

## 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 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 fan-less convection cooling and no electrolytic capacitors, 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. The TRIO 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.
- Wall-mountable design and 1000Vdc input voltage lower installation and material costs.

Power and productivity  
for a better world™



### 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.
- This inverter comes with a standard 10 year warranty. Extended warranty offered at 15 and 20 years.



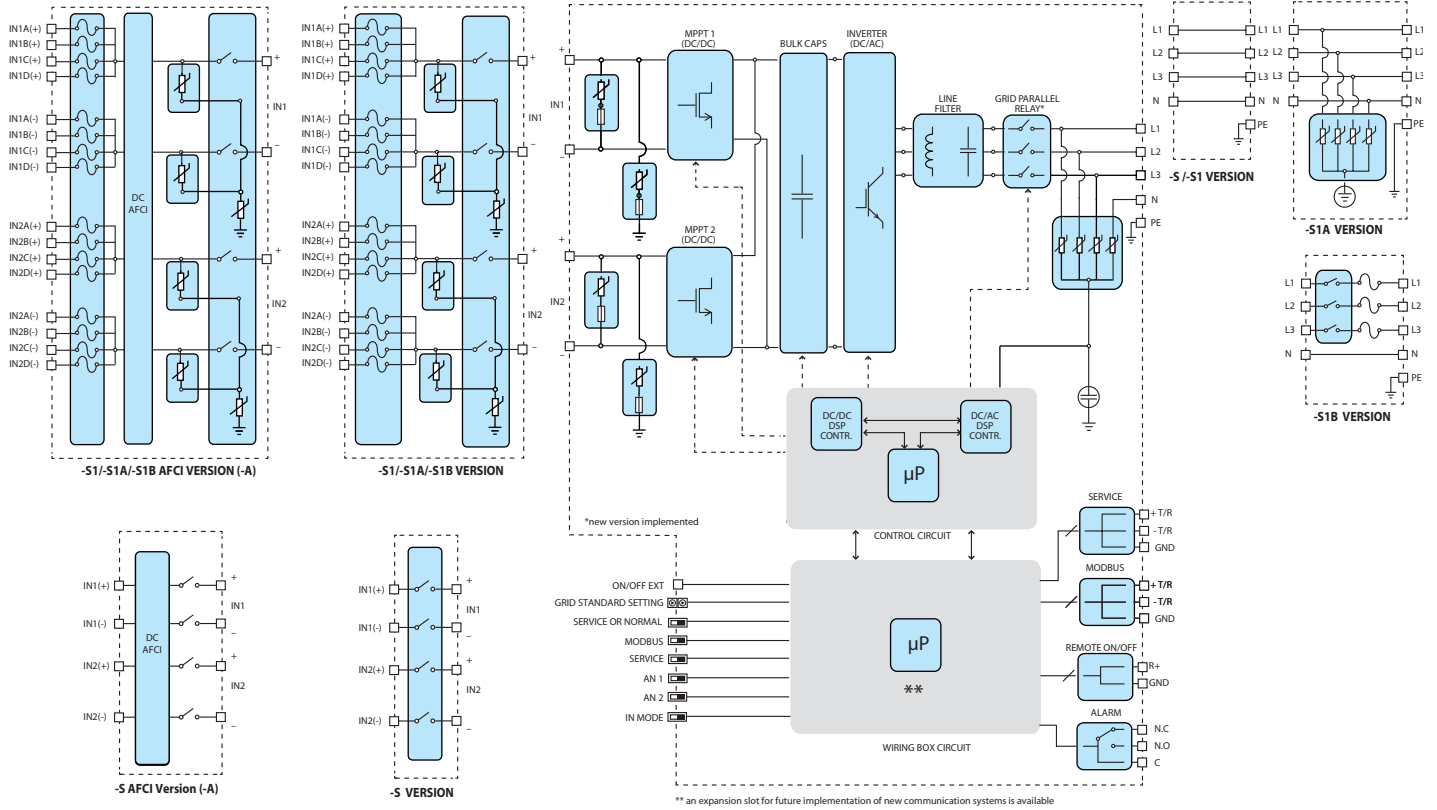
### Technical data and types

Type code	TRIO-20.0-TL-OUTD	TRIO-27.6-TL-OUTD
Nominal output power	20000W	27600W
Maximum output power	22000W <sup>1</sup>	30000W <sup>1</sup>
Rated grid AC voltage	480V	
<b>Input side (DC)</b>		
Number of independent MPPT channels	2; Programmable for 1 MPPT	
Maximum usable power for each MPPT channel	12000W	16000W
Absolute maximum voltage (V <sub>max</sub> )	1000V	
Start-up voltage (V <sub>start</sub> )	360V (adj. 250-500V)	
Full power MPPT voltage range	450-800V	520-800V
Operating MPPT voltage range	200-950V	
Maximum usable current (I <sub>dc max</sub> ) per MPPT channel	25.0A	30.9A
Maximum short circuit current (I <sub>sc max</sub> ) 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	
<b>Output side (AC)</b>		
Grid connection type	3Ø/3W or 4W + Ground	
Default voltage range	422-528V	
Adjustable voltage range	240-552V	
Nominal grid frequency	60Hz	
Adjustable grid frequency range	57-63Hz	
Maximum current (I <sub>ac max</sub> /phase)	27.0 A <sub>RMS</sub>	36.0 A <sub>RMS</sub>
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
<b>Input protection devices</b>		
Reverse polarity protection	Yes, passive inverter protection only. <sup>2</sup>	
Supplementary over-voltage protection type for each MPPT	-S1, -S1A, -S1B version: plug-in class II modular surge arrester	
PV array ground fault detection	Meets UL1741/NEC requirements	
<b>Output protection devices</b>		
Anti-islanding protection	Meets UL1741/IEEE 1547 requirements	
Supplementary over-voltage protection type	-S1A version: plug-in class II modular surge arrester	
Optional AC fused disconnect current rating (per contact)	35A	45A
<b>Operating performance</b>		
Maximum efficiency	98.2%	
CEC efficiency	97.5%	
Feed-in power threshold	65W <sub>RMS</sub>	70W <sub>RMS</sub>
<b>Communication</b>		
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	Aurora Logger Commercial (optional)	
<b>Environmental</b>		
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)	
<b>Mechanical specifications</b>		
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	157lbs (71kg)	168lbs (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	

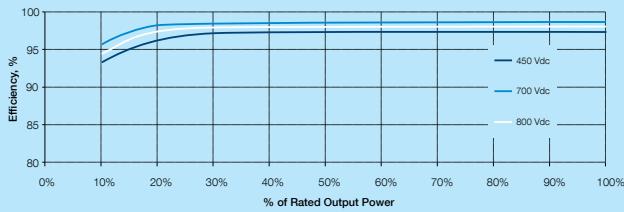
1. Capability enabled within maximum input current, maximum input power, maximum output current, and ambient operating temperature limits

2. In -S1, -S1A and -S1B models, the string polarity must be verified before connection. Please refer to installation manual for the correct installation procedure.

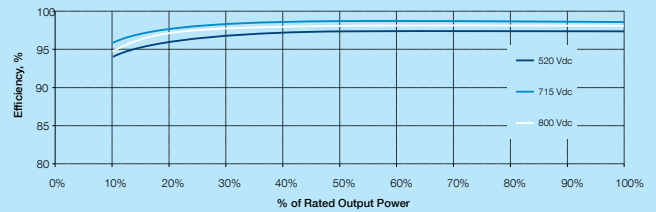
## Block diagram of TRIO-20.0/27.6-TL-OUTD



### TRIO-20.0-TL-US



### TRIO-27.6-TL-US



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Type code	TRIO-20.0-TL-OUTD	TRIO-27.6-TL-OUTD
<b>Safety</b>	Transformerless. Floating Array Required.	
Isolation level	UL1741, IEEE1547, IEEE1547.1, CSA C22.2 107.1-01-2001, FCC Part 15 Sub-part B Class B Limits	
Safety and EMC standard	CSA US	
Safety approval	CSA US	
<b>Warranty</b>	10 years	
Standard warranty	15 & 20 years	
Extended warranty		
<b>Available models</b>		
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

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:

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