

Tuesday, December 24, 2024

## Dollow Solar Powered Irrigation System

### Solar pumping project

#### Parameter

|                             |                                      |                    |       |                               |       |
|-----------------------------|--------------------------------------|--------------------|-------|-------------------------------|-------|
| Location:                   | Somalia, Doolow (4° North; 42° East) | Water temperature: | 25 °C | Altitude                      | 200 m |
| Required daily output:      | 800 m³; Sizing for average month     | Dirt loss:         | 5.0 % | Motor cable:                  | 50 m  |
| Pipe type (Discharge side): | plastic                              | Pressure head:     | 15 m  | Pipe length (Discharge side): | 50 m  |
| Pipe type (Suction side):   | plastic                              | Suction head:      | 2 m   | Pipe length (Suction side):   | 2.0 m |

#### Products

| Quantity                  | Details  |
|---------------------------|--|
| PSk3-15 CS-G100-27/2      | 1 pc. Surface pump system including controller with DataModule, motor and pump end |
| Jinko565                  | 36 pc. 20,340 Wp; 18 x 2 modules; 15 ° tilted                                      |
| Motor cable               | 50 m 16 mm² 3-phase cable for power and 1-phase cable for ground                   |
| Pipeline (Discharge side) | 50 m 150 mm (inner diameter) Pipeline  |
| Pipeline (Suction side)   | 2.0 m 100 mm (inner diameter) Pipeline   |
| Accessories               | 1 set Float Switch, Surge Protector2, PV Disconnect 1000-50-5, PV Protect 1000-125 |

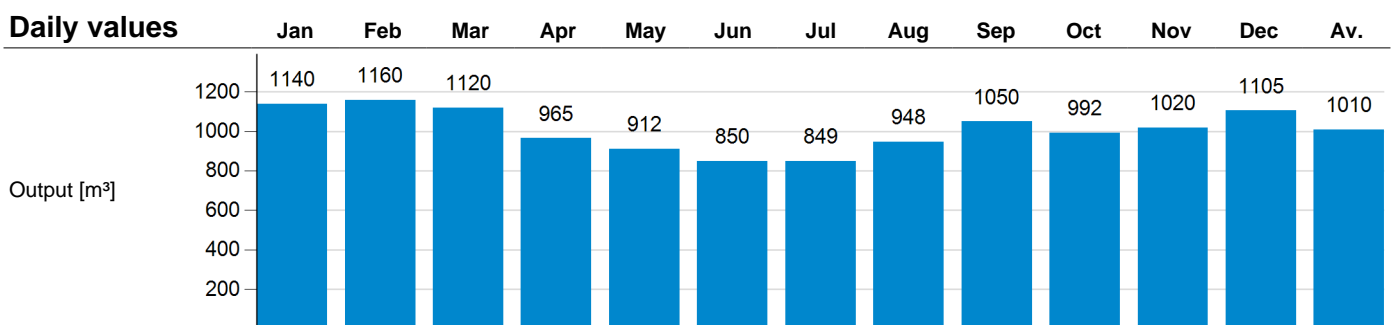
#### SunSwitch setting in PumpScanner

min. 200 W/m²

#### Daily output in average month

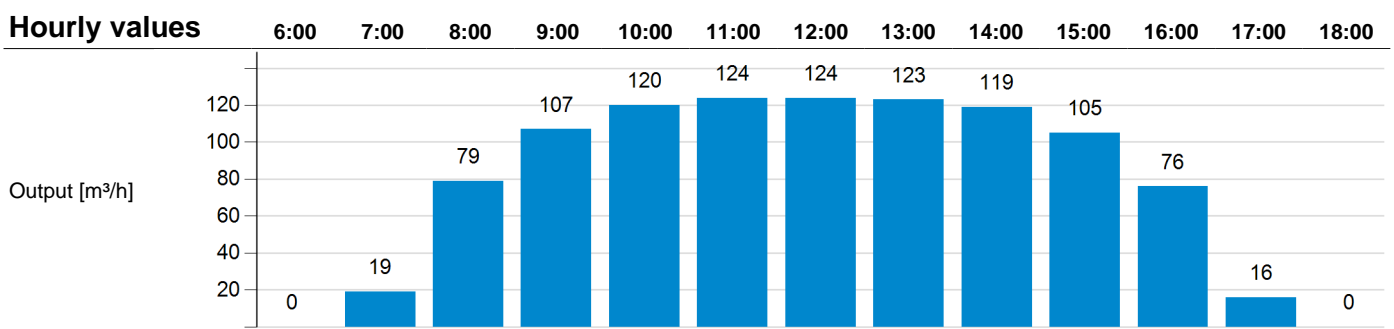
1,010 m³

#### Daily values



|                      |       |      |      |     |     |       |       |       |      |     |     |      |      |
|----------------------|-------|------|------|-----|-----|-------|-------|-------|------|-----|-----|------|------|
| Energy [kWh]         | 117   | 120  | 112  | 92  | 85  | 78    | 77    | 88    | 101  | 94  | 97  | 110  | 97   |
| Irradiation [kWh/m²] | 7.0   | 7.3  | 6.8  | 5.4 | 5.0 | 4.5   | 4.5   | 5.2   | 6.0  | 5.5 | 5.7 | 6.5  | 5.8  |
| Rainfall [mm]        | 0.067 | 0.10 | 0.70 | 3.2 | 1.4 | 0.033 | 0.067 | 0.033 | 0.10 | 1.6 | 1.5 | 0.37 | 0.77 |
| Ambient temp. [°C]   | 29    | 29   | 30   | 29  | 28  | 27    | 27    | 27    | 28   | 28  | 27  | 28   | 28   |

#### Hourly values



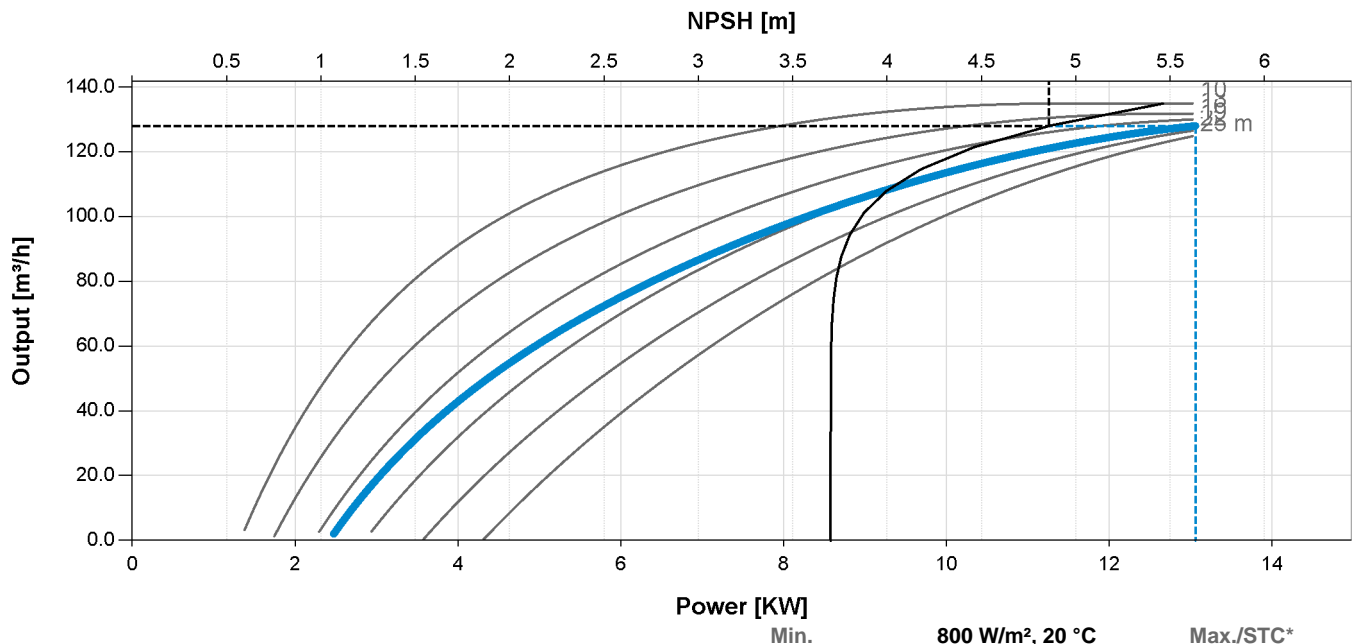
|                      |       |      |      |      |      |      |      |      |      |      |      |      |       |
|----------------------|-------|------|------|------|------|------|------|------|------|------|------|------|-------|
| Energy [kWh]         | 0.015 | 3.1  | 6.5  | 9.4  | 11   | 13   | 13   | 12   | 11   | 9.0  | 6.2  | 2.9  | 0.015 |
| Irradiation [kWh/m²] | 0.001 | 0.16 | 0.36 | 0.54 | 0.68 | 0.76 | 0.79 | 0.76 | 0.68 | 0.54 | 0.36 | 0.16 | 0.001 |
| Ambient temp. [°C]   | 23    | 23   | 24   | 26   | 28   | 30   | 32   | 33   | 33   | 33   | 33   | 32   | 32    |

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### System characteristic



|              |                            |        | Min.  | 800 W/m², 20 °C | Max./STC* |
|--------------|----------------------------|--------|-------|-----------------|-----------|
| PV generator | Cell temperature           | [°C]   |       | 46              | 25        |
|              | Temperature loss           | [%]    |       | 11              | -         |
|              | Dirt loss                  | [%]    |       | 5.0             | -         |
|              | Pmax                       | [Wp]   |       | 13,850          | 20,340    |
|              | Vmp                        | [V]    |       | 675             | 754       |
|              | Imp                        | [A]    |       | 21              | 27        |
|              | Voc                        | [V]    |       | 836             | 911       |
|              | Isc                        | [A]    |       | 22              | 28        |
|              | Pout                       | [W]    |       | 13,250          | -         |
|              | Vout                       | [V]    |       | 719             | -         |
|              | Iout                       | [A]    |       | 18              | -         |
| Motor cable  | Power loss                 | [%]    | 0.25  | 0.66            | 0.66      |
| Pump systems | Motor power                | [W]    | 2,470 | 13,050          | 13,050    |
|              | Motor voltage              | [V AC] | 265   | 377             | 377       |
|              | Motor current              | [A]    | 6.1   | 23              | 23        |
|              | Motor speed                | [rpm]  | 1,995 | 2,825           | 2,825     |
|              | Frequency                  | [Hz]   | 35    | 50              | 49        |
|              | Flow rate                  | [m³/h] | 2.1   | 128             | 128       |
|              | Efficiency                 | [%]    | 3.9   | 52              | 62        |
| Pipeline     | Flow speed                 | [m/s]  | 0.032 | 2.0             | 2.0       |
|              | Friction loss              | [m]    | 0.001 | 0.97            | 0.97      |
|              | Friction loss suction side | [m]    | 0.001 | 1.8             | 1.8       |
|              | NPSH                       | [m]    | 3.7   | 4.86            | 4.86      |

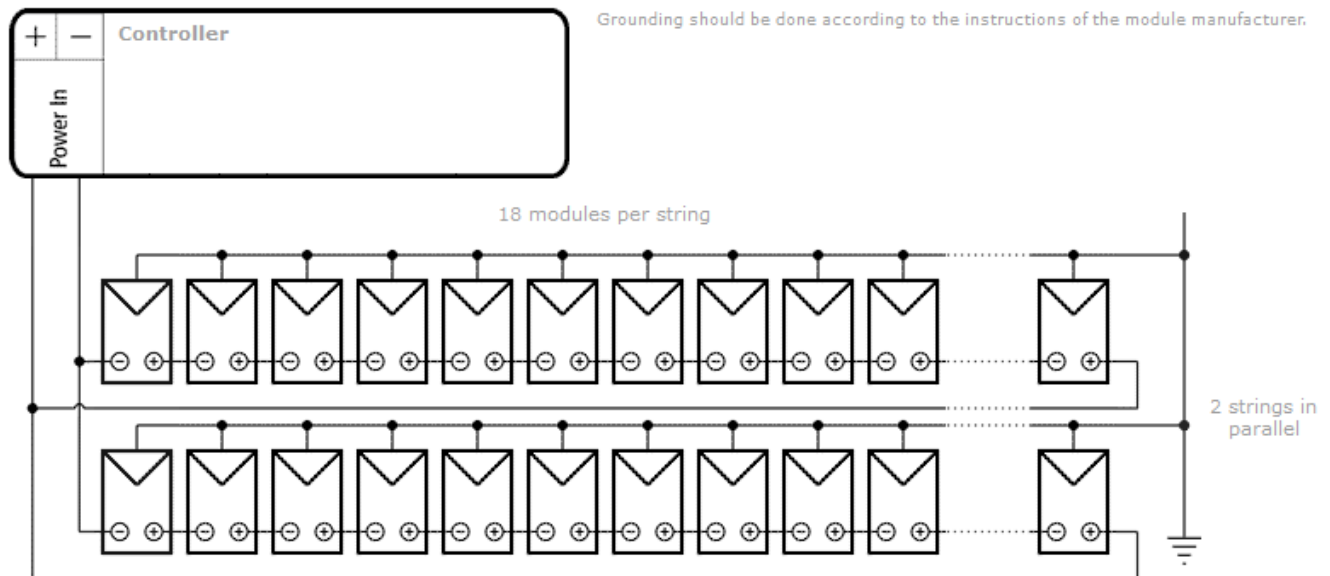
\*STC: Standard test conditions for photovoltaic modules, 1000 W/m² solar irradiance, 25 °C cell temperature

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## Dollow Solar Powered Irrigation System

Solar pumping project

### Wiring diagram

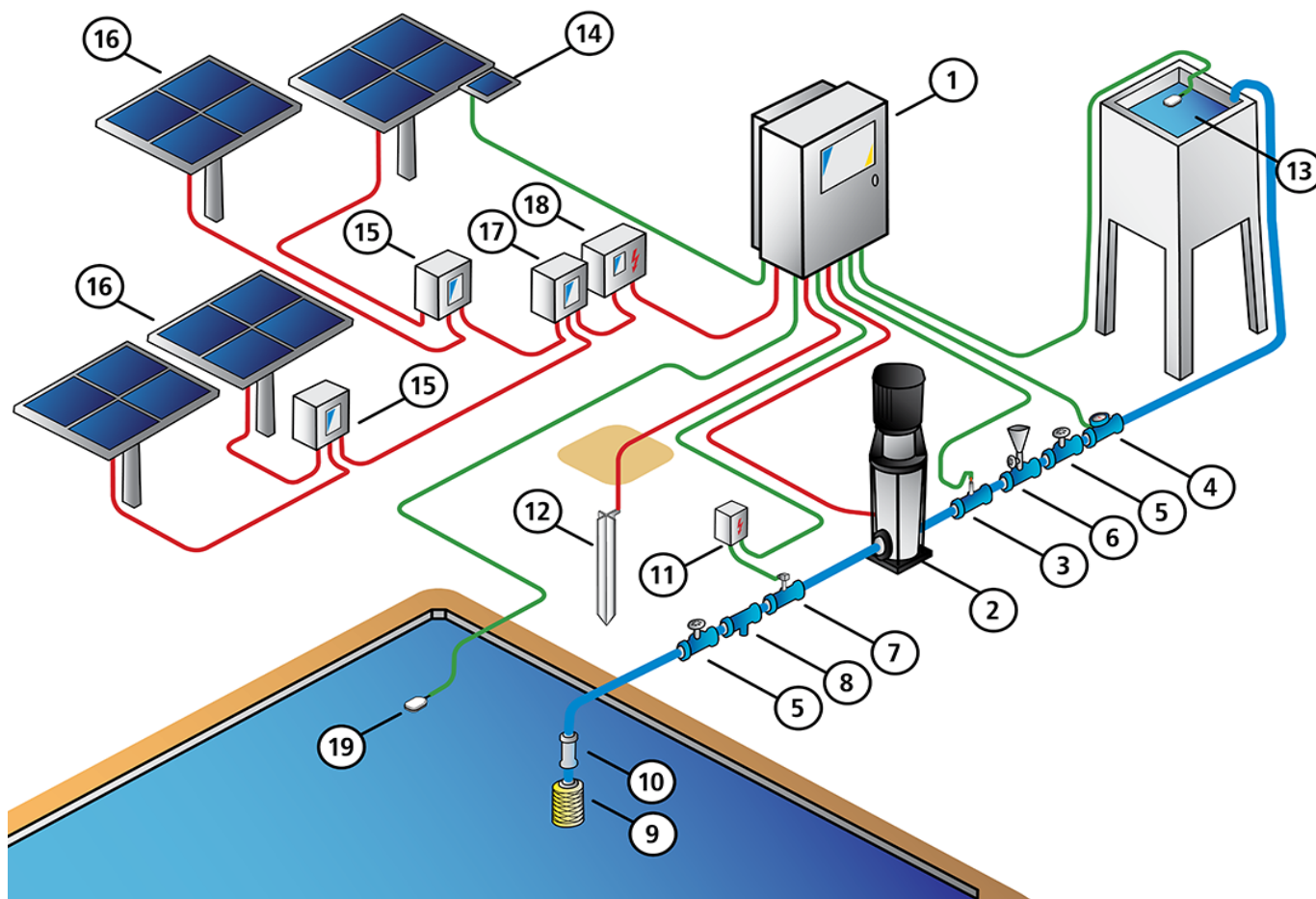


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## Dollow Solar Powered Irrigation System

Solar pumping project

### System Layout



1: PSk2 Controller

2: Surface Pump

3: Pressure Sensor

4: Water Meter

5: Gate Valve

6: Filler

7: Water Sensor

8: Strainer

9: Filter Cage

10: Nonreturn Valve

11: Surge Protector\*

12: Grounding Rod

13: Float Switch

14: PV Module for Sun Switch

15: PV Disconnect

16: PV Generator

17: PV Combiner

18: PV Protect

19: Float Switch for Well Probe

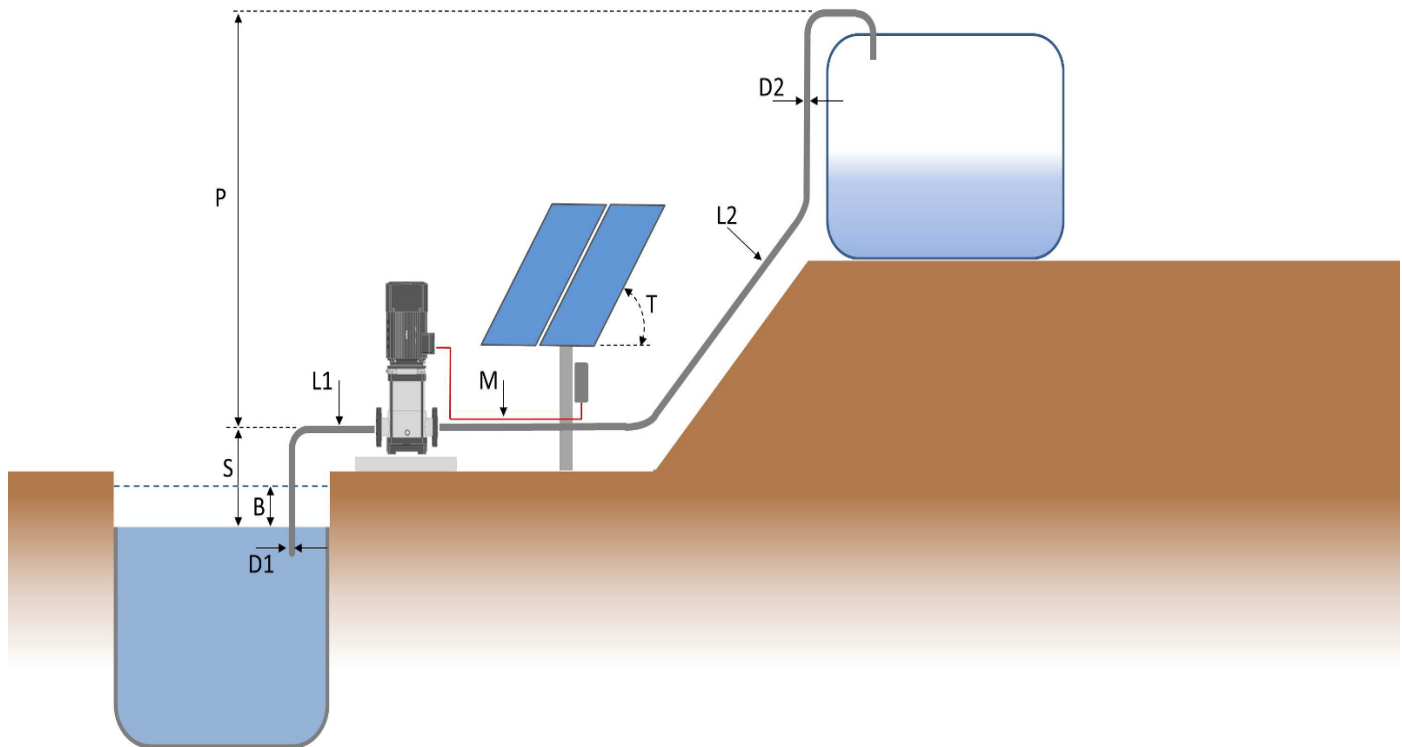
\*It is recommended to install a Surge Protector at each controller sensor input.

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## Dollow Solar Powered Irrigation System

Solar pumping project

### Sizing Layout



|  |   |
|--|---|
| <b>P (Pressure head):</b>                            | Vertical height from the pump outlet to the highest point of delivery.  |
| <b>S (Suction head):</b>                             | Vertical height from the water level to the pump inlet where the water level is below the pump inlet.   |
| <b>B (Drawdown):</b>                                 | Lowering of water level depending on flow rate and recovery rate of the reservoir.  |
| <b>D1 (Pipeline inner diameter (Suction side))</b>   |   |
| <b>D2 (Pipeline inner diameter (Discharge side))</b> |   |
| <b>L1 (Pipe length (Suction side)):</b>              | Pipe length from the water level to the pump inlet. Elbows and other fittings must be added as an equivalent length of pipeline (the losses of a 90° long radius elbow and of a check valve are already included in the calculation). |
| <b>L2 (Pipe length (Discharge side)):</b>            | Pipe length from the pump outlet to the point of delivery. Elbows and other fittings must be added as an equivalent length of pipeline.   |
| <b>M (Motor cable):</b>                              | The cable between controller and pump unit.   |
| <b>T (Tilt angle):</b>                               | Angle of the PV generator surface from the horizontal plane.  |

# PSk3-15 CS-G100-27/2

## Solar Surface Pump System

### System Overview

|           |               |
|-----------|---------------|
| Head      | max. 25 m     |
| Flow rate | max. 135 m³/h |

### Technical Data

#### Controller PSk3-15

- High efficiency solar pump controller
- Integrated hybrid power functions to mix solar with grid / generator power
- Integrated MPPT (Maximum Power Point Tracking)
- Multiple analogue and digital sensor
- Simple configuration with LORENTZ Assitant App
- Onboard data logging and system monitoring with real-time and historic data views
- Inbuilt water applications to manage your pumping system
- SunSensor included for unique pump and motor protection
- Active temperature management

|                 |             |
|-----------------|-------------|
| Power           | max. 16 kW  |
| Input voltage   | max. 850 V  |
| Optimum Vmp**   | > 575 V     |
| Motor current   | max. 25 A   |
| Efficiency      | max. 98 %   |
| Ambient temp.   | -25...60 °C |
| Enclosure class | IP66        |

#### Motor AC DRIVE CS-G 11kW

- Highly efficient 3-phase AC motor
- Frequency: 25...51 Hz

|                  |                   |
|------------------|-------------------|
| Efficiency       | max. 80 %         |
| Motor speed      | 1,400...2,905 rpm |
| Power factor     | 0.87              |
| Insulation class | F                 |
| Enclosure class  | IPX4              |

#### Pump End PE CS-G100-27/2

- Premium materials
- Centrifugal pump

|            |           |
|------------|-----------|
| Efficiency | max. 88 % |
|------------|-----------|

#### Pump Unit PU15k CS-G100-27/2 (Motor, Pump End)

|                   |                        |
|-------------------|------------------------|
| Water temperature | max. 90 °C****         |
| Suction head      | acc. to COMPASS sizing |

### Standards



2006/42/EC, 2004/108/EC, 2006/95/EC

IEC/EN 61702:1995, IEC/EN 62253 Ed.1

The logos shown reflect the approvals that have been granted for this product family. Products are ordered and supplied with the approvals specific to the market requirements.

\*\*Vmp: MPP-voltage under Standard Test Conditions (STC): 1000 W/m² solar irradiance, 25 °C cell temperature

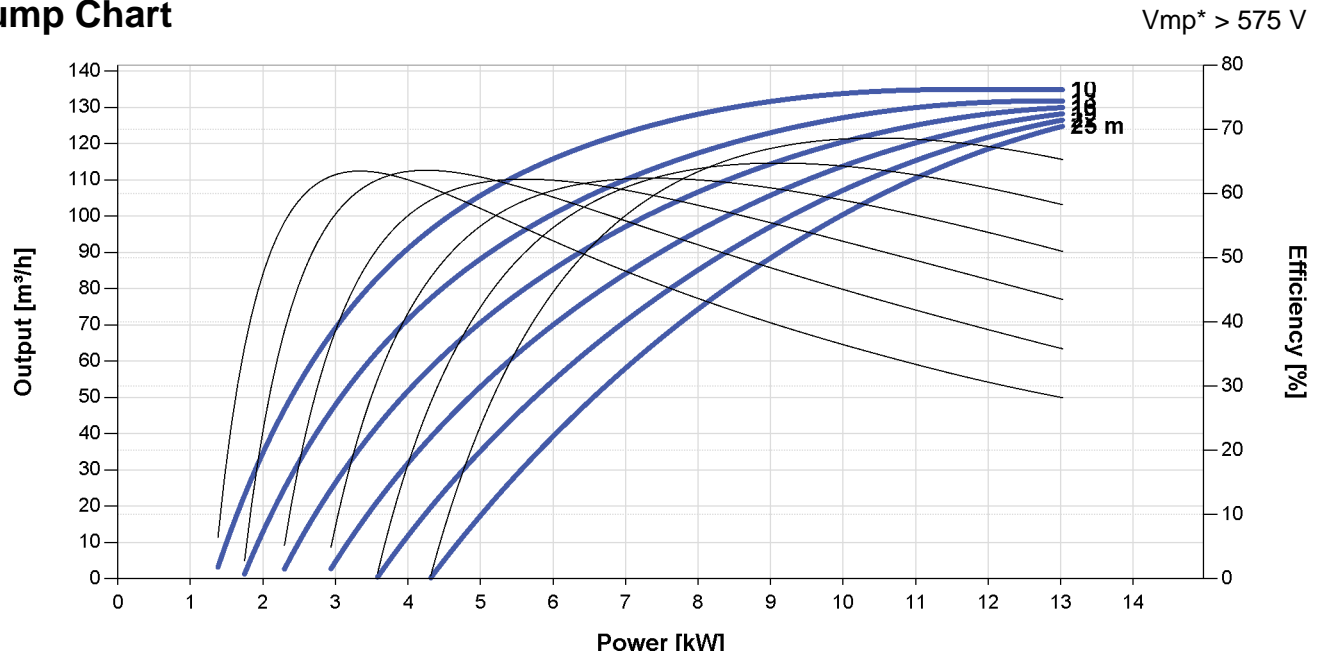
\*\*\*\*Special solutions available for >90 °C, please consult your distributor



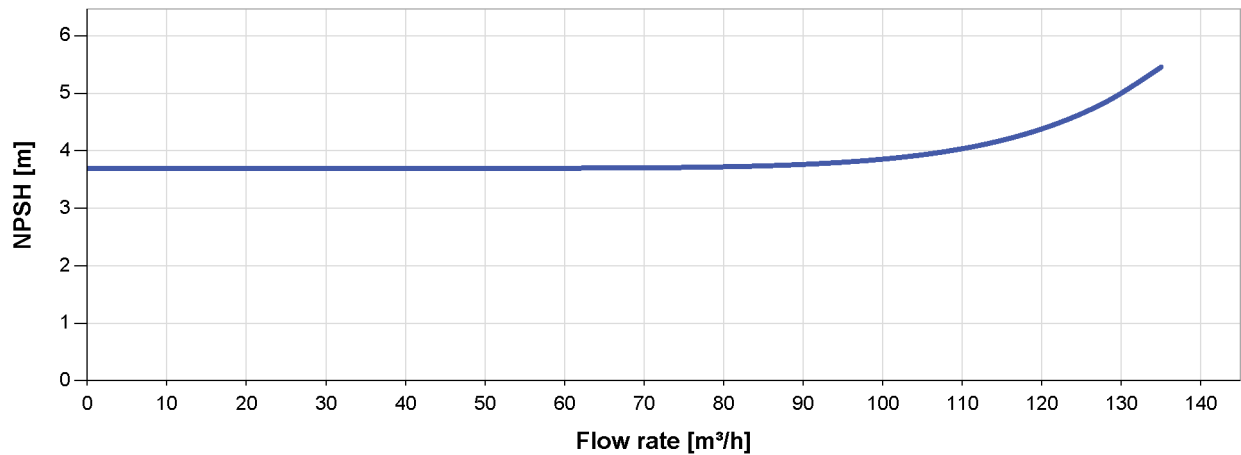
# PSk3-15 CS-G100-27/2

Solar Surface Pump System

## Pump Chart



## NPSH



The NPSH (Net Positive Suction Head) is NOT the operating suction head. To calculate the operating suction head please refer to the installation manual.

\*Vmp: MPP-voltage under Standard Test Conditions (STC): 1000 W/m² solar irradiance, 25 °C cell temperature

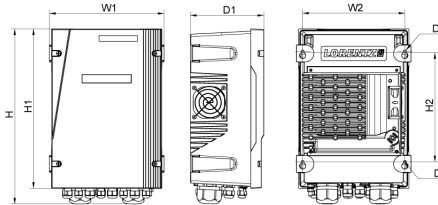
# PSk3-15 CS-G100-27/2

## Solar Surface Pump System

### Dimensions and Weights

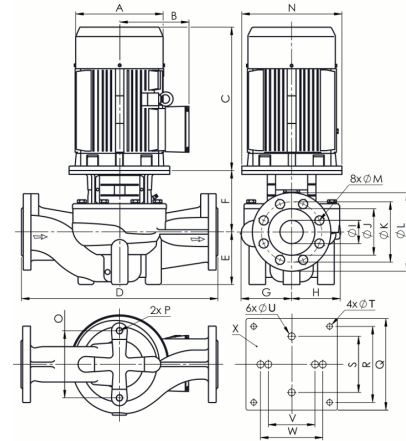
#### Controller

H = 428 mm  
 H1 = 390 mm  
 H2 = 270 mm  
 W1 = 280 mm  
 W2 = 250 mm  
 D = 6.0 mm  
 D1 = 180 mm



#### Pump Unit

A = 350 mm  
 B = 245 mm  
 C = 490 mm  
 D = 550 mm  
 E = 140 mm  
 F = 260 mm  
 G = 147 mm  
 H = 123 mm  
 I = 100 mm  
 J = 156 mm  
 K = 180 mm  
 L = 220 mm  
 M = 18 mm  
 N = 350 mm  
 O = 144 mm  
 P = M16  
 Q = 235 mm  
 R = 195 mm  
 S = 144 mm  
 T = 14 mm  
 U = 18 mm  
 V = 120 mm  
 W = 160 mm  
 X = 35 mm



Net weight

|            |        |
|------------|--------|
| Controller |        |
| Pump Unit  | 183 kg |
| Motor      | 107 kg |
| Pump End   | 76 kg  |

# Float Switch

## Mechanically Activated Device for Water Level Detection in Applications with LORENTZ Solar Pump Systems

The switch can be used to detect the water level within a tank. When the water level in the tank reaches the maximum, the LORENTZ Controller will stop the pump and indicates Tank Full LED.

### ORDER INFORMATION

- Item no.: 19-000030    product name: Float Switch

### FEATURES

- **N.O.** (normally open) and **N.C.** (normally closed) function
- Reliable water level detection
- Simple to install
- Trouble free operation
- Not sensitive to rotation
- Corrosion-free

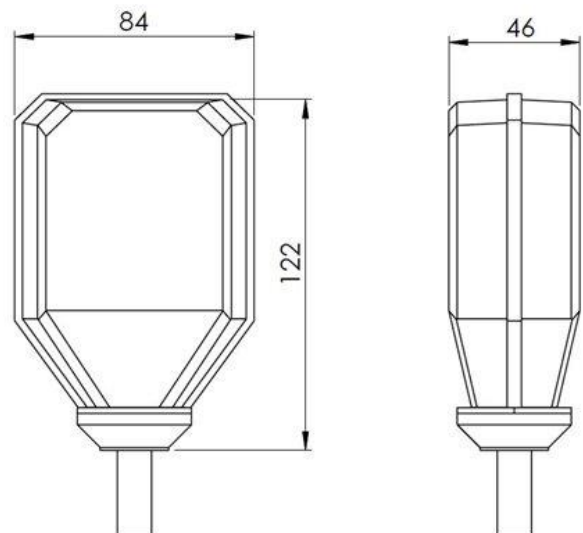


### TECHNICAL DATA

- Operating temperature: -10°C to 55°C
- Storage temperature: : -10°C to 55°C
- Enclosure class: IP68
- Cable length: 3m, waterproof
- Wire size: 3x 1.0mm<sup>2</sup> or AWG 18
- Meets the requirements for CE

### DIMENSION/WEIGHT

- Packaging dimensions: 230 x 160 x 55 mm  
9.1 x 6.3 x 2.2 in
- Total weight: 0.8 kg / 1.8 lbs



# Surge Protector2

Device to Protect LORENTZ Pump Accessories from Voltage Spikes

## ORDER INFORMATION

- Item no.: 19-005210    product name: Surge Protector2

## FEATURES/COMPATIBILITY

- Reliable surge protection device for any switched, pulse or analogue (4-20 mA) inputs sensors including:
  - Well Probe Sensor 19-000000
  - Water Sensor 19-000001
  - Float Switch 19-000030
  - Pressure Switch 19-000310
  - Liquid Level (all types, e.g. 19-005040)
  - Liquid Pressure Sensor (all types, e.g. 19-004460)
  - Water Meter (all types, e.g. 19-002160)
  - Sun Switch (19-000050)
- The device must be installed inside the PS2 or PSk2 controller.



## TECHNICAL DATA

- Max. voltage: 30 V DC
- Max current 8/20 $\mu$ s: 500 A
- Enclosure class: IP20
- Ambient temperature: max. 80°C (176°F)
- Wire size: 2 x 1.5mm<sup>2</sup> (AWG 16)
- Meets the requirements for CE

## DIMENSION/WEIGHT

- Packing dimensions:    56 x 26 x 120 mm  
                                     2.2 x 1.02 x 0.47 in
- Total weight                0.1 kg / 0.2 lbs

**BERNT LORENTZ GmbH**  
Siebenstuecken 24, 24558 Henstedt-Ulzburg, Germany  
Tel +49 (0)4193 8806-700, [www.lorentz.de](http://www.lorentz.de)

**Sun. Water. Life.**

All specifications and information are given with good intent, errors are possible and products may be subject to change without notice.  
Pictures may differ from actual products depending on local market requirements and regulations.

# PV Disconnect 1000-50-5

## Connection Box with DC Disconnect Switch

### Description

The LORENTZ PV Disconnect 1000-50-5 is a PV connection box with an integrated DC disconnect switch and a combining function designed to be used with LORENTZ PSk pump systems.

The product can combine up to five (5) PV Module strings in parallel and connect them through the enclosed DC disconnect switch to the pump controller.

Designed to be installed between the solar generator and the pump controller meeting the electrical requirements of the connected devices.



Photo may differ from actual product

### Features

- DC rated disconnect to provide safe isolation of the system
- Combining function, allows up to 5 PV strings to be connected in parallel to the solar pump system
- Robust weatherproof housing designed to make installation simple
- Lockable to secure the system during maintenance (power locked off)
- Internal touch protection with screws
- Required for a professional installation of solar pumping systems

### Technical Data

|                         |                                    |
|-------------------------|------------------------------------|
| Product name            | PV Disconnect 1000-50-5            |
| Ambient temperature     | -30 °C to 50 °C [-22 °F to 120 °F] |
| Max. Voltage            | 1000 V DC                          |
| Max. current per string | 50 A                               |
| Max. total current      | 50 A                               |
| Max. no. of strings     | 5                                  |
| Input cable size        | 2.5 - 10mm² / AWG 14 - 8           |
| Output cable size       | 4 -16 mm² / AWG 12 - 6             |
| PG glands (input)       | 10 x M16                           |
| PG glands (output)      | 2 x PG-11                          |
| Enclosure class         | IP 68                              |
| Housing material        | Polycarbonate                      |
| Approvals and standards | Switch IEC 60947-3                 |

# PV Disconnect 1000-50-5

## Connection Box with DC Disconnect Switch

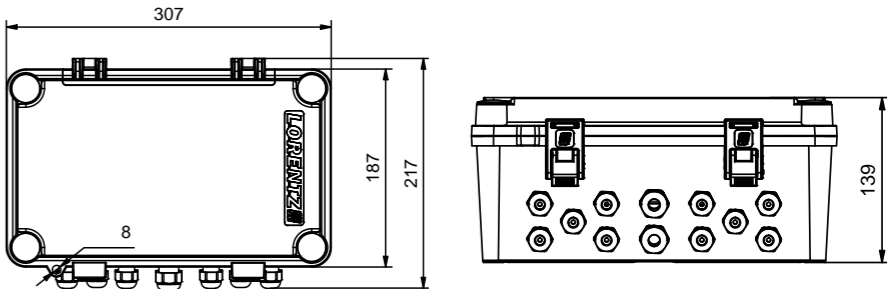
### Compatibility

- For use with LORENTZ PSk controllers.



### Product dimensions and weight

|                    |  |
|--------------------|--|
| Dimensions [LxWxH] | 307 x 139 x 217 mm [12.1 x 5.4 x 8.5 in] |
| Net Weight         | 2.1 kg [4.7 lbs]                         |



### Mounting options

- Wall mount using 4 holes with weather protection.
- Designed for optional pole mounting. Mounting points are pre-marked inside the housing.



|  |  |
|--|--|
| Mounting hole distances [WxH, Hole diameter] | 270 x 150, Ø6 mm [10.6 x 5.9, Ø0.236 in] |
|--|--|

### Order and Packaging information

|                              |  |
|------------------------------|--|
| Item number                  | 19-001965                                |
| Product name                 | PV Disconnect 1000-50-5                  |
| Packed gross weight          | 2.8 kg [6.2 lbs]                         |
| Packed volume                | 0.018 m³ [0.63ft³]                       |
| Packaging dimensions [LxWxH] | 360 x 250 x 200 mm [14.1 x 9.8 x 7.8 in] |



# PV Protect 1000-125

Surge protection device for PV systems

### Description

The LORENTZ PV Protect 1000-125 is an outdoor surge protection device for PSk solar pump systems, it will provide a higher level of protection against electrical surges from the PV generator, usually caused by indirect lightning strikes.

This product should be installed between the PV generator and the pump controller.

For operation it requires a reliable ground connection.



Photo may differ from actual product

### Features

- Provides enhanced protection to the pump controller from incoming voltage surges
- Robust weatherproof housing designed to make installation simple
- Tool required to open the housing
- Lockable for additional protection
- Correct grounding is required to make this device effective
- Required for a professional installation of solar pumping systems

### Technical Data

|                         |                                |
|-------------------------|--------------------------------|
| Product name            | PV Protect 1000-125            |
| Ambient temperature     | -30°C to 50°C (-22°F to 120°F) |
| Max. Voltage            | 1000 V DC                      |
| Max. current per string | 125 A                          |
| Max. total current      | 125 A                          |
| Input cable size        | 10 - 35 mm² / AWG 8 - 2        |
| Output cable size       | 10 - 35 mm² / AWG 8 - 2        |
| Ground cable size       | ≥ 16 mm² / AWG 6               |
| PG glands (input)       | 2 x PG16                       |
| PG glands (output)      | 2 x PG16                       |
| PG gland GND            | 1 x PG16                       |
| Enclosure class         | IP 68                          |
| Housing material        | Polycarbonate                  |
| Approvals and standards | EN 60204 - EN 61000 - EN 61643 |

# PV Protect 1000-125

Surge protection device for PV systems

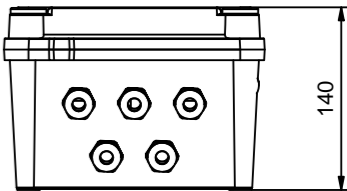
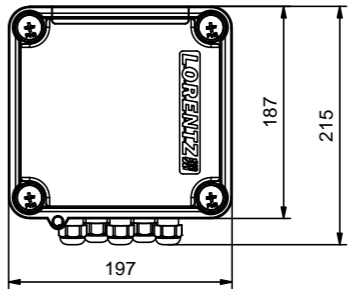
### Compatibility

- For use with LORENTZ PSk controllers.



### Product dimensions and weight

|                    |  |
|--------------------|--|
| Dimensions [LxWxH] | 215 x 140 x 197 mm<br>[8.6 x 5.5 x 7.8 in] |
| Net Weight         | 1.8 kg [3.9 lbs]                           |



### Mounting options

- Wall mount using 4 holes with weather protection.
- Designed for optional pole mounting. Mounting points are pre-marked inside the housing.

### Mounting hole distances [WxH, Hole diameter]

160 x 150, Ø6 mm  
[6.3 x 5.9, Ø0.236 in]



### Order and Packaging information

|                              |   |
|------------------------------|---|
| Item number                  | 19-001970                               |
| Product name                 | PV Protect 1000-125                     |
| Packed gross weight          | 2.4 kg [5.3 lbs]                        |
| Packed volume                | 0.0125 m3 [0.44 ft3]                    |
| Packaging dimensions [LxWxH] | 250 x 250 x 200 mm [9.8 x 9.8 x 7.8 in] |