

# PS200 HR / C



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

### Characteristics

- lift up to 50 m
- flow rate up to 5.0 m<sup>3</sup>/h
- simple installation
- maintenance-free
- high reliability and life expectancy
- cost-efficient pumping

### Application

- 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 submerged electronic parts)
- 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 approx. 30 %
- solar operation: integrated MPPT (Maximum Power Point Tracking)
- battery operation: low voltage disconnect and restart after battery has recovered
- max. efficiency 88 % (motor + controller)
- enclosure: IP 54 (sealed, weatherproof)

#### Motor ECDRIVE 600 HR / 200 C

- brushless DC motor
- no electronics inside motor
- water filled
- IP68, pressure balanced, max. submersion unlimited
- 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

#### For HR Pumps Only

- helical rotor pump (positive displacement pump)
- two main parts only: stator and rotor, field servicable
- 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 <sup>3</sup> /h]	0.8	1.2	2.7	5.0
max. efficiency [%]	60	61	62	45
<b>solar operation</b>	nominal voltage 24-48 V DC open circuit voltage max. 100 V DC			battery operation only
solar generator [Wp]	80-300	80-300	80-300	
<b>battery operation</b>	nominal voltage 24-48 V DC			



PS200 HR-04

## System Sizing Table: Battery Operation

PS200 HR, 24 V, Battery Operation

vertical lift		pump type	peak flow rate		power [W]	wire size [mm <sup>2</sup> ]
[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 <sup>2</sup> ]
[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 V to 48 V, Battery Operation

lift		20 V				24 V				26-48 V			
		power [W]	flow rate			power [W]	flow rate			power [W]	flow rate		
[m]	[ft]	[W]	[l/min]	[US Gal./min]	[Imp. Gal./min]	[W]	[l/min]	[US Gal./min]	[Imp. Gal./min]	[W]	[l/min]	[US Gal./min]	[Imp. Gal./min]
2.50	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 4 mm <sup>2</sup> / AWG #10 cable; max. length 15 m / 50 ft											

### 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 mm<sup>2</sup> / #10 min.  
**Controller To Low-Water Probe:** 1 mm<sup>2</sup> / #18 min. 2-conductor

#### Conversion For Flow

1 m<sup>3</sup> = 264 US Gal.  
 1 m<sup>3</sup> = 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

#### Conversion For Wire Sizes

AWG	mm <sup>2</sup>
# 18	1
# 12	4
# 10	6
# 8	10
# 6	16

Table shows nearest larger metric cross section.

## System Sizing Table: Solar Operation

### PS200 HR, 24 V

nominal voltage, 2 standard 12 V modules wired in series

irradiation: 4.0 kWh/m<sup>2</sup>/day, tilted surface

vertical lift		pump type	peak flow rate	flow rate for PV array power peak			wire size
[m]	[ft]			[m <sup>3</sup> /day]			
			[l/min]	80 Wp	120 Wp	150 Wp	[mm <sup>2</sup> ]
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	<del>0.8</del>	1.0	1.8	4.0
50	165	HR-04	5.1	see 36-48V table			4.0

irradiation: 6.0 kWh/m<sup>2</sup>/day, tilted surface

vertical lift		pump type	peak flow rate	flow rate for PV array power peak			wire size
[m]	[ft]			[m <sup>3</sup> /day]			
			[l/min]	80 Wp	120 Wp	150 Wp	[mm <sup>2</sup> ]
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	<del>1.9</del>	2.0	2.5	4.0
50	165	HR-04	5.1	see 36-48 V table			4.0

### PS200 HR, 36-48 V

nominal voltage, 3 to 4 standard 12 V modules wired in series

irradiation: 4.0 kWh/m<sup>2</sup>/day, tilted surface

vertical lift		pump type	peak flow rate	flow rate for PV array power peak			wire size
[m]	[ft]			[m <sup>3</sup> /day]			
			[l/min]	150 Wp	200 Wp	250 Wp	[mm <sup>2</sup> ]
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	<del>2.6</del>	3.6	5.1	2.5
		HR-07	17.5	<del>2.5</del>	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/m<sup>2</sup>/day, tilted surface

vertical lift		pump type	peak flow rate	flow rate for PV array power peak			wire size
[m]	[ft]			[m <sup>3</sup> /day]			
			[l/min]	150 Wp	200 Wp	250 Wp	[mm <sup>2</sup> ]
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

## 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.

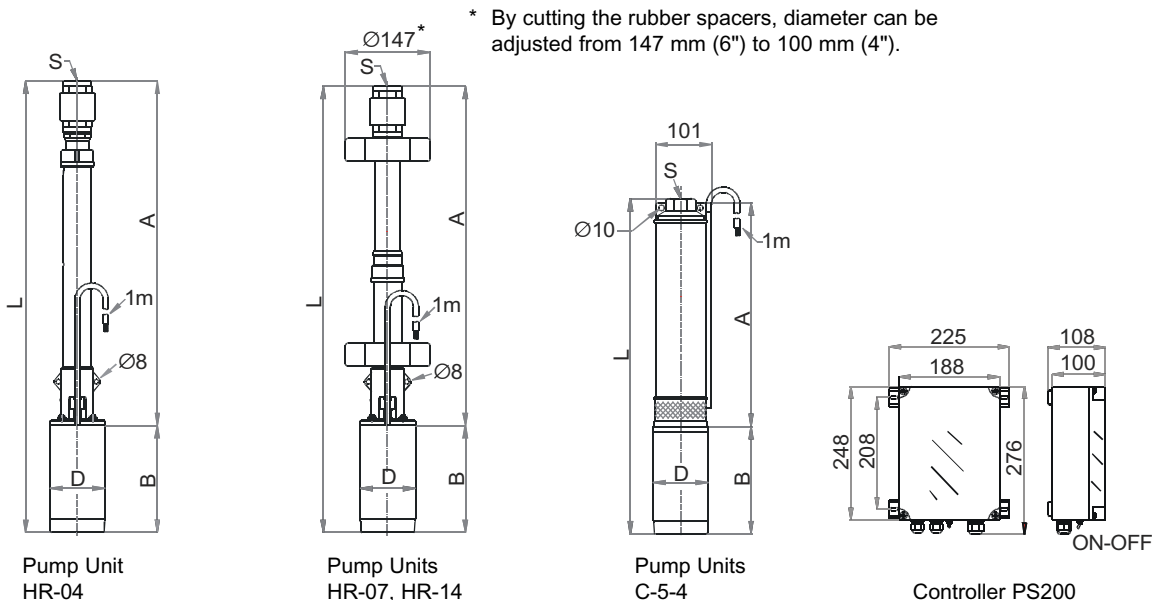
irradiation:

kWh/m<sup>2</sup>/day = peak sun hours/day

Flow rates may vary +/- 10 %.

### Technical Data, Dimensions And Weights

Pump Unit (PU) (motor + pump end)	Dimensions					Shipping Dimensions			
	L [mm]	A [mm]	B [mm]	D [mm]	S [mm]	packaging [mm]	shipping volume [m <sup>3</sup> ]	net weight [kg]	gross weight [kg]
HR-04	780	595	185	96	G1½"	850x160x150	0.0204	11.2	12.0
HR-07, HR-14	771	586	185	96	G1½"	850x160x150	0.0204	11.5	12.3
C-5-4	527	342	185	96	G1½"	660x160x150	0.0158	10.0	10.5
Controller Type									
PS200						320x240x160	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 sand, clay etc. is within the tolerance of the pump.

A concentration of solids greater 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

G1½" (optionally 1" NPT) pump outlet. If water is dirty, consider a smaller size drop pipe to increase the flow velocity. This helps 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.