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MicroLogPRO™ Solution

User Guide

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MicroLogPRO &
MicroLog Plus User Guide

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Contents

Using the Guide 1

Compliance with FDA Title 21 CFR Part 11 3

Chapter 1 MicroLogPRO 4

1.1. Overview 5

1.2. Getting Started 6

1.3. Working with MicroLogPRO 7

1.3.1. Data Displays 7

Current Data 7
Minimum and Maximum Values.....7
Status Messages 11
1.3.2. Working Modes.....15
1.3.3. Alarm Levels.....16
1.3.4. MicroLogPRO's Connections.....17
Connecting MicroLogPRO to a Computer 17
Connecting MicroLogPRO to an External Sensor.19
1.3.5. Sending Data to an Infrared Printer 20
Sending Min/Max Values.....20
Sending all of the Data 21
1.3.6. Battery Level.....22
1.3.7. Replacing the Battery 25

1.4. Working with the MicroLab Software 28

1.4.1. Installation 28
System Requirements 28
Installing the Software 29
1.4.2. Overview 31
1.4.3. Getting Started 32
Downloading Data 32
Saving Data 33
Opening Files 35
Displaying Properties 35
Printing a Graph 36
Printing a Table 37
1.4.4. Viewing the Data 38
Display Options 38
Graph 39
Table 40
Data Map 40

The Cursor.....42
Zooming and Panning 43
Cropping the Data 48
Formatting the Graph 49
Displaying Alarm Levels 50
Changing the Temperature Units.....50
Adding Annotations to the Graph.....51
Exporting Data to Excel 53
Export File Settings 54
Copying the Graph as a Picture.....55
Viewing more than one data set on the graph 55
1.4.5. Programming MicroLogPRO.....58
Setup 58
Saving Setup 68
Starting Data Recording 69
Stopping Data Recording 70

Sensor Calibration 70
Defining a Custom Sensor 76
Setting IR Printing Format 78
Communication Setup 79
1.4.6. Automatic Daily Download 81
Prepare the MicroLogPRO 81
Automatic Download 85
Manual Transmission 86
Viewing Daily Download Data and Status 86
1.4.7. Analysis Tools 88
Setting the Analysis Tools Parameters 88
Histogram 89
Pasteurization 91
Statistics 91
1.4.8. Toolbar Buttons 93
Main (Upper) Toolbar 93

Graph (Lower) Toolbar 96

Chapter 2 MicroLab Plus.....98

2.1. Overview 99

2.1.1. MicroLab Plus Default Window Layout 102

2.2. Getting Started 104

2.2.1. Installation 104
System Requirements 104
Installing the Software 105
2.2.2. Setting up the MicroLog Plus System.....107
2.2.3. Selecting Active Cradles.....109
2.2.4. Saving Data.....111
Backing Up Files.....113
2.2.5. Activating the Sound Alarm 114

2.2.6. E-mail Alarm Notification 115
2.2.7. E-mail Events Filter 119
2.2.8. Delaying Email Notifications 121
2.2.9. Alarm Trigger Settings 123
2.2.10. Changing the Temperature Units 127
2.2.11. Display Properties 127

2.3. Online Mode 129

2.3.1. Display Options 129
2.3.2. Meters View 130
2.3.3. Multiple Graphs View 132
The Cursor 134
Zooming 135
Autoscale 136
The Stretch/Compress Axis Tool 136

Panning 137
Displaying Alarm Levels 137
2.3.4. Cradle Map 139
Setting up the Cradle Map 140

2.4. Offline Mode 143
2.4.1. Offline Screen 143
2.4.2. Opening Files 144
2.4.3. Print 147
Printing a Graph 147
Printing a Table 147
2.4.4. Graph Display 149
Graph 149
The Cursor 150
Zooming and Panning 151

Cropping the Data 155
Formatting the Graph 155
Copying the Graph as a Picture 157
2.4.5. Exporting Data to Excel 157
Export File Settings 158

2.5. Programming MicroLogPRO 159
2.5.1. Setup 159
2.5.2. Auto Setup 169
2.5.3. Saving Setup 171
2.5.4. Defining a Custom Sensor 172
2.5.5. Sensor Calibration 174
Calibration Password 175
Humidity Calibration 176
Temperature Calibration 179

2.5.6. Setting IR Printing Format 180
2.5.7. Communication Setup 181

2.6. Analysis Tools 184

2.6.1. Setting the Analysis Tools Parameters 184
2.6.2. Histogram 185
2.6.3. Pasteurization 187
2.6.4. Statistics 187

2.7. Toolbar Buttons 189

2.7.1. Main (Upper) Toolbar 189
2.7.2. Graph (Lower) Toolbar 192
2.7.3. Cradle Map (Lower) Toolbar 194

Chapter 3 The Cradle 196

3.1. MicroLogPRO Cradle Line 197
3.1.1. Alarm Cradle 197
3.1.2. Wireless Cradle with Alarm 197
3.2. Operating the Cradle 199
3.3. Replacing the Battery 202
3.4. Screw Terminals 203
Chapter 4 The Receiver 209
4.1. Overview 210
4.2. Getting Started 210
4.2.1. Locating the Receiver 210

4.2.2. Receiver Layout.....211
4.2.3. Powering the Receiver 212
4.2.4. Connecting the Antenna 212

4.3. LED Indicators.....213

4.4. Beeper.....215

Chapter 5 External Magnet Antenna 216

5.1. Overview 217

5.2. Connecting the Antenna to the Receiver.....219

5.3. Connecting the Antenna to the Cradle 219

5.4. Preparing the Cradle to work with the External Antenna 221

Chapter 6 External Sensors..... 225

6.1. Temperature -50°C to 110°C (Thermistor-based). 225

6.2. Temperature PT100 Adaptor 226

6.3. Voltage Sensor 227

6.4. Current Sensor 228

6.5. pH Sensor..... 229

6.6. Conductivity 229

6.7. Contact Adapter 230
Specifications 231
MicroLogPRO 231
MicroLogPRO Cradle 236
MicroLab Plus Receiver.....240
Software 242
Appendix: Figures 248
Index 250

Using the Guide

MicroLogPRO is a compact 10-bit data logger used to monitor the temperature and humidity of perishable goods and controlled environments. The MicroLogPRO comes in two models:

- EC750 with built-in temperature and humidity sensors
- EC700 with temperature sensor only

It can also be connected to external sensors in order to monitor additional parameters, and can be mounted onto a cradle for use with the Sound Alarm feature as well as the wireless Daily Download tool.

How to use this Guide

MicroLog Plus is a sophisticated data logging system, which can remotely monitor up to 200 MicroLogPROs simultaneously.
Chapter 1 of this user guide details the operation procedures for MicroLogPRO as a standalone device, as well as instruction on how to work with its software program, MicroLab.
If you are using the wireless MicroLog Plus system, then read Chapter 2, which details the setup and operation of the wireless MicroLog Plus system.
Chapter 3 explains how to run MicroLogPRO connected to a cradle. Chapter 4 covers connecting your MicroLogPRO to a receiver. Chapter 5 explains the use of external antenna while Chapter 6 details connecting the MicroLogPRO to external sensors.

Compliance with FDA Title 21 CFR Part 11

To achieve compliance with FDA Title 21 CFR Part 11, use Fourier Systems' software packages: *MicroLab* or *MicroLab Plus* together with *DatPass*. The DatPass software is Fourier Systems' administration software. Among other features, it defines the users that can log onto the MicroLab/MicroLab Plus software, their passwords and the digital signatures the users are permitted to sign data within electronic records (files). DatPass also maintains an audit trail to keep track of all action performed within the system. The system is secured with a serial port dongle, without which the MicroLab and DatPass software packages will not operate.

Chapter 1 MicroLogPRO

1.1. Overview

MicroLogPRO can be used as a standalone device to monitor temperature and humidity levels. All viewing, exporting and printing of the data obtained is done with just two keys. MicroLogPRO continuously displays the most recent recordings, along with the maximum and minimum values for a selected time interval. Users can also define minimum and maximum alarm levels for a specific shipment, and the display screen will show alarm icons if either level is breached.

(Instructions for using the Sound Alarm feature can be found in section 3.1.1).

The data stored by MicroLogPRO can be downloaded to any computer for further viewing and analysis using the MicroLab software, and can be exported to an Excel spreadsheet.

The data can also be easily transmitted to an infrared printer.

1.2. Getting Started

In order to save battery life, MicroLogPRO is shipped in *Stop Mode*. This means that before you can start recording, you must first connect MicroLogPRO to the PC and set it up with the accompanying MicroLab software. To set up MicroLogPRO with the MicroLab software, refer to section 1.4.

Once MicroLogPRO receives the setup command, it begins logging the data immediately or waits for a predefined time to start logging.

1.3. Working with MicroLogPRO

1.3.1. Data Displays

Current Data

When MicroLogPRO is recording, the data from the sensors is alternately displayed. The data obtained from external sensors is displayed with a small EXT icon.
When MicroLogPRO stores the data, the LCD display briefly changes to a *four dash* (- - - -) symbol.

Minimum and Maximum Values

You can display minimum and maximum values, ranging from the last

1 - 24 hours and from the last 1 - 30 days, by using MicroLogPRO's left and right buttons:

Viewing Min. and Max Values in the last 1-24 Hours

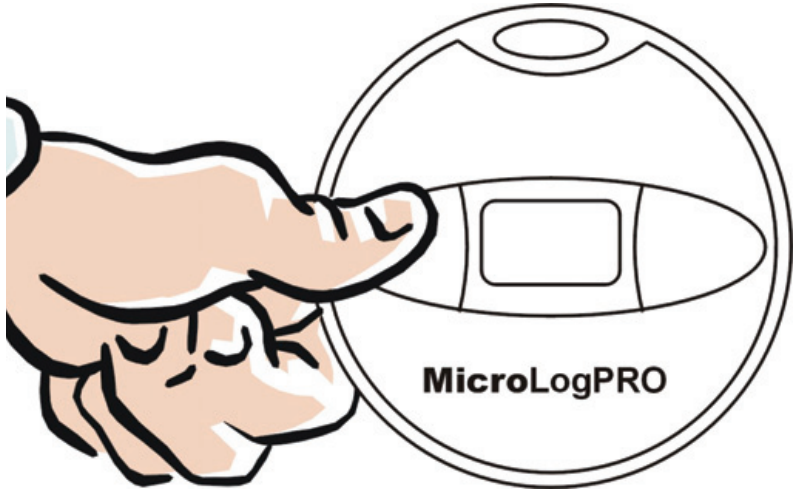
1. Select a time period by pressing the **right** button on the MicroLogPRO. The LCD will begin displaying the hour number, ranging from 1 to 24 hours. Once you've reached the desired time period, release the right

button.

2. Once you've released the right button, MicroLogPRO will display the Min and Max values logged by the sensors during the selected time period.
3. Once the button is released, MicroLogPRO will also send an IR signal of a predefined data options. To receive a printout of this data, simply point the MicroLogPRO to the IR printer (HP portable printer – model No. 82240B).

Viewing Min. and Max Values for the last 1-30 Days

1. Select a time period by pressing the **left** button on the MicroLogPRO. The LCD will display the day number, ranging from 1 to 30 days. Once you've reached the desired time period, release the left button.



2. Once the left button is released, MicroLogPRO will display the Min and Max values of the sensors for the selected time period.
3. Once the left button is released, MicroLogPRO will also send an IR signal of a predefined data options. To receive a printout of this data, simply point the MicroLogPRO to the IR printer (HP portable printer – model No. 82240B).

Status Messages

When both the left and right buttons are pressed simultaneously, the MicroLogPRO LCD will display MicroLogPRO's current working mode and version.

After releasing these buttons, MicroLogPRO will display its internal software version (if the letter H appears next to the version number, this means that this model includes a built-in humidity sensor as well as a temperature sensor)

The status messages include:

– Run

– Cyclic Run

– Timer Run

– Stop Mode

– Downloading data to a PC

– Push to Run

– Sending data to an IR printer

1.3.2. Working Modes

MicroLogPRO is always set in one of 5 possible modes:
Stop – MicroLogPRO is idle and is not recording.
Run – MicroLogPRO is recording data. It will stop recording automatically when its memory has reached full capacity (52,000 samples with one sensor).
Cyclic Run – Similar to Run mode, but MicroLogPRO will record over the old data when the memory is full, beginning with the earliest data recording.
Timer Run – MicroLogPRO can be configured to start recording at a predetermined time. When MicroLogPRO is set for such a run, its status is set to Timer Run.
Push to Run – MicroLogPRO will only begin logging data when the user pushes either the left or right buttons.

1.3.3. Alarm Levels

MicroLogPRO displays an alarm notification whenever any alarm level is exceeded.

AL-L – A sensor's reading is *lower* than its low alarm level.

AL-H – A sensor's reading is *higher* than its high alarm level.

The alarm notification remains until the next time you view Min/Max values or download data to a PC.

To learn how to set alarm levels, refer to page 58.

1.3.4. MicroLogPRO's Connections

Note: MicroLogPRO ships with a rubber plug that covers the rear socket. The plug protects the socket from moisture. Unless you are using the socket, leave the plug in.

Connecting MicroLogPRO to a Computer

For this you will need a serial communication cable (catalog number DT058).

The serial communication cable ends with a type D 9-pin female plug. Plug this in to any free COM port on your computer.

The other end of the serial communication cable ends with a small black flat plug. Plug this end into the socket at the back of the MicroLogPRO.
Note that the socket has three pins, with one further away from the other two. Take care to plug the cable in correctly.

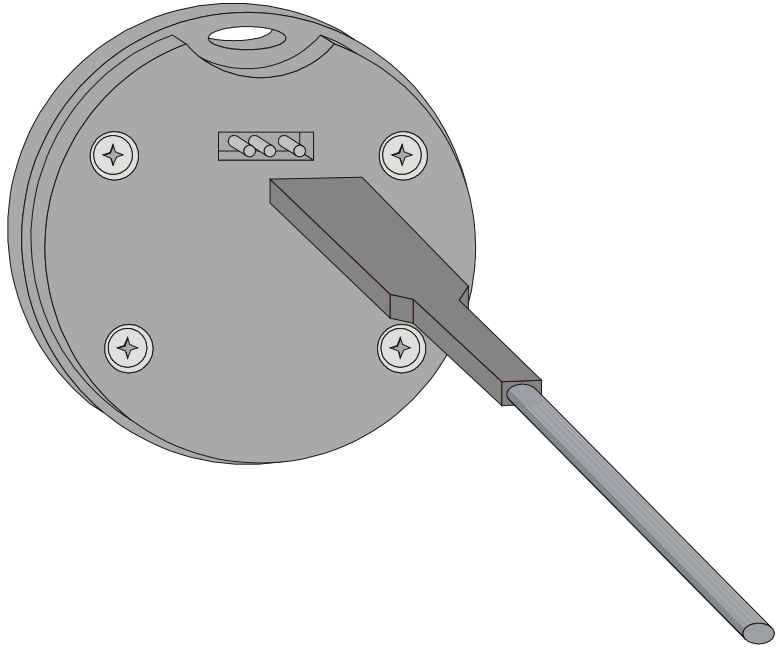


Figure 1: Connecting MicroLogPRO

Note: You can also connect to the PC via the Cradle (refer to page 199).

Connecting MicroLogPRO to an External Sensor

Use the same PC connection socket to connect to an external sensor (see Figure 1).
Note that the socket has three pins, with one further away from the other two (Figure 1). Take care to plug the cable in correctly.

Note: You can also connect the external sensor to the Cradle (refer to page 199).

1.3.5. Sending Data to an Infrared Printer

MicroLogPRO can send data to an infrared printer. There are two formats of data sending. In one format, MicroLogPRO sends the minimum and maximum values of a selected time period up to the last 30 days. The second format enables you to send all data up to 80 rows of data. Programming MicroLogPRO to the desired mode is done via MicroLab software (refer to page 78).

Sending Min/Max Values

1. Select the time period as in viewing the min/max values (refer to page 7)
2. Release the button.
3. Point MicroLogPRO to the IR printer (HP portable printer – model No. 82240B).

The printout includes MicroLogPRO's serial number and comment, alarm levels, the minimum and maximum values for each sensor and the time duration of any breaching of the alarm levels.

Sending all of the Data

1. Point MicroLogPRO to the IR printer.
2. Push any button on the MicroLogPRO logger.

The printout includes MicroLogPRO's serial number and comment, alarm levels, and a table of pre defined number of rows including time column, sensors readings columns and a column with an asterisk for each time any of the alarm levels was exceeded.

1.3.6. Battery Level

MicroLogPRO displays a battery level indicator at the top right corner of the LCD screen – a battery icon with bars in it. Three bars indicate a full battery and an empty icon indicates a low battery that needs replacing.

The MicroLogPRO battery's maximum lifespan is approximately 2 years. This long battery life is achieved by MicroLogPRO putting itself *to sleep* between recordings, or after 4 minutes goes by without communication with the computer. While in sleep mode, the data logger consumes a minimal amount of power.

MicroLogPRO *wakes up* every second for a few micro-seconds in order to check if one of the buttons has been pressed or if there is an incoming message from the

computer. For this reason, you must press and hold a button for at least two seconds before a status message appears.
If you use high sampling rates, the MicroLogPRO battery's lifespan will be considerably shorter (refer to Figure 2 below).

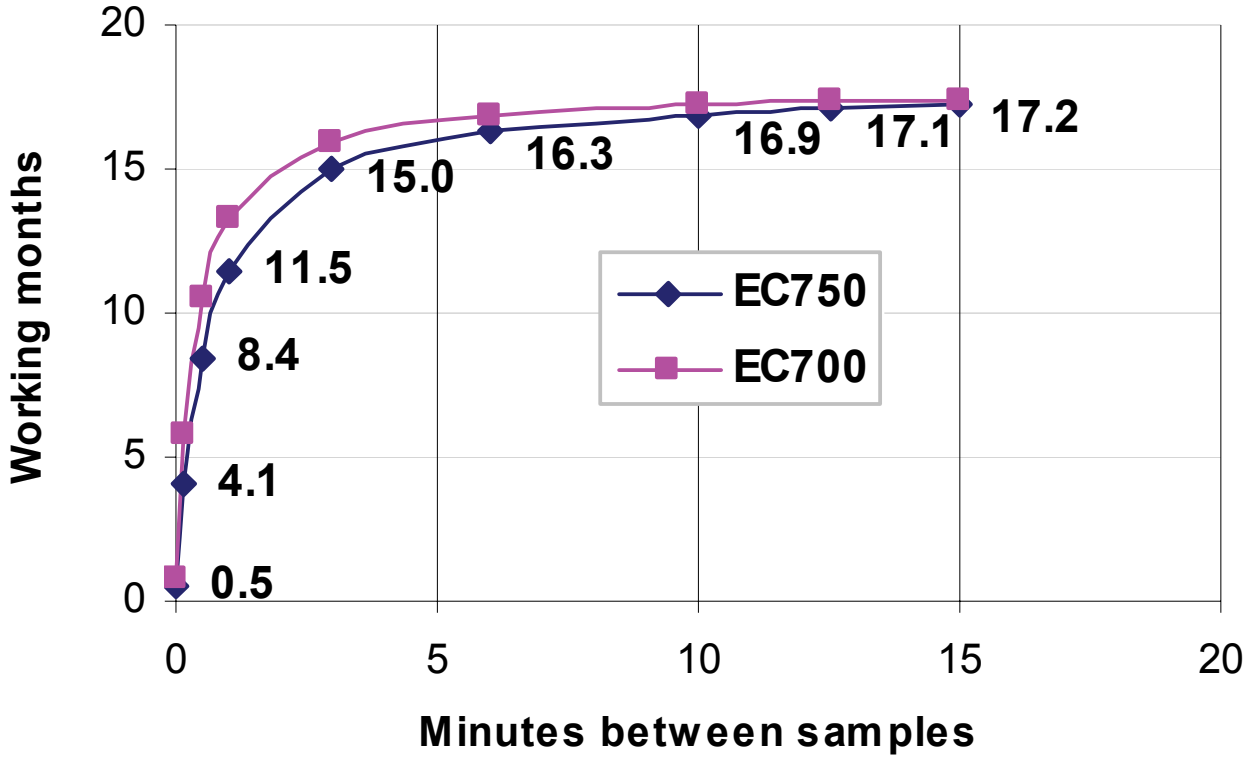


Figure 2: MicroLogPRO battery life

Note: The figures on the graph refer to MicroLogPRO usage without daily download and without viewing min/max values on MicroLogPRO's display.

1.3.7. Replacing the Battery

Warning: The back cover of the MicroLogPRO contains a special compartment for the built-in sensors, which are very fragile. When removing or replacing the cover, be careful not to harm the sensors.

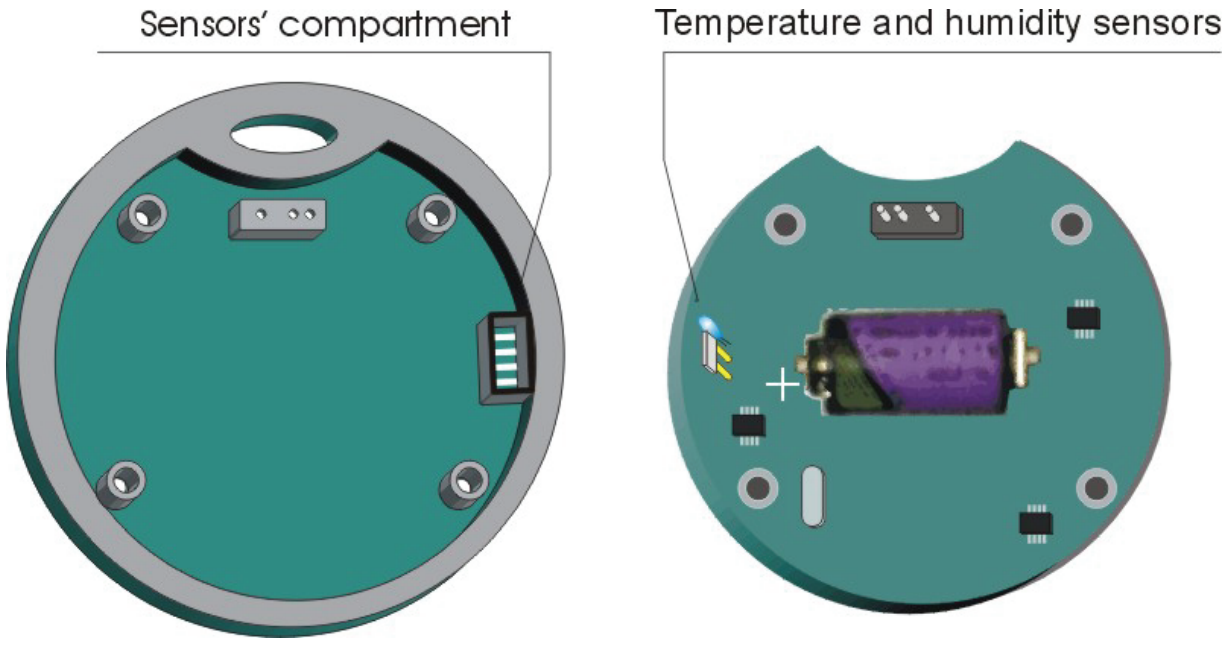


Figure 3: Replacing the battery

Note: The MicroLogPRO uses a 1/2AA 3.6V lithium battery.

1. Unfasten the four screws on the back of the MicroLogPRO.
2. Carefully remove the back cover.
3. Replace the battery, and be sure to insert the new battery into the correct corresponding polarities (look for the “” symbol next to the positive terminal).
4. Carefully reposition the electronic board on MicroLogPRO’s back cover and make sure that the humidity sensor is placed in its compartment.
5. Refasten the four screws on the back of the MicroLogPRO.

1.4. Working with the MicroLab Software

1.4.1. Installation

System Requirements

To work with MicroLab, your system should be equipped with the following:

Software

- Windows 95 or later (Windows 95 will not support USB).
- Internet Explorer 4.0 or later (you can install Internet Explorer 5 when you install MicroLab Plus, as it ships with the product).

Hardware

- Pentium 300MHz or higher
- 32 MB RAM (64 MB recommended)
- 5 MB available disk space for the MicroLab application

Installing the Software

1. Insert the CD into your CD drive.
2. The installation will start automatically. Once the process begins, follow the on-screen instructions.
3. If auto run is not working, open the CD drive folder and double-click the setup icon, then follow the on-screen instructions.

To uninstall the software: From the Start menu select Settings > Control Panel, and use the **Add/Remove Programs** tool to remove the MicroLab application.

To install the USB driver (optional for cradle communication):

1. Insert the CD into your CD drive. If Installation begins automatically (and you have already installed MicroLab), click **Cancel** to stop installation.
2. Connect the Cradle to a USB port on your PC. Windows will automatically detect the new device and open the **Add New Hardware Wizard.**
3. Select **Specify the location of the driver**, and then click **Next.**
4. Select **Search for the best driver for your device**, then check the **Removable Media** checkbox, and click **Next.**

Windows will automatically detect and install the necessary software.

1.4.2. Overview

The **MicroLab** software was designed to allow for the programming of the desired data recording specifications for MicroLogPRO, to enable the downloading of recorded data to a PC, and to store, view and analyze the data.

The **Logger** menu handles all communication between the PC and MicroLogPRO, such as programming the desired recording mode, starting or stopping data recording, as well as downloading the data.

The **View** menu controls the various data display options. Data can be viewed in graph format, in table format, or in both. The **Data Map** is a separate pane that displays a list of the open data sets. It can also be used to quickly navigate through the data sets.

The **Graph** menu contains all the commands needed to format and edit the graph.
The most common tasks and commands are available as buttons on the **main toolbar** and on the **graph toolbar**.

1.4.3. Getting Started

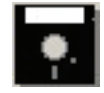
Downloading Data

1. Connect MicroLogPRO to the PC.
2. Open the MicroLab software.
3. Click **Download**  on the main toolbar.

Once the downloading has been completed, the data will be displayed both in the graph and in the table, and a new data icon will be added to the Data Map.

You can now connect a different MicroLogPRO to the PC and download its data. The number of downloads is limited only by the memory available on the computer.
Use the Data Map (refer to page 40) to navigate between the different data sets.

Saving Data

To save the displayed data, click **Save**  on the main toolbar. The data currently displayed by the graph will be saved in the MicroLogPRO Data folder:

C:\Program Files\Fourier Systems\MicroLogPRO\MicroLogPRO Data

The data file name consists of the MicroLogPRO name (Comment, refer to page 59) and of the time and date at which it was saved.

To save data in a different location or under a different name, use the **Save as…** command from the File menu:

1. Select **Save as…** from the **File** menu.
2. Enter a new name in the File name box.
3. To save the data in a different folder, select a drive and/or folder from the **Save in** dialog box.
4. Click **Save.**

If you've downloaded data from more than one MicroLogPRO and you want to save all the data sets, select **Save all** from the **File** menu.

If you are using the *Daily Download* option, data will be saved automatically.

Note: If you want to remove unwanted data before saving, apply the crop tool (refer to page 48).

Opening Files

1. Click **Open**  on the main toolbar.
2. To open a document that was saved in a different folder, select a drive and/or folder in the **Look in** dialog box.
3. Double-click the file you want to open.

Displaying Properties

You can change the way numbers and dates will be displayed on screen.

1. Click **File** on the main menu, and then click **Display properties**.

2. Under **Decimal place settings**, enter the number of decimal places you want to display (enter a number between 0 and 4) for each sensor.
3. Under the **Date format settings**, select the desired format option.
4. Click **OK**.

Printing a Graph

1. Click **Print**  on the main toolbar to open the **Print Options** dialog box.
2. Click the **Graph** option.
3. Click **Print** to open the **Print** dialog box.
4. Click **OK**.

Printing a Table

The displayed data can also be printed as a table. The table will only include data from sensors that are currently represented on the graph (to learn how to add or remove data sets from the graph, refer to page 40) as well as the MicroLogPRO name, serial number and the alarm level setup. Data that exceeds any of the alarm levels will be highlighted by arrows.

1. Click **Print**  on the main toolbar to open the **Print Options** dialog box.
2. Click the **Table** option.
3. If you want to print only part of the data, uncheck the check box and select the desired time and date in the *From* and *To* boxes.

4. Click **Print** to open the **Print** dialog box and click **OK**.

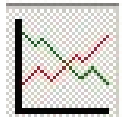
1.4.4. Viewing the Data

Display Options

MicroLab's main window consists of three parts: the graph, the table and the Data Map. You can display all three parts simultaneously (the default view) or any combination of them.

If you are using the Daily Download option, you can also display a daily status window (refer to page 86).

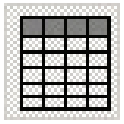
Graph

Click **Graph**  to display or remove the graph. The graph displays the data sets plotted vs. time. The graph usually displays all the data sets of a given MicroLogPRO, but you can use the Data Map to remove one or more of the sets from the graph (refer to page 40).

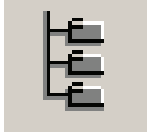
In order to keep the graph clear and simple, only two Y-axes can be shown on the graph simultaneously. If there are three curves in the graph, one of the Y-axes will be hidden. To make this axis visible, select the corresponding plot with the cursor (refer to page 42).

You can identify the Y-axis by its color, which matches the plot color.

Table

Click **Table**  to display or remove the table.
The data in the table always matches the data that is currently displayed on the graph.

Data Map

Click **Data Map**  to display or remove the Data Map.

The Data Map is a separate window that displays the list of data sets that were downloaded or opened in the current session. Use the Data Map to navigate through the available plots and to keep track of the data that is displayed in the graph and/or table windows.

When you double-click on a MicroLogPRO icon  in the Data Map, MicroLab jumps to the corresponding data and displays it in the graph and table windows. It also expands the Data Map to show the individual sensors included with the selected MicroLogPRO.

A graph icon  indicates that the data set is currently being displayed. Double-click on the icon to clear the data set from the display.

An empty icon  indicates that the data set is not being displayed. Double-click on the icon to add the data set to the display.

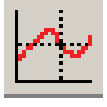
To collapse the sensor list under an individual MicroLogPRO, click the minus sign (-) next to the MicroLogPRO icon.

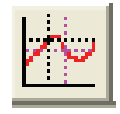
To display the complete sensor list under an individual MicroLogPRO, click the plus sign (+) next to the MicroLogPRO icon.

To remove an individual MicroLogPRO from the Data Map, right-click on its icon, then click **Remove data**.

To remove all data sets from the Data Map, right-click the Data sets icon  , then click **Remove all data**.

The Cursor

Use the cursor to view individual data recording values, or to reveal a hidden Y-axis. MicroLab enables you to display up to two cursors simultaneously.
To display the first cursor, double-click on an individual data point or click **Cursor**  on the graph toolbar. You can

drag the cursor with the mouse to any other point on the plot, or to another plot altogether.
The point coordinates of the selected data recording will appear in the status bar at the bottom of the graph window.
To display a second cursor, double-click anywhere on the graph or click **Second cursor**  on the graph toolbar.

Zooming and Panning

1. Zooming

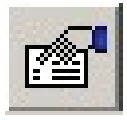
Click **Zoom in**  on the graph toolbar and drag the cursor diagonally to select the area you want to magnify. Release the mouse button to zoom in to the selected area.
Click on the **Zoom in** button a second time to turn off the Zoom tool.

2. Autoscale

Click **Autoscale**  on the graph toolbar for the full data display.

Double-click on an individual axis to auto scale it separately.

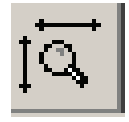
3. Manual scaling

a. Click **Graph properties**  on the graph toolbar to open the **Graph Properties** dialog box.

b. Select the **Scale** tab, and choose the axis you want to scale in the **Select axis** drop-down menu.

c. Unselect the **Auto scale** check box and enter the new values in the value fields.

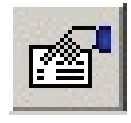
d. In the time axis, you can either enter the time and date manually, or select it with the up and down arrow buttons.
e. Click **OK**.

To restore auto scaling, click **Autoscale**  .

4. Default zooming

If you usually need to view a specific time frame (i.e. workday hours), use the Default zooming tool. You can set the start and end time of the time span and then use it whenever you open a file or download data from the MicroLogPRO.

To set the default zoom:

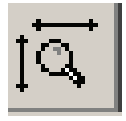
a. Click Graph Properties  on the graph toolbar, then click **Set Default Zoom**.

b. Enter the start and end times, then click **Set**.

To zoom to the default zoom:

a. Click **Graph Properties**  on the graph toolbar.
b. Check the **Use default zoom** check box and click **OK**.

Every file and every data recording you download will automatically open in the default zoom as long as the **Use default zoom** check box remains selected.

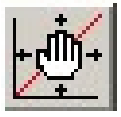
To restore auto scaling, click **Autoscale**  .

5. The Stretch/Compress Axis Tool

Move the cursor onto one of graph axes. The cursor icon changes to a double arrow symbol (↔), indicating that you can stretch or compress the axis scale. Drag the symbol to the desired location. Repeat the procedure for the other axis, if necessary.

6. Panning

Use the pan tool after zooming any part of the graph that is outside the zoomed area.

To do so, click **Pan**  on the graph toolbar, then click anywhere on the graph and drag the graph to view another area.

Click **Pan** a second time to turn off the Pan tool.

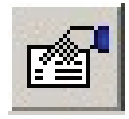
Cropping the Data

Cropping enables you to trim the edges of a data set. Use it to remove unwanted data.

1. Zoom to the data range you want to keep.
2. Click **Graph** on the menu bar, then click **Crop**.
   All data outside the zoomed area will be **permanently** removed.

Formatting the Graph

You can change a data line's color, style or width. You can also add markers that represent the data points on the graph and format their style and color.
The Y-axis color matches the corresponding plot's color and will change accordingly. The time axis color can be changed separately:

1. Click **Graph properties**  on the graph toolbar to open the **Graph Properties** dialog box.
2. Select the **Lines** tab, then select the plot or axis you want to format in the **Select plot** drop-down menu.
3. From here, you can format the line's color, style and width, as well as the markers' color and style. To

remove the line or the marker, uncheck the corresponding visible check box.

4. To restore the default formatting, click **Restore default**, and click **OK**.

Displaying Alarm Levels

1. Click **Display alarm level**  .
2. Select the sensor you wish to display from the **Select sensor** drop-down menu 

Changing the Temperature Units

Click **Toggle °C/°F** button 

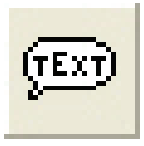
to change the temperature scale from Fahrenheit to Celsius and vice versa.

Note: To change the units in the MicroLogPRO display, use the **Setup** dialog box (refer to page 58).

Adding Annotations to the Graph

MicroLab allows you to add annotations to the graph. An annotation is always attached to a specific data point.

To add an annotation:

1. Place the cursor on the point to which you want to add the annotation.
2. Click **Add new annotation** 

on the graph toolbar
3. Type the annotation in the **New annotation caption** text box.
4. Click **OK**.

To move an annotation:

1. Click **Move annotation**  on the graph toolbar
2. Drag the annotation to any location on the graph you choose.
3. Click **Move annotation** a second time.

To edit an annotation:

1. Place the cursor on the point to which the annotation is attached.
2. Click **Graph** on the menu bar.
3. Click **Edit annotation.**
4. Edit the annotation in the text box.
5. Click **OK.**

To delete an annotation:

1. Place the cursor on the point to which the annotation is attached.
2. Click **Graph** on the menu bar.
3. Click **Delete annotation.**

To hide all annotations:

1. Click **Graph** on the menu bar.
2. Click **Show annotations** to uncheck it.

Exporting Data to Excel

Click **Export to Excel**  to export the currently displayed data to an Excel spreadsheet. MicroLab will open a new

Excel workbook displaying the data along with the MicroLogPRO info, including the MicroLogPRO name, serial number and alarm levels setup.

Export File Settings

If MicroLab Plus fails to export the data properly i.e. all of the data is displayed in one row of the worksheet, you can change the export file settings. This ensures that the data is exported using comma separated values (CSV).

1. Click **File** on the main menu, then click **Export file settings,**
2. Select the **Ignore regional settings** check box.
3. Click **OK.**

Copying the Graph as a Picture

You can copy the graph to the clipboard as a picture and then paste it into other Windows programs, such as Word and PowerPoint:

1. On the **Graph** menu, click **Copy graph**.
2. Open the destination file.
3. In the destination file, right-click and select **Paste**.

Viewing more than one data set on the graph

MicroLab lets you view more than one data set in Graph and Table view at the same time, allowing you to compare the data from several data sets side by side.

Note: To use this feature the data sets must have been recorded using the same sampling rate e.g. every 1 minute

There are two modes when using the Multi-graph feature:

- Standard mode

The time scale of all data on the graph is the same. The time and date of data recorded in the first data set included on the graph is used.
For example, if you have a graph whose data was recorded starting 10:00AM on August 11, then all additional data added to the graph will be displayed with the same recording date.

The MicroLab data table below shows all data in the graph having the same time scale:

		MicroLog PRO	MicroLog PRO 3	MicroLog PRO 4
	Time (Date)	Humidity (%)	Temperature (°C)	Temperature (°C)
0	10-Aug-06 16:53:50	39.0	25.90	22.80
1	10-Aug-06 16:54:00	39.1	25.90	22.80
2	10-Aug-06 16:54:10	39.1	25.90	22.80
3	10-Aug-06 16:54:20	39.1	25.90	22.80
4	10-Aug-06 16:54:30	39.1	25.90	22.80
5	10-Aug-06 16:54:40	39.1	25.90	22.80
6	10-Aug-06 16:54:50	39.2	25.90	22.80
7	10-Aug-06 16:55:00	39.2	25.90	22.80
8	10-Aug-06 16:55:10	39.2	25.90	22.80
9	10-Aug-06 16:55:20	39.1	25.90	22.80

- Plot sync mode

To display data on the graph using the data's actual time scale i.e. the time and date when the data was actually recorded, use the **Plot sync** feature. This will also shift all data in the data table accordingly.

Once you've added the data to the graph, on the **Graph** menu, select **Plot sync** to enable the feature. To return to Standard mode, unselect **Plot sync**.

Note: The time scale of all data is rounded to the same resolution as the time scale of the original data on the graph.

1.4.5. Programming MicroLogPRO

Setup

Use the **Setup** dialog box to view or change the MicroLogPRO and Cradle settings.

Note: If you intend to setup more then one MicroLogPRO or Cradle, use the **Save Setup** tool (refer to page 68).

1. Connect MicroLogPRO or the Cradle to the PC.

2. Click **Setup** 

to open the **Setup** dialog box.

The dialog box consists of five sections:

- **MicroLogPRO info**

Comment

Click the text box and type a name that will serve to identify the specific MicroLogPRO (e.g. its location).

S/N

Displays the MicroLogPRO's serial number.

Battery Level

If the indicator is in the red zone the battery should be replaced (refer to page 24).

- **Cradle info**

Cradle ID

The cradle's identification number sets the cradle's transmission time in daily download mode.

Battery Level

If the indicator is in the red zone, the battery should be replaced (refer to page 202).

- **Setup**

Temperature

Select the **Temperature** check box to activate the internal temperature sensor.

Humidity

Select the **Humidity** check box to activate the internal humidity sensor.

External

Select the **External** check box to activate the external sensor option, and then select a sensor in the drop-down menu.

If you want to use a sensor that is not found in the drop-down menu, you can define a new sensor (refer to page 76).

Note: The sensors' current readings will appear next to the sensor name once MicroLogPRO begins logging for the first time.

Temperature unit

To set the temperature unit in the MicroLogPRO display, select the option you want (Celsius or Fahrenheit).

Interval

This determines the logging interval, or the time interval between successive data recordings.
The time format is hh:mm:ss. Set the time setting to select a recording time interval from 10 seconds to 2 hours. For example, to set a time interval of one hour, five minutes and thirty seconds, click the hours (hh) and type 1 or use the arrows to select 01. Click

the minutes (mm) and type 5 or use the arrows, and finally, click the seconds (ss) and type 30 or select 30 using the arrows.

Timer run

Select the **Timer run** check box if you want MicroLogPRO to start recording at a predetermined time. This option is convenient if you are using several MicroLogPROs at once and want them to all begin logging at the same time.
Use the time and date selectors to set the start time.

Cyclic run

In **Cyclic run** mode, MicroLogPRO overwrites the old measurements (starting with the oldest recorded data) once the MicroLogPRO's memory is full. Click the **Cyclic run** check box to operate in this mode.

If the check box is clear, MicroLogPRO will operate in **Normal run** mode and will stop recording when the memory is full.

Push to run

In **Push to run** mode, the MicroLogPRO will only start recording data when you press either the left or right logger button. It is convenient for when you wish to start recording data soon (but not immediately) following setup, or at an unspecified time.

Daily download

Select the **Daily download** checkbox to enable automatic daily download (refer to page 81 for details).

- **Alarm levels**

Type in the desired minimum and maximum alarm levels. If MicroLogPRO records a reading that exceeds either of these levels, the MicroLogPRO's LCD will display alarm notification and the cradle's alarm will sound.

To remove the alarm sign from the display, press either of MicroLogPRO's two buttons. To stop the cradle's alarm from sounding, press both of the MicroLogPRO's buttons simultaneously.

The default alarm levels are the lower and upper ends of the sensors. Click **Cancel Alarm** to restore the default levels.

- **Alarm time settings**

Workday hours

Use the up and down arrow buttons to set the daily period when you want the Alarm and/or the Daily Download to be active, or type the desired period in manually.

Alarm delay

Use the drop-down menu to select the time delay between the time MicroLogPRO records a reading that exceeds the alarm levels and the time the alarm will sound.

Alarm duration

Use the drop-down menu to select the time for which the alarm will sound before it stops automatically.

Completing the Setup

Click **Send Setup** to send the new settings to the MicroLogPRO. This will complete the setup. Click **Cancel** if you do not wish to change the setup at this stage.

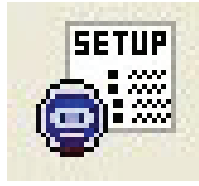
Note: The **Send Setup** command erases all existing data in the MicroLogPRO.

If you select **Timer run** mode, MicroLogPRO will wait in standby mode, displaying  . It will begin recording at the specified time.

Saving Setup

When setting up multiple MicroLogPROs or Cradles, use the **Save Setup** option in the **Setup** dialog.

1. After you have finished the settings selection of the first MicroLogPRO or Cradle and before sending the setup command, click **Save Setup** to save all of the setup settings.

2. Connect another MicroLogPRO or Cradle to the PC and click **Setup** 

on the main menu.
3. Click **Load Setup** to load your setup settings.
4. Change the Cradle ID.
5. Change the Comment (optional).
6. Click **Send Setup**.

Starting Data Recording

Click **Run**  every time you want to start a new recording. The **Run** command erases all previous data in the MicroLogPRO's memory and begins recording.

Note: If you setup the MicroLogPRO using the Setup command, it will automatically begin recording, and you don't have to click **Run**.

Stopping Data Recording

Click **Stop** 

to stop recording. In Stop mode, MicroLogPRO keeps all recorded data but does not record new data. Use this mode to save battery power.

Sensor Calibration

A new MicroLogPRO comes fully calibrated. After a long period of use however, you may want to recalibrate the humidity or the temperature sensors.

The calibration affects both MicroLogPRO and MicroLab and should be carried out while MicroLogPRO is connected to the PC.

Calibration Password

To prevent accidental change of the calibration, the calibration procedure is protected by a password. The default password is: 1234. To change the password:

1. Click **Logger** on the main menu, then click **Calibration**.
2. Click **Change Password** to open the **Change Password** dialog box.
3. Enter the current password in the **Current Password** field.
4. Enter the new password in the **New Password** field.
5. Enter the new password a second time in the **Confirm New Password** field to confirm your new password.
6. Click **OK**.

Note: The password must include at least 4 characters and is **case sensitive.**

Humidity Calibration

To calibrate the humidity sensor you will need a humidity chamber.

1. Connect MicroLogPRO to the PC.
2. Set up MicroLogPRO to record every 10 seconds (refer to page 58).
3. Click **Logger** on the main menu, then click **Calibration**.
4. Enter the calibration password, then click **OK**.
5. Select Humidity in the **Choose sensor** drop-down menu.

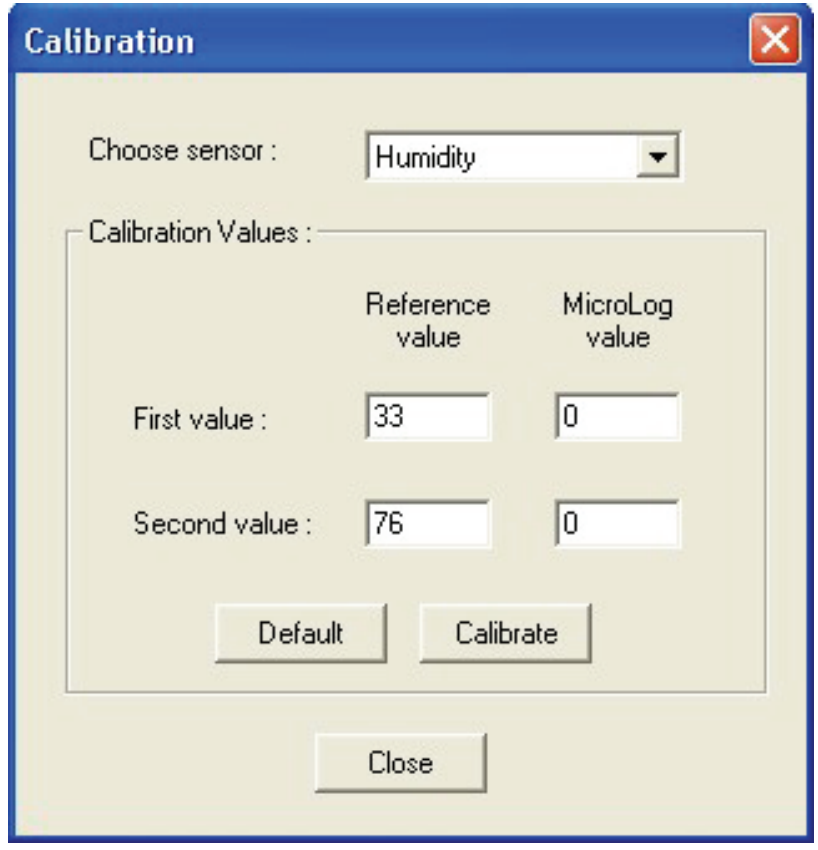


Figure 4: Humidity calibration

6. Click **Default** to restore the original values.

7. Disconnect MicroLogPRO from the PC and insert it into the humidity chamber.
8. Set the humidity chamber to the first reference value. Wait until the humidity level is stabilized and write down MicroLogPRO's reading.
9. Repeat the last step with the second reference value.
10. Connect MicroLogPRO to the PC.
11. Enter the two MicroLogPRO values into the MicroLogPRO value text boxes.
12. Enter the two reference values into the Reference value text boxes.
13. Click **Calibrate**.

To restore default calibration, click **Default**.

Temperature Calibration

1. Connect MicroLogPRO to the PC.
2. Click **Logger** on the main menu, then click **Calibration**.
3. Enter the calibration password, then click **OK**.
4. Select the desired temperature sensor in the **Choose sensor** drop-down menu.
5. Click **Default** to restore the original values.
6. Enter the two MicroLogPRO values into the MicroLogPRO value text boxes.
7. Enter the two reference values into the Reference value text boxes.
8. Click **Calibrate**.

To restore default calibration, click **Default**.

Defining a Custom Sensor

You can use MicroLogPRO with any sensor that has a 0 – 20mA current output or a 0 – 10V voltage output.

1. Click the **Logger** on the main menu and then select **Define new sensors** to open the **Define New Sensor** dialog box.
2. Click **Add** to add a new sensor to the list.
3. In the **Based on** drop-down menu, select an external sensor that matches your sensor's output.
4. Type the sensor's name in the **Sensor Name** text box.
5. Type the sensor's unit in the **Sensor Unit** text box.
6. In the **Calibration Values** section, enter two values of your sensor that correspond to the base sensor values. For example, see the definition for a 0 – 100mbar pressure sensor whose output is 0 – 20mA:

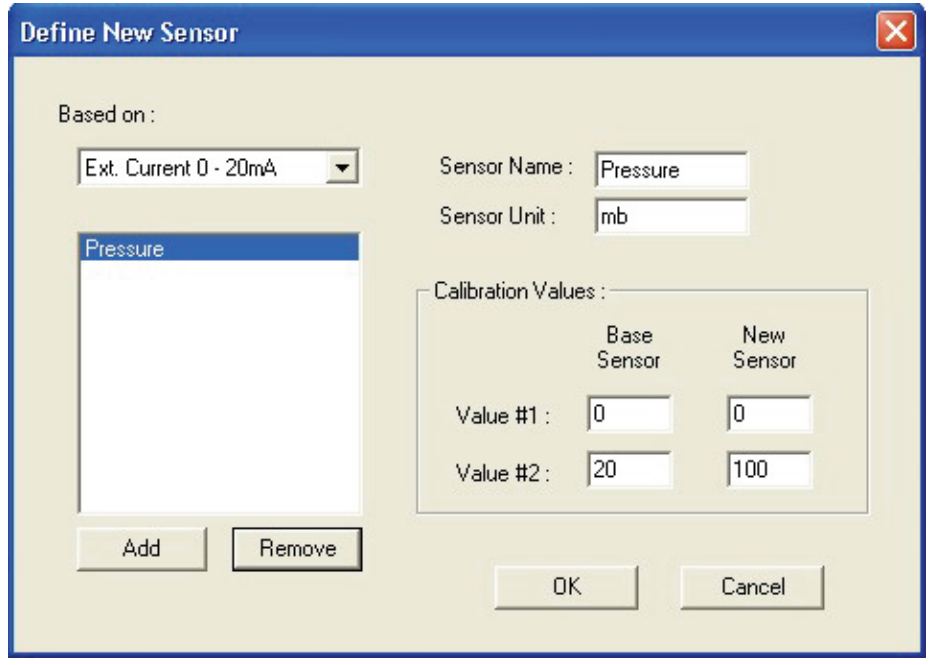


Figure 5: Defining a new sensor

7. Click **OK**.

The new sensor will then appear in the External Sensor list in the **Setup** dialog box.

Setting IR Printing Format

1. Connect the MicroLogPRO to the PC.
2. Click **Logger** on the menu toolbar, then click **MicroLogPRO IR Print Settings**:

Figure 6: IR Print Settings dialog box

3. Select a format option:
    a. Print Format 1 – Prints the minimum and maximum values of a selected time period up to the last 30 days (refer to page 20).
    b. Print Format 2 – Prints all data up to 128 rows of data
4. If you selected *Print Format 2*, enter the desired number of rows (up to 128).
5. Click **OK.**

Communication Setup

Communication between the PC and the MicroLogPRO unit takes place automatically whenever you send a command to MicroLogPRO. However, the Communication Setup dialog box can be used for more advanced communication options.

Click **Logger** on the main menu and select **Com setup** to open the **Communication Setup** dialog box:
If you are not using a Receiver and Cradle, uncheck the **Search for Receiver and Cradle** checkbox in order to speed up the search.

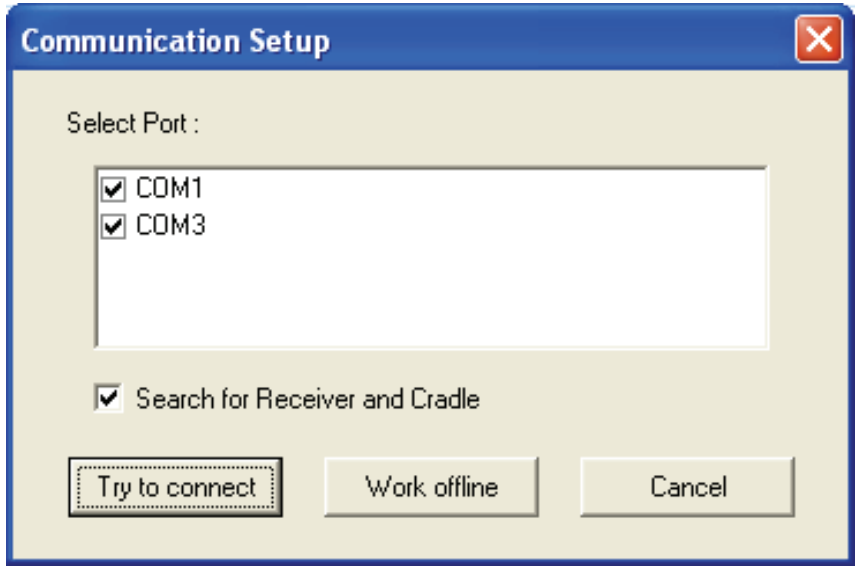


Figure 7: Communication Setup dialog box

The selected COM ports are available for communication.

1. Click **Try to connect** to establish communication.
2. Click **Work offline** to work with saved files.

1.4.6. Automatic Daily Download

You can program all the MicroLogPROs on your line to automatically transmit their data to a PC every day, at a preset time.

To work with this option you will need to mount the MicroLogPROs onto wireless Cradles (refer to page 196) and connect a Receiver to the PC (refer to page 209).

Prepare the MicroLogPRO.

To prepare a cradle with the MicroLogPRO for daily download:

1. Connect the cradle to the PC (refer to page 199).
2. Setup the MicroLogPRO and cradle (refer to page 58).

Notes:

- Enter an identification number for the cradle in the **Unit ID** text box. The number should be an integer between 1 and 200. Every cradle should have a different ID number. (For added convenience, we recommend attaching a label with the ID number to every cradle).
- The recording interval must be equal to or greater than 1 minute for recording data from one sensor, 2 minutes for 2 sensors and 3 minutes for 3 sensors.

3. Check the **Daily download** checkbox.

4. To set the download time and file location, click **Daily download** at the bottom of the setup dialog to open the **Daily download** dialog box.
5. Enter the desired download time in the **Download start time** field.

MicroLab automatically calculates and sets the cradles' transmission times according to their ID numbers, so that the cradles will transmit the data successively.

6. MicroLab creates a new daily download file every 24 hours. Set the time at which these files are created in the **Create new daily download file at** field.
7. For advanced file management, check the **Auto file management** check box.
   In this mode, MicroLab searches in every download for previously missing data and updates the corresponding files.

8. MicroLab stores the data files in the following folder by default:
   C:\Program Files\Fourier Systems\MicroLab\MicroLogPRO Data\Daily download.
   If you want to store your data in another location, click **Browse** and navigate to the desired folder.
9. Click **OK** to return to the **Setup** dialog.
10. Click **Send Setup**.
11. Repeat this procedure (except for steps 4 to 9, which should be performed only once) with every cradle. Remember to assign a different ID number to each cradle.
12. After you have finished setting up all your cradles, connect the RF receiver to the PC (refer to page 209).
13. Click **Logger** on the main menu, then click **Com setup** to open the **Communication Setup** dialog box.

Make sure that the **Search for Receiver and Cradle** checkbox is selected.

14. Click **Try to connect** to establish communication with the receiver.
15. Place the cradles at the desired data logging locations.

Automatic Download

At the download start time the cradles should be within 300m of the receiver and in its line of sight. The cradles will automatically transmit the data one after the other according to their ID number. The time interval between successive transmissions is two minutes.

MicroLab automatically saves the data after every transmission under the name: *daily download [&date].* After the daily download has been completed, the file will

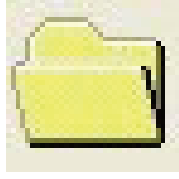
automatically be closed. MicroLab creates a new data file every 24 hours.

Manual Transmission

If one of the cradles fails to transmit data automatically, or if you need to download all data from a specific cradle (not just data that was recorded during working hours), press the **Trs** (Transmit) button on the right side of the cradle (refer to page 199). The cradle will then transmit all stored data to the PC.

Viewing Daily Download Data and Status

To open a daily download data file:

1. Click **Open**  on the main toolbar.

2. Navigate to the folder in which the daily download data files are stored.
3. Double-click the file name to open the file.

MicroLab prompts to a daily summary of the automatic download. The summary includes a list of the MicroLogPROs that have completed their data download, along with their respective cradle's battery level, transmission status and indication as to whether or not alarm levels were exceeded.

4. Click **OK** to close the **Summary** window and to display the data.

1.4.7. Analysis Tools

Setting the Analysis Tools Parameters

1. Click **Analysis** on the menu bar, then click **Set Functions' Parameters** to open a dialog box:

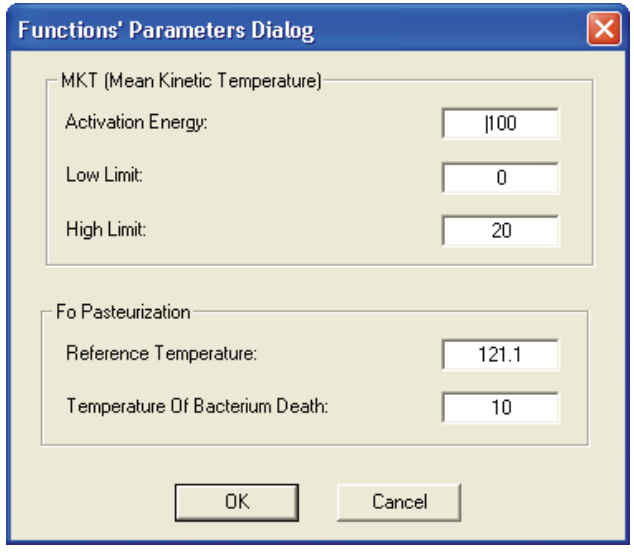


Figure 8: Functions Parameters

2. Type in the desired parameters, then click **OK.**

Histogram

Use this tool to create a frequency distribution of the selected data set.
To create a histogram:

1. Use the cursor to select a plot on the graph.
2. Click **Analysis** on the main menu bar, then click **Histogram.**

MicroLab displays a histogram of the selected data and creates a new entry in the Data Map.
Use the Data Map (refer to page 40) to hide the histogram or to return to the original data sets.

You can modify the histogram to your needs. You can set the upper limits of the first bin and the lower limit of the last bins, and refine the histogram by increasing the number of bins.

To modify the histogram:

1. Click **Analysis** on the main menu, then click **Histogram** a second time to open a dialog:

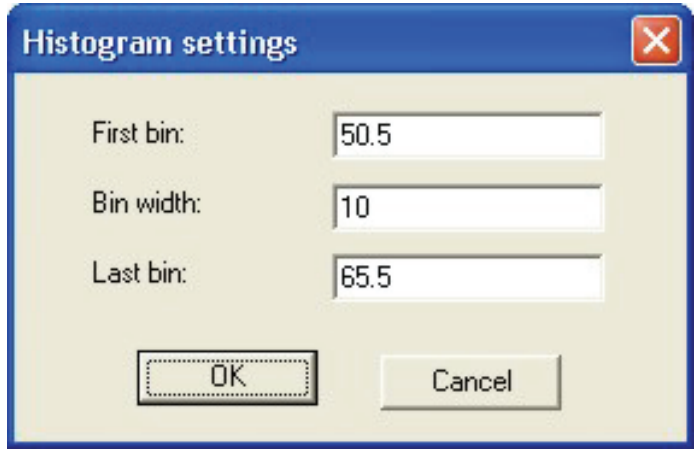


Figure 9: Histogram settings

2. Enter the desired values for the first bin, the bin width and last bin, then click **OK.**

You can repeat the process for further modification.

Pasteurization

Use this tool to create and display an FO Pasteurization curve:

Click **Analysis** on the menu bar, then click **FO pasteurization.**

Statistics

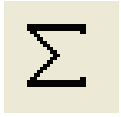
Use the statistics tool to display statistics of each data set in the graph.

The statistics include:

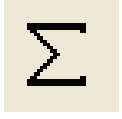
Minimum – The smallest value in the data set.

Maximum – The largest value in the data set.
Average – The average of all the numbers in the data set.
MKT – The mean kinetic temperature (for temperature data only).

To display statistics:

Click **Statistics**  on the main toolbar.

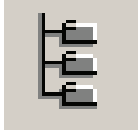
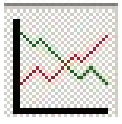
MicroLab will display the statistics in the information bar at the bottom of the graph window.

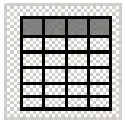
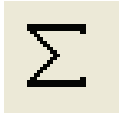
To hide the statistics, click **Statistics**  a second time.

1.4.8. Toolbar Buttons

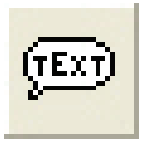
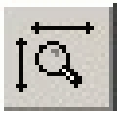
Main (Upper) Toolbar

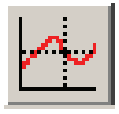
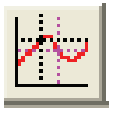
	*Open*	Opens saved files
	*Save*	Saves the data that is currently displayed
	*Print…*	Opens the Print Option dialog box
	*Export*	Exports the displayed data to an Excel spreadsheet

	*Run*	Begins recording data
	*Stop*	Stops recording data
	*Setup*	Opens the Setup dialog box
	*Download*	Downloads data from the MicroLogPRO onto the PC
	*Data Map*	Displays or removes the Data Map
	*Graph*	Displays or removes the graph

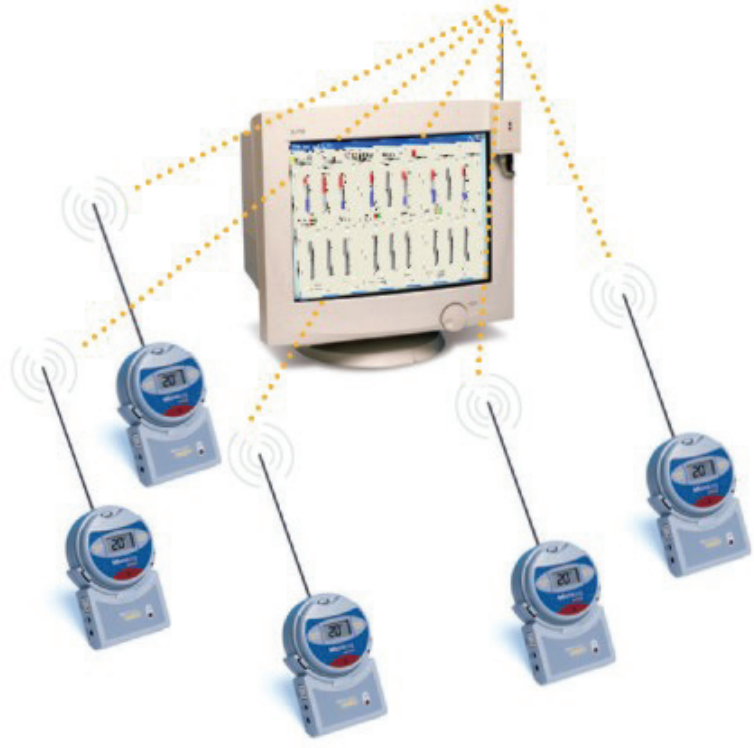
	*Table*	Displays or removes the table
	*Statistics*	Displays or removes the data's statistics
	*°C/°F*	Displays the desired unit of temperature
	*Alarm*	Displays or removes alarm levels from the graph

Graph (Lower) Toolbar

	*Add annotation*	Adds new annotation to the graph
	*Move annotation*	Relocates the annotation on the graph
	*Zoom in*	Activates the zoom tool
	*Pan*	Activates the pan tool
	*Autoscale*	Returns the graph to full view

 *Graph properties*	Opens the Graph Properties dialog box
 *Cursor*	Toggles the first cursor
 *Second cursor*	Toggles the second cursor

Chapter 2 MicroLab Plus



2.1. Overview

The MicroLog Plus solution enables simultaneous, wireless communication between a PC and up to 200 MicroLogPRO units. Furthermore, real-time temperature and humidity readings from the MicroLogPRO are automatically delivered directly to the PC. Data from external sensors can also be transmitted in the same manner. The complete MicroLog Plus solution includes the MicroLogPRO data logging device, the cradle that the data logger is mounted on, a small receiver that is placed on the PC, and the user-friendly software that allows for convenient central management.

MicroLog Plus uses MicroLogPRO data loggers to record temperature and humidity readings. The cradle that the data logger is mounted on is a wireless transmitter that can transmit measurements to a PC from up to 300 meters.

Since each cradle is tagged with an ID number, the cradles can be programmed to transmit data at various time intervals based on the criteria defined in their IDs. This advanced feature prevents data collision between two or more loggers.
The **MicroLab Plus** software reports on the status of up to 200 MicroLogPROs on a single color-coded interface. Other features that help automate all aspects of the industrial data logging procedure include the ability to store the data of each MicroLogPRO, to set MicroLogPRO alarm levels and to define sampling intervals, as well as any other necessary parameters.
The **Logger** menu handles all communication between the PC and MicroLogPRO, such as programming the desired MicroLogPRO and Cradle, calibrating sensors, as well as defining new sensors.

The **View** menu controls the various data display options. Online data can be viewed in multiple meters format (the default view), in multiple graph format, or Cradle Map format. The stored data can be viewed on an offline graph and table.
The **Offline Graph** menu contains all the commands needed to format and edit the graph.
The **Cradle Map** menu contains all the commands needed to setup and edit the map.
The **Multiple Graphs** menu contains all the commands needed to view and edit the graphs.
The most common tasks and commands are available as icons on the **Main toolbar** (upper toolbar), the **Graph toolbar** (lower toolbar) and on the **Cradle Map toolbar** (lower toolbar).

2.1.1. MicroLab Plus Default Window Layout

In Meters view (the default view), the data for each MicroLogPRO is displayed in a separate window in a meter. There are six MicroLogPRO windows in each display. The image below represents an individual MicroLogPRO display.

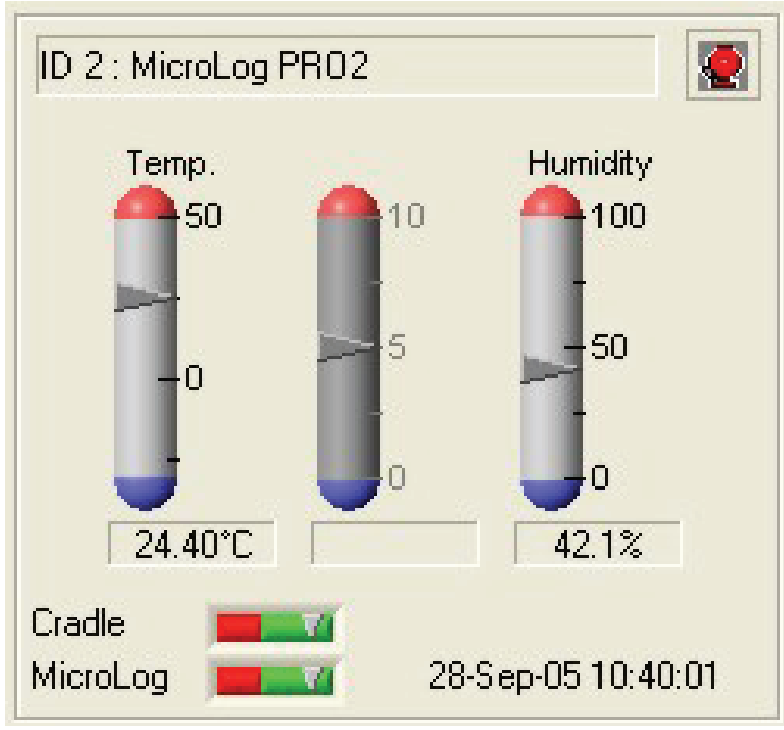


Figure 10: MicroLogPRO Meter view

The blue and red zones on the meters represent the low and high alarm level thresholds, respectively.

2.2. Getting Started

2.2.1. Installation

System Requirements

To work with MicroLab Plus, your system should be equipped with the following:

Software

- Windows 95, or later (Windows 95 will not support USB)
- Internet Explorer 4.0, or later (you can install Internet Explorer 5 when you install MicroLab Plus, since it ships with the product)

Hardware

- Pentium 300MHz or higher
- 32 MB RAM (64 MB recommended)
- 5 MB available disk space for the MicroLab Plus application

Installing the Software

1. Insert the CD into your CD drive.
2. The installation will start automatically. Once the process begins, follow the on-screen instructions.
3. If auto run is not working, open the CD drive folder and double-click the setup icon, then follow the on-screen instructions.

To uninstall the software: From the **Start** menu select Settings > Control Panel, and use the **Add/Remove Programs** tool to remove the MicroLab Plus application.

To install the USB driver (optional):

1. Insert the CD into your CD drive. If Installation begins automatically (and you have already installed MicroLab Plus), click **Cancel** to stop installation.
2. Connect the Cradle to a USB port on your PC. Windows will automatically detect the new device and open the **Add New Hardware Wizard.**
3. Select **Specify the location of the driver**, then click **Next.**
4. Select **Search for the best driver for your device**, then check the **Removable Media** checkbox, and click **Next.**

Windows will automatically detect and install the necessary software.

2.2.2. Setting up the MicroLog Plus System

Before you start using the MicroLog Plus system you must connect each Cradle to the PC using the serial communication cable and set it up. Follow the steps below to setup your system:

1. Mount the MicroLogPROs onto the cradles.
2. Open the MicroLab Plus software.
3. Connect the first cradle to the PC (refer to page 199).
4. Set up the first MicroLogPRO data logger (refer to page 159).
5. Disconnect the first cradle from the PC.
6. Repeat steps 3 – 5 with each cradle.

Note: When setting up multiple Cradles, we recommend using the **Auto Setup** tool (refer to page 169).

7. Connect the RF receiver to the PC (consult your Receiver user guide).
8. Click **Logger** on the main menu, then click **Com setup** to open the Communication setup dialog.
9. Click **Try to connect** to establish communication with the receiver.
10. Place the cradles at the desired data logging locations.

Note: If you encounter problems in the wireless connection between a certain cradle and the receiver, you may need to use Fourier's **Repeater** device to extend the transmission range.

2.2.3. Selecting Active Cradles

MicroLab Plus enables you to select what cradles you wish to monitor. This option is especially useful if another MicroLog Plus system is working nearby and interferes with your system.

To select the cradles you wish to monitor:

1. Click **File** on the main menu, then click **Set Active Cradles.**

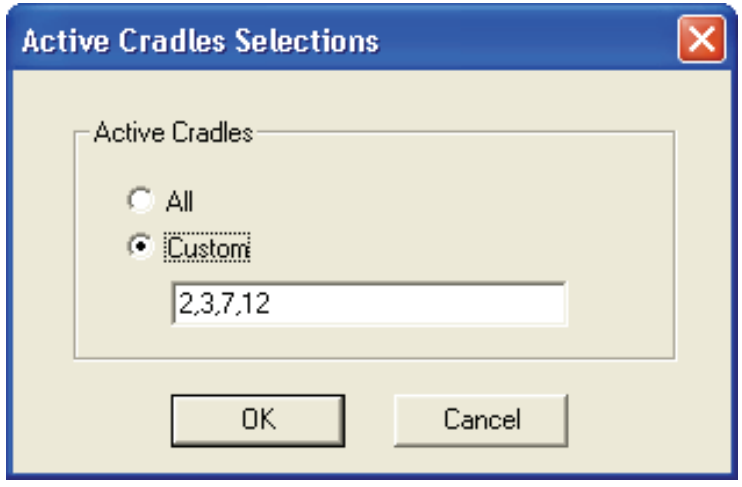


Figure 11: Active Cradles selection

2. Select the **All** option to monitor all the cradles that transmit data to your system.
3. To monitor only specific cradles, select **Custom**, then enter the cradles' ID number separated by commas (for example, 2,3,7,12).
4. Click **OK**.

2.2.4. Saving Data

There is no need to save data manually as the data is saved automatically every half an hour in the MicroLogPRO Data folder:
C:\Program Files\Fourier Systems\MicroLab Plus\MicroLogPRO Data.
However, you are able to change the file location. MicroLab Plus creates a folder for each MicroLogPRO unit, naming it with the cradle ID number. The MicroLogPRO's data is stored in this folder.
MicroLab Plus creates a new data file for each MicroLogPRO every 24 hours, at midnight.
By default the data is saved in the MicroLab Plus file format (.MPD – MicroLabPlus data). If you want to use the data in another program you can save it as a text file (.CSV –

comma separated values). The data can then be saved in either one of, or both of, the file formats.

To select the file format and location:

1. Click **File** on the main menu, then click **Stored data folder…**
2. To save data in the MicroLab Plus file format, check the **Save MicroLab Plus files** check box.
3. To change the file location, click **Browse** and navigate to the desired folder.
4. To save the data in text file format, check the **Save text files** check box.
5. To change the file location, click **Browse** and navigate to the desired folder.
6. Click **OK.**

Note: If you want to remove unwanted data from the graph, apply the crop tool (refer to page 155).

Backing Up Files

When the configuration of a cradle changes, the data that was accumulated until now is saved in a backup folder.
For example: Let's say that after saving data from Cradle ID 2 for several hours, you change its configuration and remove the temperature sensor. When the new data arrives, the old one will not be deleted but will be saved in a backup folder.

2.2.5. Activating the Sound Alarm

Click **Enable Alarm**  on the main toolbar to activate the sound alarm.

If any MicroLogPRO records a reading that exceeds its alarm levels, or if the connection with any of the cradles is lost, the MicroLab Plus alarm will sound.

The alarm will sound as long as the MicroLogPRO readings exceed the alarm levels or until connection with the cradle resumes.

To disable the alarm of an individual cradle, click **Reset alarm**  in the upper right corner of that particular cradle's window in the Meters view.

Click **Enable Alarm** on the main toolbar a second time to disable the Alarm completely.

Note: To activate the Cradle alarm, use the Setup dialog box.

2.2.6. E-mail Alarm Notification

MicroLab Plus can be programmed to send e-mail notifications to one or more e-mail addresses in any of the following cases:

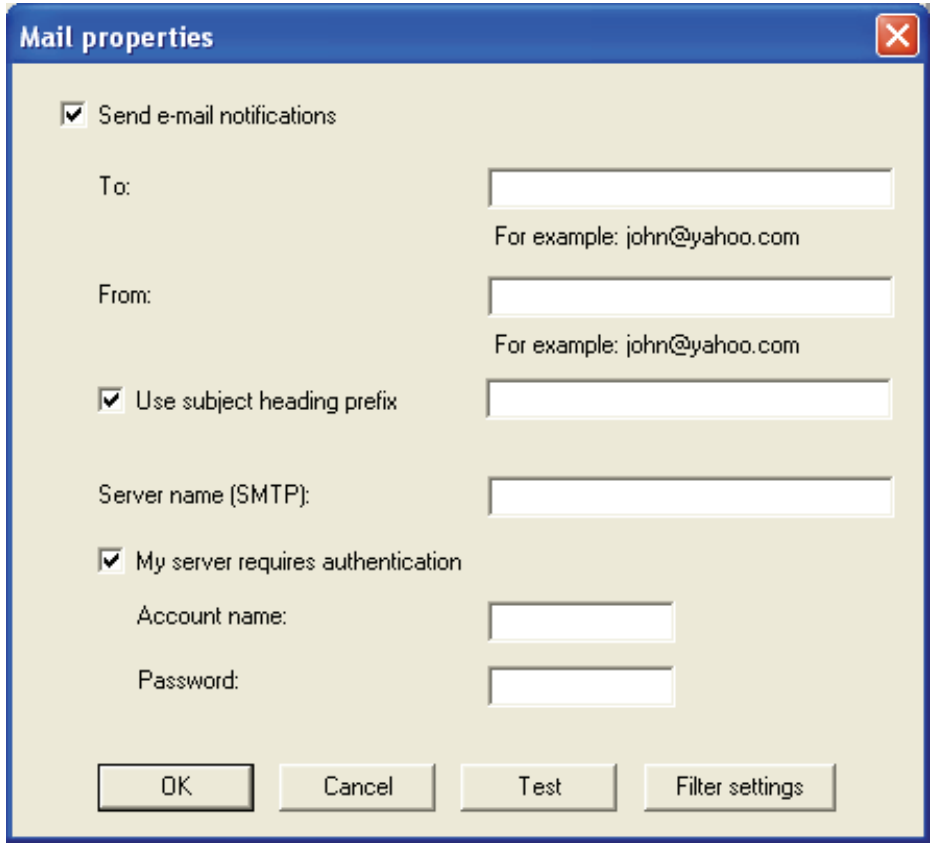
- Sensor alarm
  Notification that the cradle sensors have breached their high or low alarm level.

- Lost cradle connection
  Notification that the cradle has either stopping sending data to the MicroLab Plus, or that it has come back online.
- Low battery indicator

The notifications include the MicroLog name, the sensor whose alarm level was exceeded and the sensor's measured value.

To setup MicroLab Plus in order to send e-mail notifications:

1. Click **File** on the menu bar, then click **Mail properties** to open the **Mail properties** dialog box.



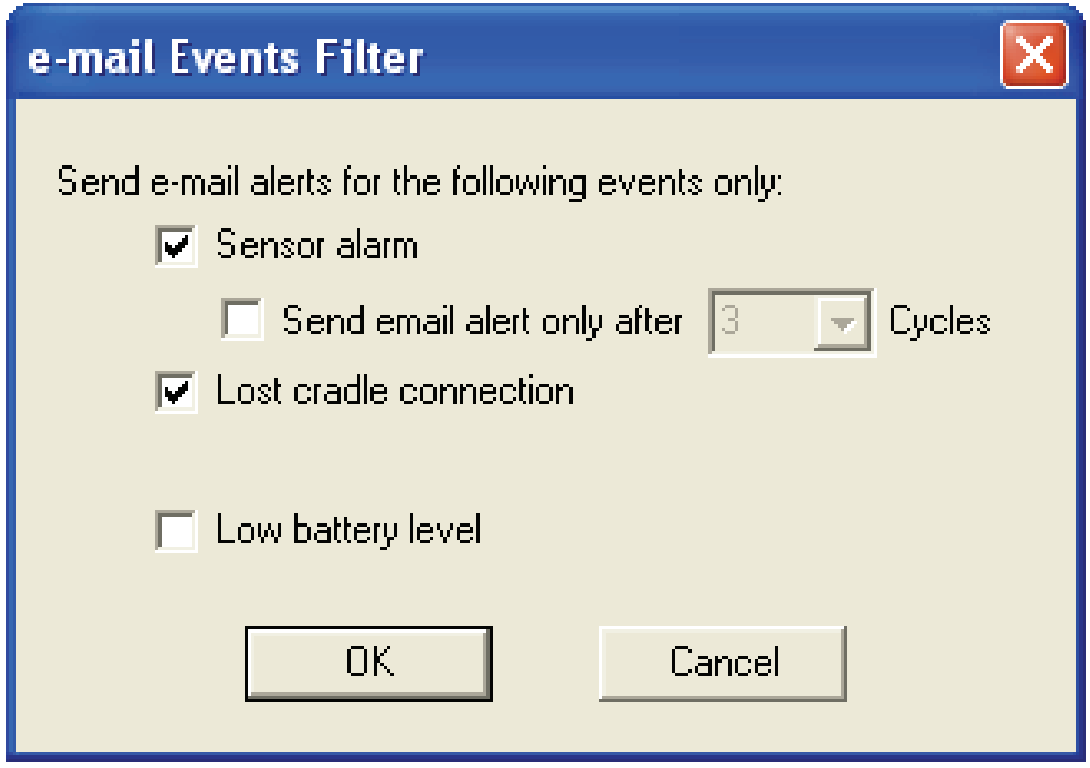
2. Check the **Send e-mail notification** check box.
3. In the **Server name** box, type the outgoing mail server name (mandatory).

4. In the **To** box, type the e-mail address of each recipient, separating names with a semicolon (;) (mandatory).
5. In the **From** box, type your e-mail address (mandatory).
6. If your server requires authentication, enter the account name and password as relevant.
7. If you require a specific subject heading in your emails, enter the prefix in the **Subject heading prefix** text box.
8. Click **Test** to verify that the email properties were entered correctly. Your default email client should receive an email from the MicroLab Plus within seconds.
9. If the email was received, click **OK** to exit the Mail properties dialog.

2.2.7. E-mail Events Filter

You have the ability to filter the type of email notifications you receive.
This will give you greater control over the frequency of email alarms generated by the software, and will in turn reduce the traffic to your email inbox.

1. Go to **File > Mail Properties** and click **Filter settings** in the **Mail properties** dialog box.
2. The **e-mail Events Filter** window will open up:



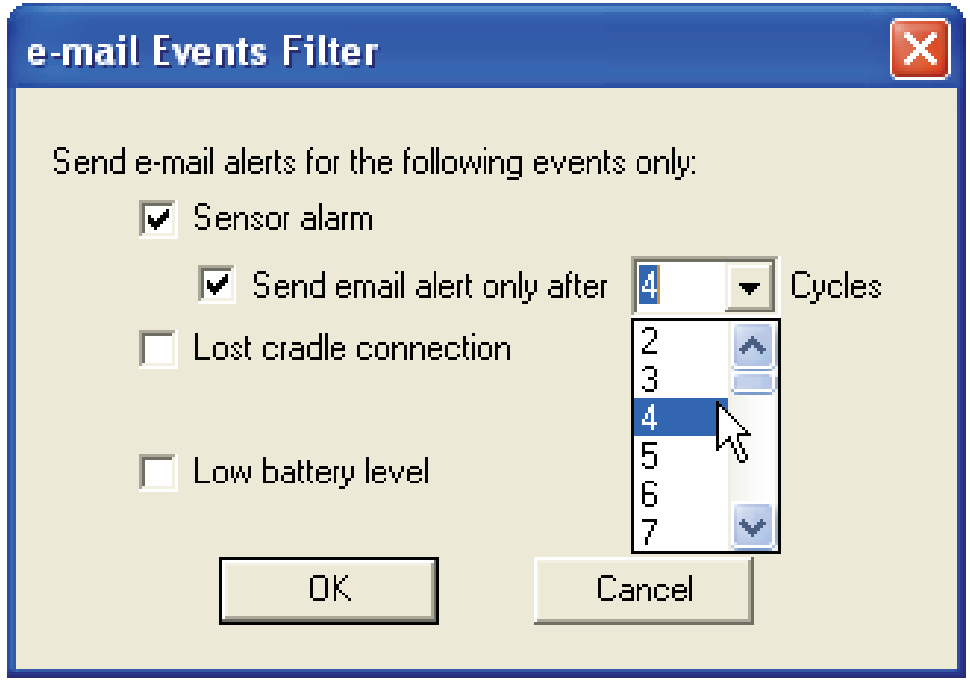
3. Select the checkboxes according to which alarm event you want to receive. If no checkbox is selected, you have effectively disabled the email alarm notification feature.

4. Click **OK** to apply the changes.

2.2.8. Delaying Email Notifications

In the **email Events Filter** dialog, you have the option to delay the sending of the email notification when your system goes into sensor alarm. You can determine that if the system returns to normal conditions from anywhere between 2 to 100 cycles after the initial alarm, then an email is not sent.
This feature is useful when wishing to minimize the number of alarm notifications as a result of a legitimate change in the environment.

1. Go to **File > Mail Properties**. Click on **Filter settings** to open the **email Events Filter** dialog.



2. Select the **Sensor alarm** checkbox and then select the **Send email alert only after X cycles** checkbox. You may select between 2 and 100 cycles.

If the MicroLog PRO returns to the pre-alarm level before the selected number of cycles is reached then no email is sent.
If the MicroLog PRO is still in alarm when the number of cycles is reached then an email is sent. Another email will be sent once the logger is out of alarm.

2.2.9. Alarm Trigger Settings

Using this feature will enable you to trigger a cradle alarm only after a combination of alarm parameters has been met. Once these alarm levels are breached, MicroLab Plus will indicate that cradle is in alarm (this includes e-mail notification).

You can define a combination of at least two of the following sensor types:

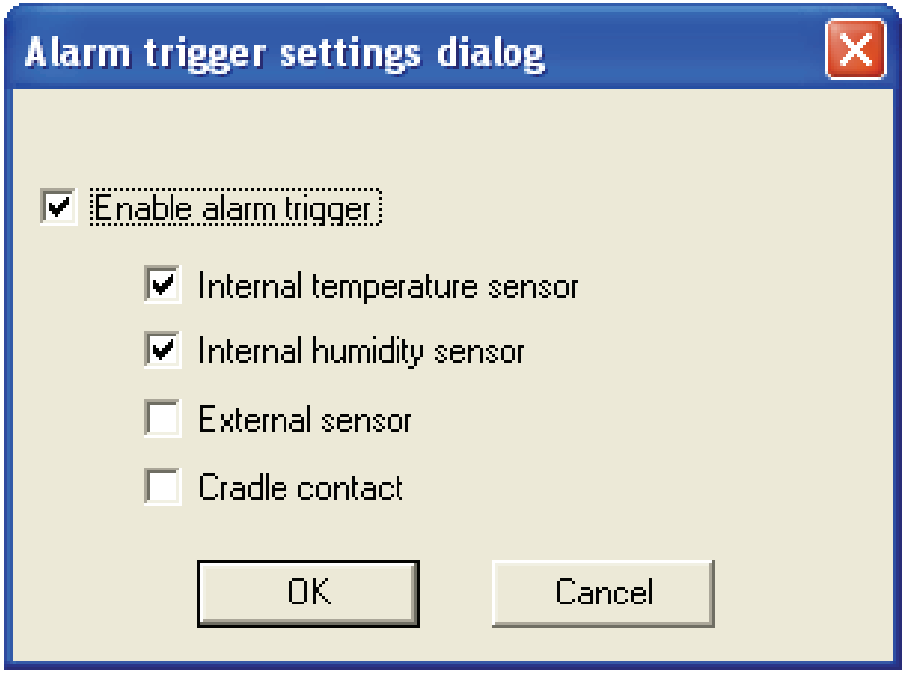
- Internal temperature sensor
- Internal humidity sensor
- External sensor
- Cradle contact

For example, you can determine that for those cradles running the internal temperature sensor and an external sensor, only when MicroLab Plus records alarms from both of these sensors will the alarm sound.

However, MicroLab Plus will indicate an alarm for cradles recording data using sensors other than what is defined in the Alarm trigger settings setup.
For example, if you selected an alarm trigger for a combination of the temperature, humidity and external

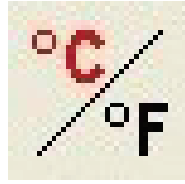
sensors, but a cradle running just the temperature and humidity sensors go into alarm, MicroLab Plus will indicate an alarm for that cradle.

1. Go to **File > Alarm trigger** setting to launch the dialog box:
2. You must select a combination of at least two triggers.



Enabling the alarm trigger applies to alarm emails, sounding of the alarm in the software, alarm indication in the Cradle map, and alarm indication in the mail MicroLab Plus window.

2.2.10. Changing the Temperature Units

Click **Toggle °C/°F** button 

to change the temperature scale from Fahrenheit to Celsius and vice versa, in the MicroLab Plus graph and data displays.

Note: To change the units in the MicroLogPRO display, use the **Setup** dialog box or the **Logger** menu.

2.2.11. Display Properties

You can change the way numbers and dates will be displayed on screen.

1. Click **File** on the main menu, then click **Display Properties**.
2. In the **Decimal place settings**, enter the number of decimal places you want to display (enter a number between 0 and 4) for each sensor.
3. In the **Date format settings**, select the desired format option.
4. Click **OK**.

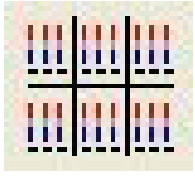
2.3. Online Mode

2.3.1. Display Options

Online data can be displayed in:

- *Meters View (*the default view), in which the current data is displayed in meters.
- *Multiple Graph View*, in which the data from the last 24 hours is displayed in graphs.
- *Cradle Map format*, where the MicroLogPRO units are represented by color coded icons.

2.3.2. Meters View

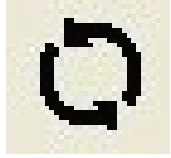
Click **Meters**  on the main toolbar to switch to Meters view.

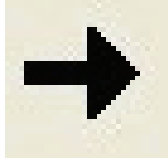
In Meters view (the default view), the data for each MicroLogPRO is displayed in a separate window in meters. The number of active meters in the window corresponds to the number of active sensors in each MicroLogPRO. The meters are updated every time MicroLab Plus receives new data.

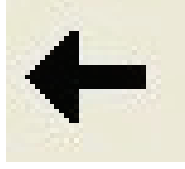
If a MicroLogPRO is inactive, the corresponding window is disabled (is grayed-out).

There are six MicroLogPRO windows in each display. If you are using more than six MicroLogPROs, you can manually

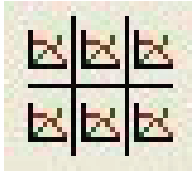
scroll to the other displays, or let MicroLab Plus do this automatically.

- Click **Auto scroll**  on the main toolbar to allow automatic scrolling. Click **Auto scroll** a second time to return to manual scrolling.

- Click **Scroll forward**  on the main toolbar to scroll to the next MicroLogPRO unit's display.

- Click **Scroll back**  on the main toolbar to scroll to the previous MicroLogPRO unit's display.

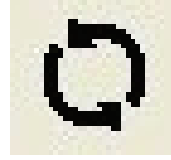
2.3.3. Multiple Graphs View

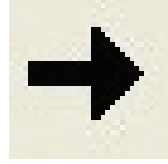
Click **Multiple graphs**  on the main toolbar to switch to Multiple Graphs View.

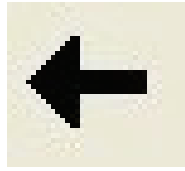
In Multiple Graphs View, the data for each MicroLogPRO is displayed in a separate window in graphs. The graphs display the data sets plotted versus time. In order to keep the graph clear and easy to read, only two Y-axes can be shown on the graph simultaneously. If there are three curves in the graph, one of the Y-axes will be hidden. To make this axis visible, select the corresponding plot with the cursor.

You can identify the Y-axis by its color, which matches the plot color.

The graphs are updated every time MicroLab Plus receives new data. If a MicroLogPRO is inactive, the corresponding window is disabled (is grayed-out).
There are six MicroLogPRO windows in each display. If you are using more than six MicroLogPROs, you can manually scroll to the other displays or let MicroLab Plus do this automatically.

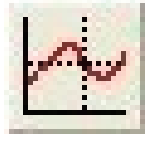
- Click **Auto scroll**  on the main toolbar to allow automatic scrolling. Click **Auto scroll** a second time to return to manual scrolling.

- Click **Scroll forward**  on the main toolbar to scroll to the next MicroLogPRO unit's display.

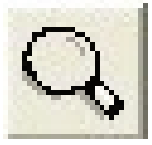
- Click **Scroll back**  on the main toolbar to scroll to the previous MicroLogPRO unit's display.

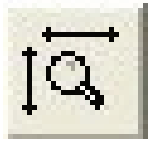
The Cursor

Use the cursor to view individual data recording values, or to reveal a hidden Y-axis.

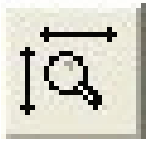
To display the cursor, click **Cursor**  on the graph (lower) toolbar. You can drag the cursor with the mouse to any other point on the plot, or to another plot altogether.
The point coordinates of the selected data recording will appear in the information bar at the bottom of the graph window.

Zooming

1. Click **Zoom in**  on the graph toolbar and drag the cursor diagonally to select the area you want to magnify. Release the mouse button to zoom in to the selected area.
2. Click on the **Zoom in** button a second time to turn off the Zoom tool.

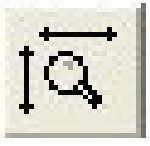
3. To restore auto scaling, click **Autoscale**  .

Autoscale

Click **Autoscale**  on the graph (lower) toolbar for the full data display.

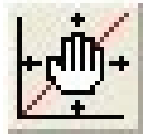
The Stretch/Compress Axis Tool

Move the cursor onto one of the graph axes. The cursor icon changes to a double arrow symbol (↔), indicating that you can stretch or compress the axis scale. Drag the symbol to the desired location. Repeat the procedure for the other axis, if necessary.

To restore auto scaling, click **Autoscale**  .

Panning

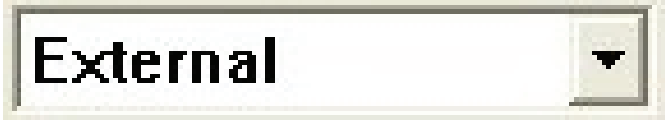
Use the pan tool after zooming any part of the graph that is outside of the zoomed area.

To do so, click **Pan**  on the graph toolbar, then click anywhere on the graph and drag the graph to view another area.
Click **Pan** a second time to turn off the Pan tool.

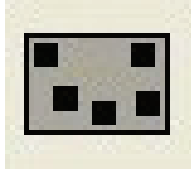
Displaying Alarm Levels

1. Click **Display alarm level**  .

2. Select the sensor you wish to display from the Select Sensor drop-down menu. For example:



2.3.4. Cradle Map

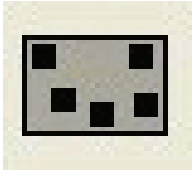
Click **Cradle Map**  on the main toolbar to display the Cradle Map.

In Cradle Map view, each MicroLogPRO is represented by an icon. Each icon carries the MicroLogPRO's individual ID number. When the MicroLogPRO is active, the icon's color is green. If the recorded data exceeds either of the alarm levels, the icon's color turns to red. Move the cursor over an icon to display the MicroLogPRO's name.

Double-click on any MicroLogPRO icon to display its meters window, which is identical to its window in the Meters view

format. To close the meters window, click **Close** at the upper right-hand corner of the window.
Before using the Cradle Map, you must first set up and then lock the map.

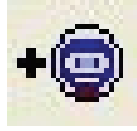
Setting up the Cradle Map

1. Click **Cradle Map**  on the main toolbar to display the Cradle Map or click **Cradle Map** on the main menu, then click **Display toolbar** to display the Cradle Map toolbar.

2. Click **Lock View**  on the Cradle Map toolbar to unlock the Cradle Map.

Adding Icons

Add icons to match the number of MicroLogPROs you are using.

1. Click **Add cradle**  on the Cradle Map toolbar to add a new icon or use the adjacent drop-down menu to add a group of 5, 10 or 15 icons at a time.

2. Click **Remove cradle**  or use the adjacent drop-down menu to remove icons.

Loading an Image

You can arrange the icons on an image or plan of your work space, so that each icon represents the corresponding MicroLogPRO's actual location in the work space.

First, load the image into the program:

1. Click **Load image**  on the Cradle Map toolbar.
2. Locate the image file you wish to load.
3. Double-click the file name.

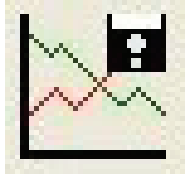
You may now click and drag the MicroLogPRO icons to their desired locations on the cradle map.

Locking the Cradle Map

After you have finished arranging the icons, click **Lock View**  on the Cradle Map toolbar to prevent any accidental change in the icon arrangement.

2.4. Offline Mode

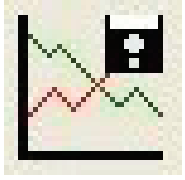
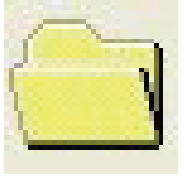
2.4.1. Offline Screen

Click **Offline**  on the main toolbar to switch to Offline mode.

MicroLab Plus's Offline screen consists of two parts: the graph and the table. The data in the table always matches the data that is currently displayed on the graph.

2.4.2. Opening Files

In Online mode, the received data is displayed online both in graphs and in meters.
To display previously saved data, switch to Offline mode:

1. Click **Offline**  on the main toolbar.
2. Click **Open**  on the main toolbar.
3. Enter the desired cradle ID number.
4. Select a date in the **From** box.
5. Select a date in the **To** box.
6. Click **OK**.

Note: To open files that where stored in backup files (refer to page 113), select the **Open files from backup** checkbox.

The software prompts to the Advanced Open dialog box:

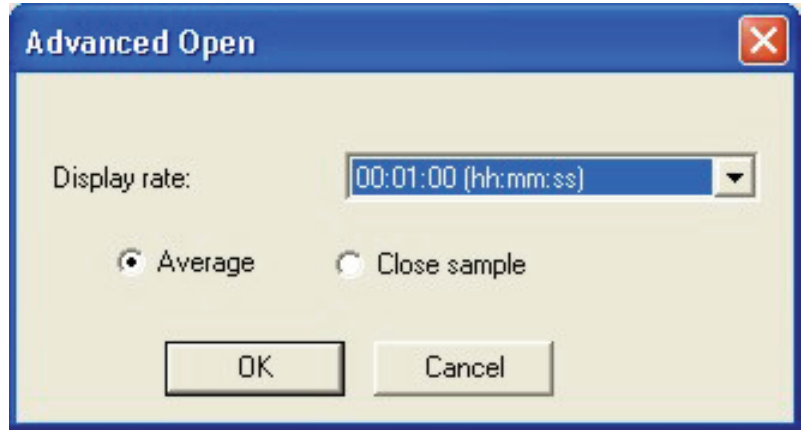


Figure 12: Opening files

You can choose to filter the data and select the time interval between displayed samples. You can view only the points that correspond to the selected time interval (or the closest samples) or you can display the averages of all samples in a time interval.

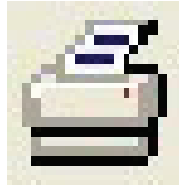
1. Select the time interval from the **Display rate** drop-down menu.
2. Select either the **Average** or **Close sample** option.
3. Click **OK**.

The data will be loaded between the dates you selected and displayed in the graph and table display.

2.4.3. Print

Printing a Graph

You can print saved data in Offline mode.

1. Click **Print**  on the main toolbar to open the **Print Options** dialog box.
2. Click the **Graph** option.
3. Click **Print** to open the **Print** dialog box.
4. Click **OK**.

Printing a Table

You can also print saved data as a table in Offline mode.

The table will include data as well as the MicroLogPRO name, serial number and the alarm level setup. Data that exceeds any of the alarm levels will be highlighted by arrows.

1. Click **Print**  on the main toolbar to open the **Print Options** dialog box.
2. Click the **Table** option.
3. If you want to print only part of the data, unselect the check box and select the desired time and date in the **From** and **To** fields.
4. Click **Print** to open the **Print** dialog box.
5. Click **OK**.

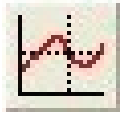
2.4.4. Graph Display

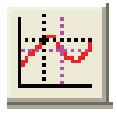
Graph

The graph displays the data sets plotted vs. time.
In order to keep the graph clear and easy to read, only two Y-axes can be shown on the graph simultaneously. If there are three curves in the graph, one of the Y-axes will be hidden. To make this axis visible, select the corresponding plot with the cursor.
You can identify the Y-axis by its color, which matches the plot color.

The Cursor

Use the cursor to view individual data recording values, or to reveal a hidden Y-axis.
MicroLab Plus enables you to display up to two cursors simultaneously.

1. To display the cursor, double-click on an individual data point or click **Cursor**  on the graph toolbar. You can drag the cursor with the mouse to any other point on the plot, or to another plot altogether.
2. The point coordinates of the selected data recording will appear in the information bar at the bottom of the graph window.
3. To remove the cursor, click **Cursor** a second time.

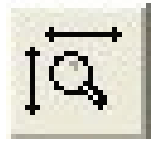
4. To display a second cursor double click anywhere on the graph or click **Second cursor**  on the graph toolbar.
5. To remove the second cursor click **Second cursor** a second time.

Zooming and Panning

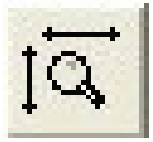
1. Manual Scaling

a. Click **Graph Properties**  on the graph toolbar to open the **Graph Properties** dialog box.
b. Select the **Scale** tab, and choose the axis you want to scale in the **Select axis** drop-down menu.

c. Unselect the **Autoscale** check box and enter the new values in the text box.
d. In the **Time** axis, you can either enter the time and date manually, or select it using the up and down arrow buttons.
e. Click **OK**.

To restore auto scaling, click **Autoscale**  .

2. Autoscale

a. Click **Autoscale**  on the graph toolbar for the full data display.
b. Double-click on an individual axis to autoscale it separately.

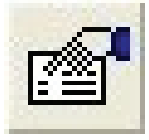
3. Default Zooming

If you usually need to view a specific time frame (i.e. work-day hours) use the Default zooming tool. You can set the start and end time of the time span and then use it whenever you open a file or download data from the MicroLogPRO.

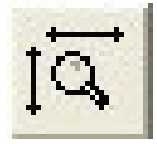
To set the default zoom:

a. Click **Graph Properties**  on the graph toolbar, then click **Set Default Zoom**.
b. Enter the start and end times, then click **Set**.

To zoom to the default zoom:

a. Click **Graph Properties**  on the graph toolbar.
b. Select the **Use default zoom** check box and click **OK**.

Every file and every data recording you download will automatically open in the default zoom as long as the **Use default zoom** check box remains selected.

To restore auto scaling, click **Autoscale**  .

Cropping the Data

Cropping enables you to trim the edges of a data set. Use it to remove unwanted data:

1. Zoom to the data range you want to keep.
2. Click **Offline Graph** on the main menu, then click **Crop**.

All data outside the zoomed area will be **permanently** removed.

Formatting the Graph

You can change a data line's color, style or width. You can also add markers that represent the data points on the graph and format their style and color.

The Y-axis color matches the corresponding plot's color and will change accordingly.
The time axis color can be changed separately as follows:

1. Click **Graph Properties**  on the graph toolbar to open the **Graph Properties** dialog box.
2. Select the **Lines** tab, then select the plot or axis you want to format in the Select plot drop-down menu.
3. Here you can format the line's color, style and width, as well as the markers' color and style. To remove the line or the marker, unselect the corresponding Visible check box.

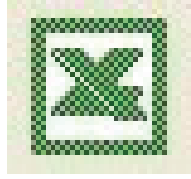
To restore the default formatting, click the **Restore default** button, and click **OK**.

Copying the Graph as a Picture

You can copy the graph to the clipboard as a picture and then paste it into other Windows programs, such as Word and PowerPoint.

1. On the **Offline Graph** menu, click **Copy graph**.
2. Open the destination file.
3. In the destination file, right-click and select paste.

2.4.5. Exporting Data to Excel

Click **Export to Excel**  on the main toolbar to export the currently displayed data to an Excel spreadsheet.

MicroLab Plus will open a new Excel workbook displaying the data along with the MicroLogPRO info, including the MicroLogPRO name, serial number and alarm levels setup.

Export File Settings

If MicroLab Plus fails to export the data properly i.e. all of the data is displayed in one row of the worksheet, you can change the export file settings. This ensures that the data is exported using comma separated values (CSV).

1. Click **File** on the main menu, then click **Export file settings,**
2. Select the **Ignore regional settings** check box.
3. Click **OK.**

2.5. Programming MicroLogPRO

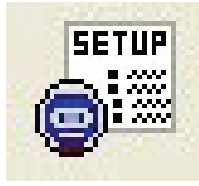
2.5.1. Setup

Use the **Setup** dialog box to view or change the MicroLogPRO and Cradle settings.

Note: When setting up multiple Cradles, use the **Auto Setup** tool (refer to page 169).

Note: To save the settings for future use, activate the **Save setup** tool (refer to page 171).

1. Connect the Cradle to the PC.

2. Click **Setup** 

on the main toolbar to open the **Setup** dialog box.

The dialog box consists of five sections:

- ***MicroLogPRO info***

Comment

Click the text box and type a name that will serve to identify the specific MicroLogPRO (e.g. its location).

S/N

Displays the MicroLogPRO's serial number.

Battery Level

If the indicator is in the red zone the battery should be replaced (refer to page 24).

- ***Cradle info***

Cradle ID

The cradle's identification number sets the cradle's transmission time in daily download mode.

Battery Level

If the indicator is in the red zone the battery should be replaced.

- ***Setup***

Temperature

Select the **Temperature** check box to activate the internal temperature sensor.

Humidity

Select the **Humidity** check box to activate the internal humidity sensor.

External

Select the **External** check box to activate the external sensor option, and then select a sensor in the drop-down menu.

Cradle Contact

Select the **Cradle contact** check box to activate the cradle contact.

Note: The sensors' current readings will appear next to the sensor name once MicroLogPRO begins logging for the first time.

Temperature unit

To set the temperature unit in the MicroLogPRO display, select the option you want (Celsius or Fahrenheit).

Interval

This determines the logging interval, or the time interval between successive data recordings.
The time format is hh:mm:ss. Set the time setting to select a recording time interval from 10 seconds to 2 hours. For example, to set a time interval of one

hour, five minutes and thirty seconds, click the hours (hh) and type 1 or use the arrows to select 01. Click the minutes (mm) and type 5 or use the arrows, and finally, click the seconds (ss) and type 30 or select 30 using the arrows.

Timer run

Click the **Timer run** check box if you want MicroLogPRO to start recording at a predetermined time. This option is convenient if you are using several MicroLogPROs at once and want them to all begin logging at the same time.

Cyclic run

In **Cyclic run** mode, MicroLogPRO overwrites the old measurements (starting with the oldest recorded data) once the MicroLogPRO's memory is full. Click

the **Cyclic run** check box to operate in this mode.
Use this mode if you intend to operate the system continuously.
If the check box is clear, MicroLogPRO will operate in **Normal run** mode and will stop recording when the memory is full.

Push to run

In **Push to run** mode, the MicroLogPRO will only start recording data when you press either the left or right logger button. It is convenient for when you wish to start recording data soon (but not immediately) following setup, or at an unspecified time.

- ***Alarm levels***

Type in the desired minimum and maximum alarm levels. If MicroLogPRO records a reading that exceeds either of these levels, the software's alarm will sound. The MicroLogPRO's LCD will start to flash and the cradle's alarm will sound.

To stop the LCD display flashing, press either of its two buttons. To stop the cradle alarm from sounding, press both of the MicroLogPRO's buttons simultaneously.

The default alarm levels are the lower and upper ends of the sensors. Click **Cancel Alarm** to restore the default levels.

- ***Cradle time settings***

Workday hours

Use the up and down arrow buttons to set the daily period when you want the Alarm and/or the Daily Download to be active, or enter the desired period manually for when you want them to all begin logging at the same time.

Alarm delay

Use the drop-down menu list to select the time delay between the time MicroLogPRO records a reading that exceeds the alarm levels and the time the alarm will sound.

Alarm duration

Use the drop-down menu to select the time for which the alarm will operate before it stops automatically.

Completing the Setup

Click **Send Setup** to send the new settings to MicroLogPRO, which will complete the setup. Click **Cancel** if you do not wish to change the setup at this stage.

Note: The **Send Setup** command erases all existing data in the MicroLogPRO, and it will automatically begin recording.

If you select **Timer run** mode, MicroLogPRO will wait in standby mode, displaying  . It will begin recording at the specified time.

2.5.2. Auto Setup

When setting-up multiple cradles, use the **Auto Setup** tool. This tool will automatically set the minimum logging interval, depending on the number of units you are using, and will set the start time for each unit.

To perform Auto Setup:

1. Connect the first cradle to the PC.
2. Click **Logger** on the main menu, then click **Auto Setup.**
3. In the **Number of units** drop-down menu, select the number of cradles you are setting up, then click **Start.**
4. Set up the first unit as you would normally.

Note: The minimum logging interval is already set in the **Interval** menu. You may not select a shorter time interval.

5. Click **OK.**
6. Click **Send.**

After setup is completed, the Auto Setup tool is ready to setup the second unit (note that the title bar on the Auto Setup dialog has changed to **Unit 2**).

7. Connect another cradle to the PC.
8. Change the Comment (optional).
9. Click **Send**.
10. Repeat this procedure with every cradle.

To change the settings of a specific unit, click **Edit** in the **Auto Setup** dialog and select the new settings before executing the **Send** command. These settings will be saved until the next time you change them.

Use the forward and backward arrow buttons on the **Auto Setup** dialog to navigate to a specific unit. Note that this will change the automatic sequence.

2.5.3. Saving Setup

When setting up multiple cradles, use the **Save Setup** option in the **Setup** dialog.

1. Once you have finished the settings selection of the first cradle, and before sending the setup command, click **Save Setup**. This will save all of the setup settings.

2. Connect another cradle to the PC, click **Setup** 

on the main toolbar, then click **Load Setup** to load your setup settings.

3. Change the **Cradle ID**.
4. Change the Comment (optional).
5. Click **Send Setup**.

2.5.4. Defining a Custom Sensor

You can use MicroLogPRO with any sensor that has a 0 – 20mA current output or a 0 – 10V voltage output.

1. Click the **Logger** menu and then select **Define New Sensors** to open the **Define New Sensor** dialog box.
2. Click **Add** to add a new sensor to the list.
3. In the **Based On** drop-down menu, select an external sensor that matches your sensor's output.
4. Enter the sensor's name in the **Sensor Name** text box.
5. Enter the sensor's unit in the Sensor Unit text box.

6. In the **Calibration Values** section, enter two values of your sensor that correspond to the base sensor values. For example, see the definition for a 0 – 100mbar pressure sensor whose output is 0 – 20mA:

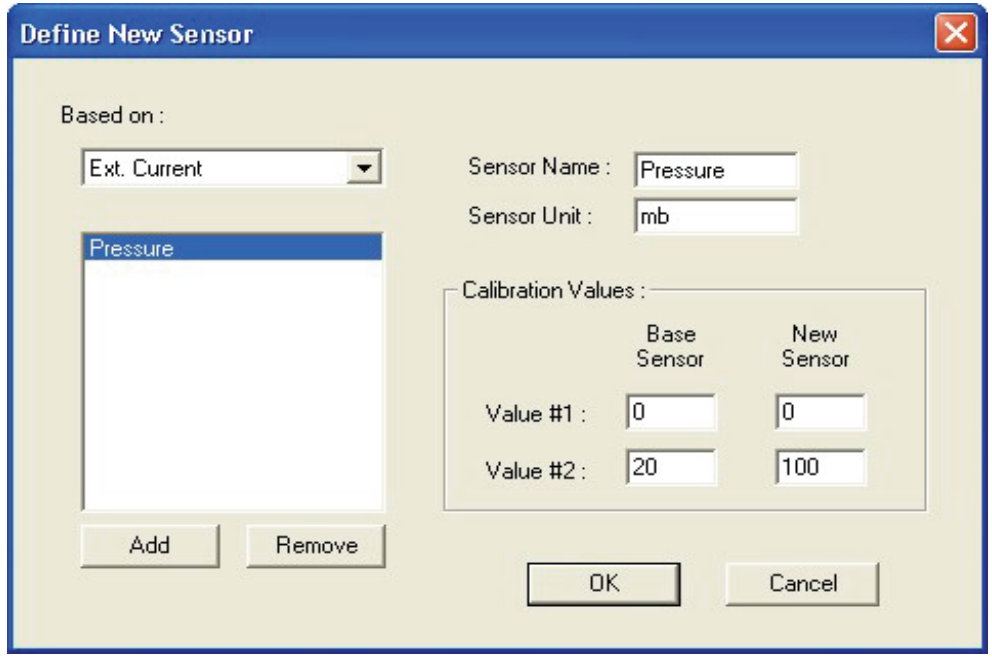


Figure 13: Defining a new sensor

7. Click **OK**.

The new sensor will then appear in the **External Sensor** list in the **Setup** dialog box.

2.5.5. Sensor Calibration

A new MicroLogPRO comes fully calibrated. After a long period of use, however, you may want to recalibrate the humidity or temperature sensors.

The calibration affects both MicroLogPRO and MicroLab Plus and should be carried out while MicroLogPRO is connected to the PC.

Calibration Password

To prevent accidental change of the calibration, the calibration procedure is protected by a password. The default password is: 1234. To change the password:

1. Click **Logger** on the menu toolbar, then click **Calibration**.
2. Click **Change Password** to open the **Change Password** dialog box.
3. Enter the current password in the **Current Password** text box.
4. Enter the new password in the **New Password** text box.
5. Enter the new password a second time in the **Confirm New Password** text box to confirm your new password.
6. Click **OK**.

Note: The password must include at least 4 characters and is **case sensitive.**

Humidity Calibration

To calibrate the humidity sensor you will need a humidity chamber.

1. Connect the MicroLogPRO to the PC.
2. Set up the MicroLogPRO to record every 10 seconds (refer to page 159).
3. Click **Logger** on the main menu, then click **Calibration**.
4. Enter the calibration password, then click **OK**.
5. Select **Humidity** in the **Choose sensor** drop-down menu.

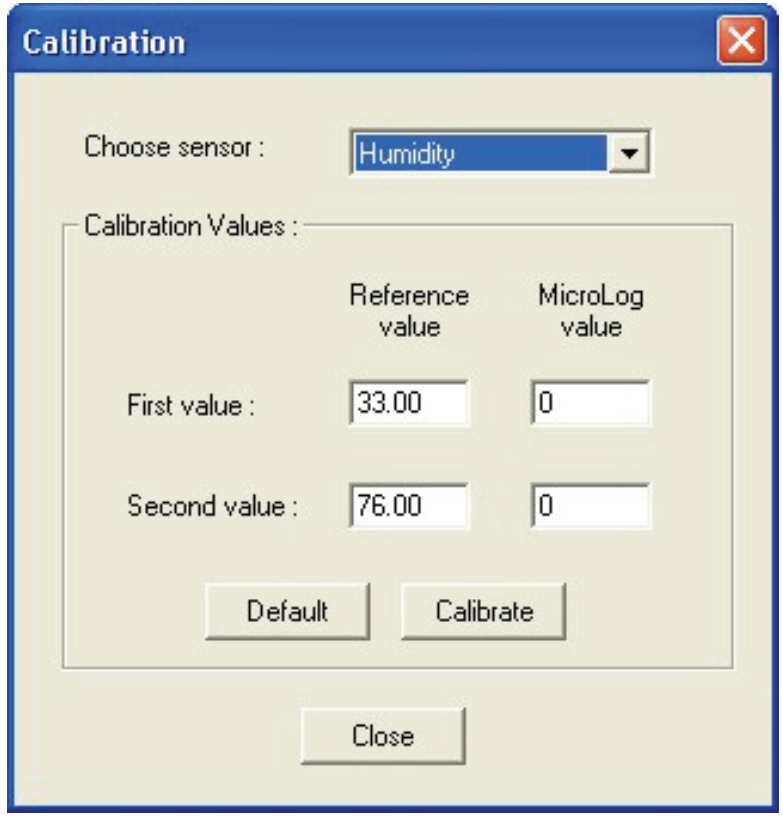


Figure 14: Humidity calibration dialog box

6. Click **Default** to restore the original values.

7. Disconnect MicroLogPRO from the PC and insert it into the humidity chamber.
8. Set the humidity chamber to the first reference value. Wait until the humidity level is stabilized and write down the MicroLogPRO's reading.
9. Repeat the last step with the second reference value.
10. Connect the MicroLogPRO to the PC.
11. Enter the two MicroLogPRO values into the MicroLogPRO Value text boxes.
12. Enter the two reference values into the Reference Value text boxes.
13. Click **Calibrate**.

To restore default calibration, click **Default**.

Temperature Calibration

1. Connect the MicroLogPRO to the PC.
2. Click **Logger** on the main menu, then click **Calibration**.
3. Enter the calibration password, then click **OK**.
4. Select **Temperature** or **Ext. Temperature** in the **Choose sensor** drop-down menu.
5. Click **Default** to restore the original values.
6. Enter the two MicroLogPRO values into the MicroLogPRO Value text boxes.
7. Enter the two reference values into the Reference Value text boxes.
8. Click **Calibrate**.

To restore default calibration, click **Default**.

2.5.6. Setting IR Printing Format

1. Connect the MicroLogPRO to the PC.
2. Click **Logger** on the menu toolbar, then click **MicroLogPRO IR Print Settings**:

Figure 15: IR Print Settings dialog box

3. Select a format option:
    a. Print Format 1 – Prints the minimum and maximum values of a selected time period up to the last 30 days.
    b. Print Format 2 – Prints all data up to 128 rows of data
4. If you selected *Print Format 2*, enter the desired number of rows (up to 128).
5. Click **OK.**

2.5.7. Communication Setup

Communication between a PC and a MicroLogPRO takes place automatically whenever you send a command to MicroLogPRO. However, the **Communication Setup** dialog box can be used for more advanced communication options.

Click on the **Logger** menu and then select **Com setup** to open the Communication Setup dialog box:

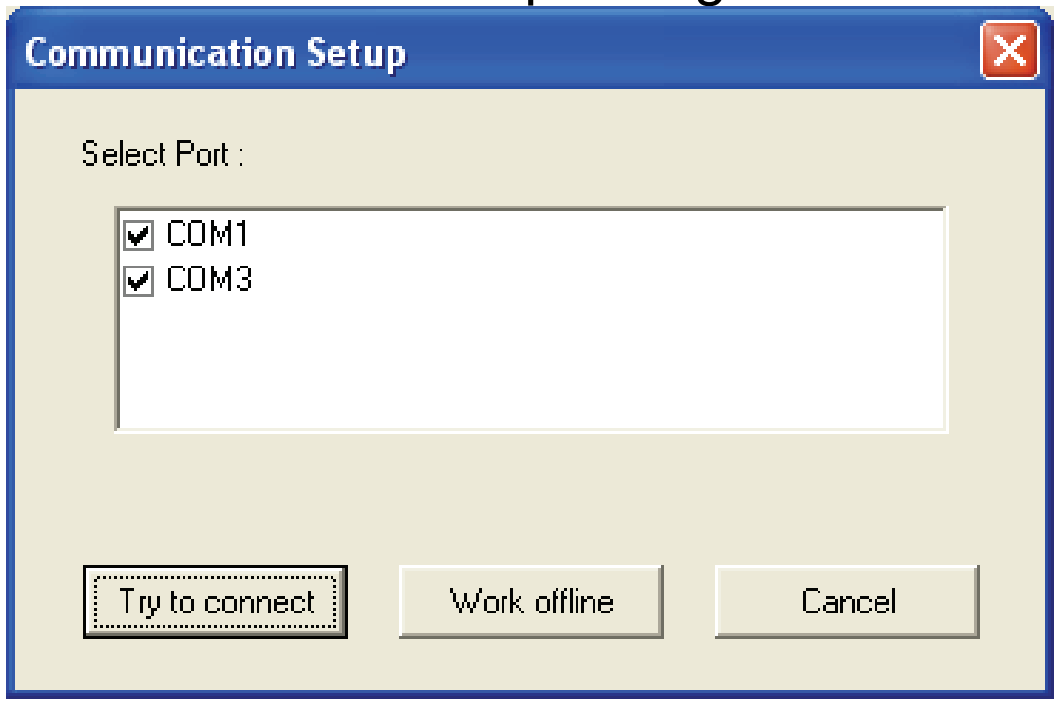


Figure 16: Communication setup dialog box

The selected COM ports are available for communication.

1. Click **Try to connect** to establish communication.
2. Click **Work offline** to work with saved files.

2.6. Analysis Tools

2.6.1. Setting the Analysis Tools Parameters

1. Click **Analysis** on the menu bar, then click **Set Functions' Parameters** to open a dialog box:

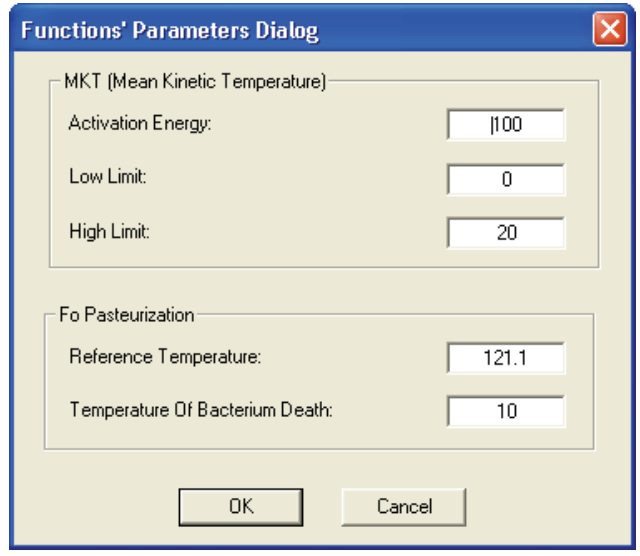


Figure 17: Functions Parameters

2. Type in the desired parameters, then click **O**K.

2.6.2. Histogram

Use this tool to create a frequency distribution of the selected data set.

To create a histogram:

1. Use the cursor to select a plot on the graph.
2. Click **Analysis** on the main menu bar, then click **Histogram.**
3. Enter the desired values for the first bin, the bin width and last bin, then click **OK** (refer to the tip below for details).
4. Click **Analysis** on the main menu, then click **Histogram** a second time to return to the original data sets

Tip: You can modify the histogram to your needs. You can set the upper limits of the first bin and the lower limit of the last bins, and refine the histogram by increasing the number of bins.

To modify the histogram:

1. Click **Analysis** on the main menu, then click **Histogram properties**:

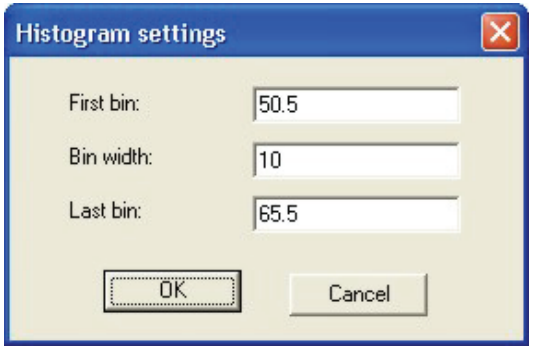


Figure 18: Histogram settings

2. Enter the desired values for the first bin, the bin width and last bin, then click **OK.**

You can repeat the process for further modification.

2.6.3. Pasteurization

Use this tool to create and display an FO Pasteurization curve:

Click **Analysis** on the menu bar, then click **FO pasteurization.**

2.6.4. Statistics

Use the statistics tool to display statistics of each data set in the graph. The statistics include:

Minimum – The smallest value in the data set

Maximum – The largest value in the data set

Average – The average of all the numbers in the data set
MKT – The mean kinetic temperature (for temperature data only)

To display statistics:

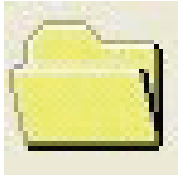
Click **Statistics** Σ on the main toolbar.

MicroLab will display the statistics in the information bar at the bottom of the graph window.

To hide the statistics, click **Statistics** Σ a second time.

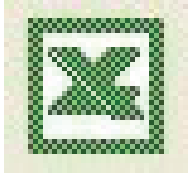
2.7. Toolbar Buttons

2.7.1. Main (Upper) Toolbar

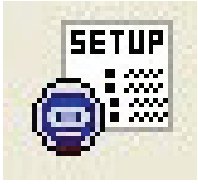
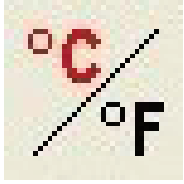
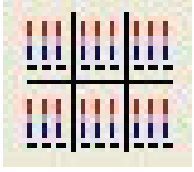
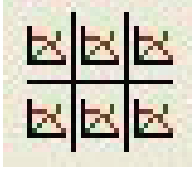


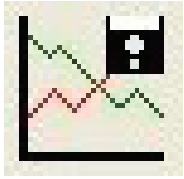
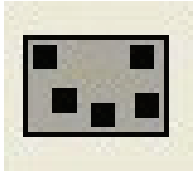
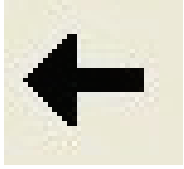
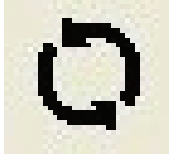
Open — Opens saved files (enabled only in Offline View)

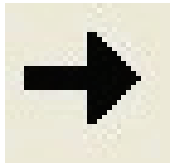
Print… — Opens the Print Option dialog box (enabled only in Offline View)



Export — Exports the displayed data to an Excel spreadsheet (enabled only in Offline View)

	*Setup*	Opens the Setup dialog box
	*°C/°F*	Displays the desired temperature unit
	*Meters View*	Displays the Meters View
	*Multiple Graphs View*	Displays the Multiple graphs View

	*Offline View*	Displays the Offline View
	*Cradle Map*	Displays the Cradle Map
	*Scroll back*	Scrolls to the previous MicroLogPRO units display (enabled only in Online View)
	*Auto-scroll*	Automatic scrolling between MicroLogPRO unit displays (enabled only in Online View)

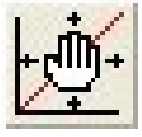


Scroll forward Scrolls to the next MicroLogPRO units display (enabled only in Online View)

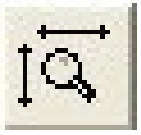
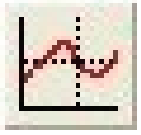
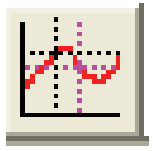
Alarm Enables or disables sound alarm

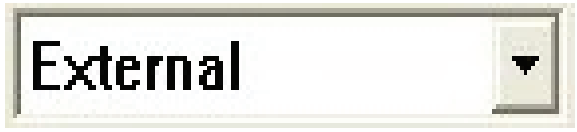
2.7.2. Graph (Lower) Toolbar

Zoom in Activates the zoom tool



Pan Activates the pan tool

 *Auto scale*	Returns the graph to full view
 *Cursor*	Toggles the cursor
 *Second cursor*	Toggles the second cursor
 *Graph properties*	Opens the Graph Properties dialog box (only in Offline view)
 *Alarm levels*	Displays or removes alarm levels from the graph



Alarm level selection box

2.7.3. Cradle Map (Lower) Toolbar

In Cradle Map view, click **Cradle Map** on the main menu, then click **Display toolbar** to display the Cradle Map toolbar.

Lock — Locks or unlocks the Cradle Map

Add Cradle — Adds a Cradle icon to the Cradle Map

Remove Cradle — Removes a Cradle icon from the Cradle Map

Load image Inserts an image to the Cradle Map

Chapter 3 The Cradle

3.1. MicroLogPRO Cradle Line

3.1.1. Alarm Cradle

This cradle accommodates an additional external sensor and RS 232/USB Computer Serial Interface, and a hardware alarm that operates the sound alarm.
Catalog number: DT174

3.1.2. Wireless Cradle with Alarm

A wireless cradle that transmits data to the PC. It accommodates an additional external sensor and RS 232/USB Computer Serial Interface, and a hardware alarm that operates the sound alarm.

Catalog number: DT175

3.2. Operating the Cradle

1. Mount the MicroLogPRO on the cradle so that its rear connection socket fits into the plug on the cradle.

3. External sensor input

2b. USB socket

Trs button

4. DC power input

LED indicator

2a. RS232 serial communication socket

Figure 19: MicroLogPRO and Cradle

To set up MicroLogPRO (see **Figure 19** above):

1. Mount the MicroLogPRO onto the cradle (1).
2. Connect the cradle to the PC using either a serial or USB communication cable (2).
3. Run the MicroLogPRO software and use the Setup command.

To prepare the wireless cradle to transmit data:

1. Set up the MicroLogPRO (see **Figure 19** above).
2. Connect an external sensor if needed (see 3 in Figure 19 above).

The cradle will automatically transmit data online or once a day depending on how it was set up.

Refer to page 99 for more on online transmission or page 81 for more on Daily Download.

When the cradle transmits data the LED indicator lights up green.

To manually transmit data to the PC:

Press the **Trs** (Transmit) button on the right side of the cradle. The cradle will then transmit all stored data to the PC.

To activate the Sound Alarm feature:

You **must** connect the AC power adaptor (see 4 in Figure 19 above).
When the alarm operates, the LED indicator lights up red.

3.3. Replacing the Battery

The cradle is powered by an internal battery or by an external AC adaptor. The cradle battery's maximum lifespan is approximately 100,000 transmissions (for example, if the recording rate is once every 15 minutes, then the battery's lifespan is approximately 3 years.

The cradle uses a 1/2AA 3.6V lithium battery

1. Unfasten the four screws at the back of the cradle.
2. Carefully rotate the cradle.
3. Remove the front cover and replace the battery. Be sure to insert the new battery in the correct corresponding polarities (look for the "+ symbol next to the positive terminal).

4. Replace the front cover, turn the cradle over and refasten the four screws at the back of the cradle.

3.4. Screw Terminals

The cradle is equipped with eight screw terminals for permanent connections to the cradle. These terminals include:

Connection to external sensor: Identical to the cradle's external sensor socket.
Contact sensor (DT175 only): This cradle sensor (in addition to the usual external contact sensor) monitors Reed Relay contacts and switch status (open/closed) to identify the correlation between phenomena such as temperature change and door status. This sensor's data is stored in the

cradle's memory and is available only through wireless transmission.

External control switch: Closes an external control circuit when sensor readings exceed alarm levels. Maximum load: 30VDC, 1A.

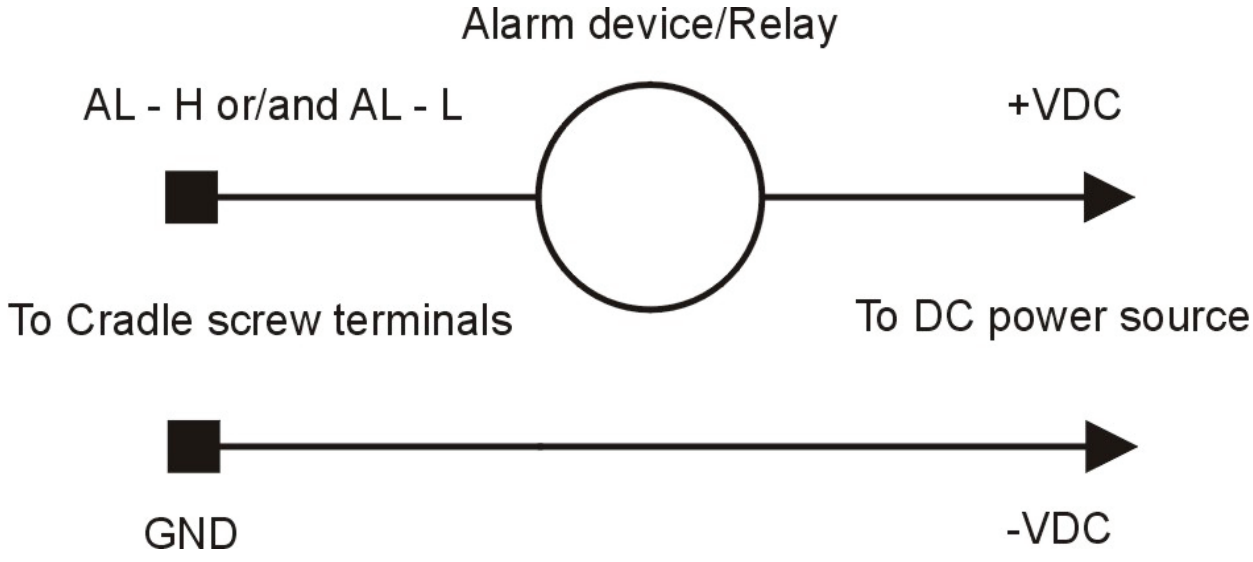


Figure 20: External control switch wiring

You can wire one alarm device for High alarm level (AL – H terminal) and another alarm device for the low alarm level (AL – L terminal), or you can connect the same device to both terminals so it will operate whenever any of the alarm levels are exceeded.

If you want to operate an alarm device that consumes more than 30VDC, 1A or an AC alarm device, you will have to use a relay.

External power: Connection to an external 12VDC power supply (i.e. vehicle battery).

To connect to the screw terminals:

1. Unfasten the antenna screw at the top back of the cradle.

2. Remove the antenna.
3. Unfasten the four screws at the back of the cradle.
4. Remove the back cover and break the oval seal at the bottom of the back cover by pressing it with a screwdriver.
5. Replace the back cover.
6. Carefully rotate the cradle.
7. Remove the front cover.
8. Insert the external wires through the oval opening you have broken at the back cover and fasten them to the appropriate screw terminals (refer to Figure 21 and the table below).
9. Replace the front cover, turn the cradle over and refasten the four screws at the back of the cradle.
10. Replace the antenna and fasten the antenna screw.

Figure 21: Cradle's screw terminals

The table below lists the various screw terminals according to their labels (from left to right) that are printed above the terminals.

Label (left to right)		**Function**
1	AN	External sensor (+ Ground)
2	PWR	
3	DOOR	Contact sensor (online only)
4	GND	
5	AL–H	External control switch (30VDC, 1A)
6	AL–L	
7	GND	External power
8	+12V	

Chapter 4 The Receiver

Chapter 4 The Receiver

4.1. Overview

The Receiver is designed to receive wireless data from remote MicroLog cradles or Repeaters and send it to your computer.

The Receiver is equipped with two LED indicators to show Receiver status and is powered by an AC/DC mains adaptor.

4.2. Getting Started

4.2.1. Locating the Receiver

Locate the Receiver near the computer. You can either place it on a tabletop or hang it on the wall.

4.2.2. Receiver Layout

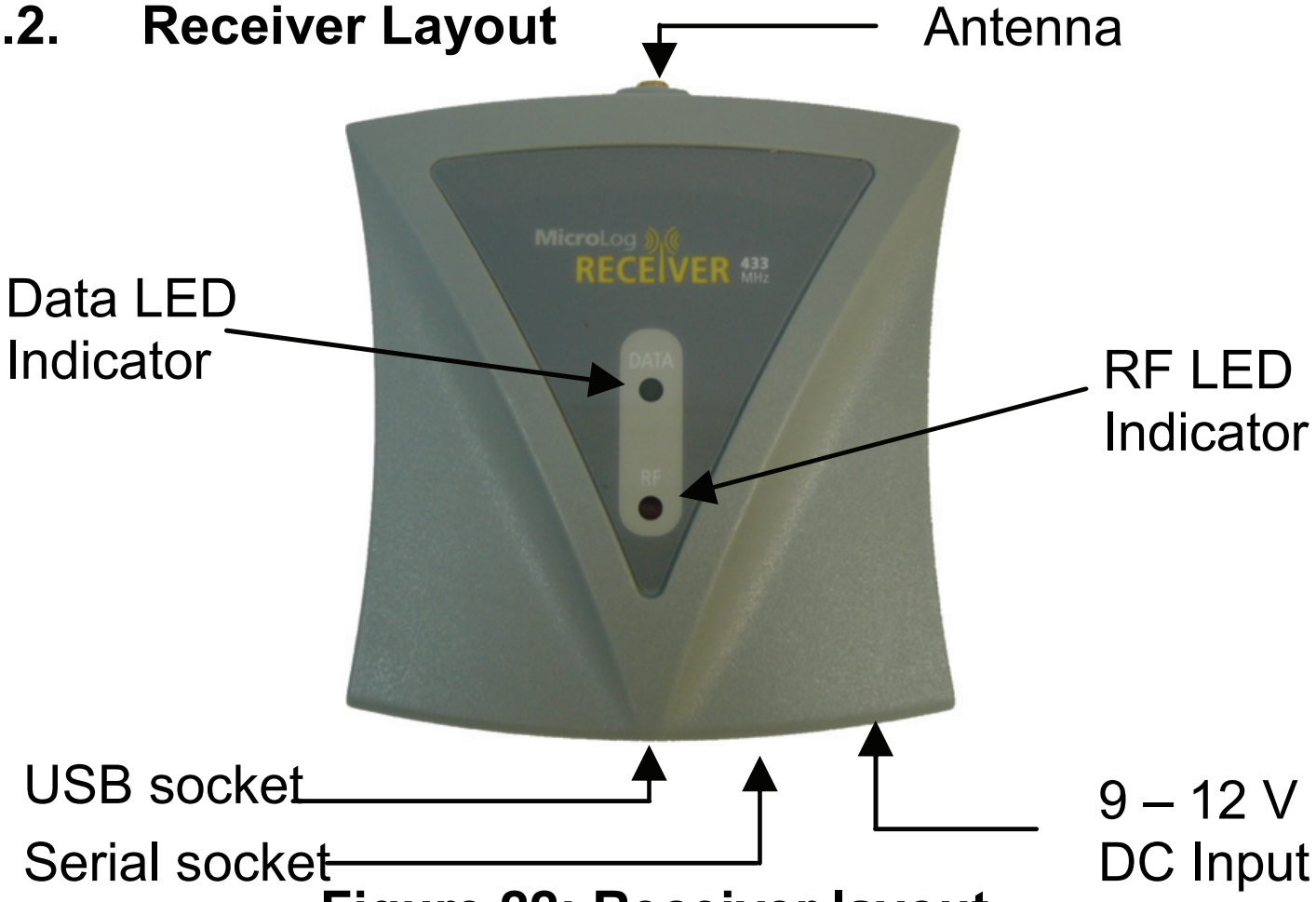


Figure 22: Receiver layout

4.2.3. Powering the Receiver

The receiver must be connected to the mains when in use. The rechargeable battery functions only as a backup in the event of electricity failure.
Connect the supplied AC/DC adaptor to the mains, and then connect it to the 9-12V DC input at the bottom of the Receiver (refer to Figure 22 above).
The Receiver is now ready to receive data and transfer it to the computer.

4.2.4. Connecting the Antenna

Screw the supplied whip antenna to the SMA antenna socket at the top of the Receiver (refer to Figure 22 above). If the Receiver is lying on a tabletop, use the hinge to bend the antenna to an upright position.

Note: You can also use Fourier Systems' magnet antenna (refer to Chapter 5).

4.3. LED Indicators

Two LED indicators are used to indicate the Receiver's status by flashing. The indicators are located on the Receiver's front panel. The upper LED is marked **DATA** and the lower LED is marked **RF**.

The **RF** indicator lights up red whenever the Receiver receives RF carrier of the operating frequency (433MHz in Europe or 915MHz in the US).

The **DATA** indicator lights up green whenever the Receiver receives MicroLogPRO data.

The upper LED also represents the power supply and lights up yellow whenever the Receiver is connected.

If the Receiver is disconnected from the mains power supply, the DATA indicator lights up yellow and keeps blinking every two seconds as long as the external power is down. The backup battery will allow for five hours of operating.

4.4. Beeper

The Receiver is equipped with a built-in beeper that beeps whenever the Receiver receives a single data point. If the Receiver receives daily download data, it beeps when transmitting it to the next leg.

To turn the beeper on and off:

1. Connect the Receiver to the computer.
2. Run MicroLab or MicroLab Plus software.
3. Click **Logger** on the main menu, then click **Receiver beeper on.**
4. To change the beeper's status, repeat step 3 above.

Chapter 5 External Magnet Antenna

For use with the Cradle and/or Receiver

5.1. Overview

The external antenna is equipped with a magnet clamp for easy mounting on metallic surfaces. Just plug the antenna to the Cradle or Receiver, place the magnet antennae in a location where transmission is most accessible (for example, on the roof of a truck) and you are ready to go.

Use the external antenna in cases where the:

- Cradle or Receiver is located in metal chambers (for example, in refrigerators).
- Cradle or Receiver is located indoors for protection from harsh environmental conditions and rain.

Chapter 5 External Magnet Antenna

The external antenna is designed for 914MHz and 433MHz carriers. The antenna adds a 1-3dB gain to the Transmitter-Receiver path. With the use of an external antenna on both Cradle and Receiver we manage to maintain a constant data reception from the Cradle at distances of *360m with no line of sight.*

5.2. Connecting the Antenna to the Receiver

To use the external antenna, simply screw the antenna to the SMA connector at the top of the receiver (refer to Figure 22 on page 211).

5.3. Connecting the Antenna to the Cradle

All cradles produced after March 2003 have an SMA connector on their right side of the cradle.
To use the external antenna, simply screw the antenna to the SMA connector.

Figure 23: MicroLog PRO with Cradle

5.4. Preparing the Cradle to work with the External Antenna

The cradle is equipped with an internal jumper that connects the transmitter either to the built-in wipe antenna or to the external magnet antenna.

To change the jumper position:

1. Unfasten the four screws at the back of the cradle.
2. Carefully rotate the cradle.
3. Remove the front cover.
4. Place the jumper in the desired position.

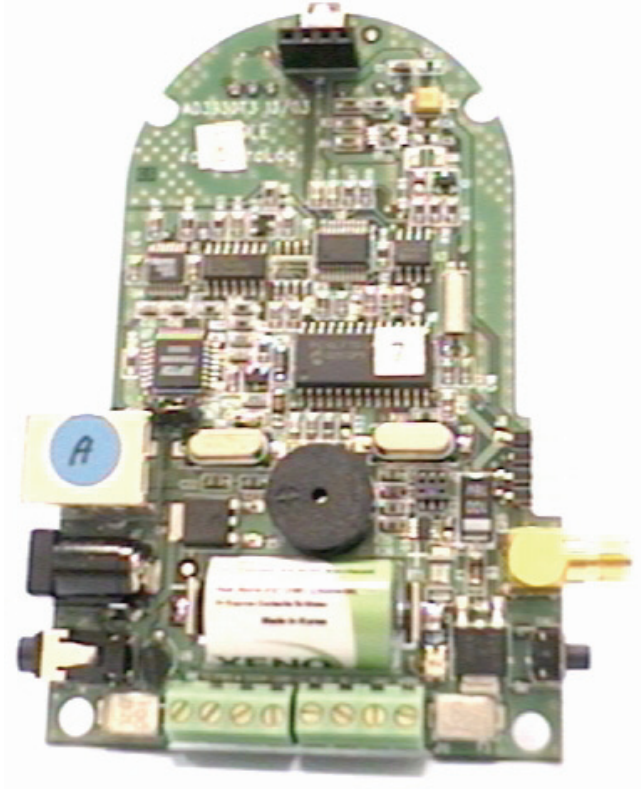


Figure 24: Changing the jumper position

The jumper connects the middle pin either to the right-hand pin marked INT (internal antenna) or to the left-hand pin marked EXT (external antenna).

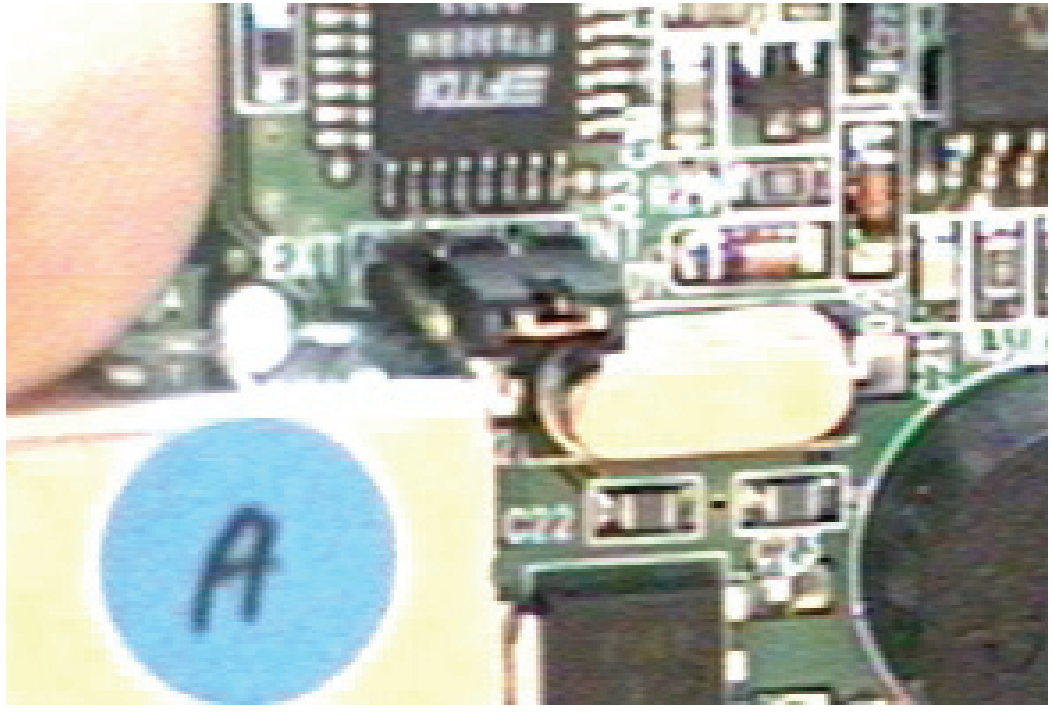


Figure 25: INT and EXT Antenna pins

5. Replace the front cover, turn the cradle over and refasten the four screws at the back of the cradle.

Chapter 6 External Sensors

MicroLogPRO works with the following external sensors:

6.1. Temperature -50°C to 110°C (Thermistor-based)

Takes external temperature measurements over a wider range than the internal temperature sensor and with a faster response time.

Specifications:

Range:	-50 °C to 110 °C
Resolution:	Better than 0.3 °C between -30 °C to 90 °C
Accuracy:	1 °C (before calibration)

Probe Length:	100 mm
Probe OD:	3.2 mm
Probe Max. Temperature:	150 °C
Cable Max. Temperature:	80 °C

6.2. Temperature PT100 Adaptor

Offers a smaller temperature range with a higher accuracy.

Range:	-10 °C to 10 °C
Resolution:	0.06 ˚C
Accuracy:	0.12 ˚C +/- 0.12 ˚C

Trimmer calibration is possible

6.3. Voltage Sensor

Measures any device or transmitter that produces a linear analog output of 0-10V. The voltage can easily be converted to the correct measured units with the help of the MicroLab and MicroLab Plus software.

Specifications:

Range:	0 to 10V
Resolution:	0.01V
Accuracy:	1% from reading +/- 0.02V
Input Impedance:	25kΩ
OV Protection:	30V

6.4. Current Sensor

Samples any device or transmitter producing a linear current of 0-20mA. The 0-20mA can be converted to the correct measured units using the MicroLab software's Calibration option.

Specifications:

Range:	0 to 20mA
Resolution:	0.02mA
Accuracy:	1% from reading +/- 0.006mA
Input Impedance:	166 Ω
OV Protection:	100mA

6.5. pH Sensor

Monitors the pH level of liquids.

Specifications:

Range:	1 to 14 pH
Resolution:	0.03 pH
Accuracy:	3% of reading

6.6. Conductivity

Monitors conductivity of liquids.

Specifications:

Range:	3 to 20 mS
Resolution:	0.04 mS

Accuracy: 3%

6.7. Contact Adapter

Monitors Reed Relay contacts and switch status (open/closed) to identify the correlation between phenomena, such as temperature change and door status.

Specifications:

Range: Open/Close

Connector: Screw Terminal

Cable Length: 2.5m

Internal Pull-Up Resistor: No need for an external power source

Specifications

MicroLogPRO

Models:

EC700: Temperature and external sensor data logger

EC750: Temperature, relative humidity and external sensor data logger

Inputs:

Two built-in sensors:

Temperature

Range:	-40 ˚C to 80 ˚C
Resolution:	0.2 ˚C (-40 ˚C to -20 ˚C)

Specifications

0.1 ˚C (-21 ˚C to 50 ˚C)

0.2 ˚C (51 ˚C to 80 ˚C)

Accuracy (all ranges): 0.2 ˚C

Response time: ~ 15 minutes

Software calibration is possible

Relative Humidity:

Range: 0 to 100%

Resolution: 0.1%

Accuracy: 3%

Response time: ~ 25 minutes

Software calibration is possible

External Sensors:

Refer to Chapter 6.

Outputs:

Four digit 7-segment LCD with decimal point

Wireless rapport to infrared HP printer HP82240B

RS232 serial communication at 19,200 bps

USB 1.1 (optional – low water and dust protection)

Memory Capacity:

1 sensor	52,000 samples
2 sensors	26,000 samples
3 sensors	16,000 samples

LCD Unit Icons:

˚C, ˚F, %RH, pH, V, mA, mS, AL-H, AL-L

Power Supply:

Internal Lithium Battery: 3.6V, 1.2AH, 1/2AA

Battery Life: Approximately two years. May vary with number of sensors connected and the sampling rate settings (for more details refer to page 22).

Sampling Rate:

User defined: From once every 10 seconds to once every 2 hours

Dimensions:

Diameter: 72mm

Thickness: 22.9mm

Weight: 55g

Standards:

Water and dust proof IP65 standard compliance

CE and FCC standard compliance

MicroLogPRO Cradle

Models:

DT174:

Additional external sensor

RS 232/USB Serial Interface

Audible alarm

DT175:

Wireless data transmission

Additional external sensor

RS 232/USB Serial Interface

Audible alarm

Serial Communication Channels:

RS232 at 19.2Kbps

USB at 1.5Mbps

Memory Capacity (DT175 only):

2,000 recording samples

Connectors:

4-pin flat connection to the MicroLogPRO

4-pin flat connection to any MicroLogPRO external sensor

Screw terminal for external DC supply, connection to external sensor, external control switch and additional

Contact sensor (the additional contact sensor is available in DT175 only)

Power Supply:

Internal: Lithium battery, 3.6V

Battery Life: Approximately 100,000 transmissions, replaceable

External: 6-30V, minimum 300mA

RF Transmission (DT175 only):

EMC conformant to ETS 300-683

Type approved to ETS 300-220. Usable range to 300m (75m indoors) 418 (UK) & 433.92MHz (Euro) versions

1mW on 418 MHz, 10mW on 433.92MHz

2nd harmonic <-60dBc

16cm wipe antenna

CE and FCC standard compliance

MicroLab Plus Receiver

Communication Ports:

RS232 at 19.2Kbps

USB at 1.5Mbps

Power Supply:

External: 9-12VDC, minimum 300mA

Red LED indicating RF signal

Green LED indicating valid data being received

RF Receiver:

European version

Frequency: 433.92MHz

Type approved to ETS 300-220

Usable range: To 300m (75m indoors)

North American version

Frequency: 914.5MHz

Usable range: To 120m (30m indoors)

Antenna:

SMA connector

Supplied with rubber whip antenna (with a hinge)

Dimensions:

10×9×2.5 cm

CE and FCC standard compliance

Software

MicroLab Software Features

Runs on WINDOWS 98/2000/ME/XP and NT
Fast data download from the MicroLogPRO
Graphic visualization of the MicroLogPRO data
Data displayed in graphs and tables
Data export to EXCEL
Graphic analysis tools such as Markers, Zoom
MicroLogPRO Setup windows, for setting up the MicroLogPRO unit ID, sample rate, sensors and alarm level
Sampling rate: Once every 10 seconds to 2 hours
Definition of additional external sensors
MicroLogPRO sensor calibration

Display of MicroLogPRO Battery Level
Integration with the wireless MicroLogPRO Cradle, Receiver and Repeater
Display of daily reports of a fleet of data loggers
Visual alarm levels on the graph and table

MicroLab System Requirements

Software

Windows 98 or later
Internet Explorer 4.0 or later (Internet Explorer 5 can be installed together with MicroLab, as it ships with the product)

Hardware

Pentium 300MHz or higher
32 MB RAM (64 MB recommended)

5MB available disk space for the MicroLab application

MicroLab Plus Software Features

Wireless communication with up to 200 MicroLogPROs
Real-time temperature and humidity and external sensor readings
Data display in meters or graphs
Visual and sound alarm when the data reading exceeds a minimum or maximum alarm threshold for temperature or humidity
E-mail alarm notification
Battery level display

Automatic data saving to an Excel file
Data Map allowing the users to easily view many MicroLogPRO data loggers on one screen

MicroLogPRO Setup windows, for setting up the MicroLogPRO unit ID, sample rate, sensors and alarm level
Sampling rate: Once every 10 seconds to 2 hours
Definition of additional external sensors

MicroLab Plus System Requirements

Software

Windows 98 or later
Internet Explorer 4.0 or later (Internet Explorer 5 can be installed together with MicroLab, as it ships with the product)

Hardware

Pentium 300MHz or higher
32 MB RAM (64 MB recommended)
5MB available disk space for the MicroLab Plus application

Appendix: Figures

Figure 1: Connecting MicroLogPRO.....18
Figure 2: MicroLogPRO battery life 24
Figure 3: Replacing the battery 26
Figure 4: Humidity calibration 73
Figure 5: Defining a new sensor 77
Figure 6: IR Print Settings dialog box 78
Figure 7: Communication Setup dialog box.....80
Figure 8: Functions Parameters 88
Figure 9: Histogram settings.....90
Figure 10: MicroLogPRO Meter view.....103
Figure 11: Active Cradles selection 110
Figure 12: Opening files 145
Figure 13: Defining a new sensor.....173

Figures

Figure 14: Humidity calibration dialog box 177
Figure 15: IR Print Settings dialog box 180
Figure 16: Communication setup dialog box..... 182
Figure 17: Functions Parameters..... 184
Figure 18: Histogram settings 186
Figure 19: MicroLogPRO and Cradle..... 199
Figure 20: External control switch wiring..... 204
Figure 21: Cradle's screw terminals..... 207
Figure 22: Receiver layout 211
Figure 23: MicroLog PRO with Cradle 220
Figure 24: Changing the jumper position 222
Figure 25: INT and EXT Antenna pins 223

Index

A

alarm · 50, 65
  activate sound · 114
  active time · 66
  delay · 66
  display levels · 137
  duration · 67
  E-mail notification · 115
  set levels · 159
  settings · 66, 159
annotations · 51
antenna · 216
automatic download · 85
autoscale · 44, 153

B

battery · 25, 60, 161, 202
battery level · 159
button · 93

C

calibration · 72, 174
cancel alarm · 159
Celsius · 62, 127, 159
change
  password · 174
  temperature units · 127
COM · 181
comment · 59, 160
communication · 79
communication cable · 17
communication setup · 181
connections · 17, 199
contact · 230
control · 204
coordinates · 43
copy · 55
copy graph · 157
cradle · 196, 199
cradle ID · 82, 159
crop · 155
current · 228
cursor · 42, 150
custom sensor · 76, 172
cyclic · 159
cyclic run · 15, 63

D

daily download · 64, 81, 165
daily status · 86
data · 7
  crop · 155
data logger · 1
data map · 40
date format · 127
decimal place · 127
default
  sensor calibration · 174
  zoom · 153
define
  new sensor · 172
define new sensor · 159
delete · *See* remove
display · 7, 38
  alarm levels · 137
  options · 129
  properties · 127
download · 32

E

excel · 157
export · 53, 157
external · 61, 159

external antenna · 216
external sensors · 19, 225

F

Fahrenheit · 62, 127, 159
format · 49
  graph · 155

G

graph · 39, 149
  copy · 157
  format · 155
  print · 147

H

humidity · 61, 159

I

icon
  MicroLog · 139
icon · 41
ID · 60, 159

install · 28, 29, 104, 105
interval · 62

L

lines · 155

M

magnet antenna · 216
mail · 115
map · 40
maximum values · 7
MicroLab · 28
MicroLog · 231
MicroLog Plus · 98
MicroLogPRO · 4
minimum values · 7
modes · 15

N

new password · 174

O

offline · 81, 183
open · 35, 144

P

pan · 48
panning · 137
password · 174
pH · 229
picture · 139, 157
print · 36
  graph · 147
  table · 147
Print · 147

R

recalibrate · 174
receiver · 210, 240
recording · 6, 15, 63, 69
reference · 174
remove · 42
  data · 155
  MicroLog icon · 139
run · 15, 69, 159

S

S/N · 159
save · 33, 111
screw terminals · 203
send e-mail · 115
sensor · 159
  calibration · 174
  define new · 172
  external · 225
serial · 17
setup · 58, 159
sleeping mode · 22
sound alarm · 114
specifications · 231
standalone · 5
start · 15, 63, 69
start recording · 159
status · 11
stop · 15, 70
stretch/compress · 47, 136
system requirements · 28, 104

T

table · 40
  print · 147

temperature · 61, 159, 225
units · 127
terminal · 203
timer · 159
timer run · 15, 63
toolbar · 93, 189
cradle map · 194
main · 189
transmission time · 83
trim · 155

U

uninstall · 29, 105
unit · 50, 62, 76

V

value · 42
viewing · 38
voltage · 227

W

wireless · 197
work offline · 181

Y

Y-axis · 155
  identify · 149

Z

zoom · 43, 135
  default · 45, 153
  manual scaling · 44, 151
  stretch/compress axis · 47, 136