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Sun Pumps Inc.
325 E Main Street
Safford, AZ 85546
(928) 348-9652



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1.0 Introduction to HR AC/DC Submersible Pumps

HR AC/DC is a range of 4" submersible pumps for clean water composed of:

- Three phase permanent magnet motor.
- Built-in inverter.
- Helical rotor pump.

Pump inverter allows:

- Modification of the pump speed. In this way the pump is operated only when needed, thus avoiding unnecessary waste of energy and granting longer system life.
- Soft start and stop, which increases the system longevity.
- Motor protection from overloading, dry running, overvoltage, under-voltage, and possible abnormal conditions.

HR AC/DC can be used in residential or commercial pressurized systems providing:

- Energy savings.
- Quick and simple installations.
- Long life reliability.

HR AC/DC Pumps have a wide margin of operating voltages (90-265 VAC or 90-400 VDC). This means that the same pump can be powered by photovoltaic panels, by generators, or by AC grid power batteries with inverters. The motor will adjust automatically according to the power that is available.

In panel-direct systems, an MPPT (Maximum Power Point Tracking) algorithm is used to adjust for various conditions of sunlight and temperature. This allows the maximum amount of water to be pumped with your system.

Pump speed is adjusted in relation to solar irradiation. When solar irradiation increases, the pump will run faster, thus pumping more water. When solar irradiation decreases (clouds or twilight), the pump will reduce its speed and will continue to pump until solar irradiation drops below safe pumping conditions.

HR AC/DC pumps can be installed with or without a controller. There are two controllers to choose from, the STOP Module and the CM MP Control Module.

The HR STOP Module makes it possible to start and stop the pump by push-button or to control the operation of the pump with a float switch or pressure switch. It also protects the pump from voltage spikes.

When installed, the Control Module (CM MP) monitors and records:

- Total run time.
- Input voltage, current and power.
- Alarms: dry running, overload, overvoltage.
- Four digital inputs make it possible to connect a float switch, a pressure switch, start and stop signal, etc...
- Running and alarm status are given by two digital outputs.

Controller Features:

- Analog inputs are used to connect sensors (i.e. flow meter).
- The pump output flow rate can be adjusted to meet the well production.

2.0 Safety Instructions

Sun Pumps strongly suggests reading the operation manual carefully before using and installing its products. Any operation (installation, maintenance and repair) must be carried out by trained, skilled, and qualified personnel. Failure to observe and follow the instructions in this manual may result fatal in dangerous electric shock.

	<p>Use an appropriately rated disconnect between your power supply and the pumping equipment.</p>
	<p>Disconnect the unit from the power supply before performing any maintenance.</p>
	<p>The pump and the pumping system must be grounded properly before operation.</p>
	<p>Do not start the pump for any reason if not completely immersed in water.</p>

Avoid any shock or serious impact during transportation.

Damage due to transportation, incorrect installation, or improper use of the device will void the warranty. **Sun Pumps cannot be held responsible for any damage to people and/or property due to use of its products.**

3.0 Storage Conditions

Store the product in its packaging in a dry and well-ventilated environment within a temperature range from -4° F to 123° F.

If the pump remains in storage for more than a year, it is recommended that you disassemble the rotating parts and test their functionality and connect the motor to power (without running the motor) to allow charging of the electrolytic capacitors in the inverter module.

If the pump has already been put into operation and is then placed in storage, the minimum storage temperature is 40° F.

4.0 Packing Content

Packing includes:

- HR AC/DC submersible pump with 8 feet flat cable length.
- Operating Manual.



Check the packing immediately upon delivery and check for damage and/or missing parts; in either case, immediately notify the supplier



When powering the pump and Control Module with a genset, it is recommended to use only generators with electronic voltage regulators. Connect (or disconnect) the pump and the Control Module to generator only when the generator has reached stable operating and voltage output.



Do not lower the pump into the well using the electric cable.

5.0 General Technical Features

HR AC/DC PUMP	
Power supply	90-400 VDC; 90-265 VAC
Max. temperature of pumped liquid	92° F
Min. speed of water flow on motor case	.65 f/s
Characteristics of pumped liquid	Clean, non-corrosive, non-explosive, free of particles and fibers, with a maximum sand content of 50 g/m ³
Grade of protection	IP68
Used materials	Pump and motor body 304 stainless steel AISI
Cable	Flat cable ACS – KTM - WRS approved
CM MP CONTROL MODULE	
Power supply	90-400 VDC; 90-265 VAC
Max. ambient temperature	140° F
Grade of protection	IP55 (NEMA 4)
Used materials	Aluminum, LCD membrane with PVC stickers, antipull plug in polyamide
Analog input	2 x analog input 4-20 mA + 2 settable analog input 4-20 mA or 0-10 V.
Digital input	4 inputs, N.O or N.C settable via software
Digital output	2 output relays 5A, 250 VAC, N.O or N.C settable
Auxiliary feeding	15 VDC (300 mA), 10 VDC (5 mA)
User display	Backlit LCD display with 16 characters x 2 rows, 5 buttons, buzzer for acoustic
Dimensions	7 x 7 x 4.72 In.
Short circuit protection	With fuse
CERTIFICATIONS	
CE	

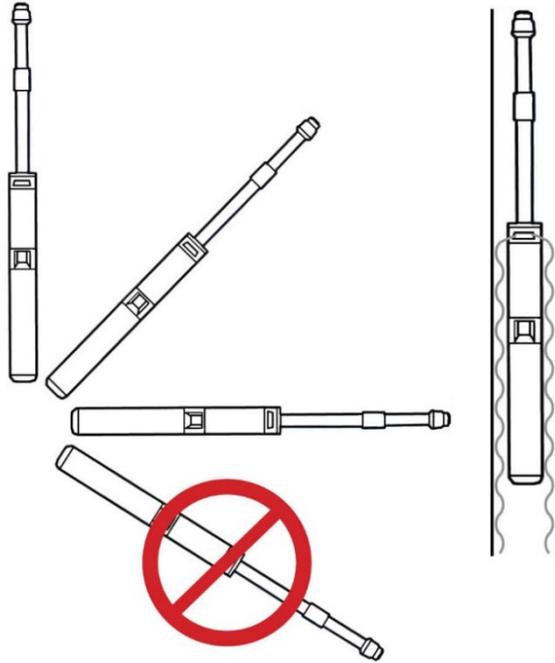
6.0 Pump Installation



Entire installation procedure must be performed verifying that pump is not connected to the power supply.

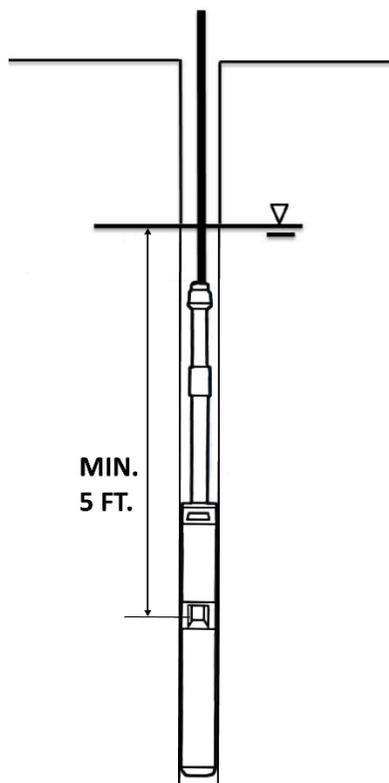
Pump can be installed both vertically and horizontally, but the outlet should never be below the horizontal line.

If the pump is not installed in a well, to provide proper cooling, a cooling sleeve must be used.



6.1 Installing Pump in the Well

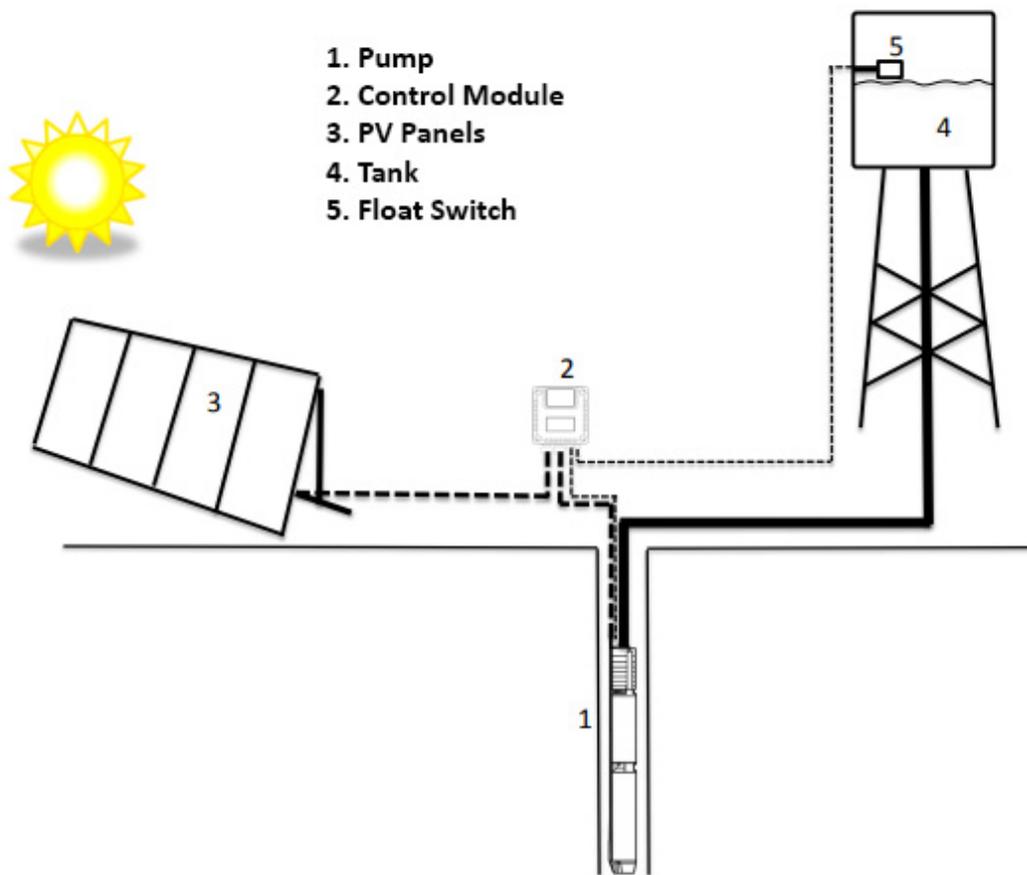
The pump must always be secured in the well with a safety rope attached to it. Do not lower the pump into the well using the electric cable. Attach the electric cable to the drop pipe about every ten feet.



6.2 Installing Pump in a Solar Pumping System

HR AC/DC pumps can be installed with or without a pump controller, so overload protection, overvoltage, and dry running protection are all integrated into the motor itself. However, there are two controllers to choose from if you need additional features, the STOP Module and the CM MP Control Module.

The HR STOP Module makes it possible to start and stop the pump by push-button or to control the operation of the pump with a float switch or pressure switch. It also protects the pump from voltage spikes.

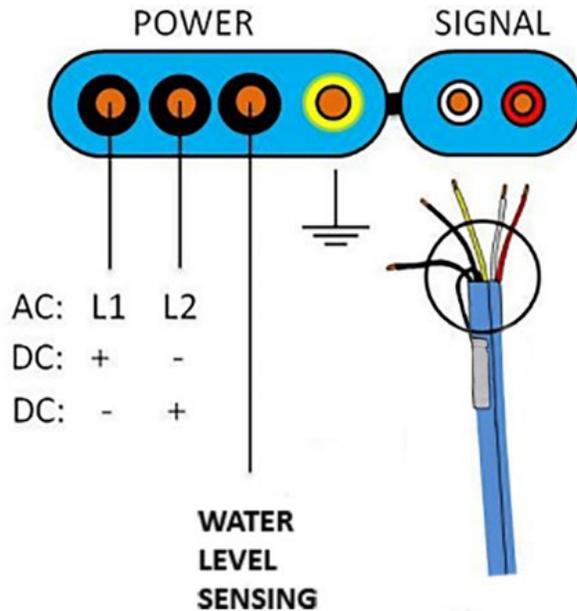


If the CM MP is used, it is possible to:

- Control the current, power, and voltage.
- Record and store all the alarms related to the pumping hours.
- Connect a pressure or a flow sensor to control the pump.
- Connect a pressure or a float switch.
- Provide an alarm digital output for remote control.

6.3 Pump Cable

HR AC/DC pumps are equipped, in their standard configuration, with 8 feet flat cable length.



← CAUTION:
Do NOT connect AC or DC power to the red and white signal wires or it will damage the pump and it will not be covered by warranty.

	<p>HR AC/DC pump communicates with CM MP (surface control module) (if installed) by signal wires. If CM MP is not installed, it is recommended to short-circuit and insulate signal wires with a splice kit, or to extend the wires to the surface to be closed by an external switch.</p>
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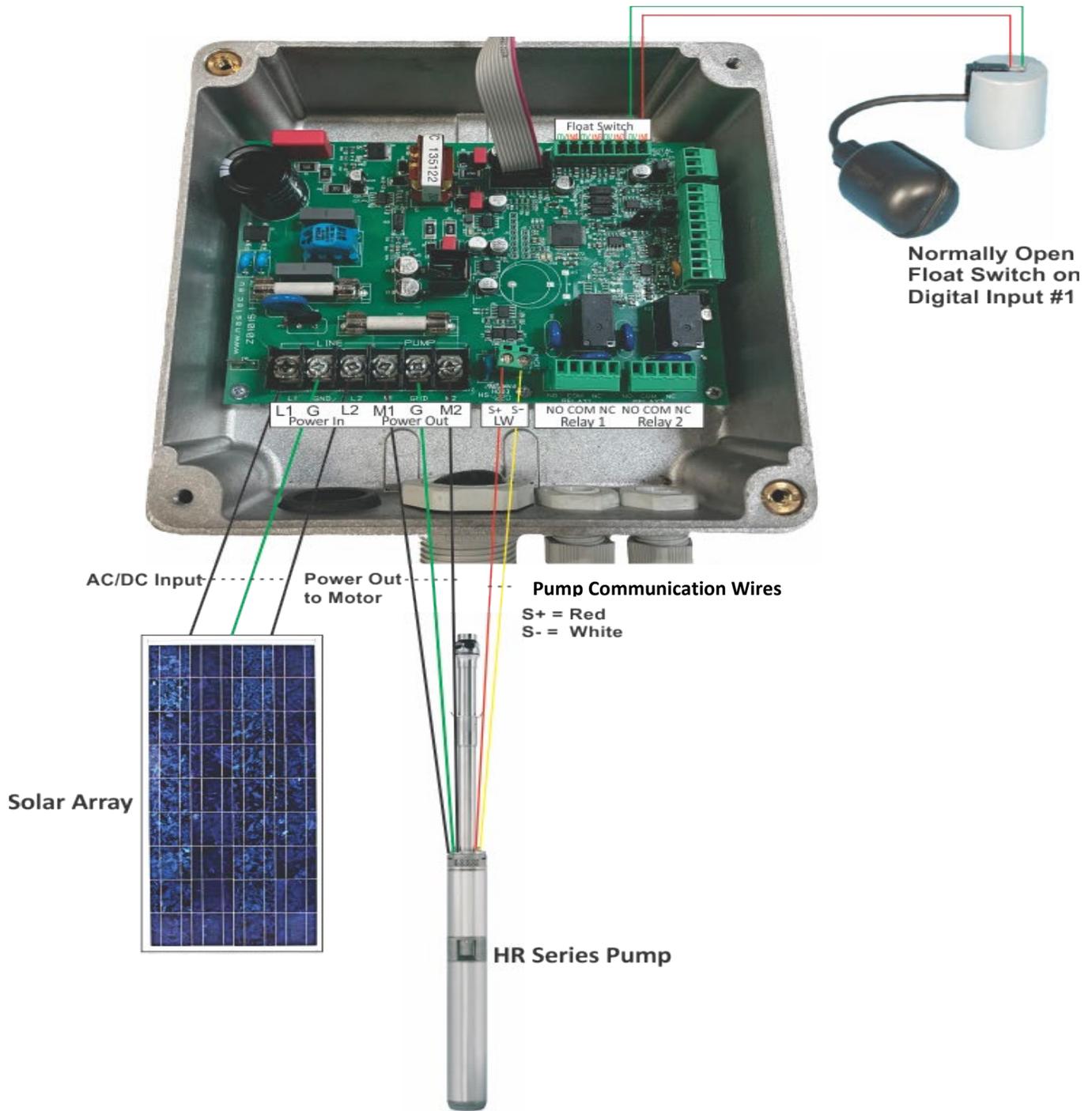
7.0 PV Panels Number and Wiring

The power rating of the selected pump (P1) defines the total power of the PV system to be adopted. The photovoltaic panels are characterized by:

- Rated power (P_{max})
- Rated voltage (V_{mpp})
- Rated current (I_{mpp})
- Open circuit voltage (V_{oc})

The panels are connected in series until the total open circuit voltage ($V_{oc} \times n$. Panels) do not exceed the voltage limit of the pump (400 VDC). If additional panels are connected, they will need to be wired in parallel.

7.1 CM MP & Pump Wiring Diagram



8.0 Troubleshooting

If after the installation and power is connected, the pump doesn't provide any water, please verify:

- Correct wiring.
- Voltage supply (90-265 VAC; 90-400 VDC). If the voltage is too high the pump will stop immediately and will attempt to restart in 10 seconds.
- Enough power is available (solar irradiance): if the solar power is too low to start the pump, the pump will stay in standby and try to start again in 4 minutes.
- Water level: if pump runs dry during operation, an alarm occurs and the pump will stop. Every 5 minutes, pump will attempt to restart.
- Water temperature and motor cooling conditions: if the temperature is too high (or motor cooling too low) the pump will stop automatically. It will attempt to restart after 7 minutes.
- Motor overloading: if the motor is overloaded the pump will ramp down and stop automatically. It will attempt to restart after 30 seconds, up to a maximum of 5 retries in 10 minutes. After 5 failed attempts, the pump will wait 10 minutes before attempting to restart.
- Electronics overloading (firmware trip): If the integrated electronics are overloaded, the pump will stop immediately. It will attempt to restart after 30 seconds, up to a maximum of 5 retries in 15 minutes. After 5 failed attempts, the pump will wait 15 minutes before attempting to restart.
- Electronic overloading (hardware trip): If the integrated electronics are overloaded, the pump will stop immediately. It will attempt to restart after 30 seconds, up to a maximum of 3 retries in 60 minutes. After 3 failed attempts, the pump will wait 60 minutes before attempting to restart.
- Loss of motor control: If there is a loss of motor control, the pump will stop immediately and will attempt to restart in 3 minutes.
- Locked rotor: if the rotor is locked or high current load, the pump will ramp down and stop automatically. It will attempt to restart in 6 minutes.