

PS600 HR / C



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

Characteristics

- lift up to 180 m
- flow rate up to 11.0 m³/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 PS600

- 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 92 % (motor + controller)
- enclosure: IP 54 (sealed, weatherproof)

Motor ECDRIVE 600 HR / 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

PS600	HR-03	HR-03H	HR-04	HR-04H	HR-07
article #	1040-X	1045-X	1050-X	1055-X	1060-X
lift [m]	0-140	140-180	0-80	80-140	40-90
max. flow rate [m ³ /h]	0.5	0.5	0.8	0.8	1.2
max. efficiency [%]	60	64	60	65	64
solar operation	nominal voltage 48-72 V DC open circuit voltage max. 150 V DC				
solar generator [Wp]	300-480	420-900	300-480	420-900	420-900
battery operation	nominal voltage 48 V DC				

PS600	HR-10	HR-14	HR-20	C-BF-04	C-DF-03
article #	1065-X	1070-X	1080-X	1296-X	1298-X
lift [m]	30-60	0-50	0-30	0-20	0-10
max. flow rate [m ³ /h]	1.9	2.7	3.6	7.3	11.0
max. efficiency [%]	64	65	64	40	40
solar operation	nominal voltage 48-72 V DC open circuit voltage max. 150 V DC				
solar generator [Wp]	420-900	300-900	420-900	300-900	720-900
battery operation	nominal voltage 48 V DC				



PS600 HR-04



System Sizing Table

Instructions

- Lift:** Find the lift you require and read the column below it.
- Daily Volume:** Find the daily volume you require, at an irradiation of 4.5, 6.0, 7.5 kWh/m²/day. 7.5 is moderately dry summer weather.

For more water, look further down the column.

3. Pipe Sizing: Use peak flow rate for pipe sizing.

4. Wire Size, Max. Wire Length

Solar Array Peak Power	VERTICAL LIFT		5 m 16 ft		10 m 33 ft		15 m 50 ft		20 m 65 ft		30 m 100 ft		40 m 133 ft		50 m 165 ft		60 m 200 ft		70 m 230 ft															
	array mounting		Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked														
flow rate [m³/day]																																		
300 Wp	irradiation	7.5	35	50	19	27	19	26	15	22	7.5	9.5	6.2	8.7	6.0	7.9	4.7	6.8	3.8	5.3														
	kWh/m ² /day	6.0	30	42	15	22	15	20	11	16	6.2	8.2	5.4	7.4	4.8	6.3	3.7	5.3	3.0	4.2														
	m ² /day	4.5	25	34	12	16	11	15	7	9	5.0	6.8	4.5	6.0	3.5	4.7	2.8	3.8	2.3	3.0														
	pump type	C-BF-04		HR-14				HR-04				HR-03																						
peak flow rate [l/min]	79		47				40				36				13.6				13.2				12.5				11.0				6.8			
wire size / max. length	4mm ² / 45m, #10 / 150ft																																	
350 Wp	irradiation	7.5	42	61	22	30	23	29	18	26	14.0	20.1	6.8	8.7	6.1	8.3	5.7	7.9	4.9	6.8														
	kWh/m ² /day	6.0	37	53	19	26	18	24	15	20	10.0	14.0	6.5	8.3	5.5	7.5	4.8	6.9	4.1	5.8														
	m ² /day	4.5	32	44	16	22	14	19	10	14	6.0	8.0	4.7	6.2	4.0	5.6	3.5	4.8	3.0	4.2														
	pump type	C-BF-04		HR-14				HR-04				HR-04																						
peak flow rate [l/min]	79		47				40				36				29.9				13.2				12.5				11.0				9.8			
wire size / max. length	4mm ² / 45m, #10 / 150ft																																	
420 Wp	irradiation	7.5	47	68	26	31	24	30	20	29	15.9	23.1	8.7	12.5	6.8	8.7	6.1	8.3	5.7	7.6														
	kWh/m ² /day	6.0	41	59	22	27	19	25	17	24	12.0	17.0	7.5	10.6	6.0	7.9	5.4	7.2	4.8	6.4														
	m ² /day	4.5	36	49	17	24	15	21	14	19	8.0	11.0	6.5	8.7	5.0	7.0	4.5	6.0	4.0	5.4														
	pump type	C-BF-04		HR-14				HR-07				HR-04																						
peak flow rate [l/min]	87		43				42				38				34.1				20.1				12.9				11.4				10.2			
wire size / max. length	4mm ² / 45m, #10 / 150ft																																	
480 Wp	irradiation	7.5	52	76	30	38	27	35	22	30	18.2	26.1	14.0	15.9	11.0	15.5	8.7	12.5	6.1	8.7														
	kWh/m ² /day	6.0	46	65	24	32	22	29	19	27	15.0	18.5	10.0	14.0	8.5	12.0	7.0	10.0	5.5	7.4														
	m ² /day	4.5	40	55	19	26	16	22	15	21	12.0	16.0	7.0	9.5	5.5	7.5	5.0	6.5	4.5	6.0														
	pump type	C-BF-04		HR-20				HR-14				HR-07				use HR-04 with #10/250ft				HR-04														
peak flow rate [l/min]	95		57				55				42				36.0				28.0				20.1				18.9				12.9			
wire size / max. length	6mm ² / 55m, #10 / 130ft																																	
660 Wp	irradiation	7.5	64	93	44	64	32	39	26	30	21.6	28.8	17.0	24.6	13.6	18.9	9.8	14.4	8.7	12.5														
	kWh/m ² /day	6.0	56	79	36	51	27	34	23	29	17.8	24.0	13.5	19.0	10.7	14.5	8.5	12.0	7.3	10.5														
	m ² /day	4.5	48	66	28	38	22	30	19	25	14.0	19.0	10.0	13.5	8.0	10.0	7.0	9.5	6.0	8.5														
	pump type	C-BF-04		HR-20				HR-14				HR-14				HR-07																		
peak flow rate [l/min]	114		106				57				43				41.6				39.7				37.9				20.1				19.7			
wire size / max. length	4mm ² / 20m, #10 / 85ft																																	
720 Wp	irradiation	7.5	70	100	50	71	36	51	29	40	24	30	20	29	18	26	11	14	10.2	14.4														
	kWh/m ² /day	6.0	62	88	43	59	28	40	26	36	20	26	18	25	14	19	10	14	9.0	13.0														
	m ² /day	4.5	53	76	35	47	20	28	23	32	17	23	16	21	9	12	9	12	8.0	11.0														
	pump type	C-BF-04		HR-20				HR-14				HR-14				HR-07																		
peak flow rate [l/min]	117		110				95				54				44				39				20				20							
wire size / max. length	4mm ² / 20m, #10 / 85ft																																	
840 Wp	irradiation	7.5	77	111	55	80	41	60	32	40	27	38	22	30	19	27	11.0	14.4	10.2	14.8														
	kWh/m ² /day	6.0	70	100	49	70	36	51	30	40	25	35	21	28	16	23	10.2	14.4	9.8	14.0														
	m ² /day	4.5	63	88	43	59	30	41	28	38	23	31	18	24	13	18	9.5	13.2	9.0	13.0														
	pump type	C-DF-03		C-BF-04				HR-20				HR-14				HR-07																		
peak flow rate [l/min]	163		121				112				55				53.7				43.1				39.0				20.4				20.1			
wire size / max. length	4mm ² / 20m, #10 / 85ft																																	

System Voltage

48-72 V nominal, e.g. 4 to 6 standard 12 V modules wired in series, Voc 150 V max.

Lift Limits

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

Wire Sizes

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

Pump Cable, example: 6 mm² / 130 m = maximum allowable length (controller to pump) for the given wire size.

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

Attention: WIRE SIZING

Especially for Lifts greater 100 m / 330 ft compare wire sizes with PS1200 system. Due to higher system voltage, a considerable amount of money can be saved on the pump wire.

More Lift ?

Choose PS1200 system for higher lift applications and lower cable cost.



Conversion For Flow

1 m³ = 264 US Gal.
 1 m³ = 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

1 lift

80 m 265 ft		90 m 300 ft		100 m 330 ft		120 m 400 ft		140 m 460 ft		160 m 530 ft		180 m 600 ft		200 m 660 ft		230 m 760 ft		VERTICAL LIFT	Solar Array Peak Power
Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	array mounting	

flow rate [m³/day]

3.2	4.7	2.6	4.2	2.5	3.8	2.3	3.4	1.9	2.7
2.6	3.7	2.1	3.1	1.8	2.7	1.6	2.3	1.3	1.8
1.9	2.6	1.5	2.1	1.1	1.6	0.9	1.3	0.7	0.9
HR-03									
6.4		6.1		5.7		5.3		4.9	
10mm ² / 120m, #10 / 330ft					10mm ² / 120m, #8 / 450ft				

3.8	5.1	3.4	5.0	3.2	4.7	3.0	4.3	2.7	4.0
3.3	4.4	3.0	4.0	2.7	3.9	2.5	3.3	2.0	2.9
2.8	3.8	2.6	3.5	2.2	3.0	1.7	2.3	1.3	1.8
HR-03									
8.3		7.6		7.2		6.8		6.4	
10mm ² / 120m, #10 / 330ft					10mm ² / 120m, #8 / 450ft				

4.7	6.9	4.5	5.4	4.0	5.0	3.7	5.0	3.0	4.2	2.3	3.2	1.7	2.4
3.9	5.5	3.7	4.7	3.2	4.2	3.0	4.1	2.5	3.4	2.0	2.7	1.4	1.9
3.0	4.0	2.9	3.9	2.4	3.3	2.3	3.2	2.0	2.7	1.7	2.2	1.0	1.4
HR-04H		HR-03						HR-03H					
9.5		7.9		7.6		7.2		6.8		6.1		5.3	
10mm ² / 120m, #10 / 330ft				10mm ² / 120m, #8 / 450ft				14mm ² / 180m, #6 / 600ft					

5.7	8.2	5.5	8.0	5.0	7.0	4.5	6.5	3.3	4.5	2.8	4.0	2.3	3.0
4.8	6.7	4.4	6.5	3.8	5.3	3.4	4.8	3.0	4.0	2.4	3.3	1.9	2.5
3.9	5.2	3.3	4.5	2.6	3.5	2.2	3.0	2.6	3.5	1.9	2.5	1.5	2.0
HR-04H				HR-03				HR-03H					
12.1		11.4		10.2		9.5		7.2		6.4		5.7	
10mm ² / 100m, #6 / 420ft				10mm ² / 140m				14mm ² / 180m, #6 / 600ft					

8.0	11.5	6.5	8.7	5.5	7.8	5.1	7.4	4.5	6.4
6.5	9.2	5.5	7.4	4.9	6.7	4.0	5.8	3.5	5.0
5.0	7.0	4.5	6.0	4.3	5.5	3.0	4.2	2.5	3.5
HR-07		HR-04H							
18.9		12.9		12.5		12.1		11.7	
#8 / 265ft		10mm ² / 100m, #6 / 420ft							

9.4	13.6	8.7	12.6	6.0	8.7	5.7	8.2	5.3	7.0
8.2	11.5	7.4	10.5	5.8	8.0	5.0	6.8	4.4	6.0
7.0	9.5	6.0	8.1	5.5	7.4	4.0	5.4	3.5	4.7
HR-07		HR-04H							
19.7		18.9		12.5		12.5		12.1	
10mm ² / 100m, #8 / 300ft		10mm ² / 120m, #6 / 500ft							

10.0	14.0	9.4	13.5	6.8	7.6	6.4	7.6	6.0	7.5
8.9	12.0	8.4	11.6	6.1	6.8	5.7	6.4	5.2	7.0
7.8	10.5	7.3	9.8	5.1	6.4	4.7	6.1	4.4	6.0
HR-07		HR-04H							
19.7		18.9		12.5		12.5		12.1	
10mm ² / 100m, #8 / 300ft		10mm ² / 120m, #6 / 500ft							

irradiation	7.5
kWh/	6.0
m ² /day	4.5
pump type	
peak flow rate [l/min]	
wire size / max. length	

300 Wp

irradiation	7.5
kWh/	6.0
m ² /day	4.5
pump type	
peak flow rate [l/min]	
wire size / max. length	

350 Wp

irradiation	7.5
kWh/	6.0
m ² /day	4.5
pump type	
peak flow rate [l/min]	
wire size / max. length	

420 Wp

irradiation	7.5
kWh/	6.0
m ² /day	4.5
pump type	
peak flow rate [l/min]	
wire size / max. length	

480 Wp

irradiation	7.5
kWh/	6.0
m ² /day	4.5
pump type	
peak flow rate [l/min]	
wire size / max. length	

660 Wp

irradiation	7.5
kWh/	6.0
m ² /day	4.5
pump type	
peak flow rate [l/min]	
wire size / max. length	

720 Wp

irradiation	7.5
kWh/	6.0
m ² /day	4.5
pump type	
peak flow rate [l/min]	
wire size / max. length	

840 Wp

2 daily volume

3 peak flow for pipe sizing

4 wire Size, max. wire length

How Daily Water Volume Is Calculated

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

Calculations include a 10 % PV output degradation (heat, dirt etc.). Cable losses are included at maximum allowable length. 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 %.

Conversion For Wire Sizes

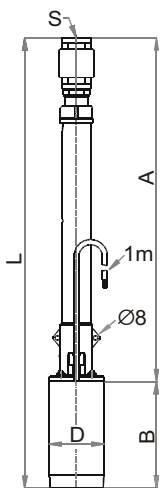
AWG	mm ²
# 18	1
# 12	4
# 10	6
# 8	10
# 6	16

Table shows nearest larger metric cross section.

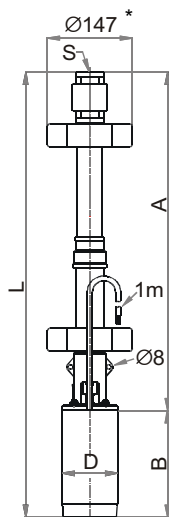
Technical Data, Dimensions And Weights

Pump Unit (PU) (motor + pump end)	Dimensions					Shipping Dimensions			
	L [mm]	A [mm]	B [mm]	D [mm]	S	packaging [mm]	shipping volume [m³]	net weight [kg]	gross weight [kg]
HR-03, HR-03H, HR-04, HR-04H	780	595	185	96	G1½"	850x160x150	0.0204	11.2	12.0
HR-07, HR-10, HR-14, HR-20	771	586	185	96	G1½"	850x160x150	0.0204	11.5	12.3
C-BF-04	565	380	185	96	G1½"	660x160x150	0.0158	10.0	10.5
C-DF-03					G2"				
Controller Type									
PS600						450x250x240	0.0270	4.5	5.3

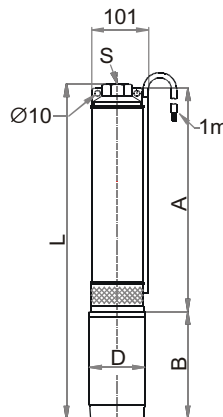
* By cutting the rubber spacers, diameter can be adjusted from 147 mm (6") to 100 mm (4").



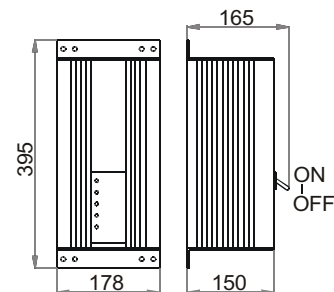
Pump Units
HR-03, HR-03H,
HR-04, HR-04H



Pump Units
HR-07, HR-10,
HR-14, HR-20



Pump Units
C-BF-04,
C-DF-03



Controller PS600

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.