

Application Note 1:

X-Series Recorder

Health-Maintenance Firmware Credits

Using the Diagnostics and Maintenance features of the QX and SX Recorders

The Diagnostic and Maintenance functions of the **QX** and **SX** recorders provide the user with powerful tools to monitor important functions and parameters relative to the recorder and many process parameters. These functions make it easier to monitor and predict when periodic servicing may be required as well as aid to quickly troubleshoot process conditions. The Diagnostics and Maintenance features are part of the recorder's optional Firmware Credits; these features use just two credits while providing a host of useful information.

Why Buy Credits for Diagnostics & Maintenance?

The Diagnostic and Maintenance functions of the **QX** and **SX** recorders are features that a user might initially overlook as providing value; at least until they understand how they can be useful. These are features that can save a lot of time, allow quick resolution to problems and answer questions related to product up time and when to best to set up preventative maintenance items to avoid a process and scheduling problem. These are features that really differentiate the Honeywell Recorder from the rest of the competition. Some of the key benefits of these functions include:

- It helps you to determine if you are getting the expected readings or why things just don't look right when commissioning the recorder for the first time, even before getting into all the Pen setting and configuration parameters. You can easily review the status of the hardware – how the Analog Inputs, Pulse Inputs, Analog Outputs, Digital I/O, Communications and Storage Media are set up along with viewing current values, which items are enabled and their status.
- Use it to sort out the wiring as you would a volt meter, if you hook up what is believed to be the input and you get no reading or a wrong reading chances are the wiring is not right.
- It makes it easy when you are experiencing problems in the process to quickly pinpoint changes, review the analog input values to see if they are correct and change as expected, review relay outputs and digital inputs to see if they change as expected.
- The ability to check the status of the calibration and when it was last done on a channel by channel basis so you can easily determine when the next calibration should be done.
- Easily determine the amount of time the recorder has been powered on and off as well as the number of times the power has been cycled providing a measure of overall recorder usage and if the recorder is seeing power line fluctuations or being turned off.
- Quickly check the number of times the relay outputs have cycled on and off, providing an indication of if the process is cycling a lot, or alarms are occurring more than expected or are the process relays approaching the end of their life and should be replaced before they fail.
- Check on the backlight of the recorder – how long has it been on; determine what the approximate amount of life left is and whether it should be changed soon.
- Easily check the health of your connected thermocouples – are they starting to deteriorate and should they be replaced before they fail or cause some process issue.
- Check to see when the configuration was last changed; this provides a quick method to allow an inspector or quality check to determine if the configuration was changed since the last inspection date. If it was changed the Audit Trail can be checked to determine when and who made the change assuming passwords are enabled.

These are features that make the job of starting up the recorder faster and easier, providing the tools and information needed to diagnose what is happening or to take corrective action before something goes wrong costing money and resulting in lost production time.

The Maintenance Function (Main Menu > Status > Maintenance)

The Diagnostic and Maintenance functions provide an overview status of the recorder's hardware set up and Maintenance information that would be useful in predicting the health of the recorder and process parameters. These coupled with some of the standard features found in the Status section of the recorder; provide a quick, comprehensive picture of the state of things, both within the recorder as well as in the process.

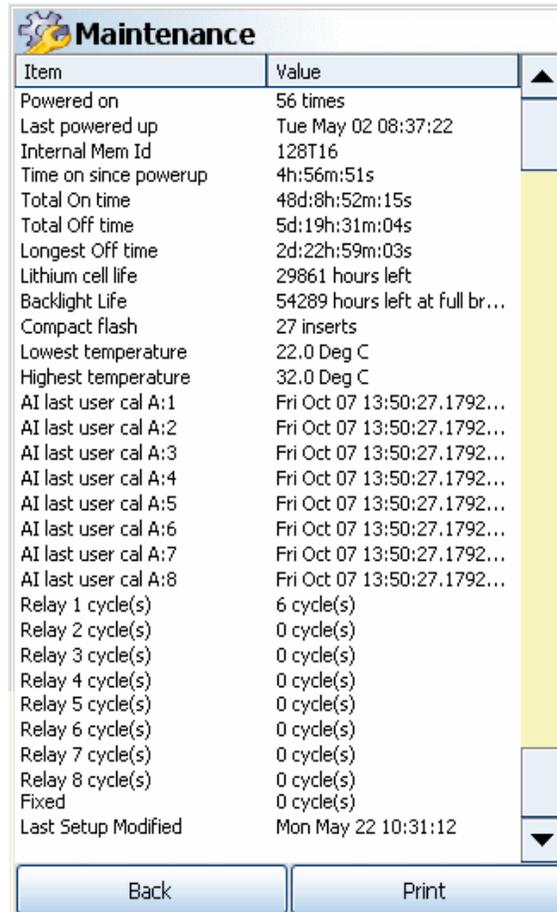
The Maintenance screen shown here provides a handy list of parameters that can be used to determine if servicing of the recorder or other process equipment is required.

There are a number of items related to the power on – power off conditions for the recorder, total time on and off as well as the longest time off, which could be used as an elapse timer for the process equipment. Generally, all the instruments are powered through a common power supply, this feature can provide an indication of equipment utilization and whether servicing based on run time is needed.

The Lowest and Highest temperature reading is taken from the Cold Junction at the back of the recorder. The higher the temperature the equipment sees, generally the shorter its life from a reliability viewpoint. This helps you monitor this parameter and action can be taken to improve system reliability by reducing the overall ambient temperature.

The Calibration shows when the last calibration was done and if the user cal or factory cal. is being used. This is a great tool for Quality/Metrology to monitor the equipment calibration.

The Relay information shows how many times the relays are being cycled. You can compare this to the specified life for the process relays to determine if they are nearing the end of their life or if a particular relay is cycling more than expected.



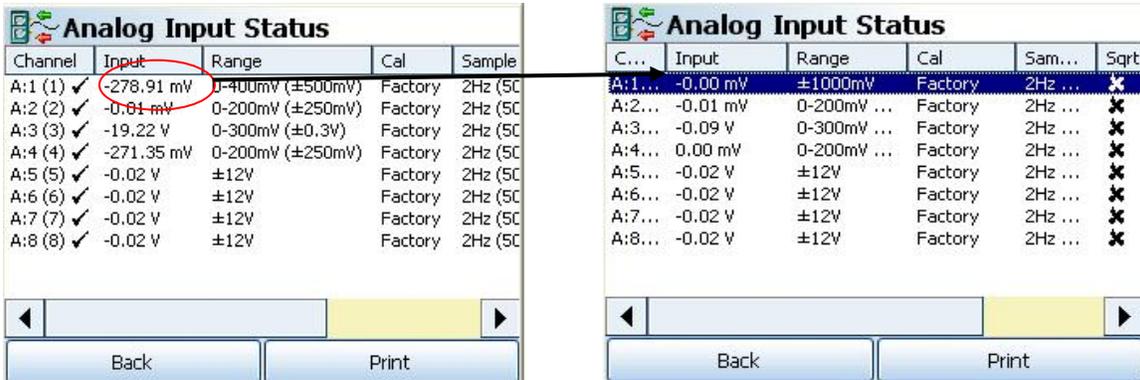
Item	Value
Powered on	56 times
Last powered up	Tue May 02 08:37:22
Internal Mem Id	128T16
Time on since powerup	4h:56m:51s
Total On time	48d:8h:52m:15s
Total Off time	5d:19h:31m:04s
Longest Off time	2d:22h:59m:03s
Lithium cell life	29861 hours left
Backlight Life	54289 hours left at full br...
Compact flash	27 inserts
Lowest temperature	22.0 Deg C
Highest temperature	32.0 Deg C
AI last user cal A:1	Fri Oct 07 13:50:27.1792...
AI last user cal A:2	Fri Oct 07 13:50:27.1792...
AI last user cal A:3	Fri Oct 07 13:50:27.1792...
AI last user cal A:4	Fri Oct 07 13:50:27.1792...
AI last user cal A:5	Fri Oct 07 13:50:27.1792...
AI last user cal A:6	Fri Oct 07 13:50:27.1792...
AI last user cal A:7	Fri Oct 07 13:50:27.1792...
AI last user cal A:8	Fri Oct 07 13:50:27.1792...
Relay 1 cycle(s)	6 cycle(s)
Relay 2 cycle(s)	0 cycle(s)
Relay 3 cycle(s)	0 cycle(s)
Relay 4 cycle(s)	0 cycle(s)
Relay 5 cycle(s)	0 cycle(s)
Relay 6 cycle(s)	0 cycle(s)
Relay 7 cycle(s)	0 cycle(s)
Relay 8 cycle(s)	0 cycle(s)
Fixed	0 cycle(s)
Last Setup Modified	Mon May 22 10:31:12

Figure 1

Diagnostics (Main Menu > Status > Diagnostics)

The Diagnostic feature focuses on specific areas related to the hardware installed in the recorder. This includes Analog Inputs, Analog Outputs, Alarms/Digital I/O, Pulse Inputs, Communications and the Storage Media. The diagnostic screens allow the user to quickly review the status of many parameters related to the area of interest. For example, you can quickly review the Analog Inputs to see what range they are set for, the current value being measured, what calibration factors are being used, the sample rate for that input, whether it is set for square root, and whether any sensor compensation has been applied to the input. Using the Diagnostic function combined with the Pen Overview helps the user to quickly understand what is happening both from an input standpoint as well as how the recorder is taking this input data and using the Pen settings to display and record the data. An example of how this can help a user is illustrated in **Figure 2**.

In **Figure 2**, an input is being set up to record and display a 0 to 500mv signal representing a corrosion rate from a transmitter. Initially the recorder input is showing an input reading of -278.91 mv, an obvious problem with the input since it should be ~0.0mv. The input was changed to a standard -1000 to 1000mv range to get it mid scale on the display and the input was checked. Initially, the input wiring was found to not be securely in the connector, creating an intermittent connection resulting in a bad reading (the -278.91mv); once corrected the Analog Input Status screen showed that the recorder input was working correctly and we were getting the expected reading of 0.00mv.



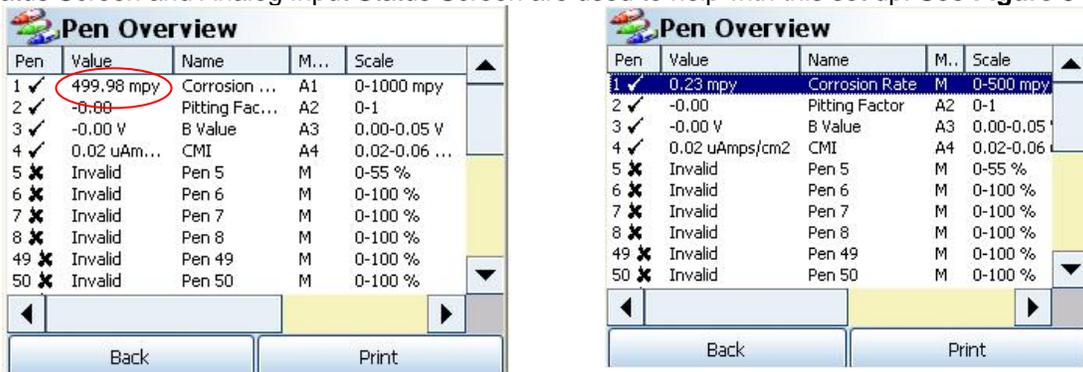
Analog Status Showing Fault

Analog Status Displaying Known Status

Figure 2

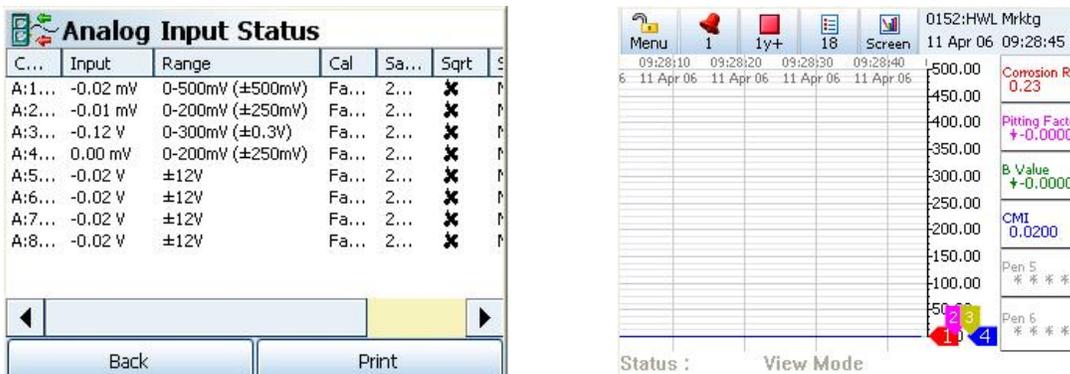
Pen Overview (Main Menu > Status > Pen Overview)

Once the input is set up and known to be working as expected, the set up of the range to the user defined range (0 to 500mv) and proper scaling for the pen can be addressed. The Pen Overview Status Screen and Analog Input Status Screen are used to help with this set up. See **Figure 3**



Pen Status Showing Fault

Pen Status After Correcting Input Signal



Analog Input Status Correct Range

Trend Display with Correct Ranging

Figure 3

This is just a simple example of how the Diagnostic function and Status Overview screens of the recorder can make set up and troubleshooting during a start up easier and faster. It provides the tools to quickly analyze and troubleshoot the situation; isolating each area and resolving the issue before moving to the next area. All the screens for the Diagnostic function of the recorder are shown in **Figure 4** as a reference. The same technique illustrated in **Figure 2** with the Analog Inputs can be used to diagnose issues relating to Analog Outputs, Alarm/Digital I/O, Pulse Inputs, Communications and the Storage Media to pinpoint issues and resolve them, see **Figure 5**.

Channel	Input	Range	Cal	Sample Rate	Sqrt	Sensor comp	Pen	CJC
A:1 (1) ✓	24.52...	PT100 (±100mV)	Factory	2Hz (500ms)	✗	None	1	-
A:2 (2) ✓	-0.02 V	±12V	Factory	2Hz (500ms)	✗	None	2	-
A:3 (3) ✓	-0.02 V	±12V	Factory	2Hz (500ms)	✗	None	3	-
A:4 (4) ✓	24.58...	PT100 (±100mV)	Factory	2Hz (500ms)	✗	None	4	-
A:5 (5) ✓	24.68...	PT100 (±100mV)	Factory	2Hz (500ms)	✗	None	5	-
A:6 (6) ✓	24.53...	PT100 (±100mV)	Factory	2Hz (500ms)	✗	None	6	-
A:7 (7) ✓	-0.02 V	±12V	Factory	2Hz (500ms)	✗	None	7	-
A:8 (8) ✓	-0.02 V	±12V	Factory	2Hz (500ms)	✗	None	8	-

Analog Input Status Screen
Figure 4

C...	TX Pen	Range	Output
B:1...	1	4-20mA ✗	0.00mA
B:2...	1	4-20mA ✗	0.00mA

Analog Output Status Screen

Channel	I/O/P	Alarm	Status	Duration
G:1 (1) ✓	Output	-	Open	-
G:2 (2) ✓	Output	-	Open	-
G:3 (3) ✓	Output	-	Open	-
G:4 (4) ✓	Output	-	Open	-
G:5 (5) ✓	Output	-	Open	-
G:6 (6) ✓	Output	-	Open	-
G:7 (7) ✓	Output	-	Open	-
G:8 (8) ✓	Output	-	Open	-
Fixed ✓	Output	-	Closed	-

Alarm/Digital I/O Status Screen

Description	Status
Ethernet	Active 100Mb Full Duplex
IP Address	Dynamic:164.145.185.132

Communications Status Screen

Drive	Size	Free	Status	Setup Files
Flash ...	184.0MB	--	Time to recycle: 11d	
CF Card	60.9MB	21.0...	Schedule: 10 Minutes	
USB 1	Empty			
USB 2	Empty			

Media Status Screen

Figure 5