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TC-08
8 Channel Thermocouple USB Data Acquisition Module Windows Software

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1 Introduction

1.1 Online help

All the dialog boxes and windows in the TC-08 software have some associated help information. To receive help in the context of a dialog box, click the **Help** button on the dialog box. To receive help in the context of a window, click . For a step-by-step introduction to the software, select **Guided tour** from the **Help** menu. Alternatively, with the help file open, do one of the following:

- Click on the **Contents** tab and choose a chapter for browsing
- Click on the **Index** tab and search on a keyword
- Move on to the next topic by clicking the >> button

1.2 Overview

The TC-08 software is a data acquisition tool that collects, records, displays and analyses measurement data. It has the following capabilities:

- Will collect blocks of data at high speed from a single converter
- Will collect data at low speed over long periods from multiple converters
- Allows you to adjust Alarm settings for measurements you want to take
- Enables you to apply Parameter scaling, using equations or tables
- Allows you to Edit calculated parameters
- Can analyse other files during data collection
- Displays data during slow collection and after collection
- Graphical display, if you activate the **PLW XY Graph** window or **PLW Graph** window, and spreadsheet display if you activate the **PLW Spreadsheet** window
- Will transfer data to other applications via clipboard, file or DDE
- Will transfer data between computers using IP sockets

1.3 Recording

The recording mode and repeat functions are selected using the **Recording** dialog box. The TC-08 software can record in the following ways:

- **Real time continuous**
  This offers continuous recording over long periods. The data can be displayed in graphical or spreadsheet format during data collection. The fastest sampling rate in realtime mode depends on the speed of the computer and the operating system (it is of the order of a few milliseconds).

- **Fast block (single converter only)**
  This is used to collect a relatively short block of data at high speed. It is not possible to display data during block mode recording. In block mode, it is possible to start recording on a trigger event. If the 'repeat immediately' option is selected, it is possible to write a run file for each occurrence of the trigger event.

There are several options to specify what should happen at the end of a run when the specified maximum number of samples have been collected. The options are as follows:

- **Stop**
- **Repeat immediately**
- **Scroll**
- **Repeat after delay**

1.4 Safety warning

Do not connect the ground input of the ADC to anything which may be at some voltage other than ground, as you may risk damage to the ADC and your computer. Furthermore, if you connect the ADC ground to something which is live, your computer chassis may become live.

If in doubt, check by connecting a channel input to the doubtful ground point, and check that there is no significant AC or DC voltage.

We strongly recommend that you read the general safety information in your installation guide and also the product-specific safety warning in the product manual before using your product for the first time.

2 TC-08 software components

2.1 Introduction

The TC-08 software is made up of a number of separate components but you need only activate the components that you wish to use. As a result, the screen is not cluttered with data that you are not using and the computer can easily be used for other applications whilst you are recording.

The application components that are available are as follows:

PLW Recorder
Enables you to start and stop recording and to specify recording files, the measurements currently being taken and the alarm state.

PLW Player
Enables you to scroll quickly and easily through stored files to compare results on successive runs.

PLW Graph
Shows the readings for single or multiple measurements over a period of time.

PLW XY Graph
Shows the readings of one measurement against another, on the same graph.

Spreadsheet
Shows detailed or summary information in a format which can be copied to a clipboard.

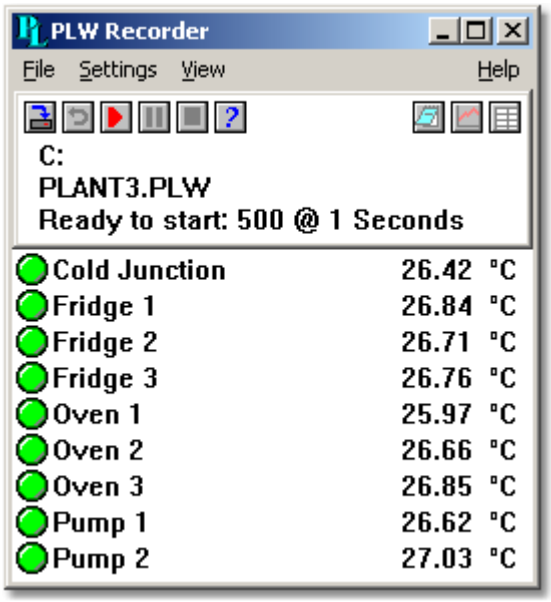
Notes
Enables you to enter information for a particular run.

When you start the TC-08 software in recorder mode, the computer displays the recorder application. The player application and display windows can be selected from the **Window** menu.

When you start the TC-08 software in player mode, the computer displays the player application. The recorder application and display windows can be selected from the **Window** menu.

2.2 PLW Recorder

When you start the TC-08 software using the Recorder icon, the computer displays the monitor window, which looks like this:



At the top is a menu bar containing the **File**, **Settings**, **View** and **Help** menus. Below the menu bar are two sets of controls, the Recorder controls and the Window controls.

Recorder controls

- **New file.** Specify a new file to record to.
- **Re-record.** Rewind the current file so that it can be re-recorded.
- **Start recording.**
- **Pause/resume**.
- **Stop recording.**
- **Help.** Access the help information for the recorder window (this page).

Window controls

The second group of buttons, on the right, is used to open other windows:

- **View Notes.** Open a **Notes** window.
- **View Graph.** Open a **PLW Graph** window.
- **View spreadsheet.** Open a **Spreadsheet** window.

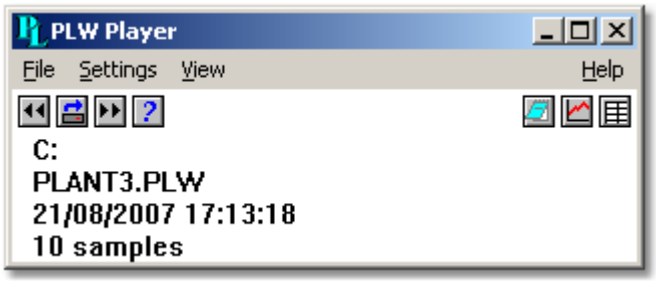
Range indicators
The lower pane of the window contains a line of information for each selected measurement. At the beginning of each line is an indicator lamp that signals the current status of the readings taken by the TC-08 software:

- The measurement value is within range
- The measurement value is currently out of range, but has not been out of range long enough to trigger an alarm
- The measurement value is in an alarm state. To cancel the alarm, use the mouse to click on the lamp
- The measurement value is in an alarm state, but the alarm has been cancelled

Next to each lamp is the name of the measurement and its current value. If you click on a measurement name, the computer will display the details of the measurement.

2.3 PLW Player

When you start the TC-08 Player, or you select **Player** from the **View** menu of the TC-08 Recorder, the computer opens a new window like this:



This shows you the name of the current Player File and the number of samples taken so far.

Player controls
The buttons on the left are used to specify a filename and to go forwards or backwards in a file sequence. The controls are as follows:

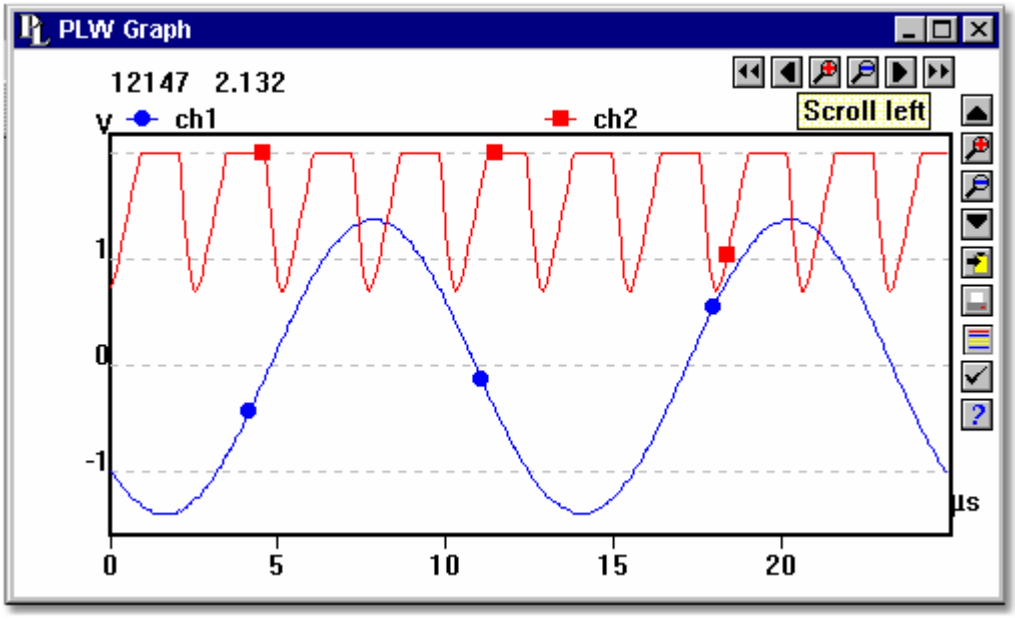
- **Open file.** Load a new file into the player.
- **Back a file.** Go to the previous file in a sequence.
- **Forwards a file.** Go to the next file in a sequence.

Window controls
The buttons on the right are used to open other windows:

- **View Notes.** Open a **Notes** window.
- **View Graph.** Open a **PLW Graph** window.
- **View spreadsheet.** Open a **Spreadsheet** window.

2.4 PLW Graph

From the **View** menu of the TC-08 Recorder or Player, select **Graph**.



Note that there are several graph options that affect the way that the graph is displayed and the format of the axis scales.

The group of horizontal buttons in the top right corner of the screen selects what time interval is displayed:

- **Scroll left.** Move a whole display left.
- **Scroll quarter left.** Move a quarter display left.
- **Expand horizontal axis.** Magnify the middle half of the display to fill the whole width.
- **Shrink horizontal axis.** Shrink the current display to half size, so that more is displayed before and after.
- **Scroll quarter right.** Move a quarter display right.
- **Scroll right.** Move a whole display right.

The upper group of vertical buttons controls the vertical range displayed. If there is more than one graph frame, the buttons control the frame with the thicker border. To switch to a different frame, point inside the new frame with the cursor and click the left mouse button.

- **Scroll up.** Move a whole display up.
- **Expand vertical axis.** Magnify the middle half of the display to fill the whole height.
- **Shrink vertical axis.** Shrink the current display height to half size, so that more is displayed above and below.
- **Scroll down.** Move a whole display down.

Note that if you use these controls to change the time or vertical range, auto-scaling for that axis is turned off automatically. Use the options to turn auto-scaling back on again (see button below).

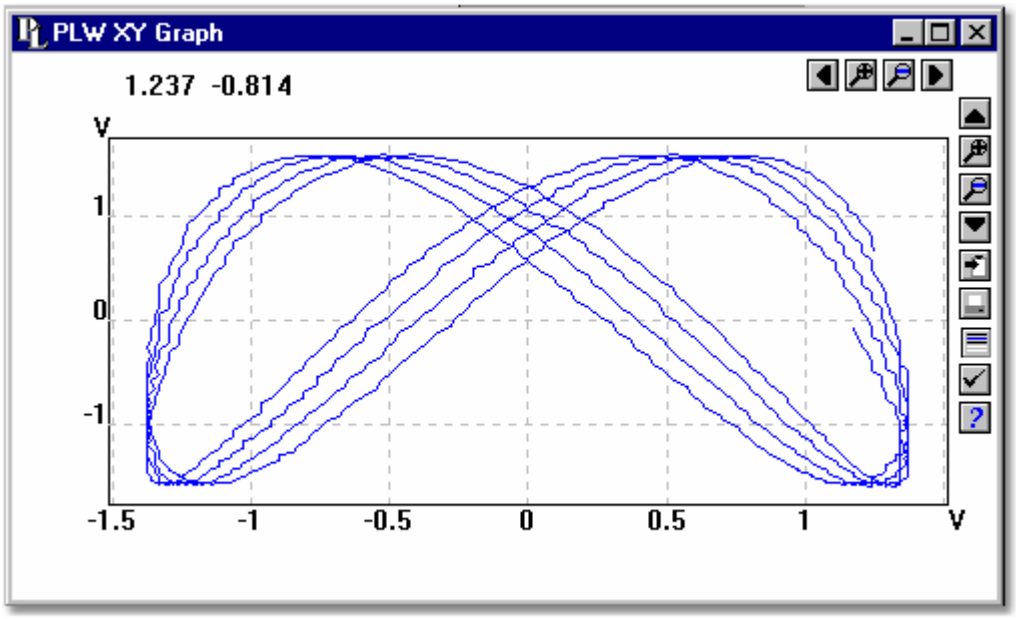
The remaining vertical controls are:

- **Copy to clipboard.** Copy the graph to the clipboard.
- **Print view.** Print the graph.
- **New file.** Write graph to file in .bmp, .jpg, or .wmf format.
- **Select channels.** Select the measurements to display on the graph.
- **View options.** Specify the options for the graph.
- **Help.** Access the help info for the graph window (this page).

If you move the mouse cursor onto the graph part of the screen, the computer will display the measurement value and time at the current cursor position. If you click the left mouse button, the graph will zoom in, centred on the mouse cursor. If you click the right mouse button, the graph will zoom out, centred on the mouse cursor.

2.5 PLW XY Graph

From the **View** menu of the TC-08 Recorder or Player, select **XY Graph**.



There are several buttons in the top right corner of the screen. The top row of buttons controls the horizontal range displayed:

- **Scroll quarter left.** Move a quarter display left.
- **Expand horizontal axis.** Magnify the middle half of the display to fill the whole width.
- **Shrink horizontal axis.** Shrink the current display to half size, so that more is displayed.
- **Scroll quarter right.** Move a quarter display right

The upper group of buttons in the column on the right controls the vertical range displayed:

- **Scroll up.** Move a whole display up.
- **Expand vertical axis.** Magnify the middle half of the display to fill the whole height.
- **Shrink vertical axis.** Shrink the current display height to half size, so that more is displayed above and below.
- **Scroll down.** Move a whole display down.

Note that if you use these controls to change the horizontal or vertical range, auto-scaling for that axis is turned off automatically. Use the options to turn auto-scaling back on again (see buttons below).

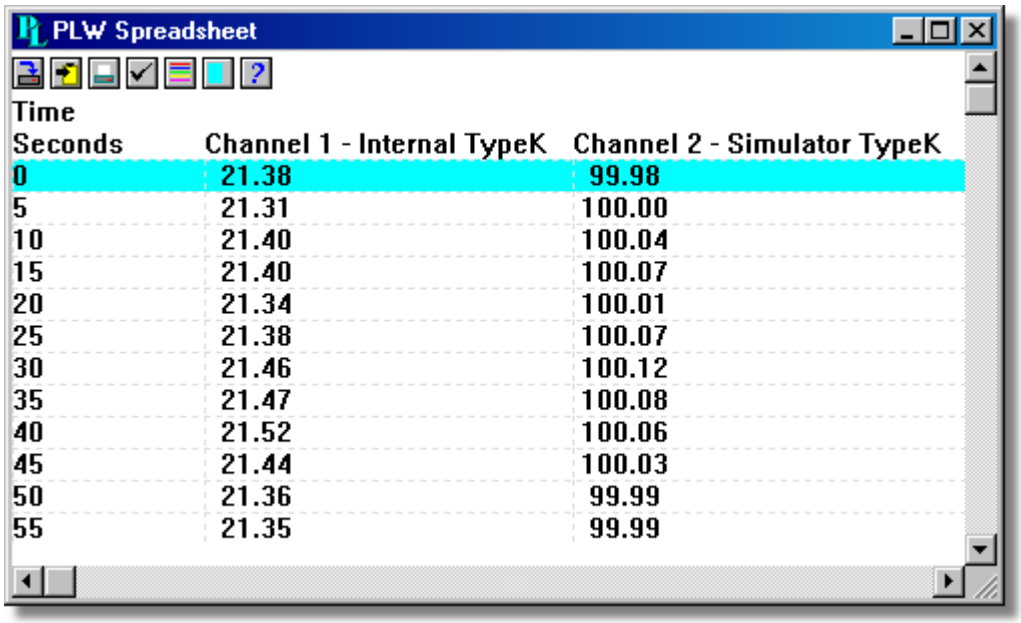
The remaining vertical controls are:

- **Copy to clipboard.** Copy the graph to the clipboard.
- **Print view.** Print the graph.
- **Select channels.** Select the measurements to display on the XY graph (only two).
- **View options.** Specify the options for the graph.
- **Help.** Access the help info for the graph window (this page).

If you move the mouse cursor onto the graph part of the screen, the computer will display the measurement values at the current cursor position.

2.6 Spreadsheet

From the **View** menu of the TC-08 Recorder or Player, select **Spreadsheet**.



Time Seconds	Channel 1 - Internal TypeK	Channel 2 - Simulator TypeK
0	21.38	99.98
5	21.31	100.00
10	21.40	100.04
15	21.40	100.07
20	21.34	100.01
25	21.38	100.07
30	21.46	100.12
35	21.47	100.08
40	21.52	100.06
45	21.44	100.03
50	21.36	99.99
55	21.35	99.99

There is one line for each reading. The first column shows the time in seconds, while the remaining columns show the selected measurements.

The following options buttons are available:

- **Select channels.** Select the measurements to display.
- **View options.** Spreadsheet options specify whether to display individual readings, or first reading, average, minimum and maximum for a period.

If you select a range of readings, you can use the following buttons:

- **Write to disk.** Write the readings to a print file (.prn) or a text file (.txt) - Both are tab separated value files.
- **Copy to clipboard.** Write the readings to the clipboard.
- **Print view.** Print the graph.

You can select a range in one of three ways:

<u>If all of the readings that you want to select are on the screen</u>**:**

- Point the mouse at the first reading
- Press and hold down the left mouse button
- Drag the mouse to the last reading (the selected readings will be highlighted as you go) and
- Release the left mouse button.

<u>If the readings are a long way apart</u>**:**

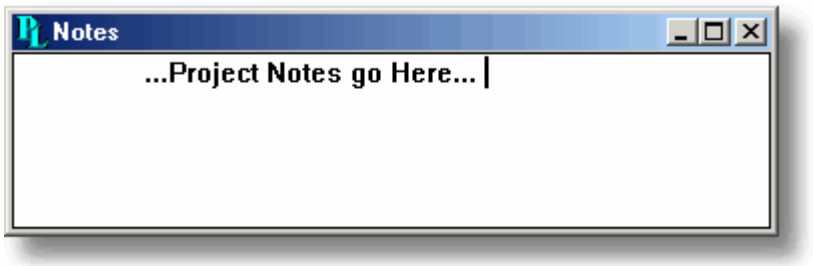
- Point the mouse at first reading
- Click the left mouse button (this will highlight the first reading)
- Scroll down to the last reading
- Point at the last reading and
- Press the shift key and click the left mouse button.

<u>If you wish to select all of the readings for one day</u>:

- Point the mouse at any reading during the required day
- Click the left mouse button (this will highlight the reading) and
- Click on the 'select day' icon:

2.7 Notes

From the **View** menu of the TC-08 Recorder or Player, select **Notes**.



This window enables you to enter information for a particular run. This is useful if you carry out a number of similar runs. The report title can be the same for every run, but the notes contain information specific to each run.

If you have a Notes window open when you use the player to browse through several runs, the notes for each run will be displayed. The notes also appear on printed reports.

3 How to...

3.1 Add new measurements

1. Select the TC-08 converter in the normal way
2. At the measurement list dialog box, select the TC-08 channels to be used
3. Select thermocouple type for each channel to be used
4. Click the **Scaling** button
5. Enter the scaling details (see **Parameter scaling** dialog box for details).

3.2 Select which measurements to display

When you first open a graph or spreadsheet window, the computer displays only the first measurement. To select a different measurement or to add further measurements:

1. Click on the **Select channels** button: . The computer will display the **Select parameters** dialog box, with a list of all of the measurements and which ones are in use
2. Click on each measurement that you wish to be active
3. Click the **OK** button

3.3 Start a new run

To start a new run from scratch, select **New settings** from the **File** menu. The TC-08 software will take you through the steps necessary to define what you want to collect:

- Recording method (real time continuous or fast block)
- Sampling Rate, including sampling interval and maximum number of samples
- Converter details
- Channel setup. The computer will display the **Edit TC-08 Channel** dialog box.

Once you have entered these details, check that the monitor window in **PLW Recorder** is displaying the measurements that you wish to record, and that the correct values are showing.

1. If you are in TC-08 Player, from the **View** menu, select **Recorder**, otherwise go straight to step 2
2. The **PLW Recorder** window has buttons like a tape recorder, to start, stop, rewind etc.
3. Click on the **New file** button:
4. Type in the name of the file to which you wish to record
5. Click **OK** (the filename will appear in the recorder window)
6. Click on the **Start recording** button:
   The sample number will increase every sample interval

3.4 Repeat an existing run

If you have just recorded a run, and you wish to retain the data, yet start a new run:

1. Click on the **New file** button: . Note: Do not attempt to save your data directly to a floppy disk. The computer will display the next sequence-numbered file name.
2. If you do not wish to use the default filename, type in a different name.
3. Click **OK**
4. Click on the **Start recording** button:

If you have just recorded a run, and you wish to discard the data and start a new run:

1. Click on the **Re-record** button:
2. Click on the **Start recording** button:

If you wish to repeat a run that you did some time previously:

1. From the **File** menu, select **Open.**
2. Select the file that you wish to repeat.
3. From the **View** menu, select **Recorder**. This displays the recorder window.
4. Proceed according to the retain or discard options described above.

3.5 Start recording whenever Windows starts

First, save the settings for the type of run that you wish to start:

1. Define the type of run that you wish to carry out
2. Select **Save as...** from the **File** menu
3. Type in a filename for these settings
4. Change the file type to .pls
5. Click **OK**

Note: Do not attempt to save your data directly to a floppy disk.

1. Click the **Start** button
2. Select **Settings** or **Control Panel**
3. Select **Taskbar and Start Menu**
4. Click **Start Menu**
5. Click **Add**
6. Type in `c:\Program Files\TC08\plw32.exe -r fred.pls` (or whatever your settings file is called) and click **OK**
7. Select the startup folder (programs in the startup folder are run automatically when Windows starts) and click **OK**
8. Click the **Finish** button

3.6 Display data

To display the data in graphical or spreadsheet format, you should first Start a new run.

You can then display the data by clicking on the appropriate button in the recorder window:

- **View Notes.** Opens a **Notes** window.
- **View Graph.** Opens a **Graph** window.
- **View spreadsheet.** Opens a **Spreadsheet** window.

Alternatively, select the window type from the **View** menu.

3.7 Print data

To print a graph:

1. Open a graph window
2. Alter the settings to display the data that you wish to print
3. Click on the **Print view** button:

To print a spreadsheet:

1. Open a spreadsheet window
2. Alter the settings to display the measurements that you wish to print
3. Point at the first reading that you wish to print
4. Click the left mouse button to highlight the reading
5. Point at the last reading that you wish to print
6. Hold down the shift key and click the left mouse button to highlight the whole block
7. Click on the **Print view** button:

3.8 Export data to a spreadsheet

To export data to a spreadsheet:

1. Open a TC-08 spreadsheet window
2. Alter the settings to display the measurements that you wish to export
3. Point at the first reading that you wish to print
4. Click the left mouse button (this reading will be highlighted)
5. Point at the last reading that you wish to print
6. Hold down the shift key and click the left mouse button (the whole block will be highlighted)
7. Click on the **Copy to clipboard** button:
8. Move to the spreadsheet program
9. Point at the top left of the area you wish to fill and
10. Select **Paste** from the **Edit** menu.

Alternatively, you can click on the **New file** button, , then write the data to a text file. You can then import the text file into a spreadsheet.

Note: Do not attempt to save your data directly to a floppy disk.

If you wish to have the readings in the spreadsheet updated continuously with the current readings, you can use DDE.

3.9 Export a graph to a word processor

To export a graph to a word processor:

1. Open a graph window.
2. Alter the settings to display the graph that you wish to export.
3. Click on the **Copy to clipboard** button: .
4. Move to the word processor program.
5. Point at the place to insert the picture.
6. Select **Paste** from the **Edit** menu.

Note: Do not attempt to save your data directly to a floppy disk.

Alternatively, you can click on the **New file** button: , then write the data to a .wmf file. You can then import the graphics file into the word processor.

3.10 Enable date and time scaling on a graph

The time axis of a graph normally shows the time (in the selected sample interval units) since the start of the run. Whilst this is convenient for short runs, it is not ideal when collecting data over longer periods.

1. Click on the **View options** button:
2. Change the time format to **Date/Time**

Other axis scale formats can be selected in the same way - see the **Graph options** dialog box for more details.

3.11 Transfer data over an IP network

The TC-08 software IP socket facility is used to take measurements on one or more computers, and record the data on another computer.

The measurements are taken by the TC-08 software on the Server. Another computer, the Client, requests the data via an IP network.

On the server**:**

1. Click **Start**
2. Select **Run...**
3. Type in `winipcfg.exe`
4. Note the server name

On the client**:**

1. Open a DOS box
2. Type in `ping` followed by the server name
3. The computer will display the time taken to send a message to the server and receive a response
4. Check that it is working and note the time

On the server**:**

1. Start up the TC-08 software
2. From the **File** menu, select **Preferences**
3. Select **IP Sockets**
4. Check the **Enable Server** box
5. Click **OK**
6. Set up the TC-08 software to measure the channels that you require

On the client**:**

1. Start the TC-08 software
2. From the **File** menu, select **Preferences**
3. Select **IP Sockets**
4. Check the **Enable Client** box
5. Exit and restart the TC-08 software
6. Select **New Settings**
7. Enter recording details and click **OK**
8. Enter the sampling details and click **OK**
9. Select **Socket** in the converter type combo box
10. Click **OK**
11. Type in the server name, eg `fred`
    Note**:** Server names are case sensitive! `Fred` is not the same as `fred`
12. Click **Connect**
13. The computer should now display the channels from the server
14. Click on one of the channels
15. If you want to change the name, type in the local name
16. Click **OK**
17. The channel you selected is marked with an X
18. Repeat for each of the channels
19. Click **OK**
20. The monitor window should now display the readings from the server

3.12 Run multiple recorders

There are two limitations to using the multiple converters mode in the TC-08 software:

- Data is collected at the **same rate** for each device
- A **single trigger** will start the recording for all converters

If you need to overcome these limitations, two separate instances of the TC-08 Recorder can be loaded. If you have tried this previously, you will have noticed that simply attempting to load the TC-08 Recorder from the Start menu twice will load the TC-08 Player**.**

You will need to create settings files for the configuration of each converter or each set of converters (use multiple converters mode):

1. Attach one (or the first set) of the converters to the PC
2. Start the TC-08 software, select **New Settings** from the File menu, then follow the sequence of dialogs to setup your Converter(s)
3. Select **Save as...** from the File menu, and from the drop down box, select .pls (settings file), then save
4. Disconnect the first converter and attach the second (or the second set) , then repeat the steps above.

Once you have a settings file for each converter or set of converters, you will need to start the TC-08 Recorder from the command line.

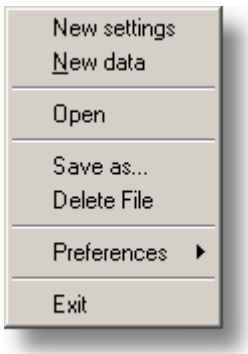
1. From the Windows Start menu, select **Run...**
2. Type `C:\Program Files\TC08\plw32.exe C:\Program Files\TC08\mysettings1.pls` (where `C:\Program Files\TC08\` is your installation directory, and `mysettings1.pls` is your first settings file) and
3. Repeat the steps above for each of your settings files (eg - `mysettings2.pls`, etc).

Note**:** None of the converters should be running in fast block mode (this will take precedence, and inhibit other converters from recording during this period).

4 Menu bar

4.1 File

To access this menu, from the menu bar of the TC-08 Recorder, select **File**.



The file menu appears on the menu bar at the top of the monitor window in **PLW Recorder**.

New settings
This menu option erases the current settings and then takes you, step by step, through the process of setting up the TC-08 software to collect some data.

New data
This menu option enables you to open a new file to record your data. If you save the file as a setup file, only the settings are stored. If you save it as a data file, both the settings and data are stored. You can also save the file as a text file only.

Open
This menu option closes all active windows and then opens a data or setup file.

If you open a data file, the settings and data are copied from the file, and the data is displayed. If you open a setup file, only the settings are recovered: no data is displayed until you start the TC-08 software running.

Save as...
This menu option asks for a filename and then writes the data to that file.

If you save the file as a setup file, only the settings are stored. If you save it as a data file, both the settings and data are stored. You can also save the file as a text file only.

Delete File
This menu option enables you to delete a file. Select the file and then click OK to delete it.

Preferences
This group of menu options enables you to customise the TC-08 software for Windows:

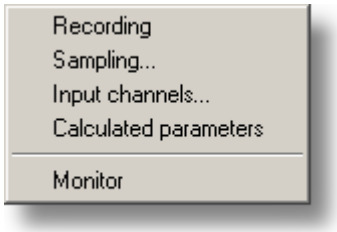
Colours - enables you to select the colours that the TC-08 software will use.
Sound - enables you to select the sounds for certain events.
Temperature - enables you to select the units for temperature measurements.
IP Sockets - activates the IP network facility, allowing you to transfer data between two computers running the TC-08 software.
Converter - used to specify what converter is to be used.
Recorder - used to specify whether the Re-record and Pause buttons are displayed in the Recorder window.

Exit
This menu option exits from the program.

Note: Do not attempt to save your data directly to a floppy disk.

4.2 Settings

To access this menu, from the menu bar of the TC-08 Recorder, select **Settings**.



The settings menu appears on the menu bar at the top of the monitor window in **PLW Recorder**.

Recording
This menu option enables you to choose the recording method for your measurements.

Sampling...
This menu option enables you to specify the sampling rate and the action at the end of a run.

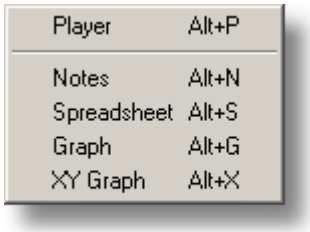
Input channels...
This menu option enables you to specify the converter and port that will take the measurements.

Calculated parameters
This menu option enables you to enter details for measurements which are calculated from one or more other measurements. This can be done either during data collection or after the data has been collected.

Monitor
This menu option enables you to select the measurements that you wish to display in the monitor window. To select a measurement, highlight it and then click **OK**.

4.3 View

To access this menu, from the menu bar of the TC-08 **Recorder** or **Player**, select **View**.



Player
This menu option creates a new **Player** window.

Notes
This menu option creates a new **Notes** window.

Spreadsheet
This menu option creates a new **Spreadsheet** window.

Graph
This menu option creates a new **Graph** window.

XY Graph
This menu option creates a new **XY Graph** window.

4.4 Help

To access this menu, from the menu bar of **the TC-08 Recorder**, select **Help**.

The Help menu appears on the menu bar at the top of the monitor window in **PLW Recorder**.

Index
This menu option takes you to the index of the TC-08 software help file.

Contents
This menu option takes you to the contents page of the TC-08 software help file.

Using help
This option explains how to use the TC-08 software help file.

This view
This option explains the operation of the monitor window in **PLW Recoder**.

Guided tour
This menu option shows you the main features of the program. A converter need not be connected.

About...
This menu option gives the version and serial number of this instance of the TC-08 software.

4.5 Keyboard shortcuts

You can control some of the TC-08 software's functions using the following keys on the keyboard:

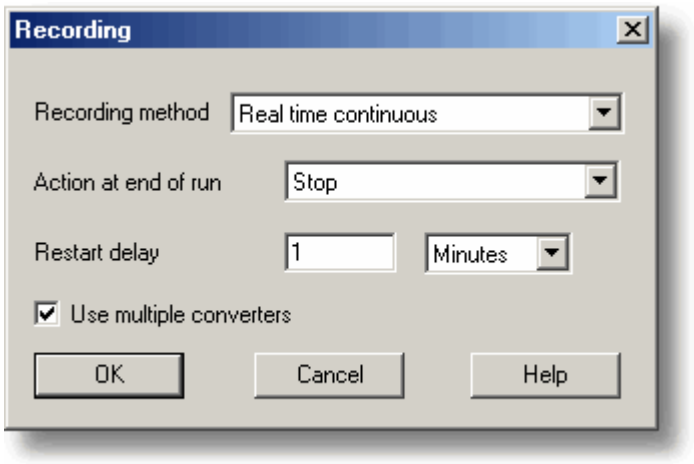
Key	Function
Alt-P	open Player View
Alt-N	open Notes View
Alt-S	open Spreadsheet View
Alt-G	open Graph View
Alt-X	open XY Graph View
F1	view Help index

5 Dialog boxes

5.1 General dialog boxes

5.1.1 Recording

To access this dialog box, open the **Settings** menu of the TC-08 Recorder and select **Recording**.



This dialog box is used to specify which recording method will be used.

The options for **Recording method** are as follows:

- **Real time continuous**
  In real time continuous mode you can record the data at the same time as displaying it in graphical or spreadsheet form. The maximum sampling rate is one per millisecond. With this method, you can use multiple converters.
- **Fast block**
  In fast block mode, data is collected at high speed but cannot be displayed until after it is collected. The sampling rate is controlled by the converter. This method is limited to a single converter.

Use multiple converters
Check this box if you wish to use more than one converter. This option is not available for fast block recording.

Action at end of run
This defines what happens when all the samples have been collected. Choose one of the following options:

- **Stop**

Means stop collecting

- **Repeat immediately**

Means start a new run immediately after completing the current run

- **Repeat after delay**

Means start a new run after the restart delay has elapsed. This could be used to collect a one-minute block of data once per hour

- **Scroll**

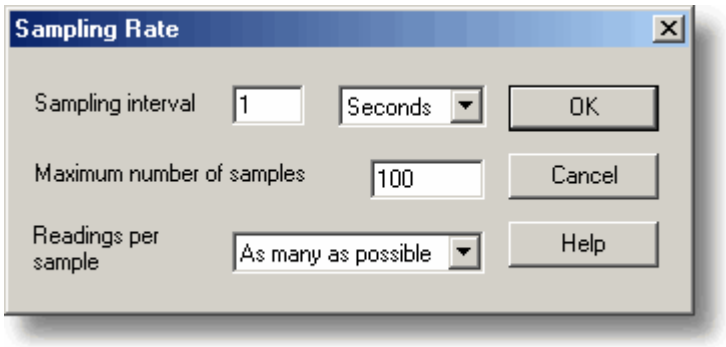
Means that new samples will be recorded and the oldest samples will discarded. This is useful if you only wish to have a record of the most recent samples

When you select a repeat option, the computer automatically increments a sequence number at the end of the filename.

Restart delay
When in 'repeat after delay' mode, this is the time interval from the start of one run to the start of the next run.

5.1.2 Sampling Rate

To access this dialog box, open the **Settings** menu of the TC-08 Recorder and select **Sampling...**



This dialog box sets the sampling rate and defines the action to take at the end of a run.

Sampling interval
To set the interval between samples, type a number in the box and select the required units. The interval must be a whole number so, for example, 30 seconds must be specified rather than 0.5 minutes.

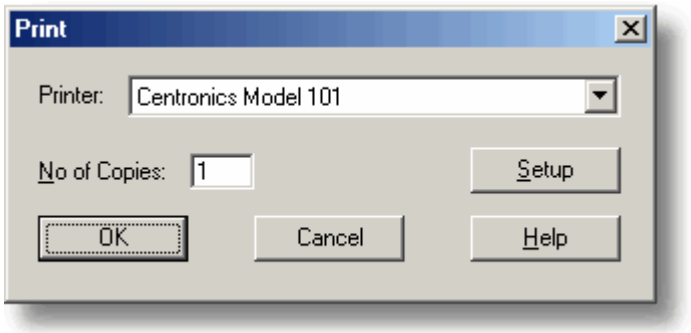
Note: When you have set sampling intervals of less than a second, displaying a graph whilst data recording is possible, but may interfere with recording.

Maximum number of samples
To set the maximum number of samples to be collected during a run, enter the maximum in this box. The maximum can be up to a million samples. During real-time data collection, the sampling can be stopped at any time, so you can enter a large number and then stop the run early.

Readings per sample
Normally the TC-08 software takes as many readings as possible during each sample period, then saves the average of the readings. If you need an instantaneous measurement, (for example, if you wish to calculate standard deviations), change this option to **Single**.

5.1.3 Print

To access this dialog box click when one of the display windows is open.



Printer:
At the top is a combo box with the name of the default printer. You can select a different printer if you wish.

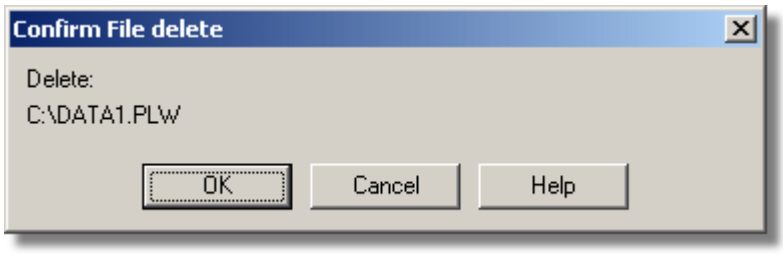
Setup
Use the **Setup** button to open a dialog box with setup information specific to the selected printer.

Once all the details are correct, click **OK** to start printing.

5.1.4 Confirm File delete

If you want to delete a TC-08 software file you have saved on your hard disk, open the **File** menu of the TC-08 Recorder and select **Delete File.** A window appears showing you the list of files in the active directory.

Double-click on the name of the file you want deleted. The following dialog box appears.

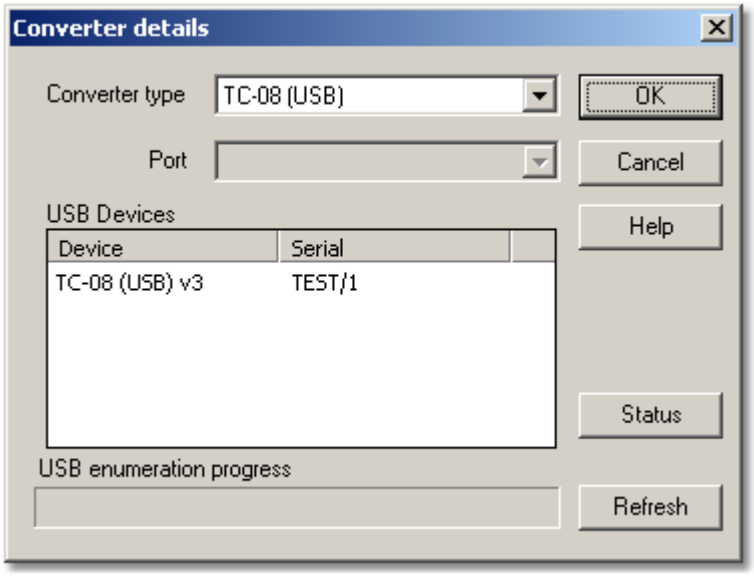


If you are certain you want to go ahead with deletion, click the **OK** button.

5.1.5 Converter-related

5.1.5.1 Converter details

To access this dialog box, select **Input channels...** from the **Settings** menu.



This dialog box is used to specify the details for a converter. Note that it is **not** displayed if you set the **Converter preferences** to automatically select a particular converter.

USB Devices
A list of USB devices of the selected type that are currently attached to the PC will be displayed.

When attempting to edit the settings of a currently opened unit, then the unit that you are editing will appear highlighted at the bottom of the list. If non-highlighted units appear at the top of this list, these represent other available devices of this type attached to the PC. You can freely switch between these available units, however, the settings of the unit you are editing will not be saved.

Note: Enumerating USB devices can take some time, especially if a number of USB devices are attached to the PC. The TC-08 software may appear to lock up during this period, but this is normal.

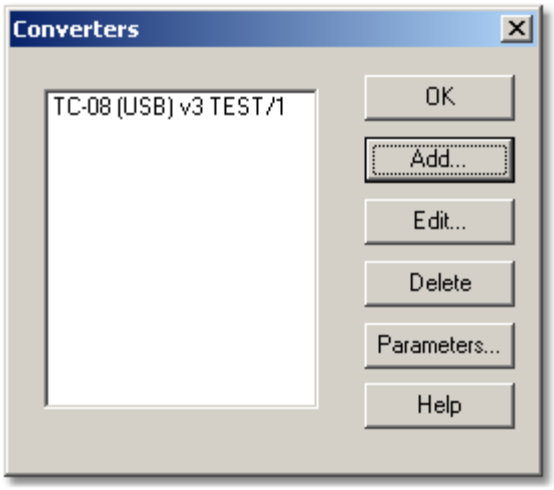
Refresh
After you have selected a converter from the **Converter type** drop-down list, click this button to scan for new USB devices.

Status
This informs you of the status of any converters you have attached to your computer. To ensure that your hardware is setup correctly, see the section on hardware setup.

OK
When you click the **OK** button, the computer will open a measurement dialog box for the selected converter. A double-click with the mouse on the desired USB device will also have the same effect.

5.1.5.2 Converters

To access this dialog box, click the OK button on the **Converter details** dialog box. Note: If the **Use multiple converters** box is ticked on the **Recording** dialog box, selecting **Input channels...** from the **Settings** menu will take you directly to the **Converters** dialog box.



This dialog box is used to build up a list of converters to use. In the pane on the left will be a list of the converters that are currently active.

Add...
To add another converter to the list, click the **Add...** button. This will open the **Converter details** dialog box so you can enter the type and port for the new converter.

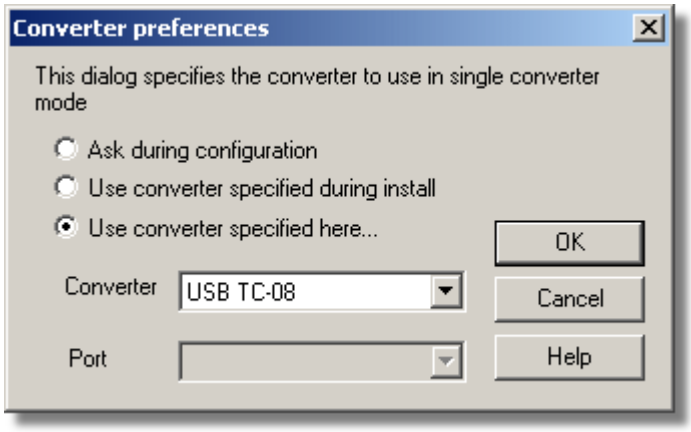
Edit...
To edit the details for an existing converter, highlight the entry for it and click the **Edit...** button. This will open the **Converter details** dialog box.

Delete
To remove a converter from the list, highlight the converter and click the **Delete** button.

Parameters...
To specify the measurements to be measured for a converter, highlight the converter and click the **Parameters...** button.

5.1.5.3 Converter preferences

To access this dialog box, open the **Preferences** sub-menu in the **File** menu and select **Converter**.



So that the computer does not ask each time you define new settings, you can specify in advance which converter to use. The options available are as follows:

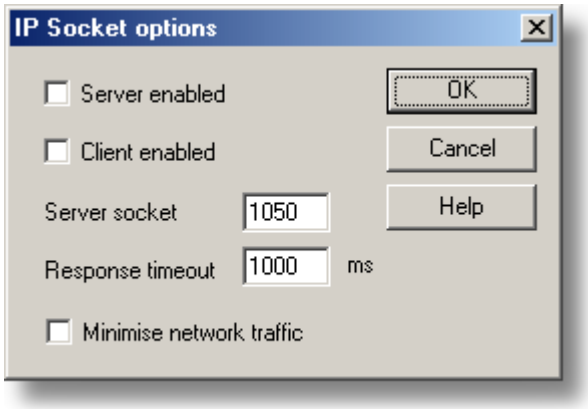
- **Ask during configuration**
  Ask for the converter every time you enter new settings
- **Use converter specified during install**
  Use the converter specified when the TC-08 software was installed
- **Use converter specified here...**
  Use the converter specified in this dialog box

When you select the last option, the computer enables the converter and port fields on the dialog box.

5.1.6 IP socket-related

5.1.6.1 IP Socket options

To access this dialog box, open the **Preferences** sub-menu in the **File** menu and select **IP Sockets**.



This dialog box is used to specify the details required to establish a link between computers via an IP network.

One computer is referred to as the server. This is the computer supplying data. The other computer is referred to as the client. This is the computer receiving data. It displays the measurements as if they are being collected locally. A server can support any number of clients, and a client can get data from up to 10 servers.

Server enabled
When this option is selected, the TC-08 software will start responding to requests for data from any the TC-08 software clients that contact it.

Client enabled
This sets this computer to act as a client. When it is checked, the socket device appears in the Select Device dialog box.

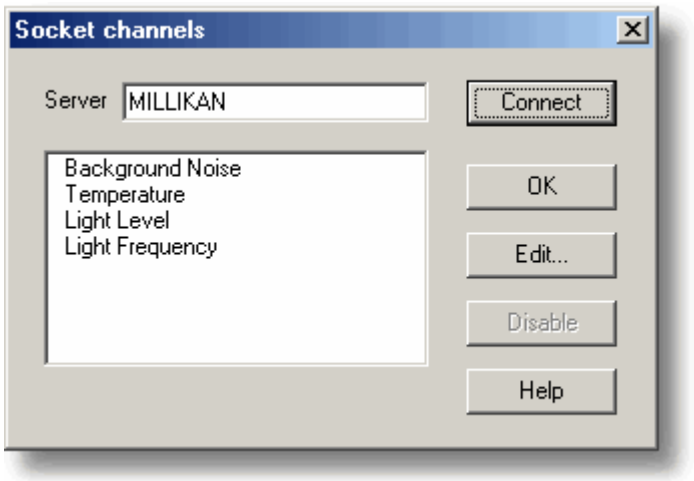
Server socket
This specifies what IP socket the server will use. It is not normally necessary to change it, unless the socket is already in use by another application. If you change it, you must do so on the server and on all clients.

Response timeout
This only has an effect on the client. It controls how long the client will wait for a response from the server. You can use the PING command to find out how long a round trip normally takes.

Minimise network traffic
If this box is not checked, the client will continuously request data from the server. This is OK over a local network, but could cause a dial-up bridge between two subnets to stay active all the time. If you check this box, the client only asks for data once per sample period. With a sample period of an hour, the client will only contact the server once per hour.

5.1.6.2 Socket channels

Accessed from the **Converter details** dialog box. Note**:** Only accessible when **Client enabled** has been checked on the **IP Socket options** dialog box and **Socket** has been selected as the **Converter type** in the **Converter details** dialog box.



This dialog box is used to establish a connection to another instance of the TC-08 software running on a remote server computer, and then to select the channels that are to be imported to this instance of the TC-08 software.

Server
This is the name of the server. If it is on your local network, the computer name should be enough (for example, "carnot"). If you want to communicate via a large network or the internet, you will need to put the full name of the computer, for example, "carnot.omega.com".

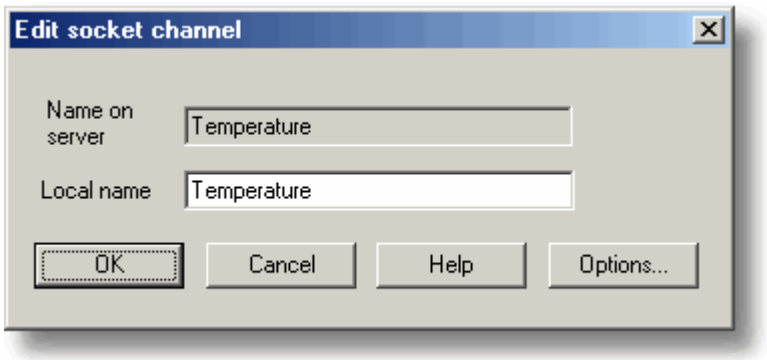
Connect
Having entered a server name, click the **Connect** button to establish a link to the server. If successful, a list of channels (corresponding to measurements) available on the server will appear. If someone changes the details on the server, you can click this button to update the details locally.

Edit...
To edit a channel, first select it, then click this button. The **Edit socket channel** dialog box will appear so that you can enter the details.

Disable
To disable a previously selected channel, highlight it and click this button.

5.1.6.3 Edit socket channel

To access this dialog box, click the **Edit...** button on the **Socket channels** dialog box.



This dialog box is used to enter the details for a channel.

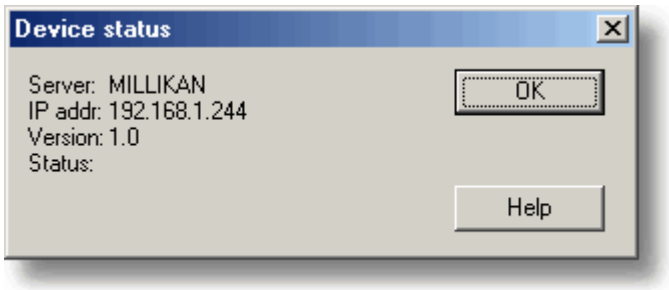
Name on server
This is the name of the channel on the remote server computer. It cannot be changed from the local computer.

Local name
This is the name of the channel as it will appear locally.

Options...
To set the Parameter options, click the **Options...** button.

5.1.6.4 Device status

To access this dialog box, click the **Status** button on the **Converter details** dialog box.

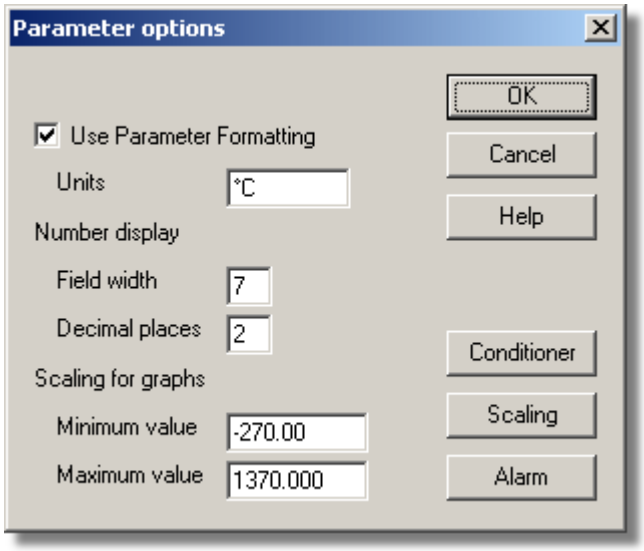


This dialog box displays the details about the IP socket connection to the server.

5.1.7 Parameter-related

5.1.7.1 Parameter options

To access this dialog box, click the **Options...** button on the measurement dialog box for the converter. If you are using a TC-08, for example, the measurement dialog box for the converter would be the **Edit USB TC-08 Channel** dialog box.



This dialog box is used to set up measurement definitions.

Use Parameter Formatting
By default, the measurement or channel that has been setup will use its own default values for formatting. If you want to use your own scaling, click the **Scaling** button. It is recommended that you tick the **Use Parameter Formatting** check-box and enter your own values in the fields described below.

Units
The units you enter here will appear on spreadsheets and graphs.

Number display
This defines the format of the information for spreadsheet entries and graph scales. For example, with a field width of 6 and 2 decimal places, a number will appear in the format `ddd.dd`. The field width must be between 1 and 8, and the number of decimal places must be less than the field width.

Scaling for graphs
This defines the maximum and minimum values to be used for graphical displays.

Note: Any scrolling in the **PLW Graph** window is based on these numbers, and limited by them. Once you have saved your data, these cannot be changed, so ensure that these limits extend up to or beyond the maximum data values you expect to capture.

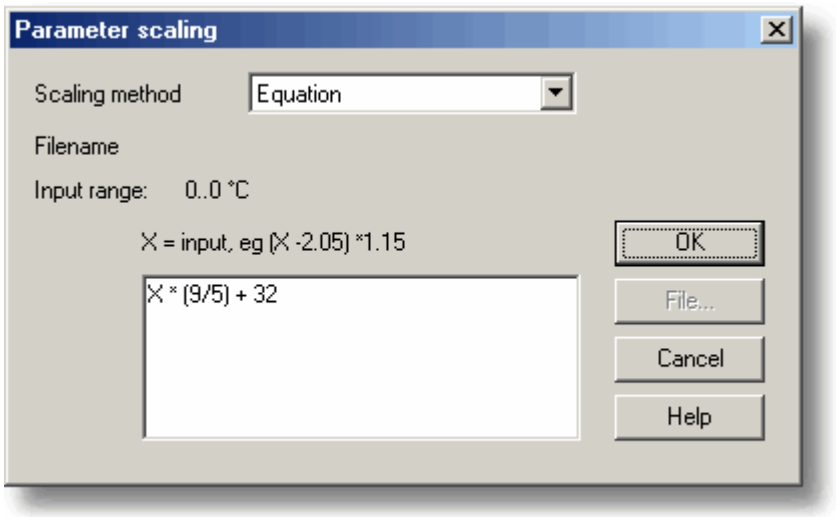
Scaling
The **Scaling** button opens the **Parameter scaling** dialog box, which can be used for the following two purposes:

- Converting an input voltage into some other units
- Applying minor scaling corrections to values that have already been scaled for a particular signal conditioner and sensor

Alarm
The **Alarm** button opens the **Alarm settings** dialog box for this measurement definition.

5.1.7.2 Parameter scaling

To access this dialog box, click the **Scaling** button on the **Parameter options** dialog box.



This dialog box is used to specify how to convert a measurement value into some other unit, for example from volts to temperature. It is invoked when you click the Scaling button on the **Parameter options** dialog box.

Scaling Method
There are three scaling methods: None, Table lookup, and Equation. You can also read in a lookup table or an equation from a file.

Table lookup
This is useful for a set of input readings corresponding to different values of the measurement to be scaled. You can put two or more pairs of values in the box below. For example, to convert a 0 to 2.5V input to minus 40 to 100C, enter the following details in the box:

0	-40
2.5	100

Two pairs is sufficient if there is a linear relationship between the raw and scaled values. For non-linear relationships, the required number of pairs depends on the maximum acceptable interpolation error. If you wish to enter more than half a dozen pairs of values, it is better to enter the table into a file, and then use file scaling (see below).

Equation
This can be used when it is possible to calculate the relationship between the input reading and the measurement value. The raw measurement values is represented by x. For example, to convert a temperature from Fahrenheit to Celsius, the equation would be:

(x-32)* 5 / 9

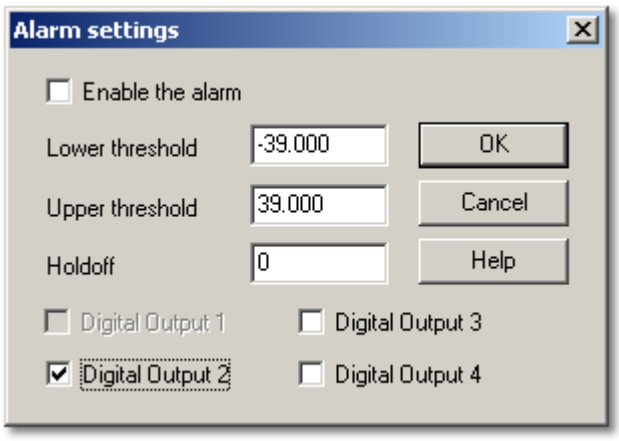
For more information on equations, see equation notation.

File
When you specify that you wish to use a file for scaling, this button is enabled. When you click this button, the computer opens up a dialog box to select a scaling file.

Scaling from file
If you wish to scale the inputs from a number of identical measurements using the same method, or if you wish to set up a large lookup table. See Scale file format for more information on the format.

5.1.7.3 Alarm settings

This dialog box defines the alarm settings for each measurement. It is invoked when you click the Alarm button on the **Parameter options** dialog box. To access it, click the **Alarm** button on the **Parameter options** dialog box.



Enable the alarm
If you wish to enable alarm limits for this measurement, check this box.

Lower and upper thresholds
If the measurement goes out of this range, the alarm will sound.

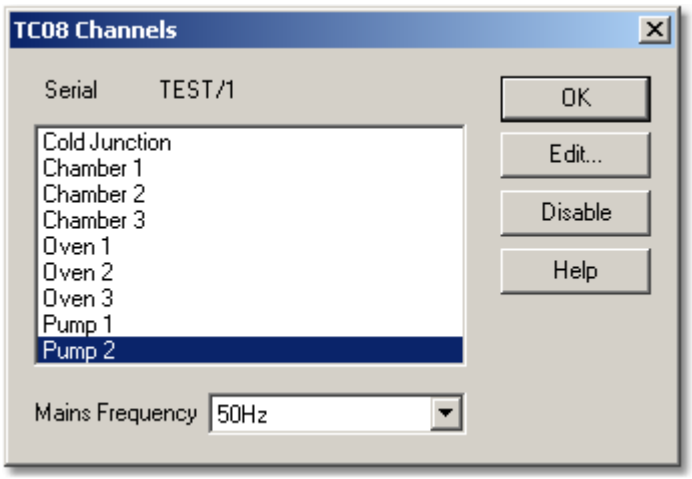
Holdoff
If the measurement value occasionally goes out of range for short periods, you can prevent this causing an alarm by setting a holdoff period. The alarm will then sound only if the measurement stays out of range for longer than the holdoff period, measured in seconds.

5.1.7.4 Select parameters

In the context of the monitor window in **PLW Recorder**, you access this dialog box by selecting **Monitor** from the **Settings** menu.

On the **PLW Graph**, **PLW XY Graph**, and **Spreadsheet** windows, click . This is the measurement selection button.

The selected measurements are highlighted. To select or de-select a measurement, simply point and click.



This dialog box is used to select the measurements which will be displayed in a window.

Group
At the bottom is the group combo-box. You can use this to save and restore a number of named groups of measurements.

To save the current measurement selection as a group, type in the group name and click **Save**.

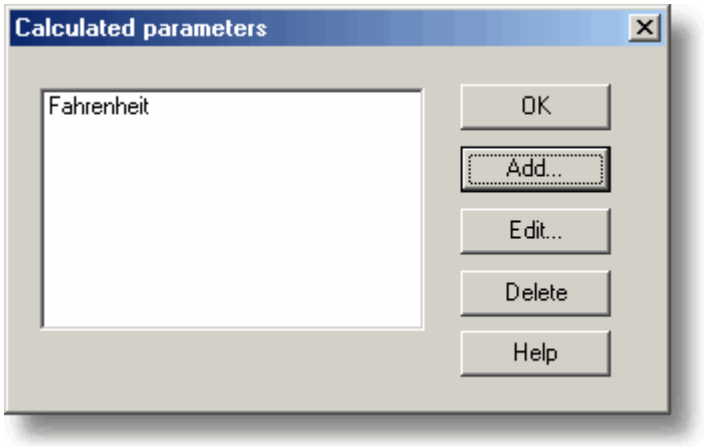
To select a saved group, open the combo box and double-click on the requested group.

To modify an existing group, make the changes to the measurement selection then type in the group name and click **Save**.

To remove an existing group, de-select all measurements, type in the group name and click **Save**.

5.1.7.5 Calculated parameters

To access this dialog box, select **Calculated parameters** from the **Settings** menu.



This dialog box is used to add or edit calculated parameters. Calculated parameters are readings that need some action performed on them before they can be presented as measurements. For instance, thermocouple voltage readings cannot be turned into temperature measurements without the aid of a scaling table.

Unlike raw measurements, with calculated measurements, it is possible to change their details once a run is completed.

On the left is a list of calculated measurements and on the right are some buttons which enable you to add, edit or delete calculated measurements.

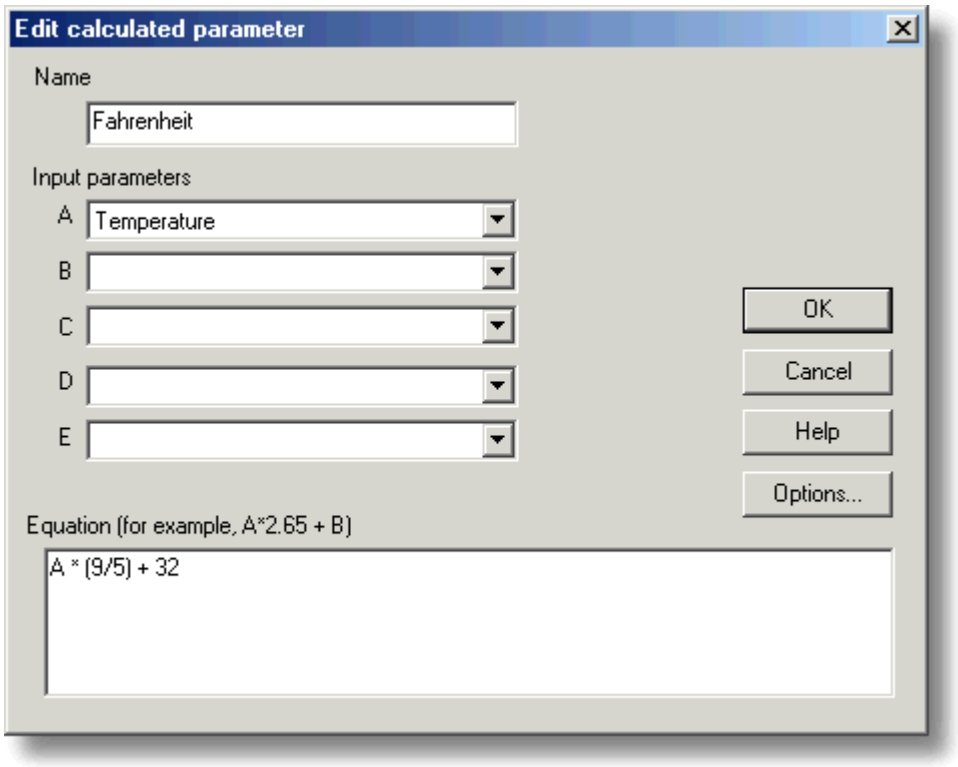
Add
To add a new calculated measurement, click the **Add...** button. This will open the **Edit calculated parameter** dialog box.

Edit
To edit the details for a calculated measurement, first highlight it and then click the **Edit...** button. This will open the **Edit calculated parameter** dialog box so that you can enter the details.

Delete
To remove a calculated measurement, first highlight it, then click the **Delete** button.

5.1.7.6 Edit calculated parameter

To access this dialog box, click on the **Add...** or **Edit...** button on the **Calculated parameters** dialog box.



This dialog box enables you to edit the details for a calculated measurement. A calculated measurement is calculated from up to five other measurements, using an equation.

Fields A to E
These fields enable you to select up to five measurements (raw or calculated) which are to be used in a calculated measurement. If you require less than five input measurements, unused measurements should be left blank.

Equation
Here you enter the equation that explains how to calculate this measurement from the input measurements. The input measurements are represented by A, B, C, D and E. For example, to calculate the power output from a boiler, the input measurements might be:

A = inlet temperature
B = outlet temperature
C = flow rate

and the equation would be

(A-B) * C * 4120

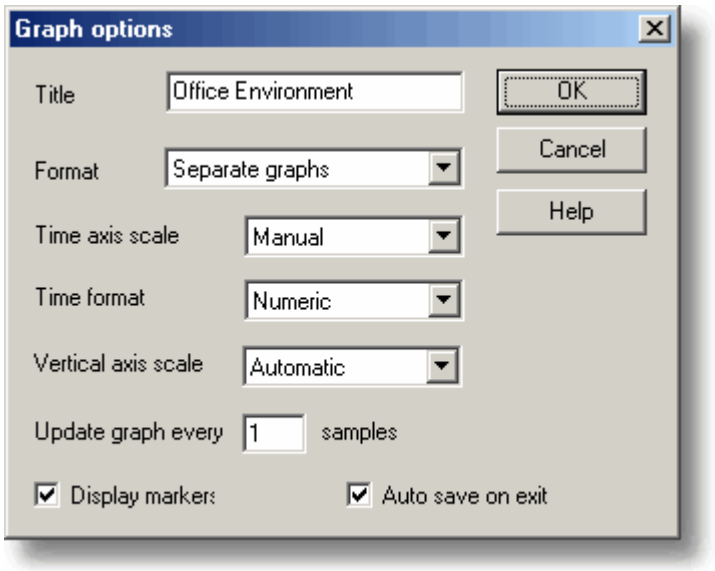
See the Equation Notation topic for more information.

Options
Set the options (units, range etc) for this measurement from Parameter options.

5.1.8 Window-related

5.1.8.1 Graph options

To access this dialog box, click ☑ in the **PLW Graph** window.



This dialog box is used to set the options for the Graph window.

Title
This is the title of the graph that will appear on the graphical reports.

Format
This specifies how traces are to be divided between graphs. The choices are:

- Automatic - the traces are allocated by the computer, putting traces with the same units on the same graph.
- Separate graphs - each measurement is displayed on a separate graph.
- All traces on same graph - each measurement is displayed on the same graph

Time axis scale
This allows you to choose how the time axis is scaled:

- Automatic - the scaling is set by the computer.
- Maximum - the time axis is set to the maximum sampling time
- Scroll - the display is scrolled across the screen
- Manual - the scale can be changed by clicking on the scroll left/right tool buttons on the Graph window.

The time axis scale is automatically set to Manual if you click any of the time scrolling buttons

Time Format
This allows you to choose the format for the time axis:

- Numeric - the time in the selected sampling time units since the start of the run
- Time since start - the time in hours and minutes since the start of the run
- Time of day - the real time
- Date/time - the real time including the date

Vertical axis scale
This allows you to choose how the vertical axis is scaled:

- Automatic - the scaling is set by the computer.
- Maximum - the axis is set to the maximum
- Manual - the scale can be changed by clicking on the vertical scrolling buttons on the Graph window.

The Vertical axis scale is automatically set to Manual if you click any of the vertical scrolling buttons

Display every xxx samples
If you are displaying a graph while collecting data, this controls how frequently the graph is updated. It has no effect after you have finished recording, or when using the player.

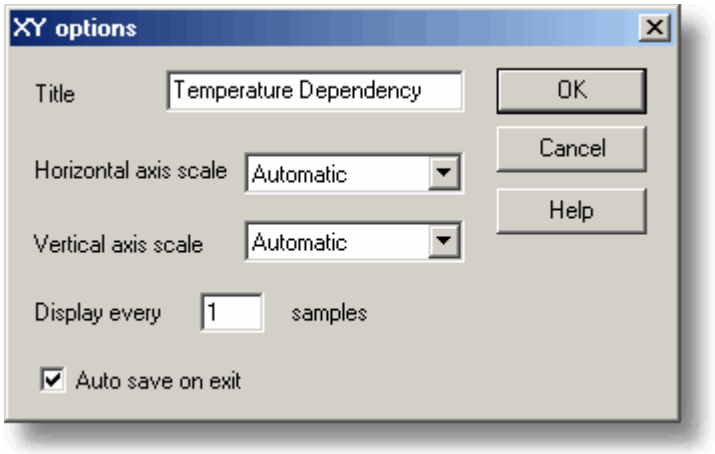
When collecting less than a thousand samples, leave it set to 1. When collecting a large number of points, it may take some time to update the graph, so updating every time a new reading is taken would be a waste off effort.

Display Markers
When this box is checked and there is more than one trace on the graph, the computer displays markers (triangles, circles etc) on the traces to help identify the traces.

Auto save on exit
When this box is checked, all graph window settings are saved automatically when you close the graph window.

5.1.8.2 XY options

To access this dialog box, click ☑ in the **PLW XY Graph** window.



Title
This is the title of the graph that will appear on graphical reports.

Horizontal/Vertical axis scale
This allows you to choose how the axes are scaled:

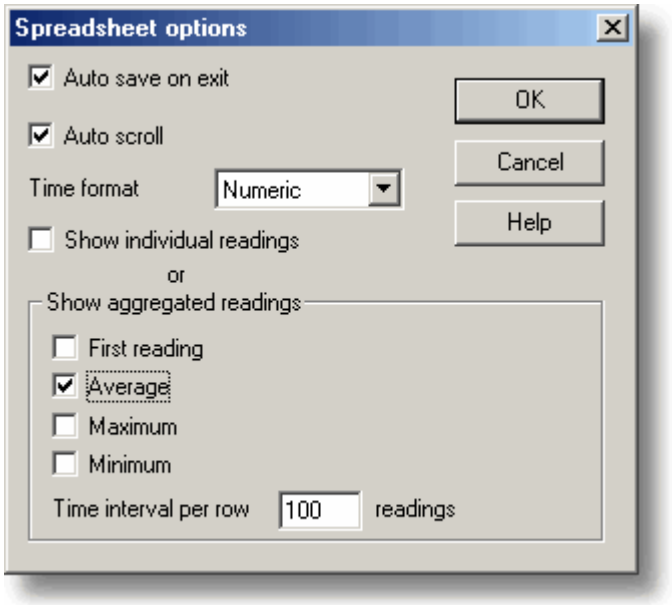
- Automatic - the scaling is set by the computer.
- Maximum - the axis is set to the maximum
- Manual - the scale can be changed by clicking on the scroll buttons on the XY Graph window.

The axis scale is automatically set to Manual if you click any of the scroll buttons.

Auto save on exit
When this box is checked, all XY graph window settings are saved automatically when you close the XY graph window.

5.1.8.3 Spreadsheet options

To access this dialog box, click ☑ in the **Spreadsheet** window.



Auto save on exit
When this box is checked, all event window settings are saved automatically when you close the event window.

Auto scroll
When auto scroll is enabled whilst sampling is in progress, the windowed range is updated automatically to keep the latest reading visible.

Time Format
This allows you to choose the format for the time:

- Numeric - the time in the selected sampling time units since the start of the run
- Time since start - the time in hours, minutes and seconds since the start of the run
- Time of day - each sample is labelled with the time it was taken
- Date/time - each sample is labelled with the date and time it was taken

Show individual/aggregated readings
When show individual readings is checked, the spreadsheet window shows each individual reading.

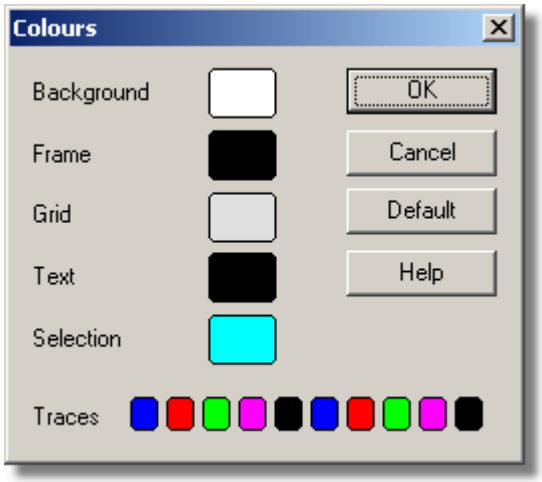
When it is cleared, the computer displays results which are aggregates (1st reading/average/maximum/minimum) of the readings for the time interval specified below. The controls in the Show aggregated readings box are then enabled. If you select more than one control, the computer displays the corresponding number of columns for each sensor in the spreadsheet, and adds a heading (1st reading/average/maximum/minimum) to each column.

Time interval per row
This specifies the time interval between each of the rows on the spreadsheet. If, for example, the sampling interval was set for every minute, and you set the time interval per row to 60, each row will be the (1st reading / average / maximum / minimum) of 60 readings.

5.1.9 Preferences

5.1.9.1 Colours

To access this dialog box, select **Colours** from the **Preferences** sub-menu in the **File** menu.



This is used to specify the colours for the background, text and traces for the graph and spreadsheet windows. To change a colour, click on the colour button to open the colour selection dialog box.

Background
This is the colour for the background on graphs, and for non-selected readings on the spreadsheet.

Frame
This is the colour of the frame round graphs.

Grid
This is the colour for the grid on the graphs.

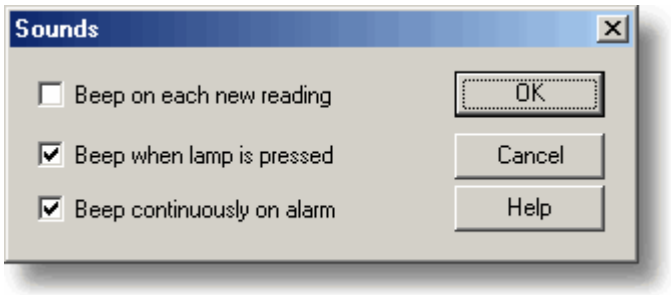
Text
This is the colour for text.

Selection
This is the colour for the selected readings on the spreadsheet.

Traces
A graph can display up to ten traces: the ten buttons along the bottom of the dialog box are the colours for each trace.

5.1.9.2 Sounds

To access this dialog box, select **Sound** from the **Preferences** sub-menu in the **File** menu.



For some events, the TC-08 software can make a sound when an event occurs. This dialog box allows you to enable the sounds for each type of event.

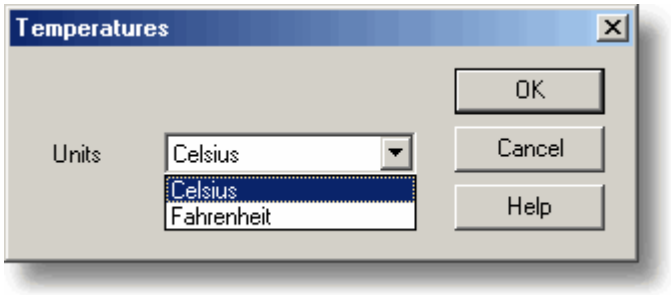
Beep on each new reading
This option is useful if there is a problem and you need to keep a close check on it. If you select a graph or spreadsheet window, the computer beeps each time a new reading is added to the graph or spreadsheet.

Beep when lamp is clicked
When there is an alarm set, the lamp on the monitor window turns red. You can click on the lamp to cancel the alarm. When this box is checked, the computer beeps to confirm it has accepted your request to cancel the alarm.

Beep continuously on alarm
When this box is checked, the computer produces a continuous tone while an alarm is active.

5.1.9.3 Temperatures

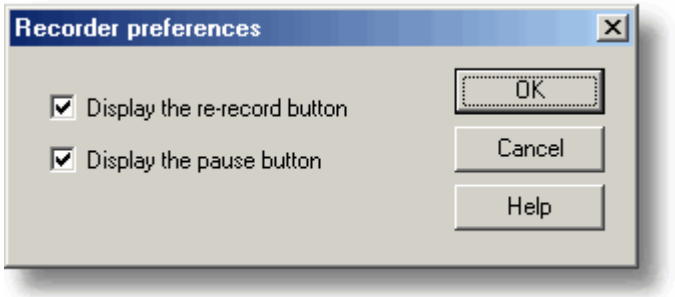
To access this dialog box, select **Temperature** from the **Preferences** sub-menu in the **File** menu.



This is used to specify the units for temperature measurements. The options are Fahrenheit or Celsius (Centigrade).

5.1.9.4 Recorder preferences

To access this dialog box, select **Recorder** from the **Preferences** sub-menu in the **File** menu.



Some buttons can be disabled to prevent the accidental erasure of data.

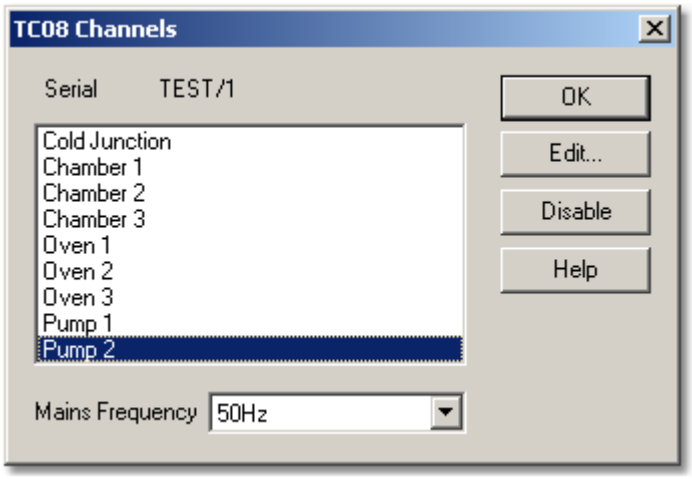
Display the re-record button
Chooses whether is visible in the **PLW Recorder** window.

Display the pause button
Chooses whether is visible in the **PLW Recorder** window.

5.2 Hardware configuration

5.2.1 USB TC-08 Channels

To access this dialog box, assuming you have already set up the TC-08 software with a USB TC-08 unit, select **Input channels...** from the **Settings** menu.



This dialog box is used to select the channels that will be used to take measurements.

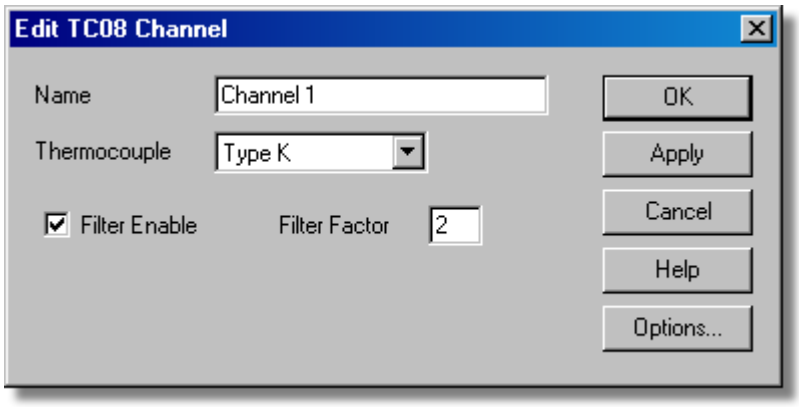
Edit
To select a channel, first highlight it, then click the **Edit...** button (or double left-click with the mouse). This will open the **Edit TC08 Channel** dialog box so that you can setup the channel.

Disable
To disable a previously selected channel, highlight it in the list window and click the **Disable** button.

Mains Frequency
The USB TC-08 can filter out the noise associated with mains. Select the option corresponding to the frequency of mains in your country.

5.2.2 Edit USB TC-08 Channel

Accessed via **Edit** button on the **TC08 Channels** dialog box.



This dialog box is used to enter the details for a channel.

Name
This is the name of the channel. This name will appear on all reports.

Thermocouple
This is thermocouple type connected to the channel. There are eight valid thermocouple types: B, E, J, K, R, S, T, and N.
There is also a ±78.125 millivolt range.

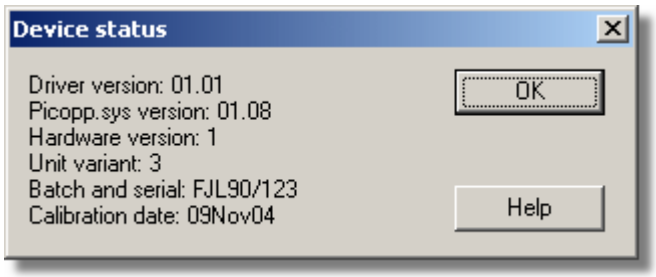
Filter enable
If you want to use a filter to reduce the effects of electrical noise, check this box.

Filter factor
A median filter is applied when '*filter factor*' number of samples have been collected, returning the middle value. Filtered values are more stable, but respond more slowly to real changes in temperature. The higher the factor, the stronger the filtering effect will be.

Options
To set the options for a parameter, click the **Options...** button.

5.2.3 Device status

Accessed via **Status** button on the **Converter details** dialog box.



This dialog box displays the details about the ADC status. The calibration date will help you keep track of when the unit should be returned to Omega for annual recalibration (optional).

6 Equipment overview

6.1 USB TC-08

The USB TC-08 works with thermocouples of any standard type, and you can also use any combination of channels to measure a voltage range of ±70 mV. thermocouples are cold-junction compensated (the cold junction temperature can be monitored as an extra channel in the TC-08 software).

The USB TC-08 is compatible with USB 1.1 and supports streaming with a guaranteed sampling interval of 40 milliseconds per active channel + 40 milliseconds cold junction (for example, for 3 active channels, the minimum interval is 160 milliseconds).
(the TC-08 software does not currently support streaming operation)

- You can connect up to ten converters to the TC-08 software simultaneously. These can all be USB TC-08s for a maximum of 80 thermocouple channels.

6.2 IP sockets

The TC-08 software has built-in support for transferring data over an IP network.

One computer supplies the data and is referred to as the server. The other computer (referred to as the client) receives data from the server and displays the measurements as if they were collected locally. A server can support any number of clients and a client can get data from up to 10 servers.

A client needs two pieces of information to talk to a server: the name of the server and a socket number (normally 1050). The server does not need to know anything about the client.

The link uses the UDP/IP protocol. This is very efficient but does not guarantee that every message will get through. On large networks, a lost message would result in a delayed data update on the client.

See the Transfer data over an IP network section for detailed instructions on setting up a link.

7 Technical information

7.1 .ini preferences file

The preference file, `plw.ini`, contains two sections: `[General]` and `[Preferences]`. These sections contain the following items:

`[General]`

- `DataPath`
  Alternate path for data files
- `UserName`
  Text to display in the footer for printed reports
- `Language`
  Language code (see **Language** dialog box)
- `Serial`
  Serial number for the TC-08 software
- `VersionWarning`
  Version warning state (tells to check web for update)

`[Preferences]`

- `Colour0` - (`0` to `16`)
  Colour of a graph component in COLORREF format (see **Colours** dialog box)
- `CustomColour0` - (`0` to `15`)
  Custom colors used by the standard windows colour selection dialog box in COLORREF format (see **Colours** dialog box)
- `BeepOnReading`
- `BeepOnLamp`
- `BeepOnAlarm`
  Sound options (see **Sounds** dialog box)
- `Fahrenheit`
  See **Temperatures** dialog box (`Yes` = Fahrenheit, `No` = Celsius)
- `QuickSampleMs`
  Minimum sample interval for which AC/frequency measurement is possible (default is 1000 ms). Warning: reducing this will significantly slow down the sampling speed of some ADC units by preventing the Quick sample mode from being active at sampling intervals up to 1000 ms.
- `AllowStandby`
  By default, the TC-08 software prevents a PC from automatically going to the power-saving Standby mode. If `AllowStandby=Yes` then the TC-08 software will not interfere with power-saving operations.
- `DemoMode`
  Use to override the installation setting for whether or not the TC-08 software is in Demo mode. However, the product drivers will need to be reinstalled if the TC-08 software was installed in Demo mode (`Yes` = Demo, `No` = Normal).

Note: Do not attempt to save your data directly to a floppy disk.

7.2 .plw data file

The `.plw` file has a fixed-length header, followed by a data record for each sample. It is terminated by a copy of the `.pls` file that was used to record it.

The first two-byte field of the header contains the length, in bytes, of the header. The remaining fields are as follows:

UNS16: `header_bytes;` the length, in bytes, of this header
char: `signature [40];` "TC-08 Windows Software"
UNS32: `version;`
UNS32: `no_of_parameters;` no of parameters recorded
UNS16: `parameters [50];`
UNS32: `sample_no;` same as `no_of_samples`, unless wraparound occurred
UNS32: `no_of_samples;` number of samples recorded so far
UNS32: `max_samples;`
UNS32: `interval;` sample interval
UNS16: `interval_units;` 0=femtoseconds, 4=milliseconds, 5=seconds, 6=minutes, 7=hours
UNS32: `trigger_sample;`
UNS16: `triggered;`
UNS32: `first_sample;`
UNS32: `sample_bytes;` length of each sample record
UNS32: `settings_bytes;` length of settings text after samples (copy of `.pls` file)
UNS32: `start_date;`
UNS32: `start_time;`
INT32: `minimum_time;`
INT32: `maximum_time;`
char: `notes [1000];`
INT32: `current_time;`
UNS8: `spare [78];`

Note: Do not attempt to save your data directly to a floppy disk.

7.3 .pls settings file

The TC-08 software uses `recorder.pls` to hold information about the current recording session. A separate file, `player.pls`, holds information about the current player session.

The user can use the **Save as...** option in the **File** menu to save the current settings in a named `.pls` file. These details can later be loaded to carry out a new test with the same settings.

The `recorder.pls` file is also written to the end of each `.plw` data file and is automatically reloaded when an old `.plw` file is loaded.

All settings files are in windows `.ini` format and could be edited using a text editor, although this is not recommended. The file contains the following sections:

`[Sampling]`
This section contains details of recording and sampling.
`[General]`
Numbers of parameters, converters, etc
`[Converter 1]`
Generic converter details - type and port
`[Unit 1]`
Type-specific converter details
`[Unit 1 Measure 1]`
Details about a measurement from converter 1
`[Parameter 1]`
Information on the monitor window
`[Recorder]`
Information on the recorder window
`[Graph1]`
Information on the graph window
`[XYGraph1]`
Information on the XY graph window
`[Spread1]`
Information on the spreadsheet window
`[File]`
Current filename

Note: Do not attempt to save your data directly to a floppy disk.

7.4 Scaling file

This file is a text file containing information in the following format:

The first few lines define a number of keyword parameters. These lines are in the same format as a Windows `.ini` file, with a keyword, an equals sign and then a value, for example:

```
Units=°C
```

One of the keyword parameters is the scaling method and must always be included. The remaining parameters are optional. The keywords for the optional parameters are listed below.

After the optional parameters, the actual scaling information appears in the same format as it is entered in the scaling dialog box.

The scaling method can be specified either in English or in the currently selected language. If the scaling method is specified in English, it will be understood regardless of what language is selected.

For a lookup table with just two pairs, the file would look like this:

```
Notes=LM35CZ Temperature sensor
Type=Table
Units=°C
-0.02       -20
 0.1        100
```

For an equation, the file would look like this:

```
Notes=Temperature in Fahrenheit from LM35CZ
Type=Equation
32 + x *0.005555
```

The optional parameters are:

- `Notes`
  You can include one or more lines of notes to explain what this scaling file is to be used for. The first few lines of the scaling file are displayed when the file is loaded, so the notes give the user an indication that they have loaded the correct scaling file.
- `Units`
  The unit text to be shown on graphs, spreadsheets etc
- `Width`
  The field width when the parameter appears in spreadsheets
- `Places`
  The number of decimal places to display
- `MinValue`
  The minimum value for graphs
- `MaxValue`
  The maximum value for graphs

Some of the optional parameters will automatically set the fields on the 'Parameter options' dialog box, for example the units, range etc. See the **Parameter options** dialog box for more information on these parameters

7.5 Command line options

The following command line options can be specified when you start the TC-08 software:

`-p`	Start the TC-08 software in Player mode
`-r`	Restart recording
`xxxx.pls`	Load the settings from `xxxx.pls`

7.6 Multiple program instances

You can have more than one copy of the TC-08 software running at once. This means that you can use one copy to examine old data files whilst another copy is collecting a new data file. You can have more than one 'player' open to examine old files, but only one recorder is allowed.

To start the TC-08 software as a recorder, click the Recorder icon in the TC-08 program group.

To start the TC-08 software as a player, you can either click the Player icon in the TC-08 program group or, if you already have a recorder running, select the Player window from the **View** menu.

See also the `-p` option for the startup command.

7.7 DDE

Stands for Dynamic Data Exchange. This is a convenient method of transferring the current set of readings to other applications. Data is updated continuously, about once per second.

Data items are identified by three keywords: `Application`, `Topic` and `Item`. The keywords accepted by the TC-08 software are:

`Application`	PLW
`Topic`	Current
`Item`	Name - parameter name Value - the current value Units - the units Alarm - the alarm status

Each DDE request returns a list of values for each parameter.

To read the current values into Excel, type the following command into a spreadsheet cell:

```
=PLW|Current!Value
```

To read the current values into Quattro Pro, type in the following command into a cell:

```
@DDELINK([PLW|Current]Value)
```

Most application programming languages (C, Delphi, Visual Basic) provide tools to make DDE requests from other applications.

7.8 Equation notation

An equation can contain the following items:

- `Input parameters`
  These are represented by X for a measured parameter and A, B, C, D and E for a calculated parameter.
- `Numbers`
  These should be in fixed point decimal notation, such as 12.34. Exponential notation, such as 1.234E1, is not supported.
- `Mathematical operators`
  See below
- `Mathematical functions`
  See below
- `Spaces`

Operators
The operators follow the normal rules of operator precedence (BODMAS, for "Brackets, Division & Multiplication, Addition & Subtraction"). If you wish to force a particular order of evaluation, use brackets.

Notation	Description	Usage
( )	brackets	(x - 5) * 6
-	unary minus	-x
-	binary minus	x - 5
+	plus	x + 5
*	times	x * 5
/	divide	x / 5

Functions

Name	Description	Usage	Example
exp	e^x	exp (x)	exp (3) = 20.085
log10	log10	log10 (x)	log10(100) = 2
ln	loge	ln (x)	ln(20.085) = 3
power	power	x power 5	2 power 3 = 8
mod	modulo (remainder)	x mod 5	10 mod 2 = 1
sqrt	square root	sqrt (x)	sqrt(2) = 1.414

7.9 Glossary

.bmp. Bitmap file format, used for uncompressed images. The bitmap format is a very widely supported generic image format. The files are not usually compressed, and are therefore very large, but the image quality is very high.

.jpg. JPEG file format, used for compressed images. JPEG stands for Joint Photographic Expert Group and is the image format most widely supported across all platforms.

.pls. TC-08 software settings file. This holds data about the setup of the current recording session, but does not hold data collected from the converter.

.plw. TC-08 software data file. This file holds the data collected from the converter, and ends with a copy of the `.pls` the TC-08 software settings file.

.prn. The print file exported from the spreadsheet window is formatted with 'tab-separated values'. The data fields are separated by tabs and each record is

separated with a carriage return, as in the following example:

Time (s)	Sound Level (dBA)
0	55.5
1	55.4
2	56.2

.scl. Scaling file. It contains data about a specific type of sensor. Some files, such as `pt 100.scl,` are installed with the application and can be loaded from the **Parameter scaling** dialog box whilst the 'Use scaling from file' option is selected. The data can be used to calibrate the sensor, or to scale it to a particular measurement unit.

.wmf. Windows Metafile. The TC-08 software uses this vector-based format because it produces scalable images and has a small file size.

Client. The client computer requests and receives information from a server. Therefore when setting up an IP Network arrangement, the server is attached to the converter and passes data to the client, which then receives and records it.

COLORREF. 'C' language typedef of `unsigned long` used by windows. For more information, search http://msdn.microsoft.com/library/.

IP socket. Internet Protocol socket. An IP socket simply defines the data transfer protocol and the socket via which the server and client communicate. The default socket number is 1050. Note: An IP socket is not a physical port.

Port. A physical connector, on the computer, to which converters are attached. The USB TC-08 should be connected to the USB port.

Server. Receives data requests from the client and returns data as a response. When you set up an IP Network, therefore, the server is attached to the converter and passes data to the client, which then receives and records it.

USB 1.1. Universal Serial Bus (Full Speed). It can support data transfer rates up to 12 Mbits per second. USB 1.1 was superseded by USB 2.0.

USB 2.0. Universal Serial Bus (High Speed). It can support data transfer rates up to 480 Mbits per second and is the successor to USB 1.1.

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