

# ABB string inverters

## TRIO-20.0/27.6-TL-OUTD

20 to 27.6 kW



**The three-phase commercial inverter offers more flexibility and control to installers who have large installations with varying aspects or orientations.**

The dual input section containing two independent Maximum Power Point Tracking (MPPT), allows optimal energy harvesting from two sub-arrays oriented in different directions.

The TRIO features a high speed and precise MPPT algorithm for real power tracking and improved energy harvesting.

**High efficiency at all output levels**

Flat efficiency curves ensure high efficiency at all output levels ensuring consistent and stable performance across the entire input voltage and output power range.

This device has an efficiency rating of up to 98.2%.

The very wide input voltage range makes the inverter suitable for installations with reduced string size.

**Highlights**

- True three-phase bridge topology for DC/AC output converter
- Transformerless topology
- Each inverter is set on specific grid codes which can be selected in the field
- Detachable wiring box to allow an easy installation
- Wide input voltage range

## Additional highlights

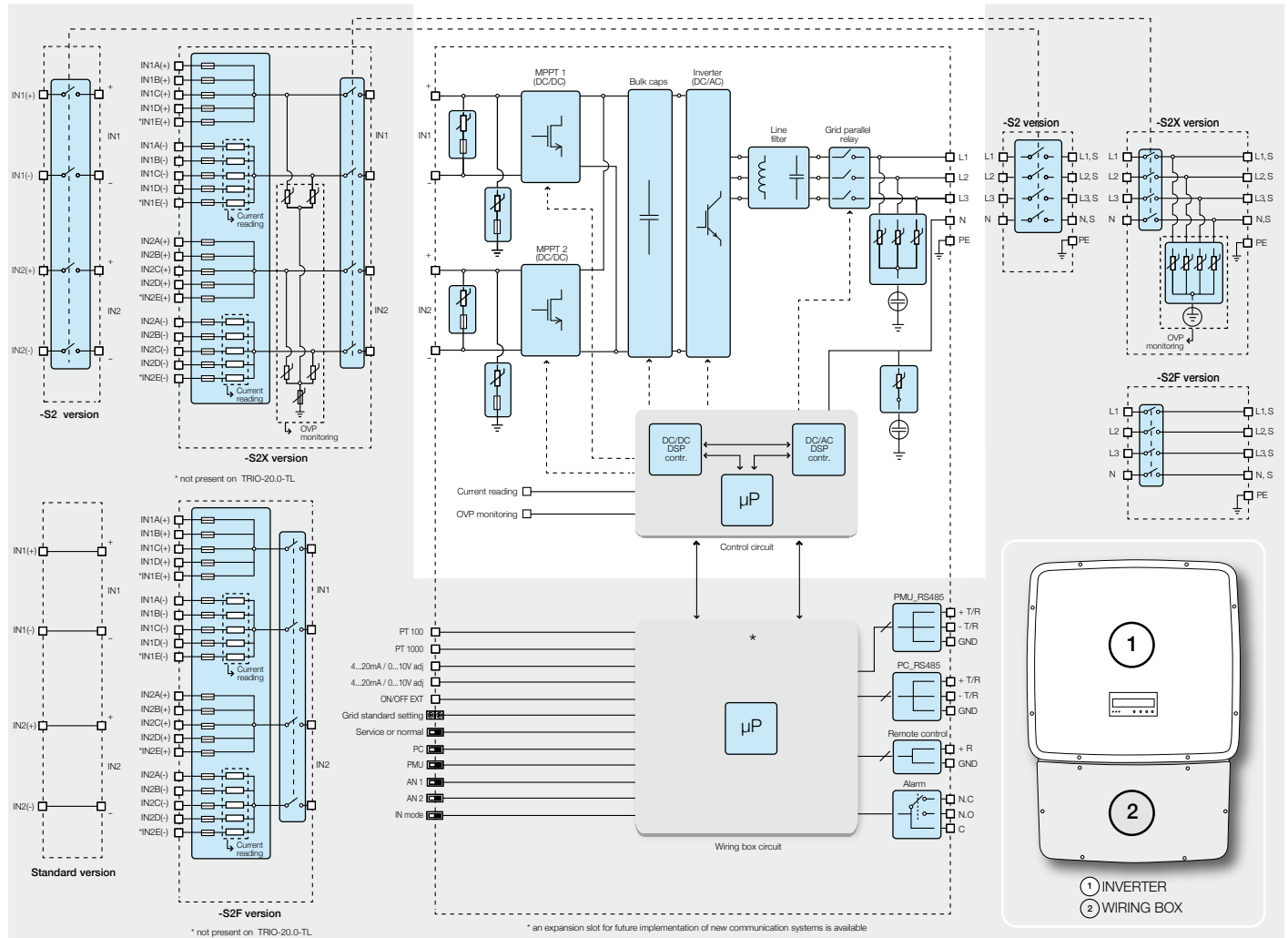
- Integrated string combiner with different options of configuration which include DC and AC disconnect switch in compliance with international standards (S2, S1J, -S2J, -S2F and -S2X versions)
- Natural convection cooling for maximum reliability
- Outdoor enclosure for unrestricted use under any environmental conditions
- Capability to connect external sensors for monitoring environmental conditions
- Availability of auxiliary DC output voltage (24 V, 300 mA)



## Technical data and types

Type code	TRIO-20.0-TL-OUTD	TRIO-27.6-TL-OUTD
<b>Input side</b>		
Absolute maximum DC input voltage ( $V_{max,abs}$ )	1000 V	
Start-up DC input voltage ( $V_{start}$ )	430 V (adj. 250...500 V)	
Operating DC input voltage range ( $V_{d,min}...V_{d,max}$ )	0.7 x $V_{start}...950$ V (min 200 V)	
Rated DC input voltage ( $V_{dcr}$ )	620 V	
Rated DC input power ( $P_{dcr}$ )	20750 W	28600 W
Number of independent MPPT	2	
Maximum DC input power for each MPPT ( $P_{MPPT,max}$ )	12000 W	16000 W
DC input voltage range with parallel configuration of MPPT at $P_{dcr}$	440...800 V	500...800 V
DC power limitation with parallel configuration of MPPT	Linear derating from max to null [ $800 V \leq V_{MPPT} \leq 950 V$ ]	
DC power limitation for each MPPT with independent configuration of MPPT at $P_{dcr}$ , max unbalance example	12000 W [ $480 V \leq V_{MPPT} \leq 800 V$ ] the other channel: $P_{dcr} = 12000$ W [ $350 V \leq V_{MPPT} \leq 800 V$ ]	16000 W [ $500 V \leq V_{MPPT} \leq 800 V$ ] the other channel: $P_{dcr} = 16000$ W [ $400 V \leq V_{MPPT} \leq 800 V$ ]
Maximum DC input current ( $I_{d,max}$ ) / for each MPPT ( $I_{MPPT,max}$ )	50.0 A / 25.0 A	64.0 A / 32.0 A
Maximum input short circuit current for each MPPT	30.0 A	
Number of DC inputs pairs for each MPPT	1 (4 in -S2X, -S2F, -S1J, -S2J versions)	1 (5 in -S2X and -S2F versions, 4 in -S1J and -S2J)
DC connection type	PV quick fit connector <sup>3)</sup> / Screw terminal block on Standard and -S2 versions	
<b>Input protection</b>		
Reverse polarity protection	Yes, from limited current source	
Input over voltage protection for each MPPT - varistor	Yes, 4	
Input over voltage protection for each MPPT - plug in modular surge arrester (-S2X, -S1J and -S2J versions)	-S2X: Type 2; -S1J, -S1J: Type 1+2	
Photovoltaic array isolation control	According to local standard	
DC switch rating for each MPPT (version with DC switch)	40 A / 1000 V	
Fuse rating (versions with fuses)	15 A / 1000 V	
<b>Output side</b>		
AC grid connection type	Three-phase 3W+PE or 4W+PE	
Rated AC power ( $P_{acr} @ \cos\phi=1$ )	20000 W	27600 W
Maximum AC output power ( $P_{ac,max} @ \cos\phi=1$ )	22000 W <sup>4)</sup>	30000 W <sup>5)</sup>
Maximum apparent power ( $S_{max}$ )	22200 VA	30670 VA
Rated AC grid voltage ( $V_{ac,r}$ )	400 V	
AC voltage range	320...480 V <sup>1)</sup>	
Maximum AC output current ( $I_{ac,max}$ )	33.0 A	45.0 A
Contributory fault current	35.0 A	46.0 A
Rated output frequency ( $f_r$ )	50 Hz / 60 Hz	
Output frequency range ( $f_{min}...f_{max}$ )	47...53 Hz / 57...63 Hz <sup>2)</sup>	
Nominal power factor and adjustable range	> 0.995, adj. $\pm 0.9$ with $P_{acr}=20.0$ kW, $\pm 0.8$ with max 22.2 kVA	> 0.995, adj. $\pm 0.9$ with $P_{acr}=27.6$ kW, $\pm 0.8$ with max 30 kVA
Total current harmonic distortion	< 3%	
AC connection type	Screw terminal block, cable gland PG36	
<b>Output protection</b>		
Anti-islanding protection	According to local standard	
Maximum external AC overcurrent protection	50.0 A	63.0 A
Output overvoltage protection - varistor	4	
Output overvoltage protection - plug in modular surge arrester (-S2X version)	4 (Type 2)	
<b>Operating performance</b>		
Maximum efficiency ( $\eta_{max}$ )	98.2%	
Weighted efficiency (EURO/CEC)	98.0% / 98.0%	
Feed in power threshold	40 W	
Night consumption	< 0.6 W	

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



## Technical data and types

Type code	TRIO-20.0-TL-OUTD	TRIO-27.6-TL-OUTD
<b>Communication</b>		
Wired local monitoring		PVI-USB-RS232_485 (opt.)
Remote monitoring		VSN300 Wifi Logger Card (opt.), VSN700 Data Logger (opt.)
Wireless local monitoring		VSN300 Wifi Logger Card (opt.)
User interface		Graphic display
<b>Environmental</b>		
Ambient temperature range	-25...+60°C / -13...140°F with derating above 45°C/113°F	
Relative humidity	0...100% condensing	
Sound pressure level, typical	50 dBA @ 1 m	
Maximum operating altitude without derating	2000 m / 6560 ft	
<b>Physical</b>		
Environmental protection rating	IP65	
Cooling	Natural	
Dimension (H x W x D)	1061 mm x 702 mm x 292 mm / 41.7" x 27.6" x 11.5"	
Weight	< 70.0 kg / 154.3 lbs (Standard version)	< 75.0 kg / 165.4 lbs (Standard version)
Mounting system	Wall bracket	
<b>Safety</b>		
Isolation level	Transformerless	
Marking	CE (50 Hz only), RCM	
Safety and EMC standard	EN 50178, IEC/EN 62109-1, IEC/EN 62109-2, AS/NZS 3100, AS/NZS 60950.1, EN 61000-6-2, EN 61000-6-3, EN 61000-3-11, EN 61000-3-12	
Grid standard (check your sales channel for availability)	CEI 0-21, CEI 0-16, DIN V VDE V 0126-1-1, VDE-AR-N 4105, G59/3, C10/11, EN 50438 (not for all national appendices), RD 1699, RD 413, RD 661, P.O. 12.3, AS 4777, BDEW, NRS-097-2-1, MEA, IEC 61727, IEC 62116, Ordinul 30/2013, VFR 2014	
<b>Available products variants</b>		
Standard	TRIO-20.0-TL-OUTD-400	TRIO-27.6-TL-OUTD-400
With DC+AC switch	TRIO-20.0-TL-OUTD-S2-400	TRIO-27.6-TL-OUTD-S2-400
With DC+AC switch and fuse	TRIO-20.0-TL-OUTD-S2F-400	TRIO-27.6-TL-OUTD-S2F-400
With DC+AC switch, fuse and surge arrester	TRIO-20.0-TL-OUTD-S2X-400	TRIO-27.6-TL-OUTD-S2X-400
With DC+AC switch, fuse and 1 DC surge arrester Type 1 + 2	TRIO-20.0-TL-OUTD-S1J-400	TRIO-27.6-TL-OUTD-S1J-400
With DC+AC switch, fuse and 2 DC surge arrester Type 1 + 2	TRIO-20.0-TL-OUTD-S2J-400	TRIO-27.6-TL-OUTD-S2J-400

<sup>1)</sup> The AC voltage range may vary depending on specific country grid standard

<sup>4)</sup> Limited to 20000 W for Germany

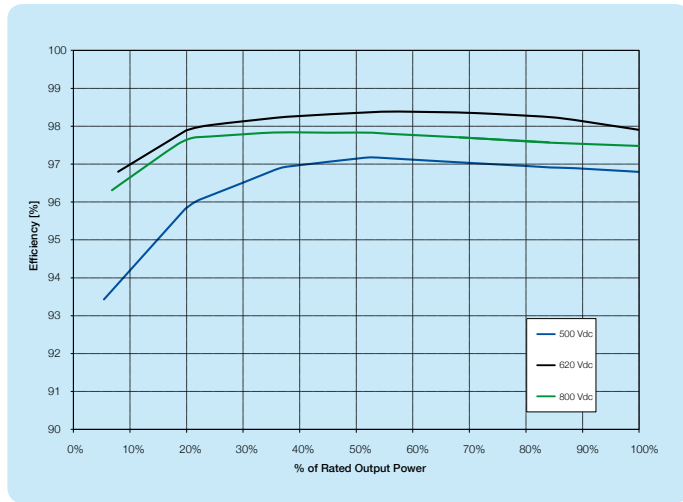
<sup>2)</sup> The Frequency range may vary depending on specific country grid standard

<sup>5)</sup> Limited to 27600 W for Germany

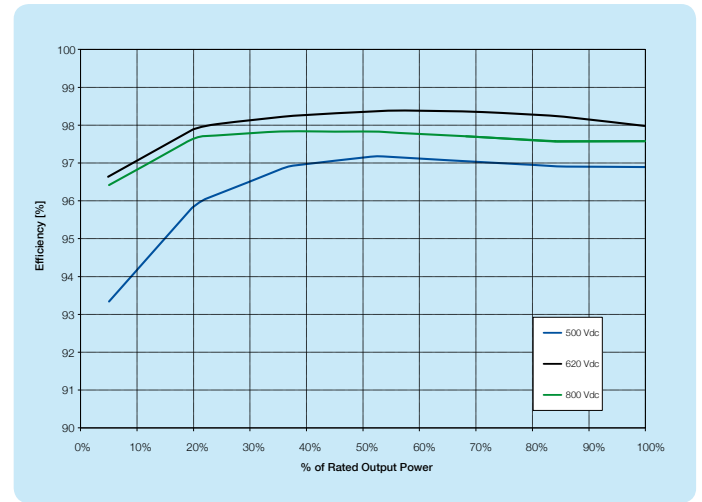
<sup>3)</sup> Please refer to the document "String inverters – Product manual appendix" available at [www.abb.com/solarinverters](http://www.abb.com/solarinverters) for information on the quick-fit connector brand and model used in the inverter

**Remark.** Features not specifically listed in the present data sheet are not included in the product

## Efficiency curves of TRIO-20.0-TL-OUTD



## Efficiency curves of TRIO-27.6-TL-OUTD



### Support and service

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