

PS200 HR/C

Solar-operated Submersible Pump System, 4" Helical Rotor (HR) or Centrifugal (C) Pump Unit

Characteristics

- lift up to 50m
- flow rate up to 5.0m³/h
- simple installation
- maintenance-free
- high reliability and life expectancy
- cost-efficient pumping

Applications

- drinking water supply
- livestock watering
- pond management
- irrigation
- etc.

Components

Controller PS200

- controlling of the pump system and monitoring of the operating states
- mounted at surface (no electronic parts submerged)
- two control inputs for well probe (dry running protection), float or pressure switches, remote control etc.
- automatic reset 20 minutes after well probe turns pump off
- protected against reverse polarity, overload and high temperature
- speed control, max. pump speed adjustable to reduce flow rate to c. 30%
- solar operation: integrated MPPT (Maximum Power Point Tracking)
- battery operation: low voltage disconnect and restart after battery has recovered
- max. efficiency 92% (motor + controller)
- enclosure: IP 54 (sealed, weatherproof)

Motor ECDRIVE 200HR/C

- brushless DC motor
- no electronics inside motor
- water filled
- IP68, pressure balanced, unlimited submersion
- dynamic slide bearings, material: carbon/ceramic
- wetted material: stainless steel (AISI 316), POM, rubber, cable drinking water approved

Pump End (PE)

- high life expectancy
- none-return valve
- dry running protection (optional)
- material: stainless steel (AISI 316), rubber

HR Pumps Only

- helical rotor pump (positive displacement pump)
- two main parts only: stator and rotor, field serviceable
- stator: geometry made of abrasion resistant rubber
- rotor: stainless steel, hard chrome plated, abrasion resistant
- more resistant to damage by sand than other pump types
- self-cleaning

Performance

| PS200 | HR-04 | HR-07 | HR-14 | C-5.4 |
|------------------------------------|---|--------|--------|-------------------|
| article # | 1007-X | 1009-X | 1008-X | 1205 |
| lift [m] | 0-50 | 0-30 | 0-20 | 0-15 |
| max. flow rate [m ³ /h] | 0.8 | 1.2 | 2.7 | 5.0 |
| max. efficiency [%] | 60 | 61 | 62 | 45 |
| solar operation | nominal voltage 24-48V DC, open circuit voltage max. 100V DC | | | battery operation |
| solar generator [Wp] | 80-300 | 80-300 | 80-300 | only |
| battery operation | nominal voltage 24-48V DC | | | |



System Sizing Table: Battery Operation

PS200 HR, 24 V, Battery Operation

| vertical lift | | pump type | peak flow rate | | power [W] | wire size [mm ²] |
|---------------|------|-----------|----------------|---------------|--------------|---------------------------------|
| [m] | [ft] | | [l/min] | [US Gal./min] | | |
| 5 | 16 | HR-04 | 5.5 | 1.5 | 24 | 2.5 |
| | | HR-07 | 7.5 | 2.0 | 37 | |
| | | HR-14 | 17.5 | 4.6 | 40 | |
| 10 | 33 | HR-04 | 5.2 | 1.4 | 29 | 2.5 |
| | | HR-07 | 7.5 | 2.0 | 42 | |
| | | HR-14 | 16.6 | 4.4 | 55 | |
| 15 | 50 | HR-04 | 4.8 | 1.3 | 34 | 2.5 |
| | | HR-07 | 7.0 | 1.8 | 50 | |
| | | HR-14 | 15.2 | 4.0 | 74 | |
| 20 | 65 | HR-04 | 4.5 | 1.2 | 38 | 2.5 |
| | | HR-07 | 6.5 | 1.7 | 60 | |
| | | HR-14 | 12.5 | 3.3 | 91 | |
| 30 | 100 | HR-04 | 4.2 | 1.1 | 48 | 4.0 |
| 40 | 130 | HR-04 | 3.8 | 1.0 | 58 | 4.0 |
| 50 | 165 | HR-04 | 3.3 | 0.9 | 65 | 4.0 |

PS200 HR, 48 V, Battery Operation

| vertical lift | | pump type | peak flow rate | | power [W] | wire size [mm ²] |
|---------------|------|-----------|----------------|---------------|--------------|---------------------------------|
| [m] | [ft] | | [l/min] | [US Gal./min] | | |
| 5 | 16 | HR-04 | 11.0 | 2.9 | 55 | 2.5 |
| | | HR-07 | 17.0 | 4.5 | 90 | |
| | | HR-14 | 38.4 | 10.1 | 130 | |
| 10 | 33 | HR-04 | 10.3 | 2.7 | 70 | 2.5 |
| | | HR-07 | 16.5 | 4.4 | 100 | |
| | | HR-14 | 36.1 | 9.5 | 165 | |
| 15 | 50 | HR-04 | 10.1 | 2.7 | 80 | 2.5 |
| | | HR-07 | 15.8 | 4.2 | 115 | |
| | | HR-14 | 35.0 | 9.2 | 195 | |
| 20 | 65 | HR-04 | 9.8 | 2.6 | 90 | 2.5 |
| | | HR-07 | 15.5 | 4.1 | 135 | |
| 30 | 100 | HR-04 | 9.3 | 2.5 | 105 | 4.0 |
| | | HR-07 | 14.2 | 3.8 | 160 | |
| 40 | 130 | HR-04 | 8.7 | 2.3 | 125 | 4.0 |
| | | HR-07 | 13.5 | 3.6 | 190 | |
| 50 | 165 | HR-04 | 7.8 | 2.1 | 140 | 4.0 |

PS200 C-5-4, 24 to 48V, Battery Operation

| lift | | 20V | | | | 20V | | | | 20V | | | |
|-----------|------|---|-----------|---------------|-----------------|--------------|-----------|---------------|-----------------|--------------|-----------|---------------|-----------------|
| [m] | [ft] | power [W] | flow rate | | | power [W] | flow rate | | | power [W] | flow rate | | |
| | | | [l/min] | [US Gal./min] | [Imp. Gal./min] | | [l/min] | [US Gal./min] | [Imp. Gal./min] | | [l/min] | [US Gal./min] | [Imp. Gal./min] |
| 2.5 | 8 | 130 | 52 | 13.7 | 11.4 | 192 | 62 | 16.4 | 13.6 | 278 | 65 | 17.2 | 14.3 |
| 5 | 16 | 140 | 43 | 11.4 | 9.5 | 206 | 55 | 14.5 | 12.1 | 278 | 63 | 16.6 | 13.9 |
| 8 | 26 | 140 | 38 | 10.0 | 8.4 | 206 | 49 | 12.9 | 10.8 | 278 | 59 | 15.6 | 13.0 |
| 10 | 33 | 132 | 31 | 8.2 | 6.8 | 205 | 45 | 11.9 | 9.9 | 276 | 55 | 14.5 | 12.1 |
| 13 | 43 | 130 | 20 | 5.3 | 4.4 | 204 | 39 | 10.3 | 8.6 | 270 | 50 | 13.2 | 11.0 |
| 15 | 49 | 120 | 10 | 2.6 | 2.2 | 200 | 34 | 9.0 | 7.5 | 268 | 45 | 11.9 | 9.9 |
| 18 | 59 | | | | | 190 | 25 | 6.6 | 5.5 | 247 | 35 | 9.2 | 7.7 |
| wire size | | use min. 4mm ² / AWG #10 cable; max. length 15m / 50ft | | | | | | | | | | | |

For Battery and Solar Direct Systems

Lift Limits

These systems are selected for optimum performance. To allow unexpected drawdown, each system can handle an additional 15 % lift.

Higher Lift? Higher Flow Rate?

Choose PS600/1200 for higher lift, higher flow rate applications and lower cable cost.

Wire Sizes

Cable Layout is calculated to stay within 4 % power loss.

Variations of Length

Longer: for each 50 % increase, the next larger wire size is required

Shorter: for each 33 % decrease, the next smaller wire size is required

Array To Controller: if shorter than 6 m / 20 ft: 4 mm² / #10 min.

Controller To Low-Water Probe: 1 mm² / #18 min. 2-conductor

For Solar Direct Systems

System Voltage

24-48 V nominal, e.g. 2 to 4 standard 12 V modules wired in series, Voc 100 V max.

How Daily Water Volume Is Calculated

Daily volume is calculated by integrating real flow versus realistic solar (PV) output through the day.

The solar array is fixed at tilt angle = latitude of the location.

irradiation:
kWh/m²/day = peak sun hours/day
Flow rates may vary +/- 10 %.

System Sizing Table: Solar-direct operation

PS200 HR, 24V nominal voltage
2x 12V standard modules in series

irradiation 4.0 kWh/m²/day, tilted surface

| vertical lift | | pump type | peak flow rate | flow rate for PV array power peak [m ³ /day] | | | wire size [mm ²] |
|---------------|------|-----------|----------------|---|------|-------|------------------------------|
| [m] | [ft] | | | [l/min] | 80Wp | 120Wp | |
| 5 | 16 | HR-04 | 7.2 | 2.2 | 2.5 | 2.8 | 2.5 |
| | | HR-07 | 13.0 | 2.0 | 3.5 | 4.7 | |
| 10 | 33 | HR-04 | 6.5 | 2.0 | 2.3 | 2.6 | 2.5 |
| | | HR-07 | 13.0 | 1.7 | 3.0 | 4.2 | |
| 15 | 50 | HR-04 | 6.0 | 1.8 | 2.0 | 2.4 | 2.5 |
| | | HR-07 | 12.0 | 1.5 | 2.8 | 3.9 | |
| 20 | 65 | HR-04 | 5.8 | 1.4 | 1.6 | 2.2 | 2.5 |
| | | HR-07 | 12.0 | 1.1 | 2.5 | 3.7 | |
| 25 | 82 | HR-04 | 5.7 | 1.1 | 1.5 | 2.1 | 2.5 |
| 30 | 100 | HR-04 | 5.5 | 0.8 | 1.2 | 2.0 | 2.5 |
| 40 | 130 | HR-04 | 5.1 | - | 1.0 | 1.8 | 4.0 |
| 50 | 165 | HR-04 | 5.1 | see 36-48V table | | | 4.0 |

irradiation 6.0 kWh/m²/day, tilted surface

| vertical lift | | pump type | peak flow rate | flow rate for PV array power peak [m ³ /day] | | | wire size [mm ²] |
|---------------|------|-----------|----------------|---|------|-------|------------------------------|
| [m] | [ft] | | | [l/min] | 80Wp | 120Wp | |
| 5 | 16 | HR-04 | 7.2 | 3.5 | 3.8 | 4.0 | 2.5 |
| | | HR-07 | 13.0 | 4.0 | 6.0 | 7.0 | |
| 10 | 33 | HR-04 | 6.5 | 3.3 | 3.6 | 4.0 | 2.5 |
| | | HR-07 | 13.0 | 3.9 | 5.2 | 5.4 | |
| 15 | 50 | HR-04 | 6.0 | 2.9 | 3.5 | 4.0 | 2.5 |
| | | HR-07 | 12.0 | 3.5 | 5.0 | 5.2 | |
| 20 | 65 | HR-04 | 5.8 | 2.5 | 3.3 | 3.9 | 2.5 |
| | | HR-07 | 12.0 | 2.4 | 3.8 | 4.9 | |
| 25 | 82 | HR-04 | 5.7 | 2.2 | 3.0 | 3.5 | 2.5 |
| 30 | 100 | HR-04 | 5.5 | 1.9 | 2.8 | 3.1 | 2.5 |
| 40 | 130 | HR-04 | 5.1 | - | 2.0 | 2.5 | 4.0 |
| 50 | 165 | HR-04 | 5.1 | see 36-48V table | | | 4.0 |

PS200 HR, 36-48V nominal voltage
2x 12V standard modules in series

irradiation 4.0 kWh/m²/day, tilted surface

| vertical lift | | pump type | peak flow rate | flow rate for PV array power peak [m ³ /day] | | | wire size [mm ²] |
|---------------|------|-----------|----------------|---|-------|-------|------------------------------|
| [m] | [ft] | | | [l/min] | 150Wp | 200Wp | |
| 5 | 16 | HR-04 | 12.0 | 4.8 | 5.4 | 6.4 | 2.5 |
| | | HR-07 | 19.5 | 4.7 | 7.0 | 8.5 | |
| 10 | 33 | HR-04 | 11.8 | 4.5 | 5.0 | 6.0 | 2.5 |
| | | HR-07 | 19.0 | 4.2 | 6.0 | 7.5 | |
| 15 | 50 | HR-04 | 11.5 | 4.0 | 4.6 | 5.7 | 2.5 |
| | | HR-07 | 18.5 | 3.9 | 6.0 | 7.4 | |
| 20 | 65 | HR-04 | 11.5 | 3.5 | 4.2 | 5.4 | 2.5 |
| | | HR-07 | 18.0 | 3.3 | 5.5 | 7.0 | |
| 25 | 82 | HR-04 | 11.3 | 2.6 | 3.6 | 5.1 | 2.5 |
| | | HR-07 | 17.5 | - | 2.5 | 4.0 | |
| 30 | 100 | HR-04 | 11.0 | 2.0 | 3.0 | 4.8 | 2.5 |
| 40 | 130 | HR-04 | 11.0 | 1.7 | 2.4 | 3.5 | 4.0 |
| 50 | 165 | HR-04 | 10.5 | 1.3 | 2.0 | 3.0 | 4.0 |

irradiation 6.0 kWh/m²/day, tilted surface

| vertical lift | | pump type | peak flow rate | flow rate for PV array power peak [m ³ /day] | | | wire size [mm ²] |
|---------------|------|-----------|----------------|---|-------|-------|------------------------------|
| [m] | [ft] | | | [l/min] | 150Wp | 200Wp | |
| 5 | 16 | HR-04 | 12.0 | 6.3 | 6.6 | 7.3 | 2.5 |
| | | HR-07 | 19.5 | 8.5 | 9.5 | 10.5 | |
| | | HR-14 | 36.0 | 11.0 | 15.0 | 18.0 | |
| 10 | 33 | HR-04 | 11.8 | 6.0 | 6.5 | 7.0 | 2.5 |
| | | HR-07 | 19.0 | 8.0 | 9.0 | 10.0 | |
| | | HR-14 | 34.0 | 9.0 | 13.0 | 16.0 | |
| 15 | 50 | HR-04 | 11.5 | 5.5 | 6.0 | 6.8 | 2.5 |
| | | HR-07 | 18.5 | 7.0 | 8.3 | 9.5 | |
| | | HR-14 | 33.0 | 8.0 | 11.0 | 14.0 | |
| 20 | 65 | HR-04 | 11.5 | 5.5 | 6.2 | 6.6 | 2.5 |
| | | HR-07 | 18.0 | 6.0 | 7.5 | 9.0 | |
| 25 | 82 | HR-04 | 11.3 | 5.0 | 5.6 | 6.2 | 2.5 |
| | | HR-07 | 17.5 | 5.0 | 6.5 | 8.0 | |
| 30 | 100 | HR-04 | 11.0 | 4.3 | 4.9 | 5.8 | 2.5 |
| 40 | 130 | HR-04 | 11.0 | 3.0 | 4.0 | 5.0 | 4.0 |
| 50 | 165 | HR-04 | 10.5 | 2.0 | 3.0 | 4.2 | 4.0 |

Conversion for Wire Sizes

| AWG | mm ² |
|------|-----------------|
| # 18 | 1 |
| # 12 | 4 |
| # 10 | 6 |
| # 8 | 10 |
| # 6 | 16 |

Conversion for Flow Rates

| | |
|------------------|---------------------|
| 1 m ³ | 264 US Gal. |
| 1 m ³ | 220 Imp. Gal. |
| 1 l/min | 0.264 US Gal./min |
| 1 l/min | 0.220 Imp. Gal./min |

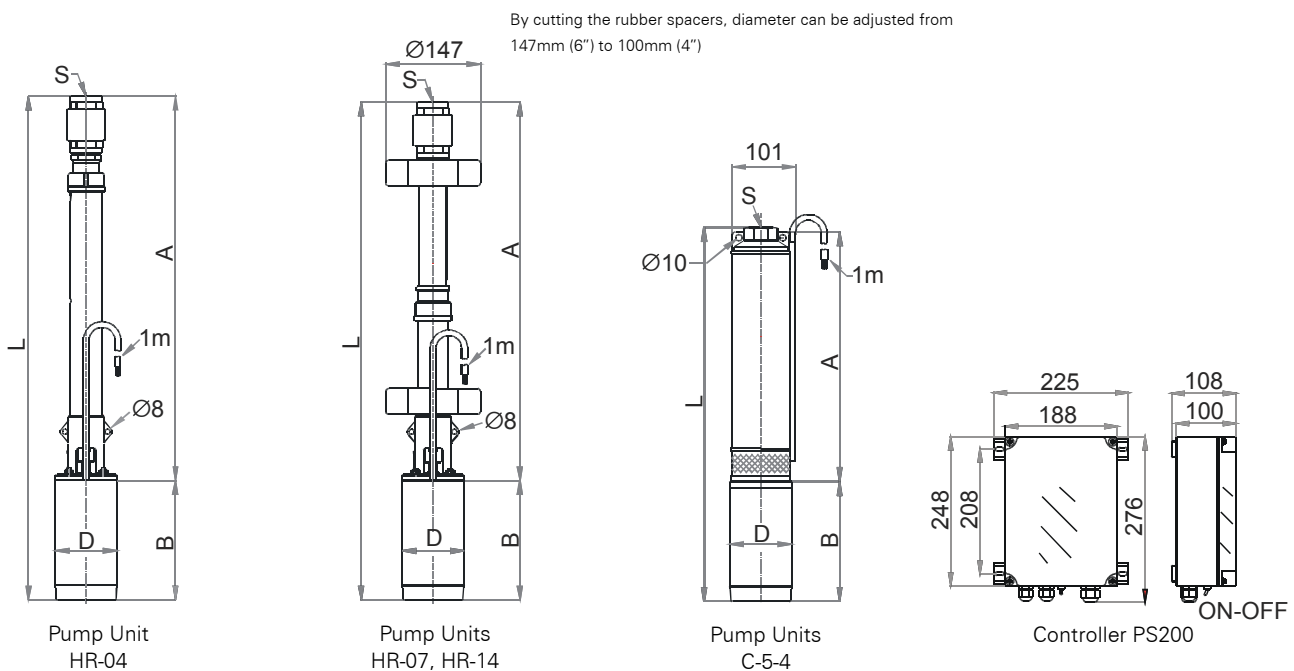
Conversion for Lift/Length

| | |
|-----|--------|
| 1 m | 3.3 ft |
|-----|--------|

Table shows nearest larger metric cross section.

Dimensions and Weights

| | dimensions | | | | | shipping dimensions | | | |
|-----------------------------------|------------|------|------|------|----------|---------------------|-------------------|------------|--------------|
| | L | A | B | D | S | packaging | shipping volume | net weight | gross weight |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [m ³] | [kg] | [kg] |
| Pump Unit (PU) (motor + pump end) | | | | | | | | | |
| HR-04 | 780 | 595 | 185 | 96 | G 1 1/4" | 850×160×150 | 0.0204 | 11.2 | 12.0 |
| HR-07, HR-14 | 771 | 586 | 185 | 96 | G 1 1/4" | 850×160×150 | 0.0204 | 11.5 | 12.3 |
| C-5-4 | 527 | 342 | 185 | 96 | G 1 1/4" | 660×160×150 | 0.0158 | 10.0 | 10.5 |
| Controller | | | | | | | | | |
| PS200 | | | | | | 320×240×160 | 0.0123 | 1.2 | 1.8 |



Sand and Silt Tolerance

The pump (HR) has a higher resistance to wear from sand, clay etc. than any other pump type. In properly constructed wells the amount of solid particles is within the tolerance of the pump.

A concentration of particles higher than 2% (by volume) may cause blockage in the pump or the drop pipe, especially at low flow rates.

Do not use the pump to clean out a dirty well.

Pump Cable and Splice

Standard submersible cable, 3-wire + ground (total four wires). Connection to the pump is made using industry-standard splicing methods.

Drop Pipe

G 1 1/4" (optional: 1" NPT) pump outlet. If water is dirty consider a smaller sized drop pipe to increase the flow velocity. This helps to exhaust solid particles and prevent accumulation in the pipe. When considering reduced pipe size, consult a pipe sizing (friction loss) chart. Pipe can be of any standard material, rigid or flexible. A torque arrestor is *not* required.

Temperature Limits

Pump end, motor: water temperature up to +40°C (+104°F)

Specify temperature range on order.

Controller: ambient temperature -30°C to +55°C (-22°F to +131°F)

Warranty

Two years manufacturer's warranty against defects in material and workmanship