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Serviced by:**

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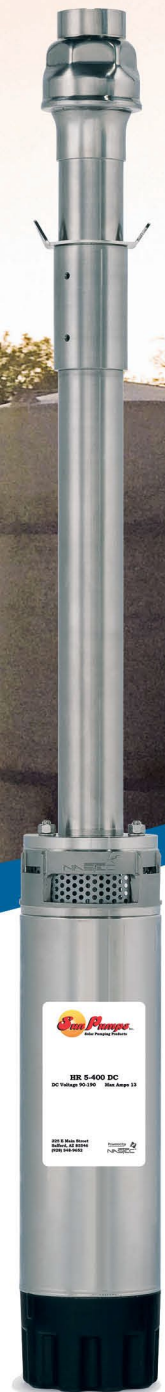


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1.0 Introduction to HR DC Submersible Pumps

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

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

Built-in inverter allows:

- Soft start and stop, which increases the system longevity.
- Motor protection from overloading, dry running, overvoltage, under-voltage, and possible abnormal conditions.

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

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

HR DC Pumps have a wide margin of operating voltages (70-190 VDC). This means that the same pump can be powered by photovoltaic panels, generators, or batteries. 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 DC pumps can be installed with or without a controller.

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.

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 in 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 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

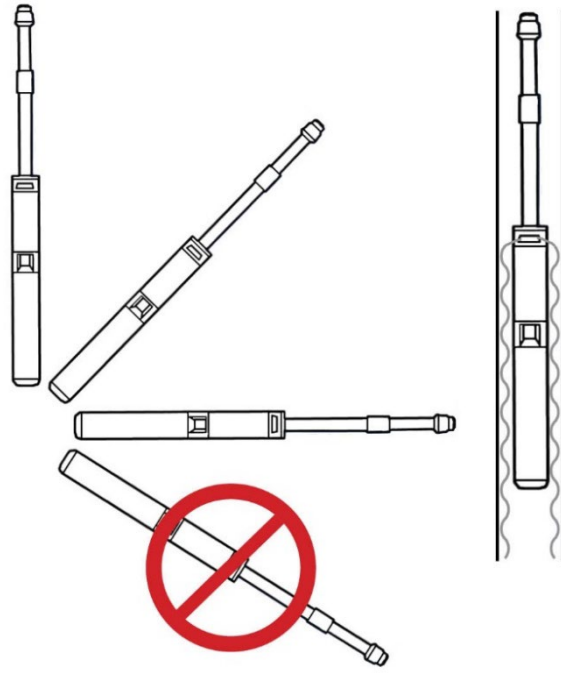
5.0 General Technical Features

HR DC PUMP	
Input voltage	70-190 VDC
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 - WRAS approved
CERTIFICATIONS	
CE	

6.0 Pump Installation

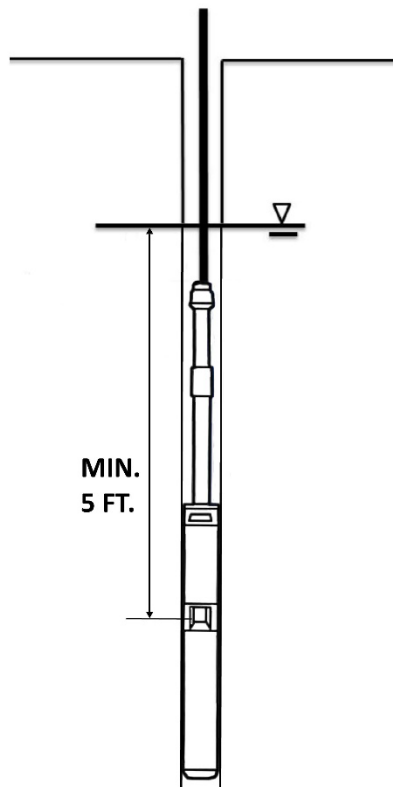
Pump can be installed both vertically and horizontally, but the outlet should never be below the horizontal line.

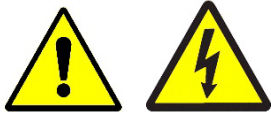
If the pump is not installed in a well, to provide proper cooling, a cooling sleeve must be used.



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.

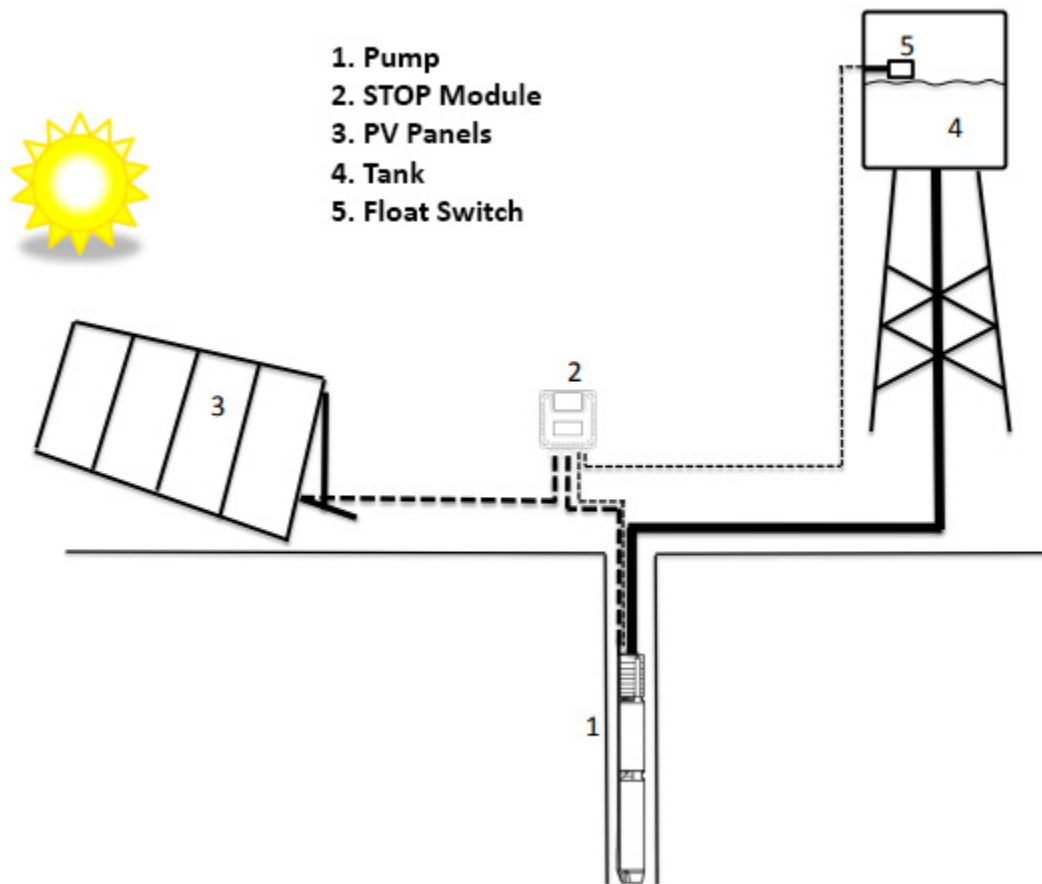




Do not lower the pump into the well using the electric cable.

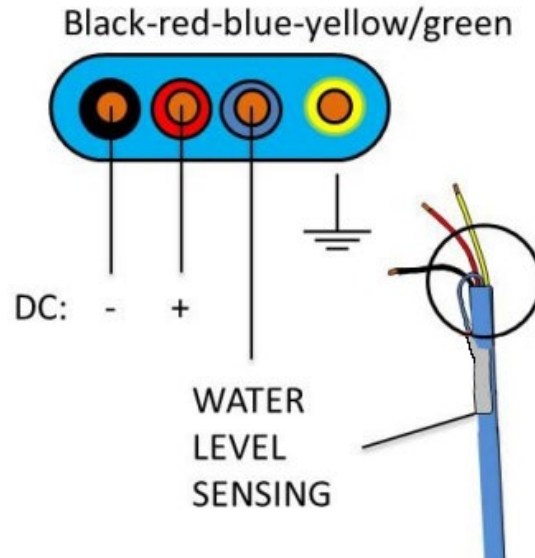
6.2 Installing Pump in a Solar Pumping System

- HR 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. If the STOP module is used, it is possible to connect a pressure or a float switch.



6.3 Pump Cable

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



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 (190 VDC). If additional panels are connected, they will need to be wired in parallel.

8.0 Troubleshooting

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

- Correct wiring.
- Voltage supply (70 – 190 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.