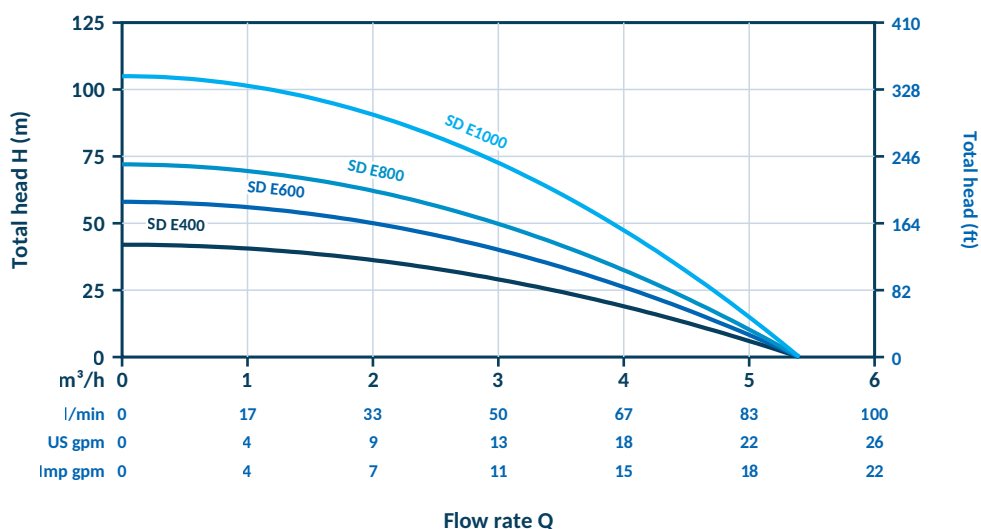


SFLO SD • DC Solar Submersible Pump • 5.4 m³/h



PERFORMANCE CHART AT 1000 W/m² IRRADIANCE



Pump, MPPT controller and PV modules are supplied as a matched set. 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.

Technical Data

SATTE Model	Rated Power (W)	Motor (VDC)	Rated Current (A)	Stages	Maximum Flow				Maximum Head		Outlet DN	MPPT Controller	Max Input (VDC)	Array Vmp Window (V)	Weight (kg)
					m³/h	l/min	US gpm	Imp gpm	m	ft					
SD E400	400	48	9.1	3	5.4	90	23.8	19.8	42	138	1"	DC48-VMP72	96	55-96	17.0
SD E600	600	48	13.6	4	5.4	90	23.8	19.8	58	190	1"	DC48-VMP72	96	55-96	19.0
SD E800	800	48	18.1	5	5.4	90	23.8	19.8	72	236	1.25"	DC48-VMP72	96	55-96	21.0
SD E1000	1000	72	15.1	7	5.4	90	23.8	19.8	105	344	1.25"	DC72-VMP108	150	82-150	24.0

Rated current is at the motor terminals at rated power and 92% controller efficiency. **Array Vmp window** is the range the MPPT controller will track: an array below the lower figure will not start the pump, and open-circuit voltage must never exceed the controller's maximum input on a cold morning. Stage counts and weights are derived from the published head and flow ratings — confirm against the factory drawing before quoting shipping.

Energy Package — 450 W LV Modules

SATTE Model	Pump (W)	Minimum Energy Package					Maximum Energy Package						Ctrl Max DC (V)
		S × P	Panels / W	Vmp / cold Voc	Ratio	Design m³/day	S × P	Panels / W	Vmp / cold Voc	Imp (A)	Ratio	Design m³/day	
SD E400	400	2 × 1	2 × 450 = 900 W	73 / 92	2.25	28.9	2 × 1	2 × 450 = 900 W	73 / 92	12.3	2.25	28.9 (+0%)	96
SD E600	600	2 × 1	2 × 450 = 900 W	73 / 92	1.50	19.6	2 × 2	4 × 450 = 1800 W	73 / 92	24.7	3.00	32.0 (+63%)	96
SD E800	800	2 × 1	2 × 450 = 900 W	73 / 92	1.12	13.9	2 × 2	4 × 450 = 1800 W	73 / 92	24.7	2.25	28.8 (+108%)	96
SD E1000	1000	3 × 1	3 × 450 = 1350 W	110 / 139	1.35	17.4	3 × 2	6 × 450 = 2700 W	110 / 139	24.7	2.70	31.1 (+79%)	150

Minimum package is the fewest 450 W LV modules that will run the pump. It is set by *voltage*, not wattage: the array must still exceed the motor voltage when the modules are hot, so the series count follows the motor rating. A 48 V pump will not start on one 450 W module whatever its wattage.

Maximum package uses the controller's full voltage headroom — the longest series string that stays under the cold open-circuit ceiling, before any second string is added, because series carries the same power at half the current.

Reference module: 450 W LV — Vmp 36.5 V, Voc 44.0 V, Imp 12.33 A, Isc 13.10 A at STC. Cold Voc is STC Voc × 1.05. A standard 450 W module (Voc 49-50 V) must not be substituted.

Model Selection by Application

SATTE Model	Max Head (m)	Duty Head (m)	Drive	Typical Application
SD E400	42	25	Solar DC	Shallow to medium boreholes, hand-dug wells, rivers and reservoirs; low static lift with a short rising main. Domestic and institutional supply, livestock, drip irrigation and tank filling.
SD E600	58	35	Solar DC	Shallow to medium boreholes, hand-dug wells, rivers and reservoirs; low static lift with a short rising main. Domestic and institutional supply, livestock, drip irrigation and tank filling.
SD E800	72	43	Solar DC	Medium boreholes and schemes lifting to an elevated tank on moderately sloping ground. Domestic and institutional supply, livestock, drip irrigation and tank filling.
SD E1000	105	63	Solar DC	Medium boreholes and schemes lifting to an elevated tank on moderately sloping ground. Domestic and institutional supply, livestock, drip irrigation and tank filling.

Duty head is 60% of maximum, the point at which each model is quoted in the delivery tables. A pump is best run in the middle third of its curve: close to shut-off it wastes array capacity, close to open flow it overloads the motor.

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.

Construction

- **Impellers and diffusers:** glass-filled engineering thermoplastic, floating-style to remove axial thrust from the motor bearing. **The SD wet end is not stainless** — this is the only difference from the SP range. Specify an SP model where a fully metallic wet end is required, for abrasive water or long duty cycles.
- **Casing, shaft, coupling and inlet base:** stainless steel AISI 304.
- **Motor:** brushless DC permanent-magnet, water-filled and rewindable, with thrust bearing sized for the full stage stack.
- **Shaft seal:** mechanical seal behind a sand guard.
- **Inlet:** stainless screen; outlet BSP female to the size tabulated.
- **Cable:** 100% copper, water- and UV-resistant, with heat-shrink splice kit.
- **Enclosure:** pump IP68; controller IP65 for outdoor wall mounting in shade.

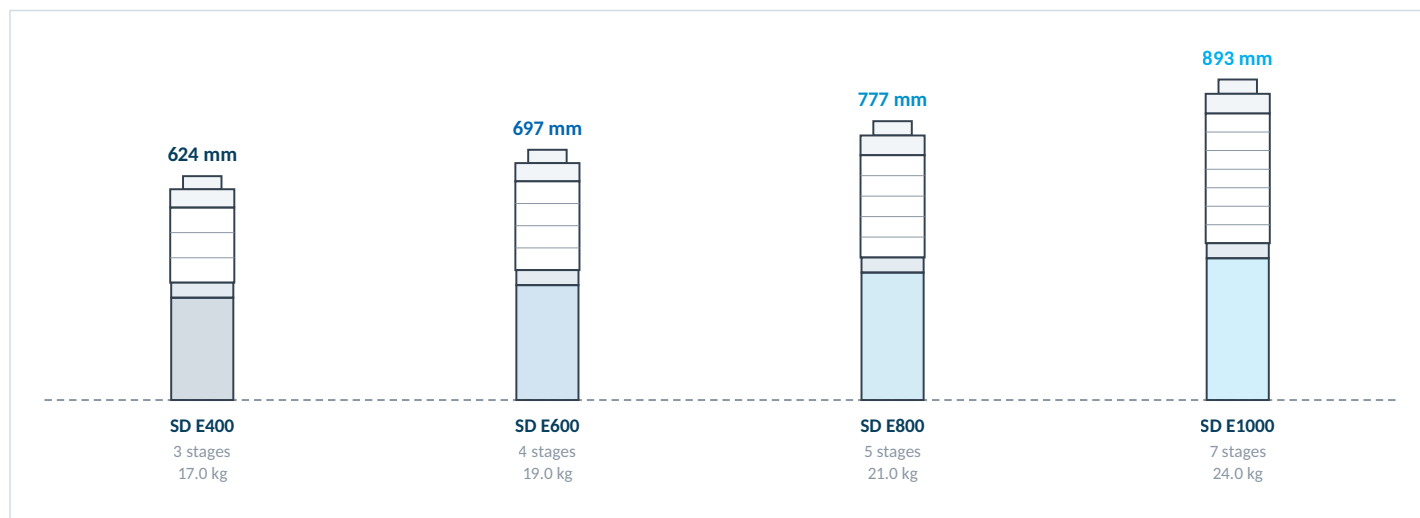
Features

- Brushless DC permanent-magnet motor — no brushes, no maintenance.
- MPPT controller with 99% tracking efficiency; starts on low irradiance.
- Stainless steel casing, shaft, coupling and inlet screen; see Construction for the wet end.
- 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.
- Anti-reverse connection — reversed array leads cause no damage.
- Wet-end efficiency above 85% — some 20% above an AC pump.

Operating Conditions

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

Dimensions



Every model in the series drawn to one common scale — discharge head, stage stack, coupling and motor

SATTE Model	Stages	Diameter (mm)		Length (mm)					Overall (inch)	Outlet Thread	Nett Weight (kg)
		Ø Pump	Ø Motor	L	P	T	M	H (overall)			
SD E400	3	98	95	88	209	42	285	624	24.6	1" BSP	17.0
SD E600	4	98	95	88	247	42	320	697	27.4	1" BSP	19.0
SD E800	5	98	95	95	285	42	355	777	30.6	1.25" BSP	21.0
SD E1000	7	98	95	95	361	42	395	893	35.2	1.25" BSP	24.0

L discharge head · P stage section including inlet screen · T coupling · M motor · H overall length. Every model fits a 4" (100 mm) bore and shares the same Ø98 mm pump and Ø95 mm motor diameters; they differ only in the length of the stage stack and motor. Allow clearance for the cable clamp and splice; the largest here is 893 mm. Nett weight excludes cable, controller and packing.

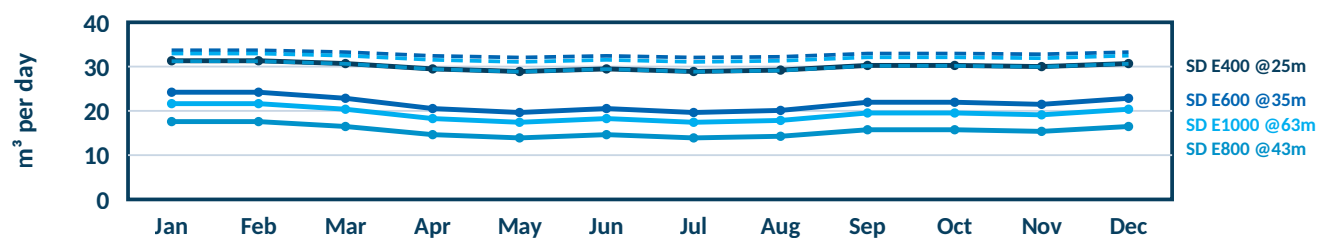
Flow Against Total Head

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
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	—	—	—	—	—	—
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	—	—	—	—	—
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	—	—	—
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, which the daily delivery figures below already account for.

Daily Water Delivery by Month

Solid line — Minimum energy package. Dashed line — Maximum energy package.



Month	Peak Sun Hours	Water delivered per day (m³/day) — Minimum package / Maximum package			
		SD E400	SD E600	SD E800	SD E1000
		at 25 m head	at 35 m head	at 43 m head	at 63 m head
		2×450 / 2×450	2×450 / 4×450	2×450 / 4×450	3×450 / 6×450
Jan	5.9	31.3 / 31.3	24.2 / 33.7	17.6 / 31.2	21.6 / 32.9
Feb	5.9	31.3 / 31.3	24.2 / 33.7	17.6 / 31.2	21.6 / 32.9
Mar	5.6	30.7 / 30.7	22.9 / 33.2	16.5 / 30.6	20.4 / 32.5
Apr	5.1	29.5 / 29.5	20.6 / 32.4	14.6 / 29.4	18.3 / 31.5
May	4.9	28.9 / 28.9	19.6 / 32.0	13.9 / 28.8	17.4 / 31.1
Jun	5.1	29.5 / 29.5	20.6 / 32.4	14.6 / 29.4	18.3 / 31.5
Jul	4.9	28.9 / 28.9	19.6 / 32.0	13.9 / 28.8	17.4 / 31.1
Aug	5.0	29.2 / 29.2	20.1 / 32.2	14.3 / 29.1	17.8 / 31.3
Sep	5.4	30.3 / 30.3	21.9 / 32.9	15.7 / 30.2	19.5 / 32.1
Oct	5.4	30.3 / 30.3	21.9 / 32.9	15.7 / 30.2	19.5 / 32.1
Nov	5.3	30.0 / 30.0	21.5 / 32.8	15.4 / 29.9	19.1 / 31.9
Dec	5.6	30.7 / 30.7	22.9 / 33.2	16.5 / 30.6	20.4 / 32.5
Annual average	—	30.1 / 30.1	21.7 / 32.8	15.5 / 30.0	19.3 / 32.0
Design month (lowest)	—	28.9 / 28.9	19.6 / 32.0	13.9 / 28.8	17.4 / 31.1
Annual total (m³/year)	—	10,976 / 10,976	7,911 / 11,982	5,666 / 10,945	7,046 / 11,672

Basis. An hour-by-hour simulation of the pumping day; irradiance scaled so its daily integral equals that month's peak sun hours, array output derated 16% for cell temperature, soiling, and cable and MPPT losses, controller input limited to the pump's rated power, and part-load flow following the affinity laws. Peak sun hours are long-term means for the Kampala / Lake Victoria basin, fixed array at 10° tilt. **Size on the design month, not the annual average,** and check the figure against the borehole's sustainable yield.

Head Limit for a Given Daily Demand

SATTE Model	Package	Greatest total head (m) at which the pump still delivers the daily demand — design month, solar only					
		10 m³/day	20 m³/day	30 m³/day	50 m³/day	75 m³/day	100 m³/day
SD E400	Minimum	40	33	24	—	—	—
	Maximum	40	33	24	—	—	—
SD E600	Minimum	50	34	17	—	—	—
	Maximum	56	48	38	7	—	—
SD E800	Minimum	53	28	2	—	—	—
	Maximum	68	57	41	—	—	—
SD E1000	Minimum	86	55	21	—	—	—
	Maximum	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 on that package.

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. **Example:** SFLO SD E1000 at 63 m head gives 17.4 m³ on the design month with the minimum package, about 870 people at 20 l/day, with a tank of at least 35 m³. 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".
- 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.