IrriMAX User Guide

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IrriMAX Version 9.1.1

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Contents

Before you begin

This manual was written for **IrriMAX Version 9.1**.

The manual contains the following sections:

- *Using IrriMAX*
- *Software Reference Guide*
- *Troubleshooting*
- *Frequently asked questions*

The *Using IrriMAX* section describes how **IrriMAX** is used to analyze soil moisture and provides an overview of the **IrriMAX** software. The basic steps for checking current soil moisture and soil moisture trends are described in this section.

The *Software Reference Guide* section describes the function and controls of each window in IrriMAX.

Conventions

The following conventions are used throughout this guide.

Mouse actions:

- 'Click' means to click and release (without moving the mouse between these actions) the primary button on your mouse. This is usually the left mouse button unless you have configured it differently in Control Panel.
- 'Double-click' means to quickly click the primary mouse button twice.
- 'Right-click' means to click the secondary mouse button, usually the right button.
- 'Drop-down list' means to click on the down pointing arrow next to a text box. This drops a list of items from which you can select an option.
- 'Point' means to move the mouse until the cursor moves on top of an item on the screen.
- 'Click and drag' means to click and hold the left mouse button; then move the mouse to drag an item (or border) to the required position; now release the button.

Convention	**Type of information**
Icons	Icons represent: • buttons on a toolbar that you click to choose commands quickly • icons on the desktop that you can double click to open software • Minimized IrriMAX windows, that appear above the **Taskbar**
Small Caps	Small capitals are used for: • keyboard shortcut keys; for example, 'Press SHIFT+F1' • filenames; for example, 'DATABASE.SDB'
Arrow bullet (Ø)	Step by step process. These processes are written based on the menu commands. The commands may also be completed using the equivalent buttons or shortcut keys as appropriate.
Bold text	Bold text is used for: • menu items and tool buttons that you click to run a program command; for example, 'From the **Menu** bar, click **Help**' • for emphasis; for example, '**Note:...**'.
This font face	This font face is used for window, dialog and message box titles; for example, 'The *Site Configuration* window displays'. It is also used to cross reference to sections of this manual.

Convention	Type of information
Square brackets	Square brackets are used for non-specific text, file names or paths; for example, '[*file name*] is not a valid logger image file'.
Note:	Text presented under the heading '**Note:**' is important information that should be considered before completing an action.
Warning:	Text presented under the heading '**Warning:**' is critical information that must be considered before completing an action.

What's included in the IrriMAX package?

IrriMAX is supplied on a Compact Disc (CD) or as an Internet download (about 18MB) and it includes:

1. The IrriMAX programs:
   IrriMAX
   Database Manager
   Data Exchange
   Database Entry
   Logger Manager
   Remote Connection Manager (RCM)
   Database Converter
   Logger Download (this version 5 only runs in command line mode)
   Logger Download version 4.1 (the superseded ESW 4.1 version)
   AutoSDB (programming tool)
2. License agreement (selectable Australia or US and other countries)
3. Readme.txt file, containing installation instructions, known problems and things discovered after this manual was prepared
4. An Installer, to setup IrriMAX on your computer
5. Manuals (User guides) for each of the programs, in PDF format (Adobe Portable Document Format) and selected resource documents e.g. case studies.
6. Online help file for each of the programs
7. Example databases and workspaces with graphs and layouts
8. Calibration.ini and Calibration-ReadMe.txt files, describing alternatives to the default Sentek calibration coefficients
9. HTML templates for use by the Webify and email feature of workspaces and graphs.
10. A License certificate which includes a unique serial number that must be entered during the Registration process.

If you require more information about other products and services provided by Sentek Pty Ltd visit the web site at www.sentek.com.au.

System Requirements

To run the **IrriMAX** software.you require a minimum of a 900 MHz processor, 128 MB RAM and one of the following versions of Microsoft Windows:

- Windows 7
- Windows Vista with Service Pack 2 or later (all editions except Starter Edition)
- Windows Server 2003 with Service Pack 2 or later (all editions)
- Windows Server 2003 R2 or later (all editions)
- Windows Server 2008 with Service Pack 2 or later

- Windows Server 2008 R2
- Windows XP with Service Pack 3 (except Starter Edition)

A typical installation requires approximately 30 MB of hard disk space.

A video display supporting at least 1024 x 768 pixels is recommended for ease of interpreting IrriMAX graphs.

Microsoft Excel 97 or Office 97 or later is required if Excel workbook support is required in Data Exchange.

Viewing of the printable version of the manuals requires PDF viewing software such as Adobe Reader.

Referenced Manuals

Other Sentek manuals that may be of interest to IrriMAX users include:

- Calibration of Sentek Pty Ltd Soil Moisture Sensors
  The methodology recommended by Sentek for soil moisture instrument calibration
- Sentek EnviroSCAN Hardware Manual
  This covers the installation and use of EnviroSCAN RT6 loggers, probes and sensors
- Sentek EnviroSCAN Plus Hardware Manual
  This covers the installation and use of EnviroSCAN Plus web enabled, wireless communications.
- Sentek Diviner 2000 User Guide
  This covers the installation and use of Diviner 2000 display unit and probe. It also covers the Diviner 2000 software utilities for backup and restoring Diviner 2000 data.
- TriSCAN Agronomic User Manual
  This manual covers the monitoring, understanding and management of the Sentek fertilizer/salinity and soil water monitoring system.
- AutoSDB2 Programmers' Manual
  This manual is programmer oriented and describes the interface between third-party developed software and IrriMAX.

The AutoSDB2 manual is available in the folder where IrriMAX is installed (typically C:\Program Files\Sentek\IrriMAX\AutoSDB2\AutoSDB2_Manual.pdf). The other manuals are available on the Sentek Resource Kit CD.

Installing IrriMAX

The IrriMAX installation process detects previous installations of EnviroSCAN or **IrriMAX** and will install the new version over the top of the previous version.

There are two ways of getting the **IrriMAX** installation media:

- Obtain an IrriMAX Compact Disc (CD)
  This CD contains the IrriMAX installer, How to use IrriMAX, Internet Explorer Installer, Acrobat Reader installer, and Sentek Resources documents.
- Download the IrriMAX installer file from the Sentek web site *http://www.sentek.com.au* using link to *Downloads*. The file size is about 18MB, so the download may take a long time on a dial-up connection. The file does not contain the support files that are present on the IrirMAX CD.

Ø To install IrriMAX from the Internet download file

1. Download the IrirMAX installer and related files from the downloads section of theSentek web site, *http://www.sentek.com.au* using link *Downloads* and save them in a convientient folder on your computer eg. My Downloads.
   - IrriMAX80_Setup.exe (about 18 Megabytes)
   - Calibration-ReadMe.txt, Calibration.ini and Rcm80.ini (these may have additional information if you are upgrading)
2. Double-click on Readme.txt and check for last minute changes etc.

3. Login as a user with Administration privileges.
   Double-click on the IrriMAX80_Setup.exe and the setup program will start.

4. Follow the instructions below for the *Steps common to download and CD install*

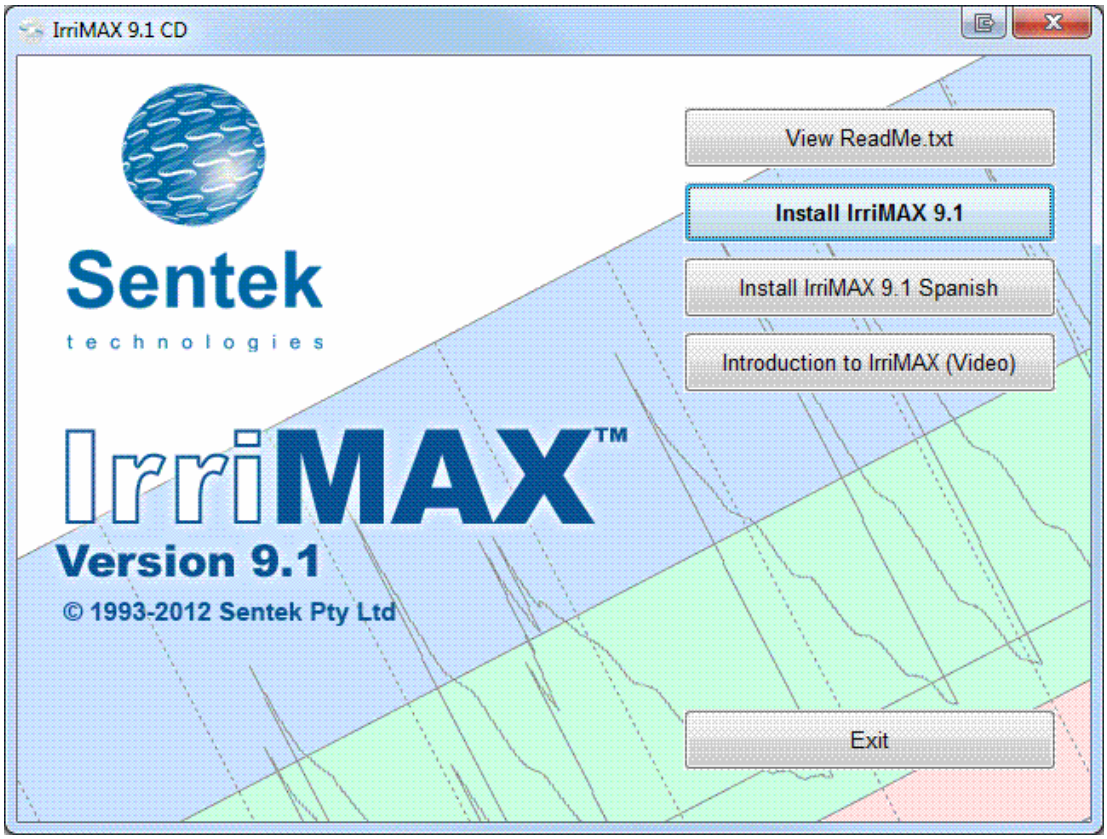
Ø To install IrriMAX from the CD

1. Login as a user with Administration privileges
   Place the **IrriMAX** CD in your CD/DVD drive and the setup menu will appear.

2. If the Setup menu does not appear, the Windows autorun facility may be disabled. In this case:

   - On the Windows task bar click the **Start** menu and select **Run....**
   - On the *Run* dialog type "d:\menu.exe" (where d: is the drive letter of your CD/DVD drive) and click **OK**

   The *IrriMAX 9 CD* menu appears:



3. Click on the **View ReadMe.txt** button and check for last minute changes etc.

4. Click the **Install IrriMAX 9.1** button and follow the instructions below for the *Steps common to download and CD install*

Ø Steps common to download install and CD install

5. The *Welcome* window is displayed.
   Read the welcome message and click **Next** to continue. The Installer will check your system for the minimum requirements and look for an existing installation of the software.

6. The *Customer Information* window is displayed.
   Enter your name and the name of your company and click **Next**.

7. The *License Agreement* window is displayed.
   Select your country and click **Next** to continue

8. The appropriate Software License Agreement is displayed.
   Select the button to accept the license agreement, then click **Next** to continue.

9. The *Choose Destination Location* window is displayed.
   (If you are upgrading an existing IrriMAX installation, this step is skipped.)
   It is recommended that you accept the proposed installation folder. To change it, click the **Change** button. Click **Next** to continue.

10. The *Select Features* window is displayed.
    (If you are upgrading an existing IrriMAX installation, this step is skipped. You can add or remove features by running the Installer again and choosing the Modify option, once the upgrade has completed)
    Select the features you want to install, and deselect the features you do not want to install. Click on a feature's name to read a description of that feature. Click **Next** to continue.

11. The *Start Copying Files* window is displayed.
    Review your settings and click **Back** if any are incorrect. Click **Next** to begin the installation process.

12. The progress meter displays and the **IrriMAX** files are installed.

13. The *InstallShield Wizard Complete* window is displayed.
    You can automatically view the Read Me file or run IrriMAX by selecting the appropriate check boxes.
    Click **Finish** to exit the wizard.

14. The installation process is now complete. If you wish, you can now logout from the Administrator login and log back in as a normal user, and start **IrriMAX.**

Uninstalling IrriMAX

If you wish to completely remove IrriMAX from your computer it can be done using the Windows Control Panel.

Note:
Removing IrriMAX does not remove existing user data. Workspaces, databases, graphs, layouts, log files, license files and configuration files are all retained.

Ø To uninstall IrriMAX from Windows Vista or Windows 7

1. From the **Start** menu, select *Control Panel*

2. Depending on your chosen view, select either **Uninstall a Program** (in the programs category) or **Programs and Features**.

3. In the list of software, select "IrriMAX" and click the **Uninstall** button (Windows Vista) or the **Uninstall/Change** button (Windows 7).

4. Select the Remove option and click **Next** to continue.

5. Respond **Yes** to the message "Do you want to completely remove the selected application and all of its features"

5. The uninstall process then displays the steps in the removal progress

6. Some user files may prevent removal of some folders. Clicking the **Details** button will list these folders

Ø To uninstall IrriMAX from Windows XP

1. From the **Start** menu, select **Settings**, and select *Control Panel*

2. In the *Control Panel*, open **Add/Remove Programs**

3. In the list of software, select "IrriMAX" and click the **Add/Remove** button
4. Select the Remove option and click **Next** to continue.
5. Respond **Yes** to the message "Do you want to completely remove the selected application and all of its features"
5. The uninstall process then displays the steps in the removal progress
6. Some user files may prevent removal of some folders. Clicking the **Details** button will list these folders

Registration and Licensing

License management in **IrriMAX** requires that every installation of **IrriMAX** be registered with Sentek. A trial period of 30 days is available for evaluation and the email delays in obtaining a registration site key.

Warning:
Uninstalling or removing **IrriMAX** will not renew the 30-day trial period. The registration site code and site key are specific to your computer and will not work on another computer. Computer clock changes may result in immediate termination of the trial period, making **IrriMAX** unusable until a site key is entered and validated. Until you have registered **IrriMAX** you should not change the computer clock by more that 75 minutes.

Until **IrriMAX** is registered, a *Registration and Licensing* dialog appears every time IrriMAX is started. This dialog has the options to **Register Now**, **Register Later** or **Transfer License**. When you select **Register Now** you must fill in the registration details and either:

- Automatically email the information
- Print the information for faxing
- View the information and manually copy it to your email program

You can also choose "Register Now" to update details you have previously sent to Sentek, such as your contact address or mailing list preferences.

Choosing "Register Later" allows **IrriMAX** to fully operate, but unless it is registered IrriMAX will stop working 30 days after the first time it is run.

Choosing "Transfer License" allows you to move a license from **IrriMAX** on one computer to another computer. After this is done IrriMAX will no longer operate on the first computer.

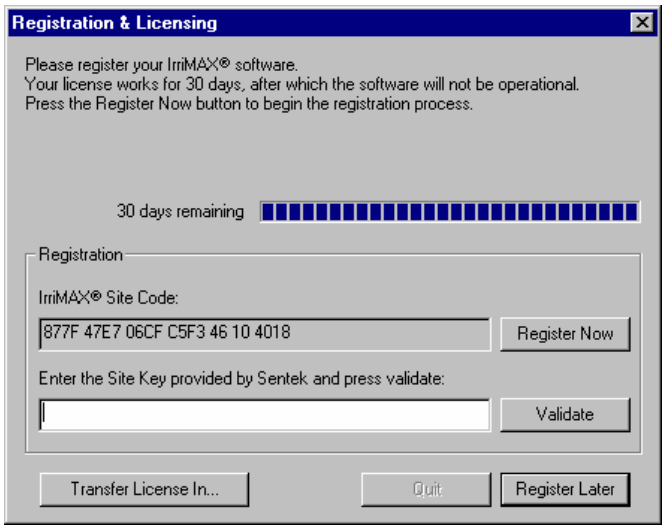
How to register IrriMAX

You can register **IrriMAX** at any time, even after the trial period has expired.

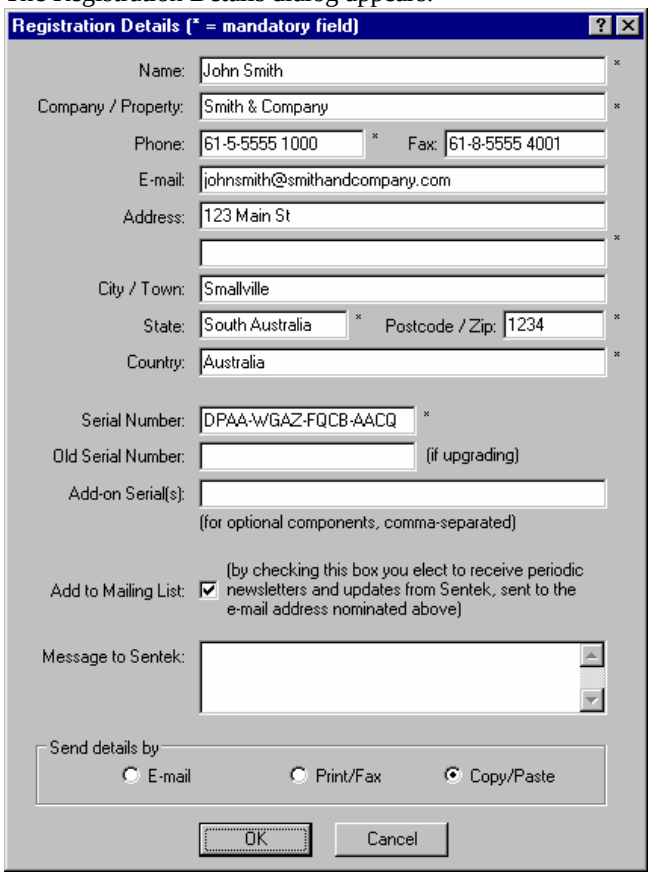
Ø To register IrriMAX

1. If you are not licensed yet the *Registration & Licensing* dialog will appear whenever you start **IrriMAX.** Alternatively, it can be invoked by choosing **Licensing IrriMAX…** from the **Help** menu in *Workspace Manager.*
   The instructions and information presented by the *Registration & Licensing* dialog will vary depending on your current license state. The image below shows how it appears if you have not yet

installed a full license.



2. Click the **Register Now** button.
The Registration Details dialog appears.



3. Enter the appropriate text and select either E-mail or Print/Fax or Copy/Paste. This information together with the IrriMAX version and registration Site Code will be composed into either an automatic email message, a printed document, or plain text that be copied into your email program.

About Serial Numbers

The dialog will verify that you have entered a correct serial number. This unique serial number is specified on the licence certificate which was supplied with the IrriMAX package and is comprised of sixteen capital letters, optionally split into groups using spaces or dashes.

If you are upgrading from an earlier version of IrriMAX, please enter your previous Serial Number in the **Old Serial Number** field.

Some add-on components of IrriMAX may be separately licensed. Enter the serial numbers for these in the **Add-on Serial(s)** field, separated by commas.

4. Click the **OK** button.

a) If E-mail was selected a message will be sent to registrations@sentek.com.au. The email may be viewed in the Sent Items folder of your email program.

Note:
Some email programs warn that an automatic email may contain a virus. You can the preview the email before sending or select Send anyway.

b) If Print/Fax was selected a single page will be printed on your default printer. You can then fax the page to the Fax number on the page.

5. After sending the request you can continue to use **IrriMAX** by clicking the **Register Later** button, until you receive a response from the Sentek Registrations department.

6. When you receive the Site Key from the Sentek Registrations department (email or FAX), start IrriMAX and on the *Registration and Licensing* dialog type (or copy/paste from the email) the supplied site key into the Site Key text box (spaces are not significant).
Click the **Validate** button.
You will get the message: "Your Site Key has been validated. Thank you for choosing a Sentek product." Registration is now complete, and the *Registration & Licensing* dialog will no longer appear at startup.

If you receive an error message check the reasons in section *Troubleshooting Registration and Licensing* Page 202.

How to transfer a license from one copy of IrriMAX to another

It is possible to transfer a license from a fully licensed copy of IrriMAX into an unlicensed copy on another machine. Both copies of IrriMAX must be the same version. The process does not require that you obtain a new Site Key from Sentek.

You will require an external storage device (for example a floppy disk or USB memory key) or a shared network folder to store the license files during the transfer process.

This is a three step process:

1. Preparation of a transfer folder on the new computer
2. Putting the old computer's license into the transfer folder
3. Extracting the license from the transfer folder onto the new computer.

Ø To perform a license transfer

1. On the computer with the unlicensed copy of IrriMAX, choose **Licensing IrriMAX...** from the **Help** menu of the workspace manager window to invoke the *Registration & Licensing* dialog. This dialog also appears each time you start an unlicensed copy of IrriMAX.
2. Click the **Transfer License In...** button and follow the directions to prepare a folder for license transfer. The folder can be on a network, floppy disk or other removable storage device (such as a USB memory key). It must be writable by both copies of IrriMAX.

Warning:
There can only be one outstanding transfer for any given unlicensed copy of IrriMAX. This means that once a folder is prepared for license transfer, you must complete the remaining steps successfully. If you lose the contents of the folder, you will need to obtain a Site Key from

Sentek.
Hidden system files are generated in this folder, so you must copy the whole folder.

3. On the computer with the licensed copy of IrriMAX, choose **Licensing IrriMAX…** from the **Help** menu of the workspace manager window.

4. Click the **Transfer License Out...** button and follow the directions to write the license to the folder you prepared in step 3. Your old copy of IrriMAX is now unlicensed and will cease to function.

5. On the computer with the unlicensed copy of IrriMAX, click the **Transfer License In...** button and follow the directions to import the license.

What's new in IrriMAX 9.1?

This section is intended for users familiar with IrriMAX 9.0. It describes new features and changes that have been introduced to the software with the release of IrriMAX 9.1.

Packages

A package is a compressed archive of all files used by a workspace or graph, intended to facilitate easy exchange of IrriMAX files. IrriMAX can extract the contents of the package to a chosen location, and then open them automatically.

Packages can be created either manually from the workspace or graph **File** menus, or automatically as attachments when using the **Mail Workspace** or **Mail Graph** commands. They can also be created when webifying a workspace or graph.

Packages can be opened by browsing in IrriMAX, or directly from Windows by double-click or drag-and-drop. They can be opened directly from email attachments or after downloading from a web page.

See page 33.

Server Mode

IrriMAX and Data Exchange command lines can be sent to an instance of IrriMAX running in server mode. This special mode allows commands to be queued and executed sequentially on a hidden desktop. A small program called IrriMAXServer.exe is used to communicate with the server instance.

See page 27.

(The Server Mode feature requires a Premium license.)

Reports

All graph reports now have the option to output to a text file rather than direct to Notepad.

All graph reports except the Budget Line Periods report can output their values to an IrriMAX database for graphing.

All graph reports now have the option to choose a time range based on growth stages.

The last-used parameters for all reports are now stored in the graph document so that they don't need to be re-entered each time the report is run.

If a single ruler is present on the graph, the start of the range to report will default to the time at the ruler. (As before, if two rulers are present, the time range to report will default to the range between the two rulers.)

See page 179.

(The Reports feature requires a Premium license.)

Alerts

The *Workspace Properties* dialog now contains an *Alerts* tab for configuring the options relating to the mailing of alert messages. See page 55.

- Alerts can be combined into one email (as before), or sent separately. You can elect to be notified about only those alerts that are new since the last alert email was sent.
- You can elect to be notified when an alert is over.
- Alert email messages now contain more information in the subject line, and redundant information in the body has been removed.

The workspace **Tools** menu has a new command **Mail Alerts...** for sending alert emails from within IrriMAX, rather than the command-line. See page 68.

The value of the last reading can be included in a graph-based alert by including **%V** in the user-defined message. See page 159.

Each alert in an email is now prefaced by a bullet-point ("*" for red alerts and "-" for yellow and green.) This prevents Microsoft Outlook removing "extra" line breaks when the email is viewed.

The **/alertmail** command-line switch now uses the new alert mailing properties stored in the workspace document. If used without an argument, it uses the email address stored in the document. See page 25.

(The Alerts feature requires a Premium license.)

Webify

When webifying a workspace with the **Upload when complete** option, it is no longer necessary to specify an Output Folder. IrriMAX will instead use a temporary folder and delete it after the upload is complete. See page 65.

It is no longer necessary to specify a full path to the Output Folder when webifying a graph (see page 178) or workspace (see page 57). Relative paths can be used to specify a folder in a location relative to the graph or workspace document.

FTP upload of webified files now uses two simultaneous connections to improve speed.

The new macro **WORKSPACE_PACKAGE_LINK** can be used in a workspace webification template to generate and include a package containing the workspace document and all related files. See page 192.

The new macros **GRAPH_PACKAGE_LINK** and **GRAPH_ZIP_LINK** can be used in a workspace or graph webification template to generate and include a package or zip containing the graph document and related database files. See page 193.

"Webify Graphs..." has been renamed to "Webify Workspace..."

(The Webify feature requires a Premium license)

Data Exchange

The Data Exchange SDB destination module has a new switch "/logger:" which is used to override the Logger ID provided by the source module. For command-line use only.

The Data Exchange SDB destination module has a new switch "/combine" which is used to combine multiple source databases into one destination. For command-line use only.

See the *Data Exchange* documentation for more information.

Miscellaneous

Upload Workspace has been added to the workspace manager **Tools** menu, to permit uploading of workspace files to a FTP server (see page 66). This feature can be accessed from the command-line using the "/upload" switch (see page 25).

It is now possible to display "tags" which show the values of the last readings on single-axis graphs, and the distance to the adjacent budget lines as a difference or a percentage on single-line graphs. Access this feature on a pane-specific basis from the **Tags** submenu of the graph's **View** menu. See page 172.

IrriMAX databases (.SDB and .WDB files) are now registered with Windows to be opened by IrriMAX, where they are added to the databases list. See page 32.

Workspace, graph and layout documents display an asterisk (*) in their title bar when they contain unsaved changes.

Mapped Readings map files are now included in workspace and graph zip files and packages. It is now possible to enter a relative path to the map file in the Download Wizard, to specify a map file in a location relative to the workspace document.

The Logger Dialog now allows a Logger ID of 32 characters for non-RT6 loggers (previously 22) and Site names of 32 characters (previously 29). See page 92.

The **Advanced...** button on the Webify and Mail dialogs has been renamed to **More Properties...**

What's new in IrriMAX 9.0?

This section is intended for users familiar with IrriMAX 8.0. It describes new features and changes that have been introduced to the software with the release of IrriMAX 9.0.

Standard and Premium Licenses

There are two license levels for IrriMAX 9 - Standard and Premium. A number of features are only available to users who have obtained a Premium license:

- Webify and Mail of workspaces and graphs (introduced in IrriMAX 7.1)
- Database and Graph Alerts (new feature - see below)
- Graph Reports (new feature - see below)

Database and Graph Alerts

An alert is a notification presented to the user that is triggered when a nominated condition is met. The user can define alert triggers based on these conditions:

- A graph line being above or below a nominated budget line on a graph.
- The last reading of a database being a nominated amount of time older than the current time.
- The last reading of a database containing an invalid moisture or salinity value.

Alerts are displayed in a window at the bottom of the Workspace Manager. See page 41.

Graph-based alerts are defined in the *Graph Properties* dialog (see page 159.) Database-based alerts are defined in the the *Database Properties* dialog (see page 62.)

IrriMAX can be invoked with the "/alertmail:" command-line switch to send the currently triggered alert messages to a nominated email address, then exit. If this switch is combined with the "/download" switch, the batch download will be performed first, then the alert triggers evaluated. See page 25.

Graph Reports

A selection of text-based reports can be generated from the Graph window, based on the data in the currently selected pane. See page 179.

- The *Graphed Values Report* outputs the values as displayed in the current pane. See page 179.
- The *Cumulative Values Report* outputs a running total of the values as displayed in the current pane. See page 180.

- The *Budget Line Periods Report* lists the amount of time the graph line spends between each pair of visible budget lines. See page 180.
- The *Daily Crop Water Use Report* attempts to give a more accurate indication of crop water use than simply graphing "daily negative change". See page 181.

Reports can also be run from the command-line. See page 25.

Sentek Plus/Multi (Satellite) Module

The new *Sentek Plus/Multi (Satellite)* Data Exchange source module allows download of readings that have been sent via satellite to a POP mailbox. Currently only the Iridium message format is supported.

See the *Data Exchange* documentation for more information.

Workspace Download Management

"New Database" Wizard

The **New Database** command now presents a *New Database Wizard* to assist with creation of a new database, either manually or by download from a selection of Data Exchange sources. If one or several databases are created from a download, the databases are automatically added to the workspace and the download command is stored in the workspace for subsequent downloads. See page 86.

Download Wizard

The *Download Wizard* in the Workspace Manager assists with the creation of the download commands for existing databases in the workspace. All Data Exchange source modules are supported. Their controls are embedded within the Wizard, so Data Exchange need not be invoked separately. See page 88.

Easy editing of Mapped Readings mapping files

The Download Wizard can create and update the Mapping Files used by the Data Exchange Mapped Readings module. These files no longer need to be edited by hand. See page 88.

Batch and Background Downloads

Each database with a download command has the option of being included in a batch (unattended or automatic) download.

The **Start Download** and **Start Batch Download** commands in the Workspace Manager start downloading into one or more databases as a background process, using the download commands stored in the workspace. See page 61.

Download progress is shown in the *Download Window* at the bottom of the Workspace Manager. Closing the window cancels the download. See page 46.

IrriMAX can be invoked with the "/download" command-line switch. This downloads into all databases that have download commands marked for inclusion in a batch download. IrriMAX then exits. See page 25.

Download direct from files on the Internet

The Data Exchange CSV, Excel and Mapped Readings source modules can now download direct from the Internet using a HTTP or FTP URL.

Direct reading from the Internet using HTTP or FTP URL (without first downloading the whole file) is supported for the Data Exchange SDB and WDB source modules.

Webify Enhancements

The new workspace comment property is substituted into the workspace template where the text WORKSPACE_COMMENT_TEXT appears. See page 192.

When webifying a graph or workspace, IrriMAX will now create the output folder if it does not exist.

When uploading a webified workspace using FTP, IrriMAX will now create the folders in the remote path if they don't exist.

The default webify templates now include the "robots" meta tag so that the pages will not be indexed by search engines.

Other Workspace Manager changes

A new **General** tab in the workspace *Properties* dialog allows the entry of comments specific to the current workspace. See page 54.

The workspace document can now store the time-zone for databases that are not using local time. This is used for sorting the **Last Reading** column, and for those alerts based on the age of the last reading. See page 62.

The *Measurement* tab of the *IrriMAX Settings* dialog now allows you to select the default unit of measure for graphing of temperature and volume values. See page 77.

The workspace document now remembers the sort column and direction for the graph list, and enforces the sort order continually. To stop sorting, drag a graph row to a different position. See page 44.

New **Edit** menu contains download and **Database Properties** commands. The **Add Database** and **Remove Database** commands have moved here from the **File** menu. See page 61.

The Trim/Extract dialog now allows an empty range to be chosen, enabling a database to be completely emptied by a trim. See page 108.

Right-clicking on an empty area in workspace manager's database list now presents a context menu that allows creating or adding a database, and starting a batch download.

The **Remove Database** and **Recalculate Database** commands in workspace manager can now operate on multiple selected databases.

The *Registration Details* dialog now allows you to enter a message to be read by Sentek Registrations. See page 6.

Other Graph window changes

Copy Pane, Paste Pane and a **Paste Properties** submenu have been added to the graph **Edit** menu and context menu. Any graph pane can now be copied to another graph, and various properties of a copied pane can be applied to an existing pane. See page 170.

The unit of measure used for the display of readings in each pane can be selected from the *Graph Properties* dialog (see page 149) and the *Graph Popup menu* (see page 138.) The default choice is to use the default IrriMAX setting (see page 77) but you can also choose to display the unit used in the database, or another unit for which a conversion is known. You can also create your own custom unit conversion for each pane (see page 149).

Growth Stages are now permitted on all panes. If a pane does not support budget lines, the growth stage names and dividers are displayed without them.

Enlarge Pane has been added to the graph **View** menu, to enlarge the current pane by 25% and shrink all the other panes equally. See page 172.

Comments has been added to the graph **View** menu, to toggle between showing and hiding all the graph comments on every pane. See page 172.

New horizontal zoom presets of **3 Months**, **6 Months** and **1 Year** have been added to the graph window's **Zoom X** menu. See page 173.

The **Day Start** property for bar graphs previously only applied if the bar duration was exactly one day. It now applies if the bar duration is an exact multiple or divisor of one day. See page 149.

Graph printouts have been modified so that the details shown are no longer linked only to the currently selected pane:

- Only the graph file name (without file extension) and the user-entered comment are shown at the top of the page.
- The graph path (not the path of the first pane's database) is shown at the bottom of the page.
- Database name, last reading time and sample interval are not printed by default. To print these, they must have been selected to appear in the legend for the pane.
- Regardless of pane settings, "Logger ID" is shown in all printed legends.

The default name for a new graph is now the same as the database from which it was created.

When choosing a vertical zoom percentage from the **Zoom Y** menu, you can now hold down the Shift key to zoom all panes at once. See page 173.

The Time Shift property can now be used on any graph pane.

Data Exchange changes

The following changes to various Data Exchange source modules are described in the *Data Exchange* documentation.

Sentek Plus/Multi Module changes

- The Sentek Plus/Multi source module has a new **Path** control and "/PATH:" command-line parameter. This is used to specify a path relative to the path in the Server record. It is no longer necessary to create Server records that differ only by path.
- The *Edit Sentek Plus/Multi Servers* dialog in the Sentek Plus module now has an **Export Servers** button, which exports all the server records to a ".reg" file. Double-click this file to import the servers into the registry of another machine, or another user account on the same machine.
- The Sentek Plus/Multi/Solo source modules now supply sensor normalization history records.

Mapped Readings Module changes

- The Mapped Readings module supports a new "Separator" directive for specifying field-separator characters other than the default comma and tab. Consecutive separators can optionally be treated as a single separator.
- The Mapped Readings module will recognize numbers that use a comma as the decimal mark, providing that the number is enclosed in double quotes or the Separator directive has been used to specify a field-separator character that isn't a comma.
- The Mapped Readings module supports a new multiplier directive for scaling the imported values. For example, add "*25.4" to the map file to convert inches to millimetres.
- The Mapped Readings module now supports a "HourOfDayCol" directive for when the time is expressed as an hour from 1 to 24.
- The Mapped Readings module will now download the entire source file from the internet if provided with a HTTP or FTP URL.

SDB and WDB Module changes

- The Data Exchange SDB and WDB modules will now read the file from the Internet when provided with a FTP URL (HTTP URLs were already supported). This functionality is also available using the AutoSDB2 interface.
- The Data Exchange SDB Destination module now supports appending and modifying records in the ESSensorHistory table. When a sensor history record (consisting of sensor address, date, air and water counts) is sent to the SDB destination, it replaces all records in the sensor history table

for that sensor from the new record's date onward. The module will accept but ignore redundant records.

- The Data Exchange SDB Destination module will now create default sensor history records for a new database if they are not supplied by the source.
- The Data Exchange SDB and WDB destination modules now support the /ERASE command-line switch, which will empty the destination database prior to the download.

CSV and Excel Module changes

- The Data Exchange CSV and Excel source modules will now download the entire source file from the internet if provided with a HTTP or FTP URL.

Miscellaneous changes

Drag-and-drop adding of files from Windows Explorer has been implemented in the Workspace Manager, Logger Layout and Graph windows, and in the *Select Sensors Dialog*.

It is now possible to edit the historical record of air and water normalization counts of a sensor. In the *Logger Configuration Dialog*, right-click a sensor row and choose **Edit Normalization History...**

The *Recalculate Database Dialog* now allows the reverse calculation of of raw counts from cooked values. This is useful for retrieving the original raw counts for Sentek Plus/Multi databases. Note that you must first enter the correct normalization history and calibration for each sensor using the *Logger Configuration Dialog*. See page 113.

The new "/log:" command-line switch allows specifying a file to contain a combined log of IrriMAX and Data Exchange events. If unspecified, IrriMAX events are not logged, and Data Exchange events are recorded in the Data Exchange log as normal. See page 25.

The *Database Entry* utility now has a right-button popup menu for changing the number of decimal places shown in each column of data. See the *Database Entry* documentation.

What's new in IrriMAX 8.0?

This section is intended for users familiar with IrriMAX 7.1 It describes new features and changes that have been introduced to the software with the release of IrriMAX 8.0.

Most changes in this release fall under the following categories:

- Better support for custom sensors (e.g. SoluSAMPLER-type readings).
- More graph presentation options and improved graphing flexibility.
- User-interface and usability enhancements.

The changes are grouped by software component.

Workspace Manager changes

New database management tab in the workspace window

The workspace window now contains two lists, Graphs and Databases. The Graph List shows the traditional view of the graphs in the workspace. The Database List contains all databases referenced by graphs and layouts in the workspace, plus any other databases that are manually added to the list. The database list is saved as part of the workspace document.

If a database is highlighted in the list, all the database operations in Workspace Manager will use the highlighted database rather than asking the user to browse for one. All database operations are also available from the context menu that appears when a database in the list is selected with the right mouse button.

The list can be sorted in either ascending or descending order by any of the columns. This sort order is maintained as databases are added or modified.

See page 46.

Live graph thumbnails in the workspace graph list

The **Graph Info** column can now display a thumbnail view of each graph. The size of the thumbnail is specified using the **General** tab of the *IrriMAX Settings* dialog. See page 84.

This feature can be turned off if it adversely affects performance.

Default Mail and Webify templates can be specified

Default Mail and Webify templates can be specified in the new **Templates** tab on the *IrriMAX Settings* dialog. This allows use of customized templates without having to select them in each graph or workspace. See page 83.

The template for the Upload Notification Email (UPLOADEMAIL.HTML) can also be changed.

Multiple graphs can be sent in a single mail

The workspace's **Mail Graphs** feature can now send all graphs in a single email, by use of the new WORKSPACEEMAIL.HTML template. See page 54.

This template can be made the default by specifying it on the new **Templates** tab on the *IrriMAX Settings* dialog. See page 83.

Mail and Webify feature extended with more options

- When mailing or webifying from a workspace, graphs can be automatically zoomed to their preset date range. If they are zoomed to their vertical extents, budget lines can be included in the extents. Graphs with more than one vertical axis can be "stacked" so they don't overlap.
  See page 54 for workspace mail properties. See page 58 for workspace webify properties.
- When mailing a workspace, a message can be entered to include in the body of each graph email. See page 54.
- When webifying a workspace manually, a message can be entered to include in the Upload Notification Mail. See page 65.

Drag-and-drop graph row ordering in workspace window

Workspace Manager allows drag-and-drop reordering of graph rows. See page 41.

Various workspace window improvements

- The **Last** column has been renamed **Type/Last**. Click the column header to sort summed graphs in order of irrigation priority, followed by the other graphs sorted by type (Stacked, Common Y or Separate Y, denoted by icons). See page 41.
- The **Graph Type** column has been renamed **Sensor Types**. Click the column header to sort the graphs alphabetically based on the type of sensors they display. See page 41.
- Layout and text windows are now invisible when minimized (like graphs.)
- Invisible layout and text windows are now accessible from buttons on a new toolbar called the *Workspace Bar*, located underneath the existing toolbar. The Workspace Bar can be hidden or shown using the Workspace Manager **View** menu. See page 41.
- The graph list can be scrolled vertically using the mouse wheel.
- The mail feature now uses the most secure authorization method from those offered by the server. The "Secure Password Authentication" checkbox has been removed. See page 82.
- The logger, site and probe information displayed in each graph row is now derived from all panes in the graph window, not just the first.
- The logger, site and probe information, and the last reading time, as shown in a mailed or webified graph header, are now derived from all graph window panes, not just the first.

- Use the spacebar to minimize the currently viewed graph or layout and return to the Workspace Manager. Use the Esc key to send the the currently viewed graph or layout behind all other windows.
- The *Save Changes?* dialogs that appear when IrriMAX is closed now have **Yes to All** and **No to All** options.
- The shortcut keys for **Cascade**, **Tile Horizontally** and **Tile Vertically** have changed to F3, F4 and F5 respectively. See page 69.
- The **Bring Layouts to Front** function can now be accessed by the F6 shortcut key. See page 69.
- Toolbar buttons have been added for **Mail Graphs**… and **Webify Workspace…** See page 64.
- The **Add Color** and **Remove Color** buttons have been removed from the *IrriMAX Settings* dialog *Color* tab. See page 78.
- The *Irrigation and Rainfall* tab has been removed from the *IrriMAX Settings* dialog, and the *Graphs* tab has been added (see page 80). Some settings are now accessed only by the new *Database Entry* utility.

Layout and Logger Configuration Dialog changes

Irrigation and Rainfall sensor support in SDB files

The *Logger Configuration* dialog now directly supports addition of Irrigation and Rainfall sensors to a standard soil moisture database (SDB file). See page 95.

To add an irrigation or rainfall sensor, ensure that the **Logger Type** combo box shows **Unspecified** (Irrigation and rainfall cannot be added to an RT6-type database). Highlight a probe in the logger tree and click the **Add Sensor**>> button, then choose Irrigation or Rainfall to add a sensor. Alternatively, choose the options from the menu that appears when you right-click a probe.

Logger type "Other" changed to "Unspecified"

The **Logger Type** combo box offers two choices, **RT6** or **Unspecified**. RT6 validation mode enforces strict rules for an RT6-compatible database. Unspecified mode does not enforce any particular rules. Unspecified used to be called **Other**.

It is now possible to switch back from Unspecified to RT6, providing the database is compatible.

Note that the validation setting is not preserved. If a database is RT6-compatible, then RT6 will be selected each time it is opened in the Logger Configuration dialog.

Sites can be hidden on logger layout

The site icons for individual loggers on the layout document can be hidden, to better represent single-probe units.

To hide sites, right click the logger icon and choose **Hide Sites** from the popup menu. Alternatively, left-click the logger icon and choose **Hide Sites** from the **Selection** submenu of the **Edit** menu. See page 127.

Sensor selection dialog supports custom sensors

The *Sensor Selection* dialog and the graph window's *Select Sensors for New Pane* dialog have been combined, to allow creation of new graphs which don't have moisture or matric potential in the primary pane. This dialog is used to create a graph from either the Workspace Manager or the Logger Layout window.

The new dialog shows the moisture probe layout on one tab, and all other sensor types in list format on the other tabs. Any type of sensor can be chosen to create a graph. See page 115.

Graph window changes

New Bar Graph mode

Graphs can be drawn in bar form in any non-I&R pane. The duration of the bars can be specified. When more than one reading falls within the time covered by a bar, the bars can be configured to show the start reading, the end reading, the minimum, the maximum, the average, the total sum of the values, or the total sum of only the positive or negative values. The graph mode (line, bar or change bar) can be configured using the graph *Properties* dialog. See page 149.

When Irrigation or Rainfall sensors are graphed from an SDB file, daily total bar mode is set by default.

Some graph mode combinations are selectable from a popup menu which appears when you click the pane's legend section with the left mouse button.

New Change Bars mode

Change Bars show the difference in value compared to the underlying value of the preceding bar. For example, daily crop water use can be shown by graphing soil moisture as a change bar, configured to show the total sum of the negative values. See page 149.

Graphing restrictions have been removed

- Graphs can now have any sensor type in the main pane.
- Summed graphs can be created in any pane. The interpolation feature is now pane-sensitive. Note that the total sum is divided by the total number of probes containing selected sensors.
- Budget lines and growth stages can be added to any pane which contains either a single sensor or a summed graph.

Improved line legends for each graph pane

The graph legends now appear immediately above the graph they refer to, or can be configured to appear in a corner of the graph. They can optionally include Logger Id, database name, last download time and current sampling interval.

The legend properties for individual panes can be configured using the graph *Properties* dialog. See page 149.

Hovering above a legend with the mouse changes the cursor to a finger symbol. A left-click opens a popup menu that allows selection of a number of graph modes, and a **More…** option that opens the graph *Properties* dialog.

The Irrigation and Rainfall pane has changed to use this mechanism for switching modes.

Time offset for a pane allows comparison with historical data

The time range of readings shown in a secondary pane can be offset from the main pane by a nominated amount, using the graph *Properties* dialog. This allows easy comparison with historical data. See page 149.

Differencing and totaling in vertical rulers

When two or more vertical rulers are added to a graph, each ruler now also shows the difference in values when compared to the ruler on its immediate left. If the graph shows "total" bars, then the ruler also shows the total sum of the values between the two rulers. See page 166.

Separate graph stacking

Stack on the graph's **Zoom** menu reorders and adjusts stacked or separate-Y graphs so that the lines don't overlap. See page 173.

Arrow-less comments

The arrow and/or border of a graph comment can be hidden, by deselecting **Show Comment** or **Show Border** on the comment's popup menu. See page 168.

Expanded integration of graph window with other components

- **Logger Configuration…** has been added to the graph's **Tools** menu. This opens the *Logger Configuration* dialog for the database associated with the currently selected pane. See page 176.
- **Enter Readings…** has been added to the graph's **Tools** menu. This opens the Database Entry utility for the database associated with the currently selected pane. See page 176.

Various Graph User Interface improvements

- Graphs can be scrolled horizontally and vertically by clicking the graph and dragging the mouse with the left button held down. See page 144.
- Graphs can be zoomed in and out vertically by use of the mouse scroll wheel. For a horizontal zoom, hold down the Shift key or the scroll wheel button while using the scroll wheel.
- Use the Shift key when zooming to horizontal or vertical extents to apply the operation to all panes. (In the case of a horizontal zoom to extents, this will zoom all panes to their combined horizontal range.) Alternatively, choose **All Extents** from either the **Zoom X** or **Zoom Y** sub-menus of the **Zoom** menu.
- Preset vertical zoom amounts have been added to the **Zoom Y** sub-menu of the **Zoom** menu. These amounts range from 5% to 100%, where the percentage is of the total valid range for that sensor. In the case of soil moisture, the valid range happens to be 0 to 100 millimeters. Choosing 10% on a soil moisture graph pane will therefore zoom the pane to a vertical range of 10 millimeters. See page 173.
- The behavior of **Zoom to Vertical Extents** can be changed in the *IrriMAX Settings* dialog to include budget lines in the extents. See page 80.
- The behavior of **Reset Graph** can be changed in the *IrriMAX Settings* dialog to optionally zoom to the preset date range and/or to vertical extents. See page 80.
- **Equalize Pane Heights** on the graph's **View** menu sizes the panes so that the graph part of all panes is the same height. See page 172.
- **Reset Graph** and **Properties…** have been added to the graph's popup menu.
- **Zoom to Rectangle** can be activated by the "Z" key.
- **Undo Zoom** can be activated by the Ctrl+Z keyboard shortcut.
- Irrigation and Rainfall panes now change height proportionally with the graph window instead of being a fixed height.
- The logger details in the header and the vertical value span in the status bar now update to reflect the currently selected pane. Previously they only referred to the primary pane.
- The *Budget Line Names* tab on the graph's *Properties* dialog has been removed and incorporated into the *Budget Lines* tab. See page 154.

IrriMAX Utilities changes

New Database Entry utility

The Database Entry utility facilitates manual data entry into soil moisture or custom databases (.SDB files) for SoluSAMPLER or any other data. It also incorporates the previous utility for entering events into Irrigation and Rainfall databases (.WDB files).

From within IrriMAX, the utility can be started from the Workspace Manager, the Graph window or the Logger Layout window. Note that Database Entry runs independently of IrriMAX, and will remain open when IrriMAX closes. It is also possible to create multiple instances of it.

To start from the Workspace Manager, choose **Database Entry…** from the **Tools** menu. The utility starts with no database loaded.

To start from the Logger Layout, right-click the logger or site icon for which you want to enter readings, and choose either **Enter Readings…** or **Enter Irrigation & Rainfall…** The utility starts with the database already loaded, and in the case of Irrigation and Rainfall launched from a site icon, the site checkbox set.

To start from the Graph window, ensure that the graph pane for which you want to enter data is selected (the pane legend at the side of the graph is bold and underlined). Choose **Enter Readings…** from the **Tools** menu.

See the *Database Entry* documentation for more information.

Data Exchange SDB and WDB module enhancements

- The Data Exchange "IrriMAX Database" and "Irrigation & Rainfall Database" source modules can now read from an SDB or WDB file over the Internet using the HTTP protocol. Simply enter a URL where you would normally enter a filename in the Source section.
- The Data Exchange "IrriMAX Database" destination module now supports the "/modify" switch, which allows modification, insertion and deletion of records within an SDB file.

See the *Data Exchange* documentation for more information.

Data Exchange Mapped Readings Module now integrated and enhanced

The Mapped Readings add-in module is now included with IrriMAX. It extends Data Exchange with the ability to download readings from text-format files that do not conform to the standard Sentek CSV structure. This is done with the aid of a "mapping file" which specifies how to translate the data for import into an existing Sentek database. See the *Data Exchange* documentation for instructions on creating a mapping file using a text editor such as NotePad.

- Tab characters are now recognised as field separators.
- When using the **TableCol** directive to merge different sets of data with non-matching timestamps, linear interpolation is now used to manufacture values in those fields that don't have values in a merged record (allowing IrriMAX to draw unbroken lines).
- New **Locale** directive to specify the locale/language that should be used to interpret dates. Use this to resolve mm/dd/yy versus dd/mm/yy ambiguity, and to interpret foreign language month names.
- **TimeShift** directive for adjusting times to a different timezone.
- **LoggerIdCol** directive for filtering out source lines based on the Logger Id.
- **ResampleMinutes** directive for merging readings into records with timestamps that are a multiple of a given number of minutes.
- A value can be hardcoded for each destination column. For example, an explicit value of 'empty' for a raw value will prevent it being automatically set to 65535, allowing IrriMAX to reverse-calculate it from the cooked value.
- **LoggerId** is now an optional directive. If not supplied, the module will attempt to retrieve it from the destination.

See the *Data Exchange* documentation for more information.

Remote Connection Manager supports Windows modems

Remote Connection Manager now supports use of any modem recognized by Windows, without requiring a device to be set up on the **Devices** tab. The modems can be selected from the **Local Communication Device** drop down list on the **Loggers** tab, where they appear at the top, surrounded by brackets.

See the *Remote Connection Manager* documentation for more information.

Remote Connection Manager has improved usability

- Phone numbers can be entered in Remote Connection Manager without requiring a Node record.

- The Remote Connection Manager window size has increased and lists are now sorted. The **Edit** menu has been renamed **File**, and **Edit Site** renamed **Edit Configuration**.
- Remote Connection Manager now returns an exit code of 0 for success, 1 for unrecognised core program exit code and negative values for various errors (see Help). Previously the RCM exit code was undefined.

See the *Remote Connection Manager* documentation for more information.

Database Manager minor enhancements

- The Database Entry utility can be started from the Database Manager **Tools** menu
- The Data Exchange utility can be started from **Import** and **Export** on the Database Manager **Tools** menu.
- The *Verifying List* dialog that appears when Database Manager is started now has a **Cancel** button.

See the *Database Manager* documentation for more information.

Using IrriMAX

This section provides an overview of **IrriMAX** and describes how **IrriMAX** is used.

The importance of a Sentek Trained agronomist or distributor on installation

For accurate, meaningful data readings, it is important to have a Sentek trained agronomist, or distributor, analyze the site, install the soil probes and configure the software.

What is IrriMAX?

IrriMAX is a Windows-based program which provides an environment for the management of databases and graphs containing soil moisture, matric potential, rainfall and irrigation, salinity and other sensors. This environment is known as the workspace and displays in the *Workspace Manager* window. See page 29 for an introduction to the workspace concept.

Hardware Integration

IrriMAX software integrates with the **Sentek** range of hardware (including RT6 Loggers, EnviroSCAN Plus, Diviner 2000, EnviroSCAN, EnviroSMART, EasyAG and TriSCAN devices) to create a network of irrigation management sites.

RT6 Logger

The RT6 logger can support up to eight sites, each site consisting of a strategic array of probes. Each probe contains up to sixteen sensors (maximum of 32 sensors per logger) set to measure moisture content over a range of preset depths.

TriSCAN Sensors

TriSCAN sensors monitor both soil moisture content and salinity. Salinity is influenced by a range of factors including irrigation and fertilizer management. These changes in salinity at various soil depths over time are plotted in the IrriMAX software in a separate graph pane above the soil moisture data.

Irrigation and Rainfall

The most critical aspect for achieving quality and yield in irrigated agriculture is the ability to match the crop's water requirements with irrigation or rainfall events. **IrriMAX** provides growers with a continuous account of the plant's water use dynamics. This accurate measure of water use provides water management control for an entire root zone. **IrriMAX** software displays this data, providing clear water management information.

IrriMAX provides the ability to display irrigation & rainfall crop water application rates in a bar-graph form, in a pane above the soil moisture graph. Each **site** can have its own irrigation & rainfall data.

Custom Sensors

Various user-defined custom sensors can be added to an IrriMAX database and graphed as a complement or an alternative to moisture sensors.

Software Components

The main IrriMAX application is supported by a suite of utility programs. Each program can be run from the Windows Start menu, and desktop shortcuts can optionally be created during installation.

IrriMAX is the main application used to manage and view soil moisture information from the logger, salinity from TriSCAN sensors, rainfall and irrigation events and readings from other custom sensors. The IrriMAX Workspace Manager maintains the graphs, layouts and database configurations.

The *Logger Configuration Dialog* component is used to create IrriMAX databases. It can also send configurations to the RT6 logger.

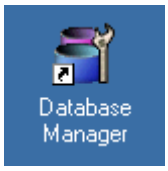
Data Exchange transfers data to and from various IrriMAX sources and destinations. It is used to populate IrriMAX databases with readings downloaded from RT6 loggers, the Diviner 2000, EnviroSCAN Plus servers, EnviroSCAN Solo probes and the SoloPORTER.

It also supports conversion of IrriMAX data to and from Comma-Separated Value text files and Microsoft Excel worksheets. Using the Mapped Readings module, readings can be imported into IrriMAX databases from almost any text-based file format.

Refer to **Data Exchange** documentation for details.

Database Entry is used to manually enter readings into IrriMAX databases and Irrigation and Rainfall databases. It allows creation of databases using the *Logger Configuration Dialog.*

Refer to the **Database Entry** documentation for details.



Database Manager is used to view all databases on your computer. It provides various database manipulation functions,.for example merging two databases to create a single database. It also allows creation of databases using the *Logger Configuration Dialog.*

Refer to the **Database Manager** documentation for details.

RT6 Logger Manager communicates with the RT6 logger to provide basic logger diagnostics and management functions. This information includes: viewing logger identification, ROM firmware version, sensor configuration, data block headers, voltages and dynamic sensor readings. It also allows the setting of baud rate, sampling interval and logger date and time.

Refer to the **RT6 Logger Manager** documentation for details.

Remote Connection Manager (RCM) manages the remote connection between a computer and a remote logger over a modem or radio connection.

Refer to the **Remote Connection Manager** documentation for details.

The **ES2 Database Converter** utility converts **EnviroSCAN 2** database formats to the **IrriMAX** database format.

Refer to the **ES2 Database Converter** documentation for details.

Starting IrriMAX

Ø To start IrriMAX

1. From the **Windows Taskbar**, click the **Start** button and point to **Programs**.
2. Point to **Sentek**, point to **IrriMAX** and click **IrriMAX**
   The *Workspace Manager* window displays.
   See page 83 for details of startup options.

Note:
The license manager *Registration and Licensing* dialog will appear until IrriMAX is registered. See page 6 for the process to register IrriMAX.

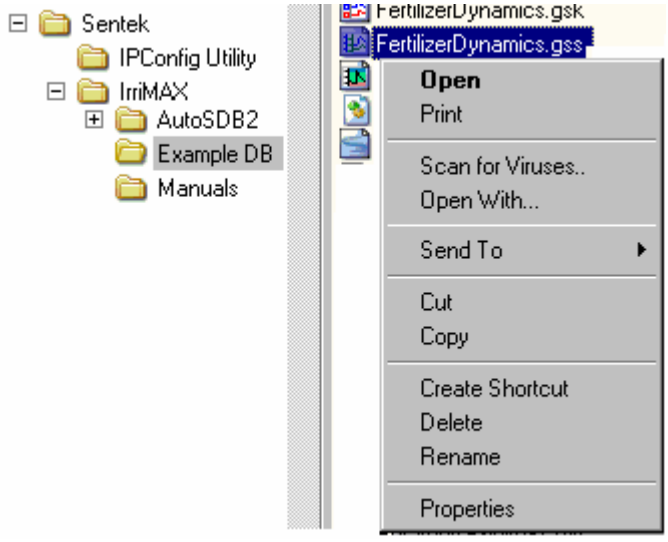
Note: If you chose to have desktop icons installed on your **Windows** desktop during the installation, you can also start **IrriMAX** by double-clicking this icon.

Ø To Open or Print IrriMAX documents from Windows Explorer:

IrriMAX has Windows file extension associations which allow the opening and printing of workspaces (.sws), graphs (.gt, .gss and .gsk) and layouts (.sll) from Windows Explorer.

1. Open Windows Explorer and browse to the folder containing the desired IrriMAX documents.

2. Double click to launch IrriMAX and open the desired document.
   OR
   Right-mouse click on the desired filename and on the popup menu select the **Open** or **Print** menu item. IrriMAX will automatically start.
   Note: If file extensions are not displayed, the icon next to the file name depicts the type of file.



3. If **Print** is selected the operation will be performed then IrriMAX will automatically close.
   Note: Print workspace only prints graphs which have the **Print** checkbox selected.

Ø To start IrriMAX and load a document

1. From the Windows Taskbar, click the **Start** button and select **Run...**

2. On the *Run* dialog, type "C:\Program Files\Sentek\IrriMAX\IrriMAX.EXE" "document", where "document" is the path to the workspace, graph or layout document that you want IrriMAX to load automatically on startup (the quotes are necessary if blanks appear in the path name). Note that the path to "IrriMAX.EXE" above is an example only. The program may have been installed at a different location on your machine.
   Note: You can also replace the IrriMAX.exe command with the full path to the required document. See *To Open or Print IrriMAX documents from Windows Explorer* above.

3. Click **OK**

Exiting IrriMAX

Exiting **IrriMAX** shuts down the **IrriMAX** application.

Ø To exit IrriMAX

From the *Workspace* **File** menu click **Exit**:

- If the open files have not been saved, message boxes display prompting you to save or abandon each document.

Once all files have been saved or abandoned the application will shutdown.

Starting IrriMAX from the Command Line

Advanced users can launch IrriMAX from the command line, a custom shortcut or the Windows Task Scheduler. This allows you to supply the filename of a workspace, graph or layout document to be automatically loaded when the program starts. You can use various command-line switches to make IrriMAX perform certain operations.

An IrriMAX command line consists of three parts, separated by spaces:

- The path to the IrriMAX executable, enclosed in double-quotes if the path contains spaces. This is typically "C:\Program Files\Sentek\IrriMAX\IrriMAX.exe". In the examples below it is assumed that the current directory is the directory in which IrriMAX is installed, so we can invoke IrriMAX by simply typing "IrriMAX.exe".
- The path to an IrriMAX document to open. You can supply a graph or layout document, but the switches detailed below are only valid for workspace documents. The path to the document must be enclosed in double-quotes if it contains spaces.
- Various combinations of switches as detailed below. Some switches require you to supply an argument. If a switch or its argument contains spaces, the switch and its argument must be enclosed in double-quotes.

The following example downloads into the databases and webifies the workspace, sending error messages to an email address:

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" /DOWNLOAD /WEBIFY /FAILMAIL:ME@MYCOMPANY.COM

Command-Line Switches

/download

IrriMAX will download into all files in the workspace that have download properties stored and the "include in batch downloads" flag set (see page 88). When all other command-line switches have been processed, IrriMAX will exit.

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" /DOWNLOAD

/webify

IrriMAX will webify the workspace according to the stored properties in the workspace document (see page 57). If the /download switch is also given, the download will be performed first. When all other command-line switches have been processed, IrriMAX will exit.

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" /WEBIFY

/mail

IrriMAX will mail the graphs in the workspace according to the stored properties in the workspace document (see page 56). If the /download switch is also given, the download will be performed first. When all other command-line switches have been processed, IrriMAX will exit.

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" /MAIL

/gvreport:outputfilename,graphname,paneno,startdate

IrriMAX will output the Graphed Values Report (see page 179) to the specified file. If the /download switch is also given, the download will be performed first. When all other command-line switches have been processed, IrriMAX will exit.

The following command writes the report to a file called C:\REPORT.TXT. The name of the graph within the workspace is GRAPH.GT (a path is not supported so there must only be one Graph.gt in the workspace). The report is run on the first pane of the graph, which is pane 0 (the panes are numbered from zero, ordered from bottom to top).

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" /GVREPORT:C:\REPORT.TXT,GRAPH.GT,0

A start date can be supplied as an optional fourth parameter. Many date formats are recognized, depending on your computer's locale settings. You can alternatively supply the name of an existing growth stage (see page 142) from which the date will be extracted.

… "/GVREPORT:C:\REPORT.TXT,GRAPH.GT,0,2011-03-11 9:00AM"

… "/GVREPORT:C:\REPORT.TXT,GRAPH.GT,0,FLOWERING"

If any parameter contains a comma, then that parameter needs to be enclosed by a pair of double-quotes on either side, and the whole report switch must be enclosed in double-quotes. For example:

… "/GVREPORT:""C:\REPORTS, OUTPUT\REPORT.TXT"",GRAPH.GT,0"

The report can also be output to an IrriMAX database (.SDB file).

/cvreport:outputfilename,graphname,paneno,startdate

IrriMAX will output the Cumulative Values Report (see page 180) to the specified text file or IrriMAX database. Usage is identical to /gvreport above.

/blreport:outputfilename,graphname,paneno,startdate

IrriMAX will output the Budget Line Periods Report (see page 181) to the specified text file. Usage is identical to /gvreport above. However, there is no option to output to an IrriMAX database with this report.

/wureport:outputfilename,graphname,paneno,startdate

IrriMAX will output the Daily Crop Water Use Report (see page 181) to the specified text file or IrriMAX database. Usage is identical to /gvreport above.

/zip:zipfilename

IrriMAX will add the workspace and all linked documents and databases to a zip file with the given name. If the /download switch is also given, the download will be performed first. When all other command-line switches have been processed, IrriMAX will exit.

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" "/ZIP:C:\BACKUPS\MY WORKSPACE.ZIP"

/alertmail:emailaddresses

IrriMAX will email all currently triggered alerts to the supplied email addresses. To send to more than one address, separate them with commas. If the /download switch is also given, the download will be performed first. When all other command-line switches have been processed, IrriMAX will exit.

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" /DOWNLOAD /ALERTMAIL:ME@MYCOMPANY.COM

The alert emails will be sent according to the stored properties in the workspace document (see page 55). To use the email addresses stored in the workspace document, omit them from the command line.

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" /ALERTMAIL

/failmail:emailaddresses

If an error occurs when loading the workspace or during a command-line operation, then IrriMAX will email an error message to the supplied email addresses. To send to more than one address, separate them with commas.

IRRIMAX.EXE "C:\DATA\MY WORKSPACE.SWS" /WEBIFY
/FAILMAIL:ME@MYCOMPANY.COM,ADMIN@MYCOMPANY.COM

/log:logfilename

If a log file name is supplied with this switch, then IrriMAX will write the command-line to the log file whenever it starts. Various events are written to the log file. All text that would normally go to the Data Exchange log file will instead be sent to this file.

IRRIMAX.EXE "/LOG:C:\LOGS\IRRIMAX.LOG"

/tempws

If you launch IrriMAX with the command line switch /tempws (not case sensitive), you will not be prompted to save any changes you have made to the workspace when you exit the program.

IRRIMAX.EXE "C:\DATA\MY GRAPH.GT" /TEMPWS

Running IrriMAX in Server Mode

IrriMAX and Data Exchange command-lines can be executed by IrriMAX in server mode. Server mode has the following advantages:

- Command-lines sent to IrriMAX in server mode are queued and executed sequentially. This ensures best use of the system's resources by avoiding the case of multiple copies of IrriMAX launching and running commands simultaneously.
- When IrriMAX runs a command in server mode it is done on its own separate desktop and does not interfere with the desktop of any other users of the computer.
- When IrriMAX is launched in server mode it remains running and waits for additional commands. This avoids delays introduced by repeatedly launching the program. Alternatively it can be instructed to close after running a command.
- All commands sent to IrriMAX in server mode are recorded in a log file called IRRIMAXSERVER.LOG, which can be found in the Sentek public folder. The log records whether the commands failed or were successful.

Communication with an instance of IrriMAX running in server mode is done by use of a small program called IRRIMAXSERVER.EXE.

Use of server mode requires a Premium license.

Using IrriMAXServer.exe

IrriMAXServer.exe is a command-line program used for submitting commands to an instance of IrriMAX running in server mode. Simply substitute IrriMAXServer.exe for IrriMAX.exe in your batches, shortcuts or scheduled tasks.

IrriMAXServer.exe will start an instance of IrriMAX in server mode (if it is not already running), then pass its command-line arguments through to the server where they are queued for execution. The usual scenario is that IrriMAXServer.exe will then terminate immediately without waiting for the command to be executed, and the instance of IrriMAX running in server mode remains in memory, waiting for more commands.

IrriMAXServer.exe recognizes the following additional command switches.

IrriMAXServer /dex

The /dex command indicates that the remaining command switches are to be forwarded by IrriMAX to Data Exchange. This allows general Data Exchange operations to be executed by the same queue as IrriMAX operations, in cases where the order of execution is important.

If an IrriMAX log file is specified, Data Exchange will use it as well. For example:

IRRIMAXSERVER /LOG:C:\LOGFILE.LOG /DEX /S:SDB C:\INPUT.SDB /D:SDB C:\OUTPUT.SDB

IrriMAXServer /help

The /help command displays a list of the command-line switches that are recognized by IrriMAXServer.exe.

IrriMAXServer /status

The /status command displays the status of the server. If the server is not running it displays "Server not running". Otherwise it displays the version number, running time, working time (the time spent actually running commands), the number of commands executed and the status of the command queues.

IrriMAXServer /quit

The /quit command switch shuts down the server when there are no more commands in the queue. You can use this switch by itself, or in conjuction with an IrriMAX command-line.

IrriMAXServer /abort

The /abort command switch shuts down the server as soon as the current command is finished, discarding any queued commands.

IrriMAXServer /wait

The /wait command switch will cause IrriMAXServer.exe to remain running until the command is executed, rather than terminate immediately after submitting the command to the queue. You can use this switch by itself, or in conjuction with an IrriMAX command-line.

IrriMAXServer /priority

The server provides a priority queue in addition to the standard queue. Any commands sent to the priority queue by use of the /priority switch will be executed before any commands in the standard queue. (The /status and /abort commands are automatically sent to the priority queue.)

IrriMAXServer /suspend

The /suspend command suspends execution of commands in the standard queue. This takes effect after the currently executing command is finished. To resume execution of commands, use the /resume command.

IrriMAXServer /resume

The /resume command resumes execution of commands in the standard queue. It has no effect if the queue was not suspended by the /suspend command.

Online Help

Online help for IrriMAX can be obtained in various ways:

Ø To obtain online help

1. Press F1 on the keyboard to view help on the currently active window.
2. Press SHIFT+F1 on the keyboard to view pop-up help on the control that has focus in a dialog box.
3. Click 

to display help on a dialog box containing this button.
4. From the *Help* window, double click items in the help list.
   Click the **Contents** tab to scroll through a table of contents for online help.
   Click the **Index** tab to search for topics by using an index of keywords and phrases.
   Click the **Search** tab to use full-text search and look for specific words.
   Click the **Favorites** tab and click **Add** to keep a reference of your favorite topics
5. Use **ScreenTips** to display information about each item on the window.

   To see a ScreenTip for a window item, click  or  and then click an item on the window to display information about that item.
6. To see the name of a toolbar button, position the mouse pointer over the button until the name appears as a ToolTip.
7. To see menu item descriptions, position the mouse pointer over the menu item until the description appears in the status bar at the bottom of the window.
8. A glossary of IrriMAX terminology is also available.
   Click the **Glossary** on the *Help* toolbar.

Printing Help Topics

Individual help topics may be printed as required. A full copy of the user guide is also supplied as a file in Adobe Acrobat portable document format (PDF), which can be printed.

Ø To print a help topic

In help, click  . Select either the selected topic, or the selected heading and all subtopics.

Ø To print the PDF version of the user guide

A full copy of this user guide is provided with the software, in PDF format. You can print a full copy of the PDF user guide using **Adobe Reader**, which is used to view the PDF user guide. Please refer to the **Adobe Reader** online help for details on how to print selected pages or a full copy of the user guide in A4 format. These files are available from the Start menu.

Note: Adobe Reader can be installed from the IrriMAX CD.

Ø To view a Manual in PDF format

1. From the **Windows Taskbar**, click the **Start** button and point to **Programs**.
2. Point to **Sentek**, point to **IrriMAX**, point to **Manuals** and click file you wish to view
   Adobe Reader displays the selected file.

The IrriMAX Workspace

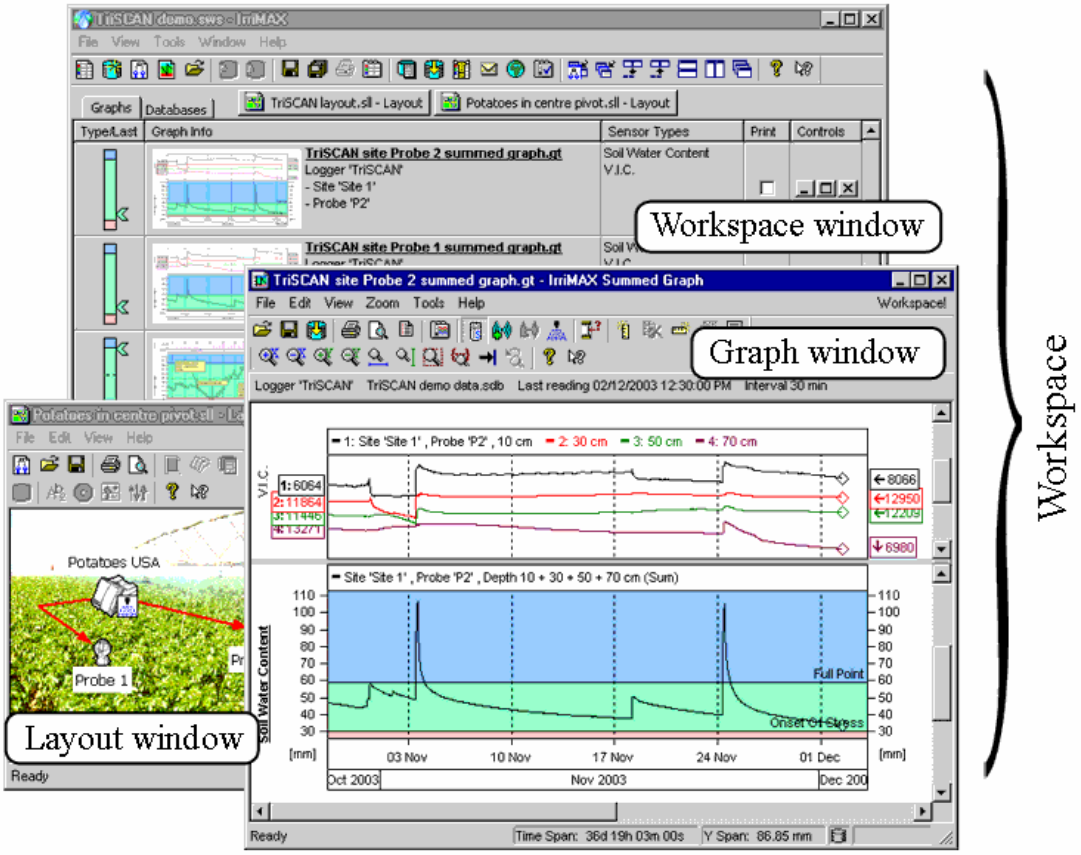
Everyday usage of IrriMAX requires interaction with many separate files. Database files are created and updated with readings from loggers; graph documents are created to display the readings from these databases; and layout documents allow access to databases from a graphical representation of the loggers in the field.

The IrriMAX Workspace Manager window provides access to a collection of related databases, graph documents and layout documents. Links to these independent files are stored in the workspace document.

- Opening a workspace document also opens all the files to which it links.
- You can create multiple workspaces, but only one can be open in IrriMAX at a time.
- Files included in one workspace can also be included by another.

You could, for example, use more than one workspace to organize and view data from a single logger if you wanted to have different 'views' of the same data. Alternatively, you can use one workspace to combine layouts or graphs from multiple loggers. A consultant would typically save a different workspace for each client.

Below is an example of a typical IrriMAX session which shows the main window types.



The Workspace Manager Window

The *Workspace Manager* is the heart of **IrriMAX** from which you can:

- Create and save workspace documents, databases, graphs and layouts.
- Organize, access and manipulate databases.
- Arrange and access the graph and layout windows.
- View a summary list of all the open graphs with thumbnail images.
- View soil moisture gauges that represent irrigation urgency.
- Manipulate databases using a variety of tools.
- Send graphs by email, or convert them for viewing on the web.
- Backup all files referenced by the workspace.
- Perform batch printing of graphs.
- Change settings that govern the way the software operates.
- Manage registration and licensing of the software.

Layout Window

From the *Layout* window you can create a picture of your site configurations and create graphs. The *Layout* window provides a stylized picture of each logger configuration. From the *Layout* window, any combination of probes, sites and sensors may be selected to display the corresponding data in a graph window.

Graph Window

From the *Graph* window you can view graphs. The *Graph* window displays readings from one or more databases in a time-based graph for detailed examination. Each graph window can contain multiple vertical panes for comparison of different information over a common time period.

Logger Configuration Dialog

The configuration of logger, sites, probes and sensors in a database is managed by the *Logger Configuration* dialog box. The *Logger Configuration* dialog box also provides access to the *Calibration Registry* where calibrations for specific soil profiles are stored. It also allows selection of custom sensor propertiess from a central registry.

The dialog also communicates directly with an RT6 logger to set its configuration.

Data Acquisition

Before using IrriMAX graphs to interpret data, that data must first be acquired and added to an IrriMAX database.

RT6 Logger

Data can be downloaded from an RT6 logger in three ways:

- By going into the field and directly connecting a laptop into the logger (front panel of the housing).
- By disconnecting the logger from the logger housing and taking it to your computer (requires office download cable)
- By remotely connecting to the logger from the office, then downloading data.

Refer to the **Remote Connection Manager** and **Data Exchange** documentation for details of downloading data either remotely or via a direct connection.

Diviner 2000

Data can be downloaded from a direct connection to a Diviner 2000 unit. See the **Data Exchange** documentation for details.

EnviroSCAN Solo

Data can be downloaded from an EnviroSCAN Solo probe in two ways:

- By going into the field and directly connecting a laptop into the probe (front panel of the housing).
- By going into the field and copying the data into a SoloPORTER device, then bringing this back to your computer and reading the data from it.

Refer to the **Data Exchange** documentation and **SoloPORTER User Guide** for details.

EnviroSCAN Plus

EnviroSCAN Plus probes upload their data to a server on the Internet. Refer to the **Data Exchange** documentation for details on downloading the data from the server into an IrriMAX database.

Manual Data Entry

Readings can be manually entered into an IrriMAX database using a spreadsheet-like interface. Refer to the **Database Entry** documentation for details.

Text Files

The Data Exchange *CSV* and *Mapped Readings* modules can assist to import data from various text-based formats. See the **Data Exchange** documentation for details.

IrriMAX File Formats

Various different types of file are used with the **IrriMAX** software.

IrriMAX Databases

The data for the **IrriMAX** system is stored in two types of related databases:

- The **IrriMAX Database (.sdb)** contains logger configuration information and sensor readings, logged over time. There can be only one logger per database.
- The **Irrigation & Rainfall Database (.wdb)** contains the irrigation & rainfall data for each of the sites in a paired IrriMAX database. The I&R databases must have the same filename as the soil moisture databases that they are paired with (except for the file suffix of WDB instead of SDB). These databases contain irrigation & rainfall application rates, times and periods.

File Name Extension...	Icon	...contains this kind of information
.SDB		IrriMAX Database
.LCS		Logger configuration portion of a SDB file that has been temporarily detached (do not delete these files)
.WDB		IrriMAX Irrigation & Rainfall Database
.WCS		Logger configuration portion of a WDB file that has been temporarily detached (do not delete these files)
.WDX		Index files associated with an IrriMAX irrigation & rainfall database (.WDB file) These files are automatically generated when required.

IrriMAX Documents

IrriMAX uses a number of different document file types for management and presentation of the data stored in the databases.

You can double-click on the icon for any document to launch **IrriMAX** and open that document.

File Name Extension...	Icon	...contains this kind of information
.SWS		IrriMAX Workspace - a document containing links to a collection of databases, layout and graph documents.

File Name Extension...	Icon	...contains this kind of information
.SLL		IrriMAX Logger Layout - a document containing pictorial links to IrriMAX databases.
.GT		IrriMAX Summed Graph - a graph with a single summed line in the main pane.
.GSK		IrriMAX Stacked Graph - a graph with multiple lines in the main pane
.GSS		IrriMAX Separate Y Graph - a graph with multiple lines in the main pane, with a vertical axis for each line
.GSC		IrriMAX Common Y Graph - a graph with multiple lines in the main pane, sharing a common axis
.IMXPAK		IrriMAX File Package - a compressed format containing any or all of the above document types

IrriMAX File Packages

An IrriMAX File Package is a compressed archive of all files referenced from either a workspace document or a graph document.

Packages are intended to facilitate easy exchange of IrriMAX files between users. They have the file extension ".imxpak".

The files within a package are stored without folder information. It is not possible to create a package containing two files that have the same name (for example two graphs called graph.gt that are stored in different folders.) The intent is that when the package is extracted, all files are put in the same folder to simplify management.

You can use the Zip Workspace (see page 64) or Zip Graph (see page 176) commands if you need to create an archive which preserves folder information.

Creating Packages

Packages can be created by choosing **Save Package…** from the **File** menu of either the Workspace *Manager* window (see page 48) or the *Graph* window (see page 162).

They can also be automatically created and attached to an email when using the **Mail Workspace** (see page 66) or **Mail Graph** (see page 176) commands.

A workspace package can be created from the command-line using the **/zip** switch. See page 25.

They can also be created when webifying a workspace or graph. See page 193.

Opening Packages

Packages can be uncompressed and opened in IrriMAX by opening the .imxpak file from Windows, or by dragging and dropping it onto the IrriMAX workspace window. You can also open them directly from email attachments or after downloading from a web page.

From within IrriMAX, they can be opened from the **Open** submenu of the workspace window's **File** menu, and the **Open** button on the toolbar. See page 48.

When a package is opened, the following dialog appears.

Create or overwrite a folder named

Enter the name of a folder that will contain the files that are extracted from the package. The default name supplied is the name of the package file.

Within the folder

Enter the full path of a folder inside which the package folder will be created. You can use the **Browse…** button to select this parent folder. IrriMAX remembers your choice for next time.

Delete the original package file after extraction

If you check this box, the original .imxpak file will be deleted after the files are successfully extracted from it.

You may want to select this option if the package was being used simply as a file transfer mechanism. Conversely, you may wish to retain the original package for backup purposes.

Ø To open a package

1. Open the package and specify a location for the uncompressed files, as described above.
2. Click the **OK** button.
3. The package files will be extracted to the desired location. If there are already files in the folder with the same names, you will be notified and given the option to either replace them, or cancel the operation.
4. If the files are successfully extracted and you ticked the **Delete the original package file after extraction** checkbox, the original package is deleted from your computer.
4. If your currently loaded workspace has unsaved changes, you will be prompted to save or discard them. You also have the option to cancel the operation at this point.

5. If the package contained a workspace document, it will be opened. Otherwise IrriMAX will attempt to open all files in the package in a new workspace document.

Managing IrriMAX files

Your databases and documents should be managed in a way that makes them easy to locate every time you need them. It is important to devise a file storage system, which matches the crops, logger configurations, and workflow practices that you prefer. The following guidelines have been provided to help you structure your file storage.

Storing similar databases in the same place

The first time IrriMAX has to perform a database save it proposes the "Save As" with default "My Documents" folder. Saving a database when a workspace is loaded proposes the same folder as the workspace document. From then on IrriMAX proposes the last save folder.

Versions of Windows have different locations for "My Documents":

Platform	Typical Default Location
Windows XP	C:\Documents and Settings\< user name>\My Documents
Windows Vista & Windows 7	C:\Users\<current user name>\Documents

IrriMAX files do not have to be in these default locations. It is suggested that separate sub-folder be created for the storage of IrriMAX files.

Multiple **IrriMAX** database files can be stored in the same folder. In this way, you can have more than one database per logger. These databases may be used at different times of the year, seasonally adjusted or under varied cropping conditions. It is recommended that where more than one database exists for one site, those files are stored in a similar place. You may have two loggers taking information from four areas. A folder (directory) structure that nominates the site of the logger for the four main loggers could be used. Within that folder structure, additional folders are added to store individual crop information. For example:

- Logger1 South Gate
  - Beetroot 2002
  - Beetroot 2003
  - Lettuce 2003
- Logger2 West Orchard
  - Nectarines 2003
  - Peaches white 2003
  - Peaches yellow 2003

Separating ES2 databases from current files

EnviroSCAN 2 database folders and files should be stored in separate folders to IrriMAX databases. It is recommended that after installing **IrriMAX**, **EnviroSCAN 2** databases should be backed up to disk and then converted to IrriMAX using the **ES2 Database Converter**

Using file names that correspond to sites

Using long file names that correspond to the actual site description is advisable. Files may be named for location, crop and seasons as required. It is important to use names that you will recognize and that are easy to remember.

Managing logger sites

It is important to use clear naming conventions for loggers and to replicate these naming conventions within computer file structures. In this way, information is easy to find and manage.

The Site names that you use will also be used as site names for the Irrigation & Rainfall database (.wdb) which is associated with each logger database (IrriMAX database .sdb).

The following guidelines should be used when setting up logger sites:

- Select a different Site for each Irrigation area
  (e.g. each Pivot, paddock, section or crop area),
  so the irrigation statistics can be recorded individually.
- Assign distinctive logger IDs
  Use location or crop names to distinguish one logger from another. If crop rotation is likely, do not use crop names alone but use combined crop and season names.
  For example, *Malbec Spring 1999*
- Label loggers/logger housing clearly with their IDs
  A space is provided on the inside lid of the logger housing for an information sticker.
- Backup the database after each successful download.

Understanding soil moisture and salinity management

IrriMAX processes continuous soil moisture and salinity data from a network of Sentek probes representing different sites on the farm and different depth levels within a particular soil profile. Data from all sites and sensors can be sampled from once a minute to once a day (typically at 10 or 30 minute intervals).

Using continuous soil water data, **IrriMAX** can display a range of dynamic changes in soil moisture and salinity that occur in the soil profile.

Trends of water extraction rates in the soil profile mirror the speed and depth level at which crop water use is occurring. You are able to observe how quickly the plant is 'drinking' and can see the extent of the living root zone. With the help of the software, you can visualize the actual depth of an irrigation or rainfall event. These are essential decision making criteria for good irrigation scheduling.

The following soil moisture parameters can be quantified numerically and displayed graphically using the **IrriMAX** software:

- Daily crop water use
- Daily evaporative and drainage losses from the soil profile
- Soil water extraction patterns within different layers of a soil profile
- Depth and distribution of the root zone
- Growth progress and growth decline rate of the root zone
- Depth and distribution of a wetting front after an irrigation
- Rate of redistribution of a wetting front after an irrigation or rainfall event
- Behavior of soil water dynamics in the soil profile indicating changes in soil texture and/or structure
- Fertilizer impact and salinity trends
- Saturation point, rate of drainage and onset of field capacity in any given layer of the soil profile
- Rate of soil water depletion in a stressed or unstressed phase of the crop
- Onset of crop water stress
- Crop water use under waterlogged conditions
- Crop water use changes as affected by:
  different crops, varieties, ages, phenological phases, canopy sizes, fruit loads, irrigation system performances, soil types, topographical exposure, disease incidents, cultural management practices, soil salinity changes, soil structural problems, weather conditions and many other factors
- Year to year irrigation management histories and a record of implemented irrigation strategies
- Effective wetting depth of irrigation & rainfall
- Occurrence and impact of water tables on the soil profile and the crop root zone
- Changes of the shape of the 'wetting onion' in drip irrigation

- Site specific soil water budgets for optimal crop productivity and irrigation efficiency (With these budgets you can predict the next irrigation date and the necessary amount of irrigation to refill the profile)
- On-farm overview of soil water budgets from all sites to prioritize irrigation management decisions in terms of urgency.

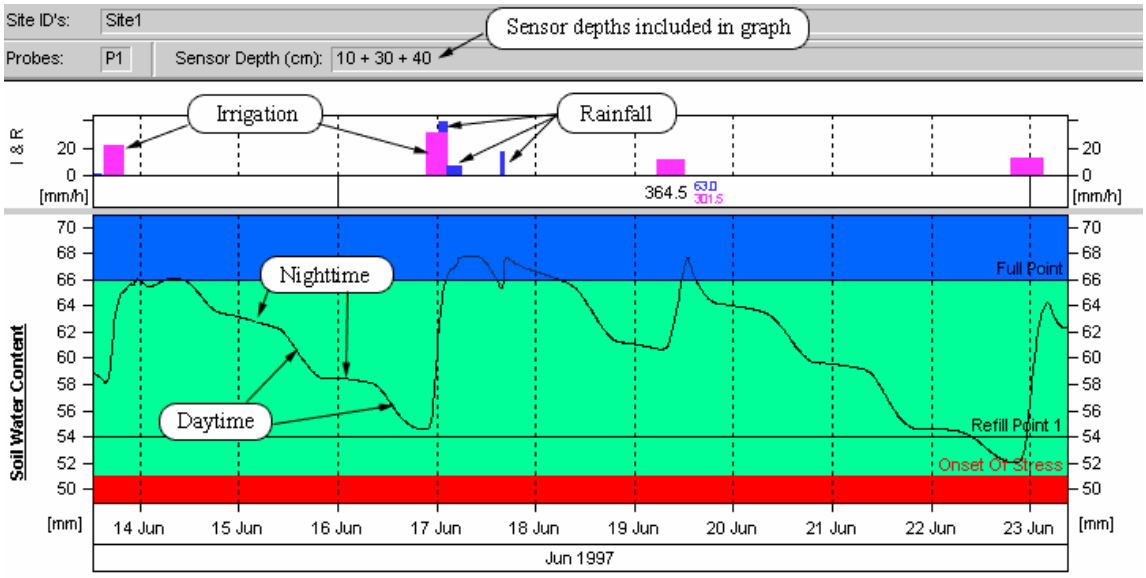
Expert advice is recommended to understand the full extent of all the parameters mentioned above, and how to recognize and work with these key decision making criteria effectively to generate rational irrigation management decisions.

By recording irrigation & rainfall water application rates and times, a clearer overview of crop water management can be seen. By viewing the I&R graph above the soil moisture graph, the reason for any increase in moisture can easily be identified and quantified.

The following is a brief introduction on the use of **IrriMAX** data using the following examples:

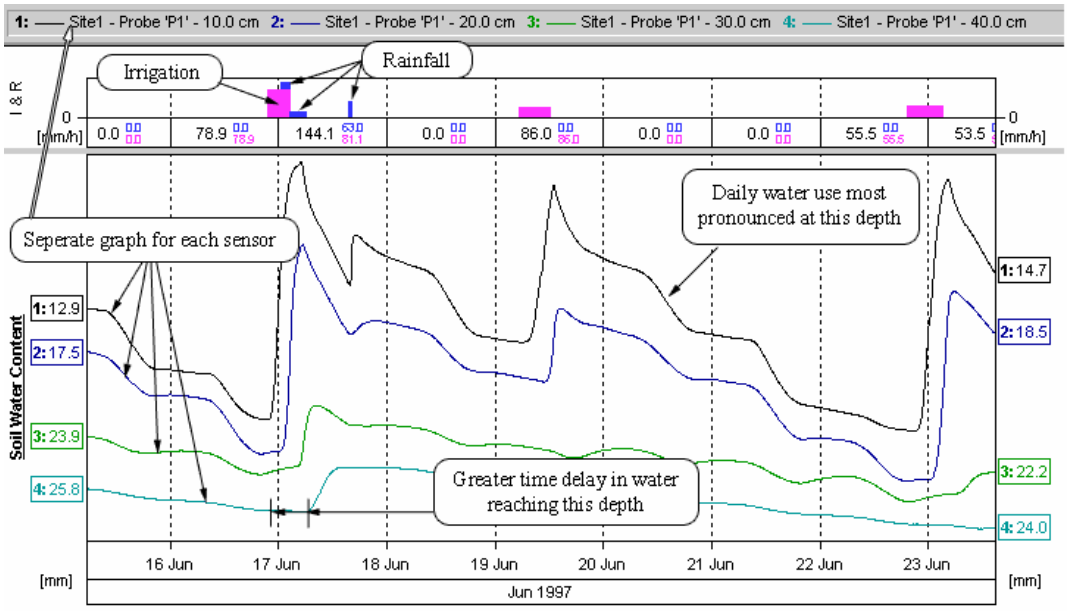
Example 1 - The Summed Graph

The summed graph provides you with a picture of soil water changes occurring in the profile.



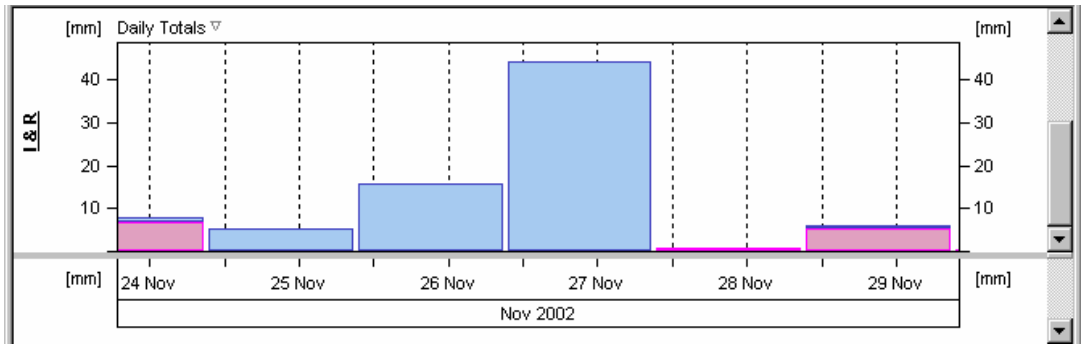
This summed graph shows the moisture values for a probe with sensors located at 10cm, 30cm and 40cm expressed as soil water content in mm. The irrigation event shows the water content rising quickly. The graph shows a steeper slope during the daytime indicating a higher water use by the crop than at nighttime. When soil moisture depletion reached the Refill Point on the 17th June, irrigation was again applied, which replenished the soil water content to the set Full point. Rain later on the 17th raised the moisture content above the Full point.

Example 2 - Stacked Graph



This stacked graph shows the readings for a probe with sensors at levels of 10cm, 20cm, 30cm, and 40cm. The graph shows crop water use is most pronounced at the 10cm soil depth, reflecting the highest concentration of roots active in water uptake located in this soil layer. Irrigation infiltration can also be seen by the rise in soil moisture occurring at the 40cm soil depth (Note the time delay for the irrigation to reach this depth).

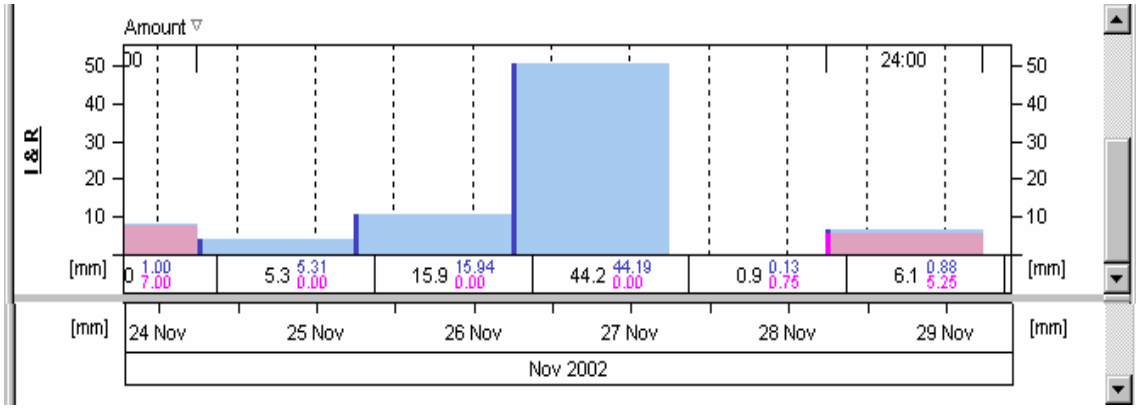
Example 3 - Daily totals Irrigation and Rainfall pane



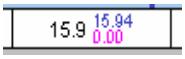
This graph shows the amount of water applied to the site in each 24 hour period in the form of rain and irrigation. There is a small gap between days to highlight the start time of each day. The start time of this 24 hour period is defined in the *Graph* , but as a default is from 9am to 9am the next day. The rainfall and irrigation data is displayed as a column graph with the column width of a 24 hour period on the x-axis. The y-axis shows the total application for the day. When the daily format is selected, the y-axis reflects the amount of water applied in total for the 24 hour period.

The value of the daily total graph is that it shows the total amount of water that is applied over the course of a day. This can then be compared directly to any increases in soil moisture. Losses due to canopy interception, runoff and evaporation can be readily seen, and the depth of infiltration related to the amount of water applied. This graph is particularly useful in applications such as drip or sprinkler irrigation where the irrigation is applied at a uniform rate and the key value of interest is the amount of water applied in millimeters or inches.

Example 4 - Event Amounts Irrigation & Rainfall pane



This "Amount" mode shows each irrigation event or rainfall application against time. It is designed for advanced interpretation of the impact of varying application rates on infiltration, depth of irrigation and even lateral spread of water where more than one probe is used. An alternative, the "Rate" mode, is particularly useful for pivot or linear movement irrigation systems where the rate of application is readily adjusted, and also for analyzing the impact of rainfall events.

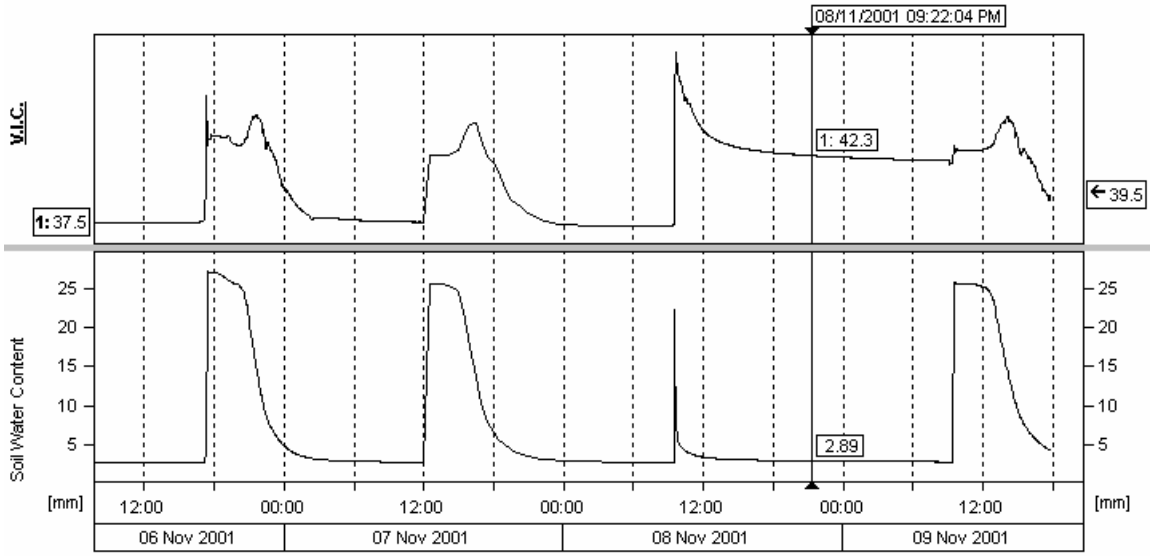
The segment box numbers 

below the irrigation and rainfall bars show the total amount of water that has been applied over a given period between the vertical dotted lines. The duration of this period is dependent upon the time scale of the x-axis. In the example above, the graph zoom is such that each vertical dotted line represents a 12 hour period and the numbers represent the total amount of irrigation and rainfall for each 24 hour period 9am to 9am the next day.

The y-axis shows the total water application for each event. The x-axis is the time scale. The width or thickness of the column reflects the duration of the water application. Therefore the amount of water applied in millimeters or inches is shown by the height of the column. This amount is also listed as a number underneath the bar when you zoom into a daily time-view.

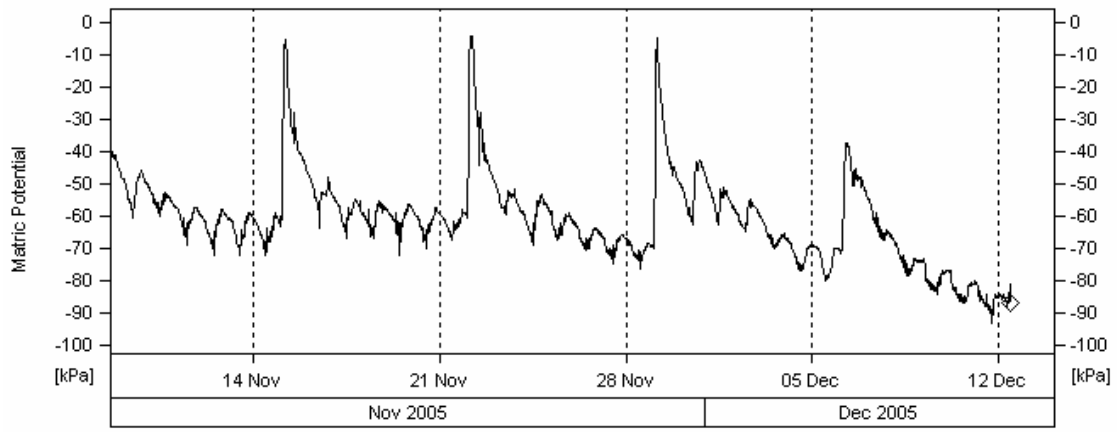
The influence of application rate on infiltration can be compared to an increase in soil moisture content. Higher application rates in some soil types can lead to surface run-off and poor infiltration. Light rain falling as drizzle will have different infiltration rates to heavy, storm events, but there will also be varying effects of canopy interception under some crop types. Plotting rainfall as a rate graph will help analyze the impact of rainfall on soil water content, which can help determine whether irrigation is necessary after rain.

Example 5 - Fertilizer/Salinity Pane



This graph shows the fertilizer/Salinity pane above the moisture pane. The graph shows that the short irrigation event on 8 November caused an increase in the salinity, while the earlier irrigation events were long enough to flush the salts from the root zone.

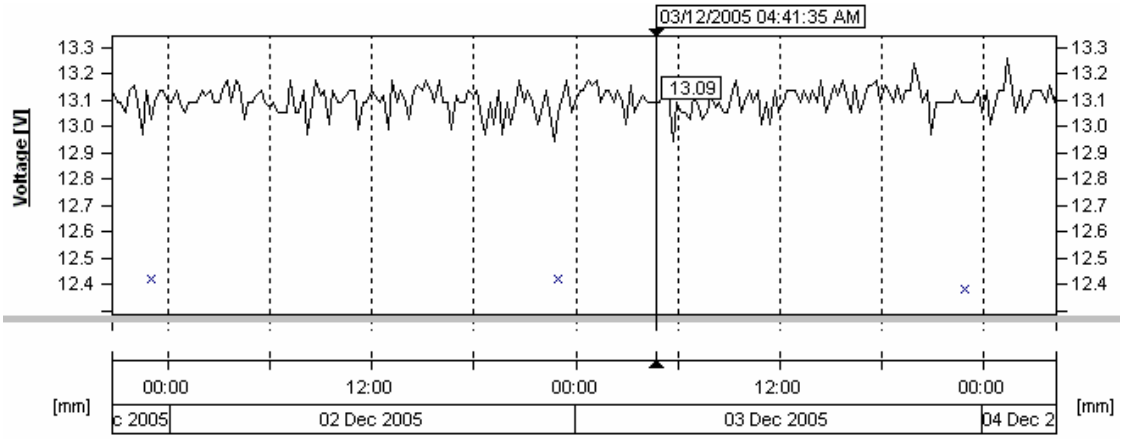
Example 6 - Matric Potential Graph



This graph shows matric potential in the primary pane. It is showing regular daily irrigation events and weekly larger saturating applications. There is also a general drying trend over the month (summer).

You cannot graph moisture and matric potential in the same pane because the axis units are different.

Example 7 - Custom Sensors



This voltage pane, from an EnviroSCAN Plus system, shows the battery voltage at each sample interval (sensor V1) and the voltage at each upload to the Internet (sensor V2, daily at 11:00 pm).

Another use for this pane is to display a stacked graph of the same sensors that are present in a summed graph in the primary graph pane.

Software Reference Guide

This guide describes the use of each component of the software.

The *Workspace Manager Window* is the main window of the application and is used to organize and access the various IrriMAX files and documents.

- See page 29 for an introduction to the workspace concept.
- See page 41 for how to use the Workspace Window.

The *IrriMAX Settings Dialog* is used to configure the way IrriMAX operates, and to specify how it should display things like dates and measurement units. See page 74.

The *Logger Configuration Dialog* is used to create IrriMAX databases and to configure RT6 loggers. It provides access to *the Calibration Registry Dialog* for managing the sensor calibrations associated with different soil types, and *the Sensor Properties Dialog* which is used to maintain a registry of user-defined sensors.

- See page 91 for how to use the Logger Configuration Dialog.
- See page 101for how to use the Sensor Properties Dialog.
- See page 103 for how to use the Calibration Registry Dialog.

Various tools are available for updating and manipulating databases. These include manual data entry, downloading and data trimming or extracting. Most tools are available from either the workspace manager window or the graph windows. See page 106.

The *Sensor Selection Dialog* is used to select sensors from a database and create a new graph. See page 115.

The *Layout Window* is used to organize your databases in a graphical form. It can be used to create graphs. See page 118.

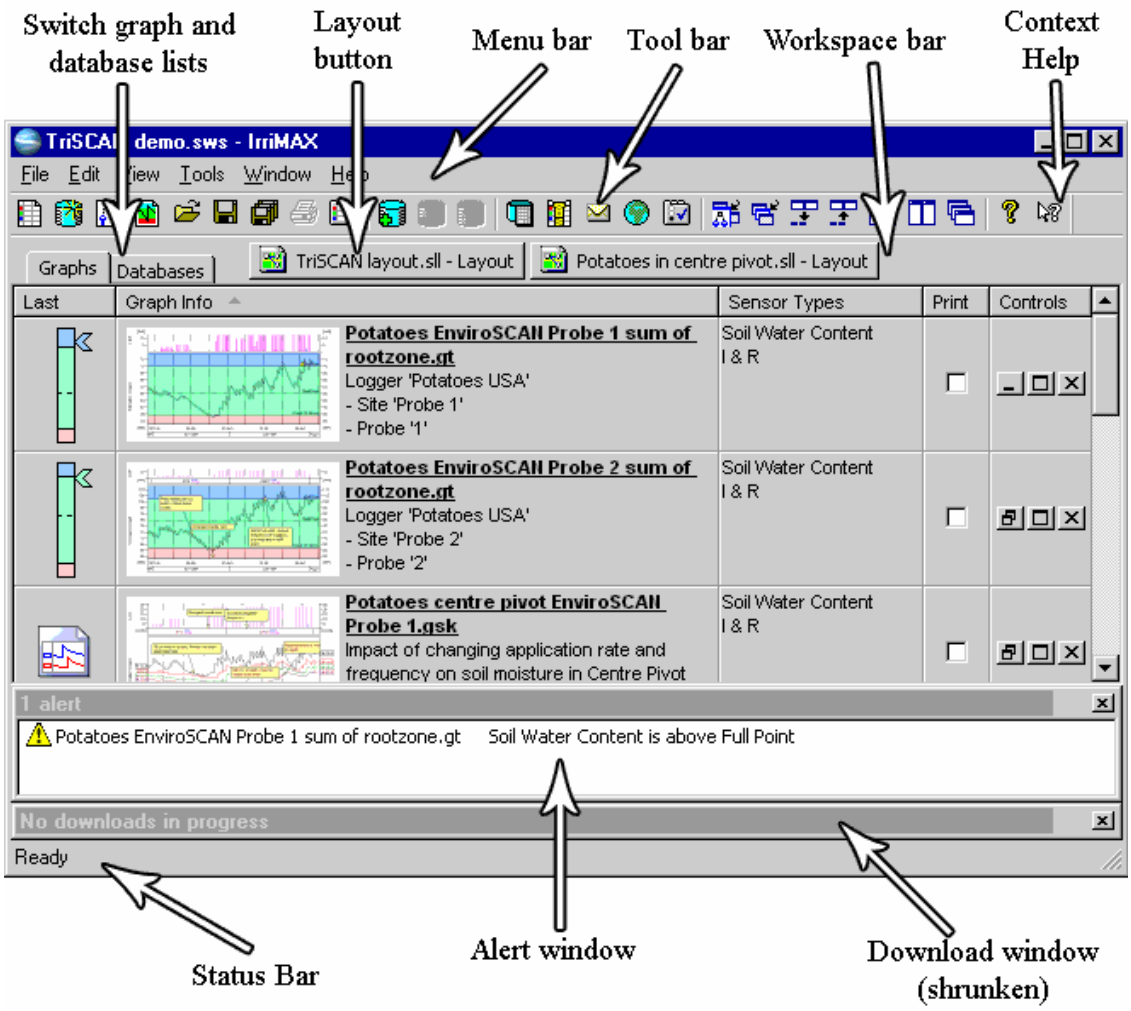
The *Graph Window* displays your data in a graphical form and provides tools to assist in interpretation and decision making. See page 135.

The *Text Data Viewer* is launched from the Graph Window and allows you to see the actual values from the database that the graph is displaying. See page 184.

Finally, the data import and export functions of IrriMAX make use of the integrated *Data Exchange* utility. See the Data Exchange documentation for more information.

Workspace Manager Window

The *Workspace Manager* or *Workspace Window* is the main window of the IrriMAX program. It provides access to all of the graphs, layouts and databases associated with the currently open workspace document.



The *Workspace Manager* window consists of a menu bar, toolbar, the workspace bar, the main display area and a status bar. There are also two windows that may appear at the bottom of the Workspace Manager window - the Alerts window and the Download window.

Menu bar

The menu bar contains all commands under five menus - **File**, **Edit, View**, **Tools**, **Window** and **Help**. Each of these menus contains sub menus and commands. The steps described in this manual refer to the menu paths even if there is another way of invoking the command. Where available, the menu commands display the shortcut keys that perform the equivalent command.

Toolbar

The toolbar is used to quickly access major editing and viewing commands that are applicable to the workspace window. The toolbar displays by default but can be hidden or displayed as required.

Workspace bar

The workspace bar contains buttons for accessing the layout and text data viewer windows in the workspace. It also contains tabs for switching whether the main display area of the workspace shows a graph list or a database list. The toolbar displays by default but can be hidden or displayed as required.

Main Display Area

The main area of the window displays either a list of graphs or a list of databases. The lists can be switched by the tabs on the Workspace Bar or from the **View** menu.

Alert window

The Alert window displays whenever a user-defined alert trigger is activated. It will not appear if there are no current alerts. Alerts are displayed in order of priority. Red alerts are the highest priority, then yellow and then green.

To suppress the display of alerts, the window can be closed using its Close button, or **Show Alerts** can be deselected from the **View** menu. This is a per-workspace setting.

The window can be resized by dragging the top of its caption bar. It can also be shrunk by double-clicking its caption bar, and restored to its previous size by double-clicking again.

Download window

The Download window displays whenever a background download is in progress. To close the window (and abort the download) use the window's Close button, or **Download Window** can be deselected from the **View** menu.

The window can be resized by dragging the top of its caption bar. It can also be shrunk by double-clicking its caption bar, and restored to its previous size by double-clicking again.

Status bar

The status bar at the bottom of a window displays information about the window. As you use the mouse to point to icons on a menu or toolbar, the name of the command being selected appears in the status bar.

The Workspace Manager window commands

All *Workspace Manager* commands are available from one of the following:

- menus on the menu bar
- buttons on the toolbar
- shortcut keys on the keyboard
- options from the title bar shortcut menu (right-click on title bar to see the menu)

Note: Not all commands are available using all methods.

Managing windows with Workspace Manager

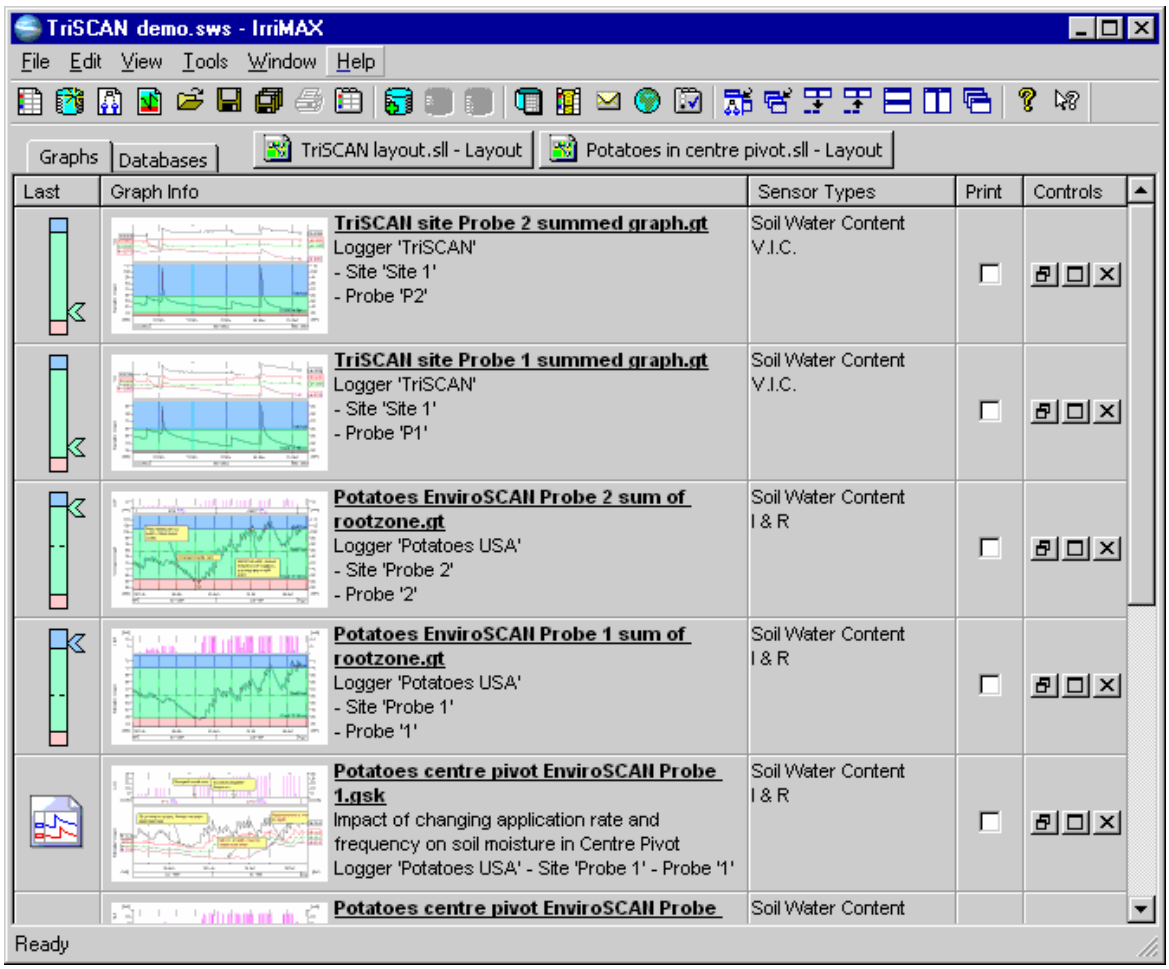
Workspace Manager allows its windows to be independently maximized, minimized and restored. When they are minimized they disappear. Special operations that can be performed in IrriMAX Windows include:

- Cascade and Tile vertically or horizontally
- Control windows of the same type as a group (graphs, layouts)
- Bring layouts to the front
- Send behind the other windows
- Rearrange icons on the desktop (while minimized)
- Control graphs from the Workspace window
- When the Workspace is minimized, all windows become hidden

For further detail see page 70.

Workspace Manager Graph List

The Graph List is shown by default when the workspace is first loaded. It contains a row for every graph window that is open in the workspace.



The Graph List contains five columns. These are:

- **Last -** displays the last summed value from the summed graphs. The value is displayed using a soil moisture gauge so that you can view the current moisture summed value compared to the Full and Refill points set in the graph.
  For non-summed graphs, the type of the graph (stacked, separate-Y, common-Y) is shown in icon form.
  Note that the information in this column refers to the primary graph pane only.
- **Graph Info** -displays the title of each graph file saved within the workspace. The graph file name is shown bold and underlined and the following lines list the sites and probes selected in to the graph and the information entered in to the graphs comments field.
  Clicking anywhere on the **Graph Info** cell for the graph opens and displays that graph.
- **Sensor Types** - lists the different types of sensor shown in all panes of the graph.
- **Print** - Graphs with the check box selected will be printed when the **File** menu **Batch Print** command is selected or a graph file is opened with the Print option. This column is also used for selecting graphs to mail or webify.
- **Controls** -displays the **Minimize**, **Maximize** and **Close** buttons for the graph windows. These controls allow you to manipulate each graph window directly from the workspace manager.

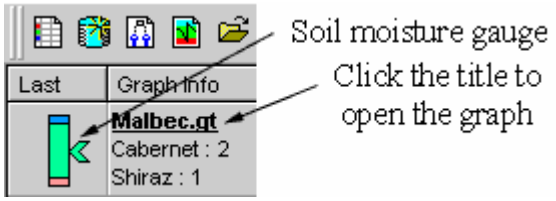
Ø To show the graph list

- Either select **Graphs** from the workspace manager **View** menu.
- Or click on the **Graphs** tab in the workspace bar.

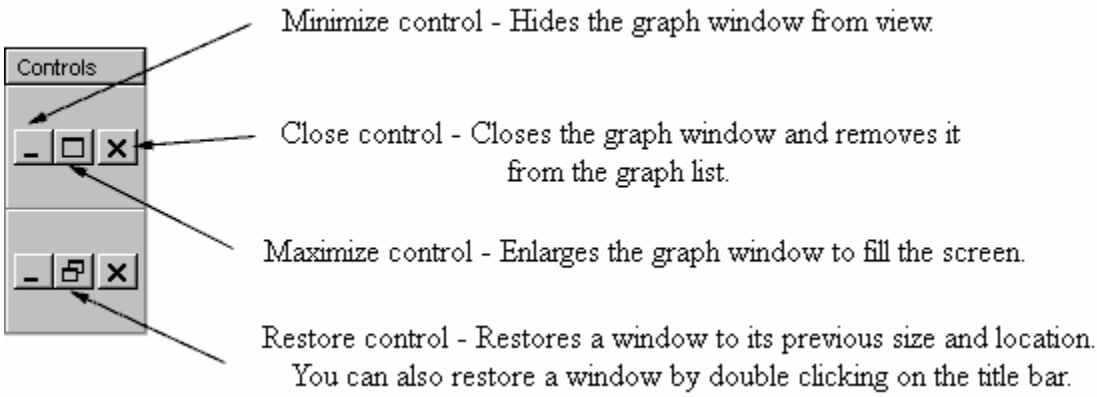
Managing graphs from the Graph List

In the Graph List you can see the type of graph that has been created and the graph's file name and other information.

You can click on the graph title to display the graph.



You can also use the controls to manage each open graph window. See page 70 for details on other ways to manage windows.

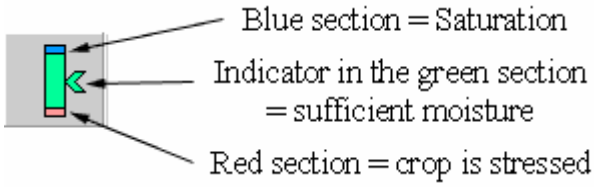


The soil moisture gauge

The soil moisture gauge is displayed for summed graphs. The gauge displays the last value from the summed graph in relation to the Full and Refill points set in the graph.

Important Note: The last reading is the last one from the database and is not necessarily the last one in the logger.

The usefulness of the fuel gauge will depend on the accurate positioning of the agronomic lines on the summed graph. A trained agronomist should set these positions.

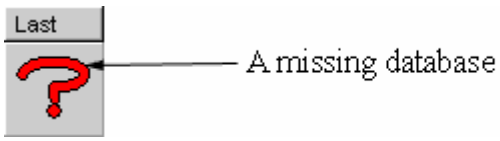


If the soil moisture gauge pointer is:

- in the blue, the last summed value is currently above the value assigned to indicate the Full Point.
- in the green, the last summed value is less than the value set for the Full Point and greater than the value set for the Onset of Stress. Therefore, the soil water content for the soil profile being graphed is within the agronomic lines set.
- in the red, the last summed value has fallen below the value assigned to Onset of Stress.

Missing databases

If you open a workspace containing a graph, and the original database file has been removed or renamed, or contains no valid data, a large red question mark displays in place of the soil moisture gauge. You can search for the missing database to update the graph and workspace. See page 147 for details of finding missing databases from the *Graph* window.



Sorting and arranging graph rows

Ø To sort the graph rows

Click on a column title to sort the graph rows by the information in that column. Click on the same column title a second time to reverse the direction of the sort. The sort order is permanently maintained, so graph rows will automatically change position when information is changed.

- Click on **Last** to sort the graphs in order of irrigation urgency (based on proximity of the last value to the refill point.). Non-summed graphs follow, sorted by type.
- Click on **Graph Info** to sort the graphs in alphabetical order of name.
- Click on **Sensor Types** to sort the graphs in alphabetical order of sensor type.
- Click on **Print** to sort the graphs based on whether they are selected for printing or not.
- Click on **Controls** to sort the graphs based on whether they are minimized or not.

To stop automatically sorting, reposition a graph row manually using the steps below.

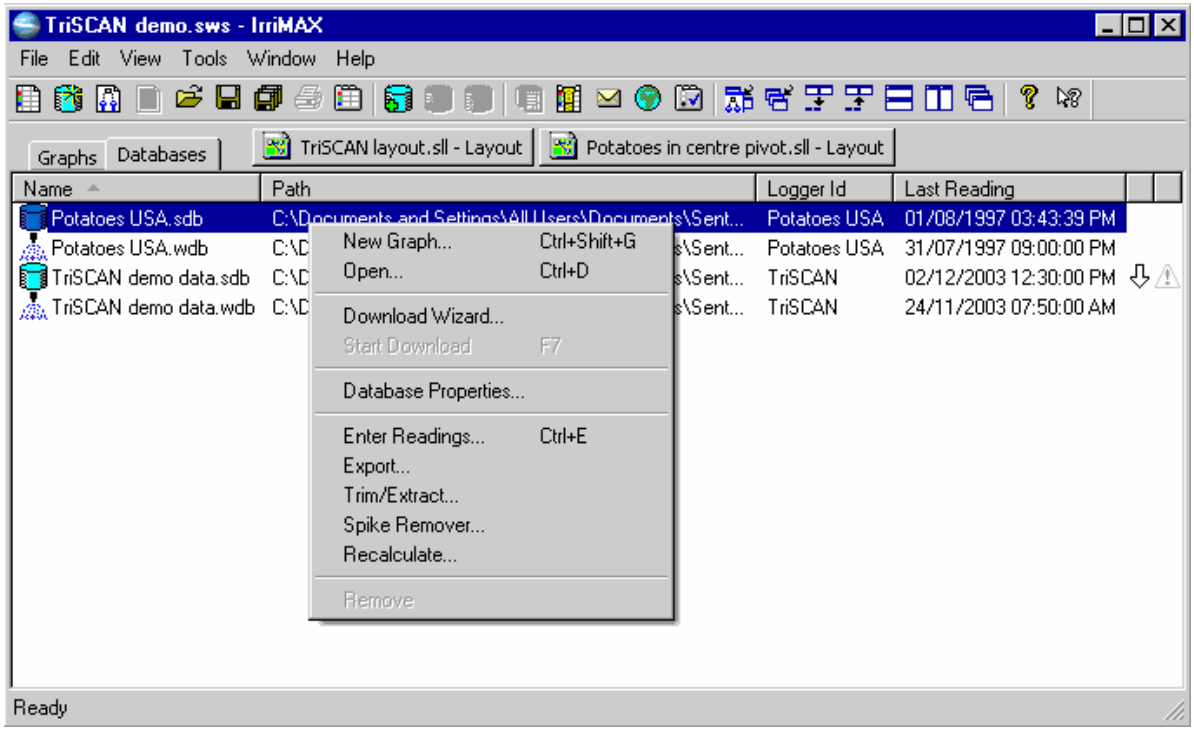
Ø To manually move a graph row to a new position

- Click a row using the left mouse button and start moving the mouse without releasing the button.
- The mouse cursor changes to indicate the row is being dragged.
- Release the left mouse button over the row which occupies the desired position of the row you are moving.

Workspace Manager Database List

The Database List is hidden by default when the workspace is first loaded. It contains a row for every database linked from the layouts and graphs in the workspace, and every database that has been manually added to the workspace.

Various functions on the **File, Edit** and **Tools** menus require selection of a database as a first step. If the Database List is visible and a database is highlighted, these functions will use the highlighted database rather than prompting you to browse for one.



The Database List contains six columns. These are:

- **Name -** displays the file name of the database and an icon indicating whether the database is a standard IrriMAX database (SDB file) or an Irrigation and Rainfall Database (WDB file). The icons are greyed if the database is not currently in use in a graph or layout open in the workspace.
- **Path** -displays the file-system folder in which the database is stored.
- **Logger Id** - displays the Id of the logger whose readings are stored in the database.
- **Last Reading** - Displays the time stamp of the last reading in the database.

- The fifth column displays icons indicating whether the database has a download command, and whether the download is to be run as part of the batch (automatic or unattended) download. Double-clicking within this column will invoke the *Download Wizard* (see page 88.)

	Signifies that the database has a download command defined.
	The database has a download command, and is flagged to be included in the batch or unattended download.
	The database was created as a result of downloading to another database. It has no download command of its own, but downloading to the other database will also download to this one. This is a result of a single download source supporting multiple destinations.

- The sixth column displays icons indicating if there are alerts defined for the database, and if these alerts are disabled or raised. Double-clicking within this column will invoke the *Database Properties* dialog (see page 62.)

	Signifies that the database has alert triggers defined, but none are raised.
	The database has alert triggers defined, but they are currently disabled.
	The database has a red alert currently raised.
	The database has a yellow alert currently raised.
	The database has a green alert currently raised.

Ø To show the database list

- Either select **Databases** from the workspace manager **View** menu.
- Or click on the **Databases** tab in the workspace bar.

Ø To show the popup menu

Database-related commands on the workspace toolbar and menu are also accessible directly from the database list on a popup menu.

Click on a database in the list with the right mouse button. The popup menu appears.

Ø To sort the database list

Click on a column title to sort the database rows by the information in that column. Click on the same column title a second time to reverse the direction of the sort.

The rows will remain sorted by that column as databases are added, removed or modified. The sort column and direction is saved in the workspace document.

Ø To add a database to the list

Ensure the database list is visible, then choose **Add Database…** from the **Edit** menu, or click the  button in the toolbar.

This function is disabled if the database list is not shown.

Ø To remove one or more databases from the list

Ensure the database list is visible and at least one database is highlighted, then choose **Remove Database** from the **Edit** menu or click the  button in the toolbar. Alternatively choose **Remove** from the database list popup menu.

It is not possible to remove a database if it is being referenced by a graph or layout in the workspace. You can only remove non-referenced databases. These are distinguished by gray icons.

This function is disabled if the database list is not shown.

Workspace File Menu

The **File** menu displays file commands for the *Layout, Graph* and *Workspace* windows.

New databases and logger configurations may also be created from the *Workspace Manager* **File** menu. The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
New Ø	ALT, F, N		Expand the New submenu.
Workspace	CTRL+SHIFT+W *or* ALT, F, N, W		Create a new workspace.
Database	CTRL+SHIFT+D *or* ALT, F, N, D		Create a database using the *New Database Wizard*. See page 86.
Layout	CTRL+SHIFT+L *or* ALT, F, N, L		Create a new layout. See page 118.

Menu item	Shortcut key	Button	To...
Graph	CTRL+SHIFT+G *or* ALT, F, N, G		Open the *Sensor Selection* dialog to create a graph. See page 115. (Also available as **New Graph…** on the Database List popup menu.)
Open Ø	CTRL+O *or* ALT, F, O		Expand the Open submenu, or browse for all IrriMAX file types if CTRL+O is used.
Workspace...	CTRL+W *or* ALT, F, O, W		Open a workspace.
Database...	CTRL+D *or* ALT, F, O, D		Open a database in the *Logger Configuration Dialog*. See page 91. (Also available as **Open…** on the Database List popup menu.)
Layout...	CTRL+L *or* ALT, F, O, L		Open a layout.
Graph...	CTRL+G *or* ALT, F, O, G		Open a graph.
Package...	ALT, F, O, P		Open an IrriMAX file package.
Save Workspace	CTRL+S *or* ALT, F, S		Save changes to the current workspace. Stores the position and ordering of the workspace, graph and layout windows.
Save Workspace As...	ALT, F, A		Save the workspace with a new name.
Save All	CTRL+SHIFT+S *or* ALT, F, L		Save all open workspaces, graph and layouts.
Save Package…	ALT, F, K		Save all workspace files in an IrriMAX file package. See page 33.
Recent Workspaces	ALT, F, W		Open a recently used workspace.
Recent Graphs	ALT, F, G		Open a recently used graph.
Recent Layouts	ALT, F, L		Open a recently used layout.
Batch Print...	CTRL+P *or* ALT, F, P		Print all selected graphs. See page 53.
Page Setup...	ALT, F, U		Change the current print page setup. See page 54.
Properties…	ALT+ENTER *or* ALT, F, R		Change the properties of the current workspace. See page 54.
Exit	ALT+F4		Close the IrriMAX software. (button is on the title bar)

Creating new files in Workspace Manager

The *Workspace Manager* window can be used to create new workspaces, layouts, graphs and databases.

Ø To create a new workspace

From the **File** menu, select **New** and click **Workspace**,or click the corresponding toolbar button. A new unsaved workspace displays.
Note: If a workspace is already open with unsaved changes to the workspace, graphs or layouts, a message box displays, prompting you to save each changed file.

Ø To create a new database

From the **File** menu, select **New** and click **Database**, or click the corresponding toolbar button
The *New Database Wizard* appears. See page 86.

Ø To create a new layout

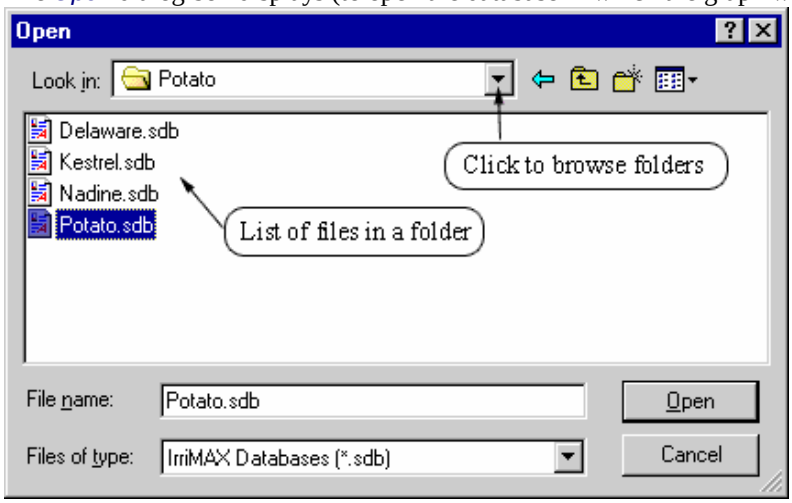
From the **File** menu, select **New** and click **Layout**, or click the corresponding toolbar button
An unsaved blank layout displays in the layout window. See page 120 for details on using the layout window.

Ø To create a new graph

Do one of the following to create a new graph.

- Click on a database in the Database List to highlight it. Press the right mouse button and choose **New Graph…** from the popup menu.
- Click on a database in the Database List and choose **Graph..** from the **New** submenu of the **File** menu or click the corresponding toolbar button.
- If the Database List is not visible or there is no highlighted database, choose **Graph…** from the **New** submenu of the **File** menu, or click the corresponding toolbar button.

1. From the **File** menu, select **New** and click **Graph**.
   The *Open* dialog box displays (to open the database in which the graph will get the data).



2. In the *Look in:* box, click on the drop-down arrow and browse for the folder where the database file is located. A list of available files displays.

3. Click on the database to be used to create the graph.

4. Click **Open**.

After performing one of the above steps, the *Sensor Selection dialog* will appear to allow you to select the sensors to appear in your new graph, and choose the type of graph to create. See page 115.

You can also create graphs from the layout window. See page 118.

Opening files in Workspace Manager

Note: Clicking  displays all **IrriMAX** file types in the *Open* dialog box.

All **IrriMAX** file types can be opened and managed from the *Workspace Manager*. When an **IrriMAX** file is opened from *Workspace Manager*, it opens in the appropriate window. For example, if you open a stacked graph file (*.GSK), a graph summary displays in the *Workspace Manager* window and the graph file displays in the *Graph* window.

When you open an existing workspace, all associated windows open, one by one, in the background. Since a workspace maintains a list of all layouts and graphs associated with the workspace, each of these files opens, in its own window, in the original size and position as when the workspace was last saved.

You can open files by:

- browsing to the directory containing the file and selecting the file
- selecting a file from the recent files list in the **File** menu.

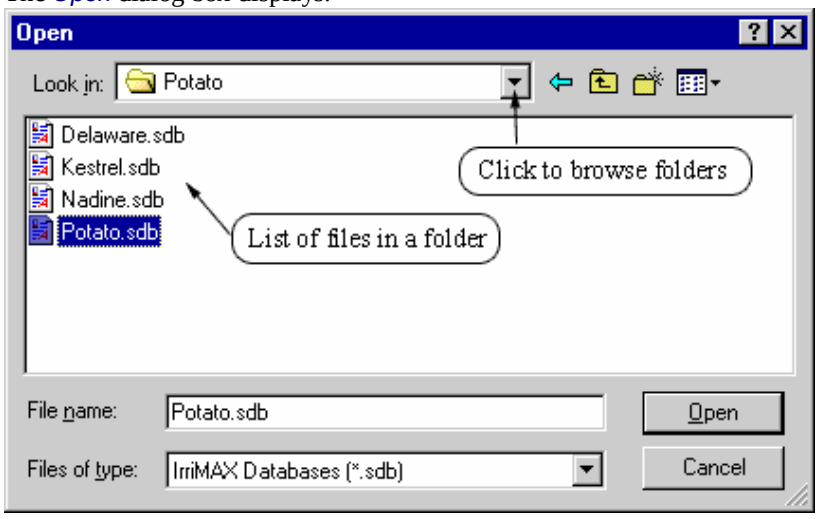
A recently used file is a file that has been opened before. *Workspace Manager* maintains a list of recently used files from which you can select a file to open. The recently used file list is continually updated each time you open a file. A maximum of four files (for each file type) is displayed in the list.

Ø To open a file

1. From the **File** menu, select **Open** and click one of the following:

   - **Workspace...** to open a workspace in the *Workspace Manager* window
   - **Database...** to open a database in the *Logger Configuration* dialog box
   - **Graph...** to open a graph in a *Graph* window
   - **Layout...** to open a layout in a *Layout* window
   - **Package...** to open a package file containing any or all of the above

   The *Open* dialog box displays.



2. In the *Look in:* box, click on the drop-down arrow and browse for the directory where the file is located.
   A list of available files displays.

3. Click on the file to be opened.

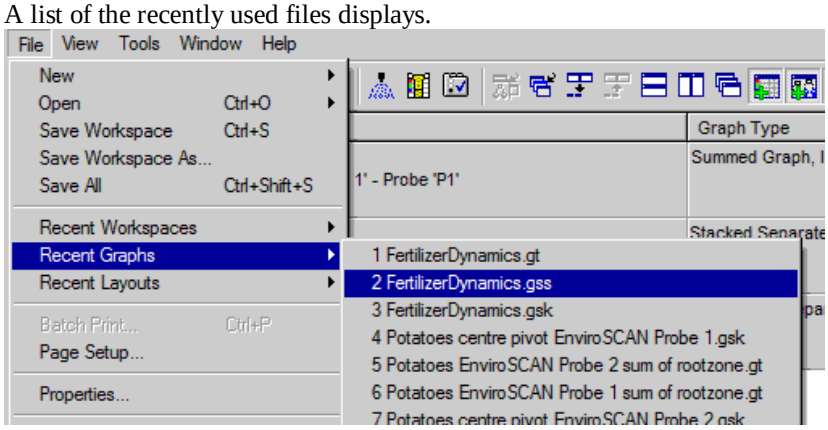
4. Click **Open**.
   The file opens and displays in the appropriate window.

Ø To open a recently used file

1. From the **File** menu, click one of the following:

   - **Recent Workspaces** to display a list of recent workspaces
   - **Recent Graphs** to display a list of recent graphs
   - **Recent Layouts** to display a list of recent layouts.

   A list of the recently used files displays.



2. Click on the required file from the list.
   The selected file opens in the appropriate window.

Saving workspaces

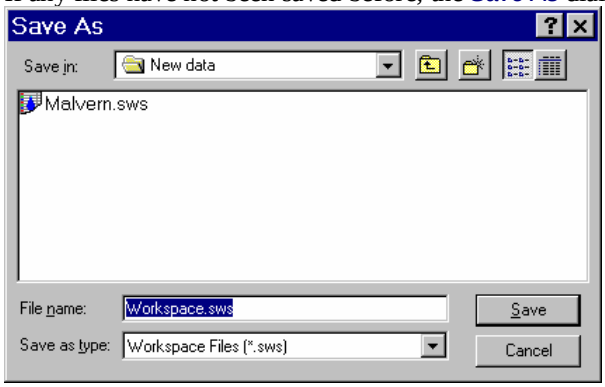
When you create a new workspace, the workspace file does not exist until you save and name the file. To quickly save changes to all open files (workspaces, layouts or graphs) you can use the **Save All** command.

If you want to save the workspace with a different file name, the **Save As** command is used.

Note: If you close the *Workspace Manager* window, or try to open a new or existing workspace, you are prompted to save all unsaved files used in the currently open workspace. The unsaved files could include workspaces, layouts or graphs.

Ø To save a workspace

1. From the **File** menu, click **Save Workspace**.
   If the workspace is an existing workspace, the file information is saved.
   You are prompted to save any unsaved layouts or graphs.
2. If any files have not been saved before, the *Save As* dialog box displays for each unsaved file.



3. Select a file location for each new file.
   Note that the default name for a new workspace is 'Workspace'.
4. Enter a file name for each new file.
5. Click **Save**.
   The new file is saved.

Ø To save a workspace as a new file

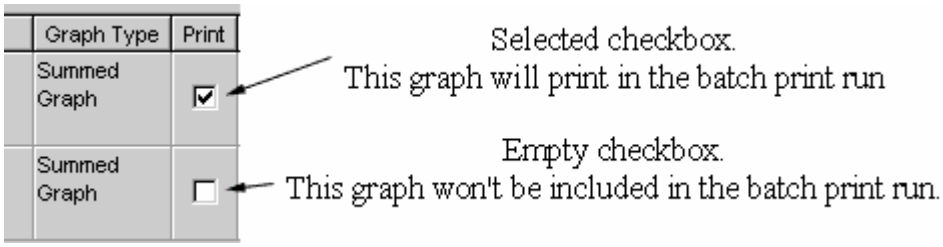
1. From the **File** menu, click **Save Workspace As...**.
   The *Save As* dialog box displays.
2. Select a file location for the new database.
3. Enter a file name for the new workspace. Note that the current file name displays in the *File name* dialog box.
   Note: If you do not enter a new file name, the original file will be replaced with this file.
4. Click **Save**.
   The new workspace is saved.

Ø To save all open windows

1. From the **File** menu, click **Save All**.
   The file information is saved for all open layouts, graphs and the workspace.
2. If any files have not been saved before, the *Save As* dialog box displays for each unsaved file.
3. Select a file location for each new file.
4. Enter a file name for each new file.
5. Click **Save**.
   The new file is saved.

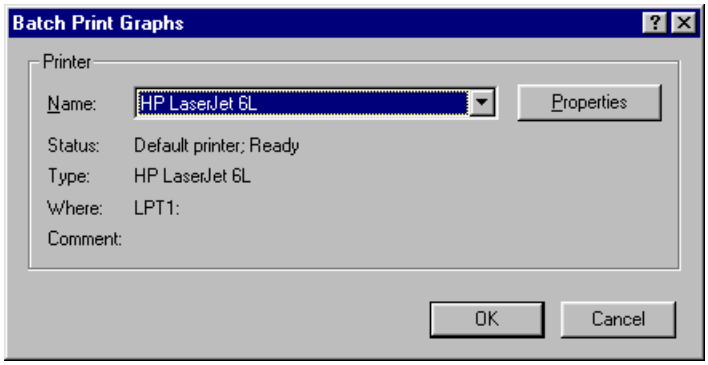
Printing from Workspace Manager

Batch printing is used to print one or more graphs at a time. Before you run the **Batch Print** command, you must have already selected the graphs to be printed. Graphs to be printed are selected in the Print column of the *Workspace Manager* window.



Ø To batch print graphs

1. From **Workspace Manager**, select the graphs to include in the batch printing.
2. From the **File** menu, click **Batch Print...**.
   The *Batch Print* dialog box displays.



3. Select a printer.

4. Click **OK**.
   The progress meter displays as graphs are sent to the printer.

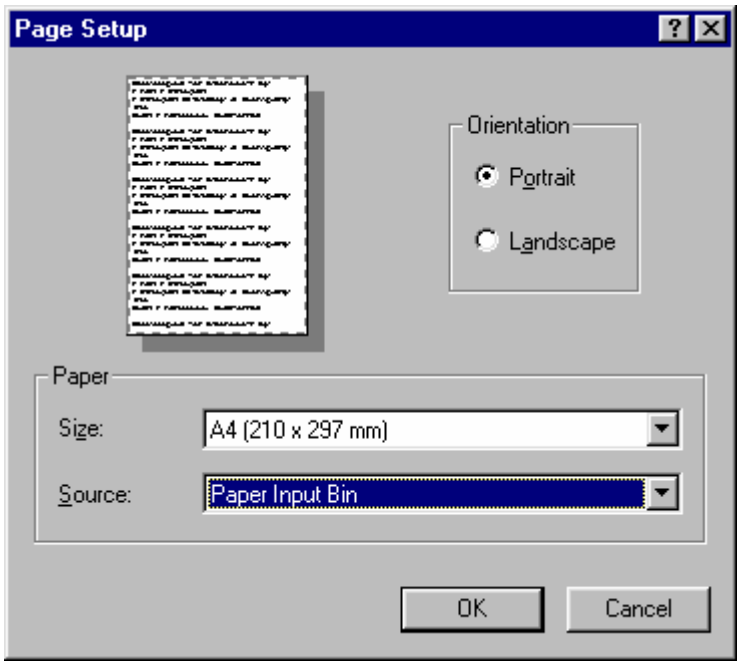
Using Page Setup

The *Workspace Manager* **Page Setup** command is used to control the default orientation (portrait or landscape) of new documents. After a document is created, you can use the **Page Setup** from the **File** menu of that document, to change the paper orientation and margins. The paper size, budget region dithering and source are common to all *Page Setup* dialogs, so changing those parameters on one document is reflected in *Page Setup* of all documents.

Note: Changes to the printer settings apply only to **IrriMAX** and do not alter the printer settings for any other application.

Ø To set the page setup options

1. From the **File** menu, click **Page Setup...**.
   The *Page Setup* dialog box displays.



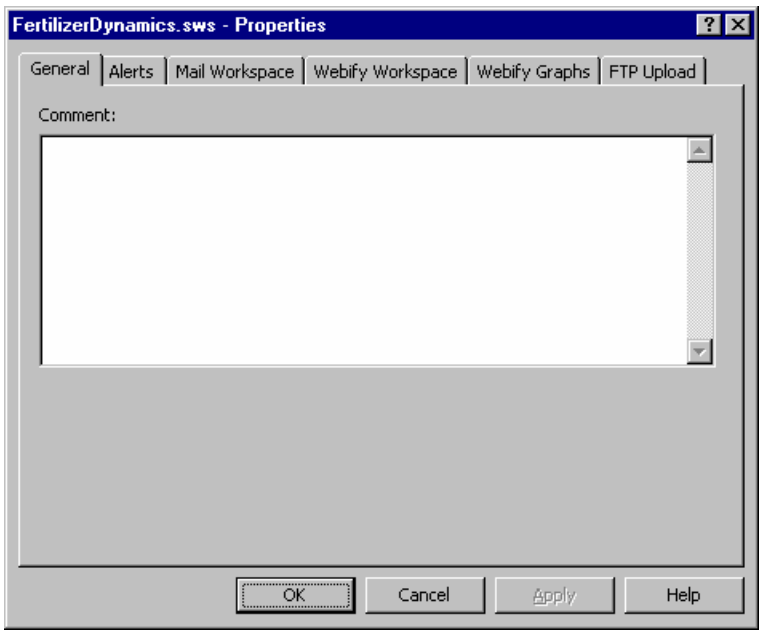
   Do one or more of the following:
2. Under **Paper**, select from the drop-down lists:
   - The required paper size
   - The paper source
3. Under **Orientation**, select either **Portrait** or **Landscape**.

Workspace Properties

The Workspace Properties dialog presents a number of tab pages containing properties that are stored within the workspace document.

General

The *General* property page is used to set various properties of the workspace (currently only the workspace comment).

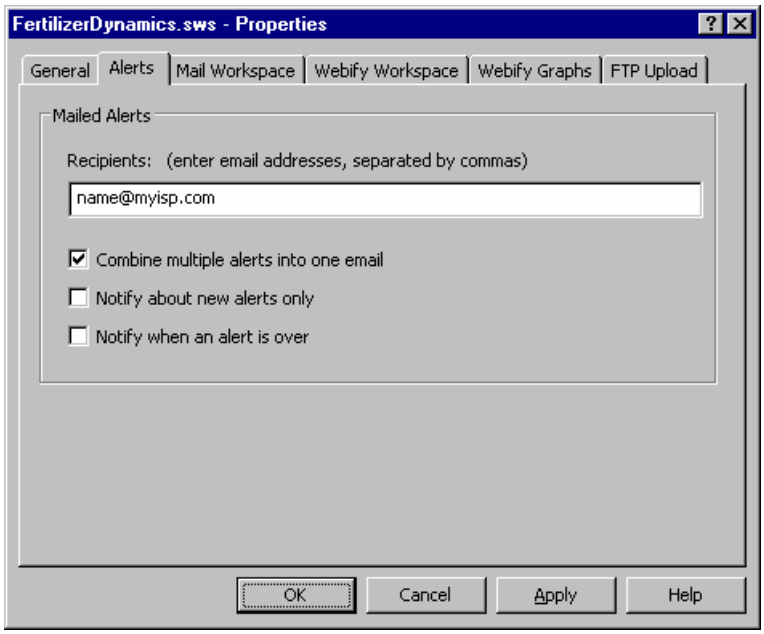


Comment

Enter anything you like in this control. Text will wrap automatically.

Alerts

The Alerts property page is used to set the properties of the workspace that control how alerts are mailed. These properties are used when manually mailing alerts using the *Mail Alerts* dialog (see page 68) and when mailing alerts using the command-line (see page 25).



Recipients

Enter the email addresses of the recipients of the alert notifications, separated by commas. Enter the email addresses here if you will repeatedly email the same people. Otherwise you can enter the recipients at the time you create the email.

Combine multiple alerts into one email

Check this box to combine all the alert notifications into one email. If this option is not selected, then a separate email will be sent for each alert notification.

You may wish to send separate emails if you are using an Email to SMS service and you want to ensure that each alert notification fits within the 160-character size limitation of SMS. On the other hand, you may wish to save costs by combining as many alerts as possible into each SMS and rely on the Email to SMS service to split them over multiple SMS messages and the recipient's mobile phone to recombine them.

Notify about new alerts only

Check this box to limit alert notifications to those alerts that have been raised since the last email was sent.

This can be useful for saving costs if you are using an Email to SMS service, or to minimize annoyance for the recipients. However, it increases the chance that alerts might be overlooked by the recipients.

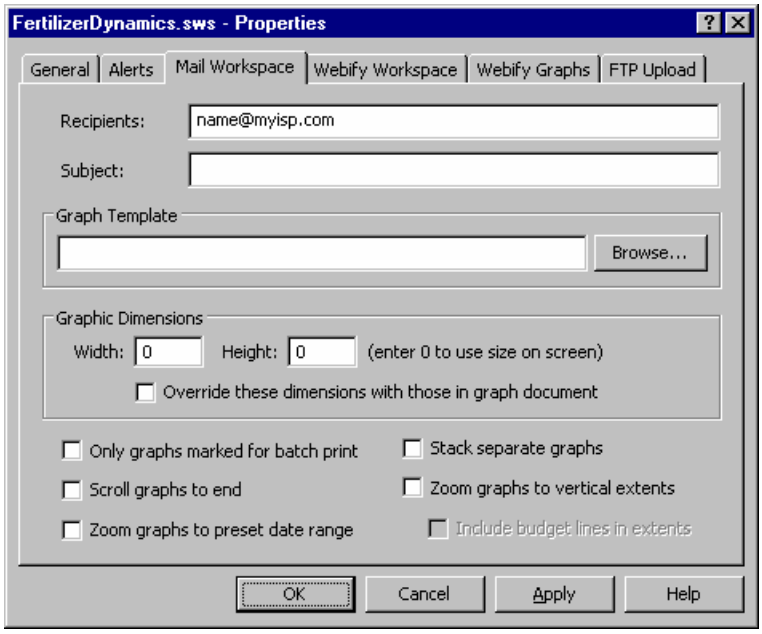
If you select this option it is recommended that you also choose to notify when an alert is over (see below). This is because the recipient no longer receives a complete list of all current alerts with each mailing.

Notify when an alert is over

Check this box to be notified if an alert, for which a notification email was sent, is now over. This notification will be sent only once.

Mail Workspace

The *Mail Workspace* property page is used to set the properties of the workspace that control how HTML graph snapshots are mailed.



Recipients

Enter the email addresses of the recipients of the emailed graph snapshots, separated by commas. Enter the email addresses here if you will repeatedly email the same people. Otherwise you can enter the recipients at the time you create the email.

Subject

Enter text for the subject line of the emails. Leave blank to use the graph names.

The subject text can contain certain macros that will be replaced with information specific to the graph you are mailing. These macros are:

- **GRAPH_NAME_TEXT** is replaced by the name of the graph.

- **GRAPH_COMMENT_TEXT** is replaced by the user-entered comment for the graph.
- **GRAPH_LOGGER_TEXT** is replaced by the Logger ID from the database shown in the main pane of the graph.
- **GRAPH_DOWNLOAD_TEXT** is replaced by the date and time of the last download into the database shown in the main pane of the graph.

Template

A template file to use when converting the graphs to emails. Leave blank to use the default template (see page 83.)

Use the **Browse…** button to search for a different template file.

Graphic Dimensions

The width and height in pixels of the graphical part of the emailed graph snapshot. Enter 0 to use the same width or height as on screen.

Override these dimensions with those in graph document

If this box is checked and a graph document specifies a non-zero dimension in its properties, then the graphic dimension will be taken from the properties of the graph document.

An example of when this can be useful is if a particular graph contains a large number of panes. It might be desirable to specify a large height value for that graph only.

Only include graphs marked for batch printing

Check this box to mail only those graphs with a tick in the Batch Print column in the workspace manager window.

Scroll graphs to end

Check this box to scroll the graphs to reveal the most recent readings, prior to taking the snapshot for emailing. Note that the graphs will continue to show the new time range after the process is complete.

Zoom graphs to preset date range

Check this box to zoom the graphs to their preset date range, prior to taking the snapshot for emailing. Note that the graphs will continue to show the new range after the process is complete.

Stack separate graphs

Check this box to arrange separate graphs in sensor order, stacked as close as possible on top of each other without overlap, and zoomed to vertical extents, prior to taking the snapshot for emailing. Note that the graphs will remain stacked after the process is complete.

Zoom graphs to vertical extents

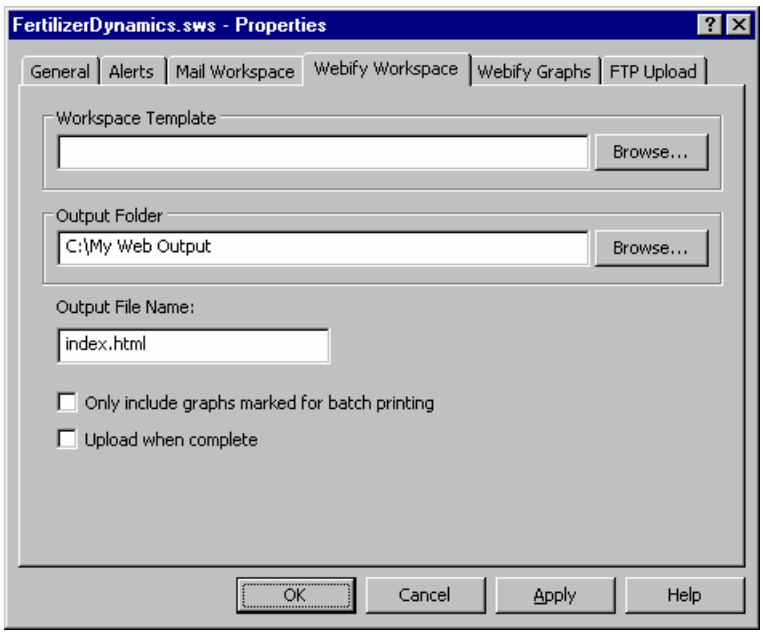
Check this box to zoom the graphs to show their full vertical range, prior to taking the snapshot for emailing. Note that the graphs will continue to show the new range after the process is complete.

Include budget lines in extents

Check this box to ensure that all visible budget lines remain visible if zooming to vertical extents.

Webify Workspace

The *Webify Workspace* property page is used to set the properties of the workspace that control how the workspace is converted to web-compatible form.



Workspace Template

A template file to use when converting the workspace to web-compatible form. Leave blank to use the default template (see page 83.)

Use the **Browse…** button to search for a different template file.

Output Folder

Use the **Browse…** button to select a folder to receive the files output by the webification process. Alternatively you can type the name of the folder in the edit box.

If the folder you specify does not exist, it will be created during the webification process.

You may enter a path relative to the location of the workspace document, rather than supply a full path.

You can leave this field blank if you also select **Upload when complete**. IrriMAX will output the webified files to a temporary folder and delete them after the upload.

Output File Name

The name for the webified workspace file. Leave blank to use the workspace name. Index.html is another common choice.

Only include graphs marked for batch printing

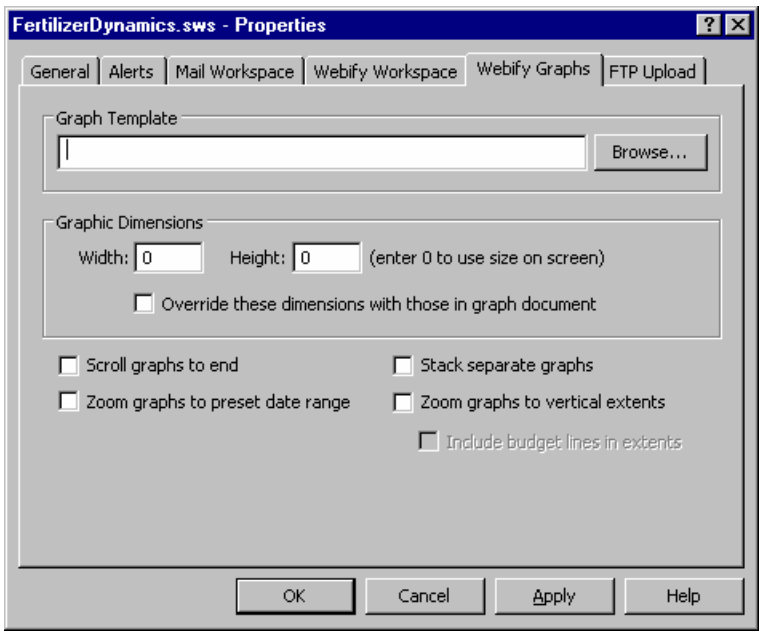
Check this box to include only those graphs with a tick in the Batch Print column in the workspace manager window.

Upload when complete

Check this box to upload the generated files to the Internet using FTP.

Webify Graphs

The *Webify Graphs* property page is used to set the properties of the workspace that control how the graphs are converted to web-compatible form.



Graph Template

A template file to use when webifying the graphs. Leave blank to use the default template (see page 83.)

Use the **Browse…** button to search for a different template file.

Graphic Dimensions

The width and height in pixels of the graphical part of the emailed graph snapshots. Enter 0 to use the same width or height as on screen.

Override these dimensions with those in graph document

If this box is checked and a graph document specifies a non-zero dimension in its properties, then the graphic dimension will be taken from the properties of the graph document.

An example of when this can be useful is if a particular graph contains a large number of panes. It might be desirable to specify a large height value for that graph only.

Scroll graphs to end

Check this box to scroll the graphs to reveal the most recent readings, prior to webifying them. Note that the graphs will continue to show the new time range after the process is complete.

Zoom graphs to preset date range

Check this box to zoom the graphs to their preset date range, prior to webifying them. Note that the graphs will continue to show the new range after the process is complete.

Stack separate graphs

Check this box to arrange separate graphs in sensor order, stacked as close as possible on top of each other without overlap, and zoomed to vertical extents, prior to webifying them. Note that the graphs will remain stacked after the process is complete.

Zoom graphs to vertical extents

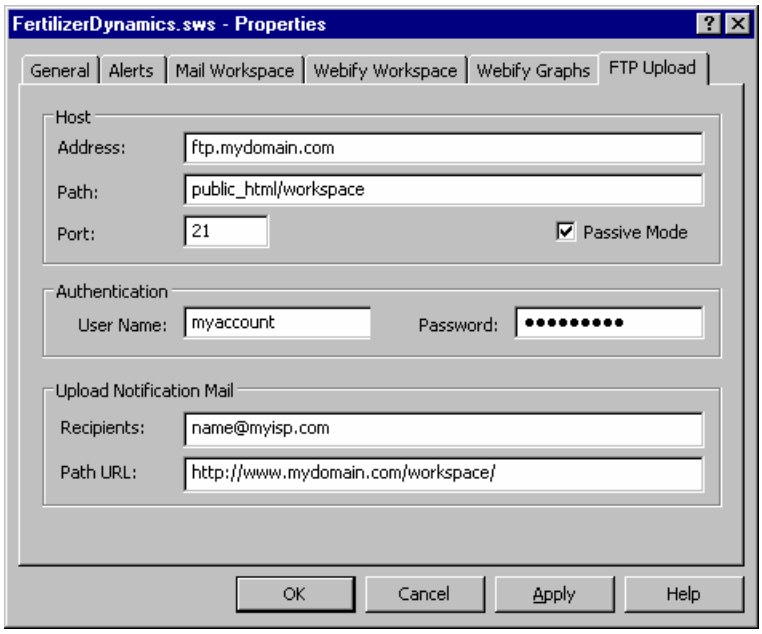
Check this box to zoom the graphs to show their full vertical range, prior to webifying them. Note that the graphs will continue to show the new range after the process is complete.

Include budget lines in extents

Check this box to ensure that all visible budget lines remain visible if zooming to vertical extents.

FTP Upload

The *FTP Upload* property page is used to set the properties of the workspace that control how the webification output files are uploaded to the Internet.



Address

The name or IP address of your FTP server.

Path

Path of a folder on the FTP server, relative to the default login folder, to receive the uploaded files.

Port

Port number to use when connecting to your FTP server. Usually 21.

Passive Mode

Check this box to connect using passive mode, uncheck for active mode. See glossary entry for FTP for more information.

User Name

User name for authentication by your FTP server.

Password

Password for authentication by your FTP server.

Recipients

Email addresses of recipients for a notification email after successful upload, separated by commas.

Path URL

The URL for public access to the upload folder on the FTP server. Used to place a hyperlink in the upload notification email.

Workspace Edit Menu

The **Edit** menu displays edit commands for the workspace window. The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Add Database…	INSERT *or* ALT, E, A		Select a database to add to the workspace.
Remove Database	DELETE *or* ALT, E, R		Remove the currently selected databases from the workspace. This is only possible if the databases are not being referenced by a graph or layout (i.e. the icon for the database in the Database List is gray). (Also available as **Remove** on the Database List popup menu.)
Download Wizard…	ALT, E, Z		Launch the *Download Wizard* to set up a download source for a single selected database. See page 88.
Start Download	F7 *or* ALT, E, D		Run the download commands for one or more selected databases.
Start Batch Download	SHIFT+F7 *or* ALT, E, B		Run the download commands for all databases that have the "include in batch download" flag set.
Database Properties…	ALT, E, P		Show the *Database Properties* dialog (see page 62.)

Ø To download into a selection of databases

1. Reveal the Workspace Manager's databases list by clicking on the **Databases** tab.
2. Click on a database in the list to highlight it. You can select more than one database by holding the CTRL key while clicking to select additional databases one at a time, or the SHIFT key to select a range of databases. Each database must have a download command set up by the *Download Wizard* (see page 88.) Databases with download commands are marked with ⇩ or  .
3. From the **Edit** menu, click **Start Download.** Alternatively you can right-click the selected databases and choose **Start Download** from the popup menu.
4. Each selected database will be downloaded in turn as a background process. Download progress is shown in the *Download Window* at the bottom of the Workspace Manager. Closing the window cancels the download. See page 46.

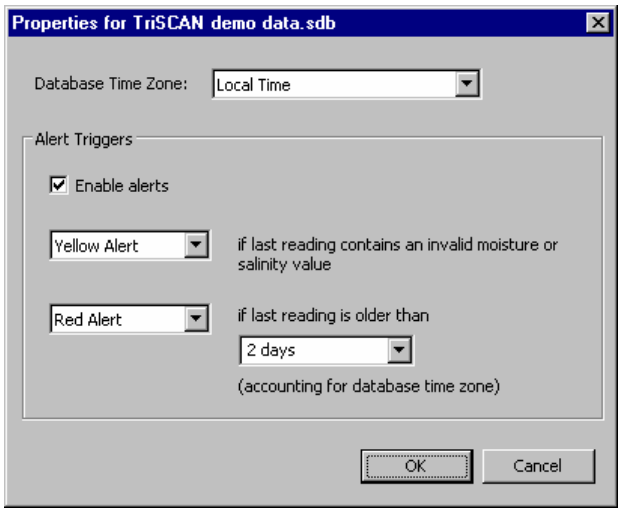
Ø To start a batch download

1. At least one database in the workspace must have a download command set up, and have the "include in batch download" flag set by the *Download Wizard* (see page 88.) Such databases will be marked with  .
2. From the Edit menu, click **Start Batch Download**.
3. Each batch database will be downloaded in turn as a background process. Download progress is shown in the *Download Window* at the bottom of the Workspace Manager. Closing the window cancels the download. See page 46.

Database Properties Dialog

The *Database Properties* dialog allows you to store extra information about databases, and to define alert triggers based on the last reading in the databases. It can be used to define these properties for a single database, or for a selection of multiple databases all at the same time.

Note: These properties are stored in the workspace document, not the database itself.



Ø To set database properties

1. Click on a database in the workspace manager's database list to highlight it. You can select more than one database by holding the CTRL key while clicking to select additional databases one at a time, or the SHIFT key to select a range of databases.

2. From the **Edit** menu, click **Database Properties…** Alternatively you can right-click a selected database and choose **Database Properties…** from the popup menu.

3. Use the dialog to edit the properties. If a control is blank, this means that you are editing the properties of more than one database, and that particular property is not currently identical for all of them. If you leave the control blank and hit the **OK** button, that property will not be changed. Otherwise you can change the property and all the selected databases will have that property set to the new value.

Database Time Zone

The workspace document can store the time-zone for databases that are not using local time. This is used for sorting the **Last Reading** column in the database list, and for triggering and sorting those alerts based on the age of the last reading.

The drop-down list contains a selection of time zones described by their offset from Universal Co-ordinated Time (UTC) in hours and minutes. You can also choose **Local Time** and **Local Time (no DST)**. The latter ignores daylight savings time.

Alert Triggers

Use the **Enable alerts** checkbox to enable or disable the generation of alerts based on the other settings in the **Alert Triggers** section.

You can choose from **No Alert**, **Red Alert**, **Yellow Alert** and **Green Alert** from the drop-down lists for the two different types of alert triggers.

The first alert trigger condition is based on whether the last reading in the database contains an invalid moisture or salinity value.

The second alert trigger condition is based on the age of the last reading in the database, compared to the current time, accounting for the database's time zone and the local time zone. You can choose a time period from the drop-down or type in a different value.

Workspace View Menu

The **View** menu lists elements of the window that may be displayed or removed from view, for example, toolbars. The toolbar and status bar display by default. The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	To...
Graphs	ALT, V, G	Display the graph list in the Workspace Manager window.
Databases	ALT, V, D	Display the database list in the Workspace Manager window.
Show Alerts	ALT, V, A	Enable the display of the alert list at the bottom of the Workspace Manager window.
Download Window	ALT, V, O	Display or hide the download window at the bottom of the Workspace Manager window.
Toolbar	ALT, V, T	Display or hide the toolbar. When ticked, the toolbar displays.
Workspace Bar	ALT, V, W	Display or hide the workspace bar.
Status Bar	ALT, V, S	Display or hide the status bar.

Viewing the graph and database lists

The Workspace Manager window can display either a list of graphs in the workspace or a list of databases. These lists are most easily selected using the tabs on the workspace bar, but can also be switched from the **View** menu.

Ø To display the graph list or database list

From the **View** menu, click:

- **Graphs** to display the graph list and hide the database list.
- **Databases** to display the database list and hide the graph list.

Viewing the alert list

The alert list is normally visible when there are currently triggered alerts, and hidden otherwise. It is possible to suppress the display of the alert window, even if there are alerts triggered.

Ø To enable or disable display of the alert list

From the **View** menu, click:

- **Show Alerts** to enable display of the alerts (item displays a check mark) or suppress display of alerts (item has no check mark.)

Viewing the download window, toolbar, workspace bar and status bar

The download window appears at the bottom of the Workspace Manager window whenever a download operation is started. Closing it will also stop the download.

The toolbar is used to quickly access major editing and viewing commands that are applicable to the window. The toolbar displays by default but can be hidden or displayed as required.

The workspace bar is used to switch the workspace between viewing graphs and databases. It also contains buttons for all open layout windows and text data windows. The workspace bar displays by default but can be hidden or displayed as required. If it is hidden, its functions can still be accessed from the **View** menu and the **Window** menu.

The status bar at the bottom of a window displays information about the window. As you use the mouse to point to icons on a menu or toolbar, the name of the command being selected appears in the status bar.

Ø To display or hide the download window, toolbar, workspace bar and status bar

From the **View** menu, click:

- **Download Window** to display or hide the download window.
- **Toolbar** to display or hide the toolbar.
- **Workspace Bar** to display or hide the workspace bar.
- **Status Bar** to display or hide the status bar.

Workspace Tools Menu

The Tools menu provides a variety of options for manipulating databases and workspaces.

All database tools apply to the currently selected database on the Workspace Manager's *Database List*. These tools are also available from the popup menu that appears when you right-click a database on that tab.

If the Database List is not visible, or there is no current selection, then you will be required to browse for the database you want.

The Tools menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Enter Readings…	CTRL+E *or* ALT, T, E		Open the *Database Entry* utility to enter readings into a database. See the Database Entry documentation for more information.
Export…	ALT, T, X		Open *Data Exchange* to export data from a database. See page 108.
Trim/Extract…	ALT, T, T		Trim readings from either end of a database, or extract readings from one database to another. See page 108.
Spike Remover…	ALT, T, S		Remove spikes from a database. See page 110.
Recalculate Database…	ALT, T, R		Recalculate the readings in a database. See page 113.
Data Exchange...	ALT, T, D		Launch the *Data Exchange* utility. See the Data Exchange documentation for more information.
Zip Workspace...	ALT, T, Z		Copy all the files in the workspace to a ZIP archive. See page 64.
Webify Workspace…	ALT, T, W		Generate a snapshot of the workspace in Web-compatible format and optionally upload it to a FTP server. See page 65.
Upload Workspace…	ALT, T, U		Upload workspace files to a FTP server.
Mail Graphs…	ALT, T, M		Send snapshots of all or some of the graphs as Web-compatible emails. See page 66.
Mail Alerts…	ALT, T, A		Send alert notifications via email. See page 68.
IrriMAX Settings...	ALT, T, E		Change the global settings for the application. See page 74.

Zip Workspace

A single workspace document and its associated graph, layout and database files can be copied to a Zip archive. This is convenient for making back-ups, or for giving the files to another person.

Ø To copy a workspace and associated files to a Zip archive

1. From the **Tools** menu of the workspace manager window, select **Zip Workspace…**
2. A file selection dialog appears. Choose the name and location for the Zip file and click Save.

If the Zip file already exists, IrriMAX will prompt for confirmation before overwriting it. It will not add files to an existing archive.

The archive will contain the workspace document, all the graph and layout documents in the workspace, and each database (.SDB file) that is currently being viewed in a graph window. If an irrigation and rainfall database (.WDB file) exists with the same name as the database in the main pane of a graph window, it will be backed up regardless of whether it is being viewed or not.

The Zip file will contain full path information for each file. However, Zip files cannot store volume information, so the volume name will be represented as the top-level folder in the path. For example, the file C:\Files\Workspace.sws will be stored within the Zip file as C\Files\Workspace.sws.

Webify Workspace

A snapshot of the current workspace can be converted into web-compatible files (HTML).

This is useful for converting the workspace into a universal format for use in presentations or for publishing on the Internet.

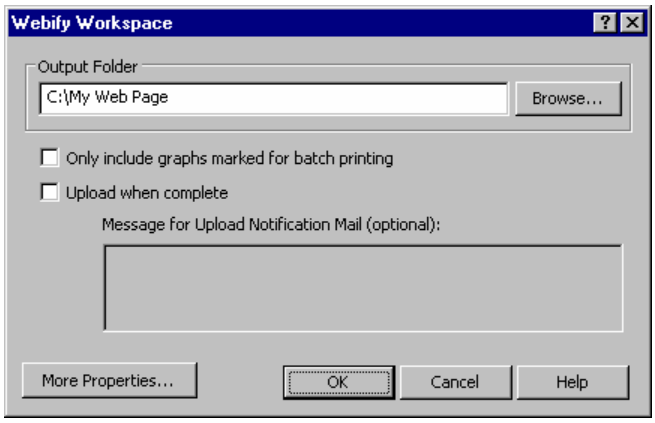
The webification process produces a web-compatible document (usually a HTML file) for each graph, with an embedded graphic file showing those elements of the graph that cannot be otherwise represented. The graphic file is in PNG (portable network graphics) format and is viewable in most modern browsers.

A document is also produced for the workspace, with links to each of the graphs. This document contains embedded thumbnail images of the graphs, and soil-moisture gauges for each summed graph.

After a workspace has been webified, IrriMAX can upload the generated files to the Internet using FTP.

Ø To webify a workspace

1. From the **Tools** menu of the workspace manager window, select **Webify Workspace…**
2. The *Webify Workspace* dialog appears



Output Folder

Use the **Browse…** button to select a folder to receive the files output by the webification process. Alternatively you can type the name of the folder in the edit box.

If the folder you specify does not exist, it will be created during the webification process.

You may enter a path relative to the location of the workspace document, rather than supply a full path.

You can leave this field blank if you also select **Upload when complete**. IrriMAX will output the webified files to a temporary folder and delete them after the upload.

Only include graphs marked for batch printing

Check this box to include only those graphs with a tick in the Batch Print column in the workspace manager window. The value you enter here will update the stored property in the workspace document.

Upload when complete

Check this box to upload the generated files to the Internet using FTP. The value you enter here will update the stored property in the workspace document.

Message for Upload Notification Mail

This field will be active if you choose to upload when complete, and you have specified one or more recipients in the workspace's FTP Upload properties. You can enter a message specific to this upload. The message will not be saved in the workspace document.

More Properties...

Click this button to invoke the *Webify* properties pages for the workspace (see page 57). From there you can specify additional properties to fine-tune the way the webified workspace will appear.

OK

Click OK to webify the workspace. When the process is complete, you will be asked if you wish to view the output. IrriMAX will open the files using your default web browser.

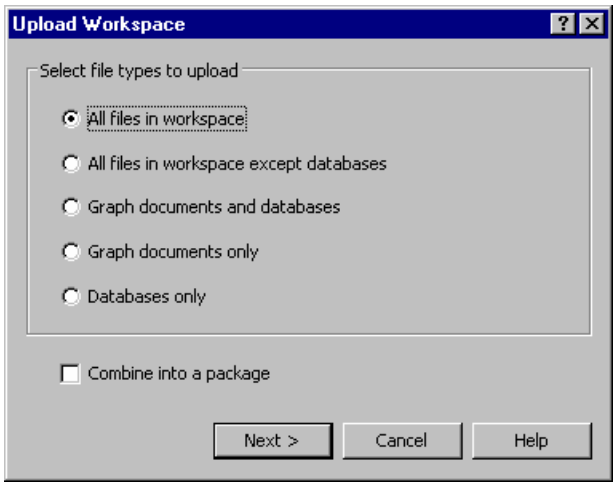
Finally, if you selected **Upload when complete**, Data Exchange will open in a special mode to allow upload of the files using FTP.

Upload Workspace

Some or all of the files comprising the workspace can be uploaded to a FTP server, either individually or combined in an IrriMAX File Package.

Ø To upload the workspace

1. From the **Tools** menu of the workspace manager window, select **Upload Workspace…**
2. The *Upload Workspace* dialog appears



3. Choose which file types to upload.
4. Choose whether to combine the files into a package.
5. Click **Next**. Data Exchange will open in a special mode to allow upload of the files using FTP.

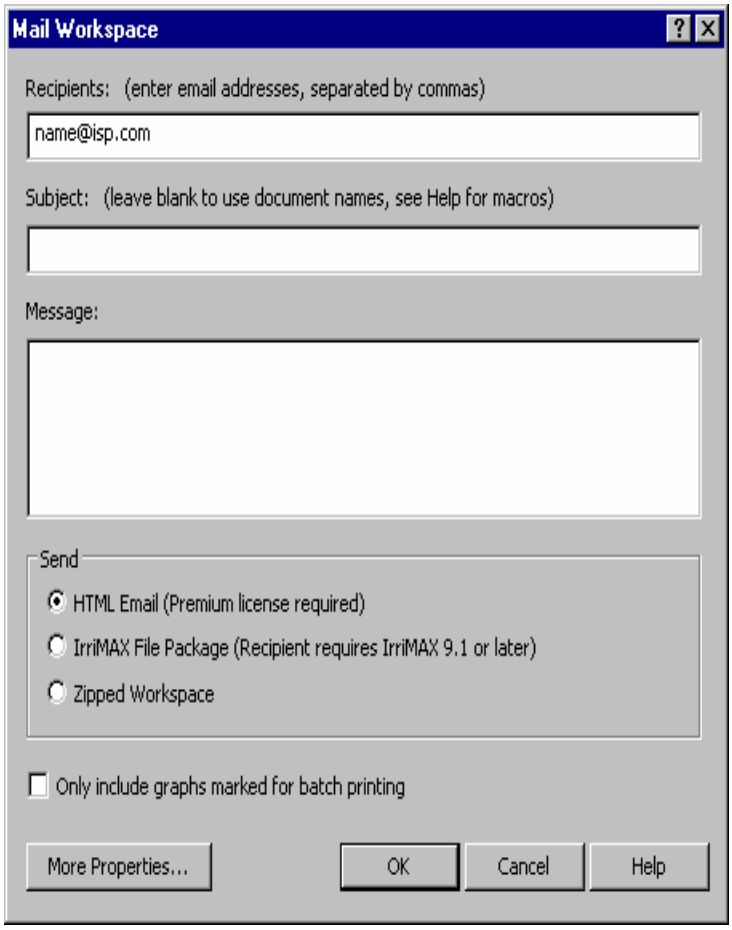
Mail Workspace

Snapshots of the graphs as currently shown on screen can be sent as HTML emails, viewable within the recipient's email client. Alternatively the actual workspace document and all related files can be sent as an IrriMAX package file or as a Zip archive.

Note: Sending HTML snapshots requires that the recipient's email client is configured to allow HTML emails with embedded pictures. If the recipient's security policy forbids this, it should be possible for them to create an exception for emails originating from you.

Ø To mail the workspace

1. From the **Tools** menu of the workspace manager window, select **Mail Workspace…**
2. The *Mail Workspace* dialog appears



Recipients

Enter the email addresses of the recipients of the emailed graph snapshots, separated by commas. This field is mandatory. The value you enter here will update the stored property in the workspace document.

Subject

Enter text for the subject line of the emails. Leave blank to use the graph names. The value you enter here will update the stored property in the workspace document.

The subject text can contain certain macros that will be replaced with information specific to the graph you are mailing. These macros are:

- **GRAPH_NAME_TEXT** is replaced by the name of the graph.
- **GRAPH_COMMENT_TEXT** is replaced by the user-entered comment for the graph.
- **GRAPH_LOGGER_TEXT** is replaced by the Logger ID from the database shown in the main pane of the graph.
- **GRAPH_DOWNLOAD_TEXT** is replaced by the date and time of the last download into the database shown in the main pane of the graph.

Message

Enter optional text to include in the body of every graph email.

Send

Choose the type of email to send. Select **HTML Email** to mail static snapshots of the graphs that the recipient can view in their Email client software.

Select **IrriMAX Package** to send the workspace document and all related files in an IrriMAX package (.imxpak) file. The recipient will be able to open the package directly from the email if they have IrriMAX 9.1 or later installed.

Select **Zipped Workspace** to send the workspace document and all related files in a standard Zip archive.

Only include graphs marked for batch printing

Check this box to mail only those graphs with a tick in the Batch Print column in the workspace manager window. The value you enter here will update the stored property in the workspace document.

This setting only applies when sending HTML emails. It has no effect when sending packages or Zip archives.

More Properties...

Click this button to invoke the *Mail Workspace* properties page for the workspace (see page 56). From there you can specify additional properties to fine-tune the way the HTML emails will appear.

OK

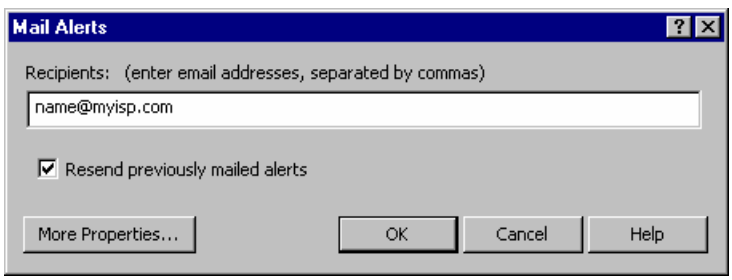
Finally, click OK to email the graphs. At this point, the *Mail Settings* page might appear if you have not already configured IrriMAX for sending mail (see page 82).

Mail Alerts

You can send notifications of your alerts to nominated recipients using email.

Ø To mail alert notifications

1. From the **Tools** menu of the workspace manager window, select **Mail Alerts…**
2. The *Mail Alerts* dialog appears



Recipients

Enter the email addresses of the recipients of the emailed alert notifications, separated by commas. This field is mandatory. The value you enter here will update the stored property in the workspace document.

Resend previously mailed alerts

Check this box to ensure that the recipients are notified about all current alerts, regardless of whether a notification has been mailed before.

Whether this box is initially checked depends on the value of the "Notify about new alerts only" workspace property (see page 55). However, changing the state of this box does not affect that stored property in the workspace document.

More Properties...

Click this button to invoke the *Mail Alerts* properties page for the workspace (see page 55). From there you can specify additional properties to fine-tune the way the email are sent.

OK

Finally, click OK to email the alert notifications. At this point, the *Mail Settings* page might appear if you have not already configured IrriMAX for sending mail (see page 82).

Workspace Window Menu

The **Window** menu provides options for sizing, displaying and accessing other open windows.

Note: The shortcut keys for windows arrangement F3, F4 and F5 can be used in most IrriMAX windows

The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Toolbar Button	To...
Arrange Ø	ALT, W, A		Open the Arrange submenu
Cascade	F3 *or* ALT, W, A, C		Overlap all open windows.
Tile Horizontally	F4 *or* ALT, W, A, H		Tile all open windows from the top to the bottom of the screen.
Tile Vertically	F5 *or* ALT, W, A, V		Tile the windows from the left to the right of the screen.
Include Workspace Manager	ALT, W, A, W		Include the *Workspace Manager* window in the window arranging commands.
Include Graphs	ALT, W, A, G		Include the graph window in the window arranging commands.
Include Layouts	ALT, W, A, L		Include the layout window in the window arranging commands.
Minimize All	CTRL+M *or* ALT, W, M		Minimize all open windows, except the *Workspace Manager* window.
Restore All Minimized	CTRL+R *or* ALT, W, R		Return all windows to the position they were in prior to minimizing.
Bring Layouts to Front	F6 *or* ALT, W, L		Bring the Layout windows in front of the Workspace window.

Menu item	Shortcut key	Toolbar Button	To...
Window Ø Windows...	ALT, W, W		Display the Windows dialog box.

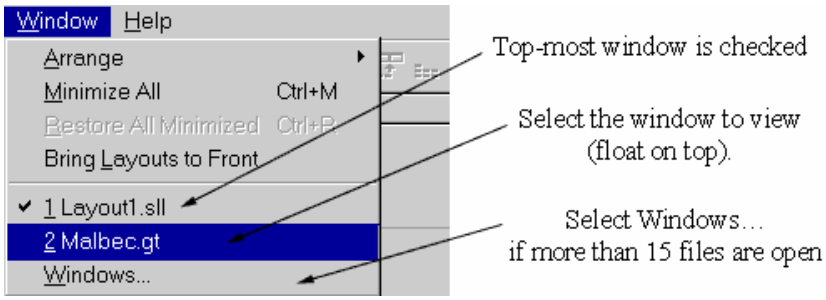
Viewing windows

Once a file is opened (see page 51), it displays in the appropriate window. All windows can be managed from the *Workspace Manager* window using the **Window** menu.

All windows can be viewed on the screen at one time, either tiled on the screen, cascaded or floating. Floating windows are free to float anywhere on the screen, including floating in front or behind other windows.

Note: To quickly hide the *Workspace Manager* window, right-click in the title bar (the bar at the top of the window containing the text **IrriMAX**) and click **Send Back**. The *Workspace Manager* window is sent behind all other floating windows.

The **Window** menu displays up to 15 file names.

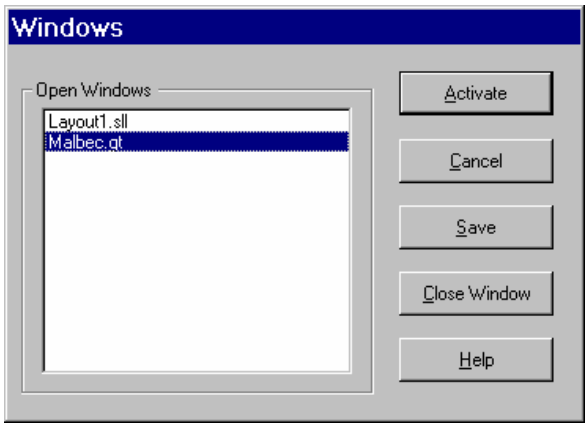


Ø To view open windows

From the **Window** menu, select the graph or layout file to view.
The graph or layout file displays.
Note: If there are more than 15 windows open, from the **Window** menu, click **Windows...**.
The *Windows* dialog box displays all open windows.

Using the Windows dialog box

The *Windows* dialog box lists all open windows.



From the *Windows* dialog box you can:

- display one or more open windows (if the windows are floating the last file selected displays on top)

- save one or more open windows
- close one or more open windows.

Note: You can select multiple files to view, save or close by pressing and holding the CTRL key and left-clicking each file name. To select all files, select the first file in the list, press and hold the SHIFT key and select the last file in the list.

Ø To view open windows from the Windows dialog box

From the *Windows* dialog box select the file(s) to view and click **Activate**.
The file(s) displays in the appropriate window.

Ø To save open windows from the Windows dialog box

From the *Windows* dialog box select the file(s) to save and click **Save**. The last file selected from the list is activated and displayed.

Ø To close open windows from the Windows dialog box

From the *Windows* dialog box select the file(s) to close and click **Close**.
Note: If you close all windows, the workspace will be empty.

Arranging windows

Windows can be arranged from the *Workspace Manager* window using the **Windows** menu. Arranging windows is useful if, for example, you want to view multiple windows at the same time.

If you do not need to see a particular window but still need to keep it open, you can minimize that window into an icon. Icons appear at the bottom of the **Windows** desktop. An exception is the IrriMAX graph window, which disappears when minimized instead of minimizing to an icon, because graphs are more easily managed from the workspace manager graph list.

You can apply the window arrangement commands to all windows or selected types of windows.

Note: The *Workspace* window has controls for minimize, maximize, restore and close each of its graphs. See page 43 for details of using the *Workspace Manager* window.

Types of windows that can be arranged

A specific type or all open IrriMAX windows can be arranged from the workspace. You can select which types(s) of windows to be included in the arrangement from the **Arrange** option of the **Window** menu in *Workspace Manager*. A type is selected to be included in the arrangements when the option is checked. The types are:

- Layouts windows
- Graph windows
- Workspace window

For example, if you only want to arrange and view the layout windows with the *Workspace Manager* window on one screen you would make sure that the **Include Layouts** option is turned on (selected) and that **Include Graphs** option is turned off (not selected).

Cascade arrangement

Cascading windows arranges multiple windows in an overlapping sequence so that the title bar of each window is visible. The windows overlap from least recently used to most recently used. The *Workspace Manager* window remains in the foreground.

Horizontal arrangement

Tiling windows horizontally arranges all open windows in horizontal pattern from the top to the bottom of the screen. You can arrange all windows or selected types of windows by selecting which types to include.

Vertical arrangement

Tiling windows vertically arranges all open windows in a vertical pattern from the left to the right of the screen.

Ø To Arrange included window types

From the **Window** menu, select **Arrange** and click one or more of the following:

- **Cascade** - All 'included' window types cascade with the *Workspace Manager* window on top
- **Tile Horizontally** - All 'included' window types tile horizontally
- **Tile Vertically** - All 'included' window types tile vertically.

Minimizing all windows

The **Minimizing all windows** command minimizes all open *Graph* and *Layout* windows in one simple step. This saves you having to minimize all windows using the standard **Windows** minimize button () in every open window.

The *Workspace Manager* window remains open, as this is the parent from which you manage the other windows. If you want to minimize the *Workspace Manager* window, click  in the title bar. All open *Graph* and *Layout* windows will disappear until the *Workspace Manager* window is restored

Minimizing windows hides the windows from view without closing the windows. When a graph window is minimized it disappears. When a layout or text viewer window is minimized an icon (button) displays at the bottom of the desktop.
Note: This is different to a conventionally minimized window that displays the button in the **Taskbar.**

Note: When all windows are minimized the window arrangement commands are dimmed. The **Minimize All** command is also dimmed.

The *Restore all Windows* command restores all minimized windows to normal windows. It does not matter whether one, multiple or all windows are minimized, the **Restore all Windows** command restores all minimized windows. Restoring minimized windows displays all open windows as they were prior to minimizing, for example, if they were tiled they will return to their tiled positions.

Ø To minimize all windows

From the **Window** menu, click **Minimize All**.

All open *Graph* and *Layout* windows are minimized and appear as icons at the bottom of the **Windows** desktop.

Ø To restore all minimized windows

From the **Window** menu, click **Restore All Minimized**.

All minimized *Graph* and *Layout* windows are restored to the previous arrangement.

Bringing layouts to the front

If *Workspace Manager* contains one or more layouts, you can bring the layouts to float on top of all other windows. This makes it easy for you to find and display a layout.

Ø To bring layouts to the front

From the **Window** menu, click **Bring Layouts to Front**

All *Layout* windows are brought to the front of all other open windows.

Workspace Help Menu

The **Help** menu provides access to the online user guide contents and search utilities. The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Help Topics	F1 *or* ALT, H, H		Display the online help file.
Licensing IrriMAX…	ALT, H, L		Display the *Licensing & Registration* dialog
About IrriMAX...	ALT, H, A		Display current version information.

Ø To access online help

From the **Help** menu, click **Help Topics**.
The *Help* window displays.

Click the **Contents** tab to scroll through a table of contents for online help.
Click the **Index** tab to search for topics by using an index of keywords and phrases.
Click the **Find** tab to use full-text search and look for specific words.

Ø To access version information about IrriMAX

1. From the **Help** menu, click **About IrriMAX...**
   The **IrriMAX** about dialog box displays.

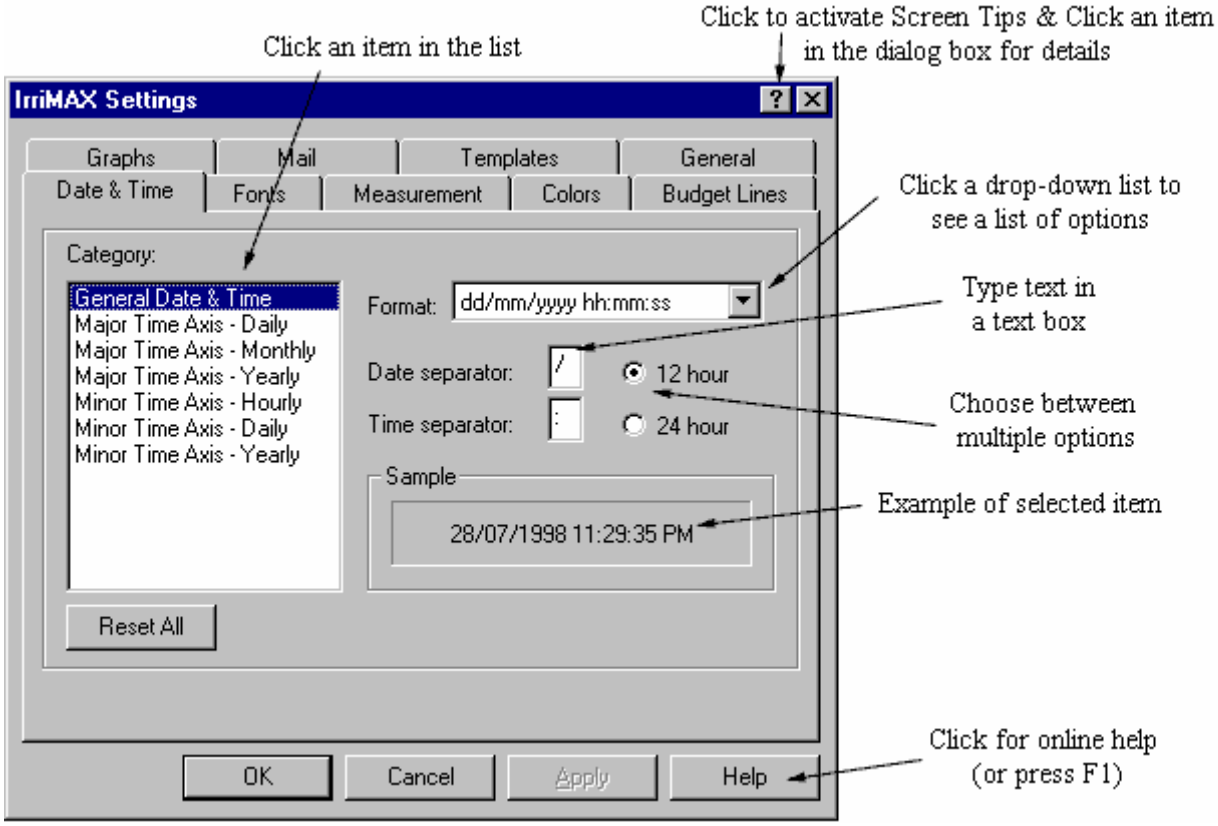
2. Click **OK** to close the dialog box.

IrriMAX Settings Dialog

The Workspace Manager *IrriMAX Settings* dialog box provides controls to customize how **IrriMAX** looks and how it displays information. For example, you can change the colors used for lines in a new graph or the measurement units displayed on all graphs. These settings are global and apply to all appropriate windows within **IrriMAX**. These settings can be changed at any time.

Ø To change IrriMAX settings

From the **Tools** menu, select **IrriMAX Settings…**, or click the IrriMAX Settings button  on the toolbar. The *IrriMAX Settings* dialog box displays with the *Date & Time* tab initially visible.



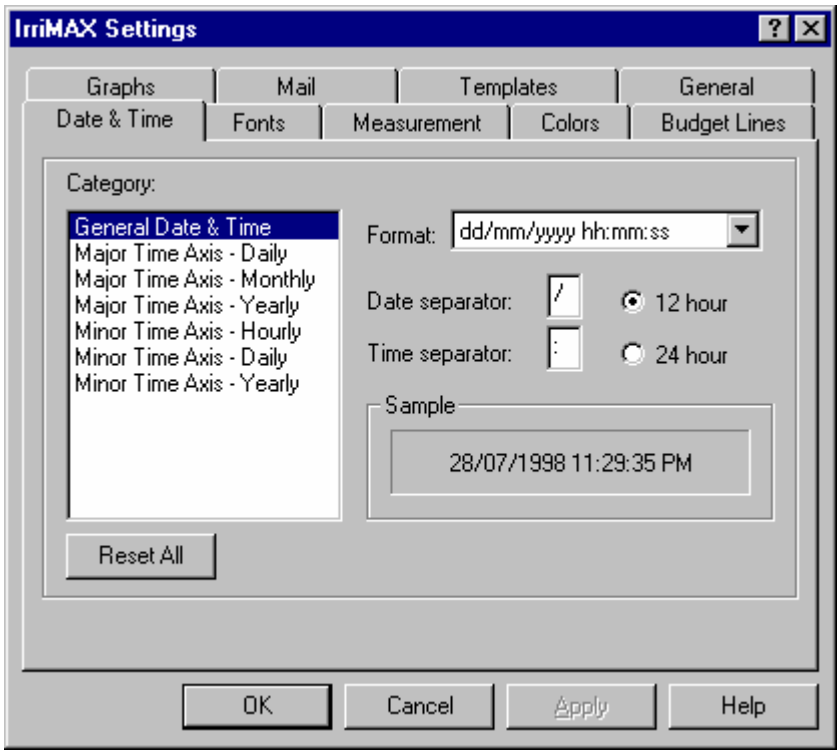
All tabs of the *IrriMAX Settings* window have a common set of buttons for editing.

Click this button...	...to perform this function
OK	Apply all changes and close the *IrriMAX Settings* dialog box.
Cancel	Cancel the *IrriMAX Settings* dialog box without applying any changes. The global settings remain unchanged.
Apply	Apply all changes without closing the *IrriMAX Settings* dialog box. This is in case you want to select another tab of the dialog box to make further changes to other settings.
Help	Display the online help.
Reset All	Reset all settings on the displayed tab to the default values. These are the values that applied when you first installed the software.

Date and Time Settings

Date and time format can be customized to suit the way you want to show dates and times within **IrriMAX.** Date and time settings can be customized to suit American or European conventions and 12 or

24-hour clocks. To return all date and time settings to the original configuration click the **Reset All** button.

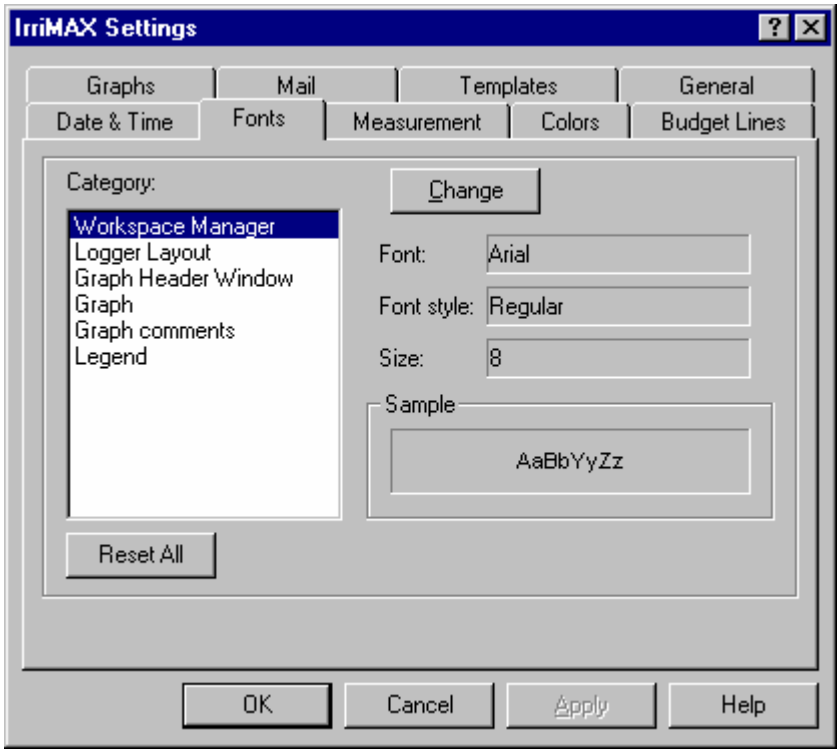


Ø To set the date and time formats

1. From the *IrriMAX Settings* dialog box, click the **Date and Time** tab (if not already displayed).
2. In the *Category* list, select the category of date and time you wish to change.
3. In the *Format* drop down list, do one of the following:
   - Click the down arrow and select the format for that date and time category
   - Accept the default
4. In the *Date Separator* box, accept the default or enter a separator, for example, forward slash (/), full stop (.) or colon (:).
5. In the *Time Separator* box, accept the default or enter a separator, for example, forward slash (/), full stop (.) or colon (:).
6. Select either 12 or 24-hour clock.
   A sample of the new date format displays in the *Sample* box.
7. In the **Week start day** box, click the down arrow and select the day on which you want week intervals shown on graphs to start.
   This setting is used in the graphs to determine the position of the vertical dashed lines when they are spaced one week apart. It also affects the calculation of weekly rainfall and irrigation totals.
8. Do one of the following:
   - Click **OK** to apply the changes and close the dialog box
   - Click **Apply** to apply the changes without closing the dialog box (you can now change other settings)
   - Click **Cancel** to discard the changes and close the dialog box.

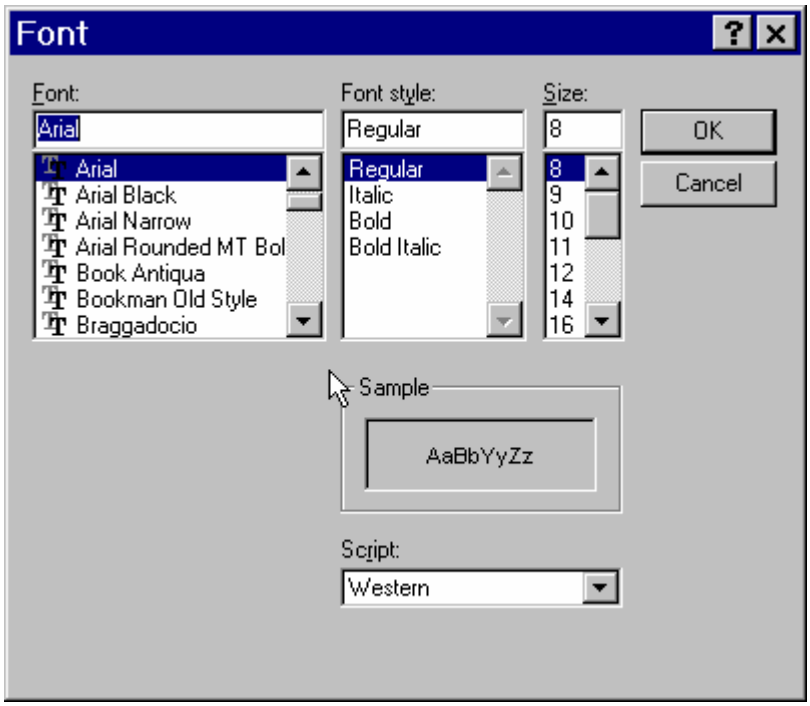
Font Settings

Character Font settings may be changed for the *Workspace Manager* window, *Logger Layout* window, and *Graph* window. The available fonts are those installed in your **Windows** font directory. To return all font settings to their original configuration click the **Reset All** button.



Ø To change the Font settings

1. From the *IrriMAX Settings* dialog box, click the **Fonts** tab.
2. In the *Category* list, select the category to be changed.
3. Click **Change**.
   The *Font* dialog box displays.



4. In the *Font* dialog box, scroll and select a font or enter the first letter/s of the font to narrow the selection to that area of the list. A sample of how the font will display is shown in the *Sample* box.

5. In the *Font style* list, select a style from those listed, for example, Italic. A sample of the font displays in the *Sample* box.

6. In the *Size* list, select an appropriate size to match your font. A sample of how the font will display is shown in the *Sample* box.

7. In the *Script* drop down list, click on the drop-down arrow and select from the list. Not all fonts have multiple script settings. Only fonts that have special character sets, such as Central European, Symbol or Mac will list multiple script settings.

8. Click **OK**.
   The *IrriMAX Settings* dialog box displays.

9. Do one of the following:

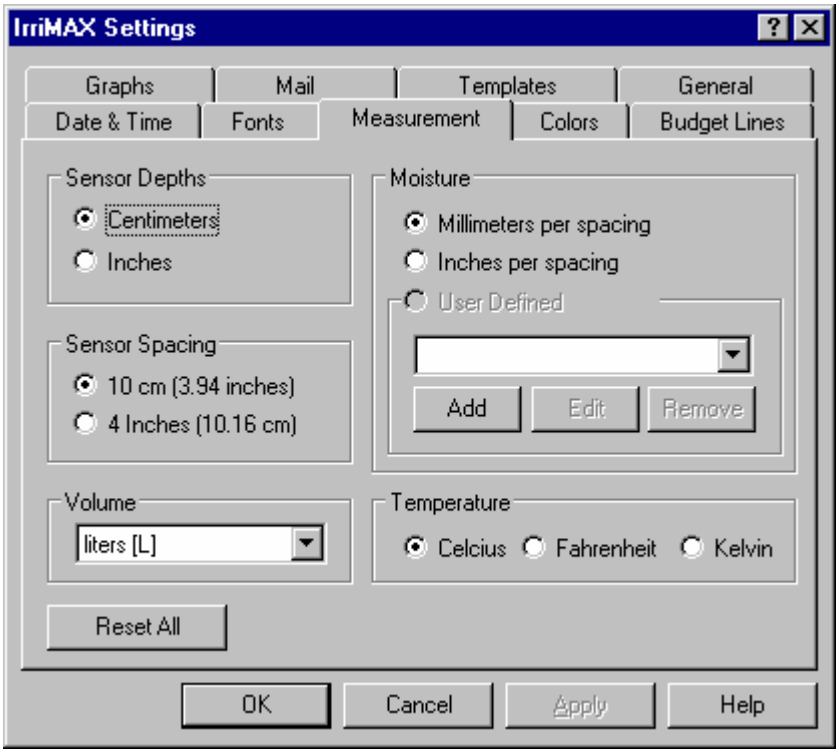
   - Click **OK** to apply the changes and close the dialog box
   - Click **Apply** to apply the changes without closing the dialog box (you can now change other settings)
   - Click **Cancel** to discard the changes and close the dialog box.

Measurement Settings

The *Measurement* tab allows you to specify the default units of measurement for the display of moisture, temperature and volume. The default units are used unless overridden by the graph window.

You can also control whether sensor depths are displayed in centimeters or inches, and set the default spacing of sensors for new databases created by the Logger Configuration dialog.

To return all measurement settings to their original configuration click the **Reset All** button.



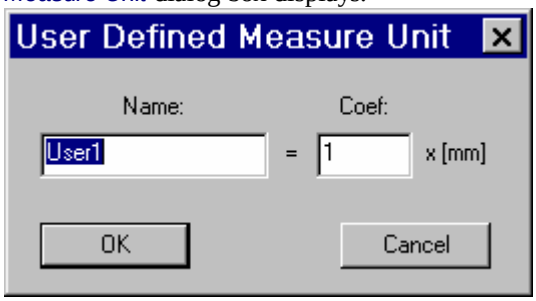
Ø To set units of measurement

1. From the *IrriMAX Settings* dialog box, click the **Measurement** tab.

2. Select a sensor depth, measurement unit of **Centimeters** or **Inches**.

3. Select a sensor spacing measurement of **10cm** (centimeters) or **4 inches** (Imperial).

4. Select a moisture measurement to display on the graphs.
Select either **Millimeters per spacing**, **Inches per spacing** or **User Defined**.
If you select **User Defined**, a list of existing user-defined units is available from the drop-down list.
You can edit or remove existing user defined units by clicking **Edit** or **Remove** respectively.
If you want to define a new moisture unit (other than those listed), click **Add.** The *User Defined Measure Unit* dialog box displays.



Enter a customized measurement equation, for example, cm = 0.1 x (mm). When customizing the name of your units, restrict the name to about five characters, as the measurement name must be able to be easily read on a graph. User defined measurements may be edited or removed as required.
Click **OK** to accept the new user defined measurement units. The *Measurement* tab of the *IrriMAX Settings* dialog box displays again.

5. Choose a unit for the display of temperature by selecting one of the Celcius, Fahrenheit or Kelvin buttons. This choice will override the unit stored in the database if IrriMAX is able to detect that the database uses one of these three temperature units (by inspecting the sensor record's short and long description fields.)

6. Choose a unit for the display of volume by making a selection from the Volume drop-down list. This choice will override the unit stored in the database if IrriMAX is able to detect that the database contains one of the listed units.

7. Do one of the following:

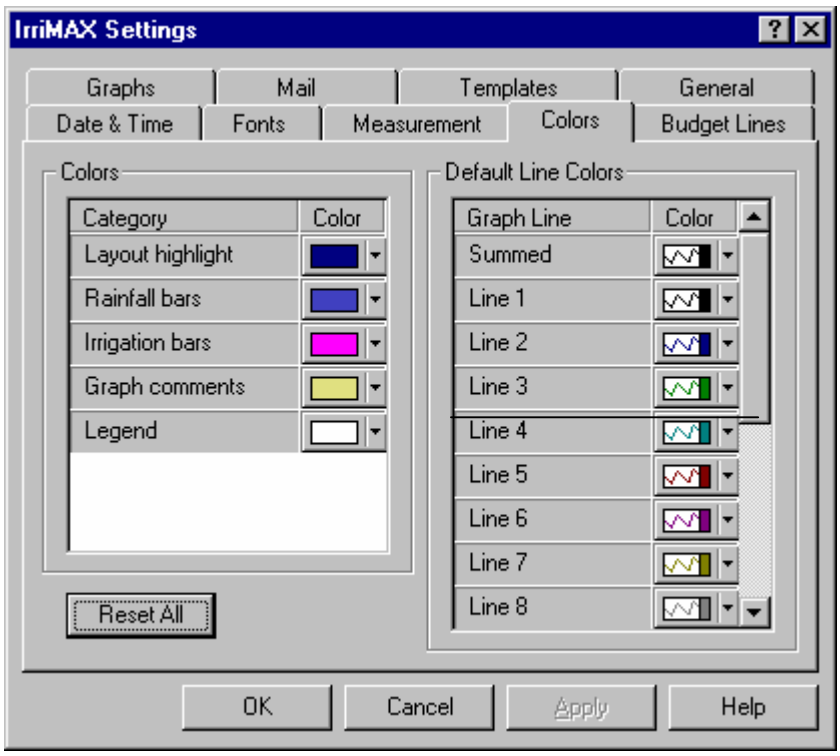
   - Click **OK** to apply the changes and close the dialog box
   - Click **Apply** to apply the changes without closing the dialog box (you can now change other settings)
   - Click **Cancel** to discard the changes and close the dialog box.

Color Settings

The color of layout highlights (showing a selected item in the layout window) and the color of graph lines and bars (as displayed in the graph window) may be changed as required. Changes to colors are made as required, for example, to make lines easier to read on a graph.

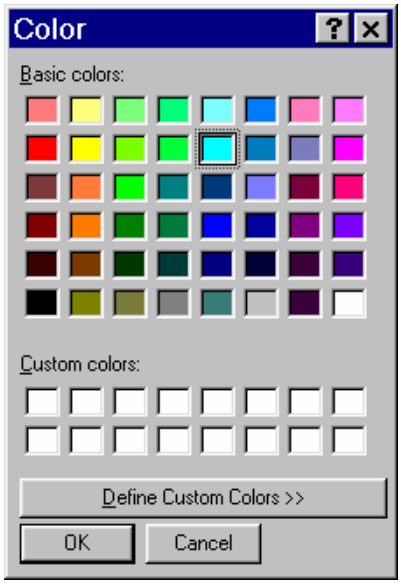
Note:
Changes to the Default Line Colors only apply to new documents created. To change the line colors of an existing graph, see page 149.

Clicking the **Reset All** button resets all colors to their default values.



Ø To change color settings

1. From the *IrriMAX Settings* dialog box, click the **Colors** tab.
2. To change a color, click on the drop-down arrow next to the category.
   The *Color* dialog box displays.



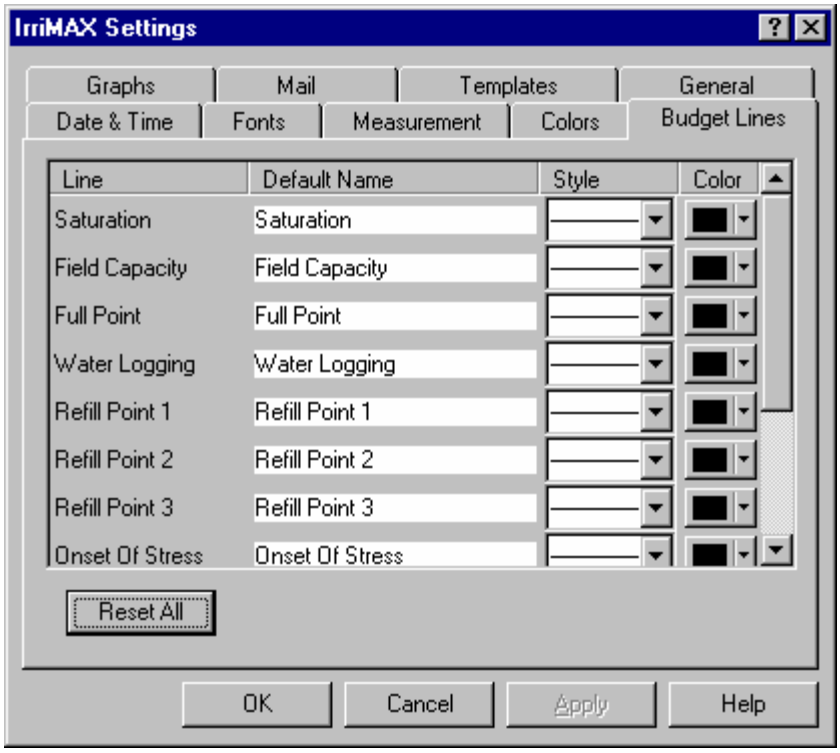
3. Do one of the following:
   - Select a color from the *Basic colors* palette
   - Click **Define Custom Colors>>** and click on the variegated palette. Click **Add to Custom Colors** to select the non-basic color and return to the *Basic colors* palette.
4. Click **OK**.
   The *Color* dialog box closes.
5. Do one of the following:
   - click **OK** to apply the changes and close the *IrriMAX Settings* dialog box

- click **Apply** to apply the changes without closing the dialog box (you can now change other settings)
- click **Cancel** to discard the changes and close the dialog box.

Budget Line Settings

The default names, drawing styles and colors of the budget lines may be changed for IrriMAX graphs.

Note: Changes to the Budget Lines settings only apply to new graphs created. To change the budget line properties of an existing graph, see page 154.



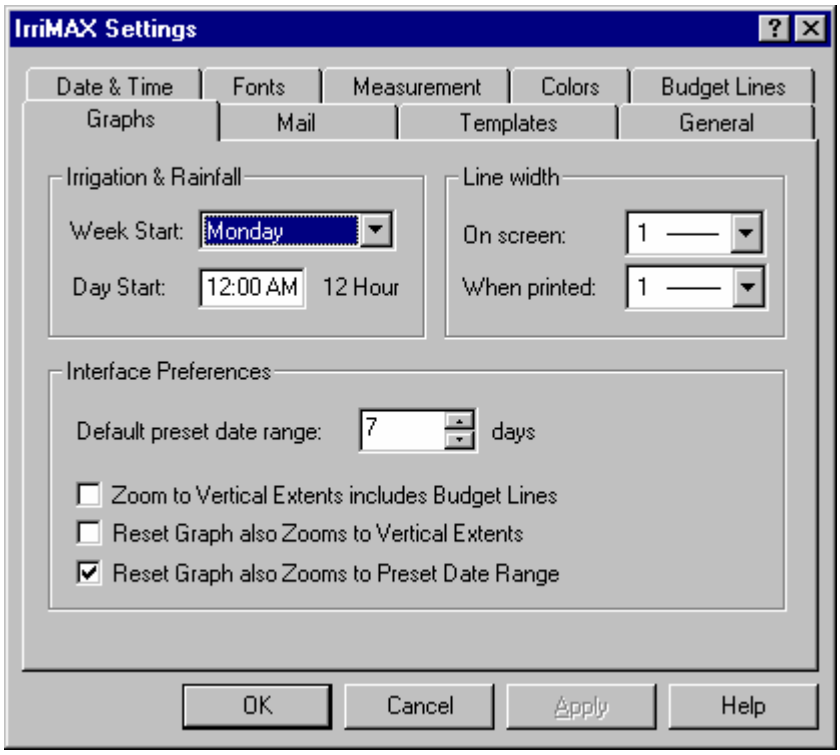
Ø To change default budget line settings

1. From the *IrriMAX Settings* dialog box, click the *Budget Lines* tab.
2. To change the default name for a budget line, click on the corresponding edit control in the **Default Name** column and type in a new name.
3. To change the default style or color for a budget line, click on the corresponding control in either the **Style** or the **Color** column.
4. To restore the default names, styles and colors to the system defaults, click on the **Default** button.
5. Do one of the following:
   - click **OK** to apply the changes and close the *IrriMAX Settings* dialog box
   - click **Apply** to apply the changes without closing the dialog box (you can now change other settings)
   - click **Cancel** to discard the changes and close the dialog box.

Graph Settings

The *Graphsl* tab of the *IrriMAX Settings* dialog box contains three sections:

- Irrigation and Rainfall
- Line width
- Interface Preferences



Irrigation and Rainfall Settings

These settings govern how irrigation and rainfall bars are calculated. They have an immediate effect on all I&R graphs.

Setting	Description
Week Start	In the **Week Start** box, click the down arrow and select the day on which you want week intervals to start. This setting is used in the graphs to determine the position of the vertical dashed lines when they are spaced one week apart. It also affects the calculation of weekly rainfall and irrigation totals.
Day Start	This is the time of day that the I&R Totals modes use as the start time for Hourly, Daily, Weekly and Monthly totals. The format of this field is controlled by Windows Regional setting for Time (12 hour with AM/PM, or 24 hour clock).

Line Width Settings

The width of graph lines can be independently set for when they are displayed on screen and when they are printed. Normally the widths are set to one, but this value may be increased to improve legibility of the lines. It must be noted that any screen line width greater than one will noticeably slow down the drawing of graphs. Changing the widths affects all the display of all graphs.

Interface Preferences

These settings allow you to customize some aspects of how the graph user interface operates.

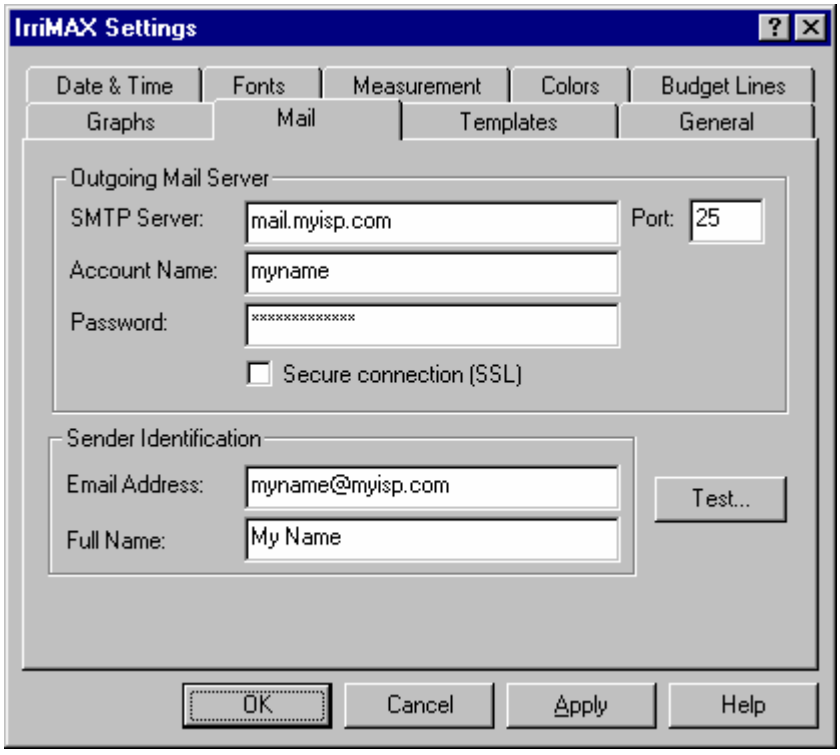
Setting	Description

Default Preset Date Range	Each graph window has a preset date range, which represents the typical time scale over which the soil moisture needs to be monitored. The preset date range for graphs can be changed individually using the graph settings dialog. The value here is the default value assigned to newly created graphs. **Note:** Changes to the Preset Date Range only apply to new graphs created.
Zoom to Vertical Extents includes Budget Lines	The graph window's **Zoom to Vertical Extents** function adjusts the vertical range so that all of the graph lines are visible. To ensure that all budget lines are also visible, check this box.
Reset Graph also Zooms to Vertical Extents	The graph window's **Reset Graph** function scrolls the graph so that the end point is visible. To automatically zoom to the vertical extents after scrolling, check this box.
Reset Graph also Zooms to Preset Date Range	The graph window's **Reset Graph** function scrolls the graph so that the end point is visible. To automatically zoom to the preset date range after scrolling, check this box.

Mail Settings

The *Mail* tab of the *IrriMAX Settings* dialog box contains two sections:

- Outgoing Mail Server
- Sender Identification



Outgoing Mail Server

IrriMAX acts as an SMTP mail client for the purpose of sending mail. The settings in this section should be the same as you would enter into a mail client like Outlook Express. Your ISP or network administrator will provide you with these settings.

Sender Identification

Enter the email address and name to identify the sender of the emails sent by IrriMAX on your behalf.

Testing your mail settings

To verify the settings you have entered, click the **Test…** button.

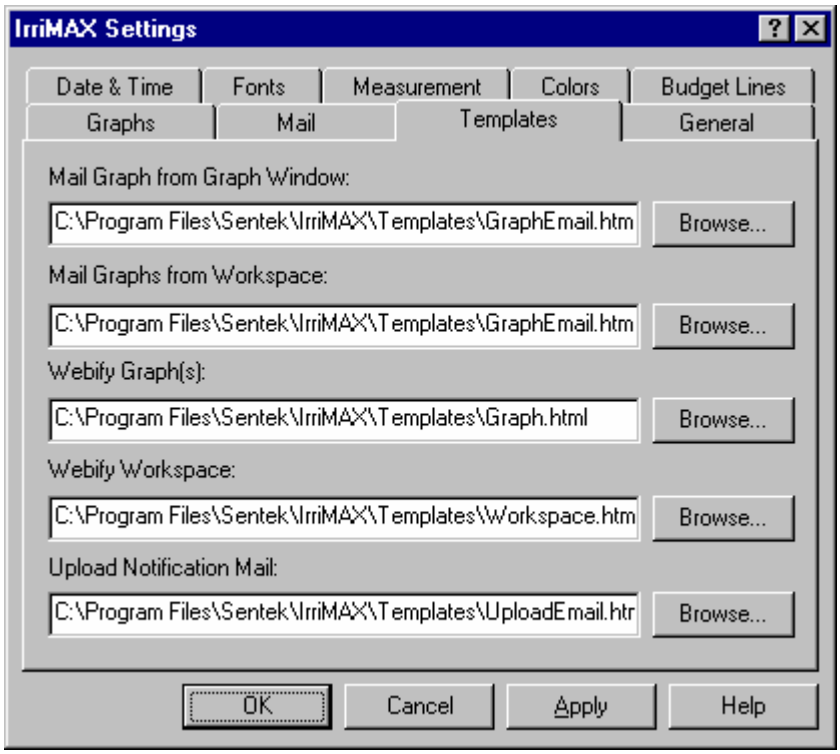
IrriMAX will attempt to send an email to the address that you entered in the **Sender Identification** section, using the mail server specified in the **Outgoing Mail Server** section.

Template Settings

The *Templates* tab of the *IrriMAX Settings* dialog box is used to supply the file paths of the default templates to use when mailing or webifying graphs and workspaces.

If the template properties of the graph and workspace documents are left blank, then the templates used will be the ones specified here.

If you wish to modify a template supplied with IrriMAX, you should first create a copy in a different location, then modify the copy. This protects your modifications from being lost when IrriMAX is reinstalled or upgraded. You can use the Templates tab to make your modified template the default



Mail Graph from Graph Window

This template is used when **Mail Graph** is chosen from a *Graph* window. The default is GRAPHEMAIL.HTML in the Templates folder within the IrriMAX program folder.

Mail Graphs from Workspace

This template is used when **Mail Graphs** is chosen from the *Workspace Manager* window. The default is GRAPHEMAIL.HTML in the Templates folder within the IrriMAX program folder.

Use of the default template will generate a separate email for each graph. To combine all the graphs into one email, browse for and select WORKSPACEEMAIL.HTML from the Templates folder.

Webify Graph(s)

This template is used when a graph is webified, by choosing either **Webify Graph** from a *Graph* window or **Webify Workspace** from the *Workspace Manager* window. The default is GRAPH.HTML in the Templates folder within the IrriMAX program folder.

There are special sections within the default template that generate different code depending on whether the graph is standalone or part of a workspace.

Webify Workspace

This template is used when **Webify Workspace** is chosen from the *Workspace Manager* window. The default is WORKSPACE.HTML in the Templates folder within the IrriMAX program folder.

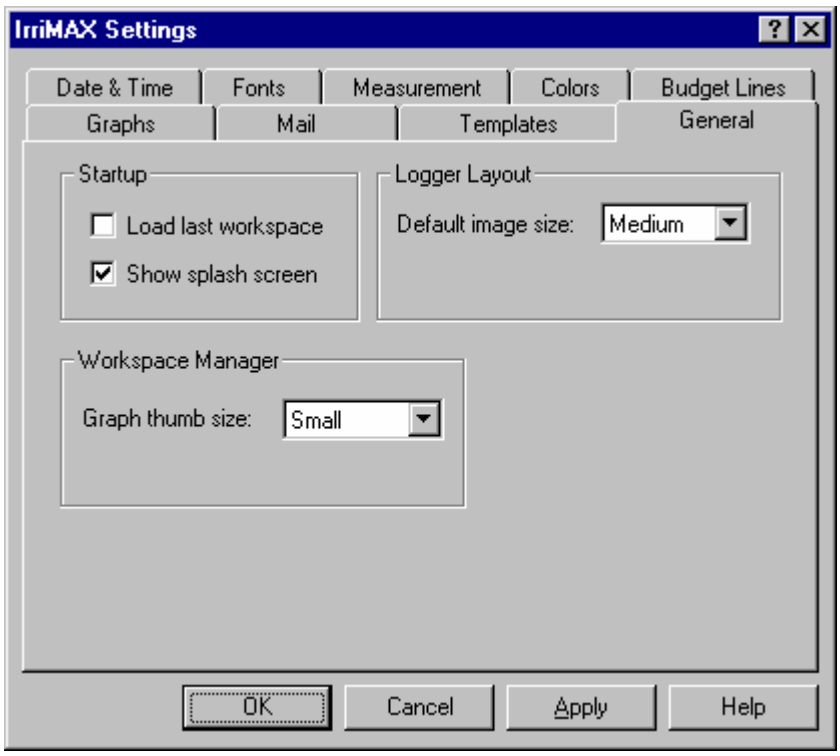
Upload Notification Mail

This template is used to generate an email message when a webified workspace has been successfully uploaded. The default is UPLOADEMAIL.HTML in the Templates folder within the IrriMAX program folder.

General Settings

The *General* tab of the *IrriMAX Settings* dialog box contains three sections:

- Startup settings
- Logger layout settings
- Workspace Manager settings



Startup Settings

IrriMAX can be configured to open the last used workspace each time it is started. This is a convenient feature if you regularly use the same workspace. To enable this feature, check the **Load last workspace** checkbox.

Holding down the SHIFT key while IrriMAX starts will prevent the opening of the last workspace.

The splash screen is the Sentek graphic picture that displays when the software is started. To prevent the splash screen from appearing, ensure that the **Show splash screen** checkbox is unchecked.

Logger Layout Default Image Size

The size of the default logger and site icons, on the *Layout* window, may be changed as required by selecting **Small**, **Medium** or **Large** from the **Default Image Size** dropdown list.

If you select a new default size, the new size only applies to newly added image objects in the layout window. This is when new database is added to a layout, or when new site is added to an existing database in the layout document.

Workspace Manager Graph Thumb Size

A miniature 'thumbnail' image of each graph can be displayed in the *Workspace Manager* graph list. Select one of the following from the **Graph thumb size** drop-down list:

- **None** - Select this to turn off the display of thumbnail images. Use this setting to maximize space for other information, or improve performance of IrriMAX if your computer is slow.
- **Tiny** - The thumbnails fit exactly into the standard row height of the graph list. Their presence does not decrease the number of rows that can be displayed at a time.
- **Small, Medium, Large, Extra Large** - These sizes allow a more detailed thumbnail to be shown, at the expense of space for other information. Small and Medium provide a good view of the graph without using too much space. Large and Extra Large may be legible enough to substitute for viewing the full graph window under some circumstances.
- **Enormous** - This selection generates a large image without any downscaling. If the workspace window is maximized on a 1280x1024 pixel-wide screen, there will be enough space for two graph images.

New Database Wizard

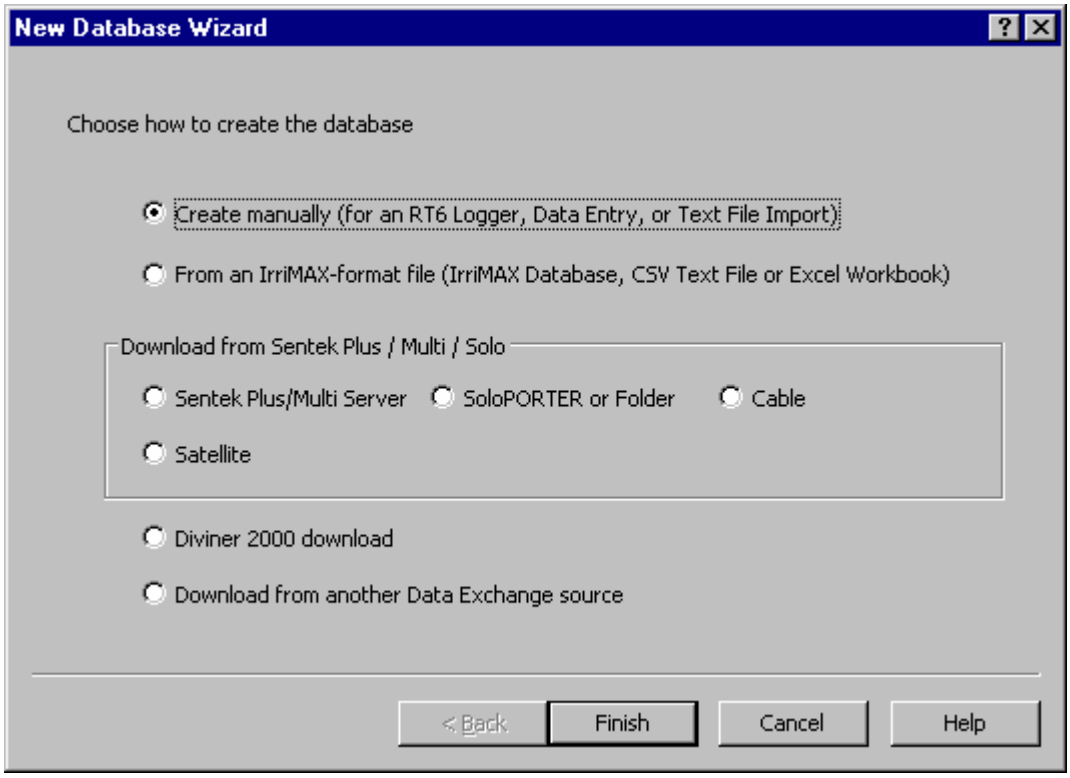
The *New Database Wizard* assists with the creation of a new IrriMAX database (SDB file), then automatically adds the created database to the workspace's database list.

IrriMAX databases can be created manually, or they can be created by downloading from various sources. If they are created by downloading, the download command is stored in the workspace to assist with subsequent downloading of new readings to the database.

Ø To invoke the New Database Wizard

- From the workspace manager **File** menu, choose **New> Database...**
- Or right-click on an empty part of the workspace manager's database list, and choose **New Database…** from the popup menu.

The first page of the wizard allows you to choose how the database will be created. Choose an option, then click **Next** (or **Finish** if you choose to create the database manually.)



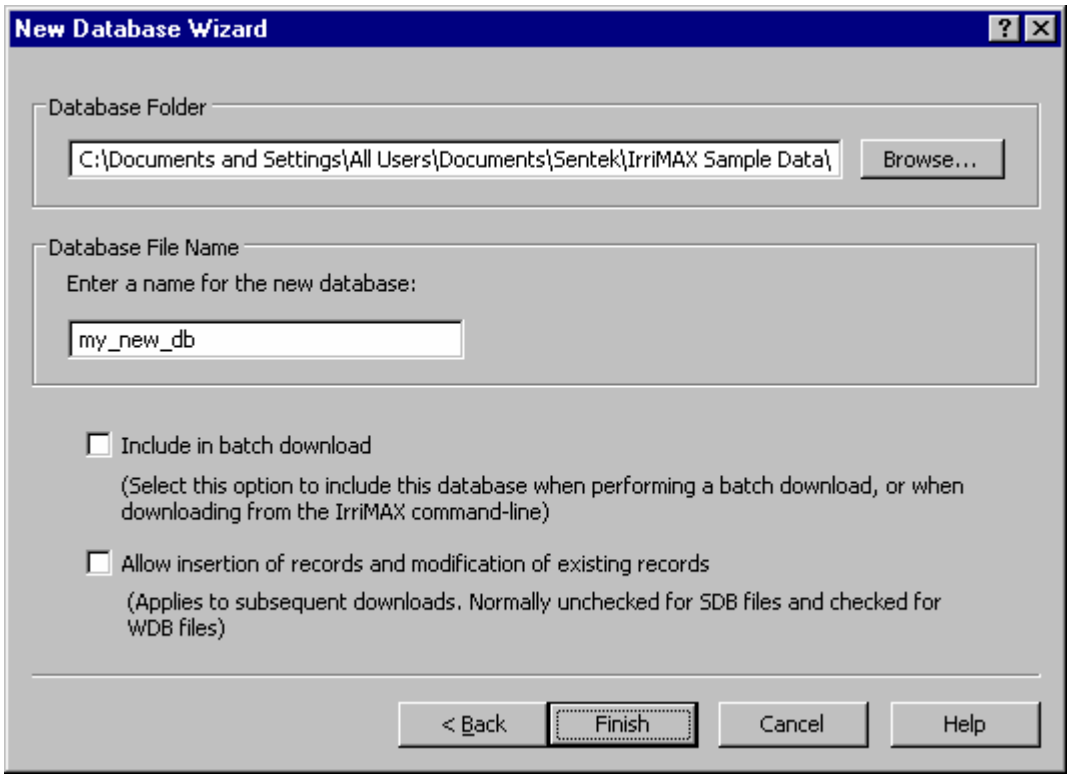
Ø To create the database manually

1. Select the **Create manually** button
2. Click **Finish** to create a database using the *Logger Configuration Dialog* (see page 91.)

Ø To create the database by download

1. Select the button for your desired download source.
2. Click **Next** to proceed to the Wizard page for that source.
3. Enter the information required for the source you have chosen.
4. Click **Next** to proceed to the final page of the wizard (see below).

The final page of the New Database Wizard is used to choose a name and location for the created database(s), and set some options for subsequent downloads.



Database Folder

Type the path of a folder in which the new database(s) will be created, or click the **Browse…** button to pick a folder using the *Browse for Folder* dialog.

Database File Name / Root Name for Multiple Databases

This control is named according to whether your download source supports multiple destinations.

- If the source creates a single database, enter a name for the new database, without the .SDB file extension.
- If the source potentially creates multiple databases (e.g. Diviner 2000), enter the root name for these databases. The final name for each database is composed of the root name, plus a suffix supplied by the source.

Include in batch download

Databases with download commands defined can be marked to be included in batch or unattended download operations. It is then possible to download into all these databases in one go, by manually invoking the batch download, or by running IrriMAX with the /DOWNLOAD command-line switch.

This option has no effect when initially creating the database. It can be modified later using the *Download Wizard* (see page 88.)

Allow insertion of records and modification of existing records

IrriMAX databases are usually updated by appending new readings. Existing readings are unaffected by a download. Select this option to allow modification of existing records and insertion of new records between existing records.

This option has no effect when initially creating the database. It can be modified later using the *Download Wizard* (see page 88.)

Ø To complete the New Database Wizard

Click **Finish** after completing the final page. If all goes well, the *Download Window* will appear at the bottom of the workspace manager window (see page 41) and display feedback from the download operation.

If a database is successfully created, it will be added to the workspace's database list (see page 46.)

If there is an error creating the database, you will be returned to the final page of the New Database Wizard. From here you can click the **Back** button to modify the options for your chosen source and try again.

The workspace manager's database list displays ⇩ if download settings are defined, or  if there are download settings and the database is flagged to be included in a batch download.

If more than one database is created, the download settings are stored against one master database and the other databases display  to indicate that their download is linked to the download of another database. Sorting the database list by the column containing these icons will group all linked databases with their master database.

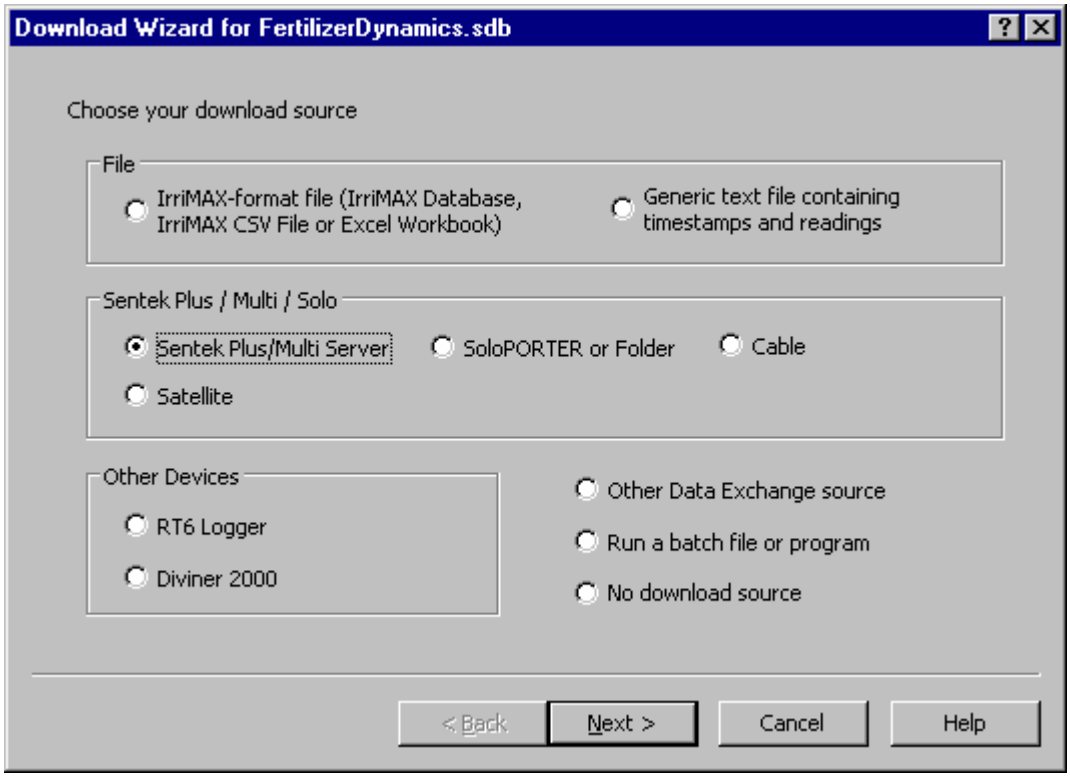
Download Wizard

.The *Download Wizard* is used to configure how readings are downloaded to a database. The settings are stored within the workspace to enable repetition of downloads, either manually or as part of a batch or unattended download.

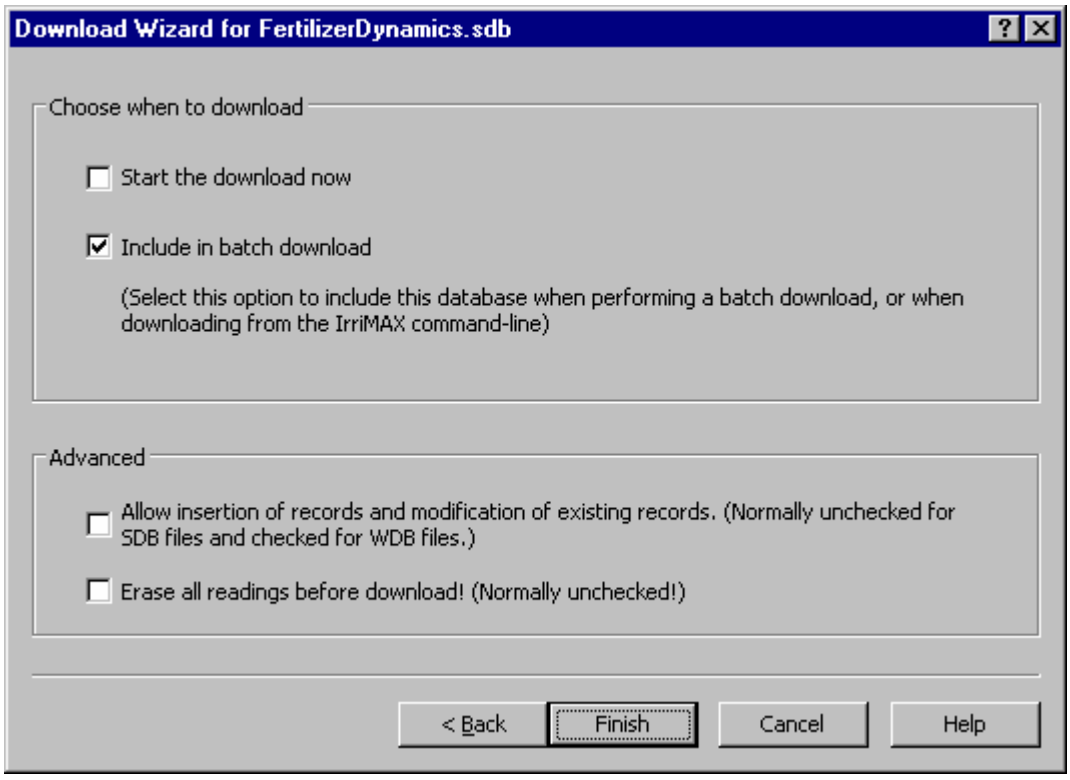
Ø To invoke the Download Wizard

- Click on a database in the workspace manager's database list, then select **Download Wizard…** from the **Edit** menu.
- Or right-click on a database in the workspace manager's database list, then choose **Download Wizard…** from the popup menu.
- Or click on the relevant pane in the graph window, then choose **Download…** from the Tools menu. Note that if you invoke the Download Wizard from the graph window, then the download properties are stored in the graph document, not the workspace document. You will need to step through the wizard each time you download, and the download can't be included in the workspace's batch download process.

The first page of the wizard allows you to choose how the database will be updated. Choose an option, then click **Next** (or **Finish** if you choose the **No download source** option.)



The final page of the Download Wizard is the same for all download sources. It allows the setting of some final options before saving the download settings to the workspace and optionally starting the download.



Start the download now

Choose this option to automatically start the download when the **Finish** button is clicked.

Include in batch download

Databases with download commands defined can be marked to be included in batch or unattended download operations. It is then possible to download into all these databases in one go, by manually invoking the batch download, or by running IrriMAX with the /DOWNLOAD command-line switch.

Allow insertion of records and modification of existing records

IrriMAX databases are usually updated by appending new readings. Existing readings are unaffected by a download. Select this option to allow modification of existing records and insertion of new records between existing records.

Erase all readings before download!

This option will empty the database before each download operation. This is useful if the role of the database is to be an exact copy of the data in the download source.

Warning: Use of this option with an inappropriate source can cause loss of data.

Ø To complete the Download Wizard

Click **Finish** after completing the final page. If you chose **Start the download now**, the *Download Window* will appear at the bottom of the workspace manager window (see page 41) and display feedback from the download operation. Otherwise the download settings will simply be stored in the workspace document for later use.

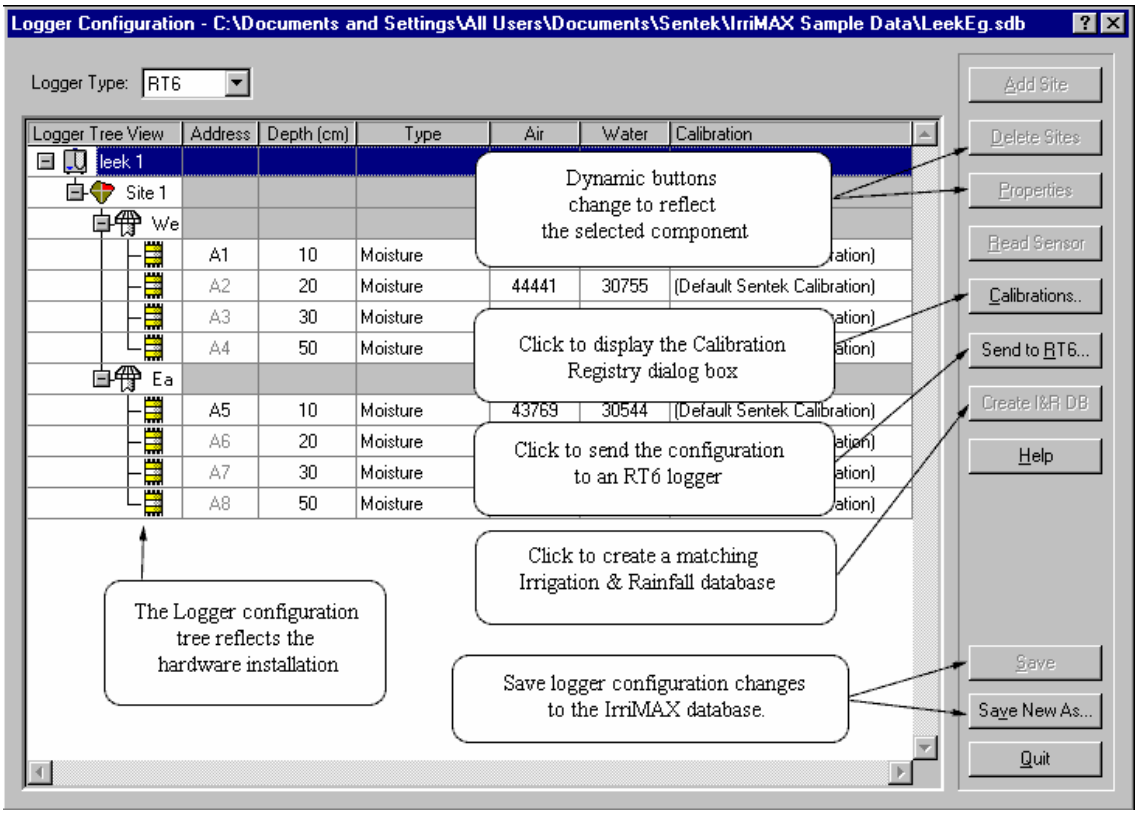
The workspace manager's database list displays  if download settings are defined, or  if there are download settings and the database is flagged to be included in a batch download. Double-clicking on these icons will invoke the Download Wizard again.

Logger Configuration Dialog

The *Logger Configuration* dialog is used to configure the database associated with a logging device. In the case of the RT6 logger, it is used to configure the logger itself.

The dialog supports two types of logger:

- Sentek RT6 loggers, which support up to 4 sites and probes on each of two runs (A and B). Each run supports up to 16 moisture sensors.
- Non-RT6 (type *Unspecified*) loggers. These loggers can have TriSCAN (moisture and salinity) sensors, matric potential, irrigation, rainfall and custom sensors. The database can have up to 16 sites, 99 probes and 999 sensors.



The dialog displays the current logger configuration in tree form as a hierarchy of sites, probes and sensors under a single logger. There are various columns describing the sensors.

Ø To open the Logger Configuration dialog box

The dialog can be accessed from many different areas of the IrriMAX software and utilities.

- From *Workspace Manager*, choose **New Database** from the **File** menu to create a new database.
- From *Workspace Manager*, choose **Open Database…** from the **File** menu. Now browse for an existing database file to open. Alternatively select the database in the Database List and choose **Open…** from the right-button popup menu.
- From the *Layout* window, right-click on a logger icon and choose **Logger Configuration…** from the popup menu to open an existing database.
- From the *Graph* window, select the pane whose database you wish to open, then choose **Logger Configuration…** from the **Tools** menu.
- From the *Database Entry* utility, choose **New Database…** from the **File** menu to create a new database, or choose **Logger Configuration…** from the **File** menu to view the currently open database.

- From *Database Manager*, choose **New Database…** from the **Tools** menu to create a new database, or select a single database from the list in the main window then choose **Edit Configuration…** from the **Tools** menu. Refer to the **Database Manager User Guide** for details.

Using the Logger Configuration dialog

The logger configuration tree represents the way in which a logger and its probes and sensors are setup. The **Add** and **Delete** buttons are dynamic and change according to the type of component that is selected in the logger tree view. This configuration can be sent to an RT6 logger using the **Send to Logger** button.

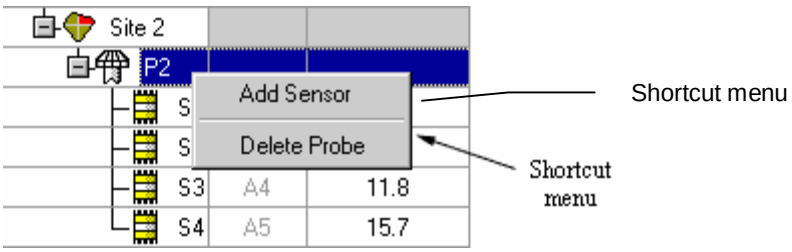
To collapse the logger tree view, click ⊟.
To expand the logger tree view, click ⊞.

To add components to the logger tree view you can:

- use the **Add** buttons
- right-click on the hardware element to display the shortcut menu listing the options specific to the selected element.

For example, to add a sensor to a probe you can do one of the following:

- Click Add Sensor.
- Right-click on the probe and select **Add Sensor** from the shortcut menu.



Click this button...	...to perform this function	The button changes to...
Add Site	Add a site to the logger.	Add Probe
Add Probe	Add a probe to a site.	Add Sensor
Add Sensor	Add a sensor to a probe.	Add Sensor >> Moisture Moisture / Salinity Custom Sensor Irrigation Rainfall Matric Potential Matric Potential / Salinity The button label changes and displays a sub-menu when **Unspecified** logger type is selected.
Delete Sites	Delete all sites from the logger.	
Delete Site	Delete a site from the logger. The line directly above the one that has been deleted is highlighted.	The **Delete** button corresponding to the highlighted component.
Delete Probe	Delete a probe from the site. The line directly above the one that has been deleted is highlighted.	The **Delete** button corresponding to the highlighted component.

Click this button...	...to perform this function	The button changes to...
Delete Sensor	Delete a sensor from the probe. The line directly above the one that has been deleted is highlighted.	The **Delete** button corresponding to the highlighted component.
Read Sensor	Take normalizing sensor readings from the selected sensor. See page 100.	Not visible when **Unspecified** logger type is selected.
Calibrations..	Access the Calibration Registry. See page 103.	
Send to RT6...	Send the logger configuration to the RT6 logger. See page 98.	Not visible when **Unspecified** logger type is selected.
Create I&R DB	Create a new Irrigation & Rainfall database to match the current logger's site names.	
Help	Access online help.	
Save	Save changes made to an existing logger configuration.	
Save New As...	Save or clone a new logger configuration.	
Quit	Close the logger configuration dialog box.	

RT6 logger Setup rules

The configuration is limited to any one of the following conditions:

On one logger you can have:

- a maximum of 32 sensors divided into 2 cable runs of 16 sensors
- a maximum of 8 probes
- a maximum of 8 sites

On one cable run you can have:

- a maximum of 16 sensors

On one probe you can have a maximum of 16 sensors.

You should not create a new irrigation & rainfall database until you have finalized the new logger sites configuration.

Naming conventions

Probe names are limited to three characters

Logger names are limited to 22 characters for RT6 loggers or 32 characters for non-RT6 loggers.

Site names are limited to 32 characters

Address column

An address is a sequential alphanumeric reference marking the position of a sensor on a cable and the position of that sensor in relation to other sensors on the same cable, e.g. A4. One RT6 logger can support two cable runs consisting of an arrangement of probes and sensors. Cable runs may be addressed as Run A (addresses A1-A16) or Run B (addresses B1-B16). Only the addresses A1-A16 and B1-B16 may be used.

If the logger type is **Unspecified** rather than **RT6**, then Run B addresses are not available.

Addresses are automatically assigned when each sensor is added. If, after you have added all sensors, you want to rearrange the address sequences you can change the address manually. If the address is dimmed, it cannot be altered. You must alter the address (from the sequence) that is not dimmed.

An address is changed by clicking on the address box and entering a new alphanumeric address or using the arrows within the cell to scroll to the new address. The address of each sensor must be unique. RT6 addresses must increase sequentially on each run with no gaps. The order of the addresses is not dependent on the probe or site name.

Depth (cm/inches) column

The depth is the depth of the sensor, in position, below ground level. The depth is changed by clicking on the depth box and entering a new depth or scrolling to a new depth. Sensors on the same probe must have unique depths.

Note: The depth indicator must be entered according to the defaults for sensor spacing (10 cm or 4 inches). A depth of anything other than multiples of the spacing value is invalid.

Depths of zero are permissible if the logger type is **Unspecified**. Sensors at zero depth are assumed to be above ground. They must still be added underneath a probe, however.

Air and water columns

The air and water columns display the normalized sensor reading for the sensors. Moisture sensors need to be normalized for air and water readings - the two extreme conditions. Normalizing sensors means taking air (no moisture) and water readings and storing them in their appropriate cells in the *Logger Configuration* dialog box. This then stores these values in the database tables. When a new logger configuration is created, a default air count (65535) and water count (0) display.

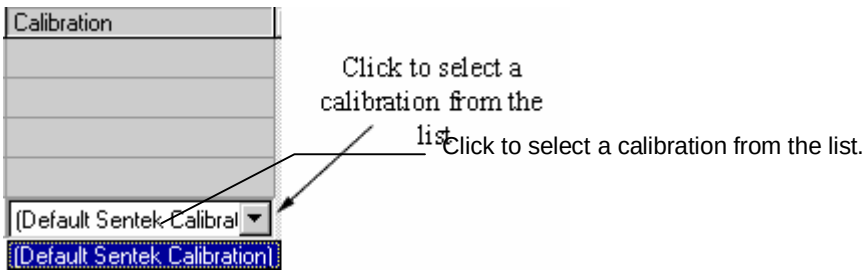
Note: It is important to normalize the air reading in non air-conditioned, non-humid air for the most accurate base reading, as the presence of any moisture will affect readings.

Calibration column

The calibration column displays the calibration that is assigned to the sensor. Sensor calibration is selecting the right calibration equation for the soil type in which the sensor is working. The calibration equation is a formula used for transforming the raw sensor reading to moisture units.

Different sensors may require different calibrations for different depths through out the soil profile. Therefore, a soil profile consisting of a sand surface layer on top of a clay layer below, can be measured accurately as different soil types respond differently when taking moisture measurements.

Calibrations are selected for each sensor by clicking on the calibration column. A drop-down arrow appears and alternative calibrations can be selected from the drop down list.



The default calibration (Default Sentek Calibration) is assigned to all new moisture sensors. When the basic logger configuration has been established and more calibration equations have been added to the Calibration Registry, the logger configuration is edited and accurate calibrations are assigned to sensors.

Custom sensors are assigned (Default calibration).

Ø To add, change or delete a calibration

From the *Logger Configuration* dialog box click **Calibrations...**.

The *Calibration Registry* dialog box displays. See page 103.

Salinity, Matric Potential and Custom Sensors

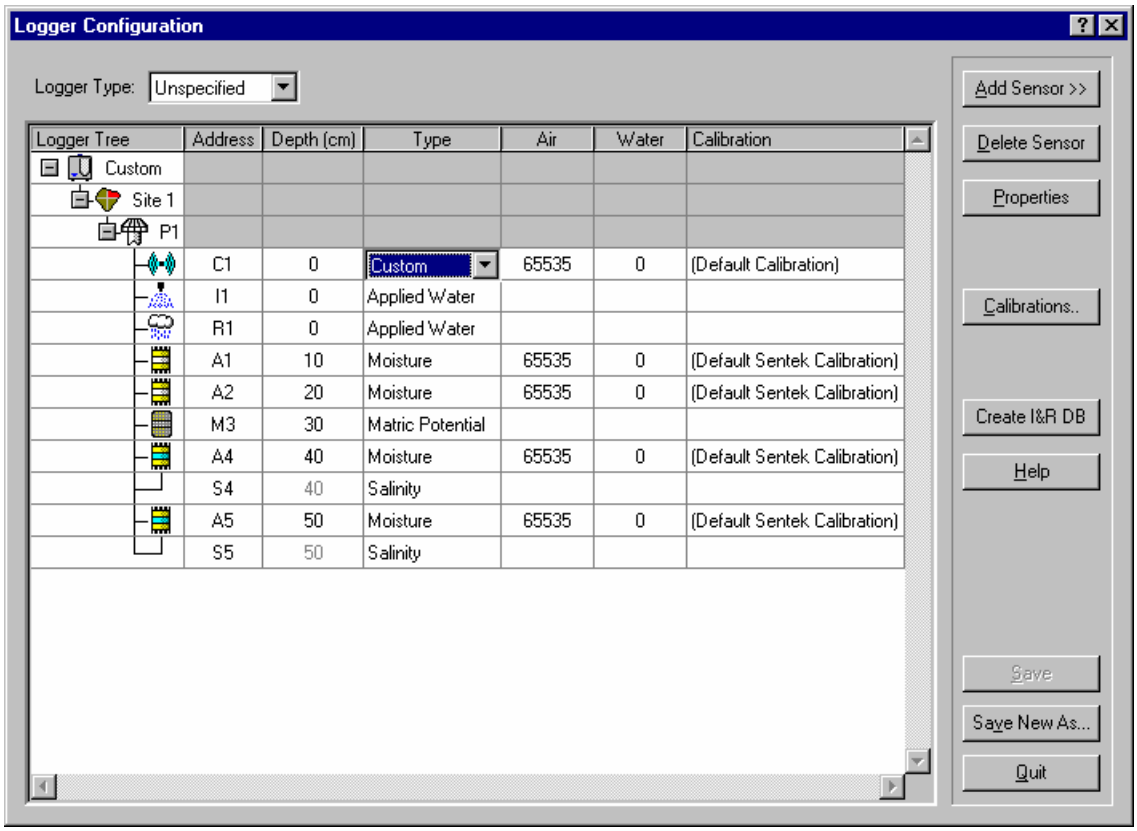
IrriMAX has the capability of creating databases that comprise:

- Moisture sensors
- Salinity sensors, such as TriSCAN sensors
- Matric potential sensors
- Custom sensors e.g. temperature, wind speed, leaf wetness

Third-party logger software can update these databases via the AutoSDB2 programming interface. Alternatively the data can be supplied in a text file (CSV) or Excel spreadsheet (XLS) using **Data Exchange**. These databases are not supported by RT6 loggers.

IrriMAX can graph the resultant fertilizer/salinity data in a salinity graph pane, above the moisture pane and custom sensors in custom sensor panes. The *Logger Configuration* dialog allows you to change the logger type from **RT6** to **Unspecified**. Once the logger type is **Unspecified** you can add moisture sensors, matric potential sensors, custom sensors, dual moisture/salinity, or dual matric potential/salinity sensors. A column on the dialog indicates the sensor type and the tree view symbols are different for salinity sensors.

TriSCAN sensors are supported on Sentek EnviroSMART and EasyAG devices.



A type "Unspecified" logger can be configured with up to 16 sites, 99 probes and 999 sensors, in any combination.

Each sensor type has a different pictorial representation:

- (A) Moisture sensors
- (A/S) Moisture/Salinity Sensors (salinity is always dual)
- (M) Matric Potential
- (M/S) Matric Potential/Salinity Sensors (salinity is always dual)

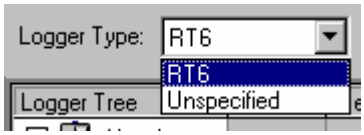
- (C initially) Custom Sensors
  Note: an asterisk will appear in the type column if the sensor properties do not match the properties in the sensor preset registry.

Creating a new database

This section illustrates the creation of databases using the *Logger Configuration* dialog.

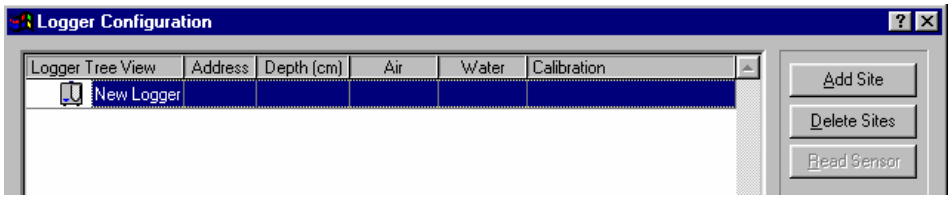
Hint: Document the cabling configuration of the loggers, sites, probes and sensors in the field on a piece of paper. Document the database configuration on paper as well. Ensure that the two maps represent the same information before loading the settings into the *Logger Configuration* dialog box.

The dialog can operate in two modes corresponding to the type of logger - RT6 or Unspecified. If RT6 is selected, then you can only add moisture sensors and the validation rules are stricter.

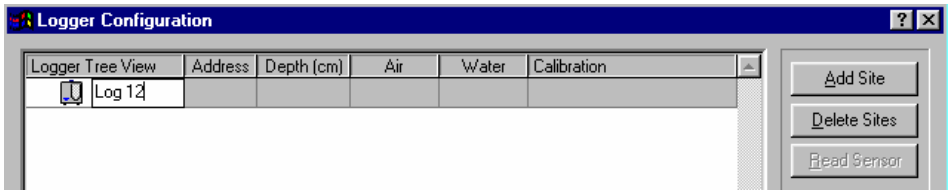


Ø To create a new RT6-compatible database

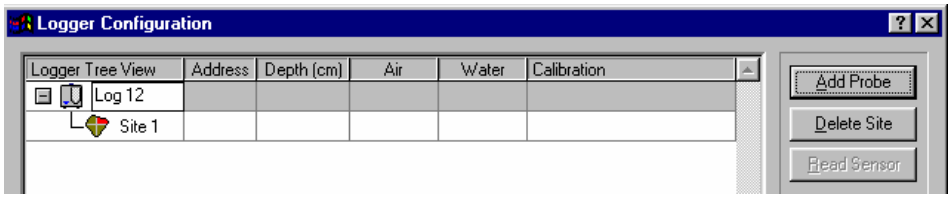
1. From the Workspace Manager **File** menu select **New** and click **Database.** Alternatively click the corresponding toolbar button.
   The *Logger Configuration* dialog box displays the text, 'New Logger', in the Logger Tree column. Note the **Add Site** button at the top right.



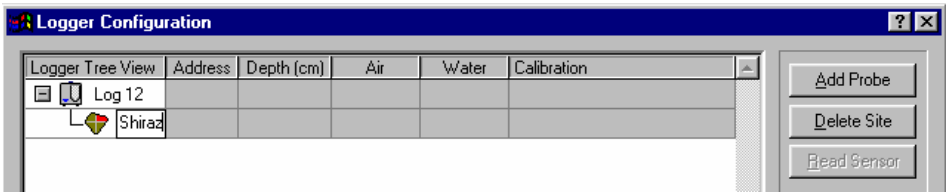
2. Click on the text, 'New Logger', and enter the "Logger ID" of the logger as used in the field. For example, 'Log12'.
   If you are unsure of the Logger ID, you can use **Logger Manager** to obtain it.
   Note: Logger names are limited to 22 characters



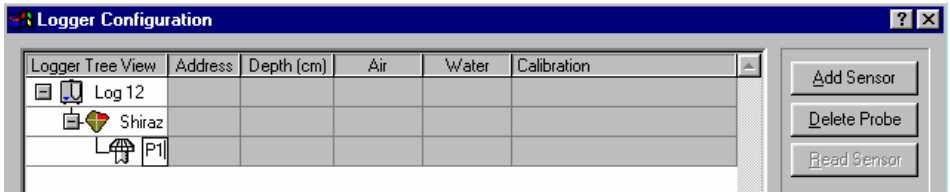
3. With the cursor still in the logger name, click **Add Site**. A site is added under the logger with the default name of 'Site 1'. Note the **Add Site** button changes to **Add Probe**.



4. Click on the text 'Site 1' and enter the name of the site as used in the field.
A site represents a block with similar physical characteristics such as crop type, soil type or irrigation facility. There may be more than one probe per site. This is the name given to the site on the *Layout* top cap image. If there are multiple probes in a site the image is shown as a cluster of top caps.
For example, 'Shiraz' for one block of shiraz grapes.
Note: Site names are limited to 18 characters.

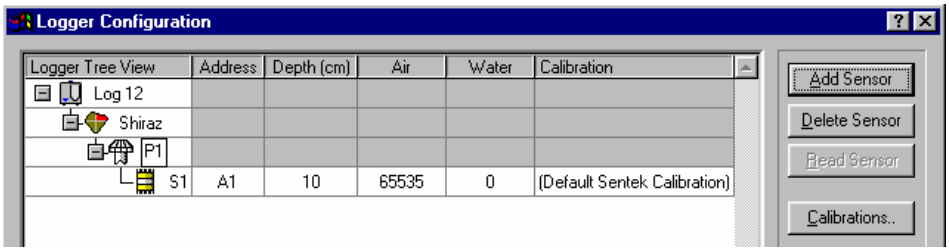


5. With the cursor still in the site name, click **Add Probe**. A probe is added under the site with the default name of 'P1'. Note the **Add Probe** button changes to **Add Sensor**.



6. Click on the text 'P1' and enter the name of the probe as it is labeled in the field.
In this example, the probe name is left as 'P1'.
Note: Probe names are limited to 3 characters.

7. With the cursor still in the probe name, click **Add Sensor**. A sensor is added under the probe with the name 'S1'. Each sensor is assigned a sequential number based on this format.



8. Continue adding sites, probes and sensors as required.
Note: The buttons for adding and deleting components are dynamic. The button name and function depend on which component is selected.

9. Click **Save New As...**.
The *Save As* dialog box displays.

10. In the *Save in:* dialog box, click on the down-arrow and select a location for the new database.
The contents of the selected directory displays.

11. In the *File name:* box, enter a file name for the new database.

12. Click **Save**.
The *Save As* dialog box closes.

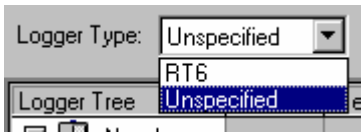
13. Click **Quit**.
The *Logger Configuration* dialog box closes.

Ø To create a database containing salinity and other sensors

These databases are created in the same way as an RT6-compatible database, but on the *Logger Configuration* dialog the **Logger Type** field must be set to "Unspecified". Once this is done, adding sensors is done in the same manner but with the ability to add any type of sensor without the restrictions imposed by the RT6.

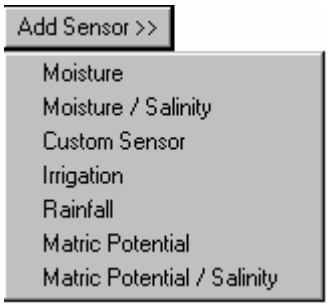
1. Open the database (SDB file) for which you wish to create a matching irrigation & rainfall database (.wdb) in the *Logger Configuration* dialog.

2. Select **Unspecified** in the Logger Type field.

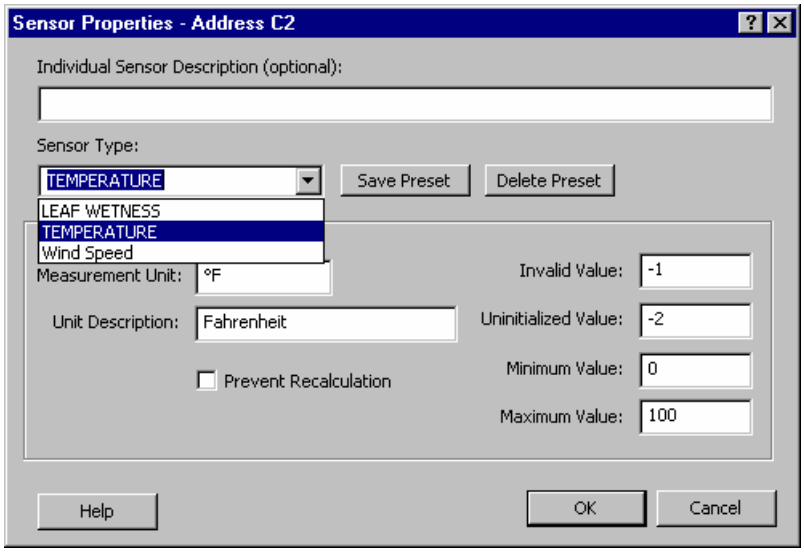


3. Change the Logger name, and add sites and probes.

4. Click the **Add Sensor** button and select the type of sensor to add. Moisture sensor addresses are always prefixed by "A", salinity sensors are prefixed by "S", matric potential "M", Irrigation "I", Rainfall "R" and custom "C" (that can be changed). The sensor number can be in the range 1 to 999.



5. Custom sensors require an additional step to configure their characteristics. Click in the custom sensor address field and the sensor type and address become editable. Enter a new type in the range A to Z excluding reserved types of A, B, M, I, R, V and S, then the sensor address number. Then click the **Properties** button to set its properties



Select the desired sensor type or enter the units and valid range and optional description for the sensor and click **OK.** See *Sensor Properties* Dialog for further details. Only sensors with matching characteristic can be graphed in the one graph pane.

6. When the configuration is built as required, click **Save New As** and save the database in your desired folder.

Note:
There are various restrictions when you create databases containing salinity sensors. You cannot change calibration equations or normalization values. This data is supplied during the download of the data from third-party loggers. For TriSCAN sensors these values are preset during the configuration of EnviroSMART and EasyAG devices.

Ø To create a new irrigation & rainfall database

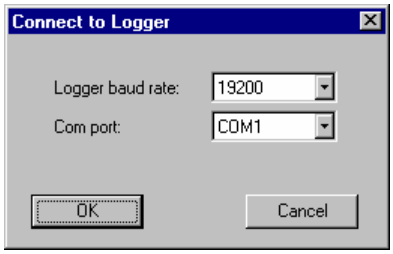
1. Open the database (SDB file) for which you wish to create a matching irrigation & rainfall database (.wdb) in the *Logger Configuration* dialog.
2. Make sure you have finished adding sites to the soil moisture database
3. Click '**Create I&R DB**' to create a matching irrigation & rainfall database (one irrigation and one rainfall sensor for each site in the soil moisture database).
   Note: If the button is dimmed, there is an I&R database already existing.
4. A message informing you that a new irrigation & rainfall database was created successfully will appear.

Sending configurations to the RT6 logger

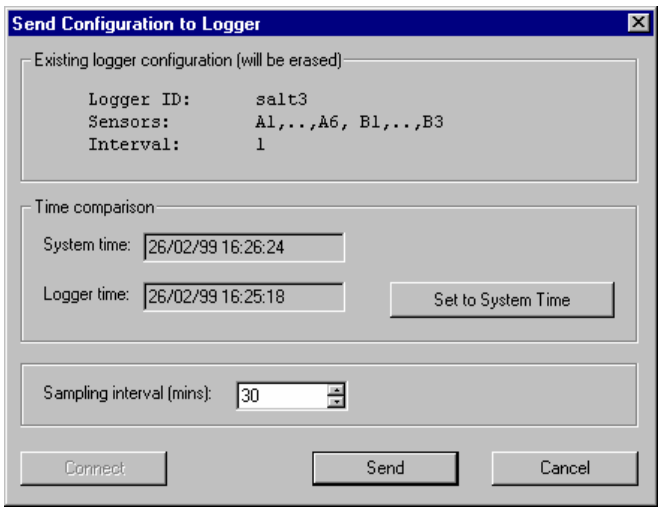
When a database is configured, the new configuration settings can be sent to an RT6 logger. A direct physical connection between the logger and the PC serial port is required. When a connection to the logger has been established, adjustments to the current sampling interval and PC and logger time can be made.

Ø To send configurations to the RT6 logger:

1. From the **Logger Configuration** dialog box, click **Send to Logger.**
   If the *Logger Configuration* dialog box has not yet established a connection to the logger, or if the connection was broken, the *Connect to Logger* dialog box displays.



2. Select the COM port and baud rate for connection to the logger, and click **OK**.
3. The *Send Configuration to Logger* dialog box appears.



Note: The section titled *Existing logger configuration (will be erased)* shows the information currently stored in the logger; the logger ID, the sensor addresses and the sampling interval. If you do not want to overwrite this information click **Cancel**.

4. The *Time comparison* section shows the computer's system time and the time in the logger. Click **Set to System Time** if you wish to synchronize the time settings on the logger and the computer.
   Note: Make sure that your computer's clock is correct.
   Note: The logger records data against a date and time. This is known as a time stamp.
   If the logger's clock is set backwards, the new time stamps overlap the previous time stamps. Data corresponding to the new time stamps is not available.

5. Enter the sampling interval required for this database.

Warning:
The next step will erase all existing data in the logger. Please make sure that you have already downloaded that data.

---

6. Click **Send**.
   This will overwrite the logger ID, sensor list and sampling interval in the logger. It will also erase all readings in the logger. A message displays asking you to confirm this action.

7. Click **OK**.
   The database configuration is sent to the logger.
   The *Send configuration to Logger* dialog box closes but a connection still exists to the logger.

Note: If the connection to the logger is broken while you are working in the *Send configuration to Logger* dialog box, you will receive an error message and the **Send** button will be disabled. Use the **Connect** button to attempt to re-establish a connection. Changes to the COM port or baud rate cannot be performed. If these settings need to be changed, click **Cancel** to return to the *Logger Configuration* dialog box, and then click **Send to Logger** again.

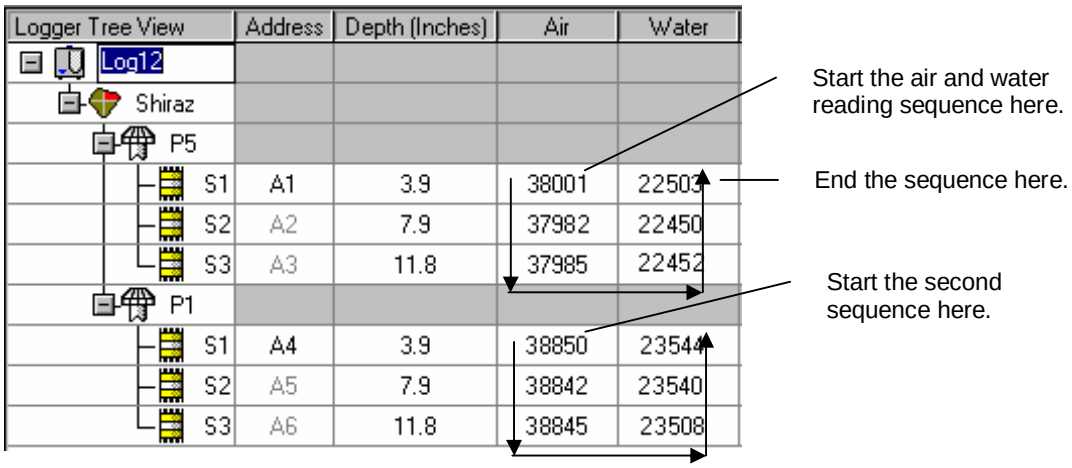
Normalizing RT6 sensors

RT6 Sensors need to be normalized for air (dry) and water (saturated) readings, the two extreme conditions of soil moisture content. Normalization takes into account variations between sensor responsiveness. Normalizing sensors means taking air and water readings and storing them in their appropriate cells in the *Logger Configuration* dialog box. These values are then stored in the database tables. When a new logger configuration is created, default air count (65535) and water count (0) are set.

The *Logger Configuration* **Read Sensor** button is dimmed until you select, in the logger tree, either the air or water cell for a sensor. The air or water count is then read by clicking the **Read Sensor** button, with the probe in an access tube.

The **Read Sensor** button remains depressed while the air or water count readings are taken. On one probe, air counts can be read sequentially by moving up and down the air count column using the arrow

keys on the keyboard. From this column, you can use the arrow keys to move to the water count column and start water readings when the probe is in place in the water filled chamber. Alternatively, click **Read Sensor** again to release it. In this way you can move to a new probe and start taking readings again.



The following steps assume that:

- The computer is connected to the logger
- Probe is installed in an access tube in dry air when taking air counts
- Probe is inserted into a "normalization container" when taking the water counts
  Note: Make sure the sensors do not get wet.

Ø To Normalize the sensors

1. Insert the probe into an access tube held clear from its surroundings. Click in the air value of the first sensor.
   The **Read Sensor** button is activated

2. Click **Read Sensor**.
   Note: If you have just sent your configuration to the logger, you will still be connected to the logger. If the logger is not already connected, the *Connect to Logger* dialog box displays. Select the logger baud rate and appropriate COM port and click **OK** to make the connection.

3. The air count is measured at regular intervals. The air count fluctuates at first and then stabilizes. When the air count has stabilized, press the keyboard down arrow to move to the next sensor.

4. When the air values are established, press the keyboard right arrow to move to the last reading in the water count column.

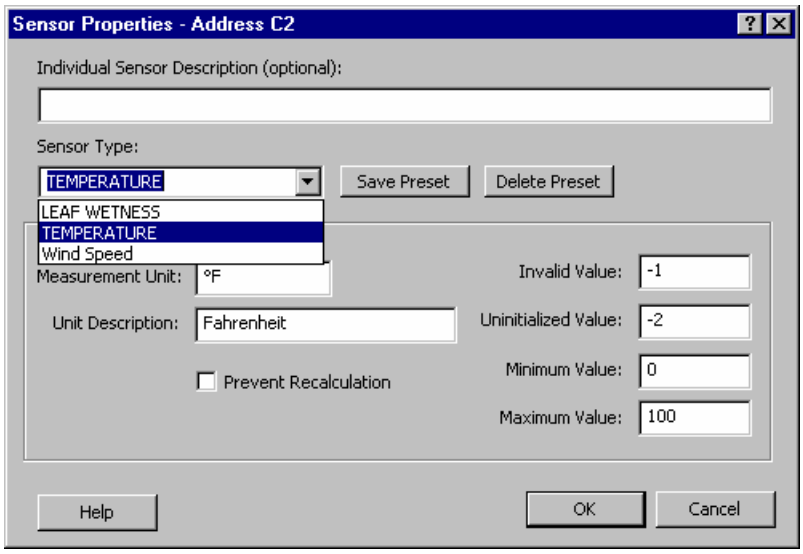
5. Insert the probe into the normalization container and position each sensor, in turn, to the middle of the container. The water count is measured at regular intervals. The water count fluctuates at first and then stabilizes. When the water count has stabilized, press the keyboard up arrow to move to the next sensor.

6. When all sensor readings on the probe have been taken, either:

   - Click **Read Sensor** again to stop the reading process, or
   - Press the keyboard up arrow once more to take you into the inactive cells.
     Note: Pressing **Enter** on the keyboard will also stop the sensor reading.

Sensor Properties Dialog

Sensor properties .are accessible from *the Logger Configuration* dialog by selecting a sensor row then either clicking the **Properties** button or right click on the row and selecting *Properties* from the popup menu.



The values for a newly created custom sensor are:

- Sensor Type: "Custom"
- Measurement Unit: "?"
- Unit Description: "Unknown"
- Invalid Value -1
- Unitialized Value -2
- Minimum Value 0
- Maximum Value 100
- Prevent Recalculation: unchecked

These values can be changed to reflect the characteristics of the sensor but it is recommended to save them in a preset which can be used later to build another sensor with the same characteristics.

Only custom sensor properties can be changed. Properties of Sentek reserve sensor types (A, B, S, M) can be viewed but cannot be changed.

Rules for custom sensors:

- Only sensors with matching characteristics can be graphed in a single graph pane (Sensor type, Measurement unit, range values)
- The graph pane vertical axis legend consists of the sensor type and measurement units in square brackets e.g. "Temperature [C]"
- You cannot save a preset for the default sensor type "Custom"
- Sensor characteristics cannot be changed once there is data in the database
- Clicking OK changes the characteristics of the sensor to match the entered values. Not the values loaded from the preset.
- If the sensor type is selected from the type list on the Logger Configuration dialog it inherits the characteristics from the preset registry.

Sensor Preset Registry

Once you have set the characteristics of a custom sensor you can save them in the custom sensor presets registry. When you add another custom sensor you can select the sensor type for the Sensor Type list, which will then set the characteristics to match the preset values.

Note:

For clarity and self documentation purposes it is recommended you assign a different sensor address symbol for each sensor type e.g. "T" for temperature sensors, "L" for leaf wetness

sensors.
It is also recommended that all sensors of a particular sensor type have the same properties. If sensor current properties do not match the preset registry properties an asterisk is added in the sensor type column of the logger tree.

Initially the preset registry is empty but as you **Save Preset** the information is saved in the file Sensors.ini, which is stored in the Sentek Public Folder.

Calibration Registry Dialog

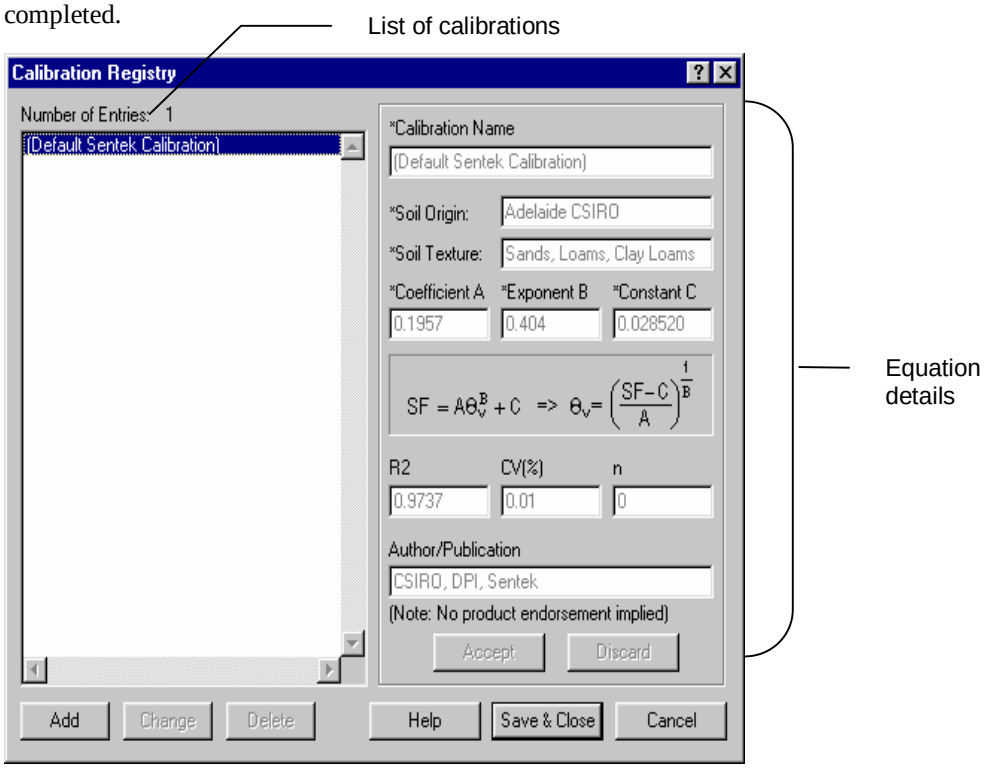
The calibration registry stores all calibration equations. Each calibration equation relates to a particular soil type.

Note: See the "Calibration of Sentek Pty Ltd soil Moisture Sensors" manual for further technical information. Advanced users can access the set of calibration equations that are described in the "Calibration-Readme.txt" file on the IrriMAX CD.

Each time a layout is opened in **IrriMAX**, the database calibration values are compared to the calibration registry. If the database calibration values are different to the registry values, you are notified of a discrepancy. This could occur if, for example, you have changed a calibration equation **after** the calibration was assigned to a sensor.

Similarly, if a database contains a calibration that is not in the registry, you are notified that the calibration is unregistered and have the option of adding the calibration to your registry. This could occur if, for example, you are using a database (with calibrations) that was configured on another computer.

Note: The boxes in the calibration registry dialog box that are marked with an asterisk (*) must be completed.



The calibration registry displays a list of all installed calibration equations and their details. If a database is loaded that has a calibration equation that is not present in the registry, you will be prompted to add it to the calibration registry.

Click this button...	...to perform this function
Add	add a new calibration equation to the *Calibration Registry*.
Change	change a calibration equation.

Click this button...	...to perform this function
Delete	delete a calibration equation from the registry.
Accept	accept the changes made to a calibration.
Discard	discard the changes made to a calibration.
Help	access online help.
Save & Close	save the changes and closes the Calibration Registry dialog box.
Cancel	close the calibration Registry dialog box without saving the changes.

Calibrations are specific to soil types. A calibration is a statistical equation that is based on a scattered group of sample values. This equation is represented by the Coefficient A, Exponent B and Constant C boxes.

When adding new calibrations to the registry it is important to complete as many details boxes as possible. The boxes marked with an asterisk (*) are mandatory.

In this box...	...enter the following details.
Calibration Name	The name of the new calibration. Calibrations may be named by institution, usage, developer or for a specific soil type. This field is limited to 99 characters
*Origin	The name of the organization or person who supplied the equation. This field is limited to 99 characters
*Soil Texture	The specific soil profile. This calibration equation is used to analyze. This field is limited to 99 characters
*Coefficient A	Calibration equation coefficient
*Exponent B	Calibration equation exponent
*Constant C	Calibration equation value
Equation display	No data is entered in this box. This box displays the formula that is used to calculate the raw sensor readings to calibrated moisture values.
R^2	The coefficient of determination (R-squared). This is a number between 0 and 1 that provides an indication of accuracy where 0 is inaccurate and 1 is accurate.
CV(%)	The coefficient of variation.
N	The number of sample values used. The higher the number the more objective the equation.
Author / Publication	The details of the author of the calibration and the publication details of where it first appeared. This field is limited to 99 characters

Warning:
Assign the correct calibration equation to your logger configuration. Calculations differ for different soil types. If the wrong calibration equation is used, data may be incorrect and misleading.

Sentek sensors are precise measurement instruments, however accurate absolute data for all soil types are not generated automatically.

If you wish to obtain accurate absolute readings of volumetric soil water content for scientific or other purposes, you must calibrate the Sentek sensors for every given soil type. See the manual "Calibration of Sentek Pty Ltd Soil Moisture Sensors" for a detailed description of the calibration procedure.

Calibration of sensors in a specific soil is done by comparing scaled frequency readings from an access tube installed in the field, or in a container in the laboratory, with values of volumetric water content determined gravimetrically from soil immediately adjacent to the tube.

When these values are plotted on a graph they form a relationship that is described by a mathematical calibration equation. In this way the moisture levels from the sensor are directly related to the real values determined from the soil.

Standard calibration equations are provided with the **IrriMAX** software. New equations can be added as required. These equations transform normalized raw data into volumetric soil water content values.

You can use the default calibration equation to convert the very first raw data into a graphical or text format. This shows the trends of soil water dynamics, before a site-specific calibration of the sensors can be undertaken. To obtain absolute data, you can insert your own calibration equation for every single sensor later. Alternatively, you can continue to use the default calibration equation to visualize changes on a relative scale.

Most **IrriMAX** users do not require absolute volumetric water content readings because they are using the relative changes in soil water dynamics for their daily irrigation management practices. Scientific users or users interested in the absolute values must carry out calibration of the Sentek sensor, as is the case with all other volumetric soil water monitoring devices.

Ø To add new calibrations to the registry

1. In the *Logger Configuration* dialog box, click **Calibrations**.
   The *Calibration Registry* displays.
2. Click **Add**.
3. Complete all boxes marked with an asterisk (*).
   Complete other boxes as required.
4. Click **Accept**.
5. Click **Save & Close** to save the changes and close the *Calibration Registry* dialog box.

Ø To change calibrations

1. In the *Logger Configuration* dialog box, click **Calibrations**.
   The *Calibration Registry* displays.
2. If adding a calibration from an existing database file, select the new equation from the registry list.
3. Click **Change**.
4. Complete or edit boxes as required. Ensure all boxes marked with an asterisk (*) are completed.
   Click **Accept**.
5. Click **Save & Close** to save the changes and close the *Calibration Registry* dialog box.

Ø To delete calibrations

1. In the *Logger Configuration* dialog box, click **Calibrations**.
   The *Calibration Registry* displays.
2. Select the equation to be deleted from the registry list.
3. Click **Delete**.
   The message "Do you wish to proceed with deletion?" displays.
4. Click **OK** to continue.
5. Click **Save & Close** to save the changes and close the *Calibration Registry* dialog box.

Editing and cloning soil moisture databases

Once you open a soil moisture database in the *Logger Configuration* dialog box, you can edit or clone the database as required. You cannot edit or clone irrigation & rainfall databases with the *Logger Configuration* dialog box.

Note for Diviner® 2000 users: If the database originates from a Diviner® 2000 unit, no parts of the configuration are editable and the database cannot be cloned. The Logger Configuration dialog box can only be used to view the configuration.

Cloning a soil moisture database

Cloning a database is the process of duplicating the configuration into a new file, but without the readings. When two loggers have the same or similar configurations, cloning the configuration and editing it may save time instead of creating a new one from scratch.

Note: Data Exchange also offers a method for cloning databases.

Ø To clone a database

1. Open the database file you wish to clone.
2. From the *Logger Configuration* dialog box, with the source configuration displayed, click **Save New As...**.
   The *Save As* dialog box displays.
3. In the *Save in:* dialog box, click on the down-arrow and select a location for the new database.
   The contents of the selected directory display.
4. In the *File name:* box, enter a file name for the new database
5. Click **Save**.
   The *Save As* dialog box closes. The *Logger Configuration* dialog box is now displaying the cloned database.
6. If you require a new irrigation & rainfall database, click '**Create I&R DB**'.
7. Click **Quit**.
   The *Logger Configuration* dialog box closes.

Editing a soil moisture database

The degree to which a database can be edited depends on whether it contains readings or not. The differences are described below.

Editing a database without readings

If the database does not contain moisture readings, all aspects of its configuration are editable. You can do any of the following:

- ü Change Logger ID, site labels and probe labels.
- ü Create and delete sites, probes and sensors.
- ü Change sensor addresses and depths.
- ü Change normalization values (air and water counts) for each sensor.
- ü Change sensor calibration equations.
- ü Create an I&R database

Editing a database containing readings

Once moisture readings are added to a database, the configuration of its sensors becomes fixed. If the database contains readings, you are limited to doing the following:

- ü Changing Logger ID, site labels and probe labels.
- ü Changing normalization values (air and water counts) for each sensor.

- ü Changing sensor calibration equations.

To protect the validity of the moisture readings already collected, you are prevented from:

- û Creating and deleting sites, probes and sensors.
- û Changing sensor addresses and depths.

Editing a database's sensor configuration after readings are taken

If it becomes necessary to change the physical layout of sites, probes and sensors after collecting moisture readings, you will need to clone the database. This will result in a database with an identical configuration, but no moisture readings. This new database can then be edited as desired, the configuration sent to the logger and readings downloaded.

Note: Readings can be transferred from the old database to the new one, using **Data Exchange**.

All existing graphs and layouts will still refer to the old database. You will have to add the new database to your layouts as required, and will have to create new graphs from it.

See page 106 for details on cloning a database. See below for details on editing a database.

Ø To edit a database

1. Open the database file you wish to edit.
2. From the *Logger Configuration* dialog box, do one or more of the following, as appropriate:
   - Make changes to the logger, site and probe labels as required by clicking on the existing labels and entering the new name.
   - Make changes to the normalization values as required, by clicking on the fields and reading new values from the sensors.
   - Make changes to the calibration equations for each sensor as required, by selecting new values from the drop-down list.
   - If the database does not yet contain moisture readings:
   - Make changes to the sensor addresses and depths as required, by clicking on the fields and entering new values.
   - If you want to delete any sites, probes or sensors, select the item.
     Click **Delete Site**, **Delete Probe** or **Delete Sensor** as required.
     Note: This is a single button but the text changes as different logger tree items are selected.
     Note: Deleting a site deletes all probes and sensors attached to that site. Deleting a probe deletes all sensors attached to the probe.
   - If you want to add an item, select the logger, site or probe to which you want to add a site, probe or sensor respectively.
     For example, to add a probe to a site, select the site.
     Click **Add Site**, **Add Probe** or **Add Sensor** as required.
     Note: This is a single button but the text changes as different logger tree items are selected.
3. Click **Save**.
   The changes are saved.
4. If the database is for an RT6 logger and you have changed the logger ID label or altered the configuration of sensors, you should update the logger by clicking **Send to Logger**.
   Note: This will erase all moisture readings in the logger's memory. If the readings have not yet been downloaded to a database, they will be lost.
5. Click **Quit**.
   The *Logger Configuration* dialog box closes.

Database Tools

IrriMAX provides a selection of tools for manipulating the readings in IrriMAX databases. These tools can be accessed from the following locations:

- In the *Workspace Manager* window, reveal the *Database List* and click on a database. Choose a tool from the **Tools** menu or the right-button popup menu for the database.
- In the *Workspace Manager* window, if the Database List is not visible or there is no database highlighted, choose a tool from the **Tools** menu. You can then browse for the required database using a file dialog.
- In the *Graph* window, click on a pane to select it then choose a tool from the **Tools** menu. The tool will apply to the database whose readings are shown in the currently selected pane.

Export from a database

The export function is a quick way to invoke Data Exchange with the chosen database preset as a source. You can export to any of the supported Data Exchange destination formats.

Ø To export data from a database

1. From the **Tools** menu of the workspace window or a graph window, select **Export…**
2. The **Data Exchange** dialog opens with the source database preset.
3. Click the **Set Range** button if you any want only a portion of the database. Then setup the destination parameters as wanted.
4. Click the **Start** button and wait for the export of data to complete. Then click the **Quit** button and return to the workspace or graph

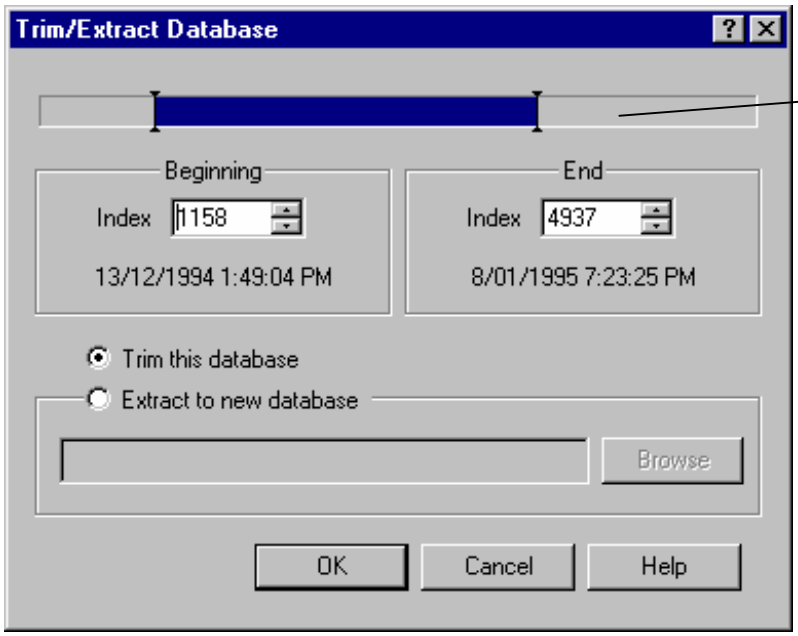
Trim/extract data from a database

The **Trim/Extract** command is used to remove data from a database or to copy data from one database to a new database. This command may be used to:

- remove old data that is no longer required
- remove corrupt data from the end of a database prior to reloading data.
- completely empty a database.
- copy an important part of the data to a new database file for archiving or demonstration purposes.

Ø To trim a database

1. In the *Database List* of the *Workspace Manager* window, click on the database to be trimmed.
2. From the **Tools** menu, or the right-button popup menu, click **Trim/Extract**.
   The *Trim/Extract Database* dialog box displays.



Note: The colored data slide bar represents the data that is to be kept in the database.

3. Select the data you wish to delete or extract using one of the following methods:

   - Click the left mouse button on the data slide bars and drag them to a specific time and date The changing date is displayed under the *Beginning* and *End Index* fields.
   - Enter an index number in the *Beginning* and *End Index* fields or scrolling to the correct date.

4. It is possible to completely empty a database by selecting an end index that is less than the start index. For example, drag the end slider all the way to the left to select a range of 0 to -1.

5. Select **Trim this database** to delete the unwanted data from the beginning and/or end of the database.

6. Click **OK**.
   The database is resized and the *Trim/Extract Database* dialog box closes.

Ø To extract data from a database

1. From the **Tools** menu, click **Trim/Extract**.
   The *Trim/Extract Database* dialog box displays.

2. Select the data you wish to extract using one of the following methods:

   - Click the left mouse button on the data slide bars and drag them to a specific time and date. The changing date is displayed under the *Beginning* and *End Index* fields.
   - Enter an index number in the *Beginning* and *End Index* fields or scroll to the correct date.

3. Select **Extract to new database** to copy the data from the current database to a new database.

4. Click **Browse**.
   The *Specify Destination File Name* dialog box displays.

5. In the *Save in:* box, click on the down-arrow and select a location for the new database.
   The contents of the selected directory displays.

6. In the *File name:* box enter a file name for the new database

7. Click **Save**.
   The *Save* dialog box closes.

8. Click **OK**.
   The data is extracted to a new database and the *Trim/Extract Database* dialog box closes.

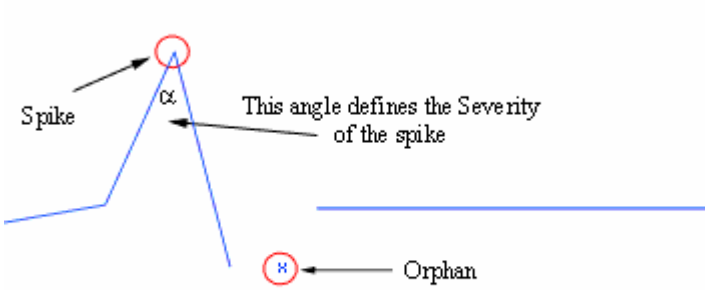
Remove spikes from a database

A spike is an unexpected change in a graph's shape. An orphan is a reading on its own with a gap on either side. Spikes and orphans can occur in logger data because of environmental factors, like lightning strikes, faulty battery connections etc. It can be helpful to remove them using *Spike Remover*.

Spike Severity

The Severity of a spike is defined by the angle of that spike, so that a smaller angle (sharper spike) will be graded as more severe than a shallow angle (wider spike).

Orphans are not considered to be spikes.



What happens to the 'Removed' spike?

When a reading (from a spike or orphan) is 'removed', its calculated value is set to INVALID (-1), indicating that this value is not to be graphed. The original raw value is not removed and can be used to recalculate the calculated value.

How do I restore the removed spikes?

When you use the database tool **Recalculate**, Select the check box "Recalculate INVALID moisture values" and the calculated values will be recalculated from the raw values using the calibration coefficients in the database. See page 110

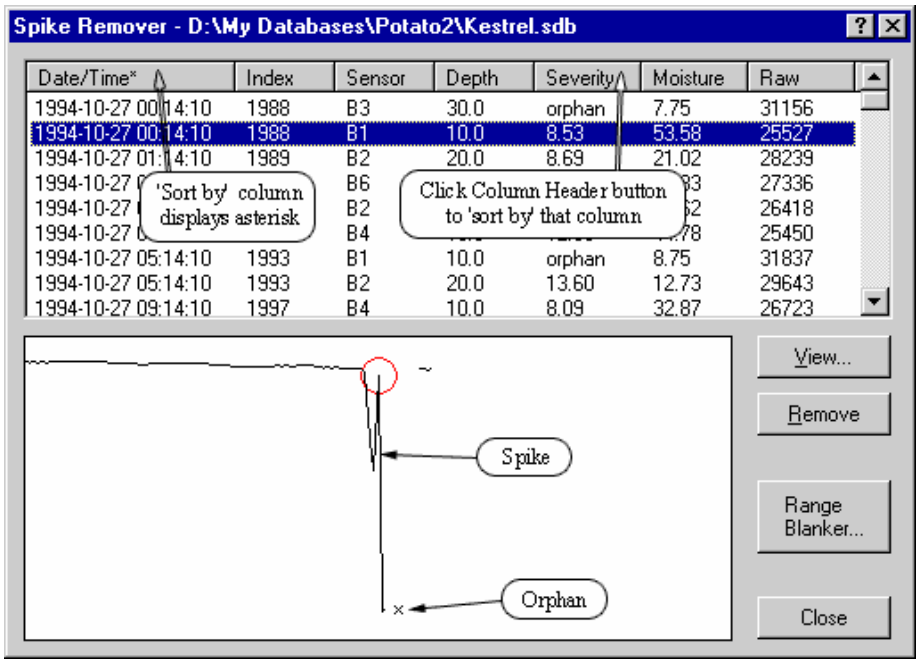
Spike Remover Dialog

This dialog can be accessed from two places:

- In Workspace Manager - from the **Tools** menu select **Spike Remover**
- On a Graph window - from the **Tools** menu select **Spike Remover**

The Spike remover window contains two main sections:

- The list of spikes which were found in the database (if any)
- A sketch of the graph section of the first selected spike in the list



Using the Spike Remover List section you can:

- Sort spikes & orphans by clicking on the header buttons. For example by clicking on **Severity**, the most severe spikes and orphans are placed at the top.
- Select a single spike and view a sketch of it in the sketch area.
- Select a single spike and view the true graph window by clicking **View**.
- Select one or multiple spikes (hold down the SHIFT key and select first and last of a range, the CTRL key to select each individually), and remove them all by clicking **Remove**.

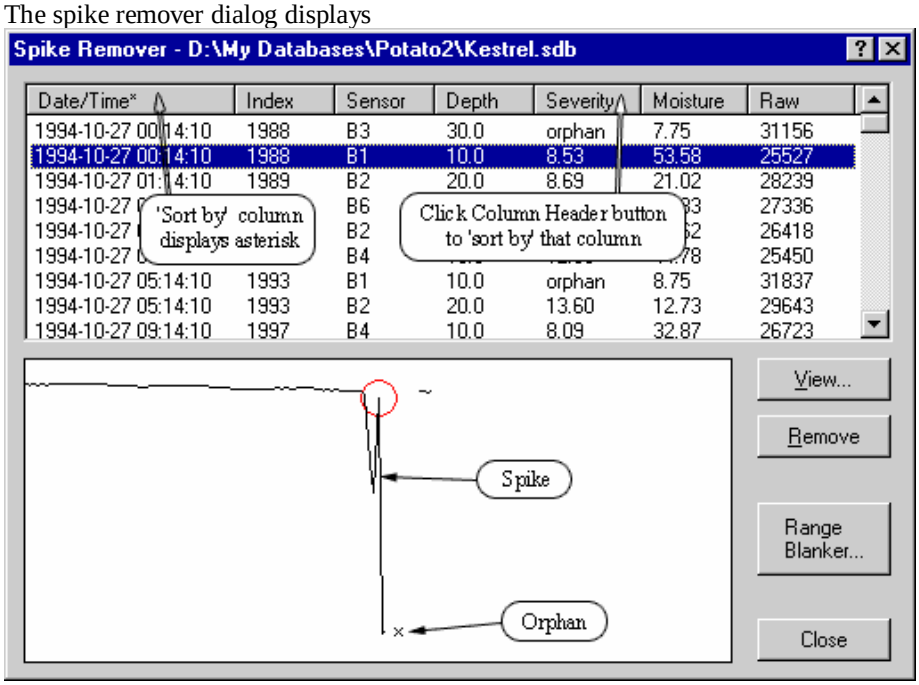
Spike remover controls

Click this button...	**...to perform this function**
Severity*	(All list control column Header Buttons) - sort the list of spikes in incremental order by a column. (the sorted column is identified by an asterisk on the column header button).
View...	View the selected spike or orphan on the graph window
Remove	Remove the selected reading(s)
Range Blanker...	Show the *Range Blanker* dialog See page 112
Close	Close the *Spike Remover* dialog

Ø To Remove spikes from a database

1a. From the **Tools** menu of the workspace window or a graph window, select **Spike Remover…**

2. The spike remover dialog displays



3. Sort through the list (if any) and click **Remove** to remove any spikes or orphans you do not want.

4. Click **Close** to close the dialog.

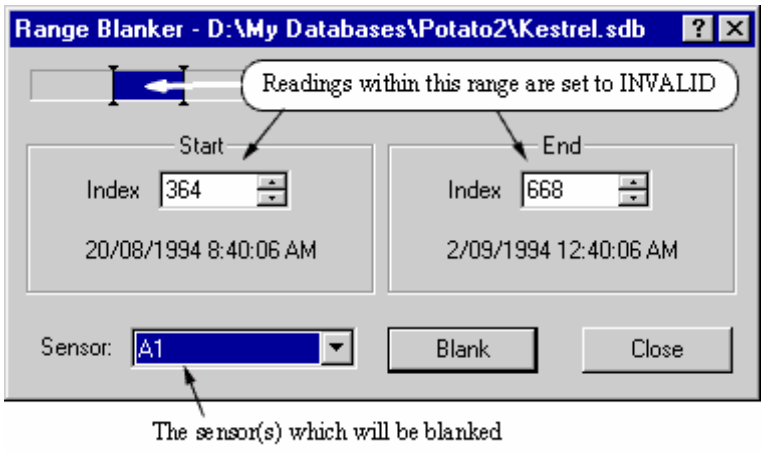
To recover INVALID readings, use the Recalculate database tool with the '**Recalculate INVALID moisture values**' checkbox checked. See page 110

Blank a range of data in a database

The Range Blanker is used to hide a range of readings from the soil moisture database. This means ALL of the readings in this range will have their calculated values set to INVALID (-1) so that they don't show on the graphs. This can be done for one single sensor, or all the sensors.

The *Range Blanker* is used if a period of instability has occurred, and you want to remove the entire period.

To access the Range Blanker, click on the **Range Blanker…** button on the *Spike Remover* dialog. See page 112.



The 'removed' values can be retrieved by using the *Recalculate* dialog, with the '**Recalculate INVALID moisture values**' checkbox checked. See page 110

Recalculate a database

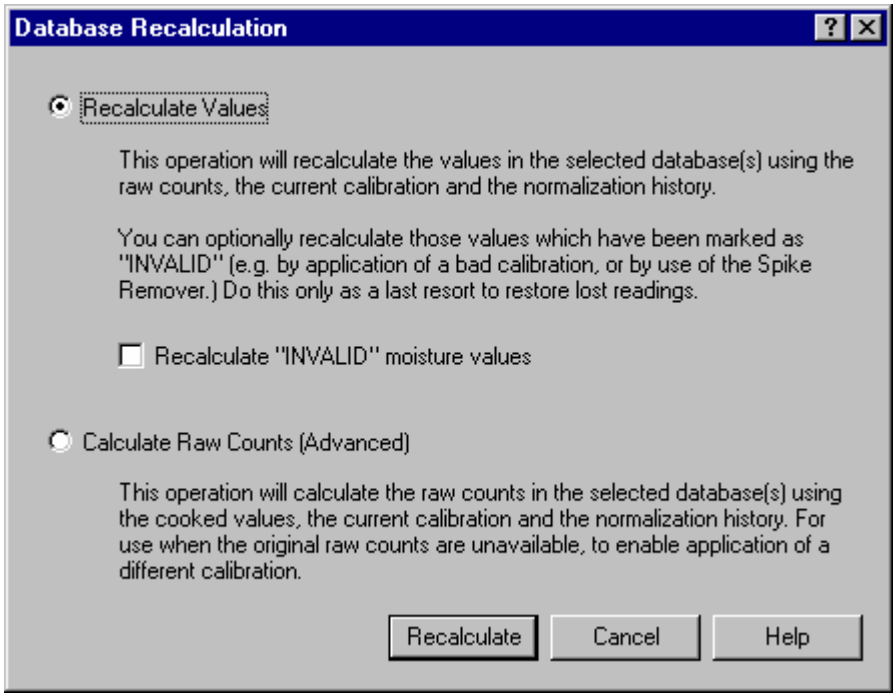
Recalculating a database re-applies the calibration formula(s) to every raw value in the database, giving a new set of calculated "cooked" values (which are the values used for graphs). Some databases may have some of their data hidden because of erroneous readings, invalid formulas or other reasons (like incorrectly calculated data being imported using **AutoSDB 2** or **Data Exchange**). The way to restore this data is to **Recalculate** the data.

It is also possible to back-calculate raw values from the current cooked values. This can be useful if you wish to change a calibration formula but the database does not contain raw values (typically they will be set to the special empty value of 65535.) This is a dangerous operation that depends on the current calibration formula and an accurate normalization history for success, otherwise raw values outside the allowed range of 0 to 65534 might be calculated and data loss will result.

Ø To Recalculate readings in one or more databases

1. Select one or more databases from the workspace manager database list and choose **Recalculate Database…** from the **Tools** menu or the right-click popup menu. Alternatively you can select Recalculate Database… from the **Tools** menu of a graph window to recalculate the database graphed in the currently selected graph pane.

2. The following *Database Recalculation* dialog appears:



3. Ensure that the **Recalculate Values** button is chosen.

4a. Leave the "Recalculate INVALID moisture readings" check box clear and click **Recalculate** to recalculate error readings e.g. after changing calibration equation coefficients.

OR

4b. Select the "Recalculate INVALID moisture readings" check box

---

Warning:
The following steps will restore every spike that was previously removed by the *Spike Remover*.

---

5. The following warning appears:

6. Click **OK**
7. Click **Recalculate** to restore every spike.

Ø To Back-calculate raw values in a database (Advanced)

This is a potentially dangerous operation that should be attempted by advanced users only.

1. Make sure that you have a backup copy of your database.
2. Select the database from the workspace manager's database list, and select **Open> Database** from the **File** menu. Alternatively, right-click the database and choose **Open** from the popup menu.
3. Use the *Logger Configuration* dialog to ensure that an accurate normalization history of air and water counts exists for each sensor, by right-clicking on each sensor and choosing **Edit Normalization History…** from the popup menu. Then resave the database and close the dialog.
4. Select the database from the workspace manager's database list, and choose **Recalculate Database…** from the **Tools** menu. Alternatively, right-click the selected database and choose **Recalculate** from the popup menu. The *Database Recalculation* dialog appears.
5. Click the **Calculate Raw Counts (Advanced)** button.
6. Click the **Recalculate** button.

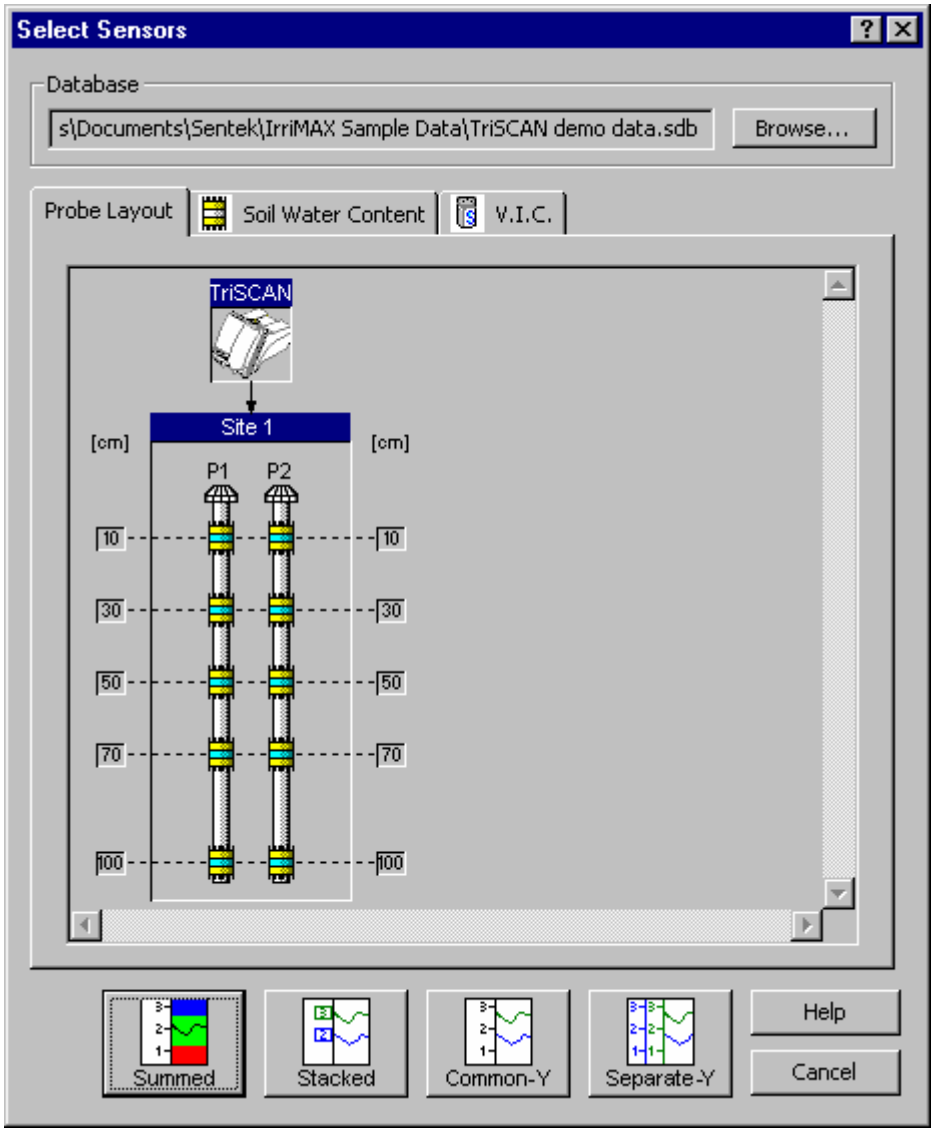
Sensor Selection Dialog

The Sensor Selection dialog is used to create new graphs, and to add panes to existing graphs. The dialog can be opened from either:

- The Workspace Manager window (see page 49.)
- The Layout window (see page 120.)
- The Graph window (see page 143.)

The dialog presents a number of tabs, one for each type of sensor in the database, and a *Probe Layout* tab if the database contains moisture or matric potential sensors.

Note that if the user made a site selection on the *Layout* window before opening the dialog, then only those sites will be shown in the dialog.



Ø To create a new graph or pane

1. If necessary, select a different database by clicking the **Browse…** button.
2. Select the tab containing the sensors you wish to graph. In the case of soil moisture and matric potential, you can also use the *Probe Layout* tab.
3. Select the sensors whose readings you wish to graph. See below for more information.

4. Click on the button for the graph type you wish to create, either **Summed**, **Stacked**, **Common-Y** or **Separate-Y**. Note that Separate-Y is unavailable if you are adding a pane to an existing graph.

Ø To select sensors using the Probe Layout tab

The Probe Layout tab displays a pictorial representation of the logger, sites, probes and sensors in the given database.

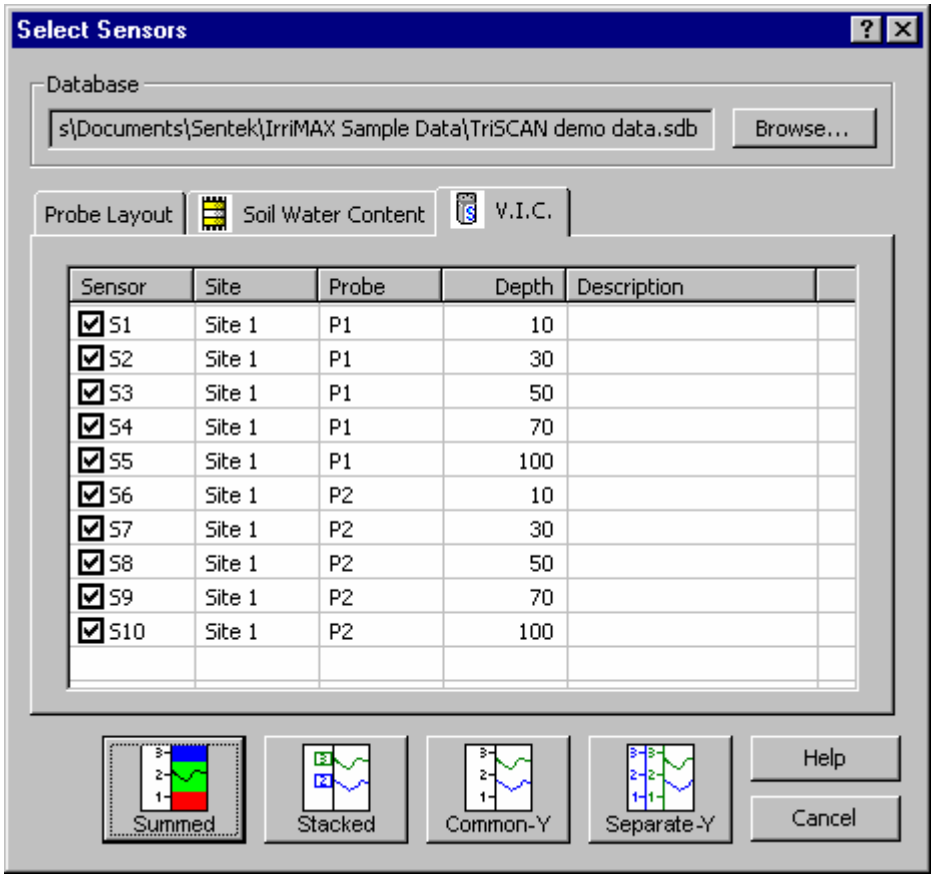
- Click the logger icon to select or deselect all sensors
- Click the probe cap to select or deselect all sensors on that probe, and again to show the current selection
- Click a depth indicator to select or deselect all sensors at that depth
- Click individual sensors to select or deselect them.

Dual (moisture and salinity) sensors are distinguished by a different color combination. Matric potential sensors have a different symbol.

You cannot mix matric potential and moisture sensors on the one graph.

Ø To select sensors using the sensor type tabs

Each type of sensor in the database is represented by a tab containing a list of all sensors of that type.



Sensors are selected by placing a tick in their checkbox. To assist in making the selection, you can:

- Click on a column header to sort by that column
- Click on one sensor then hold down the Shift key and click on another to highlight a range of sensors. Clicking on one checkbox will place a tick in the checkboxes of all other highlighted sensors.
- Click on multiple sensors with the CTRL key held down to highlight a number of sensors. Clicking on one checkbox will place a tick in the checkboxes of all other highlighted sensors.
- Hit CTRL+A to select all sensors.

- Use the TAB key, the arrow keys and the space bar to select sensors using the keyboard.

Ø To select a graph type

Click on the button corresponding to the graph type you require. The four graph types are:

- **Summed graph** - representing the sum of the data from all selected sensors, on a common Y axis (the average soil water content of two or more probes can be displayed if the sensor depths are compatible)
- **Stacked graph** - representing individual soil water sensors in order of increasing depths
- **Separate Y graph** - representing the individual soil water sensors in order of increasing depths with individual Y scales per sensor
- **Common Y graph** - representing all selected soil water sensors.

Layout Window

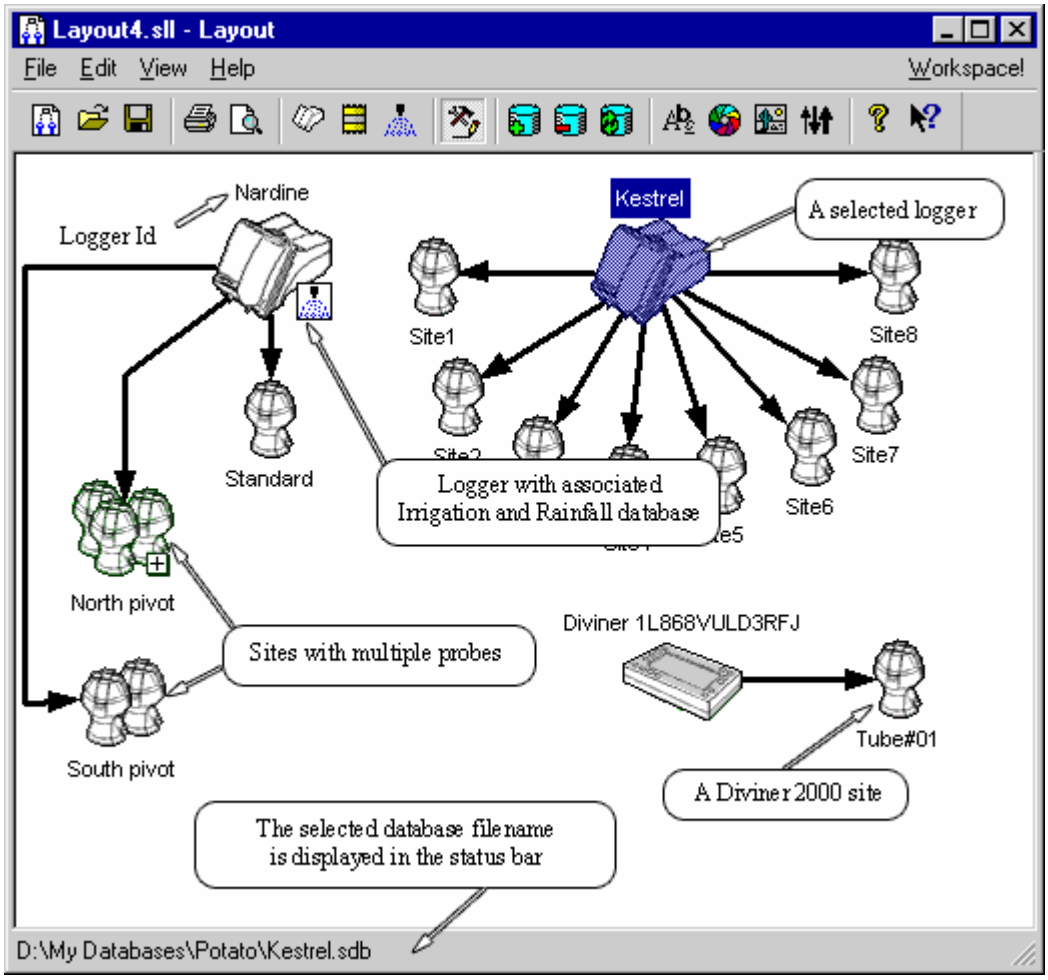
The *Layout* window provides a pictorial representation of logger configurations. From the *Layout* window you create a picture of your site, and create new graphs from the databases displayed.

From the *Layout* window you can:

- create new layouts from existing databases
- view and modify layouts
- create graphs from layouts.
- add / edit Irrigation & Rainfall data

About the Layout window

The *Layout* window opens when you view a workspace in **IrriMAX** that contains a layout, or create a new layout.



The *Layout* window consists of a menu bar, toolbar, status bar and a layout area.

The components of a layout are:

- logger image(s)
- one or more site images with probes and sensors
- a background image or color

The images can be moved around the window as appropriate. For example, You could use an aerial photograph of the site area as the background image and place the logger and site image at the appropriate places on the background.

Note: If a site contains more than three probes the image shows three probes with a '+' sign.

Menu bar

The *Layout* window menu bar contains all commands under four menus - **File**, **Edit**, **View** and **Help**. Each menu contains commands or submenus with commands. Where available the menu commands display the shortcut keys that perform the equivalent command.

Ø To return to the Workspace Manager window from the Layout window

Click on 

in the menu bar.

Toolbar

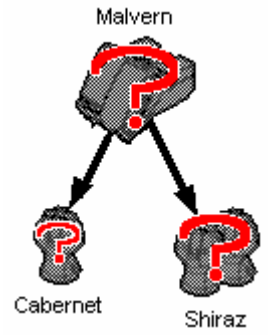
The *Layout* window toolbar is used to quickly access major editing and viewing commands that are applicable to the *Layout* window. The toolbar displays by default but can be hidden or displayed as required.

Status bar

The status bar at the bottom of a window displays information about the window. As you use the mouse to point to icons on a menu or toolbar, the name of the command being selected appears in the status bar.

Missing databases

If you open a layout and the original database file has been removed or renamed, a large red question mark displays over the logger and sites images. You can search for the missing database to update the layout. See page 127 for details of finding missing databases.



Layout window commands

All *Layout* window commands are available from one of the following:

- menus on the menu bar
- buttons on the toolbar
- shortcut keys on the keyboard
- options from the shortcut menu (right-click an item in a window to see the menu in context with the item)

Note: Not all commands are available using all methods.

Ø To display the shortcut menus

Right-click any item (object) in the window. A shortcut menu displays if available. If you do not see a menu, no shortcut options are available for that item.

For example:

- Right-click on a blank layout to display a list of commands for the layout space.

- Right-click on a logger image to display the commands specific to the logger or a whole database.
- Right-click on a site image to display the commands specific to the site.

Layout File Menu

The **File** menu displays file commands for layouts.
The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
New	CTRL+N *or* ALT, F, N		Create a new layout. See page 120.
Open	CTRL+O *or* ALT, F, O		Open an existing layout. See page 121.
Save	CTRL+S *or* ALT, F, S		Save the current layout. See page 121.
Save As...	ALT, F, A		Save the current layout with a new name.
Print	CTRL+P *or* ALT, F, P		Print the layout. See page 122.
Print Preview	ALT, F, V		Preview the file as it will print.
Page Setup...	ALT, F, U		Change the current page setup..
Close	ALT, F, C	 on the title bar	Close the layout window.

Creating new files in the Layout window

The layout window is used to create new graphs based on databases included in the layout window. It can also create new layout windows.

Ø To create a new graph

Graphs can be created from any open layout provided that the database contains at least one reading.

1. From the *Layout* window, double-click either a logger image (to display a *Sensor Selection* dialog with all sites) or a site image (to display a *Sensor Selection* dialog with only the selected sites).

2. The *Sensor Selection* dialog displays the sensor configuration for the selected object. Sensors can be selected or deselected, then a new graph window created. See page 115.

Ø To create a new layout

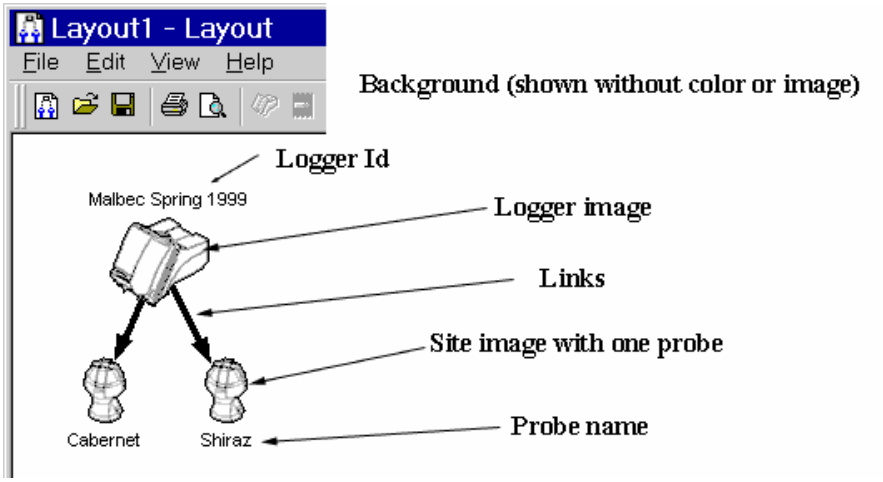
1. From the **File** menu, click **New**.
   A blank layout displays.
   Note: Follow the steps below to use the current layout displayed.

2. From the **Edit** menu, click **Add Database...**.
   The *Open* dialog box displays.

3. In the *Look in:* box, click on the drop-down arrow and select the directory where the database is located.

4. In the *Directory contents:* box, click on the file to be opened.
   Database files have a file extension of .SDB.

5. Click **Open**.
   A pictorial representation of the logger configuration database displays in the *Layout* window.



This is a new unsaved layout. From here you can alter the way any component of the layout appears using the **Edit** menu options.

Opening layouts

Each layout opens in its own layout window. Open layouts are placed in the currently open workspace of the *Workspace Manager* window.

You can open files in the *Layout* window by:

- browsing to the directory containing the file and selecting the file
- selecting a file from the recently used file list in the **File** menu.

Ø To open a layout

1. From the **File** menu, click **Open...**.
   The *Open* dialog box displays.
2. In the *Look in:* box, click on the drop-down arrow and select the directory where the file is located.
3. In the *Directory contents:* box, click on the file to be opened.
   Layout files have a file extension of *.SLL.
4. Click **Open**.
   The layout displays.

Ø To open a recently used layout from the layout window

From the **File** menu, click on the filename of the layout to be opened.
The layout displays.

Saving layouts

If you require a copy of the layout, the **Save As** command can be used to save a copy of the layout with a new name. If you close an unsaved layout you are prompted to save the layout.

Ø To save a layout

1. From the **File** menu, click **Save**.
   The layout file is saved.
   If the layout has not yet been saved, the *Save As* dialog box displays.
2. Select a file location for the layout file.
   Note that the default name for a new layout is 'Layout1'.

3. Enter a file name for the new file.

4. Click **Save**.
   The new file is saved.

Ø To save a layout as a new file

1. From the **File** menu, click **Save As...**.
   The *Save As* dialog box displays.

2. Select a file location for the new layout.

3. Enter a file name for the new layout file. Note that the current file name displays in the *File name* box. **Note:** If you do not enter a new file name, the original file will be replaced with this file.

4. Click **Save**.
   The new layout is saved.

Printing layouts

Layouts can be printed from the *Layout* window. You can print a layout with or without its background.

Note: Printing without backgrounds on black and white or slow printers may save time and printer resources. Some darker backgrounds may obscure logger setups when printed on low resolution, black and white printers.

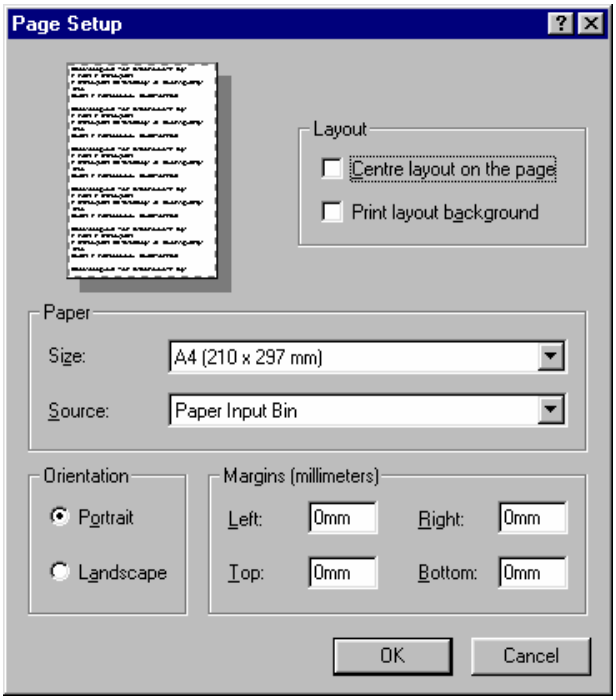
The **Print Preview** command displays the current file, as it would appear when printed. Using the **Print Preview** command, you can ensure that margin, printer settings and selected content are correct, before sending layouts to the printer.

You can also print your layout to a printer file. A printer file saves all necessary information in a file that can be used on another printer supporting the same printer language. For example, you could use this feature to print a layout using another computer that doesn't have **IrriMAX** installed.

Before you print, you should check that the page setup is correct for the document being printed. The **Page Setup** command is used to control how the document is printed on the page. For example, to set whether the document is printed in portrait or landscape orientation.

Ø To change page setup for a layout

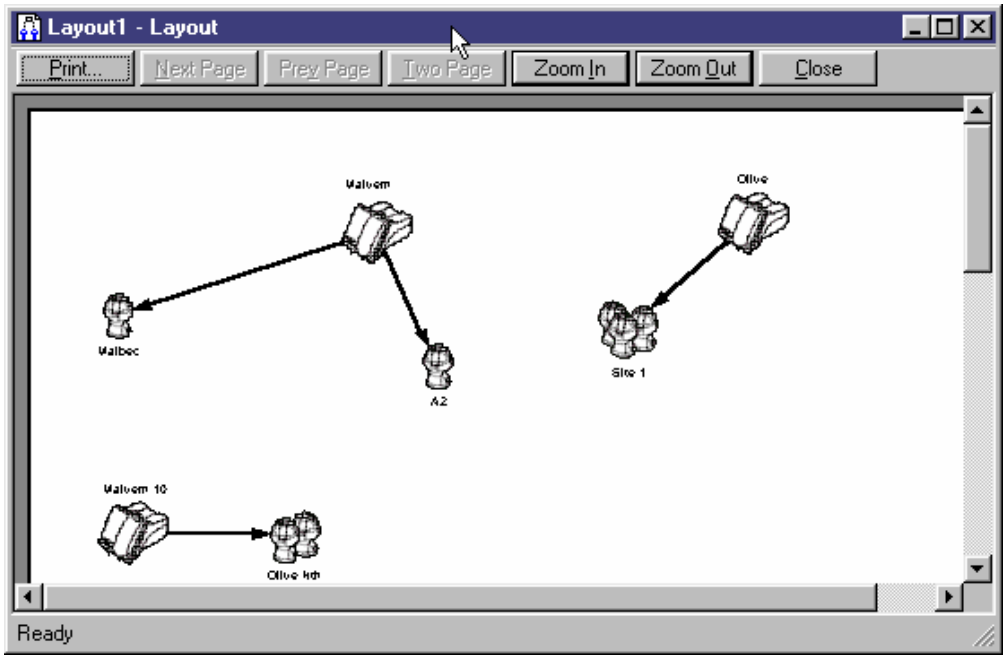
1. From the **File** menu, click **Page Setup...**.
   The *Page Setup* dialog box displays.



2. Under **Paper**, select from the drop-down lists:
   - The required paper size
   - The paper source
3. Under **Orientation**, select either **Portrait** or **Landscape**.
4. Under **Margins**, enter any special requirements for margins.
   Note how the sample page reflects these changes.
5. Under **Layout**, select any or neither of the following options:
   - Center layout on the page
   - Print layout background
6. Click **OK** to save the changes and close the *Page Setup* dialog box.

Ø To view a layout in print preview

1. From the **File** menu, click **Print Preview**.
   The *Print Preview* window displays.

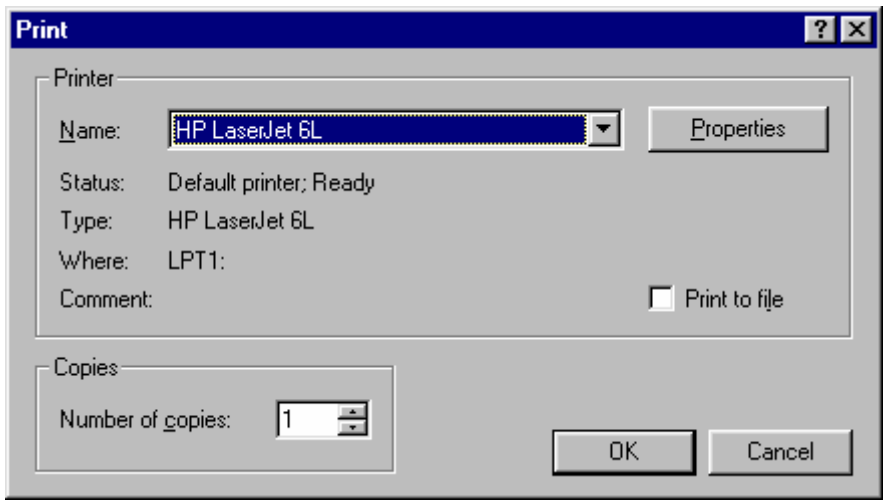


2. From the *Print Preview* window toolbar you can:

Click...	To...
Print...	send the file in its current state to the printer.
Next Page	display the second page of the file where the file has more than one page.
Prev Page	display the previous page of a file where you are on a page other than the first page.
One Page	display one page of the file, where the file has more than one page.
Two Page	display two pages of the file simultaneously, where the file has more than one page.
Zoom In	enlarge a specific area of the file.
Zoom Out	minimize the view of a specific area of the file.
Close	close the print preview window.

Ø To print a layout

1. From the **File** menu, click **Print...**.
   The *Print* dialog box displays.



2. Under **Copies**, select the number of copies you want to print.
3. Click **OK**.
   The layout is sent to the printer.

Ø To print to a printer file

1. From the **File** menu, click **Print...**.
   The *Print* dialog box displays.
2. Click the **Print to file** option.
3. Click **OK**.
   The *Print to File* dialog box displays.
4. Select a destination for the file.
5. Enter a file name. Printer files have a file extension of *.PRN.
6. Click **Save** to save the layout printer file.

Closing layouts

Since each layout file opens in its own window, closing a layout file also closes the window. Closing a layout removes the layout from the currently displayed workspace in the *Workspace Manager* window. If you close an unsaved layout, you are prompted to save the layout and the *Save As* dialog box displays.

Note: You should not close a layout if you want to retain it in the workspace, instead you could click **Workspace** on the menu bar.

Ø To close layouts

From the **File** menu, click **Close**.
The *Layout* window is closed.

Layout Edit Menu

The **Edit** menu displays commands to format and configure a layout. The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Selection Ø	ALT, E, S		Access the options for a selected item(s)
New Graph...	ALT, E, S, G		View the *Sensor Selection* dialog to create graphs. See page 115. This dialog is also displayed by double-clicking the logger image or site image in the layout window.
Logger Configuration...	ALT, E, S, C		Edit the selected logger configuration.
Enter Readings...	ALT, E, S, E		Enter readings into the SDB file.
Enter Irrigation & Rainfall...	ALT, E, S, R		Edit Irrigation & Rainfall data into the WDB file.
Hide Sites	ALT, E, S, H		Hide or show the sites associated with the logger
Remove Database	ALT, E, S, M		Remove selected database (configuration).
Image Ø	ALT, E, S, I		Access the image options for the selected item. See page 129.
Choose...	ALT, E, S, I, C		Choose a new image
Default Small	ALT, E, S, I, S		Select the small default icon

Menu item	Shortcut key	Button	To...
Default Medium	ALT, E, S, I, M		Select the medium default icon
Default Large	ALT, E, S, I, L		Select the large default icon
Label Position Ø	ALT, E, S, L		Access label position options for the selected item.
Center	ALT, E, S, L, C		Position the label in the center of the icon
Above	ALT, E, S, L, A		Position the label above the icon
Below	ALT, E, S, L, B		Position the label below the icon
Left	ALT, E, S, L, L		Position the label to the left of the icon
Right	ALT, E, S, L, R		Position the label to the right of the icon
Add Database...	ALT, E, A		Add a database to the current layout.
Refresh Databases	ALT, E, R		Refresh the databases in the current layout. This causes all the databases in the layout to reload their configuration and update the layout window.
Select All	ALT, E, A		Select all the elements of the layout window.
Font...	CTRL+F *or* ALT, E, F		Change the font settings. See page 129.
Background Ø	ALT, E, B		Access the background options. See page 129.
Color...	CTRL+B *or* ALT, E, B, C		Select a background color.
Image...	CTRL+I *or* ALT, E, B, I		Select a background image.
Tile Image	ALT, E, B, T		Tile the background image.
Links Ø	ALT, E, L		Access the links option. See page 129.
Straighten all Links	ALT, E, L, S		Straighten links.
Color...	ALT, E, L, C		Select a link color.
Thin	ALT, E, L, T		Make links thinner.
Normal Thickness	ALT, E, L, N		Make links normal thickness.
Fat	ALT, E, L, F		Make links fatter.
Snap-To Grid Ø	ALT, E, G		Change the alignment of links and images. See page 129.
Off	ALT, E, G, O		
Fine	ALT, E, G, F		
Medium	ALT, E, G, M		
Coarse	ALT, E, G, C		
Enable Editing	CTRL+E OR ALT, E, E		Enable layout editing.

Editing layouts

Layouts may be edited to change elements of the layout window such as appearance, colors and fonts. These changes can only be made when the layout window is in editing mode. Logger configurations can be edited through the *Logger Configuration* dialog box accessed from the **Edit** menu.

See page 91 for details on the Logger Configuration dialog box

Note: It is recommended to turn off edit mode when the layout has a background image, to prevent accidental movement of a logger in relation to the background picture. When editing mode is turned off, no editing commands are available. The buttons and menu options are dimmed.

Note: Logger configurations are not a part of the layout window, so can still be edited when edit mode is turned off.

Loggers and probes are displayed using the default images or customized with either the crop images supplied or your own images. Note that **IrriMAX** only supports bitmap (*.BMP) images.

You can edit the following objects in editing mode:

- The layout by adding or removing databases.
- The images and links that represent the logger and its sites and probes, see page 129 for details.
- The background by changing colors, fonts and background images, see page 129 for details.

Ø To enable editing

From the **Edit** menu, click **Enable Editing**.
Changes can now be made to the layout file.

Selecting objects for editing

All objects, except the background, must be selected before they can be edited. Selected objects can also be moved about the layout by dragging a selected object(s) with the mouse.

Note: When editing mode is turned off, objects cannot be moved within the layout.

Ø To select objects for editing

You can select one or more objects by doing one of the following:

- **One object**
  Click on one object; the object is highlighted
- **Multiple adjacent objects (not including links)**
  Place the cursor at a point, for example, above and to the left of the objects to be selected. Click and drag the mouse until the selection encloses the objects. As the mouse moves, a line displays the borders of the selection. Release the mouse button and the selected objects are highlighted.
- **Multiple scattered objects (not including links)**
  Press and hold the ctrl key; click each object to be selected. Each object is highlighted as it is selected.
- **All objects in the layout**
  From the **Edit** menu, click **Select All**.

Note: If you right-click an object, you can select the object and view the shortcut menu at the same time.

Editing selected objects

The **Edit** menu only displays the edit commands available for the selected object(s). If no object is selected or more than one object is selected, the **Selection** menu is empty.

If, for example, you select a logger image, the editing commands include **Remove Database, Image** and **Label Position** submenus.
If you select a probe, the only editing commands available are in the **Image** and **Label Position** submenus.
If you select both a logger and a probe, the **Selection** submenu is empty.

Managing databases

Databases can be added, removed and refreshed in a layout when using edit mode.

If a database has changed since the layout was first created, for example, you have changed logger or site names; you can refresh the database(s) appearance in a layout. If a database file is restored, the layout window will not know until the **Refresh Databases** command is used.

Ø To edit the logger configuration (logger selection only)

1. From the **Edit** menu, select the **Selection** submenu or right-click the logger image.
   The **Selection** submenu displays.
2. Select **Logger Configuration...**
   The *Logger Configuration* dialog box displays.
   See page 91 for details on how to configure a logger.

Note: Logger and probe labels are defined in the logger configuration and display in the *Layout* window. To edit label text you have to edit the logger configuration in the *Logger Configuration* dialog box.

Ø To enter readings into a database

1. From the **Layout** window, do one of the following:
   - Select a logger & click the Enter Readings icon  on the toolbar.
   - Right click on a logger & select 'Enter Readings...'
2. The Database Entry utility opens with the database already loaded.
   Please see the Database Entry documentation for more information.

Ø To enter Irrigation & Rainfall events

A Logger with an associated irrigation & rainfall database will have an icon like this:

1. From the **Layout** window, do one of the following:
   - Select a logger & click the 'Enter Irrigation & Rainfall data' icon  on the toolbar.
   - Right click on a logger & select 'Enter Irrigation & Rainfall...'
   - Right click one or more Site(s) & select 'Enter Irrigation & Rainfall...'
     (this will pre-select this site or sites in the I&R data entry dialog).
2. The Database Entry utility opens with the database already loaded.
   Please see the Database Entry documentation for more information.

Note: If there is no I&R database associated with the selected soil moisture logger (database), you will be given the opportunity to create a new Irrigation & Rainfall database. You should not create it yet if the site configuration of the soil moisture database is not final.

Ø To hide or show sites for a logger

1. From the **Layout** window, do one of the following:
   - Right-click on a logger and select 'Hide Sites'.
   - Left-click on a logger and choose 'Hide Sites' from the **Selection** submenu of the **Edit** menu.
2. If the sites were shown, they will be hidden. If the sites were hidden, they will be shown.

Ø To remove a database from the layout (logger selection only)

1. From the **Edit** menu, select the **Selection** submenu or right-click the logger image.
   The **Selection** submenu displays.

2. Select **Remove Database.**
   You are prompted to confirm that you want to remove the database from the layout.

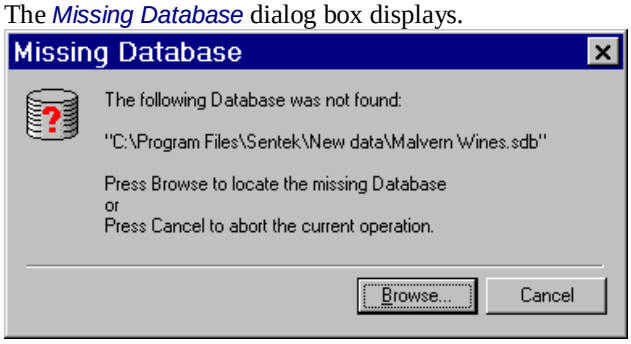
3. Click OK to remove the database.
   The logger and site images are removed from the layout.

Ø To refresh all databases (no selection necessary)

From the **Edit** menu, click **Refresh Databases**
All data is updated in the layout window.

Ø To find a missing database (logger selection only)

1. Right-click on the affected logger and click **Find Missing Database...**.
   The *Missing Database* dialog box displays.



2. Click **Browse** to browse for the missing database.
   The *Open* dialog box displays.

3. In the *Look in:* box, click on the drop-down arrow and browse for the directory where the database file is located. A list of available files displays.

4. Click on the database to be included in the layout.

5. Click **Open**.
   The red question marks are removed from the images.

Editing the appearance of a layout window

The appearance of a *Layout* window, and the images that represent loggers and probes, can be edited individually. Backgrounds can be displayed as block colors or images. Where an image is chosen, the image may be tiled (repeated across the window).

Changing the layout font setting changes the font of all the labels displayed in the *Layout* window. Individual labels cannot be formatted separately.

Layout links are the lines that join site images to logger images in the *Layout* window. By default the links display as straight lines. You can also place bends into any link. You may want to do this if, for example, you use a background image to represent your irrigation layout and you may want to place the logger and site images on the background image to reflect their true physical positions. Link color and line thickness can be changed so that the link clearly contrasts against colored backgrounds.

Links can be:

- bent (individually selected links)
- straightened (individually selected or all links)
- changed in color (all links)
- changed in line thickness (all links).

Ø To change the size of an object (any selected image)

1. From the **Edit** menu, select the **Selection** submenu.
   The **Selection** submenu displays.

2. Select **Image**.
   The **Image** submenu displays.

3. Do one of the following

   - Click **Choose...** to select a new image.
     The *Open* dialog box displays.
     In the *Look in:* box, click on the drop-down arrow and select the directory where the image is located.
     In the *Directory contents:* box, click on the image to be opened. Allowable image files have the extensions *.BMP, *.GIF, *.JPG, *.PNG, *.TIFF and *.EMF.
     Click **Open**.
   - Click **Default Small** to select the default small image
   - Click **Default Medium** to select the default medium image
   - Click **Default Large** to select the default large image.
     The new image displays in the *Layout* window.

Ø To change a label position (any selected image)

1. From the **Edit** menu, select the **Selection** submenu.
   The **Selection** submenu displays.

2. Select **Label Position**.
   The **Label Position** submenu displays.

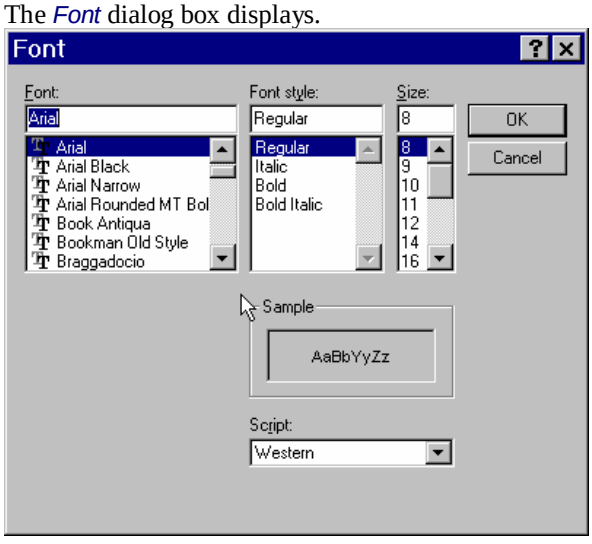
3. To position the label, click:

   - **Center** to position the label in the center of the image.
   - **Above** to position the label directly above the image.
   - **Below** to position the label directly below the image.
   - **Left** to position the label to the left of the image.
   - **Right** to position the label to the right of the image.

The label is repositioned.

Ø To change layout fonts

1. From the **Edit** menu, click **Font...**.
   The *Font* dialog box displays.



2. In the *Font* box, scroll and select a font or enter the first letter/s of the font to automatically scroll to that area of the list.
   A sample of how the font will display is shown in the *Sample* box.

3. In the *Font style* box, select a style from those listed, for example, Italic.
   A sample of how the font will display is shown in the *Sample* box.

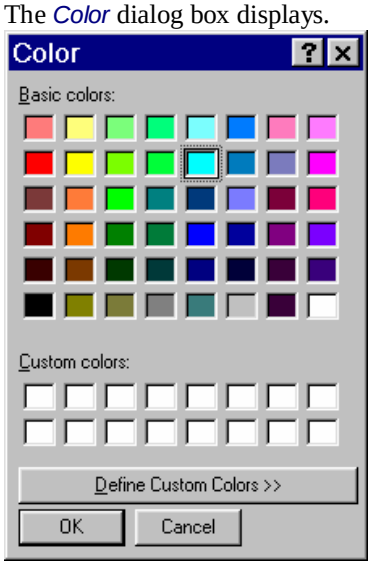
4. In the *Size* box, select an appropriate size to match your font.
   A sample of how the font will display is shown in the *Sample* box.

5. In the *Script* box, click on the drop-down arrow and select a preferred script. Not all fonts have multiple script settings. Only fonts that have special character sets, such as Central European, Symbol or Mac will list multiple script settings.

6. Click **OK**.
   The *Font* dialog box closes.

Ø Changing the background color

1. From the **Edit** menu, select **Background** and click **Color...**.
   The *Color* dialog box displays.



   Do one of the following:

2. To change the current link color using the *Basic colors* palette, select a color and click **OK**.
   The *Color* dialog box closes and the links are refreshed with the new color.

3. To change the current link color using the *Custom Colors* palette:

   - Click **Define Custom Colors>>**.
   - Select a color using the custom color controls.
   - Click **Add to Custom Colors**.
   - Click **OK**.
     The *Color* dialog box closes and the background refreshes with the new color.

Ø Changing the background image

1. From the **Edit** menu, select **Background** and click **Image...**.
   The *Open* dialog box displays.

2. In the *Look in:* box, click on the drop-down arrow and select the directory where the image is located.

3. In the *Directory contents:* box, click on the image to be opened.
   Allowable image files have the extensions *.BMP, *.GIF, *.JPG, *.PNG, *.TIFF and *.EMF.

4. Click **Open**.
   The image displays in the *Layout* window.

Note: The layout window does not control the image size. You may need to alter the image size in a graphics software package if you want it to fill the window.

Ø Tiling a background image

From the **Edit** menu, select **Background** and click **Tile Image**.
The image is replicated across the window.

Note: The current background must contain a background image for this command to work.

Ø To straighten all links

1. From the **Edit** menu, select **Links** and click **Straighten all Links**.
   You are prompted to confirm that you want to straighten all links.

2. Click **OK**.
   The window is refreshed and all links are straightened.

Ø To change the color of all links

1. From the **Edit** menu, select **Links** and click **Color...**
   The *Color* dialog box displays.
   Do one of the following:

2. To change the current link color using the *Basic colors* palette, select a color and click **OK**.
   The *Color* dialog box closes and the links are refreshed with the new color.

3. To change the current link color using the *Custom Colors* palette:

   - Click **Define Custom Colors>>**.
   - Select a color using the custom color controls.
   - Click **Add to Custom Colors**.
   - Click **OK**.
     The *Color* dialog box closes and the links are refreshed with the new color.

Ø To change the link width

From the **Edit** menu, select **Links** and click the desired width, from:

- Thin
- Normal Thickness
- Fat

All links display at the chosen width.

Ø To bend a link

1. Click on the desired link in the layout.
   The link is highlighted.

2. Click and hold the mouse button at the point on the link where you want to place the bend.

3. Drag the link to place the desired bend. The link now has two straight segments joined at the bend.

4. Repeat this process to place all required bends in the links.

Note: If you click and drag a logger or site image after the bends are placed, the bends remain intact but the segments closest to the image adjust in length to conform with the new position.

Ø To straighten selected links

Do one of the following:

- Right-click anywhere on the link, and click **Straighten**.
  The whole link is straightened.
- Right-click on a bend, and click **Remove Bend**.
  The selected bend is removed.

Using Snap-To Grid

Snap-To Grid is used to control how objects are aligned in the *Layout* window. **Snap-To Grid** settings 'draw' an invisible grid across the window and elements can only be moved to the intersecting points on the grid. When **Snap-To Grid** is on and you move an object such as a site image, you can see the image moves in 'jumps' reflecting the grid cell size. The more coarse the setting, the bigger the 'jumps'. **Snap-To Grid** can also be switched off; this allows you to place objects anywhere in the layout. Use **Snap-To Grid** when you want neat alignment of images in the layout.

Ø To use Snap-To Grid

From the **Edit** menu, select **Snap-To Grid** and click the required setting from:

- Off
- Fine
- Medium
- Coarse.

The layout links and images will conform to the chosen setting when moved.

Layout View Menu

The **View** menu lists elements of the window that may be displayed or removed from view, for example, toolbars.

The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	To...
Toolbar	ALT, V, T	Display or hide the toolbar. When ticked, the toolbar is displayed.
Status Bar	ALT, V, S	Display or hide the status bar. When ticked, the status bar is displayed.

Viewing the toolbar and status bar

The toolbar is used to quickly access major editing and viewing commands that are applicable to the window. The toolbar displays by default but can be hidden or displayed as required.

The status bar at the bottom of a window displays information about the window. As you use the mouse to point to icons on a menu or toolbar, the name of the command being selected appears in the status bar.

Ø To display the toolbar and status bar

From the **View** menu, click:

- **Toolbar** to display the toolbar.
- **Status Bar** to display the status bar. After clicking on a logger image, the staus bar shows the database name. When a menu or toolbar item is being selected a short description of the item is shown on the status bar.

Layout Help Menu

The **Help** menu provides access to the online user guide contents and search utilities.

The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Help Topics	F1		Display the online help file.
About IrriMAX...			Display current version information.

Ø To access online help

From the **Help** menu, click **Help Topics**.
The Help window displays.

Click the **Contents** tab to scroll through a table of contents for online help.
Click the **Index** tab to search for topics by using an index of keywords and phrases.
Click the **Find** tab to use full-text search and look for specific words.

Ø To access version information about IrriMAX

1. From the **Help** menu, click **About IrriMAX...**
   The **IrriMAX** about dialog box displays.

2. Click **OK** to close the dialog box.

Graph Window

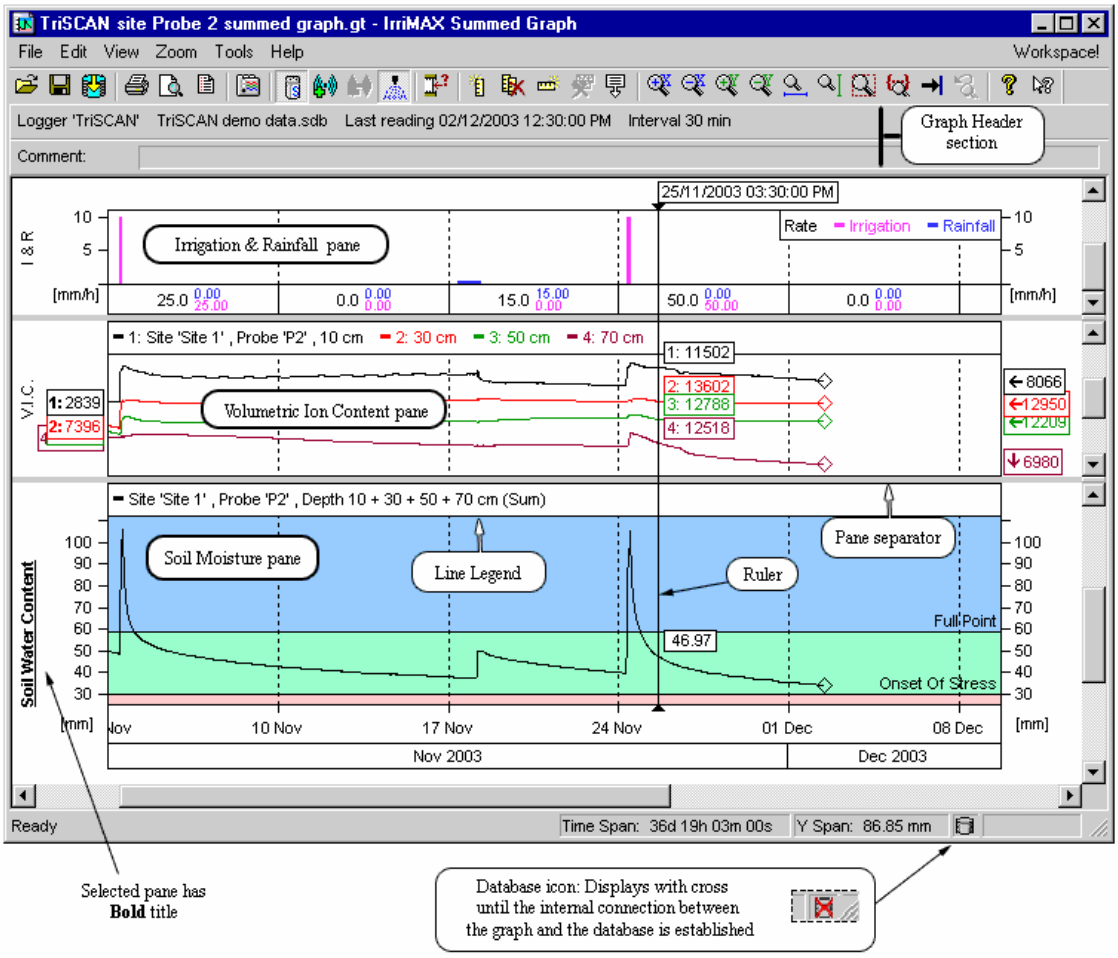
The *Graph* window presents readings from one or more databases in an easily manipulatable graphical format.

The *Graph* window contains one or more panes. Every graph has a primary pane at the bottom, with various optional secondary panes stacked on top. Each pane shows readings from a single underlying database file.

Secondary panes can be of the following types:

- The *Irrigation & Rainfall pane* is always at the top. This pane normally contains irrigation and rainfall data sourced from a WDB database file with the same filename as the SDB database file in the primary pane.
- The *Salinity (or Volumetric Ion Content) pane* is always directly above the primary pane. It displays the volumetric ion content readings from TriSCAN sensors whose moisture readings are displayed in the primary pane.
- Finally, several *Generic panes* can be created to display readings for any sensor type, sourced from any database.

Some graph menu items and toolbar buttons affect only the data shown by the graph in the currently *selected pane*. The selected pane is identified by the bold, underlined title in the left hand pane margin.



The relative height of the panes can be adjusted by dragging the splitter bars that separate the panes up or down.

Data for the currently selected pane can also be displayed in a separate *Text Data Viewer* window and saved as an ASCII text file. See page 184.

Graphs can be created from the *Workspace Manager* window (see page 49) or the *Layout* window (see page 120).

Menu bar

The *Graph* window menu bar contains all commands under six menus - **File**, **Edit**, **View**, **Zoom** and **Help**. Each of these menus contains sub menus and commands. Where available the menu commands display the shortcut keys that perform the equivalent command.

Ø To return to the Workspace Manager window from the Graph window

Click on Workspace! in the menu bar.

Toolbar

The *Graph* window toolbar is used to quickly access major editing and viewing commands that are applicable to the *Graph* window. The toolbar displays by default but can be hidden or displayed as required.

Graph Header

The *Graph Header* (the header, for short) of the *Graph* window displays details about the database whose readings are shown in the current pane:

- The Logger ID
- The database filename (excluding the folder path)
- The last reading time
- The current sample interval (the time difference between the last two readings)

These details update as the current pane changes.

The bottom row of the header section contains a *Comment* box where you can enter your own comment. You can add, edit or delete the header comment.

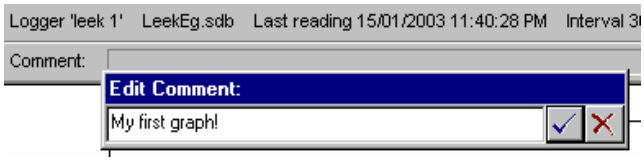
Each row of the header displays by default but if you do not need to see the details or require a larger area to display the graph, you can disable any or all of the rows in the header. Disabled rows are hidden from view until you enable them again.

Autohide is a convenient feature of the header. Using **Autohide** you can hide all enabled rows until you point the cursor to the dividing bar above the graph. All enabled rows display while the cursor remains in the header.

Ø To add, edit or delete a header comment

The graph header comment is used to provide extra information about the graph window. It is shown in the Workspace Manager graph list, and on mailed or webified graphs. It is distinct from the *Graph Comments*, which are added directly to the graph (see page 168.)

1. Double-click on the *Comment* box.
   The *Edit Comment* dialog box displays.

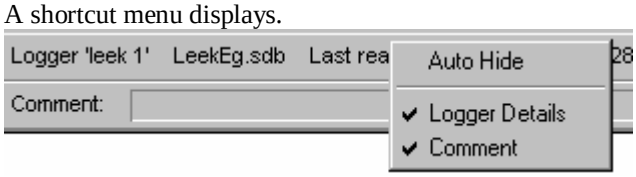


2. Type any comments about this graph in the *Edit Comment* dialog box.
   To delete a comment, just delete the text in this dialog box.

3. Click  to save the comments or  to close the comment box without saving.
   The comment displays in the *Comment* box.

Ø To enable or disable a header row

1. Right-click anywhere in the window header.
   A shortcut menu displays.



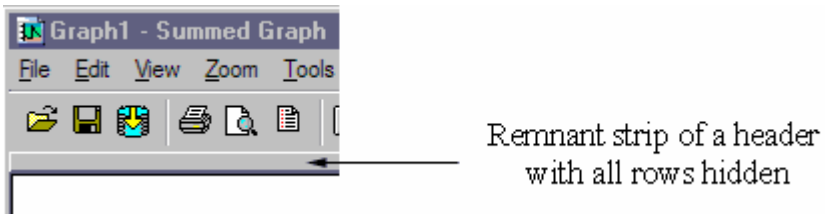
   Checked menu items indicate that a row is enabled.

2. Click the name of the row to enable or disable.
   You can choose from:

   - Logger Details
   - Comments.

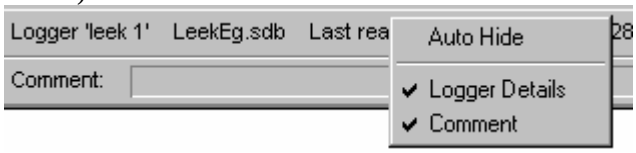
Enabled (checked) rows display and disabled (unchecked) rows are hidden.

Note: If all rows are disabled, right-click the dividing bar above the graph (a small remnant strip of the header section) to display the shortcut menu.



Ø To use Autohide

1. User the menu **View** submenu **Auto Hide Graph Header** (the item has a tick mark when Autohide is enabled), or
   Right-click anywhere in the graph header or in the dividing bar above the graph (when the header is hidden).



   A shortcut menu displays.

2. Click **Autohide** to toggle selected or cleared flag. If the menu item is:

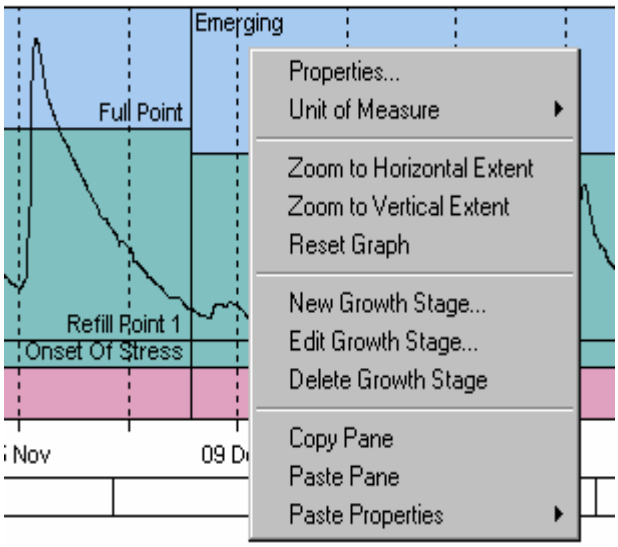
   - checked, all enabled rows hide until you point the cursor to the dividing bar above the graph
   - unchecked, all enabled rows remain display at all times.

3. Unhide the header by pointing to the dividing bar above the graph, right-click in the revealed header and in the shortcut menu deselect **Autohide**.

Note: Disabled rows do not display at any time.

Graph Popup menu

There is a shortcut to commonly used graph operations using the graph popup menu. This menu is displayed when you click the right mouse button while the mouse pointer is anywhere in graph window, excluding the axis areas.



The items in the menu depend on the type of graph pane in which you click.

- **Properties** (available on all pane types). Used to display the graph *Properties* dialog for the pane.
- **Unit of Measure** (available on all pane types). This submenu allows you to change the unit of measurement used for the display of values in the pane. Choose **IrriMAX Setting** (if available) to use the unit specified on the *Measurement* tab of the *IrriMAX Settings* dialog (see page 77) or choose **Database Unit** to use the unit as stored in the database. Depending on the type of sensor, there may be other units available on the menu. If you have defined a custom unit (see page 149), it will be selectable from here.
- **Zoom to Horizontal Extent** (available on all pane types). Changes the horizontal time range to show the full extents of the graph. Hold down the Shift key when selecting this function to zoom to the combined horizontal extents of all panes.
- **Zoom to Vertical Extent** (available on all pane types). Changes the vertical range to show the full vertical extents of the visible part of the graph. Hold down the Shift key when selecting this function to zoom all panes to their individual vertical extents. The behavior of this function can be customized from the *IrriMAX Settings* dialog (see page 80)
- **Reset Graph** (available on all pane types). Scrolls the graph so that the end point is visible, and optionally zooms to vertical extents. The behavior of this function can be customized from the *IrriMAX Settings* dialog (see page 80). Hold down the Shift key when selecting this function to zoom all panes to their individual vertical extents.
- **Stack** (available for panes with more than one vertical axes - i.e. stacked and separate-y graphs). Arranges the graph lines in sensor order so that none overlap.
- **New, Edit, Delete Growth Stage** (only available on a pane with a single vertical axis). Used to create a new growth stage with the time preset to the position of the right-click, or to edit or delete the growth stage encompassing the position of the right-click.
- **Copy Pane, Paste Pane, Paste Properties** (available on all pane types). Used to copy a pane to a copy buffer, paste the copied pane into the graph, and paste various properties from the copied pane into an existing pane. See page 170.
- **Remove Pane** (not available on the primary pane).

Status bar

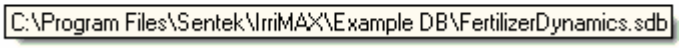
The status bar at the bottom of a *graph* window displays information about the window. As you use the mouse to point to icons on a menu or toolbar, the name of the command being selected appears in the status bar.

The graph status bar can contain the following information:

- 'Ready' or a description of toolbar and menu items when they are selected
- Time span of the X-axis
- Vertical span of the Y-Axis in the currently selected pane
- Database available icon.

  The icon will have a red-cross  if the database cannot be read. Pointing to this icon will show a ToolTip containing the path and filename of the database e.g.

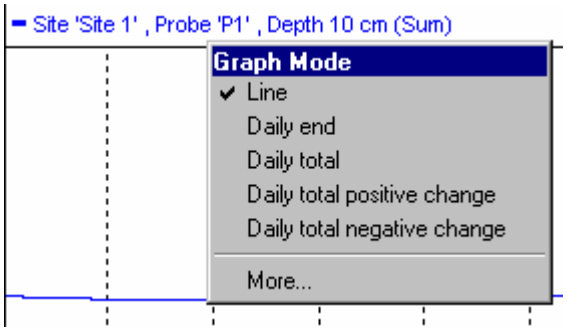
  

- Database being accessed message

Line Legends

Each pane of the graph window has a Line Legend describing the sensors associated with each line in the pane.

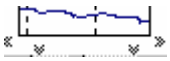
If the cursor hovers over a legend, it changes to a finger. Clicking the legend brings up a menu that allows selection of a number of common graph modes. The **More…** option opens the graph's *Properties* dialog.



The position of each legend can changed, or the legend can be hidden completely. See page 149 for legend options.

Graph symbols

As well as the graph lines, symbols can appear: within the graph panes.

Symbol	Name	Usage
	Diamond	Last data point in the database
	Cross	Orphan data point or very short line segment, having invalid points on either side
	Gap in line	One or more invalid data points
	Bold number in label	The bold number is the sensor number as shown in the line legend in the graph header
	Arrow, left and right in line labels	The arrow points in the direction and value of the next valid data reading, when there is no line intersecting the axis
	Arrow, up and down in labels	The arrow points in the direction of the graph line when the line is above or below the display area
	Chevron, left right, up and down.	Appears when graph window size reduced to a size where there is no room to display the axis as well as the data.
[mm]	Units of measurement	Measurement units of the vertical axis (metric or imperial)

Scrolling graphs

Scrolling can be done across the horizontal axis (time scale) or up and down the vertical axis (I&R or moisture scale). You can scroll a graph using the standard scroll bars and scroll buttons, by dragging a graph axis, or you can scroll horizontally and vertically at the same time by dragging the graph itself.

Ø To scroll a graph along the horizontal axis

1. Point the mouse cursor to the horizontal axis.
   The cursor changes to a hand symbol .
2. Click the left mouse button and drag the axis left or right.
   The graph scrolls along with the mouse.

Ø To scroll a graph along the vertical axis

1. Point the mouse cursor to the vertical axis.
   The cursor changes to a hand symbol .
2. Click the left mouse button and drag the axis up or down.
   The graph scrolls along with the mouse.

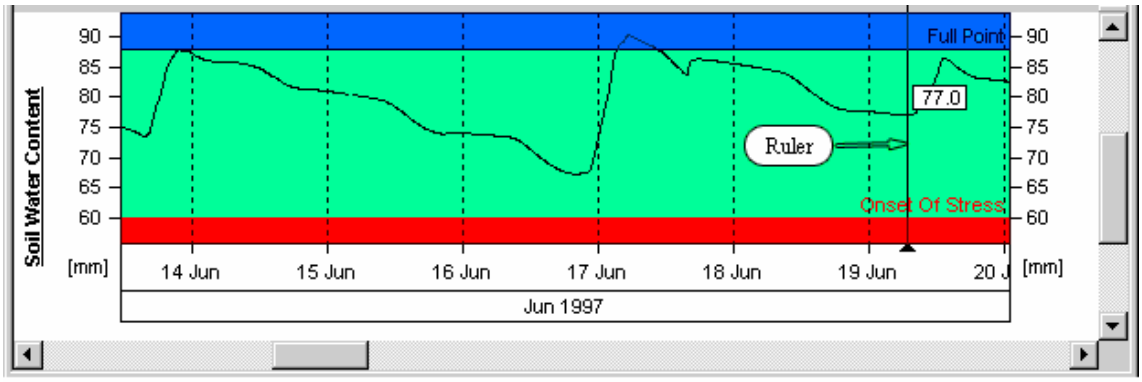
Ø To scroll a graph horizontally and vertically

1. Point the mouse cursor to the graph window (not the legend part) and click the left mouse button without releasing it.
2. Start moving the mouse.
   The cursor changes to a four-way arrow symbol and the graph scrolls along with your mouse movement..

Summed graph

This represents the sum of the data from all selected soil moisture sensors (the average soil water content of two or more probes can be displayed if the sensor depths are compatible)

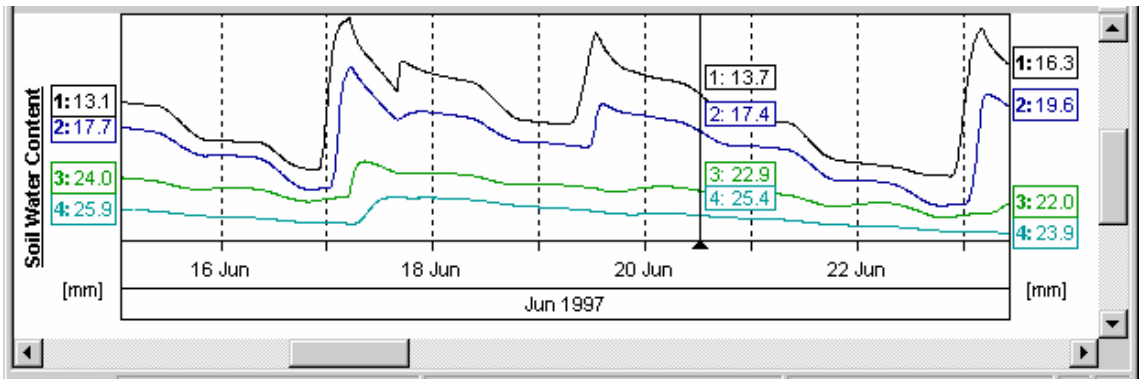
Note: You cannot sum multiple matric potential sensors, but a summed graph can be created for a single one to allow use of agronomic lines and regions.



Soil moisture pane of a summed graph

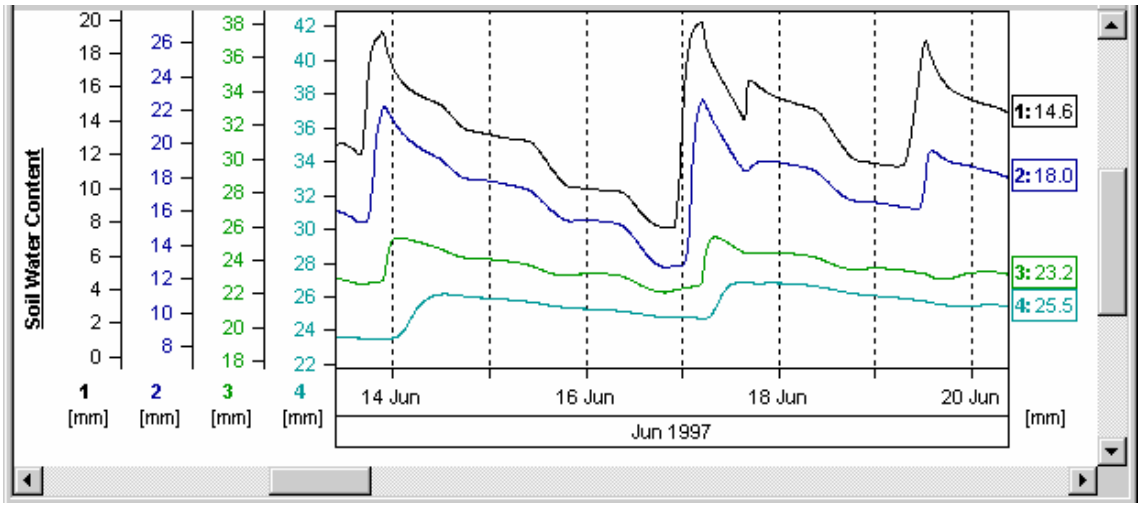
Stacked graph

This represents individual sensors in order of increasing depths.



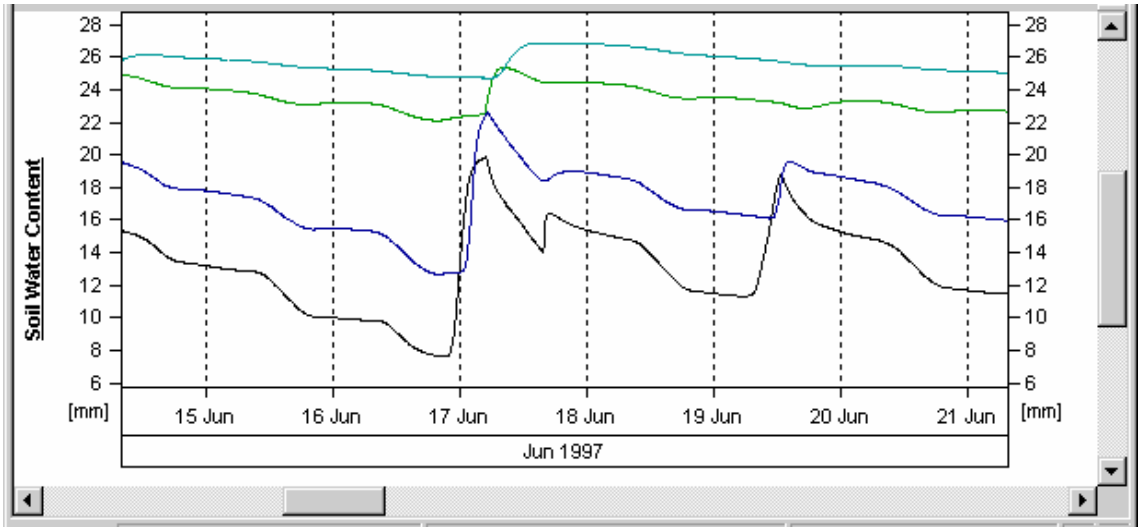
Separate Y graph

The separate Y graph represents the individual sensors in order of increasing depths, within each probe. There is an individual Y scale per sensor. To allow comparative analysis, each Y scale can be independently dragged to overlap the graph lines of other sensors.



Common Y graph

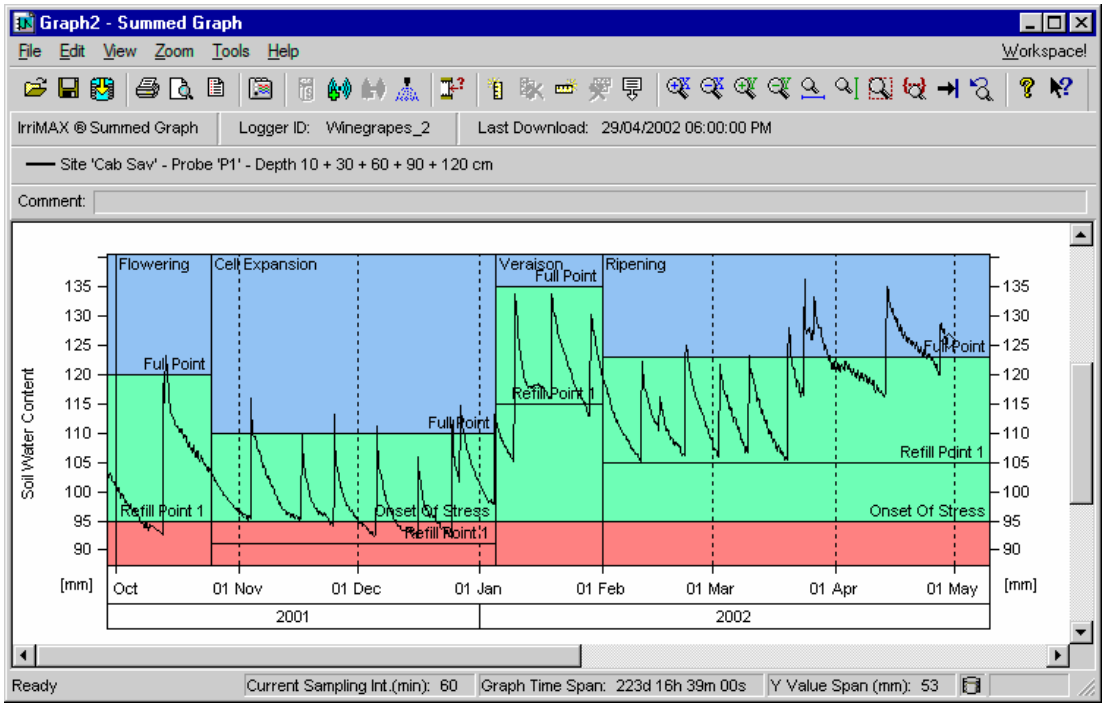
This represents all selected sensors against a common axis.



Growth Stages

If the lines in your graph do not have independent axes, you can add budget lines which can define agronomic regions (full point to onset of stress). See page 157 for setting up the growth stage budget line values and the growth stage start points.

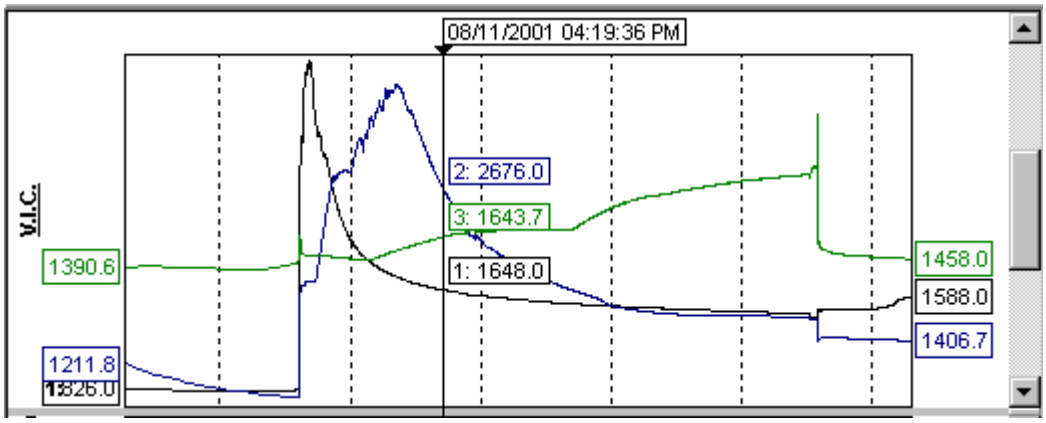
The following example shows four growth stages in grapes, and the water demands of the vines at those stages.



Salinity pane

The *Salinity pane* is displayed when menu **View, Volumetric Ion Content** or toolbar button  is selected. It displays a graph in the following format::

- The pane is only available if the database has salinity sensors.
- Stacked and summed moisture graphs display salinity sensors as stacked graphs of separately movable graph lines for each sensor.
- Common-Y and separate-Y graphs display the salinity data with the same axis type as the moisture pane.
- Salinity is displayed in units of Volumetric Ion Content (V.I.C.)
- The color of each graph line is the same color as the corresponding moisture sensor.
- The vertical ruler is common to all graph panes.



See the "TriSCAN Agronomic User Manual" for interpretation of salinity data.

Custom Sensor Pane

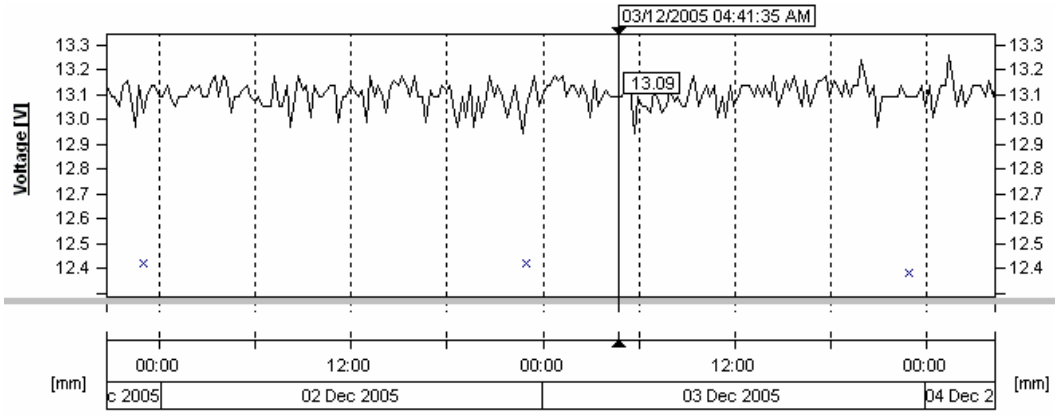
A *Custom Sensor pane* is created from menu **View, New Pane…** or toolbar "+" button  is selected.

Warning:
Closing a custom sensor pane loses all of its sensors selections and graph comments.

This opens the *Sensor Selection* dialog which enables you to choose a database, the sensors to include in the custom sensor pane, and the graph type. See page 115.

Note that the Separate-Y graph type is not available for custom sensor panes.

When the graph type button is activated the new pane is created.



The new pane has following format:.

- A line graph, summed, stacked or common-Y
- A vertical axis legend contains the units description and unit abbreviation in square brackets

Up to 9 custom sensor panes can be created on one graph.

Removing a Custom sensor pane

You can remove a *Custom Sensor pane* by either :

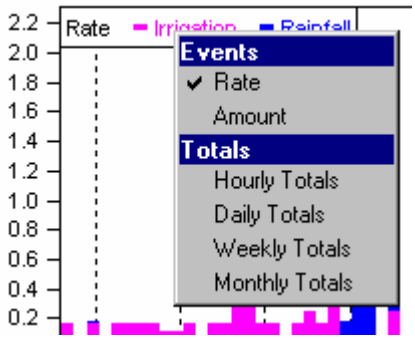
- Click in the desired pane then click the remove "-" button 
- Right mouse click in the desired pane and select **Remove Pane** from the popup menu.
- Select menu **View** then select the pane name (ticked) from the menu list to remove the pane.

Irrigation and Rainfall pane

The *Irrigation & Rainfall pane* is displayed when the **View, Irrigation and Rainfall** menu item is selected. There are six possible modes for this pane: Event Rates, Event Amounts, Hourly Totals, Daily Totals, Weekly Totals, and Monthly Totals. The event modes present the amount applied or rate of application of each specific irrigation or rainfall event. The totals modes present the total amount of water applied in a predefined period of time.

Each mode has the following format:

- Clicking on the pane's legend allows selection of the six different modes. This popup menu is equivalent to the main menu **View, Irrigation and Rainfall.** A new I&R graph pane is created with the type of mode that was previously selected.

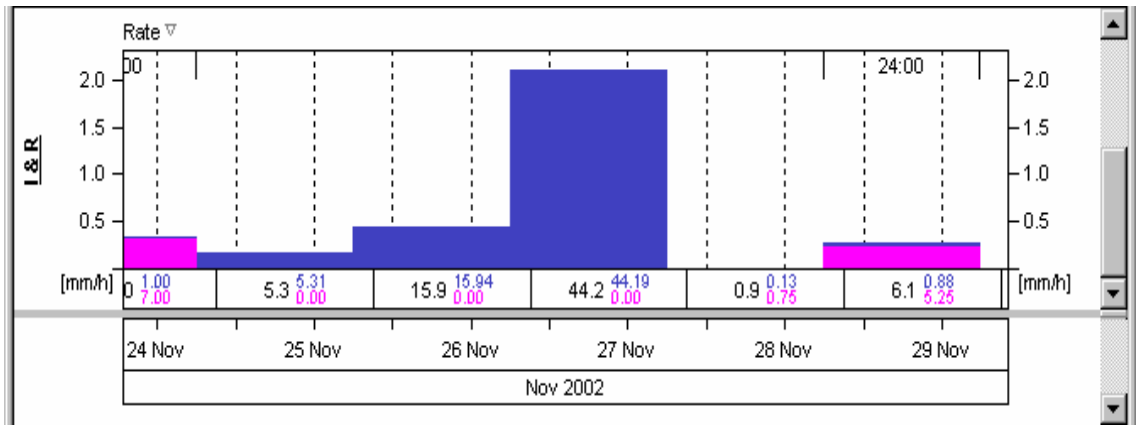


- A bar graph representing Irrigation and Rainfall.
  The default color of the rainfall bars is blue and the default color of irrigation bars is magenta. These defaults can be changed using the colors tab in Workspace *Settings.* The color of Rate mode bars can be different to the other modes. Where there is an overlap between irrigation and rainfall events the irrigation bar is placed above the rainfall bar to show an accumulated total.
  Note: When I&R data is averaged across multiple sites the totals bars have a horizontal highlight to distinguish the parts comprising the average.
- Below the bars on event modes are segmented totals for rainfall plus irrigation with subtotals for rainfall, in blue, and irrigation, in magenta. The segment size changes with different horizontal x-axis zoom levels
- Total mode graphs have a narrow space present between each bar to distinguish the period boundaries.
- The vertical y-axis on the rate graph shows the application rate in millimeters (or inches) per hour (mm/h or inches/h).
- The vertical y-axis on totals graphs show total applied water in the mode selected.
- At the top border of event graphs, the duration of irrigation is shown. The numbers only appear at zoom levels where space permits the display of numbers such as 12:00 (12 hours).

Event Rates Mode

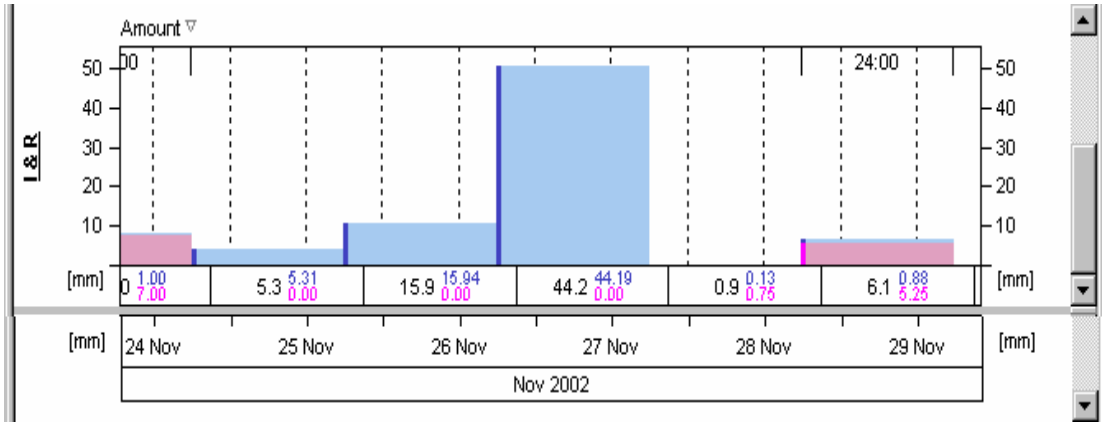
This graph display the application rate (mm/hour or inches/hour) for all I&R events. The height of each bar represents the rate of application.

The color of the I&R bars can be changed using the Workspace *Settings* for "Irrigation rate bars" and "Rainfall rate bars". These colors can be different to the bars on other mode options.



Event Amount Mode

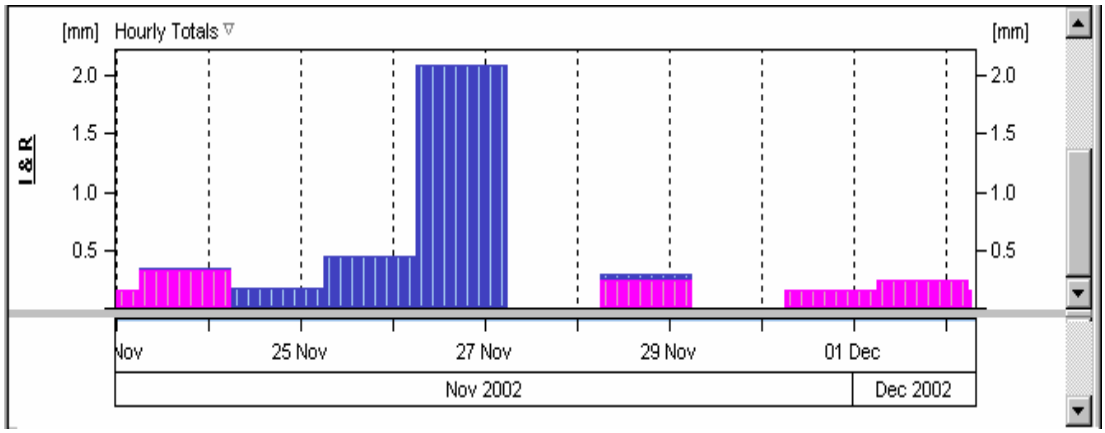
The total amount of water (mm or inches) and start time for each recorded event is shown as a solid bar followed by shading that progresses until the end of the event. The height of each bar indicates the total amount of water applied during the event.



Hourly Totals Mode

This graph displays the total water applied in each hour. When an event spans an hour boundary the total in each hour is partitioned according to the number of minutes the event covered.

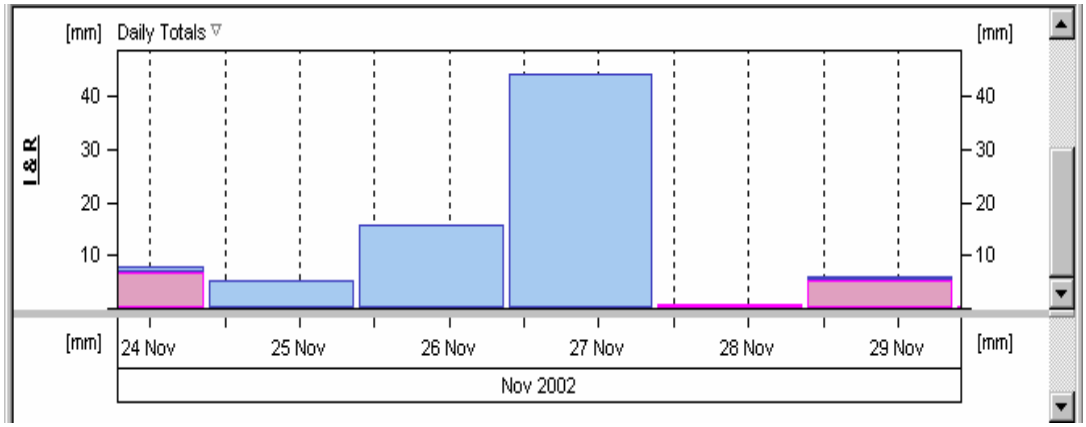
The start time of each hour is set to the time specified in I&R Global Settings for Graph "Day Start". The default is 9:00am



Daily Totals Mode

This graph displays the total water applied in each day. When an event spans a day boundary the total in each day is partitioned according to the number of minutes the event covered.

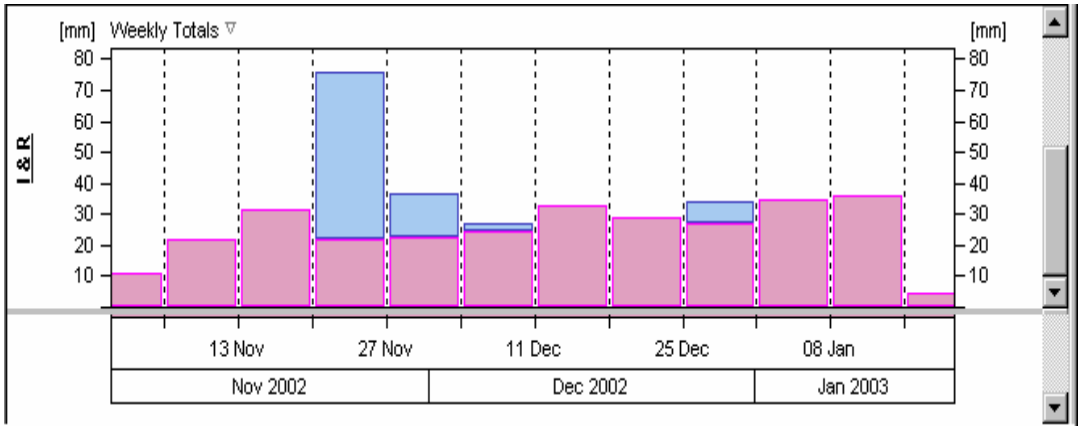
The start time of daily totals is set to the time specified in I&R Global Settings for Graph "Day Start". The default is 9:00am.



Weekly Totals Mode

This graph displays the total of water applied in each week (7 days). When an event spans a week boundary the total in each week is partitioned according to the number of minutes the event covered.

The start day of each week is set to the time specified in I&R Global Settings for Graph "Week Start". The default is Monday. The start time of each week is set to the time specified in I&R Global Settings for Graph "Day Start". The default is 9:00am.

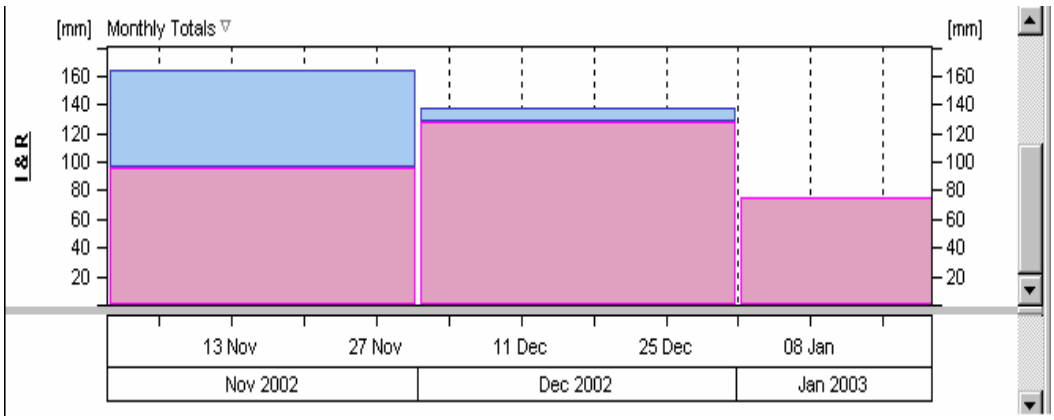


Monthly Totals Mode

This graph displays the total water applied in each calendar month. When an event spans a month boundary the total in each month is partitioned according to the number of minutes the event covered. Because each month is a calendar month there may be different number of days in each period.

The start time of the first day of the month is set to the time specified in I&R Global Settings for Graph "Day Start". The default is 9:00am.

Note: If the rainfall data entry Settings are set to "Daily Totals", "End Date" and 9:00am (the defaults) the data entered on the first day of the month will be accumulated in last day of the previous month. This is an internationally accepted method of recording daily rainfall observations.



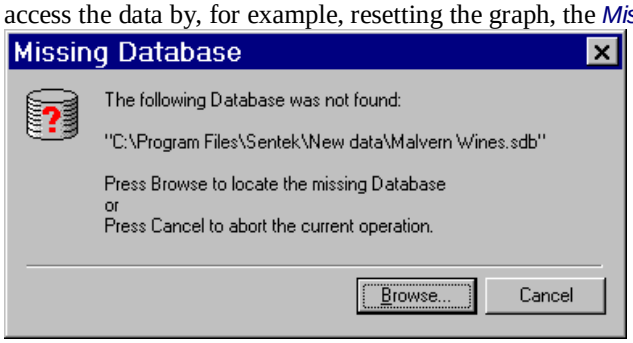
Interpretation of I&R graphs:

The following guidelines can assist in the interpretation of I&R graphs

- The I&R graph segment total is the total amount applied for the time-period demarcated by the solid vertical bars. The larger font size value is the sum of the smaller font size irrigation value and rainfall value.
- To read the time-period, follow the dotted lines down to the Soil-Water graph x-axis.
- To show a daily rate on the I&R segment totals, X-zoom in or out until the Soil-Water and I&R x-axes are at a time-scale of 1 day.
- The ruler can be used at any point to measure the instantaneous time and rate.

Missing databases in graphs

If a graph is opened and the database on which it is based was removed or renamed, the graph window displays a red cross on top of the database icon at the right of the *Graph* status bar. If you attempt to access the data by, for example, resetting the graph, the *Missing Database* dialog box displays.



Ø To find a missing database

1. From the **Missing Database** dialog box.
2. Click **Browse** to browse for the missing database.
   The *Open* dialog box displays.
3. In the *Look in:* box, click on the drop-down arrow and browse for the directory where the database file is located. A list of available files displays.
4. Click on the required database.
5. Click **Open**.
6. There are three possible outcomes:
   - The connection is restored. Save the graph to make the new connection permanent.
   - An error message box displays. The selected database is incompatible with the graph, and cannot be connected.

- A warning message box displays. The selected database is not the one that created the graph, but is compatible with it. You can proceed with connecting the database, but you should be aware of the possibility that you are connecting the wrong one. If you connect the wrong database the graph will adapt, but the water-budget lines and comments will become meaningless. If this happens, close the graph without saving it, and try again.

Graph Properties

The graph *Properties* dialog is used to modify various persistent properties of a graph document, including:

- Whether a graph is drawn as lines, bars or change bars
- How line legends are displayed
- Colors of lines or bars
- Values and display options for budget lines and regions
- Growth stages (different budget lines and regions for different time periods)
- Mail and webify options

Most properties are specific to the current graph pane. In the case of multi-pane graphs, the current pane is the one most recently clicked-on, whose title is drawn bold and underlined.

Depending on the type of the current pane, some properties may not be available:

- The special Irrigation and Rainfall pane does not allow changing line colors, budget lines or growth stages.
- The Volumetric Ion Content pane will disallow changing line colors if the same lines are shown in the primary pane.
- Budget lines and growth stages cannot be created on any pane containing independent vertical axes (i.e. a stacked or separate-Y graph).

Some properties pertain to the graph document as a whole and are not pane specific. These include those found on the *Mail and Webify* tab and the **Miscellaneous** section on the *General* tab.

Note: You can alter some of the default properties for new graphs by using the *IrriMAX Settings* dialog in *Workspace Manager.* See page 74.

Ø To view (or change) graph properties

1. Left-click on the pane whose properties you want to change to make it the current pane.
2. From the **File** menu, click **Properties...**. or select the Properties button  on the toolbar.
3. The *Properties* dialog box displays for the current graph pane.

Alternatively you can right-click on a graph pane and select **Properties…** from the popup menu. The *Properties* dialog box displays for the graph pane that you right-clicked on. The current pane does not change.

All tabs of the *Properties* window have a common set of buttons

Click this button...	**...to perform this function**
OK	Apply all changes and close the *Properties* dialog box.
Cancel	Cancel the *Properties* dialog box without applying any changes. The settings remain unchanged.
Apply	Apply all changes without closing the *Properties* dialog box.

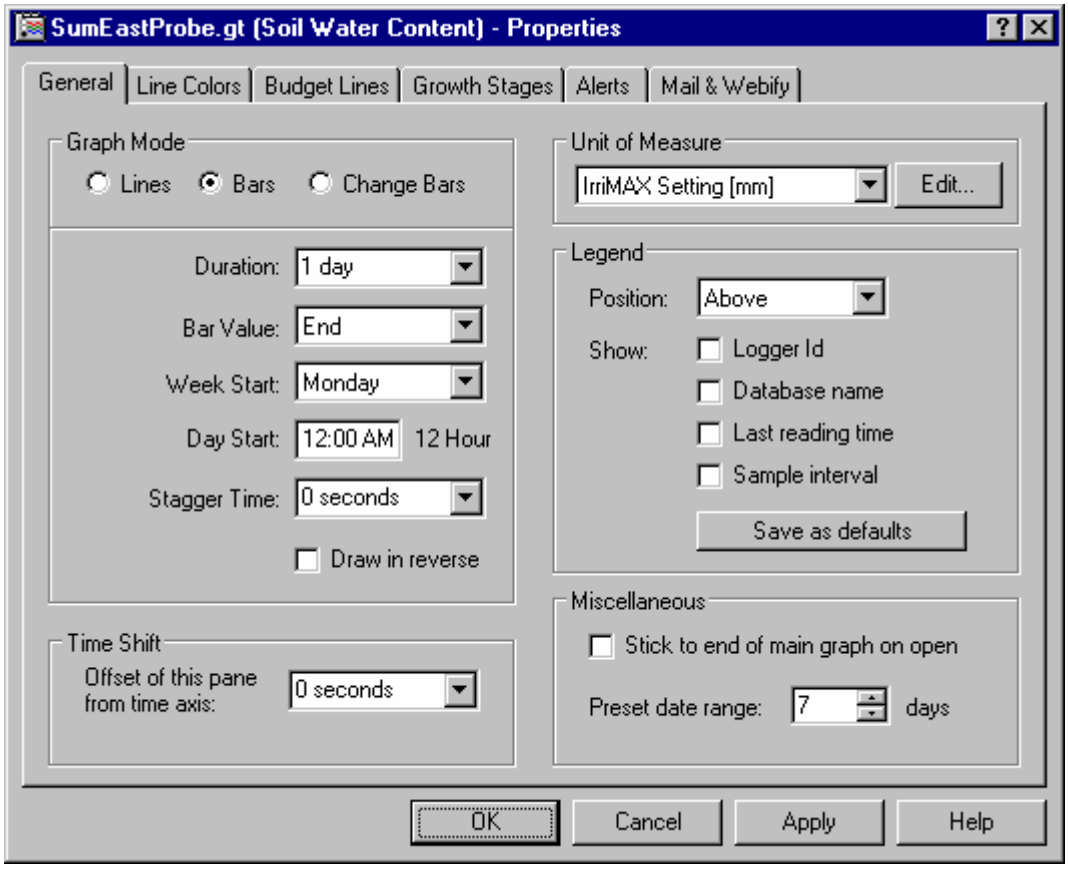
Click this button...	...to perform this function
Help	Display the online help.

General Graph Properties

General Properties control the way a graph displays in the window.

There are four sections in the General tab:

- Graph Mode (choose lines, bars or change bars, and set bar properties for the current pane)
- Unit of Measure (choose the displayed unit for the values in the pane)
- Legend (governs appearance and content of the line legend for the current pane)
- Time Shift (allows comparison with historical data and corrections to timestamps)
- Miscellaneous (non-pane-specific settings)



Graph Mode

The Graph Mode section contains controls that govern how the readings are represented on screen. Moisture and salinity are usually best represented as **Lines**, but other types of data may be better shown as **Bars**. Finally, **Change Bars** can be used with any type of data to show how each value has changed compared to the previous value.

Note: Bar graphs are most effective when there is a single vertical axis controlling all bars, in order that all bars have the same vertical origin. If you have more than one sensor graphed in the pane, the pane type should therefore be either Summed or Common-Y.

Ø To select a graph mode

1. Choose either the **Lines**, **Bars** or **Change Bars** radio button in the *Graph Mode* section of the *General* tab.

2. If you chose Bars or Change Bars, set the bar properties (see below).

3. If some lines, bars or line comments are consistently obscuring others, you can elect to draw the graphs in reverse order (see below).

Ø To set the bar properties

1. Choose a duration that will apply to every bar, by selecting a preset duration from the **Duration** drop-down list, or typing a duration directly into the **Duration** edit control. The maximum duration is one week.

2. Choose a method for determining the value of the bar from the **Bar Value** drop-down list. This method is used when more than one reading falls inside the period covered by a given bar. The choices are:

   - **End** - the bar displays the value closest to the end of the period
   - **Start** - the bar displays the value closest to the start of the period
   - **Minimum** - the bar displays the smallest value from the period
   - **Maximum** - the bar displays the largest value from the period
   - **Average** - the bar displays the average of all values within the period
   - **Total** - the bar displays the sum total of all values within the period
   - **Total Positive** - the bar displays the total of only the positive values within the period
   - **Total Negative** - the bar displays the total of only the negative values within the period

3. If you chose a duration of one week for the bars, then choose which day of the week each bar should start on, by selecting a day from the **Week Start** drop-down list.

4. If the duration you choose is an exact multiple or divisor of one day, then choose what time each day should start by entering a time in the **Day Start** drop-down list. The format of this field is controlled by Windows Regional setting for Time (12 hour with AM/PM, or 24 hour clock).

5. The **Stagger Time** property is used when the pane contains bars for more than one sensor, to ensure that all bars are visible (i.e. not completely covered by other bars).
   When the bars are drawn, the second and subsequent sensors' bars are offset by multiples of the stagger time, and the width of all the bars is reduced so that all bars still fit within the period specified in the **Duration** control.
   To set a stagger time, select a preset from the **Stagger Time** drop-down list, or type a duration into the **Stagger Time** edit control.
   The maximum allowable stagger time depends on the bar duration and the number of sensors. If you enter a value greater than the maximum, then the maximum will be used. For example, if daily bars for two sensors are graphed, the maximum stagger time is 12 hours, which will result in the bars being plotted next to each other with no overlap, within each 24 hour period.

Ø To draw the graphs in reverse order

Lines, bars and comments are drawn in order from the first sensor to the last. This means that graph elements for later sensors will overlap those for earlier sensors. If this is consistently a problem for your graph, you can choose to reverse the drawing order by placing a tick in the **Draw in reverse** checkbox.

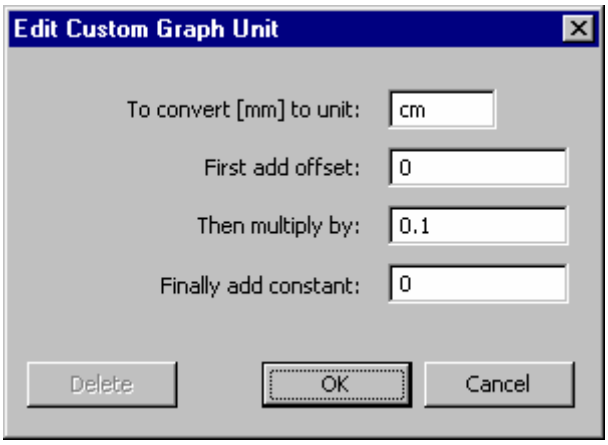
Unit of Measure

The Unit of Measure drop-down list allows you to change the unit of measurement used for the display of values in the pane. Choose **IrriMAX Setting** (if available) to use the unit specified on the *Measurement* tab of the *IrriMAX Settings* dialog (see page 77) or choose **Database Unit** to use the unit as stored in the database. Depending on the type of sensor, there may be other units available in the list.

You may also define your own unit conversion to use in the pane.

Ø To define a custom unit conversion

1. Click the **Edit…** button in the *Unit of Measure* section. The *Edit Custom Graph Unit* dialog appears.



2. Enter a name for your new unit. This must be short enough to display under the graph's axes.
3. You can enter an offset value. The first step of the conversion will be to add this offset to the value found in the database. Enter zero if you do not wish to use an offset.
4. Enter a multiplier. The second step of the conversion is to multiply by the multiplier. If you wish to perform a division, you will need to calculate the inverse of the divisor and use that as the multiplier. Enter a multiplier of 1 if you do not wish to use a multiplier.
5. Finally, you can add a constant. The third step of the conversion is to add the constant to the result obtained by applying the offset and then the multiplier. Enter a constant of zero if you to not wish to use a constant.
6. Click **OK** to save the custom unit. You unit will now be selected and available in the **Unit of Measure** drop-down list.
7. You can click **Delete** to delete the unit definition so that it does not appear as a selectable unit. The Delete button will be disabled if there is no custom unit defined, or the custom unit is currently being used by the pane.

Legend

Each pane has a line legend that describes the sensor represented by the lines or bars of a particular color. The physical positioning and some of the content of the legend can be altered.

Ø To change the position of a pane's line legend

From the **Position** drop-down list in the *Legend* section, choose one of the following:

- **Above** - Positions the legend above the graph, stretching across the entire width. No part of the graph is obscured by the legend. This is the default position. Other positions can be chosen to increase the available space for graphing.
- **Top-Right** - Positions the legend over the top-right corner of the graph. This is the recommended position for an Irrigation and Rainfall legend.
- **Top-Left** - Positions the legend over the top-left corner of the graph.
- **Bottom-Left** - Positions the legend over the bottom-left corner of the graph.
- **Bottom-Right** - Positions the legend over the bottom-right corner of the graph.
- **Hidden** - Hides the legend completely. Sometimes the legend isn't required, for example in a Volumetric Ion Content pane when the lines are already described in the main pane, or in an Irrigation and Rainfall pane where the colors are the same system-wide.

Ø To change the content of a pane's line legend

There are four optional pieces of information that can be displayed in the pane's legend. These are optional because they are also displayed in the *Header* section of the graph window (but only for the current pane, not all panes at once).

It can be useful to display this information for clarity, particularly if a pane shows readings from a different database/logger to that of the primary pane. This is particularly true if you wish to mail or webify a graph, since a mailed or webified graph lacks the pane-sensitive *Header* section.

To change the legend content, select one or more of these checkboxes:

- **Logger Id** - Shows the logger id from the pane's underlying database
- **Database name** - Shows the file name of the pane's underlying database
- **Last reading time** - Shows the timestamp of the last reading in the pane's underlying database
- **Sample interval** - Shows the time difference between the last two readings in te pane's underlying database. This is usually the sample interval of the logger.

Ø To change the default legend properties

If you have changed the legend's position and content and would like these properties to apply to all new graphs and panes, click the **Save as defaults** button in the *Legend* section.

Time Shift

The graph can be offset from the time axis in the primary pane by a user-definable time offset. This can be useful for comparing current data with historical data, for example comparing the current graph with that of the previous year. To do this, you would create a second pane with a time shift of -52 weeks.

It can also be useful for making corrections to the timestamps of the readings if they are incorrect by a known amount. A common case is that of bar graphs of pulse sensors (e.g. a tipping bucket), where the timestamp denotes the end of a sample interval rather than the start. In this case, the pane should be shifted by a positive amount equal to the sample interval.

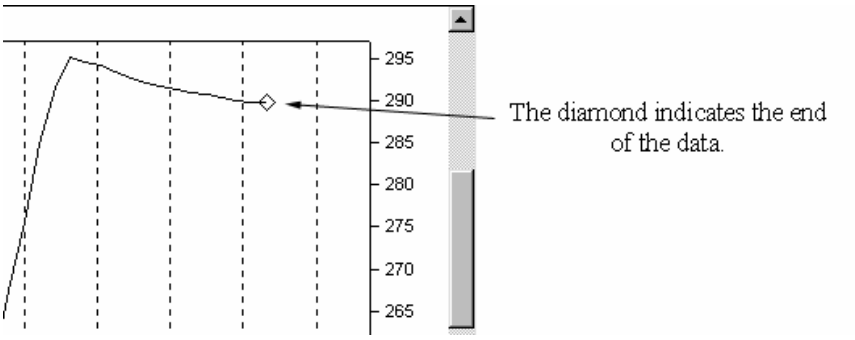
Ø To set a time shift

- Either choose a preset time shift from the **Offset of this pane from time axis** drop-down list
- Or type a value into the **Offset of this pane from time axis** edit control. You can type "seconds", "minutes", "hours", "days" or "weeks", or the control will recognize 's', 'm', 'h', 'd' and 'w' respectively. When you move off the control it reformats itself and you can verify that your input was recognized.

Miscellaneous

- **Stick to end of main graph on open**
  By default, when a graph file is opened, it displays the same section of the graph that displayed before it was last saved.
  The 'stick to end' feature can be used to ensure that the graph always shows the latest data. If the end point of the graph is visible prior to a database update, then after the database update the graph will be scrolled so that the new end point is at the same horizontal position within the graph

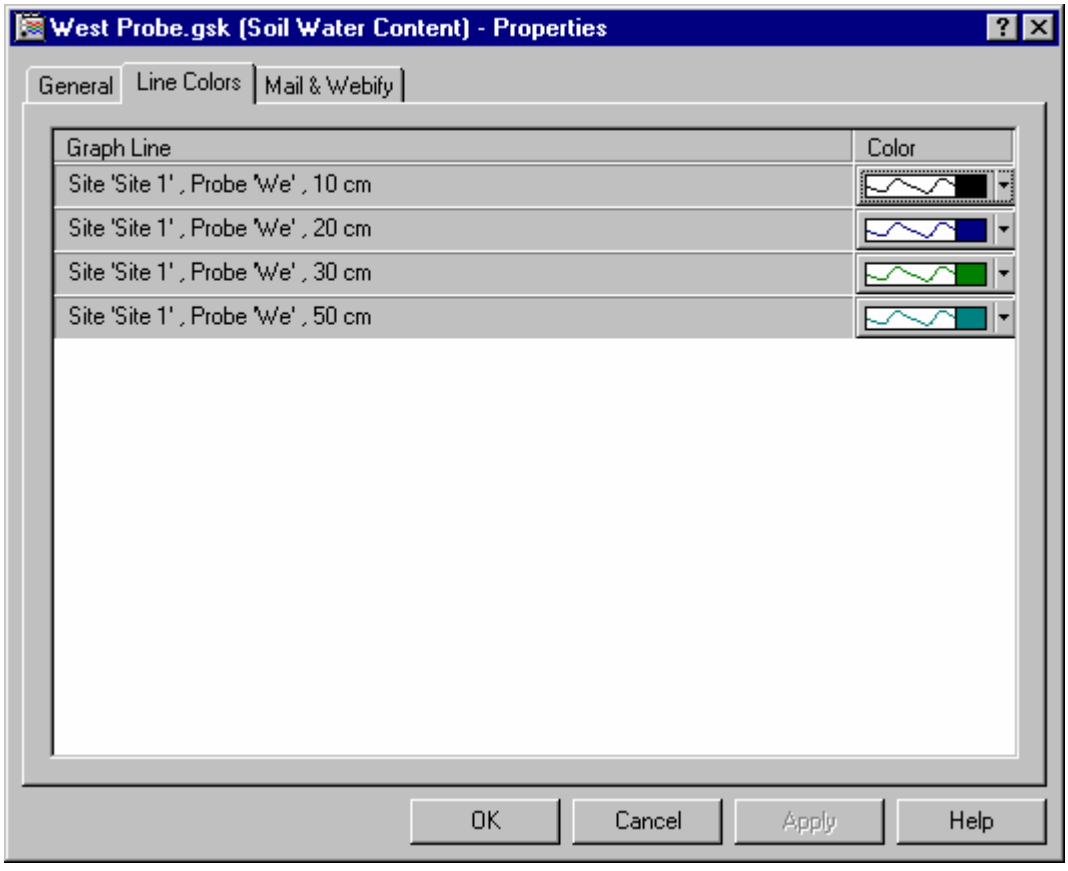
window.



- **Preset date range**
  The preset date range refers to the time scale along the horizontal axis. This can be set to the number of days that are significant for your agricultural watering cycle, for example, 7 days. This setting is used by the **Reset Graph** and **Zoom To Preset Date Range** commands.

Line Color Properties

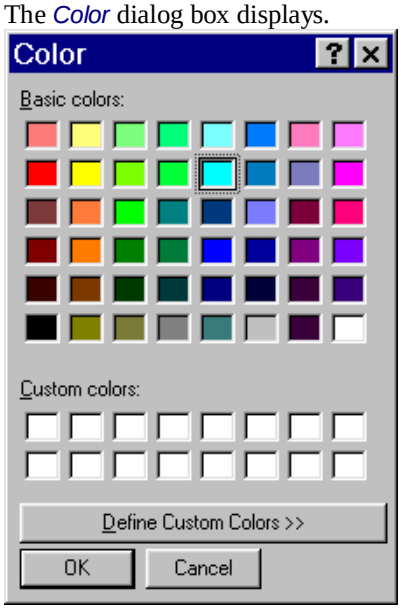
The *Graph Lines* tab allows you to set the color of the graph lines. The number of lines available to be changed depends on the type of graph being used.



Ø To set graph line attributes

1. From the *Properties* dialog box click the **Graph Lines** tab (if not already displayed).

2. Click on the **Color** down arrow of the line you wish to change.
The *Color* dialog box displays.



3. Do one of the following:

   - select a color from the *Basic colors* palette
   - click **Define Custom Colors>>** and click on the variegated palette. Click **Add to Custom Colors** to select the non-basic color and return to the *Basic colors* palette.

4. Click **OK**.
The *Color* dialog box closes.

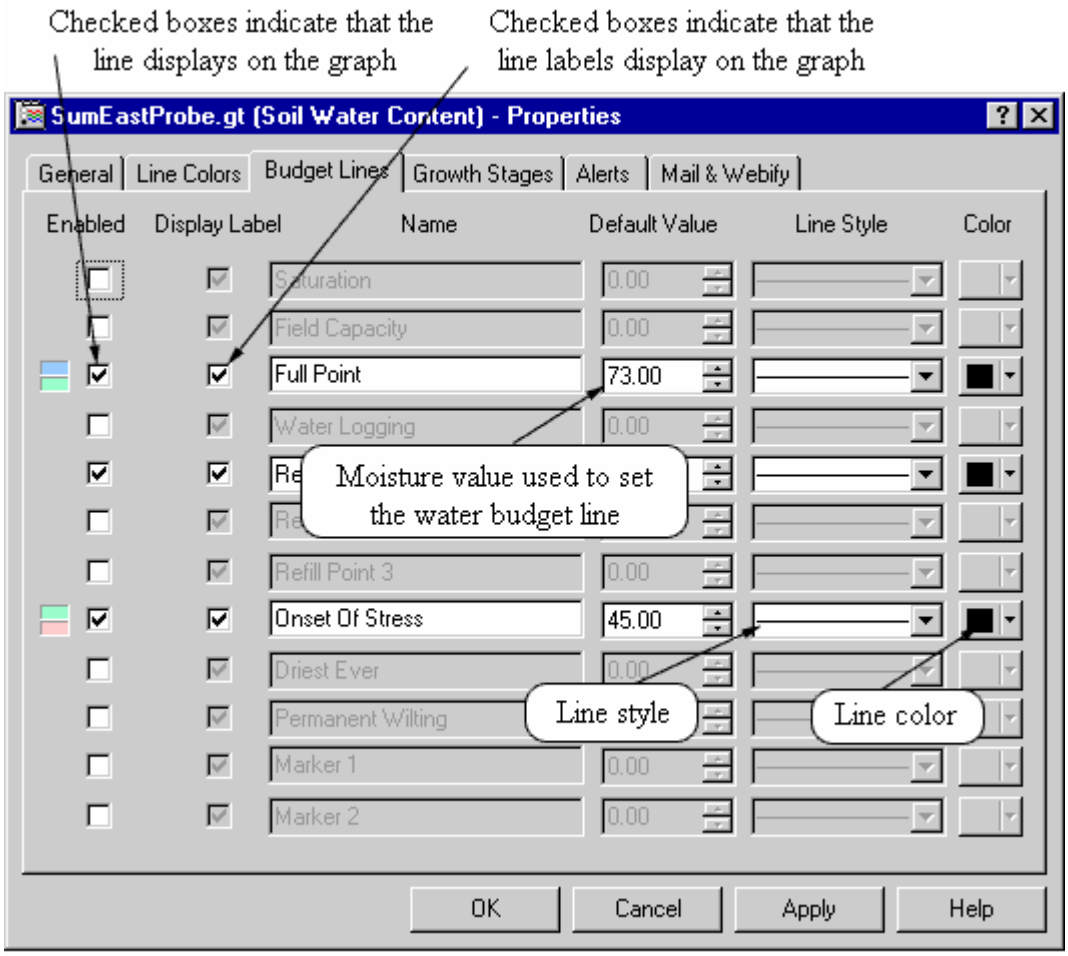
5. Do one of the following:

   - click **OK** to apply the changes and close the *Properties* dialog box
   - click **Apply** to apply the changes without closing the dialog box (you can now change other settings)
   - click **Cancel** to discard the changes and close the dialog box.

Budget Line Properties

Note: Budget lines are only available for graphs with a single vertical axis.

Budget lines allow you to specify indicators for different states of soil saturation. For example, you can specify the moisture content considered to be the refill point where irrigation is necessary.



The budget lines can be used in two ways.

1. The Full Point and Onset of Stress settings are used to display three, color-coded sections in the graph. These colored bands are reflected in the soil moisture gauge displayed in the *Workspace Manager* window.
   Note: It is recommended a Sentek trained agronomist or distributor analyze how these budget lines should be set for correct irrigation practice.

2. Marker lines can also be used to highlight strategic reference points.

The following budget lines can be used:

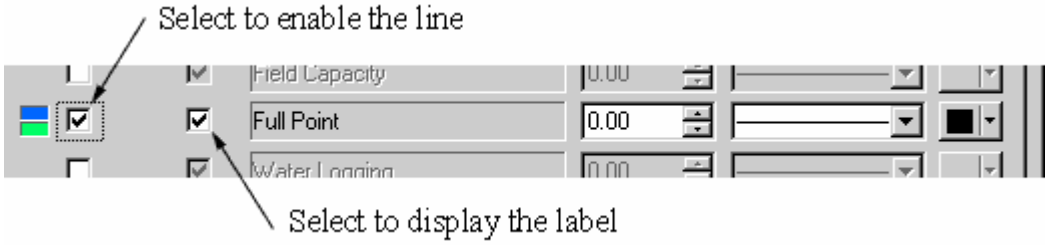
- **Saturation**
  All soil pores (spaces between solids) are filled with water.
- **Field capacity**
  The moisture content after drainage of the gravitational water is known as field capacity and it is the upper limit of moisture held in the soil.
- **Full Point**
  The 'Full Point' is the soil water content after an irrigation. Irrigation should replace the amount of soil water extracted by the plant root zone without producing significant excess that drains below the bottom of the root zone wasting water and fertilizer.
- **Water logging**
  A soil water content usually between field capacity and saturation threshold, where the rate of crop water use is reduced by a limited supply of soil air to the root zone.
- **Refill Points 1,2,3**
  The concept of a 'Refill point', is the soil water content at which point irrigation should occur, usually in order to replenish the soil water content to the Full Point. The Refill Point can be set when an applied irrigation quantity has been used up and before the crop has reached the onset of stress. Multiple Refill Points can be set to gain a desired physiological plant response (i.e. To

regulate cell expansion, maximize cell reproduction, regulate concentrations of cell content components i.e. sugars, etc.).

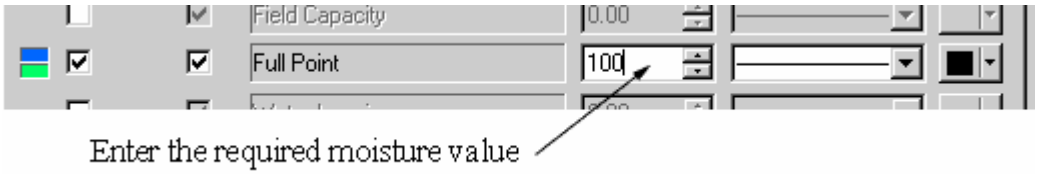
- **Onset of stress**
  The soil water content in the plant root zone, when the first observable slow down of the maximum daily crop water use rate after irrigation or rainfall occurs. This slow down should not be caused by a change in weather conditions, phenological stage of the crop, crop disease, harvest, spraying with chemicals, insect damage, etc. These factors need to be excluded through crop observation and weather monitoring. The slow down of daily intake should correlate only with the starting difficulties of the plant to develop sufficient osmotic pressure to extract soil water from a diminishing soil water reservoir.
- **Driest ever**
  This indicates the driest soil water level ever measured on that site.
- **Permanent Wilting**
  The soil water content at which the crop is subjected to irreversible wilting.
- **Marker 1,2**
  Marker lines can be used to denote other important thresholds in a soil water budget i.e. water content during flowering and fruit set etc.

Ø To set budget lines

1. From the *Properties* dialog box click the **Budget Lines** tab.
2. Click the **Full Point** check box to enable this budget line.

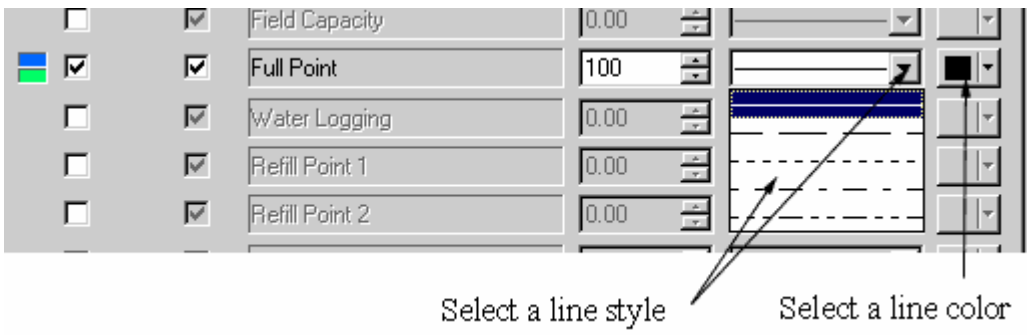


3. Enter the value for **Full Point**.
   Note: It is recommended a Sentek trained agronomist or distributor assists in setting this value.



   The graph reflects this value using colored sections.

4. Select a line style and color.



5. Repeat this sequence to set the **Onset of Stress** line.
6. Repeat this sequence to set other budget lines as required.

7. Do one of the following:

   - click OK to apply the changes and close the Settings dialog box
   - click Apply to apply the changes without closing the dialog box (you can now change other settings)
   - click Cancel to discard the changes and close the dialog box.

Ø To change budget line names

Budget Line Names describe the meaning of each budget line. These names may be changed as required by enabling the line and typing a new name into the **Name** field for the line.

A set of default names suitable for soil moisture content are provided by default. The default names can be changed. See page 80.

Note: The *Full Point* and *Onset of Stress* names, and the colors used to set the graph regions are fixed and cannot be altered.

Growth Stage Properties

Growth stages allow the user to specify agronomic lines and regions that reflect the plant's varying moisture demands at various stages of its growth cycle.

A growth stage consists of a starting date/time, and a new set of agronomic line and region values that apply from that time onward, until the start of the next growth stage.

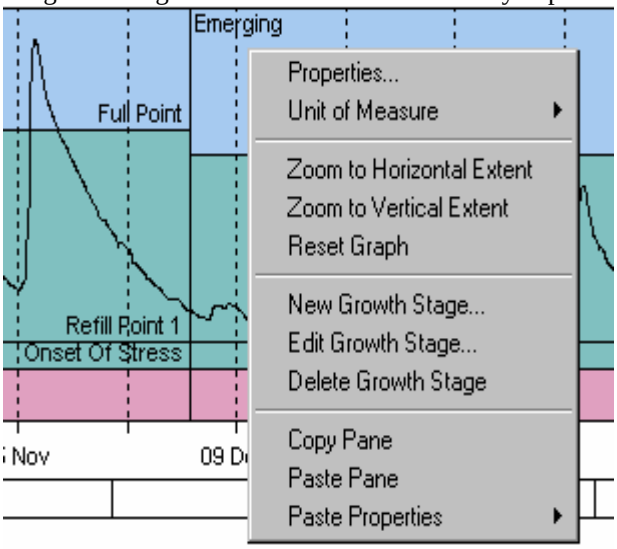
For scientific purposes there could be 20 different growth stages but typical farming uses is four or five stages.

Growth stages are created using the Graph Properties dialog and are stored in the graph so are therefore unique to that particular graph. Only lines that are enabled on the Budget Lines tab page are displayed.

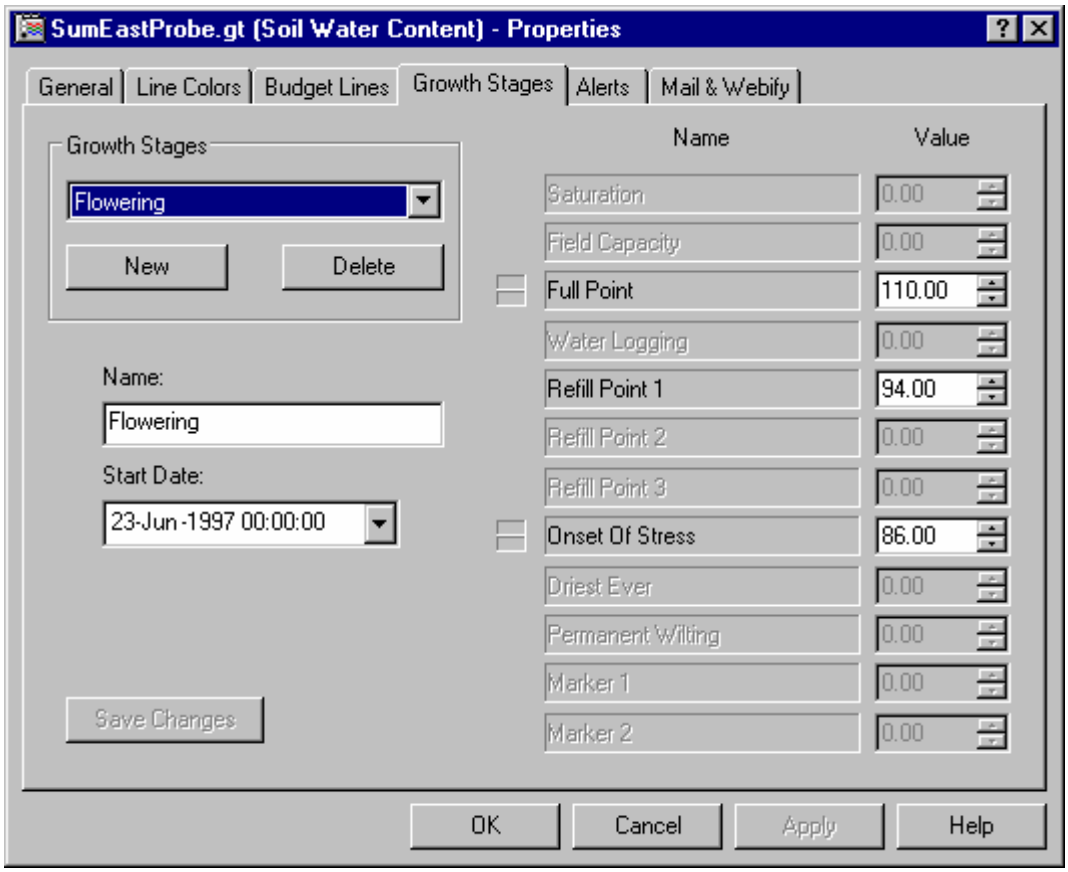
Growth Stages are defined on the Growth Stages tab page. Only lines that are enabled on the Budget Lines tab page are available for editing.

There are two method of opening the **Growth Stages** dialog:

- Click the **Graph Properties** button  on the graph toolbar and select the **Growth Stages** tab. This initializes the date and time of the growth stage to today.
- Right-mouse click on the graph, at the date and time you wish the start the growth stage to display the popup menu and select menu item **New Growth Stage..** This initializes the date and time of the growth stage to the date and time at which you positioned your mouse.



To edit or delete an existing growth stage using this popup menu you can click anywhere to the right of the growth stage start line. It is not necessary to click on the start line.

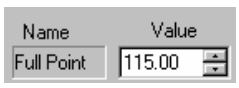


Name

Enter a short, descriptive name for the growth stage.

Start Date

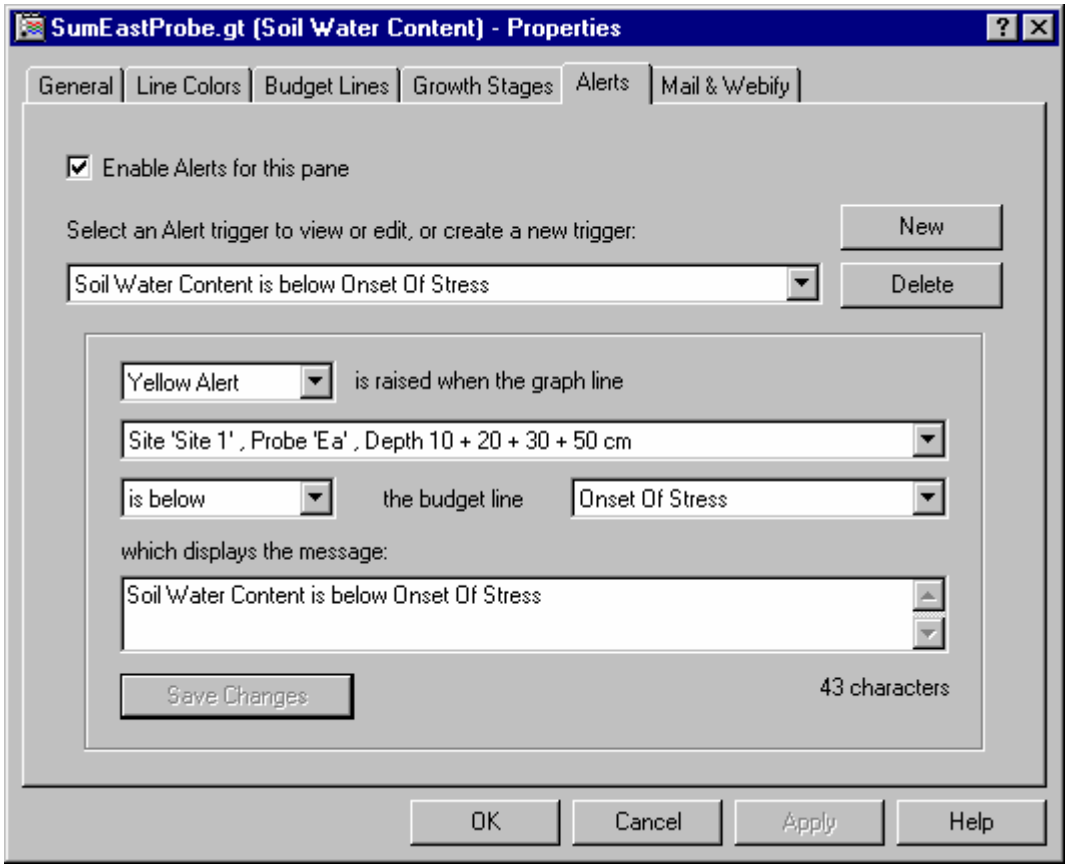
Enter the starting date for this growth stage.

Click this button...	...to perform this function
	An existing growth stage can be selected from this combo-box if you want to modify or delete it. The names do not appear here until they have been added via the New button. The list is presented in chronological order. The stage name and its start date are displayed
	Use this to add a new growth stage.
	Delete the selected Growth Stage name.
	Save the currently displayed growth stage. Either from the growth stage selection list or the new name. **Note:** For an existing name, changing the name field changes the name in the growth stage list.
	Set the agronomic line value onwards from the start date for this line. The initial value is set to the value set on the *Budget Lines* tab page. If the value field is dimmed you must enable the line on the *Budget Lines* tab page. Fine adjustment of the value can be done using the spin buttons. The Name field can be changed on the *Budget Line Names* tab page.
	Apply all changes and close the *Properties* dialog box.

Click this button...	...to perform this function
Cancel	Cancel the *Properties* dialog box without applying any changes. The settings on other tab pages remain unchanged.
Apply	Apply all changes without closing the *Properties* dialog box. This is in case you want to select another tab of the dialog box to make further changes to other settings.
Help	Display the online help.

Alerts Properties

The *Alerts* Properties tab is used to define the trigger conditions for graph-based alerts. Alert triggers can be added to any pane which contains budget lines.



Ø To enable or disable alerts

Use the **Enable Alerts for this pane** checkbox to enable or disable alerts based on the triggers defined for the pane. Disabling alerts allows you to prevent the raising of alerts, while keeping the triggers you have defined.

Ø To create a new alert trigger

1. Click the **New** button.
2. Choose the severity of the alert from the drop-down list. A **Red Alert** is the most severe. The default severity is a **Yellow Alert**.
3. Choose the graph line on which to base the alert. In the usual case of a summed graph, there is only one line to choose from, and this is selected by default.
4. Choose the position relative to a budget line that will cause the alert to be raised. The choices are **is above** and **is below**.

5. Choose the budget line to compare the graph line's position to.

6. The message control automatically updates to show the message that will be displayed when the alert is raised. You can edit this message, after which it will no longer automatically update. To restore automatic updating, delete the entire message.
You can include the value of the last reading in the message by using **%V** as a placeholder. For example, enter "Soil Water Content %V is below Onset Of Stress".

7. Click the **Save Changes** button to save the alert trigger. The trigger is saved, regardless of whether you later hit the **Cancel** button on the *Properties* dialog. To avoid saving your changes, select a different alert trigger, tab away from the page or hit the **Cancel** button.

Ø To edit an existing alert trigger

1. Choose an existing alert trigger from the drop-down list.

2. Make your changes to the various controls that define the alert trigger condition. The message control automatically updates to show the message that will be displayed when the alert is raised. You can edit this message, after which it will no longer automatically update. To restore automatic updating, delete the entire message.

3. Click the **Save Changes** button to save the alert trigger. The trigger is saved, regardless of whether you later hit the **Cancel** button on the *Properties* dialog. To avoid saving your changes, select a different alert trigger, tab away from the page or hit the **Cancel** button.

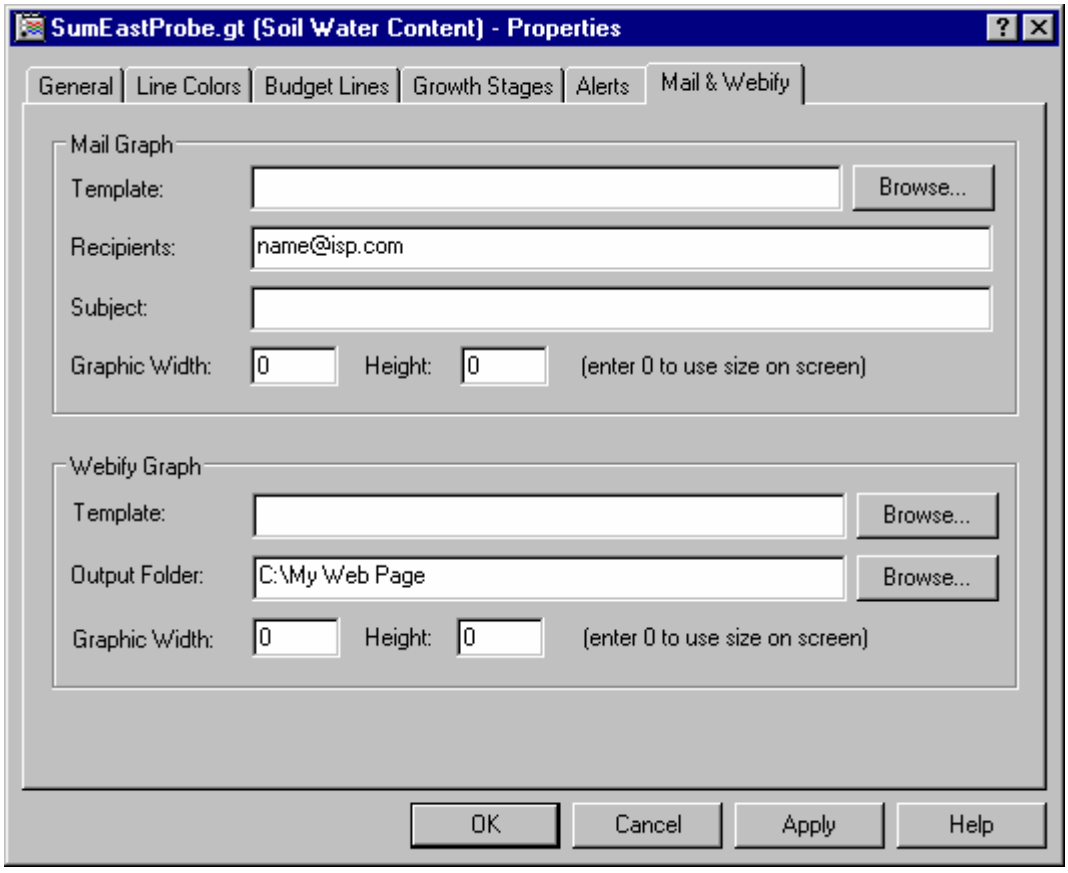
Ø To delete an existing alert trigger

1. Choose an existing alert trigger from the drop-down list.

2. Click the **Delete** button.

Mail and Webify Properties

Mail & Webify Properties control the way the graph is converted to email or web-compatible form.



Mail Graph - Template

A template file to use when converting this graph to an email. Leave blank to use the default template (see page 83.)

Use the **Browse…** button to search for a different template file.

Mail Graph - Recipients

The email addresses of the recipients of the emailed graph snapshot, separated by commas. Enter the email addresses here if you will repeatedly email the same people. Otherwise you can enter the recipients at the time you create the email.

Mail Graph - Subject

Text for the subject line of the email. Leave blank to use the graph name. You can also enter the subject at the time you create the email.

The subject line can contain certain macros that will be replaced with information specific to the graph you are mailing. These macros are:

- **GRAPH_NAME_TEXT** is replaced by the name of the graph.
- **GRAPH_COMMENT_TEXT** is replaced by the user-entered comment for the graph.
- **GRAPH_LOGGER_TEXT** is replaced by the Logger ID from the database shown in the main pane of the graph.
- **GRAPH_DOWNLOAD_TEXT** is replaced by the date and time of the last download into the database shown in the main pane of the graph.

Mail Graph - Graphic Width and Height

The width and height in pixels of the graphical part of the emailed graph snapshot. Enter 0 to use the same width or height as on screen.

Webify Graph - Template

A template file to use when webifying this graph. Leave blank to use the default template (see page 83.)

Use the **Browse…** button to search for a different template file.

Webify Graph - Output Folder

A folder to receive the files generated by the webification process.

Use the **Browse…** button to select a folder to receive the files output by the webification process. Alternatively you can type the name of the folder in the edit box.

If the folder you specify does not exist, it will be created during the webification process.

You may enter a path relative to the location of the graph document, rather than supply a full path.

Webify Graph - Graphic Width and Height

The width and height in pixels of the graphical part of the emailed graph snapshot. Enter 0 to use the same width or height as on screen.

Graph File Menu

The **File** menu lists commands used to open, save, print and close files.
The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Open...	CTRL+O *or* ALT, F, O		Open an existing graph. See page 162.
Save	CTRL+S *or* ALT, F, S		Save the current graph. See page 163.
Save As...	ALT, F, A		Save the current graph with a new name.
Save Package…	ALT, F, K		Save graph and database files in an IrriMAX file package. See page 33.
Print...	CTRL+P *or* ALT, F, P		Print the graph. See page 163.
Print Preview	ALT, F, V		Preview the file as it will print.
Page Setup...	ALT, F, U		Change the current page setup. See page 163.
Properties...	ALT+ENTER *or* ALT, F, R		Change properties for this graph and pane only. See page 148.
List of most recently open files	ALT, F, 1 2 ETC.		Open a recently accessed graph.
Close	ALT+F4 *or* ALT, F, C	 on the title bar	Close the Graph window.

Opening graphs

Only graphs can be opened in the *Graph* window.

Each graph opens in a new *Graph* window and each graph is placed in the currently open workspace of the *Workspace Manager* window.

You can open graphs in the *Graph* window by:

- browsing to the directory containing the file and selecting the file
- selecting a file from the recently used file list in the **File** menu.

Ø To open a graph from the Graph window

1. From the **File** menu, click **Open...**.
   The *Open* dialog displays
2. In the *Look in:* box, click on the drop-down arrow and select the directory where the graph file is located.
3. In the *Directory contents:* box, click on the file to be opened.
   Graph files have a file extension of *.GT, *.GSK, *.GSS and *.GSC.
   See page 31 for details of graph types.
4. Click **Open**.
   The graph displays in the *Graph* window.

Ø To open a recently used graph

From the **File** menu, click on the filename of the graph to be opened.
The graph displays in the *Graph* window

Saving graphs

If you require a copy of the graph, the **Save As** command is used.

Ø To save a graph

1. From the **File** menu, click **Save Graph**.
   The file information is saved.
   If the graph has not been saved before, the *Save As* dialog box displays.
2. Select a file location for the graph file.
   Note that the default name for a new graph is 'Graph1'.
3. Enter a file name for the new file.
4. Click **Save**.
   The new file is saved.

Ø To save a graph as a new file

1. From the **File** menu, click **Save As...**.
   The *Save As* dialog box displays.
2. Select a file location for the new graph.
3. Enter a file name for the new graph file. Note that the current file name displays in the *File name* box.
   Note: If you do not enter a new file name, the original file will be replaced with this file.
4. Click **Save**.
   The new graph is saved.

Printing graphs

Graphs may be printed from the *Graph* window or *Workspace Manager*. To batch print multiple graphs from the *Workspace Manager*, see page 53.

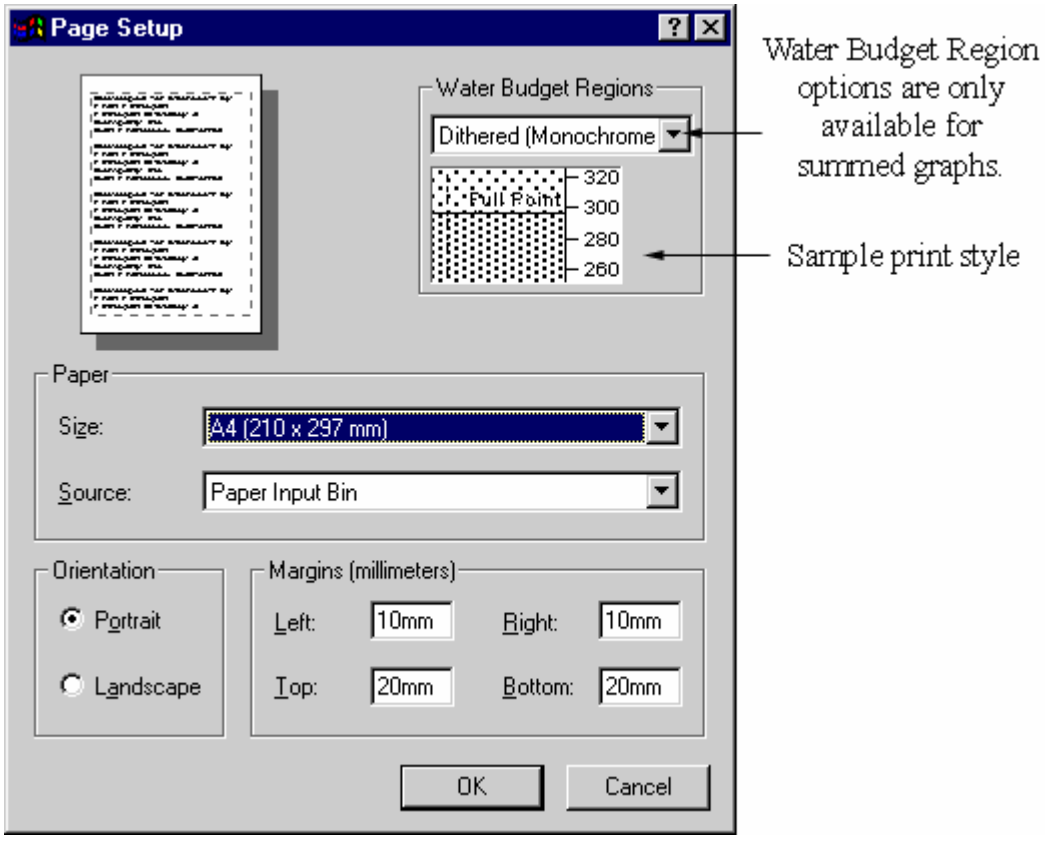
The **Print Preview** command displays the current graph, as it would appear when printed. Using the **Print Preview** command, you can ensure that margin, printer settings and selected content are correct, before sending the information to the printer.

You can also print your graph to a printer file. A printer file saves all necessary information in a file that can be used on another printer supporting the same printer language. You could use this feature, for example, to print a graph using another computer that doesn't have **IrriMAX** installed.

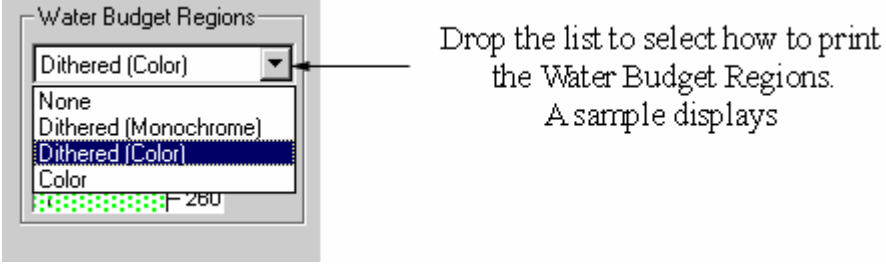
Before you print, you should check that the page setup is correct for the document being printed. The **Page Setup** command is used to control how the document is printed on the page. For example, to set whether the document is printed in portrait or landscape orientation.

Ø To change page setup for a graph

1. From the **File** menu, click **Page Setup...**.
   The *Page Setup* dialog box displays.



2. Under **Paper**, select from the drop-down lists:
   - the required paper size
   - the paper source
3. Under **Orientation**, select either **Portrait** or **Landscape**.
4. Under **Margins**, enter any special requirements for margins.
   Note how the sample page reflects these changes.
5. Under **Budget Regions**, select the printing style for the colored regions



6. Click **OK** to save the changes and the *Page Setup* dialog box closes.

Ø To view a graph in print preview

1. From the **File** menu, click **Print Preview**.
   The *Print Preview* window displays.

2. From the *Print Preview* window toolbar you can:

Click...	To...
Print...	send the file in its current state to the printer.
Next Page	display the second page of the file where the file has more than one page.
Prev Page	display the previous page of a file where you are on a page other than the first page.
One Page	display one page of the file, where the file has more than one page.
Two Page	display two pages of the file simultaneously, where the file has more than one page.
Zoom In	enlarge a specific area of the file.
Zoom Out	minimize the view of a specific area of the file.
Close	close the print preview window.

Ø To print a graph

1. From the **File** menu, click **Print...**.
   The *Print* dialog box displays.

2. Under **Copies**, select the number of copies you want to print.

3. Click **OK**.
   The graph is sent to the printer.

Ø To print to a printer file

1. From the **File** menu, click **Print...**.
   The *Print* dialog box displays.

2. Click the **Print to file** option.

3. Click **OK**.
   The *Print to File* dialog box displays.

4. Select a destination for the file.

5. Enter a file name. Printer files have a file extension of *.PRN.

6. Click **Save** to save the graph printer file.

Closing graphs

Ø To close a graph

From the **File** menu, click **Close**:
If the file has not been saved a message box displays prompting you to save the changes.

Note: You should not close a graph if you want to retain it in the workspace. To return to the Workspace click **Workspace** on the menu bar.

Graph Edit Menu

The **Edit** menu contains commands to add comments and rulers to the graph.

The menu command, equivalent shortcuts and tool buttons are:

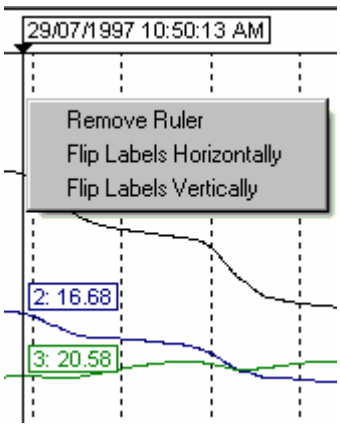
Menu item	Shortcut key	Button	To...
Insert Vertical Ruler	CTRL+L OR ALT, E, V		Add a new vertical ruler to the graph.
Remove All Vertical Rulers	ALT, E, R		Remove all vertical rulers from the graph.
Insert Horizontal Ruler	ALT, E, H		Add a new horizontal ruler to the selected pane.
Remove All Horizontal Rulers	ALT, E, E		Remove all horizontal rulers from the selected pane.
Insert Comment	ALT, E, C		Add a new comment to the graph.
Copy Pane	ALT, E, O		Copy the selected pane to the copy buffer.
Paste Pane	ALT, E, P		Paste the copied pane.
Paste Properties Ø	ALT, E, A		Open the submenu for pasting pane properties.
Line Colors	ALT, E, A, C		Paste the graph line colors from the copied pane into the selected pane.
Budget Lines	ALT, E, A, B		Replace the budget lines and growth stages in the current pane with those in the copied pane.
Growth Stages	ALT, E, A, G		Replace the growth stages in the current pane with those in the copied pane. Budget line values are not changed.
Graph Mode	ALT, E, A, M		Change the graph mode of the current pane (line or bar, bar width etc) to that of the copied pane.

Ruler commands

The **Edit** menu displays commands to add and remove rulers on a graph. A vertical ruler is able to be moved to a date/time on the horizontal scale and displays values where it intersects the graph(s). If you add two or more vertical rulers, the second and subsequent rulers will display differences or totals relative to the ruler on their left.

Horizontal rulers can be moved up and down the vertical axis. They only display a value label when there is a single vertical axis for the pane.

Up to 64 rulers can be added to a graph. Once a ruler is added to a graph you can move the ruler by clicking and dragging the ruler line. Each ruler has a set of labels in small boxes. Each of these labels can be dragged to four positions with respect to the ruler and graph line intersection (top left, top right, bottom left, bottom right). In addition, all the labels on a ruler can be to the opposite position (flipped) with the graph right-mouse popup menu.

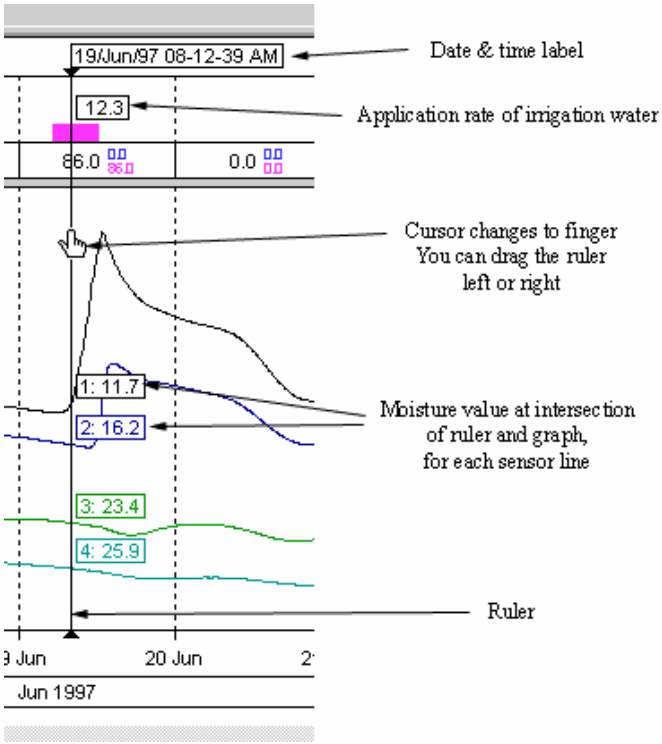


Note that the cursor changes from an arrow symbol to a pointing finger symbol.

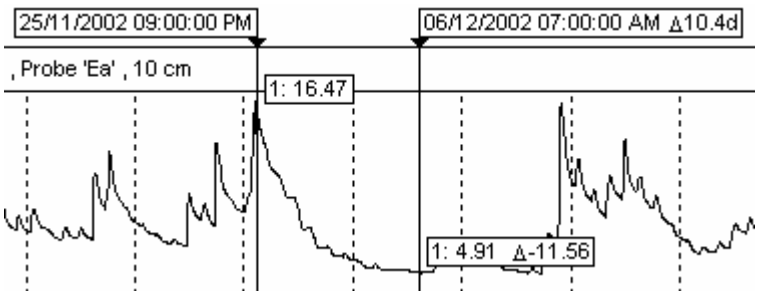
Note: Rulers remain stationary in the window when you scroll a graph.

Vertical Rulers

The following picture shows a vertical ruler on 19/Jun/1997 at 8:12:39 am. The ruler labels show the value of the graph at the ruler intersection points.

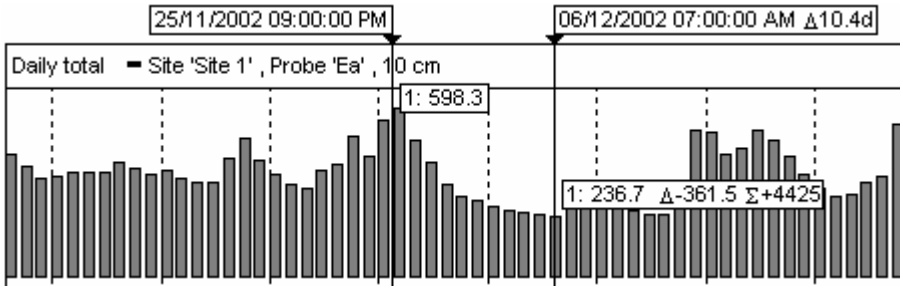


Two rulers can be used to show the difference in value and time between two points. Note the Delta symbol in the time label and the value label of the second ruler.



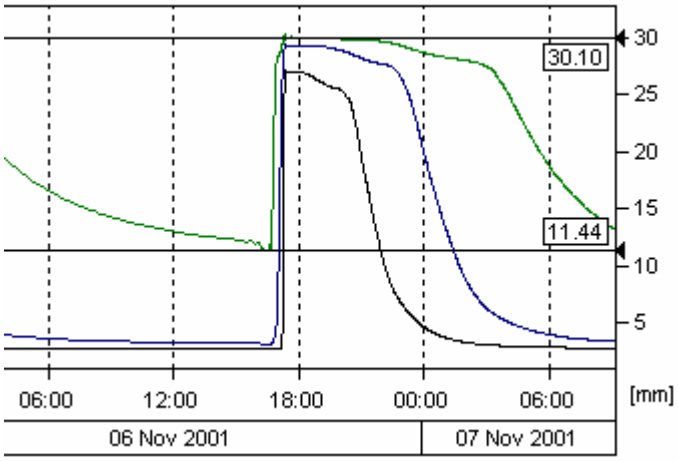
No difference will be shown if you are graphing Change Bars, because the bars are showing the difference themselves.

Two rulers can also be used to sum the values between two points, when the rulers are applied to a bar graph in totals mode. Note the Sigma symbol in the value label of the second ruler.



Horizontal Rulers

The following picture shows horizontal rulers at 30.10 mm and 11.44 mm.



Ø To insert a ruler into a graph

1. From the **Edit** menu, click **Insert Vertical Ruler** or click in the graph pane where you want a horizontal ruler then on the **Edit** menu click **Insert Horizontal Ruler.**
   A ruler appears on the graph.

2. Click the left mouse button on the ruler and drag it to the required position.

Ø To remove a single ruler from the graph

1. Hold the mouse over the ruler so that the pointing finger displays.

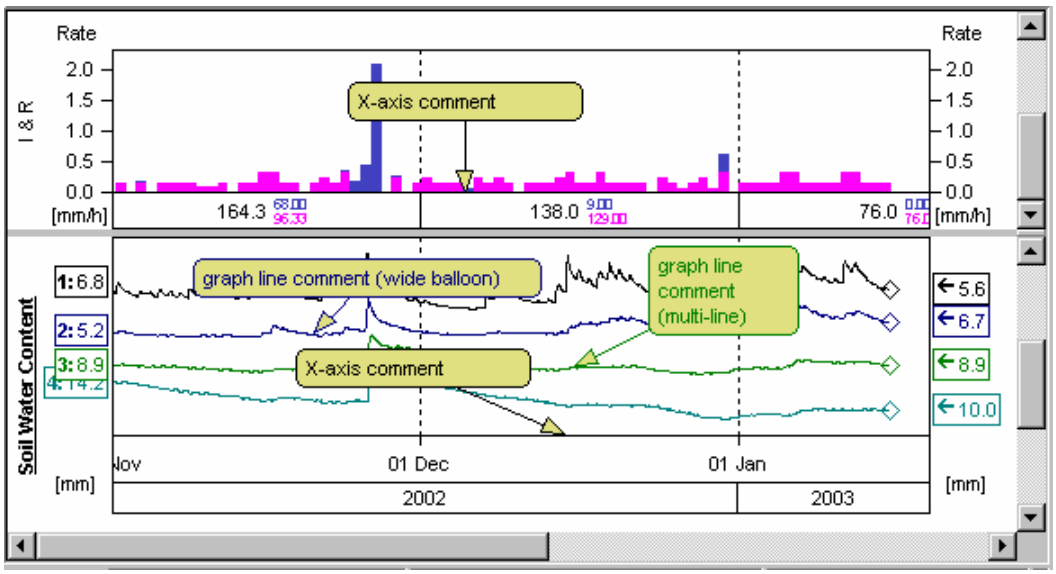
2. Right-click and click **Remove Ruler**.
   The ruler is removed.

Ø To remove all rulers from a graph

From the **Edit** menu, click **Remove All Vertical Rulers**. Or click in the graph pane where you want to remove horizontal rulers then on the **Edit** menu click **Remove All Horizontal Rulers.**
All vertical rulers are removed from the graph.. Horizontal rulers are only removed for the currently selected pane.

Graph comments

Graphs can be annotated with multiple comments. Each comment comprises a balloon containing text and an arrow pointing to the creation position. Comments are saved and restored with the graph.



The comments can be anchored to either a point on a graph line or the x-axis of any of the graph panes. There is no limit on the size or number of comments, but obviously too many comments will obscure the underlying graphs.

Once a comment has been created the following actions can be performed:

- Modify the text in a comment (word wrapping occurs automatically)
- Remove the comment
- Drag the balloon to another location in the current pane
- Adjust the comment width (height is automatically adjusted with automatic word wrapping)
- Hide or show the comment arrow and /or the comment border
- Change the font of the text in all comments
- Change the background color of all comments (the text remains the color of the associated graph lines)

Ø To insert a comment into a graph pane

1. From the **Edit** menu, click **Insert Comment** or click the comment icon on the toolbar.
   A comment cursor appears on the graph.
2. Drag the comment cursor to the desired position. While the cursor is a comment arrow pointing down the comment will anchor to the x-axis of the current pane. When the icon arrow points to a point on a graph line the icon changes to an angled-arrow and the comment will anchor to that point on the graph line. The initial text is set to "new comment".
3. If you want to abandon comment creation, move the cursor to the **Edit** menu and click **Insert Comment** (to remove the tick). Or click the comment icon on the toolbar.

Ø To remove a comment from the graph

1. Move the mouse to anywhere in the balloon (but don't left-click because that will cause text edit mode to be entered).
2. Right-click and click **Remove Comment**.
   The comment is removed.

Ø To change the text in a comment

1. Move the mouse to anywhere in the balloon and click once.
   The balloon border change from solid to dotted and the cursor changes to an edit box I-beam.
2. The text can be modified using arrow-keys and mouse movements as with any multi-line edit box.
3. Click outside the balloon to exit edit mode.

Ø To reposition a comment balloon

1. Move the mouse to anywhere in the balloon and click once.
   The balloon border changes from solid to a dotted box.
2. Move the cursor towards a corner of the dotted border and it will change into a four-way arrow cursor.
3. Drag the cursor, and the balloon will move to the new position.
4. Click outside the balloon.

Ø To change the width of a comment balloon

1. Move the mouse to anywhere in the balloon and click once.
   The balloon border changes from solid to a dotted box.
2. Move the cursor towards the dot in the middle of either side of the dotted border and it will change into a two-way arrow cursor.
3. Drag the cursor left or right cursor, and balloon width changes. The balloon height will adjust automatically and will allow for word wrapping.

Ø To hide or show the arrow or border of a comment

1. Move the mouse to anywhere in the balloon (but don't left-click because that will cause text edit mode to be entered).
2. Right-click to display the popup menu and choose **Show Arrow** or **Show Border**.
   The arrow or border is either shown or hidden, depending on the previous state.

Ø To change the background color or text font of all comments

1. See the description in global settings for *Font Settings* and *Color Settings*.

Graph pane copy and paste

The graph window's Copy and Paste feature can be used to copy entire graph panes and paste them into the same graph window, or a different graph window. It is also possible to replace the following properties of an existing pane with those from a single copied pane:

- Line or bar colors
- Budget lines (and, by implication, growth stages)
- Growth stages
- Graph mode (line, bar etc)

Ø To copy one or more panes to the copy buffer

1. A pane can be copied by doing one of the following:

- Click within the pane to select it, then choose **Copy Pane** from the **Edit** menu.
- Right-click within the pane to be copied, then choose **Copy Pane** from the popup menu.

2. To copy an additional pane to the copy buffer, hold down the SHIFT key and choose **Copy Pane** again.

Ø To paste copied panes into a graph

Choose **Paste Pane** (or **Paste 2 Panes**, **Paste 3 Panes** etc) from the **Edit** menu or the graph's right-click popup menu. Copied panes will be added at the top of the graph window, below any Irrigation and Rainfall pane. The most recently copied pane will be topmost.

Note that it is not possible to have more than one Irrigation and Rainfall pane on a graph. **Paste Pane** will not add a second I&R pane if one already exists.

Ø To paste copied line colors into an existing pane

- Click within the pane to select it, then choose **Line Colors** from the **Paste Properties** submenu of the **Edit** menu.
- Alternatively, right-click within the pane, then choose **Line Colors** from the **Paste Properties** submenu of the popup menu.

If there are fewer lines in the copied pane than in the target pane, the remaining lines in the target pane will be unchanged.

It is not possible to paste line colors into an Irrigation and Rainfall pane.

Ø To paste copied budget lines and growth stages into an existing pane

- Click within the pane to select it, then choose **Budget Lines** from the **Paste Properties** submenu of the **Edit** menu.
- Alternatively, right-click within the pane, then choose **Budget Lines** from the **Paste Properties** submenu of the popup menu.

The budget lines and growth stages in the target pane will be replaced with those from the copied pane.

If the target pane does not support budget lines (due to having more than one vertical axis, or being an Irrigation and Rainfall pane), only the growth stages will be copied.

Ø To paste copied growth stages into an existing pane

- Click within the pane to select it, then choose **Growth Stages** from the **Paste Properties** submenu of the **Edit** menu.
- Alternatively, right-click within the pane, then choose **Growth Stages** from the **Paste Properties** submenu of the popup menu.

The growth stages in the target pane will be replaced with those from the copied pane.The values of any existing budget lines will not be changed.

If the target pane does not support budget lines, only the growth stages will be copied.

Ø To paste a copied graph mode into an existing pane

- Click within the pane to select it, then choose **Graph Mode** from the **Paste Properties** submenu of the **Edit** menu.
- Alternatively, right-click within the pane, then choose **Graph Mode** from the **Paste Properties** submenu of the popup menu.

The mode properties of the target pane will be replaced with those from the copied pane.These include whether the graph shows lines, bars or change bars, and the bar graph properties such as duration and bar value.

It is not possible to paste the graph mode into an Irrigation and Rainfall pane or a V.I.C. pane.

Graph View Menu

The **View** menu lists commands used to view window objects, settings or text files. The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Irrigation & Rainfall Ø	ALT, V, R		Click button to view or hide the Irrigation & Rainfall graph pane (if I&R data is present). Select from menu to show Irrigation & Rainfall submenu.
Rate	ALT, V, R, R		
Amount	ALT, V, R, A		
Hourly Totals	ALT, V, R, H		
Daily Totals	ALT, V, R, D		
Weekly Totals	ALT, V, R, W		
Monthly Totals	ALT, V, R, M		
Volumetric Ion Content	ALT, V, V		View or hide the Volumetric Ion Content (salinity VIC) graph pane (if salinity sensors exist in the database). See page 142.
New Pane…	ALT, V, P		Open the *Select Sensors for New Pane* dialog, to create a custom sensor graph. See page 143..
Equalize Pane Heights…	ALT, V, E		Adjust the height of all the panes so that the graph portion of all panes is approximately the same.
Enlarge Pane	ALT, V, N		
Text...	ALT, V, X		Access the*Text Data Viewer*, to view the underlying data values for the graph in the currently selected pane. See page 184.
Interpolation	CTRL+I *or* ALT, V, I		Interpolate the current graph (summed graphs only), to take account of depths that have no associated sensor. See page 173.
Comments	ALT, V, C		View or hide all the comments on every pane. When ticked, the comments are visible.
Tags Ø	ALT, V, G		Show the Tags submenu. .
Last Value	ALT, V, G, V *or* F8		View or hide tags that show the last value of the lines in the currently selected pane (not supported for Stacked or Separate-Y graphs with more than one line).
Last Value and Budget Line Distance	ALT, V, G, D *or* F8		View or hide tags that show the last value of the lines in the currently selected pane, and the distance from adjacent budget lines (not supported for Stacked or Separate-Y graphs with more than one line).
Last Value and Budget Line Percent	ALT, V, G, P *or* F8		View or hide tags that show the last value of the lines in the currently selected pane, and the percentage distance from adjacent budget lines (not supported for Stacked or Separate-Y graphs with more than one line).
Auto Hide Graph Header	ALT, V, A		Display or hide the graph header information. When ticked, the header only displays when the mouse hovers over the dividing line above the top graph pane. See page 136.
Toolbar	ALT, V, T		Display or hide the toolbar. When ticked, the toolbar displays.
Status Bar	ALT, V, S		Display or hide the status bar. When ticked, the status bar displays.

Interpolating graphs

Interpolation is the process of estimating unknown intermediate values between two or more known values. For example, if you have sensors at 10, 20, 30 and 50cm on a probe but no sensor at 40cm, the software interpolates the value at 40cm and adds that value to the summed values in the graph.

Note: Interpolation is only possible if:

- one or more sensors are missing between the shallowest and deepest selected sensors
- the graph is a summed graph, where you are adding the moisture values for all sensors per probe.

Ø To interpolate a summed graph

From the **View** menu, click **Interpolation**.
The graph updates with the (added) interpolated sensor values.

Note: Any budget lines that have been created for a graph without interpolation are likely to be invalid when interpolation is turned on.

Graph Zoom Menu

The **Zoom** menu displays commands to change the scale of the horizontal or vertical axes.

Time is displayed along the horizontal (X) axis. Soil water content displays along the vertical (Y) axis of the moisture pane. Irrigation &and rainfall application rate is displayed in I&R pane.

Note:
Y-axis zooming is applied to the pane that is currently active. Clicking anywhere in a pane makes that pane active, so its vertical axis title text is shown **bold.**
X-axis zooming uses the current center point of the x-axis as the center of the next zoom level.

Zoom to rectangle to increase or decrease the size of a selected section of data or **Zoom X** or **Zoom Y** to increase or decrease the current display. The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Zoom X Ø	ALT, Z, X		
In	SHIFT+X *or* ALT, Z, X, I		Zoom in on the horizontal axis, displaying a more detailed time scale (less data)
Out	X *or* ALT, Z, X O		Zoom out on the horizontal axis, displaying a less detailed time scale (more data)
Extents	CTRL+X *or* ALT, Z, X, E		Zoom to the horizontal extents to fit all available data to the width of the window. The scale is adjusted to display the first and last readings. Also available from the graph popup menu.
All Extents	SHIFT+CTRL+X *or* ALT, Z, X, E		Zoom the horizontal axis so that the full extents of the graphs in every pane are visible simultaneously.
1 Hour 12 Hours 1 Day 1 Week 30 Days 3 Months 6 Months 1 Year			Horizontal zoom, around the current graph center point, so the graph with covers the select time range
Zoom Y Ø	ALT, Z, Y		

Menu item	Shortcut key	Button	To...
In	SHIFT+Y *or* ALT, Z, Y, I		Zoom in on the vertical axis, displaying a more detailed scale, for the current graph pane.
Out	Y *or* ALT, Z, Y, O		Zoom out on the vertical axis, displaying a less detailed scale, for the current graph pane.
Extents	CTRL+Y OR ALT, Z, Y, E		Zoom to the vertical extents, to fit all available data to the height of the current graph pane. The scale is adjusted to display the maximum and minimum readings. Also available from the graph popup menu.
All Extents	SHIFT+CTRL+Y *or* ALT, Z, Y, A		Zoom the graphs in every pane to show their respective vertical extents.
5% 10% 25% 50% 75% 100%			Vertically zoom the current graph pane to a fixed amount. The number indicates the percentage of the allowable range for the sensor type in the pane. Soil moisture has an allowable range of 0..100mm, so choosing 10% will zoom vertically to a 10mm range. Hold the SHIFT key to zoom all panes to the same percentage amount.
Zoom to Rectangle	Z *or* ALT, Z, Z		Zoom in on a selected rectangle, allowing you to choose a specific area to enlarge. The cursor changes to a cross-hair to allow you to drag-select the area.
Zoom to Preset Date Range	ALT, Z, P		Zoom in on the preset date range, restoring the time scale to match the numbers of days in the preset date range, see page 149 for details on how to change the range.
Reset Graph	CTRL+R *or* ALT, Z, R		Scrolls the graph in the current pane to reveal the last data point(s).
Stack	ALT, Z, S		Arranges graph lines in increasing sensor order, zoomed and scrolled so that the vertical space is fully utilized without any overlap of graphs. This feature only applies to stacked and separate-y graphs.
Undo Zoom	CTRL+Z *or* ALT, Z, U		Revert to the last zoom level, in the current pane. Repeating the function reverts one more level, until all zooms have been undone. This does not reposition the horizontal or vertical scales, so graph lines may disappear off the screen. You cannot redo an undo.

Note: Zoom to Horizontal Extent, Zoom to Vertical Extent, Reset Graph and **Stack** are also available from the graph popup menu, by clicking the right mouse button and selecting the desired zoom from the popup menu. See page 138.

Ø To zoom the horizontal axis

From the **Zoom** menu, select **Zoom X** and click:

- **In** - the X-axis is magnified
- **Out** - the X-axis displays a greater time range
- **Extents** - the entire time range covered by the graph in the current pane displays.
- **All Extents** - The entire time range covered by all the graphs in every pane displays..
- **1 Hour .. 1 Year** - The X axis displays the chosen time range, centered on the same point as the previous range.

When the zoom level displays the vertical dashed lines at seven-day intervals (weekly) the date on the line is the day of the week (Monday through Sunday) that is set in *Workspace Manager* **Settings** for the "Week start day".

When the zoom level displays the vertical dashed lines at month level, the date on each line is the first day of the month (not 30 day intervals).

Ø To zoom the vertical axis

From the **Zoom** menu, select **Zoom Y** and click:

- **In** - the Y-axis for the current pane is magnified
- **Out** - the Y-axis for the current pane displays a greater range
- **Extents** - the entire vertical range for the graph in the current pane displays.
- **All Extents** - all graphs in each pane display their respective vertical ranges
- **5%..100%** - the vertical range of the graph in the current pane is set to a percentage of the allowable range for the sensor type. Hold the SHIFT key to zoom all panes to the chosen percentage.

The behavior of **Zoom to Vertical Extents** can be modified so that any budget lines are also included in the extents. See page 80.

Ø To zoom to a rectangle

1. From the **Zoom** menu, click **Zoom to Rectangle**.
   The mouse pointer changes to cross hairs when pointing to a section of the graph. Also note that the **Zoom to Rectangle** button is depressed.
2. Click and drag the mouse until the selection encloses the required section of the graph. As the mouse moves, a line displays the borders of the selection.
3. Release the mouse button and the selected section enlarges to fill the available window.

   Note: This feature remains on until you turn it off by completing step 3 or click **Zoom to rectangle** again

Ø To zoom to a preset date range

From the **Zoom** menu, click **Zoom to Preset Date Range**.
The graph resizes to display the preset date range defined in *General* tab of the *Settings* dialog box.

Ø To reset a graph

From the **Zoom** menu, click **Reset Graph**.
The graph is scrolled to reveal the end-point in the current pane.

The behavior of **Reset Graph** can be modified to also perform a **Zoom to Vertical Extent** and/or a **Zoom to Preset Date Range**. See page 80.

Ø To stack a stacked or separate-y graph

From the **Zoom** menu, click **Stack**.
The graph lines in the current pane are placed in sensor order and zoomed so that the vertical space is fully utilized without any lines overlapping..

Ø To revert to the previous zoom level

From the **Zoom** menu, click **Undo Zoom**.
The window is refreshed to the previous zoom level (X-zoom or Y-zoom). The graph axis remains positioned with the new center point the same as the previous center point.

Graph Tools Menu

The **Tools** menu contains commands for manipulating the graph, and the database in the currently active graph pane.
The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Logger Configuration…	ALT, T, L		Open the *Logger Configuration Dialog* for the database in the current pane. See page 91.
Enter Readings…	ALT, T, E		Open the *Database Entry* utility for the database in the current pane. See the Database Entry documentation for more information.
Download…	ALT, T, D		Setup and open *Data Exchange* to download readings into the current pane's database. See page **Error! Bookmark not defined.**.
Export…	ALT, T, E		Open *Data Exchange* to export data from the current pane's database. See page 108.
Spike Remover…	ALT, T, S		Remove spikes from the current pane's database. See page 110.
Recalculate Database…	ALT, T, R		Recalculate the readings in the current pane's database. See page 113.
Zip Graph…	ALT, T, Z		Copy the graph document and all related database files to a Zip archive. See page 176.
Mail Graph…	ALT, T, M		Generate an email containing a snapshot of the graph. See page 176.
Webify Graph…	ALT, T, W		Save a snapshot of the graph in Web-compatible format. See page 178.

Zip Graph

A single graph document and its associated database files can be copied to a Zip archive. This is convenient for making back-ups, or for giving the files to another person.

Ø To copy a graph and associated databases to a Zip archive

1. From the **Tools** menu of the graph window, select **Zip Graph…**
2. A file selection dialog appears. Choose the name and location for the Zip file and click **Save**.

If the Zip file already exists, IrriMAX will prompt for confirmation before overwriting it. It will not add files to an existing archive.

The archive will contain the graph document, and each database (.SDB file) that is currently being viewed in the graph window. If an irrigation and rainfall database (.WDB file) exists with the same name as the database in the main pane, it will be backed up regardless of whether it is being viewed or not.

The Zip file will contain full path information for each file. However, Zip files cannot store volume information, so the volume name will be represented as the top-level folder in the path. For example, the file C:\FILES\GRAPH.GT will be stored within the Zip file as C\FILES\GRAPH.GT.

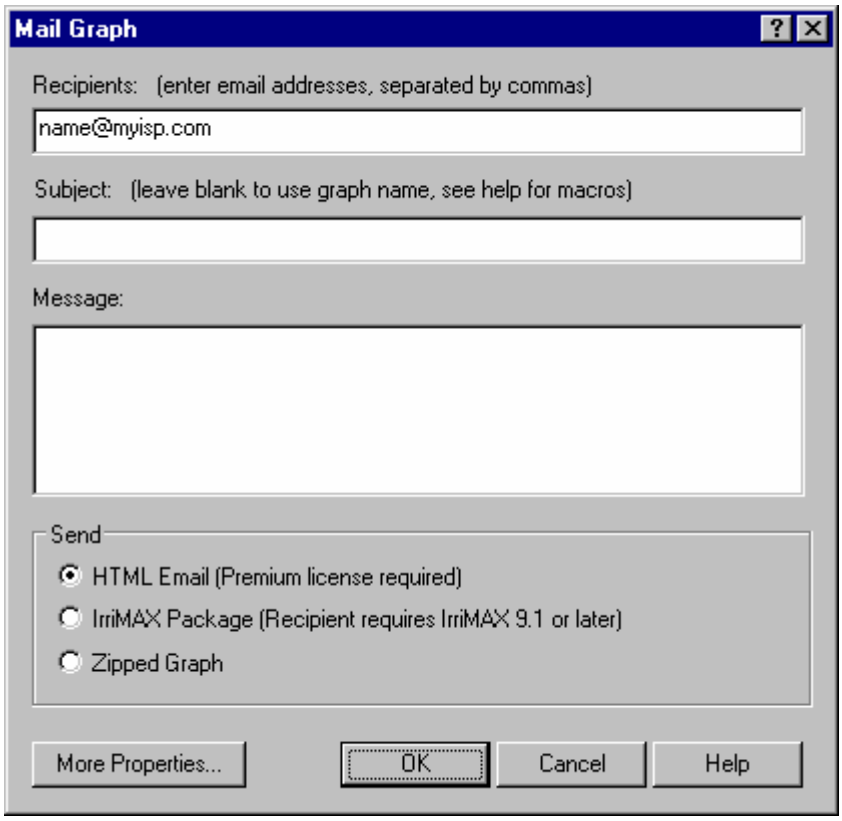
Mail Graph

A snapshot of the graph as currently shown on screen can be sent as a HTML email, viewable within the recipient's email client. Alternatively the actual graph document and any related database files can be sent as an IrriMAX package file or as a Zip archive.

Note: Sending a graph as a HTML email requires that the recipient's email client is configured to allow HTML emails with embedded pictures. If the recipient's security policy forbids this, it should be possible for them to create an exception for emails originating from you.

Ø To mail a graph

1. From the **Tools** menu of the graph window, select **Mail Graph…**
2. The *Mail Graph* dialog appears



Recipients

Enter the email addresses of the recipients of the emailed graph, separated by commas. This field is mandatory. The value you enter here will update the stored property in the graph document.

Subject

Enter text for the subject line of the email. Leave blank to use the graph name. The value you enter here will update the stored property in the graph document.

The subject text can contain certain macros that will be replaced with information specific to the graph you are mailing. These macros are:

- **GRAPH_NAME_TEXT** is replaced by the name of the graph.
- **GRAPH_COMMENT_TEXT** is replaced by the user-entered comment for the graph.
- **GRAPH_LOGGER_TEXT** is replaced by the Logger ID from the database shown in the main pane of the graph.
- **GRAPH_DOWNLOAD_TEXT** is replaced by the date and time of the last download into the database shown in the main pane of the graph.

Message

Enter an optional message for the recipients of the graph. Unlike the other values entered on this dialog, the message text is not saved within the graph document.

Send

Choose the type of email to send. Select **HTML Email** to mail a static snapshot of the graph that the recipient can view in their Email client software.

Select **IrriMAX Package** to send the graph document and related databases in an IrriMAX package (.imxpak) file. The recipient will be able to open the package directly from the email if they have IrriMAX 9.1 or later installed.

Select **Zipped Graph** to send the graph document and related databases in a standard Zip archive.

More Properties...

Click this button to invoke the *Mail and Webify* properties page for the graph (see page 160). From there you can specify additional properties to fine-tune the way a HTML email will appear.

OK

Finally, click OK to email the graph. At this point, the *Mail Settings* page might appear if you have not already configured IrriMAX for sending mail (see page 82).

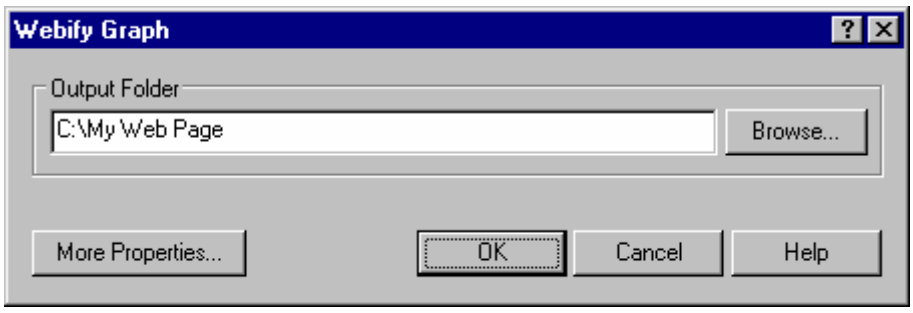
Webify Graph

A snapshot of the graph as currently shown on screen can be converted into web-compatible files. This is useful for converting the graph into a universal format for use in presentations or for publishing on the Internet.

The webification process produces a web-compatible document (usually a HTML file) with an embedded graphic file showing those elements of the graph that cannot be otherwise represented. The graphic file is in PNG (portable network graphics) format and is viewable in most modern browsers.

Ø To webify a graph

1. From the **Tools** menu of the graph window, select **Webify Graph…**
2. The *Webify Graph* dialog appears



Output Folder

Use the **Browse…** button to select a folder to receive the files output by the webification process. Alternatively you can type the name of the folder in the edit box. The value you enter here will update the stored property in the graph document.

If the folder you specify does not exist, it will be created during the webification process.

You may enter a path relative to the location of the graph document, rather than supply a full path.

More Properties...

Click this button to invoke the *Mail and Webify* properties page for the graph (see page 160). From there you can specify additional properties to fine-tune the way the webified graph will appear.

OK

Finally, click OK to webify the graph. When the process is complete, you will be asked if you wish to view the output. IrriMAX will open the files using your default web browser.

Note that, unlike the *Webify Workspace* feature, there is no option for automatically uploading the files to the Internet using FTP.

Graph Reports Menu

The **Reports** menu contains commands for generating text-format reports, based on the readings in the currently selected pane.
The menu commands, equivalent shortcuts and tool buttons are:

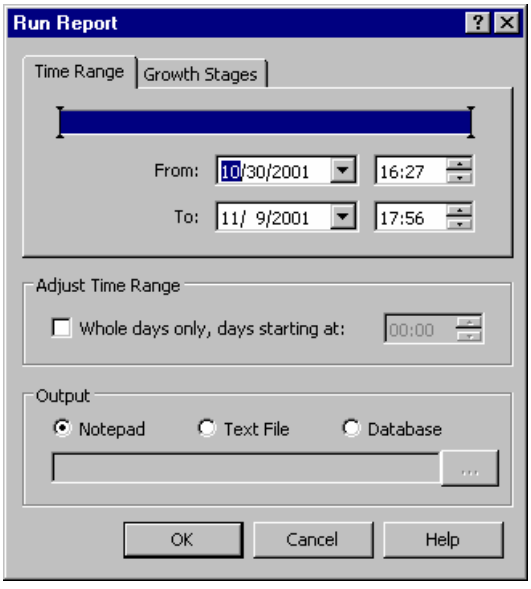
Menu item	Shortcut key	Button	To...
Graphed Values…	ALT, R, V		Run the *Graphed Values Report*
Cumulative Values…	ALT, R, C		Run the *Cumulative Values Report*
Budget Line Periods…	ALT, R, B		Run the *Budget Line Periods Report*
Daily Crop Water Use…	ALT, R, W		Run the *Daily Crop Water Use Report*

Graphed Values Report

The *Graphed Values Report* outputs the values as displayed in the current pane. In the case of bar graphs, these values are usually different from the underlying values of the individual readings (as displayed in the Text Data Viewer).

Ø To run the Graphed Values Report

1. If the graph window contains more than one pane, select the pane from which to run the report by clicking within it.
2. Optionally create one or two vertical rulers on the graph. The first ruler will provide the initial start time for the report, and the second will provide the initial end time.
3. From the **Reports** menu, click **Graphed Values…**
   The *Graphed Values Report dialog* appears:



4. Select the time range for the report by dragging the ends of the **Time Range** slider control, typing the ranges into the **From** and **To** controls, or by using the drop-down calendar pickers of the **From** and **To** controls. Alternatively, select the **Growth Stages** tab and choose the first and last growth stage to be included in the report.

5. To report only on whole days, check the **Whole days only** checkbox. Use the **days starting at** control to enter the time you want each day period to start. In the unlikely event that you want day periods to start in the afternoon, use 24-hour time notation.

6. Choose where to send the output of the report. To create a temporary file and view it in Notepad, select **Notepad**. To save the file in text format to disk, select **Text File** and enter the path to the text file. To create or update an IrriMAX database containing the output, select **Database** and enter the path to the database.

7. Click the **OK** button to run the report.

Cumulative Values Report

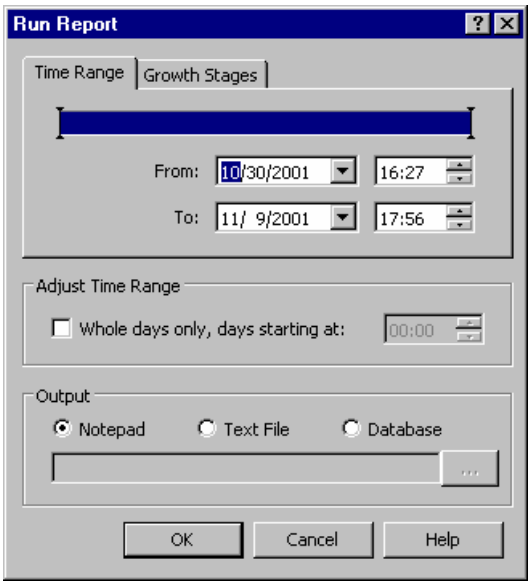
The *Cumulative Values Report* is similar to the *Graphed Values Report*, except that it outputs the values displayed in the current pane as a running total.

Ø To run the Cumulative Values Report

1. If the graph window contains more than one pane, select the pane from which to run the report by clicking within it.

2. Optionally create one or two vertical rulers on the graph. The first ruler will provide the initial start time for the report, and the second will provide the initial end time.

3. From the **Reports** menu, click **Cumulative Values…**
The *Cumulative Values Report dialog* appears:



4. Select the time range for the report by dragging the ends of the **Time Range** slider control, typing the ranges into the **From** and **To** controls, or by using the drop-down calendar pickers of the **From** and **To** controls. Alternatively, select the **Growth Stages** tab and choose the first and last growth stage to be included in the report.

5. To report only on whole days, check the **Whole days only** checkbox. Use the **days starting at** control to enter the time you want each day period to start. In the unlikely event that you want day periods to start in the afternoon, use 24-hour time notation.

6. Choose where to send the output of the report. To create a temporary file and view it in Notepad, select **Notepad**. To save the file in text format to disk, select **Text File** and enter the path to the text

file. To create or update an IrriMAX database containing the output, select **Database** and enter the path to the database.

7. Click the **OK** button to run the report.

Budget Line Periods Report

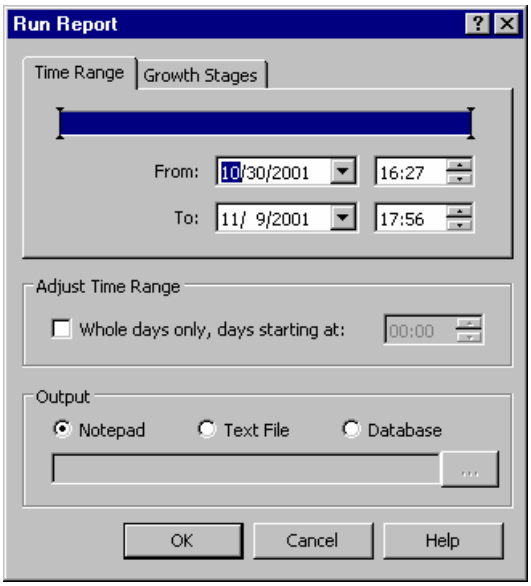
The *Budget Line Periods Report* lists the amount of time the graph line spends between each pair of visible budget lines. A list of time ranges is output, with total time spent in each budget region expressed as a total and a percentage over the nominated report range.

Ø To run the Budget Line Periods Report

1. If the graph window contains more than one pane, select the pane from which to run the report by clicking within it.

2. Optionally create one or two vertical rulers on the graph. The first ruler will provide the initial start time for the report, and the second will provide the initial end time.

3. From the **Reports** menu, click **Budget Line Periods…**
The *Budget Line Periods Report dialog* appears:



4. Select the time range for the report by dragging the ends of the **Time Range** slider control, typing the ranges into the **From** and **To** controls, or by using the drop-down calendar pickers of the **From** and **To** controls. Alternatively, select the **Growth Stages** tab and choose the first and last growth stage to be included in the report.

5. To report only on whole days, check the **Whole days only** checkbox. Use the **days starting at** control to enter the time you want each day period to start. In the unlikely event that you want day periods to start in the afternoon, use 24-hour time notation.

6. Choose where to send the output of the report. To create a temporary file and view it in Notepad, select **Notepad**. To save the file in text format to disk, select **Text File** and enter the path to the text file. There is no option to output this report to a database.

7. Click the **OK** button to run the report.

Daily Crop Water Use Report

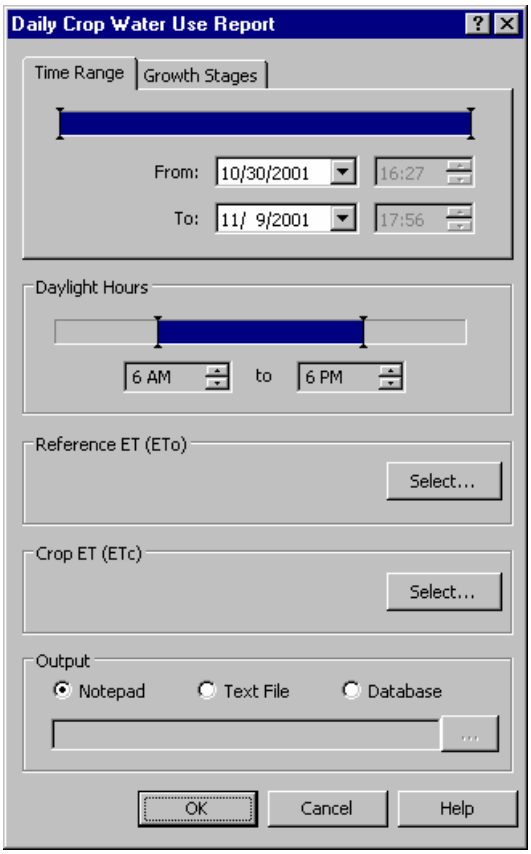
The *Daily Crop Water Use Report* attempts to give a more accurate indication of crop water use than simply graphing "daily negative change". It uses "negative change" during daylight hours as a starting point for crop water use, and uses "negative change" during night hours to estimate drainage.

Ø To run the Daily Crop Water Use Report

1. If the graph window contains more than one pane, select the pane from which to run the report by clicking within it. The pane must contain soil moisture values.

2. Optionally create one or two vertical rulers on the graph. The first ruler will provide the initial start time for the report, and the second will provide the initial end time.

3. From the **Reports** menu, click **Daily Crop Water Use…**
   The *Daily Crop Water Use Report* dialog appears:



4. Select the time range for the report by dragging the ends of the **Time Range** slider control, typing the ranges into the **From** and **To** controls, or by using the drop-down calendar pickers of the **From** and **To** controls. Alternatively, select the **Growth Stages** tab and choose the first and last growth stage to be included in the report.

5. Select the hours of daylight by dragging the ends of the **Daylight Hours** slider control or by clicking the up and down arrows of the controls displaying the first and last daylight hour. The accuracy of the report depends on setting the daylight hours correctly. It assumes that these are the hours during which the crop will actively extract water from the soil.

6. If you have a database storing relevant Reference ET (ETo), you can include these values in the report by clicking the **Select…** button in the **Reference ET (ETo)** section. The *Sensor Selection* dialog appears and allows selection of a single sensor. See page 115.

7. If you have a database storing relevant Crop ET (ETc), you can include these values in the report by clicking the **Select…** button in the **Reference ET (ETc)** section. The *Sensor Selection* dialog appears and allows selection of a single sensor. See page 115.

8. Choose where to send the output of the report. To create a temporary file and view it in Notepad, select **Notepad**. To save the file in text format to disk, select **Text File** and enter the path to the text file. To create or update an IrriMAX database containing the output, select **Database** and enter the path to the database.

9. Click the **OK** button to run the report.

Graph Help Menu

The **Help** menu provides access to the online user guide contents and search utilities.
The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Help Topics	F1 *or* ALT, H, H		Display the online help file.
About IrriMAX...	ALT, H, A		Display current version information.

Ø To access online help

From the **Help** menu, click **Help Topics**.
The *Help* window displays.
Click the **Contents** tab to scroll through a table of contents for online help.
Click the **Index** tab to search for topics by using an index of keywords and phrases.
Click the **Find** tab to use full-text search and look for specific words.

Ø To access version information about IrriMAX

1. From the **Help** menu, click **About IrriMAX...**
   The **IrriMAX** about dialog box displays.

2. Click **OK** to close the dialog box.

Text Data Viewer

The Text Data Viewer is a facility used to view and save raw and soil moisture data, salinity data or I&R data in ASCII text format. The viewer does not read text files but can save the viewed data in a text file.

Note: This feature is normally used for scientific analysis of data where data values are critical.

From the *Text Data Viewer* window you can:

- view raw and soil moisture data (per sensor or summed) from the moisture graph pane
- view salinity raw and VIC data from the salinity graph pane
- view irrigation and rainfall, duration and amount values (per site) from an I&R graph pane
- use the column colors, which make different sensor data easier to distinguish
- print the data
- save the data to a text file.

Text files are saved with a *.TXT extension.

Warning:
The *Text Data Viewer* cannot not be used to read text files, open graphs or update databases. **Data Exchange** cannot read *Text Data Viewer* files but it offers a more flexible method of exporting data in text format, which can also be reloaded into an IrriMAX database.

Ø To view the data in the Text Data Viewer

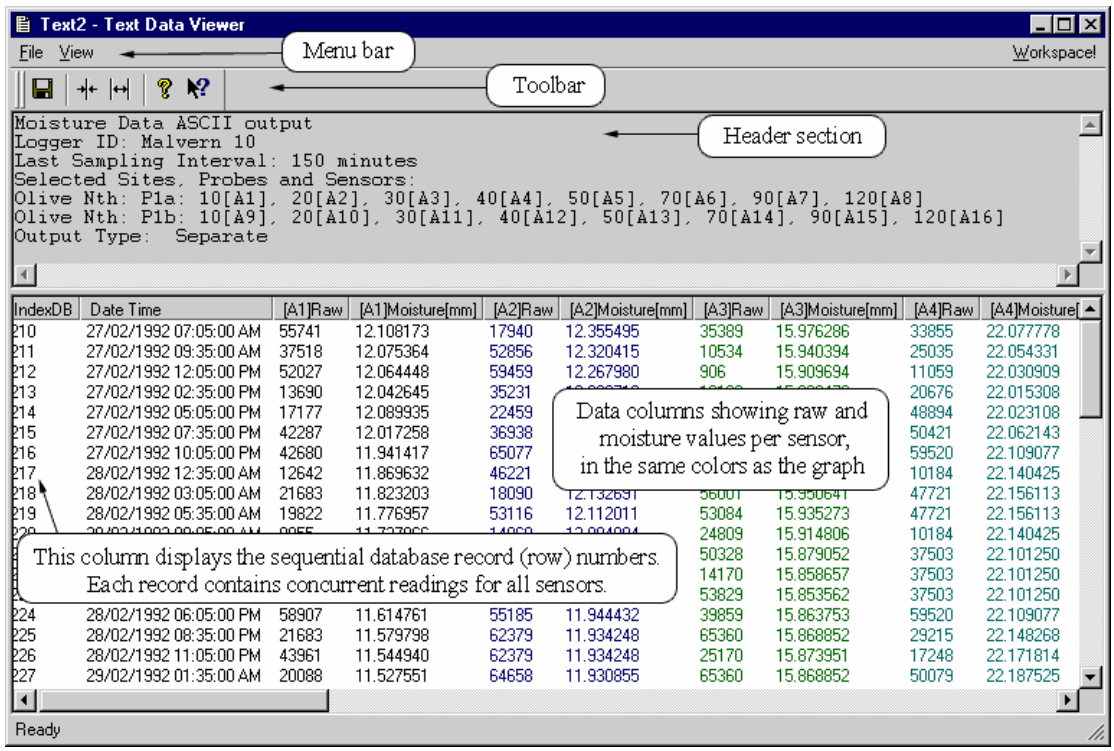
On the graph, click anywhere in the pane containing the data to be viewed. Then, from the **View** menu, click **Text**, or press the toolbar button  .

The Text Data Viewer will display the data applicable to the active *Pane*. If the *I&R pane* is visible, and was the last pane you clicked in, then the I&R graph data will be displayed. (The current pane is signified by the vertical axis title text being **bold** (e.g. Soil Water Content, salinity or I&R data). Soil moisture data will be displayed if the *Soil moisture pane* is active.

The Text Data Viewer displays the data that corresponds to the date range currently visible in the graph. For example, if the graph is viewing a three-day period of data, only that data is displayed in the viewer.

The whole database can be viewed by selecting **Entire Database** from the **View** menu.

A Text Data Viewer showing Soil Moisture Content:



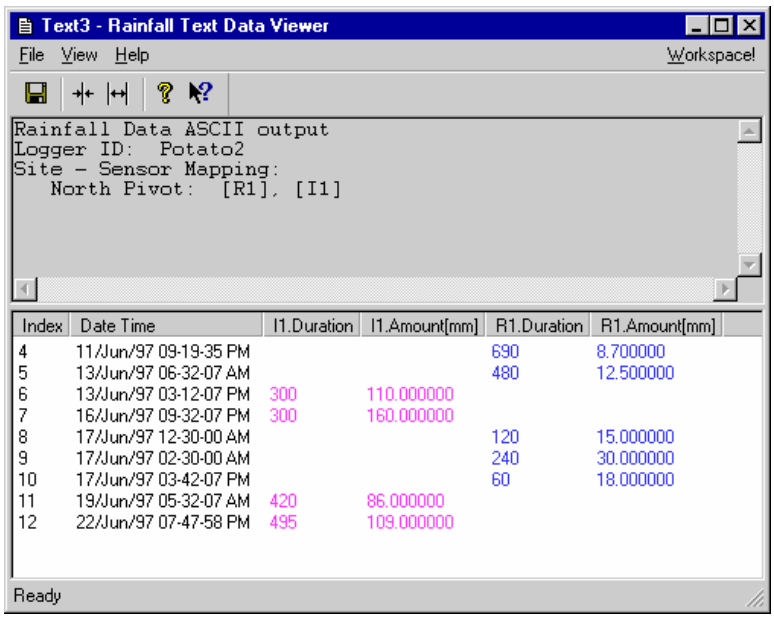
The *Text Data Viewer* window has two main sections.

1. The text header section is static and displays:
   - the logger ID
   - last sampling interval
   - selected sites
   - crop or probe name
   - type of graph (summed or separate type, and if summed, whether the data is interpolated).
2. The data section lists the data that constitutes the graph. It shows the time, the raw value for each sensor, and its calculated moisture value.

   There are two special kinds of moisture value, both of which appear as a break in the graph line:

   - **INVALID** (-1) indicates a value that cannot be graphed. These are typically inserted to cause a break in the graph line. They also occur if the raw value is zero, or if the Scaled Frequency (SF) calculation is invalid or the Spike Remover blanked or removed this reading.
   - **ERROR** (-2) indicates a value that could not be calculated, possibly due to a problem with the calibration equation for that sensor or an out-of-range condition. Unlike INVALID moisture values, ERROR values may be corrected by changing the calibration equation.

A Text Data Viewer window showing Rainfall & Irrigation data:



The *Rainfall Text Data Viewer* window has two main sections.

1. The text header section is static and displays:
   - the logger ID
   - selected site names and a map to the sensors in each site
2. The data section lists the data that constitutes the graph. It shows the time, the duration and amount values for each sensor.

In the above picture, I1 is the irrigation sensor for the "North Pivot" site, and R1 is the Rainfall sensor for the "North Pivot" site.

Menu bar

The *Text Data Viewer* menu bar contains all commands under four menu items. Each menu item contains commands or submenus with commands. Where available the menu commands display the shortcut keys that perform the equivalent command.

Ø To return to the Workspace Manager window from the Text Data Viewer

Click on Workspace! in the menu bar.

Toolbar

The *Text Data Viewer* toolbar is used to quickly access major editing and viewing commands that are applicable to the *Text Data Viewer* window. The toolbar displays by default but can be hidden or displayed as required.

Status bar

The status bar at the bottom of a window displays information about the window. As you use the mouse to point to icons on a menu or toolbar, the name of the command being selected appears in the status bar. Unlike the status bars in other windows, the status bar in the *Text Data Viewer* cannot be hidden.

Missing databases

If you open the *Text Data Viewer* and the original database file has been removed or renamed, a message box displays advising that the database could not be found. Click **OK** to continue. See page 147 for details of finding missing databases.

Text Data Viewer window commands

All *Text Data Viewer* commands are available from one of the following:

- menus on the menu bar
- buttons on the toolbar
- shortcut keys on the keyboard
- options from the shortcut menu (right-click an item in a window to see the menu in context with the item)

Note: Not all commands are available using all methods.

Ø To copy the header text

Right-click in the header section click **Select All**
Type CTRL+C to copy the header contents to the **Windows** Clipboard from which it can be pasted to, for example, a word processing document.

Note: The only shortcut menu available in the *Text Data Viewer* is the Windows text-editing menu. Since the header is a read-only section containing text you can, if required, copy all or a selected part of the header text to the **Windows** Clipboard. You cannot paste or edit the header details directly, as the information is stored in the database.

Text Data Viewer File Menu

The **File** menu displays file commands for the displayed text file.
The menu commands, equivalent shortcuts and tool buttons are:

Menu item	Shortcut key	Button	To...
Save As...	ALT, F, A		Save the current text file.
Print	ALT, F, P		Print the text file.
Print Preview	ALT, F, V		Preview the file as it will print.
Page Setup...	ALT, F, U		Change the current page setup.
Close	ALT, F, C	 on the title bar	Close the viewer window.

Saving data to a text file

Data from the *Text Data Viewer* can be saved as a text file (*.TXT) for use in other applications that do not support the **IrriMAX** database file format.

Warning:
The data structure exported by Text Data Viewer cannot be reloaded into an IrriMAX database. It is recommended to use the functionality in **Data Exchange** to select a destination of Comma Separated Values (csv) or Microsoft Excel spreadsheet (xls).

What am I saving?

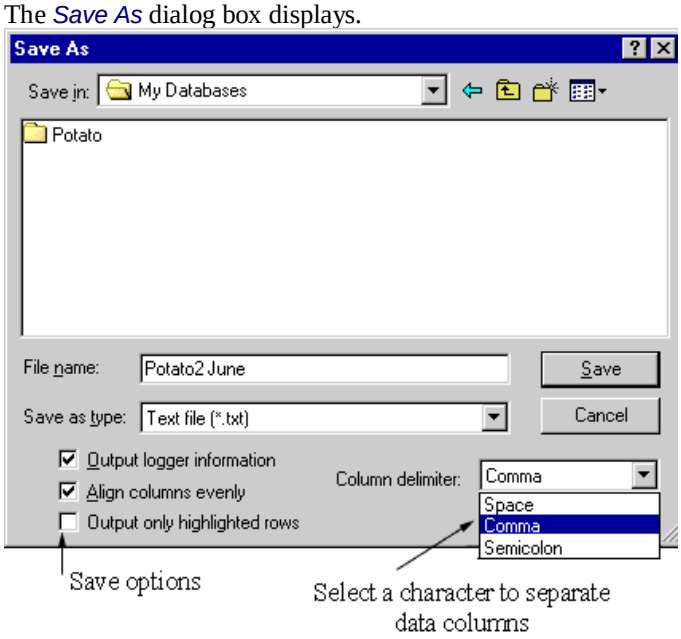
You can choose what to save in the text file. You can include the following information in the file:

- logger details as shown in the header section
- all data records that correspond to the **displayed section** of the graph (in the *Graph* window)
- all data records from the database if viewing the entire database
- selected data records (rows), contiguous or non-contiguous.
  Note: To select multiple data rows press and hold the ctrl key and left-click each row. To select

multiple adjacent rows, select the first row in the list, press and hold the SHIFT key and select the last file in the list.

Ø To save data as text

1. From the **File** menu, click **Save As...**.
   The *Save As* dialog box displays.



2. Select a file location for the file.
3. Enter a file name for the new file.
4. Select one or more of the following as required:
   - **Output Logger Information** to include the header information
   - **Align Columns Evenly** to make the text file easier to view
   - **Output only highlighted rows** to save only the selected rows in the *Text Data Viewer*
   - **Column Delimiter** as a space, comma or semicolon as required.
5. Click **Save**.
   The text file is saved.

Printing data from the Text Data Viewer

Text data can be printed from the *Text Data Viewer* window. You may print a text data in color or black and white.

Warning:
Some color printers are unable to print in colors other than the standard **Windows** colors. If this occurs, remove any custom colors being used to define text data sets.

Before you print, you should check that the page setup is correct for the document being printed. The **Page Setup** command is used to control how the document is printed on the page. For example, to set whether the document is printed in portrait or landscape orientation.

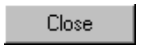
The **Print Preview** command displays the current file, as it would appear when printed. Using the **Print Preview** command, you can ensure that margin, printer settings and selected content are correct, before sending the information to the printer.

Ø To change page setup in Text Data Viewer

1. From the **File** menu, click **Page Setup...**.
   The *Page Setup* dialog box displays.
2. Under **Paper**, select from the drop-down lists:
   - the required paper size
   - the paper source
3. Under **Orientation**, select either **Portrait** or **Landscape**.
4. Under **Margins**, enter any special requirements for margins.
   Note how the sample page reflects these changes.
5. Click **OK** to save the changes and close the *Page Setup* dialog box.

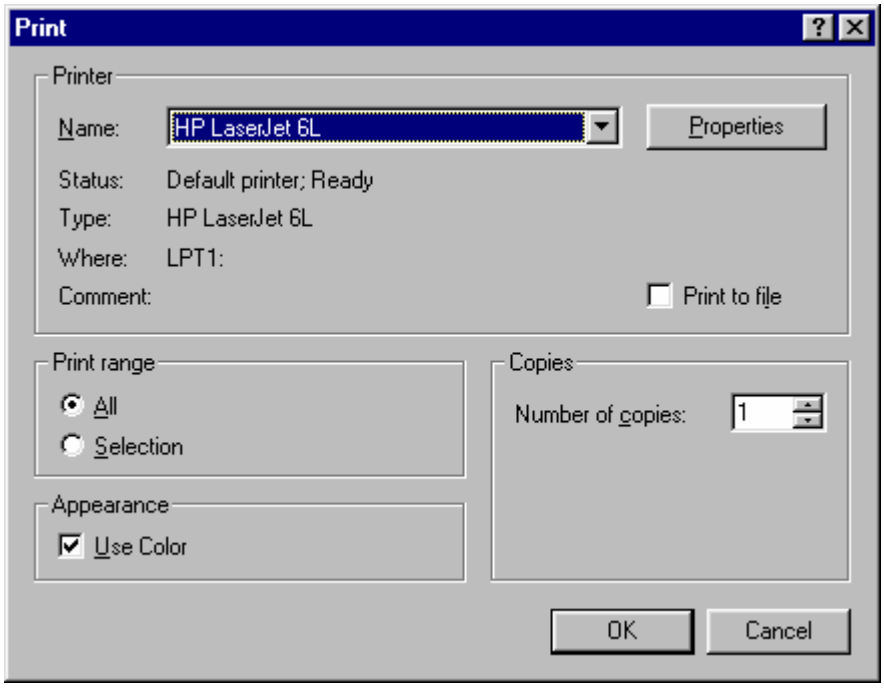
Ø To view a text file in print preview

1. From the **File** menu, click **Print Preview**.
   The *Print Preview* window displays.
2. From the *Print Preview* window toolbar you can:

Click...	To...
	send the file in its current state to the printer.
	display the second page of the file where the file has more than one page.
	display the previous page of a file where you are on a page other than the first page.
	display one page of the file, where the file has more than one page.
	display two pages of the file simultaneously, where the file has more than one page.
	enlarge a specific area of the file.
	minimize the view of a specific area of the file.
	close the print preview window.

Ø To print a text data file

1. From the **File** menu, click **Print...**.
   The *Print* dialog box displays.



2. Under **Print range**, select to print all records in the viewer or just the selected records.
3. Under **Appearance**, select if you want to print the text using the colors in the viewer.
4. Under **Copies**, select the number of copies you want to print.
5. Click **OK**.
   The layout is sent to the printer.

Ø To print to a printer file

1. From the **File** menu, click **Print...**.
   The *Print* dialog box displays.
2. Click the **Print to file** option.
3. Click **OK**.
   The *Print to File* dialog box displays.
4. Select a destination for the file.
5. Enter a file name. Printer files have a file extension of *.PRN.
6. Click **Save** to save the layout printer file.

Closing the text data viewer window

You can close the *Text Data Viewer* at any time.

Ø To close the Text Data Viewer

From the **File** menu click **Close**.
The *Text Data Viewer* closes.

Text Data Viewer View Menu

From the **View** menu you can select the toolbar, view an entire database or view sensors in different colors so that they are easily distinguished on the report.

The toolbar is used to quickly access commands that are applicable to the window. The toolbar displays by default but can be hidden or displayed as required.

What am I viewing?

When you open the *Text Data Viewer* from the *Graph* window, only the data visible in the graph window is shown in the viewer. For example, if you zoom to a smaller time period in the horizontal axis of the graph, fewer data records display in the viewer. You can use the *Graph* window zoom and scroll features to select the specific period that you want to send to the viewer. Once the viewer is open, you can still choose to include all data from the source database.

Viewing sensors in different colors makes it easier to distinguish between multiple columns. The column colors are the same as the graph line settings.

The columns in the *Text Data Viewer* window can be sized manually using the mouse or automatically using the menu paths or toolbar buttons. The column-sizing feature is provided to make it easier to view multiple columns.

Ø To display the toolbar

From the **View** menu, click **Toolbar**.
The toolbar displays.

Ø To view an entire database

From the **View** menu, click **Entire Database**.
All data in the database is displayed.

Ø To view sensors in color or black & white

From the **View** menu, click **Sensor Colors**.
When **Sensor colors** is checked the data is displayed in color, when clear the text is in black and white

Ø To compact columns

From the **View** menu, click **Compact Columns**.
Each column contracts to a minimum required width to show the values without stripping them, to display more columns.

Ø To expand columns

From the **View** menu, click **Expand Columns**.
Each column expands to fit both the data as well as the column header width.

Webify Template Reference

IrriMAX generates Web-compatible files by performing text-substitution into pre-defined templates. The templates contain all the HTML code for displaying the graph or workspace in an Internet Browser, with placeholders for the graph-specific and workspace-specific information. These placeholders are called macros.

In addition to macros, templates also contain directives. Directives are additional instructions to IrriMAX that are required to correctly interpret the template. They take the form of special HTML comments.

If the user does not choose a specific template, then IrriMAX will use WORKSPACE.HTML and GRAPH.HTML, which can be found within the Templates folder in the IrriMAX installation folder.

Workspace-Specific Directives

The following directives are recognized only when part of a workspace template. They will be ignored if included in a graph template.

<!--FOR_EACH_GRAPH--> ... <!--/FOR_EACH_GRAPH-->

These directives are used to mark the start and the end of a section of the workspace template that is to be repeated for each graph in the workspace. There can be only one such section in the template.

The graph-specific macros and directives only have meaning within these directives. They will be ignored if they appear outside the section.

<!--GAUGE_SIZE:40,100-->

Include this directive to specify a size for the "fuel-gauge" images that represent the last reading in the database. This example specifies an image 40 pixels wide by 100 pixels high. Substitute your own values to create larger or smaller images.

<!--THUMB_SIZE:140,100-->

Include this directive to specify a size for the thumbnail images that represent each graph. This example specifies an image 140 pixels wide by 100 pixels high. Substitute your own values to create larger or smaller images.

Workspace-Specific Macros

The following macros are unique to the workspace template. With the exceptions of **WORKSPACE_COMMENT_TEXT** and **WORKSPACE_ZIP_LINK**, they all relate to a specific graph and therefore must appear within a **FOR_EACH_GRAPH** section.

GRAPH_DESCRIPTION_TEXT

This macro is replaced by a description of the logger, sites and probes of the current graph.

GRAPH_GAUGE_LINK

If this macro is present, IrriMAX will create a picture representing the value of the last reading in the database in relation to the agronomic regions of a summed graph. The macro is replaced by the file name of the generated picture.

The default size for the picture is 780 pixels wide by 350 pixels high. A different size can be specified by using the **GRAPH_SIZE** directive.

When used in a workspace template, it must be within the <!--FOR_EACH_GRAPH> section

GRAPH_LINK

This macro is replaced by the filename of the generated web page that represents the current graph. If the macro is not present, graph pages will not be generated.

GRAPH_THUMBNAIL_LINK

If this macro is present, IrriMAX will create a small "thumbnail" picture representing the graph The macro is replaced by the filename of the generated picture.

The default size for the picture is 40 pixels wide by 100 pixels high. A different size can be specified by using the **THUMB_SIZE** directive.

GRAPH_TYPE_TEXT

This macro is replaced by a description of the type of graph (e.g. summed, stacked) and the type of data stored in any additional graph panes (e.g. V.I.C., I & R).

WORKSPACE_COMMENT_TEXT

This macro is replaced by the comment field in the workspace properties.

WORKSPACE_PACKAGE_LINK

If this macro is present, all files referenced by the workspace will be added to an IrriMAX Package (.imxpak) file. The macro is replaced by the filename of the package file.

WORKSPACE_ZIP_LINK

If this macro is present, all files referenced by the workspace will be added to a ZIP file. The macro is replaced by the filename of the ZIP file.

Graph and Workspace Directives

The following directives can be used in both the workspace and the graph templates.

<!--FOR_EACH_LINE--> ... <!--/FOR_EACH_LINE-->

These directives are used to mark the start and the end of a section of the template that is to be repeated for each line in the current pane. There can be only one such section in the template.

These directives must appear within a **FOR_EACH_PANE** section.

<!--FOR_EACH_PANE--> ... <!--/FOR_EACH_PANE-->

These directives are used to mark the start and the end of a section of the template that is to be repeated for each pane in the graph. There can be only one such section in the template.

If these directives are used on a workspace template, they must appear within a **FOR_EACH_GRAPH** section.

<!--GRAPH_SIZE:780,350-->

Include this directive to specify a size for the images that contain the graphical component of each graph in the workspace. This example specifies an image 780 pixels wide by 350 pixels high. Substitute your own values to create larger or smaller images.

If this directive is included it overrides the "Graphic Dimensions" properties of the graph and the workspace documents in IrriMAX.

Graph and Workspace Macros

The following macros can be used in both the workspace and graph templates. Those whose names start with **GRAPH_** are specific to an individual graph, and so must appear within a **FOR_EACH_GRAPH** section if used in a workspace template.

GENERATION_DATE

This macro is replaced by the date on which the web files were generated.

GENERATION_TIME

This macro is replaced by the time at which the web files were generated.

GRAPH_COMMENT_TEXT

This macro is replaced by the user-entered comment from the graph.

GRAPH_DOWNLOAD_TEXT

This macro is replaced by the date and time of the last download from the logger to the database in the primary pane of the graph.

GRAPH_LOGGER_TEXT

This macro is replaced by the Logger ID from the database in the primary pane of the graph.

GRAPH_NAME_TEXT

This macro is replaced by the name of the graph.

GRAPH_PACKAGE_LINK

If this macro is present, all files referenced by the graph will be added to an IrriMAX Package (.imxpak) file. The macro is replaced by the filename of the package file.

GRAPH_PIC_HEIGHT

This macro is replaced by a number representing the height of the graph picture in pixels.

GRAPH_PIC_LINK

If this macro is present, IrriMAX will create a picture representing the graph. The macro is replaced by the file name of the picture.

GRAPH_PIC_WIDTH

This macro is replaced by a number representing the width of the graph picture in pixels.

GRAPH_ZIP_LINK

If this macro is present, all files referenced by the graph will be added to a ZIP file. The macro is replaced by the filename of the ZIP file.

LINE_COLOR_TEXT

This macro is replaced by a hexadecimal number representing the color of the current line (sensor). It must appear within a **FOR_EACH_LINE** section.

LINE_NAME_TEXT

This macro is replaced by the name of the current line (sensor). It must appear within a **FOR_EACH_LINE** section.

MESSAGE_TEXT

This macro is replaced by a message typed by the user when a graph is emailed.

PANE_NAME_TEXT

This macro is replaced by the name of the current pane. It must appear within a **FOR_EACH_PANE** section.

WORKSPACE_NAME_TEXT

This macro is replaced by the name of the workspace.

Graph-Specific Macros

The following macros are unique to the graph template.

<!--IF_NO_WORKSPACE--> ... <!--/IF_NO_WORKSPACE-->

These directives are used to mark the start and end of a section of the graph template that is only included if the graph is stand-alone. The section will only be included if the user chose **Webify Graph…** from the graph window.

<!--IF_WORKSPACE--> ... <!--/IF_WORKSPACE-->

These directives are used to mark the start and end of a section of the graph template that is only included if the graph is part of a workspace. The section will be ignored if the user chose **Webify Graph…** from the graph window.

GRAPH_NEXT_LINK

This macro is replaced by the filename of the next graph in the workspace. It has no meaning if the user chose **Webify Graph…** from the graph window, and therefore should appear within an **IF_WORKSPACE** section of the template.

GRAPH_PREV_LINK

This macro is replaced by the filename of the previous graph in the workspace. It has no meaning if the user chose **Webify Graph…** from the graph window, and therefore should appear within an **IF_WORKSPACE** section of the template.

WORKSPACE_LINK

This macro is replaced by the filename of the workspace page. It has no meaning if the user chose **Webify Graph…** from the graph window, and therefore should appear within an **IF_WORKSPACE** section of the template.

Troubleshooting

This section covers error message and how to interpret them for the following areas:.

- *Troubleshooting Workspace Manager*
- *Troubleshooting layouts*
- *Troubleshooting graphs*
- *Troubleshooting the Text Data Viewer*
- *Troubleshooting logger configurations*
- *Troubleshooting Registration and Licensing*

Troubleshooting Workspace Manager

The following error and warning messages display under the conditions described.

Message	Meaning/Action
'Error reading file [*file name*] [*error description*]'	This error means that either the file is corrupt or truncated, or there is a hardware error (rare). You should restore the file from a backup.
'Error writing file [*file name*] [*error description*]'	This error will only occur if there is no more disk space or there is a hardware error (rare). You should check to see if you have run out of space, and remove unwanted files (e.g. empty **Recycle Bin**). You can then try to save the file again.
'Error opening file [*file name*] [*error description*]'	This message could mean that the file does not exist, or that another process has an exclusive lock on it. In the first case you should try to find and restore the file. In the second case, you can close any windows that may be accessing the file and try again. In a network situation, you may need to find the other user who is accessing the file, or simply try again later.
'There is no default printer. To install and detect a default printer, open the Start button, choose Settings, select Printer and then select Add Printer.'	This message displays when you are trying to print from the *Workspace Manager* window and there is no printer installed. You need to install your printer in accordance with the instructions from the manufacturer.

Troubleshooting layouts

The following error and warning messages display under the conditions described.

Message	Meaning/Action
'Error reading file [*file name*] [*error description*]'	This error means that either the file is corrupt or truncated, or there is a hardware error (rare). You should restore the file from a backup.
'Error writing file [*file name*] [*error description*]'	This error will only occur if there is no more disk space or there is a hardware error (rare). You should check to see if you have run out of space, and remove unwanted files (e.g. empty **Recycle Bin**). You can then try to save the file again.

Message	Meaning/Action
'Error opening file [*file name*] [*error description*]'	This message could mean that the file does not exist, or that another process has an exclusive lock on it. In the first case you should try to find and restore the file. In the second case, you can close any windows that may be accessing the file and try again. In a network situation, you may need to find the other user who is accessing the file, or simply try again later.
'The document will be printed very small. You may wish to change page orientation and margins, or alter your layout to cover a smaller area. Do you wish to continue printing?'	This message displays in the *Layout* window when printing a layout whose elements will probably be illegibly small after it is scaled to fit the page. This will happen if the page margins are set too wide, or the loggers and sites are placed very far apart on the layout. You can use the print preview feature to verify that the layout will be printed as you expect. Adjust the page setup or layout, or click **Yes** to continue.
'Calibration change detected! The following databases contain calibrations which differ from those in the registry with the same name: [*filename*]'	This message displays when opening a layout file, and the listed databases are detected to be using one or more calibrations that differ from calibrations in the calibration registry with the same name. This may happen if you have updated a calibration in the registry since the database was created. To bring the database up to date, you can use the *Logger Configuration* dialog box to change the calibrations for the affected sensors to the calibrations in the registry. Another possibility is that you have two distinct calibrations that share the same name. You can use the *Logger Configuration* and *Calibration Registry* dialog boxes to edit the unregistered calibration, change its name and register it, then select it into the affected sensors.
'When creating a summed graph, the sensor depths selected must be the same across all probes that have sensors selected. '	This message displays in the *Layout* window when you are creating a summed graph and select sensors from multiple probes in the Site Selection window. The selected probes use different depths. Either de-select the sensors that are a different depth and causing a conflict or correct the logger configuration before creating a summed graph.
'Cannot create graph More than 8 sensors are selected'	This message displays in the *Layout* window when you select a Separate Y graph to be generated from a selection of more than 8 sensors, in the *Sensor Selection* dialog. Click **OK** to continue. Re-select the sensors ensuring eight or less are chosen before clicking the Separate Y graph button.
'Cannot create graph No sensors are selected'	This message displays in the *Layout* window when you select a graph to be generated but no sensors have been selected, in the *Sensor Selection* dialog. Click **OK** to continue. Select the sensors to be graphed then click the graph type again.
'Cannot create graph More than 16 sensors are selected'	This message displays in the *Layout* window when you select a Common Y or Stacked graph to be generated from a selection of more than 16 sensors, in the *Sensor Selection* dialog. Click **OK** to continue. Re-select the sensors ensuring sixteen or less are chosen before clicking the Separate Y graph button.

Troubleshooting graphs

The following error and warning messages display under the conditions described.

Message	Meaning/Action
'Error reading file [*file name*] [*error description*]'	This error means that either the file is corrupt or truncated, or there is a hardware error (rare). You should restore the file from a backup.

Message	Meaning/Action
'Error writing file [*file name*] [*error description*]'	This error will only occur if there is no more disk space or there is a hardware error (rare). You should check to see if you have run out of space, and remove unwanted files (e.g. empty **Recycle Bin**). You can then try to save the file again.
'Error opening file [*file name*] [*error description*]'	This message could mean that the file does not exist, or that another process has an exclusive lock on it. In the first case you should try to find and restore the file. In the second case, you can close any windows that may be accessing the file and try again. In a network situation, you may need to find the other user who is accessing the file, or simply try again later.
'Interpolation is only allowed for a range of depths if all available sensors in the range are selected.'	This message displays in the *Graph* window when interpolation is selected but the full range of available sensors between the shallowest and deepest sensor was not used to generate the graph. The missing value may actually exist in the readings. The graph needs to be regenerated from the layout window, selecting all available sensors, between the shallowest and deepest sensor, from the Sensor Selection dialog.
'The following Database was not found: [*filename*] Press Browse to locate the missing Database or Press Cancel to abort the current operation.'	This message displays in the *Graph* window when a database has gone missing. The database may have been moved or renamed. Click **Browse** and locate the missing database file or click **Cancel** to stop the operation.
'Error reading file [*file path*] Graph was not created from this database'	This message displays in the *Graph* window when a database has gone missing. While browsing for the correct location of the database, you have attempted to open and connect to the wrong database.
'There are no readings in database [*database name*]'	This message is displayed when the database is empty. To produce a graph you need at least one reading. Download data from the logger or select a database with sufficient data to generate a graph.

Troubleshooting the Text Data Viewer

The following error and warning messages display under the conditions described.

Message	Meaning/Action
'Error reading file [*file name*] [*error description*]'	This error means that either the file is corrupt or truncated, or there is a hardware error (rare). You should restore the file from a backup.
'Error writing file [*file name*] [*error description*]'	This error will only occur if there is no more disk space or there is a hardware error (rare). You should check to see if you have run out of space, and remove unwanted files (e.g. empty **Recycle Bin**). You can then try to save the file again.
'Error opening file [*file name*] [*error description*]'	This message could mean that the file does not exist, or that another process has an exclusive lock on it. In the first case you should try to find and restore the file. In the second case, you can close any windows that may be accessing the file and try again. In a network situation, you may need to find the other user who is accessing the file, or simply try again later.

Message	Meaning/Action
'Column exceeds paper width. Try using smaller margins.'	Adjust the column margins or the page setup and try printing again.

Troubleshooting logger configurations

The following error and warning messages display under the conditions described.

Message	Meaning/Action
Logger Configuration	
'Error reading file [*file name*] [*error description*]'	This error means that either the file is corrupt or truncated, or there is a hardware error (rare). You should restore the file from a backup.
'Error writing file [*file name*] [*error description*]'	This error will only occur if there is no more disk space or there is a hardware error (rare). You should check to see if you have run out of space, and remove unwanted files (e.g. empty **Recycle Bin**). You can then try to save the file again.
'Error opening file [*file name*] [*error description*]'	This message could mean that the file does not exist, or that another process has an exclusive lock on it. In the first case you should try to find and restore the file. In the second case, you can close any windows that may be accessing the file and try again. In a network situation, you may need to find the other user who is accessing the file, or simply try again later. See *What are the database file access rules* for details about Sentek database files.
'Operation causes a sensor address to exceed the permitted range. The maximum valid address on Run A or Run B is 16.'	This message displays in the *Logger Configuration* dialog box. This error has two possible causes: • You tried to add more than 16 sensors to a single run of the logger configuration. Click **OK** to continue. • You have altered a sensor address that causes the last address in the run to exceed 16. Click **OK** to continue and change the address to a lower number or start a new sequence beginning at B1.
'Operation causes a sensor address conflict.'	This message displays in the *Logger Configuration* dialog box when two sensors have the same address. Click **OK** to continue and provide unique address to all sensors.
'A site already exists with that name.'	This message displays in the *Logger Configuration* dialog box when two sites have been given identical names. Site names are case sensitive and must be unique. Click **OK** to continue and correct the duplicate name.
'A probe already exists with that name.'	This message displays in the *Logger Configuration* dialog box when two probes have been given identical names. Probe names are case sensitive and must be unique. Click **OK** to continue and correct the duplicate name.
'The entered value causes an address conflict. Please re-enter the address.'	This message displays in the *Logger Configuration* dialog box when two sensors have been given identical addresses. Click **OK** to continue and correct the duplicate address.

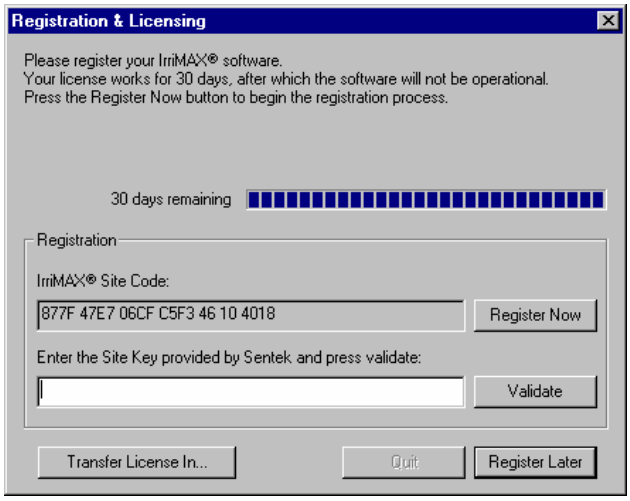
Message	Meaning/Action
'The ID must contain at least one character. Please type in a valid ID.'	This message displays in the *Logger Configuration* dialog box when the name of a logger, site or probe has been deleted. Click **OK** to continue and enter a valid name.
'The logger has no sites attached.'	This message displays in the *Logger Configuration* dialog box when trying to save a logger that has no sites attached. A logger must have a site, probe and sensor to be valid. Click **OK** to continue and add a site, probe and sensor.
'A site has no probes attached.'	This message displays in the *Logger Configuration* dialog box when trying to save a logger that has no probes attached. A logger must have a site, probe and sensor to be valid. Click **OK** to continue and add a site, probe and sensor.
'A probe has no sensors attached.'	This message displays in the *Logger Configuration* dialog box when trying to save a logger that has no sensors attached. A logger must have a site, probe and sensor to be valid. Click **OK** to continue and add a site, probe and sensor.
'The addresses on Run A are non-consecutive.'	This message displays in the *Logger Configuration* dialog box when there is a gap in the sensor address sequence on Run A. Click **OK** to continue and correct the addressing.
'The addresses on Run B are non-consecutive.'	This message displays in the *Logger Configuration* dialog box when there is a gap in the sensor address sequence on Run B. Click **OK** to continue and correct the addressing.
'This database contains one or more calibrations, which do not exist in the calibration registry. You can add them to the registry by clicking 'Calibrations...', highlighting them and clicking 'Change' then 'Accept'.'	This message displays in the *Layout* window when a database is opened that has at least one calibration equation that does not exist in the calibration registry. These calibrations can be added to your calibration registry as required. Click **OK** to continue. To add the new calibrations to the calibration registry, click **Calibrations...**. Highlight the calibrations to be added. Click **Change**. Click **Accept**. The new calibrations will be added to the calibration registry. This could occur if, for example you have deleted the calibration from the registry or you have used a database configured on another computer.
'The maximum number of sensors has been reached.'	This message displays in the *Logger Configuration* dialog box when you try to add another sensor to a probe when there are already a maximum number of sensors on that probe. This maximum may be on the probe, site or logger. Click **OK** to continue. See page 91 for details of configuring a logger.
'The air count must be greater than the water count'	This message displays in the *Logger Configuration* dialog box when normalizing air and water counts. This error may display: • when entering normalization counts manually • the sensor being normalized is not attached to the computer • the sensor has got wet Click **OK** to continue and provide a new reading that is greater than the water reading.
'The database is currently in use. You will not be able to make changes until it is released.'	This message displays in the *Logger Configuration* dialog box when database information is being displayed in layouts and graphs or the database is open in **Database Manager**. Click **OK** to continue. Close all files using the database you wish to edit before proceeding.

Message	Meaning/Action
Send to Logger	
'COM port open operation failed'	This message is displayed in the *Connect to Logger* dialog box when a connection attempt has been made and has failed. Click **OK** to continue and check the physical connections. See *communication for* details on why logger communication may fail.
'COM port write operation failed'	This message is displayed in the *Connect to Logger* dialog box when a connection to the logger has been lost. Click **OK** to continue and check the physical connections.
'Logger response timeout - logger reply not received within the specified time'	This message is displayed in the *Connect to Logger* dialog box when a connection attempt has taken too long. Click **OK** to continue and check the physical connections.
'Logger's internal data structures corrupt'	This message is displayed in the *Connect to Logger* dialog box when the logger's memory has errors. Click **OK** to continue. See **Data Exchange User Guide** for further details.
'Could not find logger communication driver:'	This message is displayed in the *Connect to Logger* dialog box when the logger driver could not be found. You will need to re-install the software to correct this problem. Click **OK** to continue.
'Could not open port:'	This message is displayed in the *Connect to Logger* dialog box when a connection to the logger could not be established and the reason is unclear. Click **OK** to continue.
'Could not open logger:'	This message is displayed in the *Connect to Logger* dialog box when a connection has been made with the logger but information exchange is not occurring. Click **OK** to continue.
'Logger communication failed:'	This message is displayed in the *Connect to Logger* dialog box when an attempt to connect to the logger has failed and the reason is unclear. The logger Id in the logger may not match the Logger Id name in the database. Click **OK** to continue.
'Could not initialize COM library'	A problem occurred loading the logger driver software. Reinstall IrriMAX and try again.
'Could not create logger driver instance [*error description*]''	A problem occurred initializing the logger driver software. If the error description is REGDB_E_CLASSNOTREG, you did not restart your computer after installing IrriMAX. If restarting you computer does not resolve the problem, you must uninstall and reinstall IrriMAX.
'Could not close logger'	The connection to the logger could not be closed.

Message	Meaning/Action
'Error getting <parameter>' 'Error setting <parameter>'	General logger error messages will report the action that failed e.g. 'Error getting logger clock time' and additional diagnostic values related to the failure.
Calibration Registry	
'At least one item in this edit is incomplete or has invalid value. Please ensure that all required items have been filled in properly.'	This message displays in the *Calibration Registry* dialog box when one or more of the mandatory fields are left blank. Click **OK** to continue and complete all boxes marked with an asterisk (*).
'Calibration with this name already exists. Use different name.'	This message displays in the *Calibration Registry* dialog box when you try to add a calibration to the calibration registry with the same name as one that is already registered. Click **OK** to continue. To add the calibration equation, provide a unique name for the equation.
'Calibrations are being edited by another process. You will not be able to make changes until that process has unlocked the calibration file.'	This message displays in the *Calibration Registry* dialog box when a calibration equation is being edited elsewhere, for example in the **Database Manager** utility. Click **OK** to continue and close down all files using that calibration equation before making changes.
'There are one or more unregistered calibrations, which may be lost if you exit now. To save them in the calibration registry, click 'No' then '**Calibrations...**'. Highlight the calibrations to save, and click the 'Change' and 'Accept' buttons. Do you wish to exit and possibly lose unregistered calibrations?'	This message may be displayed in the *Logger Configuration* dialog box when you attempt to exit after changing one or more calibrations in the database. It is a warning that you have replaced one or more calibrations, and these calibrations are no longer stored in the database or in the calibration registry, and will therefore be lost. Click Yes to close the *Logger Configuration* dialog box without saving the calibrations or follow the instructions in the message. If you want to save the calibration but don't want to use it in the database, you must register it in the Calibration Registry. Click **Yes** to close the calibration registry dialog box without saving the calibrations or following the instruction in the message.

Troubleshooting Registration and Licensing

Unitl you are fully licensed, or after an upgrade the status of your IrriMAX license will be shown on the *Registration & Licensing* dialog. During a trial or if the license is corrupt the dialog will automatically apprear at IrriMAX startup.



Warning:
The license manager installs some special files in the **IrriMAX** program directory and if these files are tampered with **IrriMAX** license management will block the software from working. You must then apply for a new registration site key by supplying the new site code.

The license management files have a file attribute of "System" and must not be moved from the location on the disk where they were created.

They will never move with normal Windows operations but some **disk defragmentation** programs are known to move system files. Please configure your disk defragmenter to exclude the following files:

- IrriMAX.ent
- IrriMAX.key
- IrriMAX.rst
- IrriMAX.41s
- C:\Windows\System32\esnecil.ind

A summary of the messages that may appear on this dialog is given below. If the action taken does not resolve your problem the file IrriMAX.ckn is needed to help to resolve the problem. This file is store in the folder (directory) where IrriMAX was installed e.g. C:\Program Files\Sentek\IrriMAX\IrriMAX.ckn.

Please close all programs and restart your computer. If the problem persists and the table below does not describe the problem, please contact you distributor or Sentek Registrations Department. Re-registering with the new site code should resolve the problem.

Message	**Reason**	**Action**
The entered site key cannot be confirmed. [<reason>]	1. Invalid site key OR	1. You may have mistyped the site key. Check that it is the same as the one that you received from Sentek Registration department.
	2. The site code was generated before the pre-registration period expired, but it has now expired.	2. You must click Register Now to get another site key from Sentek.
Authorization time too early	The computer's clock has been set back, possibly in an attempt to extend the pre-registration period.	Click Register Now to get a new site key from Sentek.
Clock change - reboot to activate time license	The system clock date or time has been modified, possible by a scheduled time resynchronization process	Close all programs and restart the computer.
No list file found	A backup copy of the disk image containing IrriMAX may have been used	Click Register Now to get a new site key from Sentek.
Site key file has been moved OR Program moved or site key bad password	The directory where IrriMAX was installed may have been relocated. The license manager checks the physical location on the hard disk to prevent unauthorized copies of IrriMAX.	Click Register Now to get a new site key from Sentek.

Restriction file moved	This can occur if the physical position of license manger files is changed. Some disk defragmentation programs and disk performance management utilities may move hidden-system files.	Check if there are disk management tools on your computer. See *Registration and Licensing* for information and guidance for license management files. Click Register Now to get a new site key from Sentek.

Frequently asked questions

This section covers common questions and suggested answers:

Questions about superseded Sentek software

Question: Can I convert my old EnviroSCAN 2.0 (ES2) data to run on IrriMAX software?
Answer: Yes, using the **Database Converter** utility.
EnviroSCAN 4.0 and **EnviroSCAN 4.1** databases are directly compatible with **IrriMAX.**

Question: Can EnviroSCAN 4 use IrriMAX databases, graphs and layouts?
Answer: No - except EnviroSCAN can recognize IrriMAX 5 database and graphs that do not have the Irrigation & rainfall pane displayed. EnviroSCAN does not access I&R databases (.wdb).

Question: Can I run dual IrriMAX and EnviroSCAN for Windows ESW on one computer?
Answer: Sentek does not support dual installation. Installing IrriMAX will overwrite EnviroSCAN program files. Installing the latest IrriMAX will overwrite earlier IrriMAX program files.

Question: Can IrriMAX 5 and earlier read IrriMAX 6 and IrriMAX 7 files?
Answer: Databases and graphs created by IrriMAX 6 or and IrriMAX 7 cannot be read by IrriMAX 5 or EnviroSCAN for Windows 4.x. IrriMAX issues a warning before saving IrriMAX 5 and ESW files in the latest IrriMAX format. A Sentek Technical Brief describes the procedure to convert IrriMAX 6 SDB files to IrriMAX 5 format.

IrriMAX 6 cannot read graphs saved by IrriMAX 7.

Questions about logger configuration rules

Question: How many sensors can I have on an RT6 logger?
Answer: Up to 32 sensors in two cable runs of 16 sensors.

Question: How many probes can I have on 1 logger?
Answer: Up to 8 probes.

Question: How many sites can I have on 1 logger?
Answer: Up to 8 sites.

Question: How many sensors can I have on a cable run?
Answer: Up to 16 sensors.

Question: How many sensors can I have on a probe?
Answer: Up to 16 sensors.

Question: How many sites, probes and sensors can I have on a type "Other" logger?
Answer: Up to 16 sites, 99 probes and 999 sensors, in any combination.

Questions about changing logger configurations

Question: How do I change the logger ID?

Answer: Download any existing data on the logger that you wish to save. Use the *Logger Configuration* dialog box (accessible from either **Database Manager** or the *Workspace Manager* window) for editing the logger configuration for the pertinent database. Send the edited configuration to the logger. This resets the logger's memory and establishes a new file.

Question: What happens if I change the logger ID?

Answer: If you have changed the logger ID and saved it you have created a new database. In most cases you should download or reset the logger memory before changing logger ID. Any data logged under the previous ID will be deleted from the logger upon sending the modified configuration to the logger.

Question: How do I change the site ID?

Answer: There are two situations where you may wish to change site IDs.

- To change incorrect site ID - where you wish to simply rename existing site names and keep all data belonging to the sites with these new names attached.
- To create a new database while retaining normalization data - this could occur where you wish to move the system in its current configuration to a new location. A new logger ID is required in this situation.
- In Database Manager, use the Edit DB command to change the ID and save the changes in the database file.

Question: What happens if I change the site ID?
Answer:

- Option 1-You have renamed the sites, keeping the original configuration of sensors and probes.
- Option 2-You have created a new database requiring a new logger ID.

Questions about logging (sampling) intervals

Question: How do I change the sampling interval?
Answer:

- From the Logger Configuration dialog box, click the Send to Logger button. The sampling interval is displayed.
- Use Logger Manager utility to change the sampling interval

Question: What happens if I change the sampling interval?
Answer: You will notice smoother or more stepped graph shapes in the displayed data after the sampling interval is changed. Also with shorter sampling intervals the database file size will grow faster.

Question: What is the shortest time interval I can log?
Answer: 1 minute.

Question: What is the longest time interval I can log?
Answer: 9999 minutes (6.9 days)

Questions about logger memory and downloading

Question: How long will the logger hold data when removed from the logging housing?
Answer: 2 days

Question: How long does it take for the logger memory to fill up?
Answer: It depends on the number of sensors the customer has installed and the logging interval. The days = 69.44 multiplied by (Sampling interval (minutes) / the number of sensors).

Questions about logger and computer time

Question: How do I change a logger's date/time?
Answer: The logger time can be synchronized to the computer clock or the logger time can be manually adjusted.

Question: What happens if I change a logger's date/time?
Answer: You will notice a gap equivalent to the change in time or you will loose data for the period the time is changed right after clock adjustment depending whether the logger's clock has been set forward or backward.

Question: What happens if I download a logger where there is a time difference between the logger and the computer clock time?
Answer: Nothing will happen. The readings in the logger are time stamped by the logger. The software uses the reading timestamps (created by logger) for all the data processing. There is absolutely no relation between the logger's clock and the computer clock. The only time when the computer clock is important is when synchronizing logger time with computer clock.

Questions about rectifying logger setup errors

Question: What happens if I mix up loggers when downloading in the office?
Answer: There will not be a problem where the loggers have different logger IDs and/or different numbers of sensors. The software compares the logger ID and the number of sensors on the logger with the logger's ID and the number of sensors in the database. Where there is no match an error message will appear preventing download. If there is a match download to the matching database will occur.

There will be a problem where different loggers have the same logger ID and number of sensors. The download will proceed, writing data to the database. To minimize the chance of this happening you should:

- Assign distinctive logger IDs
- Clearly label logger/logger housing with their IDs
- Implement a multiple directory database structure to create a unique data directory for each customer.
- Backup the database after each successful download.

Question: What happens if I mix up loggers in the field and put the wrong logger in the logging housing?
Answer:

Warning:
If you detect the error before download, reset memory on logger and replace logger in correct logging housing. You will lose the data for the period the logger was in the wrong logging housing.

If you detect the error after downloading the data recorded for the period where the logger was in the wrong logging housing will not be valid. From Database Manager, use the Trim database command to strip the period of invalid data. Then, in Logger Manager, reset the logger memory and replace the logger in the correct housing. You will lose the data for that period.

To minimize the chance of this happening you should:

- Assign distinctive logger IDs
- Clearly label logger/logger housing with their IDs

- Implement a multiple directory database structure to create unique data directory for each customer.
- Backup the database after each successful download.

Question: How can I transfer data from one database to a different one after I mixed up the logger ID's?
Answer: Use Data Exchange to transfer the data to a Microsoft Excel worksheet, or to a text file, and then import it into the correct database. See the Data Exchange User Guide for help.

Question: How can I regain missing data after the Logger Clock has been accidentally changed?
Answer: Use Data Exchange to transfer the data to a Microsoft Excel worksheet, or to a text file, then correct the invalid dates and times and transfer back to the database. See the Data Exchange User Guide for help.

Questions about sensor configuration

Question: How do I change a faulty sensor?
Answer: Download any existing data on the logger that you wish to save. Swap the faulty sensor/s making sure you replace it at the same depth and then run **Database Manager**, and use the **Edit DB** command to set the new air and water readings for that sensor. Save the updated logger configuration to the database.

Question: How do I change sensor depths on a probe?
Answer: Download any existing data on the logger that you wish to save. Run **Database Manager**, and use the **Edit DB** command. Save the configuration to a new database file using the **Save As...** command. Edit the new database, to set the configuration as desired. Save the database and send it to the logger using the **Send to Logger** command. This automatically resets the logger memory. This should only be done by trained staff.

Question: Can I backup a logger's configuration?
Answer: Yes - use **Database Manager's** Import/Export command, to export logger settings to floppy disk.

Question: Is the complete logger configuration stored on the logger in the field?
Answer: No - the complete logger configuration is stored only on the database. The logger stores only partial configuration information to ensure proper operation.

This means you cannot access data unless you have the logger's configuration on your computer. While any person can access the logger with **Logger Manager**, only those users with the logger configuration on their database can access the data. This had been done for security reasons and for backup reasons as the logger in the field is exposed to a higher risk of damage than the user's computer.

Hence the importance of making at least two backup copies of the logger configuration on floppy using export - one kept by the distributor and one by the customer.

Question: Does export logger configuration save the database as well?
Answer: No.

Question: Can I backup an individual database?
Answer: Yes - use a compression/archive program such as **WinZip®**.

Question: My disk is filling up - can I archive data?
Answer: Yes - use backup or a compression program such as **WinZip®** to move the data (database files) to archive medium and then delete the database files you no longer require regular access to.

Note: You can also use the **Trim Database** command in **Database Manager** to keep the database file to a reasonable size. Refer to the **Database Manager User Guide** for details.

Questions about calibrations

Question: How do I change the coefficients in the calibration equation?
Answer: Use the *Calibration Registry* dialog box to add/edit calibration equations. This can be accessed from the *Logger Configuration* dialog box.

Questions about circling loggers/probes between multiple sites

Question: How do I use a logger/probe if I want to move the equipment from site to site on a weekly basis?
Answer: With great care! Using the same logger or same probes on different sites can be done provided you are very clear and very careful about what you are doing with respect to transport, installation, hardware and software.

You will need to install additional access tubes at subsequent sites, complete with bottom stopper and top caps. You will also need to consider the practical issues of cabling and connections - will you install cable at subsequent sites or move the system complete with cable?

Most importantly, you must consider the practicalities of system transportation - how will you protect the system from transport damage when moving the equipment between sites?
Transport damage where equipment is being moved between sites is outside the terms of the warranty.

Because of the high risk of transportation damage and the need to do everything exactly right every time the system is moved, **Sentek** do not recommend moving the **EnviroSCAN** RT5/6 on a daily or weekly basis.

To explain what to do with respect to software it is best to go through an example. Let's assume that you want to configure the logger as having four probes each with eight sensors. You want to move the system (i.e. logger and/or probes) between two sites and log data at each site. To do this, the logger's configuration must remain the same, i.e. have the same number of probes with sensors in the same position at both sites.

Run **Database Manager** to create a new logger configuration, record air and water counts and save the database. Let's call the first site apples and the first logger ID 'Log-1-Apples'. After you have saved to the database you need to edit the logger's configuration to create the database for the second site. Be sure to select a different logger ID for the second logger, for example 'Log-2-Pears'. Use **Save As** to save the database.

After you have established two databases with the one logger you can go ahead and log data. To set the logger with the correct configuration, simply export the correct configuration to the logger (**Import/Export** command in **Database Manager**) before you start to log the data. This will automatically reset the logger's memory and start logging data.

Before you move to the next site, ensure you download data from the logger.

When you download, the data will be placed in the database that corresponds to the current logger ID. When you physically change sites, do exactly the same thing. That is, export the correct logger configuration for the new site to the logger before you intend to log data. You can switch between sites as often as you like provided you take great care to ensure you download and you have the correct logger ID at the correct site.

It is essential that you take care that the logger IDs are different and the correct one is loaded in the logger for the site before you start to log data.

Question: What data can I expect if I use a logger/probe by moving the equipment from site to site?
Answer: The data you will record for each site will have gaps in it, for example, Apples 1/11 to 7/11, Pears 8/11 to 15/11, Apples 16/11 to 22/11, Pears 23/11 to 29/11, etc.

Questions about copying workspaces and files

Question: Can I move a workspace to a different folder on my computer or from a floppy disk to my hard drive?

Answer: Yes, as long as you take care of other files that the workspace may need.

The workspace file itself (.sws file) does not contain full information about its graphs and layouts, but stores the location of the graph and layout files to open when opening the workspace. The graph and layout files in turn store the locations of their database files. In both cases, the paths of these dependent files are stored relative to the parent file, and in absolute terms. If you copy all associated files across with

the workspace, keeping any directory structure the same, everything will work correctly when the workspace is copied.

When the workspace is opened from its new location, it will be able to find the files it needs using the relative path, and will adjust the absolute location for the files.

Warning:
If you do not copy all files across, your copy of the workspace will use the original layouts, graphs and databases. For example, if you have a workspace, graph and database on a floppy disc, and forget to copy the database, the graph will look in the original location (the floppy drive) for its database, which may lead to some confusion.

Question: How do I tell which files my workspace is accessing?

Answer: For graph and layout files, you can select the **Save As...** menu item to determine the location of the file. When the file dialog opens asking for a new location in which to save the file, you can click on the drop-down box at the top to see the directory for that file. Click on the **Cancel** button to close the file dialog.

Databases in layouts will display their full file name if you hover the mouse over the logger icon for a second. Similarly, hover the mouse over the database icon in the status bar at the bottom of a graph to see the database file name.

Question: Can I change the files that my workspace refers to?

Answer: Yes. As stated above, it is recommended that you copy all files before opening the workspace from its new location. If you do miss some files in the initial transfer you can take the following corrective action.

Open the workspace. Close any graphs and layouts that are stored in the old location and use the **Open >Graph** and **Open > Layout** menu commands in the Workspace Manager to load in the graph and layout files from the new location. Then save the workspace.

If a layout or graph is referencing the wrong database stored in the old location (on the A: drive for example), you need to make the old database file unavailable. Close the graphs or layouts that reference the file and either rename the file or remove the floppy disk from the drive if the file is on a floppy disk. Reopening a layout will show the database icon dimmed with a red question mark over the top. Right click on the database and select the **Find Missing Database...** from the popup menu. This will open a file dialog and allow you to find the copy of the database on your machine. Save the layout to store the new database location.

What can you do with the Summed Graph?

The summed graph is used to:

- sum all existing sensors in the profile
- create the sum of a subset of sensors (say 30 -70cm soil depth)
- display a single sensor
- estimate the soil water content for soil layers, where sensors are not present using the interpolation command
- average the soil water content of two or more probes if the depth setting of sensors is compatible.
- identify the times when the soil water content goes beyond full point or onset of stress point.
- Add agronomic budget lines and regions
- Add growth stages to agronomic budget lines

What is Matric Potential

Matric Potential (matric suction, soil water suction) is defined as the negative gauge pressure, relative to the external gas pressure on soil water, to which a solution identical in composition with the soil solution must be subjected in order to be in equilibrium through a porous membrane wall with the water in the soil (ISSS Committee).

This pressure is typically measured using a **tensiometer**: a closed hanging column of pure water in contact with a porous ceramic membrane which is in intimate contact with the soil.

Tensiometers approximate the matric potential by measuring the degree of suction (negative pressure) present in the soil. Variations in soil pore water ionic content and in atmospheric pressure can affect the readings.

Plant roots living in the soil must exert a suction to overcome the force (matric potential) holding water in the soil. A saturated soil has a matric potential of zero kilopascals (0 kPa), while an almost completely dry soil has a matric potential of -1500 kPa. The effective range of most commercially available tensiometers is -10 to -85 kPa.

What soil volume does a single sensor measure?

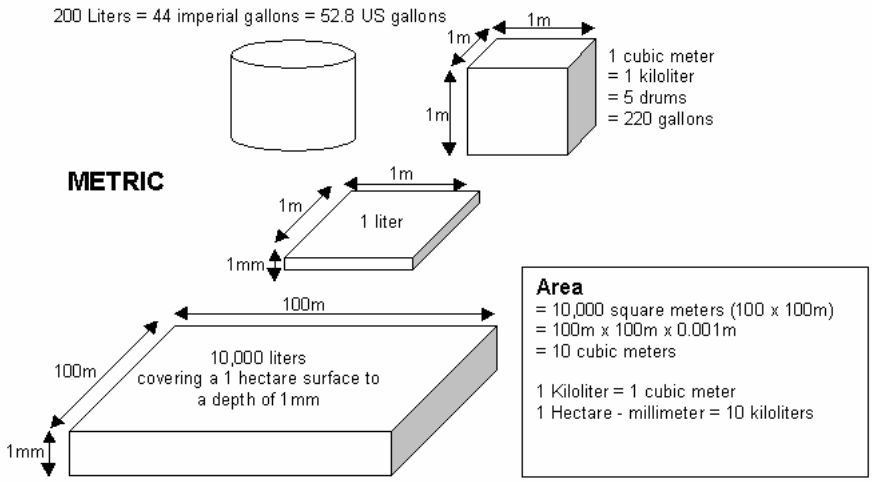
A single sensor records moisture data from a soil volume outside the access tube which has a sphere of influence 10cm vertical height and a radial distance from the outer wall of the access tube of 10cm.

What are the water units?

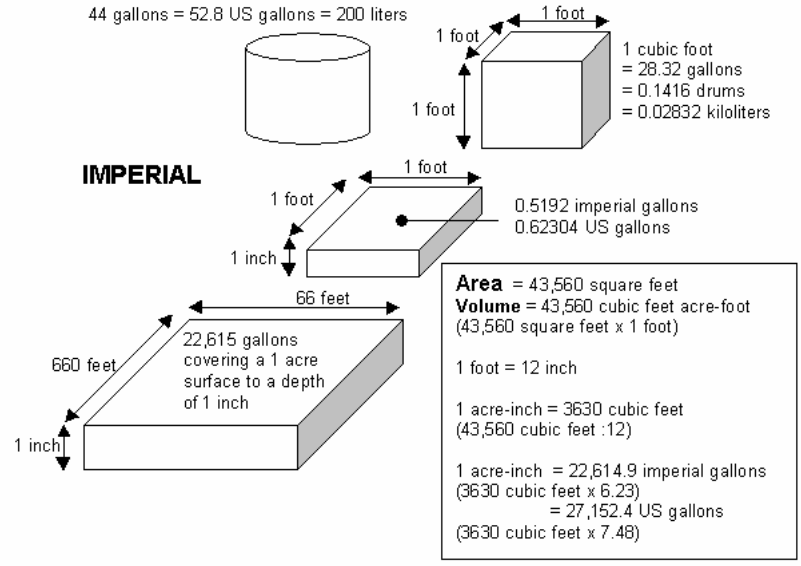
For example, if one sensor (provided it has been calibrated) reads 1 mm that means there is 1mm of water content in a 100mm thick soil slice on a volume basis. For that layer (and only that layer), this amounts to a volumetric soil water content of 1%.

What does 1% or 1mm volumetric soil water content / 10cm or 100mm soil depth mean?
You require 1 liter of water to cover 1 square meter (m^2) to a soil depth of 1mm.

Ø For metric units:



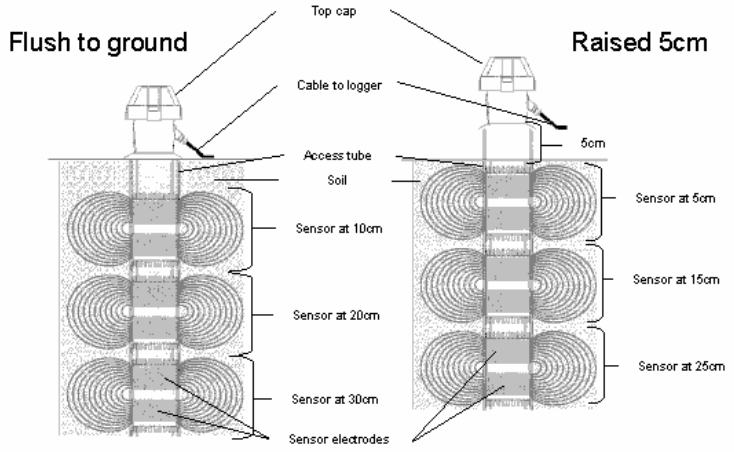
Ø For Imperial measurement units:



What parts of the soil profile do sensors on the probe measure?

Probes in almost all cases have more than one sensor to monitor the depth of irrigation and the depth of the root zone. The first sensor is located at a soil depth of 10cm (if the datum plate of the top cap sits on ground level) measuring effectively the soil profile slice of 5-15cm depth. The next sensor is located at 20 cm measuring effectively 15 -25cm soil depths. With further sensors at 10cm intervals on the probe rod, the measurement depth would be respectively (25-35cm, 35-45cm and so on).

If you raise the datum plate of the top-cap 5cm above the ground surface, placing the center of the first sensor effectively at 5cm soil depth, the sphere of influence of the sensor will measure a soil slice from 0-10cm. For the other sensors at 10cm depth intervals on the probe rod, the measurement depth would be respectively (20-30cm, 30-40cm and so on).



What will be summed?

It is your choice, given the limits of your particular number of probes, probe lengths, number of sensors per probe and depth location of these sensors. You choose which water content from different depth levels you sum up to present a total water content of an entire profile, parts of the profile or averages of compatible profiles. Above each graph will be a summary of which sites, probes and sensor depths you have selected and presented in a summed total water content.

For example, your probe has sensors located at the following depth levels giving respective readings in mm:

Depth	**mm H_2O**

Depth	**mm H_2O**
10cm	13mm
20cm	22mm
30cm	25mm
40cm	27mm
50cm	28mm
Total	**115mm**

Where:

- The total soil water content from 10 to 50 cm is 115 mm.
- The total soil water content from 10 to 20 cm is 35mm.
- The total soil water content from 30 to 50 cm is 80 mm.

If you sum two (or more) probes with compatible sensors' depth settings, the total profile sum will be calculated as an average of all profile sums selected.

How to estimate soil water content for a depth where there is no sensor?

If you have sensors at 10, 30 and 40cm on the probe rod and no sensor at 20cm you can still calculate the water content from the sensors you do have and present as a summed graph.

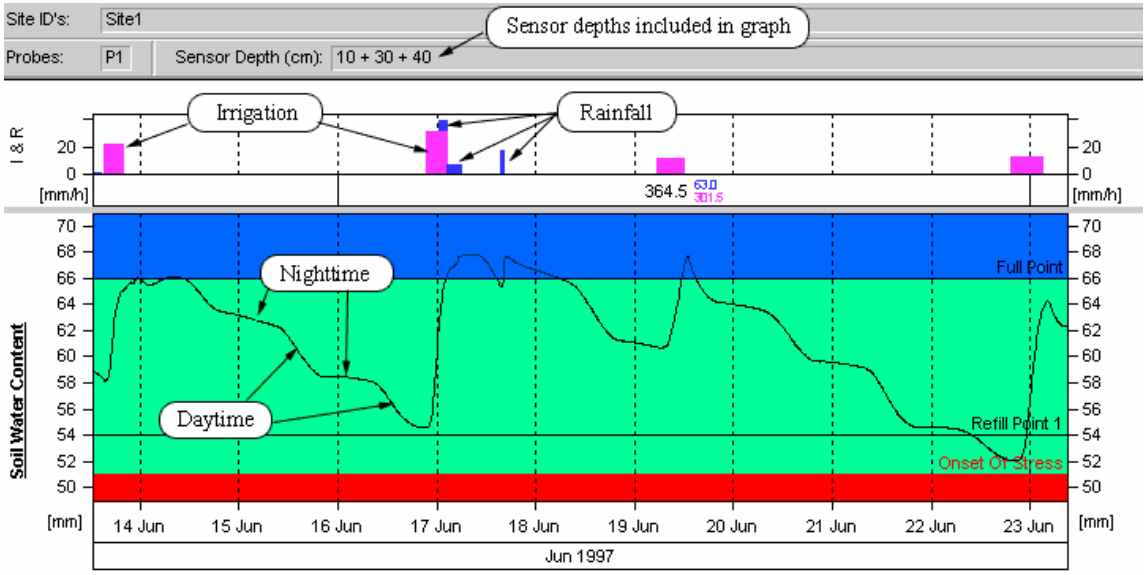
Note: This particular summed graph excludes the water content from 20 cm in the total sum of water content. It is not a true representation of the total water content in that profile. You are only adding the water content readings from 10cm thick, individual soil slices located at 10, 30 and 40 cm. In addition, if the first sensor is located at 10cm soil depth measuring effectively a depth from 5-15 cm, the water content from 0-5cm is being ignored. If you do not want to omit the first 5-cm of soil from your water content measurements, raise your datum plate of your top-cap 5 cm above ground level.

However, the software allows you to calculate an estimation of water content for this missing value at 20cm by using the interpolation command. This command simply takes the water content at 10 cm and adds it to the water content at 30 cm and then divides the value by two to give you an average or approximation of the missing water content.

Note: Interpolation may only work in uniform textured and structured soil profiles. In heavy textural layered profiles, a correct average may not be able to be estimated.

For example, if the 10cm sensor measures a 10cm thick, gravel band, followed by clay soil and the 30cm sensor measures a 10cm thick band in that clay, the average water content at 20cm would be erroneous.

You can estimate the readings from multiple missing sensors, but only if these readings are derived in between an existing upper and lower sensor in the profile. You cannot estimate the water content from 0-5cm, if your sensor is located at 10cm depth.



Checking current soil moisture

After you have setup a workspace to display and manage your logger site(s), you can easily view current soil moisture readings at any time after data has been downloaded from the logger(s) to your database(s). The current soil moisture readings are displayed in summary form using the soil moisture gauge, in the *Workspace Manager* window. Multiple gauges can be displayed by adding the required graphs to your workspace.

This procedure assumes that the **Open last workspace on startup option** is selected in the global settings, see page 83 for details. If you have not selected this option, you will have to open the Workspace from the File menu by clicking File > Open > Workspace...

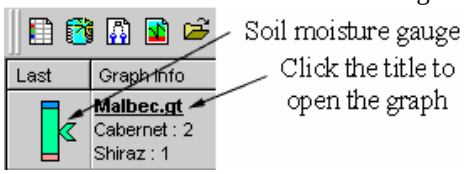
Ø To view current soil moisture readings

1. Open **IrriMAX** using one of the following methods:

   - from the desktop, double-click on 

     The last workspace open displays in the *Workspace Manager* window.
   - from the **Windows Taskbar**, click the **Start** button and point to **Programs**.
     Point to **Sentek**, point to **IrriMAX** and click **IrriMAX**.
     The last opened workspace displays in the *Workspace Manager* window.

2. The soil moisture gauge displays in the first column of the *Workspace Manager* window. It shows the condition of the most recent reading in the database.



3. If the indicator on the soil moisture gauge is:

   - in the blue (top section of gauge), the last summed value is currently above the value assigned to indicate the Full Point
   - in the green (middle section of gauge), the last summed value is less than the value set for the Full Point and greater than the value set for the Onset of Stress. Therefore, the soil water content for the soil profile being graphed is within the agronomic lines set.
   - in the red (bottom section of gauge), the last summed value has fallen below the value assigned to Onset of Stress.

Ø To check soil moisture trends and details

1. From the **Workspace Manager** window click on the graph **Window Title**.
   The graph opens and displays in the graph window. See page 135 for details of viewing graphs.

2. When you have finished viewing the graphs, click **Workspace** on the graph menu bar, close **IrriMAX** by clicking **Exit** in the **File** menu.

What are the database file access rules

Sentek database files are opened in read-only or write mode. A database that has been opened for writing cannot be accessed. **IrriMAX** and its utilities will automatically relinquish exclusive access until the operation is complete. A database can be accessed for reading by many applications simultaneously.

When a database file cannot be opened due to sharing violation the user will be alerted and advised to close down other applications or utilities, which may be accessing the database. Typical causes of this problem are

- The database is held open in read-only by another computer. This will prevent writing operations (e.g. download from logger to database) from taking place. Close **IrriMAX** on the other computer.
- **Database Manager** is also running, and is using one of the DB tools. Close the DB tool dialog and try again.

What is involved in logger communication

Communication with EnviroSCAN RT6 loggers from IrriMAX applications takes place in various modes described here. These modes are similar to the ways in which files can be opened with different read/write and sharing permissions under Windows.

It is necessary to understand these issues if two or more communication utilities are running at the same time, as conflicts can occur if certain operations are carried out simultaneously. Some of the opening modes require exclusive access. This means that while a logger is open in that mode, all other open requests will fail. Similarly, if a logger is already open in any mode requests for exclusive access will fail.

Anonymous and non-anonymous mode

When IrriMAX or a utility requests opening a logger for communication, it can name a specific logger ID (non-anonymous) or request communication with any logger that on the specified port (anonymous). Opening a logger in anonymous mode will automatically open it exclusively. The condition for this to work is that only single logger be connected to the communication line. In the case of multiple loggers connected to the communication line (e.g. RS485 multidrop connection), an attempt to communicate in anonymous mode may fail due to communication conflicts occurring.

Read-only, Direct and Set modes

When communication is opened with a logger, the calling program requests a certain level of privileges that determine what actions it can perform. The three modes in which a logger can be opened are listed below.

- **Read-only mode**
  This allows the program to read data and configuration information such as logger ID, number of sensors from the logger, number of data blocks and also the logged data. The logger clock can also be read in this mode. Read-only mode is non-exclusive.
- **Direct mode**
  In addition to the privileges for read-only mode, direct mode allows the real-time voltages and sensor readings to be read from the logger. Direct mode requires exclusive access.
- **Set mode**
  Set mode allows the calling program to set certain parameters in the logger such as communication speed, sampling interval, etc. Set mode requires exclusive access.
- **Configuration mode**
  This mode allows the calling program to over-write the logger configuration (such as number of

sensors connected to a logger) and erase the data from the logger. Configuration mode requires exclusive access.

Connection modes used by IrriMAX and utilities

Logger communication takes place from **Logger Manager**, **Data Exchange** (Logger Download**)** and the logger (setup) dialog shared by **IrriMAX** and **Database Manager**.

Data Exchange (Logger Download) always communicates in read-only mode. It usually communicates in non-anonymous mode. The only exception is when a logger is opened through the configuration dialog by specifying a COM port and baud rate. In this case, the logger will be opened anonymously in order to determine its ID, closed and then re-opened non-anonymously.

Logger Manager communicates in various modes, depending on the activity being carried out. It will initially open in read-only mode, and stays in read-only mode until the Sensors or Voltages page is activated, at which point it closes the logger and reopens in direct mode. Once the logger is opened in direct mode it will not reopen in read-only mode if the Info or Data Blocks pages are activated. On the Settings page it will close and re-open in Set mode when the 'Apply' button is clicked, in order to send the updated time and sampling interval to the logger.

The connection mode (read-only, direct or set) is displayed in the status bar.

Logger Manager will use non-anonymous mode if it is supplied with a logger ID either through the command line or by connecting through a database.

The logger dialog in **IrriMAX** and **Database Manager** always opens in anonymous configuration mode, and thus requires exclusive access. The logger is not opened until the Send to Logger button is pressed, and once opened it remains open until the logger dialog is closed.

Downloading data from a logger into a database is achieved using **Data Exchange** with the *Source module* set to RT6. Data Exchange can use either anonymous or non-anonymous mode.

Index

Glossary

Absolute moisture value

Absolute moisture values reflect accurate volumetric soil water content readings that have been derived by calibrating sensors for different depth levels for a specific site.

Access tube

The **access tube** is the cylindrical tube buried in the ground that contains the Sentek probe and its sensors.

Active Mode FTP

See **FTP** glossary entry for a description of **Active Mode FTP**.

Agronomist

An **agronomist** is a rural land management and productivity specialist.

Batch file

A **batch file** is a text-based file that contains one or more commands or programs to be executed when you run the batch file. Batch files have a .BAT file name extension (also known as Script file).

Baud rate

The **Baud rate** specifies the speed at which the data is being transmitted/received via the serial communication port.

Budget line

A **budget line** is the horizontal line that can be setup on an IrriMAX summed graph, to represent an important soil moisture value e.g. Onset of Stress and Full Point.

Cable run

Two **cable runs** can exist on an RT6 logger. Sensors send and receive information to the logger via the cable. The two cable runs are referred to as Run A and Run B.

Calculated value

The **calculated value** is the component of a logged reading that has been processed via the logger's calibration equation. The calculated value is the one used by the graphs and is a quantitative measure of the moisture for that sensor and that time. The other component of the reading is the original *raw* value, which was stored by the logger and then used with the equation to calculate the *calculated* value.

If a calculated value is set to INVALID (-1) or ERROR (-2) then it will not appear on the graphs, and a single gap will appear in the graph in the place of one or more of these values.

Calibration equation

A **calibration equation** is used to convert normalized, raw sensor data into moisture units. Moisture units describe volumetric soil water content. Most **IrriMAX** users will use the default calibration equation supplied with the software. This equation presents data for clear identification of trends and relative changes.

There can be more than one soil type within a given soil profile. Calibrations may be setup for individual soil types. It is important to assign the correct calibration to the correct soil type if absolute data is being collected.

Cascaded

Cascading windows enables you to see the title bars of all open windows but the windows are layered on the screen. Clicking on a title bar activates that window and brings it to the front of the screen.

Chemigation

Chemigation. See Fertigation.

COM port

COM Port is the abbreviation for Communications port. A computer usually has one or two COM ports named COM1 and COM2, which can be used for communication to external devices, using a special cable e.g. modem or front panel connector on the RT6 logger housing.

COM Port Handle

The **COM Port handle** is the value provided by the operating system (**Windows 98**, **Windows ME, Windows NT, Windows 2000, Windows XP**) when the **Remote Connection Manager** is opening a serial COM port. This is an internal system parameter. The program that obtains this value when opening the COM port can pass this value to another program in order to share the COM port.

Command line parameters

Command line parameters allow the passing of information ('switches' and 'Arguments') to a program via the command line, which is not normally seen by the computer user. In a batch file, these parameters are specified after a space and a forward slash '/' to signify that it is a parameter (e.g. DEXC.exe /L:"MY LOGFILENAME.TXT").

Cooked value

Cooked value is a Sentek term to describe the calibrated value resulting from passing a raw value through the Sentek calibration equation.

Data Exchange

Data Exchange is the IrriMAX utility that downloads data from Sentek devices e.g. RT6 logger, Diviner 2000, EnviroSCAN Plus front panel or EnviroSCAN Plus Server. Data Exchange also has the capability to transfer data between various IrriMAX data formats.

Database

A **database** is a file that stores data. For **IrriMAX**, there are two types of database files:

1. IrriMAX database (.SDB) contains the logger configuration and readings data.

2. Irrigation & Rainfall database (.WDB), matches the soil moisture database filename (except for the .WDB file name extension).

Device Parameter

Device parameters are used by RCM. See Token.

Dialog

A **dialog** is a part of computer screen that has a title bar but does not have a menu or toolbar and generally cannot be resized. Dialogs often prevent accessing other windows in the application until their OK or Cancel button is clicked. See also: Window.

Dimmed

Dimmed fields (light gray) occur in edit boxes, check boxes, buttons or lists (Windows controls) when the control is temporarily disabled and does not accept user input.

Dithering

Dithering is used as a method of presenting solid graph colors on printers that cannot print solid color. The solid color is replaced with different dot patterns for each region. Dithered graphs may print faster than solid color.

Diviner 2000

The Sentek **Diviner 2000** is a hand held portable soil moisture monitoring system. It comprises a data display unit and probe. The Data Exchange utility can communicate with a Diviner 2000 and download its collected data into an IrriMAX database.

Download

Download is the process of receiving of data from another location e.g. Download from the Internet to an IrriMAX database. Uploading is the sending of data to another location.

EC Units

EC units is the abbreviation for Electrical Conductivity Units (EC).

Electrical Conductivity Units (EC)

Electrical Conductivity Units (EC) is the Systéme Internationale (SI) unit for electrical conductivity (deciSiemens per metre, dSm^{-1}).

Electrical Conductivity (EC) is a measure of the ability of a material to conduct electricity. The ease with which electrical current passes through water is proportional to the salt concentration of the water. Consequently, the total salt concentration of an extracted and prepared soil solution can be estimated by measuring the EC with an electrical conductivity meter. A higher EC means a greater salt concentration. A relationship between VIC and EC needs to be established. Refer to section on "Benchmarking Soil Salinity -TriSCAN Calibration" in the Agronomic User Manual.

Note: The EC value of soil salinity is dependent on the technique used for sample preparation. See the definition of terms in the Agronomic User Manual.

EnviroSCAN Plus

EnviroSCAN Plus is a Sentek system that can upload its readings to the Internet. It incorporates an EnviroSCAN Plus probe, the Data Transmission Unit (DTU), solar panel, a modem and antenna. **Data Exchange** can download the readings from the Internet into an IrriMAX database.

Extent

The graph **extent** is the limit of graph data. Horizontal extent is the time range from earliest data point to latest data point. The vertical extent is the minimum and maximum value of the data currently displayed in the graph window.

Fertigation

Fertigation is the application of fertilizer via the irrigation system. This may change the salinity of the soil.

Field download cable

The **Field download cable** is the communications cable used to connect between a computer COM port and the front panel of the RT6 logger housing (see also Office download cable).

File name extension

A **File name extension** is the three (generally) characters present after the final dot in a Windows file name, also referred to as file name suffix. IrriMAX has some predefined file name extensions e.g. .SDB, .LIF.

Firewall

A **firewall**, in the context of Internet communications, is computer software (or hardware) that intercepts all messages transferred to a computer and prevents unauthorized messages from propagating.

Firmware

Firmware is a computer program stored in Read Only Memory (ROM) on an integrated circuit chip of a device (for example, a logger). Firmware programs are not lost when the system is turned off and are permanent.

Floating window

Floating window can be placed anywhere on the screen. They can float behind or in front of other window.

Front Panel

The **front panel** is part of the EnviroSCAN Plus Data Transmission Unit (DTU). It contains the EnviroSCAN Plus power switch and the front panel download-connector. Behind the front panel are the modem, battery and solar charger circuit.

FTP

FTP is the acronym for File Transfer Protocol. This is a standard method for data file transfer across the Internet. Another common standard is HTTP. Active mode requires the remote computer to make a connection to your computer, which your firewall may prevent. With Passive all connections are made by your computer. There is little performance difference between active and passive modes

Graph

A **graph** is used to display data in a pictorial format. **IrriMAX** displays agronomic graphs for soil moisture, irrigation and rainfall data.

HTTP

HTTP is the acronym for Hypertext Transfer Protocol. This is a standard communication method on the Internet. Another standard is FTP.

Icon

A Windows **icon** is a small picture that represents the use of a data file or program. Double-clicking an icon opens the file or program. Minimized IrriMAX windows are also called icons.

Interface

The **interface** is the area of input and output and communication between the software, monitor (hardware) and the user. **Sentek** software uses a **Windows** interface environment.

The tem "Interface board" is sometimes used to describe the circuit board at the top of a Sentek Probe which controls the sensors.

Internet

The **Internet** is a global network connecting millions of computers. More than 100 countries are linked into exchanges of data, news and opinions.

Interpolate

Interpolation (on a summed graph) uses the proportional reading between two sensors to establish a reading for a missing sensor. For example, if a graph displays readings taken from sensors positioned at 10 and 30cm, interpolating the graph includes a non-existent sensor at the 20cm position to calculate the total graph.

I&R

I&R is an abbreviation. See Irrigation & Rainfall.

Irrigation

Irrigation is the application of water to a crop. The rate of water flow and the start time and duration can be stored in an irrigation & rainfall database, on a per site basis.

Irrigation & Rainfall

Irrigation & Rainfall data is stored in a (.WDB) database file, which matches a soil moisture database (.SDB) file in name (except for the .WDB file name extension) and in site names. The rate of water flow for both irrigation & rainfall, along with the start time and duration can be stored in an irrigation & rainfall database, on a per site basis.

In IrriMAX, the I&R bar graph representation of this data is shown on a pane above the moisture graph.

Logger

A **logger** is a device used to store data in the field, for later downloading to a computer. An IrriMAX logger is the field unit that holds readings which can be downloaded into IrriMAX.

Logger ID

The **Logger ID** is a computer readable name that uniquely identifies a Sentek logger. The Logger ID in the logger and in the moisture database must match. When multiple RT6 Loggers are on a single communication line (RS485 multiple devices), every logger must have a different Logger ID.

Logger tree view

A **logger tree view** is a pictorial representation in a tree style, of the logger, probes and sensors that make up a database. This view is available in the logger configuration and database manager windows.

Matric Potential

Matric Potential (matric suction, soil water suction) is defined as the negative gauge pressure, relative to the external gas pressure on soil water, to which a solution identical in composition with the soil solution must be subjected in order to be in equilibrium through a porous membrane wall with the water in the soil (ISSS Committee).

Normalization

For a Sentek sensor, **Normalization** is the process of establishing the raw count corresponding to dry air (near 0% moisture) and raw count corresponding to water (100% moisture). Every sensor in a probe must be normalized.

Normalization container

A **normalization container** is a water container containing a short length of access tube, to allow for normalization of the water counts of sensors on a probe.

Office download cable

An **office download cable** is a special communications cable used to connect between a computer COM port and an RT6 logger when it is not connected to the Logger Facility Main Board. The cable requires a 12V DC power pack. This cable is normally used when a logger is brought back to the office for downloading (see also: Field download cable).

Pane

A **Pane** is a separate area of a graph window. Panes split the window into sub windows. The IrriMAX graph window can be split into an I&R pane, Salinity pane, custom sensors pane(s) and a primary moisture or matric potential pane.

Parallel port

A **Parallel port** is computer connector used for transmitting data in parallel, eight bits at a time. A parallel port uses a 25-pin connector. The parallel port is most commonly used for connecting printers to the computer.

Parameter

Parameter is a generic term for the value sent to a program or operation by the user or another program.

Passive Mode FTP

See **FTP** glossary entry for a description of **Passive Mode FTP**.

Password

Password is part of login identification. See **User name**.

PConfig

PConfig is the abbreviation for the Probe Configuration utility program. It is used to setup and configure EnviroSCAN Plus, EasyAG and EnviroSMART probes.

PDF

PDF is an acronym for Portable Document Format. A type of file that electronically displays the image of a document exactly as it would appear if printed. PDF files are viewed using **Adobe Acrobat Reader** software, which is freely available on the Internet.

Port

Port number, in the context of Internet access, is the access point through which Internet data is transferred. HTTP protocol by default uses port 80, FTP protocol defaults to port 21. Your Hosting Provider will inform you if you must change from these defaults. Changing these values may require the updating of your computer's firewall configuration.

Probe

A **probe** takes soil moisture/salinity readings. It is a device inside an access tube which is in the soil at a predetermined site. The probe consists of the access tube, an interface board (5-Wire board, EnviroSMART interface or EasyAG interface), top cap and probe rod with sensors attached.

Rainfall

Rainfall is the application of rain to a crop. The rate of rainfall and the start time and duration can be stored in an irrigation & rainfall database, on a per site basis.

Raw count

A **raw count** is the base unit of data recorded by the RT6 logger. Raw counts are downloaded to a computer and converted to 'useable' data (calculated values) through the application of normalize raw counts and calibration equation coefficients.

Raw data

Raw data is a general term for data that needs further processing in order to represent the desired quantitative values.

Relative value

A **relative value** reflects a volumetric soil water content reading. This is derived using initial default calibration equation(s) supplied by **Sentek Pty Ltd** and may not be an absolute moisture value for a particular soil type.

Retries

Retries - The number of times software will try to repeat the communications in the event of a Time-out from the other device.

Return values

A **return values** is numeric code that a core program returns to **Remote Connection Manager** to indicate whether the core program was able to complete a task successfully or not. You can view return values and corresponding interpretation in the RCM log file.

RS232

RS232 is a serial communication connection standard commonly used for connecting two devices within a short distance. It allows full duplex communication. e.g. computer to modem, direct field connection of computer to RT6 logger facility (see also: RS485).

RS485

RS485 is a serial communication connection standard that uses only two wires and allows connection of multiple devices. Used for longer distances than RS232 or when multiple devices are needed on one communication line (see also: RS232).

RT6 Logger

An **RT6 logger** is a Sentek proprietary logger that stores data from Sentek sensors for later download into IrriMAX Databases. The term RT6 logger also covers the superseded RT5, logger except where they are explicitly differentiated.

RTS

RTS is a telemetry term that means "Ready To Send". This feature is used in IrriMAX communication software to support remote synchronization. It is required so the computer and logger know when to send data to each other, or to pause while the other end is busy.

Ruler

A graph **ruler** is a vertical or horizontal line on an IrriMAX graph that can be moved from left to right, or up and down, using the mouse. It displays a value label at the point of interception of the ruler line with the graph data. The ruler is used in the graph window to move along the shape of the graph, displaying precise units at a specific date and time.

Run A and Run B

Run A is the primary cable and **Run B** is the secondary cable between the sites and the EnviroSCAN RT6 logger.

Salinity

The term **salinity** refers to the total dissolved concentration of major inorganic solutes or ions (principally Na^{+}, Ca^{++}, Mg^{++}, K^{+}, HCO_3^{-}, CO_3^{--}, SO_4^{--} and Cl^{-}) in aqueous samples. As applied to soils, it refers to the soluble plus readily dissolvable salts in the soil, or in an aqueous extract of a soil sample.

Salinity is quantified in terms of the total concentration of such soluble salts, or more practically, in terms of the EC of the solution.

Saline soils can be defined as soils containing sufficient soluble salts to adversely affect the growth of plants. The soluble salts are chiefly sodium chloride and sodium sulfate, but saline soils also contain appreciable quantities of chlorides and sulfates of calcium and magnesium. For purposes of definition, saline soils are those which have an electrical conductivity of the saturation soil extract of more than 4 dSm^{-1} at 25°C.

The application of fertilizer may change the salinity of the soil.

Sampling interval

The **sampling interval** is the time between individual powering of all sensors to obtain readings. The Sentek RT6 logger and EnviroSCAN Plus systems schedule readings at regular sampling intervals. These times are set in the Sampling Interval field in the **Send to Logger** dialog box (RT6 Logger) or on the Settings tab page in **IPConfig** (EnviroSMART and EasyAG probes).

Scaled frequency

Scaled frequency is a sensor raw count reading in relation to normalized air count and water count. It is used in the Sentek calibration equation.

Scaled Frequency (SF) = (*AirCount* - *SoilCount*) / (*AirCount* - *WaterCount*)

All counts are taken within an access tube.

Script file

Script file - See Batch file.

Sensor

A **sensor** is the device within a Sentek probe that takes soil moisture readings, at a particular depth.

Site

A **site** is the area around the probe(s) that is having its soil profile data gathered. An IrriMAX database reflects the site configuration and has a logger name, one or more site names and one or more probes on each site.

Site Code and Site Key

IrriMAX license registration generates a **site code**. You send this site code to Sentek registrations who generate a **site key**. You then use this site key to convert the IrriMAX 30 day trial into an unlimited use license. Each computer has a different site code and site key.

SMTP

Simple Mail Transfer Protocol is a standard for e-mail transmissions across the Internet. IrriMAX uses SMTP for e-mail transmissions.

Splitter bar

A **splitter bar** is the bar that divides two panes in a window. It usually allows the resizing of the panes within the window.

SSL

Secure Sockets Layer is a cryptographic protocol which provides secure communications on the Internet. IrriMAX can use SSL for e-mail transmissions.

Telemetry

Telemetry is the equipment involved in remote communications e.g. radio modem.

Tiling windows

Tiling windows enables you to see all open windows at once. Each window occupies a section of the screen. The size of each window is inversely proportional to the number of open windows.

Time-out

Time-out is the time the communications driver will wait for an answer from the device (e.g. logger) before it gives up and reports that it cannot communicate with the device. Factors affecting this time include end-to-end delay when communicating via a radio or other communications device.

Title bar

The **title bar** is the bar at the top of any window that contains the name of the program and the name of the open file.

ToolTip

A Windows **tooltip** is a small box containing descriptive text. It appears when you use the mouse to point to certain Windows objects.

TriSCAN

TriSCAN™ is the world's first near-continuous in-field monitoring probe that measures soil water content and soil salinity (VIC) throughout a soil profile. At each depth, soil water and salinity measurements are taken by the same sensor. The TriSCAN™ technology is protected by world patents.

Upload

Uploading is the process of sending of data to another location e.g. An EnviroSCAN Plus Probe uploads to the Internet. Download is the receiving of data from another location.

User name

User name is part of login identification. A user name and password may be are required for connection to the ES Plus server. The Hosting Provider company usually supplies the relevant user names and passwords. These values are entered using **Edit Servers** dialog in Data Exchange. These are not the same as your Internet user name and password, which are supplied by your ISP and are used to setup you Internet Network Connection.

URL

URL is the acronym for Universal Resource Locator. It contains all of the information needed to access an object over the Internet. It is the Internet address of the host location to which you want to connect. It consists of a "scheme" followed by a colon then a resolvable network address (a numeric TCP/IP address e.g. 192.168.2.1 or a domain name e.g. www.sentek.com.au). Schemes include HTTP and FTP.

VIC Units

VIC is an acronym - see Volumetric Ion Content Units (VIC)

Volumetric Ion Content Units (VIC)

Volumetric Ion Content (VIC) is a nominal instrument value that is produced by the sensor data processing model. VIC does not represent the exact soil EC value. Changes of units of VIC represent changes in units of soil EC. The exact relationship between VIC and EC varies between soil types. A relationship between VIC and EC needs to be established. Refer to section on "Benchmarking Soil Salinity -TriSCAN Calibration" in the Agronomic User Manual.

Measurement units of VIC can be quantitatively related (calibrated) to the soil EC through site-specific physical soil sampling and analysis. Similar to the soil water data, the sensor output of VIC can be presented as dynamic trend changes over a chosen time scale.

Web

Web is the abbreviation for the **World Wide Web (WWW)**, a system of Internet servers that support documents formatted in a markup language called HTML (HyperText Markup Language). It supports links to other documents, as well as graphics, audio, and video files. This means you can jump from one document to another simply by clicking on hot spots.

Web browsers make it easy to access the World Wide Web. Some of the most popular are Netscape, Firefox, Mozilla and Microsoft's Internet Explorer.

Webification

Webification is the process of converting a computer document into a form suitable for display on the Web.

Webify

To **webify** is to convert a computer document into a form suitable for display on the Web.

Window

A **window** is a part of the computer screen that has a title bar and generally a menu and toolbar. It may be resizable and you can swap between windows in one application. See also: Dialog.

Windows (with a capital W) denotes a reference to the Microsoft Windows operating system.

Workspace

The **Workspace** is the working environment of **IrriMAX**. From the Workspace, you can view the current soil moisture or access more detailed graphs to view soil moisture trends. The *Workspace* contains references to its graphs and layouts.