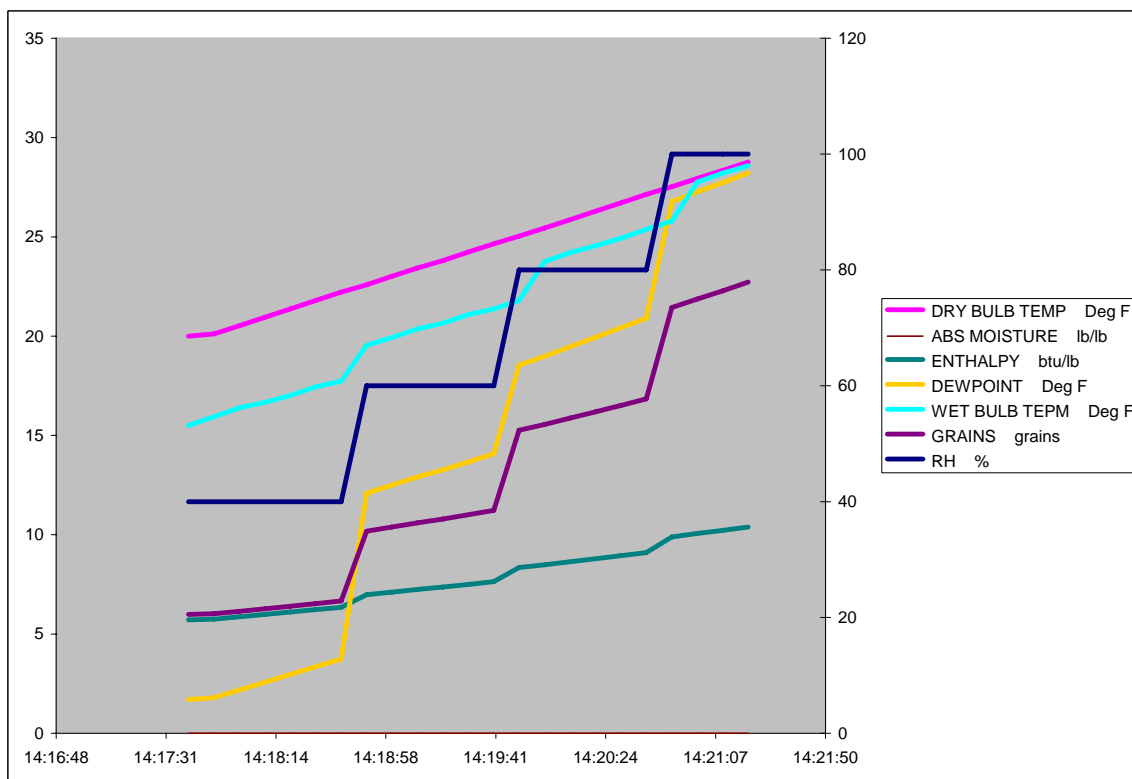


HC900 Hybrid Controller

When you need more than just discrete control

Trend Backfill – Product Note



Overview

Release 4.4 of the HC900 firmware includes a trend backfill feature that adds historical data storage capability to the controller. This feature enables a user to collect up to 250 data points at up to 3 user configurable collection rates. Stored points can be grouped with up to 50 points per group. The elapsed time of data that can be stored is a function of the size of the user configuration and the number of data points and storage rates of the points. An application program, HC Historian, running on a PC is provided to read the data from the controller and store it in CSV files that can be imported into other applications. Configuration of the data storage feature is via two new HC900 function blocks.

The data storage attributes can be summarized as:

- Storage rates.....3, configurable via Trend Rate block: 10 seconds to 24 hours
- Maximum points ..250, user configurable via Trend Point blocks
- Points per group ...50, maximum
- Trend groupsconstrained only by maximum 250 point count
- Capacity (time).....variable based on configuration, point count & storage rate

Setting Up Trend Backfill

The first step in setting up the data storage feature is to add a Trend Rate block to your configuration. This block can be found in the Auxiliary group of the normal scan blocks as shown in **Figure 1**. You can have only 1 Trend Rate block in a configuration.

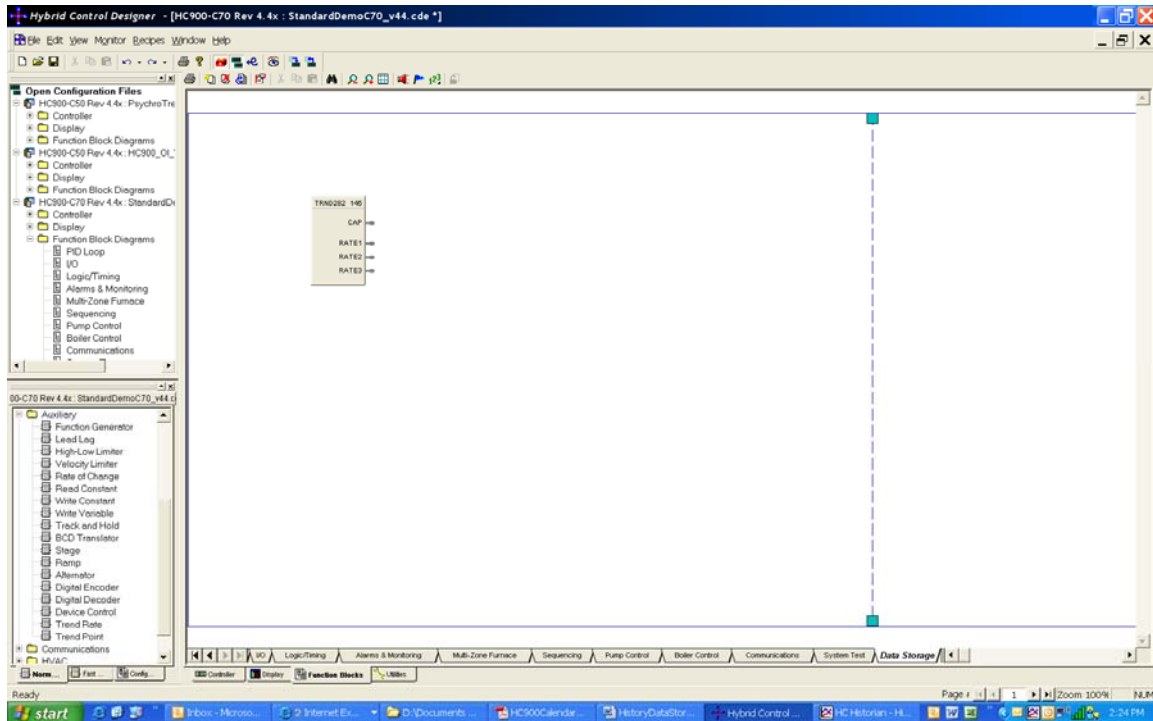
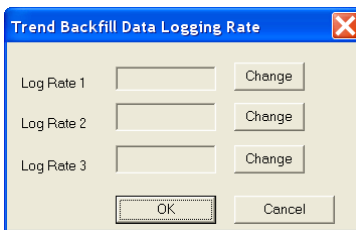
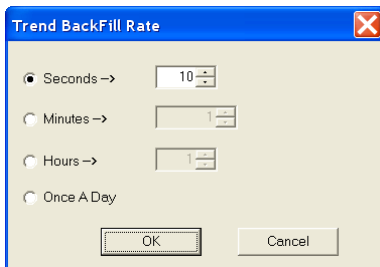


Figure 1

Double clicking on the block will open the properties page where you configure the storage rates.



Clicking on the change button for each of the log rates will open another dialog box to set the corresponding rate.



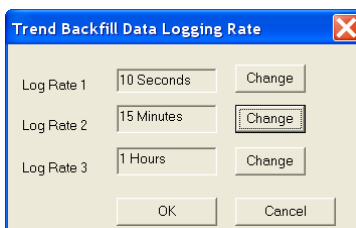
Seconds can be set in a range from 10 to 59

Minutes can be set in a range from 1 to 59

Hours can be set in a range of 1 to 23

Or you can choose to save data once a day

Click OK when you are done.



Repeat for each of the three log rates and click OK.

The next step is to choose the data points you want to store. You have the option of selecting the points by their Modbus address or by signal tag. From the Hybrid Control Designer menu bar select Edit and then Trend Backfill Log Point Selection as shown in **Figure 2**.

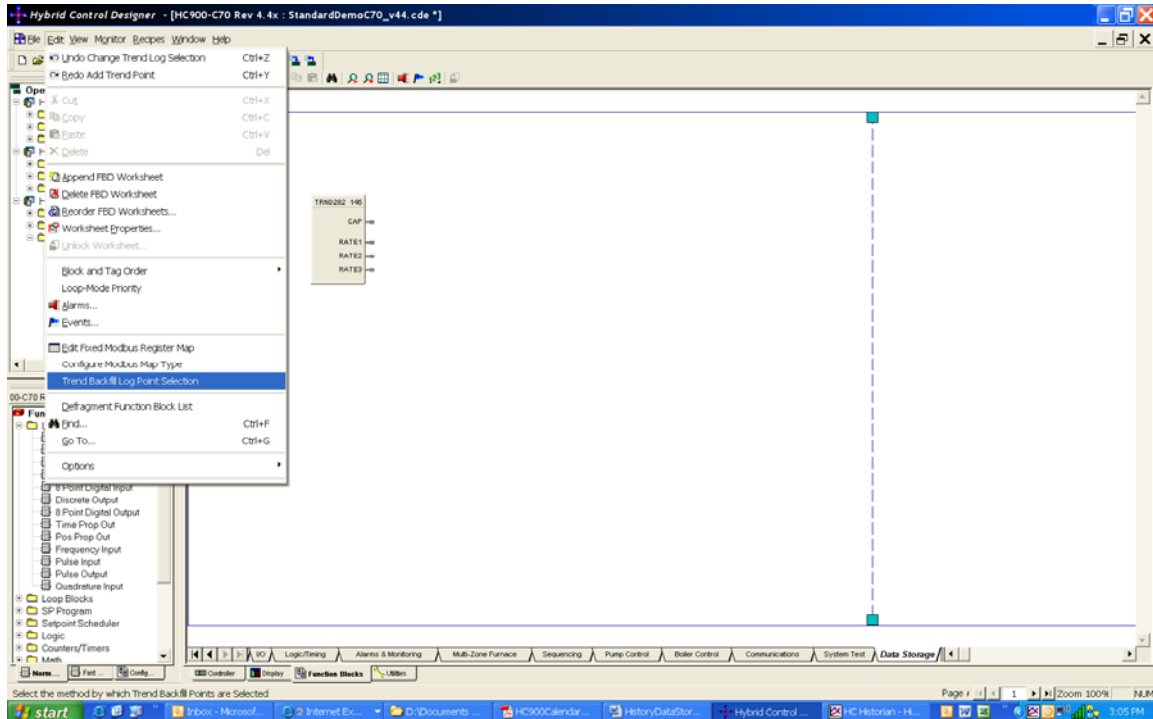
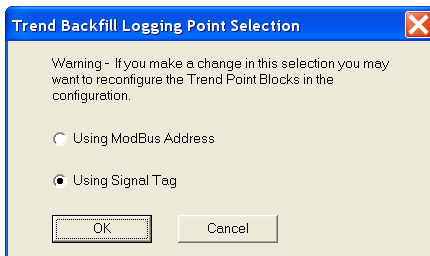


Figure 2



From the dialog, click the appropriate radio button and click OK.

You are now ready to start selecting points to store at each of the storage rates. This is done by adding Trend Point blocks from the Auxiliary group of the normal scan blocks. Connect the input pin of the Trend Point block to the appropriate rate output pin of the Trend Rate block. Each Trend Point block represents a trend group and multiple blocks can be connected to each of the Trend Rate block outputs as shown in **Figure 3**.

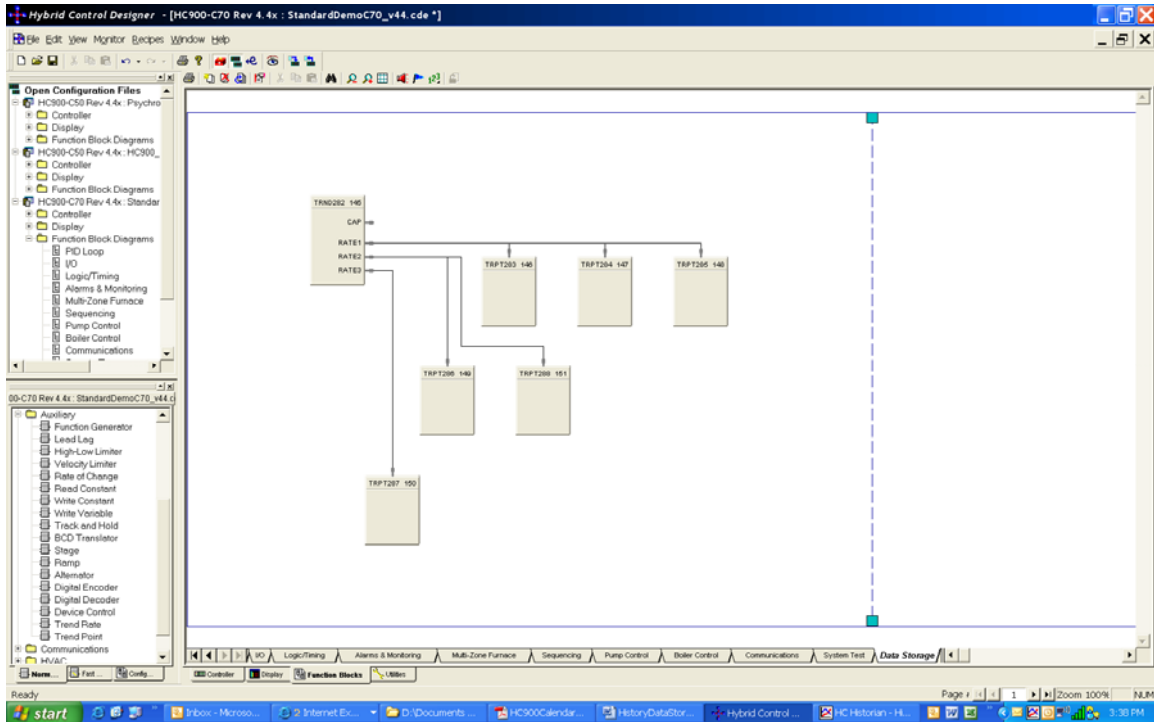


Figure 3

Double clicking on the blocks will open the dialog for configuring the points to store. Depending on the point selection mode you have chosen, the dialog will look like either **Figure 4** or **Figure 5**.

Trend Backfill Data Logging Points

Trend Backfill Group Name: Furnace 1 Data

Select from this list of points:

Tag Name	Description
ENDED	Cycle Ended
F1T1OPEN	
F1T1WARN	
F1-TC1	Furnace1-TC1
F1-TC2	Furnace1-TC2
F1TEMP	Furnace 1 TAVg
F2 %CARB	F2 % CARBON
F2-%C SP	F2 %Carbon SP
F2DEVALM	F2 Deviation Alm
F2HEATER	
F2-HIALM	F2 Zone2 Hi Alm
F2Z2WSP	F2 Zone2 WSP
F2Z1WSP	F2 ZN1 WSP-0
F2ZON1PV	LOOP 1 PV
F2ZON2PV	Loop 2 PV
F2ZON3PV	Loop 3 PV
F4HIALM	F4 High Alarm
FALL WINTER	
FAULT	
FLSHLED3	FlashCycle- Out3
FLSHLED4	FlashCycle- Out4
FLSHLED7	FlashCycle- Out7

Selected Trend Points:

#	Tag Name
01	F1-TC1
02	F1-TC2
03	F1TEMP
04	F1T1OPEN
05	F1T1WARN

Buttons: Add to list >>, Remove from list, OK, Cancel

Figure 4

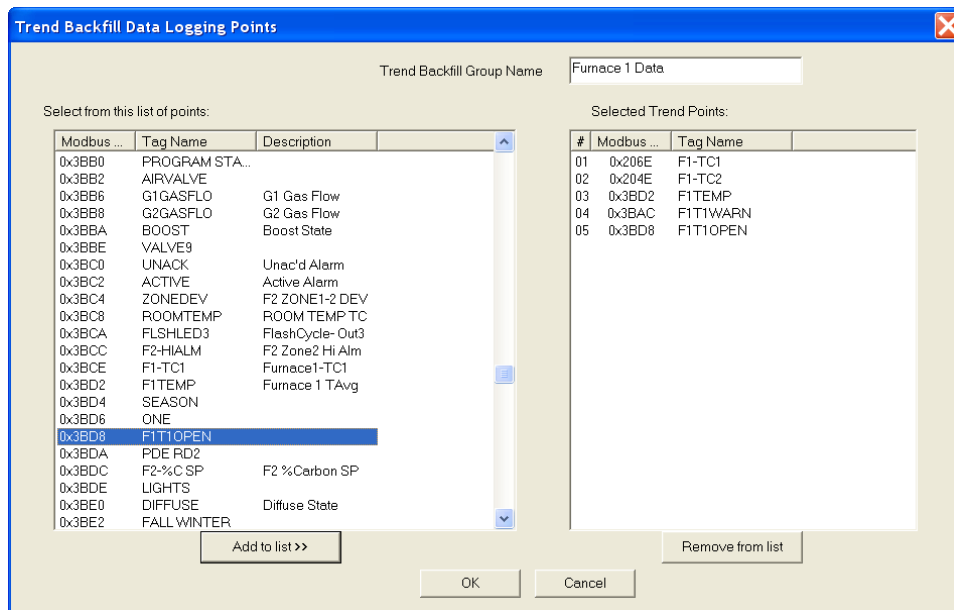


Figure 5

In either case, give your trend group a name and select the points to be included in the group. Each group can have up to 50 points. The trend group name must be unique.

At any time you can see how many points you have configured and the capacity of data storage by viewing the statistics tab of the file properties for the configuration as show in **Figure 6**. In this example, 37 points have been configured to be stored. Sixteen of these will be stored every 10 seconds, 8 every 15 minutes and 8 every hour. The data buffer in the controller can hold 44.389 hours of data.

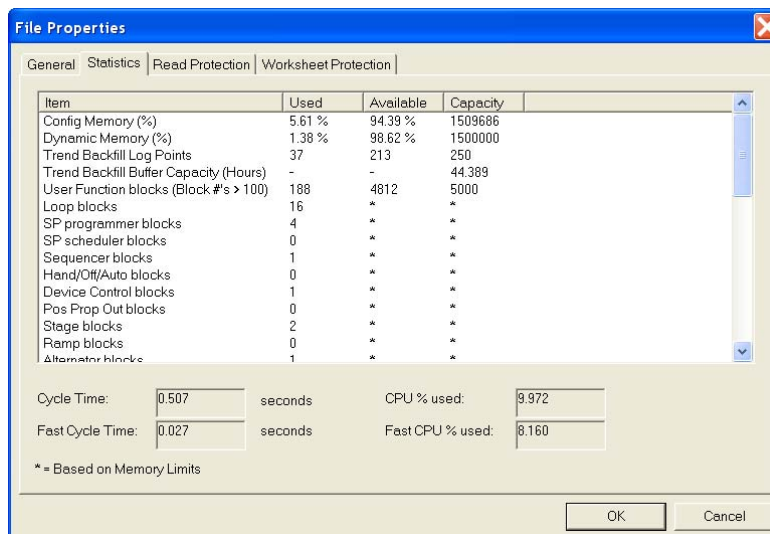


Figure 6

Once the data buffer has been filled, the controller will continue to store data by overwriting the oldest data with new samples. So in this example, as long as the history data is retrieved by the HC Historian application at least as often as every 44 hours, no data samples will be lost.

Cold Start, Warm Start and Hot Start

The data history buffer in the controller is stored in RAM memory that is preserved over a power cycle by the controller battery. Therefore, as long as the controller has a good battery, no history data will be lost because of a power cycle. Of course, depending on the length of the power outage, and the configured storage rates, there will be gaps in the data during the time that the power was off. Starting up with a good battery following a loss of power is known as a warm start.

A cold start can occur for one of three reasons – after a power cycle with a dead battery, after a configuration download requiring a cold start, or anytime the controller transitions from program mode to run mode. In each case, the data history buffer is initialized to an empty state.

A hot start occurs after a configuration change that is not so drastic that it requires a cold start. But because the history buffer uses memory not used by the function blocks, and because most configuration changes are likely to affect the amount of memory needed by the blocks, performing a hot start will also result in initializing the history buffer to an empty state. Therefore, any time the configuration is to be changed it is highly recommended that you upload the history just prior to performing the hot start to minimize any data loss.

Program Mode and Offline Mode

When the controller is in program mode the data history function is disabled. Returning to run mode forces the controller to perform a cold start resulting in the history buffer being initialized to an empty state.

When the controller is in offline mode function block execution is suspended. During this time, the trend backfill function will continue to execute, but the data stored will be equal to the last calculated value prior to the controller transition to offline.

Summary

The controller trend backfill function provides an effective way to save a historical record of controller data. It can be used as an independent function, or as the name suggests as a backup method when a SCADA system is being used as the primary method for maintaining the system history. It is easy to configure and the HC Historian PC application makes the data readily available for offline storage or further processing within other applications.