

FEATURES

- In-line charge controller with temperature compensation, with option to mount in battery box
- Micro controller for digital accuracy and reliability
- Fully automatic operation on 12V or 24VDC systems
- LED indication of solar charge and battery level status
- Will handle up to 40 Amps @ 28VDC from PV panels
- Selectable operation: sealed/ flooded batteries
- Pulse action reduces battery sulfation
- PVDM display module port and internal current shunt

DESCRIPTION & OPERATION

The micro-processor based PVC40D photo-voltaic (PV) charge controller is used to connect PV panels to 12V or 24VDC storage batteries. The PVC40D determines which mode to operate in, 12V or 24V, by measuring the battery voltage that powers it.

The PVC40D performs six basic functions:

- It senses when the battery is fully charged and disconnects the PV charge current to avoid over-charging the battery.
- It resumes charging the battery when the battery voltage has dropped sufficiently to accept additional charge current.
- It checks the availability of PV charge current, by cycling the relay every 4 minutes. If there is insufficient charge current available, its internal relay will disconnect the battery to prevent discharge through the PV panels at night.
- It also compensates for battery temperature and adjusts the charge threshold voltages when mounted in battery box.
- Monitors optional battery load current shunt and provides accumulated load Amp hours.

Three different colored LEDs indicate the status of the battery charge.

● Green = Full, ● Yellow = Partial, ● blinking orange = low

Note: When orange LED is blinking, due to low voltage, both the green and yellow LEDs will be dimly lit.

The temperature compensation works as follows: (lead acid)

below 0°C	on @ 13.3VDC	off @ 15.0VDC
between 0-5°C	on @ 13.3VDC	off @ 14.8VDC
between 5-10°C	on @ 13.1VDC	off @ 14.6VDC
between 10-15°C	on @ 12.9VDC	off @ 14.4VDC
between 15-30°C	on @ 12.7VDC	off @ 14.2VDC
between 30-35°C	on @ 12.7VDC	off @ 14.0VDC
between 35-40°C	on @ 12.6VDC	off @ 13.8VDC
between 40-45°C	on @ 12.6VDC	off @ 13.6VDC

Temperatures > 45°C

on @ 12.7VDC off @ 14.2VDC

MOUNTING AT BATTERY LOCATION

Connect the PVC40D regulator wires to battery terminals. Use 2 #8 x .75" L screws to secure PVC40D if possible.

MOUNTING AT PHOTO VOLTAIC PANEL

Note: The temperature compensation function reverts to on @ 12.7VDC off @ 14.2VDC for temps above 45°C.

**SPECIFICATIONS**

Size & Weight:	2.1 x 4.0 x 1.3 inches, 6 ounces
Enclosure:	Epoxy potted in PVC plastic
Power:	6 to 30VDC from storage battery
Load Capacity:	50 Amps @ 14VDC 40 Amps @ 28VDC Minimum is a 20 watt panel
Flooded Battery Thresholds:	@ Room temperature 15-30°C On @ 12.4VDC, off @ 13.9VDC On @ 24.8VDC, off @ 27.8VDC Accuracy ± 0.1VDC
Sealed Battery Thresholds:	Blue jumper clipped @ room temperature 15-30°C On @ 12.4VDC, off @ 13.9VDC On @ 24.8VDC, off @ 27.8VDC Accuracy ± 0.1VDC
Current Draw:	Continuous - ≤7mA During charge - ≤55mA
LED Indication:	Red Charging mode Green ≥12.75VDC or 25.5 VDC Yellow 11.2VDC to 13.3VDC 22.4VDC to 25.5VDC Orange ≤11.2V or 22.4V
Voltage Drop:	0.10VDC @ 40Amps
Minimums:	Charge current - 80mA Open PV voltage - 16V or 32VDC
Maximums:	12V System open PV voltage 22.5VDC 24V System open PV voltage 45VDC
Electrical Connections:	1/4-20" brass bolts - power 1/4" spade connections – other
Temperature Sensor:	LM 335Z precision temp sensor
Temperature:	-30 to 75°C
Relay Life:	100 million plus mechanical operations

INSTALLATION TIPS

1. Exposed connections should be waterproofed. Grease or silicon will adequately protect connections such as splices. Clip blue jumper wire for sealed batteries.
2. When wiring the PV panel into the battery system, adequate wire size must be used. 12 AWG or larger wire is recommended. If smaller wire is used, the battery may not achieve full charge.
3. Check the battery fluid level as specified by the battery manufacturer.
4. Install the controller in the battery enclosure for the temperature compensation to work properly.

TROUBLESHOOTING TIPS

Problem: Module does not click on with sunlight on the PV panels.

Solution: Verify that the battery voltage is less than 12.7V (or 25V on a 24V system) and that the open PV voltage is greater than 16V (or 32V on a 24V system). If the battery voltage is at or above 12.7V and PV voltage is above 16VDC, apply additional load to drop the battery voltage below 12.7VDC. If the PV voltage is below 16VDC, check to see if the Solar panel has direct sunlight: **To work properly there cannot be any shadows from trees, buildings, etc.**

Problem: Module clicks every four minutes.

Solution: This is the normal operating sequence.

Problem: Module is constantly clicking on & off. Battery voltage is less than 12.7VDC and PV voltage is greater than 16VDC.

Solution: Check the Battery voltage on the battery posts to see if it is fluctuating up & down or remaining steady.

When the voltage on the post is fluctuating between 12.7VDC and the solar panel voltage the battery may have a bad cell, **have the battery tested.**

When the voltage is steady, then check voltage on the battery cables. If it is fluctuating up and down, **clean the connections between battery post and battery cables.**

When the voltage is steady, check the voltage on the battery buss bar inside the trailer, inspect for water damage or oxidation which can cause a high resistance between controller and battery. **Clean and grease connections with NoALOX™.**

When the voltage is steady at the buss bar (main termination or connection point) then check the voltage at the charge controller connector (bat + red wire and bat - black wire), if fluctuating at the connector, you could have some oxidation in the connector. **Replace connectors and re-test.**

When the PVC40D is still clicking 20-30 times a minute, after replacing the connection (bat + red wire) the controller and the positive buss bar, we recommend connecting the controller's bat + red wire to the battery using a 10 gauge wire to rule out a hidden connections that could be causing the problem.

The PVC40D controller monitors battery and solar voltage to know when to charge the battery and when to stop charging. If the voltage is fluctuating between 12.7VDC and 14.2VDC, 99% of the time it is a bad connection between the controller and the battery or a bad battery.

Problem: The PVC40D charge controller enters the charge routine every 10 to 15 minutes and only charges for 3 to 4 minutes.

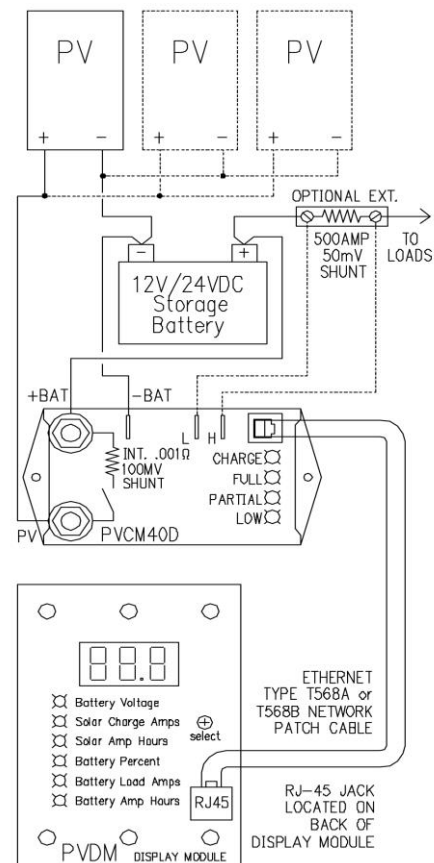
Solution: The PVC40D is working normally. The PVC40D monitors both the Battery voltage and PV voltage, when the trailers loads draw the battery down below 12.7VDC the controller begins a new charge cycle. If the PV panel is putting out its maximum charge current it may only take 3 to 5 minutes to bring the battery voltage up to the 14.2VDC cutout point. The timing may vary based on the loads and output from the PV panels.

Problem: The battery loads have been left on and the storage battery has discharged below 9VDC. The PV system is not charging when the load is turned off.

Solution: The PVC40D needs at least 9VDC from the battery to operate properly. Place panel in direct sunlight and jump the battery & PV bolts for 30 minutes, bypassing the charge controller allowing the battery voltage to rise to at least 9VDC. Disconnecting the jumper will allow the PVC40D to charge the battery up to normal levels.



Recommended Grease for all power connections between PV panels, PVC40D charge controller and battery bank.
Brand: IDEAL No ALOX 0.5oz.
Available at most hardware stores.

HOOKUP DIAGRAM

The PVC40D has an internal shunt for the solar charge current which will handle the maximum of 40 Amps. The T568A or T568B network patch cable connects the PVC40D to the PVD40 display module. The battery powering the PVC40D also powers the display module.