OPERATION AND INSTALLATION MANUAL

Quality First!

SDS SERIES
SOLAR ELECTRIC
SUBMERSIBLE PUMPS

Manufactured & Serviced By:

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Made in America

SunPumps® Inc.

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1.0 Introduction

Thank you for selecting a SunPumps SDS series solar pump system. The SDS series pump and PCA-30-M1D series pump controller are the key components to high quality solar powered pumping systems. Their stand-alone, pollution free operation makes them an ideal solution for remote homes, irrigation projects, and wildlife and stock watering without violating the environment.

SunPumps SDS series pumps are diaphragm type, DC powered, submersibles constructed of high quality stainless steel for the SDS-D and SDS-Q series pumps and Ryton and stainless steel for the SDS-T series pumps. These pumps were designed specifically for water delivery in remote locations.

The PCA series controllers are microprocessor based solid state DC power converters designed as the interface between a solar module array and the SDS series DC pump motor. The purpose of the controller is to operate the high efficiency, high reliability DC motor and maximize the total daily water output while providing protection for the pump as well as providing an interface with other related pumping system equipment.

Although these SDS series pump systems are easy to install, please read this manual to become familiar with the controller features, functions, connection points and various configurations. For future reference, keep this manual and other relevant product information in a safe place.

PRECAUTIONS

- **Safety First – Always understand what you are doing when working with any form of electricity. Guessing may cause product damage and/or severe personal injury.**

- **Shut down all power when working on the system**.

- **Do not attempt to feed live wires into the PC-series controller. Product damage and/or personal injury may result.**

- **Do not exceed the voltage rating of the controller**.

- **Do not set the controller to exceed the power rating of the motor.**

- **Do not splash water on the controller when the cover is open**.

- **Mount the controller in a shaded, well vented, _vertical_ position**.

2.0 Product Overview

The SunPumps PCA-30-M1D series controllers were designed specifically for SunPumps SDS-series, DC submersible pumps. When properly installed and configured, the unique features incorporated into this stand-alone system will automatically control and protect your pump system permitting many years of dependable, trouble free service.

When used as a solar electric panel direct system the PCA series controllers will provide pump protection from over-voltage and over-current conditions as well as current boosting in low sunlight conditions.

2.1 Controller Features

1. Current boosting for matching the load requirements of the pump.
2. Voltage regulation of the solar electric array around its maximum power point. (MPPT)
3. Over-current protection via integrated electronic circuit breaker.
4. Voltage and current limiting to pump motor..
5. Adjustable output motor power control for precision output flow.
6. System ON/OFF switch.
7. LED indicators; 1. Power In, 2. Motor Run, 3. Remote Switch, 4. Over-Current, 5. Low Water Cut-Off

8. Weather resistant enclosure with a hinged door.
9. Rising clamp screw terminal blocks – no fork terminals required.
10. Pre-adjusted pump configuration and power source selection.
11. Remote switch interface – float switch or remote shutdown –Normally Open or Normally Closed, user selectable.

2.2   Application

The only application the PCA 30M1D series controllers are designed for is the interface between a solar module array and SunPumps SDS series DC pumps.

No other applications or DC power sources are recommended or warrantied unless written approval is provided by the SunPumps factory.

3.0   Installation and Operation

The following sections are outlined in a step-by-step format to guide you through the installation and configuration of an SDS series pump and PCA series controller. The procedure for installing the SDS submersible pump is the same as a standard AC submersible pump. Any licensed pump contractor will be familiar with the proper installation procedures. The installation and operation should be in accordance with local regulations, accepted codes of good practice and common sense.

Before installing any pump system read all product manuals then review all system components to become familiar with the physical and electrical layout. Check all equipment for any product damage. Refer to applicable figure(s) as a guide during the installation. Controller door must be closed during normal operation.

Warning

Reverse polarity will result in non-warrantied product damage. Please check polarity before connecting power to the controller.

This controller is for SunPumps SDS Series DC Pumps only. Do not use this controller on Sensorless Brushless DC motors or Sensor Type Brushless DC motors. Damage to the controller will result.

3.1   Location

As the majority of system installations vary greatly, only general comments can be made about the installation location. Prior to installing the system, it is suggested to make a system layout plan. During the system layout, take into consideration any potential shading of the solar electric modules, wire runs, wire size, conduit runs, trenching, controller accessibility, tank location, pump head etc. Shading even a small portion of the array can reduce the output of the entire array and thus reduce or completely stop the output of the pump. There is no substitute for a good plan!

The PCA-series controller can either be mounted indoors or outdoors. Locate all system equipment as close as possible to each other. For top of pole mount racks, the controller is usually mounted on the north side (shaded side) of the mounting pole. The controller must be mounted in a vertical position for proper cooling and to keep the electronics dry. The pole should be located close to the well (bore hole). This general physical layout is conducive to clean installation both aesthetically and electrically.
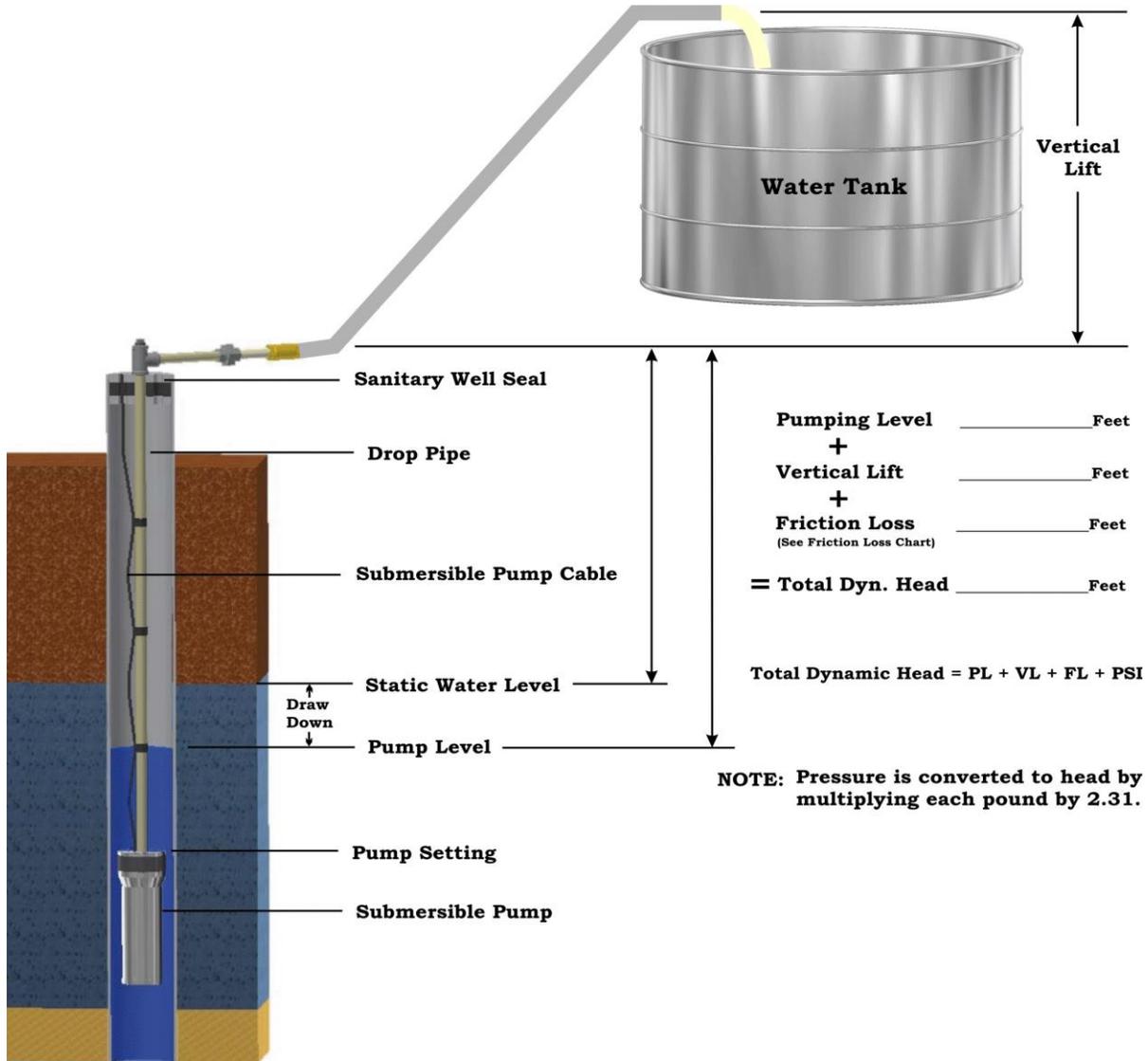
3.2 System Design Basics (Read carefully before installation)

1. Use no larger than ½" drop pipe for SDS-D and SDS-T series pumps and ¾" drop pipe for SDS-Q series pumps. Because of the low flow rates of the SDS series pumps, the water velocity is not fast enough to carry any sand and sediment to the surface. These small particles may settle inside the pump as well as the drop pipe causing pump damage.

2. If there is a known sand problem, a sand shroud or a screen is required. The minimum casing diameter for an SDS-D and T series pump with a sand shroud is 5" (12.7 cm) and for and SDS-Q series pump it is 6" (15 cm). Sand damage to an SDS series pump is not covered under warranty. It is therefore highly recommended that sand shrouds be installed on all SDS series pumps in an unproven well.

3. For optimum pump performance make sure that the wire is sized properly for the length of run between the pump and the solar modules. Wire sized too small will cause a decreased output from the pump. Keep the distance from the solar modules to the pump as short as possible. Refer to a DC wire loss chart for proper sizing. It is recommended to keep the voltage drop under 3%.

4. Due to the aggressive action of DC power, it is essential that any under-water splice be made correctly. This splice must be watertight. Improper sealing of the splice will cause poor pump performance and may cause damage to the system. A submersible 3 wire splice kit is recommended for this water tight connection.

5. Never install the pump over 50 feet (15 meters) under the static water level. Excessive water pressure on the pump housing may cause seal damage and allow water to enter the motor housing.

6. Never rest the pump on the bottom of the well. This can cause the pump to fill with mud and damage the diaphragm. It is recommended that the pump be set at least 10 feet off of the bottom of the bore hole. If this is not possible the pump may be placed a minimum of 5 feet above the bottom of the well (bore hole). If possible, install the pump above the well casing perforations. This will allow any sand intrusion to settle below the pump.

7. Never install a pump in a well that has had an oil-lubricated line shaft turbine in it without cleaning it first. Any drip oil remaining in the water may damage the pump diaphragm and seals.

8. Never chlorinate a well while the pump is installed. Heavy concentrations of chlorine will damage the diaphragm and seals.

9. Never install the controller in direct sunlight. Direct sunlight on the controller may cause over-heating of the controller.

10.   Never lay the controller on the ground or mount the controller in a horizontal position. **The controller should be mounted in a vertical position only.** A convenient place to mount the controller is on the north side (shaded side) of the solar module array.

11. The controller should be grounded to the pump motor housing, the frame of the solar modules and to an 8-foot ground rod. If the well casing is steel it may be used as the ground rod. Drill and tap a hole in the casing or weld a bolt to the casing for the ground lug. Use only a copper lug to attach the ground wire. The cemented support structure pole will not provide an adequate ground. Do not ground the positive or negative electrical wires.

12. Do not ground the array positive or negative electrical wires.

3.3 Well Measurements

Before installing the pump measure the depth of the well and static water level. The static water level is the distance from the top of the well casing to the water level in the well. This information is necessary in determining the pump setting (See Figure 1).

Figure 1   **Solar Pump System Terms & Head Calculations**

Pumping Level	_____Feet
+	
Vertical Lift	_____Feet
+	
Friction Loss (See Friction Loss Chart)	_____Feet
= Total Dyn. Head	_____Feet

Total Dynamic Head = PL + VL + FL + PSI

NOTE: Pressure is converted to head by multiplying each pound by 2.31.

Determining Total Dynamic Head

Pumping Level
Pumping level is the vertical distance in feet from the discharge pipe at the well head to the water level in the well while pumping at the specified flow rate.

Vertical Lift
Vertical lift is the vertical distance in feet from the discharge pipe at the well head to the discharge pipe at the top of the water tank.

Friction Loss
Friction loss is the resistance to flow through a pipeline measured in PSI drop and converted to head feet. The amount of loss depends on the diameter of the pipeline, the length of the pipeline, the flow rate, the number and type of fittings and the coefficient of friction of the pipeline material. Refer to friction loss tables for your specific application. (There is a Friction Loss Program on the SunPumps web site in the engineering section at www.sunpumps.com.)

3.4   Pump Installation

1. The well should be clean and disinfected before the pump is installed. You should always clean and develop a new well before installing the pump.

2. Write the pump and controller model number and serial number in the space provided on the last page in this Instruction Manual. This information will be needed when filling out the Warranty Card. And will aide in any troubleshooting which may be necessary.

3. Inspect all components for shipping damage and insure that you have all the components that are required for a complete installation.

4. Select a well-ventilated, shaded location in which to <u>vertically</u> mount the control box. The shaded side of the solar module rack mounting pole is usually a convenient place.

5. Install the poly male adapter, supplied with the pump, into the pump discharge head. Consult your pump supplier for other available adapter materials. **Do not use galvanized connections with stainless steel or bronze discharge heads as galvanic corrosion will occur.** Connect the drop pipe, safety rope and sand shroud (if used) to the pump. Barbed type connectors should always be double clamped. For poly pipe, compression fittings are recommended.

6. Splice the drop cable to the motor lead using an under water splice kit. (See wire splicing instructions provided with splice kit.) Match the drop cable wire colors to the pump motor leads. If the drop cable does not have the same color wires as the pump, be sure to record which colors go to the various colors of the motor lead and label them. The motor can run in reverse if not connected properly. Now connect the safety rope to the I-bolt located on the top of the pump.

7. You can now lower the pump into the well. Set the pump at least 10' off the bottom (see 3.2 System Design Basics #4). **Never rest the pump on the bottom of the well. Never lower the pump by the submersible pump cable.**

8. Attach the drop pipe, drop cable and safety rope together every ten feet with 2" 10 mil PVC pipe wrap tape. Make sure that the tape does not loosen as it will block the pump suction if it falls down the well. The use of the safety rope is at the discretion of the installer.

9. Slide the well seal over the discharge end of the pipe, connect the discharge fitting, pull the drop wire through the well seal and connect the safety rope, if used, to the eye-bolt on the inside of the well seal.

10. Finish lowering the pump and pipe assembly into the well (bore hole) positioning the well seal over the top of the casing. Connect the discharge pipe to the fitting on top of the well seal and run the pump wires to the controller.

3.5   Wiring

Prior to connecting any wires to the controller, be sure you have a system wiring diagram to use as a reference (see figure 2). Guessing at polarity and connection points is not worth the risk of potential product damage and/or personal injury.
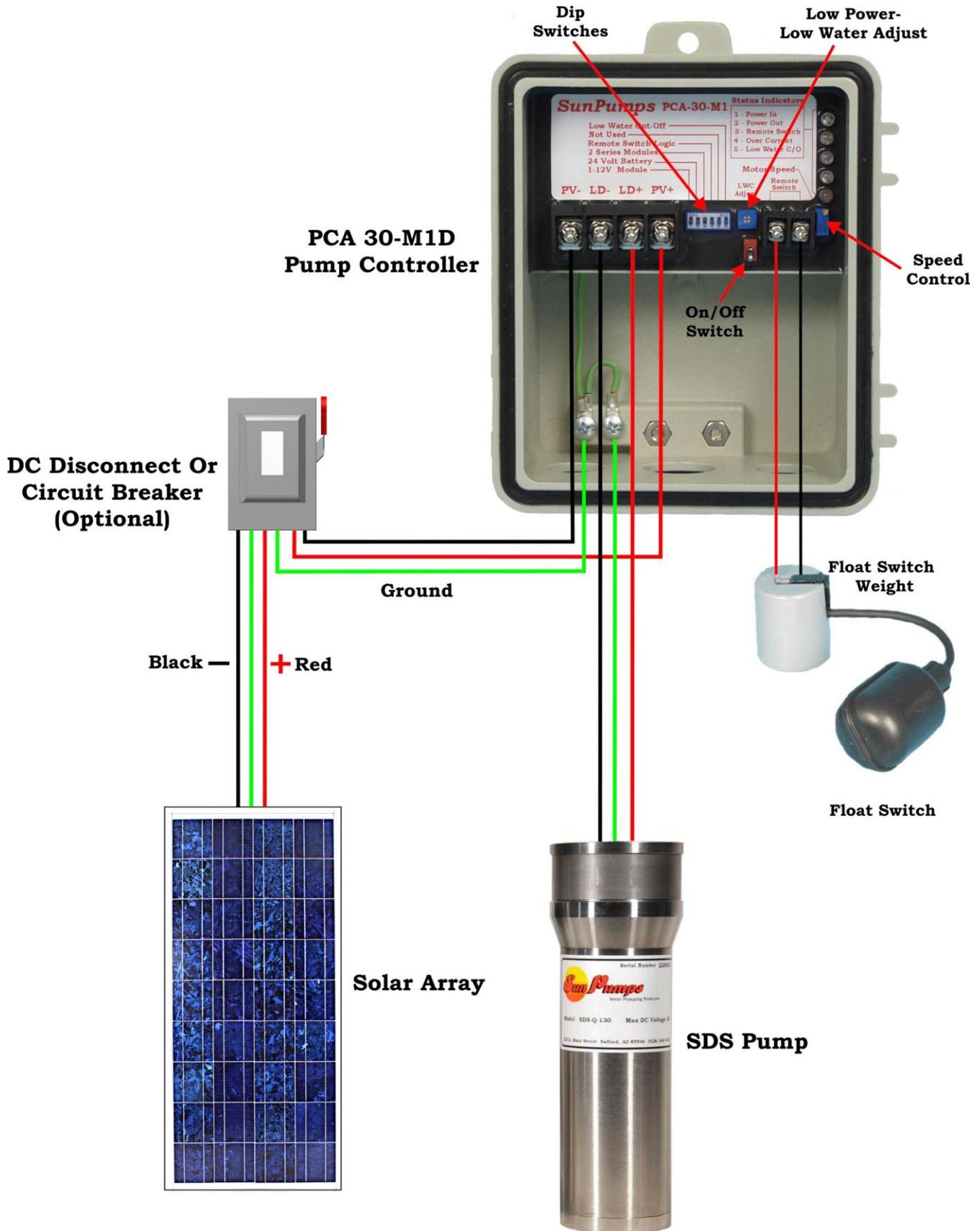
Ensure the wire sizes are of adequate diameter (gauge) to minimize voltage drop. Please refer to a DC voltage loss table or call your SunPumps dealer for assistance. Wire gauge being too small will cause excessive voltage losses to the motor and will reduce the flow rate of the pump.

All other system equipment should be installed before proceeding with wiring the controller. Double check polarity and wire termination tightness before powering up the system.

CAUTION: Photovoltaic panels produce DC electricity when exposed to sunlight. Cover the panels with a blanket or with a non-opaque material before wiring. Or you can install a disconnect switch or a circuit breaker between the solar modules and the controller so you are not wiring hot. However a disconnect switch is not absolutely necessary for these low power applications. You can cover the solar modules or disconnect one of the MC connectors, if available, until you finish wiring.

Figure 2   Controller Wiring Diagram

Dip Switches

Low Power- Low Water Adjust

SunPumps PCA-30-M1

Status Indicators
1 - Power In
2 - Power Out
3 - Remote Switch
4 - Over Current
5 - Low Water C/O

Low Water Cut-Off
Not Used
Remote Switch Logic
2 Series Modules
24 Volt Battery
1-12V Module

Motor Speed

LWC Adjust   Remote Switch

PV-   LD-   LD+   PV+

PCA 30-M1D Pump Controller

On/Off Switch

Speed Control

DC Disconnect Or Circuit Breaker (Optional)

Ground

Float Switch Weight

Black —   **+ Red**

Float Switch

Solar Array

SDS Pump

SunPumps
Solar Pumping Products

Serial Number 22064
Model SDS-Q-130   Max DC Voltage 3
125 E. Main Street   Safford, AZ 85546 (928) 348-9...

1. After mounting the controller, switch the controller to the OFF position.

2. Connect ground rod conductor to the controller chassis ground block.

3. Connect solar module frame ground conductor to controller chassis ground block.

4. Connect the green pump ground conductor to controller chassis ground block.

5. Connect pump motor leads to the corresponding "Pump" terminals on the controller. Red to LD+, and black to LD-.

6. Verify that the disconnect switch, if used, is in the off position or one of the PV array wires is disconnected. Connect the DC source supply negative (-), the black conductor, to one of the controller terminals labeled "PV-" on the "Solar Array Input".

   (NOTE: The solar array should be disconnected before connecting power to the controller.)

7. Refer to the next section for "Remote Switch" connections as well as "Adjustment Procedures" for configuration, if applicable.

8. At this point, all system components are installed and wired, double check conductor polarities, wire termination tightness and controller configuration. With a DC volt meter check the array open circuit voltage (Voc) on the array side of the disconnect switch and the module polarity. Record the Voc for future reference. You may do this on the Before Calling Sun Pumps Worksheet near the end of this manual. The Open Circuit Voltage reading should not be over 45 volts.

9. Adjust the dip switches for the proper solar module arrangement or battery system you have. Switch one is for a single 12-17 volt solar module, switch two is for a 24 volt battery system and switch three is for a 30 volt panel direct system This could be two 12-17 volt solar module wired in series or a single 24 -34volt solar module.

10. After you have verified the voltage and polarity, switch the disconnect switch on - if the polarity is correct the first LED light will be on.

11. Turn the "On/Off "switch to the ON position. The system should be operational. If the system does not start and turns on any error lights, proceed to the troubleshooting guide.

For CE Compliance

Appropriate watertight cable glands must be used to keep the controller sealed. Only one power wire may be attached to each terminal block screw. Wires may not be doubled up except for signal and control wires. Wiring must conform to HO7RN-F specifications and must be installed in accordance with all national and local regulations.

PE ground wires must be Green/Yellow with a color ratio of 50/50, not less than 70/30, and must be of a size equal to or larger than the pump primary wire. All stranded PE ground wires connected to the controller case must use a crimped ferrule over the wire for protection from the set-screw.

Figure 3   Dip Switch Settings
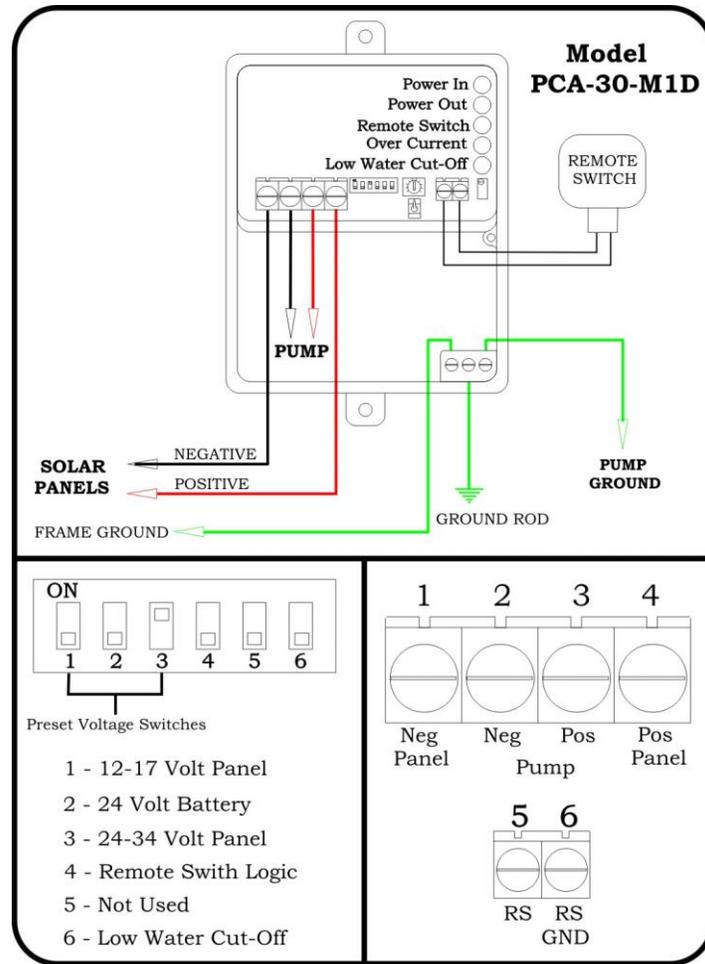
Switch Number	Switch Position	Description	Function	Default Setting
1	ON	12-17 Volt Panel Direct	Sets Controller for a 12 to 17 volt input.	OFF
2	ON	24 Volt Battery System	Sets Controller for a 24volt battery input.	OFF
3	ON	24-34 Volt Panel Direct	Sets Controller for a 24 to 34 volt input	ON
4	OFF	Remote Switch Logic	Turns pump Off when terminals connect.	OFF
4	ON	Remote Switch Logic	Turns pump On when terminals connect	OFF
5	OFF	Not Used At This Time	Should be in the off position for proper operation.	OFF
6	ON	Low Water Cut-Off	Turns pump off at low current set point and starts timer.	OFF

3.6   Controller Settings

The PCA series controllers have several settings , see figure 3. Most features include system configuration adjustments, some of which are user selectable by a six position DIP-switch located on the face of the controller.

Switch 1 is the 12 to 17 volt panel direct setting. With this switch on (UP), the controller is adjusted for a 12 to 17 volt solar module.

Switch 2 is the 24 volt battery setting. With this switch on (UP), the controller is adjusted for a 24 volt battery system.

Switch 3 is the 24 to 34 volt panel direct setting. With this switch on (UP), the controller is adjusted for a 24 to 34 volt solar module. This can be a single 24 to 34 volt solar module or two 12 to 17 volt solar modules wired in series. NOTE: The controller will regulate the output voltage to a maximum of 30 volts. This protects the pump from over-speed conditions.

Switch 4 is the Remote Switch Logic. With this switch off (DOWN), terminals "RS+" and "GND" must be connected to turn the controller off. With this switch on (UP), terminals "RS+" and "GND" must be connected to turn the controller on.

Switch 5 is not used at this time and should remain down, (OFF).

Switch 6 is the Low Water Cut-off circuit. To activate the Low Water Cut-Off feature, turn switch number 6 on. When the pump runs dry, the LWC feature will turn the pump off and an amber indicator light will flash. The pump will remain off for approximately 25 to 30 minutes and then it will start again. This cycle will continue any time the pump runs dry.

There is a Low Water Cut-Off sensitivity adjusting pot on the front of the controller. To test this circuit you can pull the pump out of the water to verify that the pump turns off. If it doesn't, with the pump still out of the water, you can turn the adjusting screw slowly to the right until the pump shuts down. You can reset the circuit by turning the On/Off switch off and on again. (See LWC Sensitivity Adjustment procedure.)

3.7   Auxiliary Control Circuits

There are two auxiliary control circuits are configured and controlled with the "Dip Switches", "#4 Remote Switch Logic" and #6 "Low Water Cut-Off".   (See Figure 3)

These circuits offer expanded capability and are described here. The remote switch control is for float switches (storage tank level), pressure switches or a remote system "ON/OFF" toggle switch. The low water cut-off circuit is to protect the pump from dry running.

There is also a motor speed control is for adjusting the flow rate of the pump. See each corresponding detailed description below.

NOTE: **Use only "Shielded Wire" to run from the remote switch to the controller and the ground wire must be grounded to the controller side only.** Induced voltages from lightning storms or two-way radio transmissions could damage the controller.

Remote Switch

The Remote Switch interface can serve as an automatic system shutdown when used with a water storage tank mounted float switch, a pressure switch or it can also serve as a manual system shutdown with a remote system ON/OFF toggle switch. The remote logic circuit allows the use of standard "Pump-Up or Pump Down" float switches. Please refer to the following operation scenarios for configuration options.

With switch number 4 in the *OFF* position, the controller is configured to accommodate a Normally Open (N.O.) float switch or remote toggle switch. In this configuration the controller will operate as follows:

<div align="center">

PUMP ON
float switch open = water tank low = pump ON

PUMP OFF
float switch closed = water tank high = pump OFF

</div>

With switch number 4 in the *ON* position, the controller is configured to accommodate a Normally Closed (N.C.) float switch, pressure switch or remote toggle switch. In this configuration the controller will operate as follows:

PUMP ON
switch closed = water tank low = pump ON

PUMP OFF
switch open = water tank high = pump OFF

Sensorless Low Water Cut-Off Circuit (LWC)

The Low Water Cut-Off Circuit (LWC) turns the pump off any time the controller output power drops below a functional level. This protects the pump in stall conditions and saves wear on the system when no or very little water is being pumped. <u>This feature must be adjusted for your specific application</u>.

This circuit works by monitoring the pump current. If the pump breaks suction the current will drop and the controller will automatically turn the pump off and start a 30 minute timer. At the end of the 30 minutes the pump will turn back on again.

Please note there are some draw backs to using this feature. Early in the morning and on cloudy days when there is very little array current available, the controller may turn the pump off because of the low current. This may cause the pump to start later in the morning or reduce the run time during the day. We recommend only using the LWC feature if there is a known low flow rate water source. We would prefer to use the motor speed control and adjust the pump flow rate to the output of the well.

LWC Adjustment for SDS Series Pumps

1. The system should be wired and the pump set slightly below the water level in the well.

2. Turn the number 6 dip switch off and then turn the pump on to fill the drop pipe with water. This way you are adjusting the pre-set current to the actual load.

3. Turn the "LWC" trim pot counter-clockwise until it stops. (Less than a turn).

4. Now turn number 6 dip switch on.

5. With the pump turned on and pumping water, pull the pump out of the water. It will not damage an SDS series pump to run dry for several minutes.

6. Very slowly turn the "LWC" trim pot clockwise until the pump turns off. This is now the set-point where the pump will turn off.

7. To verify your adjustment, put the pump back in the water and turn the switch off and back on again to reset the controller. If the adjustment is correct the pump will remain running while pumping water and if pulled out of the water it should turn off.

8. Once the pump turns off it will not turn on again for approximately 30 minutes, unless manually reset. To manually reset the timer, turn the On/Off switch off and then back on again.

Motor Speed Control

The Motor Speed Control circuit is used to control the speed of the pump motor and thus the flow rate of the pump. It is primarily used for low producing wells where the pump output is matched to the production rate of the well. However it can also be used any time specific flow rates are required.

Motor Speed Control Adjustment

The purpose of this procedure is to adjust the output voltage of the controller and thus reduce the water flow of the pump. If tests have shown the pump will out produce the well capacity, then the controller "Speed Control" feature can be used to match the flow rate of the pump to the production of the well.

1. With the system installed and controller properly configured, allow the pump to run at full power at mid-day until the pump starts surging.

2. Slowly turn the "Speed Control" trim pot located on the face of the controller <u>counter</u> clockwise until the pump stops surging. This is the point where the pump flow rate equals the well production. This process will probably take a few attempts to "balance" the system for optimum water production. If maximum water is not a critical issue you may want to reduce the pumps flow rate an additional 5% to 10% to insure the pump will not run dry.

   (NOTE: The trim pot has a15- turn range. It usually takes many complete turns in a counter-clockwise direction before you will notice any change in water output or voltage power.)

4.0   Troubleshooting

Sun Pumps, Inc. is dedicated to its customers and will gladly help you trouble shoot any problems with your system. However, especially during the busy summer pumping season, we may not be able to help you right away. Using this trouble shooting guide as your first resource when your system is not working properly can save you valuable time in getting your system fully functional. If at any time however, you are not comfortable performing any of these tasks, or do not fully understand the system, it is better to call than to guess. **Before calling please go through the section below labeled "Before Calling Sun Pumps" and complete the steps there.**

CONTROLLER DOES NOT TURN ON

1. Check the LED's on the face of the controller. The top LED, labeled "Power In", should be on. This indicates power is connected to the controller and the polarity is correct. If it is not on, verify that the controller is properly wired, including polarity, and that the input terminals have at least 12 volts. Less than 12 volts at the input terminals and the unit may show no signs of operation. If you do have at least 12 volts in the right polarity, contact Sun Pumps for further assistance.

2. If the expected voltage is not present, disconnect the panels from the controller using the disconnect switch and check any fuses and breakers in the system. Replace blown fuses and reset tripped breakers.

3. If there are not blown fuses and no tripped breakers, check the open circuit voltage of your array. If the open circuit voltage is not correct trouble shoot the array to find the problem. If the open circuit voltage is correct, call Sun Pumps for further assistance.

CONTROLLER TURNS ON BUT PUMP DOES NOT RUN

1. Make sure the On/Off switch is in the up position. (On)

2. The second LED is labeled "Run". This indicates voltage is going out of the controller. If it is on, go to the well and listen for the sound of the motor. Check for breaks in the pipe. If you cannot find a problem call Sun Pumps for further assistance.

3. Check the third LED, labeled "RS"; this is the remote switch shutdown indicator. If it is on and blinking, the remote circuit is preventing the controller from running the pump. Set the #4 dip switch to off and disconnect the remote switch wire. If the pump starts, troubleshoot the remote switch wiring and float switch. If the pump does not start and the LED is still on and blinking, call Sun Pumps for further assistance.

4. If the fourth LED, labeled "Over Current" is on and blinking, the controller has exceeded its current limit and shut down. Turning the controller off then on again will reset this fault. If the controller continues to pull high current, it will turn itself off again. Check the pump for a short to ground using an ohm meter and call Sun Pumps for further assistance.

5. Check the fifth LED, labeled "Low Water Cut-Off", this is the low water shutdown indicator. If it is on and blinking, the controller detected a low water condition. The low water cut-off is a common occurrence on days which have clouds which block the sun momentarily. (See section 3.7 for an explanation of the Low Water Cut-Off feature.)

6. Check for proper dip switch settings on your controller. For test purposes, switche 6 must be in the off position. This will bypass the Low Water Cut-off circuit to see if the pump will run.

7. Check for proper controller input voltage. If the pump is not running the voltage should be reading the array open circuit voltage (Voc). Verify that this voltage is below the maximum input voltage allowed for your controller, 45 volts. If it is correct then confirm all electrical terminations are tight and secure. Note: To accurately trouble shoot this feature there should be absolutely no clouds blocking the sun at any time during the following tests.

8.

PUMP IS RUNNING BUT THE OUTPUT IS LOW

1. Make sure you have full sun light at midday, that there are no clouds and no shadows on any part of the array. Then verify power coming out of the controller. With a DC volt meter, check the voltage and current. Check this against the pump chart for your specific application.

2. If the wires are correct verify that your system does not have any leaks where water can be lost. If you cannot determine the problem, contact Sun Pumps for further assistance.

PUMP DRAWS EXCESSIVE CURRENT (More than the rating of the pump, but less than the rating of the controller)

1. Check wiring diagram for proper connection.

2. Check for skinned wires or faulty underwater splice.

3. Check for locked motor armature. With the pump out of the well, allow the controller to attempt to start the motor. If the motor still does not run and/or it goes into an over-current state, contact the Sun Pumps for further assistance.

5.0   Before Calling SunPumps

BEFORE CALLING SUNPUMPS

If at all possible when calling Sun Pumps for technical support there are a few things which will help to speed up the process and help us determine the cause of and solution to the system failure. The best way to get help is to call while you are physically at the location of your pump, have good sunlight, and have a multimeter and a screwdriver with you.

Furthermore, please fill out the form below before calling. This information will provide us with most of the preliminary information we need to help you. If you cannot physically be at the site, filling out the worksheet is a must.

Pump Model Number: _____

Pump Serial Number: _____

Controller Model Number: _____

Date Purchased: _____

Solar Module Specifications:

      Model Number _____

      Rated Watts _____

      Voc _____

      Vmp _____

      Isc _____

      Imp _____

Solar Modules Connected in Series _____ X Voc _____ = _____ Array Voc

Solar Modules Connected in Series _____ X Vmp _____ = _____ Array Vmp

Series Strings Connected in Parallel_____ X Isc _____= _____ Array Isc

Series Strings Connected in Parallel_____ X Imp _____= _____ Array Imp

Well Specifications:

      Well Depth _____

      Well Diameter _____

      Static Water Level _____

      Pumping Level _____

      Pump Setting _____

6.0 Warranty Statement

<u>Warranty Statement</u>

SDS Series Submersible Pumps
PCA Series Pump Controllers
<u>Limited Warranty – Twelve Months</u>

SunPumps warrants to the original consumer that its products shall be free from defects in material and workmanship under normal applications and service conditions for a period of twelve (12) months after the original date of purchase, but not to exceed eighteen (18) months from the date of manufacture.

At its option, SunPumps will repair or replace any SunPumps product, which has failed due to a defect in material or workmanship during this warranty period. A PCA series controller must be installed in conjunction with the pump to validate the warranty. This limited warranty shall not apply if the SunPumps product has been damaged by unreasonable use, accident, negligence, mishandling, misapplication, alteration, modification, abrasion (sand damage to pump), shipping, service or modification by anyone (other than by SunPumps), or failure which are caused by products not manufactured by SunPumps, or should the products serial number being altered, or by damage that is attributable to an act of God, or by any other causes unrelated to defective materials or workmanship. Any disassembly whatsoever of the product voids all warranty.

The original purchaser MUST complete and send in the warranty registration card, with the pump serial number and the controller serial number for warranty validation. ***No warranty will be rendered without a valid warranty card on file at the SunPumps factory.***

There are no express warranties except as listed above. SunPumps shall have no responsibility for damage to property, persons, animals, or other loss or injury resulting from the use of a SunPumps product. The purchaser's exclusive remedy shall be only as stated herein. This warranty is in lieu of all other warranties expressed or implied.

Except for the warranty that the products are made in accordance with the specifications therefore supplied or agreed to by customer, SunPumps makes no warranty expressed or implied, and any implied warranty of merchantability or fitness for a particular purpose which exceeds the forging warranty is hereby disclaimed by SunPumps and excluded from any agreement made by acceptance of any order pursuant to this quotation.

 UNDER NO CIRCUMSTANCES WILL SUNPUMPS BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES, LOSS OR EXPENSE ARISING IN CONNECTION WITH THE USE OF OR THE INABILITY TO USE ITS GOODS FOR ANY PURPOSE WHATSOEVER. ALL PRODUCTS ARE SOLD AS IS WITH ALL FAULTS. SUNPUMPS MAXIMUM LIABILITY SHALL NOT IN ANY CASE EXCEED THE PURCHASE PRICE FOR THE GOODS CLAIMED TO BE DEFECTIVE OR UNSUITABLE.

SunPumps is not responsible for labor, transportation, and related costs incurred by the customer to make allegedly defective equipment available to the factory for inspection re-installation, lost profits or costs caused by interruption of service. SunPumps is not responsible for loss or damage to products, owned by customer and located on SunPumps premises, caused by fire or other casualties beyond SunPumps control.

This equipment is not to be used for anything other than its intended purpose as stated in this manual.

For future reference, please list your system data before installing the pump.

Installation Date_____ Static Water Level_____
Pump Model_____ Pumping Level_____
Pump Serial No._____ Additional Vertical Lift_____
Controller Model_____ Pump Depth_____
Controller Serial No._____ Total Dynamic Head_____
Warranty Card No._____ Well Depth_____