



PTSP 12-84V
Quick Installation &
Reference Guide

Ver. 1.5



Battery Management Solutions by
PowerDesigners

**PowerTrac SP Quick Installation and
Reference Guide**

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Revision History

Ver 1.5 12/13/04 BMS Manual updated to reflect rev. 1.3 of the PowerTrac Palm software and rev. 1.2.1 of the Windows software released on 12/6/04.

NOTES

Important Safety Instructions

While every care has been taken to ensure the completeness and accuracy of this manual, PowerDesigners, LLC assumes no responsibility or liability for losses or damages resulting from the use of the information contained in this document. Due to technical improvements, some information contained in this manual may change without notice.

SAVE THESE INSTRUCTIONS -- This manual contains important instructions for the PowerTrac SP series product line that shall be followed during installation and maintenance of the product.

Before attempting to install and begin logging data with the PowerTrac SP unit, please read this manual.

- 1) **WARNING: RISK OF ELECTRICAL SHOCK.** When working with batteries, extreme caution must be exercised. Individual safety requires plenty of ventilation. Remove jewelry, wear protective clothing and eye wear (safety glasses), and exercise caution. **Whenever possible, follow the manufacturer's instructions for correctly installing batteries.**

- 2) **CAUTION: RISK OF ELECTRIC SHOCK AND/OR ELECTRIC ENERGY - HIGH CURRENT LEVELS.** Do not touch un-insulated battery connectors or terminals. Be sure to discharge static electricity from tools and technician by touching a grounded surface in the vicinity of the batteries but away from the cells and flame arrestors. All tools should be adequately insulated to avoid the possibility of shorting connections. Do not lay tools on the top of the battery.

Package Contents



PowerTrac SP package

The PowerTrac SP package contains the following items:

- 1 PowerTrac SP unit
- 1 Shunt: Clamp-On or Bolt-On (per your order)
- 1 Shunt cover
- 1 CD: includes Windows & Palm S/W & user's manual
- 1 Quick Installation and Reference Guide
- Tie wraps
- 3 Self tapping screws

If any of the items listed above are missing, please contact PowerDesigners for a replacement.

A close up of the PowerTrac SP module showing the IR window is shown on page 3. The IR transceiver is accessed through the clear plastic cover to the right of the product label. The unit serial number is located in the upper right corner of the product label or through a window on the back of the enclosure. The serial number is also stored in the units memory and can be extracted with the Palm device.

Contacting PowerDesigners, LLC

Calls are answered 9 a.m. – 5 p.m. Monday – Friday central time. After hour calls will be answered by voice mail and returned on the next business day.

Phone:

+1.608.231.0450

All mail, including shipping and returns can be sent to our office address:

PowerDesigners, LLC
931 E. Main St. Suite 4
Madison, WI 53703
USA

Questions and comments can also be received via fax.

+1.608.231.9979

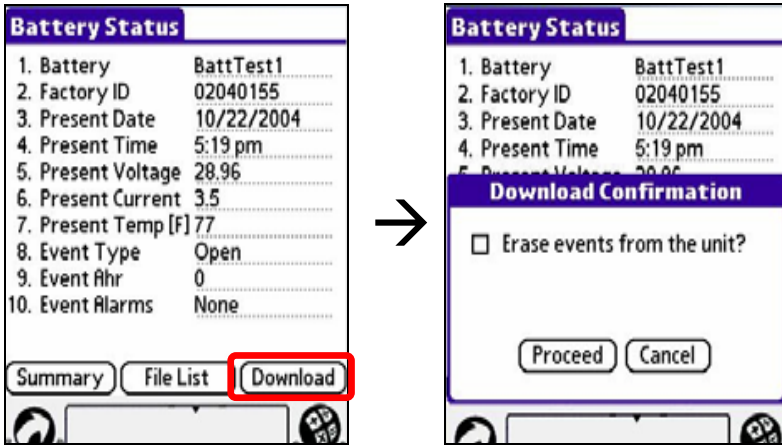
Check our web site for updated company and product information:

<http://www.powerdesigners.com>

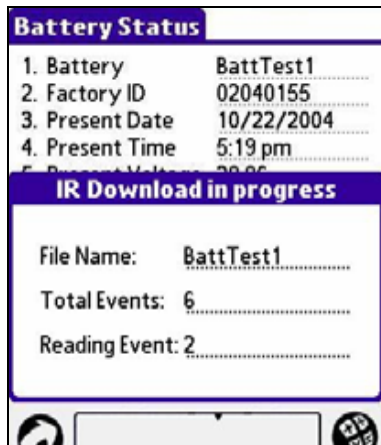
C. Downloading Events

To **Download** stored events from the PowerTrac SP unit to a Palm, the user must perform a “Quick Look” as described in section A earlier. To download events into the Palm:

1. Perform a **Quick Look**. Then tap the **Download** button.



2. Tap the **Proceed** button to download data. If you wish to erase all saved events after download is complete, check the “Erase events check box”. The downloaded file will then appear in the **File List**.



Close-up top view of the PowerTrac SP unit

The package includes a current shunt for battery current measurement. There are two shunt styles that can be used, a Bolt-On shunt for sealed batteries, and a Clamp-On shunt for flooded batteries as shown below. Please note the Clamp-On shunt **must** be soldered in place.



Bolt-On shunt



Clamp-On shunt

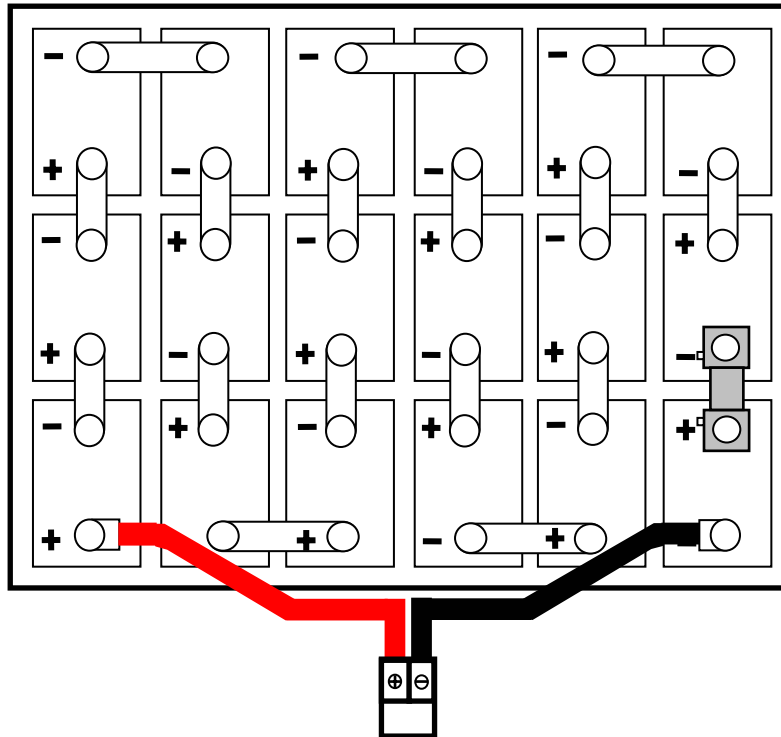
The PowerTrac SP current terminals are designed to work with 50 mV (rated, full output) shunts only.

Hardware Installation

Shunt Installation

CAUTION: DO NOT APPLY THE BATTERY VOLTAGE TO THE SHUNT SENSE LEADS. DOING SO MAY DAMAGE THE UNIT AND VOID THE WARRANTY.

WARNING: The shunt should replace the(an) intercell connector nearest to the negative post as shown below.

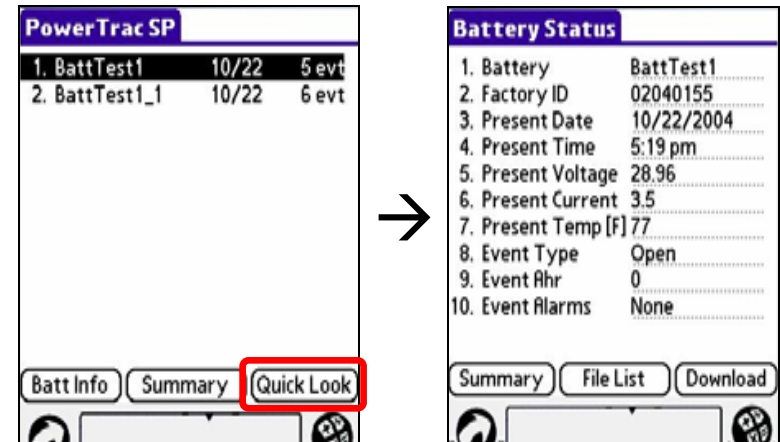


Shunt Installation for a 36V industrial battery

Palm Operation

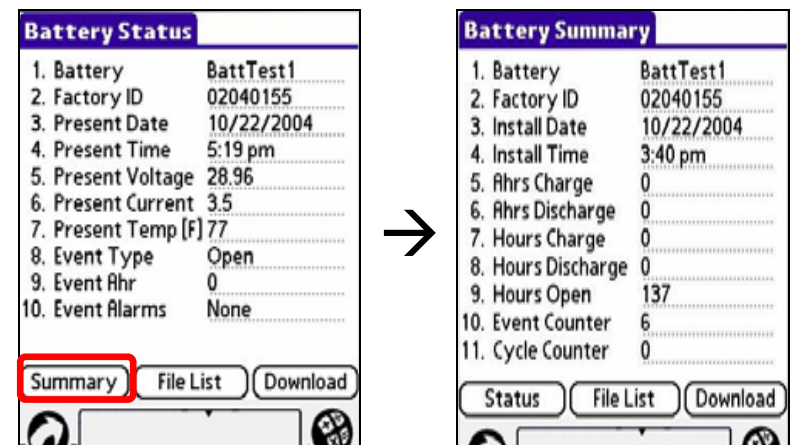
A. Present Status “Quick Look”

To find the present status of the battery, aim the Palm at the IR window and tap the “Quick Look” button. This will open the **Battery Status** screen. This will show all of the current battery information shown in the screen below.



B. Battery Summary

The **Battery Summary** screen can be accessed from the “Battery Status” screen after a Quick Look.



- Point the Palm towards the IR window on the PowerTrac and tap the “**Calibrate**” button. You will be asked to enter the password associated with that unit. Once the calibration is complete, an acknowledgment window will appear.
- To verify calibration, tap the “**Read Current**” button and confirm the readout matches the clamp-on meter reading.

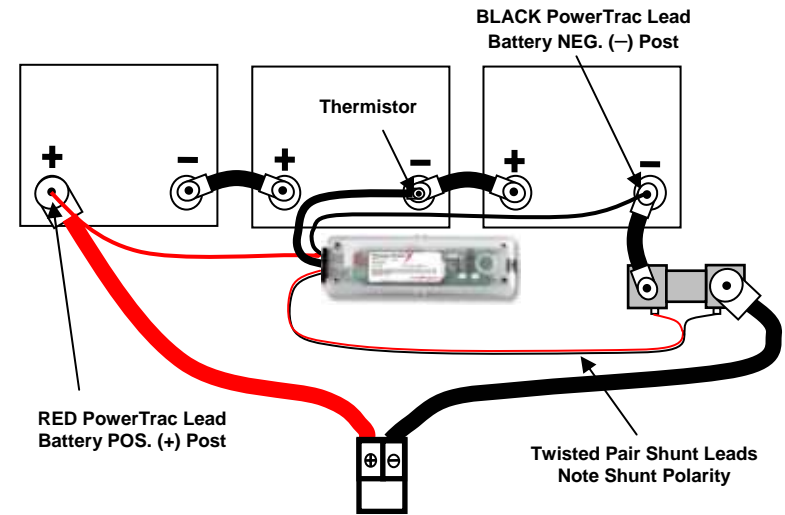
Shunt Zeroing

One can also reset the shunt reading if the shunt readout is greater than zero while the battery is idle (no load is connected to the battery and no charger is connected). To zero the shunt readout, do the following:

- While the battery is idle (no current flow), tap “**Read Current**” button to read present battery current as reported by the PowerTrac SP unit. Ideally, the current should be very close to zero.
- If the current is not zero but less than 10A (+ or -), align the Palm with the IR window of the PowerTrac and tap the “**Zero Shunt**” button.
- An acknowledgment window will appear confirming that the shunt was zeroed.

Note: If the current readout is greater than 10A while the battery is idle, the “Zero Shunt” procedure will not work. In this case, you may need to verify shunt installation and may need to uninstall the unit and leave it aside for some time before re-installing it.

WARNING: For series connected battery modules (6V or 12V batteries), the **SHUNT** should be installed in series with the negative terminal of the battery as shown below. Note the polarity of the shunt lead connections shown below.



PowerTrac and Shunt Installation for a 36V series battery

Connecting the Shunt – Sealed Battery:

- Remove the intercell connector **nearest the negative post (the one interconnecting the last two cells)**.
- Position the shunt over the posts.
- Replace bolts and tighten securely.
- Insert (2) #10-32 screws into the threaded holes of the shunt.

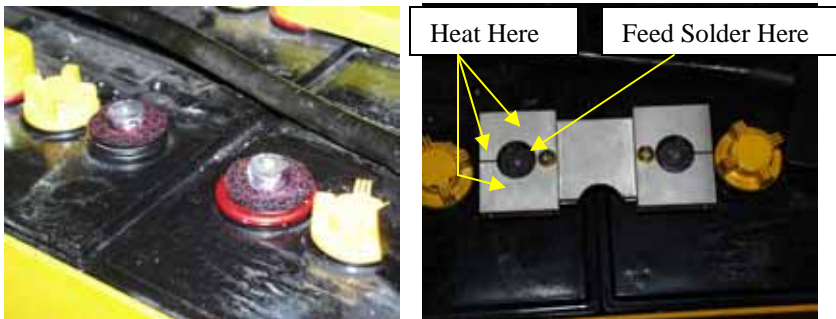
Connecting the Shunt – Flooded Battery:

- Using the correct drill bit, remove the **intercell connector nearest to the negative post** leaving post centers.
- Clean the posts and area around the base of the posts.



Remove the last intercell connector and clean the posts

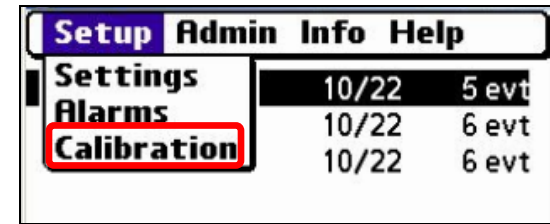
3. Place corrosion preventive felt washers over the posts. You may need to wet the felt washers.
4. Position the shunt, centered over posts.



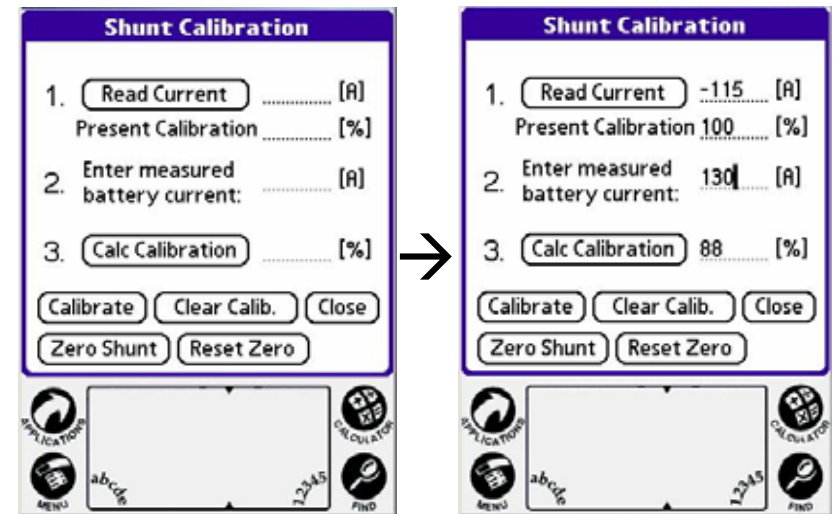
Placing the felt washer then the shunt and solder

5. Tighten the (2) ¼-20x2” shunt clamp screws securely onto the battery posts. Do not over-torque.
6. Solder the shunt using a **lead/solder** bar alloy. Adding flux will help to make a good solder joint but is not necessary. Make sure to fill the shunt post holes to the top with lead/solder. Solder both sides of the shunt.
7. Clean off excess lead from the shunt and battery.

A well soldered shunt and installation notes are shown on the next page.



2. Tap the “Setup” pull-down menu and select the “Calibration” submenu as shown above. A new window will appear which you can use to calibrate the unit.

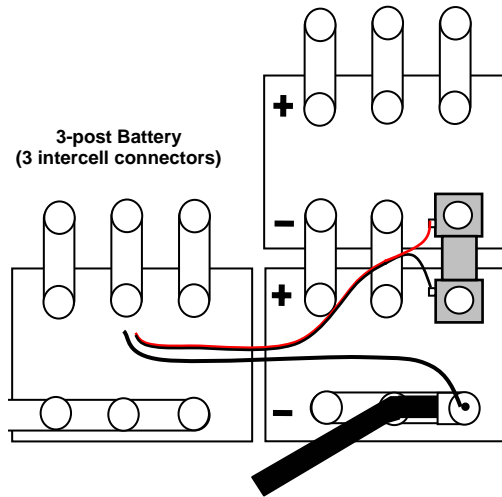


3. Discharge or charge the battery with a known current.
4. Align the Palm device with the IR window of the PowerTrac and tap the “Read Current” button to read the present battery current as reported by the PowerTrac.
5. Use a **clamp-on** meter to measure the total battery current and enter the value on line 2.
6. Tap the “Calc Calibration” button. A current correction factor will be displayed.

D. Shunt Calibration and Zeroing

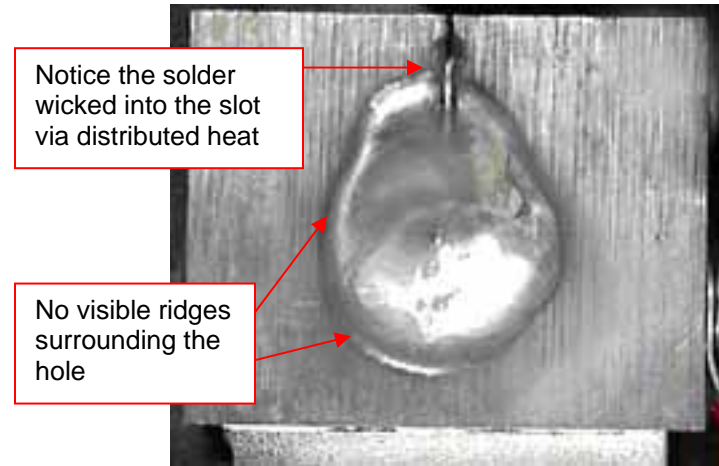
If the battery has more than one intercell connector, the shunt will only replace one of these connectors as shown below. As such, the current may not divide equally between the remaining intercell connector(s) and the newly installed shunt. To correct for the variation in current distribution, the shunt calibration procedure must be used.

Note: In order to perform the shunt calibration, a known current has to be passed through the battery by charging or discharging the battery. You need to use a clamp meter to measure the current flow through the battery.



Battery with 3 intercell connectors

1. Tap the “PowerTrac SP” label at the top of the screen. A menu bar will appear with “Setup”, “Admin”, “Info” and “Help” pull down menus.



Well Soldered Connection

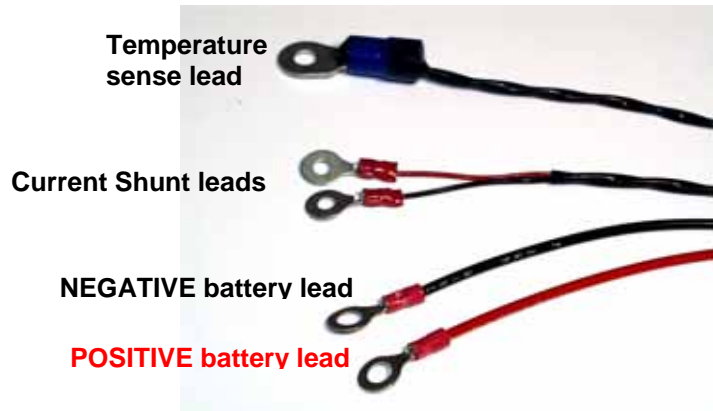
NOTE: To ensure a good connection between the shunt posts and the battery posts, make sure direct heat is applied to the shunt terminals (the block where the shunt meets the posts) and feed the solder/lead bar into the shunt post holes until it fills the void completely.

CAUTION: Do not just melt the solder/lead bar into the shunt terminal holes without heating the shunt terminals. This will result in a cold solder connection. Soldering should be done via the heating action of the shunt terminals, not the torch.

NOTE: Failure to properly install the shunt may result in inconsistent readings due to an intermittent connection and, on a multi-post battery, unequal current distribution.

PowerTrac Installation

The PowerTrac SP unit has two separate battery voltage sense leads, two shunt sense leads (twisted and sleeved) and one temperature sense lead as shown below.



PowerTrac SP Leads

CAUTION: DO NOT CUT THE TEMPERATURE SENSE WIRE. This wire has a thermocouple integrated into the lug and is used to measure battery temperature. Cutting this wire will result in erroneous temperature readings.

Installing the PowerTrac SP Unit on a battery:

1. Using a small self-tapping screw, attach the single **BLACK** wire to the negative battery post.
2. Attach the single **RED** wire to the positive battery post.
3. Attach the **black/red** (twisted and sleeved) wire pair to the shunt using screws provided (see **Note 1** on page 9).
4. Using the large self-tapping screw, attach the temperature sense lead to the innermost cell connector.
5. Use nylon wire ties to route the wires securely on top of the battery and secure the PowerTrac to the battery or an intercell connector. See picture on page 9.

C. Changing Passwords

1. To change the default password, tap the “**PowerTrac SP**” label at the top of the screen. A menu bar will appear with “**Setup**”, “**Admin**”, “**Info**” and “**Help**” pull-down menus.
2. Tap the “**Admin**” pull-down menu and select the “**Passwords**” submenu as shown below. A new window will appear which you can use to enter the new password.



3. Type in the old and the new passwords and tap the “**Change**” button at the bottom of the window while aligning the Palm with the IR window of the PowerTrac unit. A confirmation window will appear confirming that the new password has been accepted.

Note: If you forget your password, record the “**Factory ID**” of the unit and call Power Designers to obtain a new password.



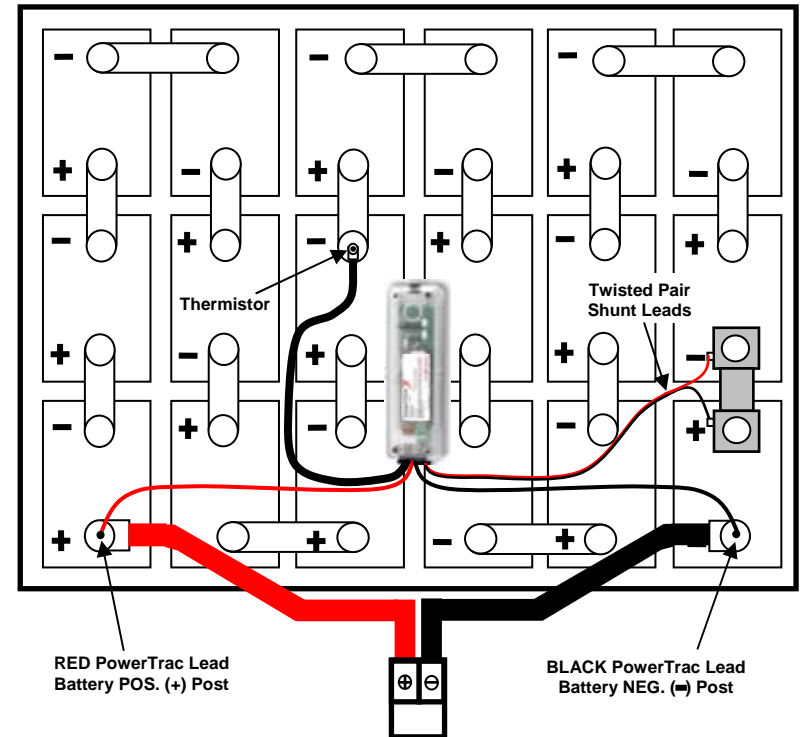
5. To verify the new settings, tap the “**Clear Screen**” button then tap the “**Scan**” button while aligning the Palm device with the IR window of the PowerTrac SP. The present alarm settings of the unit will be displayed.
6. Tap the “**Close**” button when complete.

The table below lists the “**Alarm**” screen parameter descriptions as well as their factory pre-programmed values.

“**Alarm**” Screen Parameters

Parameter	Description	Programmed Value
High Volt Alarm	Battery high voltage alarm point above which a high voltage alarm is displayed and logged.	110 (V)
Low Volt Alarm	Battery low voltage alarm point below which a low voltage alarm is displayed and logged.	10 (V)
High Curr Alarm	Battery high current alarm point above which a high current alarm is displayed and logged.	1000 (A)
High Temp Alarm	Battery high temperature alarm point above which a high temperature alarm is displayed and logged.	140 (°F)

Note 1: The **black** wire must be attached to the shunt on the side closer to the **negative** battery post (with the shunt placed before the negative post). Failure to do so will result in negative current readings on the charge cycle rather than discharge cycle. Upon power up, if this is the case, reconnect the wires properly.



PowerTrac and Shunt Installation for a 36V industrial battery

Hardware installation is now complete.

Software Installation

A. Minimum Systems Requirements

Windows

Operating systems: 98, ME, 2000, XP, NT
Communication port: One serial or USB Port
Required pre-installed S/W¹: Microsoft Access¹

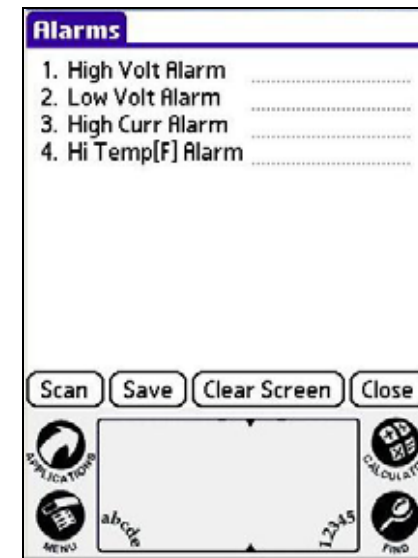
Palm

Operating systems²: 3.5 and above
Palm Desktop S/W³: 4.0 and above
Communication⁴: HotSync cable/cradle

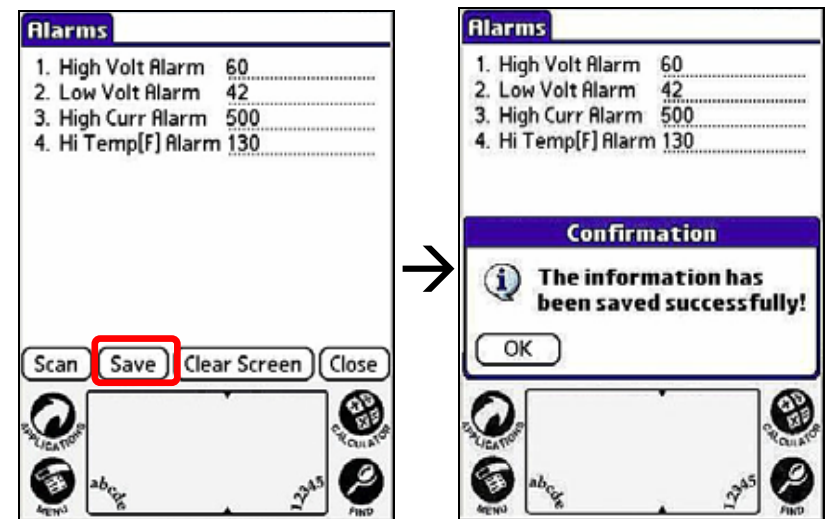
Notes:

1. If Microsoft Access is not installed on your PC, you will need to install the Microsoft Access Runtime version of the software to be able to view events and display charts (included on the PowerTrac CD).
2. If you have an earlier version of the Palm OS or Palm Desktop software, you can download an update from the Palm website: <http://www.palmone.com/us/support/>
3. To download data from your Palm to your PC, you will either need a HotSync cradle (USB or Serial) or USB (A) to mini-USB (B) cable.
4. Newly available PDAs may not support the IRcomm mode of communication that is used to communicate with the PowerTrac SP unit. The **Palm Zire, Zire 31, Zire 72**, and **Sony Clié** PDAs have been tested and work properly with the PowerTrac SP unit. Visit our [website](#) to see a list of other Palm's that are known to work with our products.

Note: PDAs with Windows OS systems (Pocket PC) will not work. Also the Palm Zire 21 and Palm Tungsten E series PDA's will not work with the PowerTrac units.



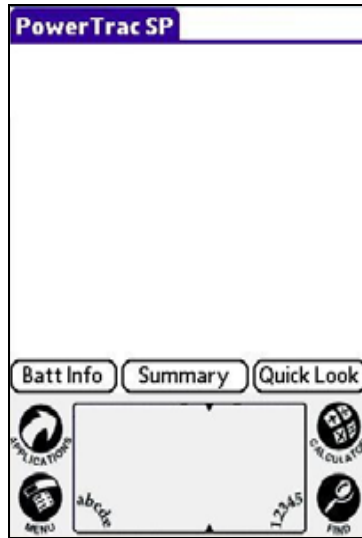
4. Enter the desired values in the spaces next to the alarms, then align the Palm device with the IR window of the PowerTrac and tap the “Save” button.



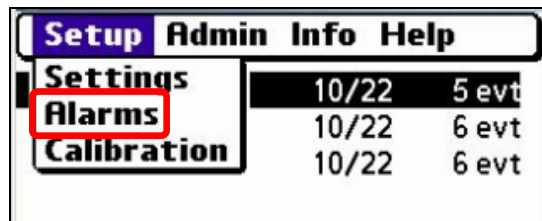
B. Setting Alarm Parameters

Setting the alarm parameters will be similar to setting the battery parameters (Setup step A).

1. Return to the File List. This is the screen (shown below) shown when the PowerTrac application is first launched.



2. Tap the “PowerTrac SP” label at the top of the screen. A menu bar will appear with “Setup”, “Admin”, “Info” and “Help” pull-down menus.



3. Tap the “Setup” pull-down menu and select the “Alarms” submenu as shown above. The “Alarms” screen will appear as shown on page 19.

B. Installing the Palm Application to the Handheld

1. Connect your palm handheld to your PC using the cable or cradle.
2. Double click on the **PowerTracSP.prc** file from the PowerTrac SP installation CD.
3. The Palm Install Tool program will appear on the screen. Please confirm the file selection. If the Install Tool does not appear automatically, you can start it from the start button, first click the “Add” button and then select the file, **PowerTracSP.prc**, from the installation CD. Click **Done**.
4. Press the “Sync” button on your cradle or handheld. This will install the PowerTrac SP palm software.

The installation procedure has been successful if you are able to see the “PwrTracSP” icon on the handheld desktop as shown below.



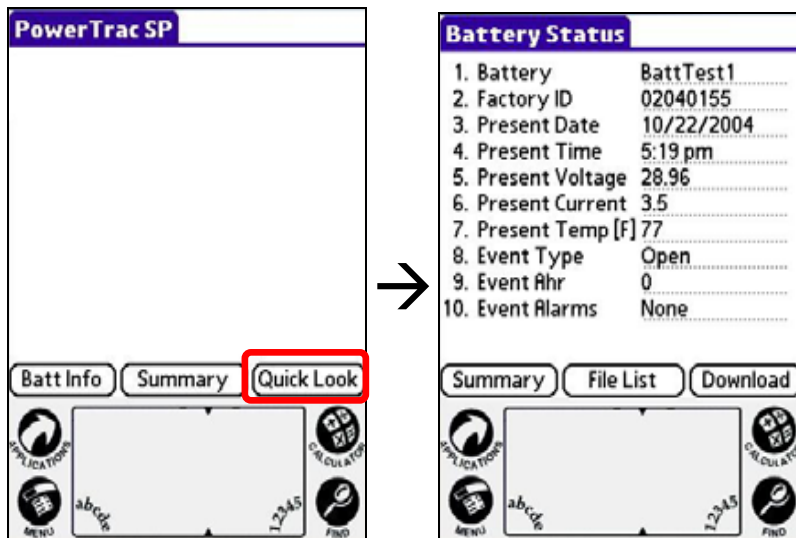
C. Palm Installation Check

To verify proper installation, do the following:

1. Start the application by tapping the “PwrTracSP” icon on the Palm home screen. Pg. 12 shows the application screen.



2. From a distance of 3-24 inches, aim the Palm device towards the PowerTrac IR window and tap the “**Quick Look**” button at the bottom of the screen.
3. The “**Battery Status**” screen will be displayed, as shown below, which shows the present status of the battery.



The table below lists the “**Settings**” screen parameters description as well as their factory pre-programmed values.

“**Settings**” Screen Parameters

Parameter	Description	Programmed Value
Battery	A unique battery name to be programmed. The battery name can consist of no more than 12 characters and/or numbers.	AAA...AAA
Nominal Voltage	The nominal voltage of the battery	36 (V)
Nominal Capacity	The nominal capacity in Amp Hours	500 (Ahrs)
Number of Posts¹	The number of posts (intercell connectors) of the battery.	1
Shunt Size	The current size used (e.g. 500 for 500A shunt). Must be 50mV type.	500
Present Date	Present date. Verify After Installation.	Present Real Date
Present Time	Present time. Verify After Installation.	Present Real Time
Install Date	The installation date of the unit. Need to Set After Installation.	Date of Shipping
Install Time	The installation time of the unit. Need to Set After Installation	Date of Shipping

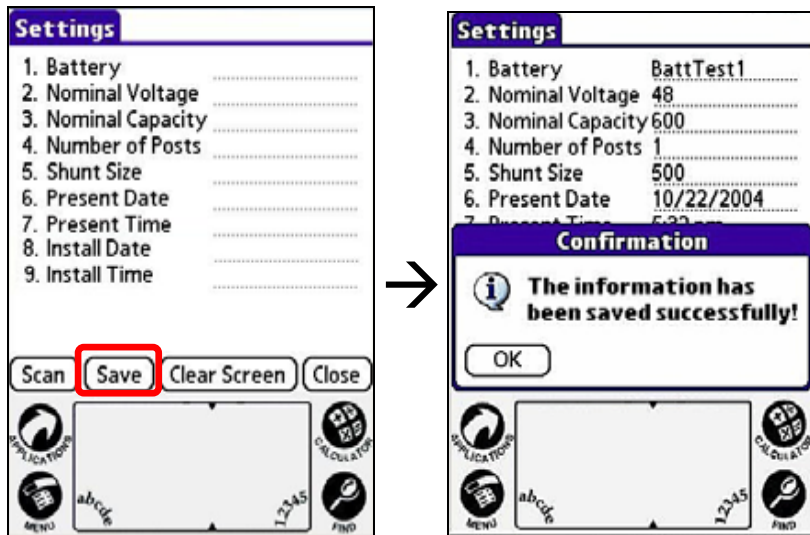
¹ **Note:** If more than one positive post (intercell connectors) exist, and since the shunt will replace only one intercell connector, the total battery current is computed by multiplying the measured current with the number of posts. **You will need also to perform a shunt calibration (as explained in section D) to ensure accurate current readout.**

- The user can set various parameters including the battery ID, nominal voltage and capacity, number of (positive) posts (per cell), the shunt size and the date and time. Set these parameters to match your specific battery ratings.

Note: You do not have to be keep aiming the Palm device with the PowerTrac IR window while entering the various parameters.

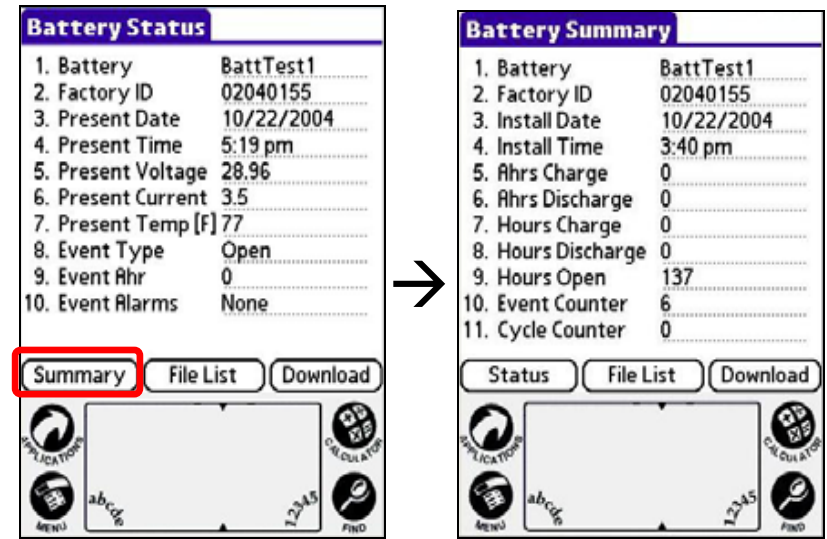
- Re-aim the Palm device with the IR window of the PowerTrac and tap the “**Save**” button at the bottom of the screen. Continue to hold the alignment. When the data transfer is complete, a confirmation window will appear.

If you are prompted for a password: The default password is “0000” but can be changed, by the user, via the password function in the “**Admin**” menu. Tap the “**Proceed**” button to transfer data to the PowerTrac SP unit.



- To verify the new settings, tap the “**Clear Screen**” button then tap the “**Scan**” button while aligning the Palm device with the IR window of the PowerTrac SP. The present settings of the unit will be displayed.
- Tap the “**Close**” button when complete.

- By tapping the “**Summary**” button at the bottom of the **Battery Status** screen, the **Battery Summary** screen will be displayed as shown below.



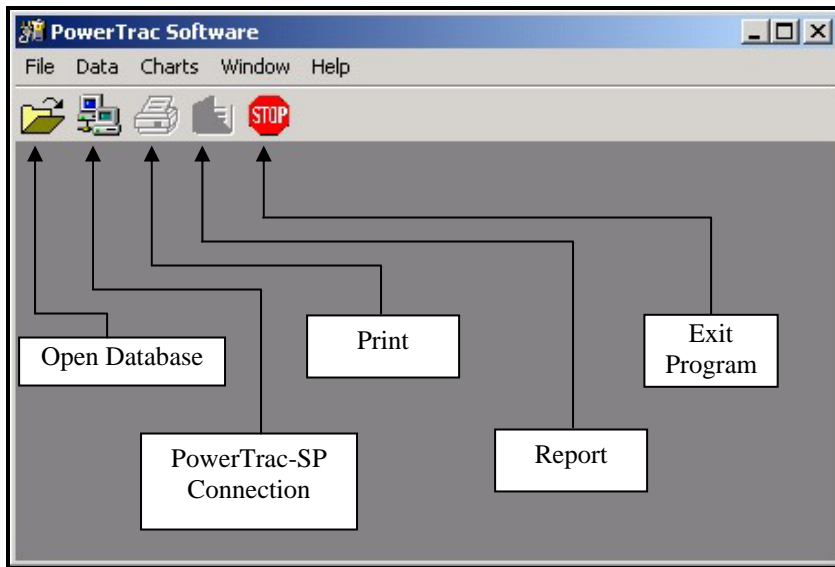
The **Battery Summary** screen lists the accumulated battery data since installation. These include:

- Installation date and time
- Total amp-hours of charge and discharge since installation
- Total hours of charge, discharge and open since installation
- Events counter (total events logged since last time events were cleared).
- Cycle counter (charge-open-discharge-charge cycles)

Note: The **Quick Look** does not save data to the Palm. In order to save the data, you must tap the **Download** button at the bottom of the **Battery Status** or **Battery Summary** screens.

D. Installing the Windows Application to your PC

1. Double-click on the “**PowerTrac-vxxx.exe**” file from the installation CD (xxx refers to the software version).
2. Follow the installation procedure. After the installation is complete, you will be able to see the “**PowerTrac**” group in your **Start→Programs** menu.
3. Go to **Start→Programs→PowerTrac** and select the “**Register Conduit-PTSP**” application. This will automatically add the software to the Palm HotSync manager, which will allow downloading data to the PowerTrac database during the HotSync operation.
4. To verify proper installation, start the PowerTrac software on your computer. The PowerTrac software screen should appear as shown below.

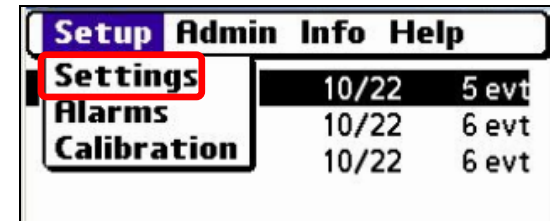


PowerTrac SP Setup

A. Setting Battery Parameters

If this is the first time you access the PowerTrac SP unit, you may have to set the battery specific parameters by doing the following:

1. Start the Palm application by tapping the “**PwrTracSP**” program icon on the Palm home screen (Refer to the **Installation Check** procedures shown earlier)
2. Tap the “**PowerTrac SP**” label at the top left corner of the screen. A menu bar will appear with “**Setup**”, “**Admin**”, “**Info**” and “**Help**” pull-down menus.



3. Tap the “**Setup**” pull-down menu and select the “**Settings**” submenu as shown above. The **Settings** screen will appear as shown below.

