PRINCETON POWER SYSTEMS

Demand Response Inverter (DRI)

3-Phase, Grid-tied, Controllable 4-Terminal Power Conditioner

Princeton Power DRI

About Princeton Power

Princeton Power Systems designs and manufactures high-performance power electronic converters and systems for commercial, industrial, and military distributed generation applications.

General Specifications	
Power Rating	100 kW
Inverter Technology	4-port PWM with central DC link
Size and Weight	90.5 W x 41 D x 70 H, 3500 lbs
Power Terminals	Four (4): DC PV or Battery, DC Battery, AC Grid, AC Load, or DC Port (optional car charge)

DC Power Terminal Specifications (x2)	
Voltage Range	280 — 600 VDC
PV MPPT Range	280 — 580 VDC
Power	100kW (bi-directional)
PV Array Configuration	Grounded
Nominal Voltage	480V
Max. Current	330 A
Control Functions	Battery charge/discharge/bulk/float for lead-acid, lithium-ion, and lead-carbon PV array control

AC Grid Power Terminal Specifications	
Voltage	480 VAC +10%, -12%
Maximum Current	133 A RMS
Power Factor	0.95 (lag) – 1 – 0.95 (lead) at rated power
Line Frequency	60Hz (59.0 – 61.0Hz compliant with UL 1741)
Harmonics	<5% THD IEEE 1547 Compliant

AC Load Power Terminal Specifications	
Voltage Range	480V + 10% - 12%
Maximum Current	133 A Continuous
Overload Capability	150% for 10 seconds, 10-minute duty cycle
Frequency Range	60Hz (59.0 – 61.0Hz compliant with UL 1741)

Environmental Specifications	
Temperature	Operating: 0 to 50°C Storage: -20 to 70°C
Humidity	5 – 95% (non-condensing)
Cooling	Forced-air cooled
Rated Max Elevation	6,000 feet (de-rated)
Enclosure	NEMA 3R Outdoor

Safety Features	
Faults	Over/Under Voltage/Frequency/Current/Temperature Ground Fault, Internal
Standards Compliance	IEEE 1547, CEC, UL 1741
Safety Features	Anti-islanding (grid fault detection, isolation, & auto-reconnect), Fused ground fault interrupter, UL-compliant trip points (factory adjustable), Password-protected parameters Battery over/under-charge protection

User Interface Features	
Front-Panel Interface	Touch screen viewable in and protected from sunlight
Communications	TCP/IP, MODBUS over RS485, DNP3
Performance Monitoring	Local performance data storage, downloadable Web-based historical performance data hosting options (*2)
Analog & Digital I/O	Analog: (1) inputs, (1) output; 0-10 V Digital: (4) inputs 0-24V, (7) output relays

Efficiency	
Peak Efficiency	96.0% (PV to Grid)
CEC Efficiency	95.0% (PV to Grid)
Energy-Saving Features	Smart load-shedding, dynamic motor control, Smart Relays

*2 - Advanced features with optional Site Controller

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Pre-configured Power Solution
The multi-terminal DRI is uniquely flexible to be more reliable, more efficient, and more cost-effective than currently available inverters. The DRI's distinctive 4-terminal architecture provides valuable grid-support functionality for high penetration of PV, energy storage, microgrids, vehicle charging, and grid support functions.

Efficient | Maximize energy.
Maximize energy and minimize cost.
Improves energy conversion efficiency. Programmable power curves and charge profiles also provide enhanced control for generators, AC loads, and batteries.

Reliable | Eliminate downtime.
Eliminate downtime and decrease demand.
Increased lifespan, and advanced, high-capacity switches allow the DRI to provide back-up power in times of need and during peak demand.

Flexible | Integrate quickly and easily.
Highly programmable and easily integrated.
E-Quad Technology allows power routing to the grid, DC energy storage, and dynamic AC loads. Multiple AC and DC terminals are ideal for microgrid and off-grid systems.

E-QUAD™ Power Flow Control Technology
Dynamic control of four bi-directional loads/sources through a central high-frequency link

DC
DC
AC Grid
AC Load

Features & Options

- 5 Smart Relays automatically shed low-priority loads in response to price signals, or grid needs
- Ground fault detection and interruption (GFDI)
- Web-based performance monitoring.
- Revenue-grade kWh meter (optional)
- Manual AC and DC disconnects and combiner box (optional)
- CHAdeMO
- Utility interface communication modules for IEC 61850, Modbus, and CANbus.

For more options please see our website

www.princetonpower.com
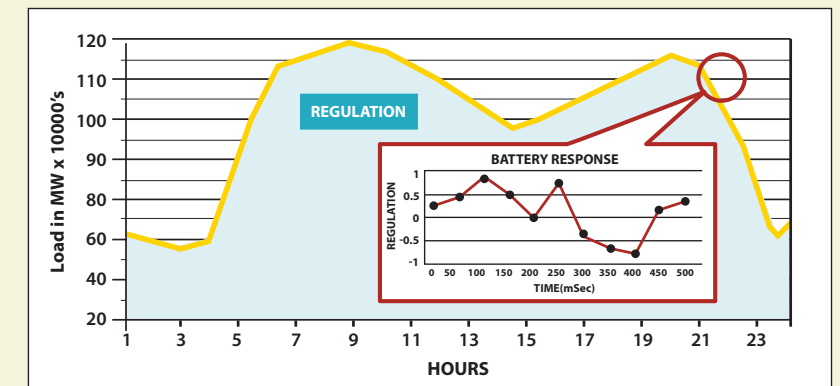
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Common Configurations

Key Features

PV with Storage

a. Dispatchable PV power
b. VAR Support
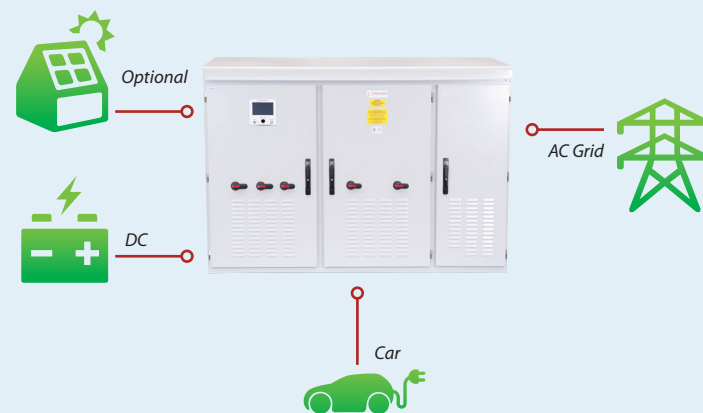c. Smooth ramp-rates, voltage flicker
d. Enables high-penetration PV

DC

DC

AC Grid

Grid-Support Functions

a. Area Frequency Regulation
b. Arbitrage
c. Automatic peak shaving
d. VAR Support

EV Charging

a. Enables fast charging (multi-vehicle)
b. CHAdeMO, SAE J1772, etc.
c. Provides grid support services
d. Optional PV input for solar charging

Optional

DC

AC Grid

Car

Available Configurations

a. DRI systems are available in several pre-configured designs or customer specific systems can be designed.

1. 10 kW System
    a. Residential
    b. EV Charging
2. 30 kW System
    a. EV Fast Charging
    b. Commercial

3. 100 kW System
    a. Multi-EV Fast Charging
    b. Commercial
    c. Industrial
4. 1 MW + System
    a. Grid-Support
    b. Larger Micro-grids
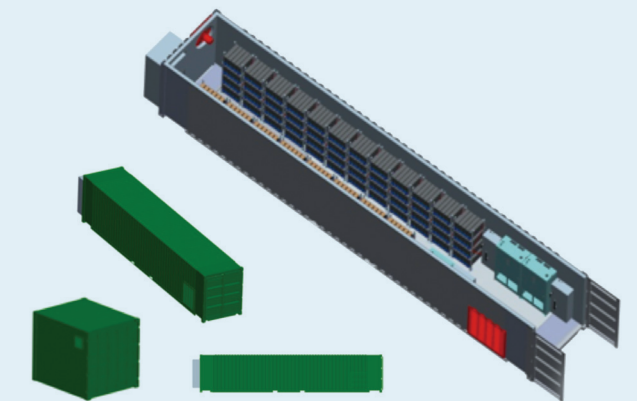
Microgrid

a. AC-coupled for high efficiency
b. Wide compatibility with AC generators (diesel, gas, etc.)
c. Optional PV or Wind inputs
d. Seamless electric grid interface

DC

DC

AC Load

Generator

AC Grid
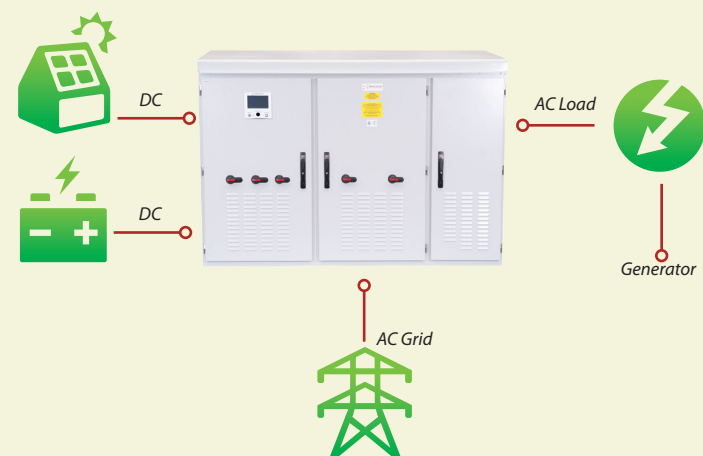
Battery Types

a. DRI systems work with multiple battery types from a variety of manufacturers, including the leading providers of lithium-ion and lead-acid technologies.

Pre-configured systems are available or specific batteries can be integrated.

b. PbA
c. Li Ph
d. PbC
e. Other