All-In-One Energy Storage System

Inverter, Battery, PV and Generator Sizing



AIO-25K · 29.9K · 30K · 40K · 50K · AIO Max 125/257

System Sizing Guide

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Document

Revision **1.0.1**	Effective **11 / 2026**	Audience **System designers and licensed installers**	Systems **All-In-One 25–50 kW · All-In-One Max 125/257**
Manufacturer **Solinteg**	Format **A4 · 11 pages**		

About This Guide

This guide shows how to choose and size an All-In-One system: the inverter model, the battery cabinet, the PV array and a generator. It brings together the ratings in the All-In-One datasheets and manual and the Solinteg M2HT 25–50 kW documents. For installation and settings, use the All-In-One User Manual, the Solinteg M2HT 25–50 kW User Manual and the Solinteg M2HT 25–50 kW Paralleling & Generator Guide.

The All-In-One is manufactured by Solinteg and supplied and supported in Australia by AERL. The system design is the designer's responsibility: check it against the local standards, including AS/NZS 3000, AS/NZS 4777.1, AS/NZS 5033, AS/NZS 5139 and, for generators, AS/NZS 3010, and the network service provider's requirements for a grid connection.

Choosing the System

The All-In-One range, steps, inverter rating

01

1.1 The All-In-One Range

Model	AIO-25K	AIO-29.9K	AIO-30K	AIO-40K	AIO-50K	AIO Max 125/257
Inverter	M2HT-25-150	M2HT-29.9-150	M2HT-30-150	M2HT-40-150	M2HT-50-150	M2HT-125K-300
Rated AC output	25.0 kW	29.9 kW	30.0 kW	40.0 kW	50.0 kW	125.0 kW
Back-up peak (10 s)	37.5 kVA	45 kVA	45 kVA	60 kVA	75 kVA	165 kVA
Battery	64.3–112.5 kWh	64.3–112.5 kWh	64.3–112.5 kWh	64.3–112.5 kWh	64.3–112.5 kWh	257.2 kWh
Max. PV array	50 kWp	60 kWp	60 kWp	80 kWp	80 kWp	250 kWp
Generator input	30.0 kVA	36.0 kVA	36.0 kVA	48.0 kVA	60.0 kVA	No GEN port: contact AERL

1.2 Steps

1. Choose the inverter rating for the load: continuous power, and the surge the back-up loads need (section 1.3).
2. Choose the battery cabinet for the energy and the battery power (chapter 02).
3. Design the PV array within the model's limits (chapter 03).
4. Size a generator, if the site needs one (chapter 04).
5. For more power, plan an off-grid parallel system (chapter 04).

1.3 Inverter Rating

- **Continuous load:** the rated AC output must cover the largest continuous load on the back-up side.
- **Surge:** off-grid, the back-up side delivers 1.5 × its rated power for 10 seconds. Loads with a higher starting current (large motors, compressors) need a larger model, a soft starter, or a start sequence. If the overload protection operates, the inverter restarts; repeated overloads lengthen the restart time, up to 2 minutes.
- **Unbalanced loads:** each model supports 100% three-phase unbalance and half-wave loads.

Battery

Battery cabinets, energy, battery power, temperature

02

2.1 Battery Cabinets

Each AIO-25K to AIO-50K takes one Solinteg E2BR battery cabinet with 4 to 7 battery packs (LiFePO4, 314 Ah, 16.076 kWh per pack).

Cabinet	E2BR-S64K-C	E2BR-S80K-C	E2BR-S96K-C	E2BR-S112K-C
Battery packs	4	5	6	7
Rated energy	64.3 kWh	80.3 kWh	96.4 kWh	112.5 kWh
Usable energy (90% DoD)	57.87 kWh	72.27 kWh	86.76 kWh	101.25 kWh
Rated voltage	204.8 V	256 V	307.2 V	358.4 V
Operating voltage range	166.4–233.6 V	208–292 V	249.6–350.4 V	291.2–408.8 V
Max. charge / discharge current	150 A	150 A	150 A	150 A
Rated charge / discharge power	30.72 kW	38.4 kW	46.08 kW	50 kW

The All-In-One Max carries a Solinteg E2BR-S257K-C cabinet: 16 packs, 257.2 kWh (231.48 kWh usable at 90% DoD), 819.2 V rated (716.8–921.6 V), with a recommended charge and discharge current of 157 A.

2.2 Energy

Divide the energy the battery must supply between charges (daily load from the battery × days of autonomy) by the usable energy, and choose the cabinet that covers it. For more storage than one cabinet holds, plan an off-grid parallel system: each inverter has its own cabinet.

2.3 Battery Power

The battery's rated charge and discharge power is set by its 150 A current and its voltage, so it grows with the number of packs. When the load must run from the battery alone (at night, or off-grid without PV), the battery's rated power limits what the system delivers, whatever the inverter's rating:

Model	S64	S80	S96	S112
AIO-25K (25.0 kW)	25.0 kW	25.0 kW	25.0 kW	25.0 kW
AIO-29.9K, AIO-30K	29.9–30.0 kW	29.9–30.0 kW	29.9–30.0 kW	29.9–30.0 kW
AIO-40K (40.0 kW)	30.72 kW	38.4 kW	40.0 kW	40.0 kW
AIO-50K (50.0 kW)	30.72 kW	38.4 kW	46.08 kW	50.0 kW

Each cell is the lower of the inverter's rated output and the battery's rated power. For an AIO-40K or AIO-50K that must carry its full rating from the battery, choose the larger cabinets. The battery also charges at no more than its rated power, which limits how much PV it can absorb.

2.4 Temperature

The battery packs charge between 1 and 50 °C and discharge between −20 and 50 °C. The cabinet's air conditioner (2 kW cooling and 2 kW heating) keeps the packs in range; allow for its consumption in the site's energy budget.

PV Array

Limits per model, string design, example: AIO-50K

03

3.1 Limits per Model

Parameter	AIO-25K to AIO-50K	AIO Max 125/257
Max. PV array power	50 / 60 / 60 / 80 / 80 kWp	250 kWp
MPP trackers	4	6
Strings per MPPT	2	3
Max. input current per MPPT	40 A	48 A
Max. short-circuit current per MPPT	50 A	60 A
MPPT operating voltage range	200–950 V	160–950 V
Max. PV input voltage	1000 V	1000 V
Rated PV input voltage	620 V	620 V
Start-up voltage	135 V	135 V

PV voltage

The inverter operates up to 950 V. Between 950 V and 1000 V it stops operating; above 1000 V it is damaged. Design every string so that its open-circuit voltage at the lowest expected cell temperature stays at or below 950 V.

3.2 String Design

Use the PV module's datasheet values and its temperature coefficients:

1. **Maximum modules per string:** the string's open-circuit voltage at the site's lowest expected cell temperature must not exceed 950 V. $V_{max} = N \times V_{oc} \times [1 + \beta_{Voc} \times (T_{min} - 25\ °C)]$, with β_{Voc} negative.
2. **Minimum modules per string:** the string's maximum power voltage at the hottest expected cell temperature must stay above the bottom of the MPPT range (200 V; 160 V on the AIO Max). For good yield, keep it near the rated 620 V.
3. **Strings per MPPT:** up to 2 (3 on the AIO Max). The strings' combined current must not exceed the MPPT's input current (40 A; 48 A), and their combined short-circuit current must not exceed 50 A (60 A). Each string input accepts up to 20 A on the AIO-25K to AIO-50K.
4. **Same strings on one MPPT:** modules of the same brand and model, at the same tilt and orientation, with the same string length.
5. **Array power:** the total must not exceed the model's maximum PV array power.

Each PV string connects to one inverter only. The M2HT 25–50 kW is not suitable for functionally earthed PV arrays (AS/NZS 5033): never earth the positive or negative pole of a PV string.

3.3 Example: AIO-50K

An example module (use your module's own datasheet): 550 W, V_{oc} 49.6 V, V_{mp} 41.6 V, I_{sc} 14.0 A, I_{mp} 13.2 A, β_{Voc} −0.25%/°C, β_{Pmax} −0.35%/°C. Site minimum cell temperature −5 °C; hottest cell temperature 70 °C.

Check	Working
Voc at −5 °C, per module	49.6 × [1 + (−0.0025 × −30)] = 53.3 V
Maximum modules per string	950 ÷ 53.3 = 17.8, so up to **17 modules** (906 V at −5 °C)
Vmp of 17 modules at 70 °C	17 × 41.6 × [1 + (−0.0035 × 45)] = 596 V, above 200 V and close to the rated 620 V
Strings per MPPT	2 strings: 26.4 A (limit 40 A), Isc 28.0 A (limit 50 A)
Array	4 MPPT × 2 strings × 17 modules = 136 modules × 550 W = 74.8 kWp, within the AIO-50K's 80 kWp

The Vmp line uses the power coefficient as an estimate of the voltage coefficient; use the module's Vmp coefficient where its datasheet gives one.

Generator and Paralleling

Generator sizing, off-grid Paralleling

04

4.1 Generator Sizing

> **The generator and the inverters never supply the loads at the same time**
>
> Size the generator and the inverter system so that each one on its own can supply the full load.

- **Generator rating:** at least the full site load, including starting currents. On the AIO-25K to AIO-50K the generator connects to the GEN port, which accepts up to the model's generator input rating (30.0 / 36.0 / 36.0 / 48.0 / 60.0 kVA; 45.5 / 54.5 / 54.5 / 72.7 / 90.9 A).
- **Other connections:** a single system can also take the generator through an automatic transfer switch (ATS) with the grid, or on its on-grid port where there is no grid; an off-grid parallel system takes it on the master's on-grid port. The M2HT 25–50 kW Paralleling & Generator Guide shows each solution; confirm the firmware with AERL.
- **Charging from the generator:** in the "loads and battery" output mode the generator supplies the loads first and charges the battery with the rest: charge power = generator maximum output − load power. To charge the battery at its rated power while the loads run, the generator must cover both.

- **Control:** a three-phase generator that starts and stops on a dry-contact signal from the inverter. Control is manual, automatic (starts when the grid fails), or by SOC (starts below the start SOC and stops at the stop SOC). To set up automatic or SOC start, contact AERL.
- **All-In-One Max:** it has no GEN port. Contact AERL to design its generator connection. Never connect a generator directly to the back-up side.

Generators must meet AS/NZS 3010.

4.2 Off-Grid Paralleling

Up to 10 All-In-One systems of the same model and rating can run in parallel on the back-up side, with no grid connection, for 50–500 kW (off-grid parallel). The total power is the number of systems × the rating of one. One master controls the system and shares the power on each phase evenly across the inverters.

- Each inverter has its own battery cabinet and its own PV strings.
- If a slave fails, the master isolates it and the system keeps running; if the master fails, the whole system shuts down.

For an All-In-One Max parallel system, contact AERL for the maximum number of systems. The All-In-One Max is for off-grid use: its grid connection is pending CEC listing.

4.3 Worked Example: Off-Grid Workshop

An off-grid workshop has a 35 kW continuous load with a 45 kVA motor start, uses 70 kWh overnight from the battery, and has a diesel generator for long cloudy periods.

Step	Working
Inverter	35 kW continuous needs the AIO-40K (40 kW). Its back-up peak, 60 kVA for 10 s, covers the 45 kVA start.
Battery energy	70 kWh overnight. The E2BR-S80K-C gives 72.27 kWh usable, with almost no margin; the E2BR-S96K-C gives 86.76 kWh.
Battery power	The S80 (38.4 kW rated) would carry the 35 kW load but limit the AIO-40K below its 40 kW rating; the S96 (46.08 kW rated) lets it deliver the full 40 kW from the battery alone. Choose the **S96**, for the energy margin and the full rating.
PV	Up to 80 kWp on 4 MPPTs; strings designed as in chapter 03.
Generator	At least the full load with the 45 kVA motor start, within the AIO-40K's 48 kVA generator input. To charge the battery as well, size it above the load, still within 48 kVA.

Support

Warranty, design support, change log

05

5.1 Warranty

The All-In-One cabinet and battery carry a 10-year product warranty and a 10-year, 70% performance warranty; the M2HT inverter carries 5 years, with an optional extension to 10 years. The warranty starts on the earlier of commissioning and six months after delivery to AERL. Conditions apply: see the All-In-One Warranty Statement, at aerl.com.au.

5.2 Design Support

Contact AERL support on 1800 950 865 or support@aerl.com.au for help with a design: parallel and generator systems, firmware, and grid connection.

5.3 Change Log

Revision	Date	Change
1.0.1	11 / 2026	Grid-connected parallel systems no longer restricted in Australia.
1.0.0	11 / 2026	First issue.

Thank You for Choosing AERL

If you have any questions or need support, contact AERL.

Sincerely,

The AERL Team

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