enereco ENERGY SOLUTIONS

TECHNICAL SHEET

"SWP200" SERIES: PHOTOVOLTAIC KITS FOR WATER PUMPING

Water is one of the few resources, without which mankind cannot do. Man has to supply with certain quantities of water in order to live and to create development in his area. This water is used for:

- his own needs;
- irrigation;
- zootechnics, fish-breeding;
- various industrial processes;
- ext.

To grant the supply of water from wells, rivers or lakes, ENERECO srl has developed a series of photovoltaic and wind KITS.

"SWP200" SERIES SYSTEMS

SWP200 series systems have been developed to satisfy the water needs of single families or of small communities. In fact, thanks to **"PS200"** group **(pump / motor / controller)**, SWP200 series systems can have water flow rates from 800 till 10000 litres per day according to the installation site, the total head and the pump. In fact "SWP200" series systems can be equipped with 3 different types of pump: HR04, HR07, HR14.
It is important to say that the pumping systems type SWP200 function without batteries: the photovoltaic modules are connected directly to the motor of the pump thanks to a booster properly studied and realised. Therefore, the pump will function only during the day when the sun shines and it will switch off during the night and with bad weather. Moreover, PS200 group is complete with the well probe sensor to protect the pump in case of water lack.

MAIN TECHNICAL CHARACTERISTICS OF THE GROUP "PS200" (PUMP / MOTOR / CONTROLLER)

Pump

- high efficiency helicoidal impeller
- pump body: in rubber, abrasionproof
- impeller: in stainless steel treated with chrome, abrasionproof
- estimated long life, thanks to the use of special materials
- less damages due to sand compared to similar pumps
- self-cleaning mechanics
- nonreturn valve in the pump body
- protected against the functioning when the water lacks

Motor

- "brushless" DC motor
- water-cooled
- "carbon/ceramic" dynamic bearings

Controller

- control system with monitoring of the pump functioning;
- waterproof case for external mounting (on the structure of the pv modules);
- 2 inputs for well probe (protection against functioning without water);
- "float" or "pressure" switch and "remote control";
- protection against pump motor overload;
- EP200M: control system of the max speed of the pump with regulation;
- *Functioning with direct photovoltaic modules*: integrated MPPT Tracking;
- *Functioning with battery*: cut-off protection for discharge battery.

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TECHNICAL SHEET

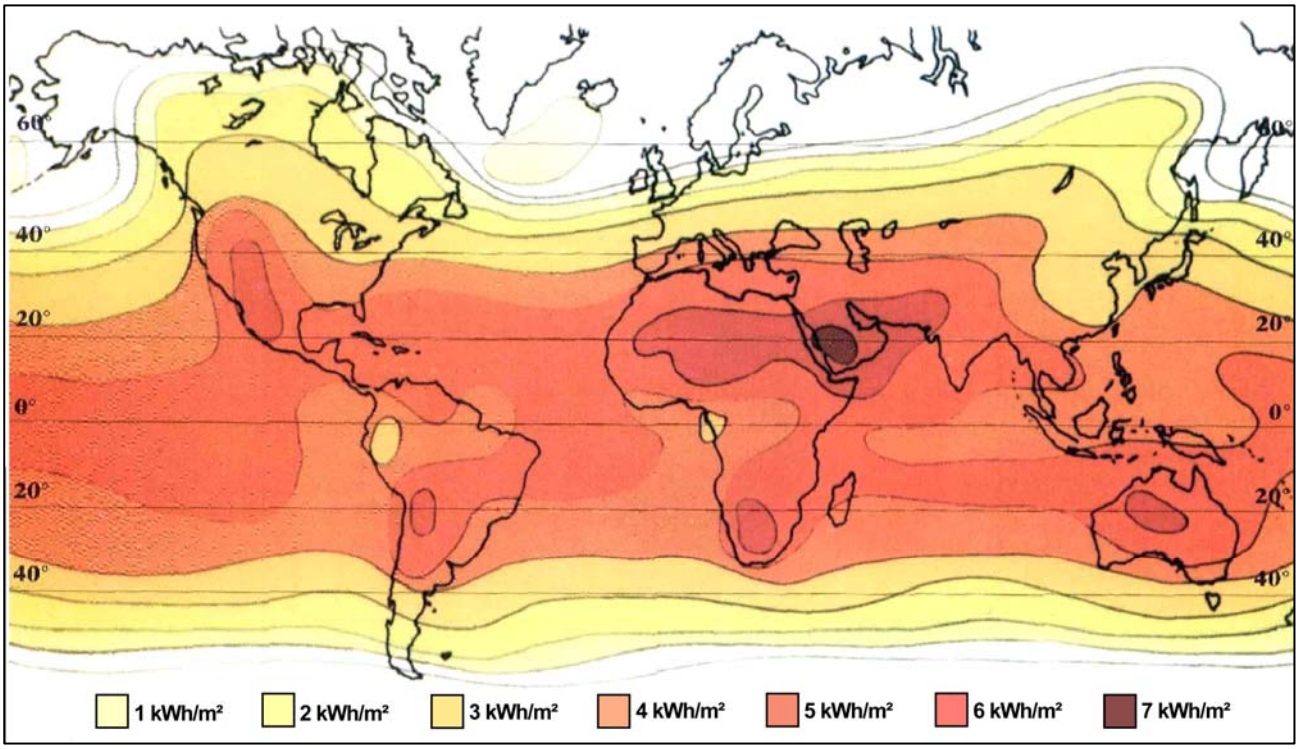
SWP200 SERIES PUMPING KITS

As already mentioned above, thanks to 3 different types of pumps, 3 different pumping kits are available:

- **PS200HR04**
- **PS200HR07**
- **PS200HR14**

Combining the groups PS200 with photovoltaic modules of different size, with configuration 24 - 36 - 48V, it is possible to develop pumping systems with daily flow rates from 800 to 18000 litres.
These flow rates change also according to the daily solar radiation of the site (kWh/m²/day), calculated on the inclined surface of the photovoltaic modules.
We have created various charts, some of which are for sites with 4kWh/m²/day/Tilt (Central Europe) and others are for sites with 6kWh/m²/day/Tilt (Africa, Caribbean area, tropical countries, Southern Europe).
Moreover, precise total head values of the system have been considered: 5 – 10 – 15 – 20 – 25 – 30 – 40 - 50 mt.
The total head is the total vertical head between the point where the pump is immersed and the tank of the water pumped.

MAP OF THE SOLAR ENERGY IN THE WORLD



Please refer to the data of the yearly average solar radiation in KWh/m² to choose the suitable calculation chart.

TECHNICAL SHEET

CALCULATION CHARTS OF SWP200 SERIES SYSTEMS

Kit SWP200 "24V SOLAR-DIRECT"

Sites with 6kWh/m²/day on the tilt of the pv modules						
Total head metres	Model of pumping group	Max flow rate litres/minute	Power of the photovoltaic array (lit/day) 80Wp	120Wp	150Wp	Pump cable mm²
5	PS200HR04	7,2	3500	3800	4000	2,5
	PS200HR07	13,0	4000	6000	7000	
10	PS200HR04	6,5	3300	3600	4000	2,5
	PS200HR07	13,0	3900	5200	5400	
15	PS200HR04	6,0	2900	3500	4000	2,5
	PS200HR07	12,0	3500	5000	5200	
20	PS200HR04	5,8	2500	3300	3900	2,5
	PS200HR07	12,0	2400	3800	4900	
25	PS200HR04	5,7	2200	3000	3500	2,5
30	PS200HR04	5,5	1900	2800	3100	2,5
40	PS200HR04	5,1	xxxxx	2000	2500	4,0
50	PS200HR04	5,1	See chart for systems "36-48V SOLAR DIRECT"			4,0

Kit SWP200 "24V SOLAR-DIRECT"

Sites with 4kWh/m²/day on the tilt of the pv modules						
Total head metres	Model of pumping group	Max flow rate litres/minute	Power of the photovoltaic array (lit/day) 80Wp	120Wp	150Wp	Pump cable mm²
5	PS200HR04	7,2	2200	2500	2800	2,5
	PS200HR07	13,0	2000	3500	4700	
10	PS200HR04	6,5	2000	2300	2600	2,5
	PS200HR07	13,0	1700	3000	4200	
15	PS200HR04	6,0	1800	2000	2400	2,5
	PS200HR07	12,0	1500	2800	3900	
20	PS200HR04	5,8	1400	1600	2200	2,5
	PS200HR07	12,0	1100	2500	3700	
25	PS200HR04	5,7	1100	1500	2100	2,5
30	PS200HR04	5,5	800	1200	2000	2,5
40	PS200HR04	5,1	xxxxx	1000	1800	4,0
50	PS200HR04	5,1	See chart for systems "36-48V SOLAR DIRECT"			4,0

The charts shown above describe the possible performance of the groups PS200 supplied with a voltage of 24V (2 modules of 36 cells in series or 1 module of 72 cells).

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TECHNICAL SHEET

Using more photovoltaic modules connected in series the performances of the pumping groups PS200 increase. In the following charts the Kits SWP200 with voltage of 36 or 48V are described.

Kit SWP200 "36-48V SOLAR-DIRECT"

Sites with 6kWh/m²/day on the tilt of the pv modules						
Total head metres	**Model of pumping group**	**Max flow rate litres/minute**	**Power of the photovoltaic array (lit/day)**			**Pump cable mm²**
			150Wp	**200Wp**	**250Wp**	
5	PS200HR04	12,0	6300	6600	7300	2,5
	PS200HR07	19,5	8500	9500	10500	
	PS200HR14	36,0	11000	15000	18000	
10	PS200HR04	11,8	6000	6500	7000	2,5
	PS200HR07	19,0	8000	9000	10000	
	PS200HR14	34,0	9000	13000	16000	
15	PS200HR04	11,5	5500	6000	6800	2,5
	PS200HR07	18,5	7000	9300	9500	
	PS200HR14	33,0	8000	11000	14000	
20	PS200HR04	11,5	5500	6200	6600	2,5
	PS200HR07	18,0	6000	7500	9000	
25	PS200HR04	11,3	5000	5600	6200	2,5
	PS200HR07	17,5	5000	6500	8000	
30	PS200HR04	11,0	4300	4900	5800	2,5
40	PS200HR04	11,0	3000	4000	5000	4,0
50	PS200HR04	10,5	2000	3000	4200	4,0

Kit SWP200 "36-48 SOLAR-DIRECT"

Sites with 4kWh/m²/day on the tilt of the pv modules						
Total head metres	**Model of pumping group**	**Max flow rate litres/minute**	**Power of the photovoltaic array (lit/day)**			**Pump cable mm²**
			150Wp	**200Wp**	**250Wp**	
5	PS200HR04	12,0	4800	5400	6400	2,5
	PS200HR07	19,5	4700	7000	8500	
10	PS200HR04	11,8	4500	5000	6000	2,5
	PS200HR07	19,0	4200	6000	7500	
15	PS200HR04	11,5	4000	4600	5700	2,5
	PS200HR07	18,5	3900	6000	7400	
20	PS200HR04	11,5	3300	4200	5400	2,5
	PS200HR07	18,0	4000	5500	7000	
25	PS200HR04	11,3	2600	3600	5100	2,5
	PS200HR07	17,5	xxxxx	2500	4000	
30	PS200HR04	11,0	2000	3000	4800	2,5
40	PS200HR04	11,0	1700	2400	3500	4,0
50	PS200HR04	10,5	1300	2000	3000	4,0

The data of water production are referred to photovoltaic systems with FIXED supporting structures.
Using a structure with solar tracker type “ACTIVE”, the data can be increased of 25% per year or even of 55% in summer in Europe.

TECHNICAL SHEET

HERE IS AN EXAMPLE OF CHOICE OF THE KIT SWP200

DATA OF THE CUSTOMER

collection point:	well of diameter 4”
storage point:	tank to be built
total head:	20 metres
water needs:	2500 litres/day
installation site:	Brindisi
use of system:	yearly
main use of the water pumped:	irrigation and zootechnics

DATA CALCULATED

Yearly average value of the solar radiation in Brindisi: 4.86 kWh/m²/day (estimate at tilt – EUROPEAN ATLAS OF THE SOLAR RADIATION – II VOLUME – VERLAG TÜV RHEINAND)

Now you should analyse the charts referred to the sites with an average solar radiation of “4kWh/m²/day”, choose the total head of 20 metres and then the pump and the photovoltaic array which can supply 2500 litres per day as requested.

Of course this system will be able to produce more litres of water per day as the available solar radiation coefficient is higher (4,86KWh/m²/gg).

Kit SWP200 "24V SOLAR-DIRECT"

Sites with 4kWh/m²/gg on the tilt of the pv modules

Total head metres	Model of pumping group	Max flow rate litres/minute	Power of the photovoltaic array (lit/day) 80Wp	mm²	150Wp	Pump cable mm²
20	PS200HR04	5,8	1400	1600	2200	2,5
	PS200HR07	12,0	1100	2500	3700	

Therefore, the pumping KIT composed in this way will be called **SWP200HR07/120.**

COMPOSITION OF THE KIT SERIES SWP200

Each KIT Series SWP200 will be composed by:

- PS200 group - PUMP/MOTOR/BOOSTER, with proper pump
- Photovoltaic modules
- Modules supporting structure
- Cables for the photovoltaic modules
- Junction box (if necessary)
- Pump cable of proper section and length equal to the total head demanded + 10 metres
- Steel cable for the pump suspension, of proper section and length equal to the total head demanded + 5 metres

Pipe, couplings, electrical and hydraulic accessories for the installation and all that is not mentioned above are not included in the KIT.

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