EasyTrack2

USER MANUAL

for use with

insight software

Issue 2

MA5610A

DATAPAQ®

A Fluke Company

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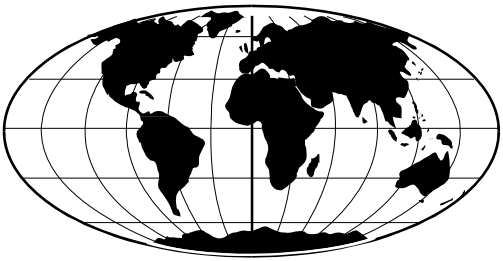

Datapaq is the world's leading manufacturer of process temperature-monitoring instrumentation. The company maintains this leadership by continual development of its advanced, easy-to-use Tracker systems.

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DATAPAQ PART NO. MA5610A

European Union Directives

The following product types

EasyTrack2 Thermocouple Data Logger

manufactured by Datapaq Ltd.
Lothbury House, Cambridge CB5 8PB, UK

comply with the requirements of European Union directives as follows.

Directive 2004/108/EC Electromagnetic Compatibility (EMC)
Standard Applied

EN61326-1: 2006 – Group 1, Class B equipment (emissions section only), and Industrial Location Immunity (immunity section only).
CFR47: 2007 Class A – Code of Federal Regulations: Part 15 Subpart B, Radio Frequency Devices, Unintentional Radiators.

RoHS Compliance Datapaq temperature-monitoring equipment is exempt from EU Directive 2002/95/EC (restriction of the use of certain hazardous substances in electrical and electronic equipment) under category 9 Monitoring and Control Instruments. This Datapaq product nevertheless uses RoHS-compliant components and manufacturing processes.

nqa. ISO 9001 Registered 015 UKAS QUALITY MANAGEMENT VIT

Conforms to relevant South Korean EMC Standards.

Electromagnetic Compatibility *Applies to use in Korea only.* Class A Equipment (Industrial Broadcasting & Communication Equipment). This product meets requirements for industrial (Class A) electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and is not to be used in homes.

User manuals are available in other languages. Contact Datapaq for details.

SAFETY WARNINGS

For safe use of Datapaq equipment, always:

- Take care to follow its supplied instructions.
- Observe any warning signs shown on the equipment itself.

Indicates **potential hazard**.

On Datapaq equipment this normally warns of high temperature, but where you see the symbol you should consult the manual for further explanation.

Warns of **high temperatures**.

Where this symbol appears on Datapaq equipment, the surface of the equipment may be excessively hot (or excessively cold) and may thus cause skin burns.

CONTENTS

Introduction

Datapaq® EasyTrack2 – incorporating Insight™ EasyTrack® software, and designed specifically for use in the general coating and finishing industry – is a complete system for monitoring the temperature profiles of products within your oven; accurate data acquisition and powerful analysis techniques are combined with flexibility and ease of use. The EasyTrack2 system's power and flexibility make it a perfect tool for process temperature monitoring, from commissioning and troubleshooting to process optimization, ensuring consistent quality of product and maximum efficiency.

Innovative analysis techniques help in identifying problems, fine tuning the process and reducing running costs.

This manual contains information for all EasyTrack2 users, from novice to experienced. The chapters are arranged in logical order, explaining the EasyTrack2 system and the sequence of events in setting up and conducting a temperature profile run. There is also a description of the features provided by the Insight software supplementing the information contained in its online Help system.

Software – How to install, remove and run the Insight software.

Hardware – Describes the EasyTrack2 data logger and thermal barrier.

Insight Basics – Describes the basics of the Insight user interface and customizing the software.

Running a Temperature Profile – All the stages of obtaining a profile, from connecting probes to downloading the data into the software.

Data Analysis – Describes the data analysis features provided by the Insight software, setting of the oven start and zooming.

File Management – Saving, loading, printing and exporting results.

Advanced Features – Description of the advanced Insight features, covering logger calibration and run alarms.

Care and Maintenance – How to look after the system.

Troubleshooting – Lists error messages and describes how to test the data logger and probes.

Software

Datapaq Insight requires the following minimum computer specification.

- 1 GHz processor.
- 2 Gb RAM.
- Monitor resolution 1024 × 768, 256 colors.
- 100 Mb free hard disk space.
- DVD drive.
- 1 free USB port.
- Microsoft Windows™ XP, Vista, 7, 8 or above.
- Microsoft Internet Explorer 4 or above.

Check that new PCs or laptops which you wish to use with the EasyTrack2 have a free USB port.

Installation

Ensure you are logged into Windows in Administrator mode.

For most systems, installation will start automatically on placing the Insight DVD in the drive. (If installation does not start, click the Windows Start button and select Run; browse to your DVD drive, and run Setup.exe.)

Follow the on-screen instructions. You will need your license number to hand, which is to be found on:

- Your license agreement.
- The outside of the DVD case.
- The outside of the system packaging.

Insight's link with the logger must also be made while Windows is in Administrator mode, and it is thus best to do this now, as part of the Insight installation: connect the logger to the PC and follow the procedure under 'Communications Setup' (below). Once this has been done, an operator will be able to use Insight with the logger connected to the PC without being in Administrator mode.

Upgrading

It is not necessary to remove an existing version of the software before installing a new one. Settings and data files used with the current installation will be maintained.

Removal

From the Windows Start button menu, select Settings and then Control Panel. Double-click Add/Remove Programs, select Datapaq Insight and click Add/Remove.

Using the Software

Full details on using the Insight software are contained entirely within its online Help system: access this by clicking Help, and then Contents, on Insight's main menu. Then, within Help, click on Contents headings and topics to expand and read them.

You may also click the Help button in any dialog – or press the F1 key – to bring up help information relevant to the task being performed.

Communications Setup

After Insight has been installed, it is necessary to establish communication between the data logger and the PC, as follows.

Only one logger at a time can be connected to the PC. It is not possible to connect simultaneously more than one logger to different USB ports on the PC and then to choose which logger to use.

1. Using the communications lead supplied, connect the logger to a free USB port on the PC (to minimize communications problems, connect the lead first to the PC and then to the logger). The red LED on the logger should flash five times to confirm that the connection between the communications lead and the logger has been made.

   If the PC is having a Datapaq logger connected for the first time, Windows will display a 'Found New Hardware' message. After a few seconds, Windows will display 'Datapaq EasyTrack2', and, after a further few seconds, 'Your hardware is installed and ready to use'. If any warnings are displayed about driver-signing, confirm them (Datapaq drivers have been tested, and were installed when Insight was installed).

Typical sources of problems with establishing communication

• **Communications lead not fully inserted** – Check correct sockets are being used.

• **Damaged communications lead or connectors** – Check for breaks and other damage. Replace the lead.

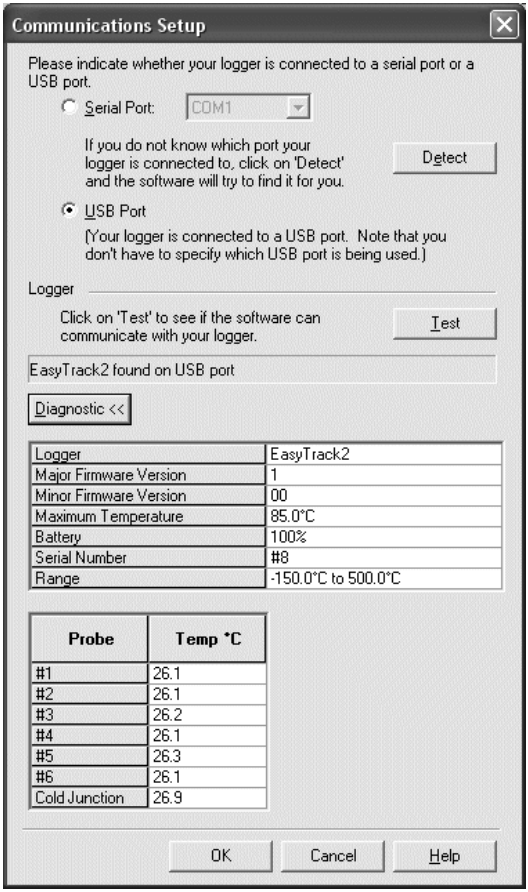
2. On the Insight software's menu bar, select Logger > Setup to open the Communications Setup dialog.
3. Click Test.

If the logger is detected, its type and the port to which it is connected are displayed.

SHORTCUT

Pressing F4 on the keyboard opens the Communications Setup dialog, tests for communication with a logger, and displays the logger type and other data (equivalent to clicking Test in the dialog).

For more information on the logger in use, click the Diagnostic button which now appears. Additional data shown covers firmware version, maximum permitted internal logger temperature, serial number and temperature recording range. Current temperature of the probes (updated once a second) is also shown – or open circuit (*OC*) if no probe is attached; the temperature of the thermocouple cold junction is effectively the current internal temperature of the logger.



The Communications Setup dialog for the EasyTrack2 logger, with Diagnostic section expanded.

Hardware

The EasyTrack2 system hardware comprises:

- EasyTrack2 data logger (including communications lead).
- Thermal barrier.
- Thermocouple probes.

EasyTrack2 Data Logger

The Datapaq EasyTrack2 Logger is designed to offer accurate and consistent monitoring of your process, combined with unparalleled ease of use.

Specification

Channels	4 – logger part no. ET4041 6 – logger part no. ET6061
Thermocouple type	K
Measuring range	-150 to 500°C/-238 to 932°F
Sample interval	0.5 s to 60 minutes
Accuracy	±0.5°C/±0.9°F
Resolution	0.1°C/0.2°F
Operating range	0–85°C/32–185°F
Memory	4,000 data points per channel – ET4041 6,000 data points per channel – ET6061
Telemetry	Hard-wired (serial) telemetry, 6-channel logger only

Battery

The EasyTrack2 logger requires a 9V PP3 **alkaline** battery.

It is important to use only good-quality, branded alkaline batteries, e.g. Duracell Plus or Procell.
Do not use zinc-carbon or zinc-chloride batteries, rechargeable batteries, batteries that may have been used previously, or batteries outside their shelf life.

The EasyTrack2 employs non-volatile memory, so – even when the battery is replaced – data stored in the logger will not be lost.

The EasyTrack2 logger, 4- and 6-channel versions.

Fitting Batteries

1. Open up the battery compartment by releasing the magnetic catch on the battery compartment.
2. Remove the old battery by gently pulling the white connector block.
3. Replace with a new alkaline 9V PP3 battery.
4. Replace the battery compartment lid.

Note that, immediately following a change of battery, a manual reset of the logger will not work; for the first profile run after a change of battery the logger must instead be reset using Insight; see p. 31.

Battery LED

The **yellow LED** on the EasyTrack2 logger indicates the battery status. If it is flashing, it indicates that the battery is low.

Given the factors that can affect the life of a battery it is obviously difficult to predict accurately. The LED on the logger will give the best indication of when the battery is low.

If you plug the communications lead into the logger and the red LED does not flash 5 times, it may indicate that the battery is flat.

Saving Battery Life

To limit power consumption and maximize battery life, the logger will power itself down (all LEDs off) at the following times.

- When the communications lead is removed from the logger after a download.
- Five minutes after the red Stop button has been pressed if the data is not downloaded.
- When the communications lead is plugged into the logger, and the logger detects no activity for 5 minutes.

To **power down the logger manually**, press the green and red buttons simultaneously and hold them for 3 s.

To **power up the logger**, either plug in the communication cable or (to start a profile run) press the green Start button. If the logger has data in memory that has not yet been downloaded, pressing the Start button will not start a new run or delete data but will simply power the logger up; the red LED will then flash every 5 s to indicate that data needs to be downloaded.

Logger Status LEDs

In addition to the yellow battery-status LED, the EasyTrack2 logger is also equipped with **red and green LEDs** which show the status of the logger and its memory.

Red	Green	Meaning
5 flashes, alternating with green LED	5 flashes, alternating with red LED	Logger successfully reset
Flashing, alternating with green LED, at sample interval	Flashing, alternating with red LED, at sample interval	Logger awaiting trigger (either Start button or temperature)
Flashing together with green LED	Flashing together with red LED	All probes are above trigger temperature, and thus data-recording cannot be triggered by rising temperature
Off	Flashing at sample interval	Logger acquiring data
Flashes 5 times (once per second)	Off	Connection between communications lead and logger has been made
Flashing every second	Off	Internal error
Flashing every 5 seconds	Off	Logger has data in memory which has not been downloaded
2 quick flashes every second	Off	Logger too hot to start logging (after pressing Start button)

Disposal of Batteries and Loggers

Always adhere to the applicable statutory regulations for recycling and waste disposal. For details of recycling Datapaq products within the European Union, see www.fluke.co.uk.

Batteries

Under the European Union Batteries and Accumulators Directive, the used batteries which are removed from the logger by the user should be disposed of at an appropriate recycling centre.

Loggers

Under the European Union WEEE Directive, users should return all loggers (whether or not containing batteries) to Datapaq for disposal at the end of their useful life.

Thermal Barriers

Specifications of thermal barriers for use with the EasyTrack2 system are as follows.

TB0250 thermal barrier

For use with a **typical** EasyTrack2 system.

Temp °C	100	150	200	250	300
Temp °F	200	300	400	475	575
Duration (min)	360	180	120	75	40
Physical	Height 111mm 4.4in	Width 185mm 7.3in	Length 260mm 10.2in	Weight 2.6kg 5.7lb	
Heatsink	1 × TB9550				

TB5000-HT thermal barrier

For use with the EasyTrack2 in **high-temperature** processes, e.g. PTFE, Dacromet.

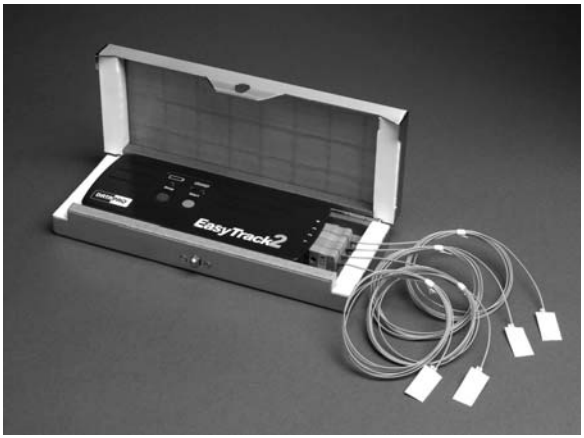
Temp °C	100	150	200	250	300	400
Temp °F	200	300	400	475	575	752
Duration (hrs)	14.5	6.5	4.5	3.5	3.0	0.3
Physical	Height 130 mm 5.1 in	Width 190 mm 7.5 in	Length 292 mm 11.5 in	Weight 6.2 kg 13.7 lb		
Heatsink	2 × TB1001					

EasyTrack2 thermal barriers and their heatsinks: standard barrier, TB0250 (left); high-temperature barrier, TB5000-HT (right).

TB2037 thermal barrier

For use with the EasyTrack2 where a **low-height** thermal barrier is required.

Temp °C	100	150	200	250	300
Temp °F	200	300	400	475	575
Duration (min)	30	18	13	–	9
Physical	Height 31 mm 1.2 in	Width 90 mm 3.5 in	Length 229 mm 9.0 in	Weight 0.6 kg 1.3 lb	
Heatsink	None				



EasyTrack2 thermal barrier TB2037 for low-height applications, with data logger and thermocouples in place.

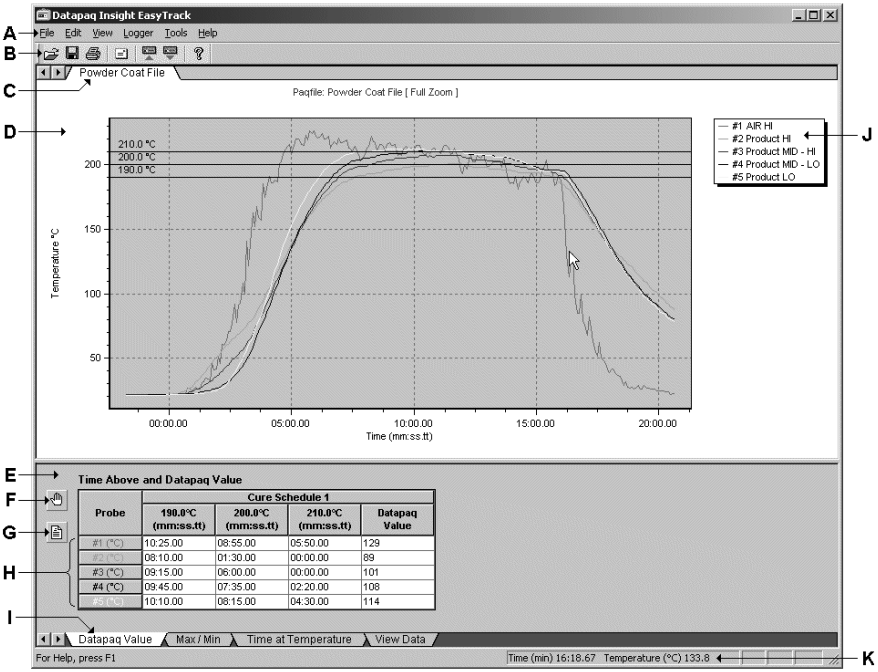
Insight Basics

This chapter describes the basics of the Insight software, describing the user interface, toolbar and menus and ways to customize the software.

User Interface

The user interface uses the standard Microsoft Windows format, enabling users to operate the Insight software quickly and easily via the mouse.

A typical display is shown below. Notice how the screen is divided horizontally into two: the top part contains the data in graphical form, while the bottom section shows the data numerically. A splitter bar divides the two presentations of the data, and this can be moved upwards or downwards to change the proportion of the screen that each view occupies.



The basic Insight user interface.

A	Menu Bar – showing the available menu options.	**G**	Probe Name Button – allowing the probe names to be specified.
B	Toolbar – contains buttons to access regularly used software functions.	**H**	Probe Buttons – allowing probes to be removed from the display. Left clicking toggles between removing or showing a probe. Right-clicking selects a probe in isolation.
C	Filename – shows the name of the currently open file.		
D	Graph Window – showing the data in graphical form.	**I**	Analysis Tab – showing the name of the current analysis mode. Click on these tabs to select the analysis mode of interest.
E	Analysis Window – showing the numeric results calculated for the current analysis mode.	**J**	Probe Key – matching the color used for the probes to their names and numbers.
F	Options Button – allowing parameters to be set up for the current analysis mode.	**K**	Status Bar – showing the coordinates of the mouse cursor on the time/temperature graph.

Toolbar

Each button on the toolbar provides single-click access to the main software functions.

Open Paqfile
Opens a previously saved file, referred to as a 'paqfile'. See the chapter on File Management (p. 47).

Save Paqfile
Saves results in a paqfile. See the chapter on File Management (p. 47).

Print Paqfile
Prints a report for the current paqfile. See the chapter on File Management (p. 48).

Send Paqfile
Opens a new email message in your default email program with the currently displayed paqfile attached (or select File > Send on the main menu; see below).

Reset Logger
Resets the data logger for a new profile run. See the chapter on Running a Temperature Profile (p. 31).

Download from Logger
Downloads results from the logger into the software. See the chapter on Running a Temperature Profile (p. 34).

About
Displays the About dialog box, showing the software version number and Datapaq contact details.

Main Menu

The main software menu, on the menu bar, has six options, which are described below.

File

This menu provides options for loading, saving and printing paqfiles:

- **Open** – Opens a previously saved paqfile. See the chapter on File Management (p. 47).
- **Save** – Saves results in a paqfile. If the paqfile has not been previously saved, then you are prompted to specify a filename for it. If the paqfile has been previously saved, then any changes are saved to the existing file.
- **Save As** – Saves results in a paqfile, prompting you for a filename.
- **Import from Clipboard** – Opens the Clipboard Paste Wizard, which guides you through the process of selecting data in a spreadsheet application and importing it to a new or existing paqfile. See the chapter on File Management (p. 48).
- **Print, Printer Setup** – Prints a report for the current paqfile to the default printer.
- **Print Preview** – Displays a preview of the printed report on the screen.
- **Print Options** – Allows you to set up a report title and margins for the report. See the chapter on File Management (p. 48).
- **Send** – Opens a new email message in your default email program with the currently displayed paqfile attached. In case the email recipient does not have Insight, the email contains a link to download free Paqfile Viewer software (from www.datapaq.com) with which to view the temperature profile.
- **Recently Used Files** – The filenames of the eight most recently used paqfiles are added to the menu. Selecting one of these opens the paqfile.
- **Exit** – Exits the Insight software.

Edit

This menu provides options for data export, editing notes or probe names, memos, and for adjusting the oven start.

- **Copy** – Exports a paqfile. See the chapter on File Management (p. 49).
- **Notes** – Allows you to enter notes and other information for your paqfile. This information is included in the printed report.
- **Probe Names** – Allows you to enter names for a paqfile's probes. These names are shown on the graph and in the printed report.
- **Memos** – Annotate your results directly on the graph.
- **Adjust Oven Start** – Allows you to position the markers for oven start and process end in a paqfile. See the chapter on Data Analysis (p. 38).

View

This menu provides options for access to the analysis mode options, showing the full zoom and options to show or hide the toolbar and status bar.

- **Overlay** – Overlay two temperature profiles on the same graph for purposes of comparison. See the chapter on Data Analysis (p. 38).
- **Analysis Options** – Allows you to enter parameters and display options for the current analysis mode. See the chapter on Data Analysis (p. 37).
- **Show Full Zoom** – Sets the graph zoom to show all the data in the paqfile. See the chapter on Data Analysis (p. 40).
- **Show Process Zoom** – Sets the graph zoom to show all the data between oven start and process end. See the chapter on Data Analysis (p. 40).
- **Toolbar** – Shows or hides the toolbar.
- **Status Bar** – Shows or hides the status bar.

Logger

This menu provides options to reset, download and set up the logger. For more details of these options see the chapter on Running a Temperature Profile (p. 27).

- **Reset** – Resets the data logger for a new profile run.
- **Download** – Downloads results from the logger into the software.
- **Setup** – Allows you to specify the communications port to use for your logger, test the communications and get diagnostic information from the logger.

Tools

There is a single option, **Options**, allowing you to customize the Insight software and set up the advanced features. See later in this chapter for customizing the software and see the chapter on Advanced Features (p. 51).

Help

This menu provides access to the online Help and the About dialog box.

- **Contents** – Displays the online Help contents.
- **About** – Displays the About dialog box, showing the software version number and Datapaq contact details.

Right-click Menu

If you right-mouse-click on the graph, the right-click menu is displayed, which contains the following commonly used options:

- **Overlay** – Overlay two temperature profiles on the same graph for purposes of comparison. See the chapter on Data Analysis (p. 38).
- **Adjust Oven Start** – Allows you to position the markers for oven start and process end in a paqfile. See the chapter on Data Analysis (p. 38).
- **Copy** – Exports a paqfile. See the chapter on File Management (p. 49).
- **Show Full Zoom** – Sets the graph zoom to show all the data in the paqfile. See the chapter on Data Analysis (p. 40).
- **Show Process Zoom** – Sets the graph zoom to show all the data between oven start and process end. See the chapter on Data Analysis (p. 40).

Customizing Insight

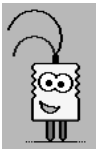
Selecting Options from the Tools menu displays the Global Options dialog. This dialog contains four tabs which allow you to customize the software and set up advanced features. This section will concentrate on describing the tabs that allow the software to be customized, these tabs being General and Units. See the Advanced Features chapter (p. 51) for details of how to set up Insight's advanced features.

General

This tab has the following options:

- **Show Large Buttons on Toolbar** – Replaces the default small toolbar buttons with larger ones.

- **Show Colored Dots on Analysis Tabs** – Adds a different colored dot to each of the Analysis Window tabs, making them easier to identify.
- **Display Messages with Dr Thermocouple** – Message boxes are accompanied by the appearance of the amusing Dr Thermocouple.



Units

This tab allows you to set up the units that the software will use.

- **Temperature Units** – Allows you to select between degrees Centigrade (°C) and degrees Fahrenheit (°F).
- **Time Units** – Allows you to specify how times are displayed and entered.
- **Distance Units** – Allows you to specify the units for distances and lengths.

Running a Temperature Profile

This chapter describes all the stages of setting up and running a temperature profile – from preparing the data logger and thermal barrier and connecting the probes to downloading the results into the software.

SAFETY
Discuss the application of the EasyTrack2 system with your Health and Safety officer.
Wear appropriate protective clothing.
The EasyTrack2 components will be hot after the test run, so handle with care.

Probe Selection, Location and Attachment

Probe Selection

Maximum temperatures for cable insulation materials are:

PTFE	265°C/510°F
Glass fiber	500°C/930°F continuous
Mineral insulation (MI)	1,250°C/2,280°F

Measurement Type

Measurements will be made of air or of surface temperature.

An array of air probes providing a view of temperature distribution across the oven enables adjustment of heaters and/or baffles. Measurements on the surface of the product characterize heat absorption from air determining the actual temperature/time profile to which it is subjected. A combination of air and surface probes enables the rate of heat absorption to be determined, and thus permits adjustments to optimize thermal efficiency and product quality.

*The tip of a thermocouple probe **must** be in good mechanical contact with the product when monitoring surface temperature.*

Probe Location

The product's geometry and the thermal requirements define the location of the thermocouple probes required for the test. In some instances it is necessary to install an array of thermocouples to provide coverage over the entire area of the product. In others, the probes are located to monitor a specific part of the product.

If required, data acquisition can be triggered by temperature, in which case the trigger is normally taken from an air probe. Channel 1 must be used for triggering.

Probe Attachment

Thermocouple probes measuring air and/or product temperature will be attached to:

- The product.
- A reusable product sample (a test piece).
- A test fixture (a structure simulating the product, with probes positioned appropriately).
- A combination of any or all of the above.

In assessing oven performance, to ensure repeatability and ease of use, test pieces or test fixtures with permanently mounted thermocouples should be used whenever possible.

Methods of attachment

The following methods may be used.

*The tip of the thermocouple probe **must** be in good mechanical contact with the product when monitoring surface temperature.*

Surface Measurement

- **Adhesive (patch)** – A self-adhesive, rapid-response probe recommended for all small test pieces, materials less than 1.0 mm/0.04 inches thick and plastics. Attach to the product, test piece or test fixture using high-temperature adhesive tape. When attached to a re-usable test piece or fixture, the probe may be coated with powder/paint enabling reliable, repeatable beneath-coating temperature measurements to be made; this is a major advantage when using infra-red heaters as the absorption of radiation, and thus heat, is affected by the coating's color.

- **Bolt-on (washer)** – A probe normally permanently mounted on a re-usable test piece or test fixture. Provides reliable, repeatable measurements. Attach to the product, test piece or test fixture using a bolt or self-tapping screw.
- **Clip-on** – A quick and easy method suitable for ferrous and non-ferrous materials. The product must have a thin, flat surface to ensure good thermal contact.
- **Magnetic** – A quick and easy method suitable for ferrous materials.
- **Welding/soldering** – A rapid-response probe normally mounted permanently on a re-usable test piece or test fixture. Provides reliable, repeatable measurements.

Ensure probes are disconnected from the data logger if they are to be welded to the test piece.

Air Measurement

- **Adhesive (patch)** – Recommended for use where rapid response is required, but used for air measurement only where clip-on or magnetic probes cannot be used due to product shape, etc. Secure the cable to the product, test piece or test fixture using high-temperature adhesive tape ensuring the probe is in space and able to measure the air temperature.
- **Clip-on** – A quick and easy method suitable for ferrous and non-ferrous materials. The product must have a thin, flat surface to ensure continuing attachment.
- **Magnetic** – A quick and easy method suitable for ferrous materials.

Probe Installation

The presence of a probe on the product will inevitably affect the product's temperature: it adds to its thermal mass and thus changes, however slightly, the rate of heating and cooling. Probes of large thermal mass are unsuitable for use with small, lightweight products.

Measuring the product's surface temperature requires good thermal contact between probe and product. Poor thermal contact will at best result in slowing the rate at which the product heats the probe and at worst prevent the probe from achieving the same temperature. Ensure probe tips are clean before attaching.

Placing a probe between the source of heat and the product can affect the rate of heating. To minimize the effect, attach the probe to the product's unheated side where possible, and/or reduce the probe's thermal mass.

Glass fiber or mineral insulation must be used if thermocouple cables are close to infra-red heating elements or are subject to temperatures over 260°C/500°F.

Route cables to ensure that they are:

- Secured in position along their length.
- Not fouling elements in the oven.
- Not thermally shading the product.
- Not too close to heater elements.

EasyTrack2 Probe Clamp Kit

To assist in the installation and removal of the thermocouples, use the EasyTrack2 probe clamp kit.

Using the probe clamp kit.

This kit is designed for use with test pieces that are routinely used to monitor a particular process. Using the clamp kit, thermocouples can be left attached to the test piece between runs. When performing another test, the probes will be automatically connected into the same thermocouple plugs on the EasyTrack2 logger, speeding up setup and providing repeatable test conditions.

To use the clamp kit, thread the two rods through the two holes in each thermocouple plug, and secure using the supplied end caps. To remove a thermocouple, carefully prise off the securing caps, and reassemble using new caps if required.

Resetting the Data Logger

The data logger needs to be reset using Insight, as follows, before it can receive fresh data.

*If the **Manual Reset** feature (see below) was selected when the logger was last reset using Insight, and if you wish to use those same reset conditions again, it is not necessary to carry out a reset with Insight. Instead, simply press the green Start button to start logging using the previous reset conditions.*
*However, if the **logger's battery has been changed**, manual reset will then not work until after the logger has again been reset using Insight; thus, you **must** use Insight to reset the logger for the first profile run immediately following a battery change.*
*If you are using a **new EasyTrack2 logger**, you **must** use Insight to reset it before performing the first profile run with it.*

1. Connect the logger to the PC.
2. Open the Logger Reset dialog (click  on the Insight toolbar, or press function key F2, or select Logger > Reset from the menu bar) and specify your reset options.

   Sample Interval Set the time which is to elapse between each set (sample) of data points (one data point for each probe) that the logger will collect. The shorter the sample interval the better you will be able to record short-term variations in your temperature regime – but the total recording time available to you will be reduced, and the data will take longer to download to the PC after the run.

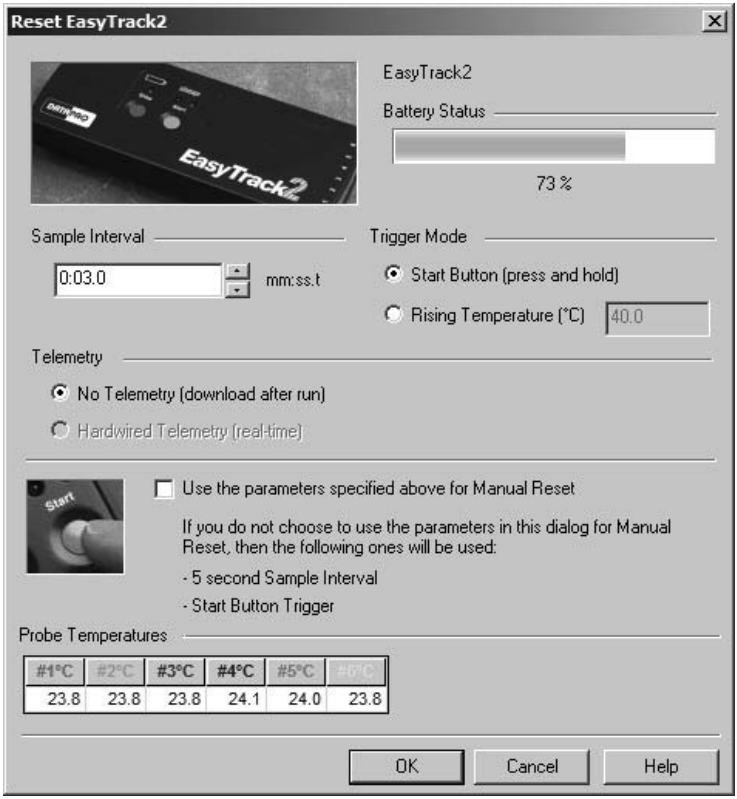
   Battery Status The charge indicator gives both the current percentage of full charge held by the logger battery, and a color-coded report:

   GREEN Sufficient charge to perform a run.
   YELLOW May be enough charge for a run, but battery getting low.
   RED Insufficient battery charge: replace immediately.

   Trigger Mode Select here a means to start the logger recording data.

   Start Button After reset, data-recording starts when the logger's green start button is pressed and held for 1 second. Check that the green LED is flashing for confirmation of logging.

   Rising Temperature Data-recording starts when the temperature of any probe rises to the specified value. (If rising temperature trigger mode is set, the logger records data from the time it is disconnected from the PC – but, once the trigger temperature has been reached, the logger keeps only a maximum of 60 data points before the trigger point and discards any others.) This is ideal for triggering the logger repeatably from run to run.



The EasyTrack2 logger Reset dialog.

Manual Reset If checked, any subsequent Manual Reset (see p. 31) will use the reset conditions specified in this dialog. If unchecked, any subsequent Manual Reset will produce a sample interval of 5 s and use Start button as trigger mode.

Probe Temperatures Current temperature measured on each of the logger's channels is shown, updated every 5 seconds. This serves as a useful check that thermocouples are working properly. (Probe temperatures, and the logger's internal temperature, are also shown in the Communications Setup dialog, p. 12.)

3. After clicking OK, the logger is reset and a message box confirms the sample interval and trigger mode you have set.
4. Disconnect the communications lead from the logger; the logger's status LEDs briefly flash red and green alternately to confirm logger reset.

Installing the Logger in the Thermal Barrier

Before proceeding, ensure the thermal barrier and logger have cooled sufficiently since their last use; check the temperature inside the thermal barrier as well as at its exterior. If the system is to be used again soon after one profile run, ensure that the performance of the thermal barrier is adequate for the temperature and overall time for which it will be used.

1. Plug the thermocouples into the logger's numbered sockets.
2. Ensure the barrier's mating surfaces are clean and undamaged. A good seal between thermal barrier and thermocouple cables is essential if the data logger is to be protected. Put the logger in place in the barrier (within the heatsink if used), laying the thermocouple cables across the sealing material to exit the barrier at the cutout, ensuring they are side by side and not crossing each other.
3. If the trigger mode is Start button, press and hold the Start button for about 1 second until the green LED starts to flash at the sample interval.
4. Close the lid ensuring a good seal around the thermocouple cables.

Placing the System in the Oven

SAFETY

Discuss the application of the EasyTrack2 system with your Health and Safety officer.
Wear appropriate protective clothing.
The EasyTrack2 components will be hot after the test run, so handle with care.

Load the test piece or product so that it enters the oven before the thermal barrier and logger.

Care of Thermocouple Probes

Do not lift the data logger by the thermocouple cables. This will damage the cables and connectors.

If storing cables when not in use, do not coil too tightly (see p. 55).

Checking the Clearance

Check the minimum height and width through the process to ensure the clearance for the system and thermocouple probes is adequate. If necessary, secure the thermocouple cables using high-temperature tape ensuring they do not get too close to heating elements.

Recovering the System

Recover the system as soon as the test is over, removing the heatsink (where appropriate) and data logger from the thermal barrier as soon as it safe to do so (failure to remove the logger from the hot barrier/heatsink could damage it).

If data acquisition has to be stopped manually, press and hold the logger's red stop button until the red and green status LEDs are on simultaneously. A flashing red LED indicates data stored in the logger but not yet downloaded to the PC.

Disconnect the probes from the logger and allow barrier and heatsink to cool to ambient temperature.

WARNING

Do not place the hot barrier on any surface that may mark, burn or melt.

Once cool, examine the thermal barrier and heatsink for damage (see p. 55).

Downloading Data

1. Connect the logger to the PC with the communications lead. The red LED on the logger should flash five times to confirm that the connection between the communications lead and the logger has been made.
2. Open the Logger Download dialog (click  on the toolbar, or press function key F3, or select Logger > Download from the menu bar) and wait while the data is downloaded to the PC. For an explanation of any error messages generated during this process, see p. 57.

If you see the message

Logger stopped due to going over temperature

the data logger's maximum-permitted internal temperature has been exceeded, and it may have suffered damage. Contact Datapaq for advice. The reason for the excessive temperature, which may be the result of process operational problems or the use of an inappropriate thermal barrier, must be resolved before further profile runs take place.

3. The newly downloaded data then appears on screen, being displayed numerically and graphically.

Using Telemetry

In addition to the standard off-line analysis, real-time analysis by hardwired telemetry is possible with Insight software when used with the 6-channel EasyTrack2 logger.

Thus, with thermocouples trailing from the oven and attached to the logger outside the oven, data being gathered by the logger is transmitted via the communications lead directly to the PC, and the temperature profile can be watched developing as data is received, i.e. in real time.

Running a profile in real time is performed in essentially the same way as a normal (non-telemetry) run (see p. 31), except:

- In the Reset dialog, select 'Hardwired Telemetry'.
- Instead of disconnecting the communications lead after resetting the logger, leave it attached to the logger and PC.

Real-time Display During the Run

When logging starts, the data is displayed in the Graph and Analysis Windows, scrolling in real time as new data is received.

You may **zoom** and **pan** the display as when viewing a paqfile (see p. 40), except that double-clicking on the graph shows only the most recently received portion of the data on the scrolling graph.

You may adjust the **oven start** position while a real-time run is in progress (select Edit > Adjust Oven Start, or use the right-click menu; see p. 38).

Calculations shown in the **Analysis Window** for the chosen data analysis mode update continuously as new data is received. As for non-real-time runs, calculations are performed only on the currently zoomed area shown on the graph. However, if the graph is scrolling and showing just the most recently received portion of the results, the analysis calculations will be performed as if on the full zoom view.

If you wish to view another paqfile while the logger is in listen mode, i.e. while data is being received and viewed in real time, you must first stop real-time mode, as follows.

Ending the Run

To **end or pause data-collection** while a telemetry run is still in progress, select Logger > Stop Real Time Mode. Data then continues to be collected by the logger, but it is no longer received in real time by Insight (download from the logger after the run is finished to retrieve the full data). The graphical and numerical data received up to that point remain on screen, available for viewing and analysis, and can be saved as a paqfile.

While the logger is still operating, you may **resume the collection of data** by Insight: select Logger > Logger Listen Mode. This second bout (and any subsequent bouts) of data-collection can also be ended and saved as a separate paqfile, as above.

The data being gathered is **automatically saved periodically** during a telemetry run. If the system fails during the run, the last-autosaved version of the data is displayed automatically when Insight is next run, and you may then choose to save it as a paqfile.

When the run is complete, ensure that data received by Insight has been **saved as a paqfile**. If you wish, you may download the data held in the logger (p. 34), though it should normally be adequate simply to save, as a new paqfile, the data already received.

Data Analysis

The Analysis Window, below the graph, shows the numeric values calculated for each probe's data using one of several analysis modes:

Datapaq Value – A reliable measure of cure quality calculated by comparing recommended curing conditions with those actually experienced.

Maximum/Minimum – Maximum and Minimum temperatures and the times at which they occurred.

Time at Temperature – Time taken to reach user-selected temperatures and time spent above or below each of these.

View Data – Raw time and temperature data for each probe.

Use the tabs at the bottom of the Analysis Window to switch between different analysis modes.

The following buttons are shown in the Analysis Window:

 **Analysis Options**
Displays the options for the current analysis mode (equivalent to selecting View > Analysis Options). These options allow you to specify the results that are displayed and enter parameters where appropriate. Note that this button is not available in View Data.

 **Probe Names**
Displays a dialog where you can enter the probe names. This is equivalent to selecting Edit > Probe Names.

 or  **Change Sort Order**
Visible only when another temperature profile is overlaid on the graph (p. 41). Switches the way data from probes are grouped in the analysis grid: clicking  causes the results for each probe to be listed by file (all data for each file are together),  groups them by probe number (all data for each probe number are together).

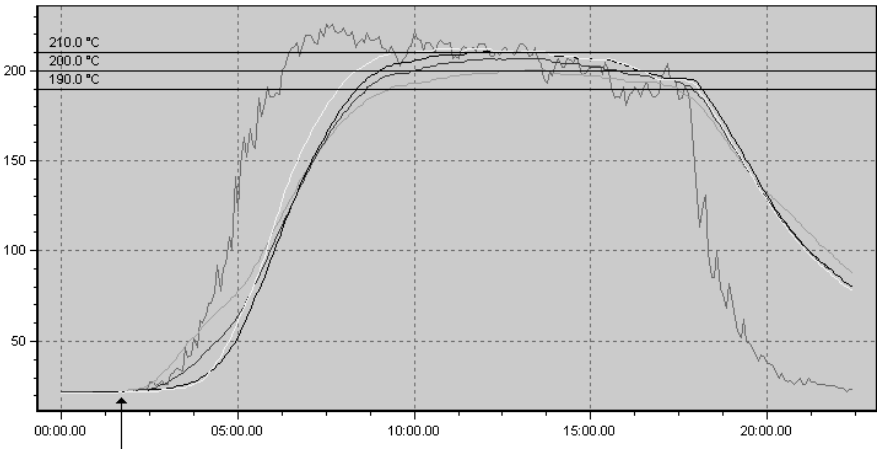
Before the analysis modes are described, there will be a description of setting up the **oven start**, **zooming** into the data and **overlaying** profiles on the graph. These features can be used to give the analysis results more meaning.

Oven Start and Process End

By specifying the start and end of the useful temperature data, as described below, you can use the process zoom (p. 40) to exclude from the analysis and from the printed report any unwanted data at the start and end of the temperature profile.

Oven Start

For some processes, there will be a delay between the time at which the logger commences recording data, and the start of the actual process, i.e. the point from which time and temperature records are actually required. This can be compensated for by setting the **oven start** position in the recorded data.

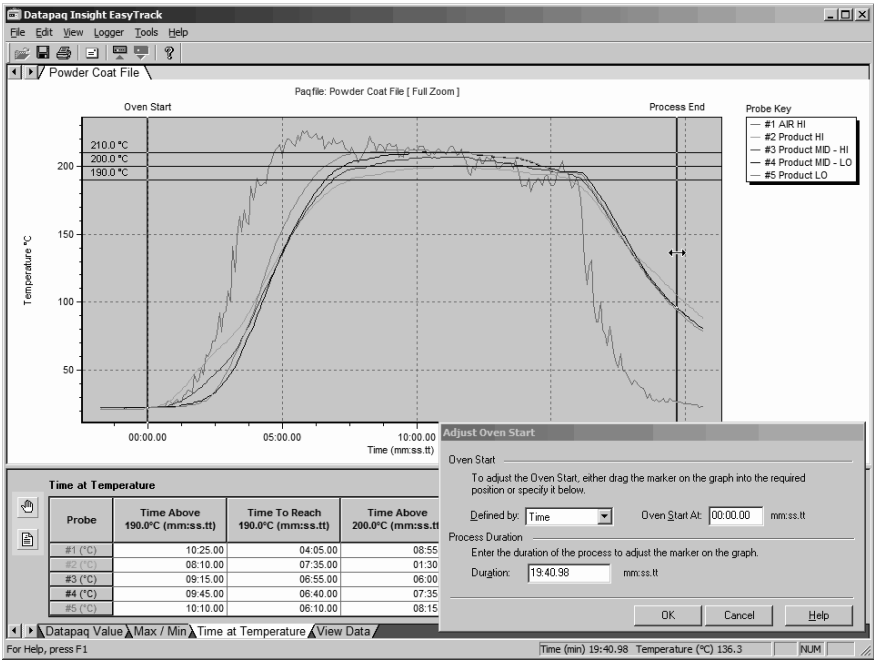


Paqfile showing delay before the actual process start.

The example above shows a delay, from zero time to when the actual process starts (indicated by the arrow in the picture), of about 1minute 30 seconds.

To correct this, do the following:

1. Right-mouse-click on the graph and select Adjust Oven Start or select Edit > Adjust Oven Start from the menu.
2. The Adjust Oven Start dialog is displayed and the current oven start position is shown as a vertical heavy black marker on the graph.
3. With the dialog still open, click on the oven start marker and drag it to the position which you think will give the best position for the oven start. To increase the accuracy of this procedure, you can zoom into the data with the mouse, as described in the next section. Once you have positioned the oven start marker, click OK to set the new oven start.



Adjust Oven Start dialog, shown with oven start and process end markers on the graph.

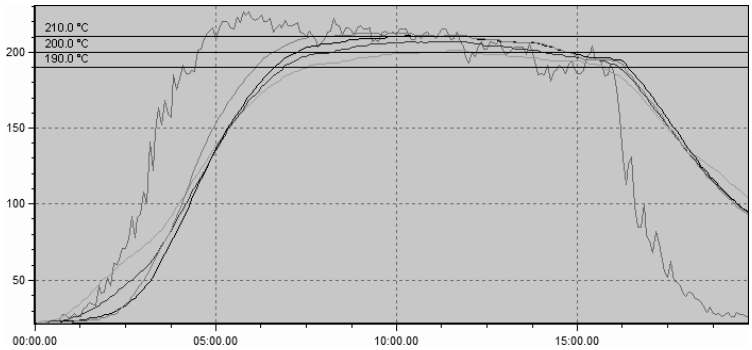
In addition to using the oven start marker on the graph to set up the oven start, the Adjust Oven Start dialog has fields that allow the oven start to be set up. These fields allow the oven start to be set up by entering a time offset from the current oven start position or when a particular temperature is reached.

Time – The Defined By field should be set to Time and the time offset should be typed into the Oven Start At field. (Notice that the Oven Start At field is automatically updated when you drag the oven start marker on the graph to set up the oven start.)

Temperature – The Defined By field should be set to Temperature and the temperature should be specified in the Oven Start At field. When you click OK, the oven start will be positioned when one of the probes first reaches or exceeds the specified temperature.

Process End

By entering a **process duration** (timed from the oven start position), you effectively define a process end, which is then marked on the graph. Alternatively, click on the **process end** marker on the graph and drag it into position.

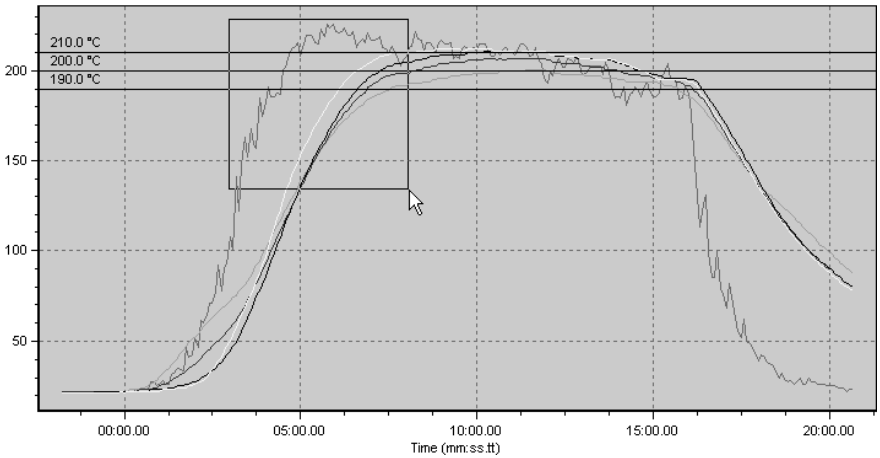


The paqfile after oven start and process end have been set up. Process zoom view has been selected, so that the profile is shown only from oven start to process end.

Zooming

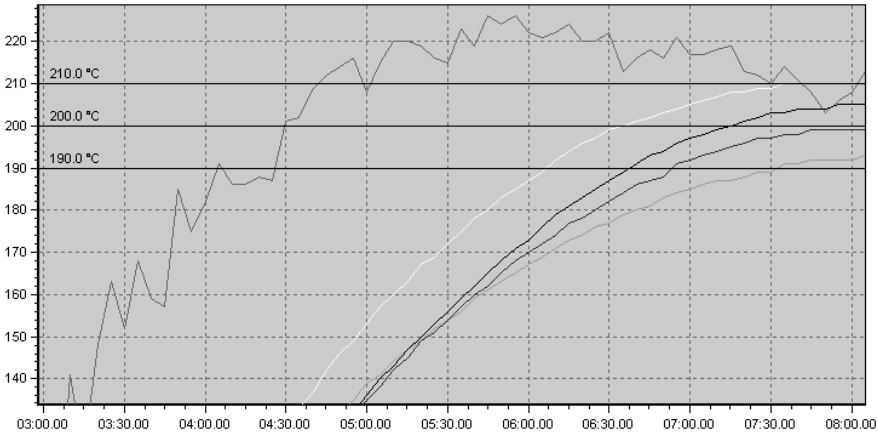
Sections of the graph of particular interest can be expanded so providing a magnified view of the graph with a corresponding numerical analysis focused on that particular area. This is accomplished by zooming into the data with the mouse.

Using the mouse, place the cursor on the top left hand corner of the graph section to be zoomed, confirming the location via the mouse's X–Y coordinates on the lower right-hand corner of the status bar. Viewing the status bar to confirm the mouse's location, drag the cursor drawing a rectangle enclosing the area to be zoomed.



Zooming in progress with the mouse.

Once the data has been selected, release the mouse button and the graph shows the selected data.



Selected data is zoomed into.

To revert to the **full zoom**, where all the data is shown on the graph: right-mouse-click on the graph and select Show Full Zoom from the pop-up menu, or select View > Show Full Zoom from the main menu, or press F5, or double-left-click on the graph.

To show the **process zoom**, i.e. to restrict the data shown on the graph to that between oven start and process end (p. 38): right-mouse-click on the graph and select Show Process Zoom from the pop-up menu, or select View > Show Process Zoom from the main menu, or press F6.

To **move the graph (pan)** across the viewing area, hold Shift and drag the mouse pointer.

Overlaying Another Temperature Profile

Overlaying another temperature profile on your graph is useful for purposes of comparison, and to check that individual profiles fall within specified limits.

- To select and overlay another profile, select View > Overlay from the main menu, or select Overlay from the graph right-click menu.
- To select curves to be overlaid, click Add and browse to the required files. Turn the display of each curve on or off with the Show checkbox. Click Browse next to a selected file to replace it with another.

In order that the overlay be meaningful, it is essential that the oven start position (p. 38) is exactly the same for all curves.

Probe numbers and **probe names** in the overlaid paqfiles are maintained unchanged: they are shown in the Probe Key beside the graph, and can be viewed and edited in the Edit Probe Names dialog (click in the Analysis Window). The traces for all probes of a given probe number are shown in the same color but in a different tint of that color.

Analysis Modes

Insight uses four different modes to analyze temperature data.

Datapaq Value

Datapaq Value is a statistic developed and copyrighted by Datapaq. It provides a unique indication of cure quality during a particular coating process, and can aid in optimizing product throughput. Insight compares the coating manufacturer's recommended curing time/temperature with the actual time/temperature values experienced by the product and, for each probe location, generates a number – the Datapaq Value – which indicates the degree of compliance. Datapaq Values are as follows:

Datapaq Value	Description	Meaning
<100	Time/temperature experienced did not achieve manufacturer's recommendations.	There was under-curing.
100	Time/temperature experienced complied with manufacturer's recommendations.	Curing was correct.
>100	Time/temperature experienced exceeded manufacturer's recommendations.	There was over-curing.

As with other temperature-profile data, Datapaq Value should be used in conjunction with complementary quality-assurance tests. By carrying out proven tests (e.g. adhesion, salt spray, impact resistance) and comparing results from these with the corresponding Datapaq Values obtained, it is possible to establish an acceptance band of Datapaq Values (e.g. 80–120) which can then be used during day-to-day process control to prove that the coating is being cured to specification.

Datapaq Value is not linear, i.e. a value of 200 does not imply that the rate at which the product moves through the oven can be doubled, or that the oven temperature can be halved. Instead, it is necessary to make small adjustments to either line speed or temperature and monitor the resulting change in Datapaq Value to optimize product quality and throughput.

Parameters

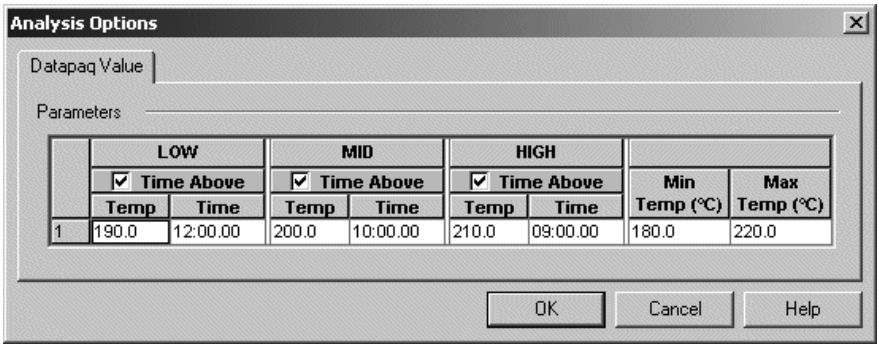
A given cure schedule recommended by a coating manufacturer normally includes three cure options:

- **Mid** threshold temperature and time.
- **Low** threshold temperature over a longer time.
- **High** threshold temperature over a shorter time.

Also defined by the manufacturer for each cure schedule are:

- **Minimum** temperature, below which curing does not take place.
- **Maximum** temperature, above which the coating is damaged.

These values are entered as parameters in the Datapaq Value Analysis Options dialog. To display this dialog, click the button when Datapaq Value is shown in the Analysis Window (or select View > Analysis Options).



Datapaq Value Analysis Options.

To display results for a given cure option, select its Time Above check box. The Datapaq Value calculated is always displayed in the results.

Click OK and the results are displayed in the Analysis Window:

- **Time Above** – time spent above each threshold temperature
- **Datapaq Value** – indicating the cure quality

Maximum/Minimum

This analysis mode displays maximum and minimum recorded temperatures and the times that they correspond to.

To select the results you wish to display, click the button (or select View > Analysis Options) to display the Analysis Options dialog.

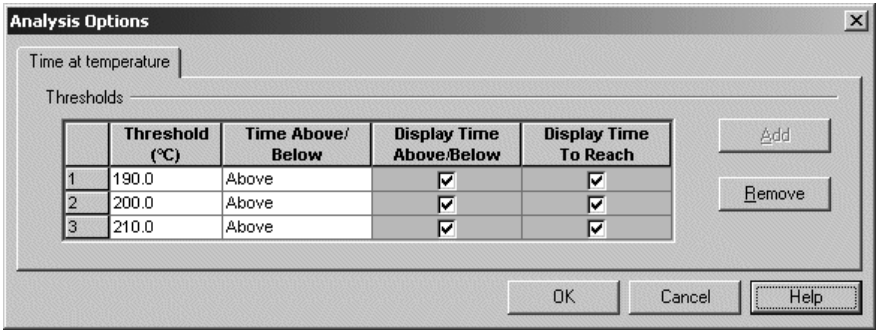
The results displayed in the Analysis Window for this analysis mode are:

- **Maximum Temperature** – Highest temperature reading from a given probe. Useful for indicating when the product reaches too high a temperature.
- **Max. Reached** – The time after the start of the profile run at which a given probe's maximum temperature was recorded.
- **Minimum Temperature** – Lowest temperature reading from a given probe. Useful for indicating when the product does not exceed a required minimum temperature during certain stages of the process.
- **Min. Reached** – The time after the start of the profile run at which a given probe's minimum temperature was recorded.

Time at Temperature

This analysis mode calculates the time taken to reach user-selected temperatures and the time spent above or below each of these threshold temperatures.

To define the thresholds, click the button (or select View > Analysis Options) to display the Analysis Options dialog:



Time at Temperature Analysis Options.

Define the threshold temperatures you wish to use and whether you wish to display time spent above or below these thresholds. Select also whether or not these results – and the time taken to reach the thresholds – are to be displayed in the Analysis Window.

The results displayed in the Analysis Window for this analysis mode are:

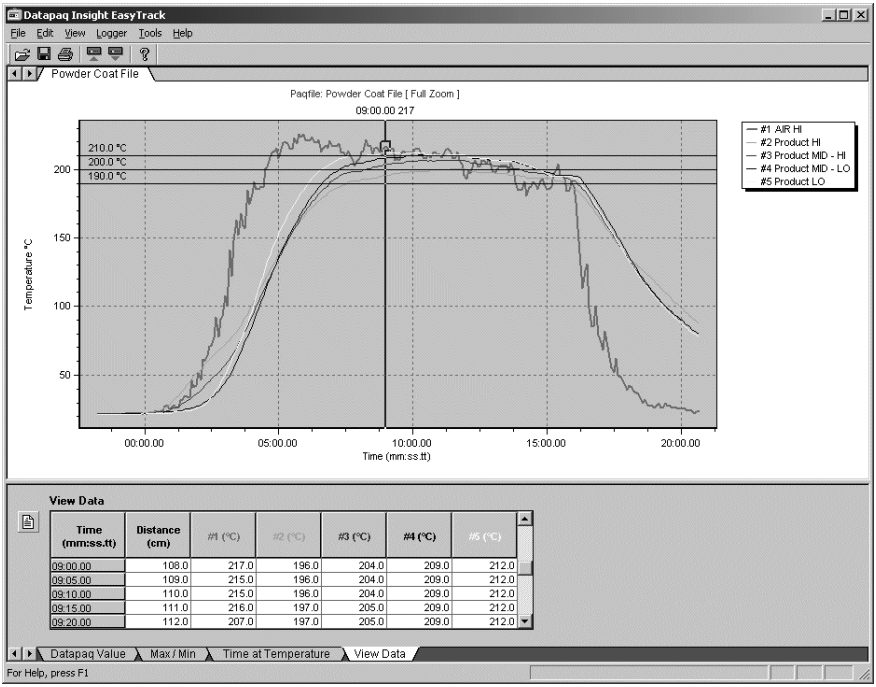
- **Time Above/Below** – The time spent above or below each threshold.
- **Time Reached** – For time above, this is the time into the run that the threshold temperature was reached. For time below, this is the time into the run that the threshold was fallen below.

View Data

This analysis mode shows the raw time and temperature data for each probe, as gathered by the logger.

The probe profile which is currently selected is thickened on the graph and on the Probe Key to the right of the graph.

To select a different probe profile, click on it on the graph.



View Data analysis mode.

Drag the cursor bar across the graph to obtain precise time and temperature data for a specific probe. These are shown numerically:

- On the graph above the top of the cursor bar
- In the data grid in the Analysis Window. The grid scrolls as the cursor is moved, with the top line of data in the grid corresponding to the current cursor position.

Similarly, scrolling the data table moves the cursor across the graph.

Zooming into a region of the graph (drag out a rectangle from top left to bottom right) re-locates the cursor to the center of the zoomed region. Return to the

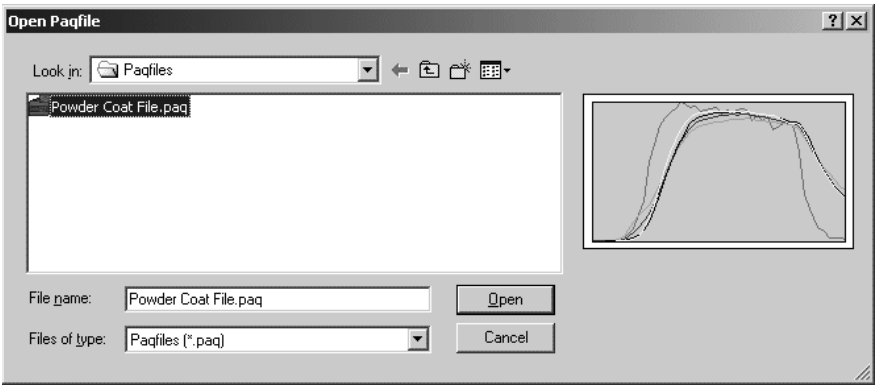
normal view by double-clicking on the graph, right-clicking and selecting Show Full Zoom, selecting View > Show Full Zoom, or pressing F5.

Values at the start of the data may be negative. This is because the oven start occurs after the logger started recording data.

File Management

Opening a Paqfile

1. Click the button on the toolbar or select File > Open. The Open Paqfile dialog is displayed. When you click on a filename, a preview of the paqfile is shown to help you find the paqfile you wish to load.



The Open Paqfile dialog.

2. Click Open, and the selected file is opened.

Saving a Paqfile

New Paqfile

If you have just downloaded a paqfile but have not yet saved it, click the button on the toolbar, select File > Save or File > Save As and the Save Paqfile dialog is displayed.

Existing Paqfile

If a paqfile which has previously been saved is currently displayed, clicking on the button on the toolbar or selecting File > Save saves your changes to that paqfile. If you select File > Save As, the Save Paqfile dialog is displayed where you can save your changes to the file under a different filename.

If you specify, in the Save Paqfile dialog, a filename which already exists, you are asked if you wish to overwrite the file. If you select Yes, then the file is overwritten. Selecting No allows you to enter an alternative filename.

Printing a Report

Click the  button on the toolbar or select File > Print. Insight prints a report containing the graph and analysis results on the default printer.

Print Preview

Selecting File > Print Preview displays the report format on the screen.

Print Options

Selecting File > Print Options displays a dialog box where you can specify the report title and margins. Once set up, the report title and margins are used for all reports.

Notes

Selecting Edit > Notes displays a dialog where you can enter the following information, which is included in the printed report for the current paqfile:

- **Notes** – Freeform notes, which can be used to describe the paqfile.
- **Operator Name** – Name of the operator who ran the profile. Insight defaults this to the operator who logged into Windows.
- **Company** – Where yours or your customer's company name can be specified.
- **Site** – Where the site, at which the profile was run, can be specified.
- **Process** – Where you can specify information about your process.
- **Product** – Where you can specify information about the product being cured.

This information is stored in the paqfile when it is saved.

Importing Data from a Spreadsheet

You may select data from a spreadsheet application and import it to a new or existing paqfile. This is accomplished by running the **Clipboard Paste Wizard** (select File > Import from Clipboard).

The procedure is largely self-explanatory: enter information as prompted by the wizard, then click Next at the end of each stage. The wizard proceeds as follows.

Copy to Clipboard

In this first wizard stage, open your spreadsheet application, select the required range of temperature data, and copy it into the Windows clipboard.

Paste

On clicking Paste, Insight interprets the contents of the Windows clipboard and displays the first few measurements.

If the data in the clipboard is not in the correct format, an error message will suggest what is wrong.

Paqfile Information

To make the data suitable for a paqfile, enter the sample interval and temperature units of the original data.

If you wish, add probe names, and date and time for the original data; use the date format dd/mm/yy or (if different) the short date format set in Windows (in Windows XP, see Control Panel > Regional and Language Options).

Create or Merge

Choose whether the pasted measurements should be used to create a new paqfile or whether to merge them with an existing paqfile.

If being merged, specify whether to:

- Merge with the current paqfile (the one currently displayed on screen), or
- Load a new paqfile with which to merge the pasted measurements; browse to select the paqfile required.

If imported measurements are merged with an existing paqfile, the new data is assigned to additional thermocouple numbers. For example, if merging with a paqfile with probes numbered 1 to 6, the imported probes would be numbered from 7 onwards.

Data Export

Insight allows you to export data from the current paqfile. Right-mouse-click on the graph and select Copy, or select Edit > Copy and the Copy to Clipboard dialog is displayed.

You can export your temperature profile data, analysis results or the graph in order to use them in other applications. Select which type of data to export, and the format you wish to use. The information is then placed on the Windows clipboard and can be pasted into (e.g.) a word processor, spreadsheet or bitmap-editing application.

The options available are:

- **Analysis Results** – Export the data analysis performed on the collected data. Everything contained in the analysis grid at the time of export is included, so you need to select the analysis mode you wish to export before opening the Copy to Clipboard dialog.

- **Raw Measurements** – Export the raw temperature/time data as gathered by the logger. All the profile's raw data is exported, regardless of the how the graph is zoomed.

  Under Export Every, select the proportion of the raw data to export. Thus enter '1' to export every data point or (e.g.) '5' to export every fifth one.

  Choose whether or not to include a file header with the exported data; this is necessary if you may later want to import the data into Insight Oven Tracker.
- **Graph** – Export a bitmap image of the graph.
- **Text** – Export data as simple text.
- **CSV** – Export data in Comma Separated Value format – useful for pasting into spreadsheet applications (NB This format will not paste into Microsoft Word or into most text editors).

Advanced Features

The Insight Global Options dialog has two tabs that allow advanced features to be set up in the software. To display the Global Options dialog, select Tools > Options. The tabs that give access to these advanced features are the Logger and Run Alarms tab.

Logger Calibration

When Insight communicates with a logger (resets it, downloads from it or performs a communications setup), it automatically stores the logger model, ID (serial number) and number of probes that the logger has. This information is displayed in the Logger tab in the Global Options dialog box.

In addition to this, the Logger tab allows you to enter the calibration information for your logger(s), and be warned when re-calibration is due.

To do this, click the Add button to add information for a new logger, and enter:

- **Logger ID** – Enter the logger ID as shown in the Last Logger ID field. If this is blank, you should enter the four-digit serial number on the back of your logger.
- **Calibration Certificate Number** – Your logger will have come with a Calibration Certificate. Enter the certificate number for your logger (note that this is optional).
- **Probe Type** – For EasyTrack2 loggers, this is always thermocouple type K (note that this is optional).
- **Calibration Expires On** – Date at which the logger calibration expires.

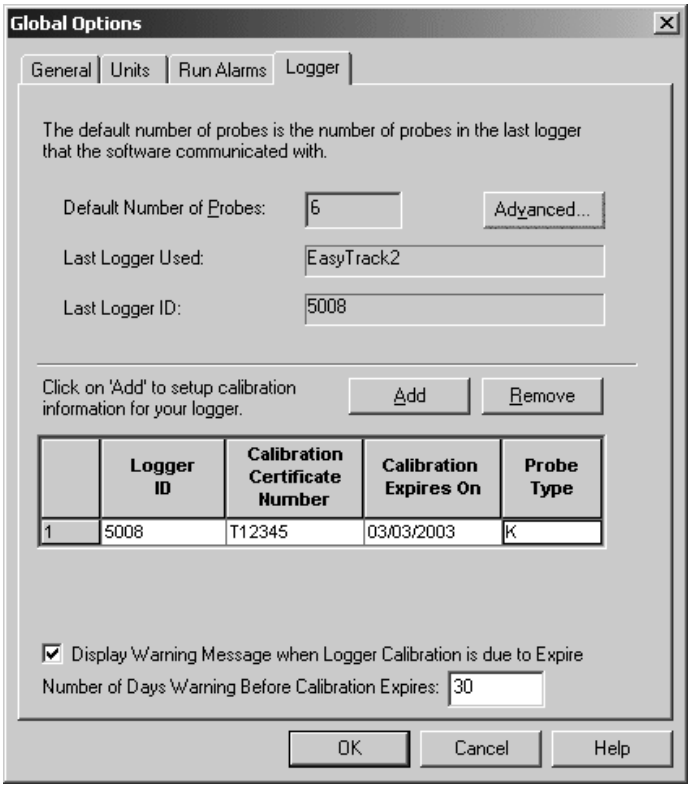
Select whether you wish to be warned before expiration of the logger's calibration, and specify how many days notice is to be given: if the warning is due, a message will appear when Insight is opened, and the logger should be returned to Datapaq for re-calibration.

To remove a logger's calibration information, click on it in the calibration grid and then click Remove.

It is recommended that Datapaq loggers are calibrated at least once a year. The Datapaq calibration procedure comprises:

- Inspection of the logger, externally and internally.
- Heat cycle test of up to 14 hrs in Datapaq's own ovens, up to 60°C/140°F without a thermal barrier.

- Stability testing, using a stable temperature source and varying ambient temperatures.
- Calibration by updating of your logger's firmware.
- Issue of a certificate, which is traceable to national standards.



Global Options for the logger, with calibration information in place.

No other company can offer this degree of in-depth testing as well as a full calibration service.

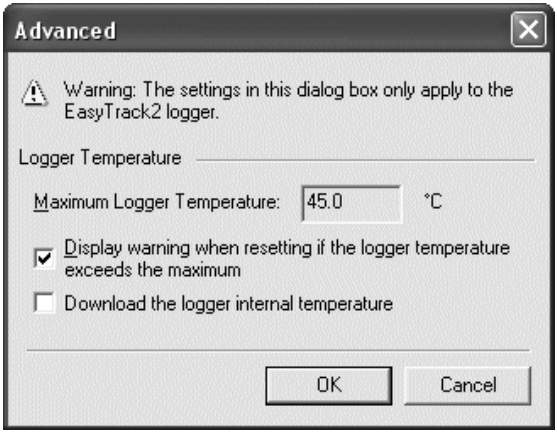
To calibrate your logger, please return it to the Service Department at Datapaq.

Logger Internal Temperature

For these options, click the Advanced button on the Logger tab of the Global Options dialog. Here you may choose to:

- Enable a warning if the logger is too hot while being reset.

- Download the profile of the logger's internal temperature for each profile run: this appears in the Graph and Analysis Windows as if it is data from an additional probe.



The Advanced dialog used to set options for logger internal temperature.

Run Alarms

You can be warned if the following events are detected during a logger download, reflecting incomplete or invalid data recorded during the profile run.

- **Logger Stopped Due to Going Over Temperature** – Repeated use of the logger with short intervals for cooling can result in a rise in the logger's internal temperature, leading to logging errors and ultimately to serious damage. This alarm warns if reliable data collection stopped during a run due to excessive internal logger temperature (greater than 70°C/160°F).
- **Logger Stopped Due to Low Battery** – Warns if reliable data collection stopped during a run due to an exhausted logger battery.
- **Paqfile Contains Invalid Measurements** – Warns if the paqfile contains invalid data such as open circuits (*OC*). See the Troubleshooting chapter (p. 57) for details of invalid data that can occur.

When triggered, an alarm is shown in two ways:

- In the Analysis Window, an additional Alarms tab appears, giving detailed information on the alarm triggered.
- In addition, Alarm Status Traffic Lights are shown in the Graph Window and also in the printed report.

Alarm Status Traffic Lights

By default, the Insight software has all run alarms disabled. When this is the case, no Alarm Status Traffic Lights are displayed or printed.

When alarms are enabled, but are not triggered, i.e. there were no problems with the run, the Alarm Status Traffic Lights are shown in green in the Graph Window. In the printed report, they look like the following:

When alarms are triggered, the Alarm Status Traffic Lights are shown in red in the Graph Window. In the printed report, they look as follows:

Care and Maintenance

Thermal Barriers and Heatsinks

Cooling

After a run, the heat absorbed by the thermal barrier will continue to affect the temperature of the heatsink and logger: remove them from the thermal barrier as soon as the test is completed, and leave them in the open to cool before further use; in most cases, cooling overnight is sufficient.

Examination

Once cool, examine the thermal barrier and heatsink for damage.

Contact Datapaq if the heatsink phase-change material leaks. It is a non-toxic wax-like substance that dries hard powdery white and has a slight acidic smell. Wait until it is dry before scraping of any material that has leaked onto the surface of the barrier.

Examine the cooled thermal barrier and heatsinks for damage before storing in a dry environment to avoid the insulation absorbing water.

Check the thermal barrier's seals and closing mechanism, and rectify any damage before further use.

Data Loggers

Store in a dry, dust-free environment. Remove the battery if not using for a significant period.

Thermocouple Probes

Examine cables, and replace any found to have damaged insulation.

When coiling cables for storage, ensure the diameter of the coil is not less than 40 cm/16 inches.

Troubleshooting

Logger Communications Problems

- **Communications lead not fully inserted:** check correct sockets are being used.
- **Wrong COM port selected:** see 'Communications Setup' (p. 12) to select the correct port.
- **Damaged communications lead or connectors:** check for breaks and other damage; replace the lead.

Logger Download Error Messages

Error Message	Action
There are insufficient readings in the logger	Check trigger set point (time or temperature) Check logger's battery for charge Check date/time settings on computer Check probes and their connections Reset logger and test probes (see 'Logger Diagnostics', p. 58)
Logger stopped due to going over temperature *	The logger's maximum-permitted internal temperature has been exceeded and it may have suffered serious damage: contact Datapaq for advice.
Logger stopped due to low battery *	Replace the battery, then repeat the profile run.
Logger memory full	Data collection may have stopped before the run was completed: check the data collection period and sample interval before resetting the logger for another run (see 'Resetting the Data Logger', p. 31).

* You can set up alarms for these errors giving a paqfile a red traffic light display to indicate the problem. See the chapter on Advanced Features (p. 53).

Checking the Data

Thermocouple probes are generally reliable, but damage resulting from inappropriate use or handling can produce erroneous readings. If you suspect that invalid data may have been introduced into your temperature profile (paqfile), select the View Data tab in the Insight software's Analysis Window to view the raw data as downloaded from the logger. The various types of invalid data which may be contained in a paqfile are shown in the analysis grid as follows.

OC	Open circuit – probe cable may be damaged.
NA	Data not available.
LO	Temperature measured was below the range of the logger.
HI	Temperature measured was above the range of the logger.
***	Calculation cannot be performed (not necessarily because the data is invalid). Does not appear in View Data analysis mode.

Probes with an intermittent open circuit may produce spiky, erratic profiles. Note that spikes are inevitable when probes are disconnected from a running data logger. Typical causes of invalid or interrupted data are:

- Thermocouple becoming detached from the logger.
- Faulty connection.

Readings which are inconsistent with those of other probes may be caused by a short circuit (see 'Logger Diagnostics', below). The probe concerned must be replaced.

Logger Diagnostics

Running the data logger diagnostics provides information on the status of the logger and the means to test the thermocouple probes. Short circuits and open circuits may be revealed: these are sometimes intermittent, and can be a function of temperature and/or rate of change of temperature, or caused by bending the probe cable.

1. Connect the logger to the PC (to minimize communications problems, connect the lead first to the PC and then to the logger). The red LED on the logger should flash five times to confirm that the connection between the communications lead and the logger has been made.
2. Connect a full set of thermocouple probes to the logger, leaving them at ambient temperature.
3. On the Insight software's menu bar, select Logger > Setup to open the Communications Setup dialog.
4. Select the number of the communications port to which the logger is connected, or click Detect to auto-detect it.
5. Click Test.
6. If the logger is detected, the Diagnostic section of the dialog appears (see p. 14). The Temperature list box identifies all available probe channels, the indicated temperature or status, and the temperature of the internal cold junction.
7. Check that all probes are indicating the same temperature. Replace any showing *OC* (open circuit), or having inconsistent readings indicating an intermittent short circuit.

8. Place the probes into a bowl of recently boiled water and check that all probes show a similar increase in temperature to around 100°C/212°F. Replace any showing ambient temperature as this indicates a short circuit. If any probe shows a temperature significantly less than ambient its plug may be incorrectly oriented in the logger socket.
9. Click OK to close the dialog.

Printing Problems

- Check printer cable connections.
- Make sure that your printer has sufficient ink.
- Check the driver used for your printer.

Datapaq Service Department

If you cannot resolve your problem, please contact the Service Department at Datapaq (see title page for contact details).

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