PicoBlender2500

Manual

SunTechDrive

Revision 4.1

Before you get started

IMPORTANT:

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 missing or damaged safety labels.

WARNING

Risk of Electric Shock
Disconnect Power Before Removing Door Cover!

CAUTION

Risk of Electric 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.
- **DO NOT** connect power wiring to the Controller before mounting the box.
- **DO NOT** service the device if your hands are wet or damp. Always make sure hands are dry before working on the Controller.
- **DO NOT** modify equipment inside the Controller.
- **DO NOT** remove any parts of the Controller unless instructed by this Manual.

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 SunTech Drive recommendations, the controller can be damaged and fail to operate.

FOLLOW instructions in this manual and labels inside the Controller for proper and successful installation.

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Contents:

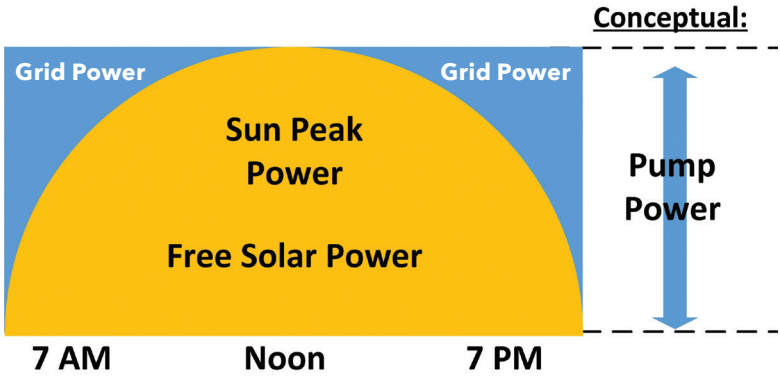
PicoBlender at a Glance

The PicoBlender is a device that seamlessly blends energy between a solar array and the power grid. It is ideally suited for applications that require 24/7 or some night time operation, particularly in areas with high power costs. This unique solution represents a cost-effective way to intelligently supplement solar power with controllable night time operation without the expense of adding a bank of batteries.

During times of full solar irradiance, the PicoBlender will draw all power from the PV array. When cloud cover or darkness reduces the level of solar irradiance, the system will automatically draw power from the grid to make up the difference. As dusk approaches and turns to night, the system will draw all of its power from the grid. This allows for both power firming during the day and full night time operation while consuming as little power from the grid as possible.

As shown in the diagram below, most of the day time operation is effectively off-loaded from the grid. This is particularly useful in areas with high demand charges or time-of-use pricing. Typical applications include swimming pool pumps,decorative fountains, aerators and waste water treatment systems.

If necessary, the power blending capability can be turned OFF using the AC Source switch on the right-hand side of the PicoBlender.



PicoBlender Product Description

The PicoBlender solar controller is a universal, high performance, variable speed motor controller for solar applications using single-phase and three-phase AC loads in a power range from 1/3 HP to 2 HP. The PicoBlender blends power between solar PV and an AC source, offsetting grid energy consumption.

The PicoBlender controller is suitable for a variety of applications:

- Industrial farming ventilation
- Swimming pool filtration
- Water transfer and evaporation
- Livestock water supply
- Village water supply
- Small scale irrigation
- Aquaculture and aeration

The PicoBlender can power new and previously installed (retrofit) AC motors. Please consult with a dealer to size the solar arrays when using the PicoBlender.

For new installations, motor selection can also optimize the system economics. 230V 3-phase motors are the most electrically efficient and require the least amount of solar, followed by 115V 3-phase, 230V 1-phase and 115V 1-phase in descending order of efficiency.

NOTE: Motors controlled by the PicoBlender do *not* require separate motor controls. The PicoBlender was designed to be universal for most inductive motors while being mindful of some basic design limitations:

> The PicoBlender may not operate 2-wire, single-phase motors that use switching devices to start. This includes, but is not limited to, 2-wire starting capacitors, both centrifugally switched and BIAC switched.
>
> Ask about SunTech Drive's Accessory Power Cable to retrofit 2-wire surface motors with starting caps.

- The PicoBlender can run motors with Service Factor Amps of 10 Amps or less for 1-phase motors, and 8 Amps or less for 3-phase motors. Please contact SunTech Drive for more information on particular motors.
- Generally, 1-phase motors up to 1.5 HP will operate well.
- Generally, 3-phase motors up to 2 HP will operate well.
- The PicoBlender does not power Direct Current (DC) permanent magnet or Brushless DC (BLDC) motors.
- The PicoBlender will replace the manufacturer's motor controller when installed on a Variable Speed Drive (VSD) or a Variable Frequency Drive (VFD) submersible pump motor.
- The PicoBlender will replace the control box for 3-wire motors.
- The PicoBlender will operate 2-wire motors with Permanent Split Capacitors (PSC).
- The PicoBlender will not operate submersible motors with 2-wire starting capacitors, including Franklin Electric 2-wire submersibles and Grundfos 2-wire submersibles. SunTech Drive offers accessory cables to retrofit most 2-wire starting capacitor surface motors.

PicoBlender Specifications

Input Specification:

- AC Grid Operating Voltage*: **115 Vac 60 Hz, 1-phase**
  230 Vac 50/60 Hz, 1-phase
- Maximum AC input Current: **12 Amps**
- Maximum Solar Open Circuit Voltage: **400Vdc****
- Maximum Solar PV Current in Series: **9 Amps*****
- Earth-ground connected to chassis

* Suitable For Use On A Circuit Capable of Delivering Not More Than 5000 rms Symmetrical Amperes, 230 Volts Maximum

** DC PV input terminals shall only be connected to Listed Photovoltaic Modules and Panels that comply with UL 1703.

*** Suitable For Use On A Circuit Capable of Delivering Not More Than 13.5 rms Symmetrical Amperes, 400 Volts Maximum.

Output Specification:

- Maximum Output Current: **10Arms (1-phase motors)**
- Maximum Output Current: **8Arms (3-phase motors)**
- Maximum Power Sustained: **2500W**

Protections:

- Input AC Grid Overcurrent : 12A fused terminal block, built in dry-well protection
- Short-circuit, Ground-fault, Over-temperature, over load, over voltage and over current
- AC Load GFCI: 5, 10, or 30mA based on selected set-point (optional)
- Automatic Dry Well protection

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.

ELECTRICAL		MECHANICAL	
AC Source operating voltage:	115-230V	Degree of protection:	TYPE 3R
AC Source phase & frequency:	1 phase only! 50/60Hz	Enclosure material:	Aluminum
		Operating temperature:	-40˚C to 40˚C
		Dimensions:	18”x10”x5”
Solar PV open circuit voltage:	400V	AC Source Terminals:	AWG #10-16
Max PV panel current in series:	9A	Solar Terminals:	AWG #10-16
Max Single phase AC motor current:	10A	Motor terminal:	AWG #10-16
Max Three phase AC motor current:	8A	Float Sensor terminals:	AWG #14-20

⚠ WARNING:

Carefully check the motor load specifications, AC source voltage available and solar PV array maximum power point voltage to setup the system properly using this manual!

If 120-Vac is used as AC grid input, maximum load that can be connected is 1400W!

PicoBlender 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 a SunTech Drive authorized suppliers, 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 SunTech Drive Supplier/Dealer for any service or warranty claims
- NEC codes take precedence over suggestions in this manual
- We strongly recommend that the installation data be recorded into the "Installation Notes" section on page 20 and that the manual is stored near the unit

The PicoBlender should be mounted at least 2 feet (60cm) above the ground when possible. A minimum of 10 inches (25cm) of clearance above the PicoBolender is required for internal access. There must not be an obstruction of air flow to the heat sink. A typical installation on an array structure is shown in Figure 1, below.

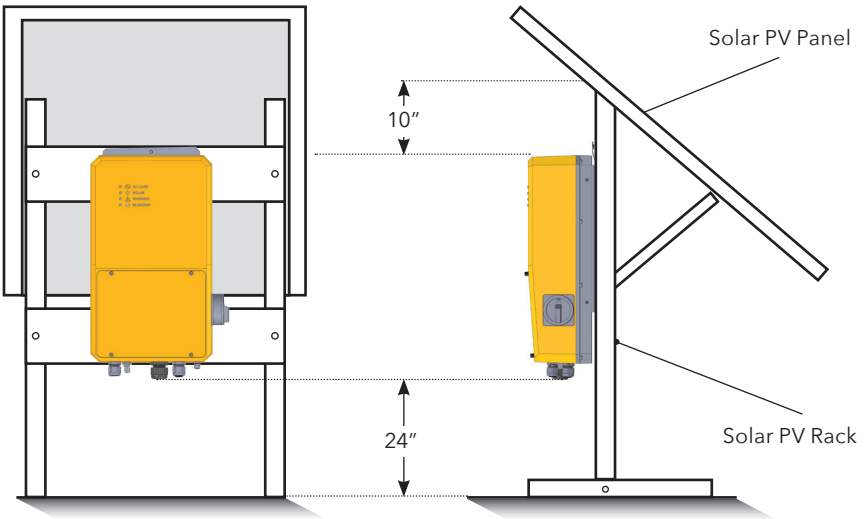


Figure 1: PicoBlender Mounting

Once the PicoBlender is installed in a shaded location, as shown in Figure 1, it should be wired to AC (grid) and DC (solar) sources. Maximum cable lengths for 115 and 230Vac for different motor load currents are shown in Figure 2 below.

This unit was evaluated for temperature rating of 60/75°C on power field wiring terminals.

Motor Load [A]	Nominal Voltage [V]	AWG Copper Wire Sizes 90˚C insulation [ft]				
		16	14	12	10	8
4	115 230	110 220	165 330	270 540	400 800	600 1200
6	115 230	70 140	110 220	175 350	275 550	400 800
8	115 230	55 110	85 170	135 270	200 400	300 600
10	115 230	45 90	70 140	105 210	165 330	240 480
12	115 230	35 70	60 120	90 180	135 270	200 400

IMPORTANT: Use copper conductors only!

Figure 2: Maximum Input Cable Lengths in Feet (Based on 3% Voltage Drop)

Dimensions of the PicoBlender and back panel are shown in Figure 3 for proper installation, with additional details on how to mount the unit on page 7.

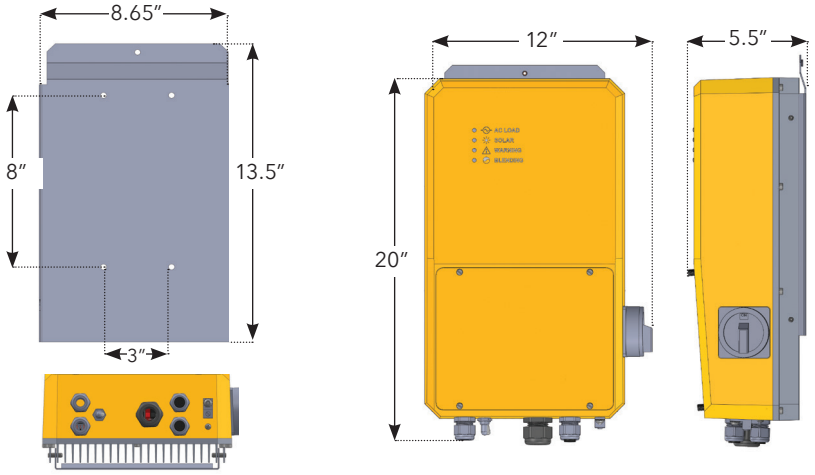


Figure 3: PicoBlender Dimensions

PicoBlender Hardware

The PicoBlender controller consists of several components, as shown in Figure 4. The unit has five wire glands: one large gland for a motor cable (middle), two glands for solar PV and AC source cables (right side), and two glands for data cables (left side), for a float switch sensor or other optional sensor. 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 Figure 4 below). On the back side of the unit there are four set screws used to hang the unit on the back bracket. More detailed mounting instructions are shown on page 7.

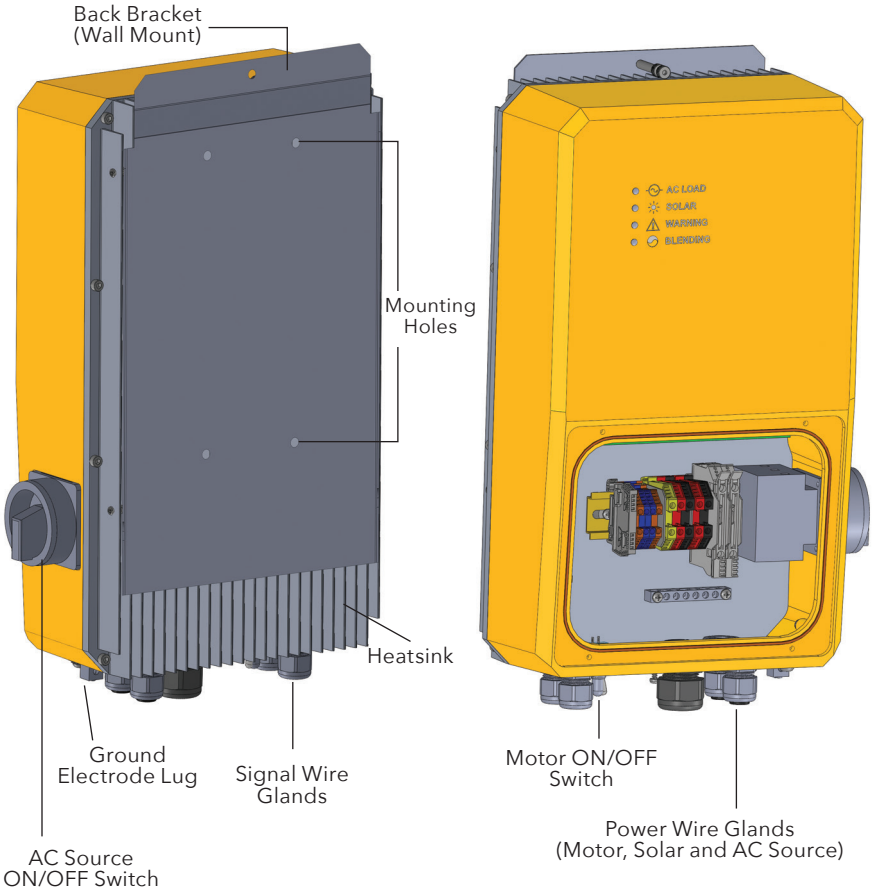
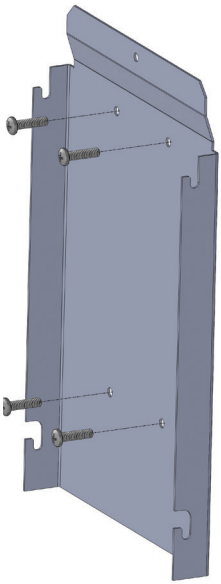


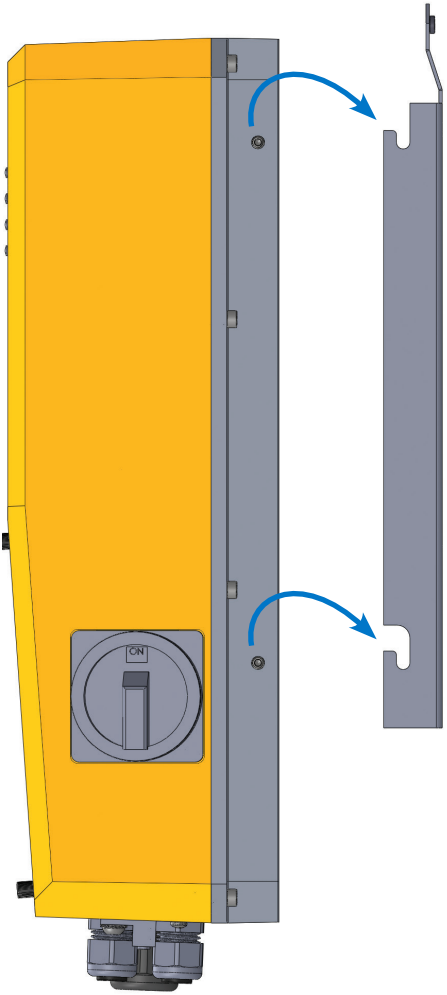
Figure 4: PicoBlender Hardware

Mounting the PicoBlender



1

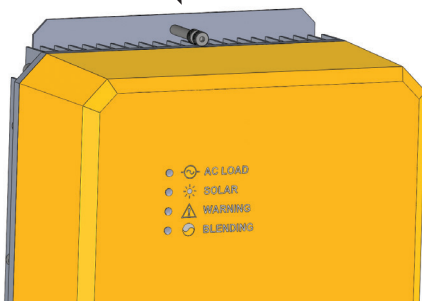
Fix the back bracket to the support surface by inserting four screws (not included) through the
4 holes in the back bracket



2

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

Shoulder bolt



3

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

PicoBlender Overview

The features of the PicoBlender controller are shown in Figure 5. The unit has five wire glands: solar PV and AC Source inputs, motor output, and two glands for the external sensors. Further details about wiring the unit are provided on page 9.

Four LEDs are used to indicate the PicoBlender controller's operation (more details provided on pages 17 and 18). On the bottom left, just 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.

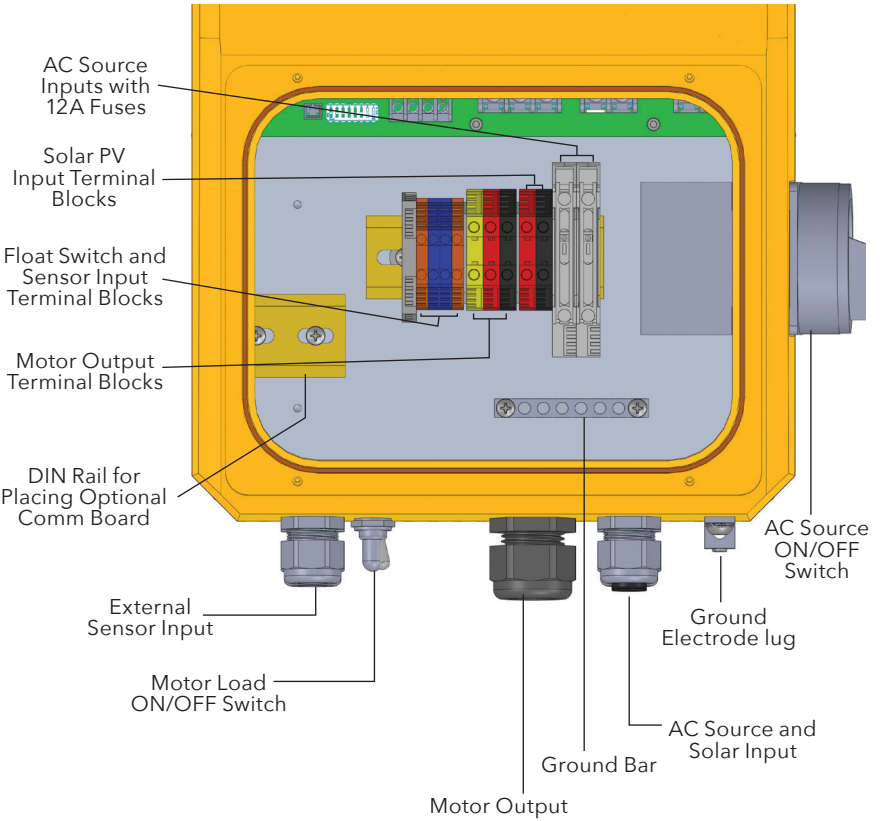


Figure 5: PicoBlender Features Overview

The features of a PicoBlender's printed circuit board are shown in Figure 6. The installer needs access to these features when configuring the PicoBlender's DIP switches to **match** the AC motor load and AC power source specifications (described in greater detail on pages 12-13).

The PicoBlender also has the ability to operate based on external sensor feedback, which is important in constant pressure pump operation where an external pressure transducer is used. The analog signal (feedback) from the pressure transducer is terminated to the connector P9 on the printed circuit board. The same connector can accept a total of two analog sensors.

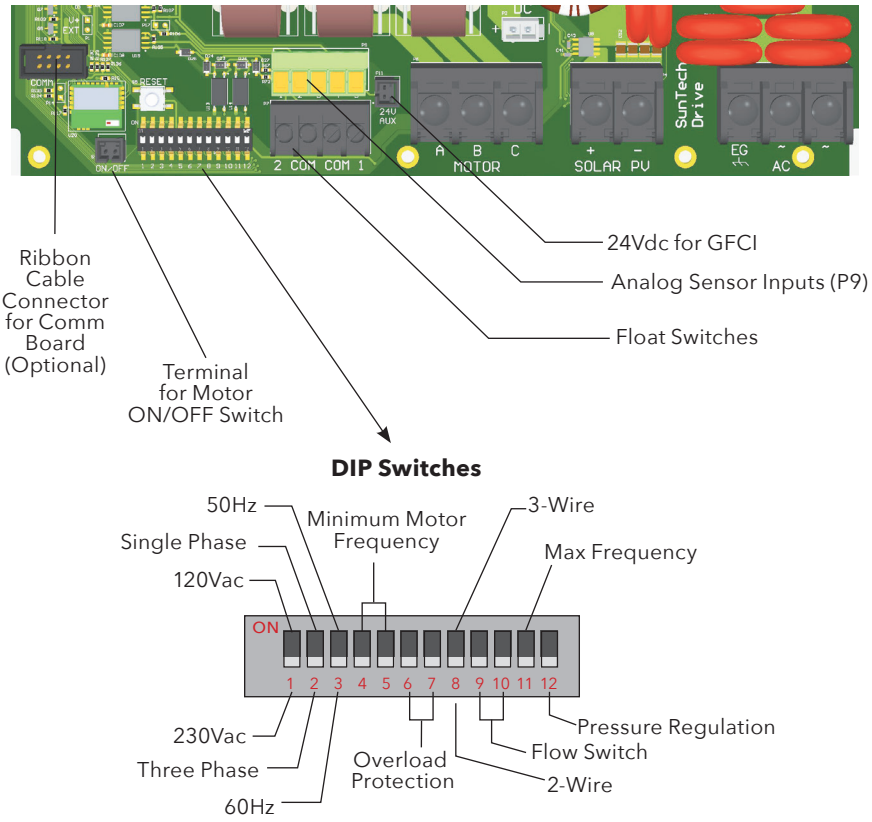


Figure 6: PicoBlender Printed Circuit Board Features Overview

⚠ 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 settings to take effect.

PicoBlender 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 with voltage and current levels defined on page 3. Please refer to maximum cable lengths from Figure 2. WiFi antenna and pressure transducer (or any other sensors) are optional.

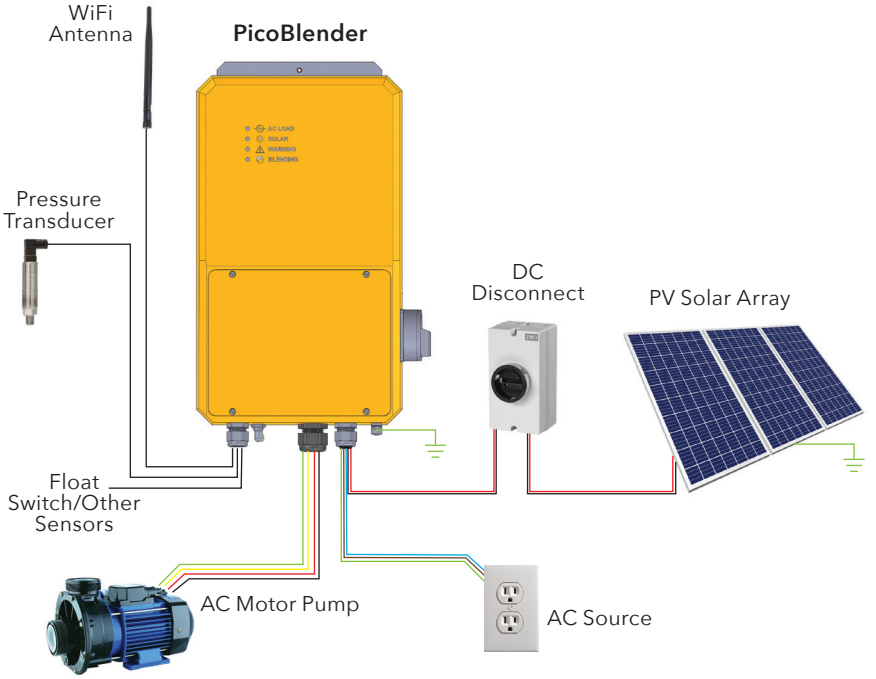


Figure 7: PicoBlender System Wiring Diagram

⚠ WARNING

Do not ground the positive or negative leads of the PV modules!
Only ground the mounting frames of the PV modules.
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!

Once the system is wired per Figure 8, the power conductors wired to the DIN rail terminals inside the PicoBlender should be tightened with torque values of:

- Solar PV and motor load conductors: 11 lb-in
- AC source conductors: 8 lb-in

The cable glands (cord grips) on the bottom of the enclosure should be used as:

- 1/2 inch cord grips should only be used with a cord that is 0.280-0.455 inch outer diameter.
- 3/4 inch cord grips should only be used with a cord that is 0.455-0.705 inch outer diameter.

When all conductors are wired into the controller, the cover (door) should be put on and tightened using the cover screws to 2-3 in-lb or equivalent.

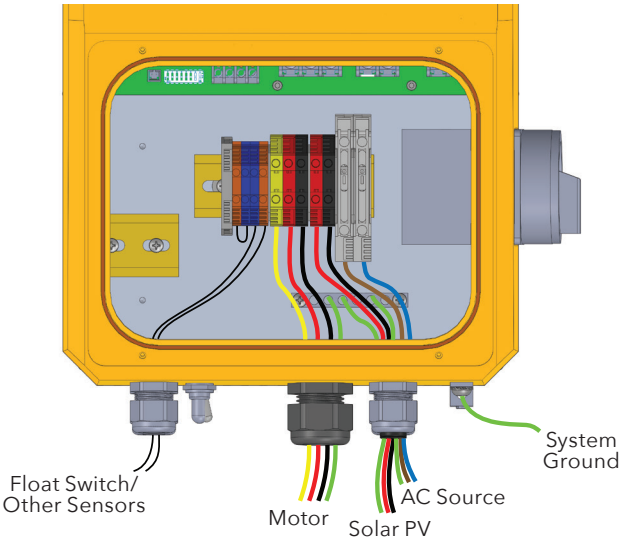


Figure 8: Wiring Inside the PicoBlender

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: YELLOW wire – common motor lead Ph_B: RED wire – start motor lead Ph_C: **BLACK** wire – main motor lead

PicoBlender DIP Switch Settings

The PicoBlender controller can operate most AC motors up to the power limits of the controller: single or three-phase; 50 or 60Hz; 120Vac or 230Vac. In order for the PicoBlender to match the motor specifications, the first three DIP switches on the left are used for motor selection:

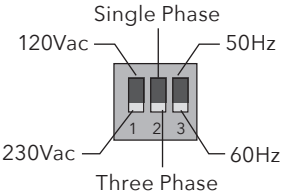


Figure 9: DIP Switches

DIP Switch 1 – 120/230Vac: If switched ON (up – as in Figure 9), the unit is configured for 120Vac pump operation; if switched OFF (down), the unit is configured for 230Vac.

DIP Switch 2 – 1/3 phase: If switched ON (up – as in Figure 9), the unit is configured for single-phase motor operation; if switched OFF (down), the unit is configured for three-phase motor operation.

DIP Switch 3 – 50/60Hz: If switched ON (up – as in Figure 9), the unit is configured for 50Hz motors; if switched OFF (down), the unit is configured for 60Hz motors.

DIP Switches 4 and 5 – Minimum Operating Motor Frequency: It is possible to set up a minimum operating motor frequency. This is important when operating in Solar Only mode and when there is not enough solar power available to pump water due to high dynamic head. In order to prevent "dead heading," it is possible to set the minimum frequency in the range of 30 to 45Hz, using a combination of DIP switches 4 and 5 as shown in Figure 10. **NOTE:** The PicoBlender's default minimum Hz setting is 30Hz.

DIP Switches 4 and 5	Minimum Motor Frequency
4 5	30Hz
4 5	35Hz
4 5	40Hz
4 5	45Hz

Figure 10: Minimum Operating Frequency

DIP Switches 6 and 7 – Overcurrent Protection: The PicoBlender can set overcurrent protection based on the motor pump and controller combination being used. Figure 11 shows how to set up overcurrent protection using DIP switches 6 and 7. The default value of RMS current (when both switches are OFF) is 10A for single phase, and 8A for three phase. DIP switches 6 and 7 are to be used to match or exceed the motor nameplate's SFAMPS in order to protect from overcurrent. For example, if a single phase motor has SFAMPS: 7.4A then DIP switches 6 and 7 have to be set for 8A, as this is the next highest protection current for this motor. Configuring Overcurrent Protection also configures automatic **Dry Well Protection**. The PicoBlender monitors motor amperage for dry well protection, and no other dry well sensor input is needed unless desired.

DIP Switches 6 and 7	Overcurrent Protection	
	Single Phase	Three Phase
6 7	10A	8A
6 7	8A	6.5A
6 7	6.5A	5A
6 7	5A	4A

Figure 11: Overcurrent Protection

DIP Switch 8 - Single Phase 2-wire/3-wire: Used for setting up the proper mode for single phase operation, relevant only when DIP switch 2 is set for single phase operation. The default setting is for single phase 2-wire motors, when DIP switch 8 is in the OFF (down – as in Figure 12) position. For 3-wire single phase motors DIP switch 8 should be in the ON (up) position.

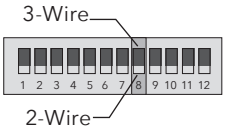


Figure 12: 2 or 3-Wire Single Phase Option

DIP Switch 9 – Flow Switch Dry Well Protection: When combined with an additional flow switch, the PicoBlender offers dry well protection by setting DIP switch 9 in the ON (up – see Figure 13) position. The Flow Switch needs to be installed in-line with the pipe (ask your dealer for Flow Switch availability). The principle of operation is very simple. As soon as the pump starts and water starts flowing through the pipe, the magnetic Flow Switch turns ON, which indicates to the PicoBlender that there is water in the well. If there is no water, the Flow Switch will indicate a dry well condition, and the PicoBlender will turn the pump off. There is a time delay from the start of the pump for the Flow Switch signal to activate, which allows time for flow from deep wells. See DIP Switch 10 for time delay settings.

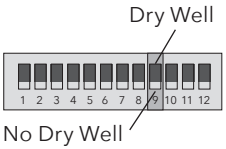


Figure 13: Dry Well Indicator Using Magnetic Switch

DIP Switch 10 – Flow Switch Time Delay: Used to define the time delay for Flow Switch sensing. When DIP switch 10 is in the OFF (down – as in Figure 14) position (default) the delay time is 15 seconds, while if it is in the ON (up) position, the delay time is 30 seconds. A 15 second setting is used for more shallow wells (less than 300ft), while 30 seconds is used for deeper wells (deeper than 300ft).

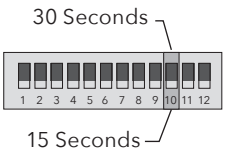


Figure 14: Time Delay

DIP Switch 11- Max Frequency: Offers an option for setting the maximum frequency for motor operation. This can be helpful to reduce pump flow. If DIP switch 11 is in the OFF (down – as in Figure 15) position (default) the maximum motor load frequency is set to 60Hz, while if in the ON (up) position, the maximum frequency is set to 55Hz for standard 60Hz AC motors. If the PicoBlender is controlling a 50Hz motor, defined by DIP switch 3, then the OFF position is 50Hz, while the ON position indicates 45Hz maximum frequency operation.

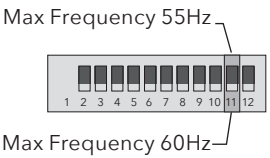


Figure 15: Maximum Frequency Operation

DIP Switch 12 – Pressure Regulation: Used for setting constant pressure when a pressure transducer is used with the PicoBlender. If the DIP switch is in the OFF (down – as in Figure 16) position (default) the pressure is set for 60psi, while the ON (up) position, sets the PicoBlender for 50psi. For the PicoBlender, a transducer of **4-20mA, for 0-100psi** of pressure range is required.

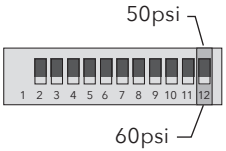


Figure 16: Pressure Regulation Setting

PicoBlender Sensor Settings

The PicoBlender controller can be remotely turned ON or OFF by using a digital input or by using a standard float switch. There is a float switch terminal block (Figure 5) where digital signal wires are connected.

If Digital Inputs 1 and COM experience a short circuit, the PicoBlender automatically turns off. Similarly, if Digital Input 2 and COM experience an open circuit, the PicoBlender automatically turns off. There are numerous remote sensors that can be used: float switch, pressure switch, flow switch, water level sensor, dry run protection, etc. Ask your dealer about configuring sensors and switches for your application.

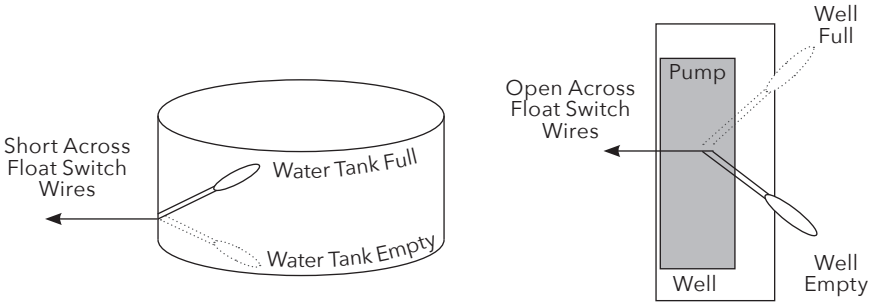


Figure 17: "Water Tank Full" and "Well empty"

A typical example of how tank and well switch signals can be used with a digital input port is shown in Figure 17. For a tank application, if the active wire is connected to Position 1 and the return wire (usually black) is connected to Position COM, then the PicoBlender will stop the pump when the tank gets full because terminals 1 and COM will be "shorted" (active short). This turns off the PicoBlender.

For a well application, if the active wire is connected to Position 2 and the return wire (usually black) is connected to Position COM, then the PicoBlender will stop the pump when the well runs out of water because terminals 2 and COM will be "open" (active open). This turns off the PicoBlender.

The PicoBlender can incorporate two external analog sensors. Analog sensors should be fed through the left cable glands and terminated to connector P9 on the printed circuit board, as shown in Figure 6.

The analog sensor inputs are designed for **4-20mA** input for common industrial sensors. A pressure transducer is commonly used in the water pumping industry for constant pressure regulation.

A table with pinout details is shown in Figure 18, which includes 24V power on Pin 5, eliminating the need for an external power supply.

Pin number	Functionality
Pin 1	Analog 1
Pin 2	24V
Pin 3	GND
Pin 4	Analog 2
Pin 5	24V

Figure 18: Analog Sensors Pins

PicoBlender Optional Modules

PicoBlender_COMM includes an optional communication **WiFi module** (Figure 19) that enables remote access to the PicoBlender by utilizing WiFi communications. The WiFi Comm module accessory enables customers to monitor the PicoBlender operation for solar energy generation relative to AC power usage. It is also possible to setup the operating profile and daily duty cycle for loads connected to the PicoBlender in order to maximize solar energy generation. The WiFi Comm module has its own antenna that should be placed near the PicoBlender and connected through the cable gland to the comm module. The WiFi Comm module can be added to new or previously installed PicoBlenders.

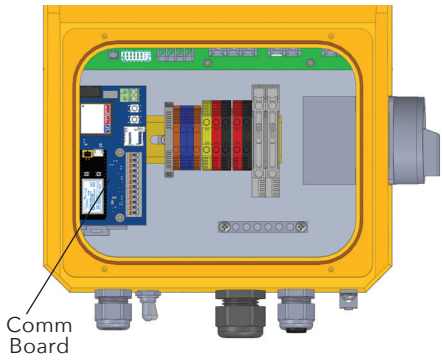


Figure 19: PicoBlender_COMM

SunTech Drive provides a user friendly web interface for customers to monitor and control their PicoBlender when installed with the WiFi Comm module. Additionally, the WiFi Comm module has four additional analog inputs that can be used for adding sensors for more complex installations.

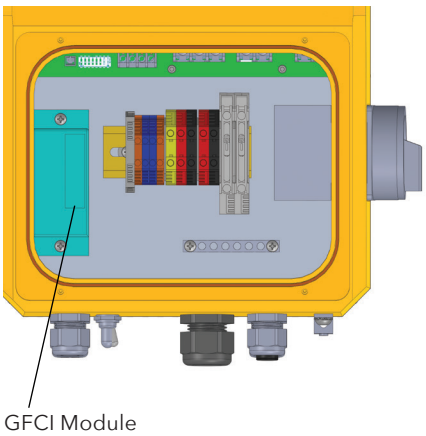


Figure 20: PicoBlender_GFCI

PicoBlender_GFCI includes an optional Ground Fault Circuit Interrupter **(GFCI) module**, (Figure 20) which is used for sensitive ground fault currents: 5, 10 and 30mA, which can be adjusted by using a simple jumper that is part of the GFCI module.

The GFCI module is an integral part of the PicoBlender_GFCI model and cannot be added in the field. A PicoBlender_GFCI model must be ordered with this option assembled at SunTech Drive's factory. The GFCI module is wired so that it instantaneously stops the PicoBlender operation if the ground current is detected to be higher than the GFCI module settings (5, 10 or 30mA).

The GFCI module is commonly used for aerators and fountains where the motor is submerged in open water such as lakes and ponds.

Ask your dealer about adding an optional comm board or GFCI module to your PicoBlender!

PicoBlender Configuration and Setup

The PicoBlender can be powered only from a single phase AC source, 115Vac or 230Vac. However, the PicoBlender can power both single and three-phase motors. It is also possible to run single/three phase 230Vac motors when the PicoBlender is powered from a 115Vac AC source, as long as the AC power does not exceed 12Aac of input.

When sizing the solar panel array for the PicoBlender, it is necessary to know the motor load power requirements and the AC source voltage.

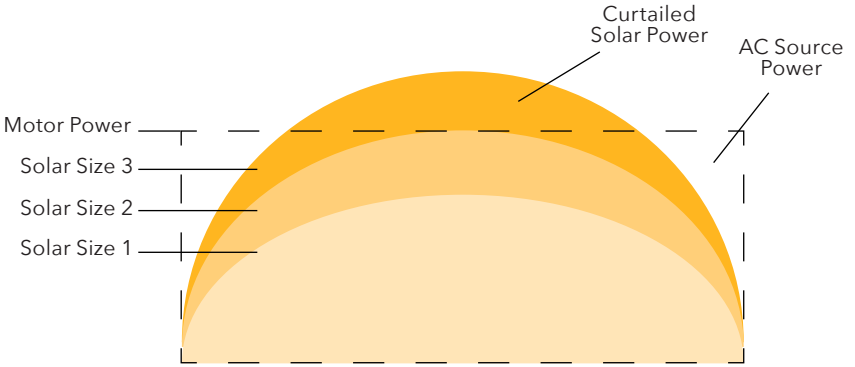


Figure 21: Sizing Solar PV Power with the PicoBlender Controller

Figure 21 above shows the principle of how utility energy can be offset using solar PV energy with the PicoBlender controller. Motor power is shown by the dashed line. If the solar system is sized per Solar Size 1, then solar is offsetting just less than a half of total motor energy used during the day.

In the case of Solar Size 2, where the solar PV system is sized to have the same capacity as the motor load, the motor will run completely off of solar during mid-day peak solar. During other periods of the day, the PicoBlender will blend power, using both solar and AC power to provide the motor with the required power.

In the case of Solar Size 3, where the solar PV system is sized with capacity higher than the motor load, the motor would run off of solar for longer periods during the day, but during that time solar would also be curtailed as the motor power is less than solar capacity.

The general recommendation is to size the solar PV system capacity to at least match the motor power requirements. To do so, it is important to know the motor power when sizing the solar system. It is further recommended to oversize the solar system, especially in areas of high electricity rates, in order to maximize solar energy and offset the AC source during several hours of the day. Contact your dealer for solar sizing for your specific motor.

PicoBlender Operation

Once the PicoBlender controller is wired to the solar source, AC source, and a motor load, and the DIP switches settings are configured to match the motor specification, then the PicoBlender is ready
for operation.

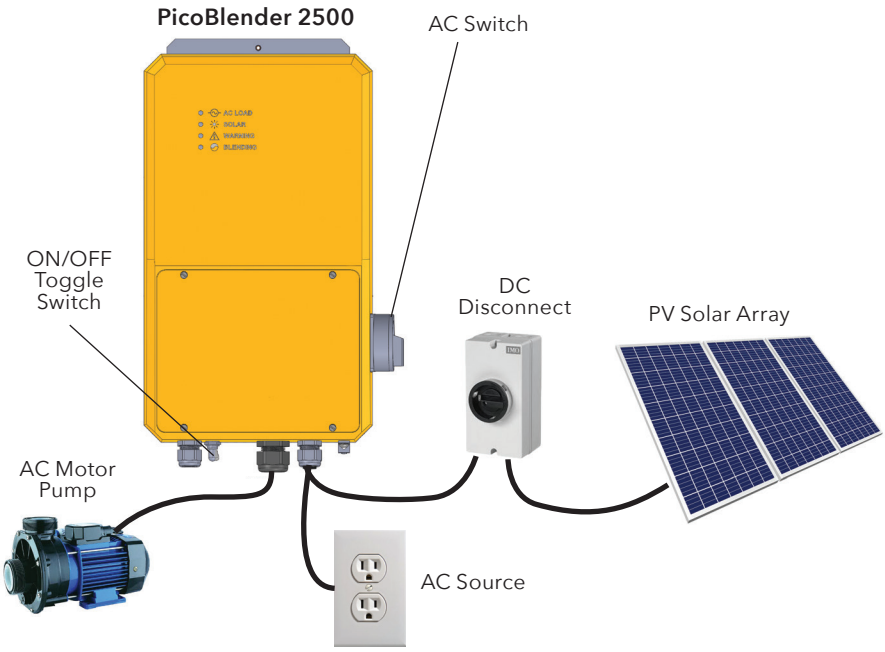


Figure 22: Solar Water Pumping System Diagram

Startup:

When starting the PicoBlender for the first time:

1. Make sure that the ON/OFF toggle switch (Figure 22 above) 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 indication LEDs (see page 18 for LED Indicators).

PicoBlender Operation

If the motor is properly connected, the PicoBlender will move to the startup procedure. The green AC LOAD LED (Figure 23) 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.

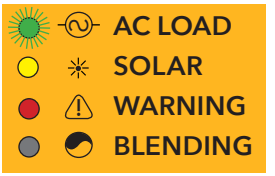


Figure 23:
LED1 – AC LOAD is ON

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 solar power, the unit's SOLAR LED light will blink yellow, as shown in Figure 24.

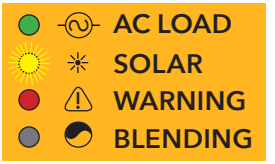


Figure 24:
LED2 – SOLAR is ON

Shutdown:

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.

However, if a tank or well float switch is used (Figure 17), when the tank becomes full or the well becomes empty, the PicoBlender will stop its operation, and the WARNING LED will blink red.

The WARNING LED will be solid red if the temperature of the PicoBlender rises above 80°C, 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 its 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.

SunTech Drive Accessories

Float Switch - Commonly used with the PicoCell and PicoBlender as a switch to indicate full tank conditions for water pumping applications. It is wired to the float switch connectors 1-com or 2-com. The Float Switch comes with 20ft of cable.

DC Disconnect – A necessary disconnect switch that connects the solar PV array with an input terminal of the PicoCell and PicoBlender. This is a 2 Pole (Single String) Enclosed DC Switch with an IP66 rating. Dimensions: 180x98x107mm. Electrical specs: 16A 800 VDC.

SolSwitch – A transfer box used for manually switching between solar power and grid power. The SolSwitch is connected to the PicoCell as well as to the AC grid/generator and has a simple and safe panel switch to transfer between solar and AC power. The unit also has an integrated DC disconnect switch.The SolSwitch is suitable for single and three phase AC motors and AC grid, 120 and 230Vac, 50 and 60Hz and is rated for 10Aac.

PicoFilter – This device is commonly used for PicoCell 2000 installations with motor cable length longer than 300ft. The PicoFilter is connected to the output of the PicoCell or PicoBlender on one side, and the motor leads on the other. The PicoFilter is rated for 10Aac current and up to 1000V peak phase voltage.

New for 2019!

Contact your local dealer for solutions for single phase, 2-wire starting capacitor surface pumps.

Installation Notes:

Date Installed: _____

Serial No. (Spec Label): _____

Installer: _____

Phone: _____

Location of Installation: _____

Pump Manufacturer / Model No: _____

Motor: HP, Vac, ph, SF Amps _____

Well Depth: (m/ft) _____

Flow Rate: (lpd/gpd)_____

AC Source Voltage Level: _____

PV Panel Manufacturer/Model Number: _____

No. of Solar PV Panels in Series: _____

We strongly recommend that the installation notes above are filled out with valid data and that the manual remains accessible and located close to the unit. Also, if you are calling our technical support, please have this installation data available for a faster and more accurate troubleshooting process.

Tech support hotline: 877-230-7501

Maintenance:

The PicoBlender unit is designed to operate autonomously, however it is suggested to be inspected every 3 months. If there are any external obstructions that prevent proper cooling of the heat sink area, please remove them to make sure nothing blocks the air flow from the bottom of the device.

If the PicoBlender operates in the area where the pump experiences freezing temperatures, make sure to turn OFF the device so it does not try to run the water pump in icy conditions. This may lead to dead heading on the pump.

Check external sensors every 3 months: float switch, pressure switch, etc.

Troubleshooting - Indicator Lights

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
FLASHING	FLASHING	FLASHING	- Dry well protection

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.
Float Switch Mode	PicoBlender is turned OFF as a result of input from one or more external sensors that are connected to the digital input.
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.
Dry Well Protection	PicoBlender detects dry well condition, and ceases pump operation, which is restored after 30 minutes. If dry well indication appears faulty, check that **Over Current Protection** DIP Switches 6 and 7 are configured correctly.

SunTechDrive

Notes:

Notes:

SunTechDrive

CONTACT:
info@suntechdrive.com
SunTechDrive.com
(877) 230-7501

For further information – scan this code:

UL LISTED
E498850
Power Conversion Equipment

Pat. Pending: US Patent
Application Number: 62/536,161