

OPERATION AND INSTALLATION MANUAL

**SCS SERIES
SOLAR ELECTRIC PUMP
&
PCB-BLS version 2.11**

PUMP CONTROLLERS

MANUFACTURED & SERVICED BY:

***SUNPUMPS*
325 EAST MAIN STREET
SAFFORD, ARIZONA 85546
UNITED STATES OF AMERICA**

**PHONE # (928) 348-9652
FAX # (928) 348-9653**

**DC# SCS-PCB-BLS-M1
REV 2009**

Table of Contents

Introduction	1.0
Precautions	
Product Overview	2.0
Controller Features	2.1
Application	2.2
Installation and Operations	3.0
Location	3.1
System Design Basics	3.2
Well Measurements	3.3
Pump Installation	3.4
Figure 1: System Installation Layout	
Figure 2: Top of Pole Mount Rack Diagram	
Wiring	3.5
Figure 3: Solar Panel Wiring Diagrams (Generic)	
Figure 4: Controller Wiring Diagram	
Auxiliary Control Features	3.6
Remote Switch	
Output Power Control Circuit	
Low Water Shut-Down Circuit	
Over-Current Shut-Down Circuit	
Low Voltage Shut-Down Circuit	
Adjustment Procedures	3.7
Output Power /Flow Rate Adjustment	
Troubleshooting	4.0
Pump does not run	
Pump runs but output is low	
Pump draws excessive current	
Technical Specifications	5.0
Pump	
Controller	
Dimensions and weights	
Warranty Statement	6.0

1.0 Introduction

Thank you for selecting a SunPumps SCS series solar pump system. The SCS series pump and Sensorless Brushless DC - PCB series pump controller are the key components to high quality solar powered pumping systems. 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 SCS series pumps are multi-stage centrifugal, DC powered, submersibles constructed of high quality marine bronze and stainless steel. These pumps were designed specifically for water delivery in remote locations.

The PCB-BLS series controllers are micro-processor-based, solid-state DC power converters designed as the interface between a solar module array and a DC pump motor. The purpose of the controller is to 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 SCS 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 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 PC-series controller or product damage and/or personal injury may result.**
- **Do not exceed the voltage and 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.**
- **Installation of this system, should be done by a licensed Pump Contractor.**

2.0 Product Overview

SunPumps PCB-BLS-M1 series controllers were primarily designed for the SCS-series, Sensorless Brushless 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.

2.1 Controller Features

1. Current boosting for matching the load requirements of the pump.
2. Voltage regulation of the solar electric array at its maximum power point. (MPPT)
3. Over-current protection via integrated electronic circuit breaker.
4. Reverse polarity protection (10 amperes maximum) on the input terminals.
5. Voltage and current limiting to pump motor.
6. Transient protection and surge suppression.

7. Adjustable output motor power control for precision output flow.
8. Digital display indicating power, voltage, current.
9. System ON/OFF switch.
10. LED indicators; 1. Red = power in, Green = power out, 2. Red = :Low Power, 3. Green = MPPT, 4 Amber = Remote switch shutdown.
11. Weather resistant cast aluminum enclosure with hinged door.
12. Rising clamp screw terminal blocks – no fork terminals required.
13. User selectable pre-adjusted pump configuration and power source selection.
14. Remote switch interface – float switch or remote shutdown –Normally Open or Normally Closed, user selectable.
15. Sensor-less Low Water Cut-Off circuit
16. Low Voltage Turn-Off circuit

2.2 Application

The only application the PCB series controllers are designed for is the interface between a solar module array and a DC motor as well as various peripheral pump system signal devices.

No other applications or DC power sources are recommended or warranted 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 SCS series pump and PCB series controller. The procedure for installing the SCS 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. This pump should be installed by a licensed professional pump installer.

Before installing any 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.

Warning

Reverse polarity on a panel system capable of producing over 10 amps will result in non-warranted product damage. Please check polarity before connecting power to the controller.

This controller is for SunPumps Sensorless Brushless DC Motors only. Do not use on Brush-Type motors or Sensor Type Brushless DC Motors or damage to the controller will result.

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 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 PC-series controller 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 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 aesthetically and electrically.

3.2 System Design Basics (Read carefully before installation)

1. The pump discharge piping should be sized for efficient pump operation. We suggest using the Friction Loss Tables to calculate the Total Dynamic Head using different pipe sizes. As a rule of thumb use 1" for up to 8 GPM, 1 ¼" for up to 25 GPM, 1 ½" for up to 40 GPM and 2" for up to 70 GPM.
2. 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%.
3. 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 SunPumps splice kit S-704 is recommended for this watertight connection.
4. Never rest the pump on the bottom of the well (bore hole). This can cause the pump to fill with mud and damage the impellers. Suspend the pump five feet (1.5 meters) or more 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.
5. 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 shaft bearing sleeves.
6. On deep wells, a check valve should be installed every 200' of vertical lift.
7. Never install the controller in direct sunlight. Direct sunlight on the controller may cause overheating of the controller.
8. 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.
9. 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. Always use a DC lightning arrestor on the panel side of the controller. (LA302-DC is recommended)
10. Do not ground the positive or negative electrical wires.

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).

Figure 1

System Installation Layout

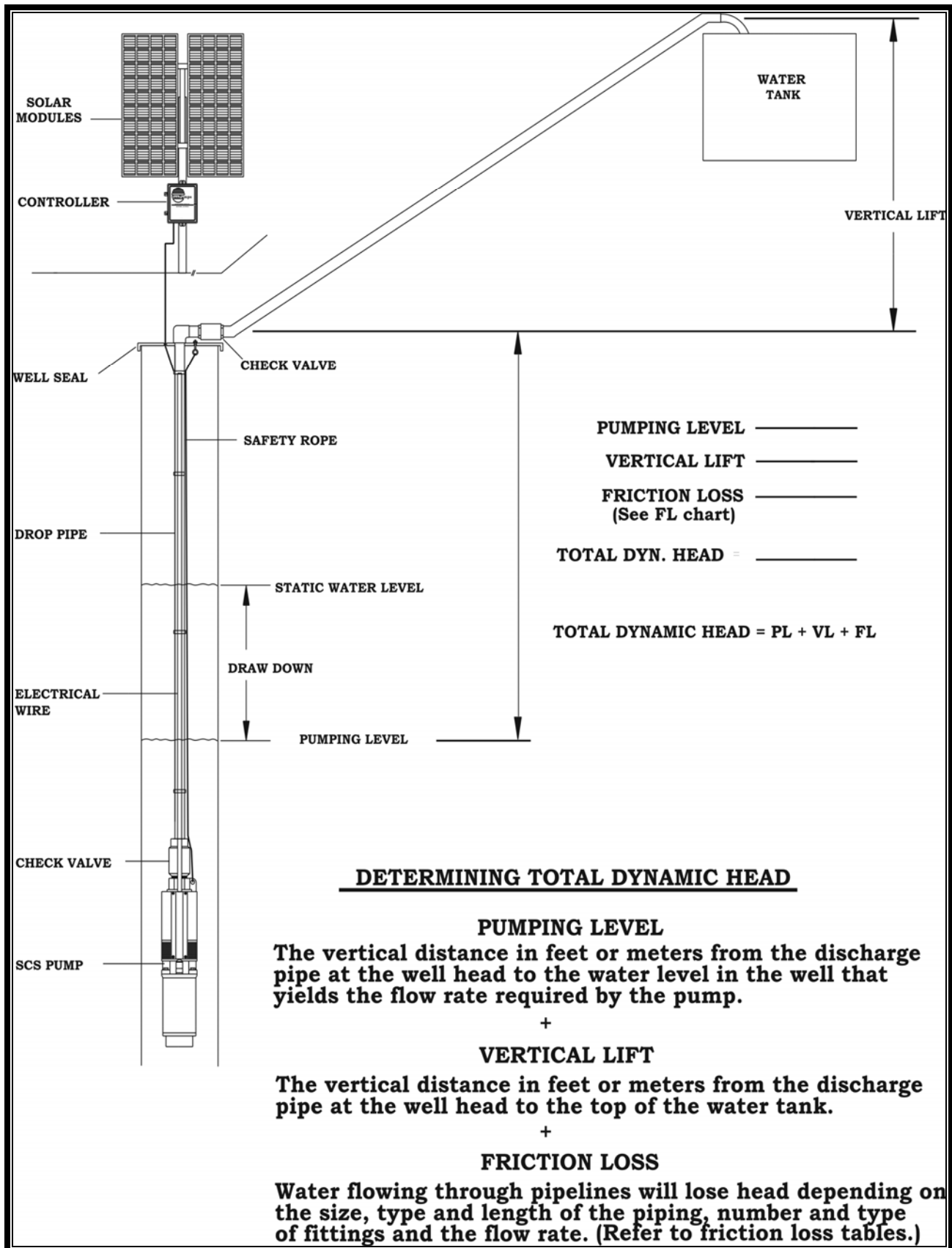
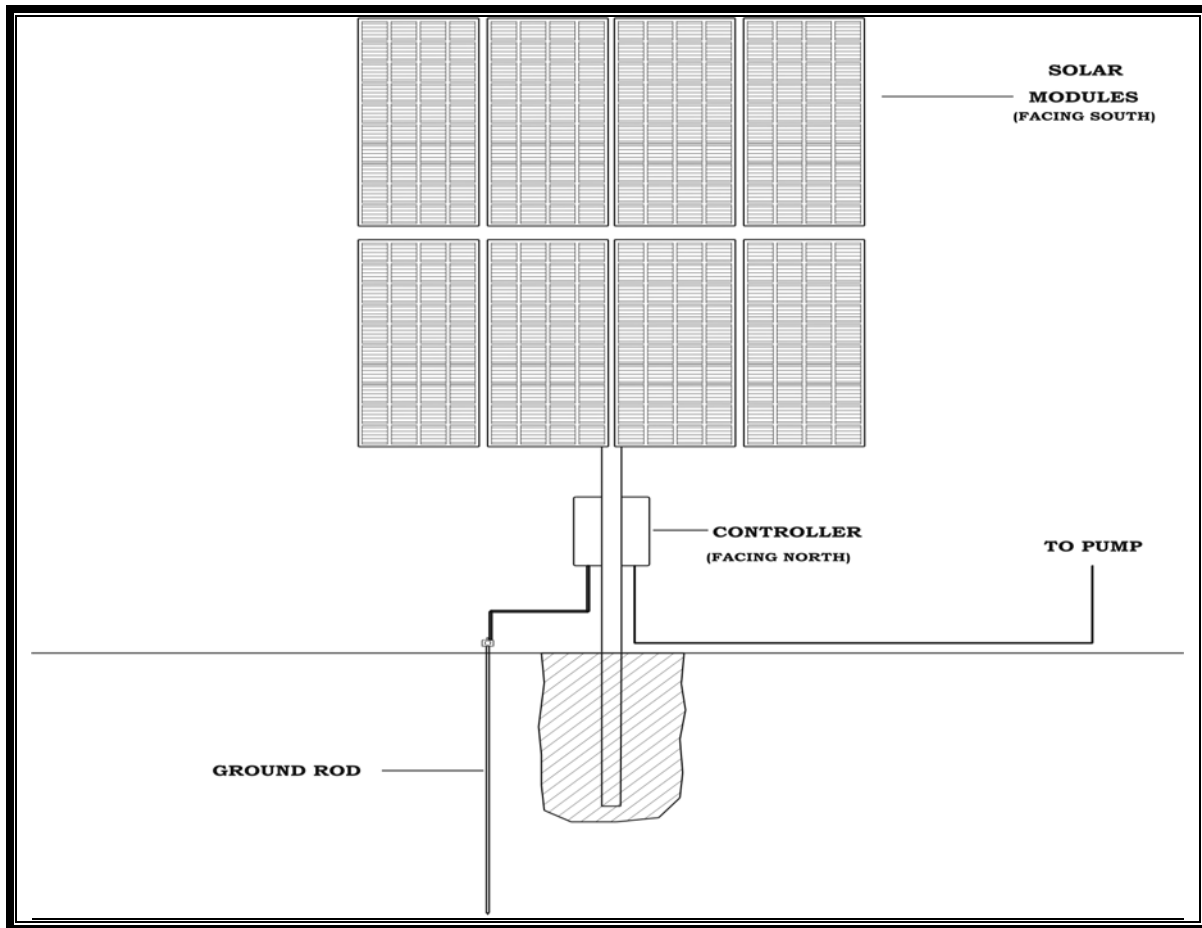


Figure 2

Top of Pole Mount Rack Diagram



3.4 Pump Installation

1. The well should be clean and disinfected before the pump is installed. You should always clean 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.
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 vertically mount the control box. The north side of the Solar Panel Tracker mounting pole is usually a convenient place.
5. If using unthreaded discharge pipe install a stainless steel or brass adapter fitting into the pump discharge head. Consult your pump supplier for other available adapter materials. **Do not use galvanized connections on 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.
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 or identify the leads to insure correct connections at the controller.

7. You can now lower the pump into the well. Set the pump at least 10' off the bottom. **Never rest the pump on the bottom of the well. Never lower the pump by the wires.**
8. Tie the drop pipe, drop cable and safety rope together every ten feet with plastic wire ties or high quality electrical 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 to the I-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. 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. 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. 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.

CAUTION : Photovoltaic panels produce DC electricity when exposed to sunlight. Cover the panels with a blanket or with an opaque material before wiring. Install a fused disconnect switch between the solar modules and the controller.

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 (-), black conductor to controller terminal labeled "LD-".
6. Connect pump motor positive (+), red conductor to controller terminal labeled "LD+".
7. Connect the DC source supply negative (-), black conductor to the controller terminal labeled "PV-". (NOTE: The power should be connected to the fused disconnect first and then to the controller).
8. Connect the DC source supply positive (+), red conductor to the controller terminal labeled "PV+". (NOTE: The power should be connected to the fused disconnect first and then to the controller).
9. Refer to the next section for "Remote Control" connections and "Adjustment Procedures" for configuration (if applicable).
10. 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 open circuit voltage and the module polarity before connecting power to the controller.
11. Switch the disconnect on - 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 4.0.

Figure 3

**Sample Solar Panel Wiring Diagram
(Generic For 17 Volt Panels)**

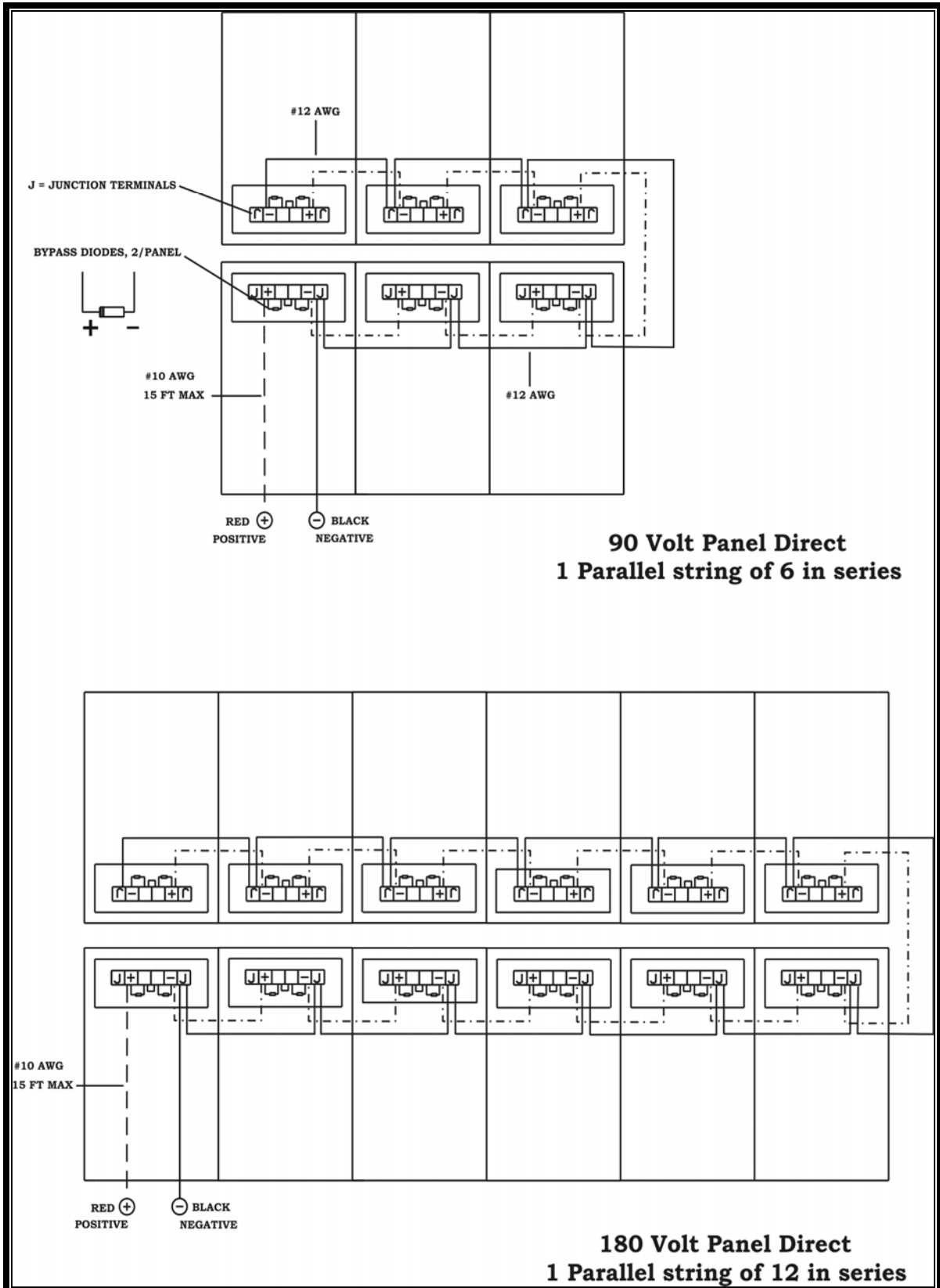
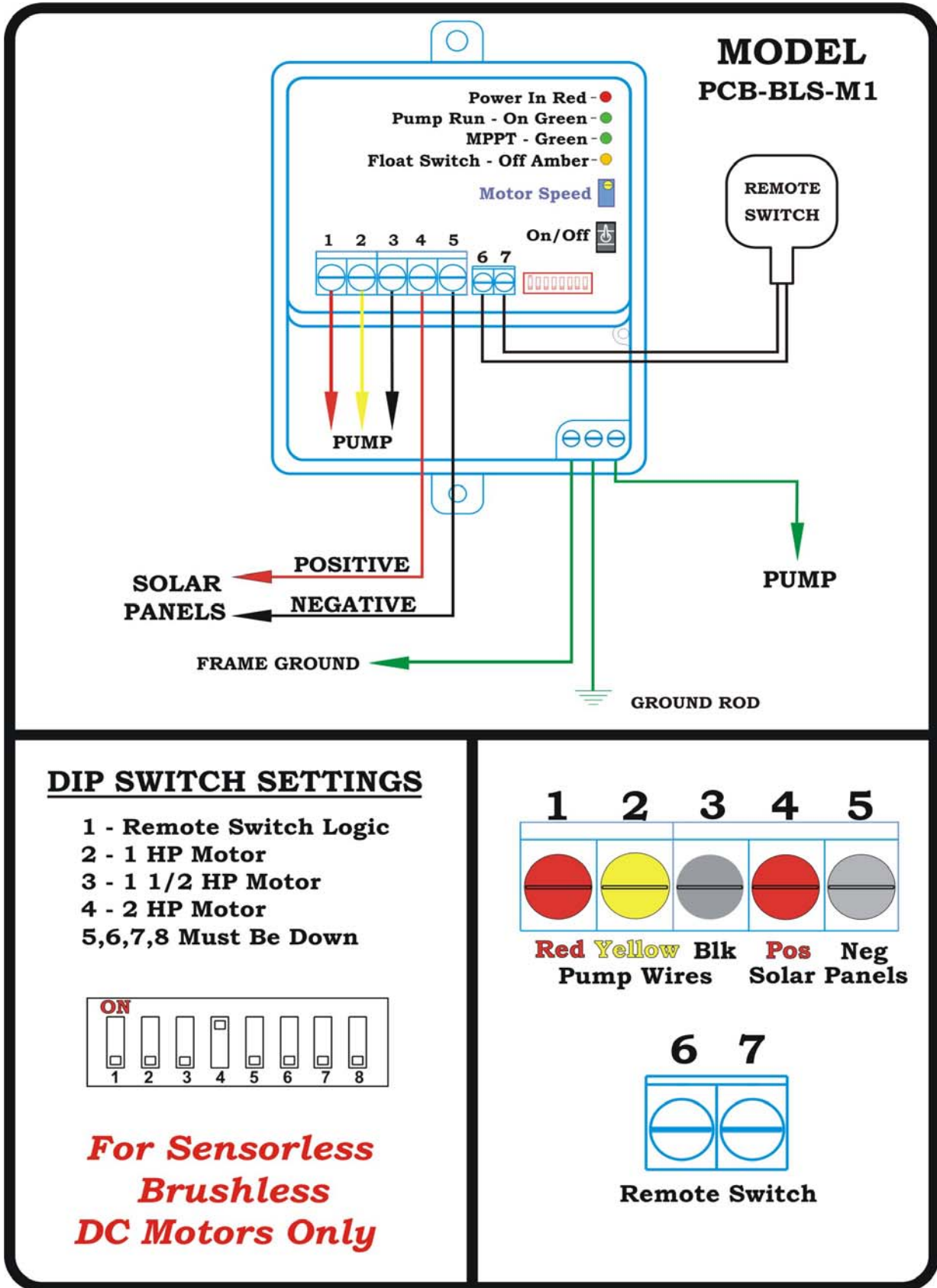


Figure 4

Controller Wiring Diagram



3.6 Auxiliary Control Circuits

The PCB series 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 and the shield 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 1 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:

PUMP ON

float switch open = water tank low = pump ON

PUMP OFF

float switch closed = water tank high = pump OFF

With switch number 1 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

Output Power Limit Circuit (Motor Speed Control)

The **Output Power 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.

Low Water Cut-Off Circuit

The **Low Water Cut-Off Circuit** is the same as the Low Power Shut-Down circuit. It monitors the power draw of the motor and turns the pump off when the power drops below the set point. 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 the “Error Light” will flash, the display will read “Low Power” and the pump will turn off. The pump will stay off for approximately 3 minutes and then turn back on. This cycle will repeat any time the water drops below the pump intake or the array power is low.

Over-Current Shut Down Circuit

The over-current shut down circuit will turn the controller off any time the current exceeds the current limit of the controller. When it turns the controller off it will remain off for 3 minutes and then turn on again. When it turns off the error light will flash red and the display will say Over-Current. When it turns on again, if it is still pulling excessive current it will continue to shut down for 3 minutes and try to restart.

Low-Power Shut-Down

The Low-Power shut-down circuit turns the pump off any time the power drops below a functional level. This protects the pump in stall conditions and saves wear on the system when no water or very little water is being pumped.

When this circuit is activated the same error light will flash red indicating the controller has turned the pump off and the display will read “Low Power”. The pump will remain off for 3 minutes and then restart. If the power is still low it will continue to cycle every 3 minutes until the array power exceeds the low power set point.

3.7 Adjustment Procedures

The PCB series controllers have several adjustment features. One feature includes system configuration adjustments, which are user selectable by an eight position DIP-switch located on the face of the controller. Switch number one is the Remote Switch Logic. With this switch off (down), terminals 6 & 7 must be connected to turn the controller off. With this switch on (up), terminals 6 & 7 must be connected to turn the controller on.

Also included are three pre-adjusted setting for various pump systems. Only one of the three switches should be on at any time. Each switch sets the parameters for a specific motor. They are as follows:

Switch 2 is for a 1 HP pump system with a nominal system voltage ranging from 100 to 170 volts. Switch 3 is for a 1 ½ HP system with voltage ranging from 150 – 210 volts. Switch 3 is for a 2 HP system with a nominal system voltage ranging from 150 to 210 volts.

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 motor parameter settings. Switches 2 to 4 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 at one time. Please refer to the charts below for the switch position identification and setting options. The last 4 switches are not used at this time and should remain down.

<u>Switch Number</u>	<u>Series Panels</u>	<u>Description</u>	<u>Voltage Range</u>	<u>Notes</u>	
2	6-10	1 HP Pump System	100-170	1	
3	10-14	1 1/2 HP Pump System	150-210	1	
4	10-14	2 HP Pump System	150-210	1	
			<u>Function</u>		
1		Remote Switch Logic	NO / NC	2	
5-8		Not used at this time.			

Note: The number of Series Modules is based on nominal Vmp of 17 volts. If the module used has a different Vmp then refer to the voltage range and adjust the number connected in series to fit.

NOTES:

1. This switch sets the proper operating parameters for the specific motor used. It also sets up the logic controlled by the MPPT to hold the array voltage at it’s maximum power point.
2. With switch number 1 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 1 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.

Output Power Adjustment

The purpose of this procedure is to adjust the output power of the controller and thus reduce 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 not produce the well then the controller “Output Power 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 Power” trim 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. (NOTE: The trimmer is a 15- turn adjustment pot. It usually takes many complete turns in a counter-clockwise direction before you will notice any change in water output or output power on the display).

4.0 Troubleshooting

PUMP DOES NOT RUN

1. Make sure the On/Off switch is in the up position. (On)
2. Check the LED's on the face of the controller. The top LED should be red. This indicates power is connected to the controller and the polarity is correct. The second LED should be green. This indicates the pump is running. If it is red the pump is turned off. The third LED should be green. This indicates the controller is operating and controlling the solar array at the maximum power point. If the LED is amber, this indicates a fault condition. Check the LC display for the type of fault. The fourth LED should be off. If it is blinking amber then the float or remote switch has turned the controller off.
3. Check for proper dip switch selector switch settings on your controller. The proper dip switch for the specific motor and array installed should be turned on. If the incoming voltage is different than the parameter setting, the controller will not turn on or operate properly.
4. Check for proper controller input voltage. A quick look at the LC display will verify the array voltage. If the pump is not running the display should be reading the array open circuit voltage, (Voc). Check the Voc on the label on the back of the solar modules and multiply this figure times the number of modules that are connected in series. This number should be + - 10% of the display reading. If it is not then confirm all electrical terminations are tight and secure. Use a DC volt meter to check each solar module for proper open circuit voltage (Voc). One bad module will drop the voltage on the complete series string.

PUMP IS RUNNING BUT THE OUTPUT IS LOW

1. Make sure you have full sun light at mid day, there are no clouds and no shadows on any part of the array. Then verify power coming out of the controller. Look at the LC display and read the voltage, current and power. Check this against the pump chart for your specific application.
2. If the power is correct for you pump model and array size then make sure the pump wires are connected to the proper terminals. If two wires are reversed the motor will be running in reverse. It will still pump but not at the full rated output.

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, remove the pump end from the motor, bypass the controller and connect power directly to the motor leads. If the motor still does not run or runs while pulling more than 3 amps, the motor must be repaired. Contact the SunPumps Factory.

5.0 Technical Specifications

Pump

There are over thirty models of the 1 to 2 HP SCS pumps available. The specifications for the most popular, at full voltage, are as follows:

<u>Model</u>	<u>Nominal Flow</u>		<u>@</u>	<u>Nominal Head</u>		<u>@</u>	<u>Nominal</u>	<u>Maximum Power</u>
	<u>GPM</u>	<u>LPM</u>		<u>Feet</u>	<u>Meters</u>		<u>Motor Voltage</u>	<u>Motor Watts</u>
1 HP Submersibles								
SCS 3-425	3.0	11		425	130		105	925
SCS 4-325	4.0	15		325	99		120	1050
SCS 5-250	5.0	19		250	76		120	1000
SCS 10-230	10	38		230	70		105	1000
SCS 11-210	11	42		210	64		120	1100
SCS 14-160	14	53		160	49		105	970
SCS 18-160	18	68		160	49		105	1160
SCS 30-115	30	114		115	35		120	1200

2 HP Submersibles

SCS 4-550	4.0	15		550	168		180	1450
SCS 4-650	4.0	15		650	198		180	1700
SCS 8-400	8.0	30		400	122		180	1800
SCS 10-400	10	38		400	122		180	1800
SCS 16-300	16	61		300	91		180	2100
SCS 20-200	20	76		200	61		180	1750
SCS 32-160	32	121		160	49		180	1760
SCS 50-100	30	189		100	30		180	1750

Controller

<u>Model</u>	<u>Max Output Voltage</u>	<u>Max Input Voltage</u>	<u>Max Current (Amps)</u>	<u>Max Surge Current</u>
PCB-BLS-M1	200	280	12	16

Maximum ambient temperature is 110 F.

Controller Dimensions and Weight

<u>Model</u>	<u>Width</u>		<u>Height</u>		<u>Length</u>		<u>Weight</u>	
	<u>Inches</u>	<u>cm</u>	<u>Inches</u>	<u>cm</u>	<u>Inches</u>	<u>cm</u>	<u>Pounds</u>	<u>kg</u>
PCB-XXX-M1	6.5	16.4	3.9	9.9	8.3	21	7.2	3.24

Warranty Statement

*SCS Series Submersible Pumps
PCB 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 PCB 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 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_____