

# All-in-One ESS

Reliable power beyond the grid — solar, storage and genset engineered as one system  
Hybrid inverter and battery in one cabinet · 20–125 kW · 220–520 kWh

## OFF-GRID · MICROGRID SERIES

**20–125**

KW INVERTER RANGE

**220–520**

KWH BATTERY RANGE

**<10 ms**

STS BACKUP SWITCH

**×6**

MICROGRID PARALLEL

### One cabinet. Independent power. Day and night.

Hybrid inverter, battery, BMS and cooling come pre-integrated and factory-tested — on site you just connect the AC and DC terminals. PV powers the site by day and the battery carries the night; when SOC runs low **the EMS starts the genset and the built-in STS + ATS shift the load in under 10 ms** — nothing separate to buy or wire. The grid, where a line exists, is just one more source: used before the genset, never required. Start with one unit and scale to 6 in parallel as a full microgrid.



### All-in-One ESS

Battery cabinet with side-mounted hybrid inverter — factory-integrated and pre-wired

#### ⚡ Hybrid Inverter

**20–50 kW Series:** 4 MPPT / 2 strings per MPPT, 950×635×315 mm, >80 kg

**80–125 kW Series:** 8 MPPT / 2 strings per MPPT, 1120×760×365 mm, 135 kg  
DC/AC Ratio 2:1 · Built-in STS · IP65 · DC & AC Type II SPD

#### 🔋 Battery Cabinet

**220/240/260 kWh:** 1324×2415×1440 mm, <2.71 T  
LFP 314 Ah cells · 0.5C · Intelligent air cooling · IP54 · C4 anti-corrosion

### 8 Pre-configured System Packages

From **20 kW / 220 kWh** for island resorts and remote communities to **125 kW / 520 kWh** for village microgrids and large off-grid sites. Each package is factory-tested and pre-wired — just connect AC/DC terminals on-site. One-click EMS commissioning with automatic system recognition. **Scalable up to 6 units in parallel for full microgrid capability.**

## Key Advantages

#### 🔄 Seamless Backup (built-in STS)

Switches between battery and generator in under 10 ms — no separate transfer switch to buy or wire. Keeps the site running with no grid at all.

#### ☀️ More Solar, Less Loss

MPPT is built into the inverter (DC-coupled) for up to 98% efficiency — vs ~95% on typical AC-coupled designs. 2:1 DC/AC ratio captures more from an oversized PV array. Off-grid, every extra solar kWh is fuel the genset never burns.

#### 🔥 Fire Protection 2.0

Two-stage aerosol suppression at pack and cabinet level, plus CO and smoke detectors and an explosion-relief panel.

#### ☁️ Smart Energy Management

Local screen plus cloud platform with remote monitoring and diagnostics — manage sites far from the office. SOC calibration keeps battery reserve accurate.

# TECHNICAL SPECIFICATIONS

## Hybrid Inverter APOLLO MTP-620x — 20–125 kW

PV + BAT + Backup STS · Built-in MPPT · DC/AC Ratio 2:1 · IP65 · <10 ms Source Transfer (STS)



### Hybrid Inverter

PV + battery + backup STS in one IP65 unit · built-in MPPT

#### MTP-621x–625x — 20–50 kW Series

4 MPPT · 180–800V Battery · IP65

|                             | 20 kW                   | 25 kW     | 30 kW     | 40 kW     | 50 kW     |
|-----------------------------|-------------------------|-----------|-----------|-----------|-----------|
| Nominal AC Power            | 20 kW                   | 25 kW     | 30 kW     | 40 kW     | 50 kW     |
| Rated AC Current            | 29 A                    | 36 A      | 43 A      | 58 A      | 72 A      |
| Max. PV Power               | 40 kWp                  | 50 kWp    | 60 kWp    | 80 kWp    | 100 kWp   |
| MPPT Full Load Voltage      | 300–800 V               | 350–800 V | 400–800 V | 500–800 V | 600–800 V |
| Max. DC Power (Battery)     | 22 kW                   | 27.5 kW   | 33 kW     | 44 kW     | 55 kW     |
| MPPT Voltage Range          | 250–950 V (Max. 1000 V) |           |           |           |           |
| No. of MPPT / Strings       | 4 / 2 per MPPT          |           |           |           |           |
| Max. Current per MPPT       | 45 A                    |           |           |           |           |
| Battery Voltage Range       | 150–900 V               |           |           |           |           |
| Battery Rated Voltage Range | 180–800 V               |           |           |           |           |
| Dimension (W×H×D)           | 950 × 635 × 315 mm      |           |           |           |           |
| Weight                      | >80 kg                  |           |           |           |           |

#### MTP-628x–6212x — 80–125 kW Series

8 MPPT · 250–850V Battery · IP65

|                             | 80 kW                   | 100 kW    | 125 kW    |
|-----------------------------|-------------------------|-----------|-----------|
| Nominal AC Power            | 80 kW                   | 100 kW    | 125 kW    |
| Rated AC Current            | 116 A                   | 144 A     | 181 A     |
| Max. PV Power               | 160 kWp                 | 200 kWp   | 250 kWp   |
| MPPT Full Load Voltage      | 450–800 V               | 550–800 V | 700–800 V |
| Max. DC Power (Battery)     | 88 kW                   | 110 kW    | 137 kW    |
| MPPT Voltage Range          | 250–950 V (Max. 1000 V) |           |           |
| No. of MPPT / Strings       | 8 / 2 per MPPT          |           |           |
| Max. Current per MPPT       | 45 A                    |           |           |
| Battery Voltage Range       | 200–950 V               |           |           |
| Battery Rated Voltage Range | 250–850 V               |           |           |
| Dimension (W×H×D)           | 1120 × 760 × 365 mm     |           |           |
| Weight                      | ~135 kg                 |           |           |

#### Common Electrical Specifications — Both Series

|                       |                                               |
|-----------------------|-----------------------------------------------|
| AC Input Voltage      | 230/400 Vac, 220/380 Vac, 3L+N+PE (–15% +10%) |
| AC Input Frequency    | 50 Hz / 60 Hz (±5 Hz)                         |
| AC Output Voltage     | 230/400 Vac, 220/380 Vac, 3L+N+PE             |
| AC Output Frequency   | 50 Hz / 60 Hz (±5 Hz)                         |
| THD                   | < 3%                                          |
| Max. Efficiency       | 98%                                           |
| Battery Inputs        | 2                                             |
| IP / Surge Protection | IP65 / DC Type II, AC Type II                 |

#### Standards & Compliance

EN 62477 · EN 62109 · EN 62920 · IEC 61000 · IEC 61727 · IEC 62116 · Communication: RS-485, CAN, Ethernet

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Battery Cabinet — LFP Air-Cooled

LiFePO4 314 Ah cells · 220–260 kWh per cabinet · Intelligent air cooling · IP54 · IEC 62619 · IEC 63056



LFP Battery Cabinet

Air-cooled outdoor cabinet with integrated EMS, BMS and multi-level fire protection · IP54 · C4 anti-corrosion

| Battery Cabinet — 220 / 240 / 260 kWh |                        | 11–13 Battery Packs · <2.71 T · IP54 |            |
|---------------------------------------|------------------------|--------------------------------------|------------|
|                                       | 220 kWh                | 240 kWh                              | 260 kWh    |
| Total Battery Capacity                | 221.05 kWh             | 241.15 kWh                           | 261.24 kWh |
| Number of Modules                     | 11                     | 12                                   | 13         |
| Weight                                | < 2.71 T               |                                      |            |
| Battery Module Capacity               | 20.09 kWh              |                                      |            |
| Cell Type                             | LFP (LiFePO4) · 314 Ah |                                      |            |
| Charge / Discharge Rate               | 0.5C                   |                                      |            |
| Dimension (W×H×D)                     | 1324 × 2415 × 1440 mm  |                                      |            |
| IP / Corrosion Rating                 | IP54 / C4              |                                      |            |
| Operating Temperature                 | -30°C to +50°C         |                                      |            |
| Max. Altitude                         | < 3000 m               |                                      |            |

Safety & Protection Features

|                                                                                                                                                                  |                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>✔ <b>Multi-Level Fire Protection</b></p> <p>2-level thermal trigger aerosol (pack + cabinet). Explosion relief panel auto-releases internal pressure.</p>     | <p>⚠ <b>Early Warning System</b></p> <p>CO detector, smoke detector, sound &amp; light alarm. Smart ventilation linkage monitors thermal runaway precursors.</p> |
| <p>✱ <b>Intelligent Air Cooling</b></p> <p>Smart temperature control logic. Lower upfront cost vs liquid cooling. Simpler structure for quicker maintenance.</p> | <p>🔋 <b>Tier 1 LFP Cells</b></p> <p>Ultra-life span &gt;8,000 cycles. 10-year performance warranty. Certified to IEC 62619 and IEC 63056.</p>                    |

| Communication & Standards                                                                                       |
|-----------------------------------------------------------------------------------------------------------------|
| CAN · TCP · Ethernet · RS-485 · IEC 63056 · IEC 62619 · IEC 62477 · IEC 62040 · IEC 61000 · EN 62477 · EN 62040 |

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SYSTEM CONFIGURATIONS

# Pre-configured ESS — 8 Packages

Factory-tested & pre-wired · Hybrid Inverter + Battery Cabinet + EMS + HVAC · On-site: connect AC/DC terminals only

## System1 — Hybrid Inverter 20–125 kW · BESS 220–520 kWh

|                         | 20 kW<br>/221 kWh      | 25 kW<br>/442 kWh | 30 kW<br>/482 kWh | 40 kW<br>/482 kWh | 50 kW<br>/522 kWh |
|-------------------------|------------------------|-------------------|-------------------|-------------------|-------------------|
| Inverter AC Power       | 20 kW                  | 25 kW             | 30 kW             | 40 kW             | 50 kW             |
| Rated AC Current        | 29 A                   | 36 A              | 43 A              | 58 A              | 72 A              |
| Max. PV Power           | 40 kWp                 | 50 kWp            | 60 kWp            | 80 kWp            | 100 kWp           |
| MPPT Full Load Voltage  | 300–800 V              | 350–800 V         | 400–800 V         | 500–800 V         | 600–800 V         |
| Max. DC Power (Battery) | 22 kW                  | 27.5 kW           | 33 kW             | 44 kW             | 55 kW             |
| Battery Type            | LFP (LiFePO4) · 314 Ah |                   |                   |                   |                   |
| Battery Rack Capacity   | 221.05 kWh             | 221.05 kWh        | 241.15 kWh        | 241.15 kWh        | 261.24 kWh        |
| Number of Racks         | 1                      | 2                 | 2                 | 2                 | 2                 |
| Total Battery Capacity  | 221.05 kWh             | 442.10 kWh        | 482.30 kWh        | 482.30 kWh        | 522.48 kWh        |
| Battery Voltage Range   | 150–900 V              |                   |                   |                   |                   |
| Weight / Cabinet        | <2.53 T                | <2.53 T           | <2.66 T           | <2.66 T           | <2.71 T           |

## System2 — Hybrid Inverter 80–125 kW · BESS 220–520 kWh

|                         | 80 kW<br>/442 kWh      | 100 kW<br>/482 kWh | 125 kW<br>/522 kWh |
|-------------------------|------------------------|--------------------|--------------------|
| Inverter AC Power       | 80 kW                  | 100 kW             | 125 kW             |
| Rated AC Current        | 116 A                  | 144 A              | 181 A              |
| Max. PV Power           | 160 kWp                | 200 kWp            | 250 kWp            |
| MPPT Full Load Voltage  | 450–800 V              | 550–800 V          | 700–800 V          |
| Max. DC Power (Battery) | 88 kW                  | 110 kW             | 137 kW             |
| Battery Type            | LFP (LiFePO4) · 314 Ah |                    |                    |
| Battery Rack Capacity   | 221.05 kWh             | 241.15 kWh         | 261.24 kWh         |
| Number of Racks         | 2                      | 2                  | 2                  |
| Total Battery Capacity  | 442.10 kWh             | 482.30 kWh         | 522.48 kWh         |
| Battery Voltage Range   | 200–950 V              |                    |                    |
| Weight / Cabinet        | <2.53 T                | <2.53 T            | <2.71 T            |

### Common Specifications — All ESS Packages

LFP (LiFePO4) · 314 Ah cells · 20.09 kWh per module · 0.5C charge/discharge · Intelligent air cooling · IP54 battery cabinet · C4 anti-corrosion · –30°C to +50°C · Max 3000 m altitude · CAN & TCP communication

### Inverter Cabinet (included in all sets)

|                          |                                     |
|--------------------------|-------------------------------------|
| Inverter Cab. (20–50kW)  | 950 × 635 × 315 mm · >80 kg · IP65  |
| Inverter Cab. (80–125kW) | 1120 × 760 × 365 mm · 135 kg · IP65 |

### Leonics Hybrid Energy Solutions

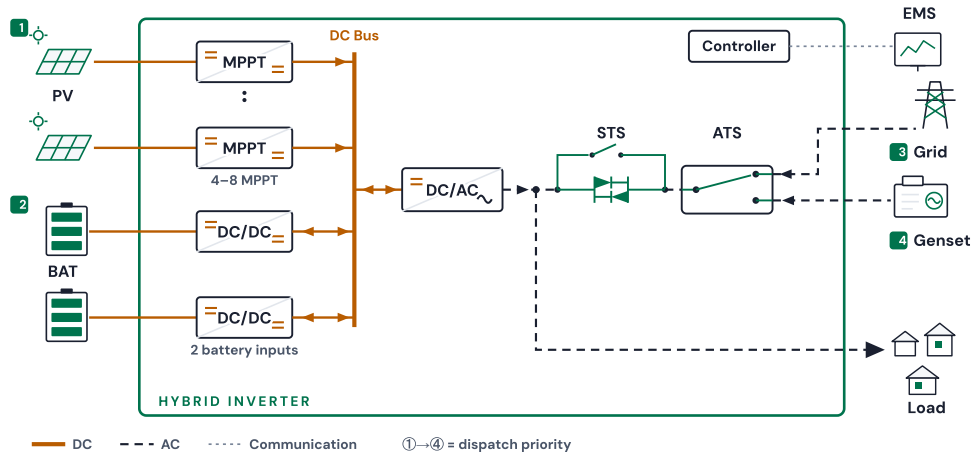
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## Built for Real-World Deployment

Multi-energy gateway with built-in STS · Advanced load management · Multi-level EMS · Easy installation

### System Diagram — How the Hybrid Inverter Works



Dispatch runs by priority: ① PV first, ② battery carries the night, ③ grid — where a line exists — is used before the genset, and ④ genset auto-starts when battery SOC runs low. The ATS selects the external source (Grid ↔ Genset); the solid-state STS ties that source to the load bus and disconnects in <10 ms on outage — the Load, fed from the inverter side, never drops.

### Built-in STS & ATS — Source Transfer & Backup

**STS — Static Transfer Switch** is built into every inverter, between the load bus and the source side, so the system switches between battery and generator in under 10 ms — no external STS to buy or install. Solid-state thyristor switching with no moving parts: transfer takes about a quarter of an AC cycle, so the load never notices. Off-grid (PV + battery + generator) is its native mode — no grid required.

**ATS — Automatic Transfer Switch** sits between the two external sources, selecting Grid or Genset before power reaches the STS — break-before-make, so the two sources are never paralleled. The EMS auto-starts the genset when battery SOC runs low; where a grid line exists, grid is used before the genset. A mechanical ATS transfers in 100 ms to a few seconds — the fast STS, not the ATS, is what keeps the load alive.

**Built for tough industrial loads:** inrush-current suppression tames the surge from motors and other inductive loads. Phase-independent control handles up to 100% unbalanced load (max 50% of capacity on one phase), and EV charging is scheduled to make the most of available power.

### Operating Modes — Off-Grid & Genset Hybrid

#### Off-Grid 24/7

PV charges the battery by day; the battery carries the load overnight. Automatic SOC calibration keeps reserve capacity accurate.

#### Genset Hybrid

PV-Battery-Genset mode brings the generator in as backup for the battery — fewer genset running hours, less fuel burned.

#### Weak-Grid Backup

Where the grid is unstable, the built-in STS switches to battery in <10 ms — loads ride through every outage.

#### Tough Load Handling

Inrush-current suppression for motor starts. Up to 100% unbalanced load (max 50% of capacity on one phase).

### Multi-Level Energy Management System

#### Level 1: Local EMS

Real-time data display, operation mode setting (off-grid, genset hybrid, manual), SOC calibration, load & demand control, power factor compensation.

#### Level 2: Master EMS

Support up to 6 local EMS units. Remote monitoring via Ethernet/WiFi.

#### Level 3: Cloud · Remote Fleet

Multi-level account management (Web APP). KPI analysis, remote upgrade. One dashboard for every remote site — monitor and upgrade units in the field without travelling.

### Easy Installation & Commissioning

All-in-one design with pre-installed power, battery, BMS, and HVAC — just connect AC/DC terminals. Optimized cabinet with bottom cable entry and forklift slots. **One-click commissioning via EMS** with automatic system recognition. Remote monitoring and diagnostics.

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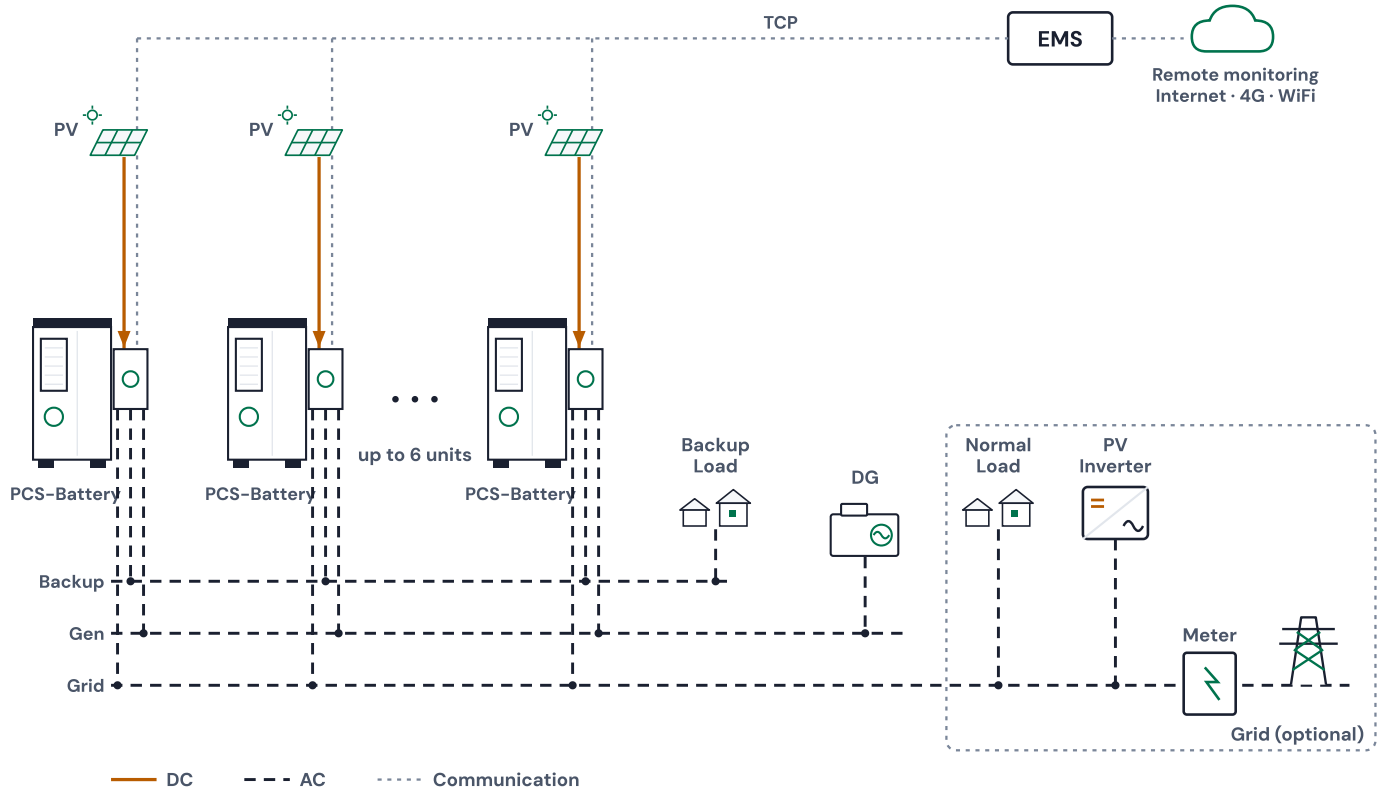
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## Parallel Operation — up to 6 units

Separate grid / backup / gen ports · EMS as communication hub · full microgrid with genset backup

### Off-Grid Parallel System



Each PCS has **separate ports** — grid, backup load and generator — and like ports of every unit join their own shared bus. Up to **6 units** parallel this way: backup loads ride the **backup bus**, the **DG** sits on the gen bus and auto-starts on low SOC, and the **grid bus** — where a line exists — carries the load centre, meter and any AC-coupled PV inverter. The **EMS** links every unit over TCP, with remote monitoring via Internet, 4G or WiFi.

### How to deploy in parallel

**Dedicated ports on every PCS.** Grid, backup load and generator each have their own connection — like ports join a shared bus, so units share load automatically. Start with one cabinet and add units as demand grows, up to a 6-unit microgrid.

**One EMS runs the fleet.** The EMS is the communication hub — TCP to every unit. One-click commissioning auto-recognizes new cabinets, and one dashboard covers the whole site, locally or via cloud monitoring.

**Genset on its own port.** The DG connects to the PCS generator port and auto-starts when battery SOC runs low. An existing AC-coupled PV inverter ties to the grid bus through its own meter (RTU) — the EMS dispatches around it.

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