

**TQSoft**

AMS2750/NADCAP/CQI-9 Compliancy for Temperature Uniformity Surveys, System Accuracy Tests and Calibration Management

WWW.TQSOFTWARE.COM

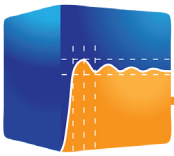
## TQAero Supplement

TQAero is an enhanced version of TQSoft with some specific additional capabilities, including TQExpress reporting software, aimed at satisfying the AMS2750 requirements.



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# TQSoft

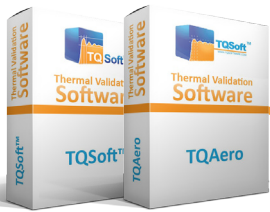
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TQAero is an enhanced version of TQSoft with some specific additional capabilities aimed at satisfying the AMS2750 requirements.

Training Videos are available on the [www.tqsoftware.com](http://www.tqsoftware.com) under the Support/Training menu. These videos go through the software features outlined in this document step by step. Users can start using TQAero and its TQSoft thermal validation documentation by setting up:

- Data Security
- Test Equipment
- Chamber records with sensor positions and SAT reports
- Logger & Sensor Calibration Files for TUS
- Test Specifications for TUS
- Reports for TUS





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TQAero checks data files when they are used to produce reports. Any changes made other than by a person authorized via a TQAero ID and Password will render records unusable.

All changes made by an authorized user in TQAero are audited with full details of the changes made and actions performed. TQAero now offers two options with respect to user Login.

1. TQAero can use the Windows user account name, so no separate TQAero ID and Password is required. This is the default method.
2. TQAero *Edit Security* option can be used from the *Setup* menu to create TQAero user accounts and access profiles.





On the **Setup** menu the **Test Equipment** option allows a record of test equipment to be created. SAT and TUS reports can automatically include information from these records.

To create a new item of Test Equipment right click on the main **Test Equipment** node.

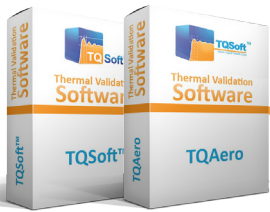
To get the **SAT correction factor** automatically included in report, enter it in the box shown below.

To tell the software which equipment is currently being used, right click on the item and choose the **Select** option.

The screenshot shows a 'Test Equipment' dialog box with a tree view on the left and a form on the right. The tree view includes 'Test Equipment' and several sub-items. The form contains fields for 'Serial No.', 'Description', 'Manufacturer', 'Model', 'Test House', 'Cat. No.', 'Revised Date', 'Version', 'Firmware', and 'SAT Correction Factor'. The 'SAT Correction Factor' field is highlighted with a red circle, and an orange arrow points to it from the text above. The 'Select' button is visible at the bottom right.

Field	Value
Serial No.	92673650
Description	Test Sensor (SAT)
Manufacturer	Fluke
Model	WT 25
Test House	Fluke
Cat. No.	40123
Revised Date	1/1/2014
Version	
Firmware	1.1
SAT Correction Factor	0.9

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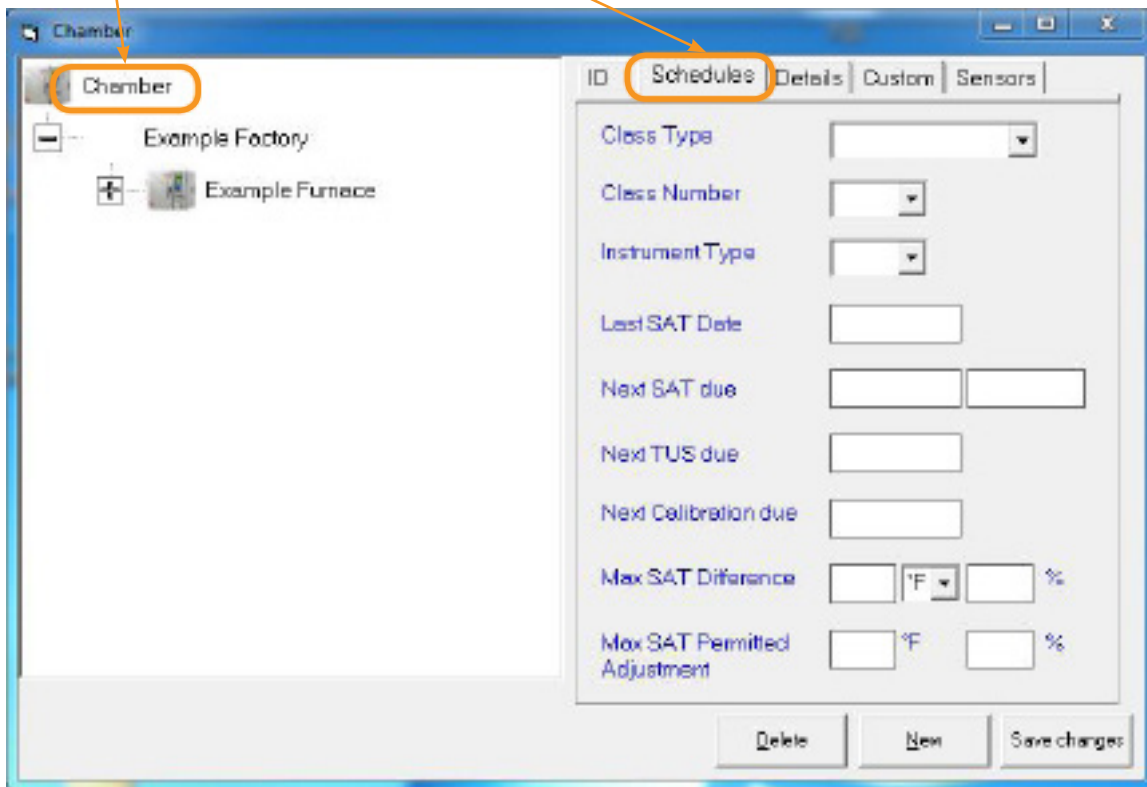
On the **Setup** menu the **Edit Chamber Records** option allows furnace records to be added by right clicking the main **Chamber** node.

It's probably best to use the serial number of the furnace (but alphanumeric characters only) as the reference.

### Schedules Tab

The **Schedules** tab allows furnace information to be added. This information will be used to alert due dates in the chamber records window, and it can be put into TUS and SAT reports.

By correctly selecting the furnace class type, class number, instrument type and last SAT date, TQAero will automatically generate the remaining SAT entries from the AMS guideline tables.

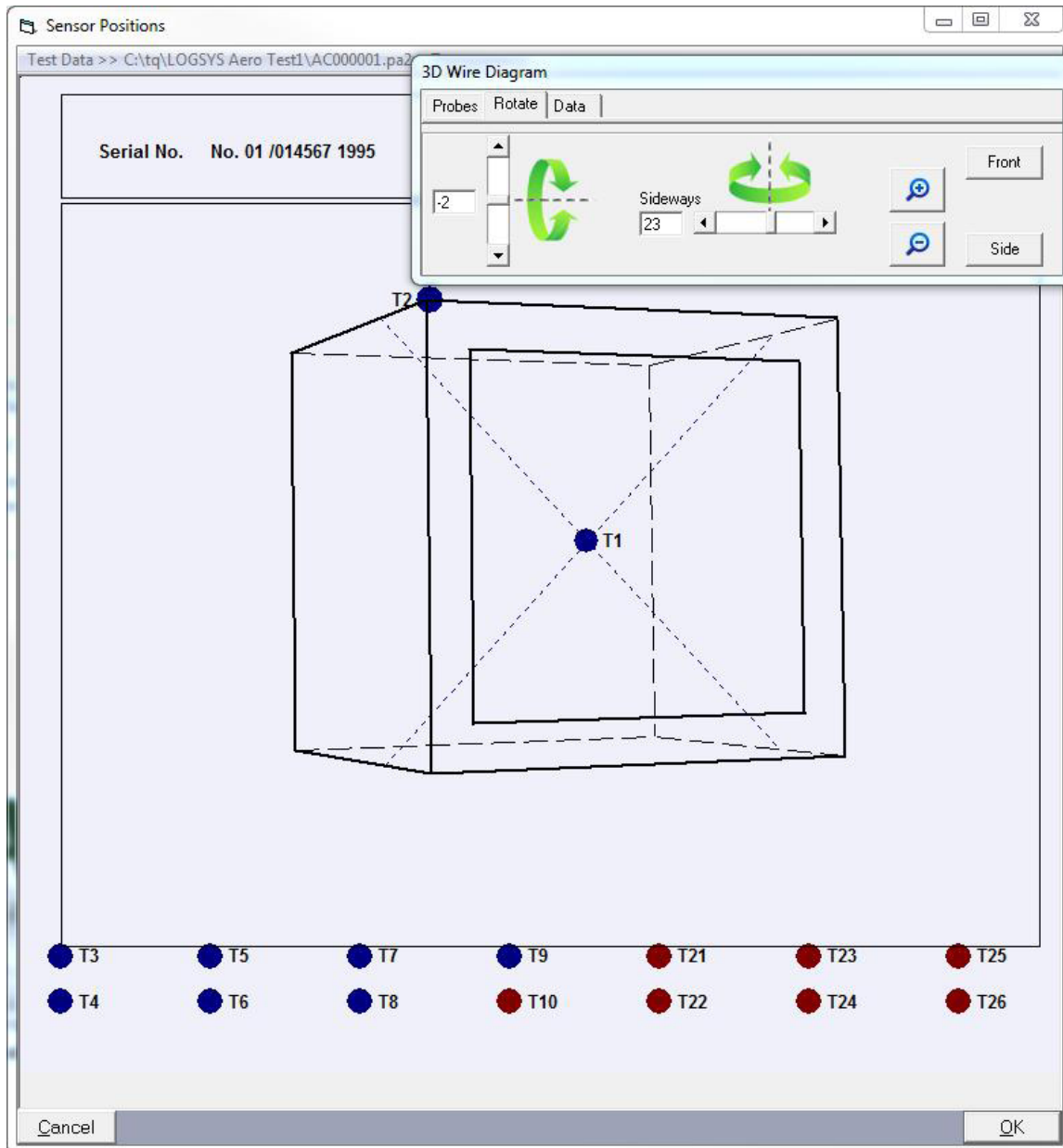


The information is also stored in the chamber section of Test Records and may be automatically displayed in reports. Reports can be designed in TQExpress or Word or Excel, but support is required from TQSolutions when identifying data in Test Records.



### Sensors Tab

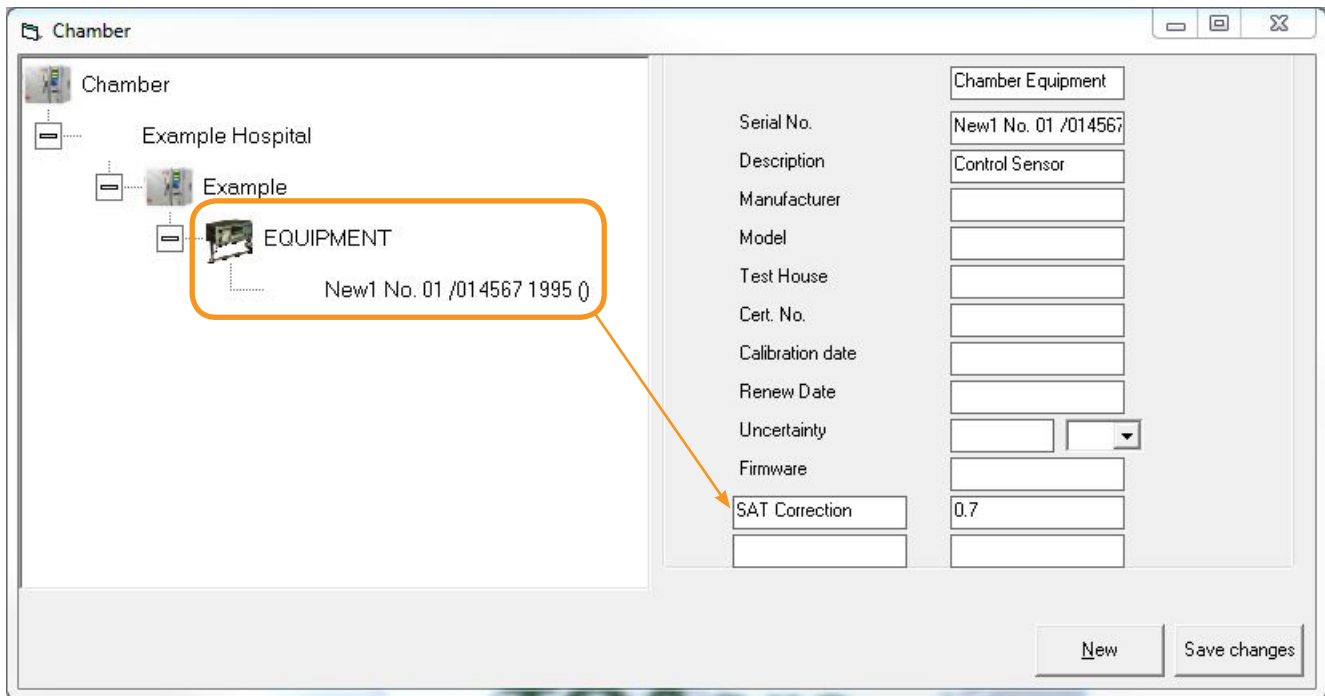
With the *Sensors* tab in *Chamber Records* the sensor positions inside the furnace can be easily managed with TQAero. The 3D chamber view allows sensors to be dragged to their precise positions. This view is saved and the view can be added to the report.





### Adding The Control Sensor To The Furnace

Double click on a furnace node to show the Equipment node. Right click on the equipment node to create a new item of equipment and enter the information for the furnace control sensor similar to that shown here.



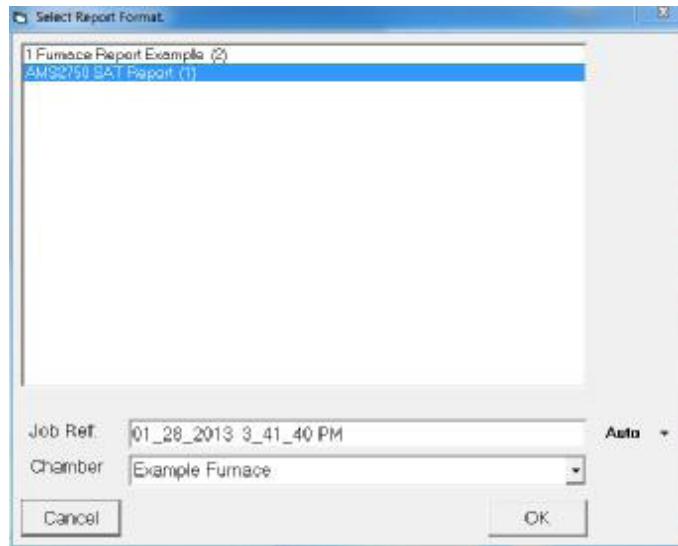
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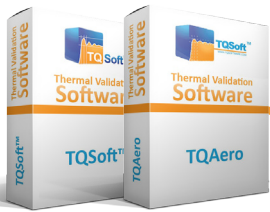
### Making A SAT Report

To start a SAT report for a furnace, right click on the furnace node and select **New Report**. Click the correct SAT entry. The **Job Ref** is an identifier for the report and can be automatically generated with the **Auto** button to include the furnace name or serial number and date and/or time.



To access the new SAT report, right click on the furnace node again, and click on **Report Forms**. The **TQExpress reports manager** window will be displayed. Double click on the Reference and then double click on the SAT report.

SAT REPORT	
Date of Test	<input type="text"/>
Time of Test	<input type="text"/>
Furnace tested:	<input type="text"/>
Sensor Tested:	<input type="text"/>
Test Sensor:	<input type="text"/>
Test Instrument:	<input type="text"/>
Indicated (uncorrected) control or recording instrument reading (A)	<input type="text"/>
Correction to balance prior internal adjustment to control or recording instrument (B)	<input type="text"/>
Control Sensor correction factor (B1)	<input type="text"/>
(A)+(B)+(B1) = Corrected control or recording instrument temperature. (C)	<input type="text"/>



### Making A SAT Report (cont.)

The yellow boxes in the report should be completed manually first.

The *Sensor Tested* is the equipment item (Control Sensor) setup in the earlier section. Its serial number should appear in the drop down box.

The *Test Sensor* and *Test Instrument* should have been setup earlier in the Test Equipment. The serial numbers should appear in the drop down box.

The correction factors should appear in the boxes when selection occurs.

When yellow boxes are complete use the *Test Data* menu option *Import Test Data*. The remaining boxes should be completed.

To setup an electronic signature file go to *Setup* menu *Edit Security* then *Add Signature* tab.

Imported information can be replaced with manual entries, but manual adjustments will be lost by reimporting.

Press OK to save the form.

System Accuracy Test

Test Data >> Transparency

### SAT REPORT

Date of Test  Time of Test

---

Furnace tested:

---

Sensor Tested:

---

Test Sensor:

---

Test Instrument:

---

Indicated (uncorrected) control or recording instrument reading (A)

---

Correction to balance prior internal adjustment to control or recording instrument (B)

---

Control Sensor correction factor (B1)

---

(A)+(B)+(B1) = Corrected control or recording instrument temperature. (C)

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### Connecting To Data Acquisition Unit

TQSoft has drivers for a number of data loggers. The most popular for TUS are Fluke Hydra or Agilent.

Connection to a Fluke Hydra or Agilent 34970A unit is quite simple and should be a matter of connecting the serial cable to a USB/RS232 adaptor. Then use the **Logger/Select Type of Logger** menu option, and select the logger.

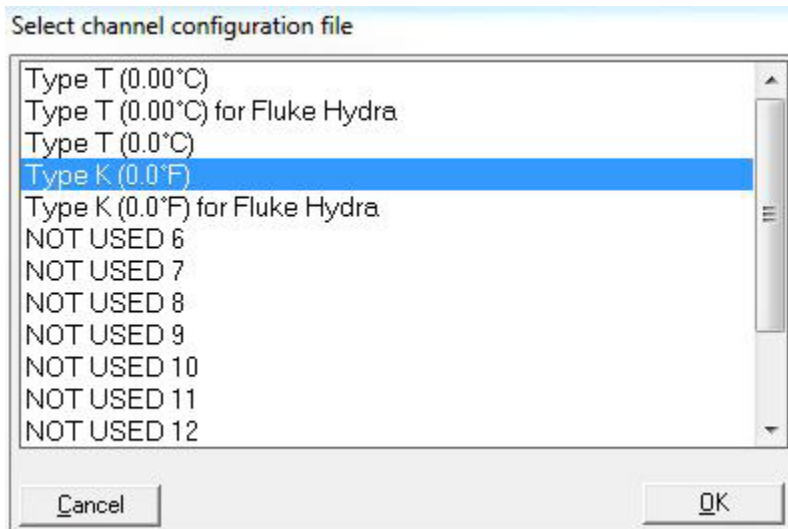
The default communications settings will match the factory default settings. You will need to select the correct COM port, and the **Test Connection** button will help check if the COM port is the right one.

The Agilent 34902A uses a LAN connection. You will need to check Appendix W for more information. Each type of logger has an Appendix section in the main TQSoft manual on the **Help/General** menu option.

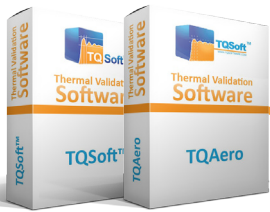
### Channel Configurations

Most loggers must be configured for the sensor or thermocouple connected to each channel. TQSoft is preset with a number of channel configuration files that will fit most requirements. A channel configuration file has a selection (eg Type K) for each channel. Every time you start a TUS with TQSoft, every channel is automatically programmed correctly.

After connecting with the logger you should see this window:



The **0.00** refers to the number of decimal places each channel is set with (cont. next page).



### Channel Configurations (cont.)

The **Fluke Hydra** configurations have a special setting for channel 1 which is a different kind of input, whereas with most other loggers channel 1 is not special.

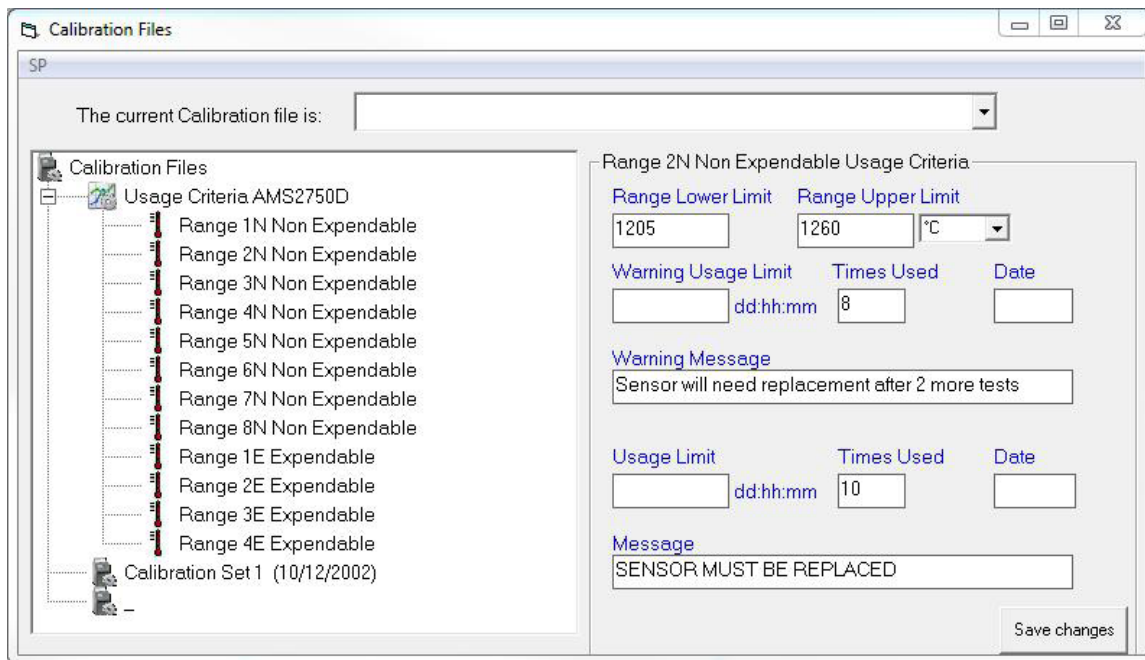
All the configurations including the **NOT USED** ones can be modified and have the name changed in the Setup/Edit channel configuration option.

### Calibration Files

Use of calibration files in TQSoft is optional, if you do not wish to enter all the calibration setpoints and have adjustments applied to the measured data you can skip this section.

On the **Logger** menu the **Calibration Files** window contains an entry for **Usage Criteria**. These criteria are set at installation to comply with thermocouple monitoring standards set out in AMS2750. A user can modify the criteria if necessary.

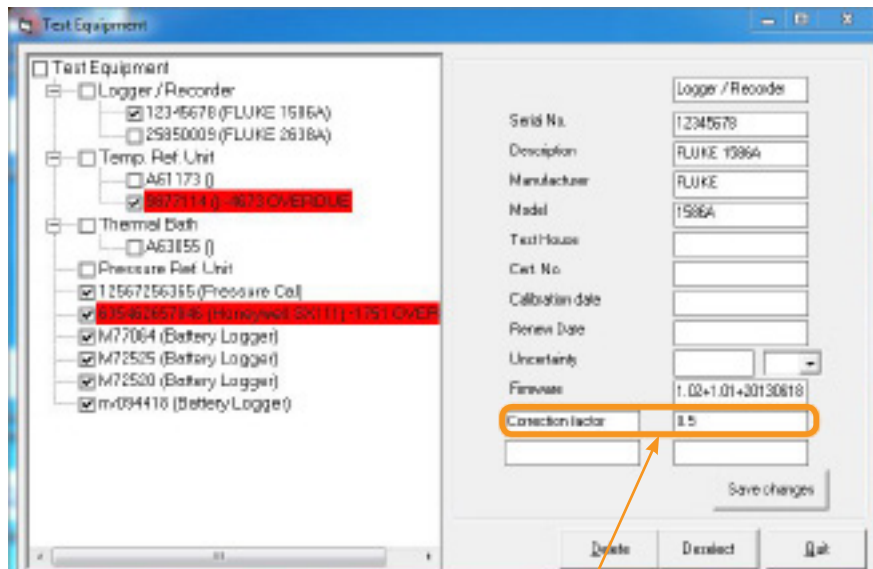
The **Usage** section of each channel in the Calibration Files will be compared with the criteria and messages displayed appropriately when user attempts to start a test.





### Entering Calibration Correction For The Logger

The calibration correction for the logger (Test Instrument) can be added in the *Test Equipment* window on the *Setup* menu. You may need to create a record under the *Logger/Recorder* section by right click on the *Logger/Recorder* item, and selecting *New*. See the next section for entering multiple correction points for the logger.

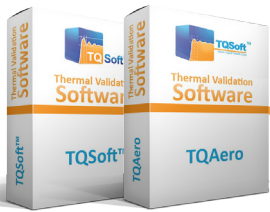


### Creating Multiple Calibration Adjustments Or Set Points For Thermocouples And Loggers

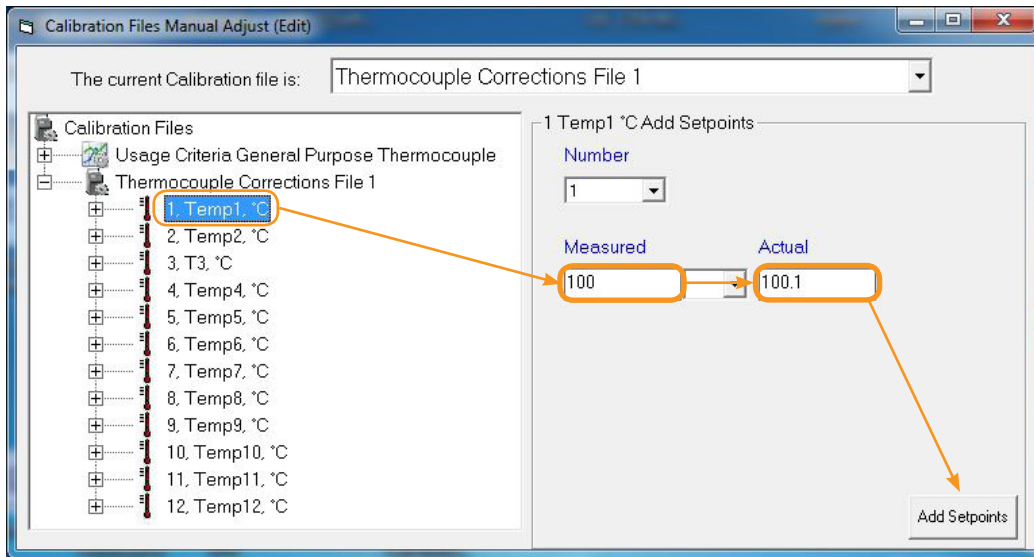
For furnace thermocouples more than 2 set points are required, and the *Manual Calibration Adjust* window on the *Logger* menu will be required to add in set points manually. The adjustments will be automatically applied to all measurements.

The Calibration Set 1 is a sample using °C, to create a new set, first be sure that you have a suitable channel configuration file selected with correct units in *Edit Channel Configuration* on the *Setup* menu. Then, in *Manual Calibration Adjust* (see next page), click on the root *Calibration Files* node, and click on *New Calibration file* in the right hand panel.

To add a Setpoint manually, click on the channel, enter the *measured* and *actual* values, and click *Add Setpoints* (cont. next page).



### Creating Multiple Calibration Adjustments Or Set Points For Thermocouples And Loggers (cont.)



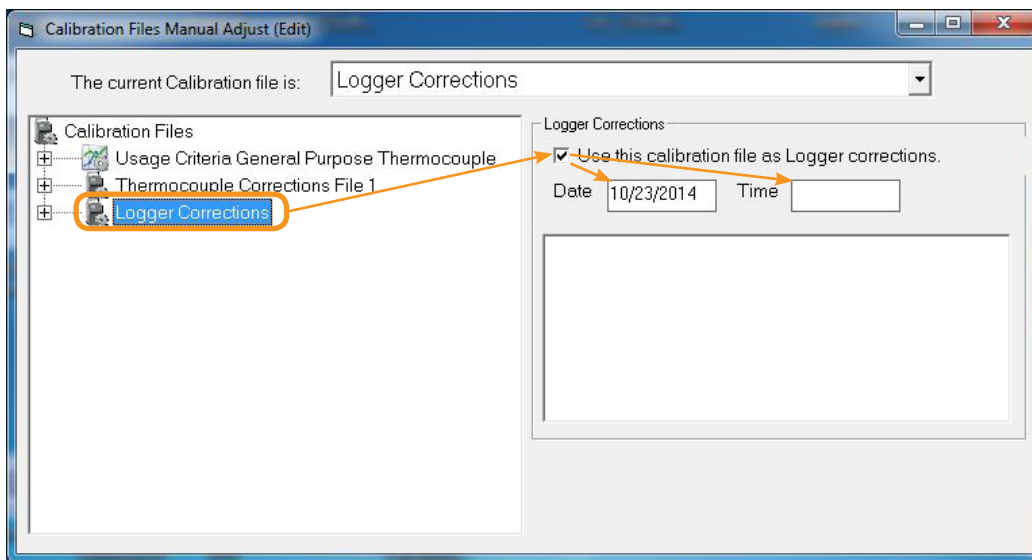
It is also possible to import Setpoints from an Excel sheet. See example here. The software requires the measured (as found) value in the first box, and the actual (standard) value in the second box. Any extra boxes are ignored. If the spreadsheet contains tables for multiple channels the software will assume any row containing *non numerical* entries in box 1 and box 2 to be a break between channels, so you can copy and paste the entire spreadsheet.

TYPE & THERMOCOUPLE METER FUNCTION Channel 1			
CALIBRATION STANDARD	UNIT UNDER TEST "AS FOUND"	UNIT UNDER TEST "AS LEFT"	CORRECTION
31.00	31.7	31.7	0.3
100.00	99.8	99.8	0.2
200.00	199.8	199.8	0.2
300.00	299.9	299.9	0.1
400.00	399.8	399.8	0.2
500.00	499.8	499.8	0.2
600.00	599.7	599.7	0.3
700.00	699.8	699.8	0.2
800.00	799.8	799.8	0.2
900.00	899.8	899.8	0.2
1000.00	999.9	999.9	0.1
1100.00	1099.9	1099.9	0.1
1200.00	1199.8	1199.8	0.2
1300.00	1299.7	1299.7	0.3
1400.00	1399.5	1399.5	0.5
1500.00	1499.5	1499.5	0.4
1600.00	1599.6	1599.6	0.4
1700.00	1699.8	1699.8	0.2
1800.00	1799.8	1799.8	0.2
1900.00	1899.4	1899.4	0.1
2000.00	2000.0	2000.0	0.0
2100.00	2100.1	2100.1	-0.1
2200.00	2200.1	2200.1	-0.1
2300.00	2300.1	2300.1	-0.1
2400.00	2400.1	2400.1	0.1



Then, in TQAero, right click on the node of the first channel you have Setpoints for (normally channel 1), and choose the *paste from Excel* option. Any existing Setpoints are first automatically removed.

To assign a calibration file to be used as an adjustment for the Logger, click on the calibration file node (see below), and tick the checkbox shown. The date and time can be set from the calibration certificate, and will be applied to each Setpoint entry.



### Securing The Logger Adjustment Setpoints

To prevent access to the file containing Logger SetPoints The Administrator should go to *Edit Security* on the *Setup* menu. On the *Hardware* tab there is an entry *Calibration Files Manual Adjust (Edit) Logger*. This option should be unchecked for any accounts that will not have access to the Loggers adjustments. If these accounts need access to enter thermocouple adjustments the option just above called *Calibration Files Manual Adjust (Edit)* must be left checked!

### Verifying Calibration Adjustments Are Correctly Applied

The *Inputs Display* will breakdown which adjustments are being made on which channels. In addition to this check, the service engineer should be aware that the Test Specifications will decide which calibration file is actually applied during a study.

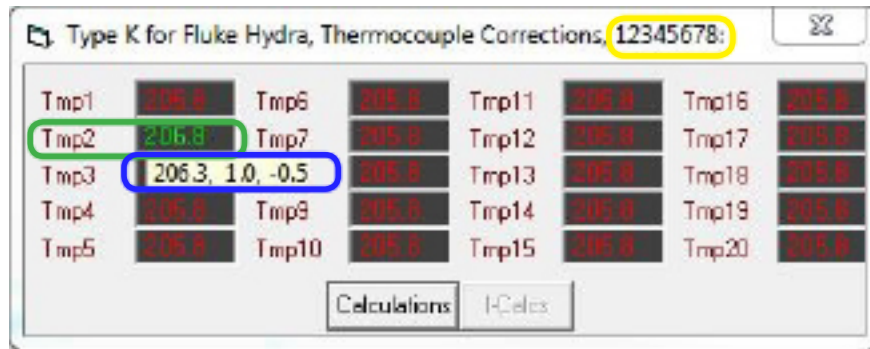
The example display (yellow rectangle on the next page) shows a window caption indicating the active calibration file is *Calibration Set 1*, then the logger serial number is *234726347* with an adjustment of *-0.5*.

The green rectangle shows channel T2 in green meaning that *thermocouple* setpoint adjustments are being applied. Measurements in red have no setpoint adjustments (cont. next page).



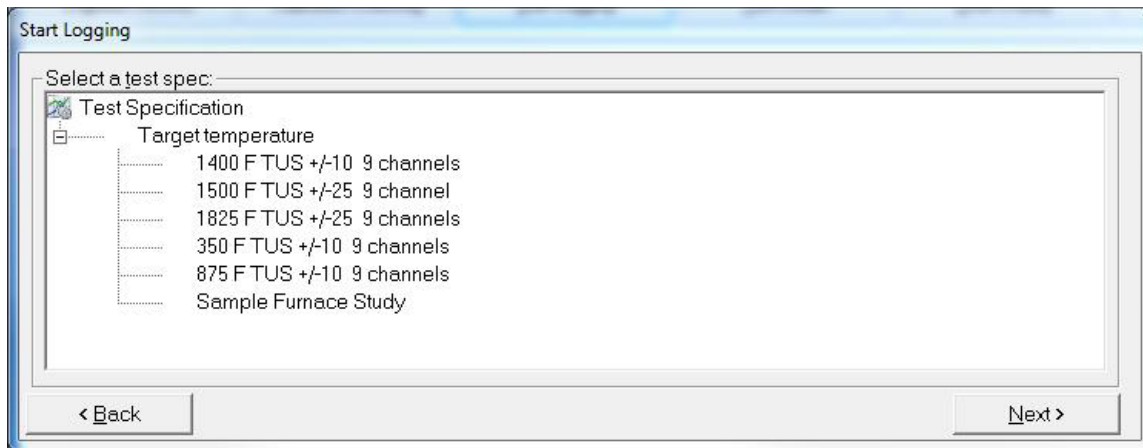
### Verifying Calibration Adjustments Are Correctly Applied (cont.)

The blue rectangle appears when the cursor is held over T2 reading. It shows the **uncalibrated reading**, the **thermocouple correction**, and the **logger correction**, separated by commas.



### Test Specifications

In TQAero a 'Test Specification' contains all the required setup parameters for a TUS. TQAero comes preconfigured with a number of set temperatures and you can easily create more based on these:



The Test Specification contains selection settings for target temperature, channel configuration, all calibration information, and all temperature parameters. Once you select the Test Specification, all settings are automatically applied by the software, and a report is automatically generated.

Before starting your first TUS, you must set the channel configuration to the correct selection in each Test Specification.

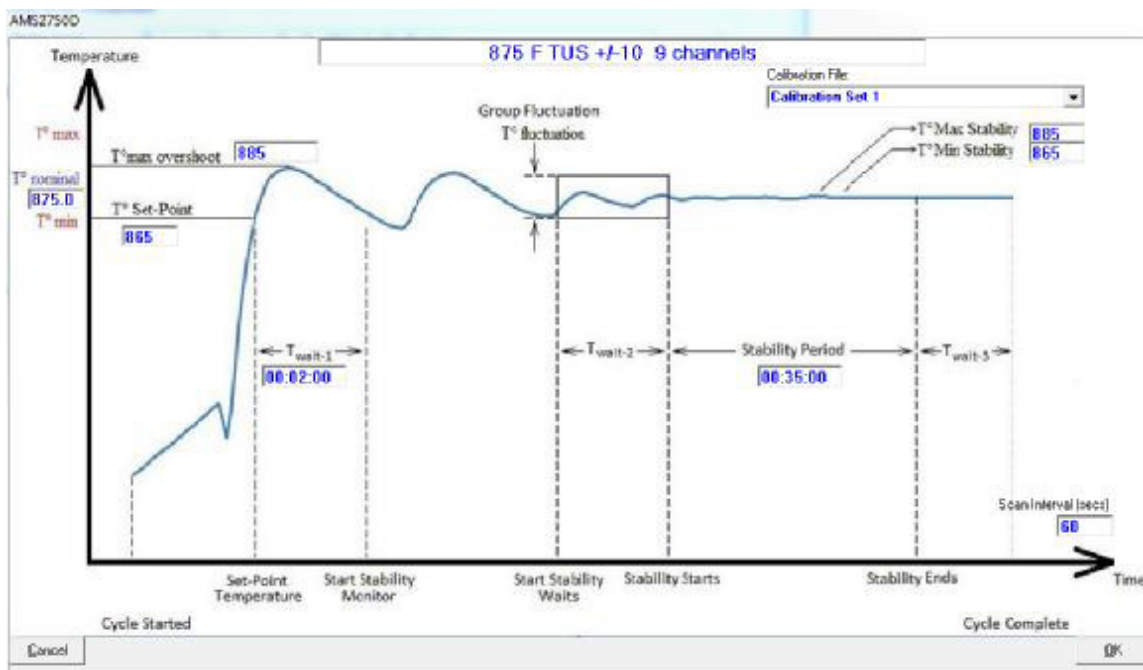
If you do wish to use a calibration file in your TUS, you must also set the calibration file in each Test Specification.





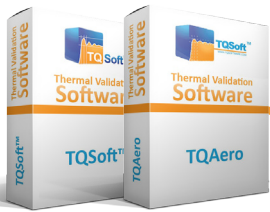
### Modifying Temperature Tolerances And Number Of Thermocouple Locations

To access the graphical interface for modifying temperature parameters/tolerances go to *Setup* menu then *Edit Test Specifications*. Select the desired one and on the *I-Calcs* tab click the *AMS2750* button. (Note that correct operation of the graphic requires that the *names* of the standard *I-Calcs* are not changed.)



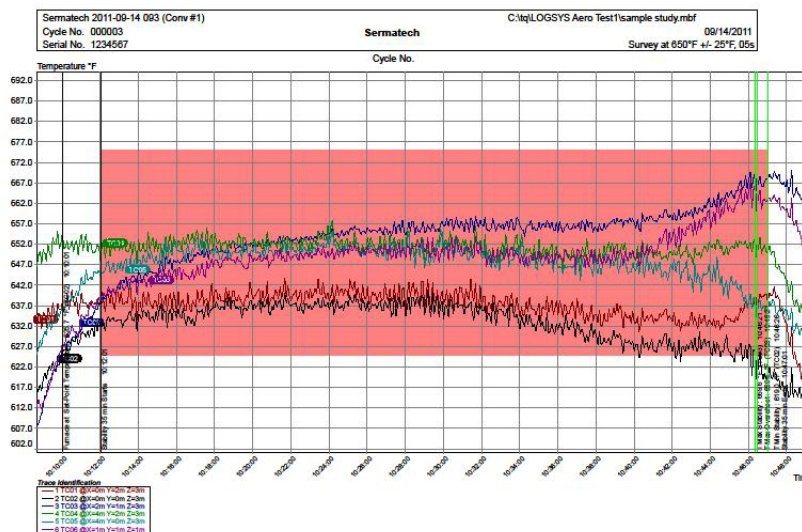
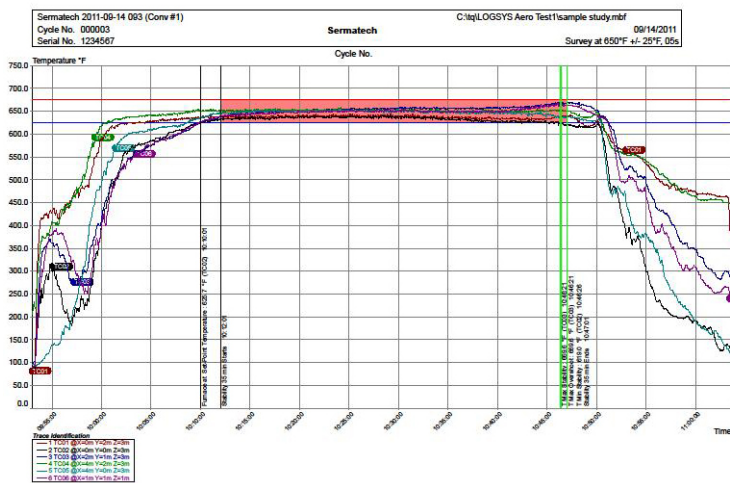
To change the number of locations in the furnace, go to the *Probes* tab of a Test Specification and click the *Probes* button.

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### Reports

As mentioned earlier custom reports can be created either within TQExpress or with Word or Excel. Most users will combine standard TQSoft chart and Data Listing with some custom sheets. The TQExpress functions are designed for this process. Please ask for support from TQSolutions when designing custom reports.



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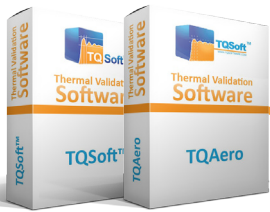


### Reports (cont.)

<b>Sermatech 2011-09-14 093 (Conv #1)</b>	<b>Page 1 of 6</b>
<b>Cycle No. 000003</b>	<b>Sermatech</b>
<b>Serial No. 1234567</b>	<b>09/14/2011</b>
<b>Survey at 650°F +/- 25°F, 05s</b>	<b>C:\tq\LOGSYS Aero Test1\sample study.mbf</b>

**Competent Person:** \_\_\_\_\_ **Sign** \_\_\_\_\_ **Date** \_\_\_\_\_  
**Reviewed By:** \_\_\_\_\_ **Sign** \_\_\_\_\_ **Date** \_\_\_\_\_

Time	TC01	TC02	TC03	TC04	TC05	TC06	Calculations	
							Max	Min
09/14/11	°F	°F	°F	°F	°F	°F		
09:52:53	Cycle Started							
09:53:01	81.5	87.8	100.2	206.2	95.7	90.5	206.2	81.5
09:55:01	430.9	298.8	362.6	407.9	137.8	382.7	430.9	137.8
09:57:01	461.4	180.8	274.5	458.2	197.4	317.9	461.4	180.8
09:59:01	518.8	274.3	357.4	570.9	422.0	301.8	570.9	274.3
10:01:01	616.3	499.5	493.4	626.7	543.0	473.5	626.7	473.5
10:03:01	625.0	571.5	547.8	637.5	602.3	543.2	637.5	543.2
10:05:01	627.6	585.0	574.5	640.3	609.7	576.9	640.3	574.5
10:07:01	632.8	603.3	591.7	643.5	616.1	596.4	643.5	591.7
10:09:01	635.3	619.2	612.7	650.7	629.5	613.5	650.7	612.7
10:10:01	Furnace at Set-Point Temperature : 625.7 °F (TC02)							
10:10:01	637.8	625.7	625.9	654.7	636.9	627.6	654.7	625.7
10:10:11	636.6	624.6	626.1	651.3	636.6	628.2	651.3	624.6
10:10:21	636.2	626.1	628.2	650.7	637.9	629.2	650.7	626.1
10:10:31	640.9	628.8	629.1	652.8	639.6	632.1	652.8	628.8
10:10:41	637.0	628.3	629.3	652.0	639.5	630.4	652.0	628.3
10:10:51	634.6	627.6	629.7	649.5	639.5	629.2	649.5	627.6
10:11:01	640.0	630.2	631.2	654.4	643.9	634.7	654.4	630.2
10:11:11	637.7	630.0	632.2	653.0	642.4	633.9	653.0	630.0
10:11:21	636.5	630.8	633.9	650.2	643.2	634.5	650.2	630.8
10:11:31	638.1	631.1	634.2	652.0	643.9	638.0	652.0	631.1
10:11:41	637.5	629.5	635.3	650.0	645.3	636.4	650.0	629.5
10:11:51	637.4	630.9	636.1	651.7	645.1	638.4	651.7	630.9
10:12:01	Stability 35 min Starts							
10:12:01	637.4	632.1	638.0	648.0	644.2	638.2	648.0	632.1
10:12:11	637.8	632.8	638.9	651.6	645.3	640.0	651.6	632.8
10:12:21	639.5	633.6	639.4	652.3	647.5	639.8	652.3	633.6
10:12:31	637.6	633.2	640.3	649.2	645.3	640.5	649.2	633.2
10:12:41	637.3	633.9	640.9	652.0	647.2	641.1	652.0	633.9
10:12:51	640.3	633.3	640.7	652.6	645.3	640.7	652.6	633.3
10:13:01	637.6	633.6	641.0	650.6	646.0	642.5	650.6	633.6
10:13:11	637.3	631.7	643.2	650.8	645.5	641.3	650.8	631.7
10:13:21	637.9	633.4	644.0	650.4	648.5	641.4	650.4	633.4
10:13:31	640.6	635.2	641.0	650.3	645.8	643.5	650.3	635.2
10:13:41	635.9	633.6	644.2	649.3	645.4	642.7	649.3	633.6
10:13:51	639.0	635.0	643.4	650.9	648.5	643.4	650.9	635.0
10:14:01	637.5	634.9	645.4	653.0	648.2	643.1	653.0	634.9
10:14:11	635.6	633.7	642.8	650.5	646.8	642.5	650.5	633.7
10:14:21	638.1	635.4	644.8	650.1	647.9	643.3	650.1	635.4
10:14:31	640.4	635.9	644.8	654.9	650.1	643.5	654.9	635.9
10:14:41	636.9	633.9	645.2	652.2	650.1	641.5	652.2	633.9
10:14:51	638.2	633.0	644.9	650.1	647.4	643.4	650.1	633.0
10:15:01	636.1	633.6	644.1	650.3	647.2	642.3	650.3	633.6
10:15:11	640.1	637.4	647.8	652.0	651.2	645.9	652.0	637.4
10:15:21	637.8	636.1	644.7	651.6	649.5	644.5	651.6	636.1



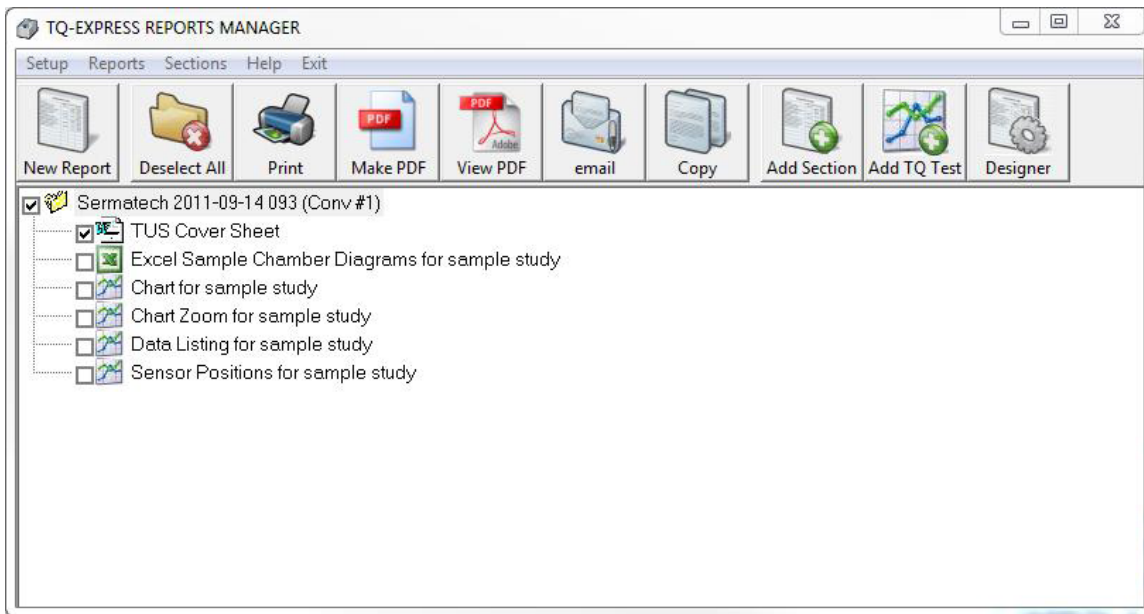
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## Reports Manager

### Reports Manager

The *TQExpress Reports Manager* window can be used to add and remove report items (Word, Excel or PDF documents), change the report order and quickly convert an entire report to a PDF.



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