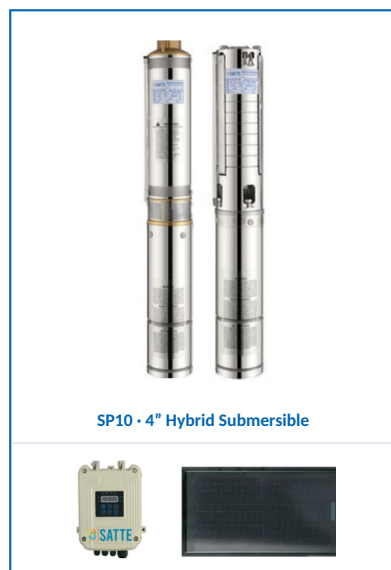
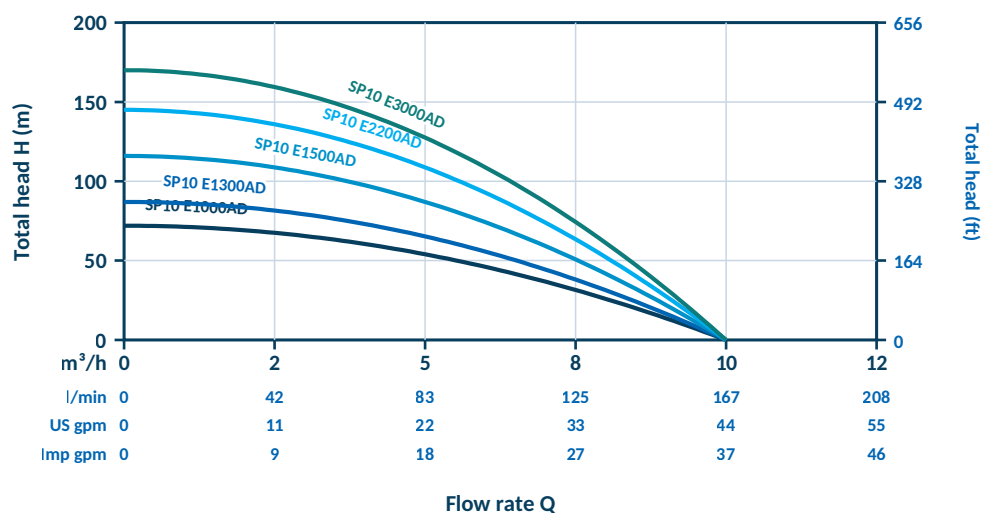


SFLO SP10 · Hybrid AC/DC Solar Submersible Pump · 10 m³/h



PERFORMANCE CHART AT 1000 W/m² IRRADIANCE



Pump, hybrid AC/DC drive and PV modules are supplied as a matched set. Every model in this series carries the hybrid AC/DC drive. 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	Supply Input to Drive		Array Vmp Window (V)	Weight (kg)
					m³/h	l/min	US gpm	Imp gpm	m	ft		Solar DC (V)	AC mains (V)		
SP10 E1000AD	1000	120	9.1	8	10	167	44.0	36.7	72	236	1.5"	80-430	80-240	138-430	19.4
SP10 E1300AD	1300	140	10.1	10	10	167	44.0	36.7	87	285	1.5"	80-430	80-240	161-430	22.2
SP10 E1500AD	1500	170	9.6	13	10	167	44.0	36.7	116	381	1.5"	80-430	80-240	195-430	25.1
SP10 E2200AD	2200	240	10.0	16	10	167	44.0	36.7	145	476	1.5"	80-430	80-240	276-430	30.8
SP10 E3000AD	3000	280	11.6	19	10	167	44.0	36.7	170	558	1.5"	80-430	80-240	322-430	37.1

Rated current is at the motor terminals at rated power and 92% drive efficiency. **Array Vmp window** is the range the drive will track: an array below the lower figure will not start the pump, and open-circuit voltage must never exceed the upper figure on a cold morning. All 5 models in this series accept both solar DC and AC mains. 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						Drive 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	
SP10 E1000AD	1000	4 × 1	4 × 450 = 1800 W	146 / 185	1.80	45.1	9 × 1	9 × 450 = 4050 W	328 / 416	12.3	4.05	64.4 (+43%)	430
SP10 E1300AD	1300	5 × 1	5 × 450 = 2250 W	182 / 231	1.73	43.2	9 × 1	9 × 450 = 4050 W	328 / 416	12.3	3.12	60.5 (+40%)	430
SP10 E1500AD	1500	6 × 1	6 × 450 = 2700 W	219 / 277	1.80	44.7	9 × 1	9 × 450 = 4050 W	328 / 416	12.3	2.70	57.3 (+28%)	430
SP10 E2200AD	2200	8 × 1	8 × 450 = 3600 W	292 / 370	1.64	40.4	9 × 2	18 × 450 = 8100 W	328 / 416	24.7	3.68	62.9 (+56%)	430
SP10 E3000AD	3000	9 × 1	9 × 450 = 4050 W	328 / 416	1.35	32.2	9 × 2	18 × 450 = 8100 W	328 / 416	24.7	2.70	57.5 (+79%)	430

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.

Maximum package uses the drive's full voltage headroom. The drive accepts up to 430 V, so the longest series string that stays under that ceiling on a cold morning is used before any second string is added. Series is preferred over parallel because it carries **the same power at half the current** — thinner DC cable, less volt drop over a long array run, and the drive working in the middle of its range instead of near the bottom. A second string is added only where one string cannot reach twice the pump rating.

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
SP10 E1000AD	72	43	Hybrid AC/DC	Medium boreholes and schemes lifting to an elevated tank on moderately sloping ground. Piped village supply, trading centres, sprinkler irrigation and bulk transfer.
SP10 E1300AD	87	52	Hybrid AC/DC	Medium boreholes and schemes lifting to an elevated tank on moderately sloping ground. Piped village supply, trading centres, sprinkler irrigation and bulk transfer.
SP10 E1500AD	116	70	Hybrid AC/DC	Medium boreholes and schemes lifting to an elevated tank on moderately sloping ground. Piped village supply, trading centres, sprinkler irrigation and bulk transfer.
SP10 E2200AD	145	87	Hybrid AC/DC	Deep boreholes and hilly terrain; lifting to a reservoir well above the wellhead. Piped village supply, trading centres, sprinkler irrigation and bulk transfer.
SP10 E3000AD	170	102	Hybrid AC/DC	Deep boreholes and hilly terrain; lifting to a reservoir well above the wellhead. Piped village supply, trading centres, sprinkler irrigation and bulk transfer.

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.

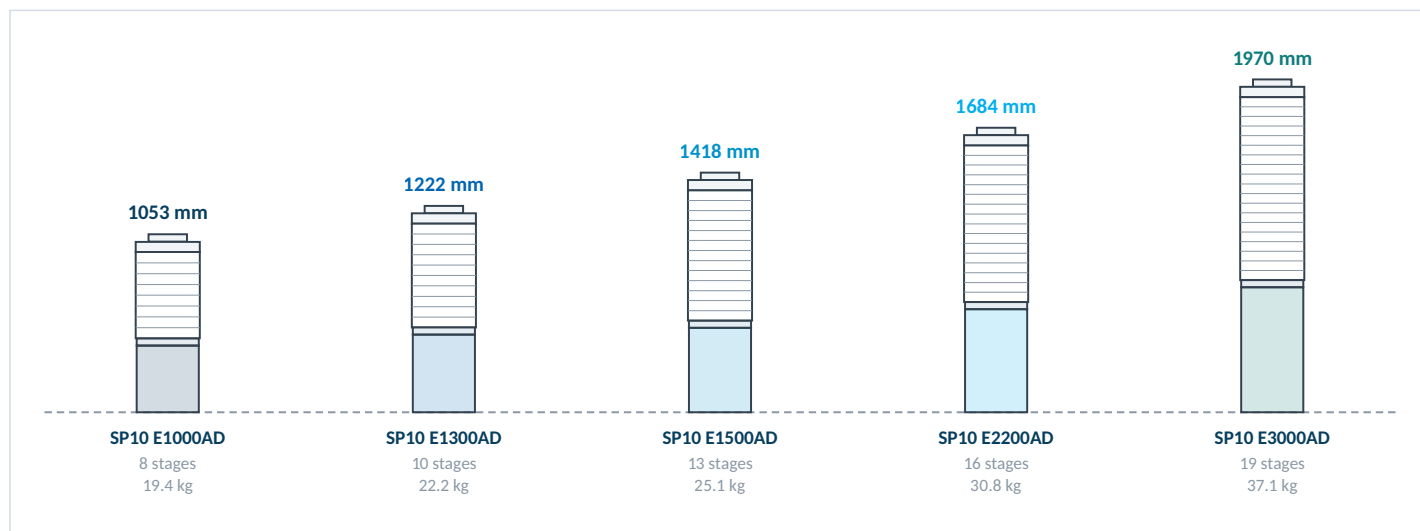
Construction

- **Impellers and diffusers:** stainless steel, floating-style to remove axial thrust from the motor bearing. This is the only difference from the SD range, which uses a thermoplastic wet end.
- **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.

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)			
SP10 E1000AD	8	98	95	105	511	42	395	1053	41.5	1.5" BSP	19.4
SP10 E1300AD	10	98	95	105	615	42	460	1222	48.1	1.5" BSP	22.2
SP10 E1500AD	13	98	95	105	771	42	500	1418	55.8	1.5" BSP	25.1
SP10 E2200AD	16	98	95	105	927	42	610	1684	66.3	1.5" BSP	30.8
SP10 E3000AD	19	98	95	105	1083	42	740	1970	77.6	1.5" BSP	37.1

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 1970 mm. Nett weight excludes cable, controller and packing.

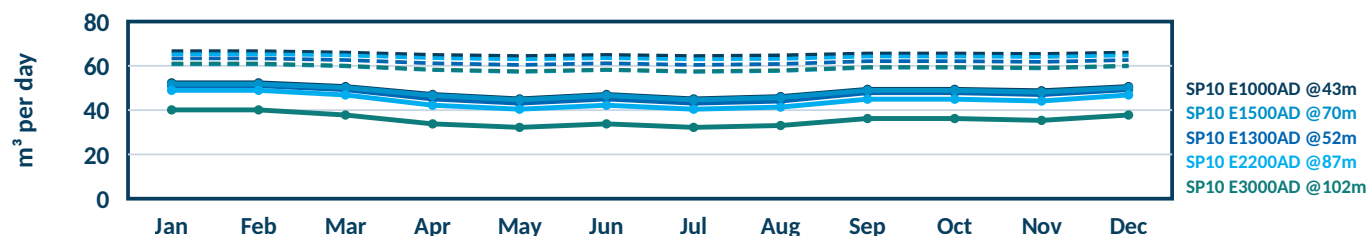
Flow Against Total Head

SATTE Model	Flow Unit	Delivered flow at total head — full irradiance (1000 W/m ²)							
		20 m	40 m	60 m	80 m	100 m	120 m	140 m	160 m
		66 ft	131 ft	197 ft	262 ft	328 ft	394 ft	459 ft	525 ft
SP10 E1000AD	m ³ /h	8.5	6.7	4.1	—	—	—	—	—
	l/min	142	111	68	—	—	—	—	—
	US gpm	37.4	29.4	18.0	—	—	—	—	—
	Imp gpm	31.2	24.4	15.0	—	—	—	—	—
SP10 E1300AD	m ³ /h	8.8	7.4	5.6	2.8	—	—	—	—
	l/min	146	123	93	47	—	—	—	—
	US gpm	38.6	32.4	24.5	12.5	—	—	—	—
	Imp gpm	32.2	26.9	20.4	10.4	—	—	—	—
SP10 E1500AD	m ³ /h	9.1	8.1	6.9	5.6	3.7	—	—	—
	l/min	152	135	116	93	62	—	—	—
	US gpm	40.1	35.6	30.6	24.5	16.4	—	—	—
	Imp gpm	33.4	29.7	25.5	20.4	13.6	—	—	—
SP10 E2200AD	m ³ /h	9.3	8.5	7.7	6.7	5.6	4.2	1.9	—
	l/min	155	142	128	112	93	69	31	—
	US gpm	40.9	37.5	33.7	29.5	24.5	18.3	8.2	—
	Imp gpm	34.0	31.2	28.1	24.5	20.4	15.2	6.8	—
SP10 E3000AD	m ³ /h	9.4	8.7	8.0	7.3	6.4	5.4	4.2	2.4
	l/min	157	146	134	121	107	90	70	40
	US gpm	41.4	38.5	35.4	32.0	28.3	23.9	18.5	10.7
	Imp gpm	34.4	32.1	29.5	26.7	23.5	19.9	15.4	8.9

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. Both are solar-only figures; the AC supply is not counted.



Month	Peak Sun Hours	Water delivered per day (m ³ /day) — Minimum package / Maximum package				
		SP10 E1000AD	SP10 E1300AD	SP10 E1500AD	SP10 E2200AD	SP10 E3000AD
		at 43 m head	at 52 m head	at 70 m head	at 87 m head	at 102 m head
		4×450 / 9×450	5×450 / 9×450	6×450 / 9×450	8×450 / 18×450	9×450 / 18×450
Jan	5.9	52.3 / 66.6	51.1 / 63.4	51.8 / 60.7	49.0 / 65.3	40.1 / 61.0
Feb	5.9	52.3 / 66.6	51.1 / 63.4	51.8 / 60.7	49.0 / 65.3	40.1 / 61.0
Mar	5.6	50.7 / 66.0	49.3 / 62.6	50.2 / 59.8	46.8 / 64.7	37.8 / 60.1
Apr	5.1	47.1 / 64.9	45.1 / 61.2	46.6 / 58.1	42.2 / 63.5	33.8 / 58.4
May	4.9	45.1 / 64.4	43.2 / 60.5	44.7 / 57.3	40.4 / 62.9	32.2 / 57.5
Jun	5.1	47.1 / 64.9	45.1 / 61.2	46.6 / 58.1	42.2 / 63.5	33.8 / 58.4
Jul	4.9	45.1 / 64.4	43.2 / 60.5	44.7 / 57.3	40.4 / 62.9	32.2 / 57.5
Aug	5.0	46.1 / 64.7	44.1 / 60.8	45.6 / 57.7	41.3 / 63.2	33.0 / 58.0
Sep	5.4	49.4 / 65.6	47.8 / 62.1	48.9 / 59.2	45.0 / 64.2	36.2 / 59.5
Oct	5.4	49.4 / 65.6	47.8 / 62.1	48.9 / 59.2	45.0 / 64.2	36.2 / 59.5
Nov	5.3	48.7 / 65.4	47.0 / 61.8	48.2 / 58.8	44.1 / 64.0	35.4 / 59.1
Dec	5.6	50.7 / 66.0	49.3 / 62.6	50.2 / 59.8	46.8 / 64.7	37.8 / 60.1

Month	Peak Sun Hours	Water delivered per day (m³/day) — Minimum package / Maximum package				
		SP10 E1000AD	SP10 E1300AD	SP10 E1500AD	SP10 E2200AD	SP10 E3000AD
		at 43 m head	at 52 m head	at 70 m head	at 87 m head	at 102 m head
		4×450 / 9×450	5×450 / 9×450	6×450 / 9×450	8×450 / 18×450	9×450 / 18×450
Annual average	—	49.0 / 65.5	47.4 / 61.9	48.5 / 59.0	44.5 / 64.1	35.7 / 59.3
Design month (lowest)	—	45.1 / 64.4	43.2 / 60.5	44.7 / 57.3	40.4 / 62.9	32.2 / 57.5
Annual total (m³/year)	—	17,774 / 23,907	17,169 / 22,585	17,608 / 21,511	16,199 / 23,390	13,048 / 21,614
On AC mains: water per hour (m³/h)	—	6.35	6.34	6.30	6.32	6.32
On AC mains: m³/day running 12 h	—	76.2	76.1	75.6	75.9	75.9
On AC mains: m³/day running 24 h	—	152.3	152.2	151.1	151.8	151.8
On AC mains: m³/year at 12 h/day	—	27,798	27,781	27,582	27,702	27,702

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, cable and MPPT losses, drive 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.

The AC rows are not seasonal. On solar the pump reaches its full curve point only around midday, so output follows the sunshine. On mains the drive holds rated power for every hour it runs, so water per hour is fixed — the same flow the curve gives at that head — and only the running time varies. In practice the **borehole's sustainable yield, not the pump, sets the ceiling** on continuous running.

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
SP10 E1000AD	Minimum	70	65	57	38	9	—
	Maximum	71	69	65	54	34	7
SP10 E1300AD	Minimum	84	77	67	43	7	—
	Maximum	86	83	78	62	35	1
SP10 E1500AD	Minimum	113	104	92	61	14	—
	Maximum	114	110	102	80	42	—
SP10 E2200AD	Minimum	140	126	108	66	3	—
	Maximum	143	139	131	107	65	10
SP10 E3000AD	Minimum	159	135	108	50	—	—
	Maximum	168	161	150	117	61	—

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 on solar alone**, so a pump chosen here meets the demand in all twelve months without touching the AC supply. 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. **Worked example.** SFLO SP10 E3000AD at 102 m head delivers 32.2 m³ on the design month with the minimum package: about 1,611 people at 20 l/day, with a tank of at least 64 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".
- 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.