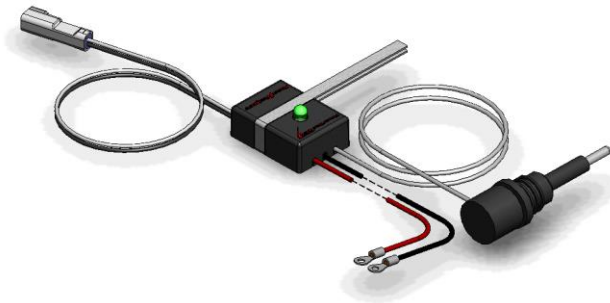
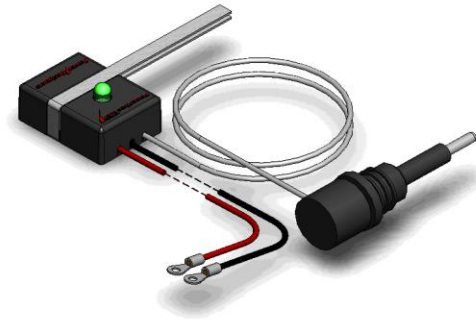


**iLEV**

**and**

**iLEV-PT**

**Installation and Operation Instructions**



## Revision History

P/N MAN-000013-00  
Revision C  
January 10, 2013  
For iLEVs manufactured after January 2013

## Contact information

For more information contact Power Designers USA, LLC

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

Phone: +1.608-231-0450

Address:  
Power Designers USA LLC  
4005 Felland Road Suite 116  
Madison, WI 53718  
USA

Questions and comments can also be received by fax.  
+1-608-231-9979

[www.powerdesigners.com](http://www.powerdesigners.com)

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## Important Notes

This Manual describes installation and operation for PowerTrac iLEV (intelligent *Level* indicator) and PowerTrac iLEV-PT

### WARNING:

- **WARNING Risk of Explosive Gases** – Working in the vicinity of a lead-acid battery is dangerous. Batteries generate explosive gases during charge. To reduce the risk of ignition, follow the safety instructions published by the battery manufacturer.
- **WARNING Eye and Skin Protection Required**– Wear Personal Protective Equipment ( PPE ) as defined by your employer under OSHA regulations for work in the vicinity of lead-acid batteries. Safety goggles and skin protection are strongly recommended.

### CAUTION:

- **Risk of electric shock and/or electric energy - high current levels.** Do not touch un-insulated battery, connectors or terminals. All tools should be adequately insulated to avoid the possibility of shorting connections. Inspect cables often for damage to the insulation. Replace cracked or worn cables immediately.
- **Risk of fire or explosion from gases vented by batteries.** Be sure to discharge static electricity from tools and technician by touching a grounded surface in the vicinity of the batteries, prior to servicing the battery or installing any accessory.

- There are no user serviceable parts within the iLEV enclosure. If service is required, contact Power Designers USA, LLC or their service representative.

### IMPORTANT:

- Follow the battery manufacturer's published instructions when installing, charging and servicing batteries.
- These instructions assume a certain level of competence by the installer and / or user. The following practices and codes contain relevant information, and should be consulted for safe handling, installation, testing, and maintaining standby batteries. Applicable state and local codes must be followed.
- **NESC**, National Electric Safety Code, ANSI C2-2007 (or latest revision). Copies may be obtained by writing:

The Institute of Electrical and Electronics Engineers, Inc.  
345 East 47<sup>th</sup> Street  
New York, NY 10017, USA

- **NEC** National Electrical Code NFPA-70 (or latest version) available from: National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- **Federal Codes:**  
29CFR1926.441 "Safety Requirements for Special Equipment"  
29CFR1910.151(c) "Medical Services and First Aid"  
29CFR1910.305(j) "Wiring Methods, Components and Equipment"  
STD 1-8.2(e) "OSHA Standing Directive"

## General Description

PowerTrac iLEV is a complete stand-alone electrolyte level indicator solution for industrial flooded lead-acid batteries.

The enhanced PowerTrac iLEV-PT is compatible with PowerTrac SP and able to supply the PowerTrac SP with battery electrolyte level status.

Both PowerTrac iLEV models indicate the electrolyte level status by detecting at the minimum acceptable level and utilizing a red/green bi-color LED to make this status readily visible to battery maintenance personnel. If the LED is blinking or solid green, the electrolyte level in the cell is adequate. Otherwise, a blinking or solid red LED indicates the electrolyte level in the cell is low. The iLEV's also indicate how long the electrolyte level has been in either status by blinking the number of days, followed by a two second pause.

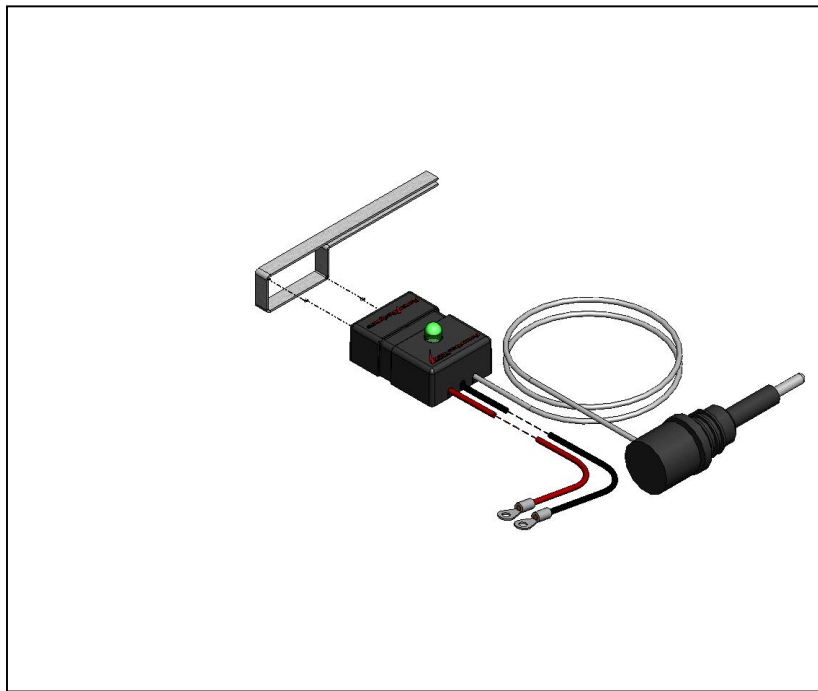
The PowerTrac iLEV is the first electrolyte level indicator that calculates the Volts per Cell (VPC). This is used when the electrolyte level is low and battery charge or equalization is complete. If the calculated VPC indicates a charged state and low electrolyte is detected the low level indication flashing red changes to a solid red.

## Features

- ✓ Easy installation.
- ✓ Complete solution, no external components needed.
- ✓ Compatible with PowerTrac SP.
- ✓ Fixed delays to reduce false indication of electrolyte level variation due to vehicle motion or electrolyte heating.
- ✓ Minimal energy consumption; ideal for continuous operation.
- ✓ Low cost.
- ✓ First electrolyte level indicator using VPC to indicate an appropriate watering condition.
- ✓ Reverse polarity protection.
- ✓ Wide operating voltage range.

## Package Contents

- PowerTrac iLEV
- 2 #8 self tapping screws
- iLEV manual
- Clip/Holder
- Cable Tie



**FIG. 1**

## Technical Specification

### *Operating values*

Operating Input Voltage .....8- 40 volts  
 Operating Current.....10 mA – 15 mA  
 Operating Temperature.....0°C – 40°C  
 Probe voltage referenced to minus (black) lead .....2-26 volts  
 Voltage per Cell (VPC) Auto Detect Range.....2.05-2.1 volts

### *Absolute Maximum rating*

Input Voltage..... 40 volts  
 Input Current.....20 mA

### *Mechanical information*

Dimensions .....1.36” X 1.00” X 0.75”  
 Packaging .....UL 94V-0 ABS, acid resistant

Lead Lengths’ Measured from iLEV Body to End of Lead:

Plus Lead.....36”  
 Probe Lead.....36”  
 Minus Lead.....36”  
 Optional PT Cable.....36”

### *Recommended operating values*

Number of cells between plus and minus terminals.....15  
 Probe voltage with respect to minus terminal.....6 volts

## Installation Instructions:

### Tools:

- Drill
- ½ (0.50) inch drill
- #36 (0.1065) inch drill
- Flat blade screw driver or ¼” nut driver

### Procedure:

- **DO NOT SECURE UNTIL ALL LOCATIONS ARE DETERMINED AND LEADS ARE ROUTED!**
- The iLEV is attached, using either a wire tie or (Clip/Holder). If using the Clip/Holder slide the clip over the iLEV housing and into the groove in the housing body, as seen in Fig.1, p5. If the cable tie is used, wrap cable tie around groove in the iLEV housing, as shown in Fig.3, p7.
- Determine a mounting location on the battery where iLEV LED is readily visible with the battery installed in the truck. A mounting location near the centerline of the battery, on the side near the negative terminal, is typical.

If the iLEV-PT is used this must be within 36” of the PowerTrac SP mounting location.

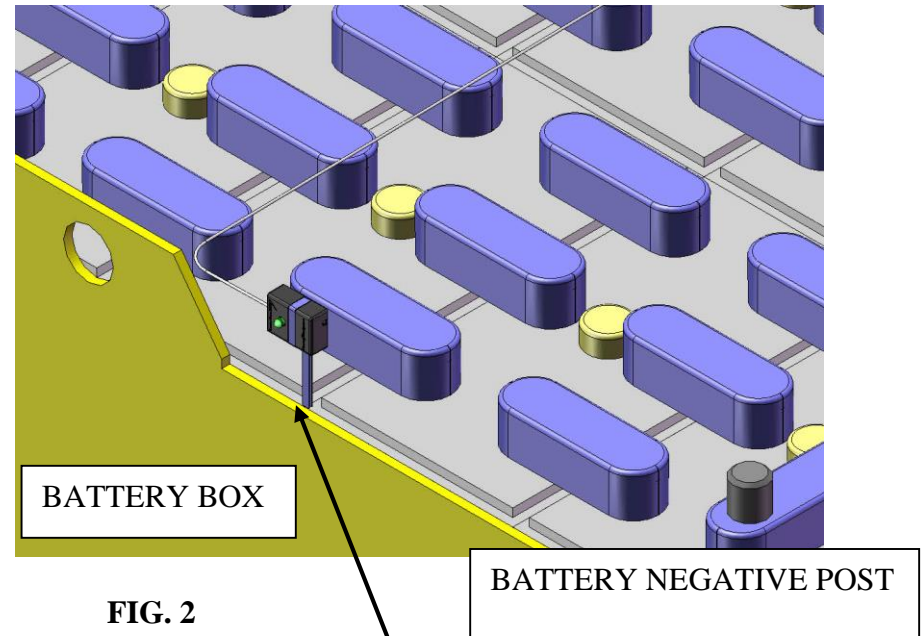
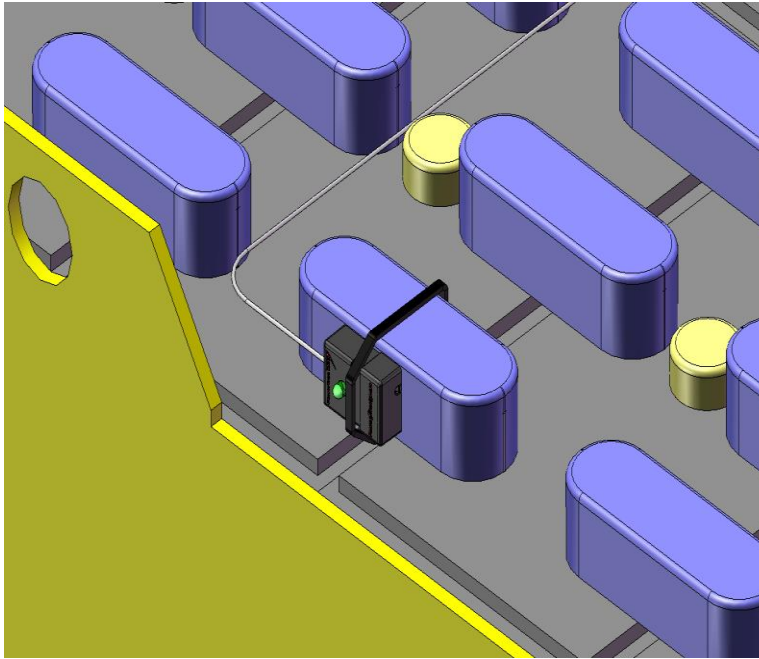


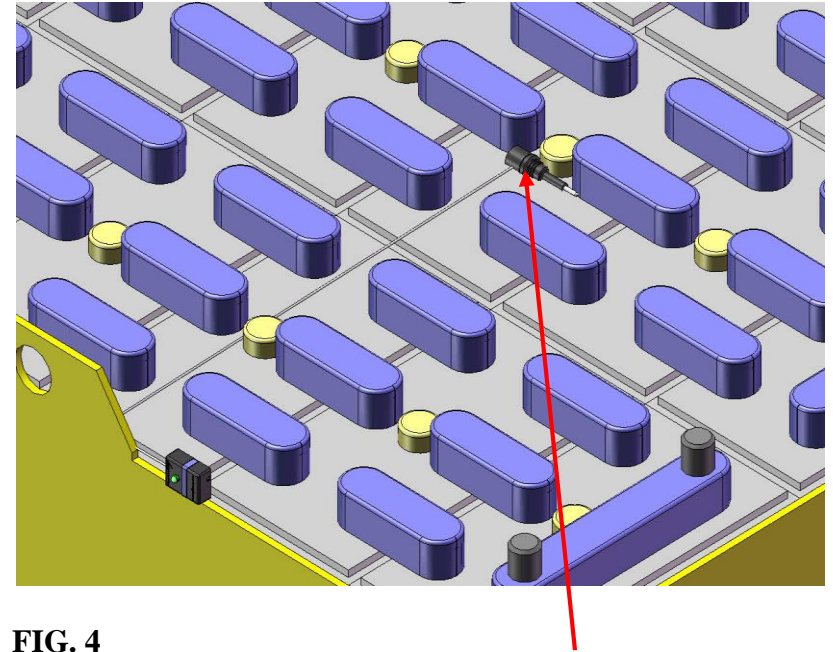
FIG. 2

Insert clip with iLEV between battery box and side of battery case as shown and push down until iLEV is seated in place.



**FIG. 3**  
Alternate method of mounting iLEV using supplied cable tie

- Determine an inner cell for location of the Electrolyte Probe
  - Verify the Electrolyte Probe can easily reach an interior cell. Interior cells tend to have the highest water loss and are preferred monitoring points.



**FIG. 4**

- Place the Sensor Probe on the top of the chosen cell and then:
  - Place the Minus (Black) power supply lead on the inter-cell connector at least one cell towards the negative post of the battery from the location of the Electrolyte Probe.
  - Place the Plus (Red) power supply lead on the inter-cell connector at least two cells towards the positive post of the battery from the location of the Electrolyte Probe

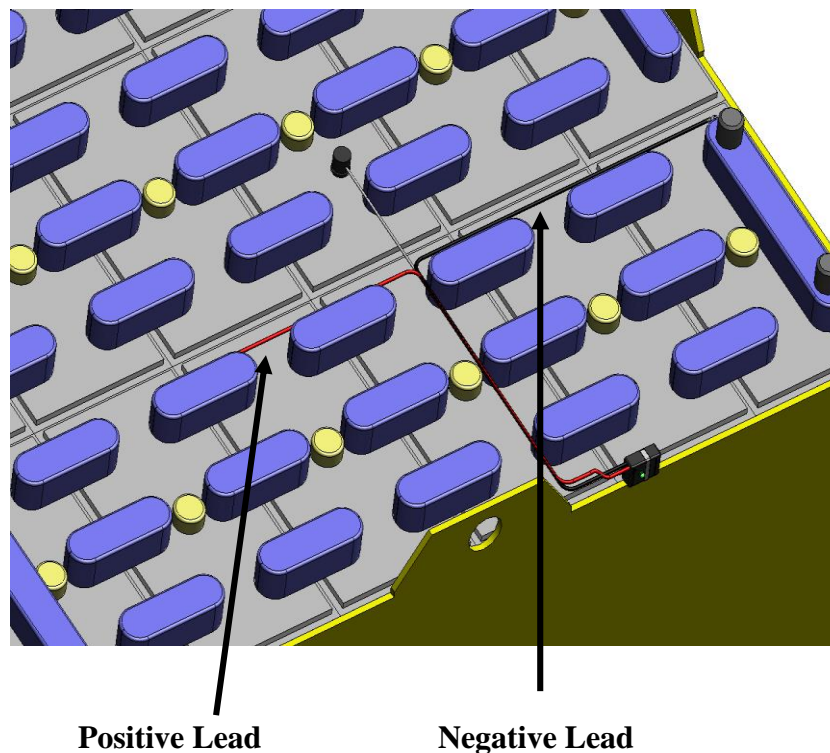


- DO NOT EXCEED 15 cells maximum between the negative and the positive terminals leads.

**NOTE:** If the power leads are too short to reach the necessary inter-cell connectors, either a different cell for the probe will need to be selected, or the iLEV will need re-location.

- When the locations of the iLEV, Electrolyte Sensor, and power supply leads have all been determined to be adequate:
  - Drill a ½” hole in the cell cover of the cell selected for the Electrolyte Sensor. The hole should be centrally located, between the inter-cell connectors. Push the probe into the hole until the rubber seal is seated fully.
  - Insert the Clip/Holder of the iLEV assembly between the battery box and battery case as described above, to secure the iLEV.
  - Or use supplied cable tie, and tie to inter-cell cap, as shown in fig. 3.

### Electrolyte Sensor Installed



**FIG. 5**

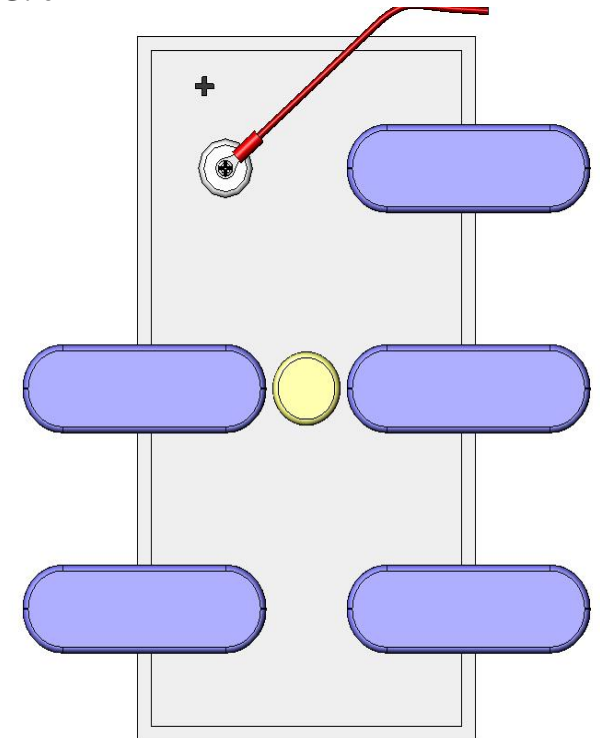


**NOTE:** The insertion depth of the Electrolyte Sensor, and therefore the level at which low electrolyte is detected, can be adjusted by cutting the stainless steel electrode to the appropriate length.

- Drill #36 holes approximately 0.5” deep in the inter-cell connectors for the plus and minus power supply leads.
  - Secure the minus lead to the inter-cell connector with the #8 self-tapping screw.
  - Observe the iLEV LED as the plus lead is secured with the #8 self-tapping screw, Fig.6. Verify the number of red-green blinks is equal to the number of cells spanned with the power leads. (2 red and 2 green blinks for the example shown, 4 cells) The plus lead may be disconnected and reconnected if necessary to verify the count.
- If the iLEV-PT is being installed, connect the PowerTrac SP to the iLEV by removing the shrink tubing from the unused connector on the PowerTrac and mating it with the connector attached to the iLEV-PT.

**iLEV Plus Lead**  
(attached by #8 self tapping screw)

**FIG. 6**

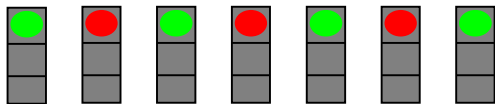


## Operation:

The iLEV is designed to indicate the appropriate time to water a flooded lead-acid battery. Recommended watering is after a charge and equalize cycle. This is typically when the Voltage per Cell (VPC) is above 2.5 volts. The iLEV indicates an appropriate time for watering with a continuously illuminated red LED. However, battery watering is part of regular battery maintenance, and should be administered immediately after every equalize cycle is applied to the battery. For best battery life, do not wait for iLEV to blink red or turn solid red.

## Initial Power Application Alternating Green-Red Flashes

The nominal battery voltage per cell (VPC) is assumed to be 2.08 volts. At power-up the iLEV calculates the number of cells by sensing the voltage between the power terminals and dividing by 2.08. It then rounds to the nearest whole integer and blinks red-green as in the following figure:



Each color corresponds to one cell. For example, the number of cells detected in the previous figure is seven.

This blink sequence should be verified against the actual electrical connections to the battery to be sure the number of cells is in agreement. Severely discharged battery cells are the most likely source of error in this measurement.

## Flashing Green

The iLEV will flash green when the electrolyte level is adequate. The number of days with sufficient electrolyte level is indicated by the number of flashes using a one second off one second on pattern for the first day.

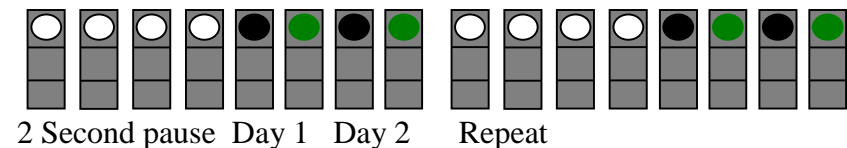
### Flashing Green during the first day



The LED blinks 1 second OFF and 1 second ON.

### Flashing Green subsequent days

On the second and following days the Green LED is off for 2 seconds and then flashes on for  $\frac{3}{4}$  seconds followed by a  $\frac{3}{4}$  second off period, with each green flash indicating a single day. The following figure is an example of the pattern during the third day, indicating 2 full days with adequate level:



The number of blinks is capped at 60; the LED will be solid green if electrolyte levels have been maintained for greater than 60 days.

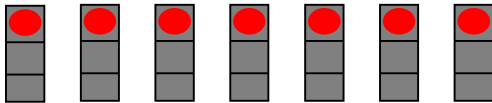
## Flashing Red

The iLEV LED flashes red when the water level is low. The flashing discontinues and becomes continuous if the level is low and the battery has been charged.

A flashing red color is decoded the same way as a flashing green to indicate the number of days the level has been unacceptably low. The number of red blinks is capped at 60.

## Solid RED

The LED is continuously illuminated red whenever the electrolyte level is low and the VPC is 2.50 volts or more.



## Change of State Delay

Electrolyte level variations can be caused by vehicle movement/attitude, or an increased volume due to bubble formation during charging.

A 120 second period of acceptable or low electrolyte level is required before the iLEV will change the indication from Green (adequate level) to Red (low level) indication, or from solid Red to Green

A three (3) hour period of voltage above 2.5 VPC along with a low electrolyte level is required to activate the solid red indication. A 10 minute period below 2.25V/cell will change the LED to blinking red. If the battery is watered, the LED will switch to blinking green after 2 minutes.

The low electrolyte level day counter requires a minimum of eight (8) hours of acceptable electrolyte level to reset to the zero (0) day low indication. If the level is acceptable for less than eight (8) hours the green LED will indicate acceptable level during this period but the counter will not reset.