TLX Inverter Series

Three phase transformerless inverter series from 6-15 kW

The TLX series includes TLX, TLX+, TLX Pro and TLX Pro+

35 kg

The weight of 6-15 kW

Ensuring easy and troublefree installation of high performance inverters

The TLX inverter series, with efficiency of 98 % deliver maximum energy in all conditions. Transformer-less design, advanced electronics and optimised internal connections reduce potential energy losses.

Balanced three-phase AC output ensures grid compliance at all times and precise MPP tracking at 99.9 % in steady conditions and 99.8 % in dynamic conditions enable the inverter to harvest all the energy of the PV modules.

The TLX inverter is designed for high performance. Integrating 1000 V input range, 250-800 V MPP range and multiple DC inputs with each their own individually regulated MPP tracker, allows for more modules in a series and longer strings, while providing greater flexibility in the PV setup.

The TLX Pro series includes master inverter technology capable of controlling up to 100 inverters from a single inverter.

Likewise, the integrated webserver, which allows you to control, monitor and adjust your PV system from any computer, comes standard on the TLX Pro.

The TLX inverter series includes the Danfoss Smart Technologies: a combination of features, which makes the TLX inverters unique in the market.

EnergySmart™
Excellent MPPT Efficiency, 98 % conversion efficiency, 1000 V_{DC}, AC power burst and an excellent cooling concept provides high yield and earlier return on investment. High voltage input reduces losses on the DC side. Early start up and late stop of power production result in maximised yield while exact cooling minimizes energy losses.

DesignSmart™
A large number of independently regulated MPP trackers along with 1000 V_{DC} and asymmetrical layout options allows for endless layout possibilities. This huge flexibility makes installations from residential to large scale plants possible.

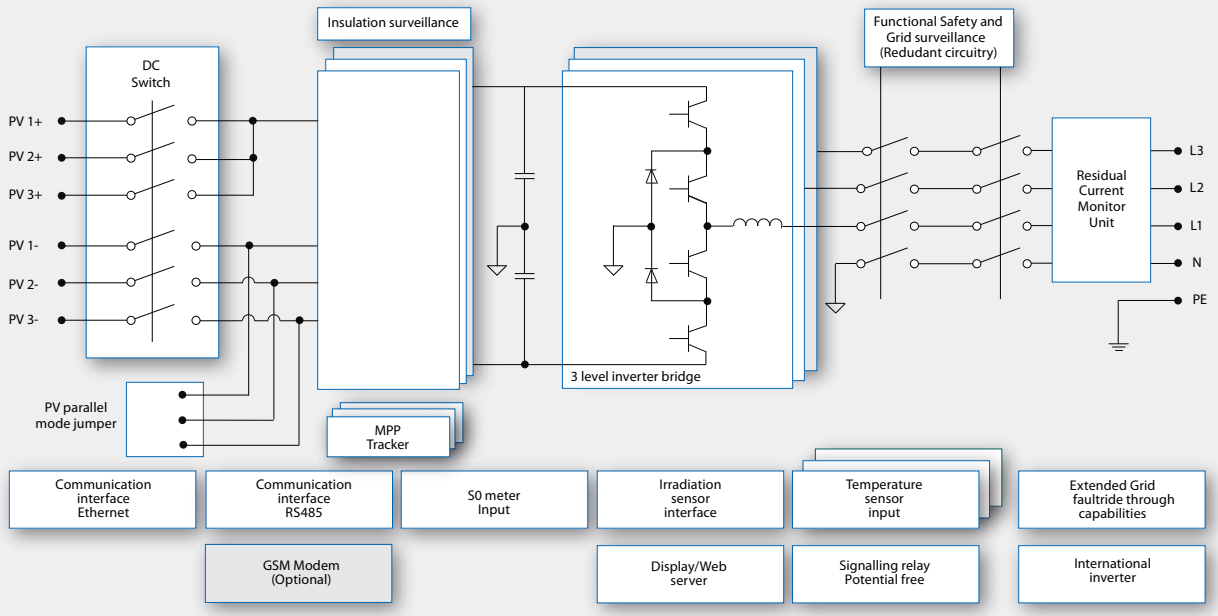
TrackSmart™
Advanced Digital Tracking algorithms with efficiency of 99.9 % creates conditions for accumulating the most energy possible, regardless of ambient conditions, physical obstacles or inclination challenges.

* **ControlSmart™**
Integrated monitoring and control options through the Master inverter and Web server allows for; management of up to 100 inverters from a single inverter, accumulation of data from all inverters as well as overview of individual inverter parameters, from any computer. Integrated data logging of 34 days detailed and 20 years of accumulated data reduces the need for additional monitoring equipment.

* TLX Pro series only.

Description of inverter

External and internal inverter design



Norms and Standards

Nomative References	TLX 6 k	TLX 8 k	TLX 10 k	TLX 12.5 k	TLX 15 k
Directive LVD	2006/95/EC				
Directive EMC	2004/108/EC				
Safety	IEC 62109-1/IEC 62109-2				
Integrated PV load switch	VDE 0100-712				
EMC immunity	EN 61000-6-1				
	EN 61000-6-2				
EMC emission	EN 61000-6-3				
	EN 61000-6-4				
Utility interference	EN 61000-3-2/-3			EN 61000-3-11/-12	
CE	Yes				
Utility characteristics	IEC 61727				
	EN 50160				
S0 Energy Meter	EN62053-31 Annex D				
Approvals & Certifications	For transformerless inverter				
Austria	TOR – Hauptabschnitt D4, TOR – Hauptabschnitt D2				
Belgium	Synergrid C10/11 – Revisie 2012-06, Synergrid C10/17- revisie 8 mei 2009				
Czech Republic	Czech Energy Act (Act No. 458/2000), Article 24, Paragraph 10 part I, II, III rev09 2009				
France	UTE NF C 15-712-1 (UNION TECHNIQUE DE L'ELECTRICITE, GUIDE PRATIQUE, Installations photovoltaïques raccordées au réseau public de distribution). NF C 15-100 (Installations électriques à basse tension). Journal Officiel, Décret n° 2008-386 du 23 avril 2008 relatif aux prescriptions techniques générales de conception et de fonctionnement pour le raccordement d'installations de production aux réseaux publics d'électricité.				
Germany	VDE 0126-1-1/A1[1] and VDE AR N 4105 (August 2011) [2]				
	–	–	BDEW- Technische Richtlinie Erzeugungsanlagen am Mittelspannungsnetz Ausgabe, Juni 2008 und Ergänzungen von 01/2009, 07/2010, 02/2011		
Greece	Technical requirements for the connection of independent generation to the grid, Public Power Corporation (PPC)				
Italy	–	CEI 0-21:2012-06, Terna Guida Tecnica Allegato A.70 [2]			
Portugal	VDE 0126-1-1, ISO/IEC Guide 67: 2004 - System No.5				
Spain	RD1699 (2011)				
	RD661 (2007)				
	REE BOE núm. 254				
UK	–	G59/2-1, G83/1-1		G59/2-1	

[1] Deviant from VDE 0126-1-1 section 4.7.1, the isolation resistance measurement limit is set to 200 kΩ, in accordance with authorities.
[2] Only with TLX+ and TLX Pro+

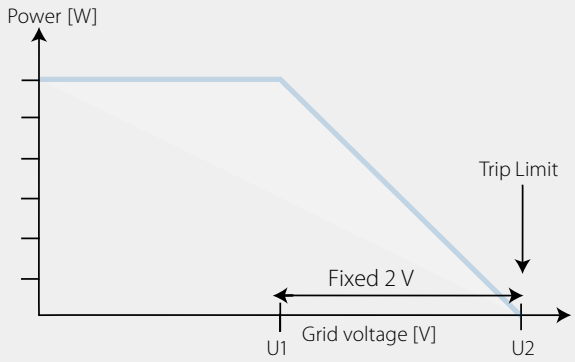
Operating Efficiency

The operating efficiency specified for V_{MPPmax}, $V_{DC,r}$ and V_{MPPmin}

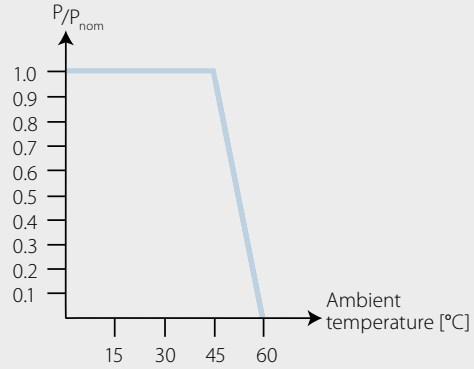
	TLX 6 k			TLX 8 k			TLX 10 k			TLX 12.5 k			TLX 15 k		
TPPV/UPV	**420 V**	**700 V**	**800 V**	**420 V**	**700 V**	**800 V**	**420 V**	**700 V**	**800 V**	**420 V**	**700 V**	**800 V**	**420 V**	**700 V**	**800 V**
5 %	88.2%	89.6%	87.5%	88.2 %	90.9 %	88.1 %	87.3 %	90.4 %	89.1 %	89.5 %	92.2 %	91.1 %	91.1 %	93.4 %	92.5 %
10 %	91.8%	92.8%	91.4%	92.4 %	92.8 %	92.6 %	90.6 %	92.9 %	92.5 %	92.1 %	94.1 %	93.8 %	93.1 %	94.9 %	94.6 %
20 %	93.6%	94.4%	94.5%	95.0 %	96.5 %	95.8 %	94.4 %	96.0 %	95.6 %	95.2 %	96.6 %	96.3 %	95.7 %	97.0 %	96.7 %
25 %	94.3%	95.1%	95.3%	95.5 %	96.9 %	96.5 %	95.2 %	96.6 %	96.3 %	95.8 %	97.1 %	96.8 %	96.2 %	97.4 %	97.1 %
30 %	94.9%	95.8%	96.0%	95.9 %	97.2 %	96.9 %	95.7 %	97.0 %	96.7 %	96.2 %	97.4 %	97.1 %	96.5 %	97.6 %	97.4 %
50 %	96.4%	97.6%	97.4%	96.4 %	97.7 %	97.5 %	96.6 %	97.7 %	97.5 %	96.9 %	97.9 %	97.7 %	97.0 %	98.0 %	97.8 %
75 %	96.6%	97.8%	97.7%	96.4 %	97.8 %	97.8 %	96.9 %	97.8 %	97.8 %	97.0 %	97.8 %	97.8 %	96.9 %	97.8 %	97.7 %
100 %	96.7%	97.8%	97.9%	96.4 %	97.8 %	97.9 %	97.1 %	97.9 %	97.9 %	97.0 %	97.8 %	97.9 %	96.9 %	97.7 %	97.9 %
EU	95.4%	96.5%	96.3%	95.7 %	97.0 %	96.7 %	95.7 %	97.0 %	96.7 %	96.1 %	97.3 %	97.3 %	96.4 %	97.4 %	97.4 %

Derating

Grid voltage derating



Temperature derating



Power/Current derating limits

	TLX 6 k	TLX 8 k	TLX 10 k	TLX 12.5 k	TLX 15 k
Max. current DC, per input	12 A (+2 %)	12 A (+2 %)	12 A (+2 %)	12 A (+2 %)	12 A (+2 %)
Max. current AC, per phase	9 A (+2 %)	11.9 A (+2 %)	14.7 A (+2 %)	18.6 A (+2 %)	22.3 A (+2 %)
Rated active power, total	6000 W (+3 %)	8000 W (+3 %)	10000 W (+3 %)	12500 W (+3 %)	15000 W (+3 %)
To avoid unintentional derating due to measurement inaccuracy, the values in brackets are added to the limits.					

Nomenclature[1]	Parameter	TLX 6 k[6]	TLX 8 k	TLX 10 k	TLX 12.5 k	TLX 15 k
	AC					
|S|	Rated apparent power	6000 VA	8000 VA	10000 VA	12500 VA	15000 VA
$P_{ac,r}$	Rated active power[2]	6000 W	8000 W	10000 W	12500 W	15000 W
	Active power at cos(phi) = 0.95	5700 W	7600 W	9500 W	11875 W	14370 W
	Active power at cos(phi) = 0.90	5400 W	7200 W	9000 W	11250 W	13500 W
	Reactive power range	0-3.6 kVAr	0-4.8 kVAr	0-6.0 kVAr	0-7.5 kVAr	0-9.0 kVAr
$V_{ac,r}$	Rated output voltage (P-N)	3 x 230 V				
$V_{ac,min}$; $V_{ac,max}$	AC voltage range (P-N)	3 x 230 V ± 20 %				
	Nominal current AC	3 x 8.7 A	3 x 11.6 A	3 x 14.4 A	3 x 18.0 A	3 x 21.7 A
I_{acmax}	Max. current AC	3 x 9.0 A	3 x 11.9 A	3 x 14.7 A	3 x 18.6 A	3 x 22.3 A
	AC current distortion (THD %)	< 4 %	< 4 %	< 5 %	< 5 %	< 5 %
$cosphi_{ac,r}$	Power factor at 100 % load	> 0.99				
	Controlled power factor range	0.8 over-excited 0.8 under-excited				
	"Connecting" power loss	10 W				
	Night-time power loss (off grid)	< 5 W				
f_r	Rated grid frequency	50 Hz				
f_{min}, f_{max}	Grid frequency range	50 ± 5 Hz				
	DC					
	Nominal power DC	6200 W	8250 W	10300 W	12900 W	15500 W
	Max. recommended PV power at STC[3]	7100 Wp	9500 Wp	11800 Wp	14700 Wp	17700 Wp
$V_{dc,r}$	Nominal voltage DC	700 V				
V_{mppmin} V_{mppmax}	MPP voltage-nominal power[4]	260 - 800 V	345-800 V	430-800 V	358-800 V	430-800 V
	MPP efficiency, static	99.9 %				
	MPP efficiency, dynamic	99.8 %				
V_{dcmax}	Max. DC voltage	1000 V				
$V_{dcstart}$	Turn on voltage	250 V				
V_{dcmin}	Turn off voltage	250 V				
I_{dcmax}	Max. current DC	2 x 12 A			3 x 12 A	
	Max. short circuit current DC at STC	2 x 12 A			3 x 12 A	
	Min. on grid power	20 W				
	Efficiency					
	Max. efficiency	97.8 %	97.9 %	98 %		
	Euro efficiency, $V_{dc,r}$	96.5 %	97.0 %	97.0 %	97.3 %	97.4 %
	Other					
	Dimensions (H, W, D)	700 x 525 x 250 mm				
	Mounting recommendation	Wall bracket				
	Weight	35 kg				
	Acoustic noise level[5]	56 db(A)				
	MPP tracker	2			3	
	Operation temperature range	-25..60 °C				
	Nom. temperature range	-25..45 °C				
	Storage temperature	-25..60 °C				
	Overload operation	Change of operating point				
	Overvoltage category AC	Class III				
	Overvoltage category DC	Class II				
	Active power control (PLA)	supported with CLX GM (TLX Pro, TLX Pro+), CLX Home GM, CLX Standard GM or 3rd party product				
	Reactive power	TLX+ and TLX Pro+				
	Relative humidity	95 % (non-condensing)				
	Functional Safety					
	Safety (protective class)	Class I				
	PELV on the communication and control card	Class II				
	Islanding detection-loss of mains	Three-phase monitoring, ROCOF				
	Voltage magnitude	Included				
	Frequency	Included				
	DC content of AC current	Included				
	Insulation resistance	Included				
	RCMU-Type B	Included				
	Indirect contact protection	Yes (class I, grounded)				
	Short circuit protection	Yes				

[1] Where relevant, according to EN 50524: 2009
[2] At rated grid voltage (Vac,r), Cos(phi) = 1
[3] For fixed systems with semi-optimal conditions
[4] At identical input voltages. At unequal input voltages V_{mppmin} can be as low as 250 V depending on total input power.
[5] SPL (Sound Pressure Level) at 1.5 m.
[6] Only TLX + and TLX Pro + variants

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