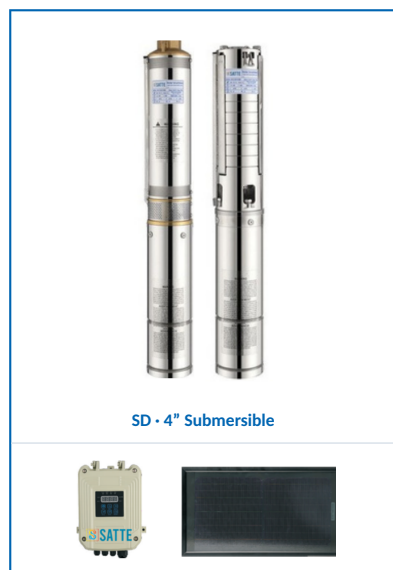
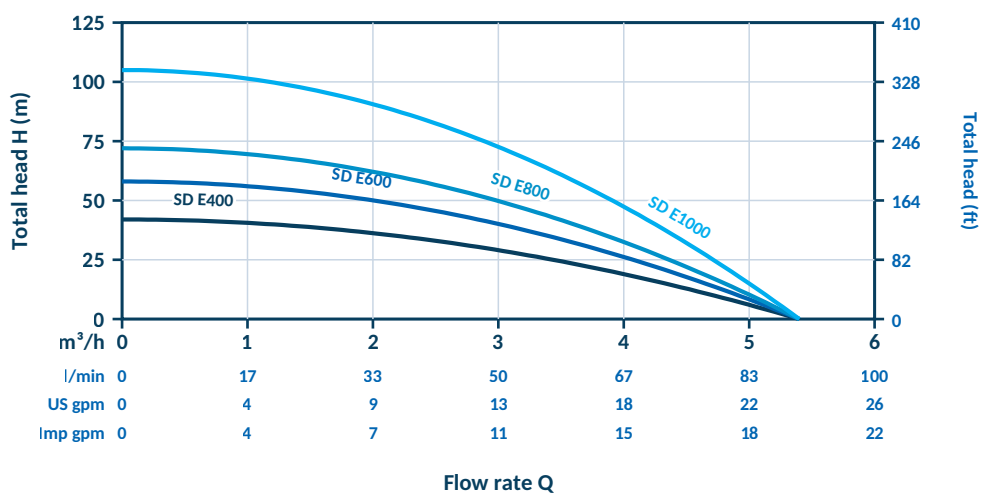


SFLO SD • DC Solar Submersible Pump



PERFORMANCE CHART AT 1000 W/m² IRRADIANCE



Pump, MPPT controller and PV module are supplied as a matched set. Brushless DC permanent-magnet submersible, 4" well, stainless steel. Curves are at full irradiance with the array at rated power; total head is the static lift from the pumping water level plus tank height plus friction in the rising main.

Technical Data

SATTE Model	Rated Power (W)	Motor Voltage (VDC)	Rated Current (A)	Stages	Maximum Flow				Maximum Head		Outlet DN	MPPT Controller		Weight (kg)
					m ³ /h	l/min	US gpm	Imp gpm	m	ft		Max Input (VDC)	Tracking Window (V)	
SFLO SD E400	400	48	9.1	3	5.4	90	23.8	19.8	42	138	1"	96	55-96	17.0
SFLO SD E600	600	48	13.6	4	5.4	90	23.8	19.8	58	190	1"	96	55-96	19.0
SFLO SD E800	800	48	18.1	5	5.4	90	23.8	19.8	72	236	1.25"	96	55-96	21.0
SFLO SD E1000	1000	72	15.1	7	5.4	90	23.8	19.8	105	344	1.25"	150	82-144	24.0

Rated current is at the motor terminals at rated power and 92% drive efficiency. The tracking window is the MPPT operating range; input below the lower figure will not start the pump.

Typical Applications

- Off-grid borehole water supply where mains power is unavailable.
- Drip, sprinkler and furrow irrigation on farms and smallholdings.
- Rural and institutional supply — schools, clinics, trading centres.
- Livestock watering points and cattle troughs.
- Filling elevated storage tanks for gravity distribution.
- Emergency and temporary supply in relief operations.

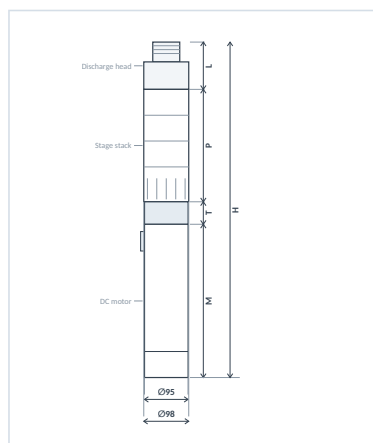
Features

- Brushless DC permanent-magnet motor — no brushes, no maintenance.
- MPPT controller with 99% tracking efficiency; starts on low irradiance.
- Stainless casing, shaft, coupling, impeller and inlet screen.
- Floating impeller eliminates axial thrust on the motor bearing.
- Protection: dry run, over/under-voltage, overload, over-speed.
- Automatic recovery after a fault clears; fault-code display.
- Wet-end efficiency above 85% — some 20% above an AC pump.

Operating Conditions

- Clean, non-corrosive water; sand content by volume not more than 3%; particle size below 1 mm.
- Maximum medium temperature +40 °C; pH 5-10.
- Minimum well diameter 4" (100 mm); the pump must remain fully immersed at all times.
- Maximum submersion depth 100 m below the water surface.
- Controller ambient -20 to +60 °C, mounted shaded and ventilated.
- The array must be unshaded across the whole pumping window.

Dimensions



Typical outline — all models

SATTE Model	Stages	Diameter (mm)		Length (mm)					Outlet Thread	Nett Weight (kg)
		Ø Pump	Ø Motor	L	P	T	M	H (overall)		
SFLO SD E400	3	98	95	88	209	42	285	624	1" BSP	17.0
SFLO SD E600	4	98	95	88	247	42	320	697	1" BSP	19.0
SFLO SD E800	5	98	95	95	285	42	355	777	1.25" BSP	21.0
SFLO SD E1000	7	98	95	95	361	42	395	893	1.25" BSP	24.0

L discharge head · **P** stage section including inlet screen · **T** coupling · **M** motor · **H** overall length. All models fit a 4" (100 mm) bore; allow clearance for the cable clamp. Nett weight excludes cable, controller and packing.

Solar Array Configuration — 450 W Modules

SATTE Model	Pump (W)	Standard Array — one string				High-Yield Array — two strings				Ctrl Max Input (V)
		S × P	Panels / Array W	Vmp / Voc (V)	Design m ² /day	S × P	Panels / Array W	Imp / Isc (A)	Design m ² /day	
SFLO SD E400	400	2 × 1	2 × 450 = 900 W	73 / 88 cold 92	28.9	Not recommended — array already 2.25× pump rating; second string adds only 23%				96
SFLO SD E600	600	2 × 1	2 × 450 = 900 W	73 / 88 cold 92	19.6	2 × 2	4 × 450 = 1800 W	24.7 / 26.2	32.0 +63%	96
SFLO SD E800	800	2 × 1	2 × 450 = 900 W	73 / 88 cold 92	13.1	2 × 2	4 × 450 = 1800 W	24.7 / 26.2	27.7 +112%	96
SFLO SD E1000	1000	3 × 1	3 × 450 = 1350 W	110 / 132 cold 139	16.8	3 × 2	6 × 450 = 2700 W	24.7 / 26.2	30.2 +80%	150

Reference module: 450 W LV (low-voltage solar-pump type) — Vmp 36.5 V, Voc 44.0 V, Imp 12.33 A, Isc 13.10 A at STC. **A standard 450 W module (Voc 49–50 V) must not be substituted** — three of those in series reach about 156 V on a cold morning and will exceed a 150 V controller. Cold Voc shown is STC Voc × 1.05, the open-circuit rise at roughly 8 °C cell temperature; use a larger factor for highland sites. **S** = modules in series per string, which sets voltage; **P** = strings in parallel, which sets current.

Standard vs High-Yield. At Uganda's design-month irradiance a single string rarely drives the pump to its rated power — the MPPT clips only for an hour or so around midday. A second string therefore converts almost one-for-one into extra water rather than being wasted, which is why the gain is 63–112% rather than the small margin oversizing gives in sunnier, cooler climates. Both strings must be identical in module type, count and orientation. **Confirm the controller's maximum PV input current before ordering the high-yield array:** two strings present 26.2 A short-circuit, and while the MPPT limits the power it draws, the input stage must still be rated for that current.

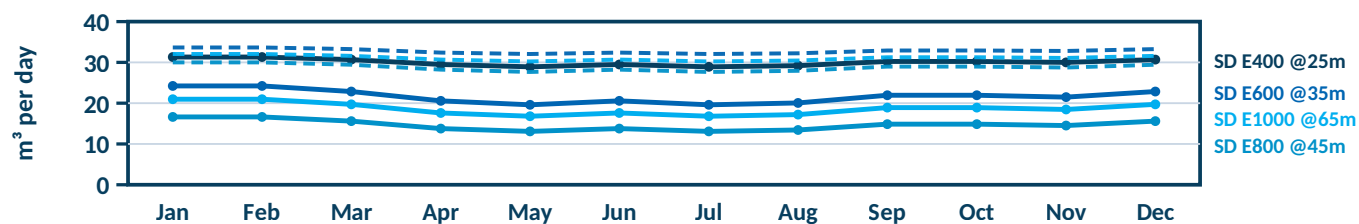
Flow Against Total Head

SATTE Model	Flow Unit	Delivered flow at total head — full irradiance (1000 W/m ²)									
		10 m	20 m	30 m	40 m	50 m	60 m	70 m	80 m	90 m	100 m
		33 ft	66 ft	98 ft	131 ft	164 ft	197 ft	230 ft	262 ft	295 ft	328 ft
SFLO SD E400	m ³ /h	4.7	3.9	2.9	1.2	—	—	—	—	—	—
	l/min	79	65	48	20	—	—	—	—	—	—
	US gpm	20.8	17.2	12.7	5.2	—	—	—	—	—	—
	Imp gpm	17.3	14.3	10.6	4.3	—	—	—	—	—	—
SFLO SD E600	m ³ /h	4.9	4.4	3.8	3.0	2.0	—	—	—	—	—
	l/min	82	73	63	50	33	—	—	—	—	—
	US gpm	21.6	19.2	16.5	13.2	8.8	—	—	—	—	—
	Imp gpm	18.0	16.0	13.8	11.0	7.4	—	—	—	—	—
SFLO SD E800	m ³ /h	5.0	4.6	4.1	3.6	3.0	2.2	0.9	—	—	—
	l/min	84	76	69	60	50	37	15	—	—	—
	US gpm	22.1	20.2	18.2	15.9	13.1	9.7	4.0	—	—	—
	Imp gpm	18.4	16.8	15.1	13.2	10.9	8.1	3.3	—	—	—
SFLO SD E1000	m ³ /h	5.1	4.9	4.6	4.2	3.9	3.5	3.1	2.6	2.0	1.2
	l/min	86	81	76	71	65	59	52	44	34	20
	US gpm	22.6	21.4	20.1	18.7	17.2	15.6	13.7	11.6	9.0	5.2
	Imp gpm	18.8	17.8	16.7	15.6	14.3	13.0	11.4	9.7	7.5	4.3

At full irradiance. Below roughly 300 W/m² the pump runs at reduced speed; the daily delivery figures below account for this.

Daily Water Delivery by Month

Solid line — Standard array (one string). Dashed line — High-Yield array (two strings). Both arrays use the same 450 W LV module and the same series count; only the number of parallel strings differs. The table below gives both figures for every month.



Month	Peak Sun Hours (kWh/m²/d)	Water delivered per day (m³/day) — Standard array / High-Yield array			
		SD E400	SD E600	SD E800	SD E1000
		at 25 m head	at 35 m head	at 45 m head	at 65 m head
		Std 2×450 · HY n/a	Std 2×450 · HY 4×450	Std 2×450 · HY 4×450	Std 3×450 · HY 6×450
Jan	5.9	31.3 —	24.2 33.7	16.6 30.0	21.0 32.1
Feb	5.9	31.3 —	24.2 33.7	16.6 30.0	21.0 32.1
Mar	5.6	30.7 —	22.9 33.2	15.6 29.4	19.7 31.6
Apr	5.1	29.5 —	20.6 32.4	13.8 28.2	17.6 30.7
May	4.9	28.9 —	19.6 32.0	13.1 27.7	16.8 30.2
Jun	5.1	29.5 —	20.6 32.4	13.8 28.2	17.6 30.7
Jul	4.9	28.9 —	19.6 32.0	13.1 27.7	16.8 30.2
Aug	5.0	29.2 —	20.1 32.2	13.4 28.0	17.2 30.5
Sep	5.4	30.3 —	21.9 32.9	14.9 29.0	18.9 31.3
Oct	5.4	30.3 —	21.9 32.9	14.9 29.0	18.9 31.3
Nov	5.3	30.0 —	21.5 32.8	14.5 28.7	18.5 31.1
Dec	5.6	30.7 —	22.9 33.2	15.6 29.4	19.7 31.6
Annual average	5.34	30.1 / —	21.7 / 32.8	14.7 / 28.8	18.6 / 31.2
Design month (lowest)	4.9	28.9 / —	19.6 / 32.0	13.1 / 27.7	16.8 / 30.2
Annual total (m³/year)	—	10,976 / —	7,911 / 11,982	5,352 / 10,511	6,806 / 11,362

Basis. An hour-by-hour simulation of the pumping day, not a flat multiplier: irradiance is scaled so its daily integral equals that month's peak sun hours, array output is derated 16% for cell temperature, soiling, cable and MPPT losses, the controller limits input to the pump's rated power, and part-load flow follows the affinity laws — so the pump must first reach the speed that produces the static head before any water is delivered. That is why array size changes the answer. Peak sun hours are long-term means for the Kampala / Lake Victoria basin, fixed array at 10° tilt. **Size on the design month, and check the figure against the borehole's sustainable yield before ordering the High-Yield array.**

Head Limit for a Given Daily Demand

SATTE Model	Array	Greatest total head (m) at which the pump still delivers the daily demand — design month					
		10 m ³ /day	20 m ³ /day	30 m ³ /day	50 m ³ /day	75 m ³ /day	100 m ³ /day
SFLO SD E400	Standard	40	33	24	—	—	—
SFLO SD E600	Standard	50	34	17	—	—	—
	High-Yield	56	48	38	7	—	—
SFLO SD E800	Standard	53	28	2	—	—	—
	High-Yield	68	57	41	—	—	—
SFLO SD E1000	Standard	86	55	21	—	—	—
	High-Yield	100	86	66	8	—	—

The curves read head→flow; this table reads the other way. Start with the volume the scheme needs each day and it gives the **greatest total head at which that model still meets it in the weakest month**, so a pump chosen here meets the demand in all twelve months. A dash means the model cannot reach that volume at any head with that array. Example: SP15 E1300 holds 75 m³/day to 22 m of head on the Standard array and to 49 m on the High-Yield array.

Selection and System Design

Work from demand, not from the pump. Establish the daily requirement first — about 20 l/person/day domestic, 5–50 l/head/day for livestock, or crop water requirement less effective rainfall — then read down the design-month row. **Worked example.** SFLO SD E1000 at 65 m head delivers 16.8 m³ on the design month with the Standard array: about 839 people at 20 l/day, with a tank of at least 34 m³ for two days of carry-over. **Irrigation is the exception** — peak crop demand falls in the dry months, which here carry the strongest sun.

- 1. Total head is not borehole depth.** Static lift from the *pumping* water level (allow for drawdown) + tank inlet height + friction in the rising main.
- 2. Rising main under 2 m/s.** To 3 m³/h use 1"; 3–6 1¼"; 6–11 1½"; above 11 use 2". Never smaller than the pump outlet.
- 3. Keep DC cable volt drop under 3%.** Size on Imp, not Isc; use UV-rated double-insulated solar cable.
- 4. Store water, not electricity.** An elevated tank holding 2–3 days of demand beats any battery on cost; fit a tank-full float switch.
- 5. Orientation.** Fixed array, 10–15° tilt facing north; every module in a string free of shade for the whole pumping window.
- 6. Protection.** Fit a DC isolator between array and controller; earth module frames and pump body. Never break a DC array under load.