

# Kasco®

## Owners Manual

### PicoBlender 2500 60 Hz



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## **Important Safety:**

Please read and follow these important instructions to help ensure your safety and the quality performance of your Kasco equipment. This manual contains important instructions that should be followed during installation, operation, and maintenance of the PicoBlender controller.

Carefully read and follow all safety instructions in this manual. Make sure that safety labels are always in good condition and replace any missing or damaged safety labels.

- Caution should be used when dealing with any electrical and/or moving equipment.
- **Under NO CIRCUMSTANCE should anyone enter the water with the electrical equipment plugged in and/or in operation.**



**Warning**  
**Risk of Electrical Shock**  
**Disconnect Power Before Removing Door Cover**  
**Caution**  
**Risk of Electrical Shock**



Before performing any service or maintenance inside the controller, or when connecting or disconnecting any wires, DISCONNECT the power and wait 90 seconds to allow the capacitor bank inside the controller to discharge to a level below 50Vdc.

## **Do Not:**

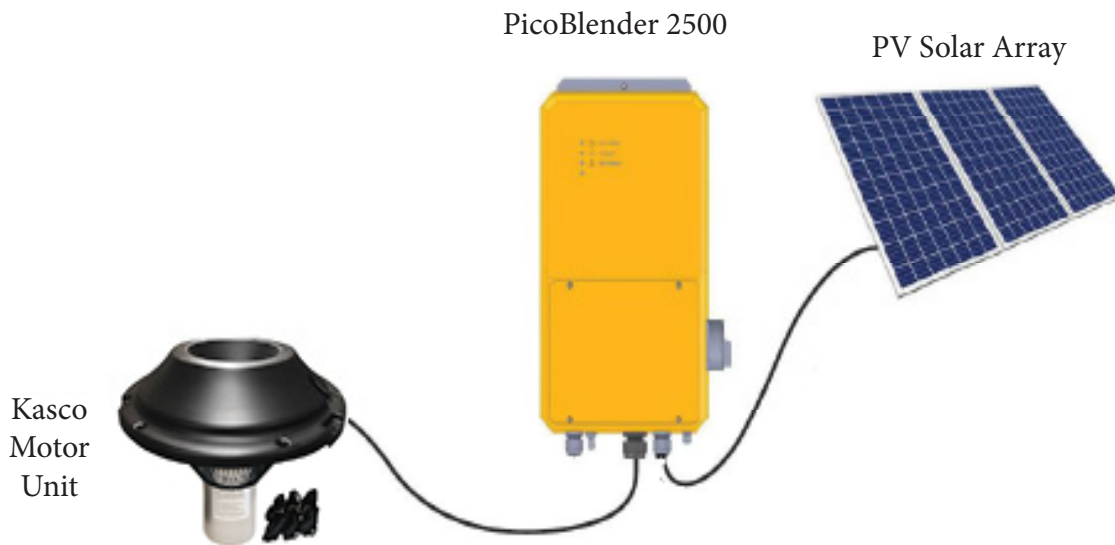
- Turn on the power to the controller before terminating all wiring connections and closing the cover door.
- Connect power wiring to the controller before mounting the box.
- Service the device if your hands are wet or damp. Always make sure hands are dry before working on the controller.
- Modify inside the controller.
- Remove any parts of the controller unless instructed by this manual.

## Product-at-a-Glance

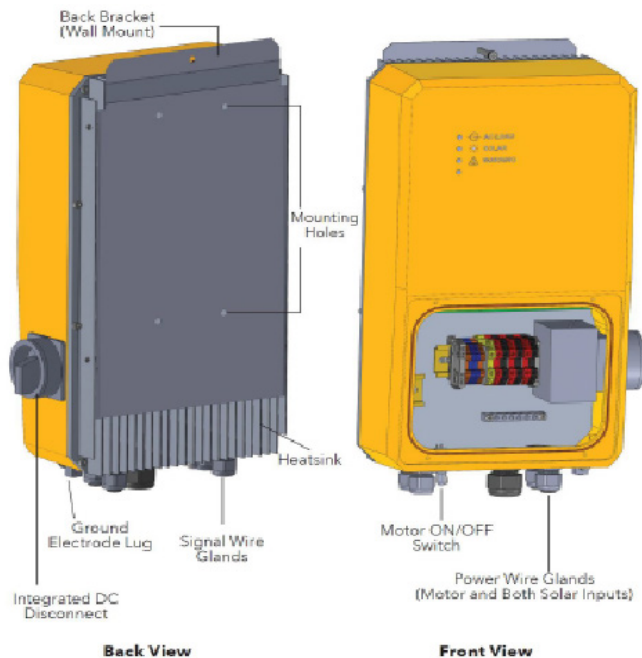
The PicoBlender 2500 is a device that blends energy between a solar panel and the power grid. It is used for applications that require 24/7 or some night-time operation, particularly in areas with high power costs. This solution offers a cost-effective way to supplement solar power with controllable night-time operation without the need for expensive batteries.

The PicoBlender can operate most alternating current (AC) motors up to 2HP single-phase and 3HP three-phase from solar panel power or grid power for night-time operation of equipment. The PicoBlender has a unique functionality that enables users to match an AC load with solar power.

A typical diagram for a PicoBlender-operated Kasco surface aerator is below. The solar panels should be connected to the PicoBlender controller via the integrated DC Disconnect. The PicoBlender controller should be installed in the shade (potentially mounted under the solar panels) and away from the direct sun.



The PicoBlender controller consists of several components, as shown below. The unit has five wire glands: one large gland for a motor cable (middle), two glands for solar panels (right side), and two glands for data cables (left side). There is direct access to the power and signal terminals on the DIN rail once the enclosure door is removed. The PicoBlender controller should be mounted on a wall or other vertical surface using the back bracket (see below). On the back side of the unit there are four set screws used to hang the unit on the back bracket.

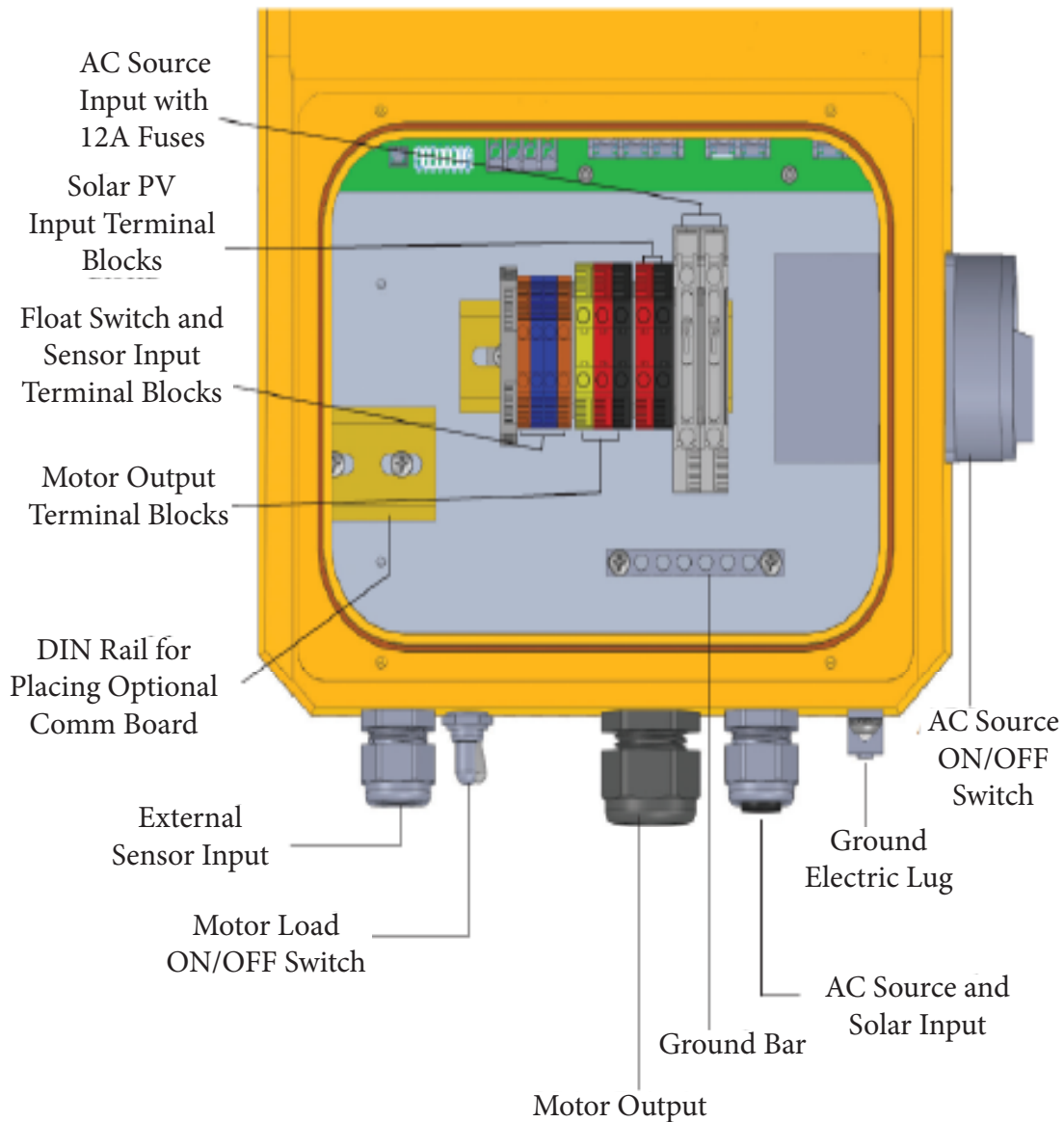


## Overview

The Features of the PicoBlender controller are shown below. The unit has five wire glands: solar PV and AC Source inputs, motor outputs, and two glands for the external sensors.

Four LEDs are used to indicate the PicoBlender controller's operation. On the bottom left, next to the external sensors glands, there is a motor ON/OFF switch that controls the PicoBlender's operation of the motor.

Once the door of the enclosure is removed, there is access to the input terminal blocks (DIN rail mounts) on the right. Below the DIN rail is a grounding block for connecting the equipment ground. The installer should use the DIN rail terminals for connecting all external wires to the PicoBlender unit. The smaller DIN rail on the lower left is used for an optional WiFi communication (comm) board, which can be purchased upon request.

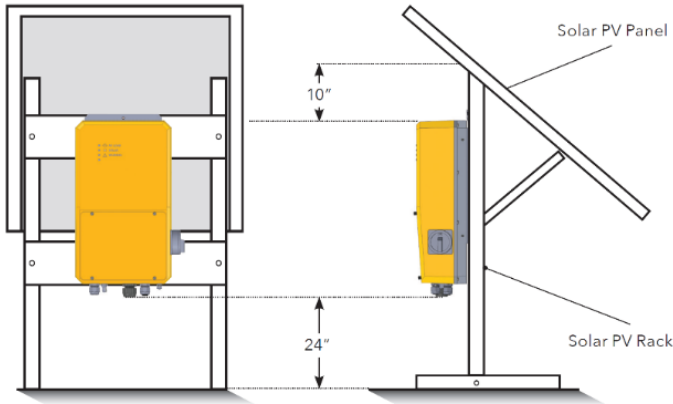


## Installation Requirements

The PicoBlender must be installed in a shaded location, away from any source of heat and moisture, and in an area free of vegetation. Measures must also be made to protect the unit from damage by unauthorized persons, large animals, overgrowth, flooding, or other harm.

### Warning

The PicoBlender has voltages capable of causing severe injury or death by electrical shock. It should only be installed and serviced by Kasco Marine authorized dealers and installers. Integral solid-state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.

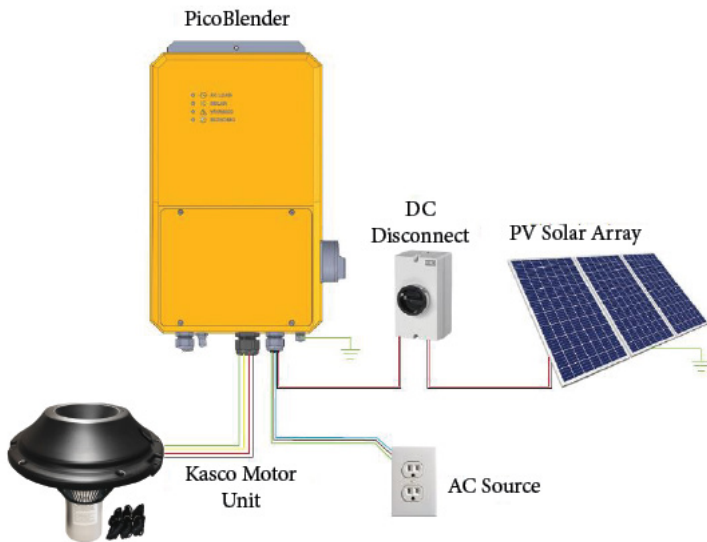


- Contact your Kasco Marine Dealer for any service or warranty claims.
- NEC codes take precedence over suggestions in this manual.

The PicoBlender should be mounted at least 2 feet above the ground when possible. A minimum of 10 inches of clearance above the PicoBlender is required for internal access. There must be no obstruction of air flow to the PicoBlender.

The controller should be installed and inspected by technically qualified personnel, and if the controller is not installed in compliance with national and local electrical codes and Kasco Marine recommendations, the controller can be damaged and fail to operate.

### A typical installation on a solar panel structure



All electrical installations must be carried out in accordance with local standards and the National Electrical Code.

Conductor rated current, temperatures, operating conditions and its power loss must be made in accordance with local standards and the National Electrical Code.

After being properly installed, the PicoBlender should be wired to AC and DC sources.

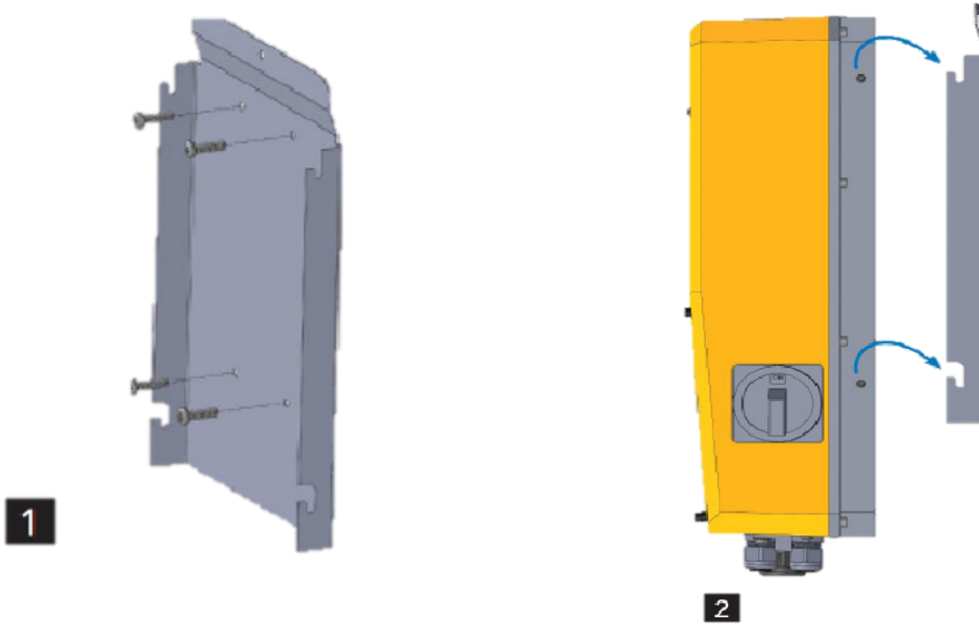
## Mounting Instructions

### Step 1

Secure the back bracket to the support surface by inserting four screws (not included) through the 4 holes in the back bracket.

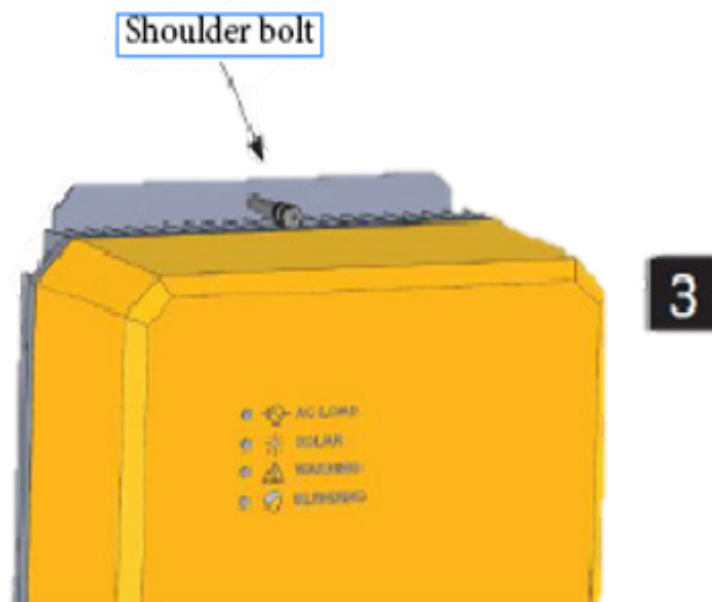
### Step 2

Make sure all 4 set screws are used to hang the PicoBlender onto the back bracket.



### Step 3

Once the PicoBlender is in place on the back bracket, screw in the shoulder bolt to secure the unit to the bracket.



# Wiring Instructions

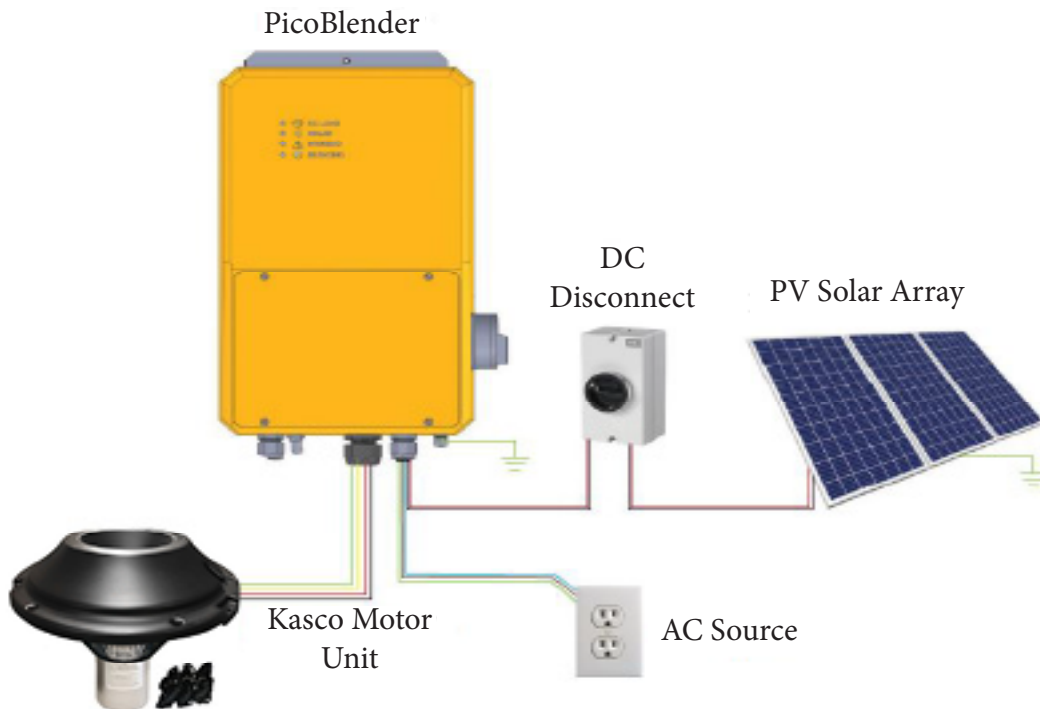
## Installation Requirements:

- All electrical installations must be carried out in accordance with local standards and the National Electrical Code.
- Conductor rated current, temperatures, operating conditions and its power loss must be made in accordance with local standards and the National Electrical Code.
- After being properly installed, the PicoBlender should be wired to AC and DC sources.

**Single phase 2-wire motors should be connected to Phase A and C.**

## Startup:

1. Make sure that the ON/OFF toggle switch is in the OFF position.
2. While the PicoBlender is still de-energized, configure the DIP switches per the Kasco product that will be connected. (See DIP switch location settings on the next page)
3. Power up the PicoBlender from solar panels by switching the solar DC disconnect to the ON position. All LEDs will light up.
4. Once the solar panel source powers up the PicoBlender, turn the bottom external motor ON/OFF toggle switch to the ON position to start the motor load. The PicoBlender will check its motor connections using built-in open and short circuit protections. If one of the motor leads is not connected or if there is a short in the motor connections, the PicoBlender will show a warning message using indication LEDs. Otherwise, it will start the motor load.



Single phase motor loads should be wired as shown below. Single phase 2-wire motors should be connected to Phase A and C, while 3-wire motors should be wired so that Common Lead is wired to Phase A, Starting Winding to phase B and Main Winding to phase C. Use DIP Switch 8 for proper single phase motor selection.

## IMPORTANT:

Single phase 2-wire motor pumps:	Connect to A and C motor terminals of PicoBlender
Single phase 3-wire motor pumps:	Ph_A: <b>YELLOW</b> wire - common motor lead Ph_B: <b>RED</b> wire - start motor lead Ph_C: <b>BLACK</b> wire - main motor lead

## Wiring Instructions

### Warning

**Do not ground the positive or negative leads of the solar panels.** Only ground the mounting frames of the solar panels.

Never run the PicoBlender controller when the AC pump is not connected. It might cause damage to the controller.

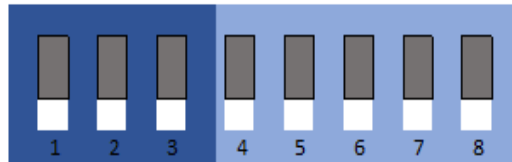
If an installed 3-phase pump does not start pumping water, switch the positions of any two of the three motor wires. It will change the direction of rotation and it should start pumping water.

### PicoBlender DIP Switch Settings

*Single phase 2-wire motors should be connected to Phase A and C.*

### Warning

**Do not modify DIP switch settings until power has been turned off and after 90 seconds have passed for internal voltages to discharge below voltage of 50Vdc. Power must be removed for DIP switch setting to take effect.**



<u>Kasco Product</u>	<u>HP, Voltage, Phase</u>	<u>DIP Switch #1</u>	<u>DIP Switch #2</u>	<u>DIP Switch #3</u>	<u>DIP Switch #4</u>	<u>DIP Switch #5</u>	<u>DIP Switch #6</u>	<u>DIP Switch #7</u>	<u>DIP Switch #8</u>
<b>2400AF</b>	<b>1/2, 120v, 1</b>	Up	Up	Down	Down	Down	Up	Down	Down
<b>2400VFX</b>	<b>1/2, 120v, 1</b>	Up	Up	Down	Down	Down	Up	Down	Down
<b>3400AF</b>	<b>3/4, 120v, 1</b>	Up	Down	Down	Down	Down	Down	Up	Down
<b>3400VFX</b>	<b>3/4, 120v, 1</b>	Up	Up	Down	Down	Down	Down	Up	Down
<b>3400JF</b>	<b>3/4, 120v, 1</b>	Up	Up	Down	Down	Down	Down	Up	Down
<b>4400HAF</b>	<b>1, 240v, 1</b>	Down	Up	Down	Down	Down	Up	Up	Down
<b>4400HVFX</b>	<b>1, 240v, 1</b>	Down	Up	Down	Down	Down	Up	Down	Down
<b>4400HJF</b>	<b>1, 240v, 1</b>	Down	Up	Down	Down	Down	Up	Down	Down
<b>2.3AF</b>	<b>2, 230v, 3</b>	Down	Down	Down	Down	Down	Up	Down	Down
<b>2.3VFX</b>	<b>2, 230v, 3</b>	Down	Down	Down	Down	Down	Down	Down	Down
<b>2.3JF</b>	<b>2, 230v, 3</b>	Down	Down	Down	Down	Down	Down	Down	Down



# Operations

## Startup:

When starting the PicoBlender for the first time:

1. Make sure that the ON/OFF toggle switch is in the OFF position.
2. Turn the AC switch (on the right side of the PicoBlender) to the ON position to provide AC power to the PicoBlender.
3. Power up the PicoBlender from solar PV (if available) by switching the solar DC disconnect to the ON position.
4. Once both solar PV and AC source power are provided to the PicoBlender, turn the bottom toggle switch to the ON position to start the motor load.



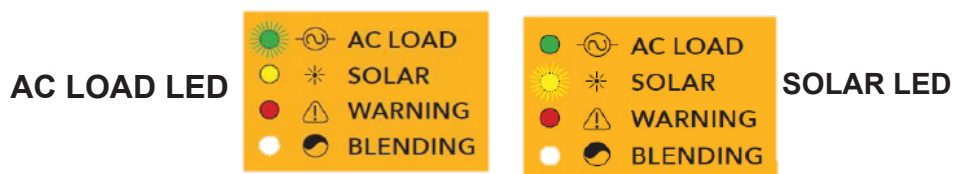
The PicoBlender will check its motor connections using built-in open and short circuit protections. If one of the motor leads is not connected, or if there is a short in the motor connections, the PicoBlender will show a warning message using the indication LEDs.

If the motor is properly connected, the PicoBlender will move to the startup procedure. The green AC LOAD LED (below) will have a solid green light, and the motor will start running. The PicoBlender immediately performs MPPT operation over the solar PV input to offset AC source power.

The PicoBlender has built-in overload protection, so if a connected motor has a power level higher than the PicoBlender can handle, it first slows down and tries to run the motor at a lower power level. If the motor power continues to be outside the power range of the PicoBlender, it will shut off the motor.

If the AC switch on the right side is ON, then the PicoBlender is automatically in Blending Mode, using as much power as is available from the solar PV panels, while automatically supplementing on an as-needed basis from the AC power source.

If the AC switch is in the OFF position, then the PicoBlender operates in Solar Only mode, and it will not draw any power from the grid, but will balance the power from solar with motor power by varying the motor frequency. If there is not enough power, the unit's SOLAR LED light will blink yellow as shown below.



## Troubleshooting

To stop the PicoBlender's operation, the ON/OFF toggle switch on the bottom of the unit should be used. Once in the OFF position, the PicoBlender will automatically stop the motor's operation.

The WARNING LED will be solid red if the temperature of the PicoBlender rises above 176°F, at which point the PicoBlender will stop operating and wait until the temperature drops. This can happen if the unit is exposed to direct sunlight, which should be avoided.

If the PicoBlender gets too hot during normal operation, it will switch to Power Deration mode, limiting the maximum power that is transferred to the motor load. During that time, the AC LOAD LED will be solid green and the WARNING LED will be solid red. If the unit cools down to a regular operating temperature, it will automatically continue operation without the thermal deration. If the temperature of the PicoBlender continues to increase, it will eventually stop operating, at which point the WARNING LED will be solid red.

There are four LED lights on the PicoBlender. Three of these are indicator lights and their definitions are listed below.

AC LOAD	SOLAR	WARNING	MODE
ON	ON	ON	- Unit is OFF
FLASHING	OFF	OFF	- Startup
ON	OFF	OFF	- Running
OFF	FLASHING	OFF	- Standby
OFF	OFF	FLASHING	- Float switch
OFF	OFF	ON	- Over temperature
ON	OFF	ON	- Power deration
FLASHING	OFF	FLASHING	- Over current
OFF	FLASHING	FLASHING	- Short/Open circuit

**OFF Mode** PicoBlender toggle switch is in the OFF position.

**Startup Mode** PicoBlender is in the process of starting the motor pump.

**Running Mode** PicoBlender is running the motor pump.

**Standby Mode** There is not enough power from the solar PV panels for PicoBlender to start the motor.

**Over Temperature Mode** PicoBlender stops operation when the temperature inside the unit exceeds 80°C/176°F.

**Power Deration Mode** PicoBlender still operates but with reduced power throughput due to increased operating temperature, or if load is connected with current higher than **Over Current Protection** DIP Switches 6 and 7.

**Over Current Mode** PicoBlender stops operation when it detects high current on the motor terminals. This can also be due to a short circuit event if the unit is mis-wired. Requires manual restart by cycling power to the unit.

**Open Circuit Mode** PicoBlender will not start operation if the motor wiring does not align with DIP switch configuration.