Solar inverters

ABB string inverters
TRIO-20.0/27.6-TL-OUTD
20kW to 27.6kW

A commercial photovoltaic (PV) system using a TRIO-based modular architecture can reduce balance of system (BOS) costs by as much as 40 percent.

The TRIO is a modular option using models at 20.0kW and 27.6kW.
It can be used alone for a 20kW system or combined as building blocks for large commercial and utility scale systems. With two independent Multiple Power Point Trackers (MPPT) and peak efficiency ratings of 98.2 percent, these inverters offer superior energy harvest. The flat efficiency curves offer high efficiency at all output levels ensuring consistent and stable performance across the entire input voltage and output power range.
Employing fanless convection cooling and no electrolytic capacitors, the TRIO is designed for long service life.

The TRIO offers flexible power factor control to comply with utility grid requirements where required.
As the first 1000Vdc string inverter certified to UL1741, the TRIO leads the way for efficient, cost-saving, decentralized system design.
This commercial inverter is equipped with integrated Modbus and utility interactive controls including adjustable power factor and curtailment. Additional AC and DC protections as well as arc-fault circuit interruption are all available in the TRIO.
These inverters provide the monitoring, control features, and protection required in today's commercial solar installations.

Highlights

- This flexible and dependable three-phase string inverter has innovative features to lower system Levelized Cost of Energy (LCOE) and improve Return on Investment (ROI) on commercial solar installations
- Fully utilize available roof space and maximize harvest with dual independent MPPT
- 1000V input voltage lowers installation and material costs
- Easy to install on any wall, racking, or carport structure

Additional highlights

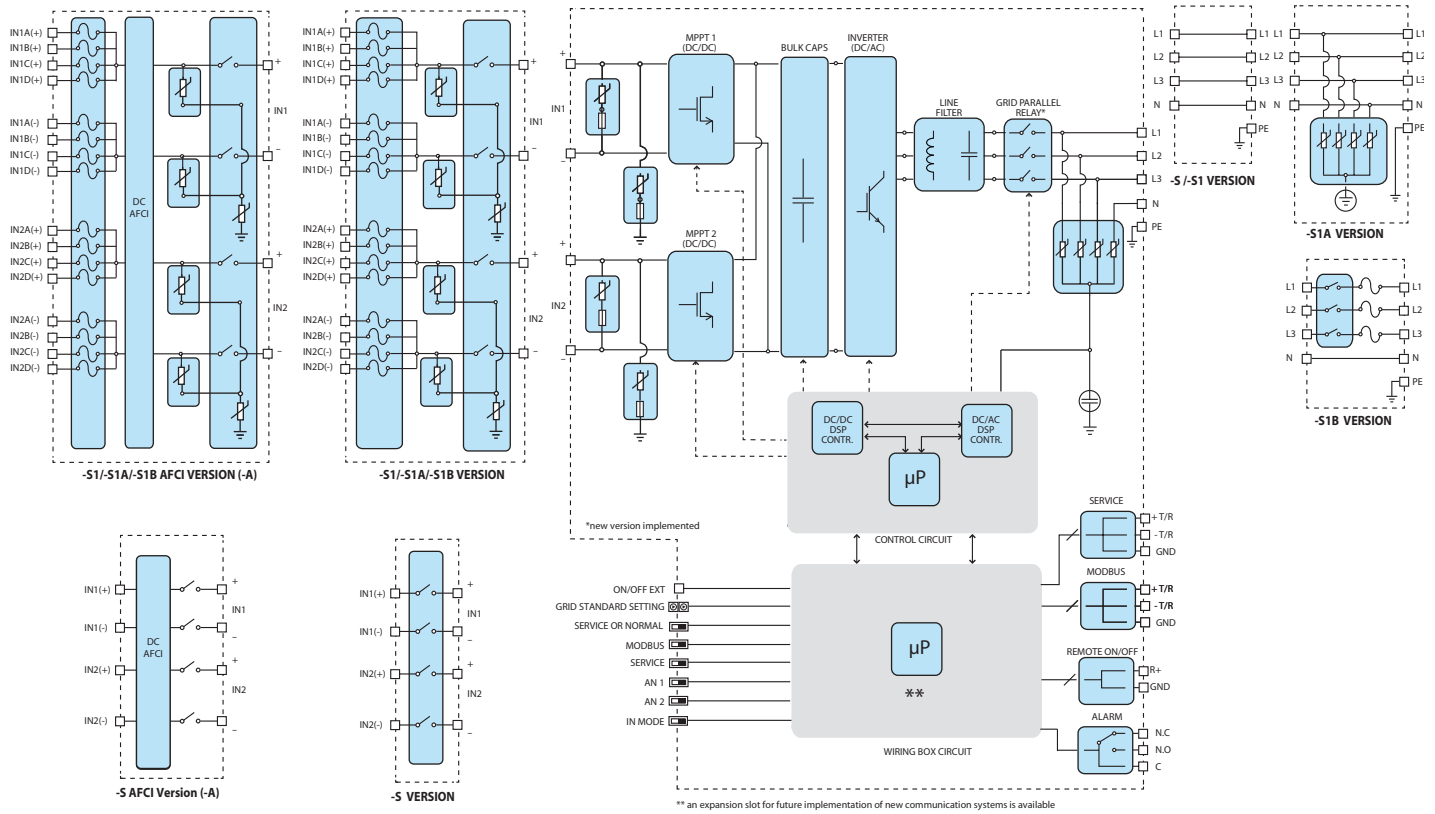
- Multiple AC and DC level protection options available including Arc-Fault Circuit Interruption (AFCI)
- Wide DC input voltage and operating temperature range enable greater PV array design flexibility
- Modular design capability improves system availability and eliminates single point of failure
- Utility interactive control features and Modbus protocol integrates with monitoring and control systems
- Design uses natural convection cooling and no electrolytic capacitors for increased reliability
- Easy to install sun shield accessory allows mounting in direct sunlight

Technical data and types

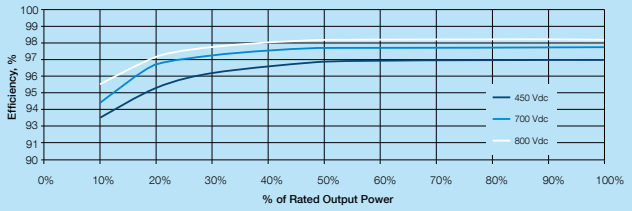
Type code	TRIO-20.0-TL-OUTD	TRIO-27.6-TL-OUTD
Nominal output power	20000W	27600W
Maximum output power	22000W[1]	30000W[1]
Rated grid AC voltage	480V	
Input side (DC)		
Number of independent MPPT channels	2; Non-AFCI models are programmable for 1 MPPT	
Maximum usable power for each MPPT channel	12000W	16000W
Absolute maximum voltage (V_{max})	1000V	
Start-up voltage (V_{start})	360V (adj. 250-500V)	
Full power MPPT voltage range	450-800V	520-800V
Operating MPPT voltage range	200-950V	
Maximum usable current (Idc max) per MPPT channel	25.0A	30.9A
Maximum short circuit current (Isc max) per MPPT channel	30.0A	36.0A
Number of inputs (strings) per MPPT channel	-S version: 1; -S1, -S1A, -S1B versions: 4	
Array wiring termination type	Terminal block, screw terminal, copper only, -S: 12AWG-2AWG; -S1, -S1A, -S1B: 12AWG-6AWG	
Output side (AC)		
Grid connection type	3Ø/4W + Ground	
Default operating voltage range	422-528V	
Extended adjustable voltage range	240-552V[2]	
Nominal grid frequency	60Hz	
Adjustable grid frequency range	57-63Hz	
Continuous current	27.0 A_{RMS}	36.0 A_{RMS}
Contributory fault current (@ 1 cycle)	51.4A_{RMS}	42.72A_{RMS}
Power factor	> 0.995 (adj. ±0.8, or ±0.9 for active power >20kW)	>0.995 (adj. ± 0.8, or ±0.9 for active power >27.6kW)
Total harmonic distortion at rated power	<3%	
Grid wiring termination type	Pass-through terminal. Tension clamp. Copper 8AWG-4AWG	Pass-through terminal. Tension clamp. Copper 6AWG-4AWG
Input protection devices		
Reverse polarity protection	Yes, passive inverter protection only.[3]	
Supplementary over-voltage protection type for each MPPT	-S1, -S1A, -S1B version: plug-in class II modular surge arrestor	
PV array ground fault detection	Meets UL1741/NEC requirements	
Output protection devices		
Anti-islanding protection	Meets UL 1741 / IEEE 1547 requirements	
Supplementary over-voltage protection type	-S1A version: plug-in class II modular surge arrestor	
Optional AC fused disconnect current rating (per contact)	-S1B version: 35A	-S1B version: 45A
Maximum AC OCPD rating	40A	50A
Operating performance		
Efficiency (Max/CEC)	98.2% / 97.5%	
Feed-in power threshold	65W_{RMS}	70W_{RMS}
Communication		
User-interface display	5.5“ x 1.25“ graphic display	
Standard communication interfaces	(1) RS485 connection, can be configured for Aurora protocol or Modbus RTU. Support for optional monitoring expansion cards.	
Optional remote monitoring logger	VSN 700	
Environmental		
Ambient operating temperature range	-22°F to +140°F (-30°C to +60°C) Derating above +113°F (45°C)	
Ambient storage temperature range	-40°F to +185°F (-40°C to +85°C)	
Relative humidity	0-100% condensing	
Acoustic noise emission level	<50 db (A) @1m	
Maximum operating altitude without derating	6560ft (2000m)	
Mechanical specifications		
Enclosure rating	NEMA 4X	
Cooling	Natural convection	
Dimensions H x W x D	41.7 x 27.6 x 11.5 in. / 1061 x 702 x 292 mm.	
Unit weight	157lb (71kg)	168lb (76kg)
Conduit connections	Bottom: (2) concentric DC KOs 1“, 1 1/2“ on removable plate, (2) 1/2“ plugged comm. openings, (1) 1“ plugged AC opening	
Mounting system	Wall bracket	

1. Capability enabled within maximum input current, maximum input power, maximum output current, ambient operating temperature limits, and power factor at unity.
2. Extended voltage range is for trip settings only, not operational voltage ranges.
3. In -S1, -S1A and -S1B models, the string polarity must be verified before connection. Please refer to installation manual for the correct installation procedure.

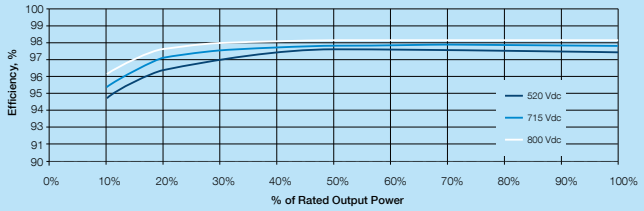
Block diagram of TRIO-20.0/27.6-TL-OUTD



TRIO-20.0-TL-US



TRIO-27.6-TL-US



Technical data and types

Type code	TRIO-20.0-TL-OUTD	TRIO-27.6-TL-OUTD
Safety		
Isolation level	Transformerless. Floating array required.	
Safety and EMC standard	UL1741, IEEE1547, IEEE1547.1, CSA C22.2 107.1-01-2001, FCC Part 15 Sub-part B Class B Limits	
Safety approval	$_{C}$CSA$_{US}$	
Available models		
Standard with DC disconnect	TRIO-20.0-TL-OUTD-S-US-480	TRIO-27.6-TL-OUTD-S-US-480
With DC disconnect, DC fuses and DC surge protection	TRIO-20.0-TL-OUTD-S1-US-480	TRIO-27.6-TL-OUTD-S1-US-480
With DC disconnect, DC fuses, DC surge protection and AC surge protection	TRIO-20.0-TL-OUTD-S1A-US-480	TRIO-27.6-TL-OUTD-S1A-US-480
With DC disconnect, DC fuses, DC surge protection and AC fused disconnect	TRIO-20.0-TL-OUTD-S1B-US-480	TRIO-27.6-TL-OUTD-S1B-US-480
Standard with DC disconnect and Arc-Fault circuit interruption	TRIO-20.0-TL-OUTD-S-US-480-A	TRIO-27.6-TL-OUTD-S-US-480-A
With DC disconnect, DC fuses, DC surge protection and Arc-Fault circuit interruption	TRIO-20.0-TL-OUTD-S1-US-480-A	TRIO-27.6-TL-OUTD-S1-US-480-A
With DC Disconnect, DC fuses, DC surge protection, AC surge protection and Arc-Fault circuit interruption	TRIO-20.0-TL-OUTD-S1A-US-480-A	TRIO-27.6-TL-OUTD-S1A-US-480-A
With DC disconnect, DC fuses, DC surge protection, AC fused disconnect and Arc-fault circuit interruption	TRIO-20.0-TL-OUTD-S1B-US-480-A	TRIO-27.6-TL-OUTD-S1B-US-480-A
Accessories		
TRIO sun shield	36“ x 40“ x 14“ | 26 lbs.	
VSN300 Wifi Logger Card	Data monitoring; 1 required per inverter	

All data is subject to change without notice

Support and service

ABB supports its customers with a dedicated, global service organization in more than 60 countries, with strong regional and national technical partner networks providing a complete range of life cycle services.

For more information please contact your local ABB representative or visit:

www.abb.com/solarinverters

www.abb.com

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