

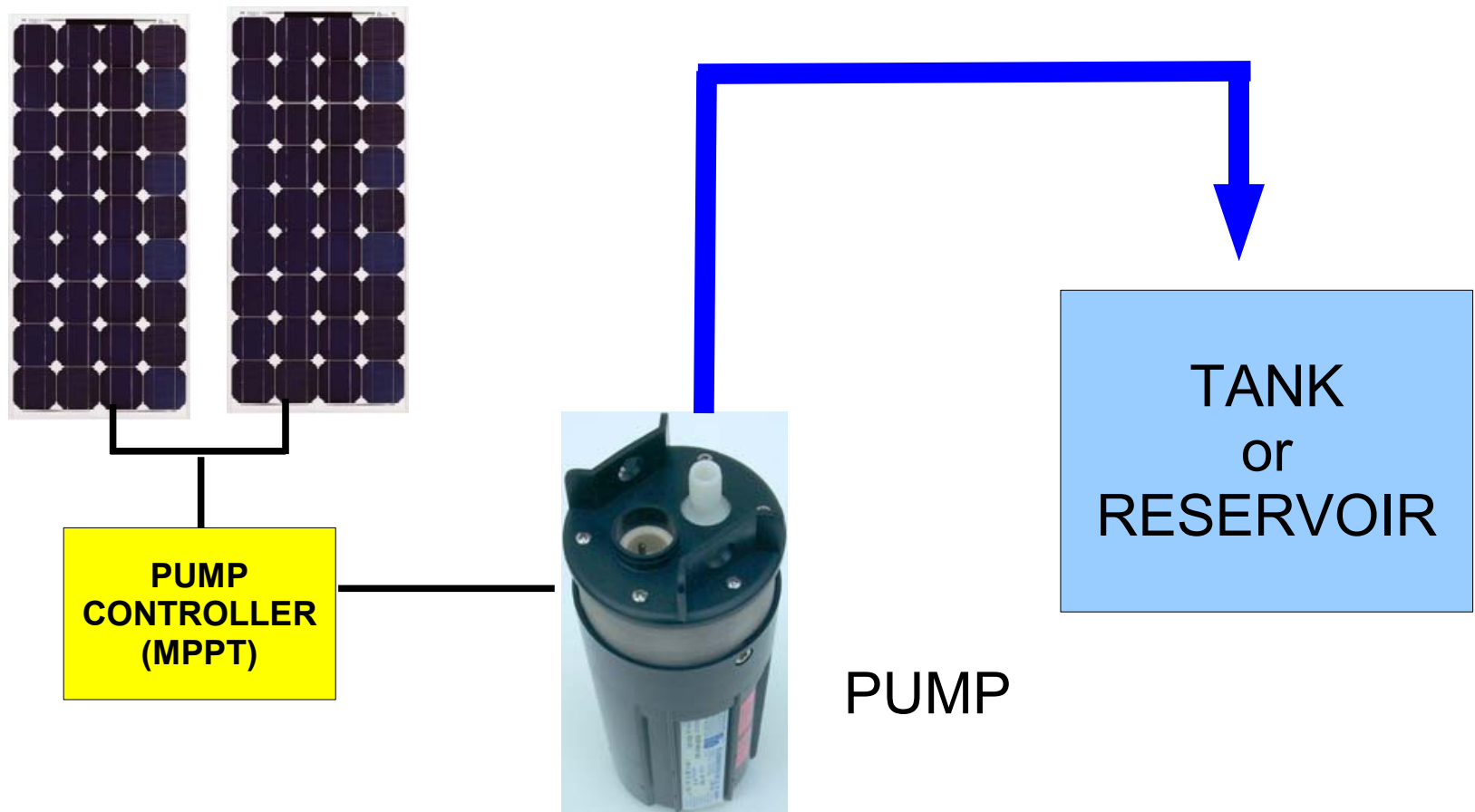
SOLAR WATER PUMPING

Solar water pumping

- Can be expensive
- Borehole can cost more than the PV system
- Generally more suitable for humans and animals rather than crop irrigation
- Usually no batteries
- At low heads it can be particularly effective



Solar water pumping system



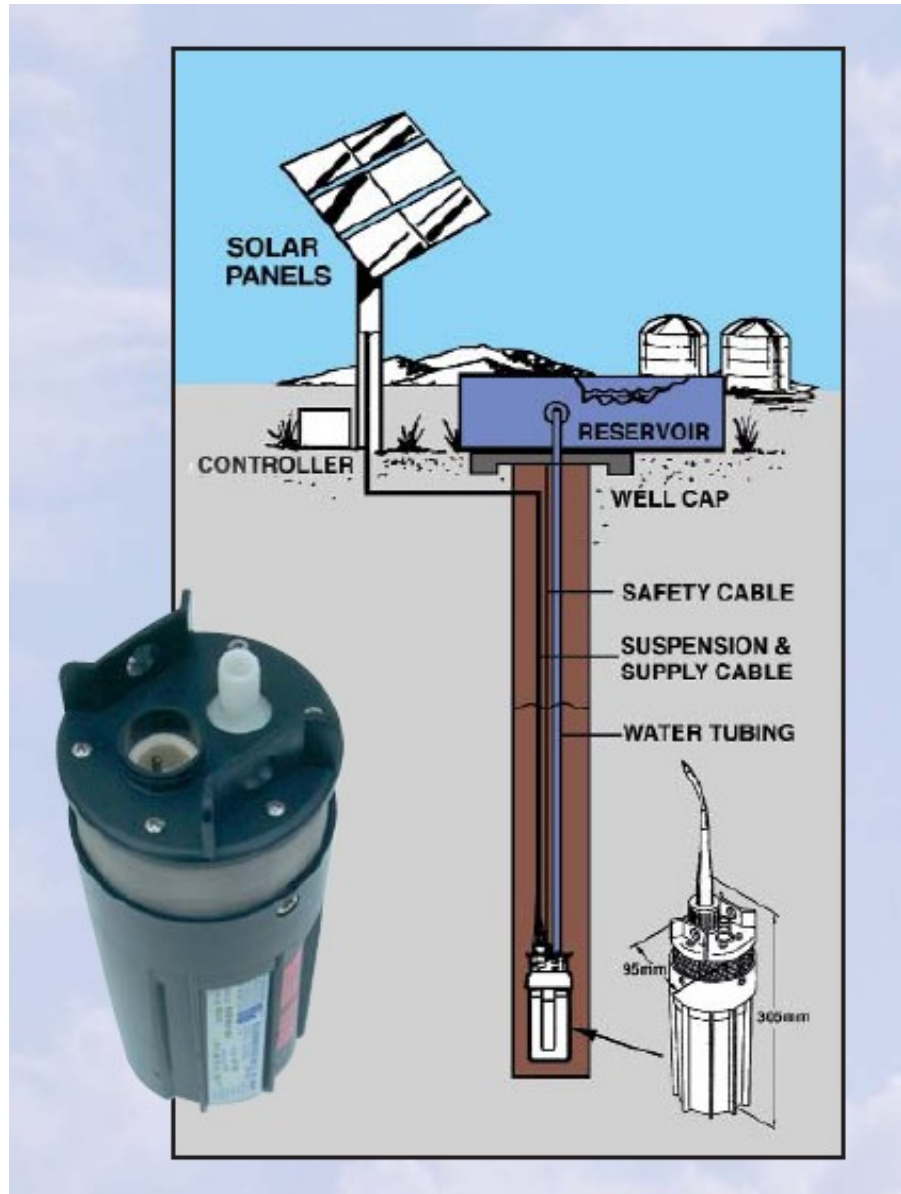
Solar water pump

- Pump works when the sun shines
- Water is stored
- High starting current needed
- MPPTs often used



Centre for Alternative Technology, Wales

Deep borehole pumps



www.ampair.com

Sizing a solar water pump

- How much water needed in m^3 per day?
- How high does it have to be pumped - in m?
 - vertical head
 - from max. borehole depth
 - to storage tank
- **With this information a pump can be selected**
- What is the solar radiation in the design month?
- **With this information a PV array can be sized**

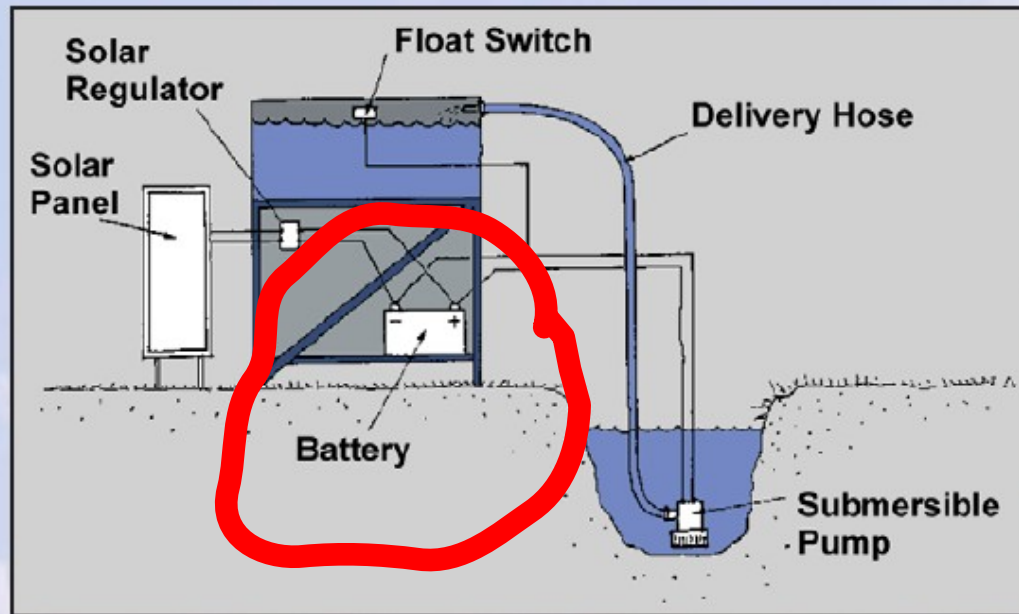
Water requirements

- Each person - 280 litres per day
 - Milk cow - 133 litres per day
- Cow/calf pair - 38-144 litres per day
- Horse, beef animal - 38-76 litres per day
 - Sheep - 8 litres per day
 - Pig - 15 litres per day
- 100 chickens - 15 litres per day

SYSTEMS
DO NOT
USUALLY
HAVE
BATTERIES

Submersible Surface Pumps.

These can be selected to suit the application. Factors that need to be considered include: Head of water (including storage tank height), flow rate required, method of priming, inclusion of automatic float switches, filtering system, match to power system and pump maintenance.



www.ampair.com

Low power boat / bilge / pond pumps

Solar Pond Pumps

These provide a remote, self-powered water feature.

The pump is directly connected to the Solar Panel

- **NO BATTERY REQUIRED**
- **NO MAINS REQUIRED**

Aquasolar 700

Recommended Solar Panel

10W to 20W

Max. Flow 12 litres per min.

Max. Head 2m

Aquasolar 1500

Recommended Solar Panel

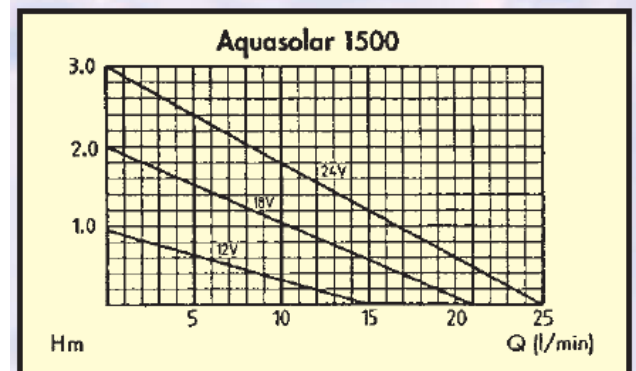
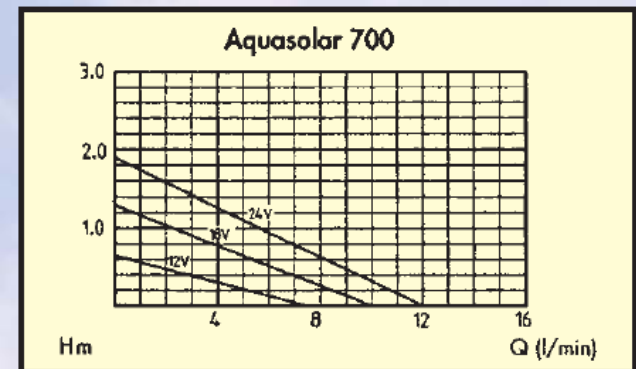
20W to 25W

Max. Flow 25 litres per min.

Max. Head 3m



ampair
MicroPower



www.ampair.com

Wind option (mechanical)

- 100,000s installed in the mid-West of USA in 19th century
- Also used in Australia and South Africa extensively
- Water is pumped and stored when wind blows
- Need to be above borehole



Wind option (electrical)

- Wind pumps often come in kit form, such as the RUTLAND FM910 wind pump kit.
- The turbine has a rotor diameter of 0.9m.
- It can pump water from wells or boreholes from a depth of 70m



Homesystem - SET



Garden irrigation Turkey

Qualified for:

- Household supply
- Irrigation of kitchen gardens
- **Up to 1,5 hectares by vegetables**
- **Up to 4 hectares by trees**

Recommended for a well depth from 10 to 40m
(Max. 70m)

Components:

| | |
|----|------------------------------|
| 2x | Solar modul TWIN 75 |
| 1x | Solar deep well pump STP 70 |
| 1x | Wiring set for solar modules |
| 1x | Wiring set for pump |

The system can be extended by 2 solar modules TWIN 75 and/or one wind generator WG 913 that could also operate at night!

Requirement: high-yield well and steady wind.

Available amount of water per day with the standard system:

| Water depth | Yield in tons per day | With additional wind generator WG 913 |
|-------------|-----------------------|---------------------------------------|
| 10m | 4 | 9 |
| 20m | 3,5 | 8 |
| 30m | 3 | 7 |
| 50m | 2,5 | 6 |



Puplic spring



www.sunset-solar.com

Field system MINI – SET

For irrigation of vegetable fields and tree plantations. Suitable for **up to 20 hectares of vegetables** and **up to 55 hectares of trees**, depending on water depth.

Recommended for a well depth of up to 30m

Components:

| | |
|-----|------------------------------|
| 15x | Solar modul KA 64 |
| 1x | Solar deep well pump STP 400 |
| 1x | Wiring set for solar modules |
| 1x | Wiring set for pump |



Field irrigation Turkey

The system can be extended by 6 solar modules KA 64 and/or one wind generator WG 1803.

Requirement: high-yield well and steady wind.

Available amount of water per day with the standard system:

| Water depth | Yield in tons per day | With additional wind generator WG 1803 |
|-------------|-----------------------|--|
| 10m | 75 | 150 |
| 20m | 45 | 90 |
| 30m | 35 | 70 |
| 50m | 20 | 40 |



Field system MIDI – SET



Deep well pump for a cattle watering tank in Namibia



For irrigation of vegetable fields and tree plantations.
Suitable for **up to 7 hectares of vegetables** and **up to 25 hectares of trees**, depending on water depth.

Recommended for a well depth of up to 70m
(max. 100m)

Components:

| | |
|-----|-------------------------------|
| 16x | Solar modul TWIN 75 |
| 1x | Solar deep well pump STP 1200 |
| 1x | Pump inverter 1200 |
| 1x | Solar distributor |
| 1x | Wiring set for solar modules |
| 1x | Wiring set for pump |

The system can be extended by 8 solar modules TWIN 75!

Available amount of water per day with the standard system:

| Water depth | Yield in tons per day |
|-------------|---|
| 20m |  |
| 30m | |
| 50m | |
| 70m | |

Field system MAXI – SET

For irrigation of vegetable fields and tree plantations. Suitable for **up to 9 hectares of vegetables** and **up to 25 hectares of trees**, depending on water depth.

Recommended for a well depth of up to 100m (max. 200m)

Components:

| | |
|-----|-------------------------------|
| 24x | Solar modul KA 64 |
| 1x | Solar deep well pump STP 1500 |
| 1x | Pump inverter 1500 |
| 1x | Solar distributor |
| 1x | Wiring set for solar modules |
| 1x | Wiring set for pump |

The system can be extended by 8 solar modules KA 64!

Available amount of water per day with the standard system:

| Water depth | Yield in tons per day |
|-------------|-----------------------|
| 30m | 55 |
| 50m | 35 |
| 70m | 25 |
| 100m | 20 |



Water supply for a village in Namibia



