

Example of using solar
pumping design software:

COMPASS

Presentation Screen when opening COMPASS:



Example for Submersible pump

LORENTZ COMPASS 3.1

COMPASS 3.1 Settings | Help | About COMPASS

LORENTZ

Pump systems PV generator PV Mounts Accessories Cable Pipe Ø D Pipe Ø S Head Output Efficiency

Inputs

General

Pumps selection
Current pumps

Location
Syria
Damascus
33° North 36° East

Tracker Pole Mount

Tilt angle 33° Azimuth angle 0°
Tilt angle, manual input

Dirt loss 5.0% Motor cable 100

Water temp. 25°C

Discharge side

Total dynamic head 200 m
 Pipe length

Output requirements

Required daily output 60 m³
Sizing for... month with least output

Flow rate limit 10.0 m³/h
 Motor speed limit

Calculate

Select your location by introducing Country and City OR GPS point

Leave the system to suggest the best performing angles for solar panel installation

Motor cable length = Typically pump installation depth + 20 meters. Make your best guess in case you don't know yet pump depth, as Motor cable length has little influence

Lost due to panels being covered with dust. If in dusty environment with little possibility to clean panels regularly, dirt lost = 10%. Otherwise leave it at 5%.

Only relevant if you are pumping hot water, as it won't refrigerate the pump properly. Otherwise, leave it at 25°C

If you don't know Total Dynamic Head of your system, tick on Pipe Length and fill the information to the best of your knowledge (see next slide)

State daily needs of water in terms of m³

If you have made a pumping test, introduce here the Safe Yield of the borehole (the maximum amount of water that can be pumped without drying the borehole).

If want to ensure the Required Daily Output of water is supplied even during months with least Sun (i.e. winter or rainy seasons) choose the option 'Sizing for month with least output'. Otherwise choose 'Average month'

Motor cable
The cable between controller and pump unit.

In case Total Dynamic Head is not known, tick on Pipe length and fill the 3 boxes to the best of your knowledge.

The screenshot displays the LORENTZ COMPASS 3.1 software interface. The main window shows a 3D simulation of a pump system with solar panels, a pump, and a water tank. A yellow double-headed arrow indicates the vertical height from the dynamic water level to the highest point of delivery. A red arrow points to the 'Pipe length' input field in the 'Discharge side' panel, which is set to 60 m. Another red arrow points to the 'Pipe type' dropdown menu, which is open to show a list of pipe types and their roughness values. A third red arrow points to the 'Static head' input field, which is set to 200 m. A text box in the top right corner defines 'Static head' as the vertical height from the dynamic water level to the highest point of delivery.

Static head
Vertical height from the dynamic water level to the highest point of delivery.

Vertical height from the dynamic water level to the highest point of delivery (not to be mistaken with static water level).

Length of pipe from pump outlet to pump to inlet of tank.

To fill Pipe Type, click on '+', then choose from the displayed 'Pipe type Menu' the closest definition to your pipe. In case of doubt, choose the worst case scenario ('steel, slightly rusty and incrustated' with Pipe roughness of 0.400).

Pipe type	Pipe roughness (mm)
plastic, drawn/pressed, new	0.007
plastic, drawn/pressed, used	0.030
steel, weldless, new comm. size galvanized	0.160
steel, weldless, new neatly galvanized	0.100
steel, weldless, rolling skin	0.060
steel, slightly rusty and incrustated	0.400
Custom pipe	Pipe roughness (mm)
custom 1	0.100
custom 2	0.200
custom 3	0.300
custom 4	0.400
custom 5	0.500

Click 'Calculate' and see whether your water needs are covered.

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Pump systems	PV generator	PV Mounts	Accessories	Cable	Pipe Ø D	Pipe Ø S	Head	Output	Efficiency
PSk2-40 C-SJ42-19	60,000 Wp (20x12 LC250-P60)			16 mm ²			100...200 m	62 m ³	1.0 l/Wp
PSk2-40 C-SJ42-19	60,000 Wp (20x12 LC250-P60)			16 mm ²			100...200 m	62 m ³	1.0 l/Wp
PS40k2 C-SJ42-19	60,000 Wp (20x12 LC250-P60)			16 mm ²			100...200 m	62 m ³	1.0 l/Wp

Inputs Wiring Report

Only relevant if you are pumping hot water, as it won't refrigerate the pump properly. Otherwise, leave it at 25C

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 Pipe length m

Output requirements
Required daily output 60 m³
Sizing for... month with least output
 Flow rate limit Motor speed limit
10.0 m³/h Hz

Calculate

Daily water pumped in m³ during April

62m³/day during December, which is the month with least output for our location. As it is higher than the Daily Required Output introduced (60m³/day), it means this system will provide all the water needed all the year round.

Daily water pumped in an average day during the year

Only relevant if you are pumping hot water, as it won't refrigerate the pump properly. Otherwise, leave it at 25C

This is an example of m³ pumped per hour in an average day. Pump will start running at 9:00h and will pump 8.1m³/h through 15:00h for 6.8m³/h

System output
Month: December
 Irradiation
 Energy
 Output
 Secondary axis
 Pump characteristic
 PV characteristic

Windows Taskbar: 1:55 PM 1/4/2017

Add/ remove solar panels and see how water output change

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PSK2-40 C-SJ42-19	40,250 Wp (23x7 LC250-P60)			16 mm²			100...200 m	40 m³	1.0 l/Wp
PSK2-40 C-SJ42-19	40,250 Wp (23x7 LC250-P60)			16 mm²			100...200 m	40 m³	1.0 l/Wp
PS40k2 C-SJ42-19	60,000 Wp (20x12 LC250-P60)			16 mm²			100...200 m	62 m³	1.0 l/Wp

Inputs Wiring **Report**

General

Pumps selection
Current pumps

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Damascus
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Dirt loss 5.0% Motor cable 100 m

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Output requirements

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Sizing for... month with least output

Flow rate limit Motor speed limit
10.0 m³/h

Calculate

By clicking the arrows up/down, number of solar panels can be increased/ decreased and water output will change accordingly

By clicking report, system characteristics will be shown (pump, number of panels, etc)

System output
Month: December

System output
 Irradiation
 Energy
 Output
 Secondary axis

Pump characteristic
 PV characteristic

2:12 PM 1/4/2017

By Clicking Report, all data of proposed system will be shown

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PS40k2 C-SJ42-19	60,000 Wp (20x12 LC250-P60)		16 mm²		100...200 m	62 m³	1.0 l/Wp	

Inputs | Wiring | Report

Project: 11/45
New project

Customer: [dropdown]
Note: 0/360

Report data

- Energy
- Irradiation
- Rainfall
- Ambient temp.
- Pump Chart
- Wiring
- System layout
- Sizing Layout
- Pump Datasheet
- Module Datasheet

CONNECTED products

- PS Communicator
- LC20-12M PS Communicator
- External Antenna
- Add CONNECTED products datasheets to report

Accessories

- Well Probe
- Float Switch
- Pressure Switch
- Liquid Level Sensor
- Liquid Pressure Sensor
- Water Meter
- Surge Protector
- PV Disconnect 1000-40-5

Create report PDF

Accessories for selected pump

- System layout
- All accessories

Parameter

Location: Syria, Damascus (33° North; 36° East) Water temperature: 25 °C

Required daily output: 60 m³; Sizing for December Dirt loss: 5.0 % Motor cable: 100 m

Pipe type: - Total dynamic head: 200 m Pipe length: -

Products

Quantity	Details
1 pc.	Submersible pump system including controller with DataModule, motor and pump end
161 pc.	40,250 Wp; 23 x 7 modules; 33 ° tilted
100 m	16 mm² 3-phase cable for power and 1-phase cable for ground
1 set	Well Probe, Surge Protector, 2x PV Disconnect 1000-40-5, PV Combiner 1000-125-4, PV Protect 1000-125, SmartPSUK2, SmartStart

SunSwitch setting in PumpScanner min. 450 W/m²

Daily output in December 40 m³

Daily values

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Output [m³]	47	48	65	66	67	72	68	67	66	62	47	40	60
Energy [kWh]	143	165	200	219	233	238	236	233	222	187	155	132	197
Irradiation [kWh/m²]	3.7	4.3	5.4	6.1	6.6	6.8	6.9	6.8	6.3	5.2	4.1	3.4	5.5

Preview

Refresh

< 1/5 >

View

- Full page
- Page width
- Customer database

5 pages showing different system data and drawings

Add/remove accessories (water level sensors, water meters etc) and produce report in .pdf if needed

2:26 PM 1/4/2017

Additional resources

- COMPASS video tutorials:
https://www.lorenz.de/en/partnernet/partner_program/partneracademy/webinar-recordings.html
- Tender template for solar pumping tenders:
<https://www.lorenz.de/en/partnernet/selling/tender.html>
- pumpScanner remote monitoring App for Android:
<https://www.lorenz.de/en/partnernet/support/pumpscanner.html>
- Knowledge Base for tricks and tips about solar pumping:
https://www.lorenz.de/en/partnernet/support/knowledge_base.html