

FEATURES & APPLICATIONS

- ❖ In-line charge controller with temp. compensation, may mount in PV panel or battery box
- ❖ Micro-controller for digital accuracy and reliability
- ❖ Fully automatic operation on 12V or 24V DC systems
- ❖ LED indication of solar charge & battery level status
- ❖ Will handle up to 20 Amps @ 28V DC 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 PVCM20D photo-voltaic (PV) charge controller is used to connect PV panels to 12V or 24V DC storage batteries. The PVCM determines which mode to operate in, 12V or 24V, by measuring both battery voltage and PV charge voltage.

- The PVCM20D performs five 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 case.
 - * Its microprocessor reduces the charging rate of fully charged batteries to minimize water addition requirements.

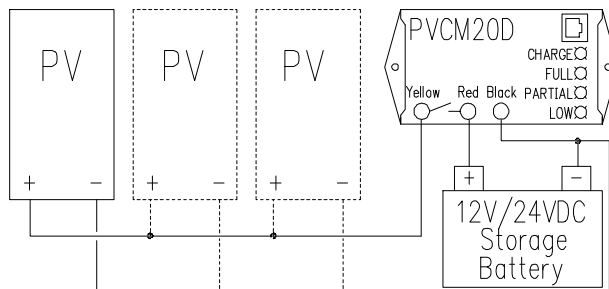
Three different colored LEDs indicate the status of the battery charge. Gm = Full, Yel = Partial, blinking Org = low.
Note: When orange LED is blinking, due to low voltage, both the green and yellow LEDs will be dimly lit.

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 or no temperature sensor connected:
 On @ 12.7VDC Off @ 14.2VDC.

WIRING CONFIGURATION



SPECIFICATIONS

SIZE/WEIGHT:	2.1 x 4.0 x 1.3 inches, 6 ounces
ENCLOSURE:	Epoxy potted in PVC plastic
MOUNTING:	2 #10 x .75" L screws (not provided)
POWER:	6 to 30 V DC from storage battery
LOAD CAPACITY:	20 Amps @ 28V DC (Minimum is 20 watt panel)
FLOODED BATTERY THRESHOLDS:	@ Room Temperature 15-30°C On @ 12.7VDC, Off @ 14.2VDC On @ 25.4VDC, Off @ 28.4VDC Accuracy ± 0.1V DC
SEALED BATTERY THRESHOLDS:	*Blue Jumper Clipped* @ Room Temperature 15-30°C On @ 12.4VDC, Off @ 13.9VDC On @ 24.8VDC, Off @ 27.8VDC Accuracy ± 0.1V DC
CURRENT DRAW:	Continuous - ≤7mA During charge - ≤ 55mA
LED INDICATION:	Battery Voltage Red Charging Mode Green ≥ 12.75VDC or 25.5VDC Yellow 11.2VDC to 13.3VDC or 22.4VDC to 25.5VDC Orange ≤ 11.2V or 22.4V
VOLTAGE DROP:	0.10V DC @ 20 Amps
MINIMUMS:	Charge current - 80mA Open PV Voltage - 16V or 32V DC
INTERNAL SHUNT:	.005 Ω, 100 millivolt
TEMPERATURE:	-30 to 75°C
RELAY LIFE:	100 million mechanical operations

ORDERING INFORMATION

PVCM20D - Photo-Voltaic charge Controller Module
 Rated for 20 Amps @ 28VDC
 With built-in temperature sensor

INSTALLATION TIPS

1. Exposed connections should be waterproofed. Grease or silicon will adequately protect connections such as splices or the network cable jack. Clip blue jumper wire for sealed battery threshold change.
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 occasionally (at least every 90 days) and add water as necessary.
4. Install the PVCM20D in the battery enclosure for the temperature compensation to work properly.

TROUBLESHOOTING TIPS

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|----------|---|--|
| Problem | - | Module doesn't click on and there is sunlight on the PV panels. |
| Solution | - | Verify that the battery voltage is less than 12.75V (or 25.5V on a 24VDC system) and that the open PV voltage is greater than 16V (or 32V). If both conditions are met, then wait for 4 minute delay period. |
| Problem | - | Module clicks every several minutes. |
| Solution | - | This is the normal operating sequence. |
| Problem | - | Module charges for a few seconds then shuts off for 4 minutes or longer. |
| Solution | - | The batteries are fully charged and the charge current was at maximum output. It may also mean that the batteries have a poor connection or a bad cell with high internal resistance. |
| Problem | - | Module switches on for 1 or 2 minutes and then is off for a much longer period of time. |
| Solution | - | This is also normal if the battery is at or nearly fully charged and the PV charge current is at or near maximum. |
| Problem | - | The battery load has been left on and the storage battery has discharged below 6 V DC. The PV system is not charging when the load is turned off. |
| Solution | - | The PVCM20D needs at least 6 V DC from the battery to operate properly. Place panel in direct sunlight and jumper the red and yellow wires for a few minutes, thus bypassing the charge controller allowing the battery voltage to rise to at least 7 V DC. Disconnecting the jumper will allow the PVCM20D to charge the battery up to normal levels. |

MOUNTING AT PHOTO-VOLTAIC PANEL

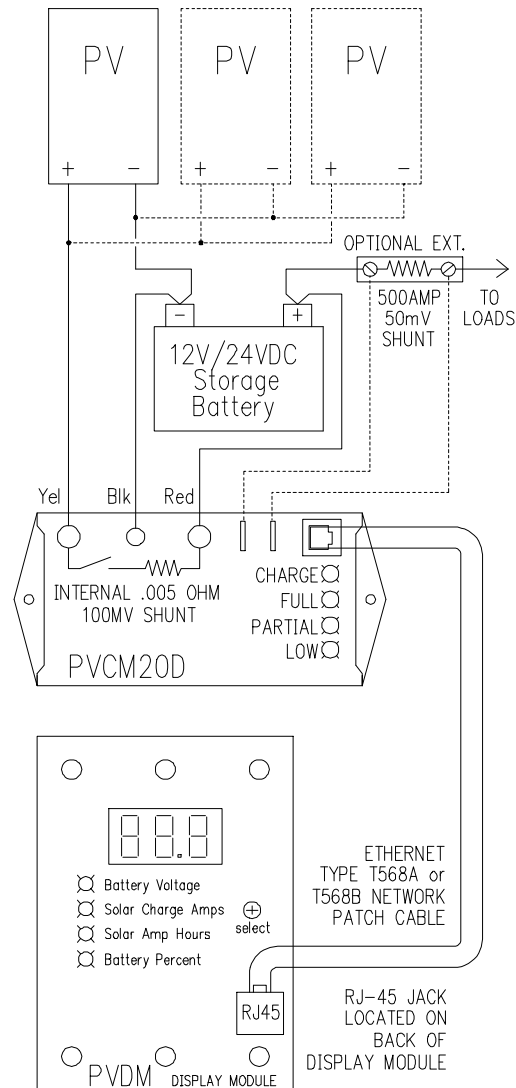
Before mounting the PVCM20D regulator inside the PV panel junction box, clean the surface to which the PVCM20D will be attached. Allow the surface to dry. Remove the double stick tape backing and press firmly into box cover.

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

MOUNTING AT BATTERY LOCATION

Connect the PVCM20D regulator wires to battery terminals. Use screws to secure PVCM20D if possible.

HOOKUP DIAGRAM FOR PVDM DISPLAY



The PVCM20D has an internal shunt for the solar charge current which will handle the maximum of 20 Amps. The T568A or T568B network patch cable connects the PVCM20D to the PVDM display module. The battery powering the PVCM20D also powers the display module.