PowerShield Link Manual

Manual Version : 1.0.1

PowerShield Part Number: 6300-017

Introduction

PowerShield Link

by PowerShield Ltd.

Link is software for monitoring multiple PowerShield Battery Monitoring sites. From a single PC, it provides permanent, online alarm monitoring, for an unlimited number of sites across a TCP/IP network.

Link consists of two parts, Link Server manages the Battery Monitors and accepts and stores event details, and the Link Client is the Graphical User Interface that interacts with the Link Server.

Table of Contents

1 Getting Started

1.1 Introduction

This manual is not intended to provide details on configuring a PowerShield battery monitoring system, only the communications configuration to allow integration with Link software. For details on configuring a PowerShield System, please refer to the appropriate manual that was supplied with the product.

This manual does assume a level of familiarity with the PowerShield System and a basic understanding of TCP/IP networking. Please refer to your IT Department in regards to issues with LAN (Local Area Network) configuration

Link is a comprehensive software tool for managing your standby batteries in conjunction with PowerShield Battery Monitors.
Link software has 2 components, LinkClient and LinkServer. Link is best utilised when the battery monitors maintain permanent communication connections.

The LinkClient program is the user interface to Link and provides the following features:

- View real-time battery status and measurements
- Alarm status of all connected monitors
- Alarm history
- View battery history
- Initiate reports
- Manage reports

The LinkServer software runs continuously in the background and is not a visual program. It performs the following tasks:

- Manages the monitors
- Stores the data recorded by the monitors
- Notifies alarms to users via Email and SMS
- Generates reports as requested by LinkClients
- Server for the LinkClient(s)

Link is a scalable system and will manage 1 to many battery monitors simultaneously. Link is a multi-user system where multiple LinkClients can run simultaneously with a single LinkServer.

Figure 1 shows an example where Link is managing 3 battery monitors.

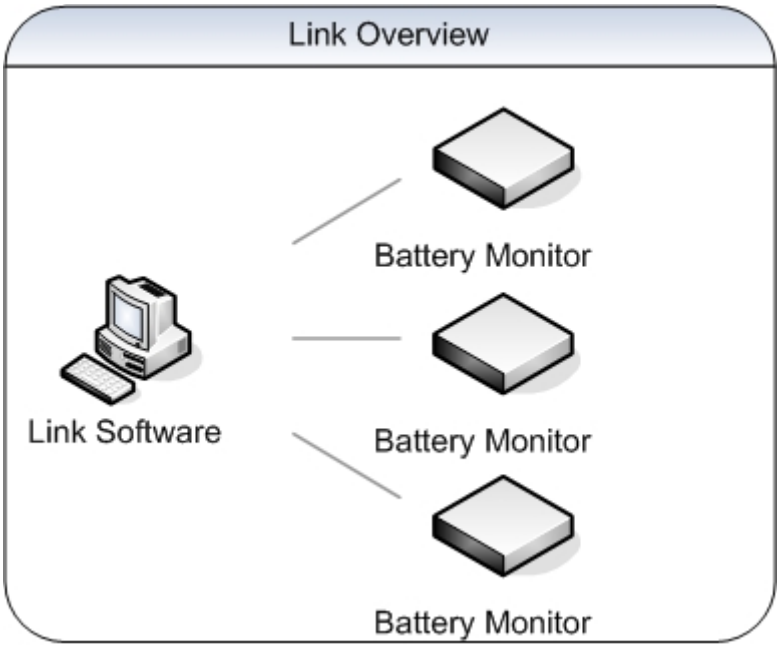


Figure 1 - Link overview

The LinkClient communicates with the LinkServer, to display events and execute user commands. LinkServer must be running for the LinkClient to operate. The LinkClient communicates with the LinkServer via TCP/IP. LinkServer software runs continuously in the background so closing the LinkClient does not stop the system.

LinkServer MUST be running for events to be received and stored. Failure to have LinkServer running will compromise the functionality of the PowerShield Battery Monitoring, and thus compromise the reliability of your power backup systems.

There are two editions of Link:

- Desktop Edition
- Server Edition

The Desktop Edition runs both LinkServer and LinkClient on a single computer. The Desktop Edition LinkServer only accepts LinkClients that are located on the same computer.

Figure 2 below shows a Desktop Edition scenario.

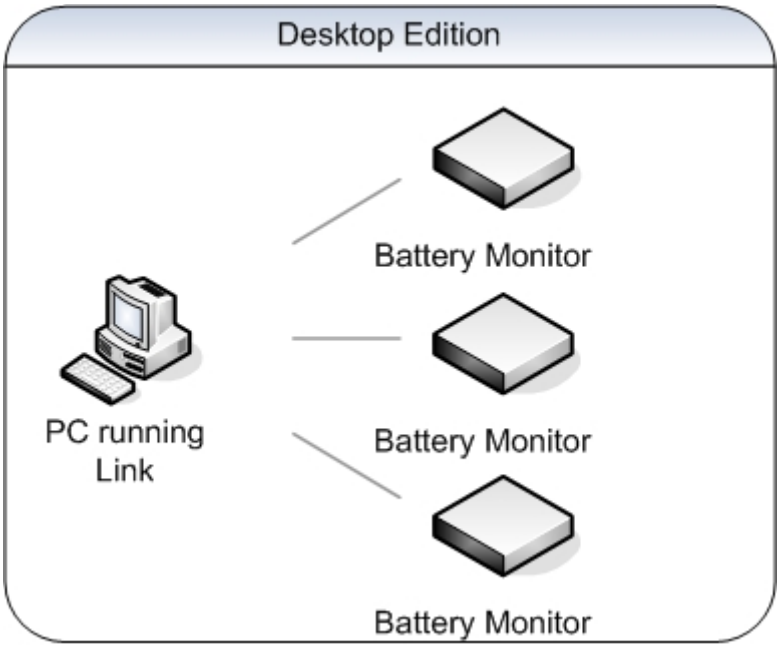


Figure 2 - Link Desktop Edition

The Server Edition is required when multiple people in an organisation need to view the system from more than one location. The Server Edition has the same functionality as the Desktop Edition but it gives the additional capability of servicing multiple LinkClients on different computers. This allows for multiple people analysing or view battery information simultaneously from different locations. For example a company with several facilities can run LinkServer on a central server, but still allow local staff to access the battery information for their facility as well as all of the other sites being monitored by Link.

The computer running LinkServer may be a Desktop computer or a Server computer depending on the number of LinkClients and Powershield Battery Monitors managed. Please contact PowerShield Ltd. if you are unsure about your system configuration.

Figure 3 below shows 2 Server Edition scenarios.

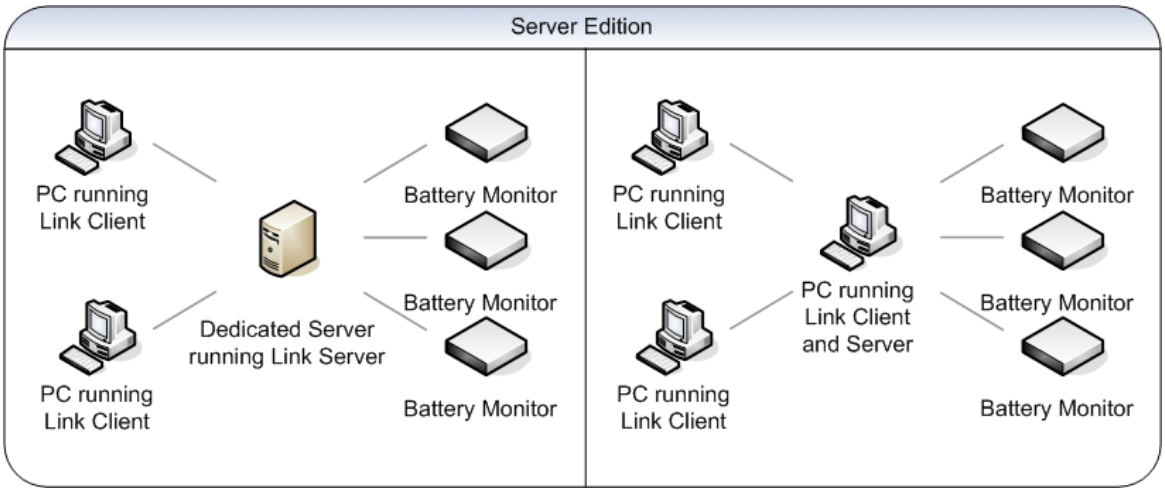


Figure 3 - Link Server Edition options

For more information on PowerShield Battery Monitors, go to the PowerShield Website.

Link software is compatible with the B1000 and Sentinel battery monitors.

1.2 Minimum PC Requirements

Before installing please check that the computer meets the minimum PC hardware requirements to run the Link software.

Windows 2000 Professional or Server Edition
Pentium II, 233MHz
128MB RAM
30MB of Hard disk space

Windows XP Professional
Pentium III, 400MHz
256MB RAM
30MB of Hard disk space

1.3 Installation

There are 2 parts to installing Link.

Step 1
Install the LinkServer by running the *LinkServer Setup.exe* from the PowerShield CD and follow the on screen instructions
Click yes when asked to reboot the computer

Step 2
Install the LinkClient by running the *LinkClient Setup.exe* from the PowerShield CD and follow the on screen instructions

Link is now installed on the computer and ready for use.

To run Link, use the Windows Start menu as show below Start > All Programs > PowerShield > Link

1.4 Logging in the first time

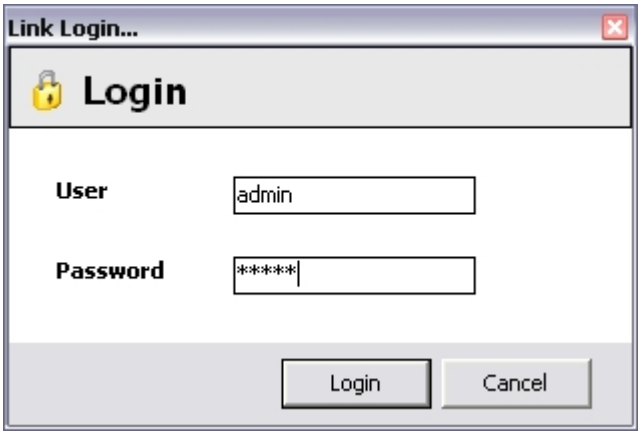
Access to the LinkServer is controlled by user accounts with passwords. This limits access for unauthorised people, and ensures appropriate records are kept when logged events are dealt with. User accounts and passwords are created by a user with Administrator Access in the User Configuration menu.

The Help Menu is always available, even when not logged in.

Login

Once LinkClient is opened, you will see a blank form with a menu bar at the top. To progress further you must log in.

To log in, select the *Login* item from the *Connect* menu.



Enter a valid Username and Password. The default login for the system after installation is:

User name: **admin**

Password: **ADMIN**

Enter the above and click *Login*

You now have full access to Link. It is recommended that the first step in configuring Link is to change the default administrator password and configure the user accounts. Note: Passwords are case sensitive. When a new user is added the password defaults to the new user name in capital letters.

At the end of your session, log off to ensure security.

Product Key

After installation, the product key has to be entered to enable the system. The product key is located on the CD or in the documentation supplied with the battery monitor. Enter the key and click *OK*. The details of the key will appear below and click *Accept* to login.

Logging Off

At the end of your session, log off by selecting *Log Off* from the *Connect* menu.

For more details on logging in, logging out and Activation go to Logging in 10 section.

1.5 Overview

This section is a brief overview for getting you started with Link. For more details on any of the functions, please refer to the User Guide section.

Once you have logged in, one or more battery monitors have to be added so Link can start managing them and the battery data.
To add sites, please refer to the Site Management 61 topic under the User Guide 9 section.

Now that Link has one or more sites the following features can be used:

Alarm Status

For alarm status of all connected battery monitors, go to the Link menu and select View  Alarm Status.

For more details refer to Alarm Status 19.

Real-Time Battery Information

For Real-Time battery information go to the Link menu and select View  Real-Time.
This screen has several displays that allow you to view the string measurements, monoblock measurements, alarm status of battery monitor and test control facility.

For more details refer to Real-Time 26.

Memory Download Status

The Memory Download Status screen allows you to view the current memory download activity. Link automatically manages the data retrieval from the battery monitors.

For more details refer to Memory Download Status 60.

To view the History for a site or Report on a site, Link needs to have collected data. When Link is first installed the database will be empty and therefore there is no information to view or report on.
To force Link to collect some data now, go to the Memory Download Status page and click on Select Site or All Sites to activate the data retrieval. Depending on the communication link, number of sites and configuration of the sites this may take minutes to hours. It is recommended that single sites are forced until the user is familiar with the time involved.

History

The battery History screen is for viewing the stored data from the battery monitors. The data can be grouped into two types which are Event data and Trend data. Event data is captured during a charge or discharge of the battery. Trend data is a summary for a period, usually where a single point represents one day. The Trend data is used for analysis of the battery under float.

To view Event data do the following:
1. Select a site in the toolbar drop-down list
2. Select a measurement type in the tree
3. Select Event tab
4. Select a date
5. Click Add button and data will appear on the top right chart

To view Trend data do the following:
1. Select a site in the toolbar drop-down list
2. Select a measurement type in the tree
3. Select Trend tab
4. Click Refresh button
5. Click Add button and data will appear on the bottom right chart

For more details refer to Battery History 32.

Reports

Link has several reports which are generated from the battery data it has downloaded from the battery monitor(s).
To generate a report do the following:
1. Select a site in the toolbar
2. Select a report type
3. Set the report options
4. Click generate in the toolbar
5. Wait for the report to be generated
6. Adobe Acrobat reader will automatically load with the generated report

For more details refer to Reports 39.

Communication Status

The Communication Status screen provide the status of the communication link(s) to the battery monitor(s).

For more details refer to Communication Status 58.

1.6 Security

Please make sure you modify the ADMIN user password of Link for the security features to be effective.

To change the password please refer to the User management 68 topic under the User Guide section.

2 User Guide

The following sections provide details for the most commonly used features of the Link software.

The following symbols are used for common actions:

Symbol	Function
	Add
	Delete
	Edit
	Save
	Cancel

2.1 Logging In

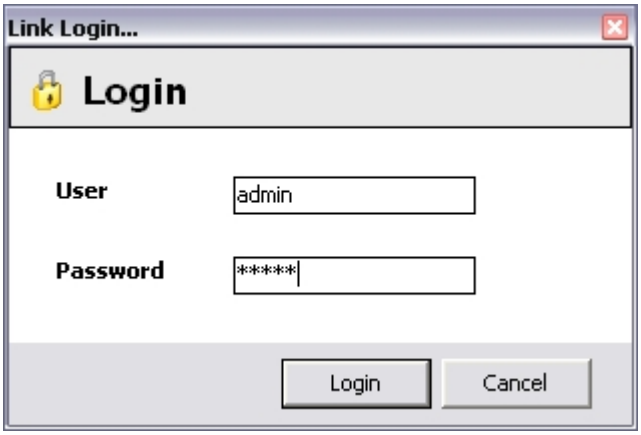
The Link software has two main components, the LinkClient and the LinkServer. For more details go to Link Components 79.
To use the Link software, the LinkClient has to connect to the LinkServer. This is done by logging in with a user name and a password.

The connect to LinkServer procedure changes depending on the license state of the Link software. The 3 states of Link are:
1. No product key - Enter user name and password and enter product key to use Link
2. Valid Product key entered - Enter user name and password and then the Activation dialog will appear after each login, either enter Activation key or click *Cancel* to proceed
3. Valid Activation key entered - Enter user name and password, no Product Key or Activation dialog will appear.

Login

Once LinkClient is opened, you will see a blank form with a menu bar at the top. To progress further you must login.

To log in, select the *Login* menu item from the *Connect* menu or press CTRL-L .



Enter a valid User name and Password. The default login for the system after installation is:
User name: **admin**
Password: **ADMIN**
Enter the above and click *Login*

Depending on the license state of Link (see above), you can enter the relevant key, or start using Link. It is recommended that the first step in configuring Link is to change the default administrator password and configure the user accounts. Note: Passwords are case sensitive. When a new user is added the password defaults to the new user name in capital letters.

If you are unable to login go to section Login problems 12.

Product Key Dialog

After installation, the Product Key must be entered to enable the system. The Product Key is located on the CD or in the documentation supplied with the battery monitor. Enter the Key and click *Accept,* and then *OK*. The details of the key will appear below and click *Accept* to login.

Logging Off

At the end of your session, log off by selecting *Log Off* from the *Connect* menu.

Note this does not stop LinkServer.

Activating Link

Go to section Link Program Activation 15

Login Failed

If you are unable to login go to section Login problems 12.

2.1.1 Login problems

When LinkClient displayed the *Warning Login Failed* message as below, you cannot connect to the LinkServer.

Reasons for an unsuccessful login:

1. Unknown user name
2. Incorrect password
3. LinkServer is not running
4. License has expired

Unknown user name

Solution is to login as Admin and check the list of existing user names in the User Management 68 screen.

Wrong Password

Solution 1 - Log in again.

Solution 2 - If you have lost your password, the Link Administrator needs to create a new user account.

LinkServer is not running

Check if the LinkServer programs are running by viewing the LinkServer Program Controller 96 program.
If the LinkServer programs are not running, then start all of them. If they are unable to start contact Link support.

License has expired

Obtain an Activation code from PowerShield and add the code into the PsMonitorServer.ini 103 file section [LICENSE] parameter CODE.

2.2 Link Program Activation

Link will run for 30 days after installation. Within this 30 day period, you need to Activate the software to allow continued use after the 30 days. Activation is done by sending a registration file - generated by Link - to PowerShield Ltd. PowerShield will then supply an Activation code. Note the Activation code is different from the Product key.

The Link software is licensed software, and the license specifies both the number of battery monitor connections and the edition. For details of the edition types go to the Introduction section 1.
The Link software Activation is permanent and only needs to be performed once. However, there are a few additional scenarios where a new Activation code needs to be obtained from PowerShield. These are:

1. When adding battery monitors above the license limit
2. When moving the LinkServer software to another computer
3. When changing from Desktop to Server edition

2.2.1 Obtaining an Activation key

Link will run for 30 days from installation. Within the 30 day period you need to Activate the software by going through the following procedure:

Step 1
Login into Link.

Step 2
Select *Register Link* from *Help* menu.

Step 3
Register Link screen will appear as below

Enter the details in the *Company Information* and *Company Representative*

Step 4
Click the *Create Reg File* button and the *Save* dialog will appear, select a folder to save the Link Registration file *LinkLicenseApplication.lic* to disk.

Step 5
Email the *LinkLicenseApplication.lic* file to registration@powershield.co.nz.

2.2.2 Activating Link

To activate Link you need an Activation code.

Their are 2 ways to enter the Activation code which are
1. During the login process
2. In the Register Link screen

Activation via Login

To enter the Activation code during the login process do the following:

Step 1

Logout if you are currently logged in

Step2

Login by selecting the *Login* menu item from the *Connect* menu and enter a user name and password.

Step 3

The Software Activation dialog will appear

Step 4

Enter the Activation code and click on *Accept,* and then *OK*

Link is now permanently activated.

Activation via Register Link Screen

To enter the Activation code in the Register Link screen do the following:

Step 1

Login into Link.

Step 2

Select *Register Link* from *Help* menu.

Step 3

Register Link screen will appear as below

Step 4

Click on *Activate Link* button and enter the Activation code in the Activation dialog as shown below.

Step 5

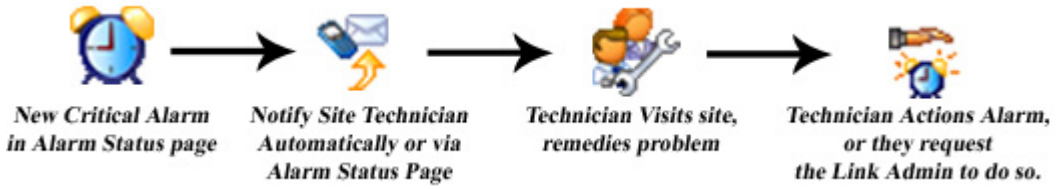
Click on *Accept* and then click *OK*

Link is now permanently Activated.

2.3 Alarm status

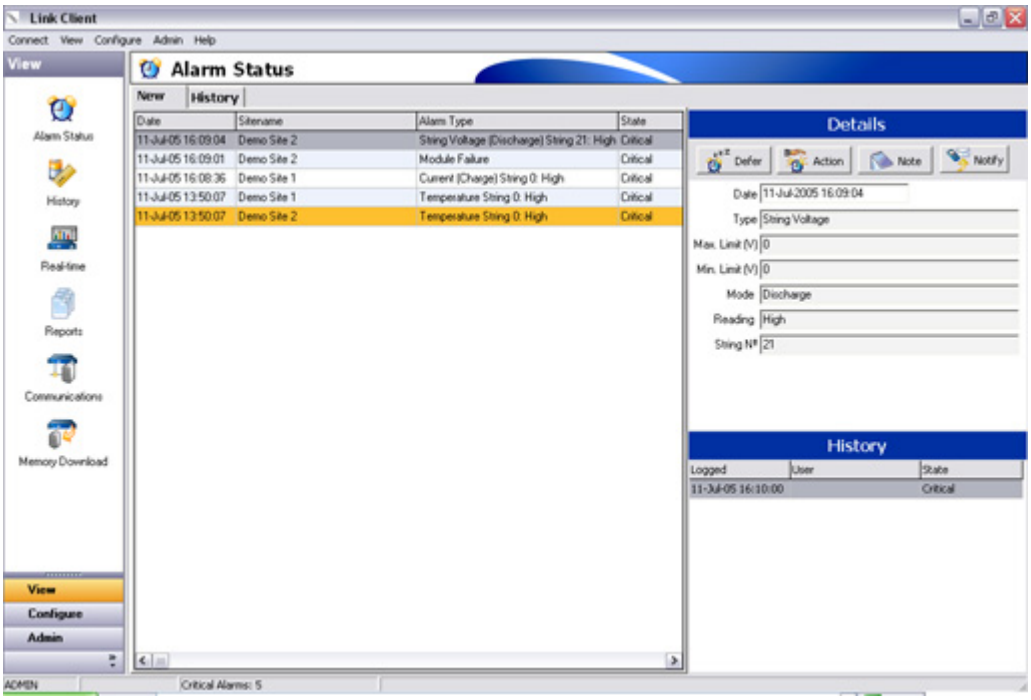
The Alarm Status page allows you to view and manage all alarms and events logged by Link. Link receives and stores alarms and events from all communicating PowerShield Battery Monitor sites.

The following diagram shows an example of how you might use Link to manage alarms:



The Alarm Status page is split into two tabs:

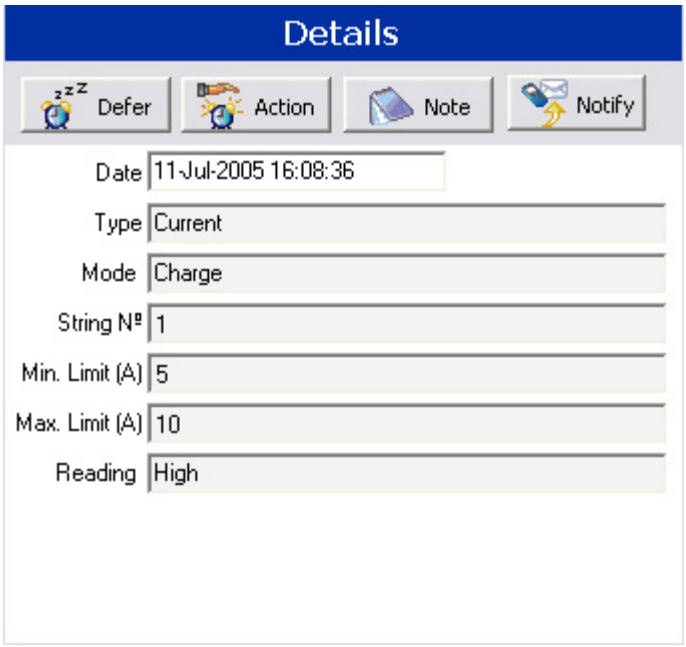
- New 21, this displays the current outstanding alarms.
- History 24, this displays all alarms that have occurred during the specified time period.



The Alarms page includes non-alarm events, such as string mode changes. Whilst not actually alarms, these events are considered worthy of user notification.

2.3.1 Alarm Details

The Alarm Details area, to the top right of the page, shows the details for the currently selected alarm. All of the relevant information for each alarm is shown. The information shown varies with the type of the alarm.

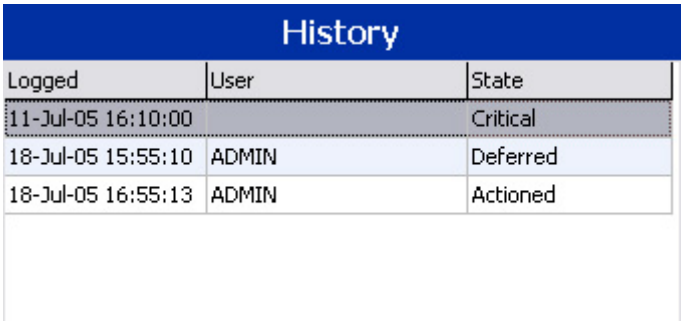


Note: This data shown cannot be edited and is as reported by the PowerShield site.

Note the difference in time stamp for an alarm -
Alarm Details 20 shows the time the alarm was triggered at the PowerShield site,
Alarm History 21 shows the time the alarm was received and stored in Link's database.

2.3.2 Alarm History

The Alarm History area, to the bottom right of the page, shows the history for the currently selected alarm. Listed are all of the events that have occurred in relation to that particular alarm.



This gives a record of who dealt with each alarm, when it was done, and the relevant state changes. Dates shown here are as logged by Link. Details for the alarm are available in the Alarm Details area above.

Additional information may be kept as notes 25 if required.

2.3.3 New Alarms

The New tab displays all events logged by Link that have not yet been actioned. These alarms are listed with date, sitename, alarm type and alarm state information.

The time and date shown refers to the time and date the alarm was triggered at the PowerShield site.

The sitename and alarm type are taken directly from the PowerShield site.

An alarm can be in three possible states: Critical, Deferred and Actioned. Once an alarm has been actioned it will not appear in the New Tab 21, only the History Tab 24.

When alarms are first received by Link, they are displayed as Critical. The user can either *Defer* it for later action, *Action* it immediately, or leave it as Critical. The user is also able to *Notify* other users of the alarm or add a *Note* to the alarm for future reference.

After selecting an alarm you are able to click one of the following buttons:

 - Deferring an Alarm 22

 - Actioning an Alarm 22

 - Adding a Note to an Alarm 25

 - Notifying an Alarm 22

2.3.3.1 Actioning an Alarm

When alarms are first received by Link, they are displayed as Critical. When a user has seen the alarm they may either Defer it for later action, Action it immediately, or leave it as Critical.

Selecting an Alarm and clicking the Action button  ,will Action the alarm and move it from the New Tab 21 window to the History Tab 24 window..

 Actioning the alarm indicates to the Link system that you have followed the procedure your company has defined for each alarm. Depending on the severity of the alarm, this may include alerting site personnel, service people, or operations dependent on the backup power supply being monitored.

When actioned, alarms are no longer displayed in the New Tab 21, but they may be viewed in the History Tab 24. Actioning alarms therefore keeps the new alarms display clear so that new alarms are easily seen. Link will record the user and time when alarms were actioned. This information is available in the Alarm History 24 area.

Failure to implement and execute appropriate systems for dealing with alarms, will compromise the functionality of the PowerShield Battery Monitoring system, and thus compromise the reliability of your power backup systems.

2.3.3.2 Deferring an Alarm

Selecting an Alarm and clicking the Defer button  will defer an alarm for later actioning.

Only Critical alarms can be deferred.

Alarms can only be deferred in the New Tab 21.

In the New Tab 21, Deferred alarms are listed below Critical alarms in the alarm list. You may want to defer a non-urgent alarm for example, while more urgent issues are resolved.

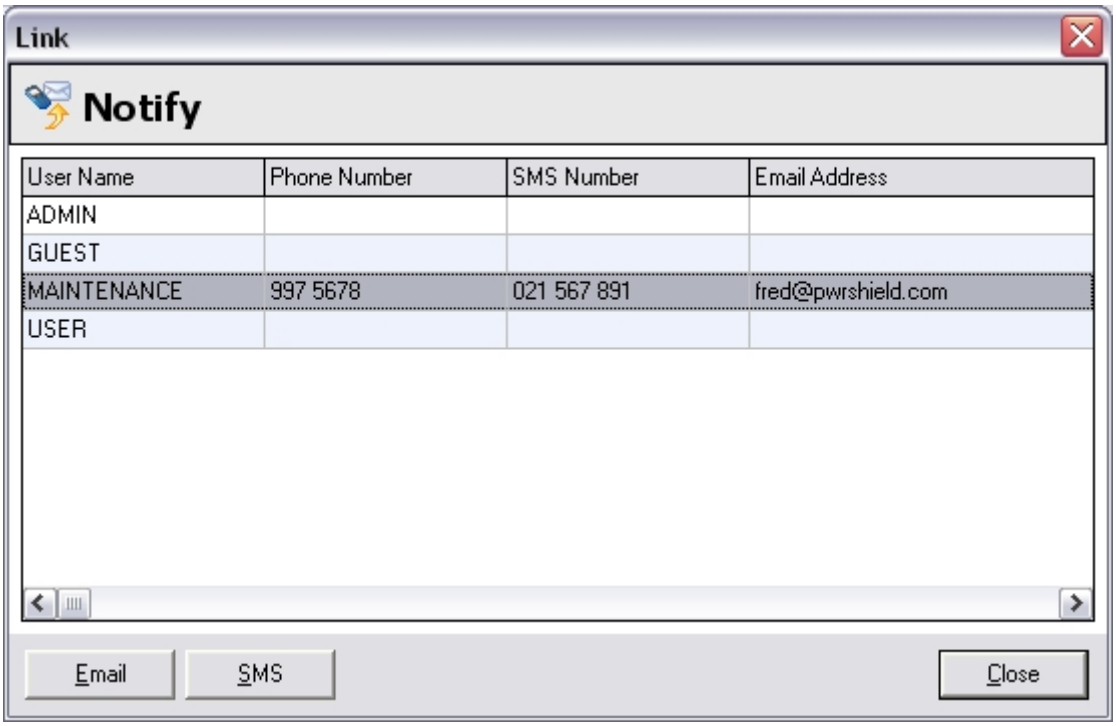
Link will record the user and time when alarms were deferred. This information is available in the Alarm History 21 area.

2.3.3.3 Notifying an Alarm

Link has 2 ways of notifying alarms. They can be manually notified via the Notify dialog, and automatically notified when the alarm occurs based on a users account settings.

Notify Alarm via Notify Dialog

To send detailed information on a particular alarm to personnel via Email or SMS (text message to a mobile phone), select the alarm and then click on the Notify button  . You will be presented with a window that allows you to select the user to send the message to and the type of message (Email or SMS).



Multiple methods can be used for the same alarm, for example you can send an SMS to a service person's mobile phone, then send an email to his desk as confirmation.

Multiple people may be informed of the same alarm, for example you may alert a mobile service person, and also the site relying on the power supply.

Automatic Alarm Notification

To have emails or SMS messages send automatically by Link one or more user accounts have to be configured to do so.
For email notification the user account requires a valid email address and the *Send Email* property ticked.
For SMS notification the user account requires a valid mobile phone number and the Send SMS property ticked.
For details on user account settings go to User Management 68 section.

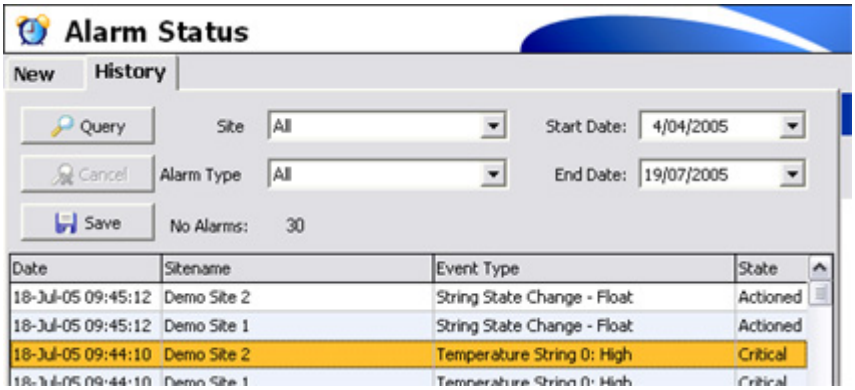
For Link to be able to send Email or SMS notification the Email Dispatcher and the Monitor Server must have a valid configuration. Go to Server Settings 98 for details.

2.3.4 History

The History tab displays all alarms logged by Link and allows filtering the alarms. The alarms are listed with date, sitename, alarm type and alarm state information.

The time and date displayed refers to the time and date the alarm was triggered at the PowerShield site.

The sitename and alarm type displayed are taken directly from the PowerShield site.



To display the alarms select the parameters you wish to filter on and then click on the Query button (see Querying Alarms) 24.

You can save the list of alarms displayed to a text file by clicking on the Save button (see Exporting Alarms) 25.

2.3.4.1 Querying Alarms

The History Tab 24 allows you to view all of the alarms that Link has logged. By default the filter will be set to display all alarms that have occurred in the last week.

You are able to filter for alarms based on the following parameters:

- **Site** - This can be set to a particular site, or 'All' for all of the sites in your system.
- **Alarm Type** - This can be set to a specific Alarm Type 76, or 'All' for all alarm types.
- **Start Date** - Calendar date for the start of the period you wish to display.
- **End Date** - Calendar date for the end of the period you wish to display.

Once you have configured the Filter simply click the Query button to display all alarms that meet the set criteria.

Link will then display the filtered list of alarms. If a large number of alarms are found and you wish to narrow your search, click the Cancel Query button at anytime to halt the search and display what

it has found so far.

Alarms are sorted by time, with the most recent at the top.

2.3.4.2 Exporting Alarms

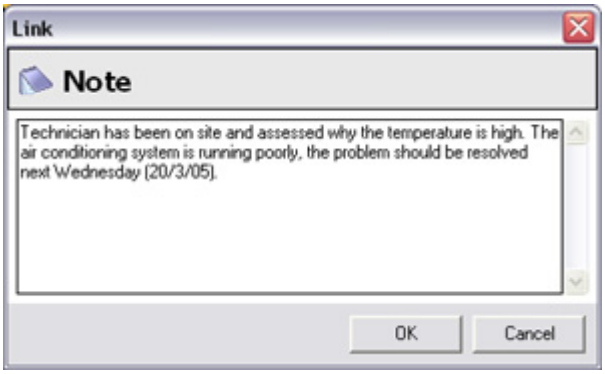
The filtered alarm information displayed in the alarm history window can be exported to another application by clicking on the Save button  .

A standard Save As dialog appears. The default filename is "Link Alarms.txt", but you may type in any filename.

Click the Save button to save the alarm information as a *.txt file. The text file is formatted in CSV format and can be imported by CSV aware applications such as Microsoft Excel or any text capable application.

2.3.5 Adding a Note to an Alarm

Notes allow you to attach information to any alarm. For example, say an alarm occurs and upon investigation it is traced to faulty HVAC equipment on site. A note can be attached to the alarm, recording details of fault and that appropriate maintenance staff have been contacted. This allows others who use the system to know what has been done about the alarm (you would probably also want to defer 22 the alarm in this example to push it to the bottom of the list).
To add a note, select an Alarm in either the New Tab 21 or the History Tab 24 and then click on the Note button  . Type in your note and click on OK to save it. You can also add a note by double clicking on the Alarm.



Notes may be added to any alarm. An alarm that has a note attached will be highlighted orange.

Notes may be added to any alarm at either the New Tab 21 or the History Tab 24.

2.4 Real-time Screens

The *Real-time* page allows you to view the status of individual PowerShield Sites, with Link taking measurements from the monitor in real-time.

Select the Site you wish to view live data from. Once you have selected a site, the Real-time screens will become active.

In all the real-time screens the data is updated from the battery monitor every few seconds. You can pause the display updating by clicking on the Pause button  , and you can resume the display updating by clicking on the Play button  .
The following screens are available:

Overview 27 **-** Shows all measured parameters on a per string basis for the selected site - String Voltage, String Current, Monoblock Variation, and String Temperature.

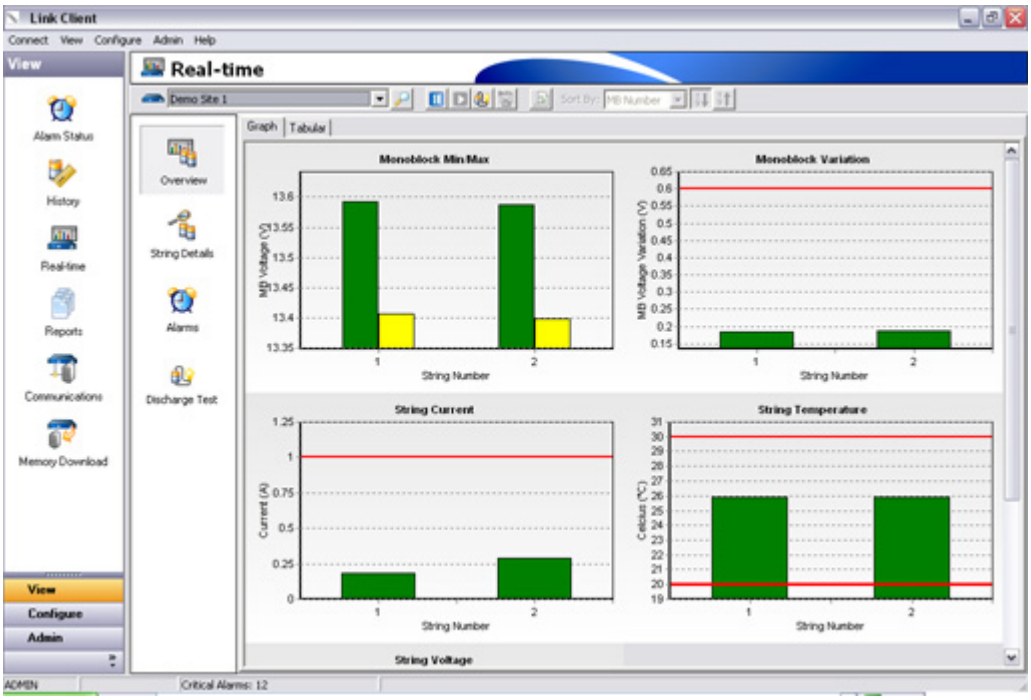
String Details 28 **-** Shows all individual monoblock voltages for the selected string. Also total string measurements, and associated data.

Alarms 29 **-** Shows all alarms and input states on the battery monitor, at the selected site.

Discharge Test 29 **-** Control and monitor remote discharge tests, at the selected site.

2.4.1 Overview Screen

The *Overview* screen displays all measured parameters on a per string basis, for all of the strings at the selected PowerShield site. You are able to view the String Voltage, String Current, Temperature, Min/Max Monoblock and Monoblock Variation for each string.
Select the *Graph* tab to view graphs of the data, and select the *Table* tab to view the data in a table.



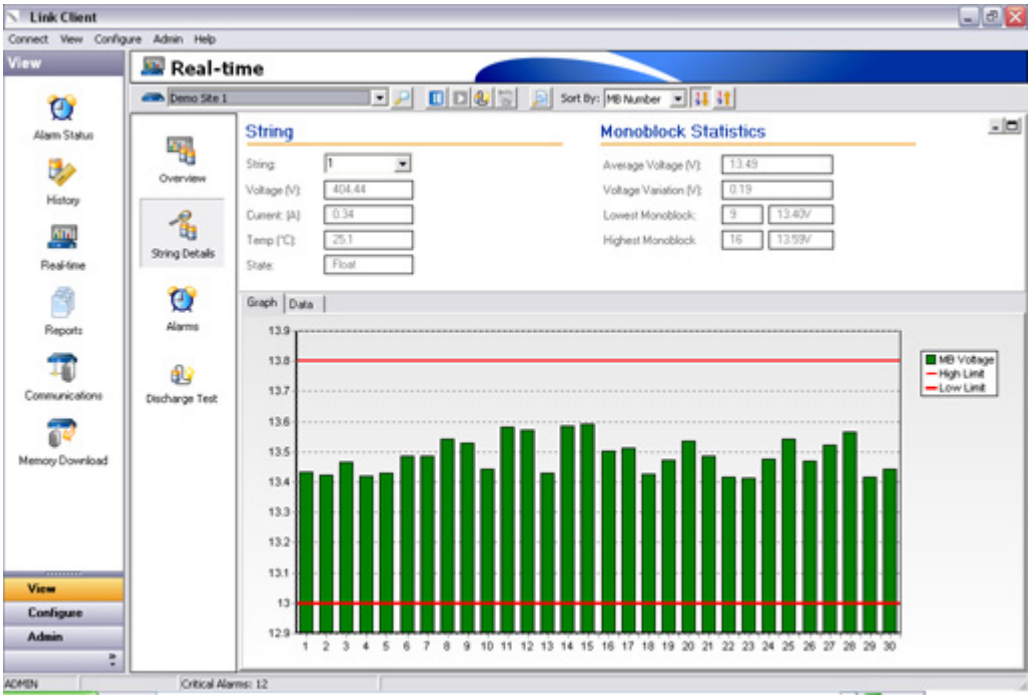
2.4.2 String Details Screen

The *String Details* screen displays site data to an individual monoblock voltage level, for each String on the battery monitor.
Use the dropdown box to select the string number that you wish to view.
String voltage, string current, string temperature and string status are all displayed in the top left of the String Details screen.
Some summary monoblock statistics (average monoblock voltage, monoblock voltage variation, lowest monoblock voltage and highest monoblock voltage) are shown at the top right of the String Details screen.

The lower part of the display has either a graph or a table showing the voltage of each monoblock in the selected string.

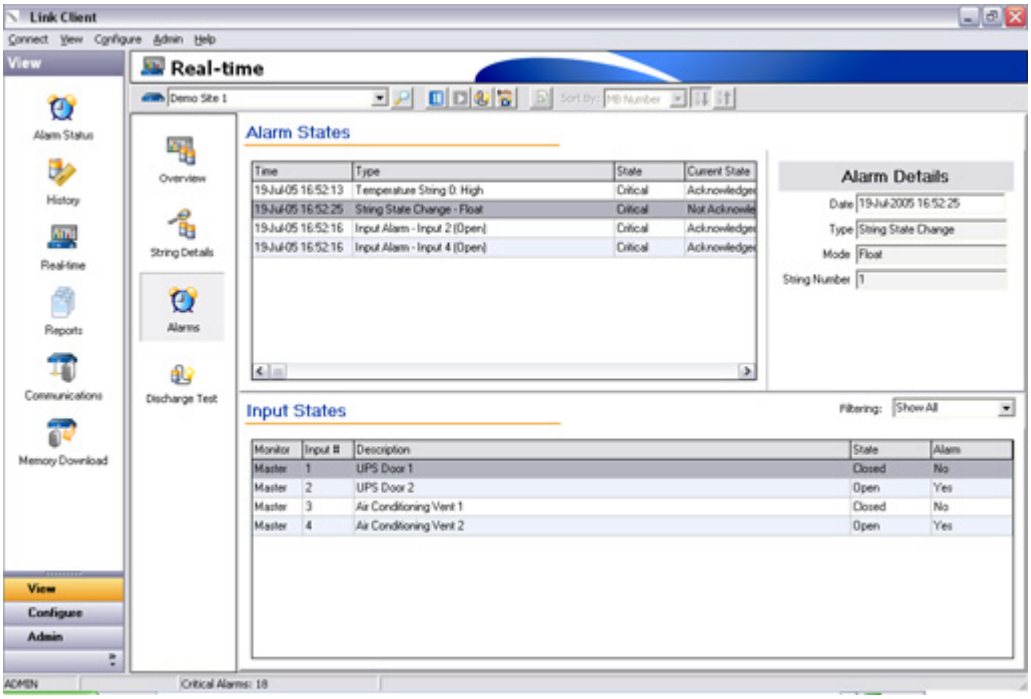
The graph or table is normally sorted by monoblock number. To sort the graph or table by monoblock voltage select Voltage from the "Sort by:" combo box. Click on  to sort the graph or table in ascending order (i.e. lowest to highest) and click on  to sort the graph or table in descending order.

To create a String Status report of this screen click on the preview button  for more details go to String Detail Report 57 section.



2.4.3 Alarms Screen

The *Alarms* screen allows you to view all present alarms and input states from the individual PowerShield site that you have selected. This information is read live, directly from the battery monitor, whereas the Alarm Status Screen 29 shows alarms that have been received and saved in the Link database.



The *Current State* column displays whether Link has acknowledged the alarm or not.

The Input States section shows the description and current state of all the contact inputs on the battery monitor. The Alarm column shows whether the input is currently indicating an alarm condition.

All the alarms on the battery monitored can be cleared, bypassing the normal "Action" process (see Actioning an Alarm) 22, by clicking on the clear alarms button . This should only be used when commissioning or trying to solve problems - in normal use the alarms will be acknowledged and cleared individually when received by Link and then actioned.

2.4.4 Discharge Test Screen

The *Discharge Test* screen allows you to monitor and control remote discharge tests. The PowerShield battery monitor can start a remote discharge test by switching an output relay that controls the charger or UPS, or switches the batteries between the charger and a load. The test runs until a time limit, voltage limit or current limit has been reached.

The discharge test control functionality can be used only when the battery monitor has control over the charger to the battery, and requires additional hardware. In most configurations the battery monitor has no control and is purely passive so this function cannot be used. Contact PowerShield to check your configuration if you are not sure.

To start a remote discharge test you must ensure that valid Discharge Test Limits 31 have been configured in the battery monitor for the type of test you wish to run (Automated or Supervised). Once a test is started, the Discharge Test Control Panel 31 will appear at the bottom of the screen. This panel is viewable from any of the four pages in the Real-Time 26 section, and can be hidden or shown by clicking the  button. This allows you, for example, to monitor site variables such as monoblock voltages on the String Details Screen 28, while a discharge test is running.

There are two modes of operation:

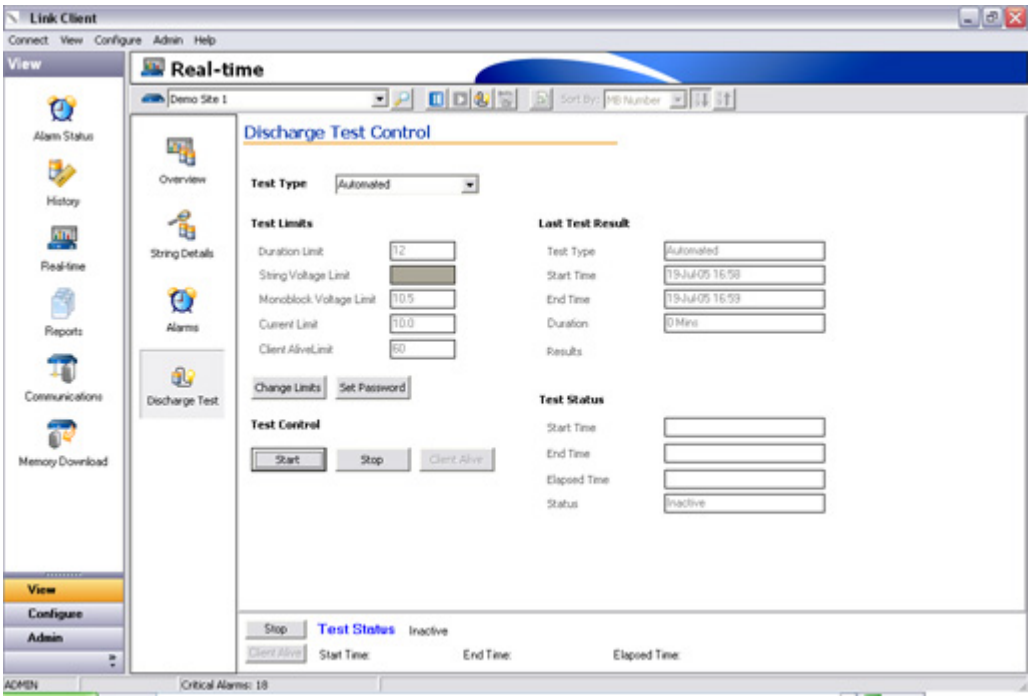
- **Automated Test**

An Automated Test will stop immediately when a battery alarm occurs on the PowerShield battery monitor or when one of the test limits 31 is reached. Automated Tests will not start if there are any battery alarms on the battery monitor. Automated Tests may be run regularly on a time Schedule 73.

- **Supervised Test**

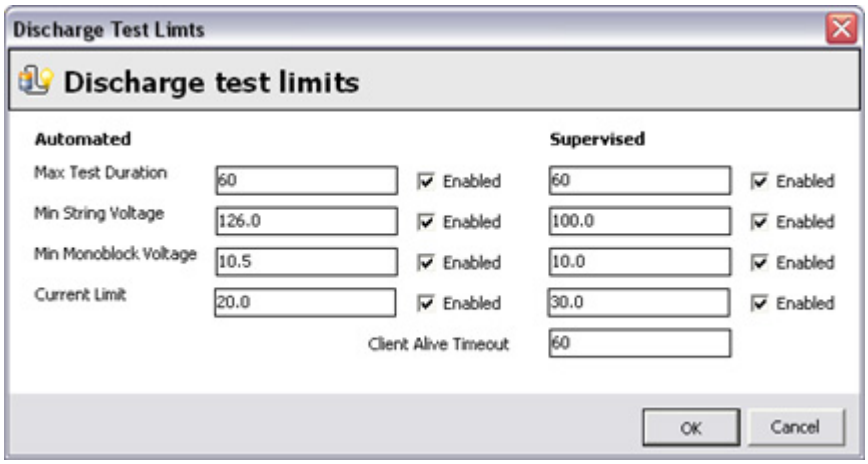
A Supervised Test will stop when one of the test limits 31 is reached or the "dead man" timer has expired. To ensure that the operator keeps monitoring the discharge test the battery monitor runs a "dead man" timer that must be regularly reset to keep the discharge test running. To keep the discharge test running, the operator must click on the "Client Alive" button regularly (before the dead man timer expires).

See Discharge Test Limits 31 for detail on setting the limits for discharge tests and setting the Client Alive (dead man timer) period..



2.4.4.1 Discharge Test Limits

Discharge Test Limits are set to automatically stop a test if a limit is reached. At least one limit for the discharge test must be enabled for a test to run. The Automated Test Limits are used when a Discharge Test is started from the Schedule 73.

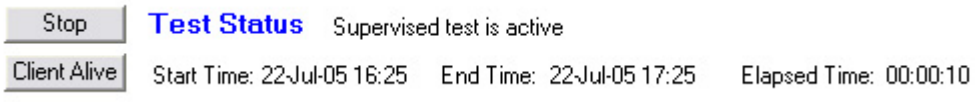


To alter the Discharge Test limits click on the 'Edit Limits' button. To change a limit, it must first be enabled. To enable a limit tick the appropriate box.

- The Maximum Test Duration limit must be less than 720 minutes (12 hours).
- The Minimum String Voltage must be less than 2621 Volts.
- The Minimum Monoblock Voltage must me less than 15 Volts.
- The Maximum String Current must be less than 6500 Amps.
- The Client Alive Timeout must be less than 900 seconds (15 Minutes).

2.4.4.2 Discharge Test Control Panel

The *Discharge Test Control* panel automatically appears at the bottom of the Real Time screens when you start a discharge test. It allows you to monitor the discharge tests while you are viewing the site in any of the Real Time screens and ensures that you have access to the "Client Alive" button while monitoring a supervised discharge test.



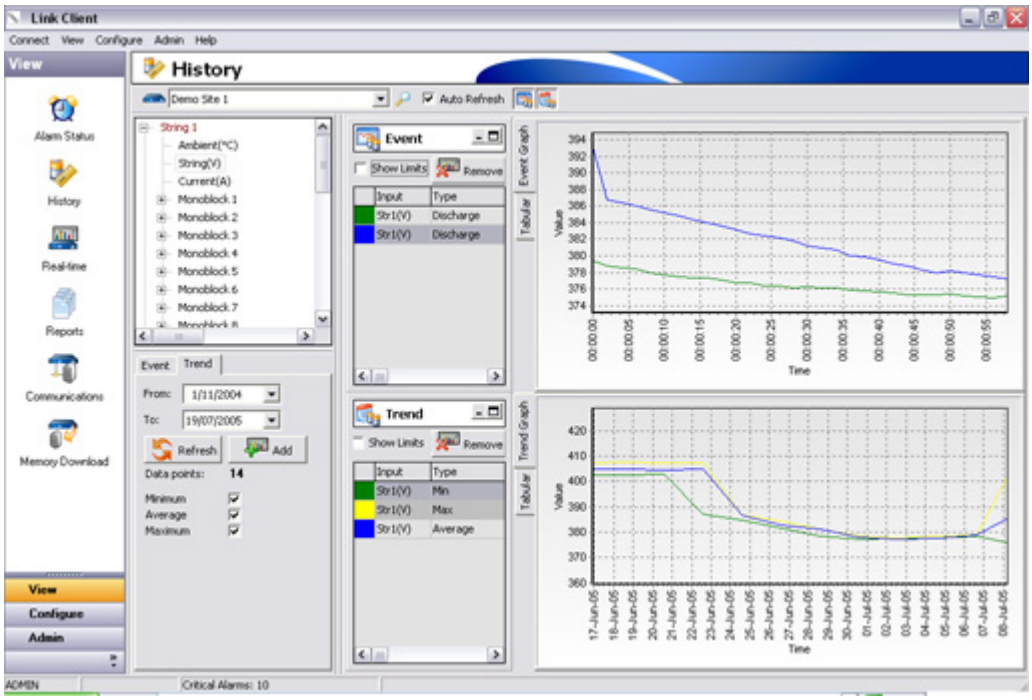
To show or hide the Discharge Test Control Panel click in the toolbar at the top of the Real Time 26 screens.

2.5 Battery history

This screen allows you to view all of the time based battery measurements stored by Link. At various times (or when various events occur) Link reads the history measurements from the battery monitors and saves the measurements in the database. (Note: The PowerShield *Config* utility refers to the history measurements as *Memories.)* The data is split into two separate groups, Event data and Trend data.

Event data – All measurements recorded during a Discharge or Charge Event.

Trend data – Long term measurements of all system readings.



This screen relies on data logged at your PowerShield sites. Each site must be configured correctly to record this information. Link automatically saves the event data in the database when a string changes state to Discharge or Charge. Link automatically saves the trend data in the database at regular intervals. Once the data is saved to the database, it is secure on the PC. It is then removed from the battery monitor at the site.

2.5.1 Display battery data

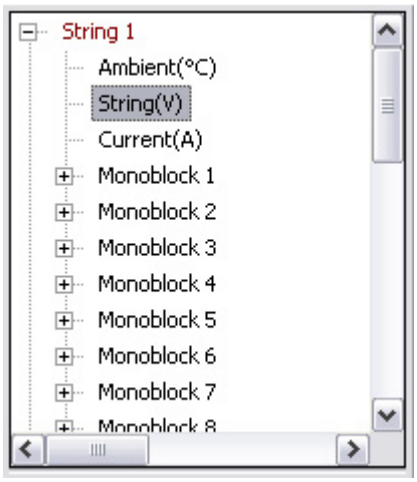
To display and view stored data, follow the steps below:

1. Select a Site

Select the Site you wish to display data from. Once you have selected a site the system tree below will update to reflect the configuration of the PowerShield Battery Monitor system you have selected.

2. Select the Data type to Display

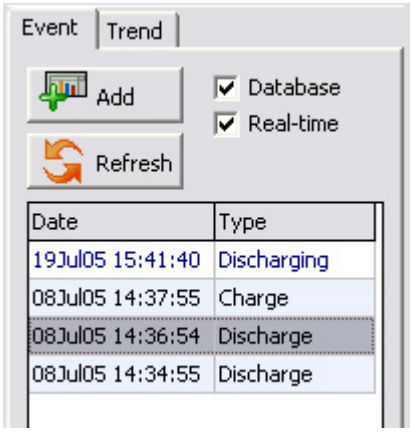
All the measured parameters for the system are grouped and displayed in a tree format, on a per string basis. Expand the system tree and select the type of data you wish to graph. In the example below we will be graphing the String voltage for String 1.



Once you have selected the type of data that you wish to graph you need to click either on the Event tab to select data associated with Discharge or Charge events, or on the Trend tab to select trended history data.

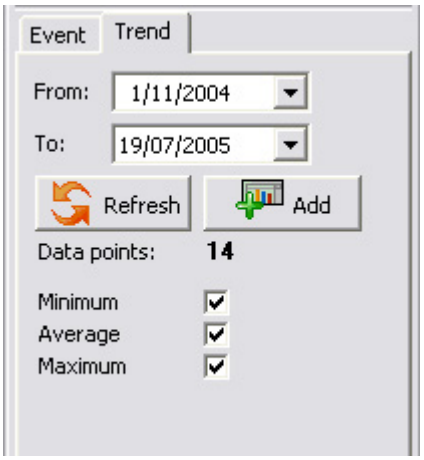
Event Data

Select the Event tab and then click on 'Refresh'. If the String you have selected is currently in discharge or charge and you wish to look at the data as it is recorded, select the 'Real-time' check box. Select the event you wish to graph and then click on 'Add'. The data will be graphed with time along the horizontal axis and values along the vertical axis.
Events that are still being actively logged on the PowerShield Battery Monitor will be highlighted and appear as "Discharging" (rather than "Discharge") and "Charging" (rather than "Charge"). When complete, they will be automatically downloaded by Link and added to the Link database.



Trend Data

Select the 'Trend' tab. Select the period you wish to graph and then click on 'Refresh'. In the example shown there are 14 data points. (Note that the sample rate is user defined using the *Config* utility. The default interval is one day, so 14 data points equals 14 days, but this may not always be the case). Click on "Add" to add the data to the graph. You can select whether minimum, average or maximum values for the period are graphed, by checking the "Minimum", "Average" or "Maximum" check boxes.



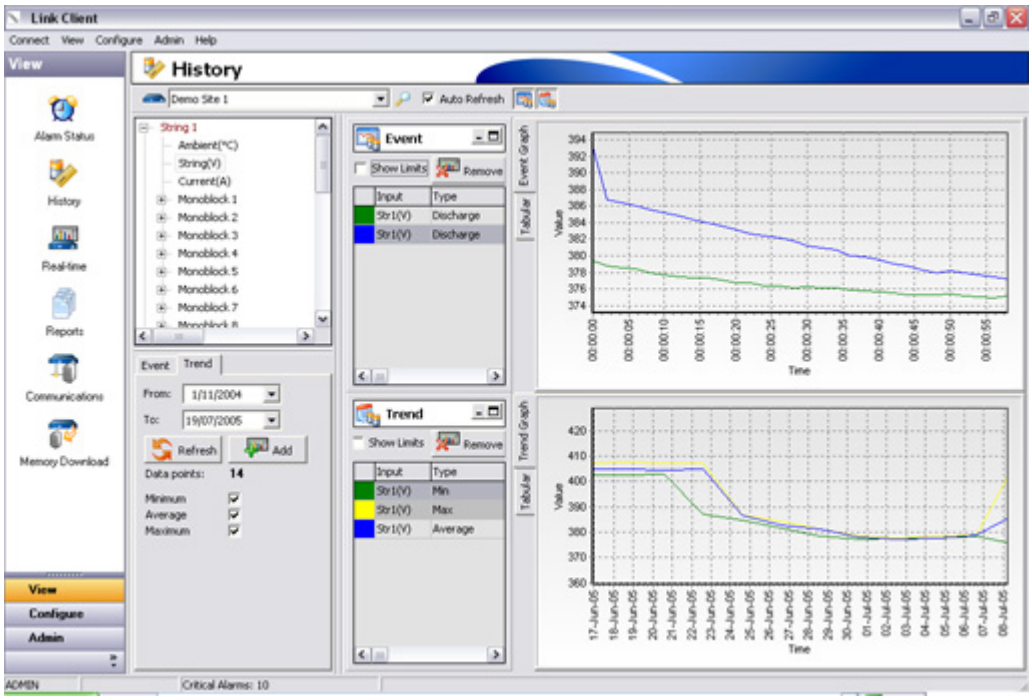
3. View data

The right side of the Battery History screen has two graphs. Event data is graphed in the top graph, and trend data is graphed in the bottom graph. A legend is displayed to the left of the graph to indicate the colour of each measurement that is graphed.

You can hide (or show when hidden) either of these graphs by clicking on the  (hide or show Event graph) and  (hide or show Trend graph) buttons.

You can hide the legend for either graph by clicking on the minimise button in the header of the legend window. To show the legend again click on the maximise button  in the header of the legend window.

The alarm limits (as configured in the battery monitor) can be drawn on the graph by ticking the "Show Limits" check box in the legend window.



When watching "real-time" data (graphing data from a discharge that is currently in progress) the graph is normally updated regularly. You can pause this updating of the graph by unticking the Auto Refresh check box at the top of the screen.

To change the colour of the series on the graph, follow the steps below:

1. Double click the data line in the legend

2. Select Colour in the dialog
The colour of the series is updated to the selected one.

2.5.2 Removing Data from the Graph

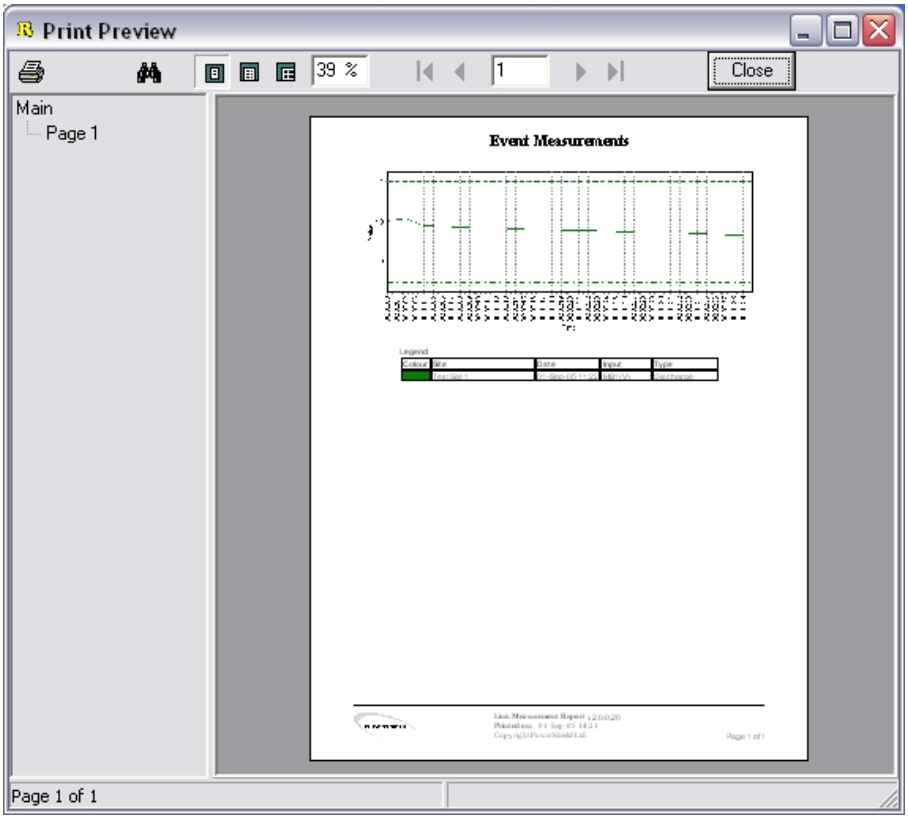
To remove data from the graph, select the measurement you wish to remove in the legend window, then click on the Remove button  .

2.5.3 Print battery data

Link allows you to print directly from graphs.
You may print either the event data or trend data graphs by following the steps below:

1. Add data to graph as described in Display Battery Data 33
2. Right mouse click on the graph.
3. Click Print...
4. A print preview window appears.
5. Click on the Print icon at the top left of the print preview window to print the file.

The printout shows both the graph and a table listing the data that has been graphed.



2.5.4 Export battery data

Link allows you to export data to text file directly from graphs.
You may export either the event data or trend data by following the steps below:

1. Right mouse click on the graph.
2. Click Save Data to File ...
3. A "Save ... data to file" window appears.
4. Select the folder to save the file to and enter a filename.
5. Click Save.

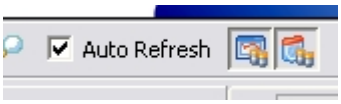
The data is saved to a text file in CSV format that can be read by any text editing program or program that accepts CSV format (such as Microsoft Excel). The file lists the description of each measurement, followed by the individual data points. For each data point the time and data of the point and the value of the point is given.

```
MB1(V) Discharge
1/09/2005 11:22:25 a.m., 13.04
1/09/2005 11:22:27 a.m., 13.08
1/09/2005 11:22:29 a.m., 12.90
1/09/2005 11:22:31 a.m., 12.89
MB2(V) Discharge
1/09/2005 11:22:25 a.m., 13.23
1/09/2005 11:22:27 a.m., 13.27
1/09/2005 11:22:29 a.m., 12.31
1/09/2005 11:22:31 a.m., 12.23
```

The default file name for the event data is "DischargeData.csv" and the default file name for the trend data is "FloatData.csv".

2.5.5 Display Real-time Event data

It is possible to use the History window to watch the progress of a discharge (or charge) as it is happening.
When selecting the data to be graphed make sure that the "Real-time" check box in the Event tab is checked. Data for events that are currently occurring at the Battery monitor will be highlighted and will appear as "Discharging" (rather than "Discharge") and "Charging" (rather than "Charge").
Select the event data that is marked as 'Discharging" and the event graph will dynamically display a time series graph of the discharge data. This graph is regularly updated every few seconds. You can pause the updating of the graph by unchecking the "Auto Refresh" check box.



2.6 Reports

The *Reports* page allows you generate reports on data collected by Link. There are several report types available, each with different options for generation.

Reports:

 Discharge Report 40 - Provides a detailed analysis of one discharge event for a chosen system.

 Test Summary Report 50 - Provides a summary of all discharge events for a chosen period.

 String History Report 52 - Provides a summary of battery performance for a single string, over a chosen period.

String Detail Report 57 - Provides a snapshot of the string measurements and its monoblocks from the String Details real-time screen.

Battery Measurement Report 37 - Provides a report based on the data selected in the charts of the Battery History screen 32.

To generate Discharge, Test Summary or String History report follow these steps:

- Select the report type by clicking the Report Type button at the left.
- For some reports you must then select the site you wish to report on.
- For some reports you must select the data (e.g. a discharge at a particular time) that you wish to report on.
- Select the report options.
- Click on "Generate the Report".
- The report will be generated on the Link Server.
- Once the report is generated, the Adobe PDF Reader will automatically run to show you the report.
- Previously generated reports can be viewed by selecting them in the Report Status window (see Managing Reports) 56.

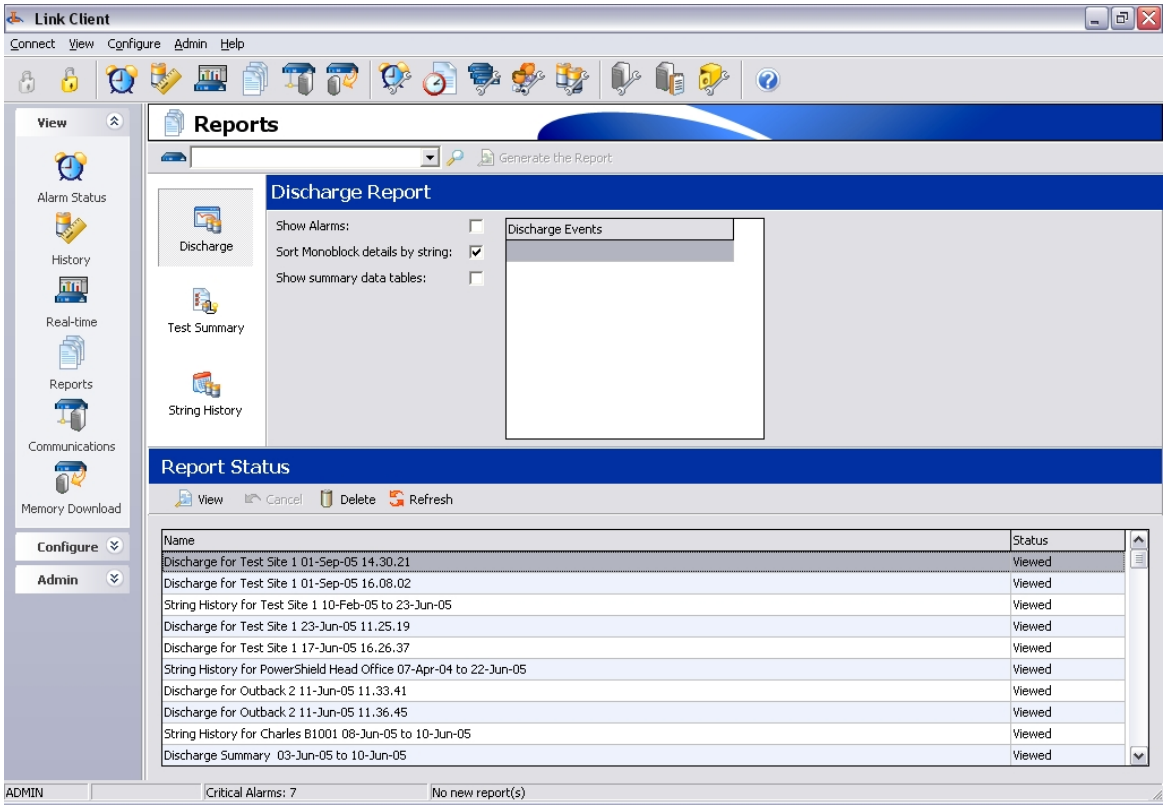
2.6.1 Discharge Report

The *Discharge* Report provides the information that is required to analyse a discharge and determine what (if any) problems there may be with the batteries on the site.

To generate a discharge report, click on the Discharge button  , then select the site for which you wish to generate a report. Once a site has been selected, the discharges for which data is available will be listed under "Discharge Events". For each discharge the time and date that the discharge started is listed. Select the discharge that you wish to report on, select the report options and click "Generate the Report". Once the report is generated, the Adobe PDF Reader will automatically run to show you the report.

The following report settings can be turned on and off for the discharge report:

- Show Alarms - If this option is selected a table listing any alarms that occurred during the discharge will be included in the report.
- Sort Monoblock data by string - If this option is selected the monoblock performance data is reported individually for each string and sorted by string number. If this option is not selected the monoblock performance data is reported for all strings together.
- Show summary data tables - If this option is selected then tables summarising the String Voltage, String Current and String Temperature are included in the summary section of the report.



The report starts with high-level summary information and provides greater detail in the later sections.

The Report is separated into the following sections:

- Title 41

2.6.1.1 Discharge Report - Title

- **Site:** The name of the site that this report refers to.
- **Date:** The date of the discharge being reported on, and the start and end time of the discharge.
- **Duration:** The duration of the discharge
- **Discharge Type:** There are Discharge types, *Power Outage* and *Controlled Test*. *Power Outage* is when a battery discharge occurs due to the loss of supply.

  Controlled Test is when the battery monitor has performed a controlled remote discharge test.

2.6.1.2 Discharge Report - Status

This section provides an overview of the status of the discharge.

Status:	Some Alarms
String Voltage at end of discharge:	49.9 V
Depth of Discharge:	27 %
Test Duration:	2 minutes
Estimated Time Remaining:	27 minutes
Estimated Capacity:	0.5 hours (7% of rated capacity)

- **Status** - Whether any alarms occurred during the discharge.
- **String Voltage at end of discharge** - The string voltage reached at the end of the discharge. The value displayed is taken from the first string for which discharge data is found (usually string 1) and is the last measured voltage before the current goes positive at the end of the discharge.
- **Depth of Discharge** - The percentage of the batteries full capacity that was discharged.
- **Estimated Capacity** - The estimated capacity of the battery, displayed as a time and a percentage. The time represents the estimated time that this site would run for, before the individual batteries reach the cut off voltage, at the same average current as this discharge, from fully charged. The percentage represents the same estimate, but as a percentage of rated capacity (i.e. as a percentage of what energy capacity the site had when all batteries were new and fully charged).

If any alarms occurred during the discharge and the "Show Alarms" option was selected, then a table listing the alarms is shown.

String	MB	Alarm	Value	Time	Limit
1	1	Monoblock Voltage High	13.57	19:00:25	13.50
1	2	Monoblock Voltage High	13.54	13:12:40	13.50
1	4	Monoblock Voltage High	13.52	01:37:10	13.50

For the capacity estimate to be meaningful, approximately 20% of the batteries rated capacity should be discharged. If the discharge has not discharged between 15 and 20% of the batteries rated capacity, then a message is displayed to warn that the estimate may not be valid.

A status of "Some Alarms" means that some values exceeded the limits during the discharge. Check the table of alarms to see what the problem was.

 A status of "No Alarms" means that no values exceeded the limits during the discharge. However, users should ensure that limits are set appropriately, and the batteries are being tested at suitable loads. If the limits are not set correctly no alarms will be detected. If the discharge is at a low current (relative to the total battery capacity) then a faulty string may not cause alarms because the good strings can easily supply the required energy.

2.6.1.3 Discharge Report - Configuration

This section lists the site configuration that is relevant to the discharge.

Configuration:

Number of Strings:	5
Strings:	1, 2, 3, 4, 5
Monoblocks per String:	4
Battery Type:	GNB - Marathon M12V70
Cut Off Voltage:	10.95V
Date of Installation:	25-May-03
Last Battery Replacements:	14-Apr-05 and 21-Dec-04

- **Number of Strings** - The number of strings on this site.
- **Strings** - Lists the strings on this site.
- **Monoblocks per String** - The number of monoblocks per string on this site.
- **Battery Type** - The type of battery installed at this site.
- **Cut Off Voltage** - The battery cut off voltage configured for this site. This is the monoblock voltage below which the site will not operate. For example, if a site has strings that provide 48V using 4 monoblocks of 12V each, and the site cannot operate below 43.8V, then the cut off voltage will be 10.95V for each monoblock.
- **Date of Installation** - The date that this site was originally installed.
- **Last Battery Replacements** - The last two dates on which batteries were replaced at this site.

 Make sure the battery type and cut off voltage are configured for a site if you want to see battery capacity and time remaining estimates.

2.6.1.4 Discharge Report - Summary Data

This section provides a summary of the discharge data.
This section is only listed if the "Show summary data tables" option is selected.

Summary Data:

String Voltage Summary

String	Minimum (V)	Time	Maximum (V)	Time
1	234.5	15:31:56	243.4	15:23:36
2	235.9	15:31:56	244.8	15:23:36

String Current Summary

String	Average (A)	Maximum (A)	Time	Discharged (Ah)
1	-78.3	-82.0	15:23:36	11.45
2	-78.3	-82.1	15:23:36	11.45
Totals	-156.6			22.9

String Temperature Summary

String	Average (°C)	Minimum (°C)	Time	Maximum (°C)	Time
1	25.4	19.5	15:23:36	32.5	15:32:26
2	24.3	19.7	15:23:36	29.8	15:32:26

The *String Voltage Summary* shows the minimum and maximum voltage of the string during the discharge and the times at which those voltages occurred.

 The minimum string voltage is usually the end voltage of the discharge.

The *String Current Summary* shows the average current for each string, maximum current for each string, when the maximum current occurred for each string and the energy (in Ah) discharged from each string.

The total average current (i.e. average current for the whole site) and total energy discharged (i.e. energy discharged for the whole site) are listed at the end of the table.

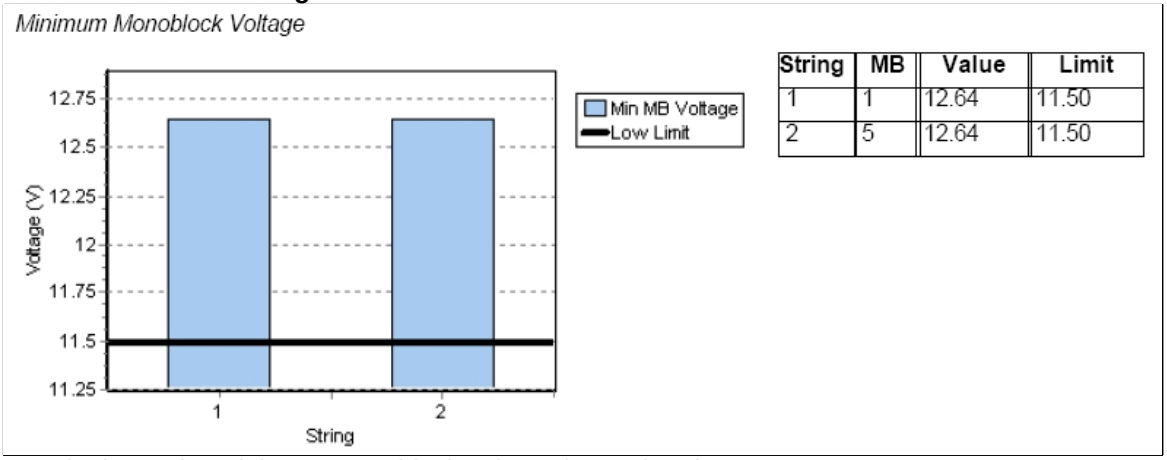
 Look for strings that have supplied considerably less current than other strings, those strings may well have a problem.

The *String Temperature Summary* table shows the average, minimum and maximum temperatures for each string during the discharge, and the time at which the minimum and maximum temperatures occurred.

2.6.1.5 Discharge Report - Summary Graphs

The next section shows six graphs to summarise the discharge data.
For all graphs in the report, if a limit that is relevant to the data is available, then that limit is shown on the graph.

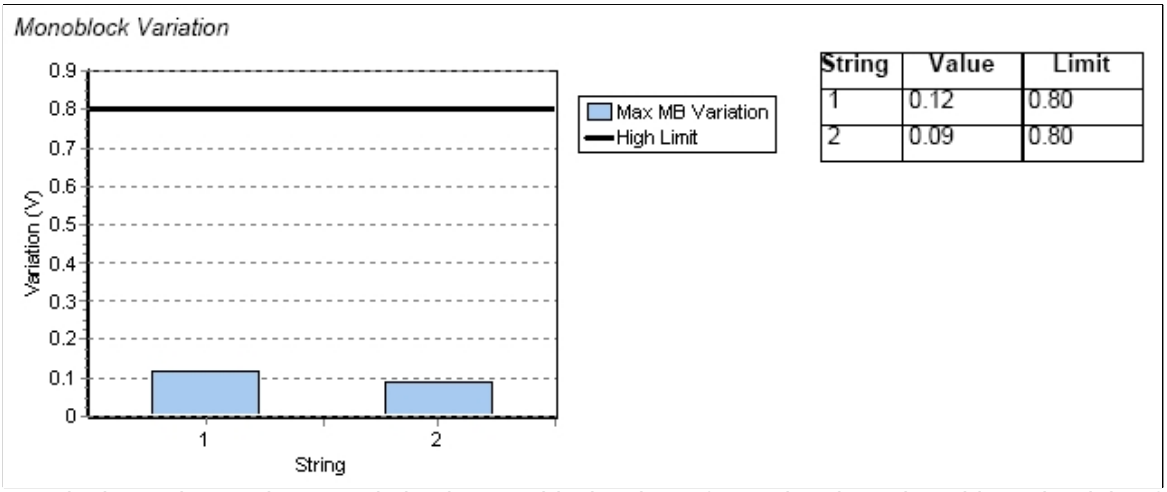
Minimum Monoblock Voltage



String	MB	Value	Limit
1	1	12.64	11.50
2	5	12.64	11.50

This graph shows the minimum monoblock voltage for each string.
The table to the right of the graph lists each string, and the monoblock number for the monoblock that had the minimum voltage within that string. The minimum monoblock voltage, and the monoblock voltage limit that was in place at the time of the discharge is also listed. If a limit is set then it is also displayed as a line on the bar graph.

Monoblock Variation

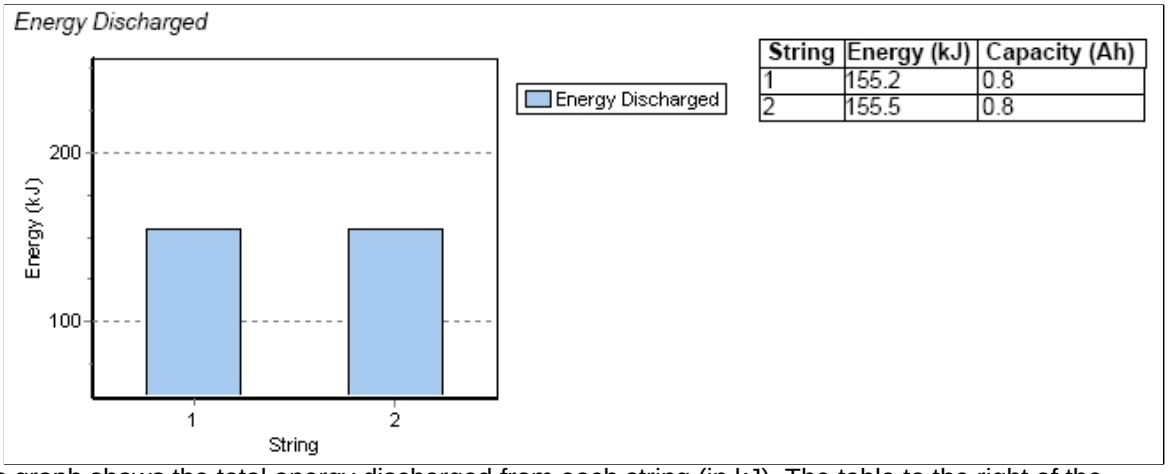


String	Value	Limit
1	0.12	0.80
2	0.09	0.80

This graph shows the maximum variation in monoblock voltage for each string. The table to the right of the graph lists each string, the maximum monoblock voltage variation for that string and the monoblock voltage variation limit that was in place at the time of the discharge. If a limit is set then it is also displayed as a line on the bar graph..

A large monoblock voltage variation on a string is a good indication that one or more monoblocks have deteriorated faster than other monoblocks. Refer to the "Monoblock Performance" section of the report to work out which monoblocks have much higher or lower voltage than most.

Energy Discharged



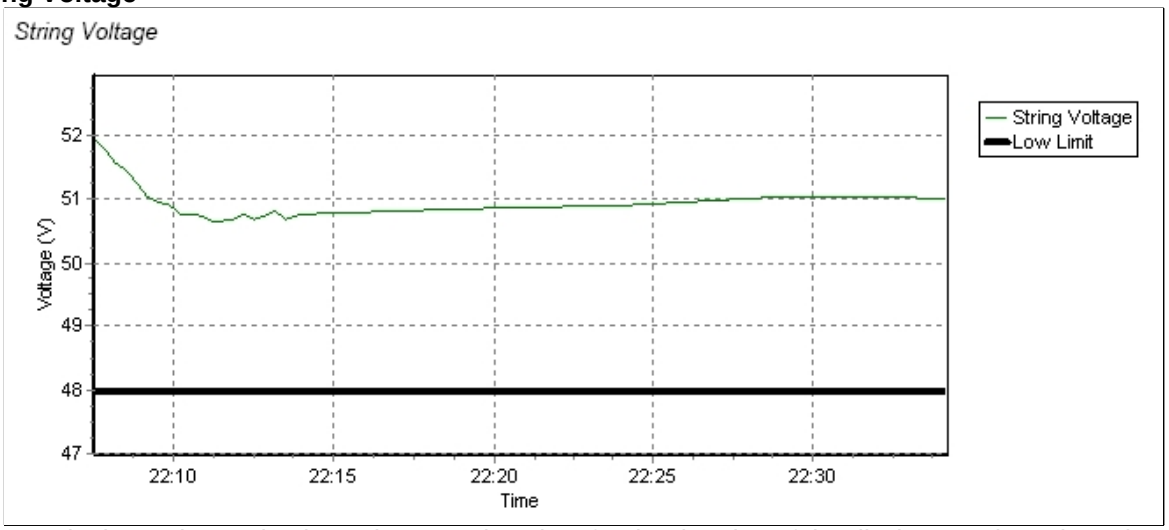
String	Energy (kJ)	Capacity (Ah)
1	155.2	0.8
2	155.5	0.8

This graph shows the total energy discharged from each string (in kJ). The table to the right of the graph lists the total energy discharged from each string in kJ and in Ah.

A large variation between strings of energy discharged is a good indication that one string has a problem. The problem could be a connection or cable fault, a faulty monoblock or a mismatched monoblock (not of same age as others in string).

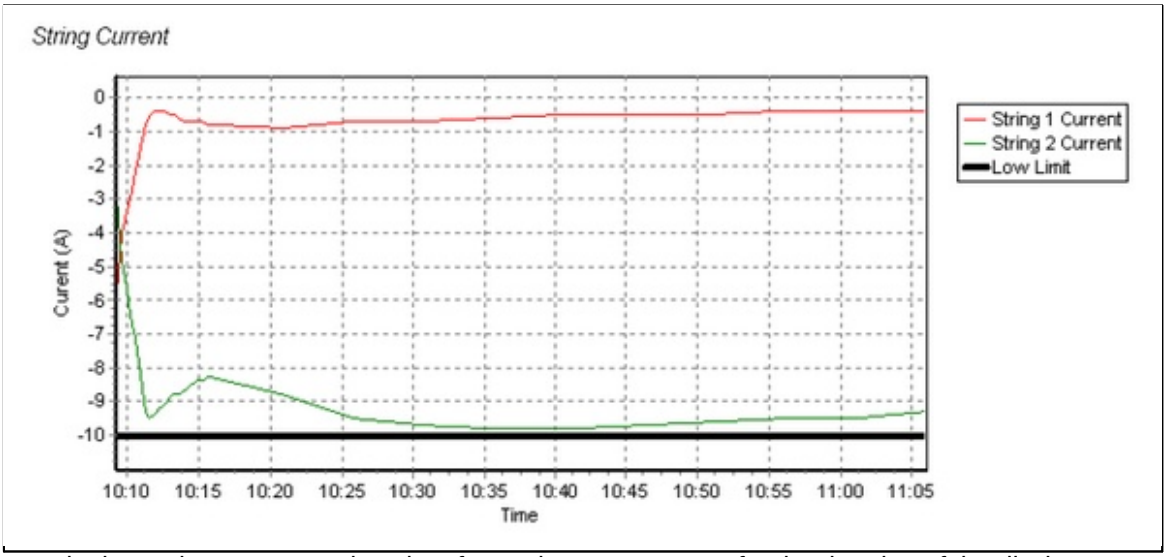
If you must replace a single monoblock in a string, always replace it with a monoblock of the same age and history as the other monoblocks in the string. A new monoblock in a string of old monoblocks risks being overcharged.

String Voltage



This graph shows the total string voltage against time for the duration of the discharge. The voltage is graphed for the first string for which valid voltage data is found – this will normally be string 1. The string voltage low limit is shown on the graph as a straight line.

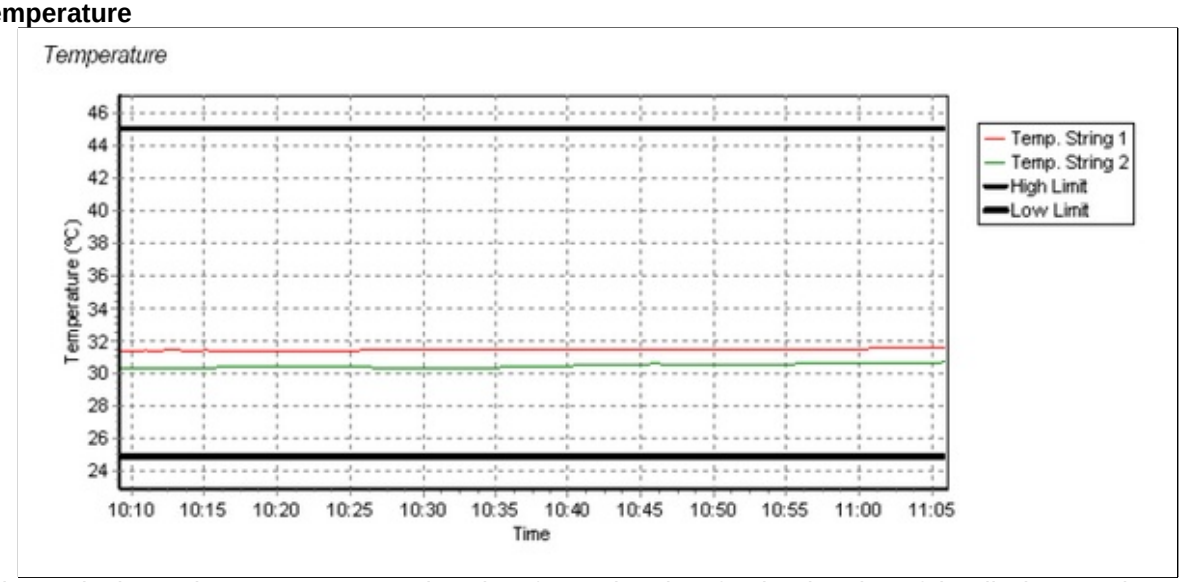
String Current



This graph shows the current against time for each current sensor for the duration of the discharge. The current limit is shown on the graph as a straight line.

The current graphs for each string should follow a similar pattern if the strings are connected to the same load. Large variations (as in the above graph) are an indication of a problem in one string. String 2 in the above graph is clearly supplying almost all of the load.

Temperature

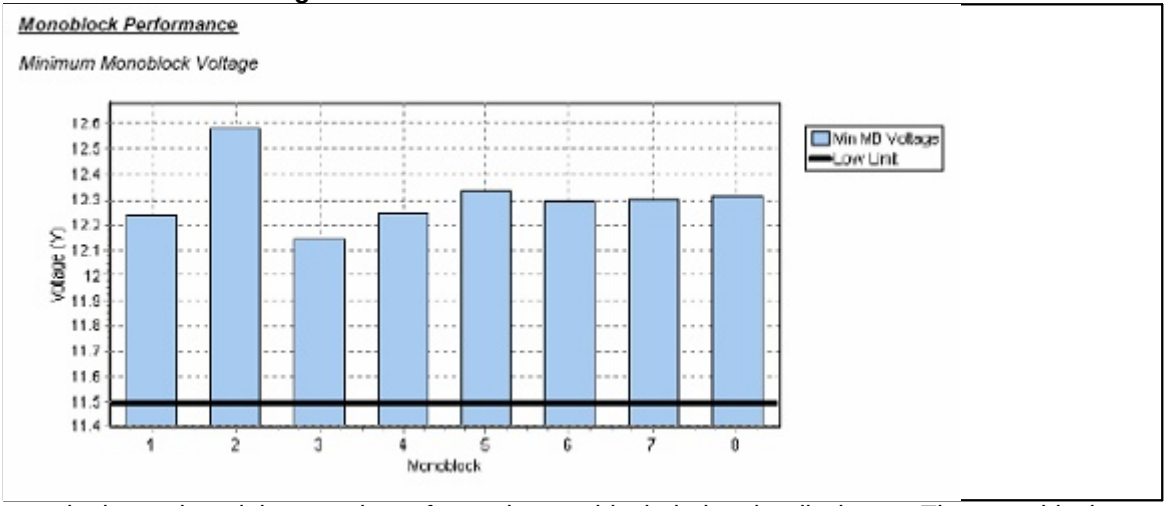


This graph shows the temperature against time for each string, for the duration of the discharge. The high and low temperature limits are shown on the graph as straight lines. This graph is not displayed if there are no temperature sensors configured for any strings.

2.6.1.6 Discharge Report - Monoblock Performance

This section provides details on the performance of individual monoblocks.
If the "Sort Monoblock data by string" option is selected then the information is presented for all monoblocks on a string, with a separate section in the report for each string. Otherwise the information is presented for all monoblocks.

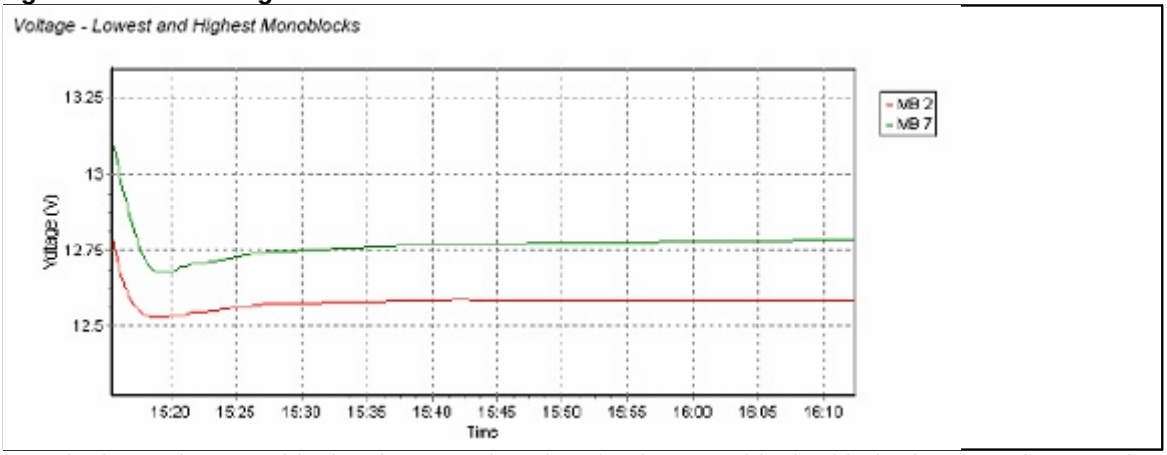
Minimum Monoblock Voltage



This graph shows the minimum voltage for each monoblock during the discharge. The monoblock voltage low limit is shown on the graph as a straight line.

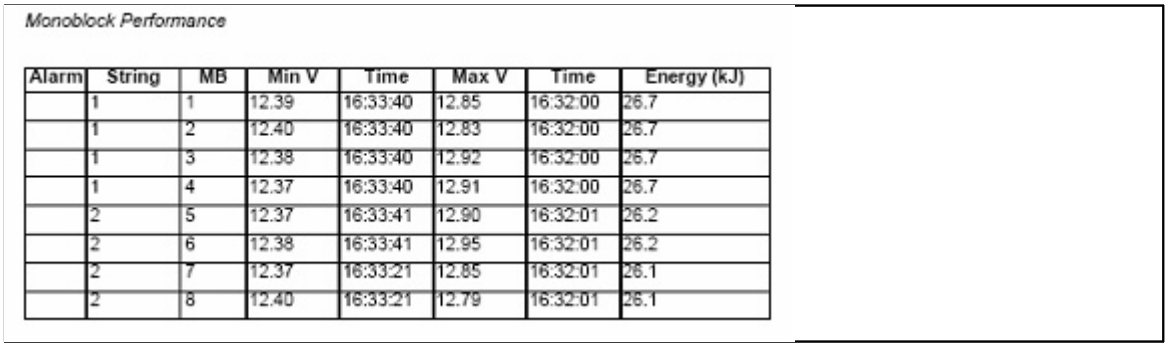
Faulty or mismatched monoblocks will stand out from the others in the graph. On a site with batteries of the same age and history in reasonable condition, you would expect the monoblock voltages in the above bar graph to be consistent.

Voltage - Lowest and Highest Monoblocks



This graph shows the monoblock voltage against time for the monoblock with the lowest voltage and the monoblock with the highest voltage during the discharge. If a monoblock voltage low limit has been configured then this limit is shown on the graph as a straight line.

Monoblock Performance

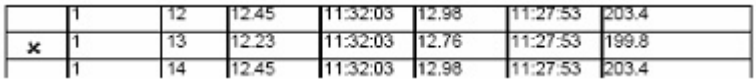


Monoblock Performance

Alarm	String	MB	Min V	Time	Max V	Time	Energy (kJ)
	1	1	12.39	16:33:40	12.85	16:32:00	26.7
	1	2	12.40	16:33:40	12.83	16:32:00	26.7
	1	3	12.38	16:33:40	12.92	16:32:00	26.7
	1	4	12.37	16:33:40	12.91	16:32:00	26.7
	2	5	12.37	16:33:41	12.90	16:32:01	26.2
	2	6	12.38	16:33:41	12.95	16:32:01	26.2
	2	7	12.37	16:33:21	12.85	16:32:01	26.1
	2	8	12.40	16:33:21	12.79	16:32:01	26.1

This table lists the following details for each monoblock on each string:

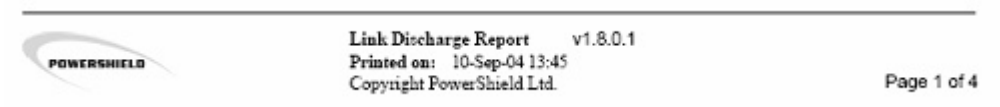
- **Alarm**: Shows X if any alarm limits were exceeded for this monoblock



	1	12	12.45	11:32:03	12.98	11:27:53	203.4
x	1	13	12.23	11:32:03	12.76	11:27:53	199.8
	1	14	12.45	11:32:03	12.98	11:27:53	203.4

- **String:** The string number that the monoblock is within.
- **MB:** The monoblock number
- **Min V:** Minimum voltage for this monoblock during the discharge
- **Time:** When the minimum voltage occurred
- **Max V:** Maximum voltage for this monoblock during the discharge
- **Time:** When the maximum voltage occurred
- **Energy:** The amount of energy in kJ that was discharged from this monoblock, during the discharge.

2.6.1.7 Discharge Report - Footer



POWERSHIELD

Link Discharge Report v1.8.0.1
Printed on: 10-Sep-04 13:45
Copyright PowerShield Ltd.
Page 1 of 4

The footer at the bottom of each page shows the report type, the date the report was generated ("Printed on") and the version number of the report generator software used to generate the report.

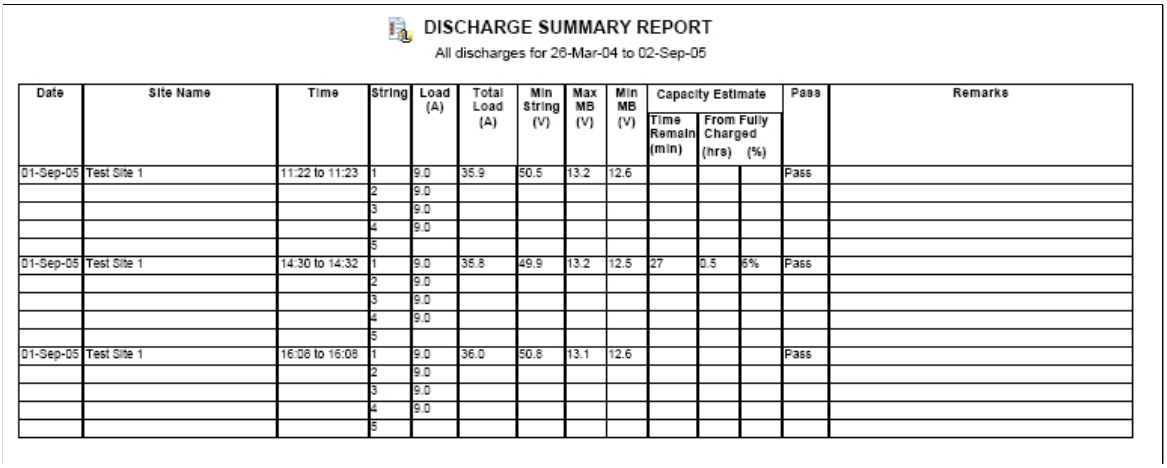
The PowerShield logo is shown by default, but the system can be configured to show your company logo or any bitmap. Select "Help" and then "Link Registration" to show the registration screen. Then click on "Upload Logo" to select a new logo for the system to use.

2.6.2 Test Summary Report

The *Test Summary* report is intended to provide a summary of all discharges from all sites over a specified period.

To generate a test summary report click on the Test Summary button  on the left. Then select the start and end date for the period you wish to report on, and select whether you want the report to include all discharges during that period, or just failed discharge tests. A "failed" discharge test is a remote discharge test that failed to start or any discharge that had alarms during the discharge). Then click the "Generate the Report" button. Once the report is generated the Adobe PDF Reader will automatically run to display the report.

The report includes at least one row for each discharge that occurred during the selected period. A discharge for a site with more than one string will take up several rows (one for each string), with the first row showing the discharge summary information for the site and the average current for string 1, and the other rows showing only the average current for the other strings.



DISCHARGE SUMMARY REPORT

All discharges for 26-Mar-04 to 02-Sep-05

Date	Site Name	Time	String	Load (A)	Total Load (A)	Min String (V)	Max MB (V)	Min MB (V)	Capacity Estimate			Pass	Remarks
									Time Remain (min)	From Fully Charged (hrs)	(%)		
01-Sep-05	Test Site 1	11:22 to 11:23	1	9.0	35.9	50.5	13.2	12.6				Pass	
			2	9.0									
			3	9.0									
			4	9.0									
			5										
01-Sep-05	Test Site 1	14:30 to 14:32	1	9.0	35.8	49.9	13.2	12.5	27	0.5	5%	Pass	
			2	9.0									
			3	9.0									
			4	9.0									
			5										
01-Sep-05	Test Site 1	16:08 to 16:08	1	9.0	36.0	50.8	13.1	12.6				Pass	
			2	9.0									
			3	9.0									
			4	9.0									
			5										

The columns displayed in the report are:

- **Date** - The date that the discharge occurred.
- **Site Name** - The name of the site at which the discharged occurred.
- **Time** - The start and end time of the discharge.
- **String** - The string number for that row.
- **Load (A**) - The average discharge current for the string.
- **Total Load (A)** - The total average current supplied to the load during the discharge.

- **Min String (V)** - The minimum string voltage, for all strings, during the discharge.
- **Max MB (V)** - The maximum monoblock voltage reached during the discharge.
- **Min MB (V)** - The minimum monoblock voltage reached during the discharge.
- **Capacity Estimate** - This section has 3 columns that list information relating to the battery capacity estimate calculated for this discharge.
    - **Time Remain (min)** - Estimated time remaining at the end of the discharge, if the discharge continued at the same average current. This is the estimated time that it would take for the monoblocks to reach the cut-off voltage configured for the site.
    - **From Fully Charged (hrs)** - This is an estimate of how long it would take to discharge the monoblocks down to the cut-off voltage configured for the site, from fully charged, if the site is discharged at the same average current as this discharge. It is an estimate of how long your site can keep running after a mains fail.
    - **From Fully Charged (%)** - This is the same estimate as in "From Fully Charged (hrs)", but expressed as a percentage of the battery rating. A brand new battery would be expected to give an estimate of 100%.
- **Pass** - Indicates whether the discharge test passed (there were no alarms during the test) or failed. If the discharge was a mains failure (as detected by the mains fail input), then this column is blank.
- **Remarks** - This column lists details of alarms. The description of the first alarm found, that may have caused a discharge test to fail, is listed. If the software has problems processing the discharge data it will list a description of the error in this column.

2.6.3 String History Report

The *String History* report provides details on activity (discharges or alarms) and float behaviour for all the strings on a selected site, over a specific period.

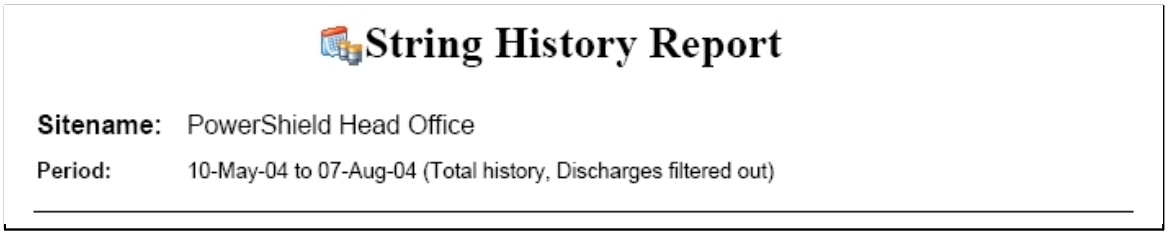
To generate a string history report, click on the String History button  in the list of report types, then select the site for which you wish to generate a report. Then select the report options and click on "Generate the Report". Once the report is generated the Adobe PDF Reader will automatically run to show you the report.

The following report settings can be turned on and off for the string history report:

- Total history - Select this option if you want the report to cover the entire period that Link has data for this site. When you select this option the start date and end date selection is disabled.
- Start Date - The start date for the period you wish to report on.
- End Date - The end date for the period you wish to report on.
- Show alarms - Select this option if you want the report to include a table showing all alarms for the selected site during the report period.
- Show Monoblock Details - Select this option if you want the report to include a table showing the minimum, maximum and average voltage, over the report period, for each monoblock .
- Filter out discharges - When this option is selected Link will exclude daily minimum, maximum and average data for days when a discharge occurred. Filtering out discharges will give more accurate figures for the minimum, maximum and average figures calculated from the float data.

The Report is separated into the following sections:

2.6.3.1 String History Report - Title

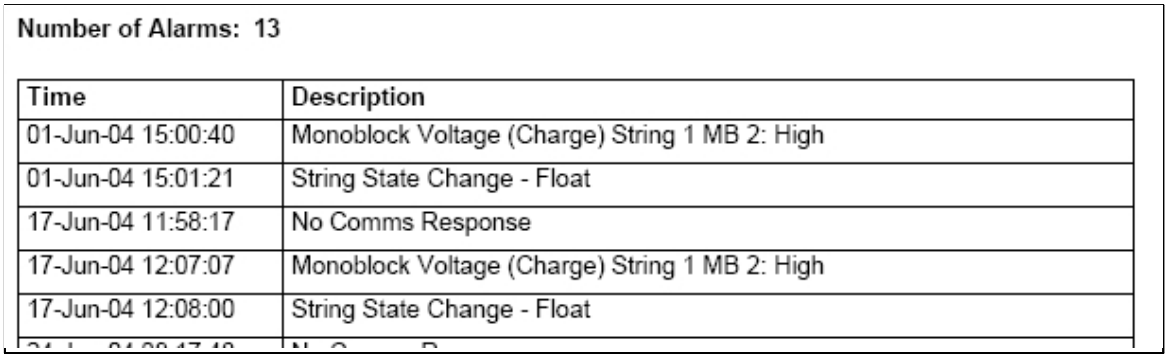

String History Report

Sitename: PowerShield Head Office

Period: 10-May-04 to 07-Aug-04 (Total history, Discharges filtered out)

The report title shows the site name and the period that the report covers, as well as indicating whether this is a "total history" report and whether discharge data has been filtered out.

2.6.3.2 String History Report - Alarms


Number of Alarms: 13

Time	Description
01-Jun-04 15:00:40	Monoblock Voltage (Charge) String 1 MB 2: High
01-Jun-04 15:01:21	String State Change - Float
17-Jun-04 11:58:17	No Comms Response
17-Jun-04 12:07:07	Monoblock Voltage (Charge) String 1 MB 2: High
17-Jun-04 12:08:00	String State Change - Float

This section lists all alarms that occurred on the site during the reporting period. The total number of alarms is given before the table.
This section is only included in the report if the "Show alarms" option is selected.

2.6.3.3 String History Report - Configuration


Configuration:

Battery Type:	GNB - Marathon M12V70				
MB Voltage:	12 V	**Battery Rating:**	70.0 Ah	**Battery Age:**	2 years 2 months
No. Monoblocks:	4				(newest 1 year 7 months)

This section summarises the configuration for the selected site.
The following information is listed:

- **Battery Type** - The battery type configured for the site.
- **MB Voltage** - The monoblock voltage for monoblocks installed at the site.
- **Battery Rating** - The Ah rating of each monoblock at the site.
- **Battery Age** - The age of the batteries at the site, based on when the strings where installed. The age of the newest monoblock on the site is given below this field (based on the "Last Replacement" field for this site).
- **No. Monoblocks** - The number of monoblocks in the strings at the site.

2.6.3.4 String History Report - Float Data

The *Float Data* section summarises the performance of the strings at the site while on Float or Charging. The report uses the Trend History measurements recorded by the system (referred to as the "Long Term Memories" in Config) to generate the tables and graphs in this section.

Float Data

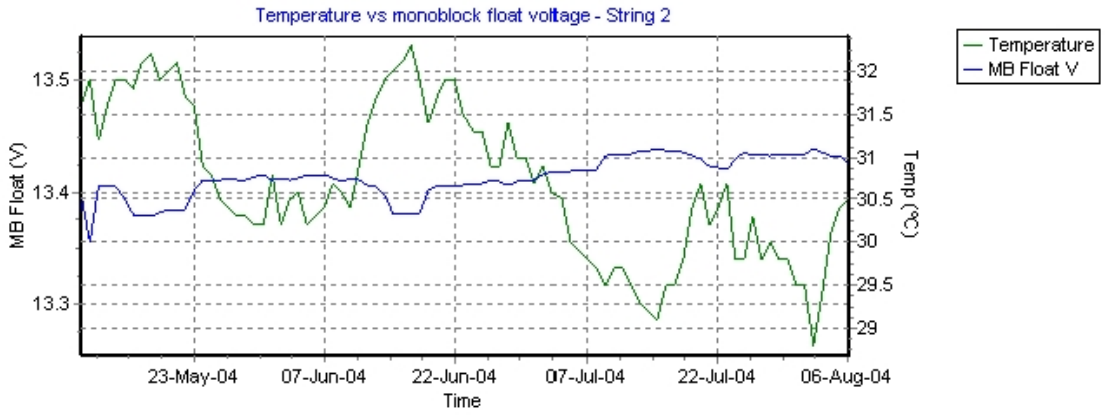
String Summary

String	Avg °C	Min °C	Max °C	Avg MB V	Min MB V	Max MB V	Life Rem.	% Life
1	30.1	27.9	32.1	13.4	12.7	13.7	5.1 years	64.7
2	30.7	28.3	32.6	13.4	12.7	14.1	5.1 years	64.1

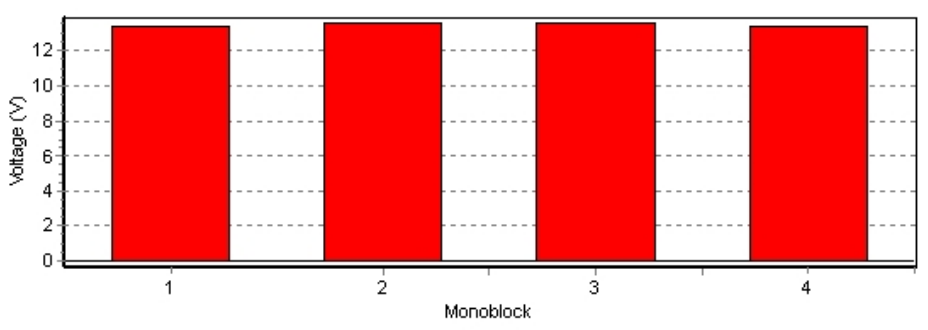
The *String Summary* table lists the following information for each string:

- **String** - The string number.
- **Avg °C** - The average temperature for this string over the report period.
- **Min °C** - The minimum temperature for this string over the report period.
- **Max °C** - The maximum temperature for this string over the report period.
- **Avg MB V** - The average monoblock voltage for this string over the report period
- **Min MB V** - The minimum monoblock voltage for this string over the report period
- **Max MB V** - The maximum monoblock voltage for this string over the report period
- **Life Rem**. - The estimated life remaining for monoblocks on this string. This estimate is calculated using the age of the battery and the temperature over the battery's life.
- **% Life** - This is the estimated total life of the batteries in the string as a percentage of the design life.

String 2



For each string, a graph showing the daily average string temperature and the daily average monoblock voltage over the period is shown. This graph can be used to check that the battery charger is correctly compensating for temperature.



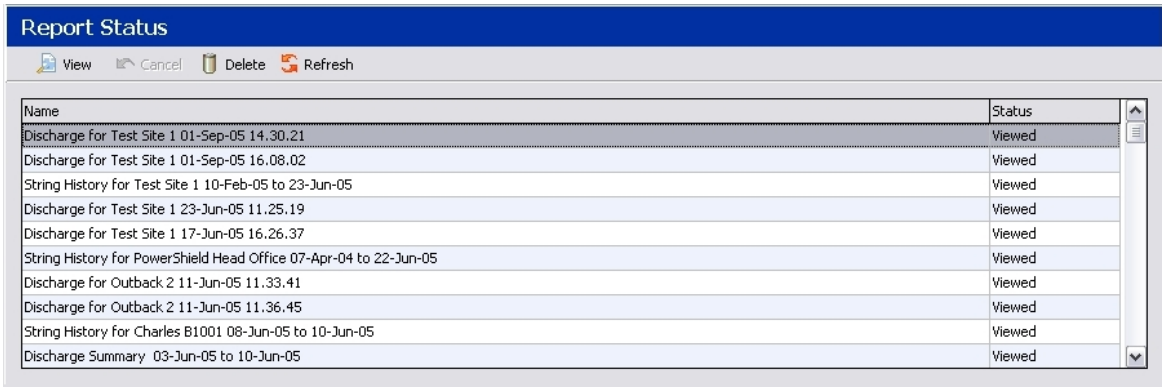
Monoblock Float voltage details - String 1

Monoblock	Average	Min V	Max V
1	13.4	12.7	13.4
2	13.5	12.8	13.7
3	13.5	12.7	13.5
4	13.3	12.7	13.6

For each string, a bar chart showing the average voltage over the period for each monoblock in the string is shown.
This is followed by a table that lists the average, minimum and maximum voltage for each monoblock over the period. This last table is only included if the "Show Monoblock Details" option was selected.

2.6.4 Managing Reports

You can view the status of reports that are currently being generated, and view old reports by using the *Report Status* window at the bottom of the reports page. This window shows all reports that have been requested, or have already been generated.



Requested
When you first ask for a report to be generated, the report will appear in the Report Status window as "Requested". You can cancel the report while the report's status is "Requested" by selecting the report in the Report Status window and clicking on Cancel.

Processing and *Generated*
When Link starts processing the report the status changes to "Processing" and when Link has finished generating the report the status changes to "Generated". At this point, if you are still logged on to the Link Client, the report will pop up in the Adobe Reader. If you are not logged on the report will pop up in the Adobe Reader when you next log on and go to the reports screen.

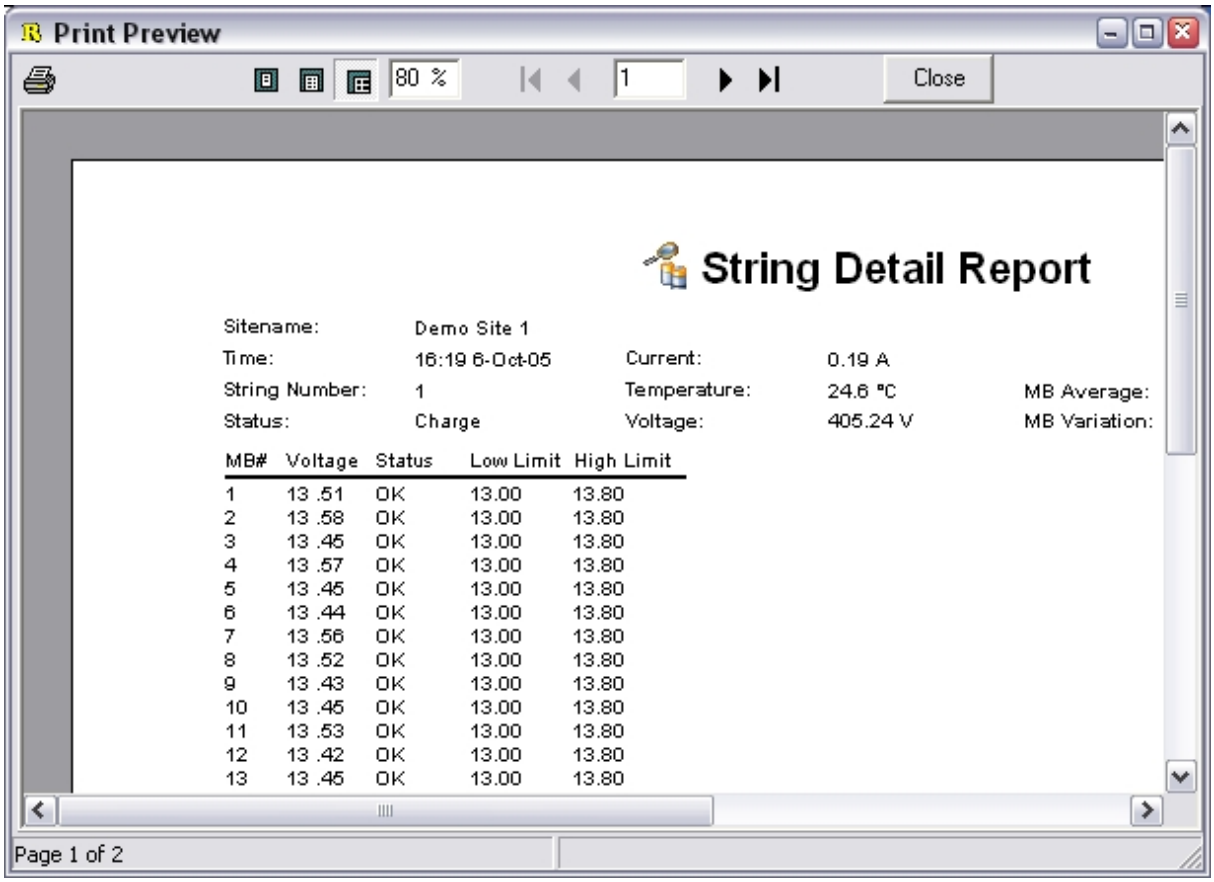
Viewed
Once the report has been viewed in the Adobe Reader it will be marked as "Viewed". Viewed reports are copied into a folder on the PC running the Link Client, as well as showing the report in Adobe Reader. The folder on your Link Client PC that the reports are copied to is "C:\Program Files \PowerShield\Link Client\Reports\" by default, but can be changed by editing the "PATH=" setting under [REPORTS] in the "LinkClient.ini" configuration file.

Failed
If an error occurs while generating a report and Link cannot generate a report file the report is marked as "Failed".

You can delete a viewed report by selecting the report and clicking on the Delete button. This will remove the report .pdf file from your hard drive.

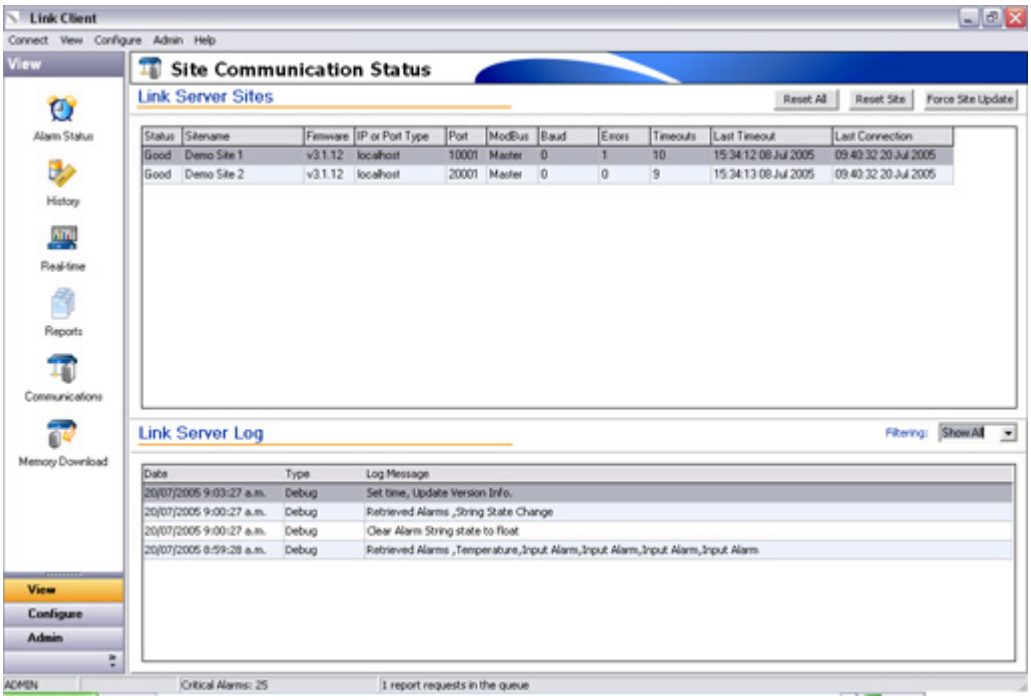
2.6.5 String Detail Report

To create a String Detail report click on the preview button in the Real-time String Details screen 28. The report is a snap shot of the string and monoblock measurements. An example is show below.



2.7 Communication status

The *Communications* screen gives you an overview of the state of the communications connections to all of the PowerShield battery monitor sites that are being monitored by Link. This screen is particularly useful for verifying that the communication links to all of the sites are operating correctly.



For each site the following columns are displayed in the table:

- **Status** - Shows the status of the communications connection to this site. Either "Good", "Bad" or "Disabled".
- **Sitename** - The name of the site.
- **Firmware** - The version of firmware that the battery monitor on the site is running. If this is blank, click on the "Force Site Update" button to make Link communicate with the site and read the firmware version.
- **IP or Port Type** - Shows the IP address for TCP/IP connected sites or "COM" for sites connected to a serial port.
- **Port** - Shows either the TCP/IP port number for TCP/IP connected sites or the COM port number for sites connected to a serial port.
- **Modbus** - The Modbus address of the battery monitor. Usually "Master".
- **Baud** - The Baud rate used to communicate to the battery monitor.
- **Errors** - Number of general communications errors while communicating with this site.
- **Timeouts** - Number of timeouts while communicating with this site.
- **Last Timeout** - When the last timeout occurred.
- **Last Connection** - When Link last successfully communicated with the site.

When you select a site in the Communications Status table the *Link Server Log* table below displays events from the Link Server Log that relate to that site. If the communications status for that site is "Bad" you may be able to tell from the Link Server Log entries why the communications connection is not operating correctly.

The "Reset All" button resets the Errors, Timeouts, Last Timeout and Last Connection fields for all sites. The "Reset Site" button resets the Errors, Timeouts, Last Timeout and Last Connection fields for the site currently selected in the Communications Status table. This can be useful if you want to see how many errors you are getting over a period of time.

The types of events shown for the site selected can be filtered by selecting an option from the "Filtering:" drop down list at the top right of the Link Server Log window. The default is "Show All" which shows all event types.

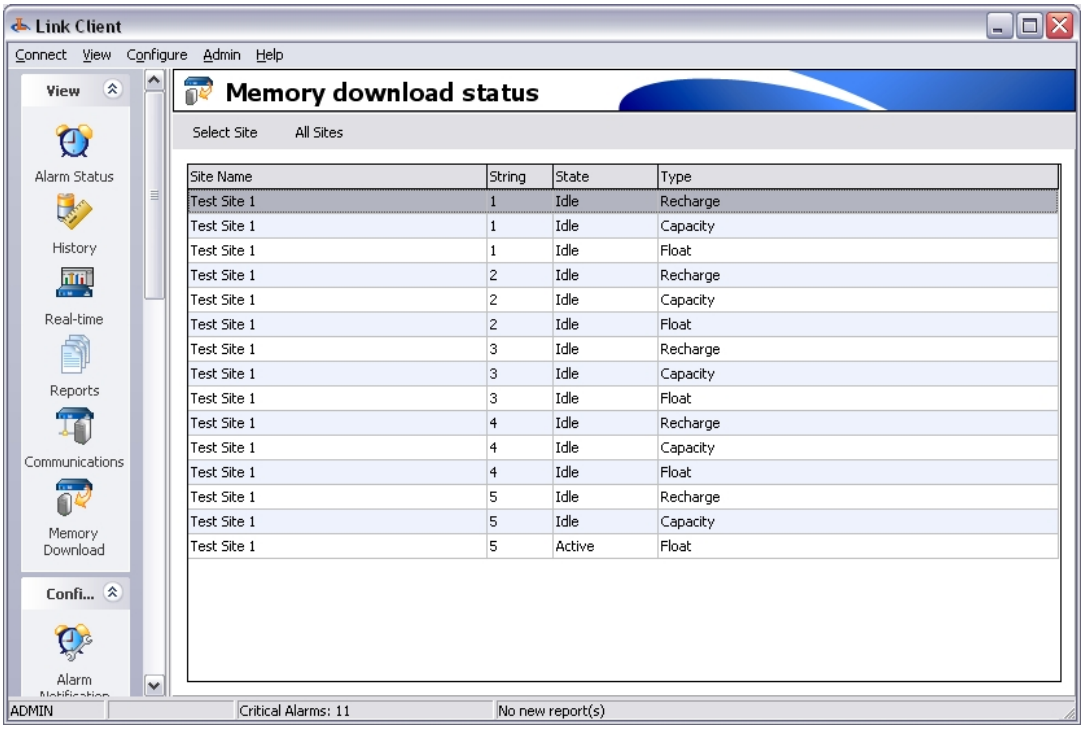
2.8 Memory Download status

The *Memory Download* page allows you to monitor any memory download activity. Link downloads memories from the PowerShield Battery Monitors automatically based on various triggers such as time or a change of string state from discharge to charge.

There are three different types of memory that Link downloads from the PowerShield Battery Monitors:

- **Capacity -** Data logged during a discharge event. This is downloaded after a discharge event stops and the string goes into charge. This data is used when creating event based graphs.
- **Recharge -** Data logged during the charging of a string. This is downloaded after the string goes into float. This data is used when creating event based graphs.
- **Float -** Long Term (trend) data. This is downloaded at regular intervals and provides a daily minimum, maximum and average value.

The memory download status shows all memories that are currently queued to be downloaded and lists the site name, string number, state and memory type. The state can be either *Idle,* meaning that the memory is waiting to be downloaded, or *Active,* meaning that the memory is currently being downloaded.

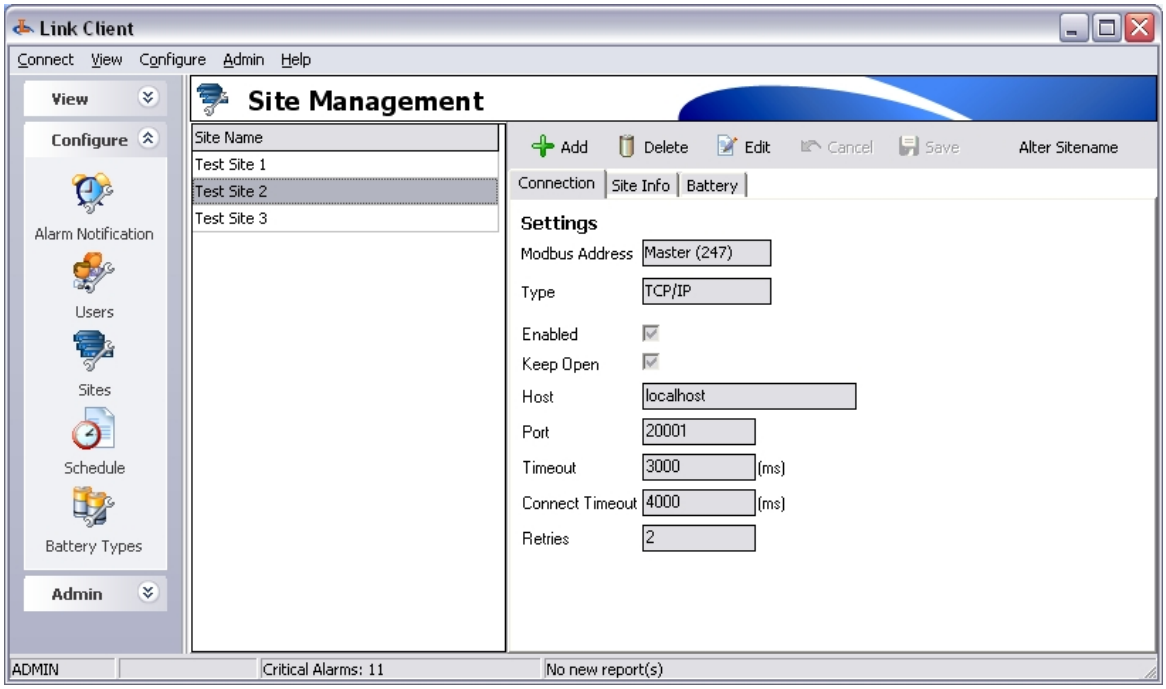


To force Link to check the memories and download any data available, you can click on either the *Select Site* or *All Sites* buttons at the top of the screen. Clicking on *All Sites* will queue up a memory download for all memory types, on all strings, on all sites in the system. Clicking on *Select Site* will allow you to select a site and then will queue up a memory download for all memory types, on all strings, on the selected site. Depending on the communication link, number of sites and configuration of the sites this may take minutes to hours. It is recommended that single sites are forced until the user is familiar with the time involved.

If a site has been recently added to Link, or there was a communications failure for a period of time and the memories have not been downloaded from the site, this screen allows you to either force a memory check on all of the sites or for a chosen site.

2.9 Site management

The *Sites* page allows you to configure the PowerShield Battery Monitor Sites that you wish Link to manage.



The *Sites* page is split into two main areas.

- A list of sites to the left of the page shows all the battery monitoring sites that have been configured. This will be blank if no sites have been configured.
- The right of the page has three tabs, Connection 63, Site Info 65 and Battery 66.

Select a site from the list and the details for that site will be displayed to the right.

2.9.1 Adding a Site

Before Link can provide monitoring for a PowerShield site, the site must be added to the Link database. To add a site to Link there must be a fully configured battery monitor with a valid communication link.
The battery monitor(s) must be configured with software called **Config,** for details see the Config Manual.

For details regarding the Monitor's alarm and communications settings see the Battery monitor configuration 108 section.

To create a new site, click the *Add Site* button 

A site called *[New]* will appear in the Site Name list, and the edit boxes to the right will be activated.

The fields in the Connection 63 tab need to be entered correctly before a site can be successfully added to Link. The Site Info 65 and Battery 66 tab are for additional information.

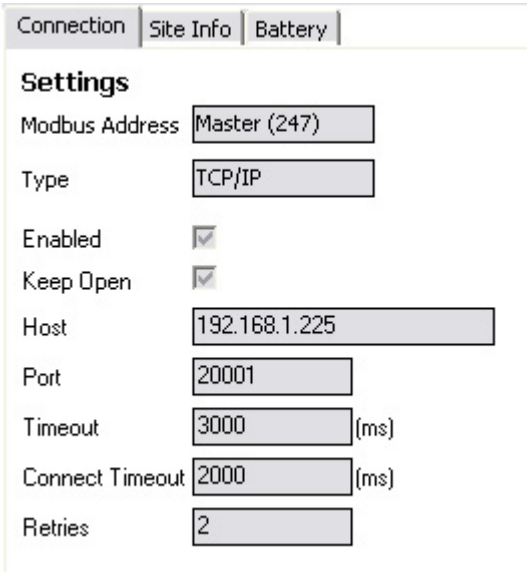
Once you have entered all of the necessary information click *Save*  to add the site to Link.
Note that Link must be able to communicate with the Site before the site can be successfully added.

 Link reads a sites configuration information as a part of the adding process. DO NOT MAKE CHANGES TO THE SITE CONFIGURATION AFTER THE SITE HAS BEEN ADDED.
If the configuration has to change at any time after the site has been added, then the current solution is to do the following:
1. Disable communication for the existing site
2. Change the battery monitor site name with Config software
3. Add the battery monitor to Link with its new configuration

2.9.1.1 Connection

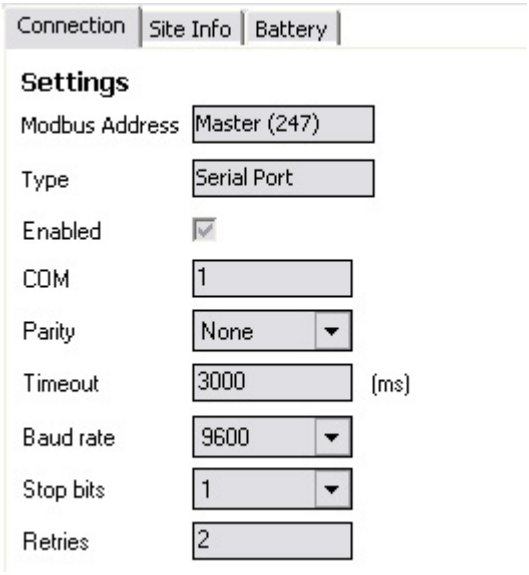
The Site Connection tab is where you enter all information relating to how Link should connect to the PowerShield battery monitor. For Link to communicate with the PowerShield battery monitor the information here must be correct. Link can connect to PowerShield battery monitors over a TCP/IP Connection or via a Serial Port on the Server PC.

Connection Settings if connecting via TCP/IP over a network



- **Modbus Address -** Leave this set to *Master (247)* unless you are adding a site that is connected via a Gateway PowerShield battery monitor. If you are adding a site that is connected via a Gateway PowerShield battery monitor, this needs to be set to the ID of the Site.
- **Type** - Select *TCP/IP* to connect via the network.
- **Enabled -** If you wish to temporarily disable a site, uncheck this button.
- **Keep Open** - Check this option if you wish to keep the network connection to the PowerShield Battery Monitor open at all times. This helps speed up the retrieval of data from the site. This is recommended if you are connecting to the site via a Lantronix UDS-10.
- **Host -** The network address or name of the site you wish to add to Link. This should be either the IP address (4 numbers separated by dots) or the computer name of the device server that the PowerShield Battery Monitor is connected to.
- **Port -** The Port of the site you wish to add to Link.
- **Timeout** - The length of time Link will wait for a reply before it will resend the data.
- **Connection Timeout** - The length of time that Link will wait for a network connection to the site.
- **Retries -** The number of times Link will resend a message to the site before raising an alarm.

Connection Settings if connecting via a Serial Port on the Server PC

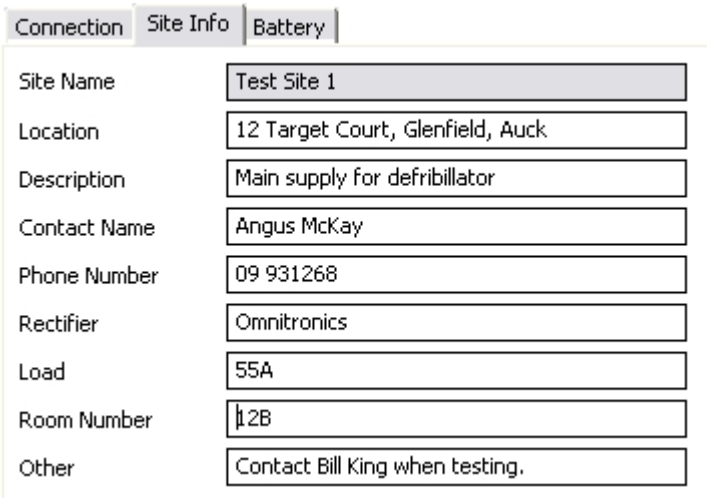


- **Modbus Address -** Leave this set to *Master (247)* unless you are adding a site that is connected via a Gateway PowerShield Battery Monitor. If you are adding a site that is connected via a Gateway PowerShield Battery Monitor, this needs to be set to the ID of the Site.
- **Type -** Select *Serial Port* to connect via a serial port on the server PC.
- **Enabled -** If you wish to temporarily disable a site, uncheck this button.
- **COM -** The number of the serial port on the server PC that the PowerShield Battery Monitor is connected to.
- **Parity -** The parity setting to be used for the serial connection. Set this to None.
- **Timeout** - The length of time Link will wait for a reply before it will resend the data.
- **Baud rate -** The Baud rate (communication speed) at which Link Server should communicate with the PowerShield Battery Monitor.
- **Stop bits -** The number of stop bits to be used for the serial connection. Set this to 1.
- **Retries -** The number of times Link will resend a message to the site before raising an alarm.

Use the *Enabled* checkbox to disable a site whenever you wish to connect to the site with Config to verify or modify the site's configuration. This is necessary because only one program can communicate with the site at one time. Don't forget to re-enable the site when you have finished using Config with the site.

2.9.1.2 Site Info

The Site Info tab allows you to store general information about the site.

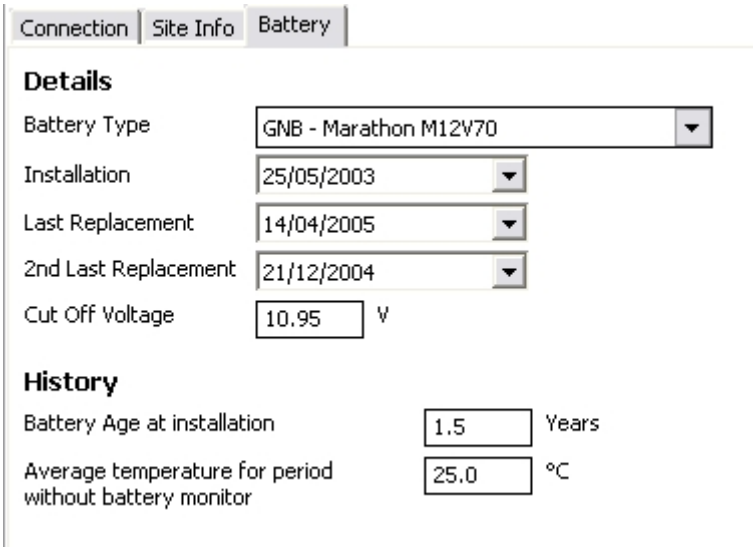


The *Site Name* is the name of the site taken from the battery monitor's configuration. You can only edit the site name using the *Alter Sitename* button.
Location and *Description* are general purpose fields for keeping track of where the battery monitor is and what it is monitoring, and can be any text up to 32 characters long.
The remaining 6 fields are user definable and can contain any text up to 100 characters long. The names of these fields can be configured by editing the *LinkClient.ini* file on the PC that is running the Link GUI software. The field names are set as `SITE_USERDEF1` to `SITE_USERDEF6` in the `[SITEUSERDEF]` section of the file. The example fields shown above were set up as follows:

```
[SITEUSERDEF]
SITE_USERDEF1=Contact Name
SITE_USERDEF2=Phone Number
SITE_USERDEF3=Rectifier
SITE_USERDEF4=Load
SITE_USERDEF5=Room Number
SITE_USERDEF6=Other
```

2.9.1.3 Battery

The Battery tab allows you to specify the type of batteries installed as well as keeping track of their maintenance history.



Details:
The *Details* section lists the following details about the batteries at this site:

- **Battery Type** - Select the type of battery installed at this site from the drop down list. To modify the battery types listed, or add new battery types to Link, refer to Battery type management 71.
- **Installation** - Date at which the batteries were originally installed.
- **Last Replacement** - Date of the very last battery replacement.
- **2nd Last Replacement** - Date of the 2nd to last battery replacement.
- **Cut Off Voltage** - Voltage at which the batteries are fully discharged. This is the per monoblock voltage at which the site will stop operating.

History:
The *History* section provides details about the history of the batteries for the time before the batteries were monitored. This history information is used to provide more accurate battery life prediction estimates.

- **Age at installation** - The age of the batteries at the time of installation.
- **Average temperature** - The average battery temperature for the period where the battery was not monitored.

Link uses the battery type information when predicting battery performance. Configuring the battery type correctly will help Link provide more useful information in your reports.

2.9.2 Modifying Site Details

The Site Details can be modified after the site has been added to Link..

To modify a site, select the site on the left and then click the 'Edit' button  , the edit boxes to the right will become active.

Once you have finished modifying the details, click the 'Save' button  to save your changes.

At any time before you have clicked the 'Save' button, you can click 'Cancel'  to revert the settings back to the last saved configuration.

2.9.3 Modifying the Site Name

The site name for a site can be changed after it has been added to Link.

To alter the site name, select the site on the left, and then click the *Alter Sitename* button. A window will now appear allowing you to enter the new site name. Click OK to save the changed site name, or cancel to leave the site name unchanged.

Altering a site name may have serious consequences for long term monitoring and site history. Ensure correct approval is gained and relevant parties are notified.

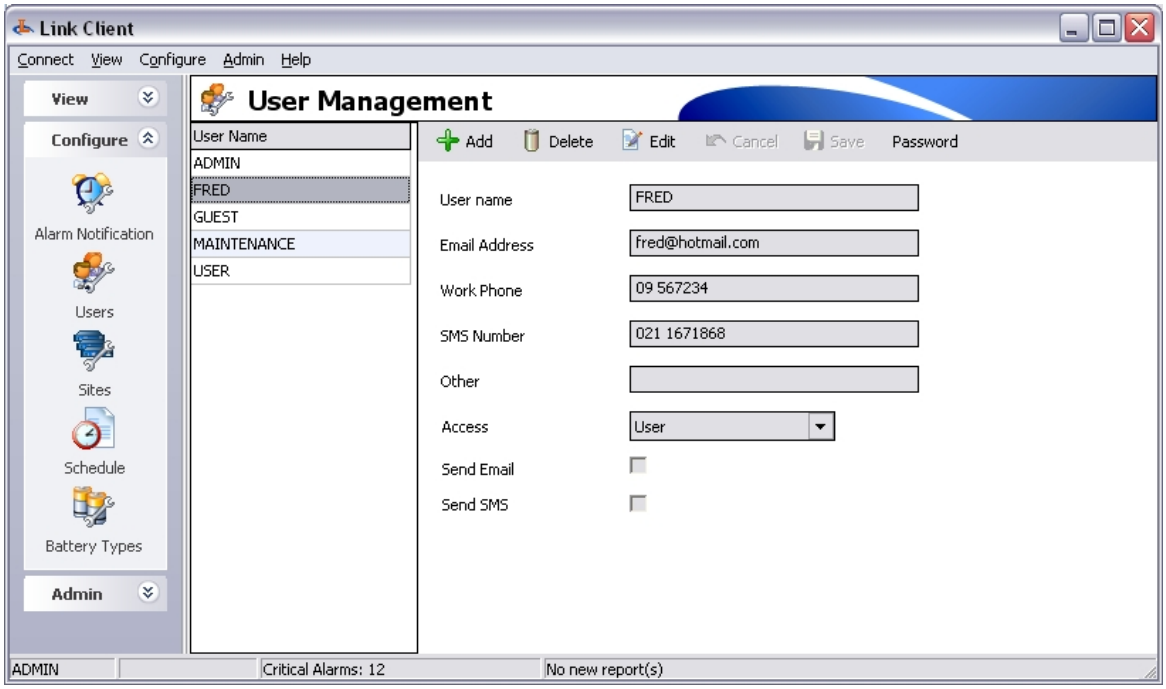
2.9.4 Deleting a Site

To delete a site, select the site on the left and then click the 'Delete' button  . A window will appear confirming that you wish to delete the site. Click *Yes* to delete the site, and *Cancel* to keep the site.

Link Server will no longer monitor the site once it has been deleted. The discharge data and associated alarms history will no longer be accessible after the site has been deleted.

2.10 User management

The *Users* page allows you to manage the users that are allowed to login to the Link Server. This limits access for unauthorised people, and ensures appropriate records are kept when logged events are dealt with. The contact details for each user is also used for Alarm Notifications from Link Server.



The *User Management* page is split into two main areas:

- The list of users to the left of the page shows all the users that have been configured.
- The right side of the page displays the details for the currently selected user.

2.10.1 Creating a User

To create a new User profile, click the 'Add' button  .

The fields to the right will be enabled and can be edited. Enter the appropriate contact details 70 so that Link Server can notify the users. Enter a user name, ensuring that this name is not already in use.

Set the new user's access level. See Security 93  for more information on access levels.

When all the required details are entered, click the 'Save' button  .

Having created a new user, you can change the password for the user. If you do not change the password, it will default to the user name in capital letters. Click to select the new user in the User Name list, then click the *Password* button at the bottom of the form. The password confirmation dialog will appear requesting the new password. Type in the new password, type it again in the confirmation line, and click OK.

The new user will now be able to log in, and the system will be able to send messages to the new user if the appropriate fields were filled in.

2.10.2 Editing a User

User Details can be modified after the User has been added to Link.
To modify the details of a user, select the user from the User Name list and click the Modify button  . The User Details fields be enabled and can be edited.

When all the required details have been modified, click the Save button  .

2.10.3 Changing a user's Password

Click to select the user in the User Name list and then click on *Alter Password*. The *Change Password* dialog will appear requesting the new password. Type in the old password, the new password, type the new password again (in the *Confirm* box), and click *OK* to save the new password.

2.10.4 User communication settings

The User Details section is where you enter in information about the user.

 **Send Email**

Checking this option enables automatic email notification of alarms. This means that the user will be sent alarm information via email, for all alarms that are auto-notify enabled, when the alarms are received by Link.

See Configuring Alarms 76 for enabling auto-notify by alarm type.

 An email address must be entered if you check the *Send Email* option.

 **Send SMS**

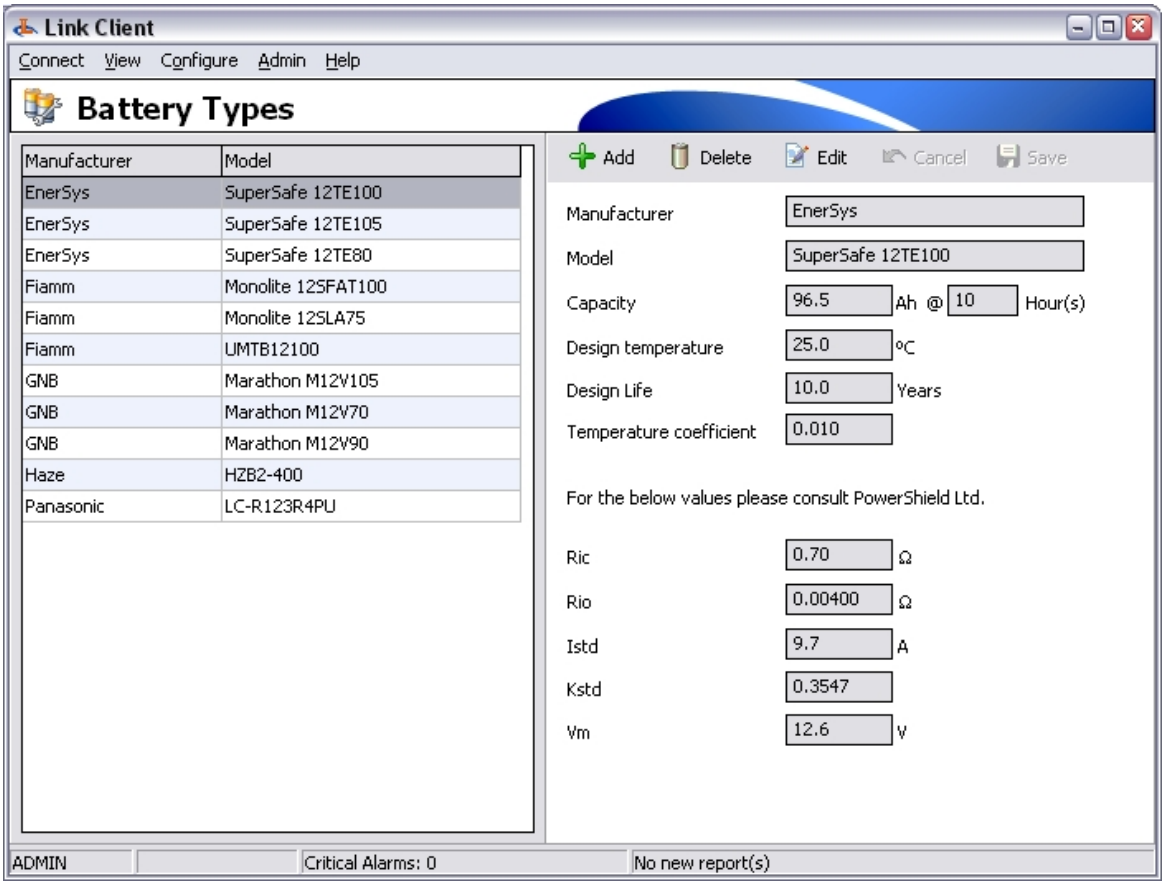
Checking this option enables automatic SMS notification of alarms. This means that the user will be sent alarm information via an SMS text message, for all alarms that are auto-notify enabled, when the alarms are received by Link.

See Configuring Alarms 76 for enabling auto-notify by alarm type.

 A mobile phone number must be entered if you check the *Send SMS* option.

2.11 Battery type management

The *Battery Types* page allows you to manage the type of batteries in use at your sites. The battery type information is used for battery life prediction calculations.



Add Battery Type

To add a Battery Type click the 'Add' button and the fields will now become active.
The fields that you can edit for each battery type are:

- **Manufacturer -** The manufacturer of the battery
- **Model -** The model of the battery
- **Capacity -** The Amp Hour rating and the rate at which this is specified. Most batteries are rated at a 10 hour rate. In the above example the battery is rated to supply 9.65 A for 10 hours before its voltage will drop to 10.5 Volts (fully discharged).
- **Design temperature -** The design temperature of the battery as specified in the manufacturer's data sheet for this battery type. This is the temperature at which the capacity and design life are specified.
- **Design Life -** The design life of the battery as specified in the manufacturer's data sheet for this battery type.
- **Temperature coefficient -** This is the fraction of the design life by which the life of the battery is reduced for each °C increase in the average temperature of the battery. Use a value of 0.01 if you cannot obtain this figure from the manufacturer's data sheet for this battery type.

For parameters Ric, Rio, Istd, Kstd, Vm please contact PowerShield.

Edit Battery Type

To edit an existing battery type, click on the 'Edit' button .
Edit the existing settings as desired. Once you have finished modifying the details, click the 'Save' button to save your changes.

At any time before you have click the 'Save' button, you can click 'Cancel' to revert the settings back to the last saved configuration.

Making changes to a battery type will affect battery Life Prediction calculations for all sites that use this type of battery.

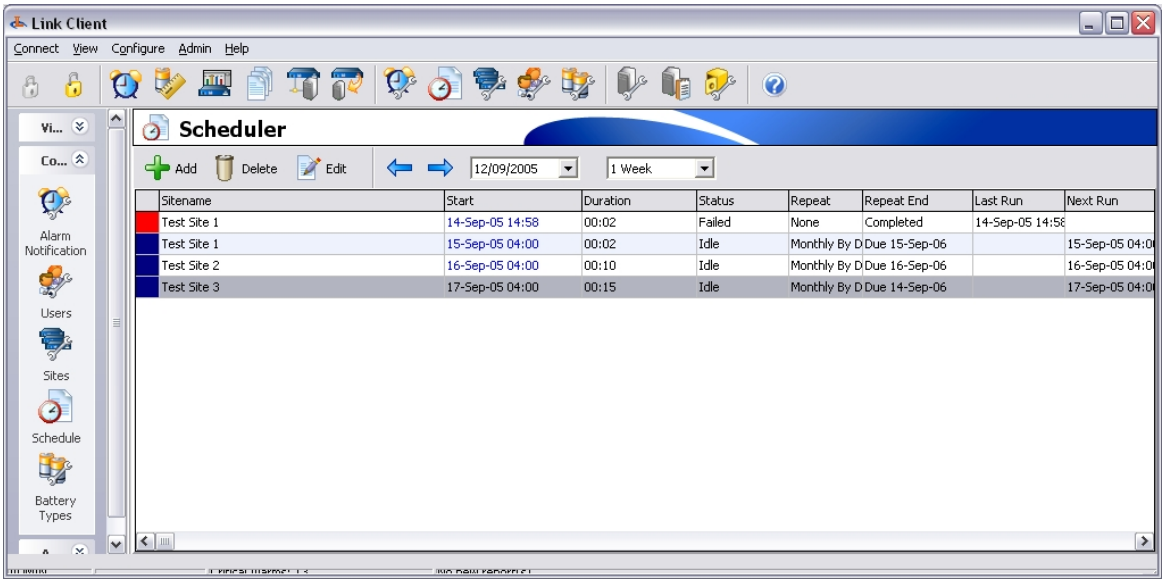
Delete Battery Type

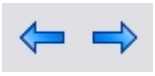
To delete a Battery Type, select the desired Battery Type and then click the 'Delete' button .

Only Battery Types that are not specified to be in use at sites are able to be deleted.

2.12 Schedule

The *Scheduler* allows you to schedule remote discharge tests. Remote discharge tests may be scheduled as a one off event in the future or on a repeated cycle.



The *Scheduler* displays all scheduled remote discharge tests, for all sites, over a specified period. The period is specified by setting the start date of the period in the date control at the top of the display and then selecting the length of the period (which may be 1 Day, 1 Week, 1 month or 1 Year). Use the  buttons to move the start date back, or forward, by one period.

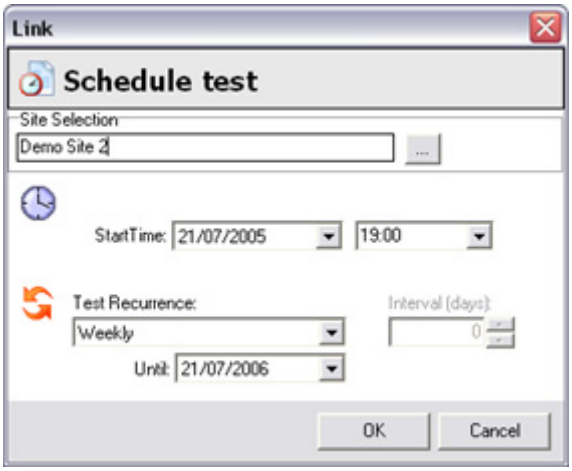
For each scheduled test listed the following fields are shown:

- **Sitename -** The name of the site for which the remote discharge test is scheduled.
- **Start** - The start time and date for the scheduled test.
- **Duration -** Duration (in hours and minutes) of the test.
- **Status -** Status of the test. This can be either *Idle* (the schedule time has not been reached and the test has not started yet), *Failed* (the schedule time has been reached but the scheduled test failed for some reason. Refer to the *Alarm status* page to find an alarm explaining why the test failed), or *In Progress* (the scheduled test is currently running).
- **Repeat -** The repeat pattern of this scheduled discharge test. See Adding a Battery Test 74 for a description of the possible repeat patterns.
- **Repeat End -** The time and date at which the repeat pattern will stop.
- **Last Run -** The last time at which the scheduled test ran.
- **Next Run** - The next time when the scheduled test will run.

 The PowerShield Battery Monitor needs to be configured correctly with the appropriate external hardware to accomplish a remote discharge test. Contact PowerShield for further details.

2.12.1 Adding a Battery Test

To add a battery test to the Link scheduler, click the 'Add' button  . The following window will appear:



Select the desired site, then specify the test start date and time. If you wish to make the test repeat on a regular basis, select a repeat pattern in the *Test Recurrence* drop down list and select an *End Date* for the chosen repeat pattern. Click *OK* to save the new scheduled discharge test.

The following repeat patterns are available:

- **None** - The test will run once at the start time.
- **Daily** - The test will run each day at the specified time.
- **Weekly** - The test will run each week, on the same day of the week, at the specified time
- **Monthly By Day** - The test will run each month, on the same day of the week. For example, if you have specified a start time and date that is 2.00 a.m. on the second Wednesday of this month, then the discharge test will run each month on the second Wednesday of the month at 2.00 a.m.
- **Monthly By Date** - The test will run each month, on the same day of the month. For example, if you have specified a start time and date that is 3.00 a.m. on the 12th of this month, then the discharge test will run each month on the 12th of the month at 3.00 a.m.
- **Yearly By Day** - The test will run each year on a day that is the same number of days from the start of the year as the start date.
- **Yearly By Date** - The test will run each year on the same date.
- **Custom** - The repeat interval can be specified by selecting the number of days using the *Interval (days)* field.

 The site discharge test limits for voltage and/or discharge test duration must be set separately using PowerShield Configuration software prior to scheduling tests in Link. The site must be configured for Automated tests. This can be using the Discharge Test Control 31 screen.

2.12.2 Editing a Battery Test

To edit an existing scheduled battery test, click on the 'Edit' button  .
Edit the scheduled test's settings as desired.

Once you have finished modifying the settings, click on the 'Save' button  to save your changes.

 At any time before you have clicked the 'Save' button, you can click 'Cancel'  to revert the settings back to the last saved configuration.

For more detail see Adding a Battery Test 74.

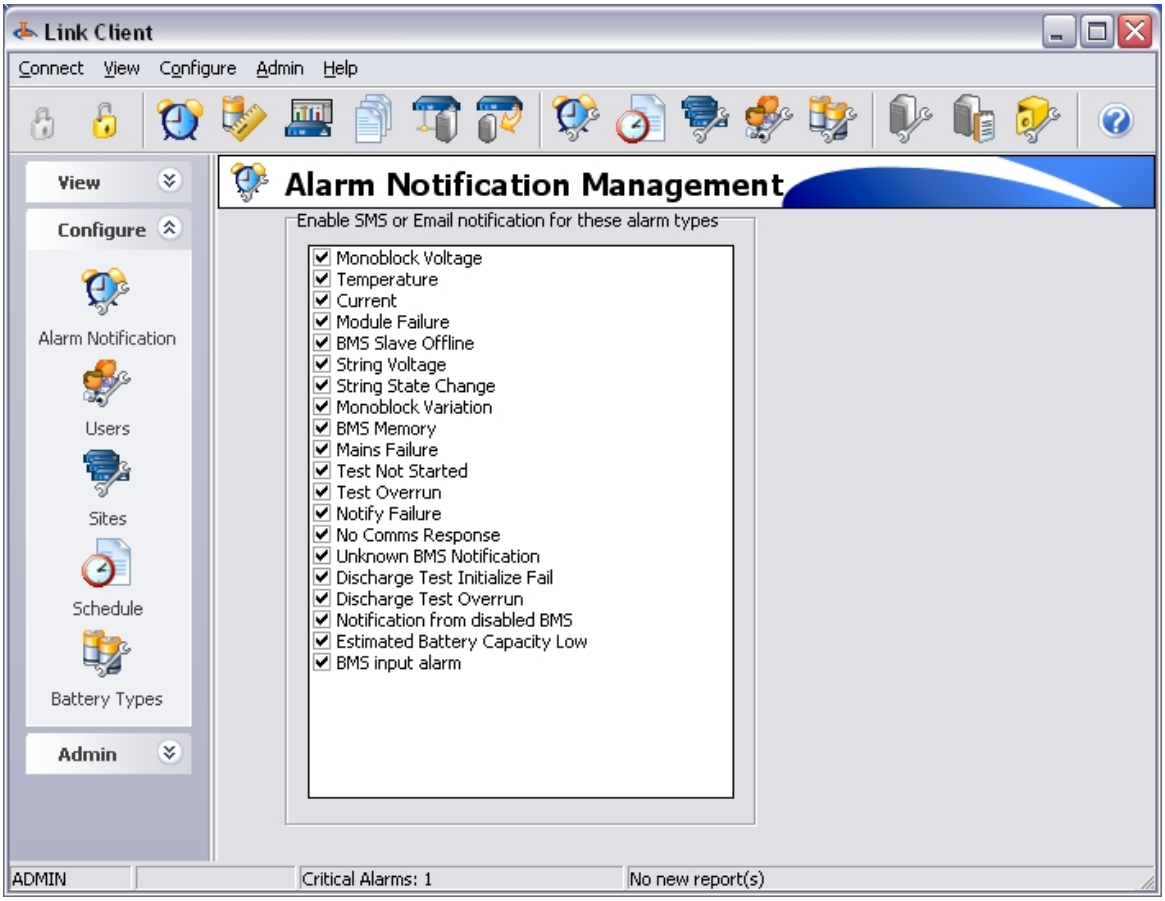
2.12.3 Deleting a Battery Test

To delete a scheduled battery test from the scheduler, select the desired test and click on the 'Delete' button  .

 Only tests in the 'Idle' state may be deleted. 'Finished', 'Failed', or 'In Progress' tests may not be deleted.

2.13 Alarm notification management

The *Alarm Notification Management* page allows you to configure the types of alarms that will cause SMS or Email messages to be sent to Users..



For each category of alarm you may either check the option (to enable SMS and email messages for that alarm type) or uncheck the option (to disable SMS and email messages for that alarm type).
When an alarm occurs, an SMS message is only sent to a user if that alarm type is enabled in the *Alarm Notification Management* screen and the user has the *Send SMS* option checked (see User communications settings 70).
When an alarm occurs an Email message is only sent to a user if that alarm type is enabled in the *Alarm Notification Management* screen and the user has the *Send Email* option checked (see User communications settings 70).

SMS and Email can be enabled or disabled for the following categories of alarms:

- **Monoblock Voltage** - Monoblock voltage not within the monoblock voltage limits.
- **Temperature** - String temperature not within the limits.
- **String Current** - String current not within the limits.
- **String Voltage** - String voltage not within the limits.
- **Monoblock Variation** - The maximum variation between monoblock voltages on a string has exceeded the limit.
- **String State Change** - String has changed state to Discharge, Charge or Float.

- **Mains Failure** - Mains failure alarm (mains detect contact open).
- **BMS input alarm** - Any input alarm on a battery monitor.
- **Estimated Battery Capacity Low** - The estimated remaining battery capacity, calculated from the discharge data just downloaded, is below the alarm limit.
- **BMS Memory** - Battery monitor memory alarm. Any of "Memory Format", "Memory Low", "Memory Full" or Long Term Memory Low", "Long Term Memory Full" alarms.

- **Test Not Started** - A remote discharge test "failed to start" alarm.
- **Test Overrun** - A remote discharge test overran the time limit.
- **Discharge Test Initialize Failure** - The schedule failed to start a scheduled discharge test.
- **Discharge Test Overrun** - A scheduled discharge test was still running after it should have completed.

- **Notify Failure** - A battery monitor failed to send an alarm to Link.
- **No Comms Response** - Link could not contact the specified battery monitor.
- **Unknown BMS Notification** - Alarm notification received from a battery monitor that has not been configured in Link.
- **Notification from disabled BMS** - Alarm notification received from a battery monitor that has been disabled in Link
- **Email Transmission Failure** - Link failed to send an email for an alarm.
- **SMS Transmission Failure** - Link failed to send an SMS for an alarm.
- **Module Failure** - A module has stopped responding.
- **BMS Slave Offline** - A slave battery monitor (in a Master/Slave system) has stopped responding to the Master.

3 Configuration

3.1 LinkClient setup for Server Edition

To install a LinkClient on a different computer from the LinkServer, additional configuration is required. The LinkClient and LinkServer communicate via TCP/IP. The LinkClient needs to be configured so it knows how to connect to the LinkServer.
Before attempting the configuration please make sure you have the LinkServer computer IP address or IP host name.

Example:
IP address 192.168.1.2
IP host name OfficePC1
Also make sure that the LinkClient PC and LinkServer PC are on the same network without any restrictions.

To configure the LinkClient PC, perform the following steps:

Step 1
Install LinkClient on the computer with the standard LinkClient installation from the CD

Step 2
Open *LinkClient.ini* file with a text editor

Step 3
Modify the values for parameters *SERVER_HOST* and *SERVER_PORT*.

Example

[SERVER]
SERVER_HOST=**OfficePC1**
SERVER_PORT=**14000**

Set *SERVER_HOST* to the LinkServer computer's IP address or IP host name.

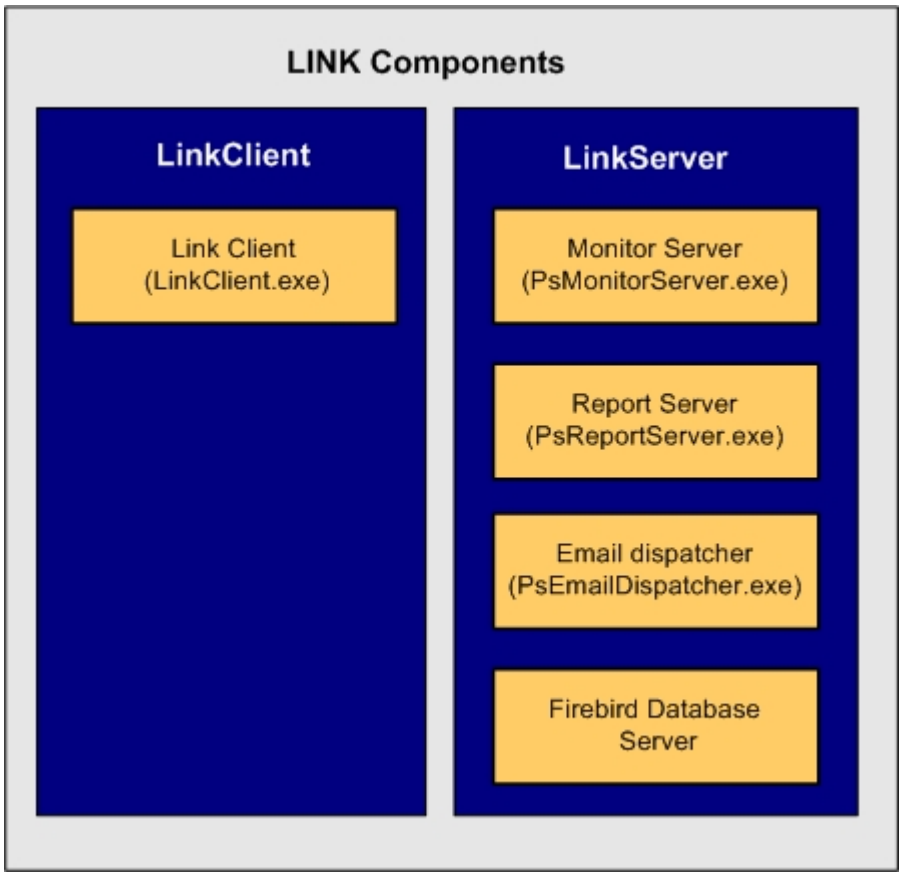
Set *SERVER_PORT* to the LinkServer port number.
LinkServer is installed with the default port number of 14000. If the LinkServer configuration has been altered, check the *SERVER_PORT* parameter value in the *PsMonitorServer.ini* file and enter this.

Step 4
Save the file and run LinkClient.

Step 5
Login as normal.
Note that performance will be dependent on the network between the LinkClient computer and the LinkServer computer.

3.2 Link components

Link is made up of several programs, grouped as follows.



LinkClient

The LinkClient program is the user interface to Link and is a Windows GUI (Graphical User Interface) program.

LinkServer

The LinkServer software runs continuously in the background and is not a visual program. The LinkServer is made up of 4 non visual programs that are Windows Services. That means the programs will run continuously and independent of Windows User login.

The LinkServer programs are:
1. Monitor Server
2. Report Server
3. Email Dispatcher
4. Firebird Database Server

As the programs are not visual programs, their configuration is through ini files. Components 1-3 are LinkServer programs written by PowerShield, the Firebird Database Server is a standalone product and its configuration is not covered by this help file. However there should be no reason for altering the Firebird Server as it is automatically installed and configured by the LinkServer installation program.

1. Monitor Server

Monitor Server is responsible for the following tasks:

- Responding to LinkClient requests
- Managing battery monitors
- Sending and retrieving data from the Firebird Database Server

The LinkClient and Monitor Server communicate via TCP/IP. The Monitor Server communicates via a range of communication interfaces with the battery monitors. The protocol used between the Monitor Server and the battery monitor is Modbus ASCII.
The Monitor Server sends requests to the Report Server via the Database Server. To send requests to the Email Dispatcher it saves files into the Link Email drop folder.
For configuration details see PsMonitorServer.ini file.

2. Report Server
Report Server generates the reports requested by the Monitor Server. The Report Server receives its requests via the Firebird Database. The Report Server launches the appropriate report executable which produces a file. This file is stored in a folder known to the Monitor Server which reads and sends the Report to the LinkClient.
For configuration details see Reports.ini file.

3. Email Dispatcher
Email Dispatcher sends text files to the configured SMTP email server. The Email Dispatcher monitors the Link Email drop folder on a regular basis, the moment it finds a text file it will process the file and attempt to send it. The format of the email file is specific to Link and for details regarding the verification of the configuration see Verify Email settings.
For configuration details see PsEmailDispatcher.ini file.

4. Firebird Database Server
This program is the Database server for Link. The name of the database file is *Link.gdb* and is located as specified in the *PsMonitorServer.ini* file. By default the location is *C:\Program Files\PowerShield\Link Server\Database*.
NOTE: Do not copy the *Link.gdb* file while the Firebird Server is running because it is managing the file. To backup the database go to the Database Backup 82 procedure.

Firebird is an SQL database server utilising modern reliable database techniques.
For further details go to http://www.firebirdsql.org

3.3 Email Test

By sending a test email, the email settings can be verified.

Step 1

Check that the Email Dispatcher program is running with the LinkServer Program Controller 96 or Windows Services program.
Browse with Windows File Explorer to the Link email drop folder. By default this folder is *C:\Program Files\PowerShield\Link Server\EmailDropFolder*.

Step 2

Copy the file "MailTest.txt" and rename it to "MailTest1.txt".
Open "MailTest1.txt" file with Notepad or your preferred text editor.

Step 3

Enter all the parameters marked in blue and save the file.

FromName = **<sender name>**
From = **<sender email address>**
To = **<recipient email address>**
Subject = **<Email subject>**

Example

FromName = LinkServer
From = link@powershield.co.nz
To = someone@alarmprocessing.com
Subject = Link Email Test
Attach =
Location: Demo Site
Test Alarm

Details
=======
Test Email

Step 4

Copy the "MailTest1.txt" file and paste it into the Link email drop folder.
Verify the file appears in the email drop folder and monitor it for 15 seconds

Step 5

"MailTest1.txt" should disappear within 15 seconds. If not, go back to step 3 and double check the mail test file.
Depending on the SMTP email server settings and the recipients email client settings, check for the email.

See PsEmailDispatcher.ini file settings to enable more detailed logging for diagnostics.

3.4 Database backup/restore

3.4.1 Backup

To backup the Link database a utility program is provided in the LinkServer folder called DBBackup.exe.
If Link is installed with all the defaults do the following:

Step 1
Open Windows File Explorer and browse to C:\Program Files\PowerShield\Link Server or open the Windows Start menu and navigate to the PowerShield menu.

Step 2
Run DBBackup.exe.

Step 3
With Windows File Explorer browse to c:\program files\powershield\link server\backup.

Step 4
Open the backup log file <DDMMMYY>_Backup.log with Notepad or alternative text editor.

Step 5
Check the end of the log for backup completed successfully "Backup duration " entry and check for database backup file called <DDMMMYY>LinkBackup.gbk
Example
Log file name *06FEB05_Backup.log*
Database file name *06FEB05_LinkBackup.gbk*

Installations with modified paths
The DBBackup program uses 2 ini file parameters to backup, the parameters are located in the file PsMonitorServer.ini.
[SERVER]
DATABASE = <database file path>
BACKUP PATH= <database backup file path>

Example
Link Database and backup in the default locations of c:\program files\powershield\link server\database and \backup.

PsMonitorServer.ini file
[SERVER]
DATABASE = *c:\program files\powershield\link server\database*
BACKUP PATH= *c:\program files\powershield\link server\backup*

Check the PsMonitorServer.ini file parameters and follow the standard backup procedure.

3.4.2 Restore

To restore the Link database a utility program is provided called DBRestore.exe. The only reason for doing a restore is when the Link database is corrupted.

To restore a Link database you need a Link Database backup file. For the default configuration the backup will be located in the Backup folder under LinkServer and with a file extension of .gbk. Example *06FEB05_LinkBackup.gbk*
The database restore creates a new database and restores all the data from the backup file into it therefore the corrupted Link database file needs to be removed.

Restore procedure is as follows:

Step 1

Run PSL Services Controller.exe from C:\Program Files\PowerShield\LinkServer and the program should appear as below.

Step 2

Stop the Monitor Server, Email Dispatcher, and Report Server by clicking on the appropriate Stop buttons. The programs may take up to 10 seconds to stop. LinkServer Program Controller should then look as follows:

Step 3

Enter the Link backup filename in the DBRestore.ini. Enter filename in the *[GENERAL]* section parameter *Filename.*
Example

[GENERAL]
Filename=*06FEB05_LinkBackup.gbk*

Step 4
Run DBRestore.exe.

Step 5
To check that the restore was successful locate the *Link.gdb* file in *C:\Program Files\PowerShield\Link Server\Database*. If the Link database file has not been created then check the restore log which will be located in *C:\Program Files\PowerShield\Link Server\Backup*.

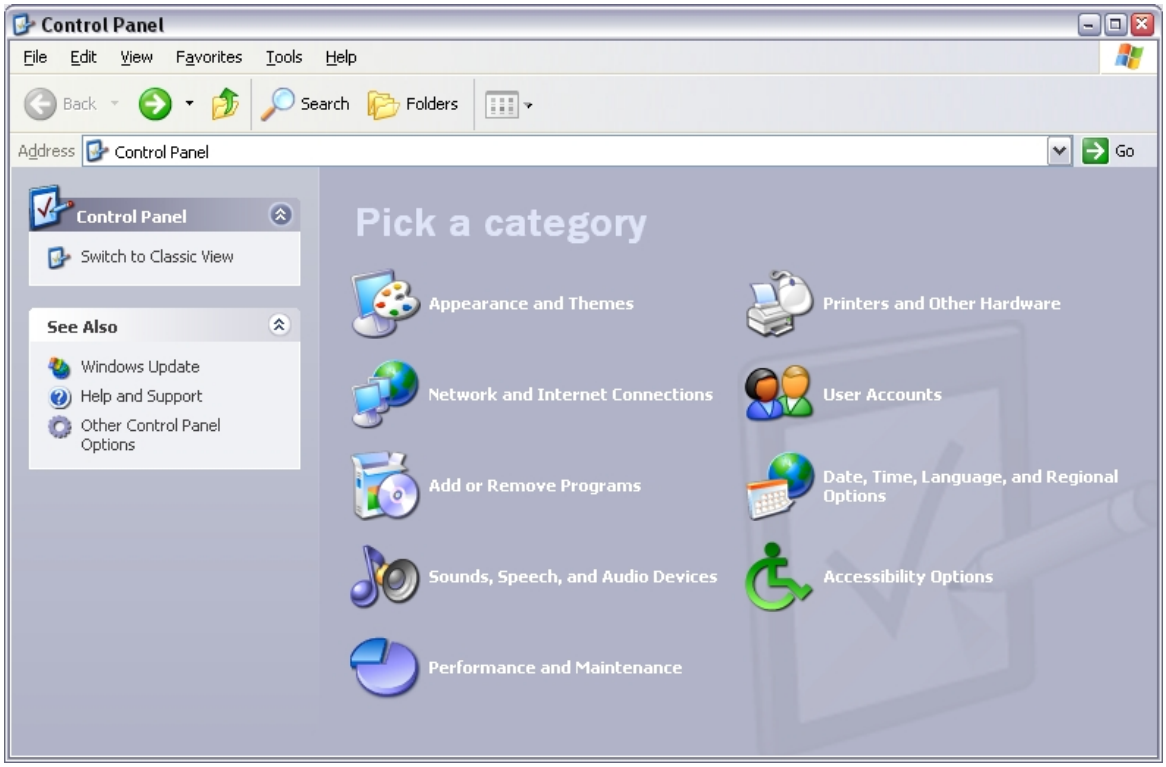
Step 6
Start the Link Server programs with the LinkServer Program Controller by clicking the start button for all the LinkServer programs.

3.4.3 Schedule backup

To create a regular backup of the Link database, the DBBackup program has to be run. This can be done by creating a task in the Windows Scheduler as follows:

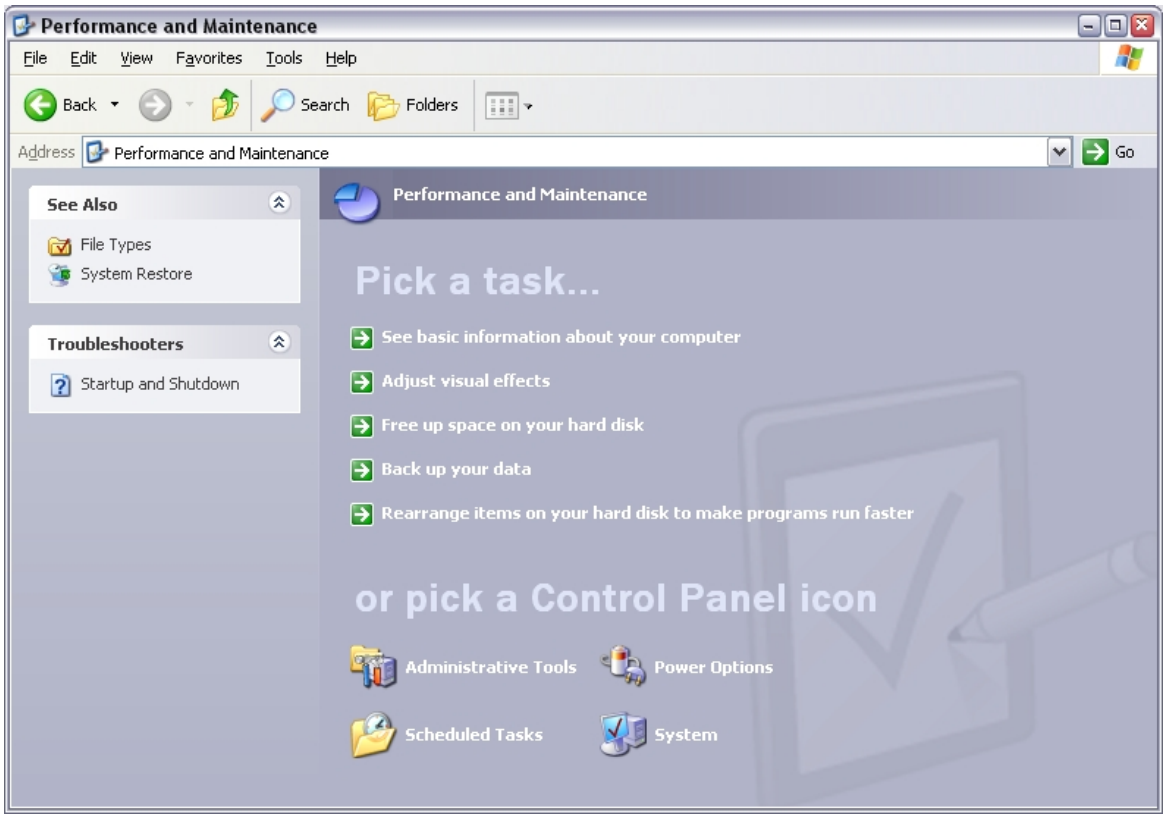
Step 1

Go to the Windows Control Panel.

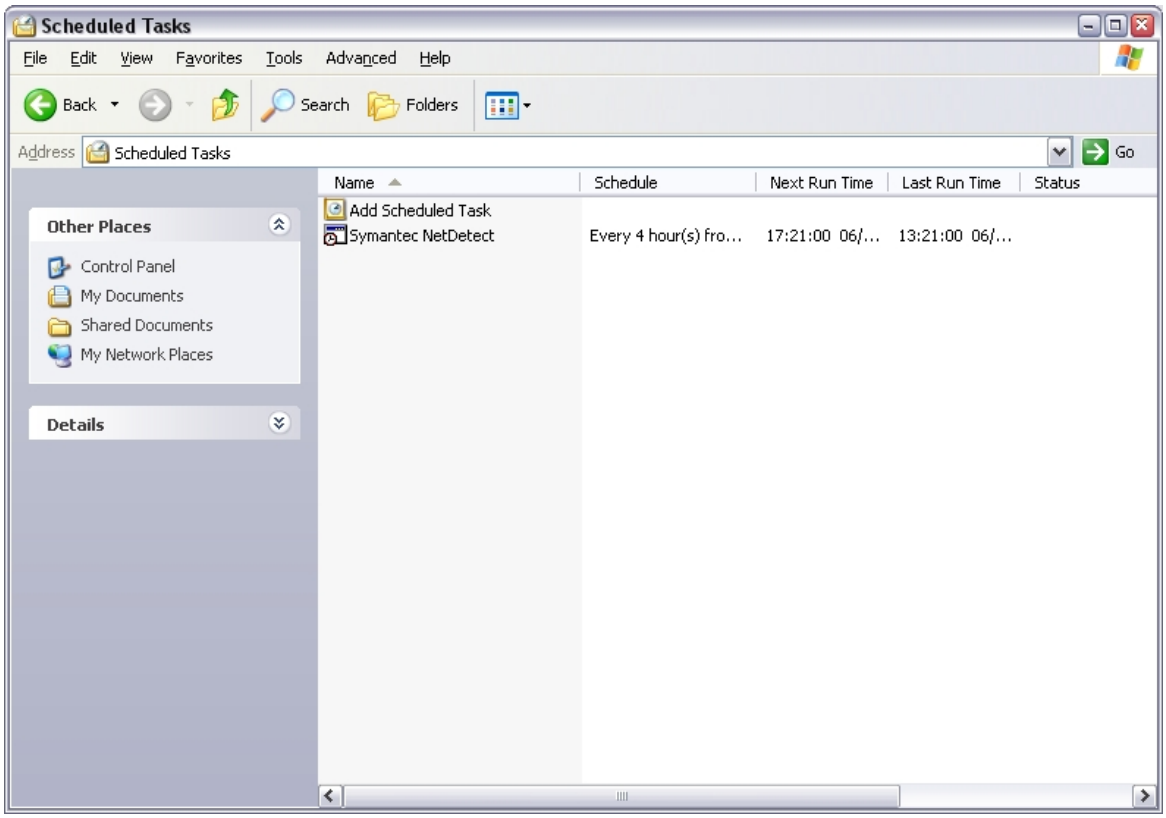


Step 2

Select "Performance and Maintenance"

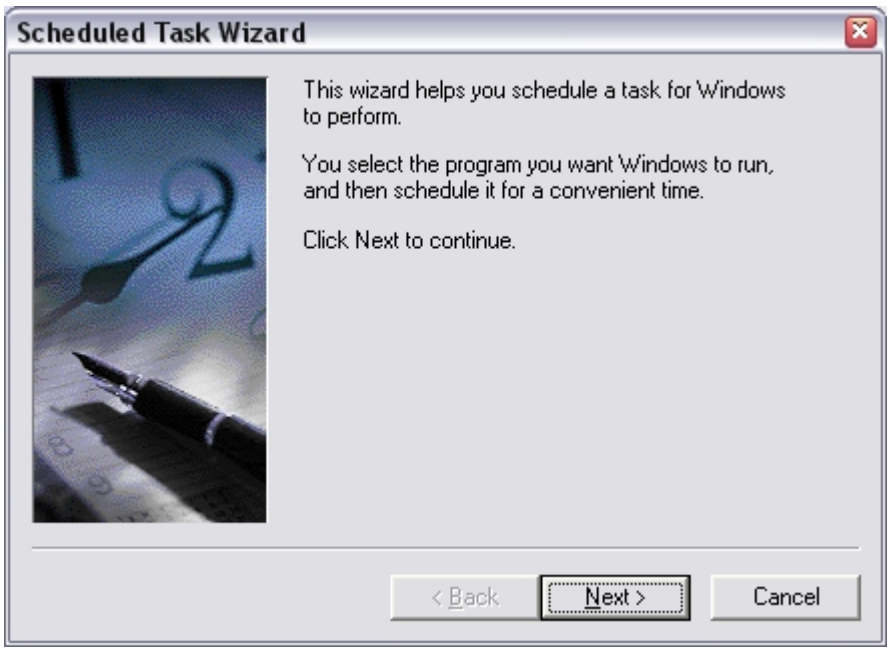


Step 3
Select "Scheduled Tasks"



Step 4

Double click "Add Scheduled Task" and the following dialog will appear.

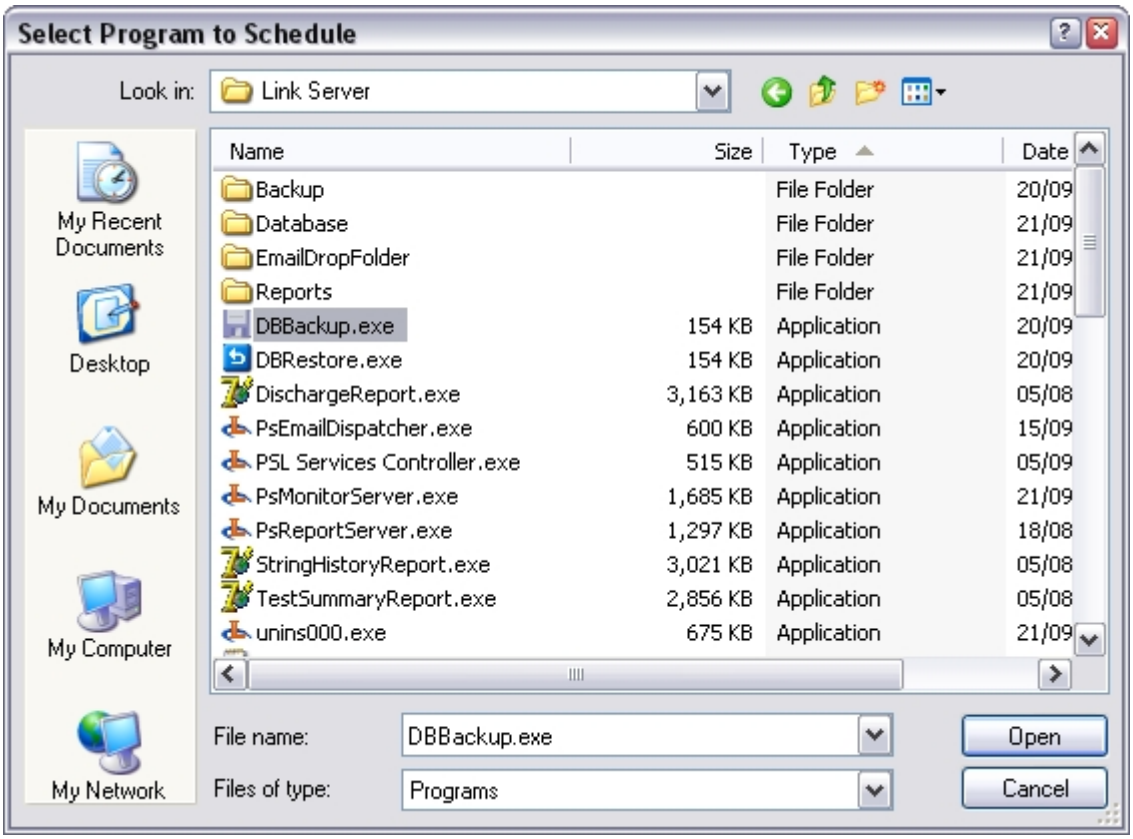


Step 5

Click "Next"

Step 6

Click "Browse" and for a default Link install go to *c:\program files\powershield\link server* and select "DBBackup.exe" and click "Open"

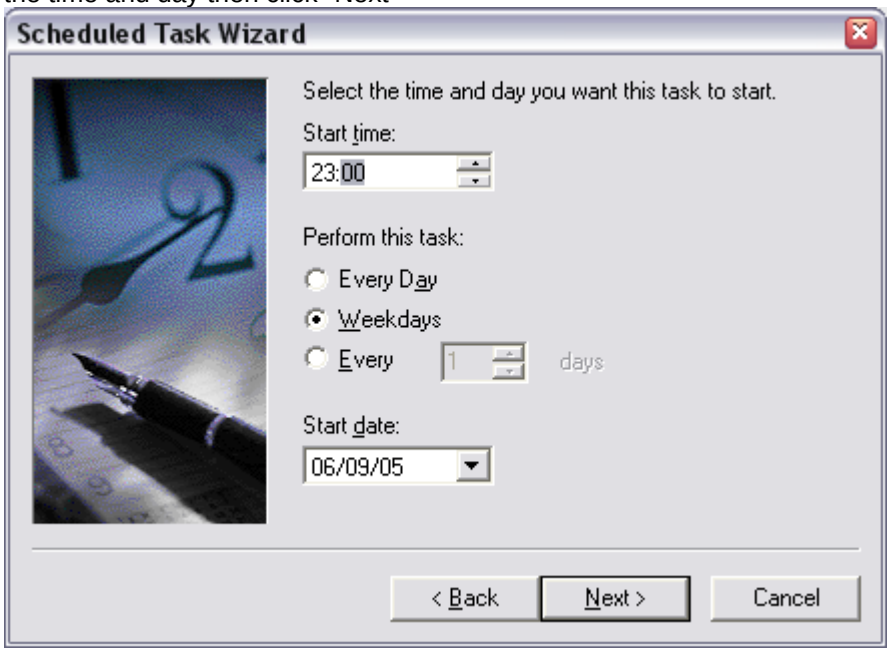


Step 7

Set the task name and its occurrence, then click "Next"

Step 8

Set the time and day then click "Next"

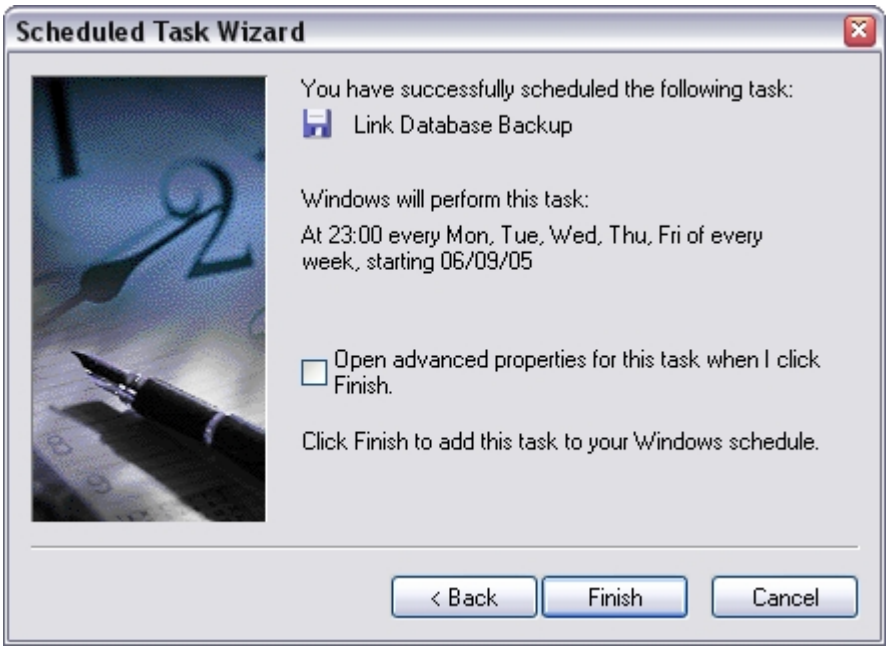


Step 9

Enter the Windows account details that the task is to use. This can be your own login information or a specific account on the Computer. See your Network Administrator for details if you are not sure what details to enter.
Then click "Next"

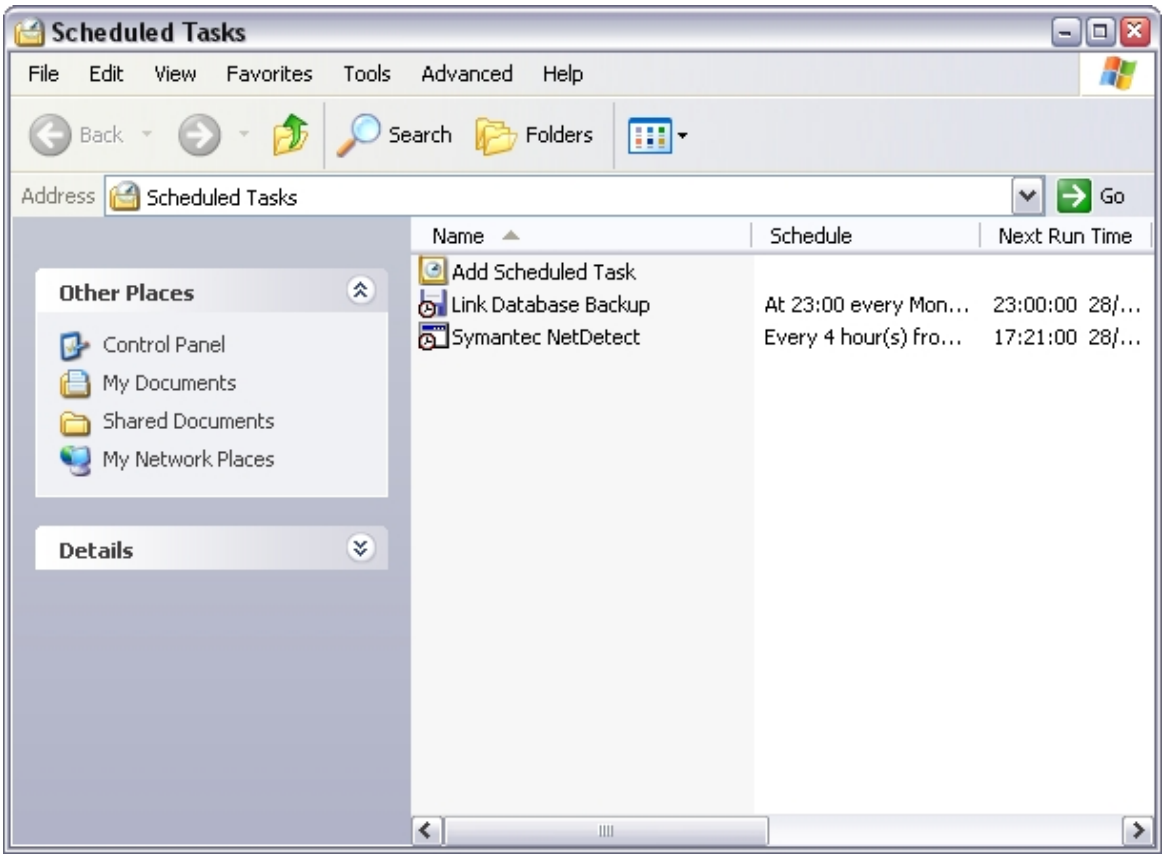
Step 10

Check the details of the time, day and interval. Then click "Finish"



Step 11

The "Link Database Backup" scheduled task has been added and displayed in the screen below. The Link Database will now be backed up by the Windows Operating System as per the configuration.



3.5 LinkServer reports folder

The location where the LinkServer stores the reports is specified by the *Filepath* parameter in the *Reports.ini* file.

Default path is *C:\Program Files\PowerShield\Link Server\Reports*.

3.6 LinkClient reports folder

The LinkClient stores the reports from the LinkServer in a specific folder. By default the location is *C:\Program Files\PowerShield\LinkClient\Reports*.
To change the LinkClient reports folder modify the *Path* parameter under the *[REPORTS]* section in the *LinkClient.ini* file.

Example

[REPORTS]
Path=**C:\Reports\Batteries**

3.7 Changing database location

The location of the Link database is defined in two locations for the LinkServer. PsMoniterServer.ini and Reports.ini file.
To modify the database location perform the following procedure:

Step 1
Stop PsMonitorServer and PsReportServer with Link Server Program Controller.

Step 2 Modify Ini files
PsMonitorServer.ini file section [SERVER] parameter DATABASE
Default is DATABASE=*C:\Program Files\PowerShield\Link Server\Database\Link.gdb*

Reports.ini file section [MAIN] parameter DATABASE
Default is DATABASE=*C:\Program Files\PowerShield\Link Server\Database\Link.gdb*

NOTE the ini files need to have the same path for the database.

Step 3
Move the Link database file *Link.gdb* to the new location specified in Step 2.

Step 4
Start PsMonitorServer and PsReportServer with Link Server Program Controller.

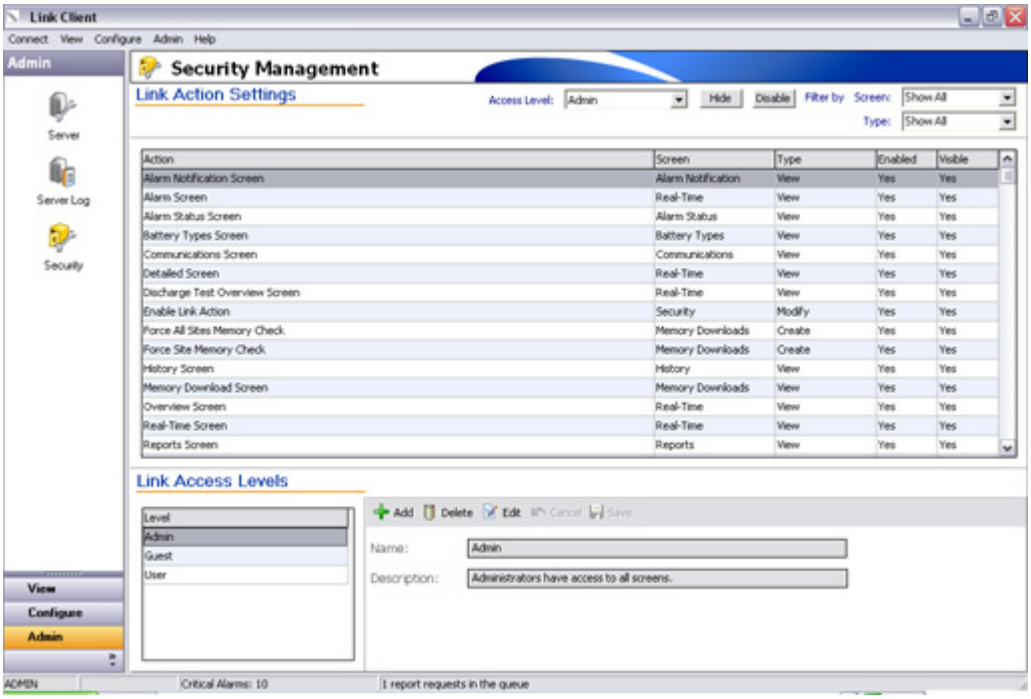
3.8 Security Management

The *Security Management* page allows you configure the security settings for Link.
The security in Link works by having an access level for a user. The access level is a group of settings which determine whether a user can access a particular screen or a particular task.
By default the system is installed with 3 access levels called Admin, Guest and User.

- Admin level has full access
- User level has access to the View and Configure menu
- Guest level has access to the View menu

The Security Management screen by default is only accessible by the Link Admin user.

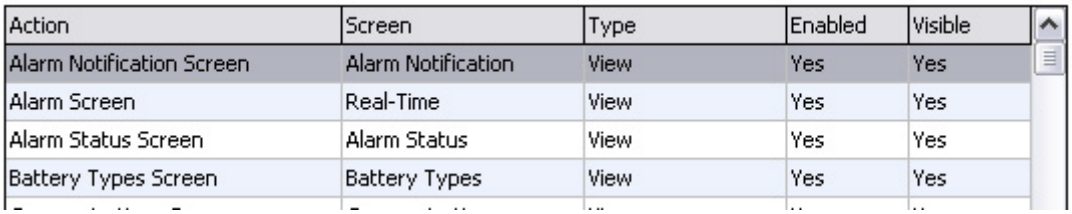
If the provided access levels do not meet your requirement you can either edit an existing user access level or create a new one.
Go to Access Levels 95 for details.
Go to Action Settings 94 for task or form access configuration.



3.8.1 Action Settings

To access the security management screen login into Link as the Admin user.

Example of *Link Action Settings* is shown below.



Action	Screen	Type	Enabled	Visible
Alarm Notification Screen	Alarm Notification	View	Yes	Yes
Alarm Screen	Real-Time	View	Yes	Yes
Alarm Status Screen	Alarm Status	View	Yes	Yes
Battery Types Screen	Battery Types	View	Yes	Yes

Action
Description of Action.

Screen
Screen name

Type
Task type of setting View, Modify, Create and Delete.

Enabled
Controls whether the user can execute the task or access the screen.

Visible
Controls whether the user can see the task or screen.

The Action Settings list can be filtered by using the Screen and Type drop down controls.

To modify a Link Action Setting do the following:

Step 1
Select the Access Level you want to modify

Step 2
Select the Setting you want to modify in the Action list

Step 3
Modify the Enabled or Visible properties by clicking the appropriate Enable or Visible button.


By making an action invisible it will no longer appear in the top toolbar or in the menus. However it will still appear in the 'Outlook Toolbar'.

3.8.2 Access Levels

Each user is assigned an Access Level. Each Access Level is assigned specific settings in the Security Management screen.

By default any user with the Access Level 'Admin' has access to all actions. Users with the Access Level 'User' have access to the View and Configure actions. Users with the Access Level 'Guest' only have access to the View actions, and are unable to make changes to the configuration of Link and the PowerShield Battery Monitors.

3.8.2.1 Adding an Access Level

To add an Access Level click on the 'Add' button .

Once you have added an Access Level you can configure the Action Settings 94 for the Access Level by selecting it and then enabling the actions you wish to allow users with this Access Level to be able to do. Once you have done this you can assign the Access Level to a User in the Users 68 screen.

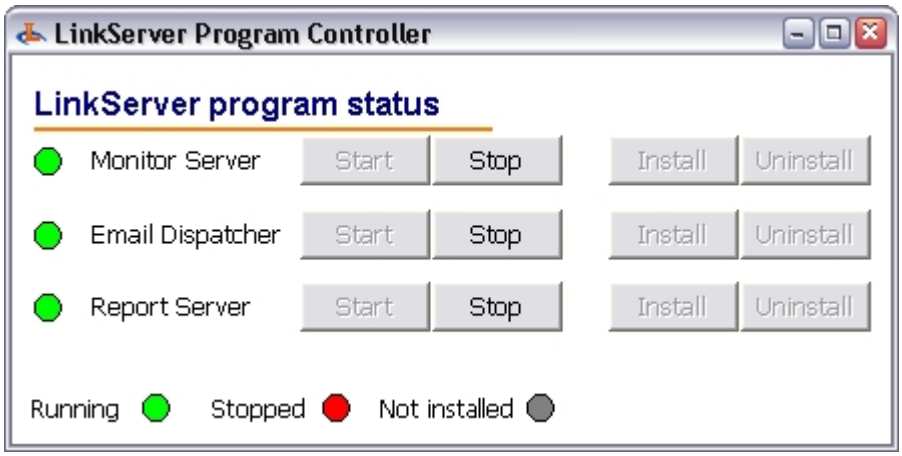
Ensure that the Access Level has a unique name.

3.8.2.2 Deleting an Access Level

To delete an Access Level, select the desired Access Level and then click Delete. Only Access Levels that are not assigned to a user can be deleted.

3.9 LinkServer Program Controller

LinkServer Program Controller shows the status of the LinkServer programs and allows the stopping, starting, installing and uninstalling of LinkServer programs.
The program by default is located in *C:\Program Files\PowerShield\Link Server\PSL Services Controller.exe*.



See Link components 79 for details on LinkServer programs.

Starting and Stopping LinkServer programs

Click the appropriate button to stop or start a program. Note the programs may take up to 10 seconds to stop or start.

One of the reasons for stopping and starting a program is to apply the changes made to an ini file. By stopping one or more of the programs, Link will stop operating and it is important not to leave any of the LinkServer programs in the stopped state.

Install and Uninstalling LinkServer programs

Click the appropriate button to Install or Uninstall a program. Note the programs may take up to 10 seconds to uninstall.

The only reason for uninstalling and installing a LinkServer program is to manually update an executable, which must be under the instruction of PowerShield or a PowerShield distributor.

Do not uninstall a LinkServer program unless there is a very good reason to do so.

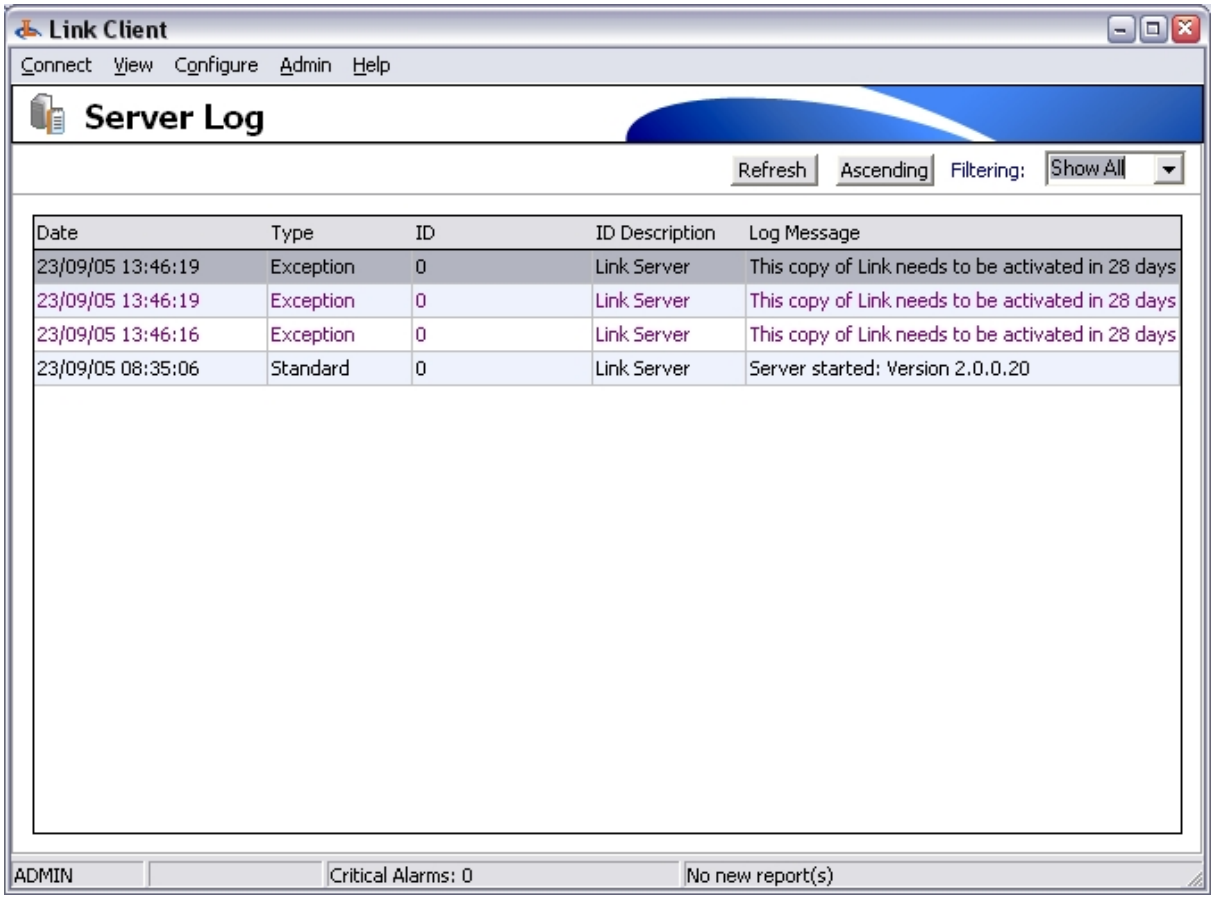
3.10 Server Log Screen

The *Server Log* screen allows you to view the most recent log statements in the Monitor Server log file.

The Monitor Server creates a log file and makes entries into the file to record the status of events and errors. A new Monitor Server Log File is generated for each new day in the same directory as the PsMonitorServer.exe. The files are named "PsMonitorServer *DATE*.log", and can be opened with any text editor (such as Notepad or MS Word) as well as being imported into a spreadsheet program such as MS Excel (the log files are stored in CSV format).

To change the logging settings go to Monitor Server Settings 98.

Server Log Screen



The Server Log screen does not automatically refresh, so to get the latest messages click the *Refresh* button.

Sorting the log

The log can be sorted into Ascending or Descending order by clicking the *Ascending* button. This will toggle the sorting.

Filtering the log

Log Statements are categorised into groups and can be filtered by selecting an item in the Filtering drop down box.

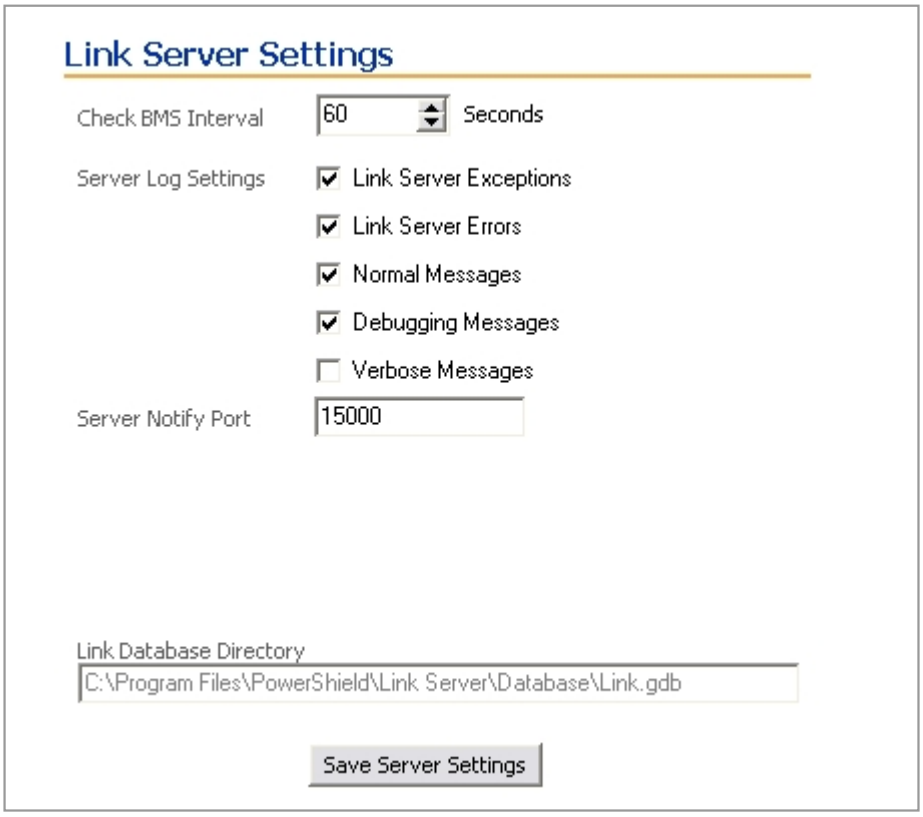
The Link Server Log Categories:

- Link Server Exceptions
- Link Server Errors
- Normal Messages
- Debugging Messages
- Verbose Messages

3.11 Server Settings

The *Server Configuration* page allows you to configure some of the LinkServer settings and Email settings.
There are 2 ways of activating changes made in the *Server Configuration* screen, either by rebooting the computer or stopping and starting 96 the LinkServer programs.

Link Server Settings



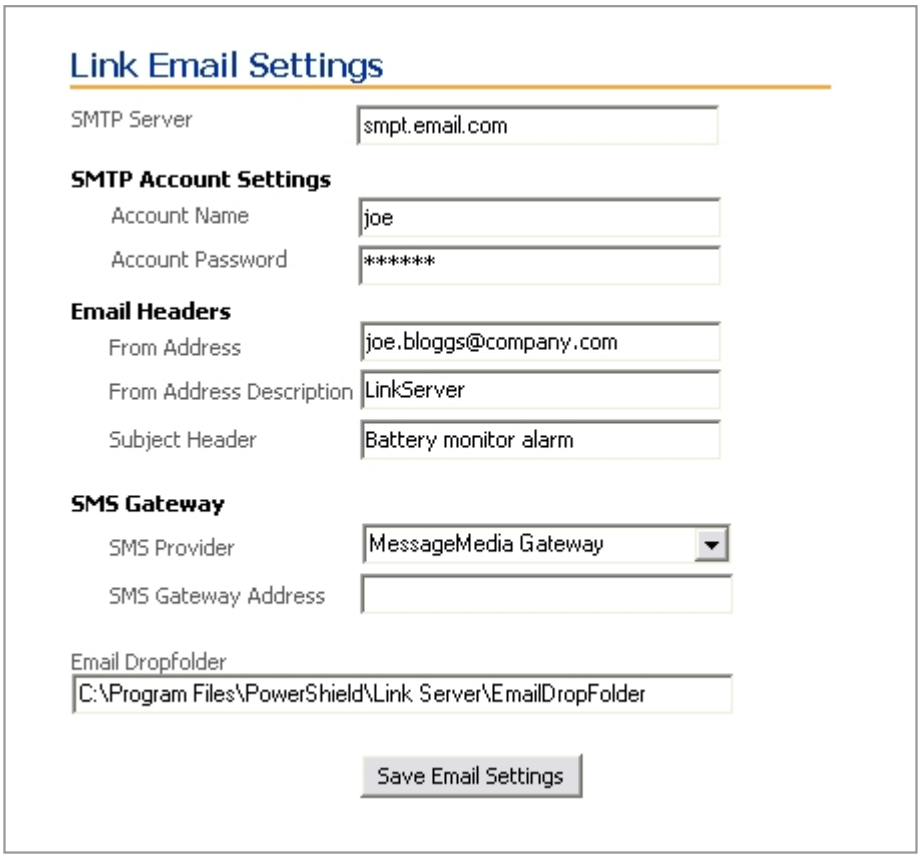
Check BMS Interval - This is the period at which Link will check the communications link to the battery monitor(s).

Log File Settings - These settings determine what kind of statements are recorded in the Monitor Server log file.

Server Notify Port **-** This is the port that the LinkServer will listen to for notifications messages from battery monitors connected via Lantronix ETS console server(s). This must match the settings of the adapter(s). This settings is only applicable when using the Lantronix ETS models.

Link Email Settings

To test the email settings go to Verify Email settings 81.



SMTP Server - SMTP email server IP address or IP hostname.

SMTP Account Settings

Account Name **-** SMTP user account name.
Account Password **-** SMTP user account password.

Email Headers

From Address **-** Email address of the SMTP account that the email will come from.
From Address Description **-** Email address description that appears in the From field of an email.
Subject Header **-** Email subject

SMS Gateway

Sending of SMS messages is done via an SMTP email gateway. The email is in a format specified by the SMS email gateway service provider. The service provider receives the email and based on the information in the email converts the email to an SMS message and sends it to the specified mobile phone number.

To be able to use this feature an account is required with an SMS service provider and for more details go to the website of the preferred option Message Media. For the SMS to function properly correct SMTP settings are required.

SMS Provider **-** Select the SMS provider. MessageMedia is the recommended option.

SMS Gateway Address - When *Email Gateway* provider is selected you can specify the email address of the SMS gateway email address.

Email Dropfolder **-** The directory (or folder) that the Email Dispatcher monitors for emails to send to the SMTP server.

Email format details

Details of the 2 email formats generated by Link are shown below.

MessageMedia Email format

To:	Phone number
Subject:	Email subject
Body:	Email body

Example

To:	6420322510@pcsms.com.au
Subject:	Link Alarm
Body:	Site 1, Temperature alarm on String 1

Email Gateway format

To:	SMS gateway email address
Subject:	Phone number
Body:	Alarm message

Example

To:	sms_provider@messages.com
Subject:	6420322510
Body:	Link Alarm, Site 1, Temperature alarm on String 1

3.12 Link ini files

Link uses ini files to store some of its configuration. As Link consists of a number of components 79, each component has an ini file.
It is recommended that only advanced users modify the ini files, because if done incorrectly Link may stop functioning.

Component	Ini configuration file
LinkClient	LinkClient.ini 101
Monitor Server	PsMonitorServer.ini 103
Report Server	Reports.ini 106
Email Dispatcher	PsEmailDispatcher.ini 107

Note changes made to an ini file do not take affect until the program has been restarted.

Ini file format has a section, parameter and a parameter value. The name of a section is defined in brackets i.e. [SectionName]. The parameter and its value follow on the next lines. A section may have one or multiple parameters.

Example

```
[SERVER]
Database=C:\Link.gdb
```

Section = SERVER
Parameter = Database
Value = C:\Link.gdb

3.12.1 LinkClient ini

The Link Client has parameters that can be configured via the LinkClient.ini file. It is recommended that only advanced users edit the LinkClient.ini file.

Ini file sections are:

- Client Connection Settings 101
- Server Communication Settings 102

 If you change any values while LinkClient is running, a restart of LinkClient is required for the changes to take effect.

3.12.1.1 LinkClient.ini Connection settings

LinkClient.ini **[CONNECTION]** section parameters.

SITE_TIMEOUT
This determines the default Timeout value used when a new site is added to Link with the Site Management window. Timeout is the period of time that the LinkServer will wait for a reply from a battery monitor before generating an error condition.
Unit is milliseconds.

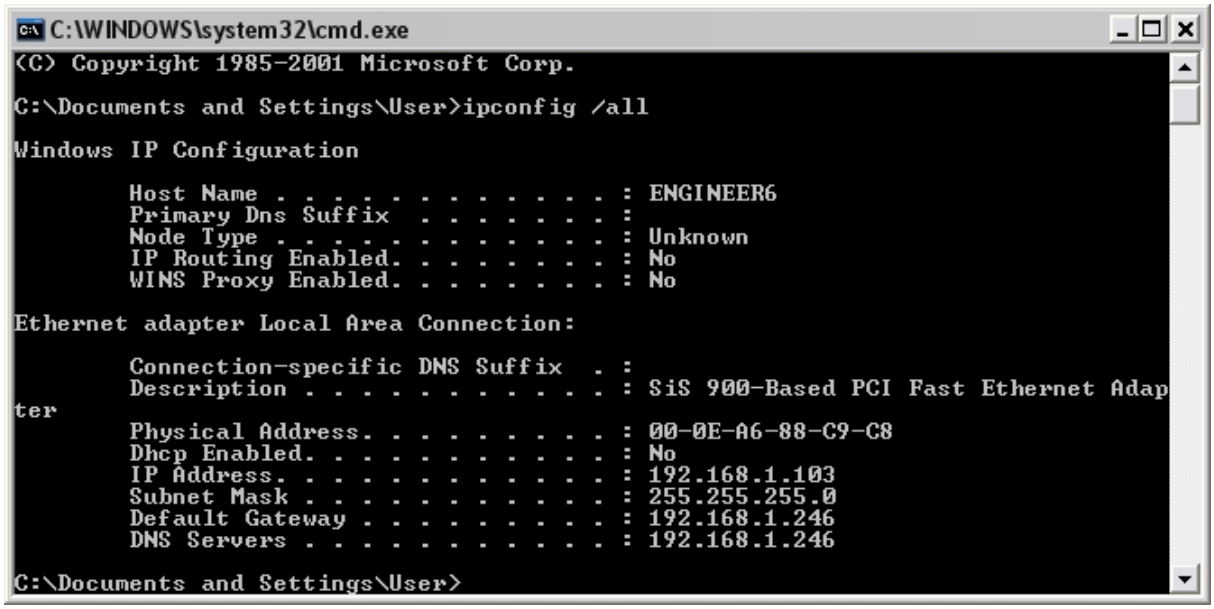
SITE_CONNECT
This determines the default Site Connect Timeout value used when a new site is added to Link with the Site Management window. Site Connect Timeout is the period of time that the LinkServer will wait to establish a connection with a battery monitor before generating an error condition.
Unit is milliseconds.

3.12.1.2 LinkClient.ini Server settings

LinkClient.ini **[SERVER]** section parameters.

SERVER_HOST
This value specifies the IP address or Host name of the machine that the LinkServer is run on. If you do not know the IP address or Host name of the LinkServer go to the computer and do the following:

1. Run the Windows *Command Prompt* via Start button > Programs > Accessories > Command Prompt.
2. Enter *ipconfig /all*
3. Output should be similar to the screen shot below



4. Host name is shown as the first value. In the above example Host name is ENGINEER6.
5. Enter the Host name into the LinkClient.ini file.

SERVER_PORT
This has to be set to the same value as used in the Monitor Server ini 103 file or LinkClient and LinkServer will not be able to communicate.

The Port number is user configurable in case an existing application on the Server or Client machines already uses the same port. It is important that the settings on the LinkServer machine and all of the LinkClient machines match.

LISTENING_PORT
The port number is for receiving notifications from the server.

The Port number is user configurable in case an existing application on the Server or Client machines already uses the same port. It is important that the settings on the LinkServer machine and all of the LinkClient machines match.

3.12.2 Monitor Server ini

The Monitor Server has parameters that can be configured via the PsMonitorServer.ini file. It is recommended that only advanced users edit the PsMonitorServer.ini file. Other users should make changes by using the System Configuration 98 windows.

Ini file sections are:

- Communications 103
- Email 104
- Log 104
- Server 105
- Directories 105
- License 105

 If you change any values while Monitor Server is running a restart is required for the changes to take effect.

3.12.2.1 MonitorServer.ini Communication Settings

PsMonitorServer.ini **[COMMUNICATIONS]** section parameters.

CHECKB1KLINK_INTERVAL
This setting determines the period at which Monitor Server tests the connection with the battery monitor(s).
Unit is seconds and default is 60 seconds.

ENABLE_SCHEDULEVPEVENTS
This setting determines if scheduled discharge tests are run by Monitor Server.
Unit is True/False and default is True.

3.12.2.2 MonitorServer.ini Email Settings

PsMonitorServer.ini **[EMAIL]** section parameters.

EMAIL_DROPFOLDER
This setting is determined by the LinkServer Installer on installation. It sets the folder that Monitor Server places email messages for the Email Dispatcher to send. If this folder does not match the folder that the Email Dispatcher is checking, Email and SMS messages will not be sent.

SMS_EMAIL_ADDR
This setting determines the SMS gateway address for Monitor Server to send SMS messages via.

MAIL_FROM_ADDR_DES
This setting determines the name that Monitor Server sends emails as.

MAIL_FROM_ADDR
This setting determines the Email address that Monitor Server sends emails as. Some SMTP servers will not allow you to send Emails unless a valid email address is specified.

MAIL_SUBJECT_HDR
This setting determines the subject header the emails that Monitor Server sends.
The default value is 'Link Server Alarm'.

3.12.2.3 MonitorServer.ini Log Settings

PsMonitorServer.ini **[LOG]** section parameters.

This section enables you to control the type of events that Link Server will log. This can be useful for diagnosis for system or network problems. Note that If all of the settings are switched on, the log files for a Link Server with a high level of activity will become relatively large. The amount of space used by the log files should be checked regularly and older log files that are of no interest should be deleted.

Message types:

- LogDebug
- LogException
- LogVerbose
- LogNormal
- LogError

Each Log parameter may be assigned a value of 0 or 1. 1 means enabled and 0 means disabled.

3.12.2.4 MonitorServer.ini Server Settings

PsMonitorServer.ini **[SERVER]** section parameters.

PORT
TCP/IP port number of the Monitor Server. This value has to match the port number in the Link Client INI file 101.

DATABASE
The directory path of the Link database.

BACKUP PATH
The directory path for storing Link database backups.

The following two settings are only applicable for systems that use the ETS series Lantronix communication adapters. This setting is not relevant if you are using a UDS10 or Sentinel Ethernet communication adapter.

NOTIFICATION_READ_TIMEOUT
This parameter is the period that the Monitor Server waits for data after a connection is made by the ETS server to the Monitor Server.
Unit is milliseconds.

SERVER_NOTIFY_PORT
This is the port number for receiving connections from ETS server(s). This has to match the ETS Lantronix Terminal Server 113 port configuration so notification messages are correctly forwarded from the battery monitor(s).

3.12.2.5 MonitorServer.ini Directories

PsMonitorServer.ini **[DIRECTORIES]** section parameters.

REPORTSERVER
Directory of the Report Server executable.

EMAILSERVER
Directory of the Email Dispatcher executable.

3.12.2.6 MonitorServer.ini License settings

PsMonitorServer.ini **[LICENSE]** section parameters.

CODE
Activation code. Go to Link Program Activation 13 for details for obtaining a code.

3.12.3 Report Server ini

The configuration file for the Link Report Server is Reports.ini file.

Ini file sections are:

- Main 101
- Report Types 102

If you change any values while Report Server is running a restart is required for the changes to take effect.

3.12.3.1 Reports ini Main section

Reports.ini **[Main]** section parameters.

DATABASE
The directory path of the Link database but requires 'localhost:' at the start.

FILEPATH
The directory path where generated reports are stored.

KEEPREPORTS
The duration reports are kept for.
Unit is days.

LOGO
Specifies the company logo displayed on all the reports.
File format is bitmap (.bmp).

3.12.3.2 Reports ini Report Types section

Reports.ini **[Report Types]** section parameters.

Type1
Path to Test summary report executable.

Type2
Path to Discharge report executable.

Type3
Path to String History report executable.

3.12.4 Email Dispatcher ini

The configuration file for the Email Dispatcher is PsEmailDispatcher.ini. For LinkServer to notify alarms via email or SMS it requires an SMTP compatible mail server for sending emails.

[SERVER] Section

DEBUG
Enable or disable detailed logging. Value is True or False.

DROPFOLDER
Directory the Email Dispatcher monitors for sending emails to the SMTP server.

MAIL_ACCOUNT_HOST
SMTP server IP address or host name.

MAIL_ACCOUNT_USER
SMTP user account name.

MAIL_ACCOUNT_PASSWORD
SMTP user account password.

 If you change any values while Email Dispatcher is running, a restart is required for the changes to take effect.

3.13 Communication Adapter list

Adapter address list.

LinkServer IP Address :

Network Adapter IP Addresses:

Adapter Name:	**IP Address :**
Adapter Name:	**IP Address :**
Adapter Name:	**IP Address :**
Adapter Name:	**IP Address :**
Adapter Name:	**IP Address :**
Adapter Name:	**IP Address :**
Adapter Name:	**IP Address :**

3.14 Link scalability

Link is scalable to installations with hundreds of battery monitors. Please contact PowerShield for assistance with these type of installations.
Scalability of Link is achieved through the LinkServer programs running on separate server computers.

Alarm detection schemes.
1. Polling
2. Event driven by battery monitor sending a notification message to raise an alarm

3.15 Battery monitor Settings

Configuring the Battery Monitor(s) requires Config, which is provided on CD.

Once Config is installed you will need to connect to each battery monitor and configure them. For further details regarding Config, see the separate Config manual, PowerShield p/n 6300-002.

Step 1 - Communication settings 109
Step 2 - Alarm settings 110
Step 3 - Alarm status 110

For remote discharge test configurations you need to do step 4
Step 4 - Test control settings 111

3.15.1 Communication

For Link to function correctly with a PowerShield battery monitor, the following settings need to be configured for the monitor. This is done using Config software.

Step1
Connect to the site with Config.

Step2
Select the System tab (B1000 in older versions of Config) at the bottom left.

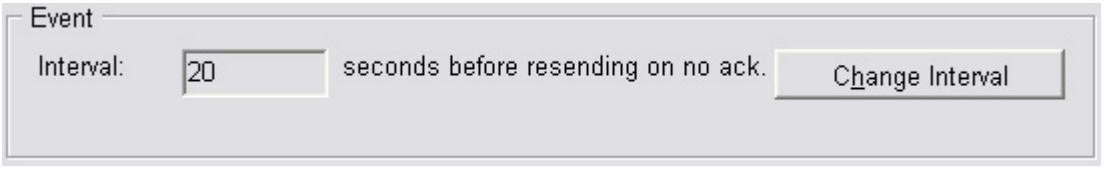
Step 3
Select the Communications Options at the top right.

Step 4
Confirm that Transmit "modem auto-answer" messages is not ticked.

Step 5
Confirm that Transmit event messages is ticked.

Step 6
It is recommended that you operate the PowerShield Battery Monitor at the 57600 baud rate where possible to increase the performance. Refer to the Config manual for details on changing the board rate.

Step 7
The Event Interval is should be set to '20'.

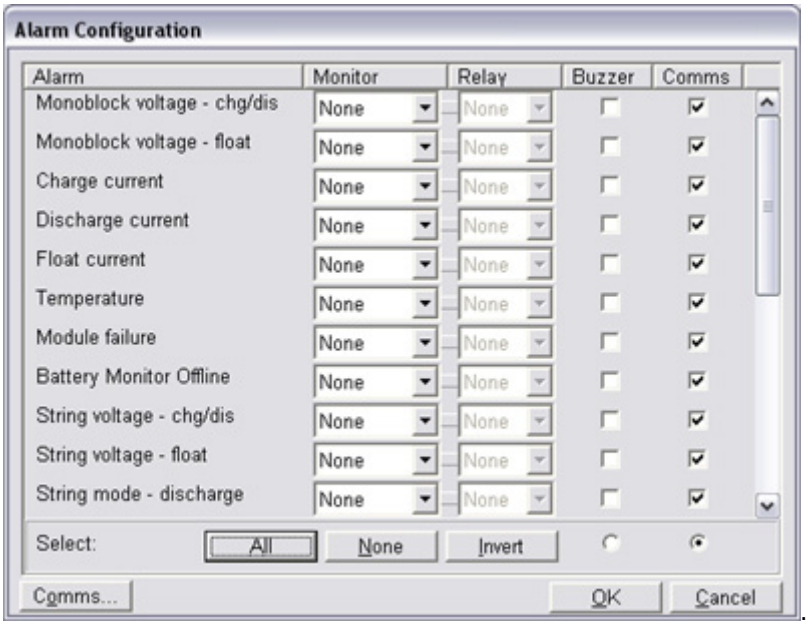


All other settings on the screen not mentioned should be left as they were originally set by the original hardware installer.

3.15.2 Alarms

Step 1

The Alarms now need to be configured so that the monitor sends a message when the alarm occurs. This is done by going to the "Alarms Screen" and clicking on the "Configure Alarms" button. The following screen will appear.



Step 2

Ensure that all of the alarms [that you wish Link to be notified of] have a tick in the "Comms" column. Selecting all is easily done by clicking the round button at the bottom of the column and then clicking "All.

Step 3

Click "OK".

3.15.3 Alarms Cleared and Stable

All present alarms should be addressed by the appropriate personnel and then cleared before the site is ready to be monitored by LinkServer. The battery system that is being monitored should be stable during the process and no new alarms should appear.

3.15.4 Test Configuration

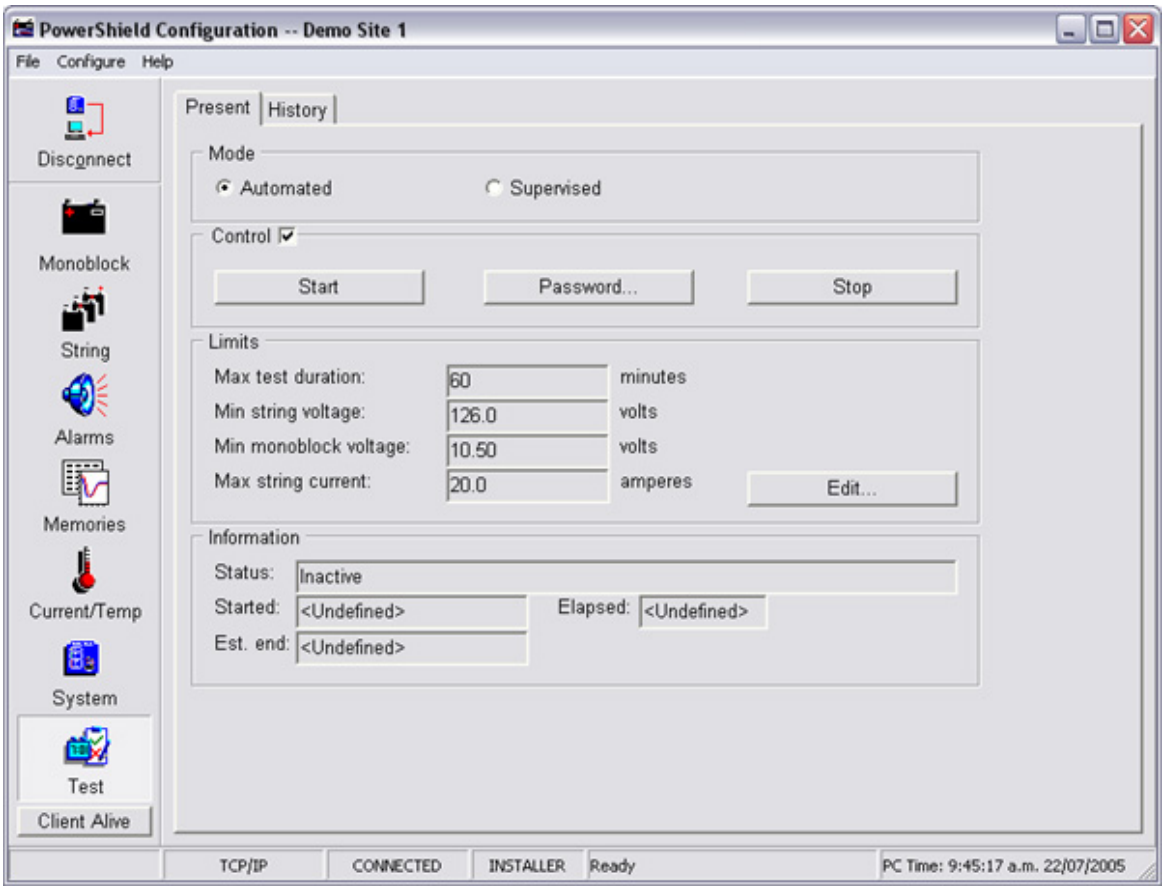
The following configuration is only required for systems that are setup for remote battery discharge tests.

For LinkServer to be able to execute Scheduled Discharge Tests, the appropriate hardware configuration needs to be installed and the Battery Monitor test settings need to be configured correctly for an 'Automated' Test.

The settings for the 'Automated' Test can be changed either with Config, or after the install using the LinkClient and then Discharge Test Control Screen.

In Config, you will need to navigate to the 'Test' tab and set the mode to 'Automated'.

The limits should be set by experienced personnel who are familiar with the battery system.



3.16 Ethernet Adapters

Ethernet LAN adapter(s) are required to manage B1000's via Ethernet. The Sentinel monitor has an Ethernet interface option.

The Link software has been tested for B1000s with specific adapters. It is recommended that you use these adapters to ensure correct operation.
Recommended Lantronix adapters are:

- UDS10
- ETS4P, ETS8P, ETS16P, ETS16PR, ETS32PR

To configure the adapters go to UDS10 114 or ETS 113 page.

3.16.1 Lantronix ETS

(ETS4P, ETS8P, ETS16P, ETS16PR, ETS32PR)

The Lantronix Terminal Servers need to be configured to allow notification message to be propagated through to the Monitor Server.

Each port that is connected to a battery monitor needs to be 'defined'. You will require the IP address of the computer running the Monitor Server and each adapters IP Address.

To configure a port on the Lantronix terminal server do the following:

- Click the Windows 'Start' button and Select 'Run'. Enter the following

telnet 'IP Address for the Adapter' , ie '*telnet 192.168.1.225*'.

- Enter a username, any name will do.
- Enter 'set privileged', it will then prompt for the password, the default is 'system'.
- Then for each Port that a PowerShield BM is connected to, enter the following:

Define port 'x' dedicated telnet 'server ip':15000T

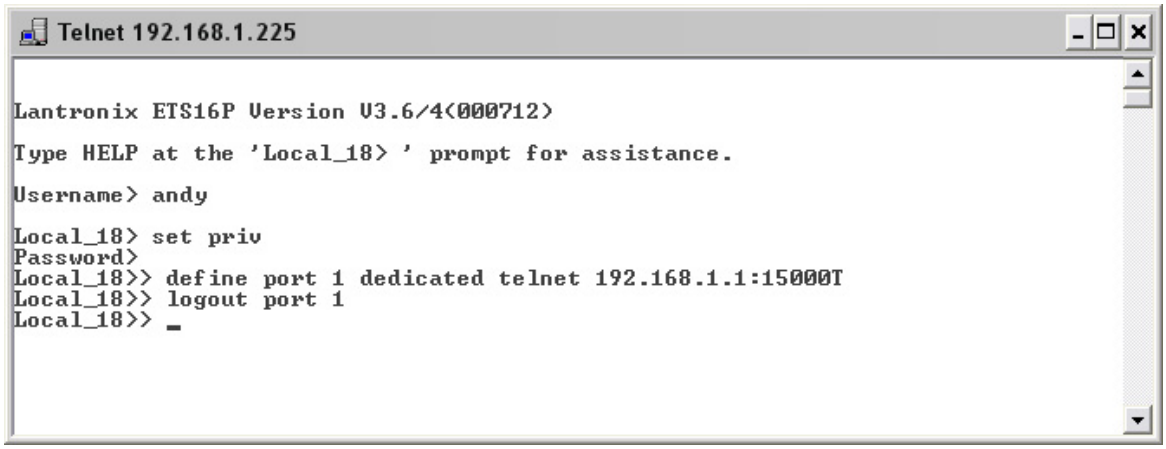
Where 'x' and 'server ip' are the port number for each battery monitor and the IP Address of the Monitor Server. 'x' can be replaced with '*all*' if you wish to route all of the ports of the Console Server to the Monitor Server.

- Log out of each port after configuring by entering the following:

logout port 'x'

'x' can be replaced with '1-16' for example if you wish to save the settings for all of the ports between 1 and 16, inclusive.

Below is an example where the port has been configured to communicate with a Monitor Server. In this example it was port 1 and the Monitor Server IP address was '192.168.1.1'.



3.16.2 Lantronix UDS10

In this section it is assumed that the adapter has its IP address set. If this is not the case refer to the Lantronix documentation for setting the IP address.

The factory default configuration is the configuration that is correct for the use with Link. Therefore no additional configuration is required.

To check the configuration please do the following:

Step 1

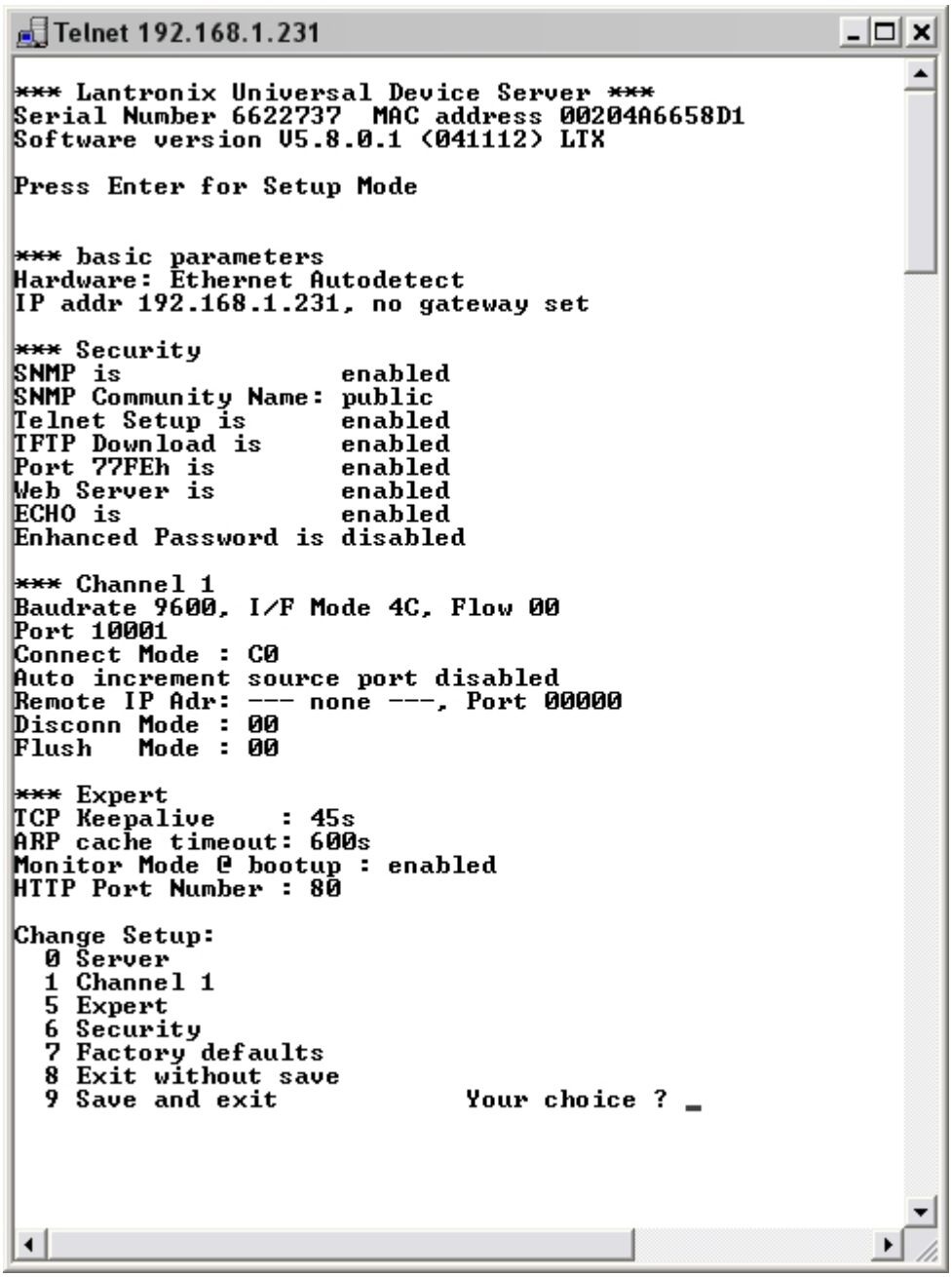
Click the Windows 'Start' button and Select 'Run'.
Enter the following:

telnet <IP Address for the Adapter> 9999

Example
telnet 192.168.1.225 9999

Step 2

Press *Enter* and the following screen will appear.



Step 3

Compare the following settings:
1. Connect Mode
2. Auto increment source port disabled
3. Remote IP Adr
4. Disconn Mode
5. Flush Mode

If your settings match then enter *8* to exit, if you settings do not match go to Step 4.

Step 4

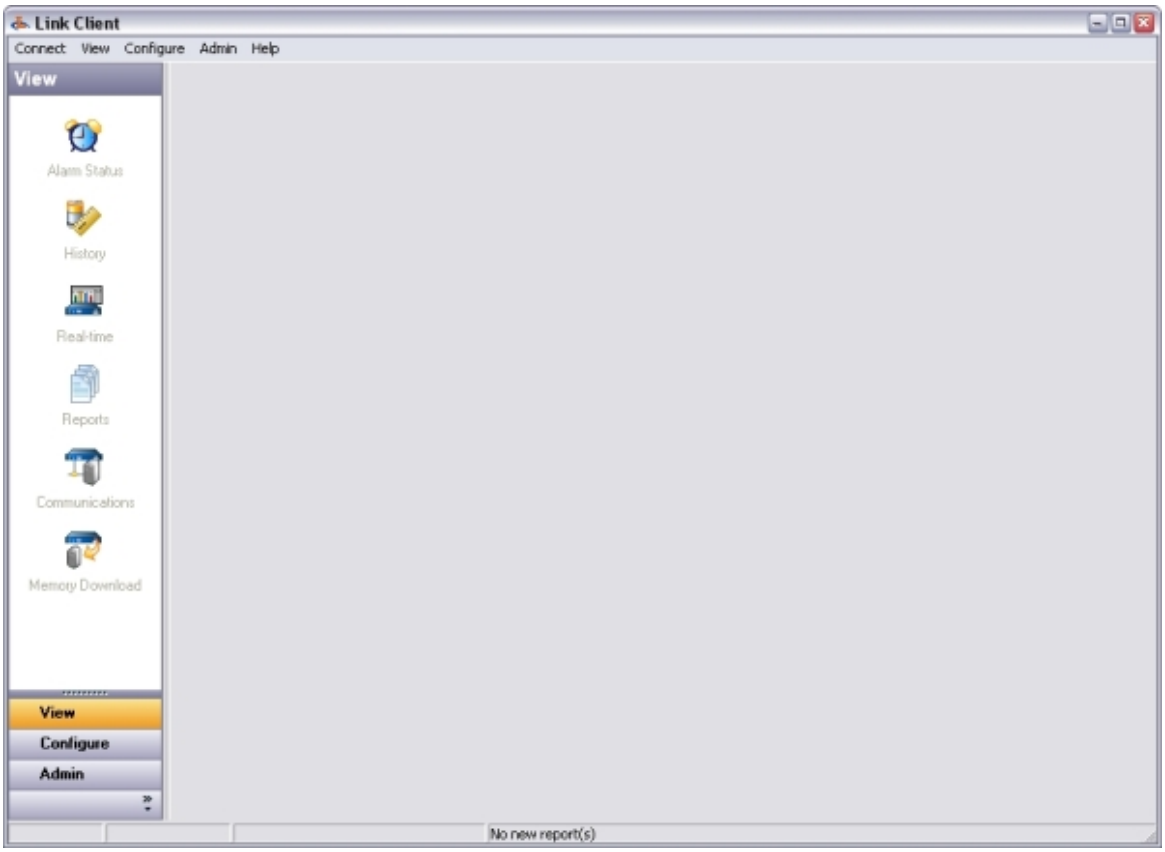
Enter *7* to restore *Factory Defaults.*

Step 5

Enter *9* to *Save and exit.*
Note the adapter will take 10-20 seconds to reboot.

3.17 Product Code Entry

You should now be able to launch Link by going to the Windows Start Menu and selecting 'All Programs' > 'PowerShield' > 'Link'. The follow screen should appear:

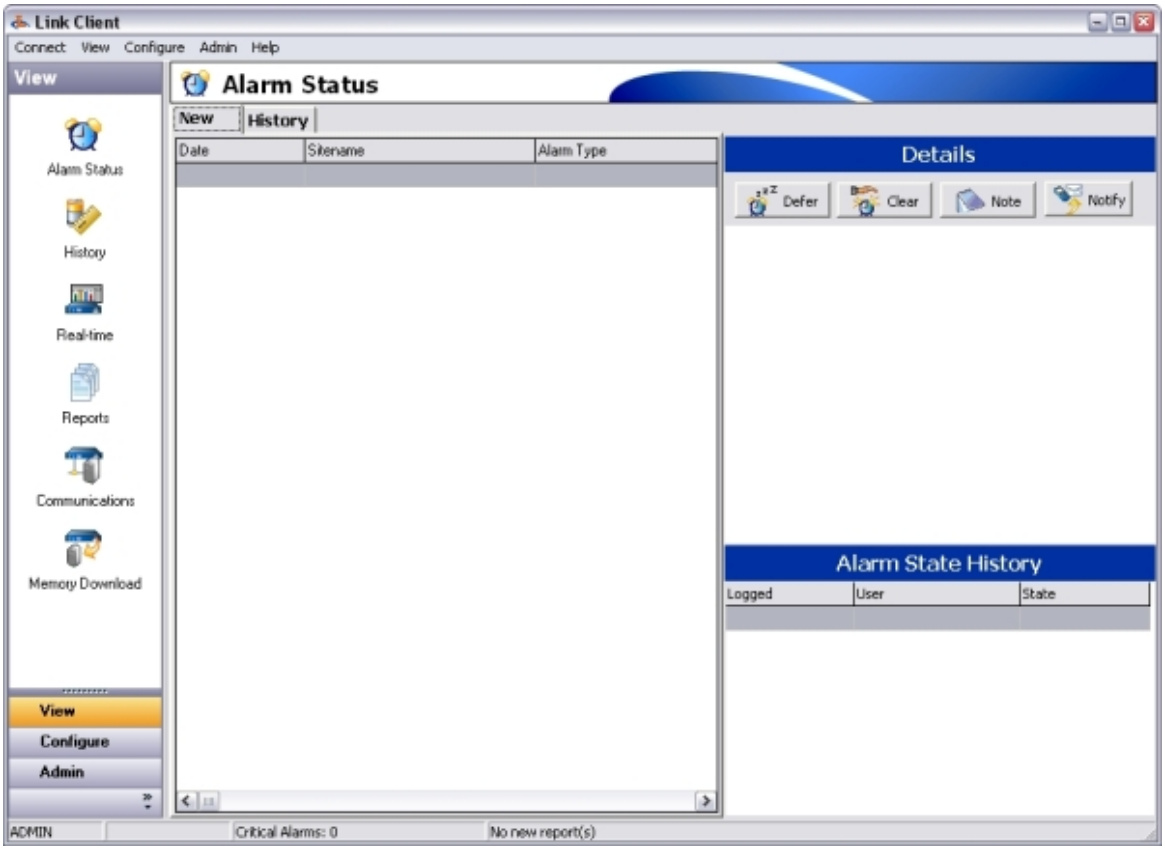


You should now be able to login in as the administrator with username *admin* and password *ADMIN*.

The first time you connect to the Link Server you will be asked for the Product Code. This was supplied with the Link Software CD. The Product Code will allow you to run Link for 30 days. You must request an Activation Code from PowerShield Ltd. before the Product Code expires. After successfully logging in you will be presented with the following window to enter the Product Code.

Verify that the Edition type is as per what you requested when purchasing Link. Please contact PowerShield Ltd. otherwise. The Site Limit is unlimited during the Activation Period however once the software is activated the Site Limit will depend on what you specify in the Registration screen 13. Please take note of the expiry and ensure that you activate Link before this time.

Once you have logged in and entered a valid Product Code, Link displays you the *Alarm Status* screen as shown below.



To verify the Link setup it is important to generate an alarm on each battery monitor and verify it appears in the New Alarms list.

Generating an alarm can be easy done by disconnecting a module from a battery on each system for 30 seconds and then reconnecting it. This should generate a 'Module Failure' alarm.

To verify the emailing and SMS functionality of an alarm see the Email Test 81 section.

4 About this document

This document explains how to use and configure PowerShield Link software.

Version 1.0.1