TLX Inverter Range

Three phase transformerless inverter range from 8-15 kW

The TLX range includes TLX, TLX+, TLX Pro and TLX Pro +

35 kg

The weight of 8-15 kW

Ensuring easy and trouble-free 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, 250-800V 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 and reduceds 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.

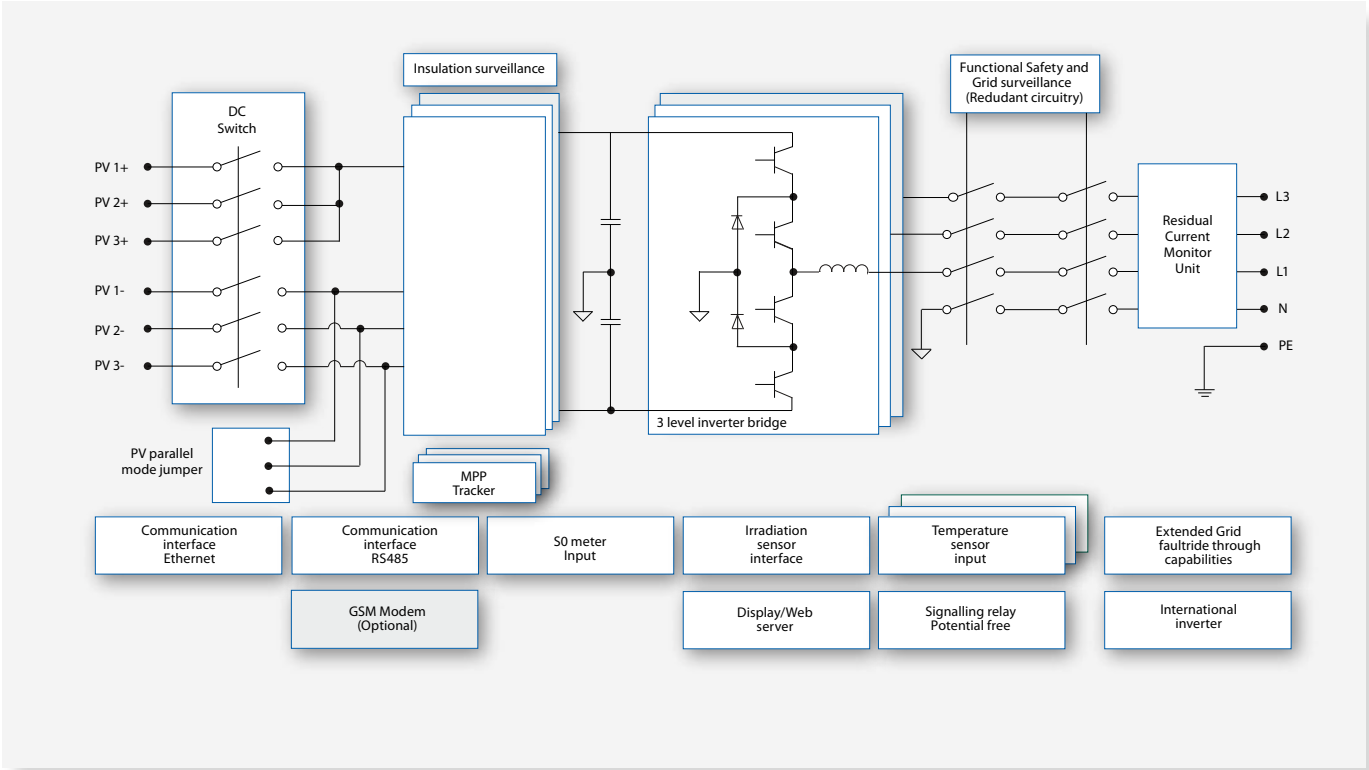
TrackSmart™
Advanced Digital Tracking algorithms with efficiency of 99.9 % creates conditions for accumulating the most energy possible, regardless of ambient conditions, physical obstacles or inclination challenges.

* **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



Nomative References	**TLX 8kW**	**TLX 10kW**	**TLX 12.5kW**	**TLX 15kW**
Directive LVD	2006/95/EC			
Directive EMC	2004/108/EC			
Safety	EN 62109	EN 50178	EN 50178	EN 50178
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 61000-3-2/-3	EN 61000-3-11/-12	EN 61000-3-11/-12
CE	Yes			
Utility characteristics	IEC 61727			
	EN 50160			
S0 Energy Meter	EN62053-31 Annex D			
Functional Safety	For transformeter inverter			
Germany	DIN VDE 0126-1-1*			
Greece	Technical requirements for the connection of independent generation to the grid, Public Power Corporation (PPC)			
Italy	DK5940-2.2 (2007)			
Spain	RD1663 (2000)			
	RD661			
Reactive Power		TLX + and TLX Pro +		
Austria		TOR - Hauptabschnitt D4, TOR - Hauptabschnitt D2		
Belgium		Synergrid C10/11 - revisie 12 mei 2009, 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 nº 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		BDEW- Technische Richtlinie Erzeugungsanlagen am Mittelspannungsnetz Ausgabe, Juni 2008		
Spain		REE BOE núm. 254		

*Deviant from VDE 0126-1-1 section 4.7.1., the isolation resistance measurement limit is set to 200 kΩ , in accordance with authorities

Operating Efficiency

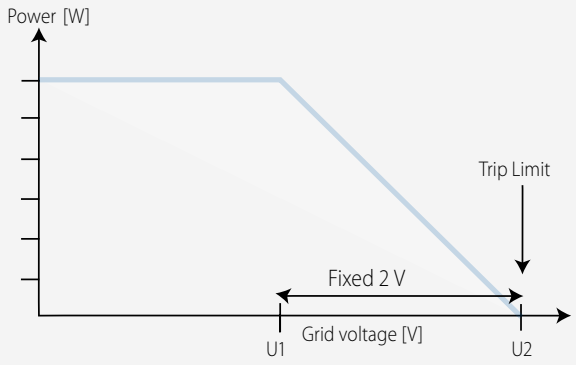
The operating efficiency specified for V_{MPPmax}, $V_{DC,r}$ and V_{MPPmin}

	TLX 8 kW			TLX 10 kW			TLX 12.5 kW			TLX 15 kW		
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**
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 %	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 %	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 %	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 %	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 %	97.7 %	97.5 %	96.6 %	97.7 %	97.5 %	96.9 %	97.9 %	97.7 %	97.0 %	98.0 %	97.8 %
75 %	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 %	96.4 %	97.8 %	97.9 %	97.1 %	97.9 %	97.9 %	97.0 %	97.8 %	97.9 %	96.9 %	97.7 %	97.9 %
EU	95.7 %	97.0 %	96.7 %	95.7 %	97.0 %	96.7 %	96.1 %	97.3 %	97.3 %	96.4 %	97.4 %	97.4 %

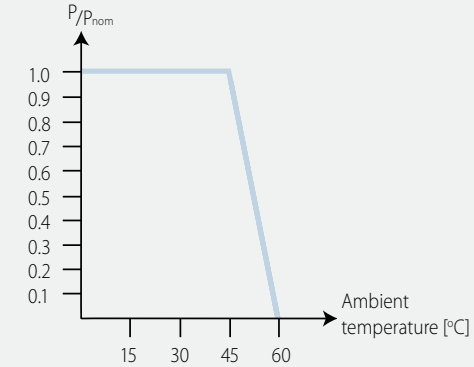
Derating

Please see the country certificate found on
www.danfoss.com/solar for values for U1 and U2

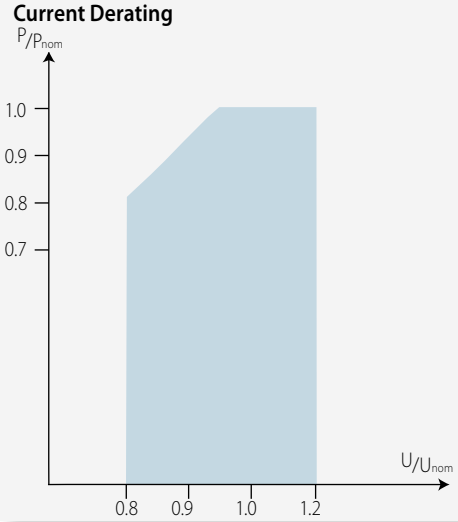
Grid voltage derating



Temperature derating



Current Derating



	TLX 8 kW	TLX 10 kW	TLX 12.5 kW	TLX 15 kW
PV current, per input	12 A (+2 %)	12 A (+2 %)	12 A (+2 %)	12 A (+2 %)
Grid current, per phase	12 A (+2 %)	15 A (+2 %)	19A (+2 %)	22 A (+2 %)
Grid power, total	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.				

Nomen-clature[1]	Parameter	TLX Pro 8k	TLX Pro 10k	TLX Pro 12.5k	TLX Pro 15k
	AC				
$P_{ac,r}$	Max./Nom. power AC	8000 W	10000 W	12500 W	15500 W
	Reactive power range		0-6.0 kVA	0-7.5 kVA	0-9.5 kVA
$V_{ac,r}$	AC voltage range (P-N)	3x230 V ± 20 %	3x230 V ± 20 %	3x230 V ± 20 %	3x230 V ± 20 %
	Nominal current AC	3x12 A	3 x 15 A	3 x 19 A	3 x 22 A
I_{acmax}	Max current AC	3x13.2 A	3 x 15 A	3 x 19 A	3 x 22 A
	AC current distortion(THD %)	< 4 %	< 5 %	< 5 %	< 5 %
$cosphi_{ac,r}$	Power factor at 100 % load		0.99	0.99	0.99
	Controlled power factor range		0.8 over-excited 0.8 under-excited	0.8 over-excited 0.8 under-excited	0.8 over-excited 0.8 under-excited
	"Connecting" power loss	10 W	10 W	10 W	10 W
	Night-time power loss (off grid)	< 5 W	< 5 W	< 5 W	< 5 W
$f_{,r}$	Grid frequency	50 ± 5 Hz	50 ± 5 Hz	50 ± 5 Hz	50 ± 5 Hz
	DC				
	Nominal power DC	8250 W	10300 W	12900 W	15000 W
	Max. recommended PV power at STC[2]	9500 W	11800 Wp	14700 Wp	17700 Wp
$V_{dc,r}$	Nominal voltage DC	700 V	700 V	700 V	700 V
V_{mppmin} V_{mppmax}	MPP voltage-nominal power[3]	345-800 V	430-800 V	358-800 V	430-800 V
	MPP efficiency	99.9 %	99.9 %	99.9 %	99.9 %
V_{dcmax}	Max. DC voltage	1000 V	1000 V	1000 V	1000 V
$V_{dcstart}$	Turn on voltage	250 V	250 V	250 V	250 V
V_{dcmin}	Turn off voltage	250 V	250 V	250 V	250 V
I_{dcmax}	Max current DC	2x12 A	2x12 A	3x12 A	3x12 A
	Max. short circuit current DC at STC	2x12A	2x12 A	3x12 A	3x12 A
	Min. on grid power	20 W	20 W	20 W	20 W
	Efficiency				
	Max. efficiency	97.9 %	98 %	98 %	98 %
	Euro efficiency, V at $_{dc,r}$	97.0 %	97.0 %	97.3 %	97.4 %
	Other				
	Dimensions (L,W,H)	700x525x250 mm	700x525x250 mm	700x525x250 mm	700x525x250 mm
	Mounting recommendation	Wall bracket	Wall bracket	Wall bracket	Wall bracket
	Weight	35 kg	35 kg	35 kg	35 kg
	Acoustic noise level[4]	56 db(A)	56 db(A)	56 db(A)	56 db(A)
	MPP tracker	2	2	3	3
	Operation temperature range	-25..60 °C	-25..60 °C	-25..60 °C	-25..60 °C
	Nom. temperature range	-25..45 °C	-25..45 °C	-25..45 °C	-25..45 °C
	Storage temperature	-25..60 °C	-25..60 °C	-25..60 °C	-25..60 °C
	Overload operation	Change of operating point	Change of operating point	Change of operating point	Change of operating point
	Overvoltage category AC	Class III	Class III	Class III	Class III
	Overvoltage category DC	Class II	Class II	Class II	Class II
	PLA[5]	Included	Included	Included	Included
	Reactive power		TLX+ and TLX Pro+	TLX+ and TLX Pro+	TLX+ and TLX Pro+
	Relative humidity	95 % (non-condensing)	95 % (non-condensing)	95 % (non-condensing)	95 % (non-condensing)
	Functional Safety				
	Safety (protective class)	class 1	class 1	class 1	class 1
	PELV on the communication and control card	class 2	class 2	class 2	class 2
	Islanding detection-loss of mains	Three-phase monitoring (ROCOF)	Three-phase monitoring (ROCOF)	Three-phase monitoring (ROCOF)	Three-phase monitoring (ROCOF)
	Voltage magnitude	Included	Included	Included	Included
	Frequency	Included	Included	Included	Included
	DC content of AC current	Included	Included	Included	Included
	Insulation resistance	Included	Included	Included	Included
	RCMU-Type B	Included	Included	Included	Included
	Indirect contact protection	Yes (class I, grounded)	Yes (class I, grounded)	Yes (class I, grounded)	Yes (class I, grounded)
	Short circuit protection	Yes	Yes	Yes	Yes

[1] According to FprEN 50524
[2] For fixed systems with semi-optimal conditions
[3] At identical input voltages. At unequal input voltages V_{mppmin} can be as low as 250 V depending on total input power.
[4] SPL (Sound Pressure Level) at 1.5 m.
[5] Grid Management Box (TLX Pro, TLX Pro+) or 3rd party product

Danfoss Solar Inverters A/S

Ulsnaes 1
DK-6300 Graasten
Denmark
Tel: +45 7488 1300
Fax: +45 7488 1301
solar-inverters@danfoss.com
www.danfoss.com/solar