Before you get started

IMPORTANT:

This manual contains important instructions that should be followed during installation, operation, and maintenance of the PicoCell 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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**NOTICE**

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PicoCell at a Glance

The PicoCell 3500 is an off-grid solar controller that can operate most alternating current (AC) motor load up to 2HP single-phase/3HP three-phase from solar photovoltaic (PV) power. The PicoCell has a unique functionality that enables users to match an AC load with Solar PV power. By using commercially and locally available AC pumps, the PicoCell makes solar water pumping and other solar-powered applications more affordable.

To size the solar PV array to your specific motor, please consult with your local dealer or SunTech Drive. A typical diagram for a PicoCell operated solar water pumping system is shown in Figure 1. The solar PV array should be connected to the PicoCell controller via the integrated DC Disconnect. The PicoCell controller should be installed in the shade (potentially mounted under the PV array) and away from the direct sun.

The PicoCell can accept up to two digital sensor inputs. For example, in solar water pumping applications, an optional float switch can be connected to the PicoCell to monitor when a water tank is full, while a second float switch can indicate dry well conditions.

The PicoCell off-grid solar controller is unique because it can run single or three phase AC motors, 115 or 230V, and 50 or 60Hz.

Figure 1: Solar Water Pumping System Diagram with PicoCell 3500
PicoCell Product Description

The PicoCell 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 HP to 3 HP.

The PicoCell 3500 has input capability for connecting two separate solar panel arrays in parallel.

The PicoCell controller is suitable for a variety of applications:
- Livestock water supply
- Village water supply
- Small scale irrigation
- Aquaculture and aeration
- Industrial farming ventilation
- Swimming pool filtration
- Water transfer and evaporation

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

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 PicoCell do not require separate motor controls. The PicoCell was designed to be universal for most inductive motors while being mindful of some basic design limitations:

- The PicoCell 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 PicoCell can run motors with Service Factor Amps of 13 Amps or less for 1-phase motors, and 10.5 Amps or less for 3-phase motors. Please contact SunTech Drive for more information on particular motors.

- Generally, 1-phase motors up to 2 HP will operate well.

- Generally, 3-phase motors up to 3 HP will operate well.

- The PicoCell does not power Direct Current (DC) permanent magnet or Brushless DC (BLDC) motors.

- The PicoCell 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 PicoCell will replace the control box for 3-wire motors.

- The PicoCell will operate 2-wire motors with Permanent Split Capacitors (PSC).

- The PicoCell 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.
PicoCell Specifications

Input Specification:

- Dual Solar PV Array Input
- Maximum Solar Open Circuit Voltage: 400Vdc*
- Maximum Solar PV Current in Series: 9Amps per solar array**
- Earth-ground connected to chassis

* 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 27 rms symmetrical amperes, 400 volts maximum.

Output Specification:

- Maximum Output Current: 13Arms (1-phase motors)
- Maximum Output Current: 10.5Arms (3-phase motors)
- Maximum Power Sustained: 3500W

Protections:

- Short-circuit, ground-fault, over-temperature, over-load, over-voltage, over-current, and solar input reverse polarity protection
- AC Load GFCI: 5, 10, or 30mA based on selected set-point (optional)
- Automatic dry well protection and pump locked rotor 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.

<table>
<thead>
<tr>
<th>ELECTRICAL</th>
<th>MECHANICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar PV open circuit voltage: 400V*</td>
<td>Operating temperature: -40°C to 40°C</td>
</tr>
<tr>
<td>Max PV panel current in series: 9A</td>
<td>Dimensions: 18”x10”x5”</td>
</tr>
<tr>
<td>Max Single phase AC motor current: 13A</td>
<td>AC Source Terminals: AWG #10-16</td>
</tr>
<tr>
<td>Max Three phase AC motor current: 10.5A</td>
<td>Solar Terminals: AWG #10-16</td>
</tr>
<tr>
<td>Degree of protection: TYPE 3R</td>
<td>Motor terminal: AWG #8-16</td>
</tr>
<tr>
<td>Enclosure material: Aluminum</td>
<td>Float Sensor terminals: AWG #14-20</td>
</tr>
</tbody>
</table>

*Per solar array

WARNING:
Carefully check the motor load specifications and solar PV array maximum power point voltage to setup the system properly using this manual!
PicoCell Installation Requirements

The PicoCell 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 PicoCell 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 PicoCell should be mounted at least 2 feet (60cm) above the ground when possible. A minimum of 10 inches (25cm) of clearance above the PicoCell is required for internal access. There must be no obstruction of air flow to the heat sink. A typical installation on an array structure is shown in Figure 2, below.

---

**Figure 2: PicoCell Mounting**
Once the PicoCell is installed in a shaded location (see Figure 2), it can be wired to DC (solar) sources. Maximum cable lengths for 115 and 230Vac for different motor load currents are shown in Figure 3 below.

This unit was evaluated for temperature rating of 60/75°C (140/167°F) on power field wiring terminals.

<table>
<thead>
<tr>
<th>Motor Load [A]</th>
<th>Nominal Voltage [V]</th>
<th>AWG Copper Wire Sizes 90°C (194°F) insulation [ft]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>115</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>220</td>
</tr>
<tr>
<td>6</td>
<td>115</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>140</td>
</tr>
<tr>
<td>8</td>
<td>115</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>110</td>
</tr>
<tr>
<td>10</td>
<td>115</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>90</td>
</tr>
<tr>
<td>12</td>
<td>115</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>70</td>
</tr>
</tbody>
</table>

**IMPORTANT:** Use copper conductors only!

**Figure 3: Maximum Input Cable Lengths in Feet (based on 3% voltage drop)**

Dimensions of the PicoCell and back panel are shown in Figure 4, with additional details on how to mount the unit on page 7.

**Figure 4: PicoCell Dimensions**
PicoCell Hardware

The PicoCell controller consists of several components, as shown in Figure 5. The unit has five wire glands: one large gland for a motor cable (middle), two glands for solar PV arrays (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 PicoCell controller should be mounted on a wall or other vertical surface using the back bracket (see Figure 5 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 5: PicoCell Hardware
Mounting the PicoCell

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 PicoCell onto the back bracket.

3. Once the PicoCell is in place on the back bracket, install the shoulder bolt to secure the unit to the bracket.
PicoCell Overview

The features of the PicoCell controller are shown in Figure 6. The unit has five wire glands: two solar PV inputs, one motor output, and two glands for the external sensors. Further details about wiring the unit are provided on page 9.

Three LEDs are used to indicate the PicoCell 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 PicoCell’s operation of the motor.

Once the door of the enclosure is removed, there is access to the input terminal blocks (DIN rail mounts). Below the DIN rail is a grounding block for connecting the equipment ground. The installer should only use the DIN rail terminals for connecting all external wires to the PicoCell 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 6: PicoCell Features Overview
The features of a PicoCell’s printed circuit board are shown in Figure 7. The installer needs access to these features when configuring the PicoCell’s DIP switches to **match** the AC motor load (described in greater detail on pages 12-13).

The PicoCell 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 up to two analog sensors.

---

**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.

---

**Figure 7: PicoCell Printed Circuit Board Features Overview**
PicoCell 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 PicoCell can be wired to solar 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.

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 PicoCell 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 9), the power conductors wired to the DIN rail terminals inside the PicoCell 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 replaced and tightened using the cover screws to 2-3 in-lb or equivalent.

![Figure 9: Wiring Inside the PicoCell](image)

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 the 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:**

<table>
<thead>
<tr>
<th>Single phase 2-wire motor pumps:</th>
<th>Connect to A and C motor terminals of PicoCell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single phase 3-wire motor pumps:</td>
<td>Ph_A: <strong>YELLOW</strong> wire - common motor lead</td>
</tr>
<tr>
<td></td>
<td>Ph_B: <strong>RED</strong> wire - start motor lead</td>
</tr>
<tr>
<td></td>
<td>Ph_C: <strong>BLACK</strong> wire - main motor lead</td>
</tr>
</tbody>
</table>
PicoCell DIP Switch Settings

The PicoCell 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 PicoCell to match the motor specifications, the first three DIP switches on the left are used for motor selection.

**DIP Switch 1 - 120/230Vac:** If switched ON (up - as in Figure 10), 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 10), 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 10), 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 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 11.

**NOTE:** The PicoCell’s default minimum Hz setting is 30Hz.

**DIP Switches 6 and 7 - Overcurrent Protection:** The PicoCell can set overcurrent protection based on the motor pump and controller combination being used. Figure 12 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 13A for single phase, and 10.5A 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: 9A then DIP switches 6 and 7 have to be set for 11.5A, as this is the next highest protection current for this motor. Configuring Overcurrent Protection also configures automatic Dry Well Protection. The PicoCell monitors motor amperage for dry well protection, and no other dry well sensor input is needed unless desired.
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 13) position. For 3-wire single phase motors DIP switch 8 should be in the ON (up) position.

DIP Switch 9 - Flow Switch Dry Well Protection: When combined with an optional flow switch, the PicoCell offers dry well protection by setting DIP switch 9 in the ON (up – see Figure 14) 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 PicoCell that there is water in the well. If there is no water, the Flow Switch will indicate a dry well condition, and the PicoCell 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 water to flow from deep wells. See DIP Switch 10 for time delay settings.

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 15) 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).

DIP Switch 11 - Automatic Dry Well Protection: The PicoCell monitors motor amperage for dry well protection, and no other dry well sensor input is needed unless desired. The default setting is dry well protection ON (down); if switched OFF (up), the protection is disabled. Turn dry well protection off for compressors, fans, and above-ground pumps.

DIP Switch 12 - Pressure Regulation: Used for setting constant pressure when a pressure transducer is used with the PicoCell. If the DIP switch is in the OFF (down – as in Figure 17) position (default) the pressure is set for 60psi, while the ON (up) position, sets the PicoCell for 50psi. For the PicoCell, a transducer of 4-20mA, for 0-100psi of pressure range is required.
PicoCell Sensor Settings

The PicoCell 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 PicoCell automatically turns off. Similarly, if Digital Input 2 and COM experience an open circuit, the PicoCell 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.

A typical example of how tank and well switch signals can be used with a digital input port is shown in Figure 18. 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 PicoCell will stop the pump when the tank gets full because Terminals 1 and COM will be “shorted” (active short). This turns off the PicoCell.

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 PicoCell 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 PicoCell.

The PicoCell 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 9.

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 19, which includes 24V power on Pin 5, eliminating the need for an external power supply.
PicoCell Optional Modules

**PicoCell_COMM** includes an optional **WiFi Comm Module** (Figure 20) that enables remote access to the PicoCell by utilizing WiFi communications. The WiFi Comm Module accessory enables customers to monitor the PicoCell 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 PicoCell in order to maximize solar energy generation. The WiFi Comm Module has its own antenna that should be placed near the PicoCell and connected through the cable gland to the Comm Module. The WiFi Comm Module can be added to new or previously installed PicoCells.

SunTech Drive provides a user friendly web interface for customers to monitor and control their PicoCell 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.

**PicoCell_GFCI** includes an optional **Ground Fault Circuit Interrupter (GFCI) Module**, (Figure 21), 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 PicoCell_GFCI model and cannot be added in the field. **A PicoCell_GFCI model must be ordered with this option assembled at SunTech Drive’s factory.** The GFCI Module instantaneously stops the PicoCell 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 these optional modules to your PicoCell!
PicoCell Configuration and Setup

Sizing the solar system to power the PicoCell and a given motor load (pump, compressor, fan, etc.) is based on the power requirement of the motor load, motor phase, daily duty cycle of the system and installation location. Motor load requirements can be obtained from the motor nameplate, look for SFAMPS.

Three-phase motor loads will typically require less solar PV capacity than single-phase loads, due to higher electrical efficiency. Hence, 3-phase pumps are more cost effective because they require less solar PV power. 1-phase motor loads with running capacitors (also called split-phase), will also require higher solar PV power at startup than their 3-phase counterparts. Service Factor (SF) can also vary between motor manufactures. A higher SF may require more PV solar power.

For off-grid solar pumping applications, the main requirement is either total daily pumped water, or the total amount of time the pump will operate from solar power. Figure 22 shows how three different solar capacities (solar power wattage) are affecting total daily pumping duration. If Solar Size 1 results in Time 1, for a given pump power, then by adding solar power to Solar Size 2, the pumping time increases significantly. However, same solar power addition to Solar Size 2 results in Solar Size 3, but incremental time between Time 3 and 2 is not the same as between Time 2 and 1. Therefore, a linear solar power capacity increase does not result in a linear daily pumping time increase. Additional solar capacity results in decreasing returns for increased pumping time.

![Figure 22: Sizing Solar PV Power with the PicoCell Controller](image)

Additionally, it is important to note the minimum and maximum solar PV array requirements when sizing solar for a given pump using the PicoCell. Configuring solar PV capacity will vary based on location of the installation (i.e. different solar irradiances at different latitudes).

For a more detailed solar PV configuration, please contact the SunTech Drive sales team or your local dealer. Be ready to provide the motor load nameplate information, as well as installation site location and application requirements of the desired daily duty cycle.
PicoCell Operation

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

Startup:

When starting the PicoCell for the first time:

1. Make sure that the ON/OFF toggle switch (Figure 23 above) is in the **OFF position**.
2. While the PicoCell is still de-energized, configure the DIP switches per the AC motor load of the connected device (see DIP switch details on page 10).
3. Power up the PicoCell from solar PV by switching the solar DC disconnect to the ON position. All LEDs will light up.
4. Once the solar PV source powers up the PicoCell, turn the bottom external motor ON/OFF toggle switch to the **ON position** to start the motor load. The PicoCell 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 PicoCell will show a warning message using indication LEDs (see page 21 for LED Indicators). Otherwise, it will start the motor load (the green LED will start blinking and remain ON).
PicoCell Operation

If the motor is properly connected, the PicoCell will begin the startup procedure, the green AC LOAD LED (Figure 24) will have a solid green light, and the motor will start running. Additionally, the PicoCell will immediately start performing MPPT operation over the solar PV source.

The PicoCell has built-in overload protection, so if a connected motor has a power level higher than the PicoCell limitations, 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 PicoCell, it will shut off the motor operation. If there is not enough solar power, the unit’s SOLAR LED light will blink yellow, as shown in Figure 25. This usually happens in the early morning or late evening, or during overcast weather. The PicoCell controller will try to start the motor once every minute. Each attempt will be indicated by the blinking green LED. If there is not enough solar production from the solar panels, the yellow LED will start blinking again.

Shutdown:

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

However, if a tank or well float switch is used (Figure 18), when the tank becomes full or the well becomes empty, the PicoCell will stop its operation, and the WARNING LED will blink red.

The WARNING LED will be solid red if the temperature of the PicoCell rises above 80°C (176°F), at which point the PicoCell 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 PicoCell 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 PicoCell 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 2000 and PicoBlender. This is a 2 Pole (Single String) Enclosed DC Switch with an IP66 rating. Dimensions: 180x98x107mm. Electrical specs: 16A 800 VDC.

**AC Backup** - Many pumps, compressors, fans, and other AC motors need to run when solar power is unavailable. Whether for nighttime operation or extended overcast and cloudy skies, the AC Backup unit works in tandem with the PicoCell 2000 controller to integrate a single-phase AC genset to power your application. The AC Backup unit will automatically switch from genset to solar, if no AC power is present, providing ongoing power for your application.

**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) _____________________________________________________

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 PicoCell 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, please remove them to make sure nothing blocks the air flow from the bottom of the device.

If the PicoCell 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 three LED lights on the PicoCell. The indicator lights and their definitions are listed below.

<table>
<thead>
<tr>
<th>AC LOAD</th>
<th>SOLAR</th>
<th>WARNING</th>
<th>MODE</th>
</tr>
</thead>
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<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>- Unit is OFF</td>
</tr>
<tr>
<td>FLASHING</td>
<td>OFF</td>
<td>OFF</td>
<td>- Startup</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>- Running</td>
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<tr>
<td>OFF</td>
<td>FLASHING</td>
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<td>- Standby</td>
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<tr>
<td>OFF</td>
<td>OFF</td>
<td>FLASHING</td>
<td>- Float Switch</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>- Over Temperature</td>
</tr>
<tr>
<td>ON</td>
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<td>- Power Deration</td>
</tr>
<tr>
<td>FLASHING</td>
<td>OFF</td>
<td>FLASHING</td>
<td>- Over Current</td>
</tr>
<tr>
<td>OFF</td>
<td>FLASHING</td>
<td>FLASHING</td>
<td>- Short/Open Circuit</td>
</tr>
<tr>
<td>FLASHING</td>
<td>FLASHING</td>
<td>FLASHING</td>
<td>- Dry Well Protection</td>
</tr>
</tbody>
</table>

- **OFF Mode**: PicoCell toggle switch is in the OFF position.
- **Startup Mode**: PicoCell is in the process of starting the motor pump.
- **Running Mode**: PicoCell is running the motor pump.
- **Standby Mode**: There is not enough power from the solar PV panels for PicoCell to start the motor.
- **Float Switch Mode**: PicoCell is turned OFF as a result of input from one or more external sensors that are connected to the digital input.
- **Over Temperature Mode**: PicoCell stops operation when the temperature inside the unit exceeds 80°C/176°F.
- **Power Deration Mode**: PicoCell still operates but with reduced power throughput due to increased operating temperature, or if a load is connected with current higher than Over Current Protection DIP Switches 6 and 7.
- **Over Current Mode**: PicoCell 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**: PicoCell will not start operation if the motor wiring does not align with DIP switch configuration.
- **Dry Well Protection**: PicoCell 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.
CONTACT:
info@suntechdrive.com
SunTechDrive.com
(877) 230-7501

For further information - scan this code:

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