



Appendix C1 - Step-by-step guide to use the Grundfos Calculator

The Grundfos calculator is available online from the product centre:

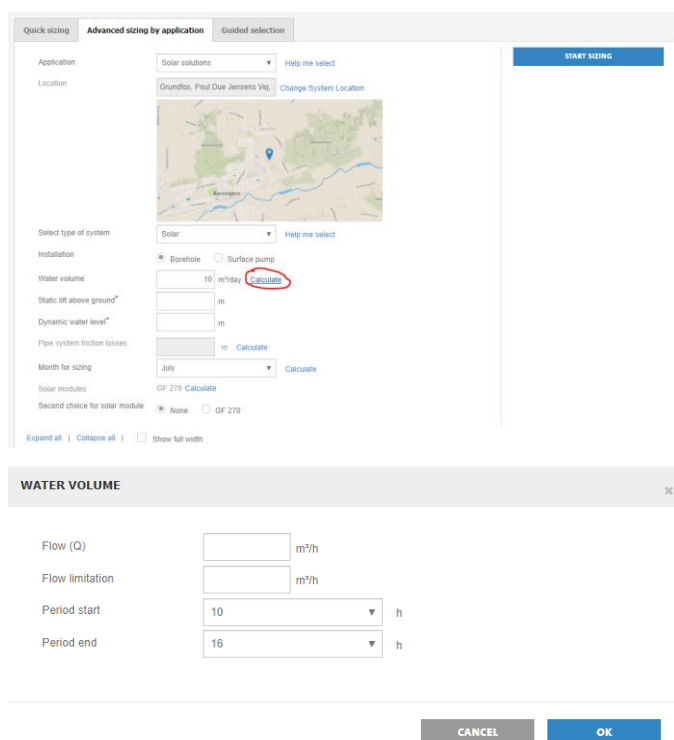
<https://product-selection.grundfos.com/front-page.html?qcid=544115734>

The first thing to do is click on 'Advanced Sizing by Application' from the sizing menu. Here a number of criteria can be entered.

1. Within the application, ensure that 'Solar Solutions' is selected

2. In location, input the location of your solar system. This can be inputted by searching for the place name or else the GPS coordinates in Decimal Degrees can be inputted. The more accurate the location the better, as solar irradiance (sun intensity) and average hours of sunlight changes depending on location.

3. In the installation tab, keep 'borehole' ticked unless you are designing a system with a surface pump.
4. The flow in m³/hr can then be inputted by clicking on 'calculate' next to water volume. The sustainable yield should have been calculated by the hydrogeologist's survey and pump testing. Due to some bugs in the software, it is best to input the 'sustainable yield' under 'flow limitation' and then to input the 'flow' as several m³/hr less than this.

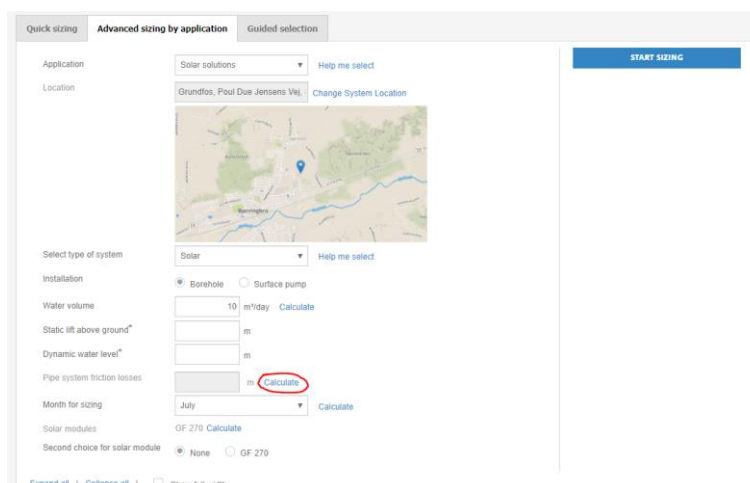


The screenshot shows the 'Advanced sizing by application' window. The 'Water volume' section is expanded, displaying the following fields:

- Flow (Q): m³/h
- Flow limitation: m³/h
- Period start: h
- Period end: h

The 'Calculate' button next to the 'Water volume' field is circled in red. The 'START SIZING' button is visible in the top right corner.

5. The hours of operation can be left as 10:00-16:00.
6. The static lift above ground should then be inputted. This is the difference in height between ground level and the base of the intake for the storage tank.
7. The dynamic water level should then be entered. This will have been calculated during the pump testing. It equals the static groundwater level + the drawdown.
8. Friction losses can then be calculated by clicking on the 'calculate button'. This is done for the riser pipe (pipe within the borehole) and discharge pipe (pipe from borehole to tank) by inputting the pipe diameters, pipe lengths and material type. Local losses can also be included by putting in the number of connections such as elbows, tees etc.



The screenshot shows the 'Advanced sizing by application' window. The 'Pipe system friction losses' section is expanded, displaying the following fields:

- Pipe diameter: mm
- Pipe length: m
- Material type: m

The 'Calculate' button next to the 'Pipe system friction losses' field is circled in red. The 'START SIZING' button is visible in the top right corner.

DISCHARGE PIPE FRICTION LOSSES

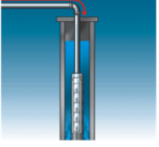
Material:

Size (inner diameter):

Length: m

Additional for single losses: [Calculate](#)

☒ % ☐ m ☐ ft



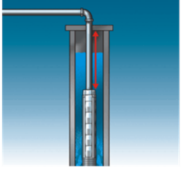
[CANCEL](#) [OK](#)

RISER PIPE FRICTION LOSSES

Material:

Size (inner diameter):

Length: m



[CANCEL](#) [OK](#)

9. The month for sizing can then be inputted. This should be the month with the minimal sunshine so that even in winter, the pump system can provide enough water.

MONTH FOR SIZING

Month	Radiation horizontal	Rating
January	0.62	
February	1.24	
March	2.59	
April	4.28	
May	5.47	
June	5.66	Maximum
July	5.44	
August	4.47	
September	3.01	Medium
October	1.67	
November	0.75	
December	0.44	Minimum

Month for sizing:

[CANCEL](#) [OK](#)

10. A number of other options can also be calculated, but these are not required for the systems that we undertake.
11. You can then click the 'start sizing' button.

Find products and solutions

Products [SEARCH](#)

Sizing
Enter pump sizing

Catalogue
Products and services

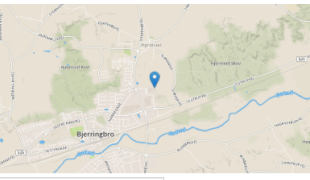
Replacement
Replace an old pump with a new

Liquids
Find pump by liquid

Quick sizing

Application: [Help me select](#)

Location: [Change System Location](#)




Select type of system: [Help me select](#)

START SIZING

12. The result will look something like the below. It is best to check that the average flow/day is consistent with your expected water demand or else you might need to go back and change some parameters. Systems are ranked according to how many litres of water they supply per Watt of installed capacity of the system. It is best to pick the first one on the list unless you have a reason for picking a different pump.

Sizing result

Basic sizing parameters		EDIT SIZING PARAMETERS				
	Application Solar solutions	Location Sudan	Select type of system Solar	Installation Borehole	Water volume 30 m³/day	Flow (Q) 5 m³/h
	Flow limitation m³/h	Period start 10 h	Period end 16 h	Static lift above ground 6 m	Dynamic water level 20 m	Pipe system friction losses m
	Month for sizing December	Solar modules GF 270	Second choice for solar module None			

ALL SUITABLE PRODUCTS (3)

☐

Batch actions:

EXPORT TO





▼

ADD TO COMPARISON

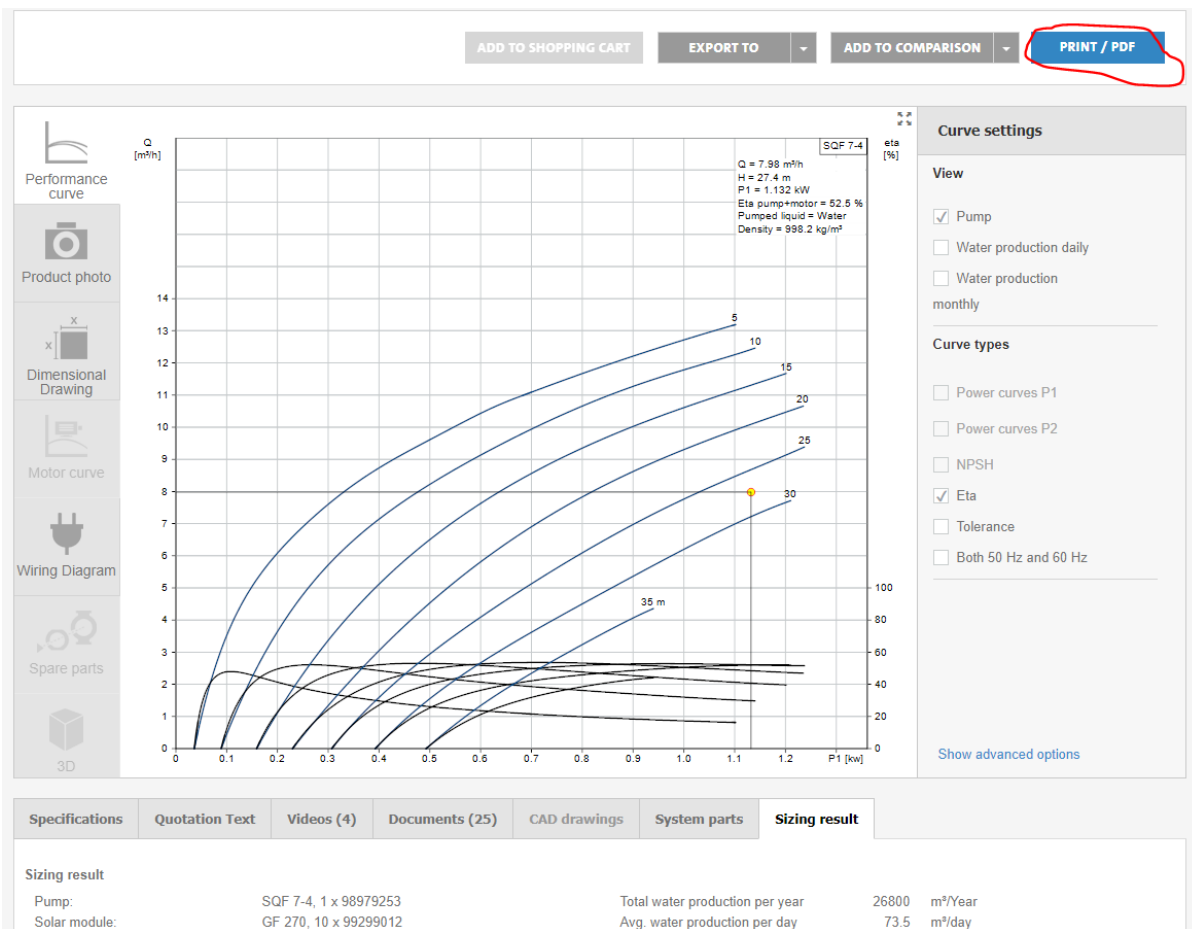
▼

Table size:

☐ Show full width

		System	Product No	Info	Pump	Sales region	Product number	Solar modules	Solar array power [kWp]	Water [m³/year]	Average water [m³/day]	Water [l/Wp/day]	Water in month for sizing [m³/day]
<input type="checkbox"/>		X	98979253 + ..		SQF 7-4	Europe/South America/Japan/Australia	99299012	8 x GF 270	2.16	20700	56.7	26.2	55.2
<input type="checkbox"/>		X	98979253 + ..		SQF 7-4	Europe/South America/Japan/Australia	99299012	10 x GF 270	2.7	26800	73.5	27.2	72
<input type="checkbox"/>		X	95027342 + ..		SQF 5A-7	Europe/South America/Japan	99299012	10 x GF 270	2.7	20900	57.3	21.2	56.5

13. After reviewing the outputs, you can then click on the system that you want and print your chosen spec sheets. These can be used to build-up your BOQs and put in Purchase Requests. Solar systems are very specific, so it is often possible to get a waiver for the three quotations if you have used one particular distributor's calculator.



14. The following tick boxes should be ticked so that an appropriate amount of information is printed on the spec sheets.

Content	Page & Headers setup	Security		
<div> <div>Product Information</div> <div> <input type="checkbox"/> US submittal data EDIT </div> <div> <input type="checkbox"/> Tender text EDIT </div> <div> <input type="checkbox"/> Incl. product photo </div> <div> <input checked="" type="checkbox"/> Quotation text <div> <input checked="" type="checkbox"/> Incl. product photo <input type="checkbox"/> Further product details </div> </div> <div> <input type="checkbox"/> Hide Product Number </div> <div> <input checked="" type="checkbox"/> Datasheet & Curve <div> <input checked="" type="checkbox"/> Include drawings <input checked="" type="checkbox"/> Curve <input type="checkbox"/> Motor curve <input type="checkbox"/> Motor datasheet </div> </div> <div> <input checked="" type="checkbox"/> Dimensional drawing <input checked="" type="checkbox"/> Wiring diagram <input type="checkbox"/> Sound measurement report <input type="checkbox"/> Vibration report <input checked="" type="checkbox"/> Sizing result <div> <input checked="" type="checkbox"/> Map <input checked="" type="checkbox"/> Summary <input checked="" type="checkbox"/> Order Data <input type="checkbox"/> Do not show prices <input type="checkbox"/> Load profile and calculators <input type="checkbox"/> Installation illustration <div> <input type="checkbox"/> Zeta values </div> <input type="checkbox"/> Life Cycle Cost report - graphics <input type="checkbox"/> Life Cycle Cost report - table <input type="checkbox"/> Replacement report </div> <div> <input checked="" type="checkbox"/> Accessories <div> <input checked="" type="checkbox"/> GF 270 <input checked="" type="checkbox"/> Wire kit array to control box (MC4) <input checked="" type="checkbox"/> Wire kit array to array (MC4) <input checked="" type="checkbox"/> RSI 3x380-440V IP66 11kW 23A <input checked="" type="checkbox"/> Sine-wave filter <input checked="" type="checkbox"/> OTDCP16, Circuit Breaker, 16Amp <input checked="" type="checkbox"/> OVR PV 40-1000 P, Surge Protection </div> </div> </div> </div>			<div> <div>Language</div> <div>Language: English ▼</div> <div>Parts information</div> <div> <input type="checkbox"/> Spare parts <div> Parts - Produced After 1609 (production year at ▼ <div> <input type="checkbox"/> (TM055374 SP30 Model B) <input type="checkbox"/> (TM055407 SP30 model B) </div> </div> </div> <div>Motor</div> <div> <input type="checkbox"/> (TM060554 MS6000 Model C for NEMO Project) <input type="checkbox"/> (tm026425 0706) <input type="checkbox"/> Exploded view <input type="checkbox"/> (tm026426 0503) <input type="checkbox"/> Sectional drawing </div> <div>Parts print options</div> <div> <div>Heading</div> <div>Font Size: 8 ▼</div> <div> <input checked="" type="checkbox"/> Portrait <input checked="" type="checkbox"/> Expanded </div> <div>Select columns to include</div> <div> <input checked="" type="checkbox"/> Pos <input checked="" type="checkbox"/> Description <input checked="" type="checkbox"/> Annotation <input checked="" type="checkbox"/> Classification Data <input checked="" type="checkbox"/> Part no. <input checked="" type="checkbox"/> Qty. <input checked="" type="checkbox"/> Unit </div> </div> </div>	