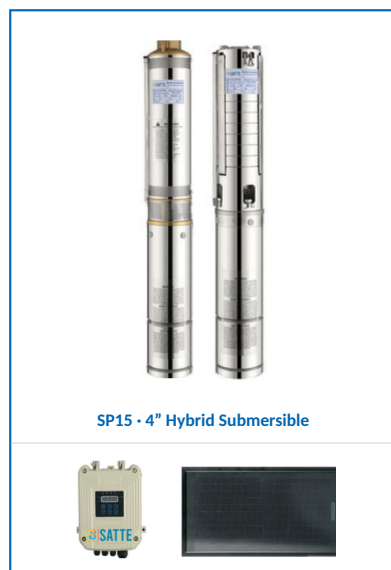
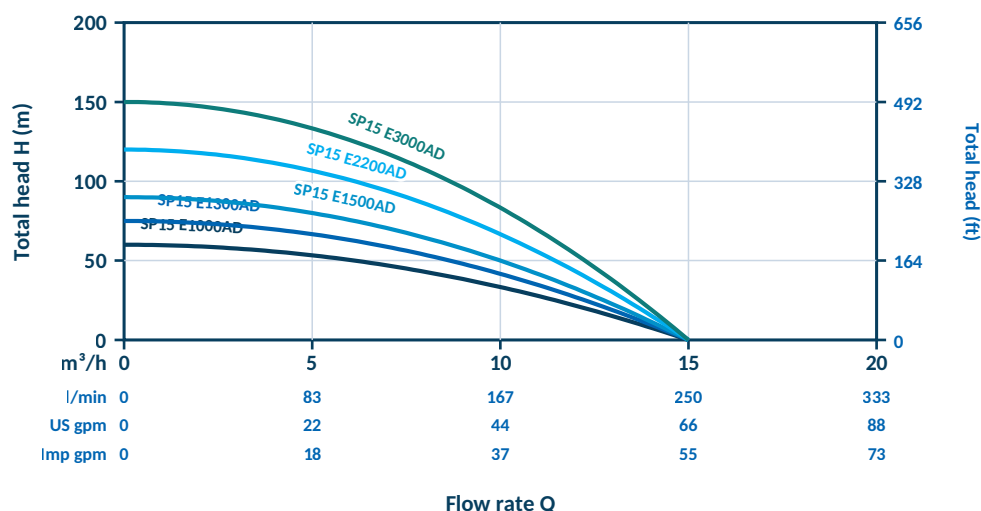


SFLO SP15 · Hybrid AC/DC Solar Submersible Pump · 15 m³/h



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)		
SP15 E1000AD	1000	120	9.1	8	15	250	66.0	55.0	60	197	2"	80-430	80-240	138-430	19.4
SP15 E1300AD	1300	140	10.1	9	15	250	66.0	55.0	75	246	2"	80-430	80-240	161-430	21.6
SP15 E1500AD	1500	170	9.6	11	15	250	66.0	55.0	90	295	2"	80-430	80-240	195-430	23.9
SP15 E2200AD	2200	240	10.0	15	15	250	66.0	55.0	120	394	2"	80-430	80-240	276-430	30.2
SP15 E3000AD	3000	280	11.6	19	15	250	66.0	55.0	150	492	2"	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	
SP15 E1000AD	1000	4 × 1	4 × 450 = 1800 W	146 / 185	1.80	67.4	9 × 1	9 × 450 = 4050 W	328 / 416	12.3	4.05	96.3 (+43%)	430
SP15 E1300AD	1300	5 × 1	5 × 450 = 2250 W	182 / 231	1.73	64.5	9 × 1	9 × 450 = 4050 W	328 / 416	12.3	3.12	90.4 (+40%)	430
SP15 E1500AD	1500	6 × 1	6 × 450 = 2700 W	219 / 277	1.80	67.4	9 × 1	9 × 450 = 4050 W	328 / 416	12.3	2.70	86.3 (+28%)	430
SP15 E2200AD	2200	8 × 1	8 × 450 = 3600 W	292 / 370	1.64	60.6	9 × 2	18 × 450 = 8100 W	328 / 416	24.7	3.68	94.4 (+56%)	430
SP15 E3000AD	3000	9 × 1	9 × 450 = 4050 W	328 / 416	1.35	48.3	9 × 2	18 × 450 = 8100 W	328 / 416	24.7	2.70	86.3 (+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
SP15 E1000AD	60	36	Hybrid AC/DC	Shallow to medium boreholes, hand-dug wells, rivers and reservoirs; low static lift with a short rising main. Commercial irrigation, large piped schemes and bulk transfer where volume matters more than lift.
SP15 E1300AD	75	45	Hybrid AC/DC	Medium boreholes and schemes lifting to an elevated tank on moderately sloping ground. Commercial irrigation, large piped schemes and bulk transfer where volume matters more than lift.
SP15 E1500AD	90	54	Hybrid AC/DC	Medium boreholes and schemes lifting to an elevated tank on moderately sloping ground. Commercial irrigation, large piped schemes and bulk transfer where volume matters more than lift.
SP15 E2200AD	120	72	Hybrid AC/DC	Deep boreholes and hilly terrain; lifting to a reservoir well above the wellhead. Commercial irrigation, large piped schemes and bulk transfer where volume matters more than lift.
SP15 E3000AD	150	90	Hybrid AC/DC	Deep boreholes and hilly terrain; lifting to a reservoir well above the wellhead. Commercial irrigation, large piped schemes and bulk transfer where volume matters more than lift.

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.

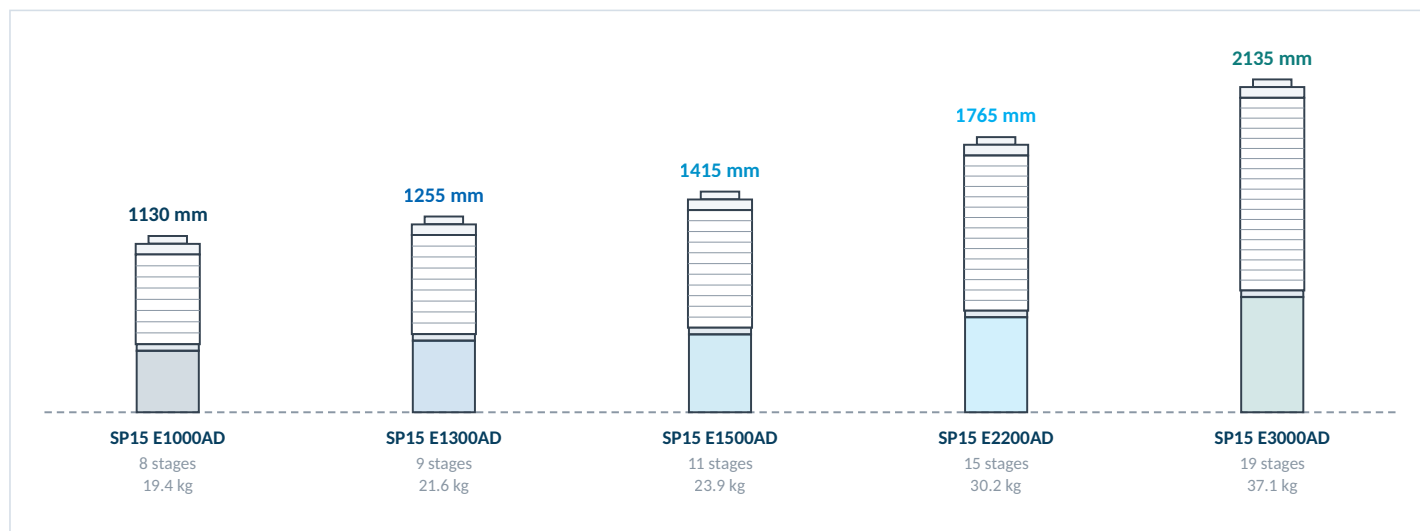
Construction

- **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)			
SP15 E1000AD	8	98	95	118	575	42	395	1130	44.5	2" BSP	19.4
SP15 E1300AD	9	98	95	118	635	42	460	1255	49.4	2" BSP	21.6
SP15 E1500AD	11	98	95	118	755	42	500	1415	55.7	2" BSP	23.9
SP15 E2200AD	15	98	95	118	995	42	610	1765	69.5	2" BSP	30.2
SP15 E3000AD	19	98	95	118	1235	42	740	2135	84.1	2" 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 2135 mm. Nett weight excludes cable, controller and packing.

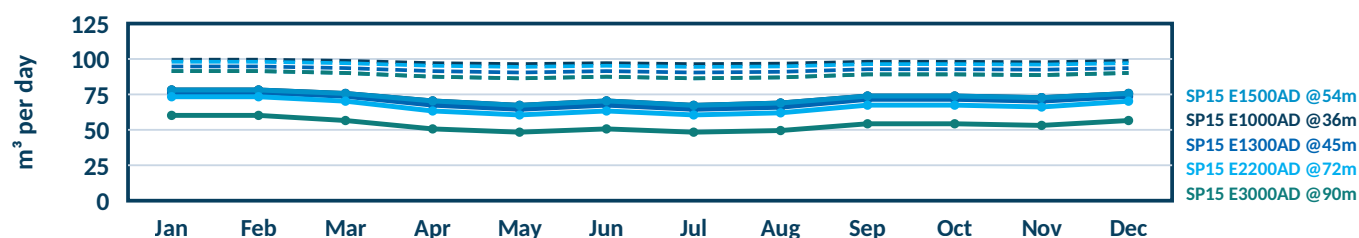
Flow Against Total Head

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
		66 ft	131 ft	197 ft	262 ft	328 ft	394 ft	459 ft
SP15 E1000AD	m ³ /h	12.2	8.7	—	—	—	—	—
	l/min	204	144	—	—	—	—	—
	US gpm	53.9	38.1	—	—	—	—	—
	Imp gpm	44.9	31.7	—	—	—	—	—
SP15 E1300AD	m ³ /h	12.8	10.2	6.7	—	—	—	—
	l/min	214	171	112	—	—	—	—
	US gpm	56.6	45.1	29.5	—	—	—	—
	Imp gpm	47.1	37.6	24.6	—	—	—	—
SP15 E1500AD	m ³ /h	13.2	11.2	8.7	5.0	—	—	—
	l/min	220	186	144	83	—	—	—
	US gpm	58.2	49.2	38.1	22.0	—	—	—
	Imp gpm	48.5	41.0	31.7	18.3	—	—	—
SP15 E2200AD	m ³ /h	13.7	12.2	10.6	8.7	6.1	—	—
	l/min	228	204	177	144	102	—	—
	US gpm	60.3	53.9	46.7	38.1	27.0	—	—
	Imp gpm	50.2	44.9	38.9	31.7	22.5	—	—
SP15 E3000AD	m ³ /h	14.0	12.8	11.6	10.2	8.7	6.7	3.9
	l/min	233	214	194	171	144	112	65
	US gpm	61.5	56.6	51.2	45.1	38.1	29.5	17.1
	Imp gpm	51.2	47.1	42.6	37.6	31.7	24.6	14.2

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				
		SP15 E1000AD	SP15 E1300AD	SP15 E1500AD	SP15 E2200AD	SP15 E3000AD
		at 36 m head	at 45 m head	at 54 m head	at 72 m head	at 90 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	78.1 / 99.5	76.3 / 94.8	78.1 / 91.5	73.4 / 98.0	60.1 / 91.5
Feb	5.9	78.1 / 99.5	76.3 / 94.8	78.1 / 91.5	73.4 / 98.0	60.1 / 91.5
Mar	5.6	75.7 / 98.7	73.6 / 93.6	75.7 / 90.2	70.2 / 97.0	56.7 / 90.2
Apr	5.1	70.3 / 97.1	67.4 / 91.4	70.3 / 87.5	63.4 / 95.2	50.7 / 87.5
May	4.9	67.4 / 96.3	64.5 / 90.4	67.4 / 86.3	60.6 / 94.4	48.3 / 86.3
Jun	5.1	70.3 / 97.1	67.4 / 91.4	70.3 / 87.5	63.4 / 95.2	50.7 / 87.5
Jul	4.9	67.4 / 96.3	64.5 / 90.4	67.4 / 86.3	60.6 / 94.4	48.3 / 86.3
Aug	5.0	68.8 / 96.7	66.0 / 90.9	68.8 / 86.9	62.0 / 94.8	49.5 / 86.9
Sep	5.4	73.8 / 98.1	71.5 / 92.8	73.8 / 89.2	67.5 / 96.3	54.3 / 89.2
Oct	5.4	73.8 / 98.1	71.5 / 92.8	73.8 / 89.2	67.5 / 96.3	54.3 / 89.2
Nov	5.3	72.8 / 97.8	70.3 / 92.4	72.8 / 88.7	66.1 / 96.0	53.1 / 88.7
Dec	5.6	75.7 / 98.7	73.6 / 93.6	75.7 / 90.2	70.2 / 97.0	56.7 / 90.2

Month	Peak Sun Hours	Water delivered per day (m³/day) — Minimum package / Maximum package				
		SP15 E1000AD	SP15 E1300AD	SP15 E1500AD	SP15 E2200AD	SP15 E3000AD
		at 36 m head	at 45 m head	at 54 m head	at 72 m head	at 90 m head
		4×450 / 9×450	5×450 / 9×450	6×450 / 9×450	8×450 / 18×450	9×450 / 18×450
Annual average	—	73.2 / 97.9	70.8 / 92.6	73.2 / 88.9	66.7 / 96.1	53.6 / 88.9
Design month (lowest)	—	67.4 / 96.3	64.5 / 90.4	67.4 / 86.3	60.6 / 94.4	48.3 / 86.3
Annual total (m³/year)	—	26,550 / 35,729	25,663 / 33,773	26,550 / 32,421	24,299 / 35,086	19,571 / 32,421
On AC mains: water per hour (m³/h)	—	9.49	9.49	9.49	9.49	9.49
On AC mains: m³/day running 12 h	—	113.8	113.8	113.8	113.8	113.8
On AC mains: m³/day running 24 h	—	227.7	227.7	227.7	227.7	227.7
On AC mains: m³/year at 12 h/day	—	41,552	41,552	41,552	41,552	41,552

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
SP15 E1000AD	Minimum	59	57	54	45	32	16
	Maximum	60	59	58	53	45	34
SP15 E1300AD	Minimum	74	71	67	55	37	17
	Maximum	75	73	71	65	54	39
SP15 E1500AD	Minimum	89	86	81	68	47	24
	Maximum	89	88	85	77	62	43
SP15 E2200AD	Minimum	118	113	105	84	54	21
	Maximum	119	118	115	106	89	67
SP15 E3000AD	Minimum	145	134	119	87	45	—
	Maximum	149	146	142	128	103	72

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 SP15 E3000AD at 90 m head delivers 48.3 m³ on the design month with the minimum package: about 2,417 people at 20 l/day, with a tank of at least 97 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 1½"; 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.