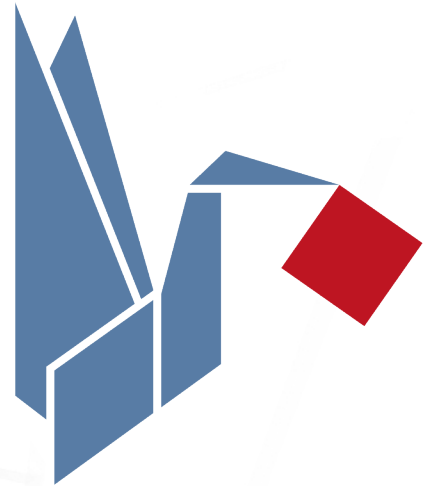


# tecnosoft

WE DELIVER DATA



## TC-Log

### Quick start guide

Version 1.0.4.1.

Date 1 may 2018



YEARS OF  
INNOVATION  
1989-2019

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## License agreement

Read this license agreement thoroughly before using the Software. Using and copying this Software is subject to the acceptance of

this agreement.

If you choose to refuse the following conditions, please delete the downloaded software or return the support where this Software is saved to the provider.

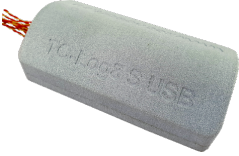

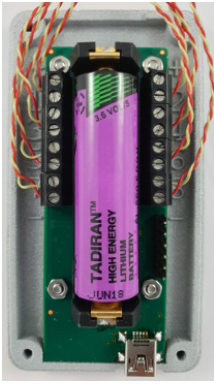
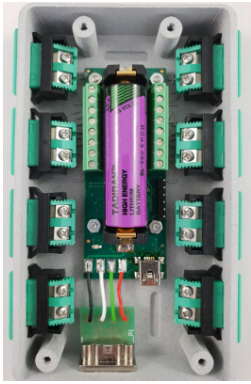
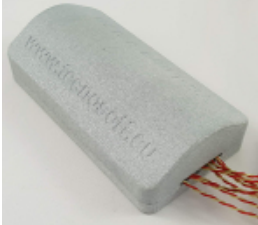
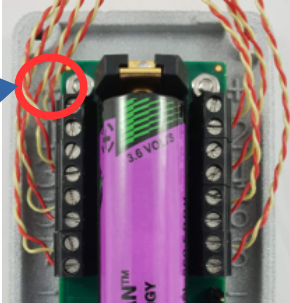
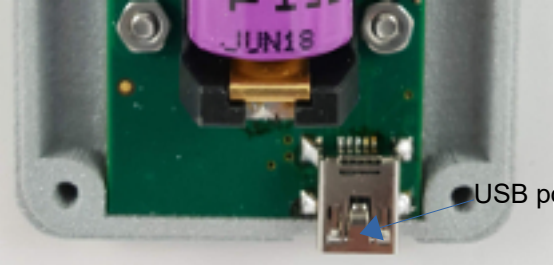
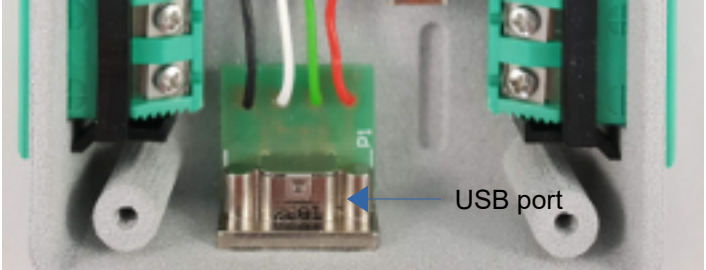
This agreement involves Tecnosoft srl, Peschiera Borromeo, Milano, Italy (henceforth called Tecnosoft) and the User (be it a physical or juridical person) for the following software products (henceforth called Software): "TC-Log" and any software product accompanying it.

Tecnosoft grants the user a revocable, non-exclusive, limited right to use a copy of the software on one or more computers provided that the user accepts the following conditions.



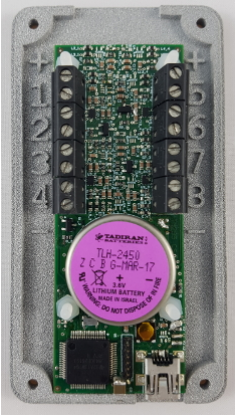
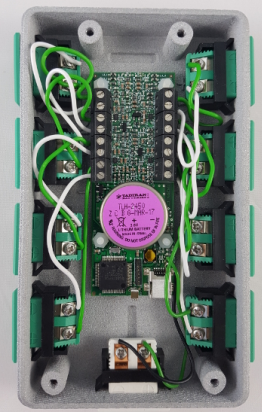

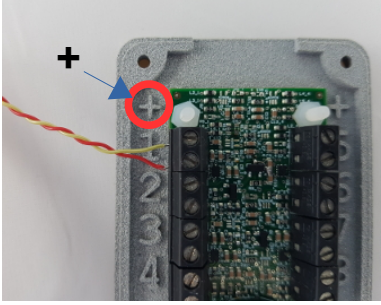
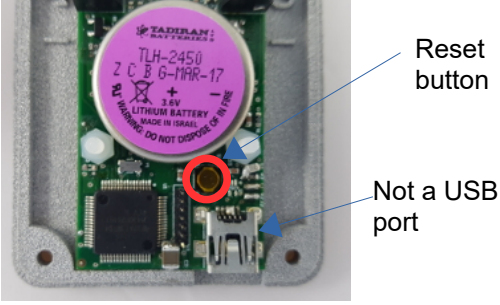
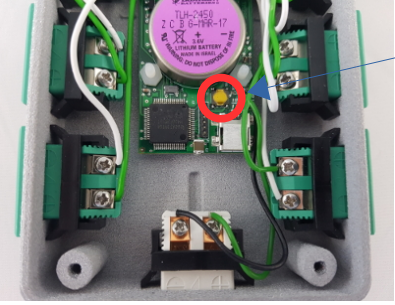
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5. **Separation of components.** The Software is licensed as a single product. Components cannot be separated.
6. **Limitations.** The User cannot convert, decode, decompile or disassemble the Software, except for what is explicitly requested by applicable laws.

## TC-Log logger

TC-Log is a temperature logger based on thermocouples. The logger comes in different versions: in a mini case without sockets and in a big case and panel connectors (K, T or universal type).

TC-LOG 8 USB S	TC-LOG 8 USB / TC-LOG 8 K USB / TC-LOG 8 T USB
	
	
	
<p data-bbox="92 1256 213 1317">+ = above - = below</p>  <p data-bbox="210 1323 236 1357">+</p>	
 <p data-bbox="635 1760 746 1794">USB port</p>	 <p data-bbox="1257 1760 1369 1794">USB port</p>

The **old model** was available in different versions: in a mini case without sockets and in a big case and panel connectors. They accept any type of thermocouple and need an interface for PC connection.

TC-LOG 8 S	TC-LOG 8
	
	
	
<p data-bbox="92 1245 213 1303">+ = above - = below</p> 	
 <p data-bbox="675 1608 754 1666">Reset button</p> <p data-bbox="635 1753 762 1812">Not a USB port</p>	 <p data-bbox="1393 1597 1473 1655">Reset button</p>

TCL Interface



with TC-Log 8 S



with TC-Log 8



## Description

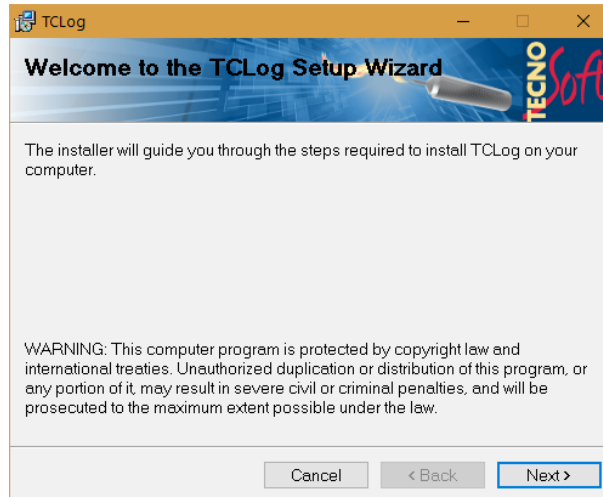
The TC-Log software is designed to handle the data acquired from the Tecnosoft TC-Log 8 data logger. The TC-Log 8 data logger is an acquisition system that records data from up to 8 thermocouple sensors.

Thermocouples may be purchased with or without a calibration certificate from Tecnosoft. If you purchase calibrated thermocouple sensors you will be provided with a calibration certificate and a file containing calibration data for each thermocouple.

Thermocouples can be read with or without loading the calibration file. A calibration procedure is implemented to allow the user to adjust the thermocouple readings even on the field.

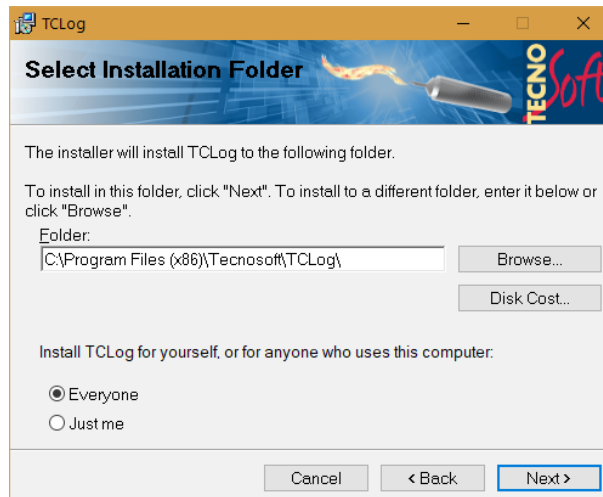
## Software installation

To install the software please double click the Setup.exe file (with the disk icon) and the following window will open:

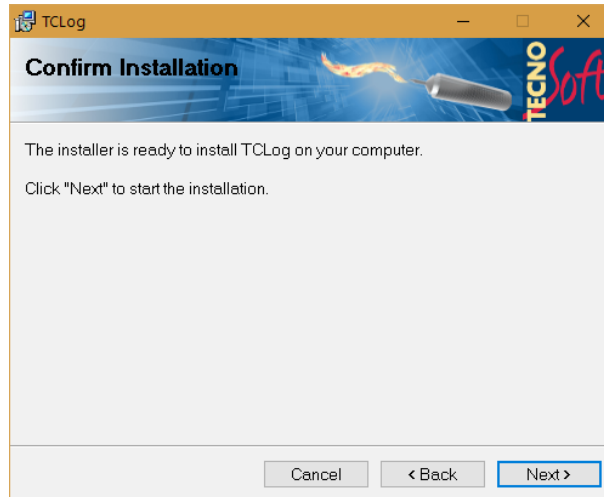


To proceed press **Next**.

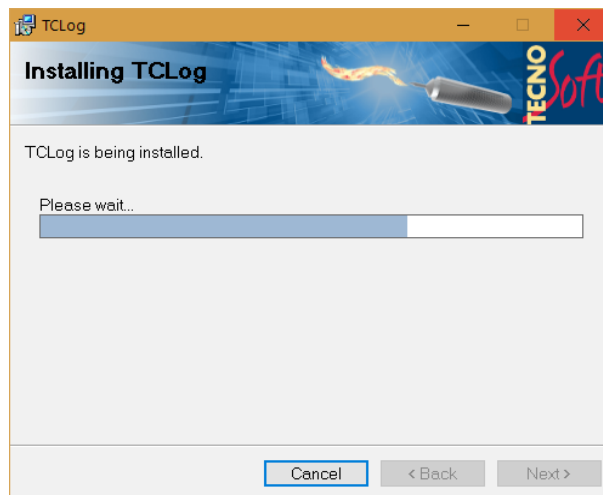
Now the user can be choose where to install the software and if to install it for all users or for the current user only. Press **Next** to proceed.



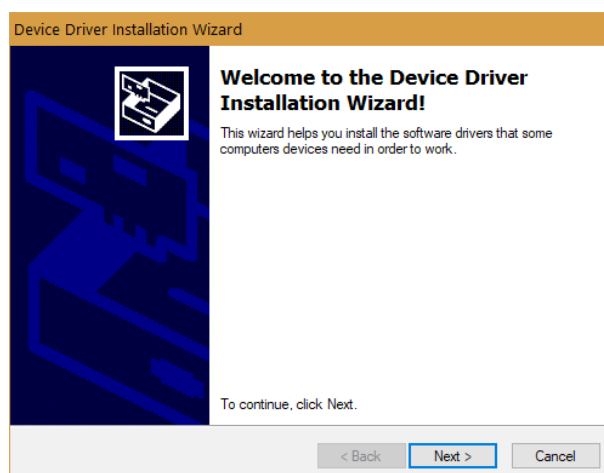
To start the installation process choose **Next**. From now on, no options can be changed, the installation can only be completed or aborted.



If necessary, administrator permissions will be requested, and the installation will complete.

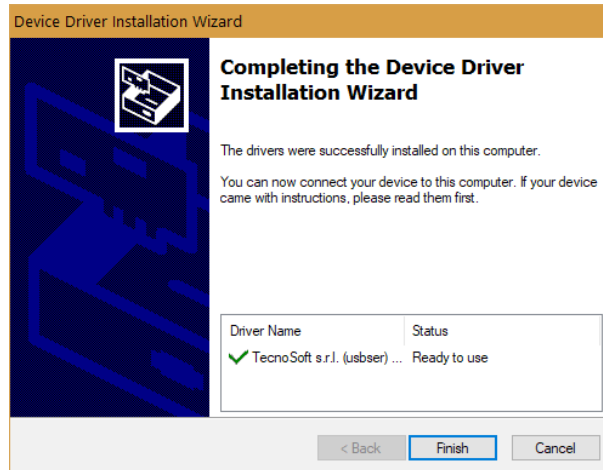


Now, the drivers for the interface or the logger (if you have a TC-Log 8 USB) will be installed. Press **Next** to continue.

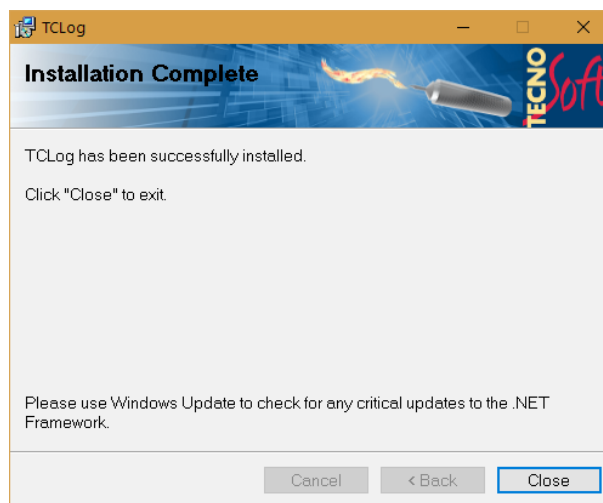




Press **Finish** to complete the installation process.



Press **Close** to close the installation program.



## Troubleshooting

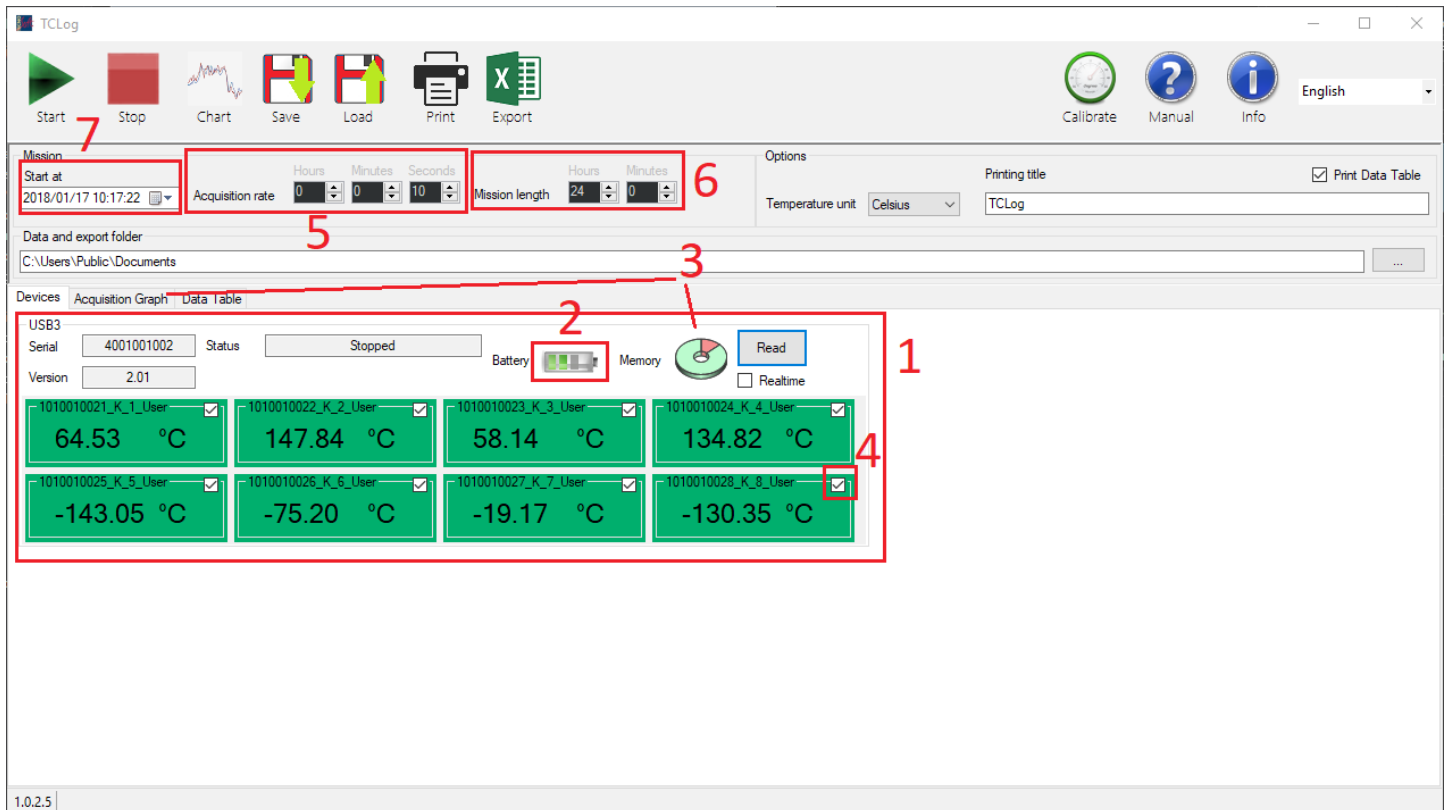
If you have any problem with the data logger connection, disconnect the USB cable, wait for the cursor to stop spinning and reconnect the cable (you might need to do it multiple times). If the software is misbehaving, restart the program.

## Connecting the TC-Log logger

Install and complete the software installation before connecting the TC-Log data logger to the PC. The TC-Log data logger is connected to the PC via a USB interface.

## Tutorial 1 - Data acquisition: start and download the data logger

After installing the software, its icon can be found on the desktop (Tecnosoft icon). Connect the logger, eventually using the interface, and then start the TC-Log software by double clicking on the icon.



Before starting a mission, one should be sure that (see reference number in the above image):

1. all and only the loggers that should be started are connected and visible in the window (scroll to the bottom in case some are hidden)
2. the logger's battery is charged and not depleted
3. the logger does not contain any data that has to be saved (save it before starting a new mission. See further to know how to save data). All data that are present inside the logger will be overwritten at each start
4. all the channels that have to be recorded are checked (ticked checkbox in the upper right corner of every sensor). If the checkbox is not ticked the sensor's data will not be recorded. To save space in the logger's memory uncheck all the sensors that are not needed
5. the acquisition rate is set to the desired value
6. the *Mission length* is not shorter than necessary
7. if necessary, the mission start is delayed to wanted the time (it is not necessary to update it manually if the mission should start immediately, since it will be done automatically)

Now the **Start** button can be clicked and the logger/s can be disconnected from its/their interface.

At the end of the mission, reconnect the loggers and the interfaces to the computer and start the program. The chart and the table will show the new data. If it doesn't happen, click the **Chart** button.

The data can now be saved, printed and exported.

Every start will overwrite the previous mission's data. The data, until a new mission is started, will remain in the logger's memory and can be downloaded again.

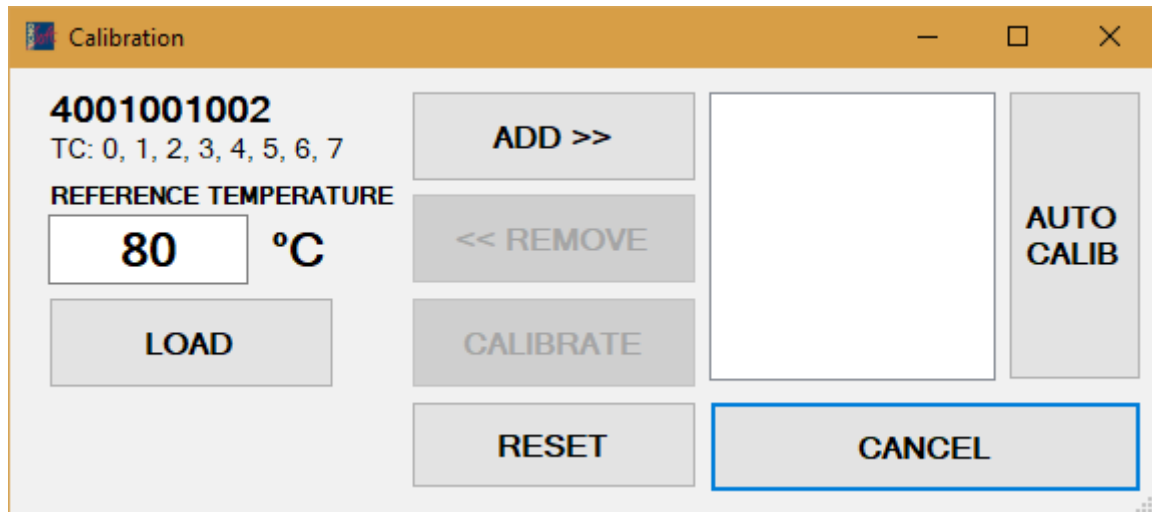
## Tutorial 2 - Logger's calibration

It is possible to calibrate all sensors at once (by pressing the **Calibration** button in the main window in the upper right corner) or to calibrate just one sensor alone (right click on the sensor itself).

The calibration process can be done in three ways:

- with a dry well, executing the reads on the fly
- with a mission's data
- with a calibration file provided by Tecnosoft

### Calibration with a dry well



The calibration dialogue, which you can open clicking on the **Calibrate** button, shows in the upper left corner the serial of the logger it is referring to (a window will open for each logger), a box in which you can enter the reference thermometer's temperature and a list which will contain the calibration points.

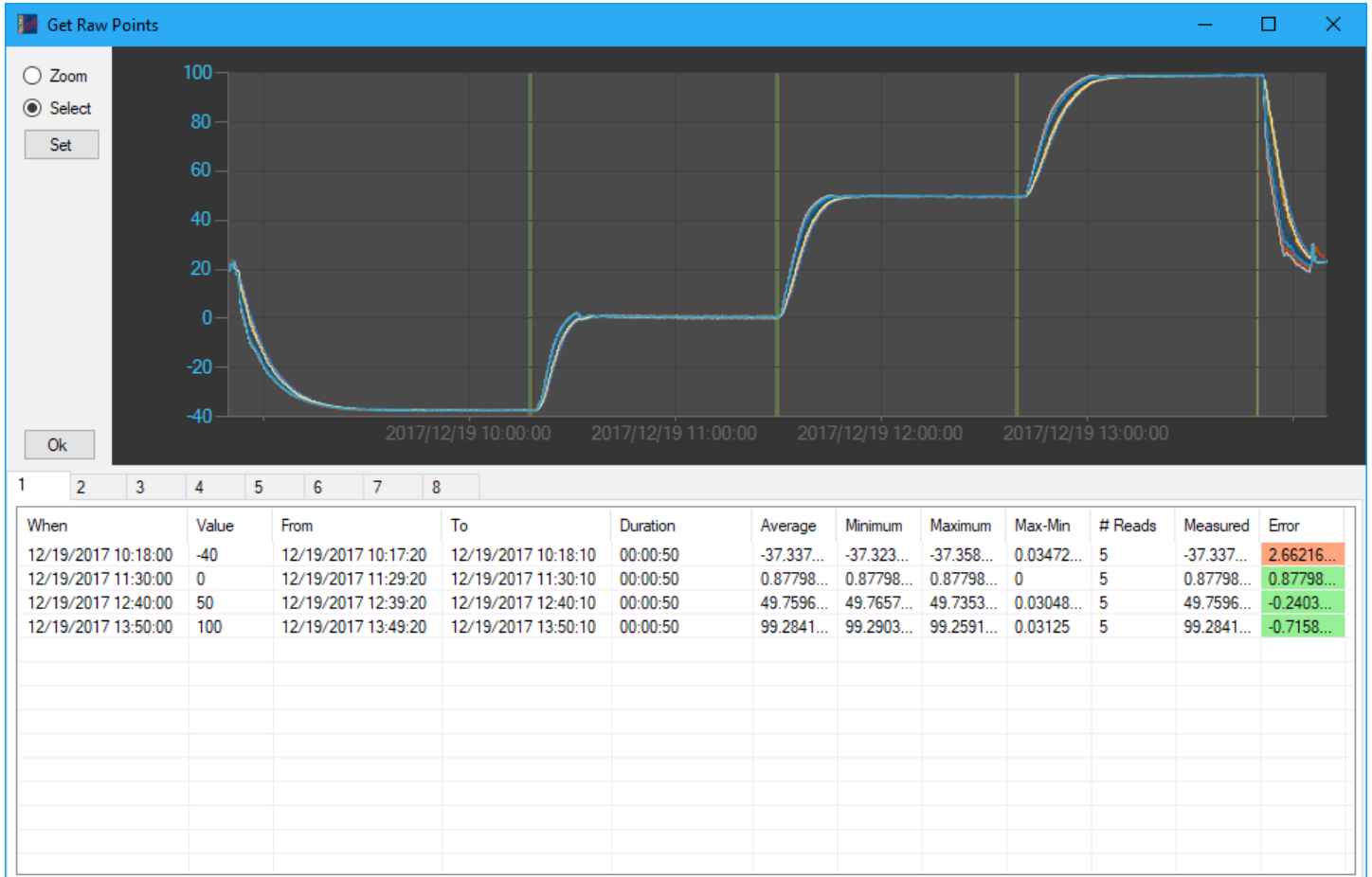
The process' steps are:

- be sure that all the sensors that should be calibrated are enabled (the checkbox in the upper right corner of the sensor should be ticked)
- insert the thermocouples in the dry well and wait for it to reach the desired temperature
- type in the current temperature (**REFERENCE TEMPERATURE**) from the reference thermometer in proper field
- click on **Add >>**
- if you want to remove a point from the list select it and click **<< Remove**
- when the points have all been listed, click **Calibrate**
- if you want to delete the calibration and restore the standard thermocouple's tables, click **Reset**

## Calibration with a mission data

This mode allows to use mission data to calibrate the logger. The mission must contain the data of all the sensors you want to calibrate. During the mission the logger will record temperature steps. They need to be saved in a .txt file together with their timestamps (example of format: 2017/09/22 23.54.10;110.034), one for each line in the .txt file.

The **Calibrate** button can now be clicked (top right of the main window, minding the logger being considered in the calibration window) and then click **Auto Calib**. The software will ask for the .txt file previously mentioned. The mission's data will be downloaded from the logger and the following window will be shown:



Each row in the table represents one temperature step (just like in the .txt file). To change the data taken from the mission for a certain temperature step do as follows:

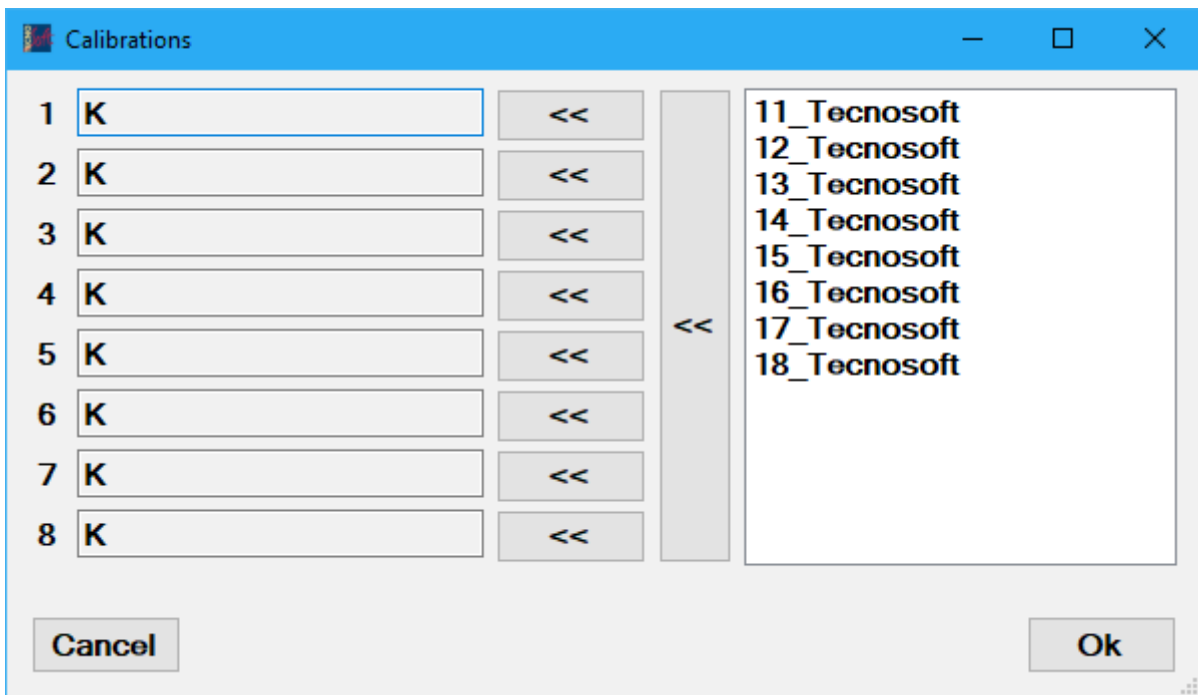
- be sure to be in the correct tab (the sensor's number is the tab's title)
- click on the table's row that needs to be changed
- if necessary, select **Zoom** and keeping the left mouse button pressed drag the cursor on the chart to zoom
- click on **Select** and keeping the left mouse button pressed drag the cursor on the chart to change the mission's data's selection
- click **Set**

The *Error* column shows the difference between the reference temperature (*Value*) and the average of the reads (*Average*).

After the necessary adjustment click **Ok** button placed at bottom left corner of the graph itself. A confirmation dialogue will open and the calibration will be written in the logger's memory. The same window as above will be shown with the calibrated values and the errors corrected.

### Calibration from a file

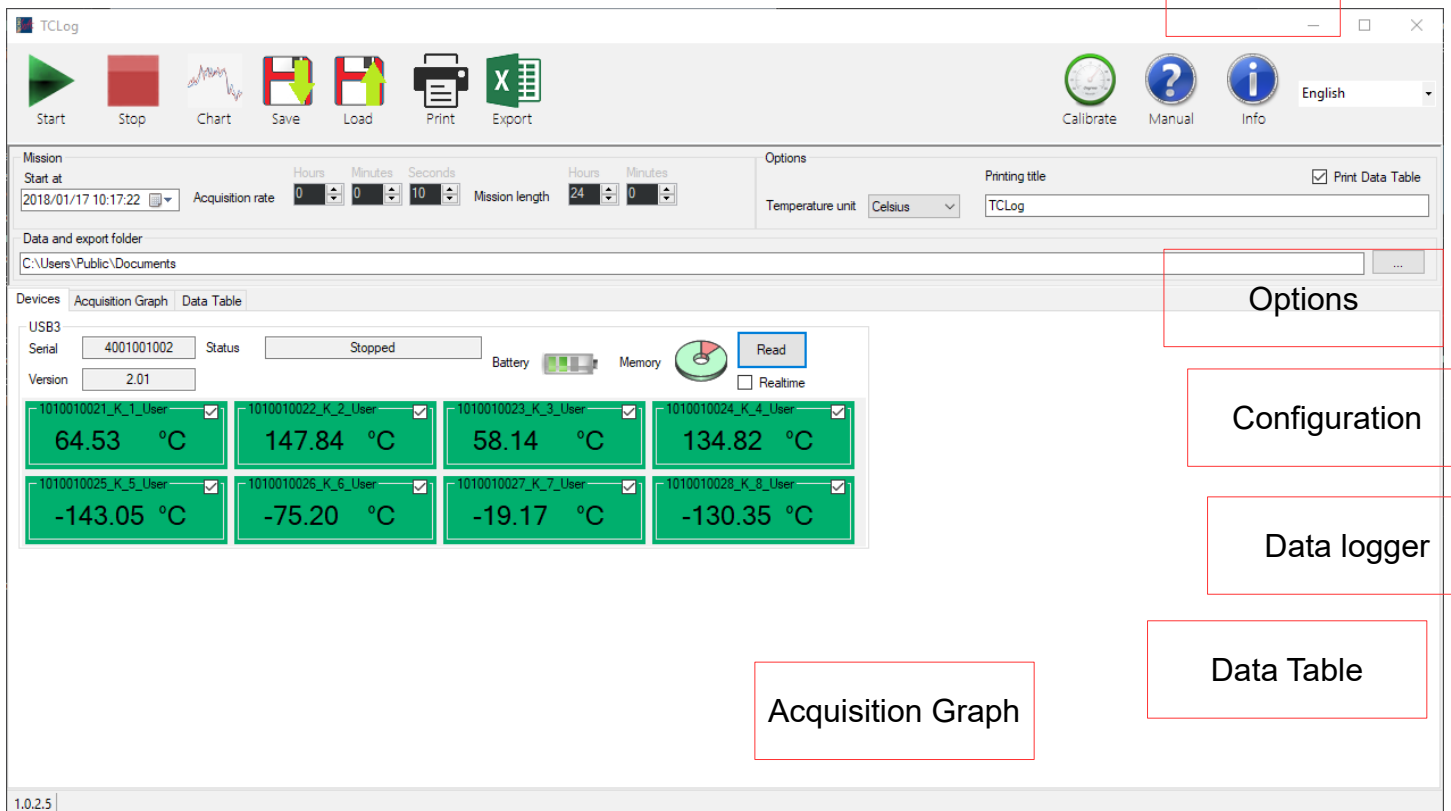
If the thermocouples were provided with a calibration file, it can be used to apply a specific calibration. Click **Calibrate** (top right in the main window) and click **Load**. After selecting the calibration file, the following window will open:



On the left there are the sensors that can be calibrated, on the right the file content is listed. A calibration, right list referred to a sensor's number, is applied by selecting it and clicking the << button next to a sensor. Alternatively you can apply all calibrations to the sensors as they are listed with the bigger << button next to the calibrations themselves.

## Running the software

Starting the software this window will be shown:



The software's main window is divided in six areas: *Toolbar area*, *Configuration area*, *Options area*, *Data logger area*, *Acquisition Graph area* and *Data Table area*.

### Toolbar area

At the top of the window, the toolbar contains the buttons used to trigger all actions required to manage the data logger.

### Start

The **Start** button triggers the data logger acquisitions with the acquisition rate and mission length specified in the *Configuration area*. Once the data logger is started the status of the data logger in the *data logger area* switches to Recording.

### Stop

The **Stop** button stops all the data loggers.

### Chart

The **Chart** button will download the acquired data and refresh the graph in the *Acquisition Graph* tab, while also rebuilding the data table.

### Save

The **Save** button will export a loadable TC8 file containing the table. TC-Log will ask where to save the file.

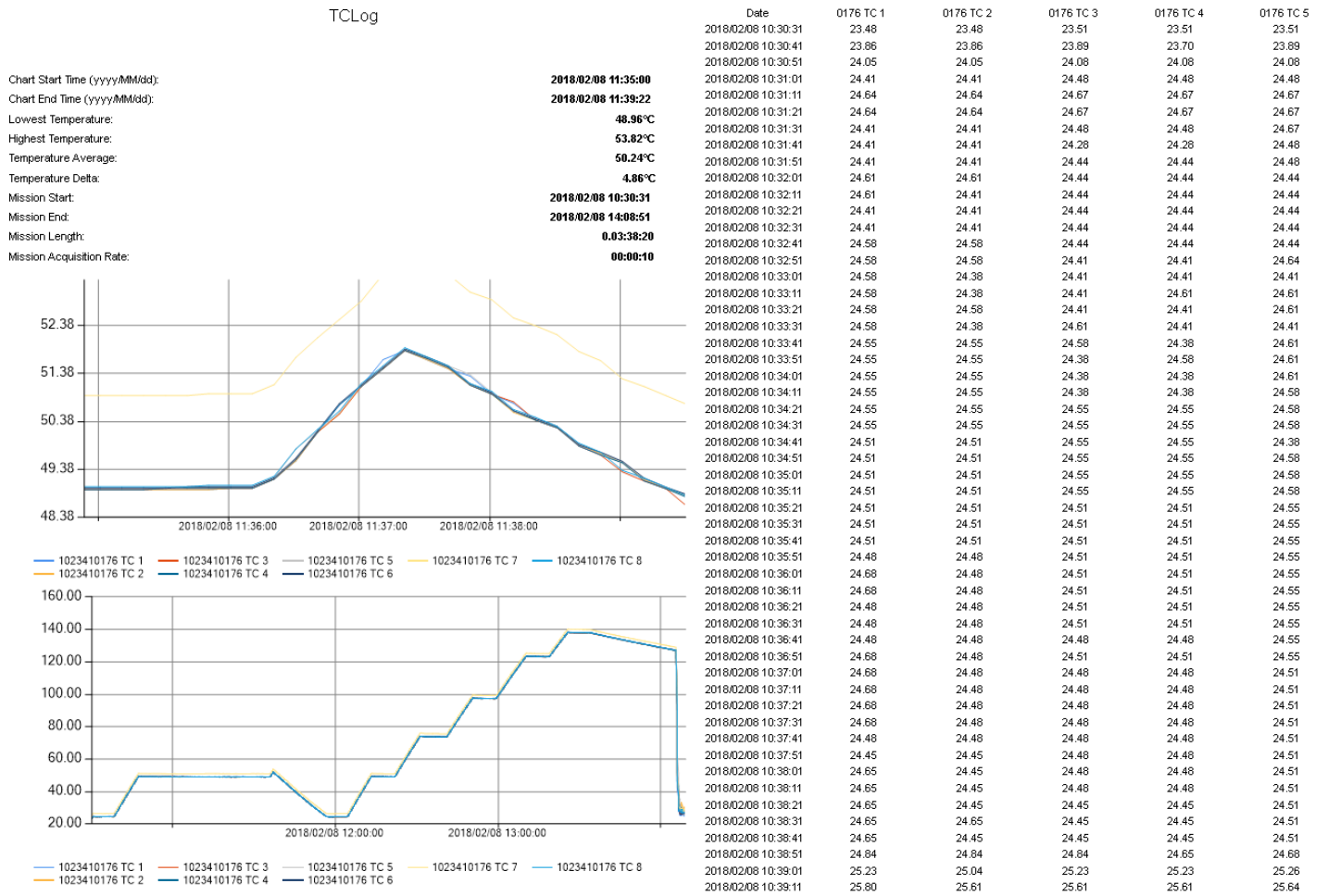
### Load

The **Load** button opens a window dialog that allows the user to choose what TC8 file to load. Its content will fill the acquisition graph and the data table. The user will be able to print the loaded mission by pressing the **Print** button and to export an Excel copy of the table.

### Print

The Print button will open the printer devices dialog, allowing the user to choose and configure a printer. The print preview window will appear after the settings confirmation, displaying all the pages that will be printed and their layout. The user

will then be able to print a copy of the document.



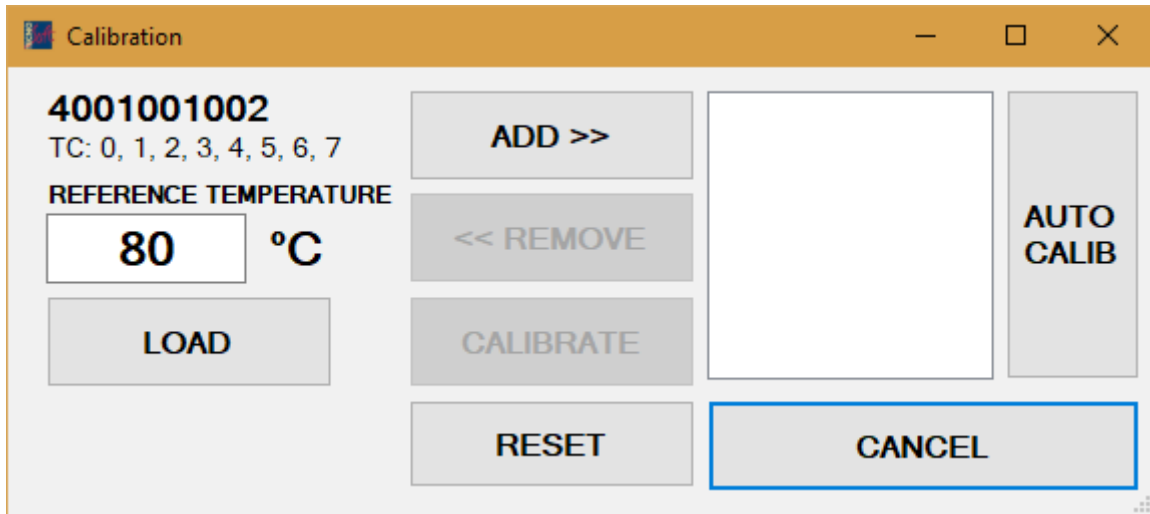
In the first page you will find the statistics taken from the graph (the zoomed view if present) and the mission's statistics, depending on the devices synchronization (if they all have the same start date and time and the same acquisition rate they will be lumped together, otherwise the statistics will be shown on a per-device basis). Below the statistics there will be the graph (if it was zoomed in the program there will also be an unzoomed version at the bottom). If the Print Table checkbox in the Options area was selected, the pages after the first one will show the data table. The thermocouples that weren't enabled in the graph won't be shown. A cell in the table will be empty if no value for the thermocouple is available at the corresponding time.

### Export

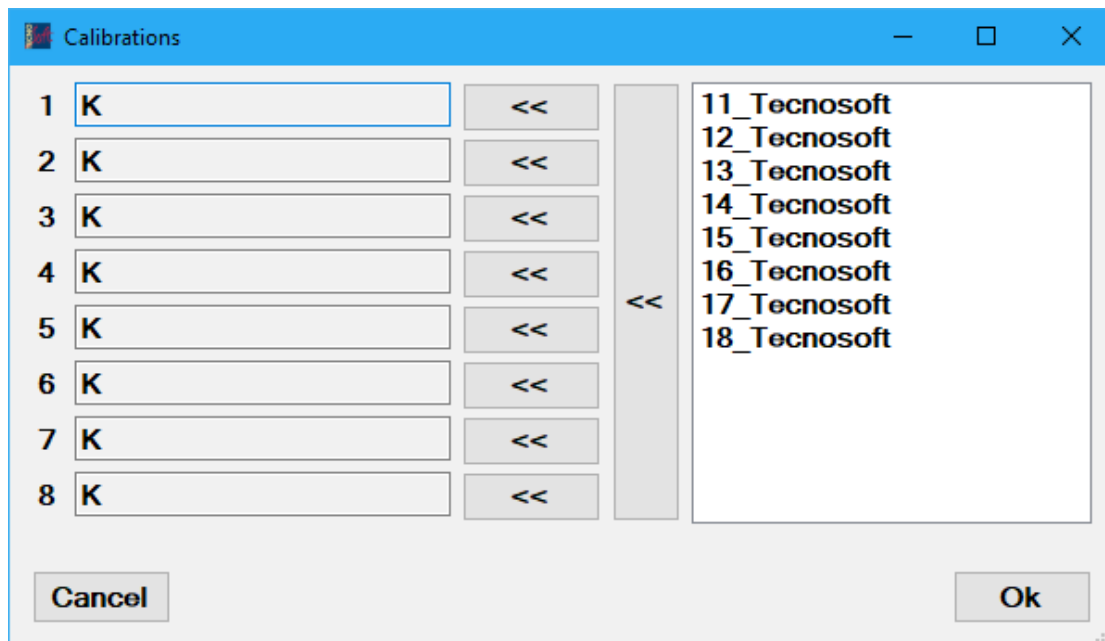
The **Export** button is used to save an Excel file that contains a copy of the data table.

## Calibrate

The **Calibrate** button is used to calibrate thermocouples. When clicking on the button the following window will be displayed (once for each logger):



This window can be used to load the Tecnosoft calibration file for given sockets and calibrated thermocouples. To load the Tecnosoft calibration file press the Load button. After selecting the calibration file (.tcc) the following window will be displayed:



On the left you will find a box for each socket present on the TC-Log data logger (the fields will be empty for sensors that have been disabled in the main window). On the right side a list of calibrated thermocouples will be available. Drag the calibrated thermocouple on the socket or select one and use the association buttons to assign it (use single << buttons to move a single sensor or the collective << button to move all the sensors in the listed order, if they are connected in the same order on the data logger).

The calibration dialogue lets the user apply an additional correction to the thermocouples. To apply the additional correction all the thermocouples must be inserted in a calibration device such as a thermostatic bath or a dry well, with a reference thermometer. Once the temperature in the bath/well is constant insert the temperature value from your reference instrument in the left field and press **Add >>**. One or more reference temperatures can be added to adjust calibration on the field. When finished press **Calibrate** to write the correction factors to the thermocouples.

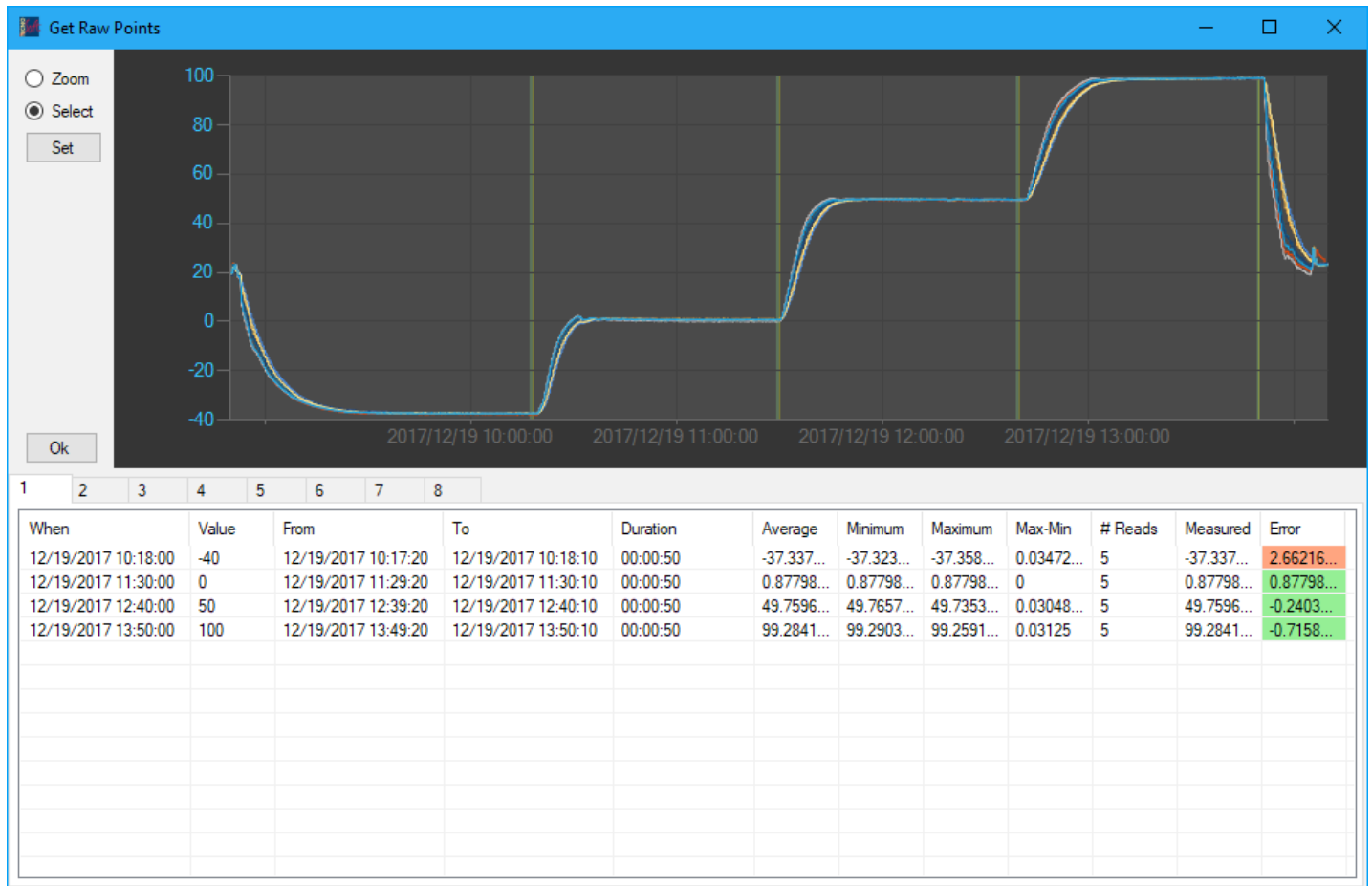
The **Reset** button will restore the default calibration.

The calibration window can be recalled for a single thermocouple by clicking the right mouse button on the thermocouple box (green box for K type thermocouples in the main window) and selecting Calibrate.

The **Auto Calib** button will let the user calibrate the thermocouples for multiple points by having a mission's data and the reference thermometer's data. The reference temperature and the corresponding time (YYYY/MM/dd



HH.mm.ss;000.00) have to be written in a .txt file which will be loaded by the program. The following window will be shown:



By selecting a row in the table, the user can modify the considered time span when calculating the data by dragging the cursor on the graph with the left mouse button clicked. Pressing the **Set** button the row will be modified with the new values. To apply the calibration press **Ok**. By closing the window the calibration will be discarded. If the calibration succeeded a new window will then be shown with the calibrated values.

## Configuration area

The Configuration area contains the settings used to start and capture data.

### Start at

The data loggers can be started with a delay. This control allows the user to set the time at which the data loggers will be started. If the set time is too soon or in the past the program will correct it automatically. The data loggers can be detached after the start of the mission.

### Acquisition rate

The acquisition rate can be adjusted to acquire data more or less frequently. A warning will be displayed if the set value is too low for the logger to be able to comfortably record it. If the acquisition rate is set too low the timing of the acquisitions could be earlier than what it should be.

### Mission length

Set here the duration of the mission: when the time is elapsed the acquisition will stop (suggestion: set a wide margin on the real mission duration).

### Export folder

The export folder is the path where the software will save the exported files. It can be changed during the process.

## **Options area**

The Options area contains the settings used to configure the program.

### **Temperature unit**

The temperature unit, when changed, converts the readings of the thermocouples in the selected unit of measure, also redrawing the graph and the table.

### **Print title**

Set here the title of the printed document. It will be displayed in the print preview.

### **Print table**

This checkbox selects whether a table containing all the data from the graph should be printed and shown in the preview. The table contains the same data as the graph.

## **Data logger area**

The data logger area contains information about the data logger. If the data logger area is empty check the USB connection and the connection between the logger and the interface.

When a data logger is connected the following information is shown:

### **Serial**

It is the serial number of the data logger.

### **Version**

It is the firmware version of the data logger.

### **Status**

The status of the data logger can be:

- stopped if a download process has been executed
- recording if a mission has been started
- waiting for [date] if the logger has to wait before getting the first acquisition
- failure, if it was reset (it is still operational)

### **Battery**

The battery status will display the actual battery charge. If the battery status turns red the battery is low and must be replaced soon.

### **Memory**

The memory use is displayed in red. The maximum number of acquisitions depends on how many thermocouples are enabled. With all 8 thermocouples the available memory will be of a maximum of 4352 readings.

### **Read**

The read button will execute a reading of all enabled thermocouples. If the real time checkbox is ticked the readings will keep being executed at the set acquisition rate, filling the table and the graph with data. It is recommended to set an acquisition rate of at least five seconds.

Temporary files will be saved in the default folder as a backup.

### **Reset ROM**

By pressing the right mouse button on the logger a context menu will be shown. It allows the user to reset the logger's internal memory, in case there had been problems when writing it in precedence. This will delete all calibrations.

### **Thermocouples**

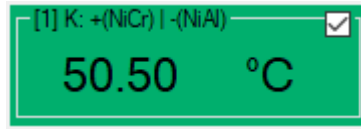
Every socket of the TC-Log 8 is displayed as a box numbered as the labels on the data logger. On the upper right of each box a checkbox can be switched on and off to enable or disable the thermocouple.

Note: disabled thermocouples will be not recorded.

By pressing the right mouse button on a thermocouple the single sensor can be calibrated.

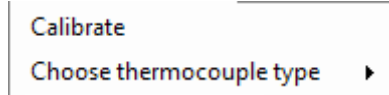
The text at the top is the name of the table that the sensor is using. It either represents the thermocouple's type and elements or the thermocouple's serial, its type, the sensor's number and the calibration's creator (user/Tecnosoft).

The sensor is presented like this:



The color remarks the thermocouple's type.

By pressing the right mouse button on the sensor this will be shown:



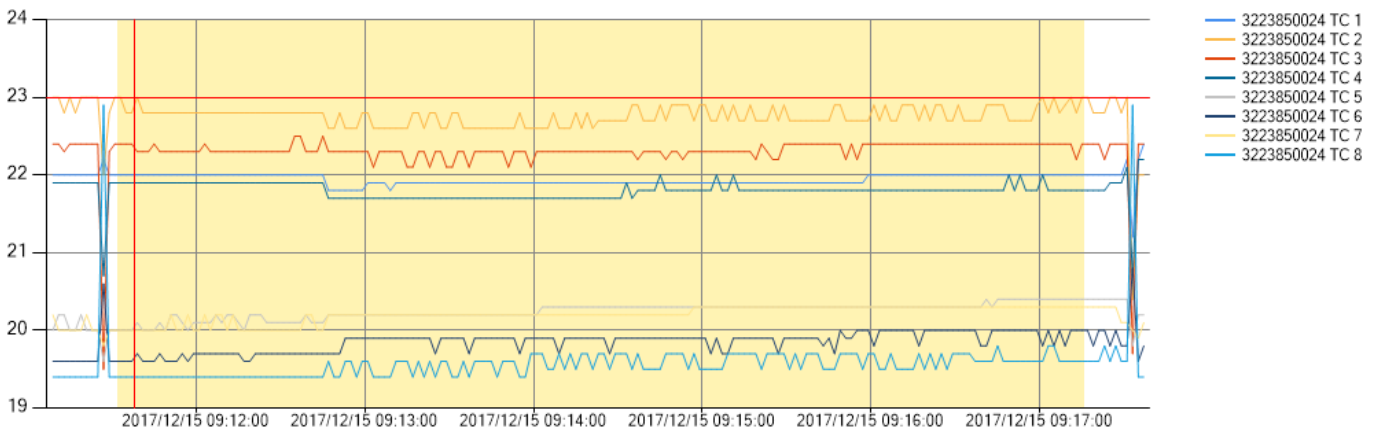
- Calibrate: the calibration window will be shown for the single sensor, so that it can be calibrated individually.
- Choose thermocouple type: it allows the user to change the thermocouple's table.

### Acquisition Graph area

The Acquisition Graph area contains the graph that displays the acquisition data and the controls to manipulate the chart itself.

Press the left mouse button and drag the cursor on the chart to select an area to be zoomed. To undo this action roll the mouse wheel backwards (towards the user) to gradually decrease the zoom level. To go back by one step in the zoomed view use the buttons at the end of the graph's scroll bars can be used.

### Current View Statistics



Current View Statistics		Minimum Value		Average Value		Selected Date		Value	
Start Date Time	2017/12/15 09:11:32	19.40	°C	21.08	°C	12/15/2017 09:11:41	22.80	°C	
End Date Time	2017/12/15 09:17:16	Maximum Value	23.00 °C	Max-Min	3.60 °C	Selected TC	3223850024 TC 2		

The current view statistics section allows for the automatic calculation of the graph's main statistics, like its highest temperature, its lowest temperature, the average temperature, the difference between the highest temperature and the lowest temperature and the cursor's statistics.

By clicking the **Calculate Stats** button the program will highlight the timespan that goes from the **Start Date Time** until the **End Date Time**, extracting the highest value, the lowest value and calculating the delta and the average. If a thermocouple is disabled it will not be held in consideration.

By clicking on a point in the graph the **Selected Date** and the **Selected Thermocouple's** temperature will be displayed.

## Chart controls



The screenshot shows a 'Chart Control' window. It has two main sections: 'Offset' and 'Series Controls'.  
In the 'Offset' section, there is a dropdown menu showing '3223850024 TC 1'. Below it is a numeric input field containing '2', a 'Minutes' dropdown menu, and a 'Set' button. A 'Reset offset' button is located below these controls.  
The 'Series Controls' section contains a list of checkboxes for each thermocouple ID: 3223850024, 1, 2, 3, 4, 5, 6, 7, and 8. The checkboxes for 3223850024, 4, 5, 7, and 8 are checked, while the others are unchecked.

When the thermocouples are used to measure the temperature on moving parts that reach a given position at different times, it makes sense to shift graphs in time before visually comparing them.

Select a data logger or individual thermocouples and set an amount of time. Click the **Set** button to shift the selected graphs by the set amount. The amount can also be negative. The **Reset** button will restore the selected thermocouple's original position.

In the *Series Control* section the user can enable or disable each individual thermocouple or all the thermocouples of a device. A disabled thermocouple won't be counted when calculating the minimum/maximum/average values and it won't be displayed in the printed table.

**Data Table area**

	Time	1000 TC 1	1000 TC 2	1000 TC 3	1000 TC 4	1000 TC 5	1000 TC 6	1000 TC 7	1000 TC 8	0024 TC 1	0024 TC 2	0024 TC 3
▶	2017/10/06 16:38:00	25.4	25.4	25.5	25.5	25.5	25.5	25.4	25.4	29.1	28.7	29.2
	2017/10/06 16:38:02	25.4	25.4	25.5	25.5	25.5	25.5	25.4	25.4	29.3	28.7	28.8
	2017/10/06 16:38:04	25.4	25.4	25.5	25.5	25.5	25.5	25.4	25.4	29.1	28.7	29.2
	2017/10/06 16:38:06	25.4	25.4	25.5	25.5	25.5	25.5	25.4	25.4	29.3	28.7	29.2
	2017/10/06 16:38:08	25.4	25.4	25.5	25.5	25.5	25.5	25.4	25.4	29.3	28.7	29.2
	2017/10/06 16:38:10	25.4	25.4	25.5	25.5	25.5	25.5	25.4	25.4	29.3	28.7	29
	2017/10/06 16:38:12	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.4
	2017/10/06 16:38:14	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.2
	2017/10/06 16:38:16	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29
	2017/10/06 16:38:18	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.2
	2017/10/06 16:38:20	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.2
	2017/10/06 16:38:22	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.4
	2017/10/06 16:38:24	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.2
	2017/10/06 16:38:26	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.2
	2017/10/06 16:38:28	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.2
	2017/10/06 16:38:30	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29.4
	2017/10/06 16:38:32	25.4	25.4	25.5	25.5	25.5	25.5	25.5	25.5	29.3	28.7	29

The *Data Table* area displays the graph's data in a table format. When printing, if the option to print the table is selected a copy of this table will be printed.