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AXIOM

Smart Datalogger for Extreme Environments

Field Reference and Guide

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The Axiom Suite of Manuals

Axiom (F6/H2/H1) Overview	Description, Quick Start Guide, General Operating Instructions, Specifications.
Axiom Operator's Manual	Detailed description of all functions of 7 home screen icons. Brief description of Telemetry (8th icon). Covers Sensor Extensions and sensor mapping.
Axiom G6 Telemetry Reference	Detailed description of the Axiom Telemetry functions including message formatting.
Axiom Field Reference and Guide	A field reference with the most common features and functions used on site visits.
Axiom Installation and Maintenance Guide	Installation and maintenance details.
Axiom AirTalk Reference	Detailed description of configuring the Datalogger to interface with AirTalk.
Axiom RVT Reference	Detailed description of configuring the Datalogger to interface with RVT

Contents

Chapter 1 GENERAL INFORMATION

Very little maintenance is required for the Axiom datalogger. All software updates, configuration updates/modifications, and troubleshooting can be performed via the touch screen and a USB memory stick attached to one of the datalogger's USB HOST ports.

This manual will outline common features and activities which are done as part of a normal site visit. Additional information and details can be found in the Axiom Configuration Reference which should be read and used in conjunction with this manual.

In order to be able to download and review data being collected from the sensors, the following has to happen:

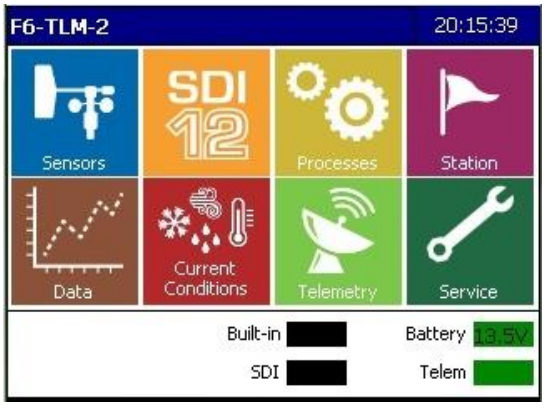
1) Sensors must be attached and mapped (Chapter 4);
2) Sensor variables (data points) must be named and intervals assigned (Chapter 5); and
3) Data logging must be set up with data points designated from selected sensor variables and intervals assigned (Chapter 7).

1.1 SCREENS AND ICONS

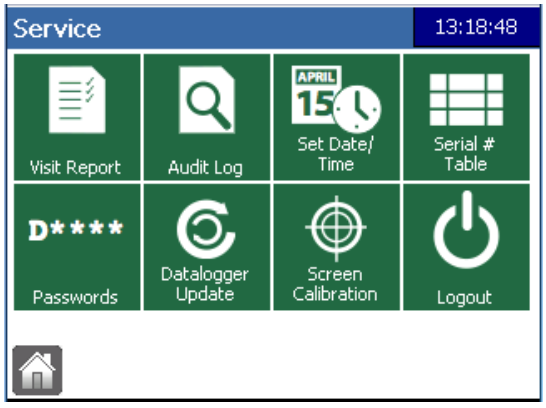
The Axiom datalogger has a **Home** screen which consists of eight **Main Menu** icons. Each icon accesses screens to configure or view information related to a particular subarea of the datalogger's functionality. After 10 minutes of inactivity the datalogger screen times out from the current session and the screen goes dark. Touching the screen will "wake up" the datalogger.

When a **Main Menu** icon is selected, the next screen could consist of **Sub Icons, Tabs,** or **Information Fields**, depending on the function. A variety of **Action** buttons are displayed on the bottom of some screens. This selection varies according with the functions available on the screen. Selections are made by tapping the desired portion of the screen with the stylus or your finger tip.

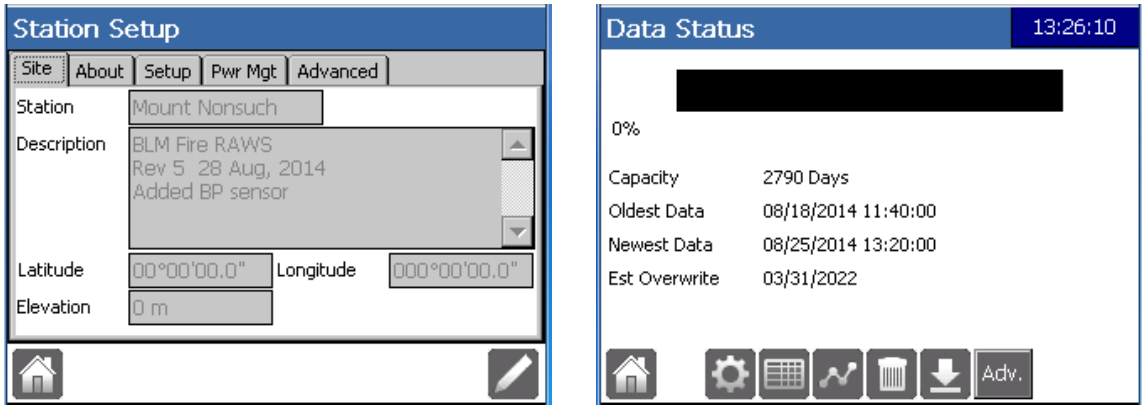
When directions are provided in this manual, a series of selections to bring the user to a particular screen or function shall be illustrated as follows: **Home>Main Icon>Sub Icon>Tab> Action Icon/Information Field.**



The **Home** screen showing the 8 **Main Icons**



The **Service** screen showing **Sub-icons**



Screen with several **Tabs** and **Information fields** Screen with several **Action icons**

Figure 1-1: Screen and icon hierarchy

In order to amend fields, select the edit icon , then select the field you wish to amend. Some fields will turn white when in edit mode; others will remain grey but will be highlighted once they are selected. Read only fields will remain greyed out and will not highlight.

1.1.1 ACTION ICONS

The action icons and their functions are outlined below.

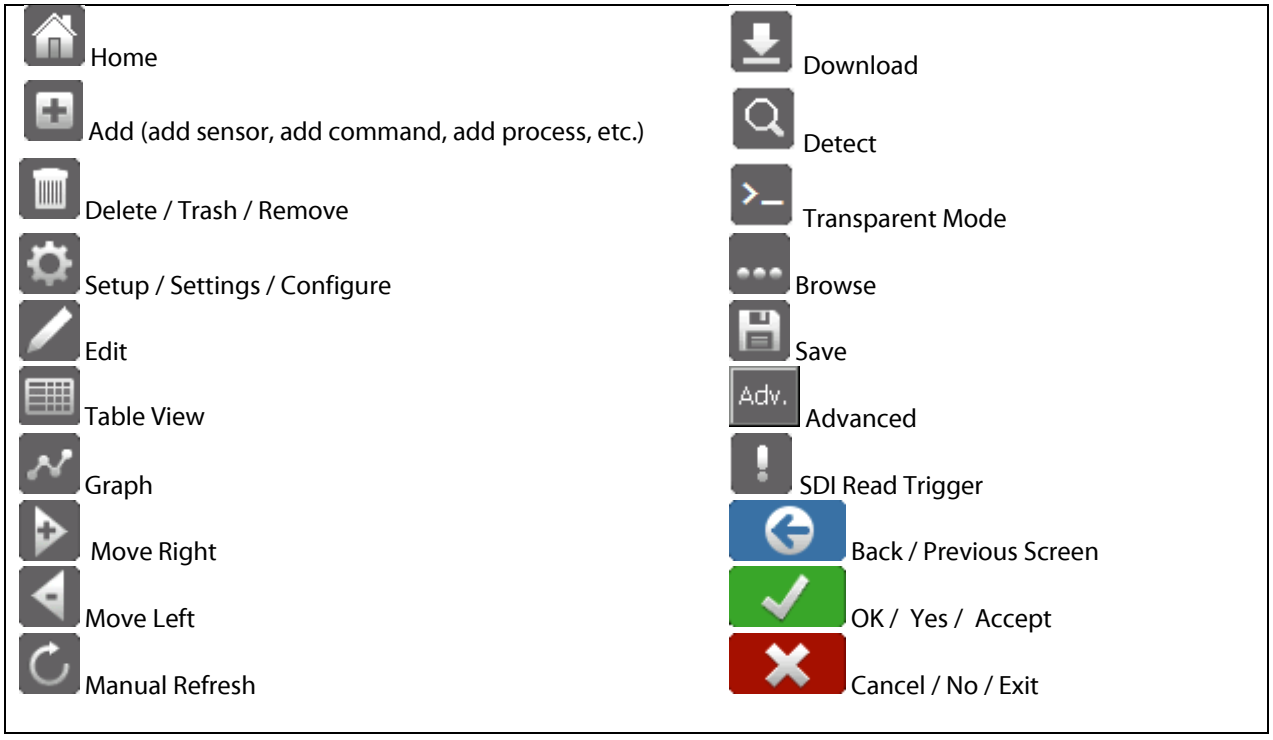


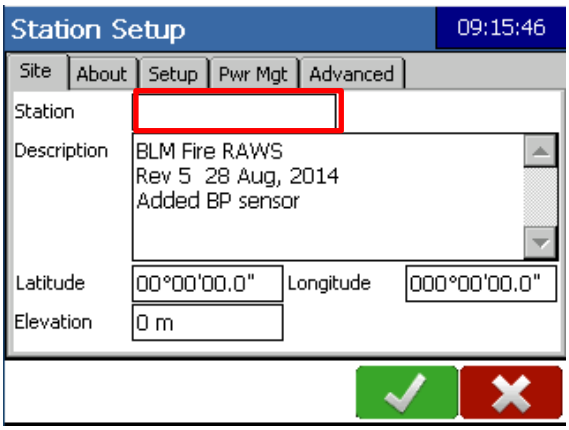
Figure 1-2: Action icon legend

Chapter 2 STATION SETUP

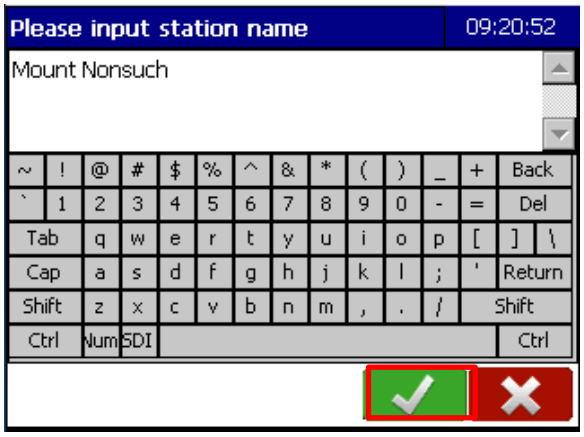
Station information encompasses all of the aspects which are unique to a particular datalogger. The Station icon on the touchscreen allows the user to view and edit datalogger site information, to view datalogger version information, and also allows the user to load and save datalogger configuration and template files.

If you are setting up a new station, a unique station name and description need to be entered. Select **Home>Station.**

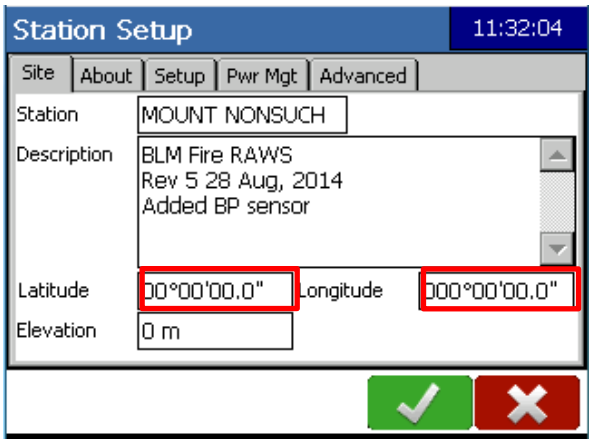
1. To populate the **Station** and **Description** fields, select **Edit** then tap on the empty field.



2. Use the keyboard to enter a **Station Name> OK.** Repeat for the **Description**.



3. If there is a GPS antenna, the latitude and longitude will be populated when GPS synchronization occurs. If there is no GPS antenna attached to the datalogger, select the Latitude and Longitude field boxes to enter the appropriate station location. Tap **OK.**



Tap **OK** again to exit Edit mode. Tap **Home** to return to the Home screen.

2.1 CONFIGURATION FILES

A configuration file encompasses all datalogger details – this includes datalogger specific information such as site and telemetry parameters as well as general data collection and processing algorithms. FTS normally configures the datalogger to meet the user's requirements; however, should it be necessary, the user can set-up or modify the datalogger's configuration.

If configuration updates are known prior to the site visit a user may come to the site with a preconfigured file. This file can then be loaded from a USB memory stick onto the datalogger and will save considerable time on-site.

2.1.1 LOADING A CONFIGURATION FILE

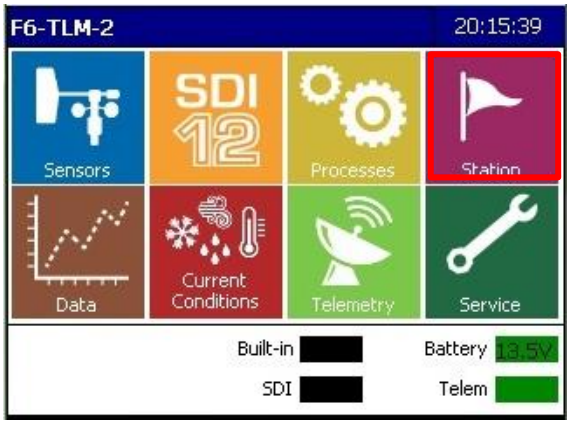
> **IMPORTANT!** If the station is transmitting via satellite (GOES, Meteosat, or International) then it may lose its GPS fix during the configuration update. It can take up to 20 minutes to obtain a GPS fix which is needed before another transmission can occur. To minimize disruption to data collection, do not load a configuration until there are at least 25 minutes before the next transmission.

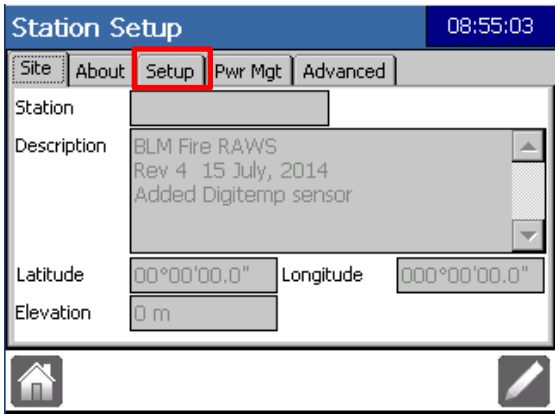
A basic guide to loading an existing configuration file into the datalogger is outlined in the following steps.

1. Load the desired **Configuration File** onto a USB memory stick. Configuration files always have the "**.xml**" extension.

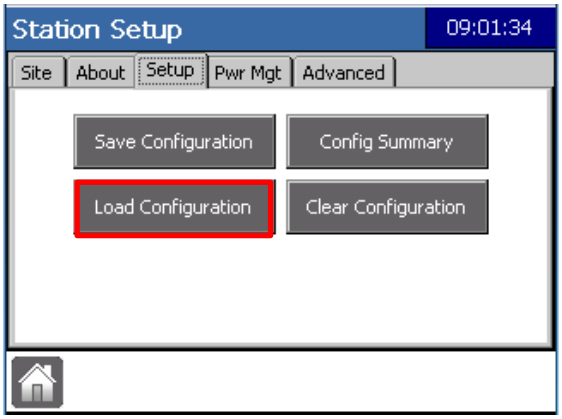
2. Insert the USB memory stick into either of the datalogger's USB HOST ports.

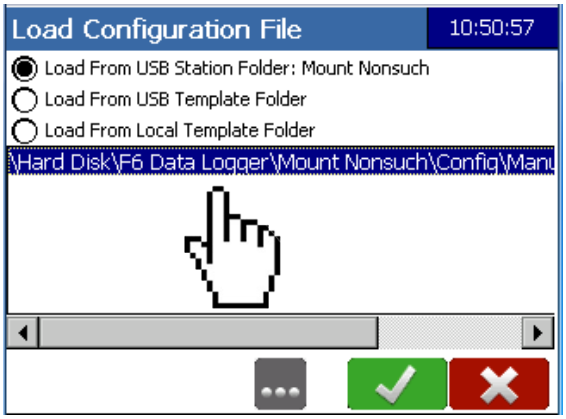
3. Select **Home>Station> Set-Up**.





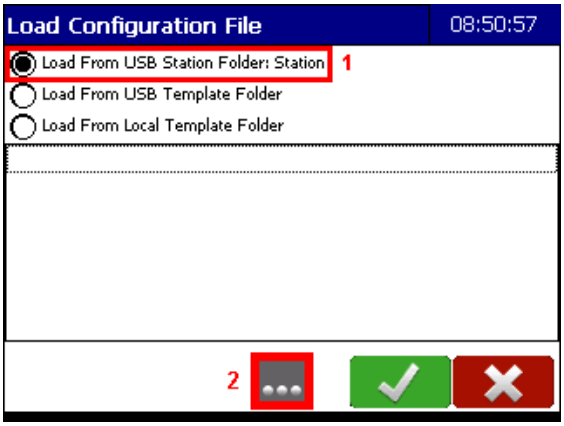
4. Select **Load Configuration.**



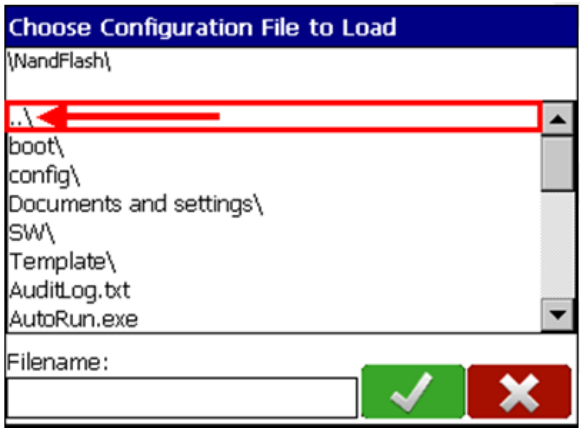


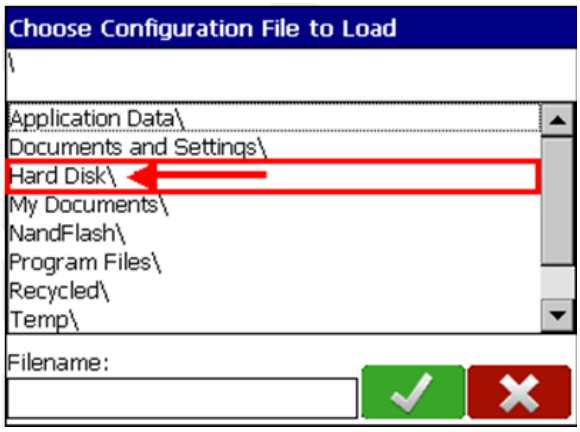
If the desired configuration is placed in the **Datalogger > "Station name" > Configuration folder** then the datalogger will auto detect it and populate the selection box with all configuration files present in that folder ,including the configuration file saved in the Start Visit report. If this is the case, then the desired configuration file can be directly loaded by selecting the file from the selection box and tapping **OK**. Care should be taken to ensure the correct configuration file is selected.

5. If the datalogger does not auto detect the configuration file, then it must be found prior to downloading. Ensure that **Load from USB Station Folder** is selected, and then select **Browse** **.**

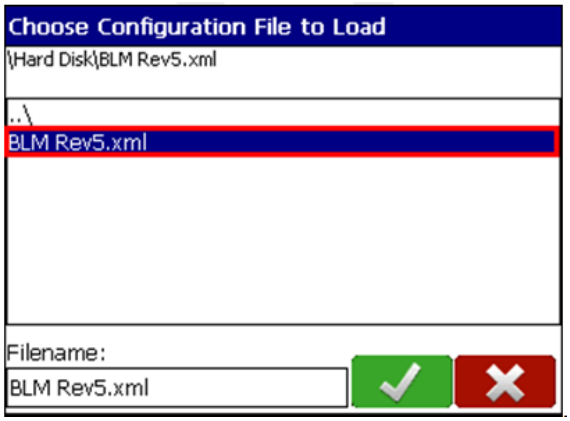


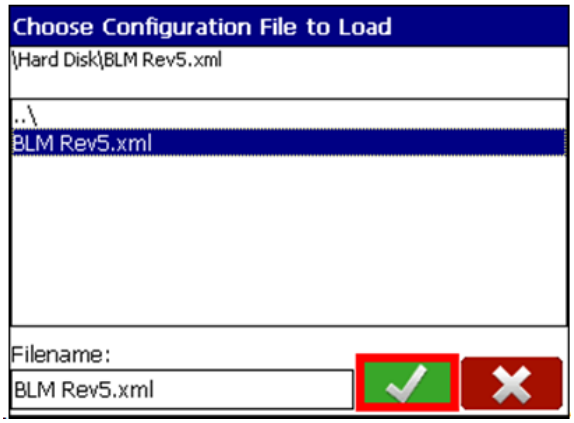
6. To browse to your file on the USB memory stick, go up one level to the root directory by tapping **"..\"**, then select **Hard Disk**.



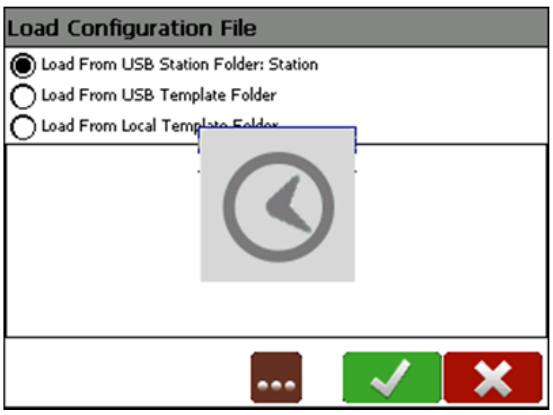


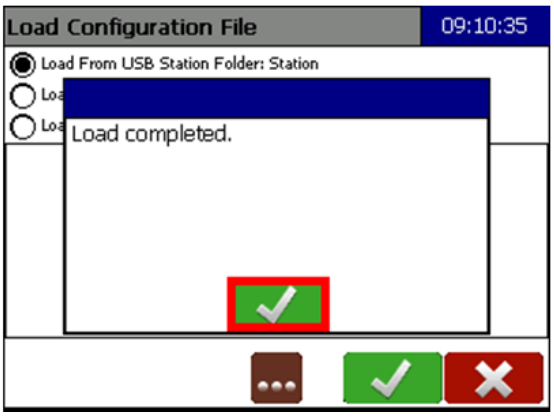
7. You are now in the USB memory stick's memory; select the appropriate **Configuration File** then click **OK**. A configuration named "BLM Rev5.xml" is used in the example below. Configuration files always end in ".xml".



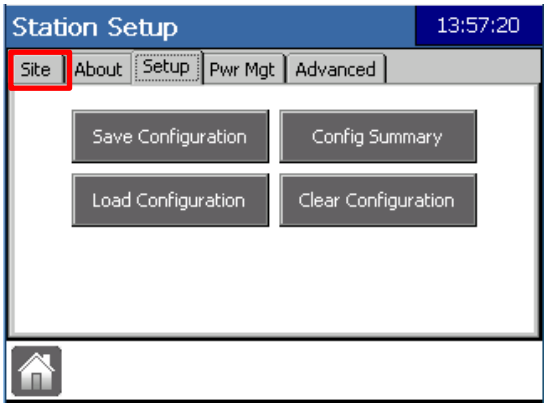


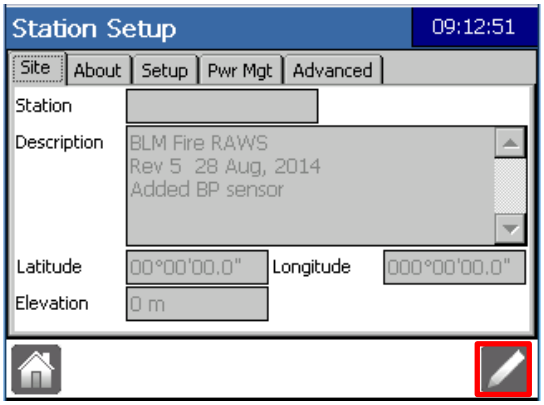
8. It will take about 60 seconds to load the configuration file. When the configuration has been loaded a "Load Completed" message appears. Select **OK**.





9. Select **Site** to review the Site and update the Description field to reflect the recent configuration file.





2.1.2 LOADING A CONFIGURATION FILE FROM A START VISIT REPORT

If reloading a configuration from a start visit report, the file will be found on the Hard Disk and will be displayed in the selection box. By scrolling right, the timestamp from the Start Visit will be displayed in yyyy-mm-dd-hh-mm-ss format.

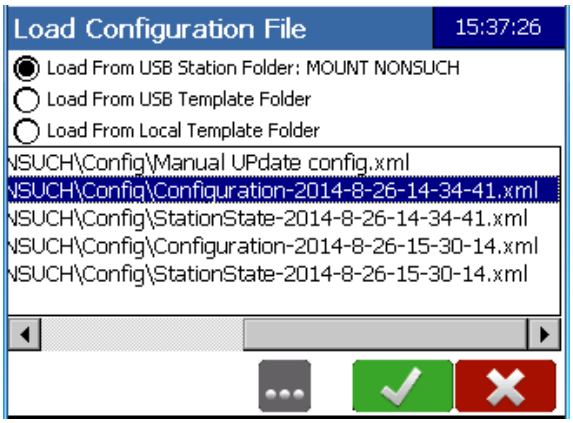


Figure 2-1: Loading a configuration file from a Start Visit Report

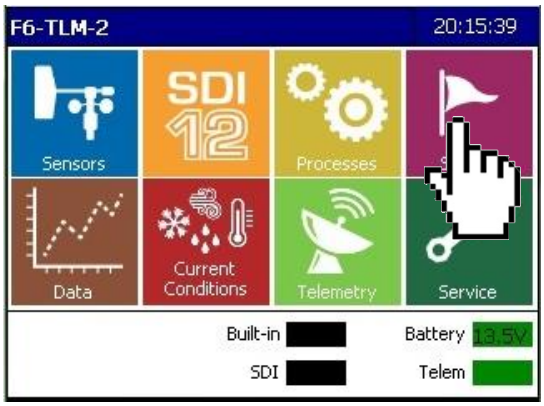
Select the configuration file which corresponds to the timestamp of the Start Visit report.

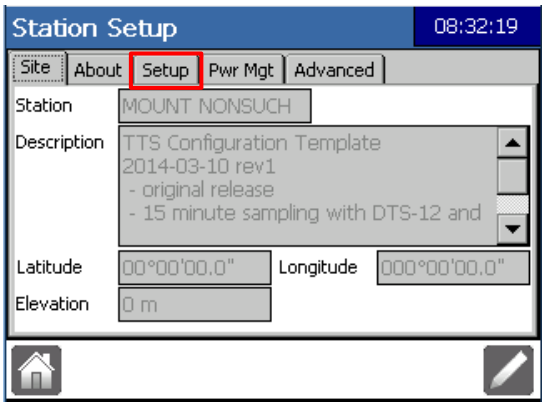
2.1.3 SAVING A CONFIGURATION FILE

A configuration file can be saved manually or automatically as part of a visit report. See Chapter 3 for more information on how to perform a visit report. A basic guide to saving a configuration file into the datalogger is outlined in the steps below.

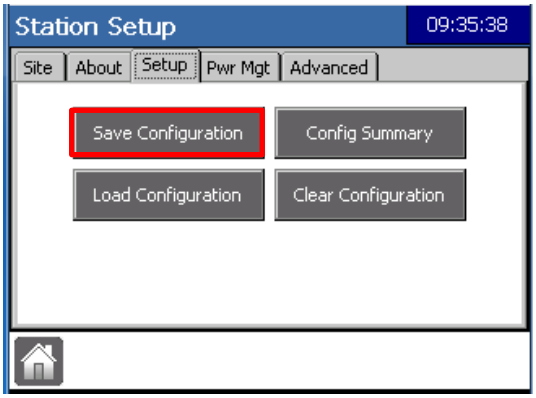
1. Insert the USB memory stick into either of the datalogger's USB HOST ports.

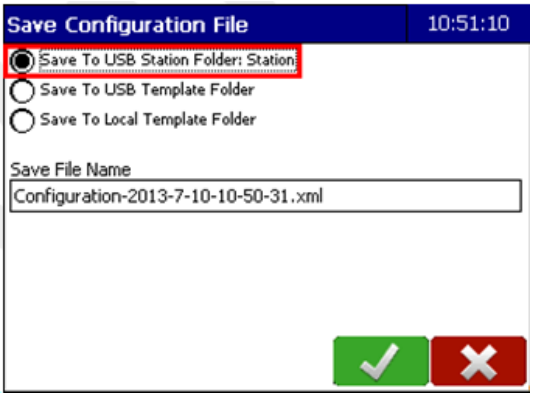
2. On the Home screen select **Station** then select the **Set-Up** tab.





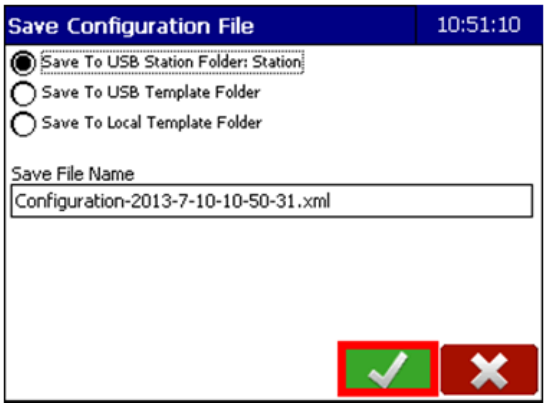
3. Select **Save Configuration** and ensure that **Save to USB Station Folder** is selected.

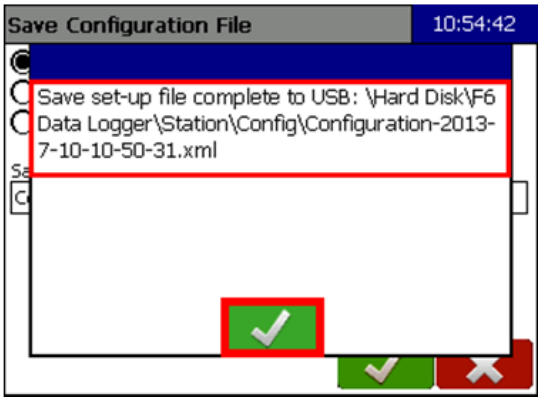




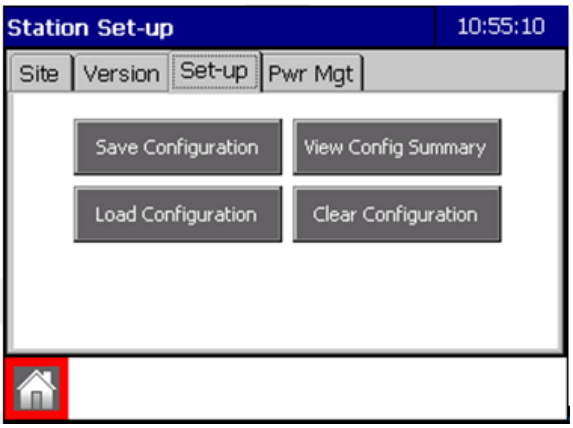
NOTE: A name for the configuration file is automatically generated and populated in the Save File Name text box. The file name has a date and time stamp (Configuration-YYYY-MM-DD-hh-mm-ss.xml). If you wish to re-name the file, then tap on the Save File Name text box and enter the desired file name.

4. Select **OK** to save then select **OK** again to confirm. Note the folder path to which your configuration file will be saved on your USB memory stick (Hard Disk).





5. Tap the **Home** button to return to the Home screen.



2.2 APPLICATION UPDATE

The Application Software is the program which runs the datalogger and provides the GUI and the functionality for the datalogger to be configured for specific requirements. The version of the Application currently running in the datalogger is displayed in the **About** tab of the **Station** screen (**Home > Station**).

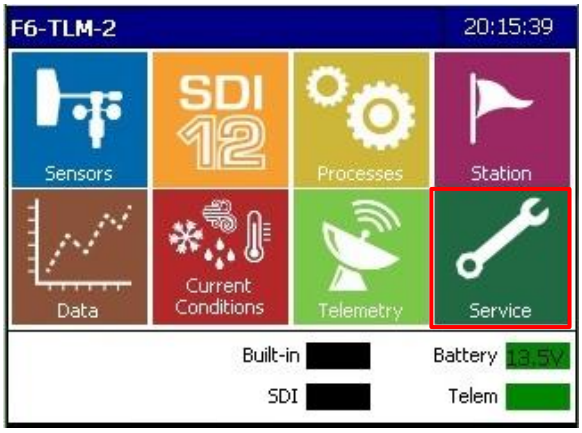
Latest updates can be downloaded via the FTS Technical Support Resources web page: http://support.ftsenvironmental.com/

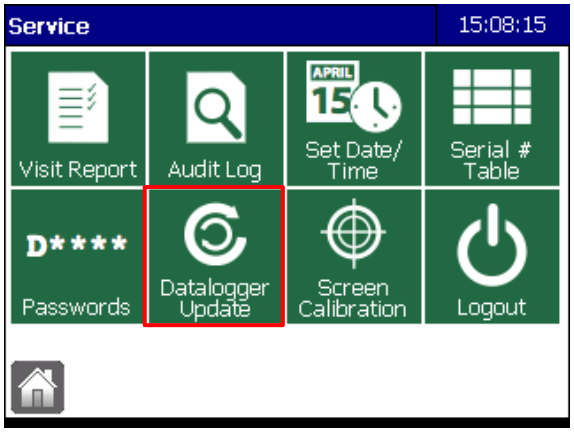
> **IMPORTANT!** If the station is transmitting via GOES then it will lose its GPS fix during software updates. It can take up to 20 minutes to obtain a GPS fix which is needed before a GOES transmission can occur. Therefore, if there are less than 25 minutes before the next scheduled GOES transmission, that next transmission may not occur. We recommend waiting until there are more than 25 minutes before the next transmission.

A basic guide to updating the datalogger is outlined in the following steps.

1. Load the desired **Application File** onto a USB memory stick and insert the USB memory stick into either of the datalogger's USB HOST ports. Application files always have the **".CAB"** extension.

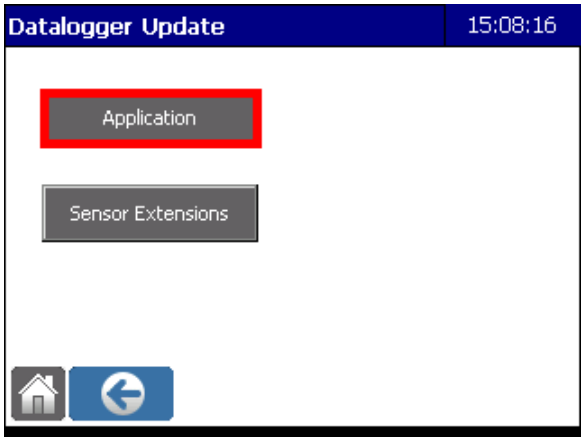
2. On the Home screen, tap **Service** then tap **Datalogger Update.**

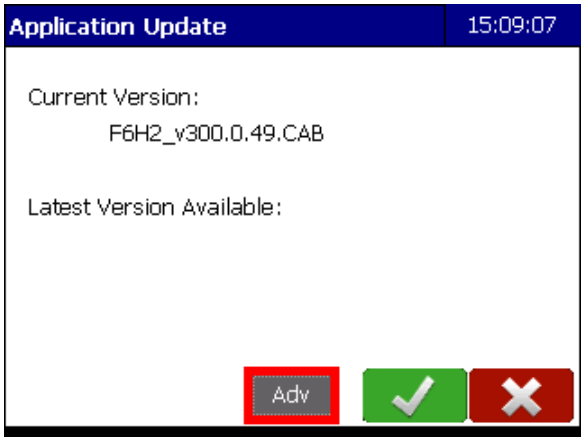




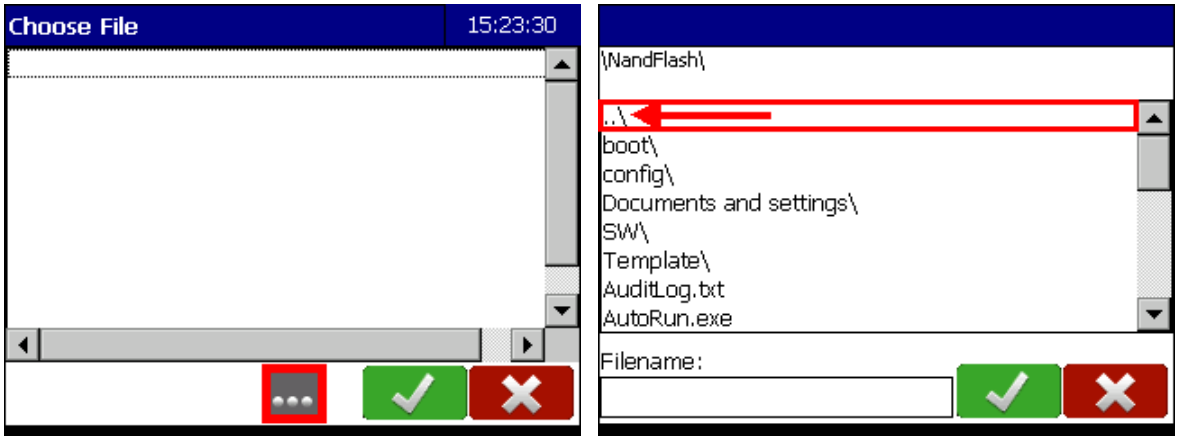
3. Select **Application** then **Adv**.

> Note: If the desired Application is placed in the Datalogger > "Station name" > SW folder then the datalogger will auto detect it and populate the "Latest Version Available" field. If this is the case then the desired Application file can be directly loaded from the screen below by tapping OK instead of Adv.

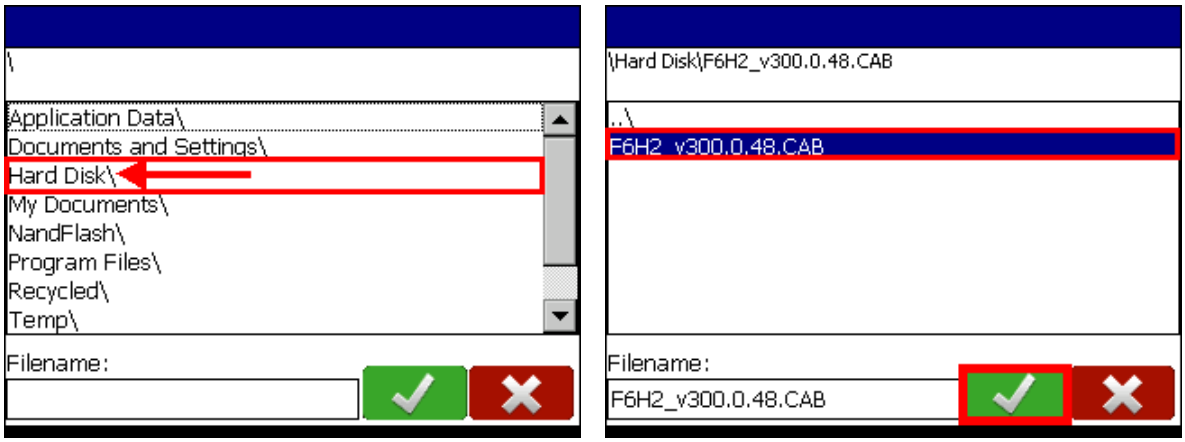




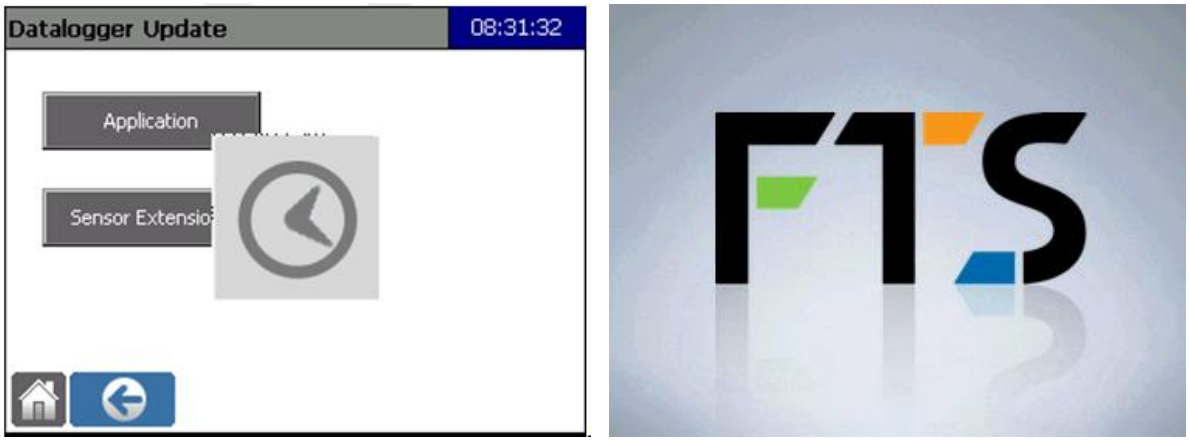
4. Click **Browse**. To browse to your file on the USB memory stick, first go up one level to the root directory by tapping **"..\"**.



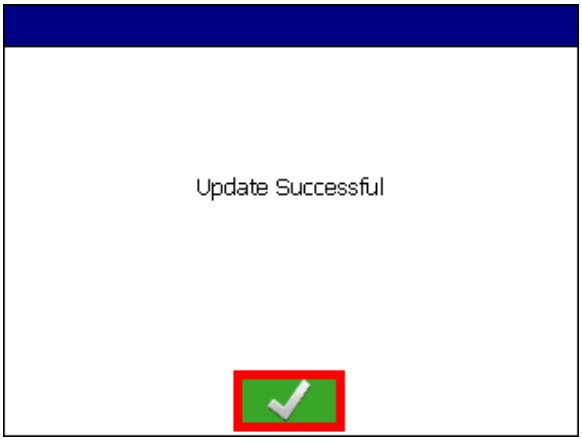
5. Select **Hard Disk**. You are now in the USB memory stick's memory; select the appropriate **Application File** then click **OK**. Application files always have the **".CAB"** extension.

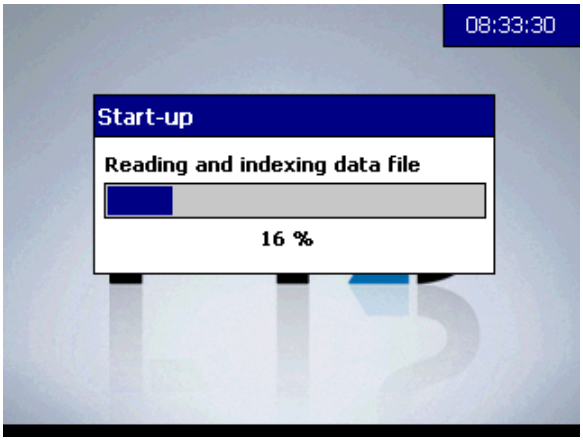


6. Several screens appear while the datalogger stops processes and loads the new Application Software.



7. When the Update Successful message appears, select **OK** and wait for the datalogger to boot into the Home screen.





Chapter 3 SITE VISIT

A site visit should always start with a start visit report. This report takes a snapshot of the current state of the datalogger and downloads it onto a USB memory stick. If any unwanted configuration changes are made during the site visit then the file captured on the USB memory stick can be used to easily revert back to the datalogger's initial state. See Section 2.1.2 for details. Once the start visit report is complete, proceed with the applicable service work.

If configuration updates are known prior to the site visit a user may come to the site with a preconfigured file. This file can then be loaded from a USB memory stick onto the datalogger and will save considerable time on-site.

New applications are periodically released that can include new features as well as bug fixes. These can be found at http://support.ftsenvironmental.com/software-updates/. Application updates can be downloaded to a USB memory stick and then onto the datalogger. See Section 2.2 for details

Datalogger data is not automatically downloaded in the visit report and must be downloaded via the Data screen. See Chapter 7 for details. Downloaded data can be ingested into a software program or used in its raw format for historical purposes.

Adding or swapping sensors is a typical action performed on an annual visit. Before and after an addition/ swap is done, it is good practice to update the serial number table as well as check current conditions (Section 3.2.4 and Chapter 6 respectively). Updating the serial number table allows the user to track serial numbers along with date of installation. Serial number data is saved in the visit report. Checking current conditions by triggering an SDI read displays real time values from the selected data points which have been added to the current conditions list and ensures all required data is being read.

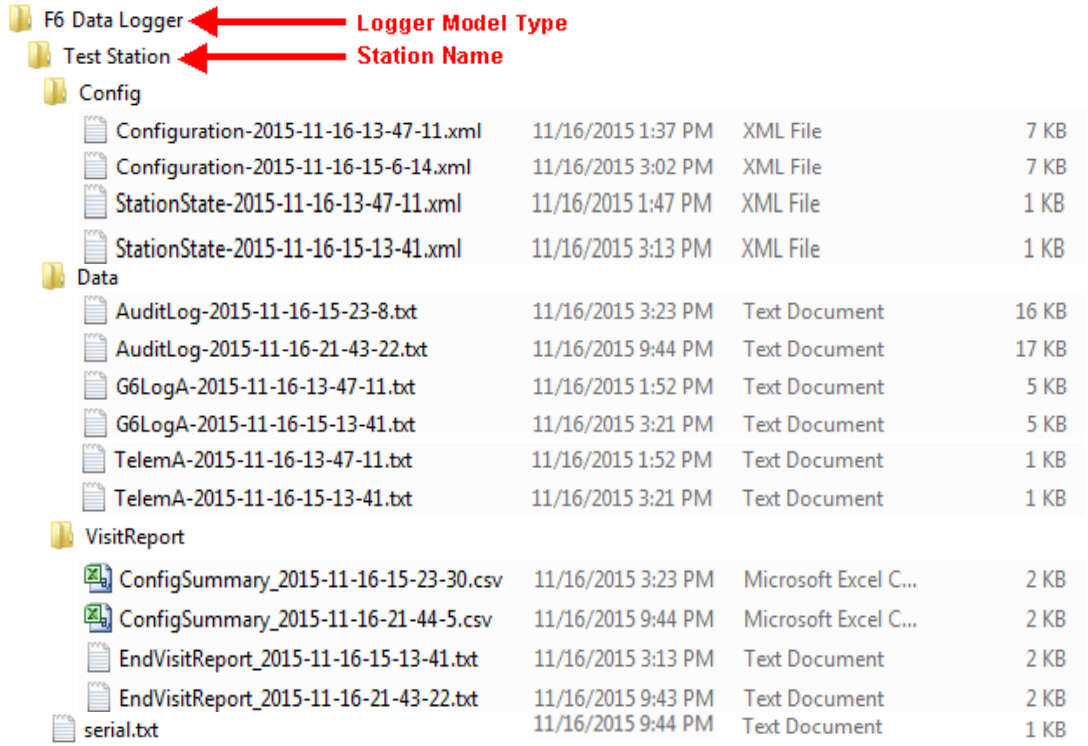
> **IMPORTANT!** Triggering an SDI read prior to leaving the site is highly recommended to ensure all sensors are properly mapped, and reading and returning the required data. If not all the data points are returned or an error message is displayed, connections and configurations can be checked prior to leaving the site.

After all necessary service work has been performed an end visit should always be performed. This report takes a snapshot of the current state of the datalogger after the service work is complete. If anything has gone wrong during the visit, then the start and end visit reports can be compared to determine which action caused the failure and is a valuable trouble-shooting tool.

3.1 VISIT REPORT

A visit report allows the user to download a log of relevant datalogger information regarding the current state of the datalogger onto a USB memory stick at the start and end of the site visit. This information is used for tracking configuration changes and for troubleshooting.

An Axiom folder will be created and named by model type (e.g. F6 Data Logger, H2 Data Logger, H1 Data Logger etc.). The datalogger folder will have a **Visit Report File Structure** similar to the example below. Folders and files present in the data folder may vary depending on the telemetry configuration on the datalogger. Copies of each file are created at the start and end of the visit.



Example Visit Report Folder Structure (F6-G5-TLM)

Note: timestamp format is YYYY-MM-DD-hh-mm-ss format. E.g 2013-7-18-10-3-47 denotes July 18, 2013 at 10:03:47.

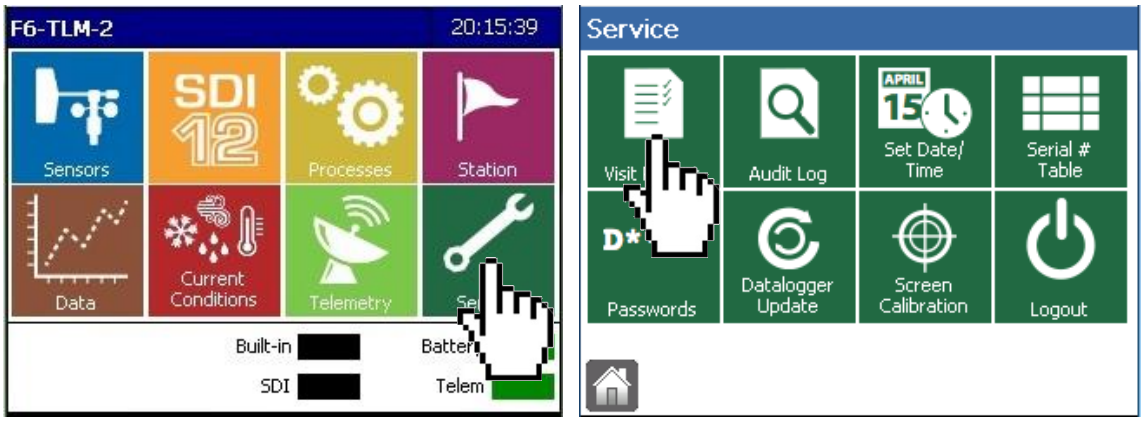
A basic guide to performing a visit report (start and end) is outlined in the following steps. A start visit report should be initiated at the start of a site visit and an end visit report should be the last action the user performs before leaving site.

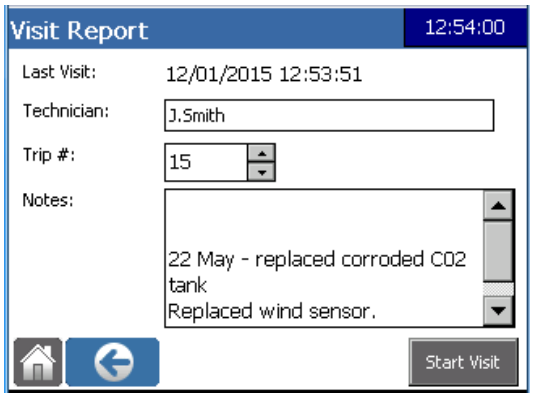
> IMPORTANT! Performing a visit report does not download data. See Chapter 7 for data download instructions

3.1.1 START VISIT REPORT

1. Insert a USB memory stick into either of the datalogger's USB HOST ports.

2. From **Home** select **Service>Visit Report>Technician**. A keyboard will be displayed. Enter your name. The trip number increments automatically, or a number can be manually entered by using the up and down arrows.

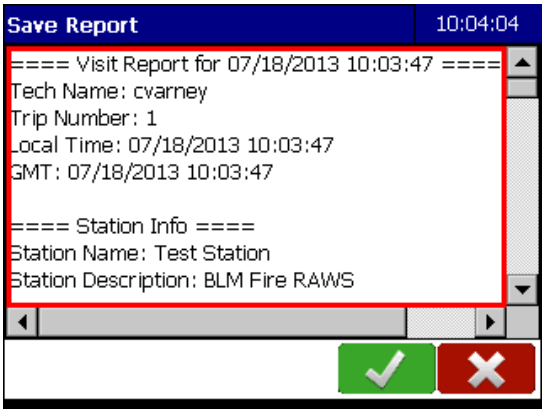


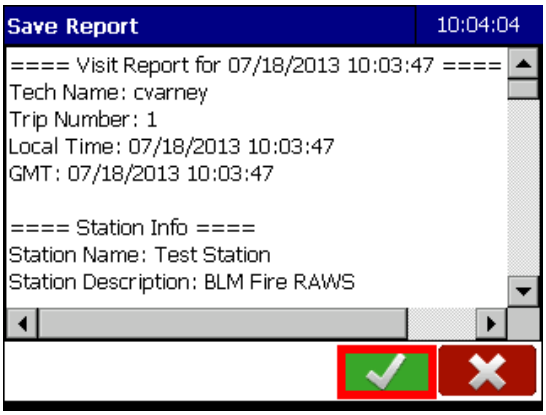


3. Use the Notes box to log any information or observations. Tap on the Notes field and use the keyboard to input any notes you may have. Notes will be displayed in reverse chronological order (most recent at the top). Use the scroll bar to view older notes. The notes will also be compiled and displayed in full at the end of the **Start** and **End Visit Reports**. is used for entering Notes

4. Select **Start Visit**.

5. The **Start Visit Report** appears. Scroll through the report to verify the current state of the logger. Select **OK** to save the report.

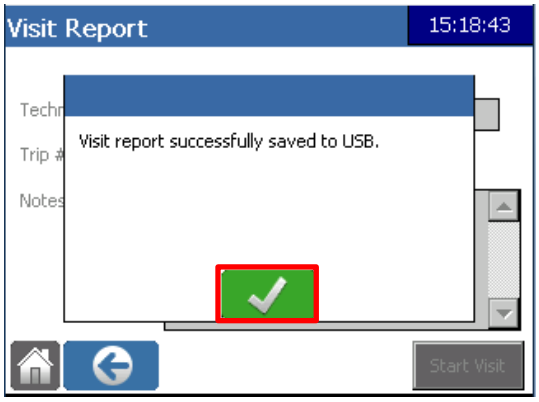


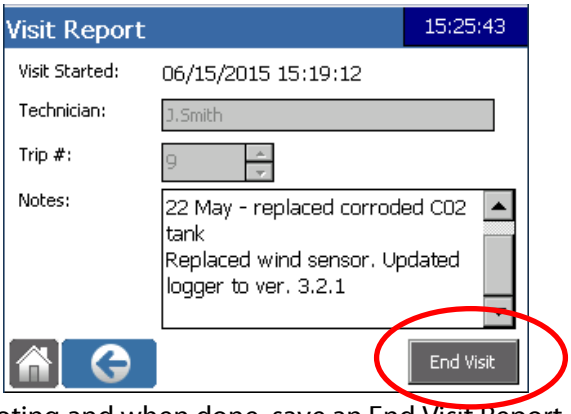



```
==== Visit Report for 12/03/2015 23:28:34 ====
Tech Name: V3.5.1 Tests
Trip Number: 4
Local Time: 12/03/2015 23:28:34
GMT: 12/03/2015 23:28:34
Length of Visit: 00:18:08

==== Station Info ====
Station Name: QA - V3.5.1 Tests
Station Description: Configuration for DL-2288 that was
created using AS 3.4.1.4
Logger Model: F6-TLM-2
Logger Version: 2
Serial Number: 35516, Mfg Date: 09/19/2013
OS Version: 3.11
Software Version: 3.5.1.1, Firmware Version: 17
Latitude: 48°26'50.0"N, Longitude: 123°30'22.1"W, Elevation: 71.300 m
Installed Dlls:
  - AmModDll.dll (v3.5.1.1, 12/01/2015)
  - TavisDll.dll (v3.5.1.1, 12/01/2015)
  - RmyWind.dll (v3.5.1.1, 12/01/2015)
  - DigiTemp.dll (v3.5.1.1, 12/01/2015)
  - CSciSnowSensor.dll (v3.5.1.1, 12/01/2015)
  - WindSonic.dll (v3.5.1.1, 12/01/2015)
  - RadarSensor.dll (v3.5.1.1, 12/01/2015)

==== Rain Sensor Info ====

==== Power Supply Info ====
Battery Voltage: 13.4V
Battery Current: -0.1A
Battery Temperature: 20.9C
DCell Voltage: 4.1V
Solar Panel Voltage: 13.9V
Solar Panel Current: 0.0A
Logger Case Temperature: 22.1C
V Cut-off: 6.5V
V Resume: 11V

==== Sensor Serial Number Table ====
Rain
Temp & Rh
Fuelstick
Wind Dir
Wind Spd
SDI_UWS
SDI_BP
SDI_SR
SDI_SMT
G5 Port A
DigiTemp
Encoder
SDI_RMY
SDI_AM
CMPB
Stage
WindSonic
Tavis
SDI_ISCO
Shaft
SDI_PT
Gill
G6 Port A                       15091074        09/11/2015 12:21:39
SDI_sr
G5 Port B
Rad_Sol
Ventus
Compass
HG
SL1500
H355
SDI

==== Telemetry Info ====

Telemetry A
Device Type: G6
Power Management - V Cut-off: 6.5V, V Resume: 11V
Satellite Network: GOES
NESID: 2
Standard: CS2
Serial#: 15091074
SW Ver: 10.17 2015/10/26
Format: WSC
Channel: 196
Bit Rate: 300
Window Length: 10
Interval: 01:00:00
Offset: 00:00:00
Antenna: Not Available
Antenna Bearing: 195° True, 179° Compass (16 declination)
Antenna Inclination: 33°
GPS Fix Interval: 00:00:00
Failsafe: OK
GPS Time of Fix: 12/03/2015 17:52:01

Telemetry B
Device Type: FTS
Power Management - V Cut-off: 6.5V, V Resume: 11V
Baud rate: 9600
Data: 8 bit
Parity: None
Stop: 1 bit
Flow control: None
Power Cycle Settings: Off

==== Current Conditions ====
An1: 247.726 mV
Max_An1: 244.061 mV
Min_An1: 244.061 mV
ATC: 21.8 C
Mean_ATC: 21.9 C
Med_ATC: 21.9 C
RMax_ATC: 21.9 C
RMin_ATC: 21.8 C
SD_ATC: 0.0
rPeakDirection: 226.8 deg
rPeakSpeed: 0.0 kph
tPeakDirection: 227.4 deg
tPeakSpeed: 0.0 kph
Wdir: 227.4 deg
Wspd: 0.0 kph

==== Detected SDI-12 Sensors ====
SDI_AM - Address: 3, Port: B
        313FTS-----SDI-AM11-51799

Tavis - Address: 7, Port: B
        710 Tavis  DISI1200 009 31049 10M


==== Data ====
Capacity: 289 Days
Oldest Data: 12/03/2015 23:05:00
Newest Data: 12/03/2015 23:28:00
Estimated Overwrite: 09/17/2016

==== Additional Notes ====
Test for DL-2288
```

Start Visit Report

6. Wait for the "Visit report successfully saved to USB" pop up to appear. Select **OK.** The **Visit Report** screen now displays an **End Visit** button in place of the **Start Visit** button





7. Perform any required service work or troubleshooting and when done, save an End Visit Report.

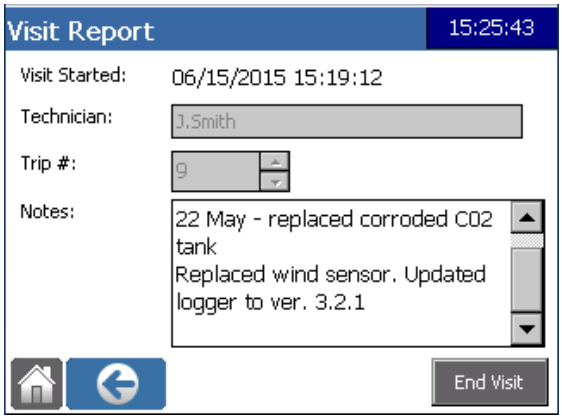
Common service work includes the following:

Check current conditions (Chapter 6)
Download data (Chapter 7)
Swap sensors then update Serial Number Table (Chapters 4 and 3)
Update configuration file as needed (Chapter 2)
Update Application as needed (Chapter2)

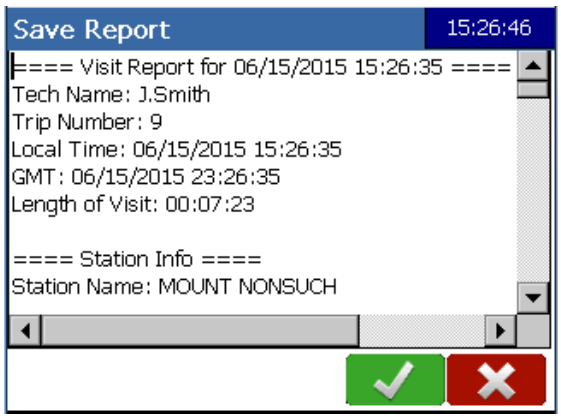
3.1.2 END VISIT REPORT

NOTE: Perform an End Visit Report as the last step in any site visit.

1. Select **Home>Service> Visit Report>End Visit**.



2. Scroll through the report to verify the current state of the logger. Select **OK** to save the report.

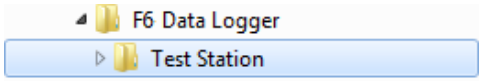


3. Wait for the "Visit report successfully saved to USB" pop up to appear. Select **OK> Home.**

3.1.3 ZIPPING A VISIT REPORT FOR TROUBLESHOOTING

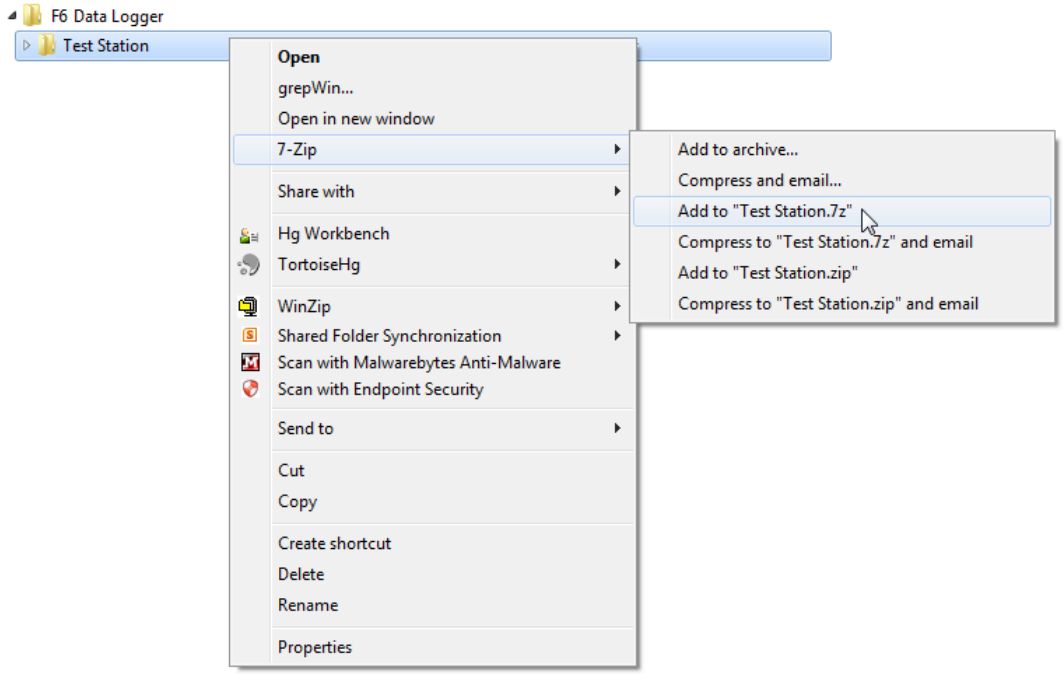
If the visit report was created for troubleshooting purposes then follow the basic steps below in order to zip the files and send them to FTS for diagnosis.

1. Insert the USB memory stick, with downloaded visit reports, into your computer.
2. Browse to and open the Datalogger folder.
3. Highlight the station(s) that you wish to send to FTS. In this example the station that needs troubleshooting is called "Test Station".

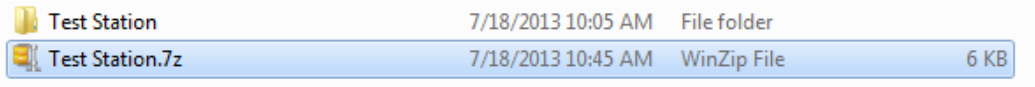


Note: you may highlight multiple stations if you need diagnosis on more than one site.

4. Using a compression program such as 7- Zip or WinZip, right click on the Station Folder(s) and choose to add the Station Folder(s) to a .7z or a .ZIP.



5. Attach the .7z or .zip file to an e-mail and send it to your FTS contact.



IMPORTANT! Take note of the size of the zipped file. If it is too large to send, the data file may need to be removed (if present). Data files are located in the Data folder and end in either .CSV or.BIN

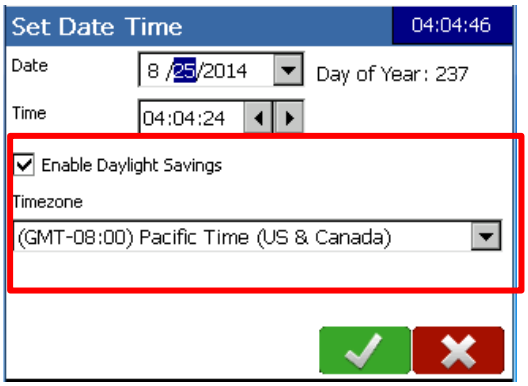
3.2 SET DATE/TIME

To set the datalogger's local date and time, select **Home> Service>Set Date/Time**. This sets the time the datalogger uses to timestamp its logged data and audit log entries.

To leave the datalogger's Date/Time settings unchanged, press **Cancel**.

3.2.1 SET TIME FOR G6 SYSTEMS

If the datalogger is connected to an FTS G6 transmitter, the datalogger's time is synchronized with the transmitter's high accuracy, GPS based clock; however, the datalogger's time zone setting remains unaffected and the datalogger continues to operate based on its set time zone. The datalogger's logs and clock will show the local timestamp while the transmitted message header contains UTC time. For this reason a datalogger with G6 is typically set for UTC time in order to have synchronicity between transmitted and logged information.

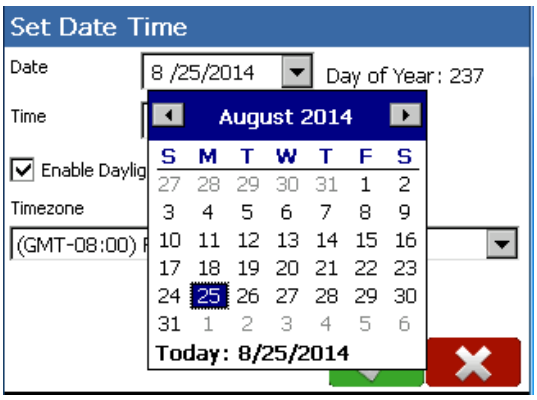


Logs and clock will be in Pacific Time with Daylight Savings Enabled

3.2.2 SET TIME FOR NON-G6 SYSTEMS

A system without an integrated G6 or one attached externally through a telemetry port should have its date and time set upon installation. The time should be checked periodically for any drift. If the displayed Date, Time, and Time Zone values are correct, select **OK**.

To set the date, tap the down arrow on the **Date** field to reveal the calendar. Select the date then tap the down arrow again.



Time hh:mm:ss elements can be individually adjusted by tapping on the desired element to highlight it and increasing or decreasing it using the arrows.

To set time precisely, enter a time that is slightly ahead of the current time, then press **OK** at the precise moment corresponding to the entered time.

3.3 SERIAL NUMBER TABLE

The **Serial Number Table,** accessed via the **Service Screen** (**Home > Serial # Table**), is used to enter serial numbers of the sensors, telemetry, and other equipment associated with the site. A device whose serial number needs to be manually entered is shown with a beige background (e.g., Wind Spd). A device capable of reporting its

serial number is identified with a yellow background (e.g., SDI_SR). Devices whose serial numbers have not been entered or detected are shown with a red background (e.g., SDI_BP). The **Last Update** column is automatically populated with the time the serial number of the device was entered.

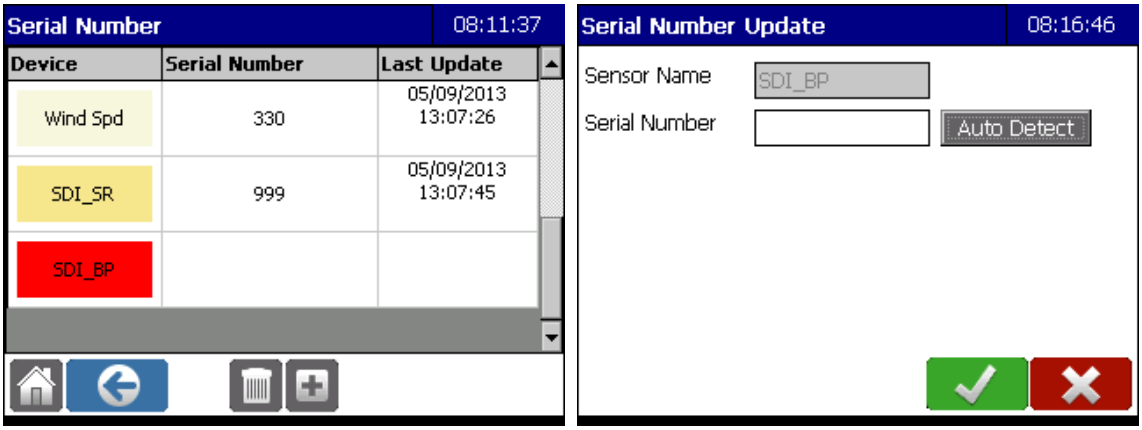


Figure 3-1: Serial Number table and auto detecting a sensor

To auto-detect or to manually enter a serial number, touch the name of the device in the serial number table. The **Serial Number Update** screen opens. If the device is not capable of reporting its serial number then the **Auto Detect** button is absent. The user can manually edit a serial number which was auto detected.

When a sensor or telemetry is added to the datalogger, it is automatically added to the serial number table.

3.3.1.1 *Add/Delete a Serial Number*

A device can be added to the serial number table by selecting the **Add** button. The user can then give the device a name and manually enter its serial number. To remove a sensor from the serial number table select the **Delete** button. Select the device to be deleted from the list on the screen. A prompt will appear confirming the deletion. Select **OK** or **Cancel.**

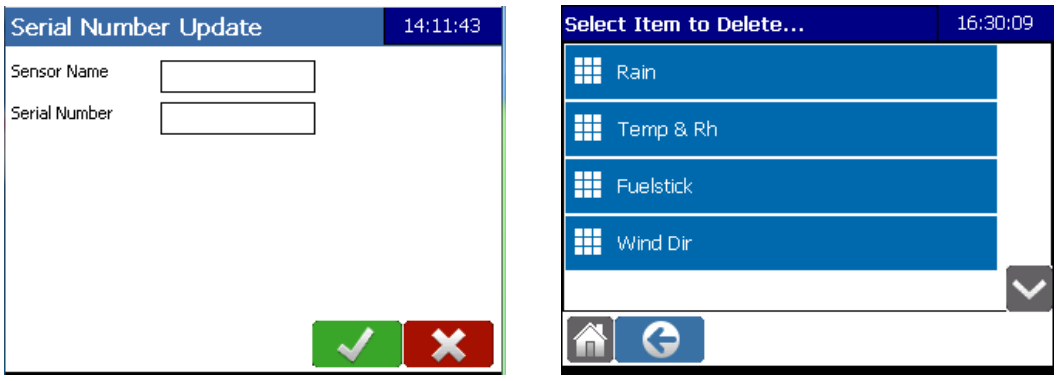


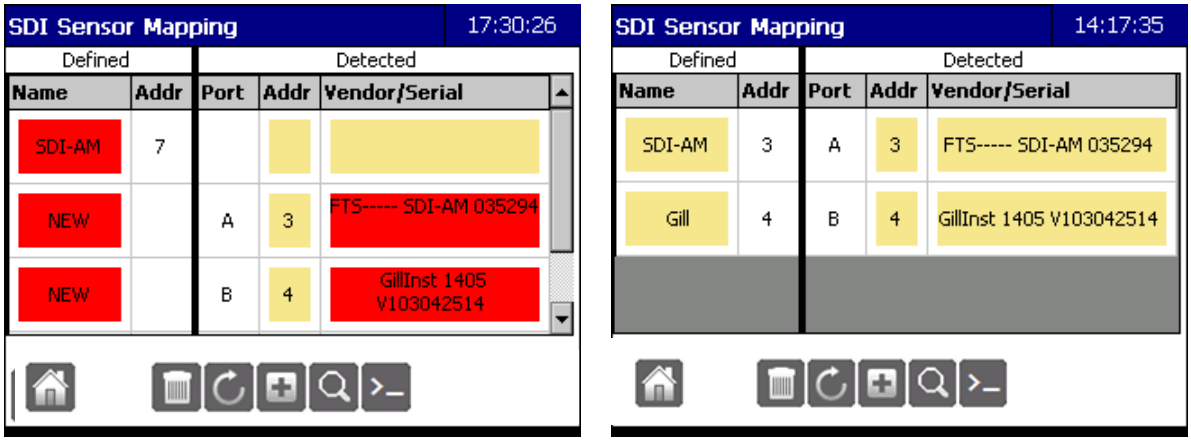
Figure 3-2: Adding/Deleting Serial Numbers

Chapter 4 ADDING AND MAPPING SENSORS

The **SDI-12** icon opens a mapping of the SDI sensors currently configured in the datalogger to the SDI sensors actually connected to the datalogger. The **Defined** table is a list of sensors configured in the datalogger while the **Detected** table is a list of sensors that the datalogger found connected to one of its SDI ports.

Mapping is complete when the defined and detected columns are populated and no longer highlighted in red.

> IMPORTANT! If you are swapping or installing an SDI sensor then you **MUST** map the sensor in order to ensure correct sensor settings are used by the datalogger. See section 4.2 for details.



Mapping incomplete Mapping complete

Figure 4-1: Mapping sensors

Defined Sensors

A sensor is defined once it has been added to the datalogger, configured and saved. Normally, the sensor is attached and then configured through the Sensors icon. A sensor which is not attached can be configured in the same way; once it is attached and mapped, the previously defined configuration will be matched with the sensor.

4.1 DETECTING SDI SENSORS

Once SDI sensors are connected to the datalogger, press **Detect** on the **SDI Sensor Mapping** screen (**Home > SDI-12**) to begin the sensor mapping process.

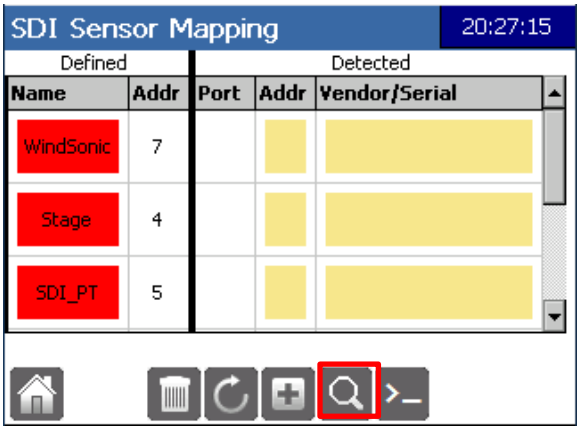


Figure 4-2: Detecting Sensors

Detection automatically determines whether SDI sensors are connected. The datalogger will look for any defined sensor and determine if it is attached or not.
When **Detect** is pressed, the **SDI Detect** dialog box appears. Select **OK**.

Leave Blank:
See note below.

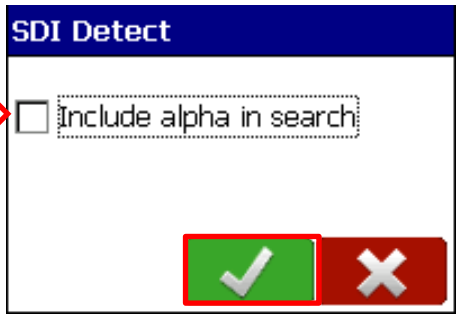


Figure 4-3: SDI Detect Dialog

Include alpha in search check box: This should only be checked if you suspect you have an SDI sensor with a non-numeric address (i.e. an address that isn't 0 to 9). The detection process takes longer if the check box is enabled since the datalogger must now also search for sensors at the non-numeric addresses (addresses a to z and A to Z).

For each detected SDI sensor, the datalogger displays on which independent SDI port the sensor was detected (**SDI A**, **SDI B, SDI C, SDI D**), the sensor's address, and the information string returned from the sensor.

4.2 MAPPING SDI SENSORS

A sensor that has any defined or detected field in red is unmapped. To map the sensor you have three choices:

1. Map the NEW sensor to a previously defined sensor.
2. Create a definition for the NEW sensor
3. Add a sensor and map to it

NOTE: If **In-line Logging** has been setup (from **Station>Advanced**) when adding a new sensor or editing a currently mapped sensor, the **"Sensor Name" Sensor Setup** will appear as part of the mapping process. Selecting **OK** will display the **In-line logging Setup** screen. The setup screen will be unique for each sensor. Input the interval and toggle the appropriate boxes for the data points to **Enable Logging** and **Add to Current Conditions** options. Mapping will continue once **In-line Logging** is completed.

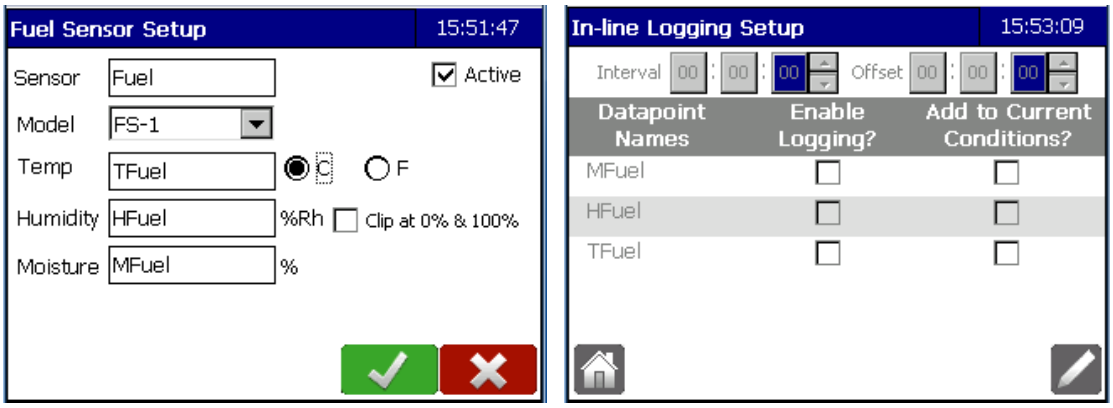
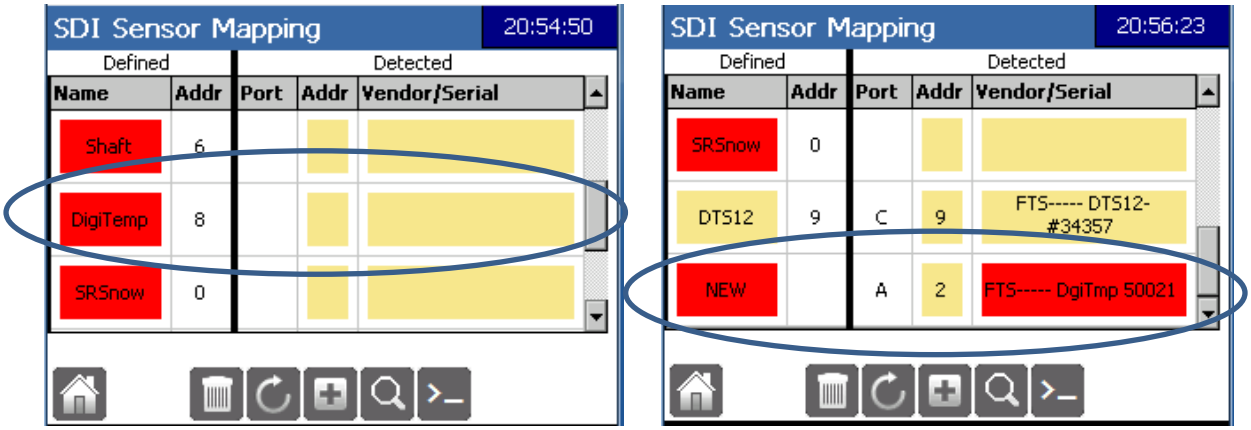


Figure 4-4: Example of In-line Logging Screens

4.2.1 MAPPING A SENSOR TO A PREVIOUSLY DEFINED SENSOR

If a sensor of the same type had already been defined in the datalogger, its name will appear in the **Name** column. However, when Detect is completed, the same sensor is identified as NEW. Be sure to scroll through the entire list so that a previously defined sensor is not missed.



Previously defined DigiTemp Sensor Detected DigiTemp Sensor identified as NEW

Figure 4-5: Mapping to a previously defined sensor

For example, in Figure 4-5, a DigiTemp sensor has been previously defined, and a NEW DigiTemp has been detected.

1. Press on the red **Vendor/Serial** field of the detected sensor. The Sensor Mapping dialogue box will appear.

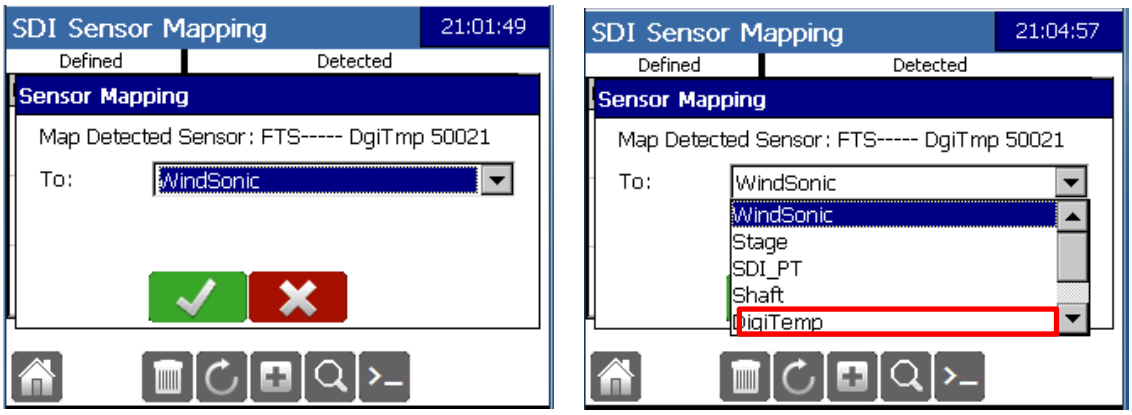


Figure 4-6: Sensor Mapping dialogue box

2. Use the drop down menu to select the sensor (DigiTemp in the example). Select **OK.**

3. The sensor is mapped.

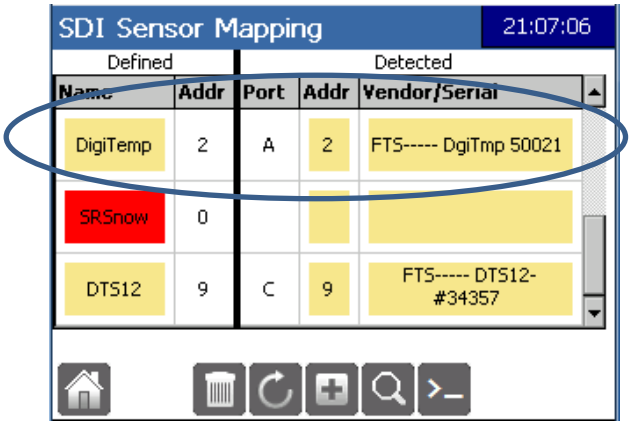


Figure 4-7: Mapped Sensor

4.2.2 CREATE A DEFINITION FOR A NEW SENSOR

If the datalogger detects a sensor that was not previously defined, it will identify it as **NEW**.

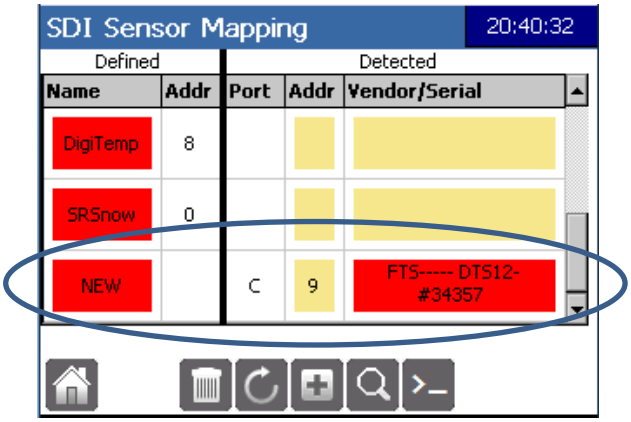


Figure 4-8: Mapping a NEW sensor

1. Click the red **NEW** box in the defined column. Pressing **NEW** causes different responses depending on whether the sensor is 'recognized' by the datalogger.

2. The **Sensor Setup Screen** appears (unique to each sensor). Define the sensor name, address, schedule and any other sensor specific parameters. See Section 4.2 for details Select **OK**.

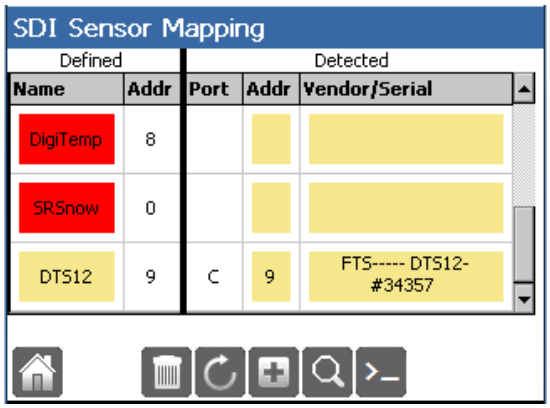


Figure 4-9: NEW sensor mapped

3. The **NEW** Sensor (re-named DTS 12 as part of the sensor setup in step b) is no longer highlighted in red and is mapped.

4.2.3 ADD A SENSOR AND MAP TO IT

When there is no associated detected sensor, create a new sensor by selecting the **Add** button.

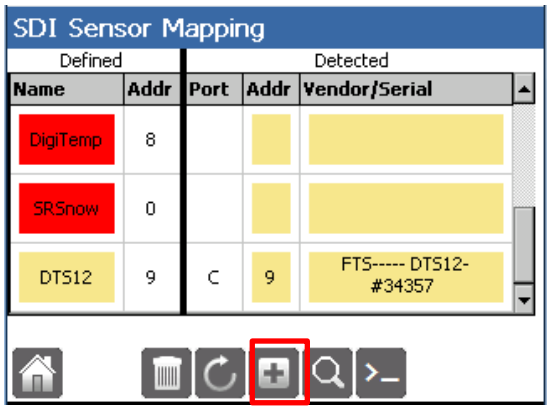


Figure 4-10: Adding a sensor

1. Select the sensor type, either the generic SDI type sensor or one of the built in sensor extensions depending on the attached sensor (the example will use the SDI Generic).

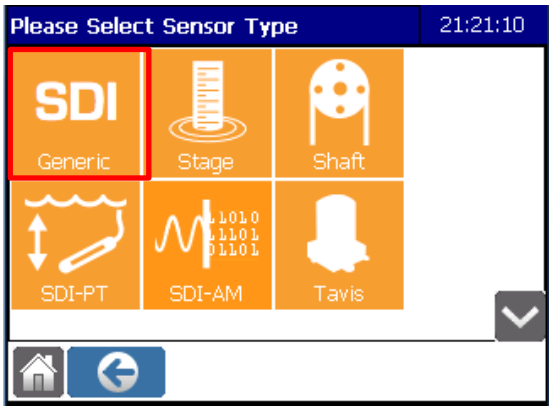


Figure 4-11: Sensor Type Menu

2. The Sensor Setup Screen appears (unique to each sensor). Define the sensor name, address, schedule and any other sensor specific parameters. See Chapter 5 for details of how to setup a sensor. Select **OK**.

3. You will be returned to the SDI Sensor Mapping Screen where the newly added sensor will appear, but mapping is not yet complete (Figure4-12).

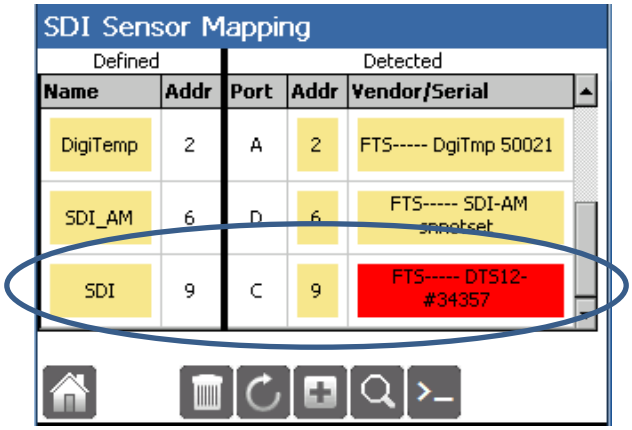


Figure 4-12: Added sensor – mapping incomplete

4. Press on the red Vendor/Serial field of the added sensor and use the drop down menu to select the Sensor type, and then **OK.**

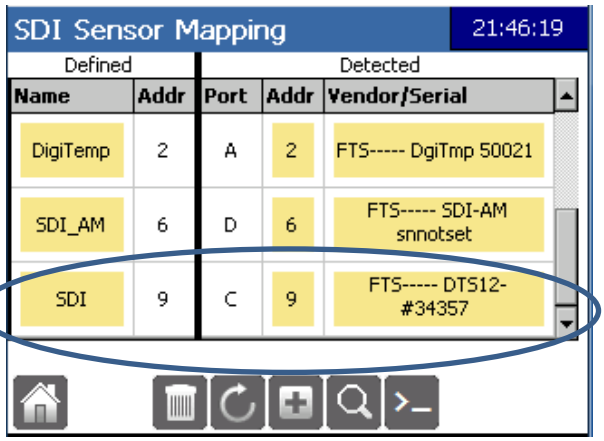


Figure 4-13: Mapping Complete

4.2.4 CHANGING A DETECTED SDI SENSOR'S ADDRESS

Sometimes it is necessary to change the address of a sensor. To do so press the **Addr** field in the detected column for the sensor. The **Input Sensor Address** dialog box appears which allows the user to select a new address for the sensor. Enter the new address then press **OK.**

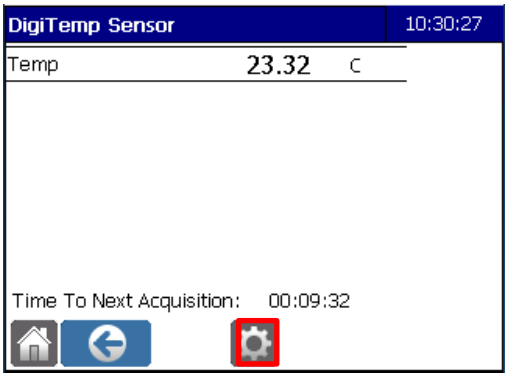
Chapter 5 SETTING UP SDI SENSORS

Once a sensor is attached and mapped, it must be Setup to be given named data points and instructions with respect to when and how often to take readings. This is the first step in creating data points which will be used to log the information. If the information is not logged, the data cannot be viewed or downloaded.

5.1 CONFIGURING SENSORS

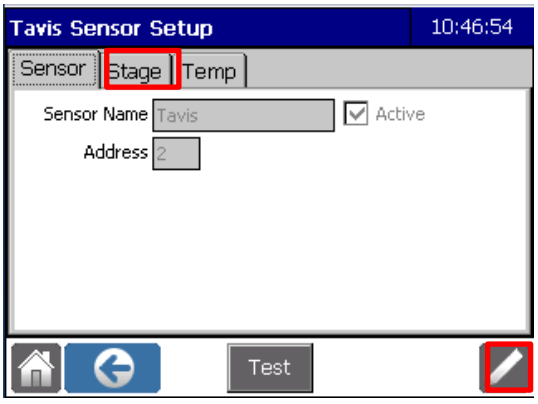
1. Select **Home>SDI-12**. Then select the name of the mapped sensor you wish to set up.

2. Select **Set Up.**

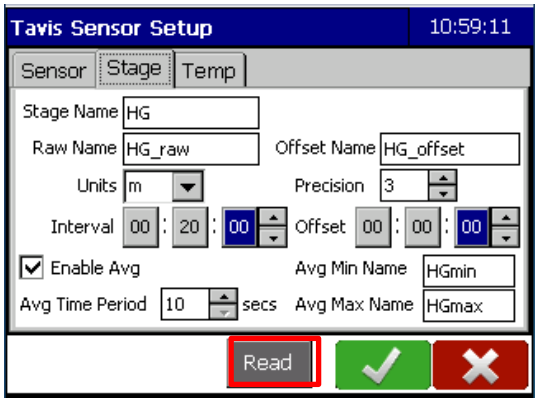


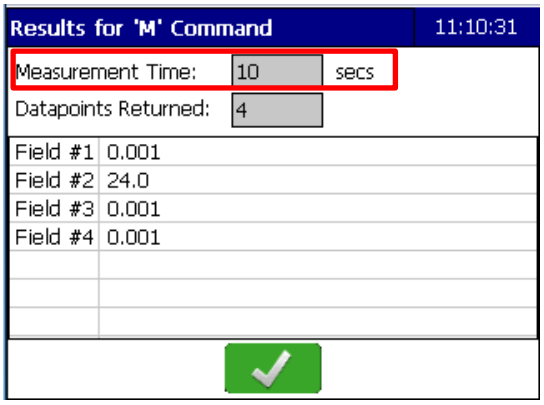
The Sensor Setup screen is displayed with its unique tabs. The first tab provides information about the sensor and the following tabs provide information about the different variables the sensor can read.

3. Select a tab>**Edit**.



4. Each tab will display unique information fields specific to that sensor. Refer to that sensor's operating manual and the FTS Axiom Configuration Reference for detailed explanations of the fields.





5. The **Interval** determines how often the selected variables will be read; **Offset** defines the time after the top of the hour the sensor will take its reading(s).

   For example: A sensor with an interval of 01:00:00 and an offset of 00:05:00 will take readings every hour commencing at 5 minutes after the hour (00:05, 01:05, 02:05, etc.).

6. **READ:** It is good practice to **Read** each variable as it will return the measurement time. This can be used to ensure the selected interval is greater than the measurement time.

   For example: If the measurement time takes 10 seconds, setting an interval of 5 seconds will be counterproductive

7. In general, each tab must have at minimum an **Interval** assigned. Edit the information according to your needs by tapping on the fields and using the arrows or keyboard to input desired parameters. Select **OK**. Follow step 5 for each tab for the sensor.

Upon completion, the sensor will have several variables assigned and it will be configured to take readings of those variables at assigned intervals along with any other instructions detailed within the information fields contained within the **Sensor Setup Tabs**. Those variables will be used to determine data points to log the readings.

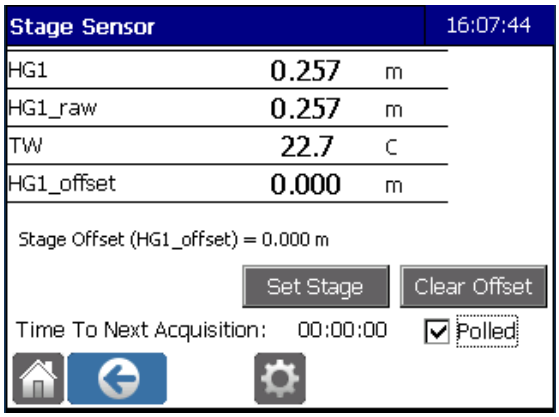
5.2 POLLING STAGE SENSORS

The layout of some sites require stage sensors and staff gauges to be located a considerable distance from the datalogger. On occasion, field personnel must align sensor readings with staff gauge readings. The polling option is used to set polling for a period of time between 20-120 minutes to allow field personnel sufficient time to travel to the staff gauge and check readings.

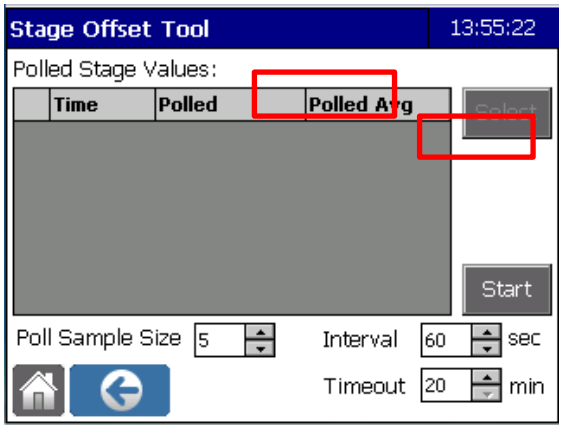
Select the **Polled** checkbox and then press **Set Stage** to begin a series of stage sensor readings while the user checks the staff gauge reading. After checking the staff gauge reading and returning to the datalogger, select the appropriate time stamped stage sensor reading and then enter the staff gauge value so that the datalogger can calculate the appropriate stage offset.
The polling option is meant as a temporary measure to confirm stage sensor operations and any data collected during the polling will not be recorded by the datalogger. It will also not affect the Stage Setup values. That is to say, once polling is stopped, interval values will revert to those originally input in the **Stage Setup Screen**.

The steps to set up polling follow.

1. Select **Home>SDI-12**. From the list of mapped sensors, select the sensor you wish to poll and tap the **Polled** box, then select **Set Stage**.

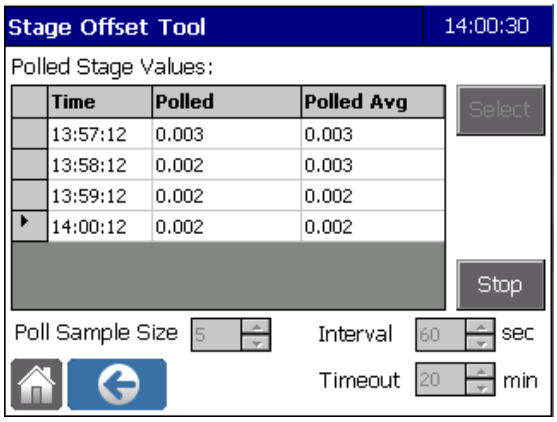


2. The **Stage Offset Tool** screen is displayed. Enter the desired **Interval** and **Timeout** times, Interval being the polling interval and Timeout being the period of time over which polling will take place. The **Poll Sample Size** refers to how many readings will be averaged per interval.

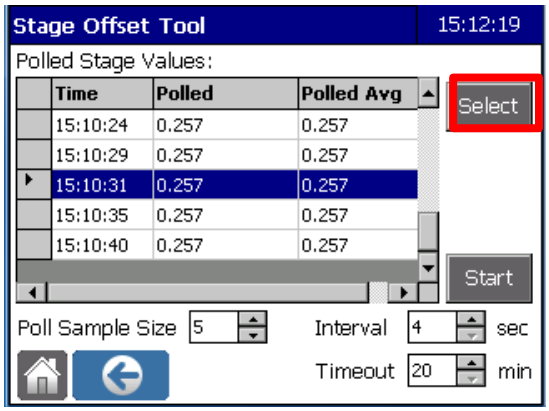


NOTE: Once polling is stopped, interval values will revert to those originally input in the **Stage Setup Screen**. Any data collected during the polling will not be recorded by the datalogger.

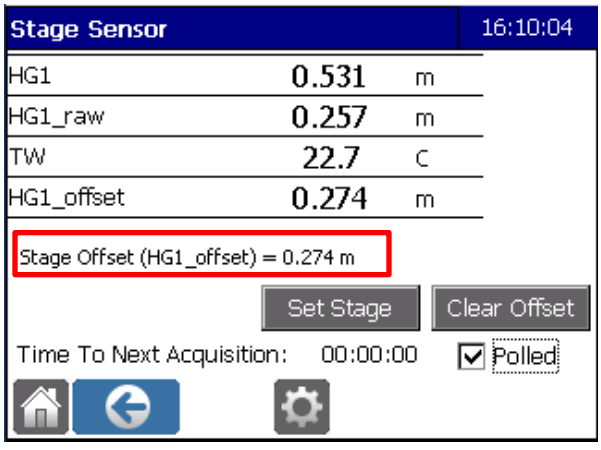
3. Synchronize your timepiece to the datalogger and select **Start**. The screen is displayed in view only mode and polling commences. Polling values will be displayed until the **Stop** button is selected.



4. Go read the staff gauge. Note the time and the Staff Gauge value. When you return to the datalogger select STOP, scroll through the stage sensor readings and tap on the time that corresponds to your reading of the staff gauge. Press **Select**.



5. The **Enter Staff Gauge Value** screen appears. Enter the observed value and confirm. The new Stage Offset will be calculated.



6. De-select the **Polled** box.

7. Pressing **Clear Offset** will return the Stage Offset to zero.

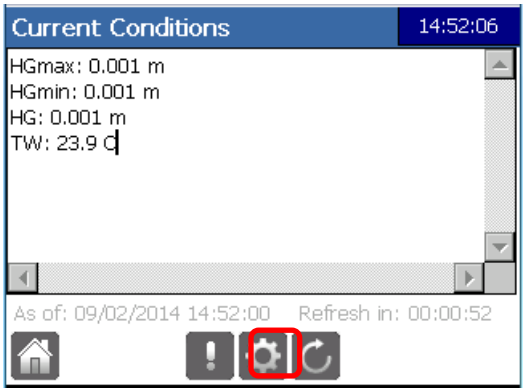
Chapter 6 CURRENT CONDITIONS

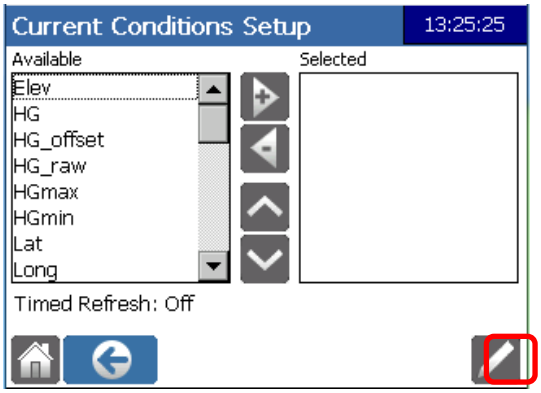
The Current Conditions screen displays a set of user selected variables for easy monitoring of a specified set of data. The screen will display the last reading taken of the variables. However, the Current Conditions display can be manually or automatically refreshed (timed refresh). Built-in and analog sensors are read every time a manual or automatic refresh event occurs.

However, it is important to note that **Refresh** does not trigger a new set of readings from SDI sensors or process outputs. **Refresh** only causes the last measured value to be displayed. For example, an SDI sensor that is programmed to be read every 10 minutes displays the same value until the 10 minute rollover occurs and a new SDI measurement is performed.

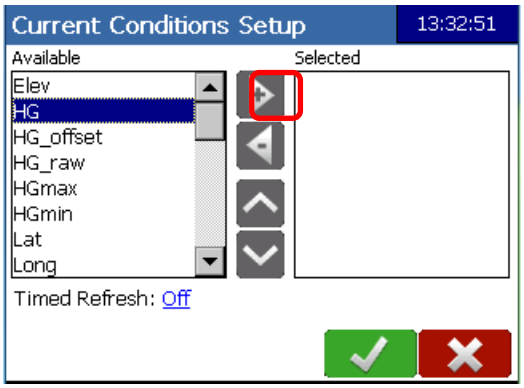
6.1 CURRENT CONDITIONS VARIABLES

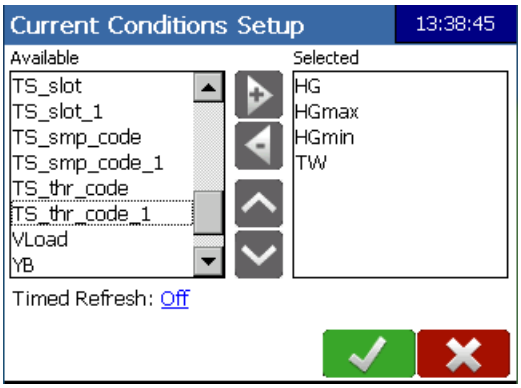
1. The Current Conditions screen will display data from selected variables. To build a list of Current Condition variables, select the **Setup Cog** on the **Current Conditions** Screen. A series of data points will be displayed in the "Available" column. This list will vary depending on the SDI sensors mapped to the datalogger. Select **Edit.**



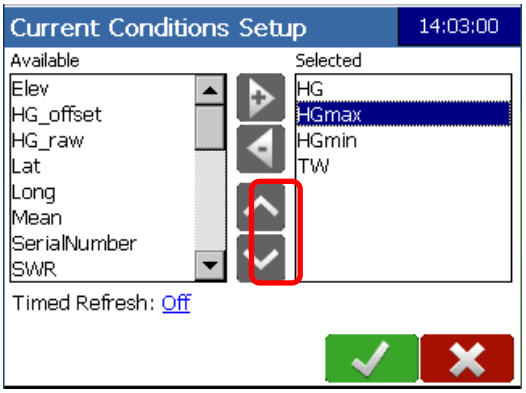


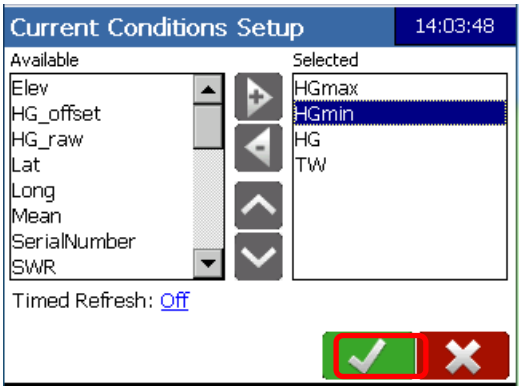
2. Tap on the variable you want to add to the "Selected" column and then move it by selecting the "Move Right" button . Continue this until all the desired variables are in the "Selected" column.





3. The order of the variables in the "Selected" column can be arranged by selecting the variable and then using the scroll arrows to move it to its desired position. Once the "Selected" list is complete, select **OK**. The variables will be displayed in that order in the Current Conditions screen.

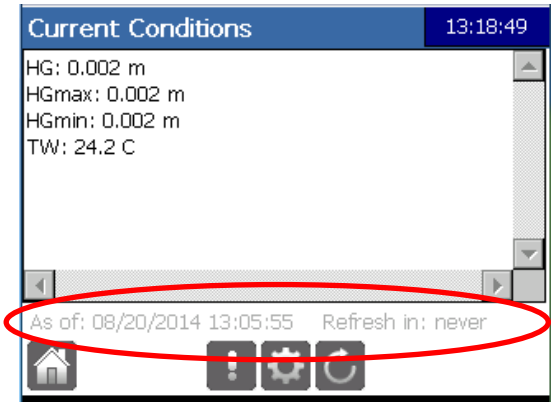




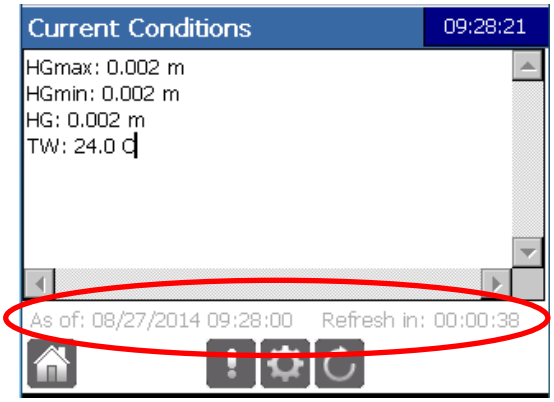
4. Variables can be removed from the "Selected" column and returned to the "Available" column in the same way, except by using the "Move Left" button  .

> NOTE: Selecting Current Conditions merely ensures the variables are being read at the selected intervals. In order to log, download, or examine the data, further steps are required. See Chapter 7.

If timed Refresh is not enabled, the time of the last SDI sensor reading is displayed at the bottom of the screen in the following format: "As of: mm/dd/yyyy hh/mm/ss", and the Refresh message reads "Refresh in: never". If Timed Refresh is enabled, the time of the last Timed Refresh is displayed in the "As of" message and the count down time until the next refresh will be displayed in the "Refresh in:hh:mm:ss" message.



Current Conditions – Timed Refresh not enabled



Current Conditions – Timed Refresh enabled

IMPORTANT! In Timed Refresh, the "As of: hh:mm:ss" reflects the time the Timed Refresh process was run. Built in and analog sensors' variables will be updated at that time, but NOT SDI sensors, which will display the last value read at its configured reading interval.

6.2 REFRESHING CURRENT CONDITIONS

There are two ways to refresh the Current Conditions screen: manually and timed refresh. The Current Conditions screen can be manually updated by selecting the **Manual Refresh** icon . This will refresh the Current Conditions screen once. If there is a need to continually review Current Conditions over a short period of time, an alternative to manually refreshing the screen is to place the datalogger in Timed Refresh mode. The Timed Refresh button updates the Current Condition screen at selected time intervals for a maximum of 60 minutes. The default value is every 60 seconds.

To enable the Timed Refresh function, select **Current Conditions> Setup** > **Edit.** The Timed Refresh indicator is highlighted in blue. Select Off > **Enabled,** then use the arrows to set the desired refresh interval. Time intervals from 5-120 seconds can be set. Select **OK>OK** to return to the Current Conditions screen.

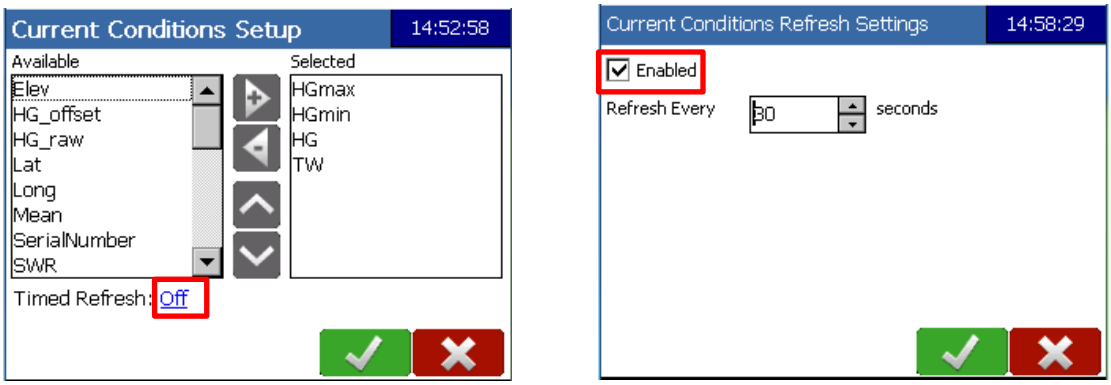


Figure 6-1: Enabling Timed Refresh

Timed Refresh information is now displayed in the Current Conditions Setup (Timed Refresh: 30 seconds) and Current Conditions screens.

To turn Timed Refresh off, follow the same steps. The check mark will be removed from the **Enabled** box when it is selected.

6.2.1 TRIGGERING A FORCED READ

A forced read differs from the refresh functions in that it will return a read from ALL sensors (including SDI sensors) at the time of the forced read.

A forced read is used as the final check at a site visit, especially after adding or changing SDI sensors, or after an update. It provides the field technician real time data in order to verify if all sensors are returning the requested data. Data on the Current Conditions screen can be several hours old, depending on the selected reading intervals and therefore can be misleading with respect to the immediate state of the sensors.

> NOTE! Any data read during a forced read will not be saved to the data store.

To force a read of the sensors, from the **Current Conditions** screen select the **Force Read Trigger** . A warning dialog will appear. If a read is forced at the same time as a scheduled read, the scheduled read data may not be saved. Select **OK** and then the forced read data will be displayed

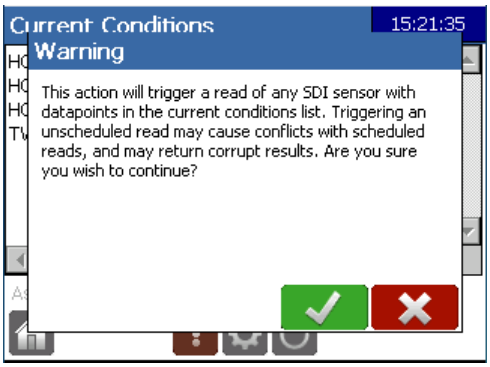
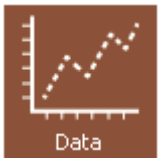
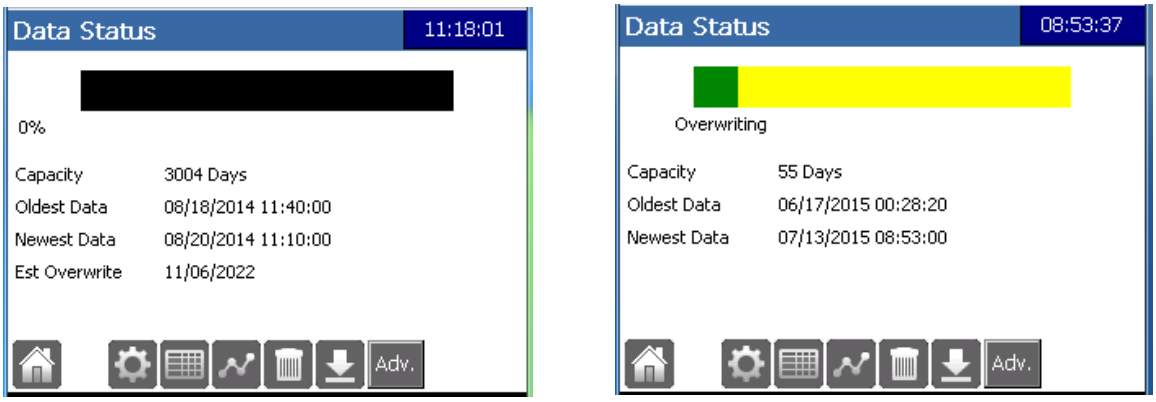


Figure 6-2: Triggering a Forced Read

Chapter 7 MANAGING DATA



Data management is done through the Data screen which displays data storage information. The Data functions are used to configure data logging, to download and delete data, or to examine the datalogger's recorded data.



Screen indicating percentage of capacityused Screen indicating data being overwritten

Figure 7-1: Data Status Screen

Data is stored chronologically. Once the capacity reaches 100%, the newest data will overwrite the oldest data, which is pictographically indicated with stored data shown in yellow and the portion being overwritten shown in green. Depending on the frequency of site visits and the amount of data being logged, consider periodically deleting the data after downloading it to ensure no data is lost due to being overwritten before the next site visit.

7.1 SETUP LOGGING

Data logging is configured through the **DATA>Setup Cog**. Figure 6-1 shows the **Logging** screen for a blank Datalogger (no data logging intervals configured) and a Datalogger with logging intervals configured. Logging intervals created through the Data functions, as described here, are displayed in blue. Logging intervals created using the In-line Logging feature are displayed in green.

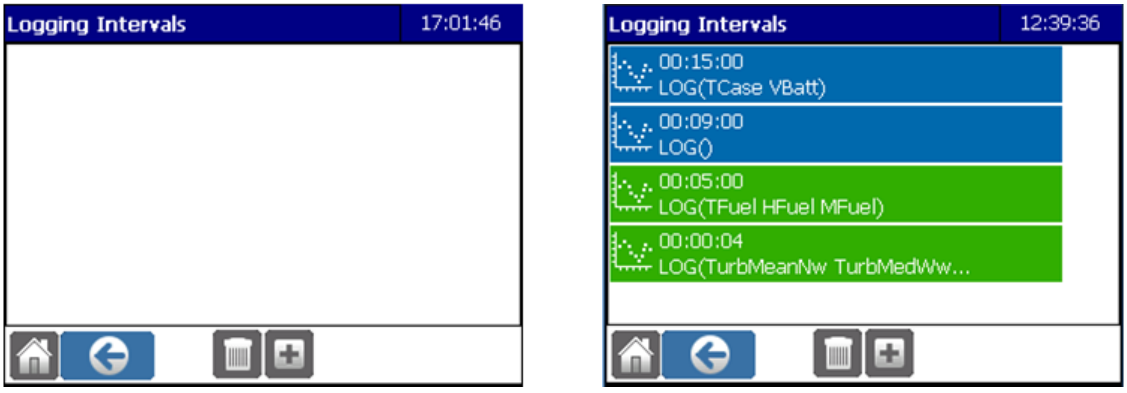


Figure 7-2: Logging Intervals Screens

To view Logging Interval details, press on the desired bar.

NOTE: In-line logging intervals cannot be edited from the **Data** functions, only through the Sensor Setup screen.

Press **Add** to configure a logging interval. After a Logging Interval is configured, it appears on the **Logging Intervals** screen. Multiple Logging Intervals can be configured in the Datalogger.

To delete a Logging Interval, tap **Delete**. A **Delete Item** screen will appear. Click on the item you wish to delete and then confirm the deletion to remove the log interval from the Datalogger. Repeat for each item you wish to delete and then click the **Back** or **Home** button to leave the Delete Item screen.

NOTE: Deleting a Logging Interval does not delete the data stored in the Datalogger.

7.2 CONFIGURING A LOGGING INTERVAL

To configure a Logging Interval, the user must set how often and when the data is logged, and specify what data is to be stored. Press **Data>Setup** and then press **Edit** (see Figure 6-2) to display the **Interval Tab**

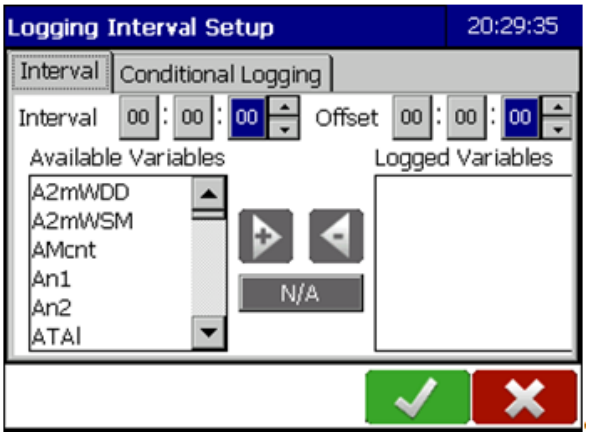


Figure 7-3:

A list of all **Available Variables** is displayed. Use the arrows to create the list of Logged Variables.

Interval: This specifies how often the data from the selected variables is logged.

Offset: This specifies at what time the data is logged based on midnight.

For example: An interval of 10 minutes (00:10:00) and an offset of 00:05:00 will log the data every ten minutes commencing at 5 minutes after midnight (00:05:00, 00:15:00, 00:25:00 etc.).

7.2.1 CONDITIONAL LOGGING

Conditional Logging will log the variables selected in the Logging Interval when the defined conditions are met.

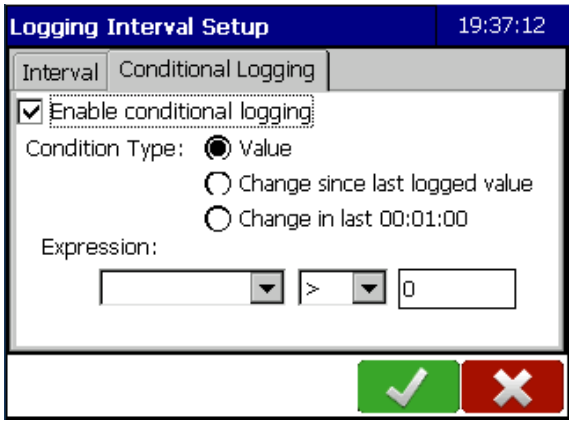


Figure 7-4: Conditional Logging Setup

Enable Conditional Logging Checkbox: This must be checked for Conditional Logging to take place.

Condition Type: Select the type of condition to be defined.

Condition type	Meaning
Value	Only log if the value of the variable selected in the Expression drop down satisfies the Expression.
Change Since Last Logged Value	Only log if the difference between the value of the variable selected in the Expression drop down and the last logged value of the variable satisfies the Expression.
Change in Last 00:00:00	Only log if the difference of the value of the variable selected in the Expression drop down over the last logging interval satisfies the Expression. Note that once this radio button is selected, the default time of 00:00:00 will change to reflect the Interval time input in the **Interval** tab.

Expression: 1) Use the drop down menu to select the variable upon which the condition rests.

2) Use the drop down menu to select the mathematical operator. Valid operators are:

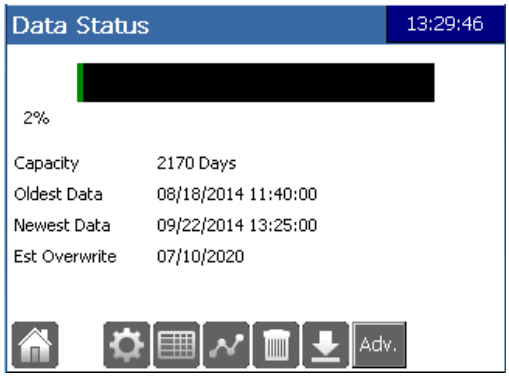
>	greater than	<=	less than or equal to
>=	greater than or equal to	=	equal to
<	less than		

4) Input the desired value.

Once all Conditional Logging fields have been filled in, select **OK**.

7.3 VIEWING DATA

Data can be viewed from the Data Status page either in Table View or Graph View.



7.3.1 DATA TABLE VIEW

A table of logged data can be created and viewed from **Home > Data > Table**. The **Data Table** is useful for examining specific data values with respect to each other. Data columns can be resized and repositioned (drag and drop) so that data values can easily be compared. The **Jump** button on the **Data Table** screen is used to go to a specific time in the logged data. The **Jump** button also acts like a refresh button if the specified jump time is slightly in the future (this way the most current data is shown in the table).

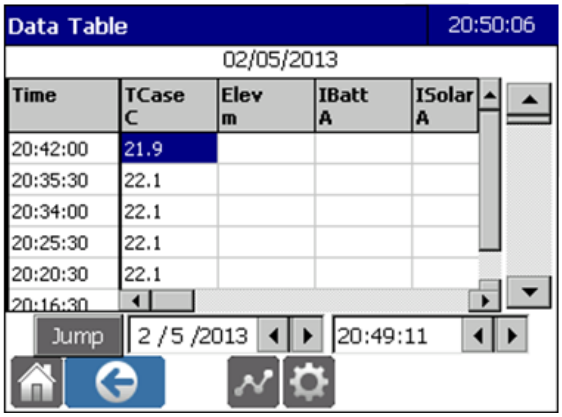


Figure 7-5: Data Table View

7.3.2 DATA GRAPH VIEW

A graph of logged data can be created and viewed from **Home > Data > Graph**. While it is possible to graph a large date range, users should be aware that there may be a delay to format the graph depending on the number of readings in the selected range. Graphing capability in the datalogger is intended to show trends over a short time period to help users determine proper sensor and station operation. Multiple variables can be graphed at the same time. The graph below shows a graph of the RNIN sensor over a two hour period.

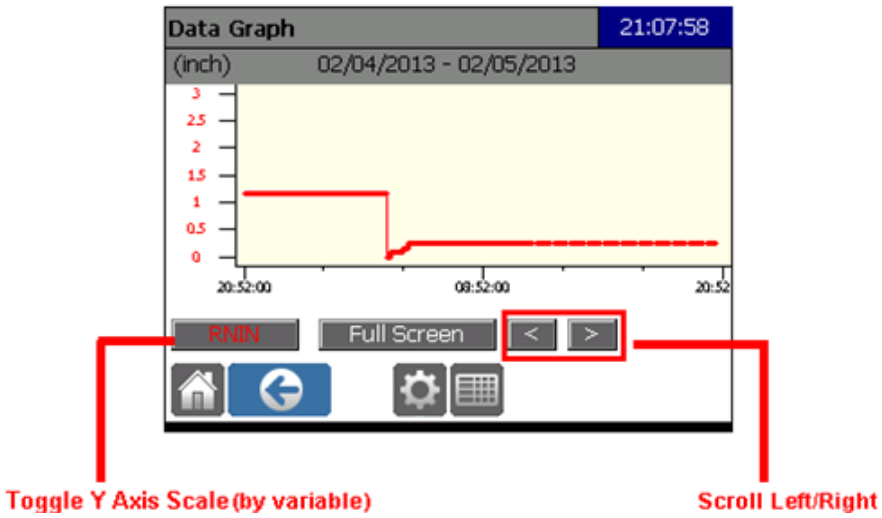


Figure 7-6: Data Graph View

The **Graph Setup** screen allows you to set the display range, select the variables to be displayed and set the range and colour on the displayed variables.

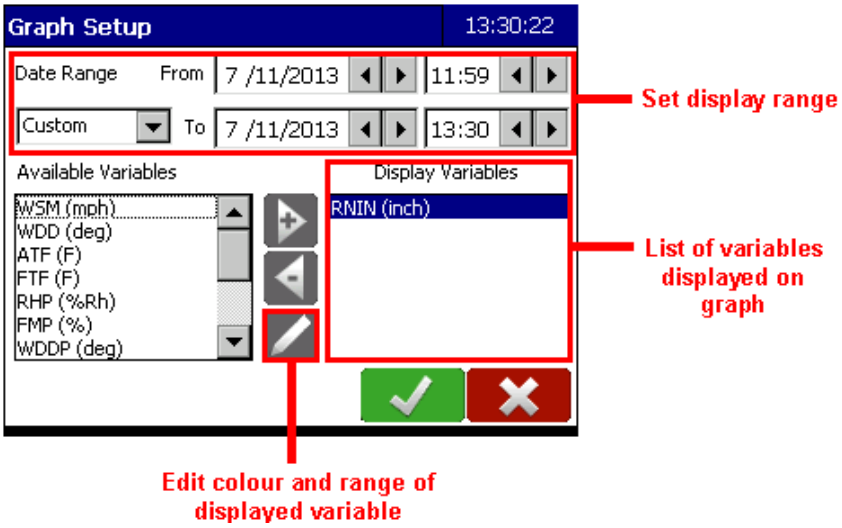


Figure 7-7: Setting up the graph

7.4 DOWNLOADING DATA

The **Download** button on the **Data Status** screen is used to export data to a USB memory stick.

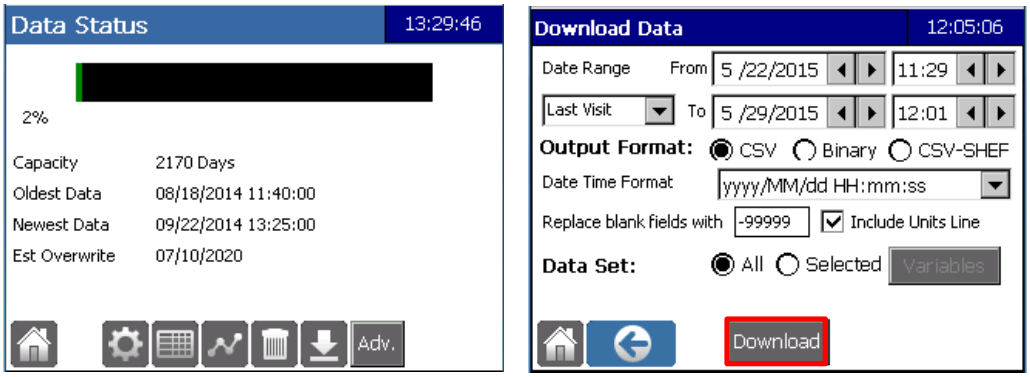


Figure 7-8: Download Data

Date Range: Use the down arrows in the **Date Range** to display and select the options. In the **Date Range** field, selecting **Last Day, Last Week, Last Month**, or **All** will automatically adjust the dates in the **From and To** fields. The time will reflect the current time.

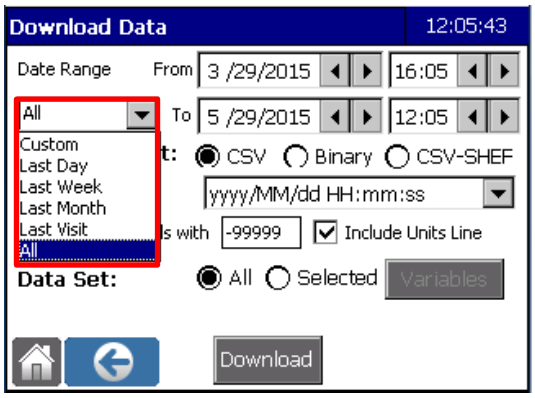


Figure 7-9: Date Range Options

Output Format: There are three formats to export data. Use the radio buttons to specify the desired format.

Replace blank fields with: Missing data fields will be filled in using the input figure. The default setting is -99999. To change it tap on the field and input the desired value using the keyboard. Select **OK**.

Include Units Line Checkbox: When checked units will be included in the data sheet.

Data Set: This feature is used to select and order the variables to download. The default selection is **All**. When selected, the Data Set will consist of all the variables and the data will be downloaded in the order of the data store index unless ordered. To create a smaller Data Set made of specific variables, press on the **Selected** radio button, then the **Variables** button. To adjust the download order of the variables in the Data Set, see section 7.4.1.

Variables: Select the variables to export by pressing the **Select** radio button and then **Variables**. Press on the desired variable(s) and use the arrows to build the list. The variables will be downloaded in the order they appear in the list unless ordered (see following section).

7.4.1 CREATING AN ORDERED DOWNLOAD LIST OF VARIABLES

If the variables need to be downloaded, but in a different order than they appear in the data store index, their order can be adjusted. Press on the **Selected** radio button and then the **Variables** button to display the **Select Variables** screen. Select **Edit.**

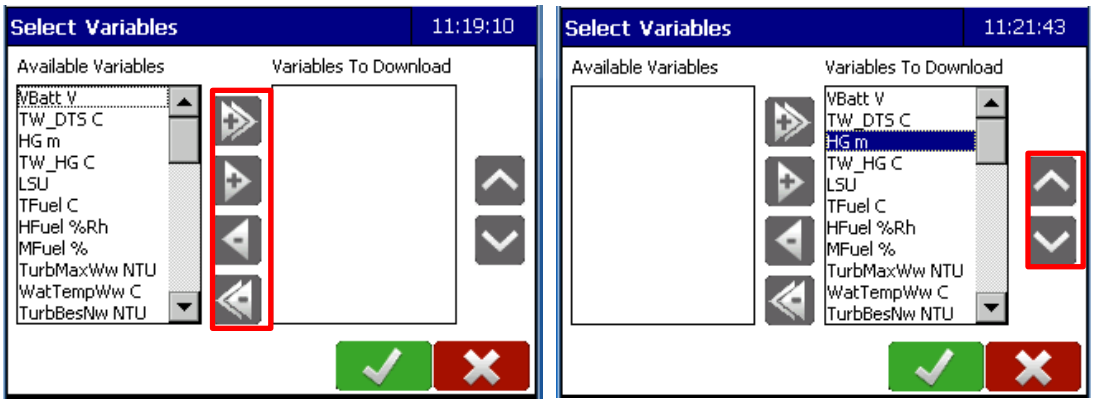


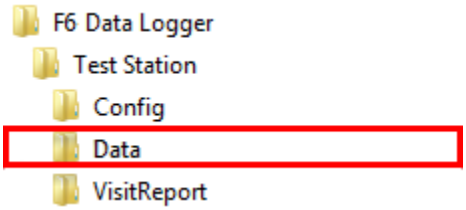
Figure 7-10: Selecting and Ordering Variables

Move the desired variables from the **Available Variables** column to the **Variables to Download** column using the arrows. All the variables or select variables can be moved.

Adjust the order of the download list by pressing on a variable and using the up and down arrows to place it. Once the download variable list is complete, select **OK.**

Download Button: Once all desired options in the Download Data screen have been filled in, press on the Download button.

The downloaded data will appear in the following file structure on the USB memory stick.



The downloaded data file is time-stamped and has the following naming format: station name-yyyy-mm-dd-hh-ss with either a .csv or .bin extension.

7.5 DELETING DATA

The **Delete Data** button on the **Data Status** screen permanently deletes all data stored in the datalogger. After the **Delete Data** button a confirmation prompt will be displayed.

IMPORTANT! Once deleted, the data cannot be recovered.

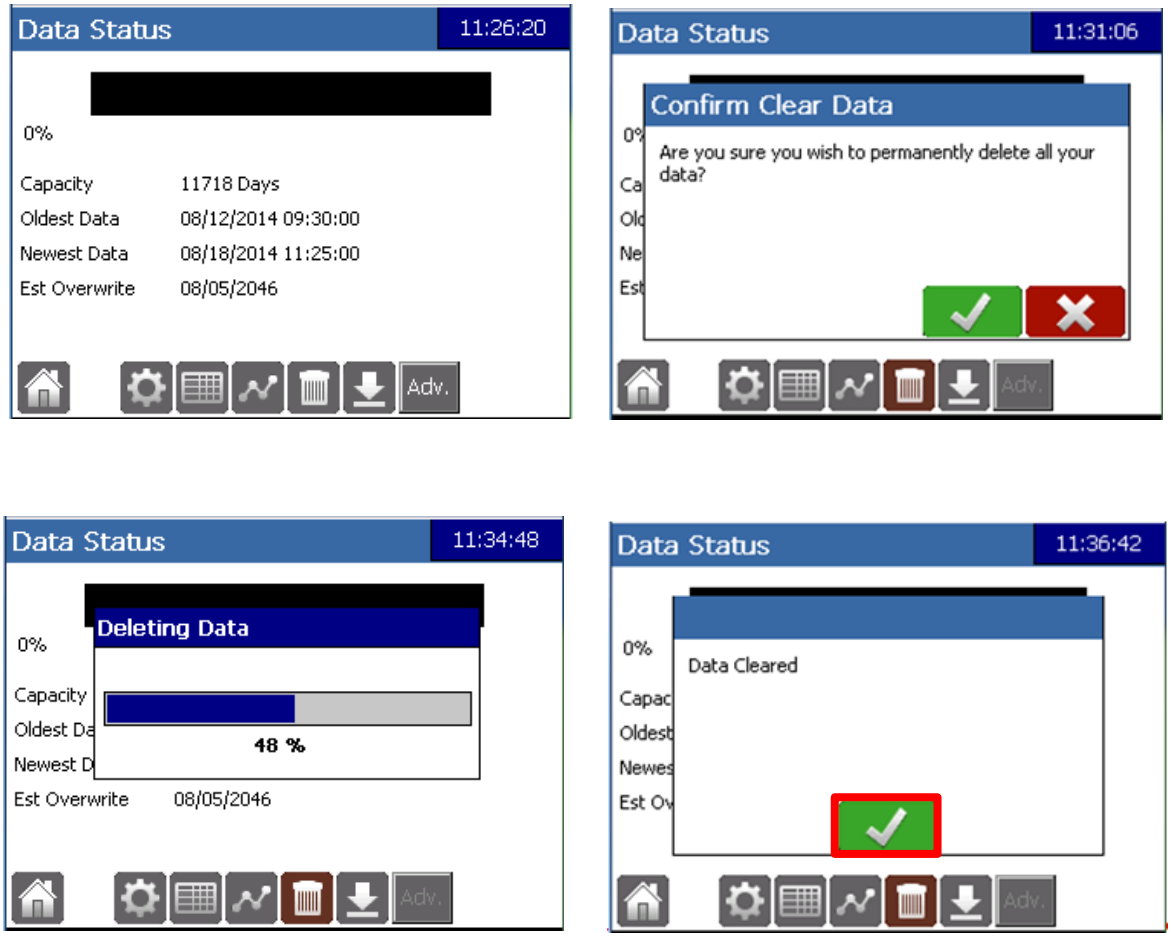


Figure 7-11: Deleting Data

A 'Data Cleared' message is displayed once the data has been deleted from the datalogger. Press **OK** to continue.

Data is not deleted when loading a new configuration, when updating the Application, or when updating the Operating System. The only way to delete data is to push the **Delete Data** button on the **Data Status** screen.

DOCUMENT REVISION HISTORY

Revision	Date	Description
1	8 Jul 2015	Original release. Format and name change from Axiom User Manual Rev 5. Current to AS 3.3.0.45.
2	10 Dec 2015	Updated for AS ver 3.5.1.1 Visit Report screenshots updated.