



## 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 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 <sup>2</sup> / 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 mm<sup>2</sup> / #10 min.

Controller To Low-Water Probe: 1 mm<sup>2</sup> / #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/m<sup>2</sup>/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/m<sup>2</sup>/day, tilted surface**

vertical lift		pump type	peak flow rate	flow rate for PV array power peak [m <sup>3</sup> /day]			wire size [mm <sup>2</sup> ]
[m]	[ft]		[l/min]	80Wp	120Wp	150Wp	
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/m<sup>2</sup>/day, tilted surface**

vertical lift		pump type	peak flow rate	flow rate for PV array power peak [m <sup>3</sup> /day]			wire size [mm <sup>2</sup> ]
[m]	[ft]		[l/min]	80Wp	120Wp	150Wp	
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/m<sup>2</sup>/day, tilted surface**

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

vertical lift		pump type	peak flow rate	flow rate for PV array power peak [m <sup>3</sup> /day]			wire size [mm <sup>2</sup> ]
[m]	[ft]		[l/min]	150Wp	200Wp	250Wp	
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 <sup>2</sup>
# 18	1
# 12	4
# 10	6
# 8	10
# 6	16

**Conversion for Flow Rates**

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
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Table shows nearest larger metric cross section.

