ENAC
CERTIFICACIÓN
Nº 87/C-PR244

SGS

Certificate number					**No: 2617/0071/2-CER**
Manufacturer	**Ingeteam Power Technology S.A - Energy** Polígono Industrial El Juncarillo, Nave 1, 31293 Sesma (Navarra), Spain				
Trademark	*Ingeteam*				
Type	**1 PLAY**				
Models	**INGECON SUN 2.5TL M / INGECON SUN 3TL M / INGECON SUN 3.3TL M / INGECON SUN 3.68TL M** **INGECON SUN 4.6TL M / INGECON SUN 5TL M / INGECON SUN 6TL M**				
Type of generating unit	**Static Power Converter**				
Technical Data	**Nominal Power**	**2,5 kW**	**3 kW**	**3,3 kW**	**3,68 kW**
		4,6 kW	**5 kW**	**6 kW**	
	Nominal Voltage	**220 / 230 /240 V**			
	Nominal Frequency	**50 / 60 Hz**			
	Firmware version	**ABE1000**			
	Number of phases	**Single phase**			
	Isolation Transformer	**NO**			
Standard	**EN 50530: 2010.** Overall efficiency of grid connected photovoltaic inverters.				

The above-mentioned generating unit is certified according the SGS internal procedure PE.T-ECPE-34 based on the requirements of the UNE-EN ISO / IEC 17065.

This certificate is valid until: 25th of April 2020.

Madrid, 25th of April 2017

Daniel Arranz Muñiz
Certification Manager

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Summary of efficiency results measured for the tested model:

- Static MPPT efficiency

INGECON SUN 1PLAY 4.6TL M								
Test condition	**5%Sn**	**10%Sn**	**20%Sn**	**25%Sn**	**30%Sn**	**50%Sn**	**75%Sn**	**100%Sn**
Minimum rated input voltage	98,74%	99,21%	99,59%	99,53%	99,70%	99,72%	99,69%	99,63%
Nominal input voltage	97,89%	98,72%	99,50%	99,54%	99,14%	99,43%	99,56%	99,68%
90% of the maximum rated input voltage	97,65%	98,64%	99,20%	99,47%	99,46%	98,89%	99,84%	99,42%

- Dynamic MPPT efficiency

INGECON SUN 1PLAY 4.6TL M								
Ramp Gradient (W/m²/s)	**0,5**	**1**	**2**	**3**	**5**	**7**	**10**	**14**
Irradiance changes 100 <-> 500 W/m²	99,84%	99,81%	99,74%	99,60%	99,54%	99,40%	98,87%	99,38%
Ramp Gradient (W/m²/s)	**20**	**30**	**50**					
Irradiance changes 100 <-> 500 W/m²	98,08%	99,35%	99,46%					
Ramp Gradient (W/m²/s)	**10**	**14**	**20**	**30**	**50**	**100**		
Irradiance changes 300 <-> 1000 W/m²	99,82%	99,81%	98,99%	99,38%	99,44%	99,55%		
Ramp Gradient (W/m²/s)	**0,1**							
Irradiance changes 2 <-> 100 W/m²	98,59%							

These efficiency results are considered as a representative sample of the expected behavior for the variant models under the scope of this certificate.

- Overall efficiency

INGECON SUN 1PLAY 2.5TL M								
Test condition	**5%Sn**	**10%Sn**	**20%Sn**	**25%Sn**	**30%Sn**	**50%Sn**	**75%Sn**	**100%Sn**
Minimum rated input voltage	81,45%	89,76%	93,27%	93,78%	94,43%	95,15%	94,80%	93,96%
Nominal input voltage	84,09%	90,86%	94,72%	95,21%	95,20%	96,61%	96,86%	97,01%
90% of the maximum rated input voltage	84,28%	91,74%	95,31%	96,13%	96,49%	96,56%	97,70%	97,32%

INGECON SUN 1PLAY 3TL M								
Test condition	**5%Sn**	**10%Sn**	**20%Sn**	**25%Sn**	**30%Sn**	**50%Sn**	**75%Sn**	**100%Sn**
Minimum rated input voltage	85,44%	91,70%	94,27%	94,44%	95,00%	95,47%	95,03%	94,23%
Nominal input voltage	85,90%	91,97%	95,28%	95,56%	95,84%	96,48%	97,04%	96,97%
90% of the maximum rated input voltage	86,42%	92,73%	95,76%	96,47%	96,73%	96,66%	97,72%	97,29%

INGECON SUN 1PLAY 3.3TL M								
Test condition	**5%Sn**	**10%Sn**	**20%Sn**	**25%Sn**	**30%Sn**	**50%Sn**	**75%Sn**	**100%Sn**
Minimum rated input voltage	85,20%	91,33%	95,21%	94,79%	95,31%	95,68%	95,25%	94,46%
Nominal input voltage	86,80%	92,60%	94,64%	96,08%	95,72%	96,75%	96,94%	96,97%
90% of the maximum rated input voltage	87,38%	93,17%	95,96%	96,62%	96,85%	96,71%	97,73%	97,26%

INGECON SUN 1PLAY 3.68TL M								
Test condition	**5%Sn**	**10%Sn**	**20%Sn**	**25%Sn**	**30%Sn**	**50%Sn**	**75%Sn**	**100%Sn**
Minimum rated input voltage	85,70%	91,77%	95,07%	95,27%	95,62%	95,90%	95,48%	94,76%
Nominal input voltage	88,04%	93,05%	95,84%	96,20%	95,94%	96,81%	96,91%	96,96%
90% of the maximum rated input voltage	88,43%	93,64%	96,13%	96,76%	96,96%	96,75%	97,71%	97,22%

INGECON SUN 1PLAY 4.6TL M								
Test condition	**5%Sn**	**10%Sn**	**20%Sn**	**25%Sn**	**30%Sn**	**50%Sn**	**75%Sn**	**100%Sn**
Minimum rated input voltage	88,17%	93,17%	95,48%	96,11%	97,39%	96,21%	95,83%	95,20%
Nominal input voltage	89,74%	94,01%	96,30%	96,63%	96,18%	96,94%	96,93%	96,87%
90% of the maximum rated input voltage	90,35%	94,50%	96,50%	97,00%	97,27%	96,78%	97,66%	97,09%

INGECON SUN 1PLAY 5TL M								
Test condition	**5%Sn**	**10%Sn**	**20%Sn**	**25%Sn**	**30%Sn**	**50%Sn**	**75%Sn**	**100%Sn**
Minimum rated input voltage	89,21%	93,49%	95,74%	96,04%	96,28%	96,30%	95,88%	95,26%
Nominal input voltage	90,63%	94,38%	96,16%	96,58%	96,47%	96,83%	96,90%	96,79%
90% of the maximum rated input voltage	90,99%	94,82%	96,62%	97,09%	97,21%	96,78%	97,60%	97,00%

INGECON SUN 1PLAY 6TL M								
Test condition	**5%Sn**	**10%Sn**	**20%Sn**	**25%Sn**	**30%Sn**	**50%Sn**	**75%Sn**	**100%Sn**
Minimum rated input voltage	90,92%	94,82%	96,31%	96,18%	96,60%	96,52%	96,10%	95,48%
Nominal input voltage	91,47%	94,87%	96,77%	96,92%	96,50%	96,88%	96,85%	96,67%
90% of the maximum rated input voltage	91,95%	95,25%	96,80%	97,22%	97,30%	96,78%	97,52%	96,87%

These overall efficiency results are representatives for the referred models with a testing frequency of 50Hz.

These efficiency results are calculated between the product of the Static Efficiency of the MPPT obtained after the representative model tested according to EN 50530: 2010, INGECON SUN 4.6TL M, for the Conversion Efficiency results obtained for the certification of this family according to IEC 61683:1999. See the product certificate with reference nº 2617/0071/1-CER.