



Apollo Solar™

Remote telecom energy systems

- Reduced **CAPEX** with optional features
- Comprehensive remote monitoring
- Internal rectifier & diesel generator control
- Easy installation in remote locations

A single factory-built cabinet provides simple, clean, trouble-free installations

Designed for a wide range of standard telecom BTS and microwave relay sites, the Apollo Solar Series supports pure solar or hybrid (grid and/or genset) site powering scenarios. The typical installation has 3-20kW PV per site; systems also often serve “multi tenant” sites (multiple MNO or Virtual MNOs, for example).

KEY FEATURES AND BENEFITS

Remote Telecom Energy System

- Reduced CAPEX, through a base-level system with optional features
- Comprehensive remote monitoring
- Internal rectifier & diesel generator control
- Easy installation in remote locations

Single factory-built cabinet for simple, clean, trouble free installations

- Supports pure solar or hybrid (grid and/or genset)
- 500W-5000W loads, typical, (depending on radio and telephony equipment on-site)
- Rectifier integration and automatic transfer switch options for generator use
- Easily expandable to accommodate radio technology upgrades or additional tenants when they increase powering requirements

Minimize OPEX and Optimize CAPEX

- Reduce diesel costs to zero with solar
- Easy field upgrades as loads increase

Proven Remote Telecom (RTS) Site Power

- Over 1000 sites installed and operating
- From the leader in MPPT Charge Controllers since 2006
- Hybrid DG/solar or pure solar
- Smart control loads up to 2.5kW, PV/DG hybrid loads up to 20kW per cabinet

The Apollo Series Remote Telecom Energy System is engineered for situations where reliability is paramount, 100% uptime is a requirement, and any minutes of downtime may incur costly penalties. It's a fourth-generation powering system now built and backed by Morningstar—makers of the “worlds leading solar controllers and inverters.”

Complete energy system in an enclosed, weatherized cabinet

- Comprehensive remote monitoring
- IP66 enclosure is rated for weatherized use outdoors
- Factory-wired and tested in the USA
- 5 -year warranty

At the heart of the system: Morningstar's field-proven TriStar™ TS-MPPT-60 Solar Controller

The TriStar TS-MPPT-60 Solar Controller is probably the most iconic design in the solar industry, proven in installations ranging from Antarctic research stations to desert oil and gas fields. The TriStar design integrates acclaimed TrakStar™ Maximum Power Point Tracking (MPPT) technology, battery charge management, and communications into a single product. Moreover, TriStar controllers have no cooling fans to fail or compromise performance and reliability by ingesting dirt and debris. Each TS-MPPT-60 will support up to 3.2kW of PV Array with up to 150 volts Voc. The 60Amps of battery charge current is available even with ambient temperatures up to 45°C.

Reduced CAPEX through optional features

The Apollo systems are designed to minimize CAPEX (Capital Expense) when buying solar replacements for diesel generators. The basic package is offered at a base cost, with optional features that may be added when required.

Comprehensive remote monitoring and control

Remote monitoring of the entire energy system is near real-time. Data is sent to our server every minute showing: voltage and current on PV input, batteries, and load; internal cabinet and battery temperatures; battery state of charge (SOC), energy harvest, alarms and diagnostics. Alarms are provided on all vital parameters with load disconnect on low battery SoC. Data communication is via Ethernet, GSM modem, LTE, satellite via SNMP.

Internal rectifier & diesel generator control

Hybrid system including Internal Rectifier up to 21kW. Smart Energy Flow Algorithm starts an external generator at the optimum time and minimizes run time and fuel consumption. A smart ATS allows grid power input with automatic selection of energy source based on costs for fuel. The Telecom BTS loads are always powered and the batteries are never deeply discharged.

Rectifier shelf with breakers and ATS

The rectifier shelf is mounted on the door. The compact system supports up to seven 3kW SMPS modules plus the controller. Easy access is provided to the circuit breakers and ATS mounted below the rectifier on the door.

Easy installation in remote locations

Apollo PVT systems are completely assembled, wired, and tested in the USA to provide a single point for communication and support.



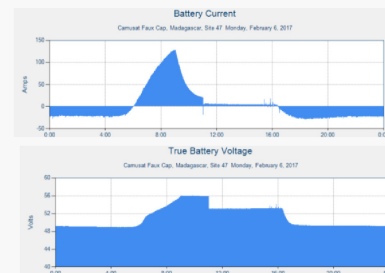
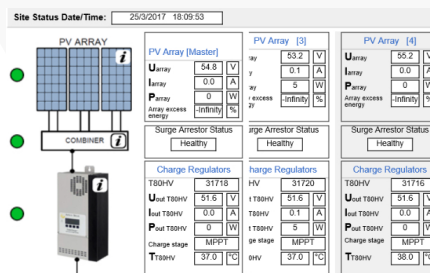
Below: panel inside the cabinet enclosure, which is **100cm (39 3/8in) W x 30cm (11 13/16in) D x 120cm (47 1/4in) H**. Ground mounting legs provide 450mm of room underneath for cables. Direct access to all parts makes field service and power upgrades easy. The IP66-rated enclosure is powder-coated steel.



Options:

- Combiner boxes – 4 to 6 PV string inputs with 75kA SPD
- 3 to 21kW rectifier – hybrid PV/DG includes gen-starting
- Lithium-Ion supported– integrated BMS for Li-Ion batteries
- 350W inverter – true sine wave AC for small accessories
- 4kW inverter – true sine wave output for major AC loads
- Enhanced surge protection –on-board SPD/TVSS circuitry for high lightning strike areas
- 250A battery breakers – protects AWG 4/0 battery cables
- Fans w/filters – provide cooling for 40OC ambient temps
- Air conditioner – provides cooling for 55OC ambient temps
- Energy metering – current sensors on each DC output
- Multiple DC outputs – for both primary/essential and secondary/non-essential loads
- ATS – for hybrid units with occasional grid availability

Remote monitoring: site locations, fast status dashboard and charts of parameter history



Morningstar Corporation builds and supports Apollo Solar Series products
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