Ingecon®Sun

Photovoltaic Solar Energy

A complete inverter family for grid-connected PV plants

Ingeteam

Photovoltaic Solar Energy

Ingeteam

Energy

Industry

Marine

Traction

Basic Technologies

Services

A Corporation structured into 6 divisions, each specializing in a different sector, all customer oriented.






International Network

Ingeteam

An all-inclusive offer with customised solutions, adapted to suit the requirements of each particular customer or project

Thanks to its division-based structure and sustainable growth policy, **Ingeteam** enjoys a privileged, competitive position and has strongly established itself as one of the leading companies in the electronics-electro technical sector.

Ingeteam's core business is based on power and control electronics, generator, motor and electric machine technology and applications engineering.

The workforce comprising more than 3,500 professionals, 9% of which are dedicated to R&D, is a key asset to **Ingeteam**. In the case of the Renewable Energies division, 37% of personnel is engaged in R&D activities.

Ingeteam is committed to R&D&i as a growth engine.

Innovation and Technology at the service of our customers

Mission

"Apply engineering to investigation, design, manufacture and sale of products and services in fields where a great exchange of energy is performed, both generation and consumption, in an attempt to help to the change of the current energy model and contribute towards man's well-being".

Ingeteam´s Manufacturing Facilities in Wisconsin, USA with completion set for 2011

Ingeteam Energy, S.A.

Focused on the wind, photovoltaic, thermo-solar, hydropower, biomass and biofuels fields since 1990, **Ingeteam Energy, S.A.,** is the company dedicated to the supply and development of equipment for the Renewable Energies sector.

In the Solar Photovoltaic area, **Ingeteam** offers its customers solutions for the equipment of PV plants, adapted to suit their specific control and generating requirements.

For **Ingeteam**, the customer is its very raison d'être, as demonstrated by the attentive service provided, with ongoing collaboration right from the system design stage and throughout the entire system lifecycle.

In order to successfully cover the requirements of each new development and guarantee the excellence of the final product, **Ingeteam** is equipped with cutting edge Technology and counts on a workforce committed to quality.

The **Ingeteam** commitment to innovation and to the development of in-house technology, has led to considerable investments in R&D.

In this context, a key milestone is the forthcoming creation of the first and only experimental research and test centre for power electronics and high power electric machines in South Europe. This centre is set to accommodate more than 200 international top-level researchers.

Design and manufacture of inverters for **PV systems**


1


2


3


4

1. **SOLARTIA**
PV array at Viana (Spain)
8.7 MWp (223 **Ingecon®Sun 5,** 106 **Ingecon®Sun 25,** 40 **Ingecon®Sun 100**)

2. **NOBESOL**
PV array at Olmedilla de Alarcón (Spain)
60 MWp (453 **Ingecon®Sun 100**)

3. **ACCIONA SOLAR**
PV Plant at Amareleja (Portugal)
46 MWp (70 **Ingecon®Sun 500TL**)

4. **Ingecon®Power Max** MT

More than 1.8 GW supplied

to the solar PV market worldwide

Ingeteam, the leading company in Spain in the photovoltaic sector, designs and manufactures grid-connected and stand alone inverters.

The high quality of the inverter range is enhanced by specifically-designed electronics and software, making it possible to provide solutions tailored to suit the requirements of each particular system.

With an annual 2 GW production capacity, and the new Manufacturing facility in Wisconsin (300 MW annual) to be operative by 2011, Ingeteam offers the following product range: **Inverters with power ouputs ranging from 2.5 to 625 Kw, and a range of tools for inverter interconnection, and for display via PC of the system parameters.**

All these products are customized to suit the requirements of each and every customer, in line with one of **Ingeteam**'s core values:

Customer guidance, service and adaptability.

Ingeteam boasts a long, proven track record in the industrial and energy sectors, which stretches back to 1972, clearly demonstrating the company's ongoing policy of technological development. In the nineties, Ingeteam became more involved in the development of electrical and control systems specific to the renewable energies sector; this was initially directed at the wind power and hydroelectric sectors and then, from 2001 onwards, our company broadening its scope to encompass the PV solar energy sector as well.

Since then we have provided our customers with more than 1.8 GW of power with **Ingecon®Sun** photovoltaic inverters. This confirms Ingeteam as one of the world leaders in the PV sector.

At **Ingeteam,** we have extensive experience in the design and supply of grid-connected inverters for power ratings ranging from 100 to 625 kW, for large-scale PV farms.

We also specialise in the design and manufacture of high-power hybrid inverters for stand-alone installations, having supplied this type of inverter principally to the regions of Pacific Asia and Africa.

One of our key benchmark projects is the Acciona Solar PV plant at Amareleja (Portugal); this plant is the largest of its kind in the world, having an installed power of 46 MWp. For this project, **Ingeteam** designed a holistic solution with a medium voltage output including: 2,520 **Ingecon®Sun String Control** for monitoring the PV array string currents and 70 **Ingecon®Sun 500TL** inverters. This solution included the design of a housing for each inverter, comprising a prefabricated concrete enclosure to hold the medium voltage transformer, protection cells, auxiliary electric panels and the thermal dissipation system.

The 60 MWp Nobesol solar farm situated in Olmedilla (Spain) is another important project in which Ingeteam has participated, supplying more than 450, **Ingecon®Sun 100** inverters.

Ingecon®Sun Lite

The new generation of single phase inverters

Ingecon®Sun Lite

Supported by many years of experience in the PV sector, **Ingeteam** is committed to ongoing product improvement, day by day. This has led to the development of a new generation of **Ingecon®Sun Lite** inverters, offering a sleeker line, with an up-to-date design and a new, lighter casing.

The **Ingecon®Sun Lite** single-phase inverter family offers users a robust product, reflecting the extensive experience accumulated over the years, capable of withstanding extreme temperatures, even outdoors. The power ratings range from 2.5 to 6 kW. This inverter family is primarily directed at the residential sector and also at larger, decentralised projects.

A product which satisfies even the most demanding international markets.

Ingecon®Sun Lite

TRANSFORMER / TRANSFORMERLESS

5 U / 5 TL U

The **Ingecon®Sun Lite 5 U** inverters are available with or without a galvanic isolation AC transformer. They are designed to adapt to the standards and regulations in force in the different international markets. The inverters are apt for different types of installations, ranging from residential applications up to large-scale solar plants.

The **Ingecon®Sun Lite** inverters are compatible with the different PV module technology on the market, thereby permitting greater flexibility when sizing PV installations.

The inverters feature an aluminium casing, for indoor and outdoor installation and capable of withstanding extreme temperatures, and an advanced maximum power point tracker system (MPPT) to extract the maximum power from the PV array. Each inverter incorporates an internal data logger for up to 3 months data storage, which can be accessed from either a remote PC or in situ from the inverter front panel, through a keypad.

The **Ingecon®Sun Lite 5 U / 5TL U** inverters have been designed with components which offer a useful life of more than 20 years.They come with a standard guarantee of 10 years, which can be extended up to 20 years.

Protections

The **Ingecon®Sun Lite 5 U / 5TL U** inverters are equipped with the following electrical protections against:

- Reverse polarity.
- Input and output overvoltage.
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.
- DC breaker.

Optional accessories

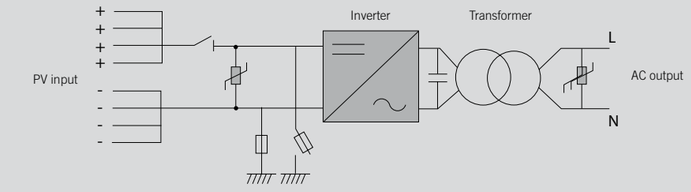
- Inter-inverter communication via RS-485 or Ethernet.
- **Ingecon®Sun Manager** software for parameter display and data recording.
- **IngeRAS™ PV** for Internet data display.

Technical data

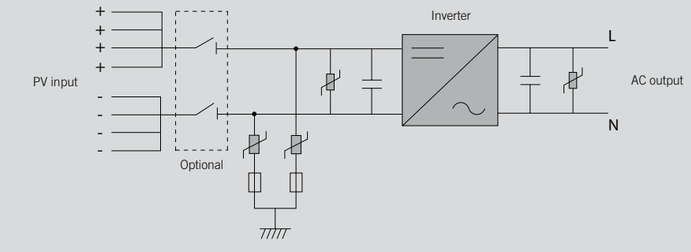
Model	Ingecon Sun 5 U	Ingecon Sun 5TL U
Input (DC)		
Recommended PV array power range[1]	5.8 - 6.5 kWp	5.7 - 6.5 kWp
Voltage range MPP	200 - 450 V	200 - 450 V
Maximum voltage DC[2]	550 V	550 V
Maximum current DC	30 A	30 A
DC inputs	4	4
MPPT	1	1
Output (AC)		
Rated power AC	5 kW	5 kW
Maximum current AC	25 A	25 A
Rated voltage AC	208 / 240 / 277 V	208 / 240 / 277 V
Frequency AC	60 Hz	60 Hz
Phi Cosine[3]	1	1
Phi Cosine adjustable	+/-0.9 to Pnom	+/-0.9 to Pnom
THD[3]	<3%	<3%
Efficiency		
Maximum efficiency	95.86%	96.47%
CEC - Weighted efficiency	95.30%	96.20%
General Information		
Stand-by consumption	<10 W	<10 W
Consumption at night	<0.5 W	<0.5 W
Ambient temperature	-4ºF to +113ºF	-4ºF to +113ºF
Relative humidity	0 - 95%	0 - 95%
Protection class	NEMA 3R, IP54 (IP65 electronics)	
Warranty	Standard: 10 years / Extended: up to 20 years	
Compliance with standards	UL1741 CSA C22.2 nº107.1-01, IEEE 1547, IEEE 1547.1	

Notes: [1]Depending on the type of installation and geographical location. [2]Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures. [3]For Pout >25% of the rated power.

Ingecon Sun Lite 5 U



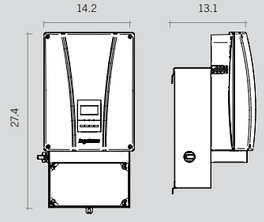
Ingecon Sun Lite 5TL U



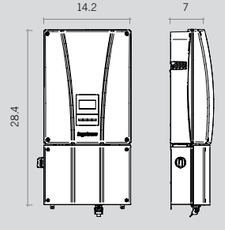
Size and weight

(inches and pounds)

Ingecon Sun 5 U 168 pounds



Ingecon Sun 5TL U 62 pounds



Ingecon®Sun Smart

The intelligent solution for outdoor installations

Ingecon®Sun Smart

The **Ingecon®Sun Smart** three-phase inverter family has been specially designed to facilitate installation and maintenance procedures, thanks to its ingenious component replacement system.

Featuring power ratings from 10 to 30 kW, a size and casing suitable for outdoor use, this equipment is ideal for medium sized industrial roofs and for plants with sun tracker systems.

Ingecon®SunSmart

TRANSFORMER
15 U / 25 U

The **Ingecon®Sun** **Smart 15 U / 25 U** combine a rugged stainless steel housing for use in outdoor installations (NEMA 3 R) with the versatility of an extensive range or power ratings, making it ideal for installations of all sizes.

The inverter pure three phase conversion stage offers a balanced output in all three AC phases, with no additional equipment required for simultaneous disconnection.

Inverter maintenance is exceedingly simple, due to the fact that the electronics block is easily replaceable from the exterior.

The inverters feature a stainless steel casing, for indoor and outdoor installation and capable of withstanding extreme temperatures, and an advanced maximum power point tracker system (MPPT) to extract the maximum power from the PV array. Each inverter incorporates an internal data logger for up to 3 months data storage, which can be accessed from either a remote PC or in-situ from the inverter front panel, through a keypad.

The **Ingecon®Sun** **Smart** inverters have been designed with components which offer a useful life of more than 20 years. They come with a standard guarantee of 5 years, which can be extended up to 20 years.

Protections

The **Ingecon®Sun** **Smart 15 U / 25 U** inverters are equipped with the following electrical protections against:

- Galvanic isolation between the DC and AC side.
- Reverse polarity
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.
- DC breaker.
- Voltage surge arresters at the DC and AC.
- Plus/minus grounding PV modules.

Optional accessories

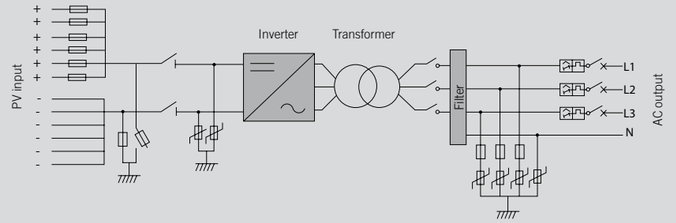
- Inter-inverter communication via RS-485 or Ethernet.
- DC input combiner, 10 inputs (only available for **Ingecon®Sun** **Smart 15 U**)
- **Ingecon®Sun** **Manager** software for parameter display and data recording.
- **IngeRAS™** **PV** for Internet data display.

Technical data

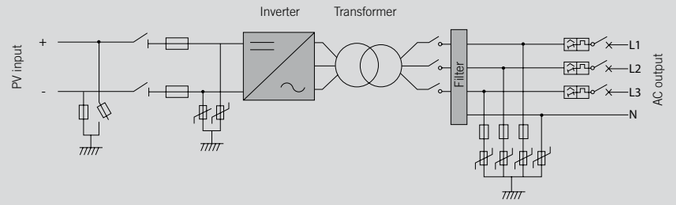
Model	Ingecon®Sun 15U 208	Ingecon®Sun 15U 480	Ingecon®Sun 25U 208	Ingecon®Sun 25U 480
Input (DC)				
Recommended PV array power range(1)	16 - 20 kWp	16 - 20 kWp	26 - 33 kWp	26 - 33 kWp
Voltage range MPP	300 - 550 V	300 - 550 V	300 - 550 V	300 - 550 V
Maximum voltage DC(2)	600 V	600 V	600 V	600 V
Maximum current DC	52 A	52 A	87 A	87 A
DC inputs	2(3)	2(3)	2	2
MPPT	1	1	1	1
Output (AC)				
Rated power AC	15 kW	15 kW	25 kW	25 kW
Maximum current AC	47 A	20 A	78 A	34 A
Rated voltage AC	208 V	480 V	208 V	480 V
Frequency AC	60 Hz	60 Hz	60 Hz	60 Hz
Phi Cosine(3)	1	1	1	1
Phi Cosine adjustable	+/-0.9 to Pnom	+/-0.9 to Pnom	+/-0.9 to Pnom	+/-0.9 to Pnom
THD(3)	<3%	<3%	<3%	<3%
Efficiency				
Maximum efficiency	94.3%	94.3%	96.1%	95.9%
CEC - Weighted efficiency	95.8%	95.8%	95.7%	95.5%
General Information				
Stand-by consumption	30 W	30 W	30 W	30 W
Consumption at night	1 W	2 W	1 W	2 W
Ambient temperature	-4ºF to +131°F	14ºF to +131°F	14ºF to +113°F	14ºF to +113°F
Relative humidity	0 - 95%	0 - 95%	0 - 95%	0 - 95%
Protection class	NEMA 3R, IP54 (IP65 electronics)			
Warranty	Standard: 5 years / Extended: up to 20 years			
Compliance with standards	UL1741, CSA C22.2 nº107.1-01, IEEE 1547, IEEE 1547.			

Notes: (1)Depending on the type of installation and geographical location. (2)Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures. (3)Multi-string option 10. (4)Up to 113ºF ambient temperature, Pmax=110% Pnom for non permanent transients. (5)For Pout >25% of the rated power.

Ingecon®Sun
15 U (Multistring version)

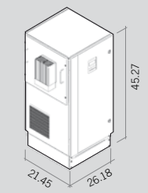


Ingecon®Sun
15 U / 25 U

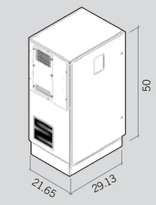


Size and weight
(inches and pounds)

Ingecon®Sun
15 U 581 pounds

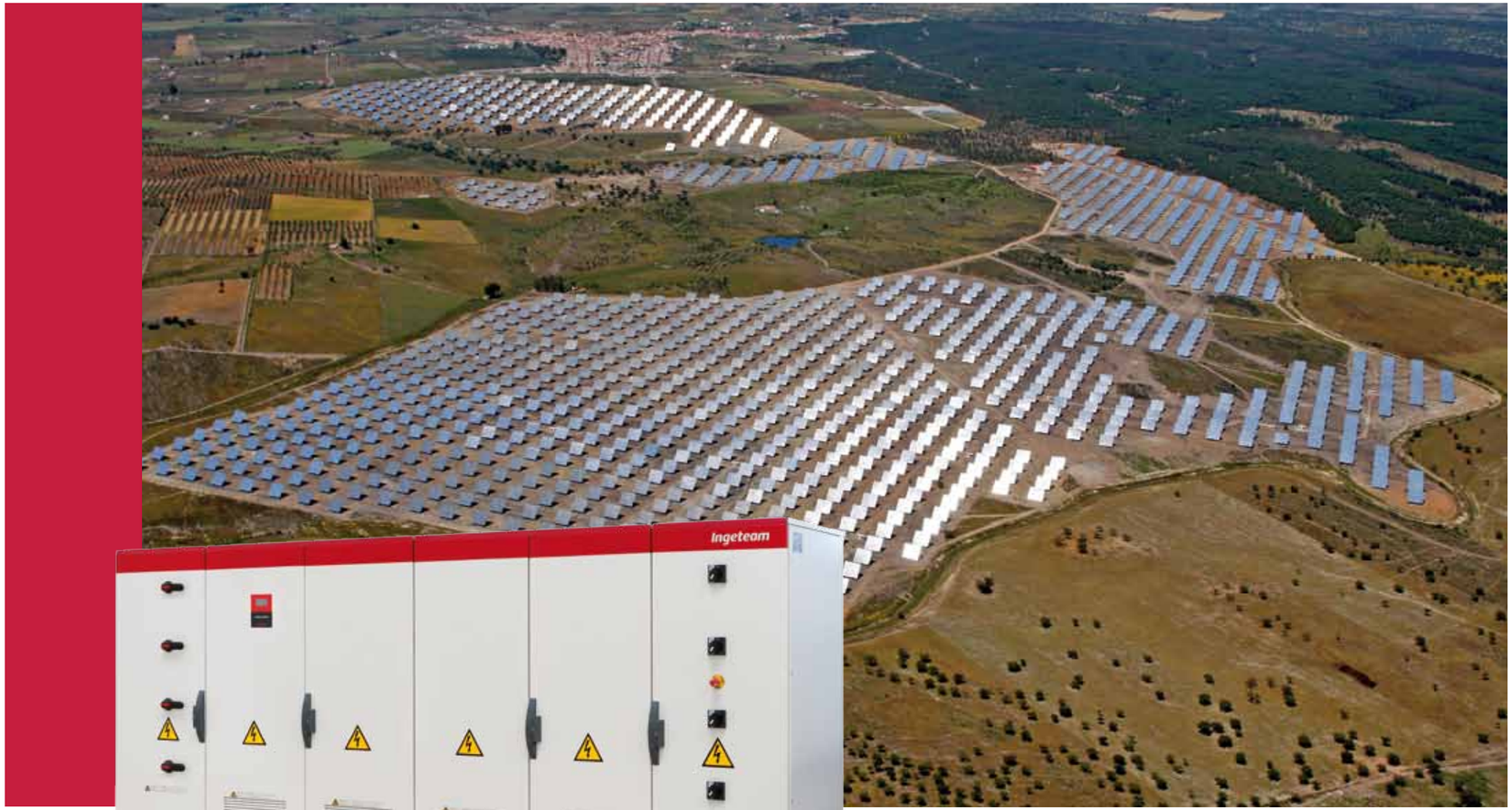


Ingecon®Sun
25 U 771 pounds



Ingecon®Sun Power / Power Max

Optimum performance in large multi-megawatt installations



Ingecon®Sun Power/Power Max

The **Ingecon®Sun Power** three phase inverter range, offering power ratings from 50 to 100 kW, is designed for use on large sized industrial roofs and ground-based PV farms. These inverters are widely installed in the market, thanks to their ease of maintenance.

The **Ingecon®Sun Power Max** range features power ratings from 100 to 625 kW, with the possibility of providing the complete supply of the prefabricated concrete housing and the transformer and protection cells for a Medium Voltage output.

It is primarily designed for use in large scale megawatt plants.

Ingecon®Sun Power

TRANSFORMER
100 U

Designed for ease of maintenance, offering high efficiency at high temperatures, and featuring full electric protections as a standard supply, the **Ingecon®Sun Power 100 U** inverter is one of the most popular in the **Ingecon®Sun** inverter range. It is designed for medium and large power roof installations and also for ground-based multi-megawatt installations.

This inverter is equipped with an advanced maximum power point tracking system (MPPT) to extract the maximum power from the PV array. No additional items are required and it can be manually disconnected from the grid.

Each inverter incorporates an internal data logger for up to 3 months data storage, which can be accessed from either a remote PC or in-situ from the inverter front panel, through a keypad.

The **Ingecon®Sun Power 100 U** inverter has been designed with components which offer a useful life of more than 20 years. They come with a standard guarantee of 5 years, which can be extended up to 20 years.

C SA US

Protections

The **Ingecon®Sun Power 100 U** inverter is equipped with the following electrical protections against:

- Galvanic isolation between the DC and AC side.
- Reverse polarity.
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.
- AC MT and DC breaker and DC fuses.
- AC and DC surge arresters.
- Plus / minus grounding PV modules.

Optional accessories

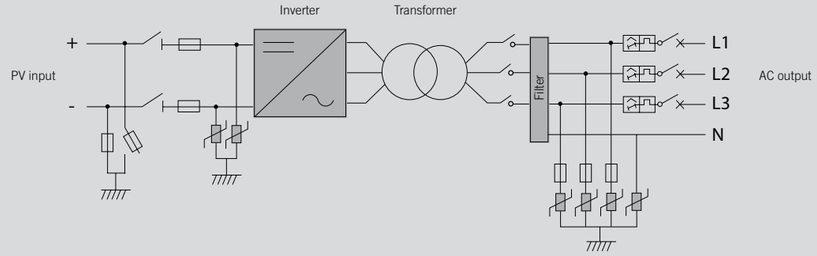
- Inter-inverter communication via RS-485 or Ethernet.
- **Ingecon®Sun Manager** software for parameter display and data recording.
- **IngeRAS™ PV** for Internet data display.

Technical data

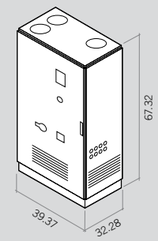
Model	Ingecon Sun 100U 208	Ingecon Sun 100U 480
Input (DC)		
Recommended PV array power range[1]	106 - 130 kWp	106 - 130 kWp
Voltage range MPP	300 - 550 V	300 - 550 V
Maximum voltage DC[2]	600 V	600 V
Maximum current DC	350 A	350 A
DC inputs	4	4
MPPT	1	1
Output (AC)		
Rated power AC[3]	100 kW	100 kW
Maximum current AC	317 A	137 A
Rated voltage AC	3 x 208 V	3 x 480 V
Frequency AC	60 Hz	60 Hz
Phi Cosine[4]	1	1
Phi Cosine adjustable	+/-0.9 to Pnom	+/-0.9 to Pnom
THD[4]	<3%	<3%
Efficiency		
Maximum efficiency	95.8%	96%
CEC - Weighted efficiency	95%	95.5%
General Information		
Stand-by consumption	30 W	30 W
Consumption at night	1 W	2 W
Ambient temperature	+14°F to +149°F	+14°F to +149°F
Relative humidity	0 - 95%	0 - 95%
Protection class	NEMA1 (IP 20)	
Standard warranty	5 years	
Extended warranty	Up to 20 years	
Compliance with standards	UL 1741, CSA C22.2 nº 107.1-01, IEEE 1547, IEEE 1547.1	

Notes: [1]Depending on the type of installation and geographical location. [2]Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures. [3]Up to 113°F ambient temperature, Pmax=110% Pnom for non permanent transients. [4]For Pout > 25% of the rated power.

Ingecon Sun Power 100 U



Size and weight
(inches and pounds)



Ingecon Sun 100 U — 2,559.47 pounds

Ingecon®Sun Power Max

220 AC
250TL / 375TL / 500TL

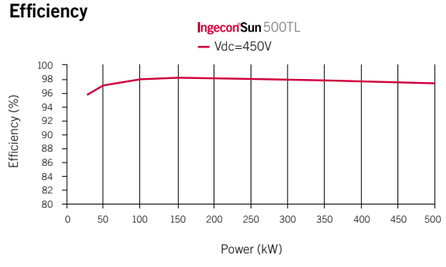
The modular design and absence of a low voltage transformer considerably enhance the inverter efficiency through the different DC stages, and the independent maximum power point trackers (MPPT*). The **Ingecon®Sun** Power Max range also incorporates those DC/AC protection devices required by even the most exacting standards and regulations. This inverter family has been specifically designed for medium voltage applications, offering increased availability thanks to the independent operation of the power stages and also ease of maintenance, which are both fundamental factors in large-scale PV installations.

Ingeteam offers a customised, holistic solution for each particular market. A solution which, in addition to the inverter, also includes a medium voltage transformer centre comprising a prefabricated concrete housing, a medium voltage transformer, medium voltage protection cells, auxiliary services panel and heat dissipation system.

The **Ingecon®Sun** Power Max inverters have been designed with components which offer a useful life of more than 20 years. They come with a standard guarantee of 5 years, which can be extended for periods to up to 25 years.

**The MPPTs connected through TL inverters to the same transformer must have the same voltage configuration.*

Efficiency



Protections

Each of the modular independent stages is equipped with:

- Reverse polarity.
- Output short-circuits and overloads.
- DC breaker with a door control optional.
- DC fuses.
- AC thermal-magnetic breaker with door control.
- Lightning induced DC surge suppressor.
- Lightning induced AC surge suppressor.
- Anti-islanding monitoring system with automatic disconnection.
- DC isolation monitor.

Optional accessories

- Inter-inverter communication via RS-485 or Ethernet.
- Modem for GSM/GPRS remote communication.
- **Ingecon®Sun** Manager software for parameter display and data recording.
- **IngeRAS™** PV for Internet data display.
- PV array string current monitoring. **Ingecon®Sun** String Control.

Technical data

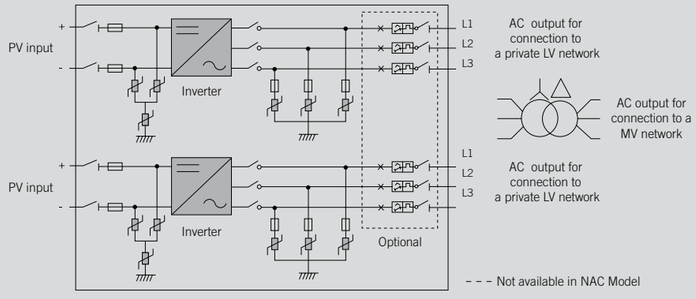
Model	Ingecon Sun 250TL	Ingecon Sun 375TL	Ingecon Sun 500TL
Input (DC)			
Recommended PV array power range[1]	283 - 325 kWp	424 - 488 kWp	566 - 650 kWp
Voltage range MPP	405 - 750 V	405 - 750 V	405 - 750 V
Maximum voltage DC[2]	900 V	900 V	900 V
Maximum current DC	715 A	1,072 A	1,429 A
DC inputs	8	12	16
MPPT	2	3	4
Output (AC)			
Rated power AC HT[3]	250 kW	375 kW	500 kW
Rated power AC HP[4]	275 kW	412 kW	550 kW
Maximum current AC	736 A	1,104 A	1,472 A
Rated voltage AC	220 V IT System	220 V IT System	220 V IT System
Frequency AC	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine[5]	1	1	1
Phi Cosine adjustable	+/-0.9 to Pnom	+/-0.9 to Pnom	+/-0.9 to Pnom
THD[6]	<3%	<3%	<3%
Efficiency			
Maximum efficiency	98.10%	98.10%	98.10%
Euroefficiency	97.70%	97.70%	97.70%
General Information			
Stand-by consumption[7]	60 W	90 W	120 W
Consumption at night	<5 W	<5 W	<5 W
Ambient temperature	-20ºC to +65ºC	-20ºC to +65ºC	-20ºC to +65ºC
Relative humidity	0 - 95%	0 - 95%	0 - 95%
Protection class	IP 20	IP 20	IP 20
Compliance with standards	RD 661/2007, EN 50178, Reglamento VDEW BT, RTC alle rete BT di Enel Distribuzione, CEI 11-20, CEI 11-20 V1, CEI 0-16, CE Mark		

HT mode (high temperature)
Rated outputs at 45ºC

HP mode (high power)
Rated outputs at 40ºC

Notes: [1] Depending on the type of installation and geographical location. [2] Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures. [3] Up to 45ºC ambient temperature, Pmax= 110% Pnom for non permanent transients [4] Up to 40ºC ambient temperature, Pmax = Pnom [5] For Pout > 25% of the rated power. Possibility to modify the Phi Cosine. [6] For Pout > 25% of the rated power and voltage in accordance with IEC 61000-3-4 [7] Consumption from PV field.

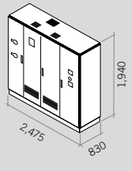
Ingecon Sun 250TL
220 AC



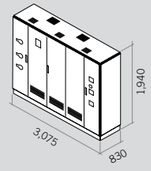
Size and weight

(mm)

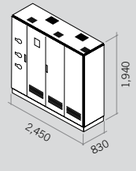
Ingecon Sun 250TL
1,300 kg.



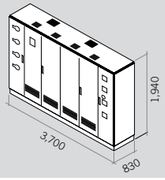
Ingecon Sun 375TL
1,900 kg.



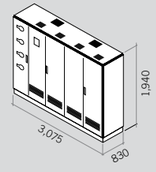
Ingecon Sun 375TL
NAC Model 1,500 kg.



Ingecon Sun 500TL
2,500 kg.



Ingecon Sun 500TL
NAC Model 2,100 kg.



Ingecon®Sun Power Max

275 AC
315HE TL / 500HE TL / 625HE TL

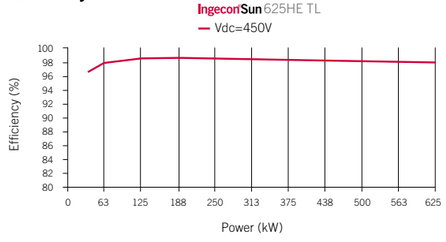
The modular composition and lack of low voltage transformer help to considerably increase the efficiency through the various DC stages, in addition to the independent maximum power point trackers (MPPT*). Likewise, the **Ingecon®Sun Power Max** is equipped with all the DC/AC protection mechanisms required by the most demanding standards and regulations. This inverter family is specifically designed for medium voltage applications and provides increased availability thanks to the independent operation of the power stages, in addition to ease of maintenance, all fundamental aspects in large PV arrays.

Ingeteam offers a holistic, customised, market-specific solution which, in addition to the inverter, also includes a medium voltage transformer centre consisting in a prefabricated concrete enclosure, a medium voltage transformer, medium voltage protection cells, auxiliary services panel and heat dissipation system.

The **Ingecon®Sun Power Max** units have been designed with components which offer a useful life of more than 20 years. There is a standard 5 year warranty, which can be extended to up to 25 years.

**The MPPTs connected through TL inverters to the same transformer must have the same voltage configuration.*

Efficiency



Protections

Each of the independent modular stages is equipped with the following protections:

- Reverse polarity.
- Output short-circuits and overloads.
- DC breaker with a door control.
- DC fuses.
- AC thermal-magnetic breaker with door control.
- Lightning induced DC surge suppressor.
- Lightning induced AC surge suppressor.
- Anti-islanding monitoring system with automatic disconnection.
- DC isolation monitor.

Optional acessories

- Inter-inverter communication via RS-485 or Ethernet.
- Modem for GSM/GPRS remote communication.
- **Ingecon®Sun Manager** software for parameter display and data recording.
- **IngeRAS™ PV** for Internet data display.
- PV array string current monitoring. **Ingecon®Sun String Control.**
- Grounding kit for those PV modules requiring this.

Technical data

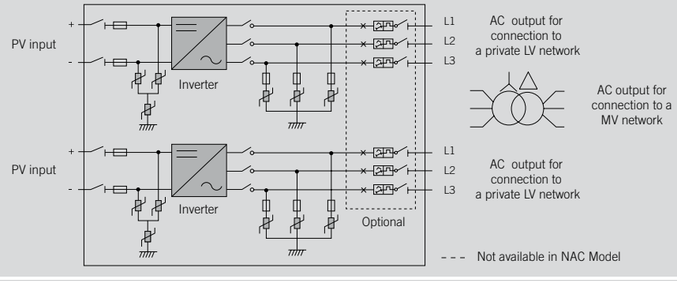
Model	Ingecon Sun 315HE TL	Ingecon Sun 500HE TL	Ingecon Sun 625HE TL
Input (DC)			
Recommended PV array power range[1]	354 - 410 kWp	532 - 650 kWp	709 - 819 kWp
Voltage range MPP	450 - 750 V	450 - 750 V	450 - 750 V
Maximum voltage DC[2]	900 V (1000 V optional)	900 V (1000 V optional)	900 V (1000 V optional)
Maximum current DC	715 A	1,072 A	1,429 A
DC inputs	8	12	16
MPPT	2	3	4
MPPT Master-Slave	1	1	1
Output (AC)			
Rated power AC HT[3]	315 kW	500 kW	625 kW
Rated power AC HP[4]	346 kW	519 kW	690 kW
Maximum current AC	736 A	1,104 A	1,472 A
Rated voltage AC	275 V IT System	275 V IT System	275 V IT System
Frequency AC	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine[5]	1	1	1
Phi Cosine adjustable	+/-0.9 to Pnom	+/-0.9 to Pnom	+/-0.9 to Pnom
THD[6]	<3%	<3%	<3%
Efficiency			
Maximum efficiency	98.5%	98.5%	98.5%
Euroefficiency	98.2%	98.2%	98.2%
General Information			
Stand-by consumption[7]	60 W	90 W	120 W
Consumption at night	<5 W	<5 W	<5 W
Ambient temperature	-20ºC to +65ºC	-20ºC to +65ºC	-20ºC to +65ºC
Relative humidity	0 - 95%	0 - 95%	0 - 95%
Protection class	IP 20	IP 20	IP 20
Compliance with standards	RD 661/2007, EN 50178, Reglamento VDEW BT, RTC alle rete BT di Enel Distribuzione, CEI 11-20, CEI 11-20 V1, CEI 0-16, CE Mark		

HT mode (high temperature)
Rated outputs at 45ºC

HP mode (high power)
Rated outputs at 40ºC

Notes: [1] Depending on the type of installation and geographical location. [2] Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures. [3] Up to 45ºC ambient temperature. More power available in transient operating condition [4] Up to 40ºC ambient temperature, Pmax = Pnom [5] For Pout > 25% of the rated power. Possibility to modify the Phi Cosine. [6] For Pout > 25% of the rated power and voltage in accordance with IEC 61000-3-4 [7] Consumption from PV field.

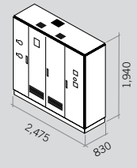
Ingecon Sun 315HE TL
275 AC



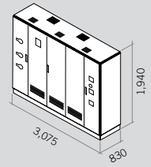
Size and weight

(mm)

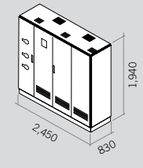
Ingecon Sun 315HE TL
1,300 kg.



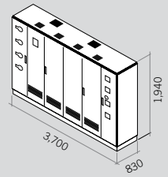
Ingecon Sun 500HE TL
1,900 kg.



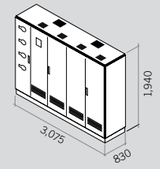
Ingecon Sun 500HE TL
NAC Model 1,500 kg.



Ingecon Sun 625HE TL
2,500 kg.



Ingecon Sun 625HE TL
NAC Model 2,100 kg.



Ingecon®Sun Power Maxter

MASTER-SLAVE CONFIGURATION

This innovative concept optimizes the **Ingecon®Sun Power Max** inverter performance and increases the availability of the PV field (up to 1.8 points higher efficiency at low power) at low irradiance periods, particularly at dawn and dusk. This design is available for inverters beginning at 500 kW.

The **Ingecon®Sun Power Maxter** balances out the work between the different power blocks obtaining the maximum efficiency and extending the useful life of the whole unit.

Ingecon®Sun Power Maxter is the perfect combination for improved performance and ease of plant maintenance. Should any of the power stages fail, the system distributes the power to the remaining stages so that almost all the inverter power is maintained.

Further system advantages include:

- High output
- Low maintenance costs. Same kit for the 4 inverter blocks.
- Modular inverters. Simple maintenance.
- Fast reception of spares, thanks to the use of lightweight, compact components.
- In the event of a block breakdown, less than 1/4 of the inverter power is lost.
- Low installation and connection costs, thank to the inverter compactness.
- Simple component replacement, built-in diagnostic systems.
- With a cooling system: guaranteed rated power of up to 40/45ºC.
- Polypropylene capacitors.
- System for reducing interfering inductance.
- Built-in LCD monitoring screen.
- Built-in Datalogger for up to 3 months data storage.

Protections

- System against reverse polarisation.
- Over-voltage protection.
- Out-of-range frequency protection.
- Over-heating protection.
- Emergency button.
- 4 DC breakers.
- 4 AC magnetothermal protections (optional).
- 4 lightening induced DC surge suppressors.
- 4 lightening induced AC surge suppressors.
- Anti-islanding system with automatic disconnection.
- Insulation protection.

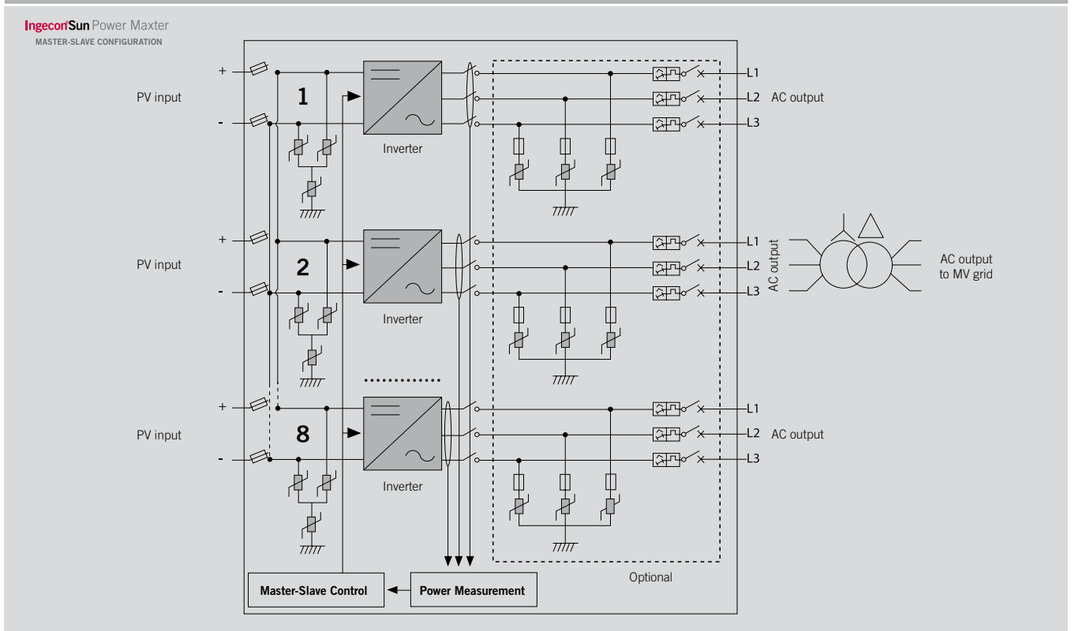
Optional accessories

- Inter-inverter communication via RS-485 or Ethernet.
- Modem for GSM/GPRS remote communication.
- **Ingecon®Sun Manager** Software for parameter display and data recording.
- **IngeRAS™ PV** for data display on the Internet.
- **Ingecon®Sun String Control** for monitoring the PV array string currents.

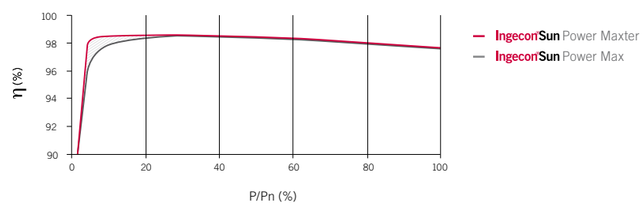
Technical data

Model	Ingecon®Sun Power Maxter 500HE TL
Type	Self-switching with IGBTs
Operation	1 MPPT
Nº DC Inputs	3 inputs
MPPT voltage range	500 / 750 V
Maximum DC voltage	900 V (1,000 V optional)
Maximum DC current	1,072 A
AC rated power HT mode	500 kW
AC rated power HP mode	519 kW
Maximum AC current	1,104 A
AC voltage output (between phases)	275 V
Output frequency	50 / 60 Hz
Maximum efficiency	98.5%
European efficiency	98.2%
Power factor	1
Operating temperature	-20ºC to +65ºC
Ambient humidity	0-95%
Compliance with standards	RD 661/2007, EN 50178, Reglamento VDE BT, RTC alle rete BT di Enel, Distribuzione, CEI 11-20, CEI 11-20 V1, CEI 0-16, CE Mark

HT mode (high temperature) - Rated outputs at 45ºC **HP mode (high power) -** Rated outputs at 40ºC



Efficiency



Ingecon®Sun Power Max

MEDIUM VOLTAGE

500 / 625 / 1000 / 1250

In North America, the **Ingecon®Sun Power Max MT** is available for Utility-scale projects "behind the fences" that do not require UL compliance.

Ingeteam has developed a range of Medium Voltage equipment which integrates everything necessary to step up the energy generated by the inverters of up to 1.5 MW to medium voltage for up to 36 KVac. The equipment is customizable, based on the requirements of each particular user, and it is available "pier mounted" or "skid platform".

This solution is delivered fully furnished, with complete integration of housing, inverters, controls and transformer into a containerized housing or skid for "plug and play" integration at the site.

The equipment housed in a concrete enclosure can include:

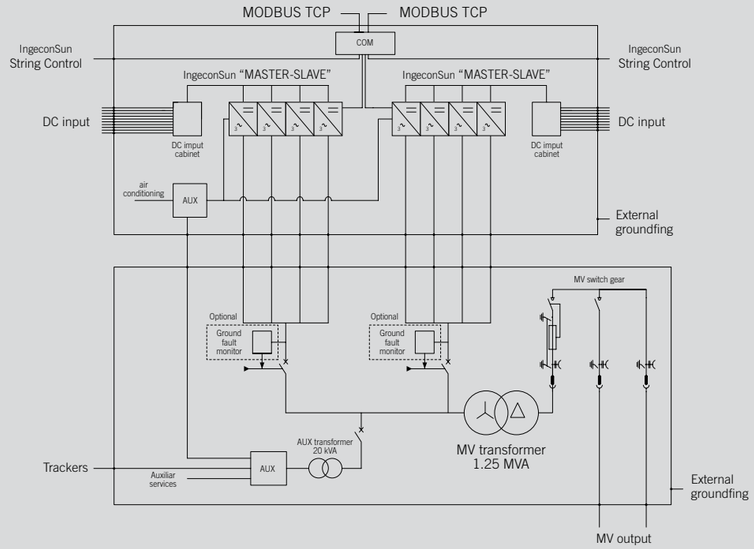
- PV inverters up to a maximum of 1.5 MW.
- Step up transformer up to 36 KV.
- MV Disconnect.
- Heat dissipation system for optimum inverter performance.
- Particle Filters.
- Auxiliary services panel for powering the services to the enclosure and any trackers.
- Transformer for the auxiliary services.
- Complete in-house integration of all electrical components.

Options

- High efficiency heating / air conditioning.
- Metering equipment.
- Reduced loss transformer.
- Remote communications.
- Scada for system supervision.
- Start-up at the system site.

IngeconPower Max
MEDIUM VOLTAGE

Electrical scheme 1.25 MW

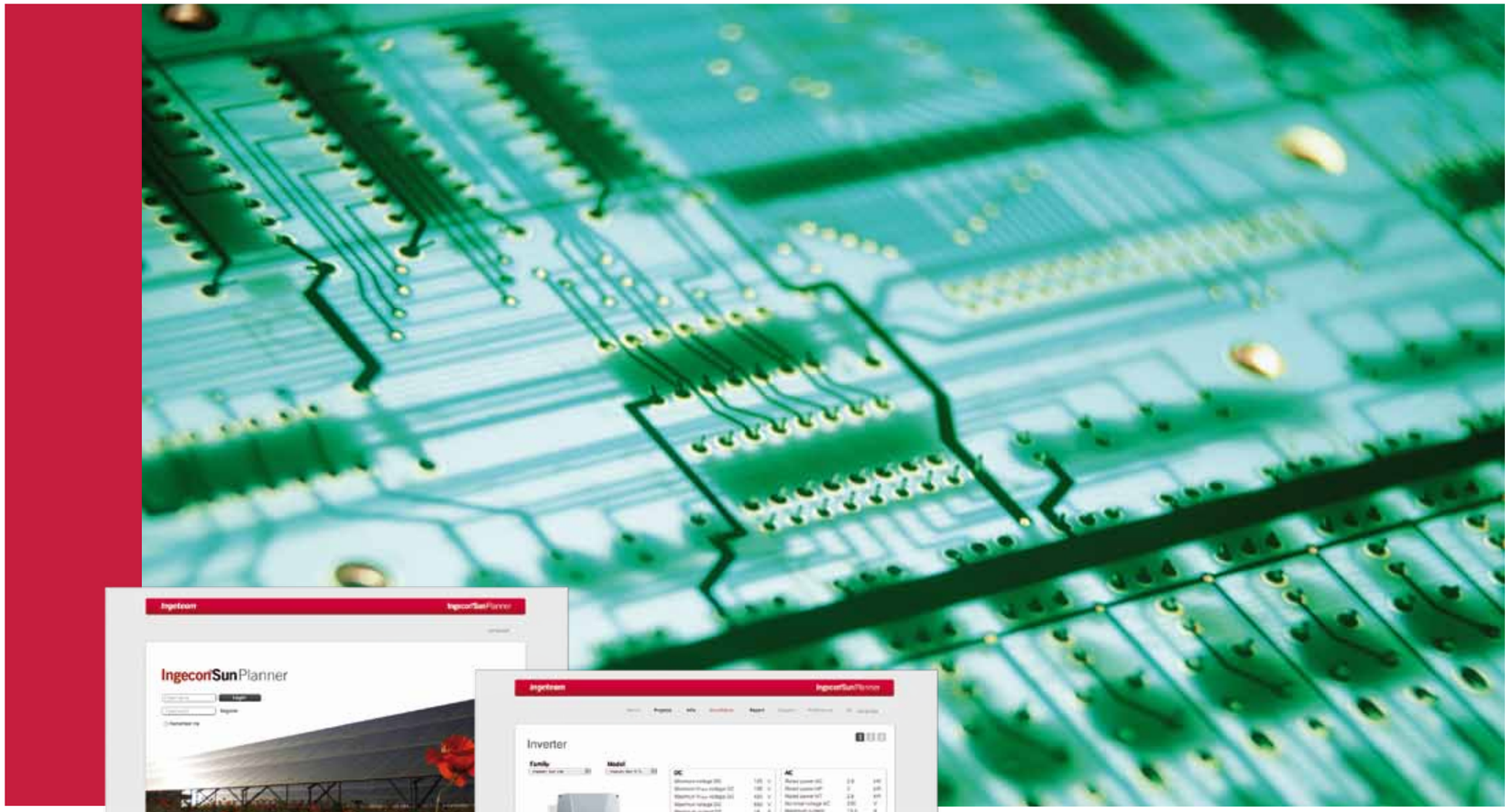


Size
(ft)

Up to 625 kW	Up to 1,5 Mw
20 ft x 8 ft x 9 ft	40 ft x 8 ft x 9 ft

Accesories

Multi-options for PV plant control and monitoring



Ingecon®Sun Communication
PC-Inverter communication options.

Remote operation and SCADA. Communication Remotes.

Ingecon®Sun Manager
Software for the monitoring of the PV plants.

IngeRAS™ PV
Web Portal for PV plant access.

Ingecon®Sun Planner
Software for the dimensioning of the PV array.

Ingecon®Sun Communication

Multiple options for data communication with inverters from a PC

With the **Ingecon®Sun Manager** software it is possible the remote communication of a PV plant with a PC and the transmission of all the PV plant variables: Inverter parameters, historical data, etc.

This PV plant-PC communication is possible through inverter integrated cards.

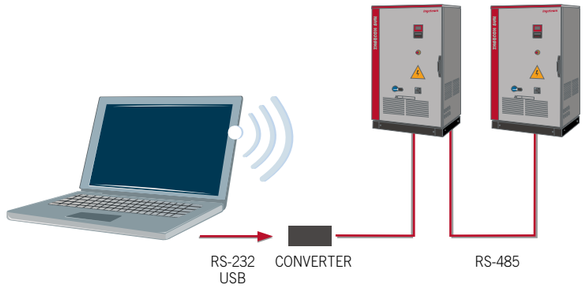
RS-485 card

- Controllable from a local PC.
- Half-Duplex (two wire) configuration mode.
- Multi-connection between inverters in a closed loop system.
- Supply of RS-485/RS232 or RS485/USB for easy PC connection with a PC.

Ethernet card

For Ethernet communications between the **Ingecon®Sun Manager** software and the inverters.

Inverter quick plug-in for easy connection to a PC.



Remote operation and SCADA

Remote control enables real time operation and supervision of the PV installations and is an essential tool for guaranteeing the highest level of availability.

It is adapted to the requirements of each installation and can incorporate new features based on modular SCADA architecture. It is scalable and flexible thanks to its OPC based client/server architecture.

The Remote Controller can integrate the Substation and any other device that may be remotely controlled. It is compatible with a multitude of protocols and supports (ADSL, RDSI, GSM, GPRS, Internet, fibre optics, radio, microwaves, and satellite).

Communication Remotes

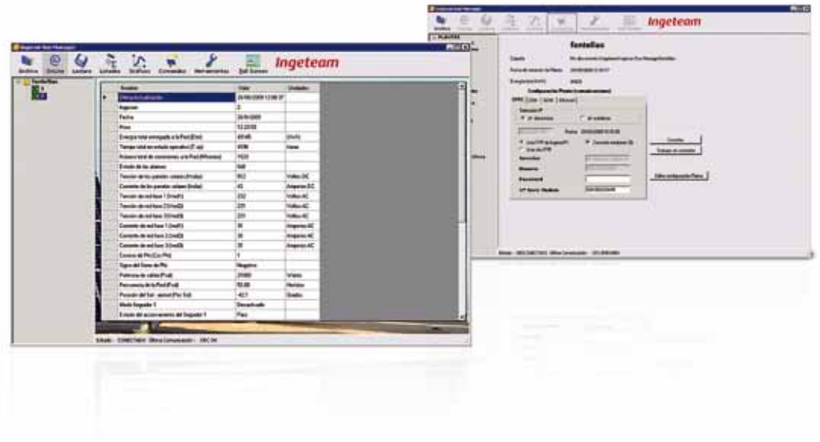
In the case that signals not coming from the inverter should be implemented in the SCADA, such as the status of automatics, temperatures, etc., communication remotes would need to be installed in each of the enclosures. In the case of **Ingecon®Sun Power Max** Inverters, this remote would need to be installed in the AC and auxiliary services enclosure.

Some possible communication protocols:

- Ethernet-TCP/IP
  (MODBUS, IEC-608-70-5-104, etc.)
- Interbus-S
- Profibus-DP
- RS-232
  (3964, MODBUS, IEC-60870-5-101, etc.)
- RS-485
  (3964, MODBUS, etc.)
- CAN

Ingecon®Sun Manager

PV plant monitoring software



The **Ingecon®Sun Manager** software is a Windows® graphic environment PC based program for PV plant monitoring and management over the Internet. It is possible to integrate single phase and three phase inverters and string control devices in a single software package. Communication is through RS-485 communication cards, Ethernet and modem.

The software features:

- Individual configuration of each PV plant inverter.
- On-line display of the inverter internal variables.
- One-screen display of all the plant inverters.
- Multi-PV plant management from a single PC.
- Historical data capture and disc storage possibility.
- Data log display in various graph or table formats.
- Data storage in XML format.
- Configurable modem SMS alarm message functionality.
- Available in Spanish, English, German, French and Italian.

Display

Totally configurable tool for displaying the most important plant parameters:

- Accumulated energy.
- Daily energy.
- Instantaneous power.
- Irradiance.
- Module temperature.
- Ambient temperature.
- Wind speed.

Customizable screen wallpaper. Data display on a TFT, LCD screen etc.

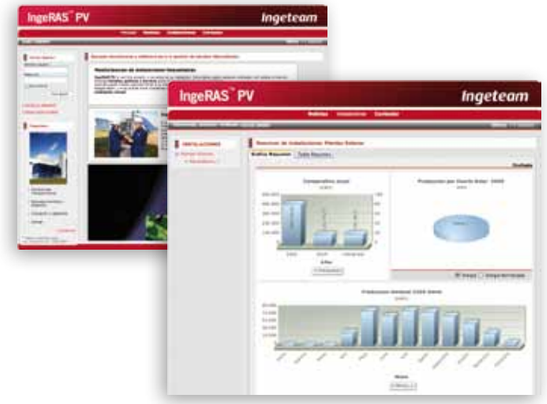
Online viewable variables

List of the online viewable variables, and which are saved by the inverter:

- Accumulated energy to the grid.
- Total time in operating status.
- Total number of grid connections.
- Total number of errors.
- Alarm status.
- Solar panel voltage.
- Solar panel current.
- Solar panel power.
- Output current to the grid.
- Phi Cosine.
- Positive/Negative Phi Cosine.
- Grid voltage.
- Grid frequency.
- Actual date and time.

IngeRAS™PV

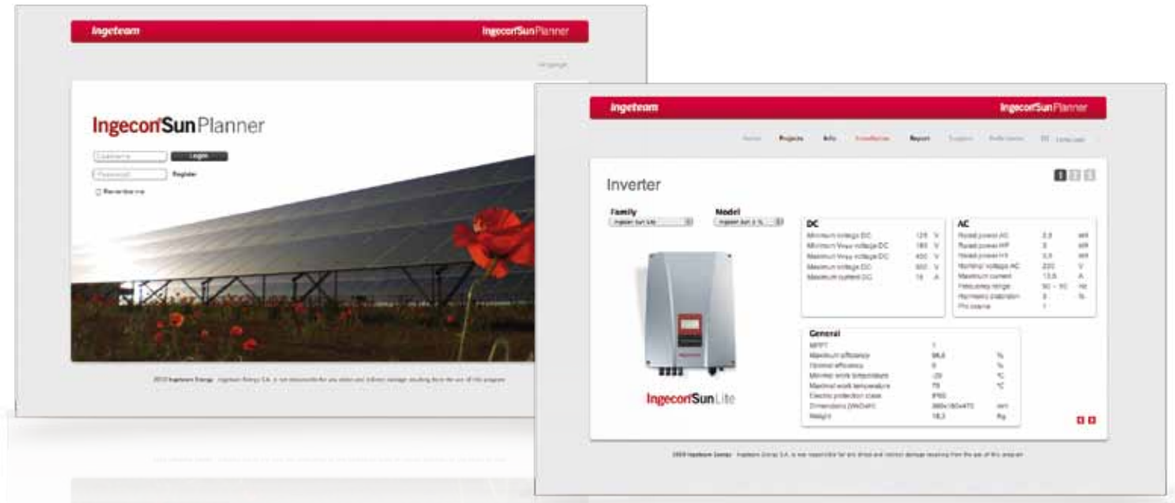
Web Portal for PV plant access



The **IngeRAS™ PV** provides access to the PV plant data from any PC with an Internet connection and GPRS modem. Its ease of access facilitates owner, installer or promoter plant control. This software provides information on the PV plant status and production, either in list and graphic format or through an e-mailed production report. The data recording and storage are made throughout the entire inverter service life.

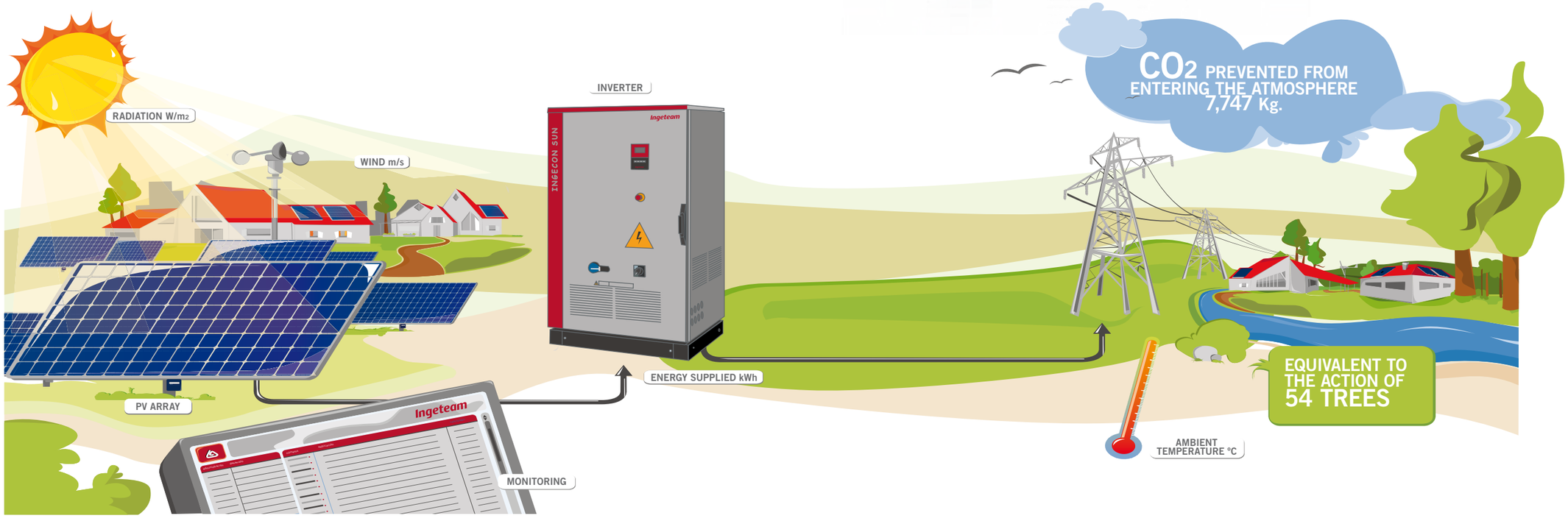
Ingecon®Sun Planner

PV array dimensioning



The **Ingecon®Sun Planner** software offers the possibility of quickly and easily customising each project. It contains a database of the different modules made by each manufacturer.

There is the option of selecting the **Ingecon®Sun** inverter which best adapts to the system and of adjusting the parameters to optimise the configuration.

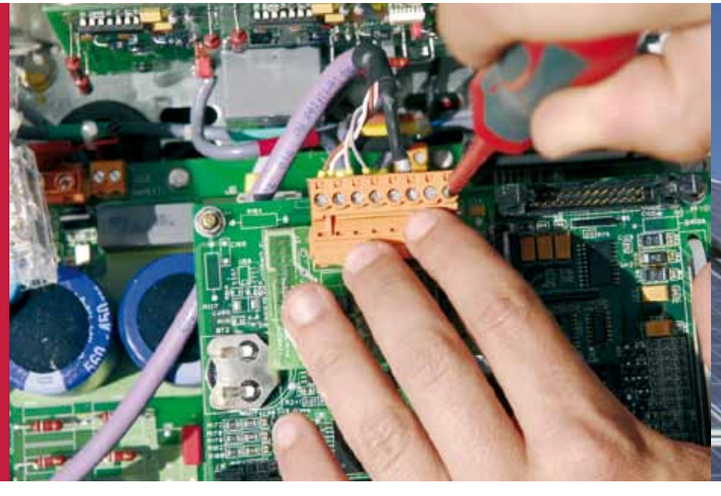


Beyond the product

Ingeteam's committment to customers does not end with the product delivery.

The collaboration and Service offered to customers initiated during the product development stage, continues throughout the product life.

Ingeteam is in a position to work a-long-side customers and to offer all the necessary support for their expansion within North America or abroad, providing technical assistance services anywhere these may be required in the world.



Extended guarantee

In addition to the Standard Guarantee, the company offers an Extended Guarantee to warranty that the **Ingecon®Sun PV** inverters are free from any defects in material and workmanship that would prevent normal operation in correct conditions of usage, installation and maintenance.

Serquality

These are service contracts that extend the standard warranty and guarantee high availability and field response times with penalties for noncompliance to availability agreements.

There are three different types with a maximum coverage period of 25 years:

GOLD

SILVER

BRONZE

Complete PV plant operations and maintenance

Ingeteam offers service in the field: While the service is in effect it is possible to contract:

- Remote installation monitoring.
- Periodic issuance of production reports.
- Computer aided maintenance management (CAMM).
- Spare parts management.
- High voltage corrections in Substations and
- Transformer centres.
- Operation and management of energy centres.
- Additional services such as panel cleaning, etc.

Predictive maintenance

Thermograph Analysis of Components:

- Voltage transformers.
- PV Generator.
- Inverters.
- DC Installation and electrical panels.
- AC low voltage installation (Connections and components).
- Overhead lines and Substations.
- Auxiliary Service Panels.

Irradiation analysis and performance / efficiency study:

- Photovoltaic Generation (series/parallel configuration).
- Inverters.
- AC low voltage installation.

Physical-chemical analysis of Insulating Oils.

Technical service by phone

Ingeteam offers its customers a phone based technical service they can use for technical questions as well as to report any incidents.

Quick, effective and efficient service is offered through a network of country-wide offices.

This network of Service Centres has been extended to various countries for our international customers.

Support, management, and engineering services

Quality and assembly audits.

Commissioning.

Component Inspection.

Design and certification of specific tooling.

Waste management.

Management system implementation.

Training courses.

Preparation of Technical Work Instructions and procedures.

Specialized Technical Assistance.

Maintenance engineering.

Development, manufacture and standardization of tooling.

Audits / Consulting.

Training.

Development of customized monitoring, supervision and diagnostic tools.

Ingeteam complete operations and maintenance of PV plants

Service and Maintenance of PV Installations

Ingeteam also offers field service to its customers through **Ingeteam Service.** The company pertains to the Energy division, which among other things, provides operation and maintenance of installations using renewable energy to generate electricity.

Ingeteam Service unites the experience, knowledge and leadership position of Ingeteam's design and manufacture of photovoltaic inverters with the capabilities of its solid base and extensive expe-rience operating and maintaining PV plants.

It currently provides its operation and maintenance services to mo-re than 800 PV solar energy generation and solar heating plants, for a total of more than 90 MW.

Service Centres

Ingeteam maintains strategic centres covering the entire country so as to provide rapid efficient service for any of our customers' solar energy installations. Our international brand expansion makes us capable of offering these services any place in the world.

Quality, R&D&i, Evironment, and Risk Prevention

Ingeteam Service is committed to establishing policies that guarantee customer satisfaction, worker health and safety, and which are environmentally friend. Examples of this effort are:

- Continuous improvement of systems for overall management of quality , the environment, prevention of occupational hazards, and R&D&i under ISO 9001, ISO 14001, SHAS 18001 and UNE 066002 standards.
- Implementation of the EFQM model for corporate excellence.
- Making progress with Corporate Social Responsibility models.

GOLD, SILVER and BRONZE serquality
extended guarantees:

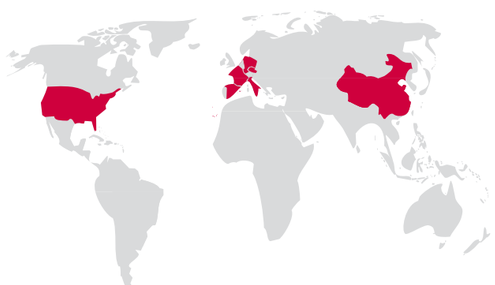
- Extension of the manufacturer's guarantee for inverters to include their installation site.
- Guarantee of inverter availability. Penalties for non compliance.
- Response time for incidents under guarantee.
- Commissioning assistance.
- Inverter repair done by specialized technicians.
- Costs arising from removing and reinstalling included equipment.
- PV plant monitoring. Monthly production/incident report.
- Spare parts management.
- Annual inspection including preventative maintenance tasks.
- Telephone assistance.

After-Sales Service

Ingeteam is determined to meet the needs and expectations of its clients. It offers different levels of after-sales service for PV solar plants, ranging from customized maintenance to complete installation maintenance.

Services offered to customers include:

- Corrective and preventative maintenance of all installation components (modules, one or two axis trackers, internal panels and lines, transformer centres, safety systems, civil works...).
- Plant management and operation.
- Continuous and/or remote monitoring.
- Preparation of audits and technical reports.
- Periodic thermograph analysis of critical points of the installation.
- Periodic panel cleaning.



Our commitment to quality and to the environment

Ingeteam's strategy is to constantly work towards quality excellence, whilst showing the utmost respect for the environment.

This is being achieved through the following key lines of action:

- Internal development of the EFQM model.
- Improved satisfaction of internal and external customers, suppliers and the social environment.
- Integration of the quality management, environmental impact and occupational safety systems, according to ISO 9001:2000, ISO 14001 and OHSAS 18001:1999.
- Reduction in emissions and hazardous waste, in addition to strict compliance with the RoHS regulations.

All products developed and manufactured by **Ingeteam** have the corresponding CE Marking, based on compliance with the applicable directives and, therefore, the respective harmonised standards.

Likewise, should the customer so require, the products can be designed and manufactured to comply with the UL/USA standards, capable of complying with even the most demanding specifications.

Our production process control and final tests on each and every unit manufactured ensure that all our products are of the highest possible standard and comply with even the most demanding specifications.

Ingeteam's team of highly qualified technicians are available to perform commissioning and start-up tasks and to provide after-sales service for all equipment supplied.

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