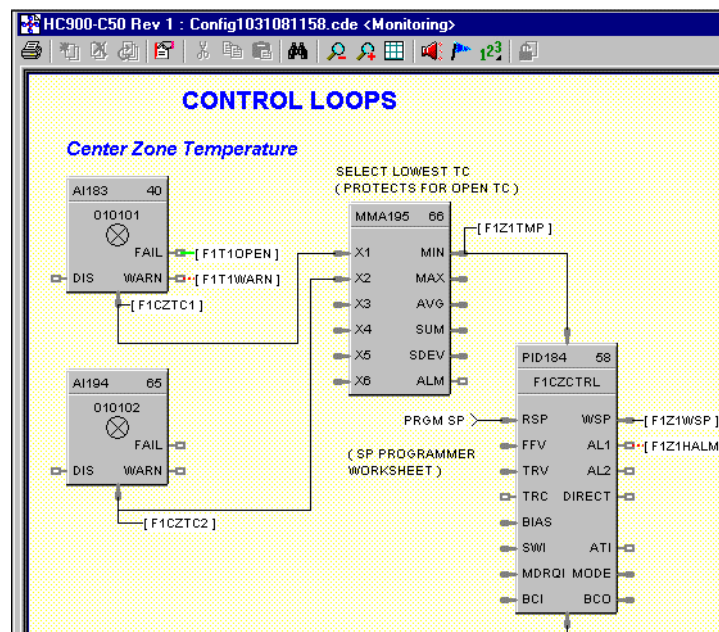
Monitor Update Rate

Introduction

You can specify the monitor update rate that determines how often data is collected from the controller during monitoring. This update rate can be set to either 1/4 second, 1/2 second, 1 second, or 5 seconds.

This option is **allowed only during edit mode**, not while you are monitoring the controller. The default monitor update rate is 1 second and this update rate is remembered between sessions of the software.

If you want to monitor from a relatively slow computer set the monitor update rate to a slow setting.

Procedure

1. Select "Set Update Rate" from the "Monitor" menu on the Main Drop-down menus.
2. Select an Update Rate from the Sub-menu:
   1/4 Second
    1/2 Second
   1 Second, or
    5 seconds

Monitor Toolbar
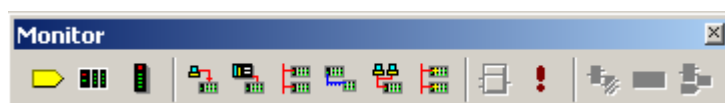
Click on ICON to open a dialog box. More than one dialog box can be open at a time.

The Monitor Toolbar toggles monitor windows for the following:

ICON	Function	Window Comments
	Watch Summary	Toggles the Watch Summary Window that lets you view groups of related data such as I/O and Signal Tags.
	Controller Diagnostics	Toggles the Controller Diagnostics Window that lets you view the controller parameters and values.
	Rack Diagnostics	Toggles the I/O Rack Diagnostics window that lets you view the Rack Diagnostics, Expansion I/O Comm Diagnostics (except C30 CPU), and the I/O Module diagnostics.
	Serial S1 Port Diagnostics	Opens the Serial Port S1 Configuration Port Diagnostics window that lets you view the parameters and values of the S1 port on the controller.
	Serial S2 Port Diagnostics	Toggles the Serial Port S2 (RS485 default) OI Port Diagnostics window that lets you view the S2 port (default RS485 Operator Interface) parameters and values.
	Network Port Diagnostics	Toggles the Network Port Diagnostics window that lets you view the network port parameters and values.
	Expansion I/O Comm Diagnostics (except C30 CPU)	Toggles the Expansion I/O Comm Diagnostics window that lets you view the expansion port parameters and values.

ICON	Function	Window Comments
	Master Connections Diagnostics	Toggles the Master Connections window that lets you view the master connections parameters and values.
	Peer-to-Peer Diagnostics	Toggles the Peer-to-Peer Connections Diagnostics window that lets you view the Peer-to-Peer parameters and values.
	Function Block Monitor	Toggles the Monitor Function Block window that lets you monitor key parameters of the selected Function Block.
	Forced Blocks Window	Toggles the Forced Block Summary Window Window that lets you see all the function blocks that have forced outputs.
	All Function Block Windows	Lets you toggle the function block windows that are open - Display or Hide
	All Pins	Lets you toggle (display/hide) monitoring values (numeric or On/Off state) at all input and output pins that are shown.
	All Monitor Windows	Lets you toggle the Monitor windows that are open - Display or Hide.

How Do I Start Monitoring

Procedure

1. Either upload the configuration from the controller to your PC or Open the file from disk that matches what's in the controller. Process Control Utilities will inform you if the file you opened is not currently loaded in the controller. In this case, limited monitoring capabilities will be available. For example, you won't be able to monitor function blocks or bring up the Watch Summary Window.
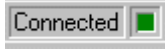
2. Press the MONITOR button on the main toolbar.

   The "Enter Monitor Mode" dialog box will open.
   Note: *While in monitor mode, you won't be able to edit the configuration. For example, you won't be able to add or delete function blocks, move items on the Function Block Diagram, or change configuration parameters of function blocks on their property pages. You will, however, be able to view the configuration parameters of function blocks on their property pages, but these values aren't being read from the controller. They exist only in the configuration open in Process Control Utilities. That is why it is recommended that you perform an upload from the controller before monitoring so that current values from the controller are shown on the function block property pages."*

3. Select the Comm port and controller address to monitor. Press **OK**.
   It checks to see if information is the same in the controller.

4. The feedback will be the monitor toolbar.

The Status Bar shows Connected ■ on bar indicates that monitor mode is in effect. The green square is an activity indicator and flashes bright green when requests for monitored data are made to the controller.

There is also the word "Monitoring" indicated on the banner of the worksheet, the FBD worksheet background turns yellow and an eye appears with the cursor arrow.
See "Visual Indicators for Monitor Mode" for on-line monitoring indicators.

Right Click Procedure in Monitor Mode

Depending where you right-mouse click on the FBD worksheet during monitoring, the resulting menu will have some differences.

Below each item in red is shown the menu items that appear when you right-click on that item on your FBD during Monitor Mode.

	Right click on these					
	Function Block	**Variable**	**Yellow Space**	**Signal Tags**	**Connectors**	**Page Connectors**
To see these choices	Monitor Block	Monitor Block	Execution Order	Watch Summary	Watch Summary	Watch Summary
	Watch Summary	Watch Summary	Fast Logic Order	Add to Watch Summary	Add to Watch Summary	Add to Watch Summary
	Monitor Pins	Add to Watch Summary	Find	Monitor Pins	Monitor Pins	Monitor Pins
	Help	Monitor Pins	Go To	Help	Help	Help
	Execution Order	Help	View	Find Where Used	Find Where Used	Find Where Used
	Copy	Execution Order	Properties (File)	Properties (Signal Tag)	Properties (Connector)	Properties
	Properties (Function Block)	Copy				
		Properties (Function Block)				

	Right click on these		
	Input Pins	**Output Pins**	**Wire Node**
To see these choices	Trace	Monitor Pins	Help
	Monitor Pins		

Function Block Monitor Window

The Process Control Utilities provides live monitoring of all Function Blocks.

To access, select "Monitor Function Block" from the "Monitor" menu or from the Monitor toolbar.

Or

Right Click a function block or variable in Monitor Mode and select the Monitor Block menu item.

The summary will provide status of the parameters shown in the list.

For "Loop" blocks, the current mode will be shown in the lower right of the window
      LSP AUTO = Local Setpoint, Automatic Output
      LSP MAN = Local Setpoint, Manual Output
      RSP AUTO = Remote Setpoint, Automatic Output
      RSP MAN = Remote Setpoint, Manual Output
      To change Mode settings of a loop block, click on a radio button to select
            Local or Remote Setpoint
            Automatic or Manual Output

Click the "Change Mode" button to change the mode.

Changing a Parameter

Some blocks allow you to change some parameters. Click on a parameter name, if allowed the "Write" field will become active. Enter an override value in the field.
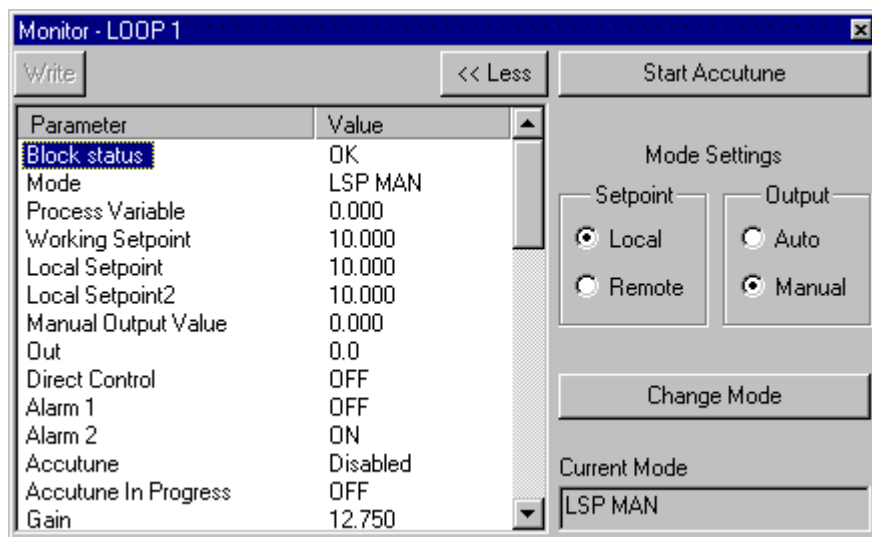
Channel/Sensor Status

I/O blocks display a parameter called Channel/Sensor Status to indicate any abnormalities. See I/O Channel/Sensor Status for details.

Click on "X" to exit box.

Attention: All function blocks dialog boxes have a "MONITOR" button when in Monitor mode that will access this window.

Below is an example of a Monitor Window for a PID block.

Forced Blocks Window

Overview

The Forced Blocks window provides a list view of all function blocks that have forced outputs and provides a quick means of removing the forced outputs on selected block. The Forcing and Unforcing of function block outputs is a feature that is only available in Monitor Mode. For more information on how to force function block outputs see Forcing/Unforcing an Output.

Opening the Window

The Forced Blocks Window is represented by the Exclamation Mark icon and can be accessed in 3 ways as described below. For each method, the system must already be in Monitor Mode for the option to be available.

Monitor Menu

1. Select **Monitor** from the main application menu.
2. Select ! **Forced Blocks…** to launch the Forced Blocks window.

Monitor Mode Toolbar

1. Click on the ! button in the **Monitor Mode Toolbar** from the main application toolbar.

Utilities Worksheet

1. Select the 🔧 Utilities tab from the main Worksheet Category Tabs to display the Controller Utilities worksheet.
2. Click on the 🧰 button to bring up the Controller Diagnostics submenu.
3. Select ! Forced Blocks… to launch the Forced Blocks window.

Unforcing Block Outputs

There are two versions of the Forced Blocks dialog window, depending on whether or not the controller being monitored is one that supports the SIL Safety standard. For SIL compliant controllers the version shown on the left below will be displayed. For non SIL compliant controllers the version shown on the right below will be displayed.
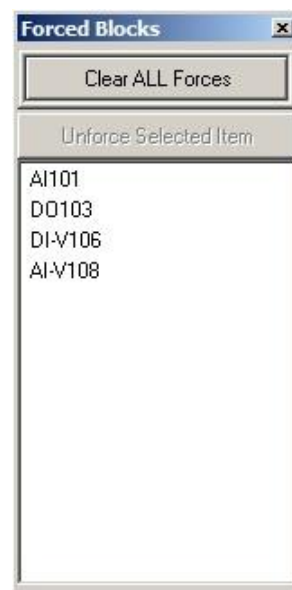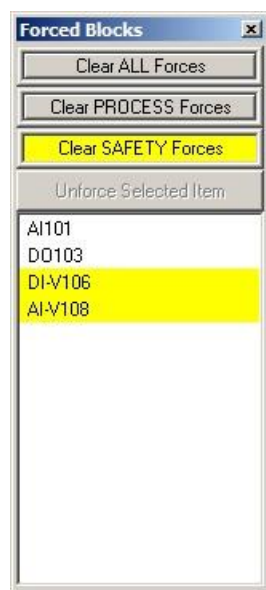
Both versions of the window have a list box displaying a list of all the function blocks that currently have forced outputs.

- Function blocks located on a Safety worksheet have a yellow background.
- Function blocks located on a Process worksheet have a white background.
- If no function blocks have forced outputs the word NONE is displayed.
- If new forces are added or removed from individual function block monitor windows the list will be updated dynamically.

Both versions of the window have a **Clear ALL Forces** button that allows all forced outputs to be cleared with one click. For Safety enabled controllers there are additional **Clear PROCESS Forces** and **Clear SAFETY Forces** buttons that allow forced outputs on the Process and Safety worksheets to be cleared independently. In either, case a warning message similar to the one shown below will be displayed requesting confirmation before the action is taken.

Both versions of the window have an **Unforce Selected Item** button that allows the output of a single function block to be unforced. To enable this button, click on the desired function block as shown below. (Multiple selections using the Shift or Ctrl keys are not allowed.)
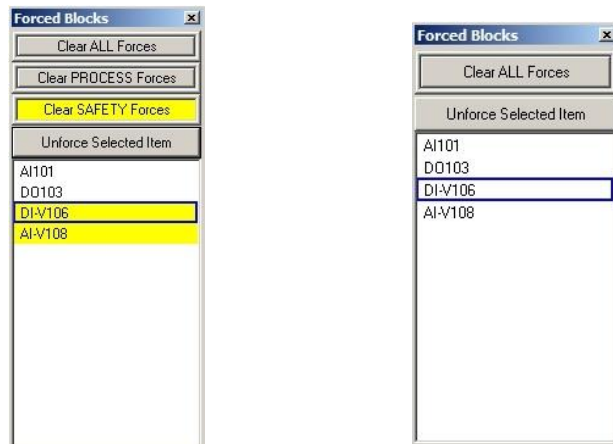
Clicking on the **Unforce Selected Item** will now clear the forced output on the selected function block. In this case the action takes place immediately and no confirmation is required.

Exiting

To close the Force Blocks window click on the **X** in the top right-hand corner.

How Do I Stop Monitoring

Press the MONITOR button on the main toolbar.

This will return the associated configuration to VIEW mode.

Feedback will be the monitor button (unpressed), and all open monitor windows will disappear. The FBD Worksheet background returns to white and the eye disappears from the cursor.

Attention: If you return from VIEW mode to Monitor mode, all your previously opened monitor windows will appear (if the same configuration)

Logic Flow

Overview

In Monitor Mode, Logic Flow is shown within the Configuration Worksheet Monitor Window.

Soft Wires are identified to represent the Logic state at the pin of the source in monitor mode.

Function Block pin values can be monitored briefly or you can stick the values on display until you dismiss them. Analog Values are in decimal format and Digital States are On/Off.

Digital Signal Tags and corresponding Connectors at the block pins include color-coded representations for state changes.

Page Connectors include color-coded representations for state changes.

Logic Inversion indicators are pictorially identified on the block and are color-coded to identify logic states impeding or permitting logic flow.

CAUTION

During Live-Monitoring (especially fast scan), it is possible to see transient states where the block output is inconsistent with its input values. This occurs because it is possible for the input values and outputs values to be taken from different controller execution cycles. Therefore, either the viewed inputs or outputs may be "older". Logic monitoring is appropriate for static conditions.

Soft Wire Identification

Solid/Green = On, Dotted/Red = Off

Logic State at the Output Pin = ON

The Digital Signal Tag and its corresponding Connector/Page Connector will have the entire length of its tail drawn in solid GREEN.

Logic State at the Output Pin = OFF

The Digital Signal Tag and its corresponding Connector/Page Connector will have the entire length of its tail drawn in dashed RED.

Solid/Red = On, Dotted/Green = Off

Logic State at the Output Pin = ON

The Digital Signal Tag and its corresponding Connector/Page Connector will have the entire length of its tail drawn in solid RED.

Logic State at the Output Pin = OFF

The Digital Signal Tag and its corresponding Connector/Page Connector will have the entire length of its tail drawn in dotted GREEN.

Signal Tags and Connectors/Page Connectors

Digital Signal Tags and Connectors/Page Connectors include color-coded representations for state changes as substitutes for soft-wires. To select one of the following color schemes, go to Monitor menu, then Set Logic State Colors.
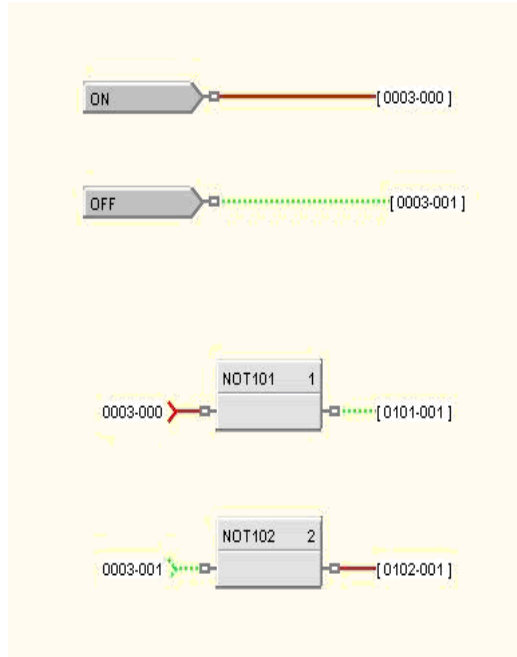
Solid/Green = On, Dotted/Red = Off

Logic State at the Output Pin = **ON**

The Digital Signal Tag and its corresponding Connector/Page Connector will have the entire length of its tail drawn in solid GREEN.

Logic State at the Output Pin = **OFF**

The Digital Signal Tag and its corresponding Connector/Page Connector will have the entire length of its tail drawn in dashed RED.
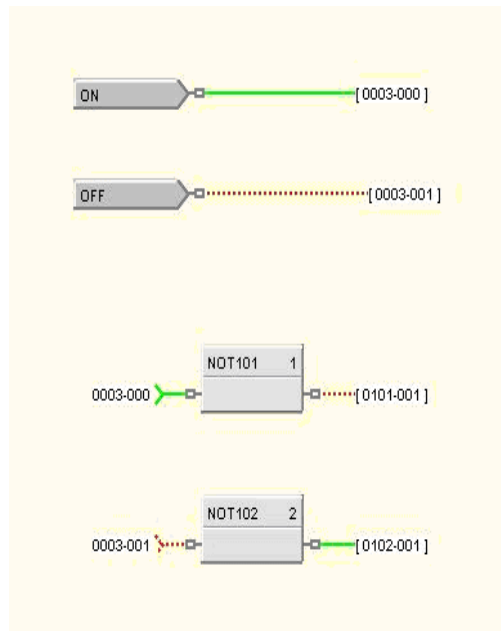
Solid/Red = On, Dotted/Green = Off

Logic State at the Output Pin = **ON**

The Digital Signal Tag and its corresponding Connector/Page Connector will have the entire length of its tail drawn in solid RED.

Logic State at the Output Pin = **OFF**

The Digital Signal Tag and its corresponding Connector/Page Connector will have the entire length of its tail drawn in dotted GREEN.

Displaying Function Block's Pin Values

Function Block pin value(s) can be monitored **briefly** and you can set one or all the values on display (**constant display**) until you dismiss them. Analog Values are in decimal format and Digital States are On/Off.

Displaying a Single Pin Value
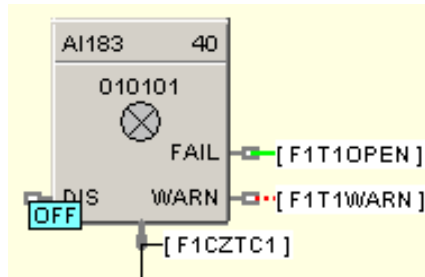
Displaying Briefly

Hover the cursor over any pin momentarily. The pin's value will be displayed next to the pin as long as the cursor remains motionless over the pin.

To **remove** the briefly displayed value:
> remove the cursor from the pin.

Displaying Until Dismissed (Constant Display)

Hover the cursor over any pin and left-click while the pin value is displayed, or right-click and select "Monitor Pins" from the menu.

To **remove** the constantly displayed value:
> left-click on the pin again, or
> right-click and select "Monitor Pins" again from the menu.

Displaying All Function Block Pin Values
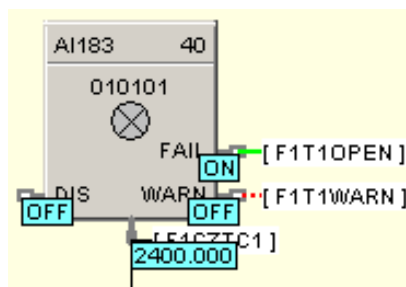
Displaying Briefly

Hover the cursor over the interior of a function block momentarily. All the Function Blocks pin values will be displayed next to the pins as long as the cursor remains motionless over the block.

To **remove** the briefly displayed values:
> remove the cursor from the block.

Displaying Until Dismissed

Hover the cursor over the interior of a function block and left-click while the pin values are displayed, or right-click and select "Monitor Pins" from the menu.

To **remove** the constantly displayed value:
> left-click on the pin again, or
> right-click and select "Monitor Pins" again from the menu.

Toggling All Pin Values on Worksheet

Select on the Monitor Toolbar or select "Monitor Pins" from the Monitor menu.

NOTE: Any pin values shown when monitor mode is exited will be re-shown when Monitor mode is re-entered. This only applies to the current session of the application and not between sessions of the application.

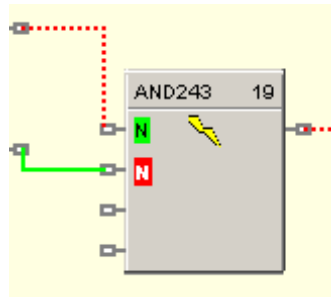**Logic Inversion Color Codes**

Logic Inversion indicators are pictorially identified on the block and are color-coded to identify logic states impeding or permitting logic flow.
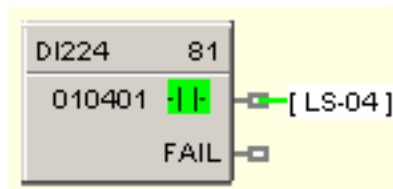
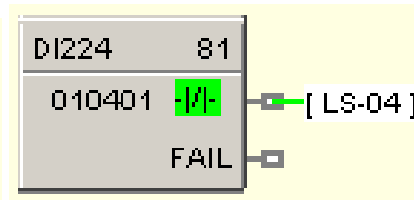*Logic Blocks Inversion Indicators*
RED = OFF
GREEN = ON

Digital Input Blocks Inversion Indicators

Digital Output Blocks Inversion Indicators
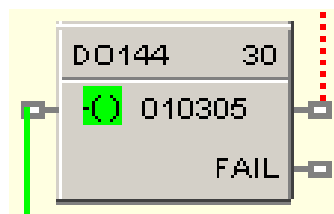
ON   **or Inverted ON**
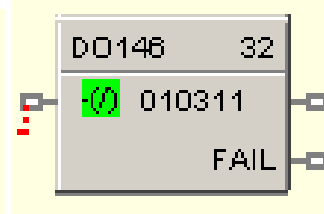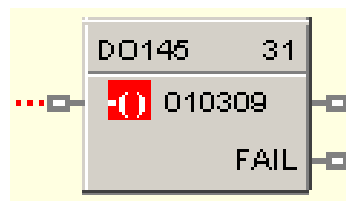
OFF   **or Inverted OFF**
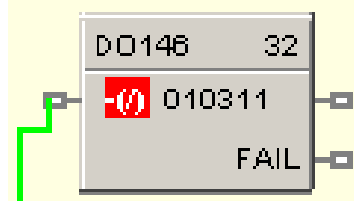
20.   Watch Summary Window

Watch Summary Window

Overview

The Watch Summary window is a dockable (movable), re-sizable window that lets you view the current values of groups of related data, such as I/O and Signal Tags, from the controller.

Docking and Undocking the Window

The Watch Summary window is represented by the 🔲 icon and can be accessed in 2 ways as described below. For each method, the system must already be in Monitor Mode for the option to be available.

Monitor Menu

1.   Select **Monitor** from the main application menu.
2.   Select 🔲 **Watch Summary…** to launch the Watch Summary window.

Monitor Mode Toolbar

1.   Click on the 🔲 button in the **Monitor Mode Toolbar** from the main application toolbar.

Using the Window

The Watch Summary window will have a slightly different appearance depending on the revision of software and the type of controller, however, the general layout is as shown below:
- Tab control to select from different groups of data
- Pull-down selectors at the top to further filter items within the group
- Table to display information and current values of the selected items
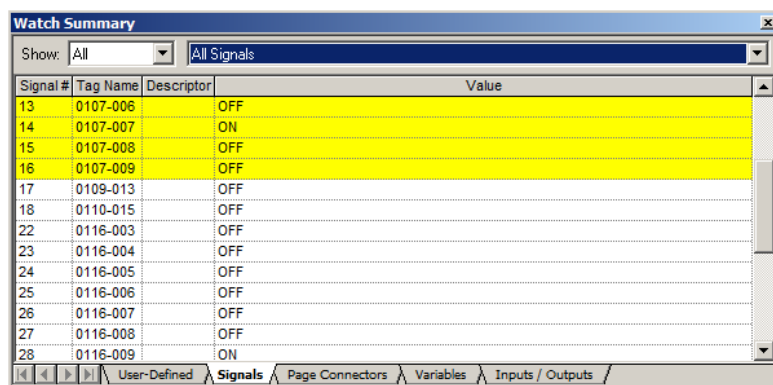
The number of different data groups available through the tabs at the bottom of the window will depend on the revision of software running in the controller. The possible selections are listed below (click on any of the links **to view an example** of the selected data for that tab):
- **User-Defined**   (Customized list of Signals, Page Connectors and/or Variables)
- **Signals**   (Analog, Digital)
- **Page Connectors**   (Analog, Digital)
- **Variables**   (Analog, Digital)
- **Inputs / Outputs**   (AI, AO, DI, DO)
- **Display Groups**   (Not available in revision 6.0 and higher

The number of pull-down selectors at the top of the display will depend on the controller type. For SIL-compliant controllers there will be a leading selector which allows the data items within the group to be filtered based on the type of function block worksheet they are located on; Process, Safety or All (both Process and Safety worksheets).

For all controller types there will be a pull-down selector which allows the data items within the group to be further filtered based on a sub-type, such as analog versus digital, or input versus output. The list of available sub-types is determined by the data group selected through the tab control.

Information about each item in the filtered list is displayed in the table in the middle of the window. The amount of information displayed will vary based on the selected tab, but will always include a current value from the controller. The rows of data may be sorted by clicking in the header for most of the configuration information columns. Subsequent clicking within a column header will toggle between ascending and descending sort orders. (See also Sort Feature)

For SIL-compliant controller types, the rows of data will be colored coded. Items located on a Safety worksheet will be displayed with a yellow background, whereas items located on a Process worksheet will be displayed on a white background.

Docking and Undocking the Window

Double clicking in the Title Bar area of the Watch Summary Window will toggle its docked state. If the window is docked, double clicking in the title bar area will undock the window. If the window is undocked

- Double-clicking in the title bar area will dock the window at it last docked position
- Dragging the window to the top, bottom, left, or right edge of the main viewing area of the application will dock the window at that location

  [Press and hold the CTRL key down to prevent Docking when moving the window]

-

Hot Links

You can click on any I/O function block or Signal on the Controller Worksheet or any I/O function block, Signal, or Variable in the Watch Window and that item will be located on the Function Block Diagram.

As you move the mouse over a HOT LINK, the text changes to Underlined Blue and the cursor changes to a hand. (See also Find Feature)

Writes or Forces

By clicking on the item in the Value column, you may write a value such as for a Variable or force a value for an analog input or digital input. For I/O, a Forced column will indicate that the I/O point is forced.

Find Feature

You can click on any I/O function block or Signal on the Controller Worksheet or any I/O function block, Signal, or Variable in the **Watch Window** and that item will be located on the Function Block Diagram.

As you move the mouse over a HOT LINK, the text changes to Underlined Blue and

the cursor changes to a Hand.

You can also find within the Watch Summary window itself any tag, descriptor, signal number, variable number, as well as rack number, module number, channel number, or block on the Inputs / Outputs tab. For example, to find a tag in the Watch Summary window, click anywhere in the Tag Name column and start typing the characters of the tag you want to find. The tag matching the characters you type will scroll into view. To find a tag name and prevent the tag hot link from re-positioning the Function Block Diagram, right-click the tag name instead of left-clicking it.

Sort Function

The Sort function in the Watch Summary lets you sort the tag list by:

Signal #

Variable #

Tag Name

Descriptor

Block

At the top of the Watch Window, click on the **Column title**. The list will be sorted accordingly. Clicking the column title the first time sorts the list in ascending (alphabetical) order. Clicking the column title a second time sorts the list in descending (reverse alphabetical) order, and so forth.

Watch Summary - User Defined

On the User-Defined tab of the Watch Summary Window you can view a list of tags that you want to monitor. You can add the following to the list:

- Signals
- Page Connectors
- Variables

The Watch Summary window doesn't have to be visible in order to add items to the list of User-Defined tags to display, nor do the drop-down selectors on the User-Defined tab have to match what you'll be adding.

For example, you can add a signal to the User-Defined tab of the Watch Summary window even if the window is not visible or the User-Defined tab's "Show" drop-down selector is set to All Variables. As long as you are in monitor mode, you can add items at any time.

Note that there is no limit to the number of items that you can add to the list, but the list is not saved between sessions of the software.

To add Signals, Page Connectors or Variables to the user-defined watch list:

1. Navigate to the function block worksheet that contains the item.
2. Right-click on the item to display the context menu.
3. Select Add to Watch Summary from the context menu.

(See the <u>Watch Window Summary</u> for instructions on how to view the Watch Summary Window.)

The number of pull-down selectors at the top of the User-Defined tab of the Watch Summary window will depend on the controller type. For SIL-compliant controllers there will be a leading selector which allows the signals to be filtered based on the type of function block worksheet they are located on:

- All (both Process and Safety worksheets)
- Process
- Safety

For all controller types there will be a pull-down selector which allows the type of user-defined tags to be selected:

- All
- All Signals
- All Page Connectors
- All Variables

(Note that in this case "All" refers to the list of user-defined items and not to the full configuration.)

For each item in the selection list, its Tag Name, Descriptor and Value are displayed in the table, as shown below.

For SIL-compliant controller types, the rows of data will be colored coded. Items located on a Safety worksheet will be displayed with a yellow background, whereas items located on a Process worksheet will be displayed on a white background.

You can change the value of any item that can be forced by entering a new value in the Value column.

You can re-order the items in the list by selecting a single row or range of rows in the list and dragging the row(s) to another position in the list. You can also delete selected items in the list.

To select the first row in a range:
- Positioning the cursor over the gray cell at the beginning of the row.
- Wait for the cursor to change to an arrow.
- Click on the gray cell.

To select the last row in a range:
- Positioning the cursor over the gray cell at the beginning of the row.
- Wait for the cursor to change to an arrow.
- Hold down the Shift key and click on the gray cell.

To reposition the selected row(s):
- Position the cursor over any gray cell in the selected rows.
- Drag and drop the rows to their new position.
- A red line will appear as you drag the rows to show you where the row that was clicked will be dropped when you release the mouse button.

To delete the selected row(s) press the Delete key.

Use the Find Feature to locate a specific I/O on the Function Block Diagram.

Use the Sort Function to sort the table rows by a specific column.

See the Watch Window Summary for more details on this window.

Watch Summary - Signals

The number of pull-down selectors at the top of the display will depend on the controller type. For SIL-compliant controllers there will be a leading selector which allows the signals to be filtered based on the type of function block worksheet they are located on:

- All (both Process and Safety worksheets)
- Process
- Safety

For all controller types there will be a pull-down selector which allows the type of signals to be selected:

- All Signals
- Analog Signals
- Digital Signals

For each signal in the selection list, its Number, Tag Name, Descriptor and Value are displayed in the table, as shown below.

For SIL-compliant controller types, the rows of data will be colored coded. Signals located on a Safety worksheet will be displayed with a yellow background, whereas signals located on a Process worksheet will be displayed on a white background.

You cannot change the value of a signal as they are Read Only.

Use the Find Feature to locate a specific I/O on the Function Block Diagram.

Use the Sort Function to sort the table rows by a specific column.

See the Watch Window Summary for more details on this window.

Watch Summary - Page Connectors

The number of pull-down selectors at the top of the display will depend on the controller type. For SIL-compliant controllers there will be a leading selector which allows the page connectors to be filtered based on the type of function block worksheet they are located on:

- All (both Process and Safety worksheets)
- Process
- Safety

For all controller types there will be a pull-down selector which allows the type of page connectors to be selected:

- All Page Connectors
- Analog Page Connectors
- Digital Page Connectors

For each page connector in the selection list, its Tag Name and Value are displayed in the table, as shown below.

For SIL-compliant controller types, the rows of data will be colored coded. Page connectors located on a Safety worksheet will be displayed with a yellow background, whereas page connectors located on a Process worksheet will be displayed on a white background.

You cannot change the value of a page connector as they are Read Only.

Use the Find Feature to locate a specific I/O on the Function Block Diagram.

Use the Sort Function to sort the table rows by a specific column.

See the Watch Window Summary for more details on this window.

Watch Sunnary – Boundary Items

Helps to create modular groupings in the control logic for a better understanding of the functionality. Drag the Boundary Item to the worksheet and logically group the logics.

Alternatively, right-click on the worksheet and go to **Drop other items** > **Boundary Item**.
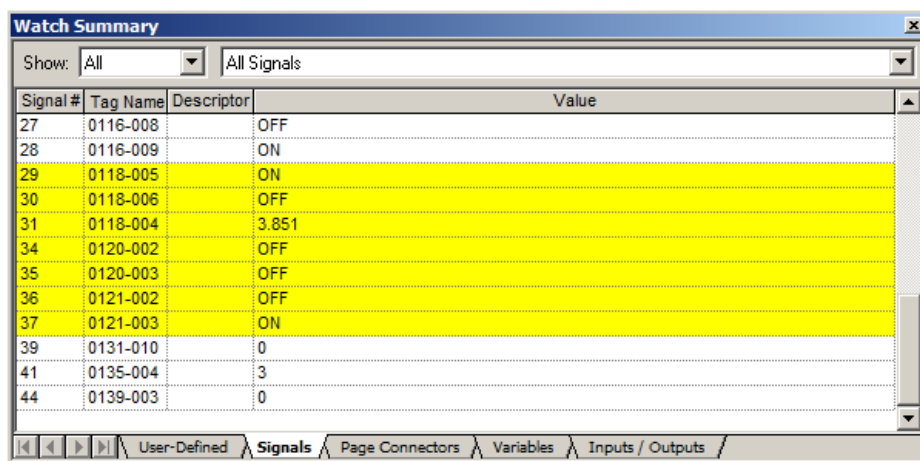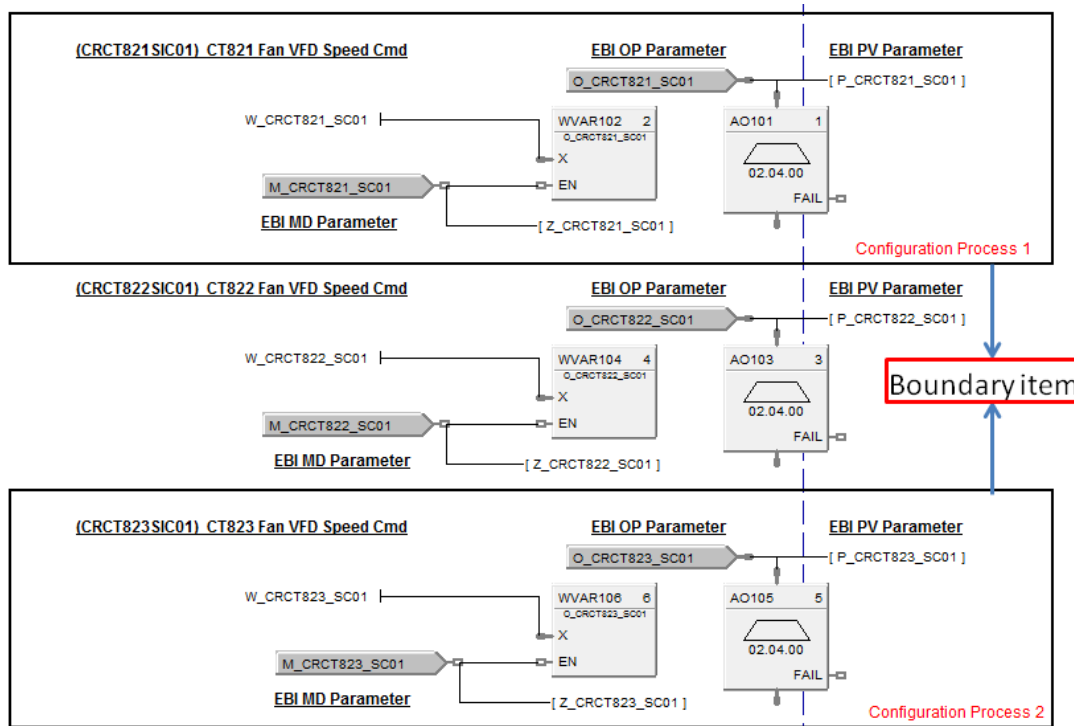
Watch Summary - Variables

The number of pull-down selectors at the top of the display will depend on the controller type. For SIL-compliant controllers there will be a leading selector which allows the variables to be filtered based on the type of function block worksheet they are located on:

- All (both Process and Safety worksheets)
- Process
- Safety

For all controller types there will be a pull-down selector which allows the type of variable to be selected:

- All Variables
- Analog Variables
- Digital Variables

For each variable in the selection list, its Number, Tag Name, Descriptor and Value are displayed in the table, as shown below.

For SIL-compliant controller types, the rows of data will be colored coded. Variables located on a Safety worksheet will be displayed with a yellow background, whereas variables located on a Process worksheet will be displayed on a white background.

You can change a variable by clicking on a variable value and entering a new value for an analog variable or selecting the appropriate user-configured OFF or ON label from a drop-down menu for a Digital variable.

Note: the new value entered is not written to the controller until you move off of the current cell either by tabbing out of the cell using the Shift+Tab keys or clicking on another cell using the mouse. If the value you want to change also shows engineering units, as in "100.0 LBS", for example, you just need to change the number portion; you don't need to delete the engineering units or type it in again.

Use the Find Feature to locate a specific I/O on the Function Block Diagram.

Use the Sort Function to sort the table rows by a specific column.

See the Watch Window Summary for more details on this window.

Watch Summary - Inputs/Outputs

The number of pull-down selectors at the top of the display will depend on the controller type. For SIL-compliant controllers there will be a leading selector which allows the I/O points to be filtered based on the type of function block worksheet they are located on:
- All (both Process and Safety worksheets)
- Process
- Safety

For all controller types there will be a pull-down selector which allows the type of I/O point to be selected:
- Analog Inputs
- Analog Outputs
- Digital Inputs
- Digital Outputs

For each Input/Output in the selection list, its Rack, Module, Channel Number, Block Name, Tag Name, Descriptor, Value, and Status are displayed in the table, as shown below.

NOTE: *Only "assigned" inputs and outputs are shown in this window. Inputs and outputs whose rack, module, and channel that are all zero are not shown in this window. These unassigned inputs and outputs are shown on the controller worksheet, however*.

For SIL-compliant controller types, the rows of data will be colored coded. I/O blocks located on a Safety worksheet will be displayed with a yellow background, whereas I/O blocks located on a Process worksheet will be displayed on a white background.

You can Force an I/O by clicking on a value and entering a new value for an analog input or selecting the appropriate user-configured OFF or ON label from a drop-down menu for a digital input or output. A checked box and the word FORCED will appear in the Status column indicating that the I/O is forced. [Click off the value cell to see the box]

To **Remove a Force**, double-click to deselect the checked box.

Notes:

- Analog outputs cannot be forced.
- Safety I/O points cannot be forced while the controller is in Run mode.
- Time Proportioning outputs and Three Position Step outputs cannot be monitored since the live value is maintained only on the D.O. module itself. The text "n/a" (for "not available) is shown as the value for these outputs.

Use the Find Feature to locate a specific I/O on the Function Block Diagram.

Use the Sort Function to sort the table rows by a specific column.

See the Watch Window Summary for more details on this window.

Watch Summary - Display Groups

This tab appears only for Controller Revision 4.4 and earlier. Watch Summary - Display Groups lets the user monitor the same points configured on the Operator Interface displays.

Select a **Display Group** (Show Menu) then a **Group Number** (Group Menu) from the drop-down menus at the top of the dialog box. The window will monitor the Display Group selected. Note that new values can be written to the variables shown in this window.
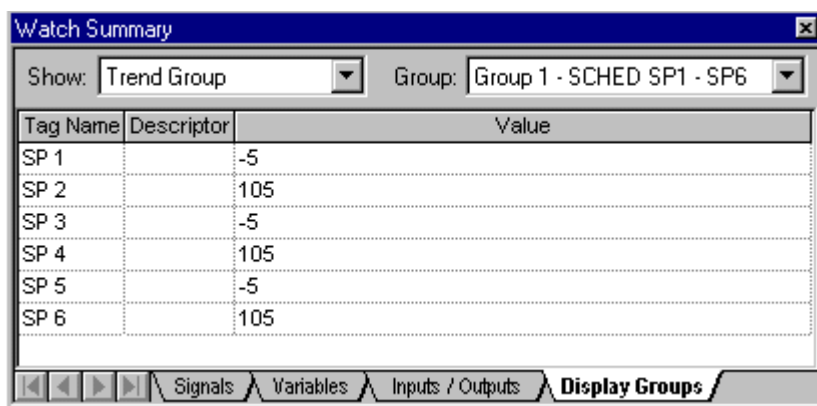
Use the "Find Feature " to Find a specific tag on the Function Block Diagram.

Use the "Sort Function " to sort the tag list by a specific column.

ControlEdge HC900 Utilities User Guide

21. Diagnostics

Controller Diagnostics

Introduction

The Process Control Utilities provides live monitoring of Controller diagnostics. The instrument executes diagnostic routines during instrument start-up and during on-line operation and displays the controller status and diagnostics.

Select "Controller Diagnostics" from the "Monitor" drop-down menu, from the Monitor toolbar.

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(This window can be launched from the "Utilities Worksheet")

The Controller Diagnostics (C30/C50/C70) or Diagnostic Overview (C70R/C75) window will appear. See below.

The "Controller Diagnostic Status Indications" explains the parameters and their values.

Click on "X" to exit box.

C30/C50/C70: Controller Diagnostics

Parameter	Value
Controller Time	10/27/01 9:51:35 AM
System Diagnostics	Good
CPU Diagnostics	Good
Memory Diagnostics	Good
Real-Time Clock Diagnostics	Good
Rack I/O Diagnostics	Module Error
Communication Port Diagnostics	Good
Hardware okay	OFF
Controller Mode	RUN
Code Revision	99.40
Code Build Revision	D
Loop Capacity	32
Product Type	HC900
Cycle Time (S)	0.51
CPU % used	3.29
Peak Time (S)	0.01
CB Overruns	0
Fast Cycle Time (S)	0.05
Fast CPU % used	0.00
Fast Peak Time (S)	0.00
Fast CB Overruns	0

C70R: Diagnostic Overview

Parameter	Value
Controller Time	5/3/05 2:38:31 PM
System Diagnostics	Good
CPU Diagnostics	Good
Memory Diagnostics	Good
Real-Time Clock Diagnostics	Good
Communication Port Diagnostics	Good
Rack Comm Diagnostic	Good
Rack IO Diagnostics	Good
Power Supply Diagnostic	Good
Reserve Available	ON
Redundancy Link Diagnostics	Good
Hardware okay	ON
Controller Mode	RUN LOCK
Loop Capacity	32
Product Type	HC900-C70R
Cycle Time (S)	0.53
CPU % used	8.18
Peak Time (S)	0.03
CB Overruns	0
Fast Cycle Time (S)	0.05
Fast CPU % used	3.90
Fast Peak Time (S)	0.04
Fast CB Overruns	0

C75: Diagnostic Overview

Parameter	Value
Controller Time	08-04-2021 18:46:36
System Diagnostics	Good
CPU Diagnostics	Good
Memory Diagnostics	Good
Real-Time Clock Diagnostics	Good
Communication Port Diagnostics	Good
Rack Comm Diagnostic	Good
Rack IO Diagnostics	Good
Power Supply Diagnostic	Good
Reserve Available	ON
Redundancy Link Diagnostics	Good
Hardware okay	ON
Controller Mode	RUN
Product Type	HC900-C75
Cycle Time (S)	2.250
CPU % used	33.126
Peak Time (S)	0.504
CB Overruns	0
Fast Cycle Time (S)	0.250
Fast CPU % used	16.531
Fast Peak Time (S)	0.062
Fast CB Overruns	0

C75S: Diagnostic Overview

Parameter	Value
Controller Time	08-04-2021 18:46:36
System Diagnostics	Good
CPU Diagnostics	Good
Memory Diagnostics	Good
Real-Time Clock Diagnostics	Good
Communication Port Diagnostics	Good
Rack Comm Diagnostic	Good
Rack IO Diagnostics	Good
Power Supply Diagnostic	Good
Reserve Available	ON
Redundancy Link Diagnostics	Good
Hardware okay	ON
Controller Mode	RUN
Product Type	HC900-C75S
Cycle Time (S)	2.250
CPU % used	33.126
Peak Time (S)	0.504
CB Overruns	0
Fast Cycle Time (S)	0.250
Fast CPU % used	16.531
Fast Peak Time (S)	0.062
Fast CB Overruns	0

C75S: Lead Diagnostics Overview

Write

Parameter	Value
Scanner2 Rack#1 Network Diagnostics	Good
Scanner2 Rack#2 Network Status	Good - Port I/O A
Scanner2 Rack#2 Network Diagnostics	Good
Scanner2 Rack#3 Network Status	Good - Port I/O A
Scanner2 Rack#3 Network Diagnostics	Good
Scanner2 Rack#4 Network Status	Good - Port I/O A
Scanner2 Rack#4 Network Diagnostics	Good
Scanner2 Rack#5 Network Status	Good - Port I/O A
Scanner2 Rack#5 Network Diagnostics	Good
Scanner2 Rack#6 Network Status	Good - Port I/O A
Scanner2 Rack#6 Network Diagnostics	Good
Scanner2 Rack#7 Network Status	Good - Port I/O A
Scanner2 Rack#7 Network Diagnostics	Good
Scanner2 Rack#8 Network Status	Good - Port I/O A
Scanner2 Rack#8 Network Diagnostics	Good
Scanner2 Rack#9 Network Status	Good - Port I/O A
Scanner2 Rack#9 Network Diagnostics	Good
Scanner2 Rack#10 Network Status	Good - Port I/O A
Scanner2 Rack#10 Network Diagnostics	Good
Scanner2 Rack#11 Network Status	Good - Port I/O A
Scanner2 Rack#11 Network Diagnostics	Good
Scanner2 Rack#12 Network Status	Good - Port I/O A
Scanner2 Rack#12 Network Diagnostics	Good
CPU Slot Position	CPU A
Power Supply Type	P01
MAC Address (E1)	00-40-84-00-02-12
MAC Address (E2)	00-40-84-00-12-12
Manual Failover	0
Power Supply Diagnostic	Good
Controller Rack Type	Single Rack

C75S: Reserve Diagnostics Overview

Reserve Diagnostics Overview	x

Parameter	Value
Scanner2 Rack#1 Network Status	Good - Port I/O B
Scanner2 Rack#1 Network Diagnostics	Good
Scanner2 Rack#2 Network Status	Good - Port I/O B
Scanner2 Rack#2 Network Diagnostics	Good
Scanner2 Rack#3 Network Status	Good - Port I/O B
Scanner2 Rack#3 Network Diagnostics	Good
Scanner2 Rack#4 Network Status	Good - Port I/O B
Scanner2 Rack#4 Network Diagnostics	Good
Scanner2 Rack#5 Network Status	Good - Port I/O B
Scanner2 Rack#5 Network Diagnostics	Good
Scanner2 Rack#6 Network Status	Good - Port I/O B
Scanner2 Rack#6 Network Diagnostics	Good
Scanner2 Rack#7 Network Status	Good - Port I/O B
Scanner2 Rack#7 Network Diagnostics	Good
Scanner2 Rack#8 Network Status	Good - Port I/O B
Scanner2 Rack#8 Network Diagnostics	Good
Scanner2 Rack#9 Network Status	Good - Port I/O B
Scanner2 Rack#9 Network Diagnostics	Good
Scanner2 Rack#10 Network Status	Good - Port I/O B
Scanner2 Rack#10 Network Diagnostics	Good
Scanner2 Rack#11 Network Status	Good - Port I/O B
Scanner2 Rack#11 Network Diagnostics	Good
Scanner2 Rack#12 Network Status	Good - Port I/O B
Scanner2 Rack#12 Network Diagnostics	Good
CPU Slot Position	CPU B
Power Supply Type	P01
MAC Address (E1)	00-40-84-00-00-01
MAC Address (E2)	00-40-84-00-00-02
Power Supply Diagnostic	Good
Controller Rack Type	Redundant Split Rack

Controller Diagnostics Status Indications

For C30/C50/C70, the "Controller Diagnostics" window appears. For C70R/C75, the "Diagnostics Overview" window appears.

C30/C50/C70 Controller Diagnostics parameters

Parameter	Value	Possible Cause	Controller Action	User Action
System Diagnostics	Good	Controller is in RUN mode.	Executes the run mode. Outputs are updated.	None
	Forced Output	A block has an output that is forced.	None	Remove force on block output.
	Invalid Config.	A configuration that exceeds the loop capacity of the controller was downloaded or an invalid configuration exists.	An empty database is created.	Download a valid configuration.
	Switch Fault	A failure is detected in the switch reading.	All control blocks stop running All I/O scanning ceases. This forces the modules into failsafe.	Replace CPU.
	Invalid Change Of Mode	Controller mode is changed to RUN-Locked while there are forces on safety sheets.	Controller will not go to RUN-Locked mode.	To clear the diagnostic: 1. Change mode back to RUN mode OR 2. Clear all safety forces using HCD through Monitor->Forced Blocks OR 3. Force a cold-start
	Safety Configuration mismatch	Controller mode is changed to RUN-Locked when safety configuration is changed at run-time	Controller will not go to RUN-Locked mode.	To clear the diagnostic: 1. Change mode back to RUN mode OR 2. Force a cold-start
CPU Diagnostics	Good	N/A	N/A	N/A
	Watchdog	Watchdog reset resulting from software failure	Associated rack monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off.	Force a cold start. Upgrade control file software. Replace CPU board. Contact Honeywell Personnel.
	Prefetch Abort	CPU failed when attempting to fetch an instruction from the prefetch register.	Controller performs a restart Associated rack monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off.	Force a cold start. Isolate system from noise and force a cold start. Replace CPU board
	Address Error	The reserved exception occurred for an unknown reason.	Same as above	Same as above

Parameter	Value	Possible Cause	Controller Action	User Action
	Undefine Error	Bad Instruction Detected	Same as above	Same as above
	Data Abort	CPU failed when attempting to access data.	Same as above	Same as above
	Software Interrupt Error	Software Interrupt occurred which is not supported by the software.	Same as above	Same as above
Memory Diagnostics	Good	N/A	N/A	N/A
	5 Day Low Battery Warning	Estimated battery life is less than 5 days.	Associated rack monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off.	Replace battery.
	Low Battery	Battery voltage is low.	Associated rack monitor block's RACK OK pin is turned off. ASYS block's LOW BATTERY pin is turned on. ASYS block's HW OK pin is turned off.	Replace battery.
	Flash Error	Flash failed to burn	Associated rack monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off.	Force a cold start. Replace CPU board.
Real Time Clock Diagnostics	Good	N/A	N/A	N/A
	Not Programmed	RTC not programmed	Time and date is set to 00:00:00, January 1, 1970. Associated rack monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off.	Program RTC.
	Bad Data	Bad date and time	Same as above	Program RTC. Cycle power. Replace CPU. Replace boards in rack. Replace rack
	Programming Failure	RTC failed to program	Same as above	Same as above
	Read Failure	Unable to read RTC	Same as above	Same as above

Parameter	Value	Possible Cause	Controller Action	User Action
Rack I/O Diagnostics	Good	N/A	N/A	N/A
	Module Error	One of the module diagnostics in the associated rack is set to WRONG MODULE, MODULE NO COMM (if the communications is failing due to the module not installed), BAD MODULE, or BAD CHANNEL.	Refer to related Module diagnostic.	Access the I/O Module diagnostics screen.
	Hi Temp	One of the module diagnostics in the associated rack is set to HI CJ TEMPERATURE.	Refer to HI CJ TEMPERATURE in Module diagnostics	Access the I/O Module diagnostics screen
	Rack Backplane Fail	The Main CPU/Scanner is unable to successfully communicate to any modules that are in its SPI backplane.	All associated module diagnostics are set to MODULE NO COMM. Refer to MODULE NO COMM diagnostic for further details.	• Remove modules and check for bent pins on connectors. • Reinsert modules one at a time and note which module the diagnostic reoccurs, and replace that module. • Cycle power to the rack. • Replace the power supply. • Replace the rack. • Replace the CPU board.

Parameter	Value	Possible Cause	Controller Action	User Action
	Rack Comm Fail	The Main CPU is unable to successfully communicate to an expansion rack that is in its configuration. **Please note that there are NO expansion racks permitted on the ControlEdge HC900-C30 controller**.	Same as above	Verify that the expansion rack should be in the configuration Verify that the jumpers on the scanner are setup for the correct rack address. Check that expansion rack is on. Check the expansion rack's status LED for diagnostic information. Check that cable is connected to expansion rack. If a hub is used, check that all cables are properly connected to the hub, proper crossover cables are used, and that hub is powered. Cycle power to the rack. Cycle power to the hub. Replace the expansion rack's power supply. Replace the expansion rack. Replace the expansion rack's scanner board.
	Rack SW Incompatility	The Main CPU determined that its software is not compatible with the scanner module.	All associated module diagnostics are set to MODULE NO COMM. Refer to MODULE NO COMM diagnostic for further details.	Upgrade the scanner software either by replacing the module or doing a code-download. Update Main CPU software either by replacing the module or doing a code download.
Comm Port Diagnostics	Good	N/A	N/A	N/A
	Warning	One of the comm port's is reporting an application error	*Refer to related Comm port diagnostic*	Access the Comm port diagnostics screen
	Failed	One of the Comm port's is reporting a physical or data link failure	*Refer to related Comm port diagnostic*	Same as above

C70R/C75 Diagnostic Overview parameters

Parameter	Value	Possible Cause	Controller Action	User Action
System Diagnostics	Good	Controller is in RUN mode.	Executes the run mode. Outputs are updated.	None
CPU Diagnostic	Good	System is functional	None	None
	Rack 'n'	Rack 'n' is reporting a diagnostic	Diagnostic may cause a failover Diagnostic may prevent a failover	Refer to the Rack Diagnostics for more details
	Multiple Racks	More than one Rack is reporting a diagnostic	Diagnostic may cause a failover Diagnostic may prevent a failover	Refer to the Rack Diagnostics for more details
	Lead CPU	The Lead CPU is reporting a diagnostic	None	Refer to the Lead CPU Diagnostics for more details
	Reserve CPU	The Reserve CPU is reporting a diagnostic	None	Refer to the Reserve CPU Diagnostic for more details
	Serial Port S1 or S2	There is a diagnostic on the Lead CPU Serial Port (S1 or S2)	None	Refer to the Serial Port S1 or Serial Port S2 Diagnostic Screen for more details
	Network E1 or E2	There is a diagnostic on the Lead CPU Network Port E1 or E2	None	Refer to the Network Port Diagnostic Screen for more details
	Scanner Link	Lead CPU is reporting a diagnostic on the Scanner Link	None	Refer to the Lead CPU Diagnostic and the Scanner Link Diagnostic screens for more details
	Redundancy Link	Lead CPU is reporting a diagnostic on the Redundancy Link. There is a problem with the communications between the Lead and Reserve CPUs.	None	Refer to the Lead and Reserve CPU Diagnostic screens for more details. Check the Redundancy Link Diagnostic screen for more details
Memory Diagnostic	See CPU Diagnostic for possible values			
Real-Time Clock Diagnostic	See CPU Diagnostic for possible values			
Communication Port Diagnostics	See CPU Diagnostic for possible values			
Rack IO	See CPU Diagnostic			

Parameter	Value	Possible Cause	Controller Action	User Action
Diagnostics	for possible values			
Rack Comm Diagnostic	See CPU Diagnostic for possible values			
Power Supply Diagnostic	See CPU Diagnostic for possible values			
Reserve Available	On	There is a Reserve CPU Available for failover		
	Off	No Reserve CPU is available Reserve CPU may be powered off Reserve CPU is powered on but synchronizing with the Lead CPU There may be other physical problems with the Reserve CPU	System will not be able to perform a failover	Check that Reserve CPU is powered ON If powered ON, check the Reserve status LED on the Reserve CPU and the RSM Module Check Reserve CPU Diagnostics for additional details
Redundancy Link Diagnostics	Good			
	Data Link Failure	No Reserve CPU is available Reserve CPU may be powered off Reserve CPU is powered on but synchronizing with the Lead CPU There may be other physical problems with the Reserve CPU	System will not be able to perform a failover	Check that Reserve CPU is powered ON If powered ON, check the Reserve status LED on the Reserve CPU and the RSM Module Check Reserve CPU Diagnostics for additional details
	Hardware Failure	There may be physical problems with the Lead CPU	System will not be able to perform a failover	Replace the Lead CPU

Rack Diagnostics

Introduction

The Process Control Utilities provides live monitoring Rack diagnostics. The instrument executes diagnostic routines during instrument start-up and during on-line operation.

Select the "Rack Diagnostics" from the "Monitor" drop-down menu or from the Monitor Toolbar.

(This window can be launched from the "Utilities Worksheet"

The "Rack Diagnostic Summary" dialog box will appear.

Select a Rack from the "Monitoring Rack" drop-down menu on the dialog box. The information for the selected rack will appear on the dialog box.

The summary window will provide Controller status and diagnostic information *for the selected Rack:*

> **Rack in Configuration** - ON or Off
> **High CJ Temp status** - On or Off
> **Revision Level of the Rack** - Read Only
> **Number of Slots -** Read Only
> **Rack Diagnostics** - The status of the selected rack. Refer to "Controller Diagnostics Status Indications" for diagnostic messages. Not all diagnostics appear for expansion racks.
> **Power Supply Diagnostics** – C70R/C75 only. Status of the rack's power supply/supplies. See Rack Diagnostics: Power Supply.
> **Expansion I/O Comm Diagnostics (except C30 CPU)** - The status of the Expansion I/O Comm Diagnostics. Refer to "Expansion I/O Comm Diagnostic Status Indicators". Read the diagnostics for a particular rack.
> **I/O Module Diagnostics** - Status of the Modules shown in the list:
>
>> Physical Type
>> Configured as (type)
>> Error Status. – Refer to "I/O Rack Diagnostic Status indicators" for status indications, possible cause, and actions to correct the problem.
>> Model Number & Rev Level (scroll horizontally to view)

For status of individual I/O channels, see Function Block Monitor Window.

Click on upper right X to exit box.

C30/C50/C70:

Rack Diagnostics

Monitoring Rack	Rack in Config	Hi CJ Temp	Rev Level	# Slots
Rack 2	OFF	OFF	0.00-	0

Rack Diagnostics

System: n/a for this rack
Real-Time Clock: n/a for this rack
Comm Ports: n/a for this rack
CPU: Good
Memory: Good
I/O: Good

Expansion I/O Comm Diagnostics

Rack Comm: Good
Number of Messages: 0
Data Link Errors: 0

Clear Statistics

I/O Module Diagnostics

Module	Physical Type	Configured As	Error Status
1	None	None	
2	None	None	
3	None	None	
4	None	None	
5	None	None	
6	None	None	
7	None	None	
8	None	None	
9	None	None	
10	None	None	
11	None	None	
12	None	None	

C70R/C75:

Rack Diagnostics

Monitoring Rack: Rack 5

Rack in Config: ON

Hi CJ Temp: OFF

Rev Level: 1.000

Slots: 12

Rack Diagnostics

CPU: Good
Memory: Good
I/O: Good

Power Supply Diagnostics

Diagnostics: Good
Status: Both power supplies are good

Expansion I/O Comm Diagnostics

Lead Comm: Good
Slot Position: CPU A
Number of Messages: 306499
Data Link Errors: 0
Status: Good - Port I/O A

Reserve Comm: Good
Slot Position: CPU B
Number of Messages: 306487
Data Link Errors: 0
Status: Good - Port I/O B

Clear Statistics

I/O Module Diagnostics

Module	Physical Type	Configured As	Error Status
1	None	None	
2	None	None	
3	DI 120/240 VAC 16-Chan	None	
4	DI 24 VDC 16-Chan	None	
5	None	None	
6	None	None	
7	None	None	
8	None	None	
9	DI 120/240 VAC 16-Chan	None	
10	DO Lo-Current Rly 8-Chan	Digital Output	
11	DO 120/240 VAC 8-Chan	None	
12	DO 120/240 VAC 8-Chan	Digital Output	

Rack Diagnostics: Power Supply

The Power Supply diagnostics provide status of the parameters shown in the list.

Parameter/ Message	Value	Possible Cause	Controller Action	User Action
Power Supply Status	Unknown	No rack communication.	If under power I/O will switch to failsafe values Loss of Comms	Determine & correct cause of communication failure
			If not powered (un-powered outputs) Loss of AC mains Bad power supply Failed scanner2	Restore rack operation Restore AC main power, reset breaker Replace Power supply Replace scanner2
	Redundant P/S is not present	Single power supply configuration	Status reported Rack continues to function properly	No action required if single power supply rack.
		Redundant Power Backplane not detected	Status reported Rack continues to function properly	If dual power supplies installed Replace Redundant Power Backplane Replace rack backplane Replace Scanner2.
	Power Supply PS-1 Failed (PS-1 LED is OFF)	No AC Mains on PS-1	Diagnostic reported. Rack continues to function properly. Status posted.	Restore AC main power, reset breaker.
		Failed Power Supply		Replace Power Supply
		Failed Redundant Power Backplane detection circuit		Requires unit shutdown - Replace Redundant Power Backplane
	(PS-1 LED is ON)	Failed rack backplane status signal		Requires unit shutdown - Replace rack backplane.
		Failed Scanner2 status input		Requires unit shutdown - Replace Scanner2.
	Power Supply PS-2 Failed (PS-2 LED is OFF)	No AC Main on PS-2	Diagnostic reported. Rack continues to function properly. Status posted.	Restore AC main power, reset breaker.

		Failed Power Supply		Replace Power Supply
		Failed Redundant Power Backplane detection circuit		Requires unit shutdown - Replace Redundant Power Backplane
	(PS-2 LED is ON)	Failed rack backplane status signal		Requires unit shutdown - Replace rack backplane.
		Failed Scanner2 status input		Requires unit shutdown - Replace Scanner2
	Both Power Supplies are Good	NA	None	None
Power Supply Diagnostic	See Power Supply Status for possible values			

I/O Module Diagnostics Status Indications

The "I/O Module Diagnostic Summary" dialog box will provide status of the parameters shown in the list.

The following table lists the possible Error Statuses.

Error Status	Possible Cause	Controller Action	User Action
Good	N/A	N/A	N/A
Hi CJ Temperature	Possible causes of this diagnostic are: One of the two CJs on the module is indicating a temperature reading greater than 70 degrees C. Both cold-junction sensors are failing to convert. The CJs are converting properly, but their differential is greater than 10 degrees C.	Associated AI blocks that are configured as T/Cs set their fail pin on, their warn pin off, and their output pin to the failsafe value. Associated AI blocks that are configured as T/Cs set their IO status to "CJ High Temperature" for reason 1 or "CJ Failure" for possible causes 2 and 3. Associated rack monitor block's module fail pin is turned on. Associated rack monitor block's RACK OK pin is turned off. Associated rack monitor block's HITEMP pin is turned on. ASYS block's HITEMP pin is turned on. ASYS block's HW OK pin is turned off.	Improve ventilation to rack Replace AI module

Error Status	Possible Cause	Controller Action	User Action
Wrong Module	The module does not agree with the module required for the control scenario	1. Associated blocks set their fail pin on, their warn pin off, and their output pin to the failsafe value. 2. Associated blocks set their IO status to "Channel No Comm". 3. Associated rack monitor block's module fail pin is turned on. 4. Associated rack monitor block's RACK OK pin is turned off. 5. ASYS block's HW OK pin is turned off.	1. Verify configuration 2. Replace module with the correct one.
#Module No Comm	Main CPU is unable to communicate to the module for one of the following reasons: • Module is not installed • The module cannot communicate with the controller CPU or the expansion rack CPU because of a backplane problem.Module is on an expansion rack and the expansion rack communications are failing	See Wrong Module.	Action is based on the IODIAG indication. If IODIAG is not MODULE ERROR, then follow the prescribed action defined for that diagnostic. For MODULE ERROR, do the following: Verify configuration Install module. Check the communication cables that connect the expansion rack(s) to the Main Rack. Replace the controller or expansion rack backplane.
Bad Module	Module is bad. Module LED flashes to indicate the problem.	N/A	See ControlEdge HC900 Controller Manual 51-52-25-107, I/O Module Indicators. A table describes the LED flashes and what they mean.
Bad Channel	One or more channels in the module is bad.	The I/O rack's Scanner status LED and the Controller rack's status LED (not the module or channel LED) flash 6 times.	1) To determine which channel(s) are bad, monitor the function blocks corresponding to the channels in this module. See Function Block Monitor Window Check each I/O function block's "Channel/Sensor Status ". 2) To determine the cause, see ControlEdge HC900 Controller Manual 51-52-25-107, I/O Module Indicators, Bad I/O Channel Diagnostics. A table describes the channel statuses and what they mean.

I/O Channel/Sensor Status

When monitoring blocks of the type in the table below, the Channel/Sensor Status is displayed. Statuses vary in severity; the more serious will trigger an error message/indicator elsewhere, such as a I/O Module Diagnostic Error or a flashing LED on the I/O rack.

Here is an alphabetical list of possible statuses for each I/O channel type.

Channel/Sensor Status	Channel type										Possible Cause	User Action
	AI	AO	DI	DO	TPO	TPSC	PI	PO	FI	QUAD		
Good	√	√	√	√	√	√	√	√	√	√	Normal operation	
Bad Channel		√						√			There are two possible causes for this error: 1. If the channel is an Analog Output: There is no physical output device connected to this channel, or the output device is showing an "open" connection. 2. If the channel is a Pulse Output: The channel is failing to output the correct value. A BAD CHANNEL I/O module diagnostic is posted.	Check terminal connections. Replace module.
Burnout Failure	√										The sensor – T/C, RTD, or mV source -- is failing burnout checks. A BAD CHANNEL I/O module diagnostic is posted.	Check terminal block connections Replace source element Replace module.
CJ Failure	√										Two conditions can create this failure. 1. Both cold-junction sensors are failing to convert. 2. The CJs are converting properly, but their differential is greater than 10 degrees C. In either case a HI CJ TEMP I/O module diagnostic is posted.	Improve ventilation to rack. Replace AI module.
CJ High Temperature	√										One of the CJs is indicating a temperature reading above 70 degrees C. A HI CJ TEMP I/O module diagnostic is posted.	Improve ventilation to rack. Replace AI module.
CJ Warning	√										One of the cold-junction sensors is failing to convert. The temperature compensation for the thermocouple readings could have a slight error because only the good CJ is being used in the	

Channel/Sensor Status	Channel type										Possible Cause	User Action
	AI	AO	DI	DO	TPO	TPSC	PI	PO	FI	QUAD		
											temperature calculation.	
Clamp High		√									The AO block's input is greater than the block's configured high range value.	
Clamp Low		√									The AO block's input is less than the block's configured low range value.	
Disabled	√										AI channel is programmatically disabled	
Failed to convert	√										When attempting to take a reading, the analog-to-digital (ADC) fails. This can occur if the incoming signal is either too large or too small. It also could result if the ADC circuit is failing. If the problem is the ADC circuit, most likely other channels will have the same failure. A BAD CHANNEL I/O module diagnostic is posted.	Check the signal level being applied to the terminals. Replace module.
Forced	√		√	√							The point has been manually forced to its present value, probably via a PC host.	
No Channel Available	√		√	√			√	√	√	√	There is no hardware on the I/O module to support this channel. For example, the customer configured Channel #15 for a given module, but there is an 8-channel module installed in the rack. A BAD CHANNEL I/O module diagnostic is posted.	
No Comm	√	√	√	√	√	√					The Main CPU is unable to communicate to the channel. Possible reasons are module missing, wrong module installed, SPI backplane is failing, expansion rack is missing.	
Over current				√			√	√	√	√	A Digital Output module detected an excessive amount of current on its output terminals. Note that this message will only appear for the 32-channel DO module. A BAD CHANNEL module diagnostic is posted.	

| Channel/Sensor Status	Channel type										Possible Cause	User Action
	AI	AO	DI	DO	TPO	TPSC	PI	PO	FI	QUAD		
Over range	√										The signal at the terminals is more than 10% over the range of the sensor.	Check the signal level being applied to the terminals. Replace module.
Sensor & Range type not available	√										The AI module installed in the rack does not support the range or sensor type configured for this channel. For example, this channel's AI function block is configured as a thermocouple, but there is a high-level AI module installed in the rack.	
T/C Failing	√										When burnout check occurs on the T/C, the measured resistance indicates that the T/C's resistance is to a point where the burnout failure will result.	
T/C Warning	√										When burnout check occurs on the T/C, the measured resistance is higher than normal.	
Under range	√										The signal at the terminals is less than 10% below the range of the sensor.	Check the signal level being applied to the terminals. Replace module.
Wrong Firmware Rev	√										The firmware in the AI module is not compatible with the firmware in the controller or scanner CPU, or AI module does not support slidewire as an input type.	

Controller Ports Diagnostics

Accessing Port Diagnostics

Overview

The Process Control Utilities provides live monitoring of Controller Ports diagnostics. The instrument executes diagnostic routines during instrument start-up and during on-line operation.

Select "Controller Ports Diagnostics" from the "Monitor" drop-down menu or from the Monitor toolbar. There is a sub-menu from which you can choose the type of port you want to monitor:

Toolbar	Menu
	Serial Port S1 Configuration Port Diagnostics
	Serial Port S2 OI Port Diagnostics
	Network Port Diagnostics
	Expansion I/O Comm Diagnostics (except C30 CPU)
	Master Connections Diagnostics
	Peer-to-Peer Connections Diagnostics

The specific monitoring dialog box for that selection will open.

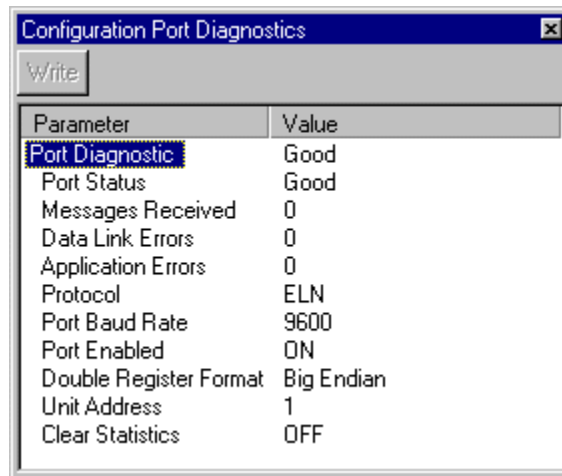### Serial Port S1 Configuration Port Diagnostics

The Process Control Utilities provides live monitoring of the Serial Port S1 Configuration Port. The instrument executes diagnostic routines during instrument start-up and during on-line operation.

1. Select "Controller Ports Diagnostics" from the "Monitor" drop-down menu then select "Serial Port S1" from the list provided or from the Monitor toolbar.

2. The "Serial Port S1 Diagnostic Summary" dialog box will appear. It shows Port Status, Diagnostics, Statistics and parameters for the Serial Port S1 Configuration Port.
   (This window can be launched from the "Utilities Worksheet")
3. The summary will provide status of the parameters shown in the list.
4. Click on "X" to exit box.

Refer to the Serial Port S1 (RS232 default) Configuration Port Diagnostics Status Indicators for status indications, possible cause, and actions to correct the problem.

Serial Port S1 Configuration Port Diagnostics Status Indicators

The "Serial Port S1 Diagnostic Summary" dialog box will provide status of the parameters shown in the list.

Value	Possible Cause	Controller Action	User Action
Good	N/A	N/A	N/A

Value	Possible Cause	Controller Action	User Action
Data Link Failure	A large number of messages are resulting in data link errors.	Rack 1 monitor block's COMPORT DIAG is set to FAILED. Rack 1 monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off. If configured as a Modbus host: ASYS and FSYS blocks' Modbus Host Fail pins are turned on. Modbus Device and read blocks associated with the modbus device experiencing the failure have their read pins frozen to the last value read. Modbus blocks associated with the modbus devices experiencing the failure have their BAD COMM and NO SCAN pins turned on. IN SCAN STATUS is set to NO for all modbus devices experiencing the failure. COMM STATUS is set to BAD for all modbus devices experiencing the failure. The modbus devices with the data link errors have a non-zero data link error count. The modbus devices experiencing the failure are moved to the background scan rate.	Check baud rate Check connectors Check cable polarity Isolate cabling from electrical interference If RS232 to RS485 converter is used, check its power, switch/jumper settings, and polarity. If configured as a Modbus Host, use the device status screens to determine which modbus devices are experiencing the problem. For those modbus devices check: • power • connections • address • baud rate • parity • number of stop bits • for electrical interference • grounding • termination resistor (if at end of link) The diagnostic is cleared by clearing the port's statistics.
HW Failure	The DUART is failing to operate properly.	Rack 1 monitor block's COMPORT DIAG is set to FAILED. Rack 1 monitor block's RACK OK pin is turned off. ASYS and FSYS blocks' HW OK pins are turned off. If configured as a Modbus host: ASYS and FSYS blocks' Modbus Host Fail pins are turned on. All Modbus device and Modbus read blocks have their read pins frozen to the last value read. All device blocks have their BAD COMM and NO SCAN pins turned on. IN SCAN STATUS is set to NO for all devices. COMM STATUS is set to BAD for all devices in the function block diagram. Statistical data for all devices are frozen. All modbus devices in the function block diagram are scanned at the background scan rate.	Replace CPU module

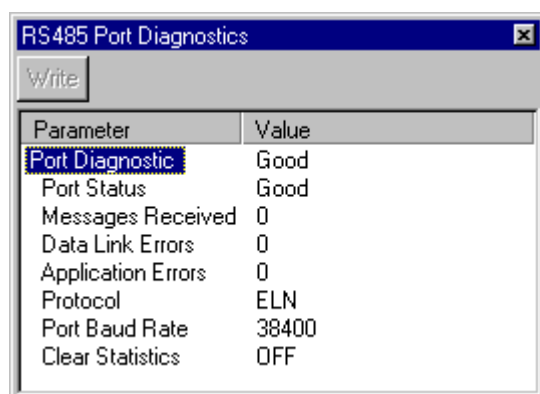## Serial Port S2 (RS485 default) OI Port Diagnostics

The Process Control Utilities provides live monitoring of the S2 (RS485 default) OI Port. The instrument executes diagnostic routines during instrument start-up and during on-line operation.

1. Select "Controller Ports Diagnostics" from the "Monitor" drop-down menu then select "Serial Port S2" from the list provided or from the Monitor toolbar.

2. The "Serial Port S2 Diagnostic Summary" dialog box will appear.
   It shows Port Status, Diagnostics, Statistics and parameters for the Serial S2 Port (default RS485 for Operator Interface).
   (This window can be launched from the "Utilities Worksheet"

3. The summary will provide status of the parameters shown in the list.

4. Click on "X" to exit box.

Refer to the Serial Port S2 (RS485 default) OI Port Status Indicators for status indications, possible cause, and actions to correct the problem.

Serial Port S2 (RS485 default) OI Port Status Indicators

The "Serial Port S2 Diagnostic Summary" dialog box will provide status of the parameters shown in the list.

Value	Possible Cause	Controller Action	User Action
Good	N/A	N/A	N/A
Application Error	At least 1 response to a master resulted in an exception code or NAK.	Rack 1 monitor block's COMPORT DIAG is set to WARNING. Rack 1 monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off.	At master, determine which message is causing the exception code and fix.

Value	Possible Cause	Controller Action	User Action
Data Link Failure	A large number of messages are resulting in data link errors.	Rack 1 monitor block's COMPORT DIAG is set to FAILED. Rack 1 monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off. If configured as a Modbus Host port, associated device blocks have their read pins frozen to the last value read.	Check baud rate Check connectors Check cable polarity Isolate cabling from electrical interference If RS232 to RS485 converter used, check its power, switch/jumper settings, and polarity.
HW Failure	The DUART is failing to operate properly.	Same as above	Replace CPU module

Network Port Diagnostics

The Process Control Utilities provides live monitoring of the Ethernet Network Port. The instrument executes diagnostic routines during instrument start-up and during on-line operation.

1. Select "Controller Ports Diagnostics" from the "Monitor" drop-down menu then select "Network Port" from the list provided or from the Monitor toolbar.

   (This window can be launched from the "Utilities Worksheet"

2. The "Network Port Diagnostic Summary" dialog box will appear. It shows Port Status, Diagnostics, Statistics and parameters for the Ethernet Network Port.

3. The summary will provide status of the parameters shown in the list.

4. Click on "X" to exit box.

Refer to "Network Port Diagnostics Status Indicators" for status indications, possible cause, and actions to correct the problem.
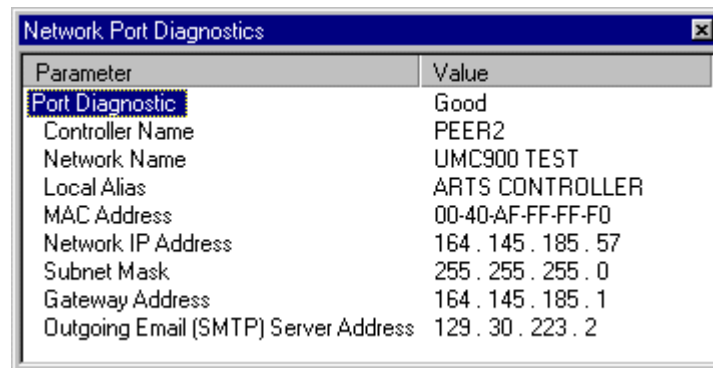
Network Port Diagnostic Status Indicators

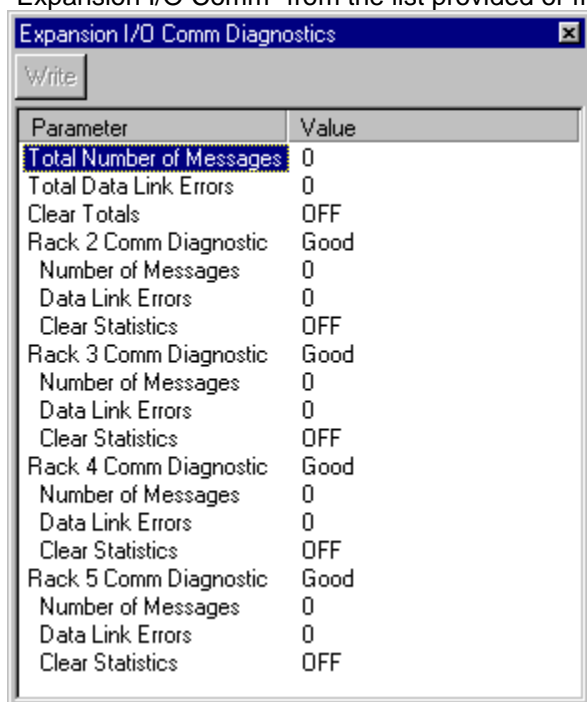The "Network Port Diagnostic Summary" dialog box will provide status of the parameters shown in the list.

Value	Possible Cause	Controller Action	User Action
Good	N/A	N/A	N/A

Value	Possible Cause	Controller Action	User Action
Network Setup Error	Controller/network names determined on network are illegal	Rack 1 monitor block's COMPORT DIAG is set to FAILED. Rack 1 monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off.	Correct the setup problem.
No IP Address	DHCP and IP address are not configured	Same as above	If a DHCP server is present, download a configuration that uses DHCP. Enter an IP address
Hardware Failure	Ethernet port tests failed during power-up.	Same as above	Replace CPU Module

Expansion I/O Comm Diagnostics

The Process Control Utilities provides live monitoring of the Expansion I/O Comm subsystem. The instrument executes diagnostic routines during instrument start-up and during on-line operation.

1. Select "Controller Ports Diagnostics" from the "Monitor" drop-down menu then select "Expansion I/O Comm" from the list provided or from the Monitor toolbar.

(This window can be launched from the "Utilities Worksheet")

2. The "Expansion I/O Comm Diagnostic Summary" dialog box will appear. It shows Port Status, Diagnostics, Statistics and parameters for the I/O Expansion I/O Comm subsystem.

3. The summary will provide status of the parameters shown in the list.

4. Click on "X" to exit box.

Refer to "Expansion I/O Comm Diagnostics Status Indicators" for status indications, possible cause, and actions to correct the problem.

Expansion I/O Comm Diagnostics Status Indicators

The "Expansion I/O Comm Diagnostic Summary" dialog box will provide status of the parameters shown in the list. **(C50, C70 and C70R/C75 CPU only)**

Value	Possible Cause	Controller Action	User Action
Good	N/A	N/A	N/A
Data Link Failure	The communications to a particular rack is resulting in a lot of DLL errors.	Related rack monitor block's RACK OK pin is turned off. Depending on the nature of the DLL errors, the associated rack monitor block's module diagnostics, and pins could be affected.	Use the OI to determine which rack is experiencing the DLL errors. Verify that the expansion rack should be in the configuration Verify that the jumpers on the scanner are setup for the correct rack address. If a hub is used, check that all cables are properly connected to the hub, proper crossover cables are used, and that hub is powered. Cycle power to the rack. Cycle power to the hub. Replace the ControlEdge HC900-C50 expansion rack's power supply. Replace the ControlEdge HC900-C50 expansion rack. Replace the ControlEdge HC900-C50 expansion rack's scanner board. Replace the main CPU.
Hardware Failure	The power-up test of the expansion rack Ethernet controller failed.	All rack monitor block XIO PORT DIAG are set to HWFAIL. All rack monitor block RACK OK pin are turned off. All modules in the configuration have their diagnostic set to MOD_NOCOMM, their rack monitor module fail pin is turned on., and the rack monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off. The statuses for the AO and AI channels that are affected are set to BAD_CHANNEL.	Replace main-CPU module
Port A/B Cable Mismatch	C70R/C75 only. The I/O cables from CPUA and CPUB are connected to the wrong ports on the I/O scanner CPU	Controller continues to run but is not able to access the I/O on the associated rack	Swap the cables so that I/O A is connected to I/O on CPUA and I/O B is connected to I/O on CPUB
Protocol Mismatch	The firmware version in the controller CPU is not compatible with the firmware version in the I/O scanner	Controller continues to run but is not able to access the I/O on the associated rack	Upgrade the firmware in the CPU and/or scanner to be compatible versions

Master Connections Diagnostics

The Process Control Utilities provides live monitoring of the Master Connections. The instrument executes diagnostic routines during instrument start-up and during on-line operation.

1. Select "Controller Ports Diagnostics" from the "Monitor" drop-down menu then select "Master Connections" from the list provided or from the Monitor toolbar.

   (This window can be launched from the "Utilities Worksheet")

2. The " Master Connections Diagnostic Summary" dialog box will appear.

3. The summary will provide status of the parameters shown in the list.

4. Click on "X" to exit box.

Refer to "Master Connections Diagnostics Status Indicators" for status indications, possible cause, and actions to correct the problem.

Parameter	Value
Port Diagnostic	Good
Protocol	None
Network IP Address	0 . 0 . 0 . 0
Messages Received	0
Application Errors	0
Clear Statistics	OFF
Port Diagnostic	Good
Protocol	None
Network IP Address	0 . 0 . 0 . 0
Messages Received	0
Application Errors	0
Clear Statistics	OFF
Port Diagnostic	Good
Protocol	None
Network IP Address	0 . 0 . 0 . 0
Messages Received	0
Application Errors	0
Clear Statistics	OFF
Port Diagnostic	Good
Protocol	None
Network IP Address	0 . 0 . 0 . 0
Messages Received	0
Application Errors	0
Clear Statistics	OFF
Port Diagnostic	Good
Protocol	None
Network IP Address	0 . 0 . 0 . 0
Messages Received	0
Application Errors	0
Clear Statistics	OFF
Port Diagnostic	Good
Protocol	None
Network IP Address	0 . 0 . 0 . 0
Messages Received	0
Application Errors	0
Clear Statistics	OFF

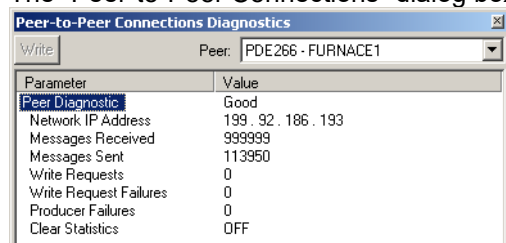**Master Connections Diagnostics Status Indicators**

The "Network Master Connections Diagnostic Summary" dialog box will provide status of the parameters shown in the list.

Parameter	Value	Possible Cause	Controller Action	User Action
Network Master Connections Diagnostics	Good	N/A	N/A	N/A
	Application Error	At least 1 response to a master resulted in an exception code	Rack 1 monitor block's COMPORT DIAG is set to WARNING. Rack 1 monitor block's RACK OK pin is turned off. ASYS block's HW OK pin is turned off.	At master, determine which message is causing the exception code and fix.

Peer-to-Peer Connections Diagnostics

The Process Control Utilities provides live monitoring of the Peer-to-Peer Connections. The instrument executes diagnostic routines during instrument start-up and during on-line operation.

1. Select "Controller Ports Diagnostics" from the "Monitor" drop-down menu then select "Peer-to-Peer Connections" from the list provided.

2. (This window can be launched from the "Utilities Worksheet") Select "Controller Diagnostics" icon then select "Controller Ports Diagnostics" then "Peer-to-Peer" Connections.

3. The "Peer-to-Peer Connections" dialog box will appear.

4. The summary will provide status of the parameters shown in the list.

5. Click on "X" to exit box.

Refer to "Peer -to-Peer Connections Diagnostics Status Indicators" for status indications, possible cause, and actions to correct the problem.

From version 6.300 and above this same dialog box also includes the safety peer connection diagnostics.

Peer-to-Peer Connections Diagnostics Status Indicators

The "Peer-to-Peer connections" dialog box will provide status of the parameters shown in the list.

The "Peer-to-Peer connections " dialog box contains a parameter "Peer Status". Following are the possible statuses.

Value	Possible Cause	Controller Action	User Action
Good	N/A	N/A	N/A
Application Error	The peer connection could not be established due to an internal program problem.	N/A	1. Reset the controller to restart the UDP/IP protocol stack and reset buffer allocations. 2. Contact Honeywell Technical Assistance if the problem exists.
Setup Error	The peer device indicated that one or more data item is not valid.	The error will occur when an incompatibility exists between peer devices with regard to variable or signal assignments. This error should not occur when exchanging data between ControlEdge HC900 controllers.	Contact Honeywell Technical Assistance if the status occurs.
Peer Fail	The assigned peer could not be located on the network.	N/A	1. Check the controller name and network name of the peer device to assure that they match that specific PDE block. 2. Check that the IP addresses of the peer devices are all within the range of the IP mask. 3. Check that the peer devices have the same IP subnet mask. See Network parameters for IP mask setting.
Port Fail	The peer data exchange IO subsystem could not be started due to internal resource problem.	N/A	1. Reset the controller to restart the Ethernet IO hardware and reassign processor IO mapping. 2. Contact Honeywell Technical Assistance if the problem exists.

Value	Possible Cause	Controller Action	User Action
Not Started	The assigned peer IO connection has not yet been attempted. Normal state during startup and during configuration mode. This status should automatically change to GOOD after both peer controllers are in the RUN mode.	N/A	1. If this status persists during run time, check that the peer device is properly connected and that the control name and network name is correct. 2. Check that the IP masks of all peer devices to assure that all IP addresses are within the same subnet. 3. Check that all external network components such as switches and routers allow passing of UDP packets on port 502. 4. Check that the peer device is powered on and is in RUN mode.

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22.   Reports

Print Report

Step	Action
1	Click **Print Report** from the file menu. If you have selected from the Custom Modbus Map toolbar, it prints the currently displayed partition. Print Report lets you print a report for various functions.
2	Click the icon on the toolbar and select a report from the drop-down menu that appears. The **Print** dialog box appears to enable you print a specific report. You can also print a report from **Print Report Preview** from the File menu.

Report Categories

The Print Report function provides access to the greatest number of reports. For software revisions prior to 6.0, all 5 main report categories are available. For revision 6.0 and later the Display worksheet is no longer supported, so the Displays report category option is not available. For SIL compliant controller types, additional sub-menus allow for filtering of some reports based on Process or Safety worksheets. For more information see Reports Overview.
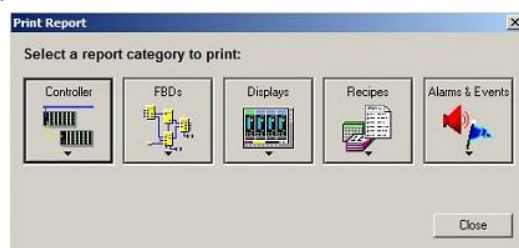
Controller Reports

Clicking the **Controller** button provides a drop-down menu which allows the selection of 2 different reports, as shown below. Note that for SIL compliant controller types only; there is an additional sub-menu for the I/O Configuration report.
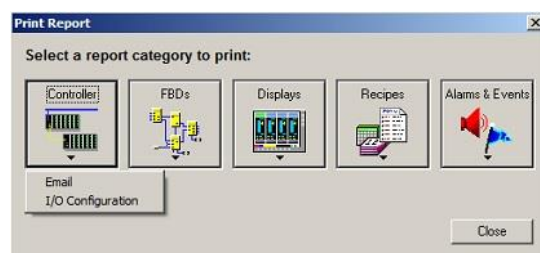
Report	Description	SIL Filtering
Email	Shows how E-mail notification is configured.	No
I/O Configuration	Shows configuration of all I/O on all racks. This report is similar to the data shown on the Controller worksheet. It may also be printed by clicking on the Print button in the Controller Configuration Toolbar.	Yes

Function Block Diagram Reports

Clicking on the **FBDs** button provides a drop-down menu which allows the selection of reports or report sub-categories related to the items contained on the function block diagrams of the configuration. The available report options for configurations with a Fixed Modbus Address Map are shown in the first figure below. The available report options for configurations with a Custom Modbus Address Map are shown in the second figure below.
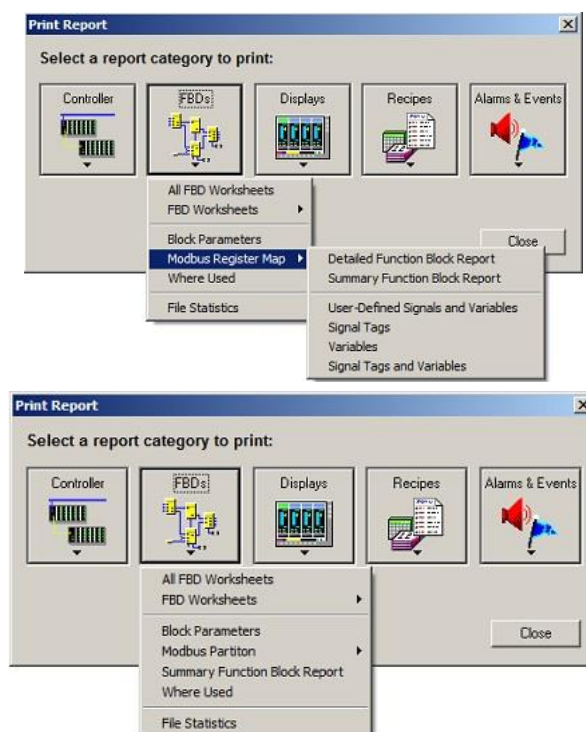
Report	Description	SIL Filtering
All FBD Worksheets	Not a traditional report. Prints out the graphical representation of all Function Block Diagrams in the configuration.	Yes
FBD Worksheets	Not a traditional report. Prints out the graphical representation of a single Function Block Diagrams from the configuration. Hovering over this menu option will display a sub-menu(s) which allows selection of the desired function block diagram worksheet.	Yes
Block Parameters	Shows a detailed report of each function block's parameters. **[Modbus Register Map]** *(appears if using* fixed map*)*	Yes
Detailed Function Block Report	Shows the starting Modbus address of each function block, as well as the Modbus addresses of all its parameters.	Yes
Summary Function Block Report	Shows the starting Modbus address of each function Block (also available if using *custom map*).	Yes
User-Defined Signals and Variables	Shows the user-defined Modbus addresses of signals and variables.	Yes

Report	Description	SIL Filtering
Signal Tags	Shows the system-defined Modbus addresses of all signal tags.	Yes
Variables	Shows the system-defined Modbus addresses of all variables.	Yes
Signal Tags and Variables	Shows the system-defined Modbus addresses of all signal tags and variables. **[Modbus Partition]** *(appears if using [custom map](#))*	Yes
Modbus Partition	Shows the Modbus addresses and contents of the selected partition. Hovering over this menu option will display a sub-menu(s) which allows selection of the desired partition. The report generated by this method is equivalent to the report printed when the same Modbus address partition is selected in the [Custom Modbus Map](#) worksheet and the Print button on the worksheet's toolbar is clicked.	No
Where Used	Shows location (worksheet and page) of every item in the function block diagram.	Yes
File Statistics	Shows useful file statistics. Schema # is a database revision code used by the controller, OI and the software to ensure compatibility	No

Display Reports

Clicking on the **Displays** button provides a drop-down menu which allows the selection of 4 reports related to displays, as shown below. As noted above, this category is not available starting with revision 6.0.

Report	Description	SIL Filtering
General Settings	Shows Operator Interface settings (security, startup display, and filenames).	No
Help Screens	Shows Operator Interface help screens.	No
Assigned Display Keys	Shows Operator Interface displays and contents for each display button.	No
Data Storage Settings	Shows data storage settings (trend group data points, batch enable, etc.)	No

Recipe Reports

Clicking the Recipes button provides a drop-down menu which allows the selection of 4 reports related to recipes, as shown below.
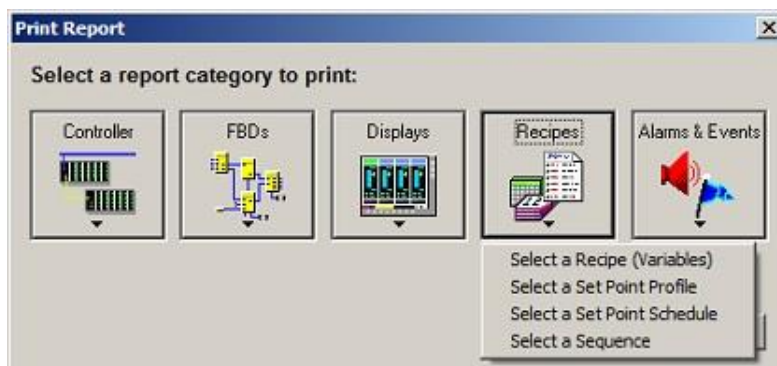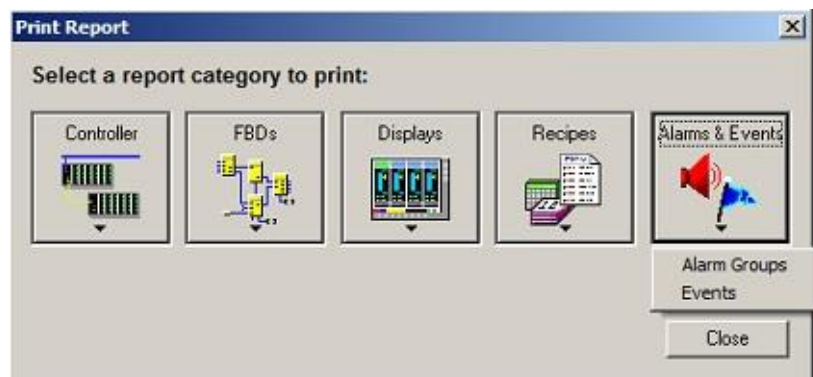

Report	Description	SIL Filtering
Select a Recipe (Variables)	Shows contents of the selected recipe (variables, descriptions).	No
Select a Set Point Profile	Shows contents of the selected Setpoint Profile.	No
Select a Set Point Schedule	Shows contents of the selected Setpoint Schedule.	No
Select a Sequence	Shows contents of the selected Sequence.	No

Selecting any of the 4 report options noted above brings up a selection dialog similar to the one below that allows one of the available Variables, Set Point Profile, Set Point Schedule or Set Point Sequences to be selected from a pool for printing. Clicking on the Print button completes the report printing.
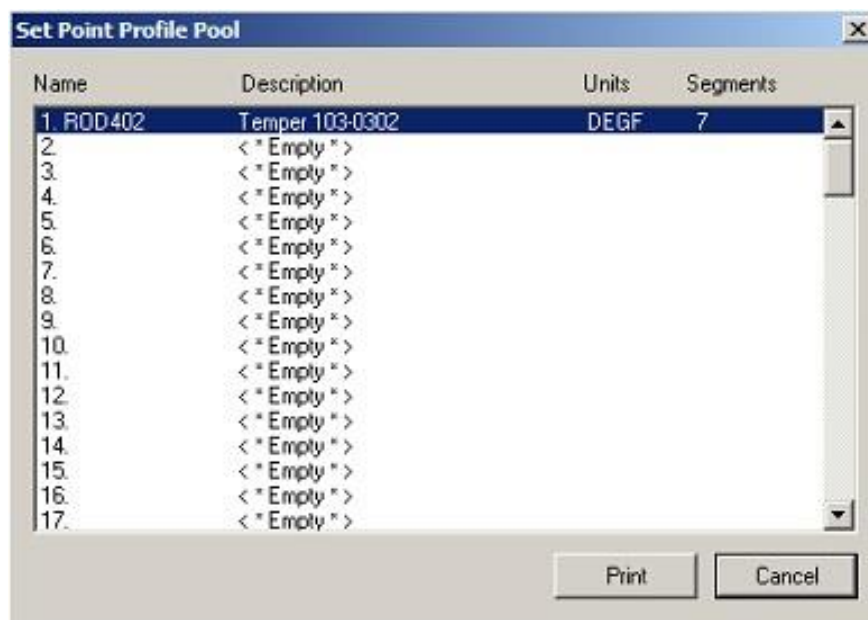
Alarms & Events Reports

Clicking on the **Alarms & Events** button provides a drop-down menu which allows the selection of 2 reports related to displays, as shown below.

Report	Description	SIL Filtering
Alarm Groups	Shows contents of each Operator Interface alarm group display.	Yes
Events	Shows all configured events and their triggers.	Yes

Print Report Preview

Report Categories

The Print Report Preview function provides a means of previewing reports before they are printed. As such, the reports available for previewing is essentially the same as those available in the Print Report function. The one notable exception is that the option to preview the printing of all Function Block Diagrams at once is not supported.

Navigation

A toolbar at the top of the Print Report Preview window lets you navigate through the pages of the report:

The functions from left to right are:

Print	Prints the active report without going to "Print Report" in the file menu
Previous Page	Selects the previous page on the report for display
Next Page	Selects the next page on the report for display
Two Pages	Shows two report pages at once
Zoom Out	Makes the report larger on the screen
Zoom In	Makes the report smaller on the screen

Export Report

Select "Export Report" from the File menu or select the icon from the Custom Modbus Map toolbar. Export Report lets you export some reports as files in comma delimited (.csv) or tab delimited (.txt) format. The files contain the same data as shown in the printed report, just formatted differently. Exported reports can then be imported by other applications such as third party operator interface configurations.

Not all printable reports can be exported; choices are limited.

Click on the Icon on the toolbar and select a report from the drop-down menu that appears. Name the report and save it as .csv or .txt.

To change the default export file type, see Export Delimiter.

Exported Files have the following format for their Header sections.

Header	Example	Description
RevisionID:	0115.0030.0002.0002.0003	AAAA.BBBB.CCCC.DDDD.EEEE Where AAAA = Export ID: 0103 = IO Configuration Information Report 0106 = Variable and Signal Tag Information Report 0115 = Modbus Address Detailed Report 0116 = User Defined Modbus Registers Report 0117 = Signal Tag Report 0118 = Variable Report 0119 = Modbus Address Summary Report 0120 = All Function Block Modbus Addresses 5000 = Modbus Partition Registers Report 5500 = All Modbus Registers Report BBBB = Database Schema Number CCCC = Product type: 2 = HC950 3 = HC930 4 = HC970R 5 = HC970 DDDD = Platform type: 2 = ControlEdge HC900 series controllers EEEE = Feature Set: Schema database minor revisions
File Name:	ControlEdge HC900-C50 Rev 2.1x : jjpconfig1 C50_R2.1.cde	Device Type Device Revision: Configuration Filename
Controller Name:	JOE	Controller name assigned within the configuration
Title:	Joe's Furnace Control	Optional title or description for the configuration
Author:	Joe	Optional author or creator of the configuration
Created Date:	5/20/2005 13:09	Date when configuration file was first created
Modified Date:	5/30/2005 14:05	Date when configuration file was last modified and saved.
Report Title:	Modbus Address Detailed Report	Report title: IO Configuration Information Report Variable and Signal Tag Information Report Modbus Address Detailed Report User Defined Modbus Registers Report Signal Tag Report Variable Report Modbus Address Summary Report All Function Block Modbus Addresses Modbus Partition Registers Report – Partition Name All Modbus Registers Report

23. Modbus Register Addresses

Modbus Register Map Overview

Modbus addressing is available in revision 2.0 and later. The map is view-only in HC Utilities.

In your controller's configuration certain parameters are each automatically assigned a Modbus address. These include certain types of function blocks (such as loops and set point programmers), signals and variables, among other items. Through their addresses these parameters can be accessed or displayed remotely, such as by a third-party operator interface. Collectively, these Modbus addresses and parameters are known as the Modbus map. You can use a predefined fixed map where common parameters are mapped out automatically at fixed addresses, or you can create a custom map for configurations rev. 4.0 or higher.

Fixed or custom map

There are two kinds of Modbus maps available: fixed or custom. Basically, the fixed and custom maps both can contain the same types of items but the custom map has more flexibility with those items' quantities, addresses and data types. The maps have these characteristics.

Fixed map	Custom map
The items that can be in the fixed map are limited to certain types of function blocks and other configuration data.	The items that can be in the custom map are limited to certain types of function blocks and other configuration data, same as fixed map.
Items are automatically assigned to the fixed map.	At the moment you switch from fixed to custom map mode, any items in your configuration maintain their addresses from the fixed map. However, once you are in custom map mode, if you add more items to your configuration they are not automatically added to the custom map, you must add them manually.
Each item type is grouped in a fixed address range of the map. For example, the address range designated for Loops is restricted to Loops only, it cannot contain Setpoint Programmers.	You can create partitions with custom names and address ranges. Partitions can contain any item types, you can mix and match items if needed.
Quantities of each item type are at a fixed maximum (such as 32 loops, 8 programmers). Good for smaller configurations or pre-4.0 configurations. If your configuration exceeds these maximums a message reminds you to consider switching to the custom map.	Quantities are limited only by the amount of free space in the map or partition. Use custom map when you need to access data from more than 32 loops, for example.
Every parameter of a function block is automatically added to the map. You don't need to specify which of the block's parameters are mapped, they're all there. For example, all of a PID block's 40-plus parameters are added to the map.	Lets you pick and choose which block parameters to add. For example, a PID block contains over 40 parameters. The fixed map adds them all; the custom map lets you add only the ones you need to access, thus freeing up more addresses for other parameters. You can create templates to apply to any or all function blocks of a type. For example, you can select 5 of a PID block's parameters then save them to a PID template. You can load that template into other PID blocks

Fixed map	Custom map
	so they each address the same 5 parameters.
You can reorder items within a group, such as switching Loop 1 with Loop 10. You can assign signals and variables to a user-defined area of the map.	You can reorder items. More generally you can put any parameter at any address or at multiple addresses or partitions.
The fixed map has a fixed range (45057-46056) for assigning configured signal tags and variables to another data type, such as integer 16.	The custom map lets you assign any data type to any address (float 32, integer 16, etc.). A default data type is applied but can be changed.
The fixed map contains several gaps of unused (and unusable) addresses.	Since you can put any parameter at any address you can eliminate gaps of unused addresses, thus increasing the map's capacity.
The fixed map is the default map for all configurations. Unless and until you switch to the custom map, the fixed map is in use. Items are automatically added to the map when you access the map, up to the quantity limits (such as 32 loops, 8 programmers). The only items that are not automatically added are user-defined signals and variables.	Uses the fixed map as a starting point*. Any edits to the fixed map (such as reordered items within a group or user-defined signals and variables) are carried over when you switch to the custom map. The custom map's default partitions are based on the fixed map's groups. Conversely, if you switch from custom map to fixed map, any customized partitions or addresses are lost. *You can revert to this starting point at any time by using the Replace feature in the custom map.

Fixed Map

Overview

Certain items in your configuration are automatically assigned Modbus addresses in the fixed Modbus map. These items include signal tags, variables and principal function blocks like loops and setpoint programmers. As each item is added to your configuration it is assigned to the first (lowest) available Modbus address within the range reserved for that item type. If you delete an item from your configuration it is removed from that Modbus address and that address becomes available for another item.

Also available is a range of 1000 addresses (45057 for assigning user-defined signal tags and variables to any address or multiple addresses. Within these 1000 addresses the data type of each signal tag or variable can be changed, for example, from float 32 to integer 16.

Access

To access the fixed Modbus register map to view an address, select the main menu Edit item, Edit Fixed Modbus Register Map, or right-click on a configured signal, variable, or function block. The map is view-only in HC Utilities.

The following tabs are presented.

User Defined Signals and Variables Tab

Select an address range. There are 20 ranges of 50 addresses each for a total of 1000 addresses.

To view all addresses of an item, display its Properties.

Signal Tag Properties
Variable Properties

Function Blocks Tab

Procedure for viewing function block addresses.

Use Filter to list all configured function blocks of a certain type. Types are:
Loops (PID, On-Off, Carbon Potential, 3 Position Step, Auto-Manual Bias)
Alternator
Hand/Off/Auto Switch
Sequencer
Setpoint Programmer
Setpoint Scheduler
Stage
Device Control
Ramp

Addresses containing that type of function block are shown in numerical order.

Unlike signals and variables, only one Modbus address is allowed per function block.

To view the address of any function block, display its Properties by right-clicking on the function block in the configuration diagram under the Controller tab.

Custom Map

Access

To access the custom Modbus register map to view an address, click on the Modbus Map tab at the bottom of the display. This tab is visible only after you configure your map type as custom.

The map is view-only in HC Utilities.

Overview

The custom Modbus map is applicable to the array of Modbus registers classified as "holding registers" or "4xxxxx" registers using decimal addressing where "xxxxx" equals the Modbus address ranging from 1-65535 decimal (0-FFFE hex).

Working with partitions

You can view addresses in defined partitions only. Addresses in undefined partitions are not available until you create a new partition with those addresses. Partitions need not be empty to be edited. If you need more addresses in a partition you can combine it with adjacent partitions, or resize it using space from an adjacent undefined partition.

Functions

Function	Description
Select a partition	You must select a partition whose contents you want to display. The map takes a few seconds to build the contents. Default partitions are based on the fixed map.
Currently displayed partition	Name of the current partition. See Select a partition.
Show Register Address as	Select whether to display addresses in hexadecimal or decimal.
Item	View only. Block name or signal/variable name.
Parameter Name	View only. If the item is a function block this is the parameter name. If the item is a signal tag or variable this is the tag name.
Description	Read only. Description of signal tag or variable.
Data Type	View only. Choices: Unsigned 16 Signed 16 Unsigned 32 (requires 2 registers) Signed 32 (requires 2 registers) Float 32 (requires 2 registers) If 2 registers are required, the higher register is grayed out and not assignable. Note: For signals and variables, when changing data type from float 32 to integer 16, keep in mind the decimal point location. For example, 1000.1 translates to 10001.Note: For function blocks, when changing data type from float 32 to integer 16, the value is rounded. For example, 1000.1 translates to 1000 and 1000.5 translates to 1001.
Decimals	Read only. Decimal places of signal tag or variable.
R/W	View only. Type of access to the parameter. Read/Write
Register	Number of the address in decimal or hex.
Horizontal Scroll	Use to scroll to offscreen areas of the map.

Function	Description
Vertical Scroll	Lets you scroll through the partition.
Toolbar	Print a Partition Report. Export a Partition Report. Lock/unlock Worksheet

Further information

For details on Modbus parameters, see the ControlEdge HC900 Controller Communications User Guide, document number 51-52-25-111.

24.   Redundancy

C70R/C75 controllers/networks have their own diagnostics that are accessed under

Utilities Worksheet Overview

Monitor Menu

Redundancy diagnostics are grouped as follows.

Redundancy System

Redundancy Link

Lead CPU

Reserve CPU

Scanner 2 Link

Redundancy System Status Indicators

The Redundancy System Diagnostics dialog box will provide status of the parameters shown in the following list.

Parameter	Value	Possible Cause	Controller Action	User Action
Redundancy Status	Available	Normal operation	N/A	N/A
	No RSM module detected	Switch on RSM is set between two positions. RSM Module is not inserted RSM Module has failed	The controller will continue to operate with a missing RSM. Automatic failover is still possible if required.	Make sure switch is in desired position Install RSM module Replace RSM
	RSM switch is bad	RSM Switch is indicating an invalid position	The controller will continue to operate with a bad RSM. Automatic failover is still possible if required.	Replace RSM
	I/O comm error on reserve	Reserve CPU is unable to communicate with one or more of the I/O racks.	The lead controller will continue to control the process. Failover to the reserve is still possible if a subsequent failure renders the current lead less capable than the reserve.	Verify all cabling between the reserve CPU and the scanners. Replace any Ethernet switches between the reserve CPU and the I/O rack(s). Replace the reserve CPU Replace the scanner CPU Contact Honeywell service
	Database Not Synchronized	Hardware failure on the reserve CPU Hardware failure on the lead CPU Hardware failure on the CPU rack backplane	The lead controller will continue to control the process, but failover is not possible.	Replace the reserve CPU Replace the lead CPU Replace the CPU rack backplane Contact Honeywell

Parameter	Value	Possible Cause	Controller Action	User Action
				service
	Invalid Configuration	Neither CPU has a valid configuration database	An empty database is created.	Download the desired configuration file and perform a cold start.
	Firmware Version Mismatch	The reserve controller does not have the same version of controller firmware installed	The lead controller will continue to control the process, but failover is not possible.	Upgrade the CPU firmware so both the lead and reserve have the same version.
Redundancy Diagnostics	Good			
	Database Not Synchronized	Hardware failure on the reserve CPU Hardware failure on the lead CPU Hardware failure on the CPU rack backplane	The lead controller will continue to control the process, but failover is not possible.	Replace the reserve CPU Replace the lead CPU Replace the CPU rack backplane Contact Honeywell service
	Invalid Configuration	Neither CPU has a valid configuration database	An empty database is created.	Download the desired configuration file and perform a cold start.
	Firmware Version Mismatch	The reserve controller does not have the same version of controller firmware installed	The lead controller will continue to control the process, but failover is not possible.	Upgrade the CPU firmware so both the lead and reserve have the same version.

Redundancy Link Status Indicators

The Redundancy Link Diagnostics dialog box will provide status of the parameters shown in the following list.

Parameter	Value	Possible Cause	Controller Action	User Action
Redundancy Link Port Status	Good	Lead and Reserve CPUs working ok	N/A	N/A
	Reserve not present	Reserve CPU module is not plugged in.	N/A	Install Reserve CPU
	Reserve Bad Comm	Reserve CPU module is plugged in but not communicating.	Reserve or Lead CPU module could be bad. Backplane could be bad.	Replace faulty CPU. Replace rack.
	Hardware failure	Bad Lead module Bad backplane	N/A	Replace faulty CPU. Replace rack.
Redundancy Link	Good	N/A	N/A	N/A

Parameter	Value	Possible Cause	Controller Action	User Action
Port Diagnostics	Data Link Failure	Reserve CPU module is not plugged in. Reserve CPU module is plugged in but not communicating.	The lead CPU will continue to control the process but failover is not possible.	Replace faulty CPU Replace rack
	Hardware Failure	Bad Redundancy link hardware detected on the lead CPU	The lead CPU will continue to control the process but failover is not possible.	Replace faulty CPU

Lead CPU Status Indicators

The Lead Diagnostics Overview dialog box will provide status of the parameters shown in the following list. These parameters are also shown for the Reserve Diagnostics Overview.

Parameter	Status	Possible Cause	Controller Action	User Action
CPU Diagnostics	Good	N/A	N/A	N/A
	Watchdog	Watchdog reset resulting from software failure	ASYS block's HW OK pin is turned off.	Force a cold start. Upgrade control file software. Replace CPU board. Contact Honeywell Personnel.
	Prefetch Abort	CPU failed when attempting to fetch an instruction from the prefetch register.	Controller performs a restart ASYS block's HW OK pin is turned off.	Force a cold start. Isolate system from noise and force a cold start. Replace CPU board
	Address Error	The reserved exception occurred for an unknown reason.	Same as above	Same as above
	Undefine Error	Bad Instruction Detected	Same as above	Same as above
	Data Abort	CPU failed when attempting to access data.	Same as above	Same as above
	Software Interrupt Error	Software Interrupt occurred which is not supported by the software.	Same as above	Same as above
	Good	N/A	N/A	N/A

Parameter	Status	Possible Cause	Controller Action	User Action
	Watchdog	Watchdog reset resulting from software failure	ASYS block's HW OK pin is turned off.	Force a cold start. Upgrade control file software. Replace CPU board. Contact Honeywell Personnel.
Memory Diagnostics	Good	N/A	N/A	N/A
	5 Day Low Battery Warning	Estimated battery life is less than 5 days.	ASYS block's HW OK pin is turned off.	Replace battery.
	Low Battery	Battery voltage is low.	ASYS block's LOW BATTERY pin is turned on. ASYS block's HW OK pin is turned off.	Replace battery.
	Flash Error	Flash failed to burn	ASYS block's HW OK pin is turned off.	Force a cold start. Replace CPU board.
Real-time Clock Diagnostics	Good	N/A	N/A	N/A
	Not Programmed	RTC not programmed	1. Time and date is set to 00:00:00, January 1, 1970. 2. ASYS block's HW OK pin is turned off.	Program RTC.
	Bad Data	Bad date and time	Same as above	Program RTC. Cycle power. Replace CPU. Replace boards in rack. Replace rack
	Programming Failure	RTC failed to program	Same as above	Same as above
	Read Failure	Unable to read RTC	Same as above	Same as above
Port S1/S2 Diagnostic	Good	N/A	N/A	N/A

Parameter	Status	Possible Cause	Controller Action	User Action
	Data Link Error	A large number of messages are resulting in data link errors.	SYSTEM MONITOR block's HW OK pin is turned off.	1. Check baud rate. 2. Check connectors. 3. Check cable polarity. 4. Isolate cable from electrical interference. 5. If RS232-to-RS485 converter used, check its power, switch/jumper settings, and polarity.
	Hardware Failure	The UART is failing to operate properly.		Replace the controller CPU module.
Lead Port E1/E2: Network Port Diagnostics	Good	N/A	N/A	N/A
	Hardware Failure	Ethernet port tests failed during power-up.	Same as above	Replace CPU module
Rack Comm Diagnostic	Good	See Expansion I/O Comm Diagnostics Status Indicators		
	Data Link Failure	See Expansion I/O Comm Diagnostics Status Indicators		
	Hardware Failure	See Expansion I/O Comm Diagnostics Status Indicators		
	Port A/B Cable Mismatch	See Expansion I/O Comm Diagnostics Status Indicators		
	Protocol Mismatch	See Expansion I/O Comm Diagnostics Status Indicators		
Scanner2 Rack n Network Status	No Comm	See Scanner 2 Link Status Indicators .		
	Marginal - Port I/O A	See Scanner 2 Link Status Indicators .		
	Marginal - Port I/O B	See Scanner 2 Link Status Indicators .		
	Good - Port I/O A	See Scanner 2 Link Status Indicators .		
	Good - Port I/O B	See Scanner 2 Link Status Indicators .		

Parameter	Status	Possible Cause	Controller Action	User Action
	Not in Configuration	See Scanner 2 Link Status Indicators .		
Scanner2 Rack n Network Diagnostics	Good	See Scanner 2 Link Status Indicators .		
	Data Link Failure	See Scanner 2 Link Status Indicators .		
	Hardware Failure	See Scanner 2 Link Status Indicators .		
	Port A/B Cable Mismatch	See Scanner 2 Link Status Indicators .		
	Protocol Mismatch	See Scanner 2 Link Status Indicators .		
CPU Slot Position	CPU A	CPU A is the Lead/Reserve.	N/A	N/A
	CPU B	CPU B is the Lead/Reserve.	N/A	N/A
	CPU is missing	Reserve CPU is not installed or not powered. CPU rack backplane failure.	The lead CPU will continue to control the process but failover is not possible.	1. Install reserve CPU. 2. Apply power to reserve CPU. 3. Replace CPU rack backplane. 4. Call Honeywell service.
Power Supply Type	Unknown	CPU cannot identify the Power Supply Type	None	None
	24VDC	CPU identified a 24VD DC power supply	None	None
	Low Wattage	CPU identified a Low wattage power supply	None	None
	High Wattage	CPU identified a High wattage power supply	None	None

Parameter	Status	Possible Cause	Controller Action	User Action
Controller Rack Type	Redundant Split Rack	NA	NA	NA
	Single Rack	If the Redundant CPU rack is used.	NA	NA
		If the CPU is not correctly inserted into the 1-slot rack and thereby the rear connector of the CPU doesn't engage correctly with the mating connector of the rack backplane.	NA	1. Press the CPU module into the 1-slot rack until the rear connector of the CPU engages the mating connector of the rack backplane 2. Secure the CPU module top and bottom with the captive mounting screws. Torque settings to be 0,4 to 0,5 Nm (3.5 to 4.4 Lb-In.)

Reserve CPU Status Indicators

Contains same information as for the Lead CPU Status Indicators.

Scanner 2 Link Status Indicators

The Redundancy Scanner 2 Link Diagnostics dialog box will provide status of the parameters shown in the following list.

Parameter	Value	Possible Cause	Controller Action	User Action
Scanner-2 Network Status	No Comm	Controller is communicating to none of the Scanner 2s that are in the configuration. or Controller may be communicating to a Scanner 2 that is not in the configuration	If scanners are in the configuration, see Expansion Rack Link Diagnostics below.	See Expansion Rack Link Diagnostic below.
	Marginal - Port I/O A	Controller is experiencing marginal communications on the respective Scanner 2 link to one or more Scanner 2s in the configuration and/or Controller is communicating to some of the Scanner 2s in the configuration but not all	If a scanner 2 in the configuration is not communicating, then a communication diagnostic Is posted for that rack. Refer to the Expansion I/O Comm Diagnostic Summary dialog box	Refer to the Expansion I/O Comm Diagnostic Summary dialog box
	Marginal - Port I/O B	Controller is experiencing marginal communications on the respective Scanner 2 link to one or more Scanner 2s in the configuration and/or Controller is communicating to some of the Scanner 2s in the configuration but not all	Same as above	Same as above
	Good - Port I/O A	Controller is experiencing good communications on the respective Scanner 2 link. Scanner 2s not in the configuration have no effect on the status	Lead CPU is operating normally using the I/O Port A to communicate with the Scanner Racks	none
	Good - Port I/O B	Controller is experiencing good communications on the respective Scanner 2 link. Scanner 2s not in the	Lead CPU is operating normally using the I/O Port B to communicate with the Scanner Racks	none

Parameter	Value	Possible Cause	Controller Action	User Action
		configuration have no effect on the status		
	Not in Configuration	No Scanner 2s in the configuration	N/A	N/A
Expansion Rack Link Diagnostics	Good		N/A	N/A
	Data Link Failure	The ratio of the number of data link errors and the number of good messages exceeds a certain threshold	See the "Rack Comm Diagnostics" parameter in the Expansion I/O Comm Diagnostic Summary dialog box	See the "Rack Comm Diagnostics" parameter in the Expansion I/O Comm Diagnostic Summary dialog box
	Hardware Failure	The expansion I/O port's hardware is indicating a failure	See the "Rack Comm Diagnostics" parameter in the Expansion I/O Comm Diagnostic Summary dialog box	See the "Rack Comm Diagnostics" parameter in the Expansion I/O Comm Diagnostic Summary dialog box
	Port A/B Cable Mismatch	At least one Scanner 2 has its A and B ports swapped with the Lead and Reserve	See the "Rack Comm Diagnostics" parameter in the Expansion I/O Comm Diagnostic Summary dialog box	See the "Rack Comm Diagnostics" parameter in the Expansion I/O Comm Diagnostic Summary dialog box

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Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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