

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 | | | |

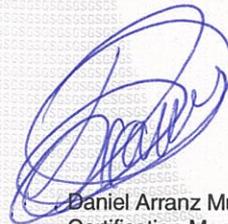
Standard

EN 50530: 2010. Overall efficiency of grid connected photovoltaic inverters.

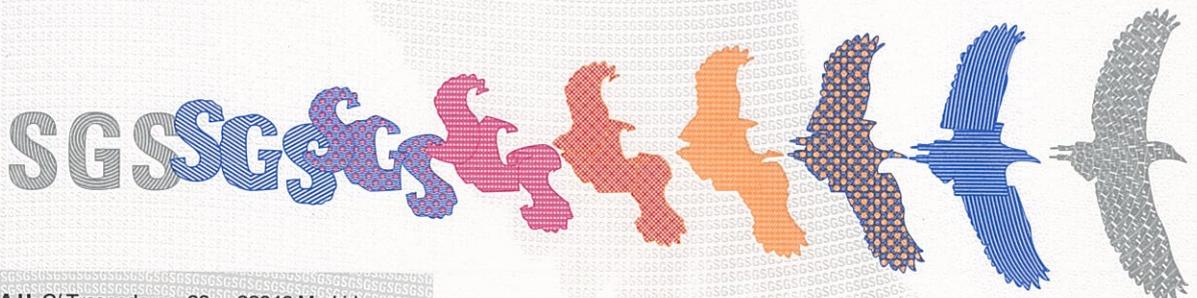
The above-mentioned generating unit is certified according the SGS internal procedure PE.T-ECPE-34 based on the requirements of the UNE-EN ISO / IEC 17065.

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

Madrid, 25th of April 2017



Daniel Arranz Muñiz
Certification Manager



Summary of efficiency results measured for the tested model:

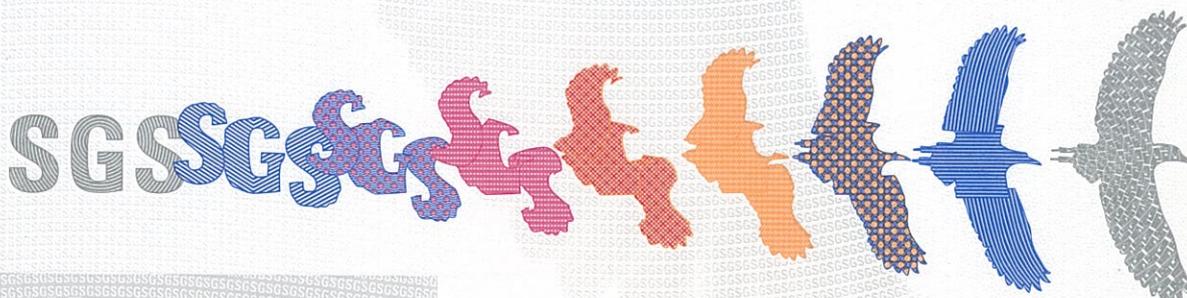
- Static MPPT efficiency

| 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/m ² /s) | 0,5 | 1 | 2 | 3 | 5 | 7 | 10 | 14 |
| Irradiance changes 100 <-> 500 W/m ² | 99,84% | 99,81% | 99,74% | 99,60% | 99,54% | 99,40% | 98,87% | 99,38% |
| Ramp Gradient (W/m ² /s) | 20 | 30 | 50 | | | | | |
| Irradiance changes 100 <-> 500 W/m ² | 98,08% | 99,35% | 99,46% | | | | | |
| Ramp Gradient (W/m ² /s) | 10 | 14 | 20 | 30 | 50 | 100 | | |
| Irradiance changes 300 <-> 1000 W/m ² | 99,82% | 99,81% | 98,99% | 99,38% | 99,44% | 99,55% | | |
| Ramp Gradient (W/m ² /s) | 0,1 | | | | | | | |
| Irradiance changes 2 <-> 100 W/m ² | 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 n° 2617/0071/1-CER.

