2.2 Power Xpert Solar 1500/1650 kW Inverter

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Product Description

The Power Xpert Solar™ MW scale inverter is a rugged, robust and reliable solar inverter designed with Eaton engineering's 100-year tradition of safety and reliability. Designed for utility applications the Power Xpert Solar 1500/1650 is the world's largest PV inverter and sets the new standard in reliability and performance.

The inverter is outdoor-rated, and no extra shelter (canopy) or environmental protection is needed in order for the equipment to sustain operation in harsh environments (rain, dust, snow and sun). This makes the Power Xpert Solar inverter not only an economical and cost-effective solution but capable of rapid deployment and installation.

Availability is optimized by a complete fault tolerant design. This inverter is composed by three blocks of 500 kW (550 kW), which can be individually isolated in the unlikely event of a fault, allowing the inverter to operate at partial power until field service arrives on site. This provides for higher reliability and availability than using multiple smaller inverters.

The Power Xpert Solar inverter provides the most cost-effective solution in the market for the following reasons:

- Fully outdoor rated enclosure—no extra shelter or environmental protection needed
- Inverter includes:
  - Re-combiner box with fuses
  - Load brake rated DC disconnect switches
  - AC circuit breaker for AC disconnection
  - AC and DC surge suppression
  - True MW design—one inverter is needed for 1.5 MW/1.65 MW station providing the lowest cost of installation and operation:
    - Fewer cement pads, less excavation and less cement
    - Reduced field labor for cabling and wiring due to fewer units needed
    - Direct-coupling connection with step-up transformer
    - No special transformers with dual primaries are needed
- Fault tolerance design—inverter is able to run at partial power (1/3, 2/3 of full power)
- High reliability due to conservatively rated components, film capacitors and liquid cooling
- No active power de-rating for up to ±0.91 power factor support
- SCADA communication via Modbus® over TCP or RS-485

Features and Benefits

- True MW scale inverter allows for maximum cost savings on installation of inverter and transformer. It also enables a skidless solution as there is only one inverter and a simple pad-mount transformer to be installed
- Inverter can be configured as a 1.5 MW or 1.65 MW for maximum output power optimization. Depending on the MPPT range for the array, the inverter output power can be set to 1.5 MW or 1.65 MW
- Power factor support at rated power. The inverter will supply full rate power (1.5 MW or 1.65 MW), and still provide support for up to a ±0.91 power factor range. This provides cost optimization especially on projects with a power factor support requirement
- Maximum flexibility on grid support. Power Xpert Solar grid and frequency ride through settings are flexible and can be changed to meet local utility or special grid requirements
- The inverter voltage and frequency disturbance characteristics are set and controlled by a widely accepted protection relay SEL-751A. This device is well known by utilities and enables one extra protection layer for safe inverter shutdown under abnormal grid conditions
- Direct-coupling throat connection between the inverter and transformer enables cost savings on cables, conduits and pad installation. The throat connection has been implemented using Eaton's vast experience on low voltage switchgear with connection to a step-up transformer
- DC grounding configuration is available as positive, negative and floating schemes
- For floating arrays, the inverter comes with an isolation monitoring device to monitor array isolation to ground
- A re-combiner box with maximum flexibility is available. The standard configurations for number of DC inputs, DC fuse current and cable size allowed are shown in the table below
- Array Zone monitoring is possible with the option of current sensing on each DC input. This option allows current monitoring of the ungrounded DC polarity inputs. Each DC input current measurement is stored on the internal inverter controller and available to a plant monitoring device via Modbus (TCP or RS-485).
- Fiber optics communication connection is available for large plants, where inverter stations are placed at a far distance from the plant central controller or monitoring device
- Optional auxiliary I/O ports provide an effective way of cost-savings when external devices need to be monitored, such as step-up transformer measurements (liquid temperature, pressure and level). The I/O ports that are available are eight digital inputs/outputs, eight 4-20 mA analog ports and two serial RS-485
- A revenue grade-meter is also present as an option when energy metering is needed at the inverter level

Number of Inputs (+/– Pairs)	Maximum Fuse Size Allowed	Maximum Cable Size Allowed
16	400	600 kcmil or 2 x 300 kcmil
18	350	600 kcmil or 2 x 300 kcmil
20	300	500 kcmil or 2 x 250 kcmil
22	250	400 kcmil or 2 x 200 kcmil
24	250	400 kcmil or 2 x 200 kcmil

Note: Other configurations are possible using the fuse sizes listed above. Please consult factory.

Catalog Number Selection

The catalog number system is what determines the product configuration. The base configuration and subsequent catalog number of the Power Xpert Solar 1500/1650 kW Inverter is **SOX560T101000000000**.

Power Xpert Solar 1500/1650 kW Inverter

SOX 5 6 0 T 1 0 1 0 0 0 0 0 0 0 0 0

Part String
SOX = Power Xpert Solar Inverter

Power Range
5 = 1500 kW
6 = 1650 kW
7 = Other

Frequency
6 = 60 Hz

Reserved
0 = No options

AC Connection
T = Throat (direct-couple)
C = Cables

Ground Scheme
1 = Negative ground
2 = Positive ground
3 = Floating

Isolation Monitoring
0 = None
1 = Isolation monitoring option

Recombiner OCPD—Fusing
0 = No OCPD
1 = 16 x 355A
2 = 18 x 315A
3 = 20 x 250A
4 = 24 x 200A
5 = 24 x 160A
6 = Others

DC Input Current Monitoring
0 = None
1 = DC input current monitored

Reserved
0 = No options

Reserved
0 = No options

Reserved
0 = No options

Fiber-Optics Comms Connection
0 = Not included
1 = Included

Reserved
0 = No options

Revenue-Grade Meter
0 = No meter
1 = Revenue-grade meter included

Reserved
0 = No options

Weather Package
0 = Standard (–20° to 50°C)
1 = Cold weather (–40° to 50°C)

Technical Data and Specifications

Power Xpert Solar

Description	1500 kW	1650 kW
AC Output		
Nominal apparent power AC at 50°C	1650 kVA	1815 kVA
Rated output power AC at 50°C	1500 kW	1650 kW
Maximum continuous output current at 50°C	3000A	3000A
Nominal operating voltage	320 Vac	352 Vac
Operating voltage range (withstand)	+/–10%	+/–10%
Nominal operating frequency	60 Hz	60 Hz
Operating frequency range	57–63 Hz	57–63 Hz
Total harmonic distortion at rated power	Per IEEE 1547, <5% TDD	Per IEEE 1547, <5% TDD
Power factor at rated power	± 0.91 adjustable power factor (zero to unity)	± 0.91 adjustable power factor (zero to unity)
AC configuration	Delta three-wire	Delta three-wire
DC Input		
Number of DC inputs	Customer specified fuse arrangement (16–24 input pairs)	Customer specified fuse arrangement (16–24 input pairs)
Maximum input voltage open circuit, V_{OC}	1000 Vdc	1000 Vdc
MPPT input DC voltage range	500–1000 Vdc	550–1000 Vdc
MPPT DC voltage range for full power production	500–1000 Vdc	550–1000 Vdc
Nominal DC operating current DC	3100A DC	3100A DC
PV array grounding	Negative and positive (optional)	Negative and positive (optional)
DC monitoring	Optional current sensors on each DC input	Optional current sensors on each DC input
Efficiency and Losses ①		
Weighted efficiency (CEC)	98%	98%
Protection		
AC disconnect	AC circuit breaker with LOTO	AC circuit breaker with LOTO
AC surge suppression	Yes, monitored by inverter SCADA	Yes, monitored by inverter SCADA
DC disconnect	Load brake switch disconnect	Load brake switch disconnect
DC surge suppression	Yes, monitored by Inverter SCADA	Yes, monitored by Inverter SCADA
Ground fault monitoring	Yes, monitored by Inverter SCADA	Yes, monitored by Inverter SCADA
Insulation monitoring	Optional	Optional
Communications and Controls		
Communications with plant central controller	Modbus (TCP/RS485) optional fiber optics connection	Modbus (TCP/RS485) optional fiber optics connection
Power metering	Optional power metering device	Optional power metering device
HMI	Yes	Yes

Note

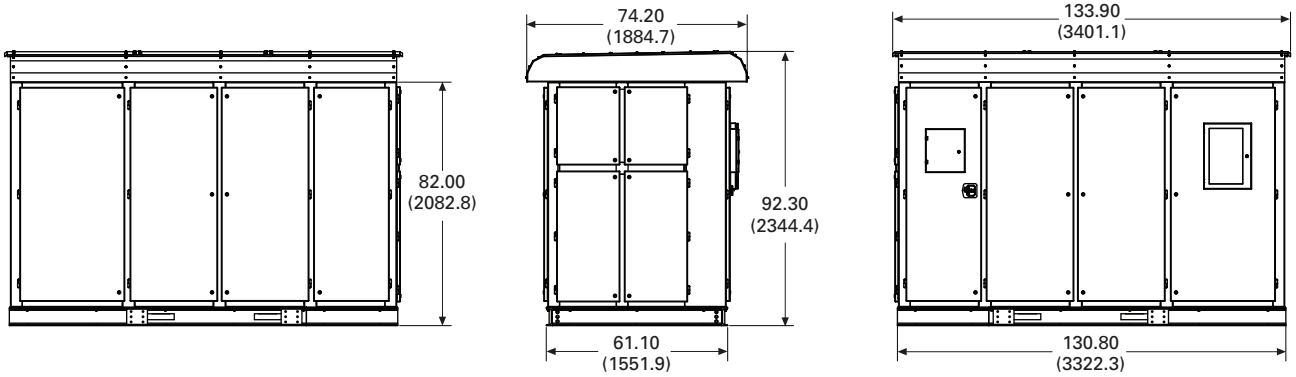
① Preliminary.

Power Xpert Solar, continued

Description	1500 kW	1650 kW
Mechanical		
Operating temperature range full power	–20° to 50°C	–20° to 50°C
Optional extended temperature range (cold weather package)	–40° to 50°C	–40° to 50°C
Storage temperature range	–30° to 70°C	–30° to 70°C
Enclosure protection	Outdoor rated NEMA® 4 for power electronics and controls equipment NEMA 3R for magnetics and switchgear	Outdoor rated NEMA 4 for power electronics and controls equipment NEMA 3R for magnetics and switchgear
Enclosure painting	Powder-coated cold-rolled steel with corrosion-resistant hardware and fittings	Powder-coated cold-rolled steel with corrosion-resistant hardware and fittings
Relative humidity	0 to 100% condensing	0 to 100% condensing
Inverter mounting	Pad or skid mount	Pad or skid mount
Cooling	Independent, self-contained, closed- loop liquid cooling and air forced convection	Independent, self-contained, closed- loop liquid cooling and air forced convection
Maximum operating altitude	3300 ft (higher altitudes possible with derating)	3300 ft (higher altitudes possible with derating)
Inverter dimensions in inches (H x W x D) ①	96 x 131 x 62	96 x 131 x 62
Standards and Compliance		
Safety	UL 508c, UL 1741 (in process)	UL 508c, UL 1741 (in process)
Design Features		
Grid management features (optional)	LVRT	LVRT
	HVRT	HVRT
	ZVRT	ZVRT
	FRT	FRT
	Ramp control	Ramp control
	Frequency droop	Frequency droop
	Grid management features adjustable to meet FERC, WECC and ERCOT requirements	Grid management features adjustable to meet FERC, WECC and ERCOT requirements
	Optional anti-islanding detection	Optional anti-islanding detection

Dimensions

Approximate Dimensions in Inches (mm)



Note

① Preliminary.