# OPERATION AND INSTALLATION MANUAL

## SDS SERIES
## SOLAR ELECTRIC PUMP
## &
## PCA-30-M1 SERIES
## PUMP CONTROLLER

# Table of Contents

**Phone (928) 348-9652 Fax (928) 348-9653**

# 1.0   <u>Introduction</u>

Thank you for selecting a SunPumps SDS series pump system. The SDS series pump and PCA series controller are the key components to a high quality submersible pump system. Their stand-alone, pollution free and low noise operation makes them an ideal solution for remote homes, wildlife and stock watering problems without violating the environment.

SunPumps SDS series pumps are positive displacement, low voltage, DC powered, submersibles constructed of high quality marine bronze and stainless steel. These pumps were designed for corrosion free service in clean potable water.

The PCA series controllers are solid-state DC power converters designed as the interface between and SDS series pump and a DC power source. The purpose of the controller is to maximize the total daily water output while providing protection for the pump and the DC power source as well as providing 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 pump and controller features, functions, connection points and various configurations. For future reference, keep this manual and other relevant product information in a safe place.**

<div align="center">

### *<u>PRECAUTIONS</u>*

</div>

- **Safety First – Always understand what you are doing when working with any form of electricity. Guessing at something is not worth the potential of 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 PCA series controller or product damage and/or personal injury may result.**

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

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

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

- **When working with batteries be careful not to short battery terminals as hundreds of amperes can flow. Remove all jewelry, use insulated tools and secure all conductors.**

- **Batteries can produce explosive hydrogen gas**. **Be sure battery housing is well ventilated.**

# 2.0   <u>Product Overview</u>

The SDS series pumps and PCA series controllers are designed to operate with a variety of DC power sources. The most common of these are solar electric modules and batteries. When properly installed and configured, the unique features incorporated into this stand-alone system will automatically control and protect your pump system permitting several 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.

In a battery-powered system, the PCA series controllers are *not* to be used as a solar electric charge regulator between the solar electric panel and the battery bank. However, the PCA controllers feature a Low Voltage Cut-off function when used on battery-sourced systems. This feature will prevent excessive battery discharge conditions thereby helping to extend the battery bank life. In addition, the PCA

controllers will provide a degree of protection for your charge regulator by attenuating inductive voltage spikes generated when pump motors switch on or off.

## 2.1 <u>Controller Features</u>

1. Current boosting for matching the load requirements of the pump
2. Voltage regulation of the solar electric array at its maximum power point
3. Low Voltage Cut-off function for battery sourced installations.
4. Over-current protection via integrated electronic circuit breaker, with manual or automatic reset features
5. Reverse polarity protection (10 amperes maximum) on the input terminals
6. Voltage and current limiting to pump motor
7. Transient protection and surge suppression
8. Adjustable pump motor voltage control for precision output flow
9. Adjustable input voltage for system optimization or solar modules
10. System ON/OFF switch
11. LED indicators; Red = power in, Green = power out, Amber 1 = Remote switch shutdown, Amber 2 = over current shutdown and Amber 3 = Low Water Cut-Off
12. Weather resistant cast aluminum enclosure with hinged door
13. Rising clamp screw terminal blocks – no fork terminals required
14. User selectable pre-adjusted input voltage configuration and power source selection
15. Remote switch interface – float switch or remote shutdown –Normally Open or Normally Closed user selectable
16. Sensor-less Low Water Cut-Off circuit

## 2.2 <u>Application</u>

The only application the PCA-30-M1 controllers are designed for is the interface between the SunPumps SDS series of pumps and the DC power source as well as peripheral pump system signal devices. The PCA-30-M1 controllers are capable of operating with two different DC inputs, solar electric modules or batteries. Of these, solar electric modules are the most common.

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

## 3.0 <u>Installation and Operation</u>

The following sections are outlined in a step by step format to guide you through the installation, configuration and system power-up of the SDS pumps and the PCA-30-M1 controllers. **Before installing the pump system, read all product manuals and 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.

## *<u>Warning</u>*

***Reverse polarity on a battery sourced system or a panel system capable of producing over 10 amps will result in non-warranted product damage.***

## 3.1  Location

As the majority of system installations vary greatly, only general comments can be made as to 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 and etc..  There is no substitute for a good plan!

The PCA series controllers can either be mounted indoors or outdoors.  Locate all system equipment as close as possible to each other.  Generally the controller is mounted on the north side of a pole which has solar electric modules mounted on top of it.  The pole should be located close to the well (bore hole).  This general physical layout is conducive to clean installation aesthetically and electrically.

## 3.2  System Design Basics  (Read carefully before installation)

1. 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.

2. Make sure the discharge pipe is sized properly for the length of run.  Friction loss in a pipeline over a long distance will add head to the pump and thus reduce the flow rate.  Consult your SunPumps distributor if there is any question.

3. Never rest the pump on the bottom of the well (bore hole).  This can cause the pump to fill with mud and damage the diaphragm.  Suspend the pump five feet (1.5 meters) or more above the bottom of the well (bore hole).  If possible mount the pump above the well casing perforations.  This will allow any sand intrusion to settle below the pump.

4. Use no larger than ½" drop pipe for SDS-D 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.  If there is a known sand problem, a sand shroud or a screen is required.  The minimum casing diameter for an SDS-D 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 (bore hole).

5. Due to the aggressive action of DC power, it is essential the wire splice at the pump 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 SunPumps splice kit S-703 is recommended for this watertight connection.

6. 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.

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

8. Never install the pump in a well that has or has had an oil-lubricated line shaft turbine in it.  Any drip oil remaining in the water may damage the diaphragm and seals.

9. If the pump is used in a well over 100 feet (30 meters) deep, install a check valve above the pump.  This will help relieve some of the pressure on the internal check valves and will keep any sediment from entering back into the pump.

## 3.3  Well Measurements

Before installing the pump measure the depth of the well (bore hole) 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 (bore hole).  This information is necessary in determining the pump setting.  (See Figure 1).

**It is important the "Total Dynamic Head" does not exceed the rating of the pump.  Section 5.0 lists the specifications for each pump.**

## Figure 1            System Installation Layout

SOLAR MODULES

CONTROLLER

WATER TANK

VERTICAL LIFT

WELL SEAL

SAFETY ROPE

DROP PIPE

STATIC WATER LEVEL

DRAW DOWN

ELECTRICAL WIRE

PUMPING LEVEL

SunPumps

PUMPING LEVEL        —    _____

VERTICAL LIFT        —    _____

FRICTION LOSS        —    _____
(See FL chart)

TOTAL DYN. HEAD    =    _____

TOTAL DYNAMIC HEAD = PL + VL + FL
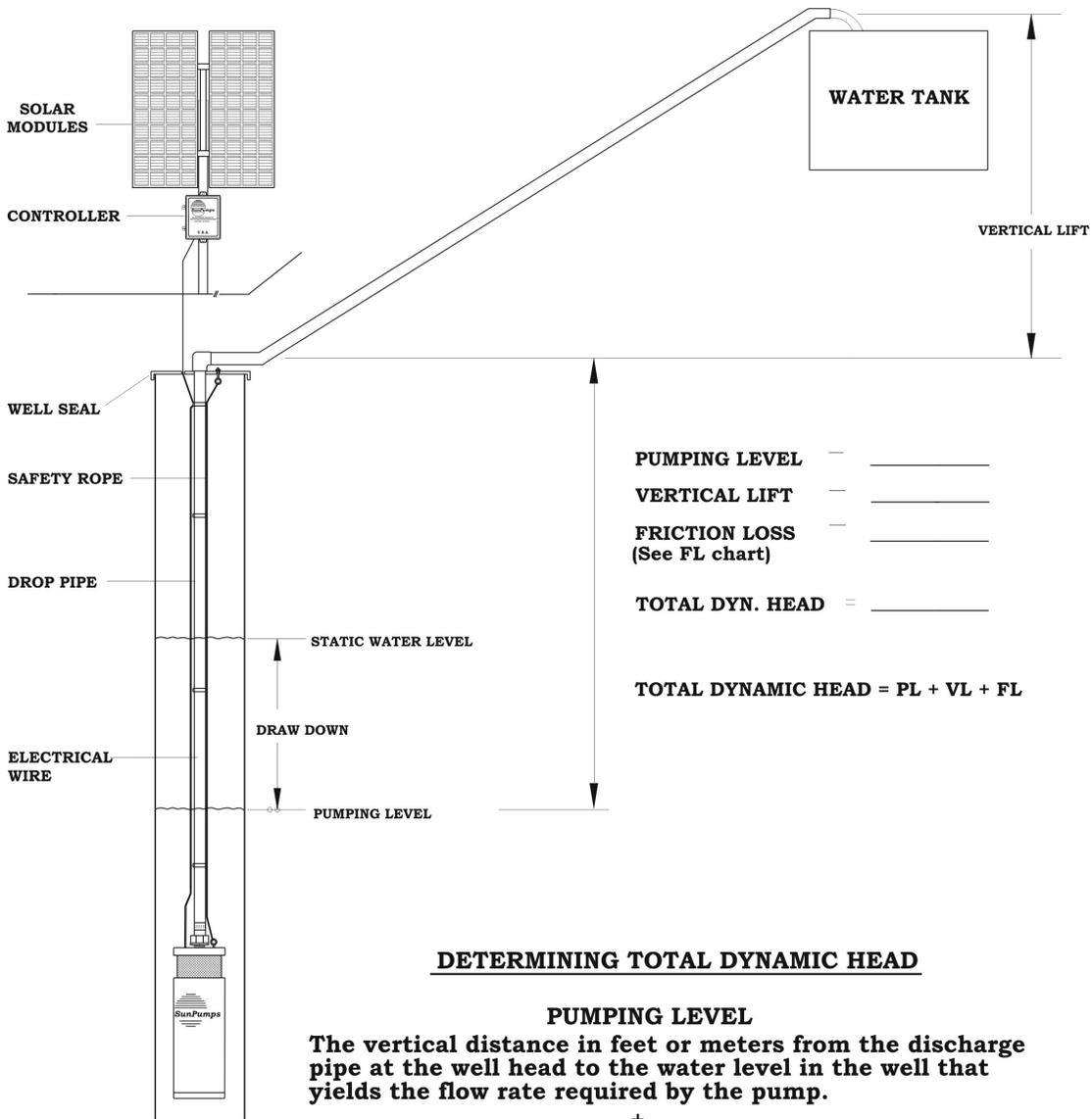
### DETERMINING TOTAL DYNAMIC HEAD

**PUMPING LEVEL**
The vertical distance in feet or meters from the discharge pipe at the well head to the water level in the well that yields the flow rate required by the pump.
+
**VERTICAL LIFT**
The vertical distance in feet or meters from the discharge pipe at the well head to the top of the water tank.
+
**FRICTION LOSS**
Water flowing through pipelines will lose head depending on the size, type and length of the piping, number and type of fittings and the flow rate.   (Refer to friction loss tables.)

## 3.4  Pump Installation

1. Connect the drop pipe, safety rope and sand shroud (if used) to the pump. Splice the drop cable to the motor lead using an under water splice kit. (See wire splicing instructions provided with splice kit.)  Unroll the drop cable, drop pipe and safety rope and lay them on the ground in a straight line.

   **(Care must be taken not to get dirt inside the drop pipe while stretching it out on the ground. If a saw is used to cut the drop pipe, make sure to remove the saw cuttings from the inside of the pipe before assembly.)**

2. Make the length of the drop pipe the distance of the anticipated draw down of the water level plus a minimum of two feet (.6 meters).  Never install the pump deeper than necessary.

   *NOTE: Never install the pump over 50 feet (15 meters) below the static water level. This will cause excessive pressure on the pump and may cause water leakage into the motor housing.*

3. Tie the drop pipe, drop cable and safety rope together every ten feet with plastic wire ties or high quality electrical tape. 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 to the I-bolt on the inside of the well seal.

4. Lower 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.


## Figure 2                    Top of Pole Mount Rack Installation



SOLAR MODULES
(FACING SOUTH)

CONTROLLER
(FACING NORTH)

TO PUMP

3'

GROUND ROD

CONCRETE
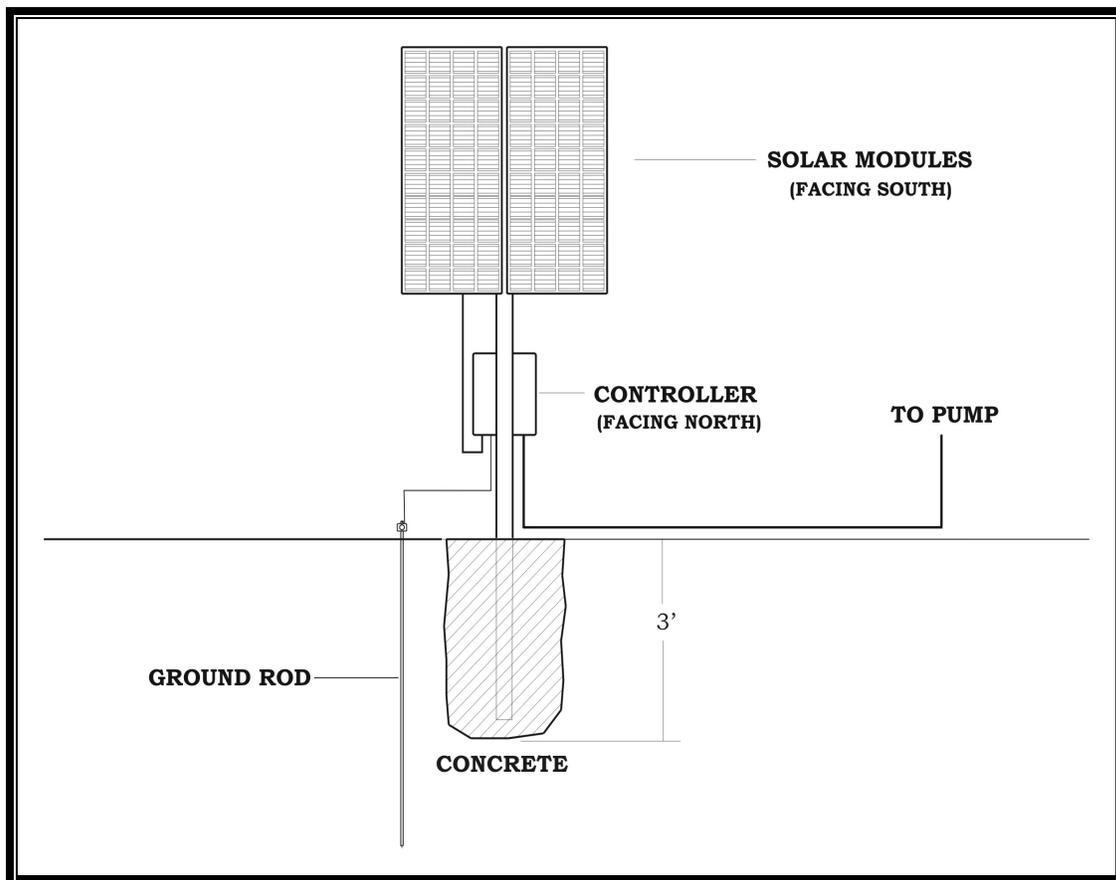
## 3.5    <u>Wiring</u>

Prior to connecting any wires to the controller be sure you have a system wiring diagram to use as a reference. Generic system wiring diagrams are included in this manual for your convenience. **(See Figure 3)** 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. As a quick rule use 12 gauge (4 mm$^2$) wire up to 100 feet (30 meters) and 10 gauge (6 mm$^2$) wire up to 250 feet (76 meters).  If  distances greater than this is required please refer to a DC voltage loss table or call your SunPumps dealer.

All other system equipment should be installed before proceeding with wiring the controller.  Pre-configure the controller switches prior to wiring. **.  (See Figure 4***)*   Refer to "Adjustment Procedures" for details.  Double check polarity and wire termination tightness before powering up the system.

1.  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 pump ground conductor to controller chassis ground block.
5.  Connect pump motor negative (-) conductor to controller terminal labeled "LD-".
6.  Connect pump motor positive (+) conductor to controller terminal labeled "LD+".
7.  Connect the DC source supply negative (-) conductor to the controller terminal labeled "PV-". (NOTE: If a fused disconnect is used, the power should be connected to it first and then to the controller).
8.  Connect the DC source supply positive (+) conductor to the controller terminal labeled "PV+". (NOTE: If a fused disconnect is used, the power should be connected to it first and then to the controller).
9.  Refer to the next section for "Remote Control" connections and "Adjustment Procedures" for configuration (if applicable) and then return to this point.
10. At this point, all system components are installed and wired, double check conductor polarities, wire termination tightness and controller configuration.
11. Switch the disconnect, if used, on and if the polarity is correct the red light will be on.
12. Turn the "ON/OFF" switch to the ON position.  The system should be operational.  If the system is not working refer to the "Troubleshooting" section.

## <u>For CE Compliance</u>

**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 <u>not</u> 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    Solar Panel Wiring Diagram
## (Generic)



Positive    Negative
**15 Volt Panel Direct**

**2 Solar Panels
wired in series.**

Positive    Negative
**30 Volt Panel Direct**

**2 Solar Panels
wired in series.**

**Fused
Disconnect**

**Charge
Controller**

**2-12 Volt Batteries
wired in series.**

**5 Amp
Fuse**

Positive              Negative
**24 Volt Battery System**
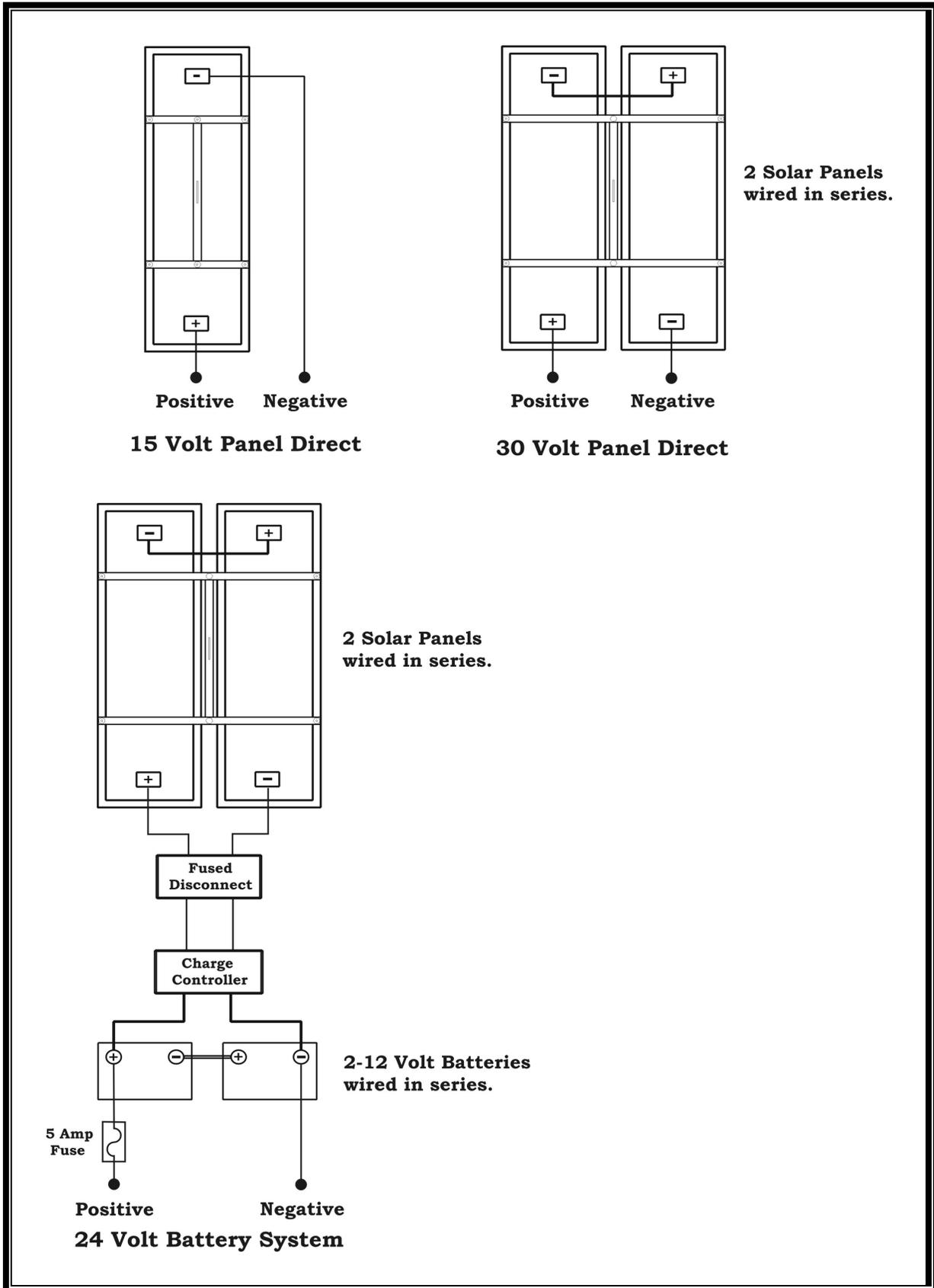
# Figure 4      Controller Wiring Diagram

Power In

Power Out

Remote Switch

Over Current

Low Water Cut-Off

REMOTE SWITCH

PUMP

SOLAR PANELS

NEGATIVE

POSITIVE

FRAME GROUND

GROUND ROD

PUMP GROUND

ON

1   2   3   4   5   6

Preset Voltage Switches

1 - 15 Volt Panel

2 - 24 Volt Battery

3 - 30 Volt Panel

4 - Remote Swith Logic

5 - Fuse / Auto Reset

6 - Low Water Cut-Off

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Neg Panel | Neg Pump | Pos Pump | Pos Panel |

| 5 | 6 |
|---|---|
| RS | RS GND |
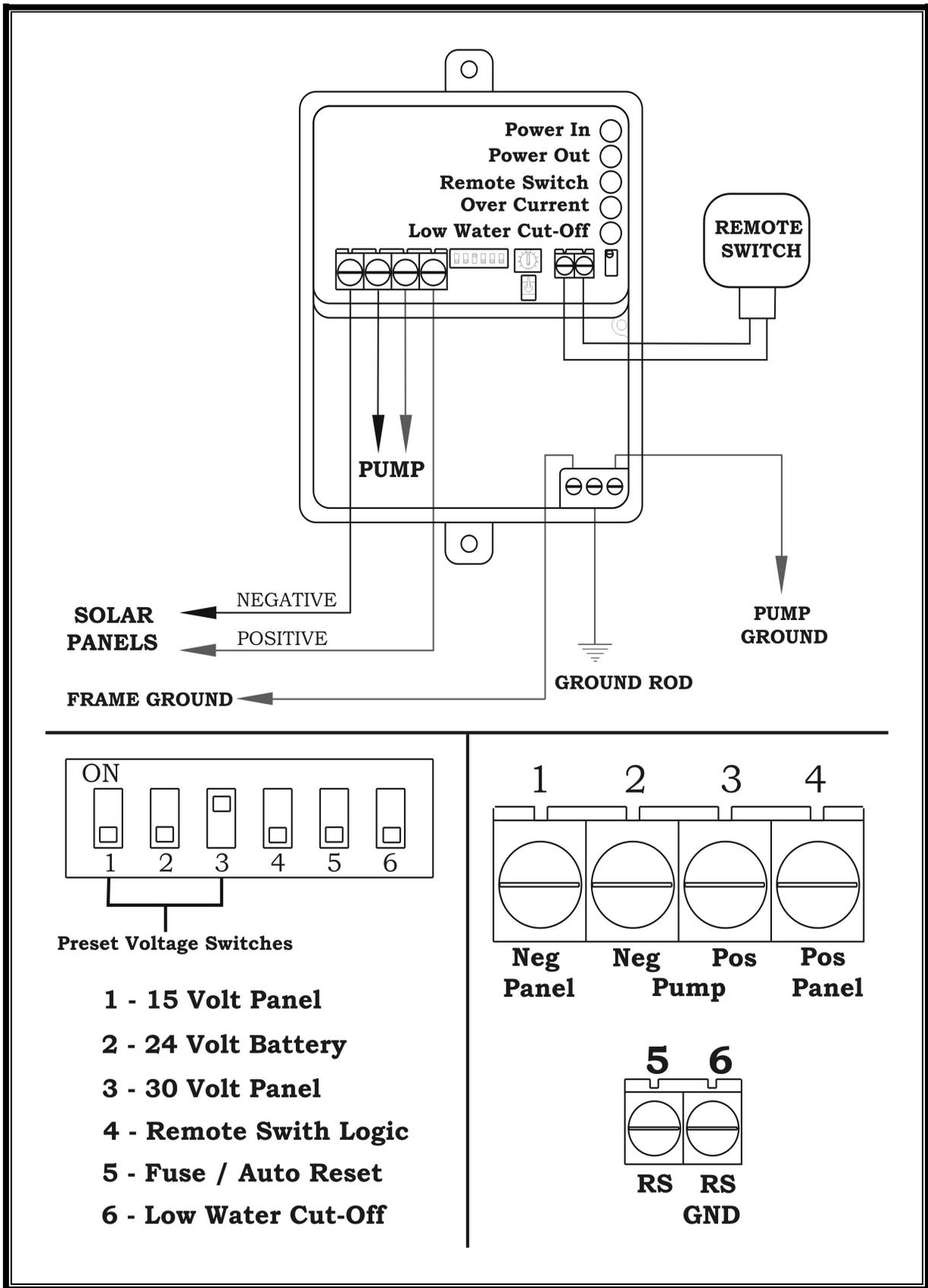
## 3.6    Auxiliary Control Circuits

The PCA-30-M1 controllers feature remote peripheral interface functions with easy programming.   The remote switch interface supports float switches (storage tank level), pressure switches or a remote system "ON/OFF" toggle switch. **Use only "Shielded Wire" to run from the remote switch to the controller.** 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:

<div align="center">

**PUMP ON**
**switch closed = water tank low = pump ON**

**PUMP OFF**
**switch open = water tank high = pump OFF**

</div>

## Output Voltage Control Circuit

The **O**utput **V**oltage **C**ontrol circuit or Motor Speed Control circuit is used to regulate the output voltage of the controller 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. (See Section 3.7 "Output Voltage Adjustment" for the correct adjusting procedure).

## Low Water Cut-Off Circuit

The **L**ow **W**ater **C**ut-Off circuit is used to protect a pump from running dry.

The controller has already been adjusted at the factory to fit the SDS series submersible pumps and no further adjustments are usually necessary. If a different pump is being used, the LWC should be tested to verify that it is adjusted properly. The best way to test it is by pulling the pump out of the water while the pump is operating. If the pump does not turn off within 5 seconds then the sensitivity must be adjusted. If the pump is at very low power, it may take up to 15 seconds for the pump to turn off. (See Section 3.7 "LWC Sensitivity Adjustment" for the correct adjusting procedure).

With switch number 6 in the ON position, the low water cut-off circuit interface serves as an automatic system shutdown when water in the well drops below the pump intake. When the LWC circuit is activated one of the amber lights will flash and the pump will turn off. The pump will stay off for approximately 20 to 25 minutes and then turn back on. This cycle will repeat any time the water drops below the pump intake.

With switch number 6 in the *OFF* position, the LWC circuit is disabled. The pump will continue to operate even if it runs dry.

## 3.7 Adjustment Procedures

The PCA–30-M1 controllers have several adjustment features.  They are system configuration adjustments, which are user selectable by a six position DIP switch located on the face of the controller.  These include three pre-adjusted solar panel and battery selections, remote switch logic selection, low water level cut-off and electronic circuit breaker reset selection.

The pre-adjusted DC source selection allows the user to choose the nominal input voltage and basic source configuration.  These consist of three pre-adjusted voltage settings consisting of two solar panel selections and one battery selection. The first three switches on the DIP switch are used for these selections.  For proper controller operation, only one of these first three switches should be in the ON position.  Please refer to the chart below for the switch position identification and setting options.

| Switch No. | Description | Setpoint | Note |
|:---:|:---:|:---:|:---:|
| 1 | 15 Volt Panel Direct | 13.0 Volts | 1 |
| 2 | 24 Volt Battery | 23.8 Volts | 2 |
| 3 | 30 Volt Panel Direct | 26 Volts | 1 |
|  |  | **Function** |  |
| 4 | Remote Switch Logic | NO / NC | 3 |
| 5 | Fuse - Auto Reset | Manual / Auto | 4 |
| 6 | Low Water Cut-Off | Off / On | 5 |

## NOTES:

1.  Set-point is solar module input constant voltage regulation held approximately at the solar modules maximum power point.  These voltages will work with most standard solar modules available in the marketplace today.

2.  Set-point is Low Voltage Cut-off.  The controller will turn off the pump if the battery voltage drops below set-point preventing excessive battery discharge conditions thereby helping to extend battery life.

3.  With switch number 4 in the OFF position, the controller is configured to accommodate a Normally Open (N.O.) float switch; float switch open = water tank low = pump water or float switch closed = water tank high = shut off pump.  With switch number 4 in the ON position, the controller is configured to accommodate a Normally Closed (N.C.) float switch; float switch closed = water tank low = pump water or float switch open = water tank high = shut off pump.

4.  With switch number 5 in the OFF position, the controller is configured for "Manual Reset" for the over-current electronic circuit breaker. If an over-current condition occurs, the controller will turn the pump off and an amber indicator light will flash. To reset the circuit breaker, turn the On/Off switch off and then back on. If power is removed from the controller it will also reset. Each morning the controller will automatically be reset on start-up. This is the standard setting for all SDS series pumps.

    With switch number 5 in the "On" position, the controller is configured to reset the electronic circuit breaker automatically every 2.5 to 3 minutes after an over-current condition occurs. While the pump is off, an amber indicator light will be flashing. . ***This setting is for special use pumps only. Do not use with SDS series pumps.***

5.  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 below")

## Output Voltage Adjustment /(Motor Speed Control)

The purpose of this procedure is to lower the output voltage of the controller thus reducing the water flow of the pump.  Typically this is only used for low producing wells where the pump output is matched to the production rate of the well.

If tests have shown the pump will out produce the well then the controller "Output Voltage Adjustment" 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 voltage at mid-day until the well runs dry and the pump starts surging.

2. Slowly turn the "Output Voltage" trimmer pot located on the face of the controller counter 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 pump flow rate an additional 5% to 10% to insure the pump will not run dry. However if the Low Water Cutoff circuit is enabled, (switch number 6 turned on), the pump will automatically turn off if the pump runs dry.

## LWC Sensitivity Adjustment

The purpose of this procedure is to adjust the Low Water Cut-Off circuit to turn the pump off as the pump breaks suction. (Pump runs dry). This feature is only used for low producing wells where the pump output exceeds the production rate of the well.

This adjustment procedure can be done with the pump outside the well in a bucket of water before installation or with the pump installed in the well. Either way will work but it is usually easier to use the bucket method.

### Adjustment for SDS Series Pumps

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

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

3. Turn number 6 dip switch on.

4. 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.

5. 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.

6. 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.

7. Once the pump turns off it will not turn on again for approximately 25 minutes, unless manually reset.

# 4.0    Troubleshooting

*PUMP DOES NOT RUN*

1.  Check wiring diagram for proper connections.  Confirm all electrical terminations are tight and secure.

2.  Check for proper voltage selector switch settings on your DC source input.  If the incoming voltage is less than the set point voltage, the controller will not turn on.

3.  On a 24 volt battery system, make sure the batteries are at a full state of charge and that the controller voltage selector number "2" switch is turned on.

4.  Check for proper controller input and output with a DC volt-meter.  A quick look at the LED indicator lights will verify power coming from the DC source supply going to the controller (red), power going from the controller to the pump (green). If any of the three amber lights are flashing the pump will be turned off. They are over-current shut down, low water cut-off or remote switch cut-off. If the red light is on and the green and amber lights are not, make sure the system on/off switch is on, disconnect the remote switch wires and turn switch 4 off.  If the green light is still not on, disconnect the pump wires, LD- and LD+.  If the green light does not turn on then check voltage on LD- and LD+ with a volt-meter to confirm no output voltage.  If there is still no output voltage the controller is faulty and must be sent back to the factory for repair.  If the green light turns on and the output voltage is now equal to the input voltage, there is a short circuit either in the wiring or the pump.

5.  For additional pump test, if the red light is on, connect a jumper wire across terminals PV- and LD-. This will bypass the controller and allow the pump to run directly from the DC source.  This step will confirm pump operation. **If the DC source is a solar array, the test must be conducted when full sunlight is available for a valid test.**

*RED AND GREEN LIGHTS ARE ON, AMBER LIGHTS ARE OFF AND THE PUMP DOES NOT RUN*

To verify power coming out of the controller, connect a DC voltmeter across LD+ and LD-.  If 12 Volts or more is coming out then:

1.  Check the splice above the pump for proper connections.

2.  Check for broken wire leading to the pump.

3.  Check for open motor winding.  With an ohmmeter set on the R x 1 scale, check between the two pump lead wires.  The meter reading should be between .5 to 50 ohms.  If the resistance is higher than this, disconnect the pump at the splice above the pump and check again.

*NO VOLTAGE AT THE LD+ AND LD- TERMINALS*

1.  Make sure the system ON/OFF switch is ON.

2.  Make sure none of the amber lights are flashing.

3.  Check to see if the float switch, if used, is functioning properly.

4.  Check the controller for proper programming and adjustment.  If the voltage setting on the controller is higher than the incoming voltage, the controller will not turn on. (See controller adjustment section)

**Note: To bypass all remote switching circuits, disconnect all wires from the sensor interface terminal block in the controller housing (the small terminal block) and switch program switches #4 to the OFF position.**

*EXCESSIVE CURRENT DRAW (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, bypass the controller and connect power directly to the motor leads. If the pump still does not run and the current is over 1.5 amps, the pump is in a loaded or locked rotor condition and must be repaired.

## 5.0    Technical Specifications

**Pump**
There are three models of SDS pumps. The specifications at full voltage (30V) are as follows:

|  | Maximum Flow | | Maximum Head | | Maximum Power |
| --- | --- | --- | --- | --- | --- |
| Model | GPM | lpm | Feet | meters | Motor Watts |
| SDS-D-128 | 2.0 | 7.5 | 115 | 35 | 95 |
| SDS-D-228 | 1.3 | 4.9 | 230 | 70 | 95 |
| SDS-Q-128 | 3.7 | 14 | 100 | 30 | 116 |

Voltage rating is 12 – 30V d.c. amperage rating is 1 – 4 A.

**Controller**

| Model | Max Output Voltage | Max Input Voltage | Max Current (Amps) |
| --- | --- | --- | --- |
| PCA-30-M1 | 30 | 45 | 8 |

Maximum ambient temperature is 120 F.

**Dimensions and Weights**

|  | Width | | Height | | Length | | Weight | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Inches | cm | Inches | cm | Inches | cm | Pounds | km |
| SDS-D-128 | 3.8 | 9.6 | 10.8 | 27.3 | | | 14.0 | 6.4 |
| SDS-D-228 | 3.8 | 9.6 | 10.8 | 27.3 | | | 14.0 | 6.4 |
| SDS-Q-128 | 4.5 | 11.5 | 12.3 | 31.1 | | | 16.5 | 7.5 |
| PCA-30-M1 | 5.0 | 12.7 | 3.1 | 7.9 | 6.0 | 15.2 | 3.4 | 1.6 |

Voltage rating is 12 – 30V D.C. amperage rating is .1 – 8 A.

Note: All SDS series pumps are round and the width refers to the outside diameter including the cable guard.

# Warranty Statement

## SDS Series Pumps and PCA Series Pump Controllers
### Limited Warranty – Twelve Months

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 performance 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 in not to be used for anything other than it's 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_____