

INGECON



Solar Energy Solutions
Product Catalogue

Ingeteam

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TO INTERNATIONAL STANDARDS

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MORE THAN 37 GW SUPPLIED TO THE RENEWABLE ENERGY MARKET WORLDWIDE



Energy

Industry

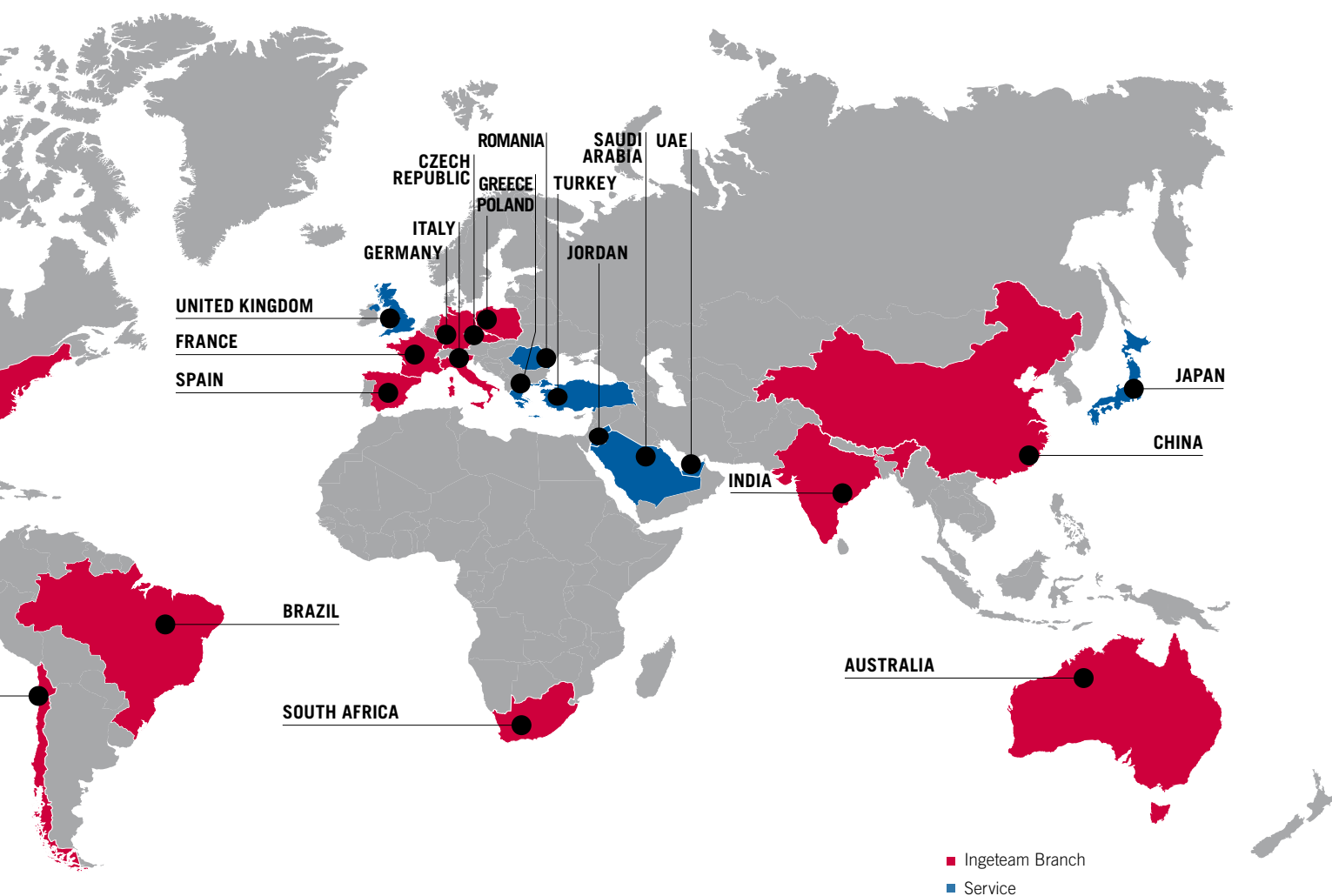
Marine

Traction

Basic
Technologies

Services





Ingeteam is a global corporation specialized in 6 different sectors (Energy, Industry, Marine, Traction, Basic Technologies and Services), all customer oriented and based on power and control electronics, electrical machines and application engineering.

With more than 60 years experience in the electricity sector, more than 3000 professionals dedicated to engineering and project development, and more than 37 GW supplied to the renewable energy market worldwide, Ingeteam is

committed to investing in technology and innovation as the drivers of future growth.

Since 1990, the Energy business unit of Ingeteam Power Technology, S.A. has been dedicated to supplying equipment for the renewable energies sector (wind power, photovoltaic, solar thermal, hydropower, biomass and biofuels).

WE DESIGN AND MANUFACTURE A WIDE RANGE OF INVERTERS

MORE THAN 4 GW SUPPLIED TO THE
SOLAR PV MARKET WORLDWIDE





Ingeteam is a leading company in the PV sector worldwide. The electronics and software have been especially developed for the INGECON® inverters, resulting in a high-quality end product, adaptable to the specific characteristics of each plant.

With an annual 3 GW production capacity, Ingeteam offers the following product range:

- Grid-connected inverters from 2.5 to 3500 kVA.
- Battery inverters from 3 to 1070 kVA.

- Energy management solutions.
- String currents monitoring equipment.
- Communications, software and hardware.

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.**

PRODUCT RANGE

ALL OUR PRODUCTS ARE CERTIFIED ACCORDING TO INTERNATIONAL STANDARDS

Solar inverters



SUN 1Play
2.5 - 6 kW

p. 10



SUN Lite
2.5 - 10 kW

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SUN 3Play
10 - 33 kW

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SUN Power
50 - 250 kW

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Battery inverters



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3 - 6 kW

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SUN STORAGE Power
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500 - 1164 kW

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Solutions**

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Accessories



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SUN PowerMax
300 - 1164 kVA

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SUN PowerStation SHELTER
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μWIND
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μWIND Interface
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Energy management solution



EMS Manager

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EMS Plant Controller

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iSun Monitor

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SUN Planner

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EMS Tools

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**SUN Remote operation
and SCADA**

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SUN String Control

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INGECON **SUN**

SOLAR INVERTERS

TL M



2.5TL M / 2.7TL M / 3TL M / 3.3TL M / 3.68TL M / 4.6TL M / 5TL M / 5.5TL M / 6TL M

Single-phase TL inverter with a double MPPT system

The INGECON® SUN 1Play TL M inverters have been designed to maximize the power generation and also to facilitate user access to the PV plant. This solar inverter family is valid for low kilowatt residential applications, and also for decentralized commercial and industrial systems rated up to several hundred kilowatts. In domestic installations, these inverters present the great advantage of being compatible with 30 mA RCDs, the most commonly used to protect the people against electric discharges.

High efficiency system

Ingeteam has developed its own technology to maximize the efficiency rates of the INGECON® SUN 1Play TL M inverter family. Thanks to this *High efficiency system* and to the use of innovative electronic conversion topologies, values of up to 98% can be achieved. Furthermore, an advanced double-MPPT algorithm makes it possible to harness the maximum energy from the PV array at all times, even in difficult situations, such as scattered clouds and partial shadings.

Easy to install

The INGECON® SUN 1Play TL M inverters feature fast-on connectors on the DC side (type 4) and the AC side for a fast and easy connection to the system. Every country-specific configuration and language can be easily selected from the inverter screen. Moreover, the INGECON® SUN 1Play TL M inverters are compatible with all the PV module technologies on the market.

Simple operation and maintenance

Ingeteam is at the forefront of innovative firmware. As a result, the INGECON® SUN 1Play TL M inverters are extremely easy to operate. The menu displayed on the LCD screen has been designed so that it is simple and easy to use. These inverters feature an internal datalogger for several months data storage, accessible from a PC.

Every inverter can be accessed from either a remote PC or onsite from the inverter front touch key-pad through its LCD screen. The display also features a number of LEDs to indicate the inverter operating status.

These LED indicators light up whenever any incident is detected, thereby simplifying and facilitating equipment maintenance tasks.

Firmware updating

The INGECON®SUN 1Play TLM inverters allow the user to perform the firmware (FW) updating himself. It is as easy as to download the latest version of the firmware from the Ingeteam website: www.ingeteam.com, and update it using a simple SD memory card.

Monitoring and communication

The internal operating variables and the internal datalogger can be monitored through a number of media such as USB communications, supplied as standard. Also, RS-485, Ethernet, Wi-Fi, Bluetooth and GSM / GPRS communications are available upon demand.

Included at no extra cost are the INGECON® SUN Manager, INGECON® SUN Monitor and its Smartphone version

iSun Monitor -available on the App Store- for monitoring and recording the inverter data over the Internet.

Able to withstand extreme conditions

The INGECON®SUN 1Play TL M inverter housing is suitable for outdoor use (IP65 protection rating). Likewise, it can be used under extreme atmospheric conditions with temperature ranges from -25 °C to +65 °C, although its main cooling system is air convection.

SiC technology

This solar inverter presents silicon carbide (SiC) components. SiC technology allows higher efficiency levels and also a more reliable, light and compact equipment.

Service life of more than 20 years

Ingeteam takes every care in the selection and sizing of the electronic components used for its inverters. The 1Play inverters have been designed to guarantee a service life of more than 20 years, as demonstrated by the stress tests they are subjected to.

Standard 5 year warranty, extendable for up to 25 years.

PROTECTIONS

- Reverse polarity.
- Input and output overvoltages with type 3 surge arresters.
- Output shortcircuits and overloads.
- Anti-islanding with automatic disconnection.
- Insulation failures.

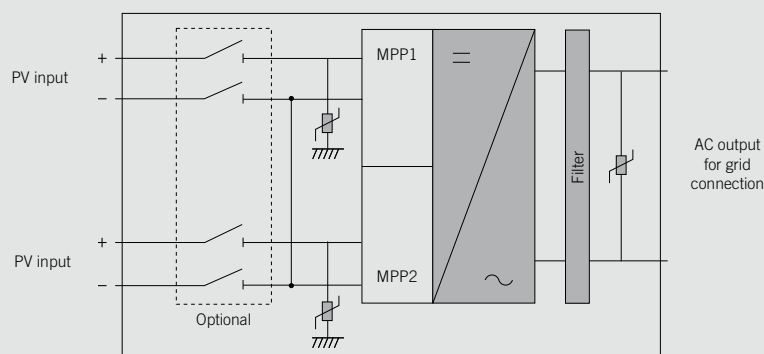
MAIN FEATURES

- Compatible with 30 mA RCDs.
- Double-MPPT system.
- Available from 2.5 up to 6 kW.
- 98% maximum efficiency.
- SiC Technology inside.
- Inverter updating by the user through a SD memory card.
- USB communications supplied as standard.
- Software INGECON®SUN Manager for PV plant access and data registration.
- Software INGECON®SUN Monitor for PV plant monitoring.
- LCD Display.
- Easy maintenance.
- Suitable for indoor and outdoor installations (IP65).
- Display-configurable potential free contact, to indicate insulation fault or grid connection.
- Compact design.
- Language, Country Code and rated voltage configurable by display.

OPTIONAL ACCESSORIES

- Inverter communication via RS-485, Ethernet, Bluetooth, Wi-Fi or GSM / GPRS.
- DC switch.
- INGECON®SUN WeatherBox for meteorological values measurement and registration.
- Digital inputs.
- Self-consumption kit.

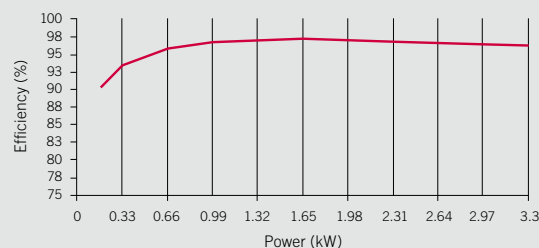
1Play TL M



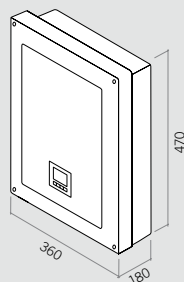
	2.5TL M	2.7TL M	3TL M	3.3TL M	3.68TL M
Input (DC)					
Recommended PV array power range ⁽¹⁾	2.8 - 3.3 kWp	3 - 3.6 kWp	3.2 - 4 kWp	3.8 - 4.4 kWp	3.9 - 4.8 kWp
Voltage range MPP1 ⁽²⁾	125 - 750 V	125 - 750 V	125 - 750 V	125 - 750 V	125 - 750 V
Voltage range MPP2 ^{(2) (3)}	90 - 750 V	90 - 750 V	90 - 750 V	90 - 750 V	90 - 750 V
Min. voltage for Pnom with parallel inputs	125 V	127 V	141 V	155 V	172 V
Maximum voltage ⁽⁴⁾	850 V	850 V	850 V	850 V	850 V
Maximum current (Input 1 / Input 2)	11 / 11 A	11 / 11 A	11 / 11 A	11 / 11 A	11 / 11 A
Inputs (Input 1 / Input 2) ⁽⁵⁾	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
MPPT	2	2	2	2	2
Output (AC)					
Rated power	2.5 kW	2.7 kW	3 kW	3.3 kW	3.68 kW
Max. temperature at rated power ⁽⁶⁾	60 °C	57 °C	55 °C	52 °C	50 °C
Maximum current	16 A	16 A	16 A	16 A	16 A
Rated voltage	230 V	230 V	230 V	230 V	230 V
Voltage range	122 - 265 V	122 - 265 V	122 - 265 V	122 - 265 V	122 - 265 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine	1	1	1	1	1
Phi Cosine adjustable	Yes. Smax=2.5 kVA	Yes. Smax=2.7 kVA	Yes. Smax=3 kVA	Yes. Smax=3.3 kVA	Yes. Smax=3.68 kVA
THD	<3%	<3%	<3%	<3%	<3%
Efficiency					
Maximum efficiency	97.6%	97.6%	97.7%	97.7%	97.8%
Euroefficiency	97.3%	97.3%	97.4%	97.4%	97.5%
General Information					
Refrigeration system	Air convection				
Stand-by consumption ⁽⁷⁾	<10 W	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W	0 W
Ambient temperature	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	IP65	IP65	IP65	IP65	IP65
Marking	CE				
EMC & Security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100				
Grid connection standards	RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2 ⁽⁸⁾ , P.O.12.3, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, DEWA (Dubai) Grid Code, Jordan Grid Code				

Notes: ⁽¹⁾ Depending on the type of installation and geographical location ⁽²⁾ The output power will be conditioned by the voltage and current configuration selected at each input ⁽³⁾ To drop to 90 V, the other input must be at least at 125 V ⁽⁴⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures ⁽⁵⁾ Optionally, the DC inputs could be duplicated ⁽⁶⁾ For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁷⁾ Consumption from PV field ⁽⁸⁾ Related only inverters up to 16 A.

Efficiency INGECON® SUN 3.3TL M V_{dc} = 680 V



Size and weight (mm)

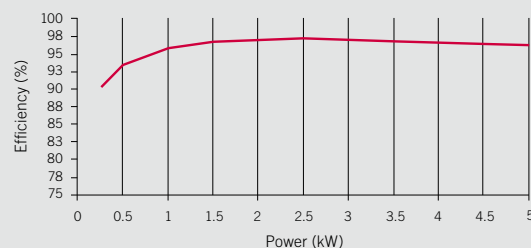


2.5TL M / 2.7TL M / 3TL M / 3.3TL M / 3.68TL M
20 kg.

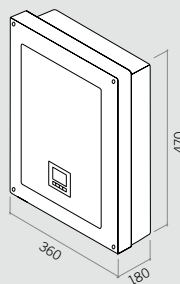
	4.6TL M	5TL M	5.5TL M	6TL M
Input (DC)				
Recommended PV array power range ⁽¹⁾	5.2 - 6 kWp	5.7 - 6.5 kWp	6 - 6.8 kWp	6.3 - 7 kWp
Voltage range MPP1 ⁽²⁾	125 - 750 V	125 - 750 V	125 - 750 V	125 - 750 V
Voltage range MPP2 ^{(2) (3)}	90 - 750 V	90 - 750 V	90 - 750 V	90 - 750 V
Min. voltage for Pnom with parallel inputs	216 V	234 V	258 V	281 V
Maximum voltage ⁽⁴⁾	850 V	850 V	850 V	850 V
Maximum current (Input 1 / Input 2)	11 / 11 A	11 / 11 A	11 / 11 A	11 / 11 A
Inputs (Input 1 / Input 2) ⁽⁵⁾	1 / 1	1 / 1	1 / 1	1 / 1
MPPT	2	2	2	2
Output (AC)				
Rated power	4.6 kW	5 kW	5.5 kW	6 kW
Max. temperature at rated power ⁽⁶⁾	58 °C	55 °C	50 °C	45 °C
Maximum current	26.2 A	26.2 A	26.2 A	26.2 A
Rated voltage	230 V	230 V	230 V	230 V
Voltage range	122 - 265 V	122 - 265 V	122 - 265 V	122 - 265 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine	1	1	1	1
Phi Cosine adjustable	Yes. Smax=4.6 kVA	Yes. Smax=5 kVA	Yes. Smax=5.5 kVA	Yes. Smax=6 kVA
THD	<3%	<3%	<3%	<3%
Efficiency				
Maximum efficiency	97.9%	98%	98%	98%
Euroefficiency	97.5%	97.6%	97.6%	97.6%
General Information				
Refrigeration system	Air convection			
Stand-by consumption ⁽⁷⁾	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W
Ambient temperature	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	IP65	IP65	IP65	IP65
Marking	CE			
EMC & Security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100			
Grid connection standards	RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2 ⁽⁸⁾ , P.O.12.3, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, DEWA (Dubai) Grid Code, Jordan Grid Code			

Notes: ⁽¹⁾ Depending on the type of installation and geographical location ⁽²⁾ The output power will be conditioned by the voltage and current configuration selected at each input ⁽³⁾ To drop to 90 V, the other input must be at least at 125 V ⁽⁴⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures ⁽⁵⁾ Optionally, the DC inputs could be duplicated ⁽⁶⁾ For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁷⁾ Consumption from PV field ⁽⁸⁾ Related only inverters up to 16 A.

Efficiency INGECON® SUN 5TL M V_{dc} = 680 V



Size and weight (mm)



4.6TL M / 5TL M / 5.5TL M / 6TL M
21 kg.

HF



2.5HF / 2.7HF / 3HF / 3.3HF / 3.68HF / 4.6HF / 5HF / 5.5HF / 6HF

Single-phase string inverter with a high-frequency transformer

The INGECON®SUN 1Play HF inverters have been designed to achieve maximum energy performance and also to facilitate user access to the PV plant. This solar inverter family is valid for low kilowatt residential applications, and also for decentralized commercial and industrial systems rated up to several hundred kilowatts. In domestic installations, these inverters present the great advantage of being compatible with 30 mA RCDs, the most commonly used to protect the people against fatal electric discharges.

High-frequency technology

A high-frequency transformer provides galvanic isolation between the input and

output sides. This kind of transformer also reduces the weight of the inverter and increases the efficiency in relation to low frequency inverters with conventional galvanic isolation (50 / 60 Hz).

The INGECON®SUN 1Play HF inverters are compatible with all the PV module technologies on the market, whilst allowing the PV generator to be grounded whenever required.

Easy to install

The INGECON®SUN 1Play HF inverters feature fast-on connectors on the DC side (type 4) and the AC side for a fast and easy connection to the system. The grounding of the PV generator is also

facilitated through built-in fuse holders. Every country-specific configuration and language can be easily selected from the inverter screen.

Maximum efficiency values

These inverters feature an innovative electronic conversion topology which, together with an advanced maximum power point tracking system (MPPT), leads to maximum efficiency rates of up to 96%, positioning them as market leaders.

Simple operation and maintenance

Ingeteam is at the forefront of innovative firmware. As a result, the INGECON®SUN 1Play HF inverters are extremely easy to operate.

The menu displayed on the LCD screen has been designed so that it is simple and easy to use.

These inverters feature an internal data-logger for several months data storage, accessible from a PC. Every inverter can be accessed from either a remote PC or on-site from the inverter front touch keypad through its LCD screen.

The display also features a number of LEDs to indicate the inverter operating status. These LED indicators light up whenever any incident is detected, thereby simplifying and facilitating equipment maintenance tasks.

Firmware updating

The INGECON® SUN 1Play HF inverters allow the user to perform the firmware updating himself. It is as easy as to download the latest version of the firmware from the Ingeteam website: **www.ingeteam.com**, and update it using a simple SD memory card.

Monitoring and communication

The internal operating variables and the internal datalogger can be monitored through a number of media such as USB communications, supplied as standard. Also, RS-485, Ethernet, Wi-Fi, Bluetooth and GSM / GPRS communications are available upon demand.

Included at no extra cost are the INGECON® SUN Manager, INGECON® SUN Monitor and its Smartphone version iSun Monitor -available on the App Store- for monitoring and recording the inverter data over the Internet.

Able to withstand extreme conditions

The INGECON® SUN 1Play HF inverter housing is suitable for outdoor use (IP65 protection rating). Likewise, its innovative ventilation system allows it to be used in extreme atmospheric conditions with temperature ranges from -25 °C to +65 °C.

Compact design

This solar inverter presents a compact design. Older equipment used to have an external transformer that was coupled to the inverter's main body, but this new single-phase transformer inverter features an integrated topology that combines the transformer and the converter inside the same casing.

Service life of more than 20 years

Ingeteam takes every care in the selection and sizing of the electronic components used for its inverters. The 1Play inverters have been designed to guarantee a service life of more than 20 years, as demonstrated by the stress tests they are subjected to.

Standard 5 year warranty, extendable for up to 25 years.

OPTIONAL ACCESSORIES

- Inverter communication via RS-485, Ethernet, Bluetooth, Wi-Fi or GSM / GPRS.
- DC switch.
- INGECON® SUN WeatherBox for meteorological values measurement and registration.
- Digital inputs.
- Self-consumption kit.

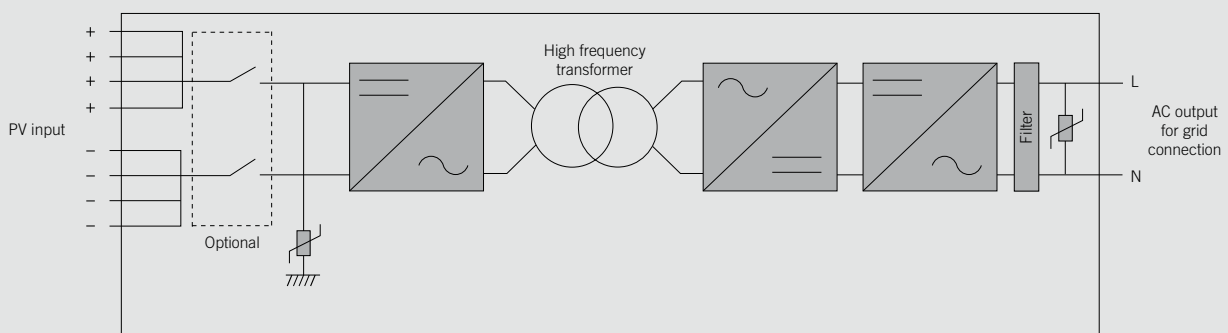
PROTECTIONS

- Galvanic isolation between the DC and AC sides.
- Reverse polarity.
- Input and output overvoltages with type 3 surge arresters.
- Output shortcircuits and overloads.
- Anti-islanding with automatic disconnection.
- Insulation failures.
- Grounding kit if required for the PV modules.

MAIN FEATURES

- Compatible with grounded installations.
- High-frequency technology.
- Compatible with 30 mA RCDs.
- Available from 2.5 up to 6 kW.
- 96% maximum efficiency.
- Higher efficiency rates.
- Inverter updating by the user through a SD memory card.
- USB communications supplied as standard.
- Software INGECON® SUN Manager for PV plant access and data registration.
- Software INGECON® SUN Monitor for PV plant monitoring.
- LCD Display.
- Easy maintenance.
- Suitable for indoor and outdoor installations (IP65).
- Display-configurable potential free contact, to indicate insulation fault or grid connection.
- Compact design.
- Language, Country Code and rated voltage configurable by display.

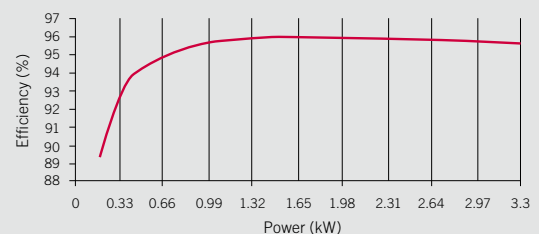
1Play HF



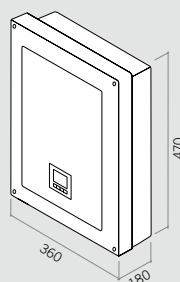
	2.5HF	2.7HF	3HF	3.3HF	3.68HF
Input (DC)					
Recommended PV array power range ⁽¹⁾	2.8 - 3.3 kWp	3 - 3.6 kWp	3.2 - 4 kWp	3.8 - 4.3 kWp	3.9 - 4.8 kWp
Voltage range MPP	125 - 500 V	125 - 500 V	125 - 500 V	125 - 500 V	125 - 500 V
Min. voltage for rated power	147 V	159 V	142 V	150 V	167 V
Maximum voltage ⁽²⁾	550 V	550 V	550 V	550 V	550 V
Maximum current	17 A	17 A	22 A	22 A	22 A
Inputs ⁽³⁾	2	2	2	3	3
MPPT	1	1	1	1	1
Output (AC)					
Rated power	2.5 kW	2.7 kW	3 kW	3.3 kW	3.68 kW
Max. temperature at rated power ⁽⁴⁾	51 °C	48 °C	55 °C	52 °C	45 °C
Maximum current	13.5 A	13.5 A	16 A	16 A	16 A
Rated voltage	230 V	230 V	230 V	230 V	230 V
Voltage range	122 - 285 V	122 - 285 V	122 - 285 V	122 - 285 V	122 - 285 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine	1	1	1	1	1
Phi Cosine adjustable	Yes. Smax=2.5 kVA	Yes. Smax=2.7 kVA	Yes. Smax=3 kVA	Yes. Smax=3.3 kVA	Yes. Smax=3.68 kVA
THD	<3%	<3%	<3%	<3%	<3%
Efficiency					
Maximum efficiency	95.6%	95.6%	95.8%	95.8%	95.8%
Euroefficiency	95%	95.1%	95.2%	95.2%	95.1%
General Information					
Refrigeration system	Air convection		Forced ventilation		
Air flow	-	-	45 m³/h	45 m³/h	45 m³/h
Stand-by consumption ⁽⁵⁾	<10 W	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W	0 W
Ambient temperature	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	IP65	IP65	IP65	IP65	IP65
Marking	CE				
EMC & Security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS 3100				
Grid connection standards	RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2 ⁽⁶⁾ , P.O.12.3, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, DEWA (Dubai) Grid Code, Jordan Grid Code				

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⁾ Optionally, the DC inputs could be duplicated ⁽⁴⁾ For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁵⁾ Consumption from PV field ⁽⁶⁾ Related only inverters up to 16 A.

Efficiency INGECON® SUN 3.3HF V_{dc} = 430 V



Size and weight (mm)



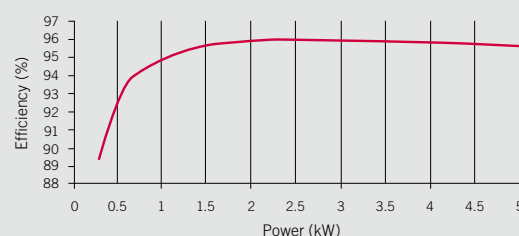
2.5HF / 2.7HF
20 kg.

3HF / 3.3HF / 3.68HF
22 kg.

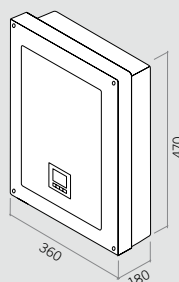
	4.6HF	5HF	5.5HF	6HF
Input (DC)				
Recommended PV array power range ⁽¹⁾	5.2 - 6 kWp	5.7 - 6.5 kWp	6 - 6.8 kWp	6.3 - 7 kWp
Voltage range MPP	125 - 500 V	125 - 500 V	125 - 500 V	125 - 500 V
Min. voltage for rated power	146 V	158 V	174 V	190 V
Maximum voltage ⁽²⁾	550 V	550 V	550 V	550 V
Maximum current	33 A	33 A	33 A	33 A
Inputs ⁽³⁾	3	3	3	3
MPPT	1	1	1	1
Output (AC)				
Rated power	4.6 kW	5 kW	5.5 kW	6 kW
Max. temperature at rated power ⁽⁴⁾	58 °C	55 °C	50 °C	45 °C
Maximum current	26.2 A	26.2 A	26.2 A	26.2 A
Rated voltage	230 V	230 V	230 V	230 V
Voltage range	122 - 285 V	122 - 285 V	122 - 285 V	122 - 285 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine	1	1	1	1
Phi Cosine adjustable	Yes. Smax=4.6 kVA	Yes. Smax=5 kVA	Yes. Smax=5.5 kVA	Yes. Smax=6 kVA
THD	<3%	<3%	<3%	<3%
Efficiency				
Maximum efficiency	96%	96%	96%	96%
Euroefficiency	95.2%	95.2%	95.3%	95.3%
General Information				
Refrigeration system	Forced ventilation			
Air flow	90 m³/h	90 m³/h	90 m³/h	90 m³/h
Stand-by consumption ⁽⁵⁾	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W
Ambient temperature	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C	-25 °C to +65 °C
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	IP65	IP65	IP65	IP65
Marking	CE			
EMC & Security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS 3100			
Grid connection standards	RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2 ⁽⁶⁾ , P.O.12.3, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, DEWA (Dubai) Grid Code, Jordan Grid Code			

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⁾ Optionally, the DC inputs could be duplicated ⁽⁴⁾ For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁵⁾ Consumption from PV field ⁽⁶⁾ Related only inverters up to 16 A.

Efficiency INGECON® SUN 5HF V_{dc} = 430 V



Size and weight (mm)



4.6HF / 5HF / 5.5HF / 6HF
25 kg.



2.8TL U M / 3.3TL U M / 5TL U M / 6TL U M

Single-phase TL inverter with a double MPPT system

The INGECON[®] SUN 1Play TL U M inverters have been designed to maximize the power generation and also to facilitate user access to the PV plant. This solar inverter family is valid for low kilowatt residential applications, and also for decentralized commercial and utility-scale systems rated up to several hundred kilowatts. In domestic installations, these inverters present the great advantage of integrating an arc fault circuit interruption system (AFCI). Moreover, they are compatible with 30 mA RCDs, the most commonly used to protect the people against fatal electric discharges.

High efficiency system

Ingeteam has developed its own technology to maximize the efficiency rates of the INGECON[®] SUN 1Play TL U M inverter family. Thanks to this high efficiency system and to the use of innova-

tive electronic conversion topologies, values of up to 98.4% can be achieved. Furthermore, an advanced double-MPPT algorithm makes it possible to harness the maximum energy from the PV array at all times, even in difficult situations, such as scattered clouds and partial shadings.

Easy to install

Every country-specific configuration and language can be easily selected from the inverter screen. Moreover, the INGECON[®] SUN 1Play TL U M inverters are compatible with all the PV module technologies on the market.

Simple operation and maintenance

Ingeteam is at the forefront of innovative firmware. As a result, the INGECON[®] SUN 1Play TL U M inverters are extremely easy to operate. The menu displayed on the LCD screen has been designed so that it is simple and easy to use.

These inverters feature an internal data-logger for several months data storage, accessible from a PC. Every inverter can be accessed from either a remote PC or on-site from the inverter front touch keypad through its LCD screen. The display also features a number of LEDs to indicate the inverter operating status. These LED indicators light up whenever any incident is detected, thereby simplifying and facilitating equipment maintenance tasks.

Firmware updating

The INGECON[®] SUN 1Play TL U M inverters allow the user to perform the firmware (FW) updating himself. It is as easy as to download the latest version of the firmware from the Ingeteam website: www.ingeteam.com, and update it using a simple SD memory card. These photovoltaic inverters feature a SD input slit to facilitate the firmware updating by the user.



Monitoring and communication

The internal operating variables and the historical production data can be monitored through a number of media such as USB communications, supplied as standard. Also, RS-485, Ethernet, Bluetooth and GSM / GPRS communications are available upon demand. Included at no extra cost are the INGECON® SUN Manager, INGECON® SUN Monitor and its Smartphone version iSun Monitor -available on the App Store- for monitoring and recording the inverter data over the Internet.

Able to withstand extreme conditions

The INGECON® SUN 1Play TL U M inverter housing is suitable for outdoor use (NEMA 3R protection rating). Likewise, it can be used under extreme atmospheric conditions with temperature ranges from -13 °F to +149 °F, although its main cooling system is natural air convection.

SiC technology

This solar inverter presents silicon carbide (SiC) components. SiC technology allows higher efficiency levels and also a more reliable, light and compact equipment.

Easy rooftop installation

Vertical or horizontal mounting, enabling the location of the inverter next to the PV modules and avoiding the installation of any additional rapid shutdown device.

Standard 10 year warranty, extendable for up to 20 years

OPTIONAL ACCESSORIES

- Inverter communication via RS-485, Ethernet, Bluetooth or GSM / GPRS.
- Combiner Box with arc-fault circuit interruption and DC switch.
- INGECON® SUN WeatherBox for meteorological values measurement and registration.
- Self-consumption kit.

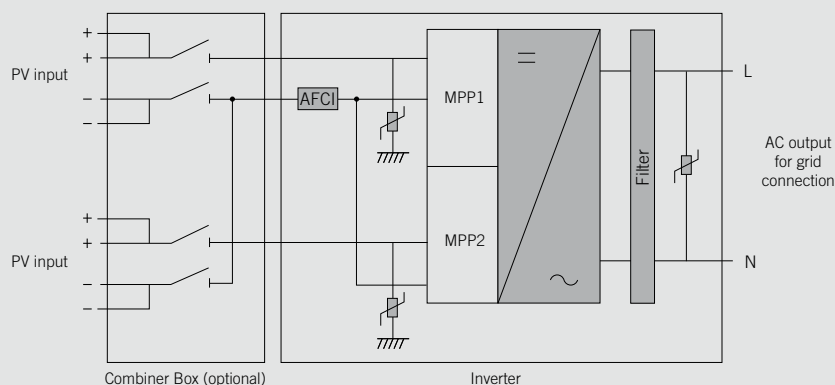
PROTECTIONS

- Reverse polarity.
- Input and output overvoltages with type 3 surge arresters.
- Out shortcircuits and overloads.
- Anti-islanding with automatic disconnection.
- Insulation failures.

MAIN FEATURES

- AFCI (Arc Fault Circuit Interrupt).
- Compatible with 30 mA RCDs.
- Easy rooftop installation.
- Double-MPPT system.
- Available from 2.8 up to 6 kW.
- 98.4% maximum efficiency.
- SiC Technology inside.
- Inverter updating by the user through a SD memory card.
- USB communications supplied as standard.
- Software INGECON® SUN Manager for PV plant access and data registration.
- Software INGECON® SUN Monitor for PV plant monitoring.
- LCD Display.
- Easy maintenance.
- Suitable for indoor and outdoor installations (NEMA 3R).
- Display-configurable potential free contact, to indicate insulation fault or grid connection.
- Compact design.
- Plug & Play technology.
- Language, Country Code and rated voltage configurable by display.

1Play TL U M



Combiner Box

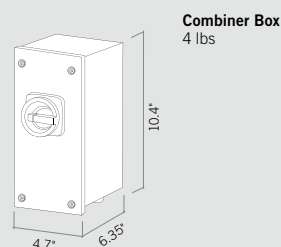
The Combiner Box is supplied with two inputs per MPPT, DC switch.

COMBINER BOX MAIN FEATURES

- DC switch.
- 2 MPPTs (2 inputs per MPPT).
- Fuses not required, according to NEC 2014 690.9.



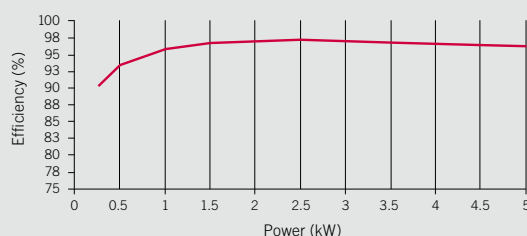
Size and weight (inches)



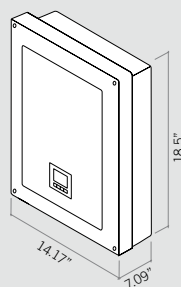
	2.8TL U M	3.3TL U M	5TL U M	6TL U M
Input (DC)				
Recommended PV array power range ⁽¹⁾	2.8 - 3.6 kW	3.4 - 4.3 kW	5.1 - 6.5 kW	6.1 - 7.8 kW
Voltage range MPP ⁽²⁾	125 - 750 V	125 - 750 V	125 - 750 V	125 - 750 V
Voltage range MPP2 ⁽²⁾⁽³⁾	90 - 750 V	90 - 750 V	90 - 750 V	90 - 750 V
Min. voltage for Pnom with parallel inputs	127 V	155 V	234 V	281 V
Maximum voltage ⁽⁴⁾	850 V	850 V	850 V	850 V
Maximum current (Input 1 / Input 2)	11 / 11 A	11 / 11 A	11 / 11 A	11 / 11 A
Inputs (Input 1 / Input 2)	1 / 1	1 / 1	1 / 1	1 / 1
MPPT	2	2	2	2
Output (AC)				
Rated power	2.8 kW	3.3 kW	5 kW	6 kW
Max. temperature at rated power ⁽⁵⁾	113 °F	113 °F	113 °F	113 °F
Maximum current	16 A	16 A	26.2 A	26.2 A
Rated voltage	208 / 240 V	208 / 240 V	208 / 240 V	240 V
Frequency	60 Hz	60 Hz	60 Hz	60 Hz
Phi Cosine	1	1	1	1
Phi Cosine adjustable	Yes. Smax=2.8 kVA	Yes. Smax=3.3 kVA	Yes. Smax=5 kVA	Yes. Smax=6 kVA
THD	<3%	<3%	<3%	<3%
Efficiency				
Maximum efficiency	98.4%	98.4%	98.4%	98.4%
CEC - Weighted efficiency	97.5%	97.5%	97.5%	97.5%
General Information				
Refrigeration system	Natural air convection			
Stand-by consumption ⁽⁶⁾	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W
Ambient temperature	-13 °F to 149 °F	-13 °F to 149 °F	-13 °F to 149 °F	-13 °F to 149 °F
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R
DC AFCI	✓			
Marking	CE, ETL			
EMC & Security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2			
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE			

Notes: ⁽¹⁾ Depending on the type of installation and geographical location ⁽²⁾ The output power will be conditioned by the voltage and current configuration selected at each input ⁽³⁾ To drop to 90 V, the other input must be at least at 125 V ⁽⁴⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures ⁽⁵⁾ The output power will be reduced at the rate of 1% for each 1 °F of increase ⁽⁶⁾ Consumption from PV field.

Efficiency INGECON® SUN 5TL U M V_{dc} = 680 V



Size and weight (mm)



2.8TL U M / 3.3TL U M
44.1 pounds

5TL U M / 6TL U M
46.3 pounds



2.8HF U / 2.3HF U / 5HF U / 6HF U

Single-phase string inverter with a high-frequency transformer

The INGECON® SUN 1Play HF U inverters have been designed to maximize the power generation and also to facilitate user access to the PV plant. This solar inverter family is valid for low kilowatt residential applications, and also for decentralized commercial and utility-scale systems rated up to several hundred kilowatts. In domestic installations, these inverters present the great advantage of integrating an arc fault circuit interruption system (AFCI). Moreover, they are compatible with 30 mA RCDs, the most commonly used to protect the people against fatal electric discharges. The other main advantage is that it allows grounding the PV array.

High-frequency technology

A high-frequency transformer provides galvanic isolation between the input and output sides. This kind of transformer also reduces the weight of the inverter and increases the efficiency in relation to low frequency inverters with conventional galvanic isolation.

The INGECON® SUN 1Play HF U inverters are compatible with all the PV module technologies on the market, whilst allowing the PV generator to be grounded whenever required.

Easy to install

The grounding of the PV generator is also facilitated through built-in fuse holders. Every country-specific configuration and language can be easily selected from the inverter screen.

Maximum efficiency values

These inverters feature an innovative electronic conversion topology which, together with an advanced maximum power point tracking system (MPPT), leads of maximum efficiency rates of up to 96.3%, positioning them as market leaders.

Simple operation and maintenance

Ingeteam is at the forefront of innovative firmware. As a result, the INGECON® SUN 1Play HF U inverters are extremely easy to operate.

The menu displayed on the LCD screen has been designed so that it is simple and easy to use. These inverters feature an internal datalogger for several months data storage, accessible from a PC. Every inverter can be accessed from either a remote PC or on-site from the inverter front touch keypad through its LCD screen. The display also features a number of LEDs to indicate the inverter operating status. These LED indicators light up whenever any incident is detected, thereby simplifying and facilitating equipment maintenance tasks.

Firmware updating

The INGECON® SUN 1Play HF U inverters allow the user to perform the firmware updating himself. It is as easy as to download the latest version of the firmware from the Ingeteam website: www.ingeteam.com, and update it using a simple SD memory card.



Monitoring and communication

The internal operating variables and the historical production data can be monitored through a number of media such as USB communications, supplied as standard. Also, RS-485, Ethernet, Bluetooth and GSM / GPRS communications are available upon demand. Included at no extra cost are the INGECON® SUN Manager, INGECON® SUN Monitor and its Smartphone version iSun Monitor -available on the App Store- for monitoring and recording the inverter data over the Internet.

Able to withstand extreme conditions

The INGECON® SUN 1Play HF U inverter housing is suitable for outdoor use (NEMA 3R protection rating). Likewise, its innovative ventilation system allows it to be used in extreme atmospheric conditions with temperature ranges from -13 °F to +149 °F.

Compact design

This solar inverter presents a compact design. Older equipment used to have an external transformer that was coupled to the inverter's main body, but this new single-phase transformer inverter features an integrated topology that combines the transformer and the converter inside the same casing.

Easy rooftop installation

Vertical or horizontal mounting, enabling the location of the inverter next to the PV modules and avoiding the installation of any additional rapid shutdown device.

Standard 10 year warranty, extendable for up to 20 years

OPTIONAL ACCESSORIES

- Inverter communication via RS-485, Ethernet, Bluetooth or GSM / GPRS.
- Combiner Box with DC fuses, DC switch.
- INGECON® SUN WeatherBox for meteorological values measurement and registration.
- Digital inputs.
- Self-consumption kit.

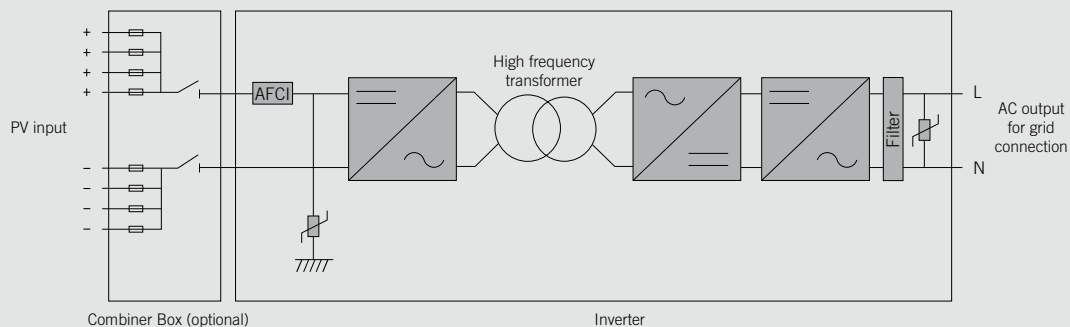
PROTECTIONS

- Galvanic isolation between the DC and AC sides.
- Reverse polarity.
- Input and output overvoltages with type 3 surge arresters.
- Out shortcircuits and overloads.
- Anti-islanding with automatic disconnection.
- Insulation failures.
- Grounding kit if required for the PV modules.

MAIN FEATURES

- AFCI (Arc Fault Circuit Interrupt).
- Compatible with grounded installations.
- High-frequency technology.
- Compatible with 30 mA RCDs.
- Available from 2.8 up to 6 kW.
- 96.3% maximum efficiency.
- Inverter updating by the user through a SD memory card.
- USB communications supplied as standard.
- Software INGECON® SUN Manager for PV plant access and data registration.
- Software INGECON® SUN Monitor for PV plant monitoring.
- LCD Display.
- Easy maintenance.
- Suitable for indoor and outdoor installations (NEMA 3R).
- Display-configurable potential free contact, to indicate insulation fault or grid connection.
- Compact design.
- Plug & Play technology.
- Language, Country Code and rated voltage configurable by display.

1Play HF U



Combiner Box

The Combiner Box is supplied with four inputs, fuses on each pole, DC switch.

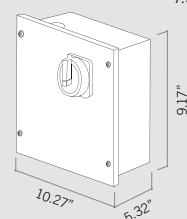
COMBINER BOX MAIN FEATURES

- DC switch.
- 4 inputs.
- 4 fuses per pole. Fuse rating: 20 A.
- Maximum current per input: 12 A.



Size and weight (inches)

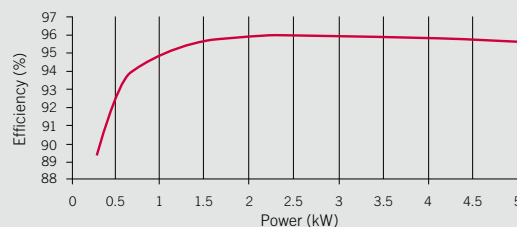
Combiner Box
7.5 lbs



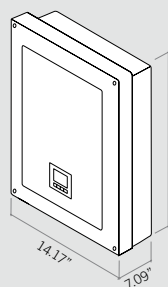
	2.8HF U	3.3HF U	5HF U	6HF U
Input (DC)				
Recommended PV array power range ⁽¹⁾	2.9 - 3.6 kW	3.4 - 4.3 kW	5.2 - 6.5 kW	6.3 - 7.8 kW
Voltage range MPP	125 - 500 V	125 - 500 V	125 - 500 V	125 - 500 V
Min. voltage for rated power	165 V	150 V	152 V	182 V
Maximum voltage ⁽²⁾	550 V	550 V	550 V	550 V
Maximum current	17 A	22 A	33 A	33 A
Inputs	1	1	1	1
MPPT	1	1	1	1
Output (AC)				
Rated power	2.8 kW	3.3 kW	5 kW	6 kW
Max. temperature at rated power ⁽³⁾	120 °F	126 °F	131 °F	113 °F
Maximum current	13.5 A	16 A	26.2 A	26.2 A
Rated voltage	208 / 240 / 277 V	208 / 240 / 277 V	208 / 240 / 277 V	240 / 277 V
Frequency	60 Hz	60 Hz	60 Hz	60 Hz
Phi Cosine	1	1	1	1
Phi Cosine adjustable	Yes. Smax=2.8 kVA	Yes. Smax=3.3 kVA	Yes. Smax=5 kVA	Yes. Smax=6 kVA
THD	<3%	<3%	<3%	<3%
Efficiency				
Maximum efficiency	96.3%	96.3%	96.3%	96.3%
CEC - Weighted efficiency	95.5%	95.5%	95.5%	95.5%
General Information				
Refrigeration system	Air convection	Forced ventilation		
Air flow	-	0.44 ft³/s	0.88 ft³/s	0.88 ft³/s
Stand-by consumption ⁽⁴⁾	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W
Ambient temperature	-13 °F to 149 °F	-13 °F to 149 °F	-13 °F to 149 °F	-13 °F to 149 °F
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R
DC AFCI	✓			
Marking	CE, ETL			
EMC & Security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2			
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE			

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⁾ The output power will be reduced at the rate of 1% for each 1 °F of increase ⁽⁴⁾ Consumption from PV field.

Efficiency INGECON® SUN 5HF U V_{dc} = 430 V



Size and weight (mm)



2.8HF U / 3.3HF U / 5HF U / 6HF U
55.12 pounds

TL



2.5TL / 3TL / 3.3TL / 3.68TL / 4.6TL / 5TL / 6TL / 7.5TL / 8.2TL / 8.6TL / 10TL

An inverter family with a wide range of outputs from 2.5 to 10 kW

Singlephase transformerless inverters, intended for the residential sector and for larger, decentralised projects.

Wide range of AC power outputs

The INGECON[®] SUN Lite TL single phase inverters offer an extensive range of power outputs from 2.5 to 10 kW. As a new addition, this range of inverters can now be supplied for 7.5 kW, 8.2 kW, 8.6 kW and 10 kW.

Simple installation and maintenance

Fast-on connectors on the DC side (type 4) and the AC side and RS-485 serial communications. The country-specific configuration and language can be easily selected from the inverter screen.

The INGECON[®] SUN Lite TL inverters feature an internal datalogger for three months' data storage with control from either a remote PC or on-site from the inverter front keypad through its LCD screen. Status and alarm LED indicators.

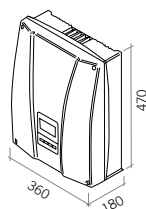
Fans are easily replaceable by the user. Configurable for self-consumption mode.

Software included

Included at no extra cost are the INGECON[®] SUN Manager, INGECON[®] SUN Monitor and its iSun Monitor smartphone version for monitoring and recording the inverter data over the internet.

Standard 5 year warranty, extendable for up to 25 years

Size and weight (mm)



2.5TL / 3TL

18.3 kg.

3.3TL / 3.68TL

19.7 kg.

4.6TL / 5TL / 6TL

23.3 kg.

7.5TL / 8.2TL / 8.6TL / 10TL

25.2 kg.

PROTECTIONS

- Reverse polarity.
- Input and output overvoltages, type 3 surge arresters.
- Output short circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.

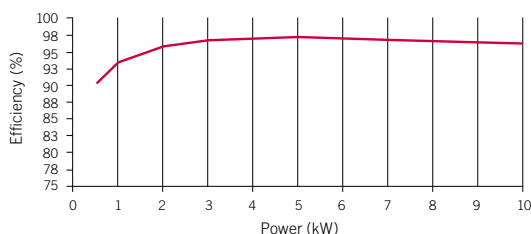
OPTIONAL ACCESSORIES

- DC switch.
- Inter-inverter communication via Bluetooth or Ethernet.
- GSM / GPRS remote communication.
- Potential free contact for insulation fault indication (by default) or inverter connected to the grid (optional).

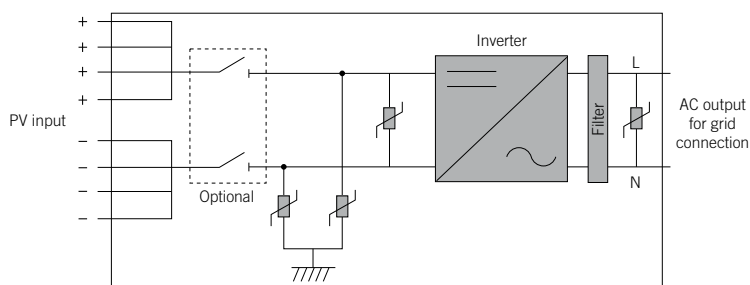
EFFICIENCY

INGECON[®] SUN 10TL

V_{dc} = 330 V



Lite TL



	2.5TL	3TL	3.3TL	3.68TL	4.6TL	5TL
Input (DC)						
Recommended PV array power range ⁽¹⁾	2.8 - 3.3 kWp	3.2 - 4 kWp	3.8 - 4.3 kWp	3.9 - 4.8 kWp	5.2 - 6 kWp	5.7 - 6.5 kWp
Voltage range MPP	100 - 450 V	100 - 450 V	100 - 450 V	100 - 450 V	100 - 450 V	100 - 450 V
Minimum voltage for rated	160 V	195 V	155 V	175 V	145 V	160 V
Maximum voltage ⁽²⁾	550 V	550 V	550 V	550 V	550 V	550 V
Maximum current	17 A	17 A	22 A	22 A	33 A	33 A
Inputs	3	3	3	3	4	4
MPPT	1	1	1	1	1	1
Output (AC)						
Rated power ⁽³⁾	2.7 kW	3 kW	3.63 kW	3.68 kW	5 kW	5.5 kW
Maximum current	13 A	13.5 A	16 A	16 A	24.2 A	26.2 A
Rated voltage	230 / 240 V	230 / 240 V	230 / 240 V	230 / 240 V	230 / 240 V	230 / 240 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine	1	1	1	1	1	1
Phi Cosine adjustable	Yes. Smax=2.7 kVA	Yes. Smax=3 kVA	Yes. Smax=3.63 kVA	Yes. Smax=3.68 kVA	Yes. Smax=5 kVA	Yes. Smax=5.5 kVA
THD	<3%	<3%	<3%	<3%	<3%	<3%
Efficiency						
Maximum efficiency	96.6%	96.6%	96.8%	96.8%	97%	97%
Euroefficiency	95%	95.1%	95.2%	95.2%	96%	96.1%
General Information						
Air cooling	30 m³/h	30 m³/h	45 m³/h	45 m³/h	90 m³/h	90 m³/h
Stand-by consumption ⁽⁵⁾	<10 W	<10 W	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W	0 W	0 W
Ambient temperature	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	IP65	IP65	IP65	IP65	IP65	IP65

	6TL	7.5TL	8.2TL	8.6TL	10TL
Input (DC)					
Recommended PV array power range ⁽¹⁾	6.3 - 7 kWp	8.7 - 10.3 kWp	9.5 - 11.2 kWp	10 - 11.8 kWp	11.6 - 13.7 kWp
Voltage range MPP	100 - 450 V	100 - 450 V	100 - 450 V	100 - 450 V	100 - 450 V
Minimum voltage for Pnom	190 V	215 V	235 V	245 V	300 V
Maximum voltage ⁽²⁾	550 V	550 V	550 V	550 V	550 V
Maximum current	33 A	35 A	35 A	35 A	35 A
Inputs	4	4	4	4	4
MPPT	1	1	1	1	1
Output (AC)					
Rated power ⁽³⁾	6 kW	7.5 kW	8.2 kW	8.6 kW	10 kW
Maximum current	26.2 A	36.1 A	36.1 A	36.1 A	36.1 A
Rated voltage	230 / 240 V	208 / 230 / 240 / 277 V ⁽⁴⁾	230 / 240 / 277 V ⁽⁴⁾	240 / 277 V ⁽⁴⁾	277 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine	1	1	1	1	1
Phi Cosine adjustable	Yes. Smax=6 kVA	Yes. Smax=7.5 kVA	Yes. Smax=8.2 kVA	Yes. Smax=8.6 kVA	Yes. Smax=10 kVA
THD	<3%	<3%	<3%	<3%	<3%
Efficiency					
Maximum efficiency	97%	97.5%	97.6%	97.7%	98%
Euroefficiency	96.1%	96.5%	96.6%	96.6%	96.8%
General Information					
Air cooling	90 m³/h	90 m³/h	90 m³/h	90 m³/h	90 m³/h
Stand-by consumption ⁽⁵⁾	<10 W	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W	0 W
Ambient temperature	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	IP65	IP65	IP65	IP65	IP65

Marking: CE. **EMC & Security standards:** EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100. **Grid connection standards:** RD1699/2011, DIN V VDE V 0126-1-1, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2⁽⁶⁾, P.O.12.3, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, DEWA (Dubai) Grid Code, Jordan Grid Code

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⁾ AC Power for 45 °C ambient temperature ⁽⁴⁾ Voltage configurable through the display ⁽⁵⁾ Consumption from PV field ⁽⁶⁾ Related only inverters up to 16 A.

TL



3.6TL U / 5TL U / 6TL U / 7.5TL U / 8.6TL U / 10TL U

Single phase TL inverters designed for the residential sector and larger, decentralized projects

The INGECON[®]SUN Lite TL U inverters 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 up to commercial solar systems.

Maximum efficiency and flexibility

The INGECON[®]SUN Lite TL U inverters are compatible with all the PV module technology on the market, thereby permitting greater flexibility when sizing PV installations. Furthermore, they feature an advanced maximum power point tracker system (MPPT) to extract the maximum power from the PV array.

Software included

It includes, without any extra cost, RS-485 communications as well as the

software INGECON[®] SUN Manager, INGECON[®] SUN Monitor and its iSun Monitor Smartphone version for monitoring, displaying and recording the data from the inverter through the Internet. Each inverter incorporates an internal datalogger for up to 3 months data storage, which can be accessed from either a remote PC or on-site from the inverter front panel, through a keypad.

Robust design

This inverter features an aluminium casing, for indoor and outdoor installation, capable of withstanding very high temperatures. The INGECON[®]SUN Lite TLU inverters have been designed with components which offer a useful life of more than 20 years.

Standard 10 year warranty, extendable for up to 20 years

PROTECTIONS

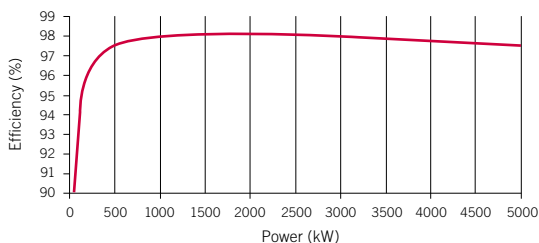
- Reverse polarity.
- Input and output overvoltage.
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.

OPTIONAL ACCESSORIES

- Inter-inverter communication via Ethernet, GSM / GPRS or wireless.
- Combiner Box that includes DC switch and fuses.

EFFICIENCY

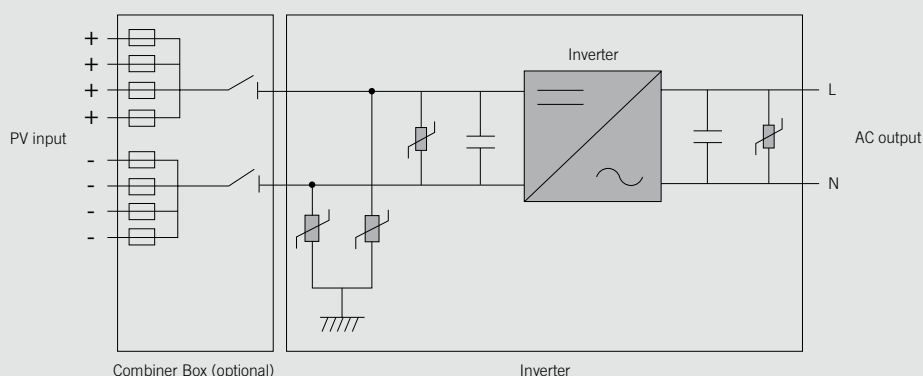
INGECON[®]SUN 5TL U
V_{dc} = 350 V



	3.6TL U	5TL U	6TL U	7.5TL U	8.6TL U	10TL U
Input (DC)						
Recommended PV array power range ⁽¹⁾	3.8 - 4.7 kWp	5.3 - 6.5 kWp	6.3 - 7.4 kWp	7.9 - 9.3 kWp	9.1 - 11 kWp	10.5 - 13.7 kWp
Voltage range MPP	125 - 450 V	125 - 450 V	125 - 450 V	125 - 450 V	125 - 450 V	125 - 450 V
Minimum voltage for P _{nom}	200 V	200 V	200 V	225 V	250 V	300 V
Maximum voltage ⁽²⁾	550 V	550 V	550 V	550 V	550 V	550 V
Maximum current	22 A	30 A	32 A	35 A	35 A	35 A
Inputs	4	4	4	4	4	4
MPPT	1	1	1	1	1	1
Output (AC)						
Rated power ⁽³⁾	3.6 kW	5 kW	6 kW	7.5 kW	8.6 kW	10 kW
Maximum current	17.5 A	25 A	26.2 A	36.1 A	36.1 A	36.1 A
Rated voltage	208 / 240 / 277 V	208 / 240 / 277 V	240 / 277 V	208 / 240 / 277 V	240 / 277 V	277 V
Frequency	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz
Phi Cosine ⁽⁴⁾	1	1	1	1	1	1
Phi Cosine adjustable	Yes. S _{max} =3.6 kVA	Yes. S _{max} =5 kVA	Yes. S _{max} =6 kVA	Yes. S _{max} =7.5 kVA	Yes. S _{max} =8.6 kVA	Yes. S _{max} =10 kVA
THD ⁽⁴⁾	<3%	<3%	<3%	<3%	<3%	<3%
Efficiency						
Maximum efficiency	98%	97.2%	97.7%	97.8%	97.8%	97.8%
CEC - Weighted efficiency	96.5%	96%	96.5%	97%	97%	97%
General Information						
Stand-by consumption	<10 W	<10 W	<10 W	<10 W	<10 W	<10 W
Consumption at night	0 W	0 W	0 W	0 W	0 W	0 W
Ambient temperature	-4 °F to +150 °F	-4 °F to +150 °F	-4 °F to +150 °F	-4 °F to +150 °F	-4 °F to +150 °F	-4 °F to +150 °F
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%	0 - 100%	0 - 100%
Protection class	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R
Marking	CE, ETL					
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2					
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE					

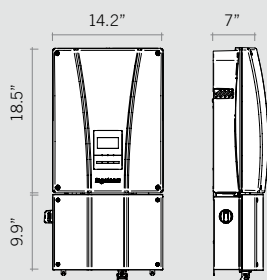
Notes: ⁽¹⁾ Depending on the type of installation and geographical location ⁽²⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures
⁽³⁾ AC Power for 45 °C ambient temperature ⁽⁴⁾ For P_{out}>25% of the rated power.

5TL U



Size and weight

(inches and lbs)



Inverter

3.6TL U
44.09 lbs

5TL U
61.73 lbs

6TL U
61.73 lbs

7.5TL U
66.14 lbs

8.6TL U
66.14 lbs

10TL U
66.14 lbs

DC disconnect box
10.75 lbs

TL



10TL / 12.5TL / 15TL / 20TL / 28TL / 33TL

Three-phase TL inverters with the maximum efficiency at the best price

A three-phase inverter family for domestic, industrial and large-scale PV plants.

Maximum efficiency at the best price

A single DC-to-AC power conversion stage with an advanced single maximum power point tracking system (MPPT), that makes it possible to harness the maximum energy from the PV array at the most competitive price.

Plug & Play technology

Extremely easy to install. The inverter connection is fast and simple. The country-specific configuration and language can be easily selected from the inverter screen.

Rugged design

Steel casing, especially designed for indoor and outdoor applications (IP65). Able to withstand extreme temperatures. The INGECON® SUN 3Play TL inverters have been designed to guarantee a service life of more than 20 years, as demonstrated by the stress tests they are subjected to.

Ease of maintenance

Internal datalogger for up to 3 months data storage. Control either from a remote PC or on-site from the inverter front keypad. Status and alarm LED indicators. LCD screen.

Easy to operate

The INGECON® SUN 3Play TL inverters feature a LCD screen for the simple and convenient monitoring of the inverter

status and a range of internal variables. The display also includes three LEDs to show the inverter operating status. All this helps to simplify and facilitate maintenance tasks.

Software included

Included at no extra cost are the INGECON® SUN Manager, INGECON® SUN Monitor and its smartphone version iSun Monitor for monitoring and recording the inverter data over the internet. RS-485 communications are supplied as standard. In addition, users can download the latest version of the firmware from the Ingeteam website: www.ingeteam.com, and update it using a simple SD memory card.

Standard 5 year warranty, extendable for up to 25 years



Different versions to choose from

In order to satisfy its clients' needs, Ingeteam has created four different versions for the INGECON® SUN 3Play TL family:

- "S": Standard version
- "S+": Advanced Standard version
- "P": Premium version
- "P+": Advanced Premium version

All the versions are supplied with DC and AC varistors. The "S" version represents the most basic model of all. It features a single MPPT input with terminal blocks. The Advanced Standard version "S+" also features a DC switch.

On the other hand, the Premium version includes two options for DC connection: conventional terminal blocks or fused and monitored PV connectors.

Moreover, it also features DC fuses, the input current measuring kit and a DC switch. The Advanced Premium version "P+" is supplied with DC surge arresters, type 2.

MAIN FEATURES

- MPPT system.
- 98.5% maximum efficiency.
- Digital inputs.
- RS-485 communications supplied as standard.
- Inverter firmware updating by the user through a SD memory card.
- Software INGECON® SUN Manager for PV plant access and data registration.
- Software INGECON® SUN Monitor for PV plant monitoring.
- LCD display.
- Easy maintenance.
- Display-configurable potential-free contact, to indicate insulation fault or grid connection.
- Plug & Play technology.
- Suitable for indoor and outdoor installations (IP65).
- High temperature performance.
- Different versions to satisfy every project needs.
- Compact design.
- Language, rated voltage and Country Code configurable by display.

PROTECTIONS

- Reverse polarity.
- Shortcircuits and overloads at the output.
- Anti-islanding with automatic disconnection.
- Insulation faults.

OPTIONAL ACCESSORIES

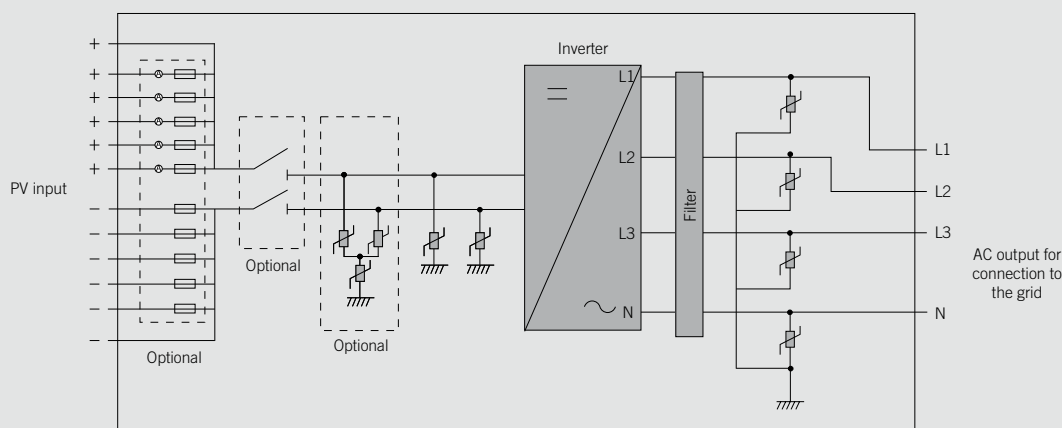
- Inverter communication via Ethernet, Bluetooth, GSM / GPRS or Wi-Fi. A second RS-485 communication card is available.
- Self-consumption kit.

BENEFITS

- The best possible price.
- High efficiency rates.
- Easy maintenance.

	Standard version		Premium version	
	S	S+	P	P+
Terminal blocks	✓	✓	✓	✓
PV connectors			✓	✓
DC switch		✓	✓	✓
DC surge arresters				✓
DC fuses			✓	✓
Current measuring kit			✓	✓
DC and AC varistors	✓	✓	✓	✓

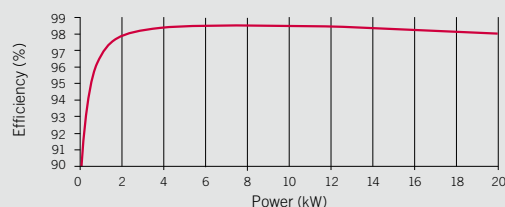
3Play TL P+ version (20 kW)



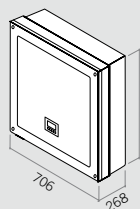
	10TL	12.5TL	15TL	20TL	28TL	33TL
Input (DC)						
Recommended PV array power range ⁽¹⁾	10.3 - 13.4 kW	12.9 - 16.8 kW	15.5 - 20.1 kW	20.6 - 26.8 kW	28.9 - 37.5 kW	34 - 45 kW
Voltage range MPP	560 - 820 V	560 - 820 V	560 - 820 V	560 - 820 V	560 - 820 V	560 - 820 V
Min. voltage for P _{nom} at rated Vac	560 V	560 V	560 V	560 V	560 V	560 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V
Maximum current ⁽³⁾	19 A	24 A	28 A	37 A	52 A	61 A
Inputs for the S and S+ versions	1	1	1	1	1	1
Inputs for the P and P+ versions ⁽⁴⁾	4	4	5	5	8	8
MPPT	1	1	1	1	1	1
Output (AC)						
Rated power	10 kW	12.5 kW	15 kW	20 kW	28 kW	33 kW
Max. temperature at rated power ⁽⁵⁾	55 °C	55 °C	55 °C	55 °C	45 °C	45 °C
Maximum current	15 A	19 A	22 A	29 A	41 A	48 A
Rated voltage	400 V	400 V	400 V	400 V	400 V	400 V
Voltage range	277 - 528 V	277 - 528 V	277 - 528 V	277 - 528 V	277 - 528 V	277 - 528 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁶⁾	1	1	1	1	1	1
Phi Cosine adjustable	Yes. S _{max} =10 kVA	Yes. S _{max} =12.5 kVA	Yes. S _{max} =15 kVA	Yes. S _{max} =20 kVA	Yes. S _{max} =28 kVA	Yes. S _{max} =33 kVA
THD	<3%	<3%	<3%	<3%	<3%	<3%
Efficiency						
Maximum efficiency	98.5%	98.5%	98.5%	98.5%	98.5%	98.5%
Euroefficiency	98.3%	98.3%	98.4%	98.3%	98.3%	98.3%
General Information						
Refrigeration system	Forced ventilation					
Air flow	200 m³/h	200 m³/h	200 m³/h	200 m³/h	400 m³/h	400 m³/h
Stand-by consumption ⁽⁷⁾	10 W	10 W	10 W	10 W	10 W	10 W
Consumption at night	1 W	1 W	1 W	1 W	1 W	1 W
Ambient temperature	-25 °C to 65 °C	-25 °C to 65 °C	-25 °C to 65 °C	-25 °C to 65 °C	-25 °C to 65 °C	-25 °C to 65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%
Protection class	IP65	IP65	IP65	IP65	IP65	IP65
Marking	CE					
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100					
Grid connection standards	RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-16 Ed. III, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2 ⁽⁸⁾ , P.O.12.3, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, DEWA (Dubai) Grid Code, Jordan Grid Code					

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 'V_{oc}' at low temperatures ⁽³⁾ The maximum current per PV connector is 11 A ⁽⁴⁾ Optionally, the DC inputs could be duplicated ⁽⁵⁾ For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁶⁾ For P_{out}>25% of the rated power ⁽⁷⁾ Consumption from PV field ⁽⁸⁾ Related only to inverters up to 16 A.

Efficiency INGECON® SUN 20TL V_{dc} = 600 V



Size and weight (mm)



10TL / 12.5TL / 15TL / 20TL
46.8 kg.

28TL / 33TL
51.5 kg.

TL M



10TL M / 12.5TL M / 15TL M / 20TL M / 28TL M / 33TL M

Maximum efficiency with Multi-MPPT three-phase technology

A three-phase inverter family for domestic, industrial and large-scale PV plants.

Maximum efficiency with two independent MPPT inputs

A single DC-to-AC power conversion stage with an advanced maximum power point tracking system (MPPT), making it possible to harness the maximum energy from the PV array at all times, including difficult situations such as scattered clouds and partial shading. Great flexibility for configuring the solar array, thanks to the two independent MPPT trackers with a wide input voltage range. Possibility of asymmetrical configurations.

Plug & Play technology

Extremely easy to install. The inverter connection is fast and simple. The country-specific configuration and language can be easily selected from the inverter screen.

Rugged design

Steel casing, especially designed for indoor and outdoor applications (IP65). Able to withstand extreme temperatures. The 3Play TL M inverters have been designed to guarantee a service life of more than 20 years, as demonstrated by the stress tests they are subjected to.

Ease of maintenance

Internal datalogger for up to 3 months data storage. Control either from a remote PC or on-site from the inverter front keypad. Status and alarm LED indicators. LCD screen.

Easy to operate

The INGECON[®] SUN 3Play TL M inverters feature a LCD screen for the simple and convenient monitoring of the inverter status and a range of internal variables. The display also includes three LEDs to show the inverter opera-

ting status. All this helps to simplify and facilitate maintenance tasks.

Software included

Included at no extra cost are the INGECON[®] SUN Manager, INGECON[®] SUN Monitor and its smartphone version iSun Monitor for monitoring and recording the inverter data over the internet. In addition, users can download the latest version of the firmware from the Ingeteam website www.ingeteam.com, and update it using a simple SD memory card. RS-485 communications are supplied as standard.

Standard 5 year warranty, extendable for up to 25 years

Different versions to choose from

In order to satisfy its clients' needs, Ingecon has created four different versions for the INGECON® SUN 3Play TL M family:

- "S": Standard version
- "S+": Advanced Standard version
- "P": Premium version
- "P+": Advanced Premium version

All the versions are supplied with DC and AC varistors. The "S" version represents the most basic model of all. It features a single MPPT input with terminal blocks. The Standard version "S+" also features DC switch.

On the other hand, the Premium version includes two options for DC connection: conventional terminal blocks or fused and monitored PV connectors.

Moreover, it also features DC fuses, the input current measuring kit and the DC. The Advanced Premium version "P+" is supplied with DC surge arresters.

MAIN FEATURES

- Double-MPPT system.
- 98.5% maximum efficiency.
- Digital inputs.
- RS-485 communications supplied as standard.
- Inverter firmware updating by the user through a SD memory card.
- Software INGECON® SUN Manager for PV plant access and data registration.
- Software INGECON® SUN Monitor for PV plant monitoring.
- LCD display.
- Easy maintenance.
- Display-configurable potential-free contact, to indicate insulation fault or grid connection.
- Plug & Play technology.
- Suitable for indoor and outdoor installations (IP65).
- High temperature performance.
- Different versions to satisfy every project needs.
- Compact design.
- Language, rated voltage and Country Code, rated voltage configurable by display.

PROTECTIONS

- Reverse polarity.
- Shortcircuits and overloads at the output.
- Anti-islanding with automatic disconnection.
- Insulation faults.

OPTIONAL ACCESSORIES

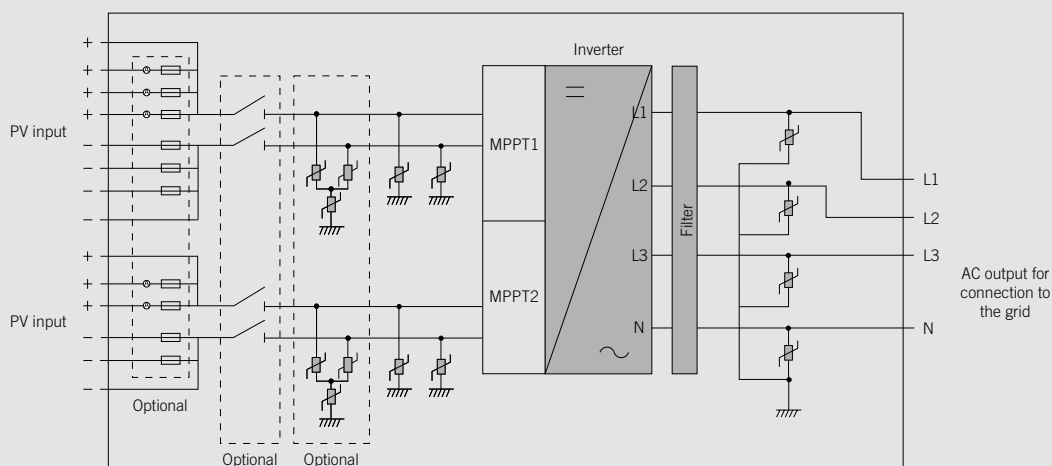
- Inverter communication via Ethernet, Bluetooth, GSM / GPRS or Wi-Fi. A second RS-485 communication card is available.
- Self-consumption kit.

BENEFITS

- Greater performance thanks to the double MPPT system.
- Easy maintenance.
- Higher inverter life expectancy.

	Standard version		Premium version	
	S	S+	P	P+
Terminal blocks	✓	✓	✓	✓
PV connectors			✓	✓
DC switch		✓	✓	✓
DC surge arresters				✓
DC fuses			✓	✓
Current measuring kit			✓	✓
DC and AC varistors	✓	✓	✓	✓

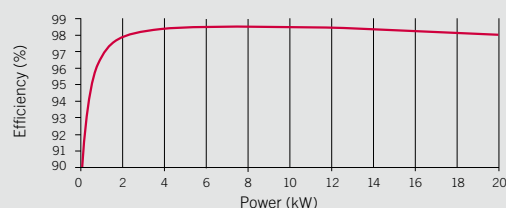
3Play TL M P+ version (20 kW)



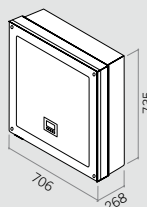
	10TL M	12.5TL M	15TL M	20TL M
Input (DC)				
Recommended PV array power range ⁽¹⁾	10.3 - 13.4 kW	12.9 - 16.8 kW	15.5 - 20.1 kW	20.6 - 26.8 kW
Voltage range MPP1 ⁽²⁾	200 - 820 V	200 - 820 V	200 - 820 V	200 - 820 V
Voltage range MPP2 ⁽²⁾	200 - 820 V	200 - 820 V	200 - 820 V	200 - 820 V
Min. voltage for Pnom with parallel inputs	260 V	325 V	310 V	415 V
Maximum voltage ⁽³⁾	1,000 V	1,000 V	1,000 V	1,000 V
Maximum current ⁽⁴⁾ (Input 1 / Input 2)	20 / 20 A	20 / 20 A	30 / 20 A	30 / 20 A
Inputs for the S and S+ versions (Input 1 / Input 2)	1 / 1	1 / 1	1 / 1	1 / 1
Inputs for the P and P+ versions (Input 1 / Input 2) ⁽⁵⁾	2 / 2	2 / 2	3 / 2	3 / 2
MPPT	2	2	2	2
Output (AC)				
Rated power	10 kW	12,5 kW	15 kW	20 kW
Max. temperature at rated power ⁽⁶⁾	55 °C	55 °C	55 °C	55 °C
Maximum current	15 A	19 A	22 A	29 A
Rated voltage	400 V	400 V	400 V	400 V
Voltage range	277 - 528 V	277 - 528 V	277 - 528 V	277 - 528 V
Frecuency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁷⁾	1	1	1	1
Phi Cosine adjustable	Yes. Smax=10 kVA	Yes. Smax=12.5 kVA	Yes. Smax=15 kVA	Yes. Smax=20 kVA
THD	<3%	<3%	<3%	<3%
Efficiency				
Maximum efficiency	98.5%	98.5%	98.5%	98.5%
Euroefficiency	98.3%	98.3%	98.3%	98.3%
General Information				
Refrigeration system	Forced ventilation			
Air flow	200 m³/h	200 m³/h	200 m³/h	200 m³/h
Stand-by consumption ⁽⁸⁾	10 W	10 W	10 W	10 W
Consumption at night	1 W	1 W	1 W	1 W
Ambient temperature	-25 °C to 65 °C	-25 °C to 65 °C	-25 °C to 65 °C	-25 °C to 65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%	0 - 95%
Protection class	IP65	IP65	IP65	IP65
Marking	CE			
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100			
Grid connection standards	RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-16 Ed. III, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2 ⁽⁹⁾ , P.O.12.3, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, DEWA (Dubai) Grid Code, Jordan Grid Code			

Notes: ⁽¹⁾ Depending on the type of installation and geographical location ⁽²⁾ The output power will be conditioned by the voltage and current configuration selected at each input ⁽³⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures ⁽⁴⁾ The maximum current per PV connector is 11 A ⁽⁵⁾ Optionally, the DC inputs could be duplicated ⁽⁶⁾ For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁷⁾ For P_{out}>25% of the rated power ⁽⁸⁾ Consumption from PV field ⁽⁹⁾ Related only to inverters up to 16 A.

Efficiency INGECON® SUN 20TL M V_{dc} = 600 V



Size and weight (mm)



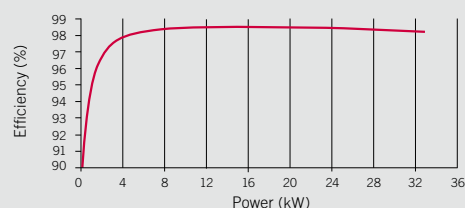
10TL M / 12.5TL M
56.2 kg.

15TL M / 20TL M
57.8 kg.

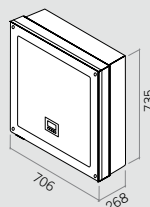
	28TL M	33TL M
Input (DC)		
Recommended PV array power range ⁽¹⁾	28.9 - 37.5 kW	34 - 45 kW
Voltage range MPP1 ⁽²⁾	200 - 820 V	200 - 820 V
Voltage range MPP2 ⁽²⁾	200 - 820 V	200 - 820 V
Min. voltage for P _{nom} with parallel inputs	365 V	430 V
Maximum voltage ⁽³⁾	1,000 V	1,000 V
Maximum current ⁽⁴⁾ (Input 1 / Input 2)	40 / 30 A	40 / 40 A
Inputs for the S and S+ versions (Input 1 / Input 2)	1 / 1	1 / 1
Inputs for the P and P+ versions (Input 1 / Input 2) ⁽⁵⁾	5 / 5	5 / 5
MPPT	2	2
Output (AC)		
Rated power	28 kW	33 kW
Max. temperature at rated power ⁽⁶⁾	45 °C	45 °C
Maximum current	41 A	48 A
Rated voltage	400 V	400 V
Voltage range	277 - 528 V	277 - 528 V
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁷⁾	1	1
Phi Cosine adjustable	Yes. S _{max} =28 kVA	Yes. S _{max} =33 kVA
THD	<3%	<3%
Efficiency		
Maximum efficiency	98.5%	98.5%
Euroefficiency	98.3%	98.3%
General Information		
Refrigeration system	Forced ventilation	
Air flow	400 m³/h	400 m³/h
Stand-by consumption ⁽⁸⁾	10 W	10 W
Consumption at night	1 W	1 W
Ambient temperature	-20 °C to 65 °C	-20 °C to 65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	IP65	IP65
Marking	CE	
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100	
Grid connection standards	RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-16 Ed. III, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2 ⁽⁹⁾ , P.O.12.3, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, DEWA (Dubai) Grid Code, Jordan Grid Code	

Notes: ⁽¹⁾ Depending on the type of installation and geographical location ⁽²⁾ The output power will be conditioned by the voltage and current configuration selected at each input ⁽³⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures ⁽⁴⁾ The maximum current per PV connector is 11 A ⁽⁵⁾ Optionally, the DC inputs could be duplicated ⁽⁶⁾ For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁷⁾ For P_{out}>25% of the rated power ⁽⁸⁾ Consumption from PV field ⁽⁹⁾ Related only to inverters up to 16 A.

Efficiency INGECON® SUN 33TL M V_{dc} = 600 V



Size and weight (mm)



28TL M / 33TL M
62.5 kg.



18TL U M480 / 24TL U M480 / 40TL U M480

Maximum efficiency with Multi-MPPT three-phase technology

A three-phase inverter family for residential, commercial and large-scale PV plants. It integrates an arc fault circuit interruption system (AFCI).

Maximum efficiency with two independent MPPT inputs

A single DC-to-AC power conversion stage with an advanced maximum power point tracking system (MPPT), making it possible to harness the maximum energy from the PV array at all times, including difficult situations such as scattered clouds and partial shading. Great flexibility for configuring the solar array, thanks to the two independent MPPT trackers with a wide input voltage range. Possibility of asymmetrical configurations.

Plug & Play technology

Extremely easy to install. The inverter connection is fast and simple. The coun-

try-specific configuration and language can be easily selected from the inverter screen.

Rugged design

Steel casing, especially designed for indoor and outdoor applications (NEMA 4). It with-stands extreme temperatures. The 3Play inverters have been designed to guarantee a service life of more than 20 years, as demonstrated by the stress tests they are subjected to.

Ease of maintenance

Internal datalogger for up to 3 months data storage. Control either from a remote PC or on-site from the inverter front keypad. Status and alarm LED indicators. LCD screen. Integrated DC arc-fault circuit interruption system.

Easy to operate

The INGECON® SUN 3Play TL U M inverters feature a LCD screen for the

simple and convenient monitoring of the inverter status and a range of internal variables. The display also includes three LEDs to show the inverter operating status. All this helps to simplify and facilitate maintenance tasks.

Software included

Included at no extra cost are the INGECON® SUN Manager, INGECON® SUN Monitor and its smartphone version iSun Monitor for monitoring and recording the inverter data over the internet. In addition, users can download the latest version of the firmware from the Ingeteam website www.ingeteam.com, and update it using a simple SD memory card. RS-485 communications are supplied as standard.

Standard 10 year warranty, extendable for up to 20 years



TL U M

A versatile equipment

The INGECON[®] SUN 3Play TL U M inverters integrate an arc-fault circuit interruption system.

The standard inverter features a double MPPT input with terminal blocks. Optionally, it can be supplied with DC and AC surge arresters, type 2.

Easy rooftop installation

Vertical or horizontal mounting, enabling the location of the inverter next to the PV modules and avoiding the installation of any additional rapid shutdown device.

MAIN FEATURES

- AFCI (Arc Fault Circuit Interrupt).
- Double-MPPT System.
- Easy rooftop installation.
- 98.5% maximum efficiency.
- Inverter firmware updating by the user through a SD memory card.
- Software INGECON[®] SUN Manager for PV plant access and data registration.
- Software INGECON[®] SUN Monitor for PV plant monitoring.
- LCD display.
- RS-485 communications supplied as standard.
- Display-configurable potential-free contact, to indicate insulation fault or grid connection.
- Plug & Play technology.
- Suitable for indoor and outdoor installations (NEMA 4).
- High temperature performance. Rated power up to 131 °F (55 °C) for the 18 kW and 24 kW inverters.
- Language, rated voltage and Country Code configurable by display.

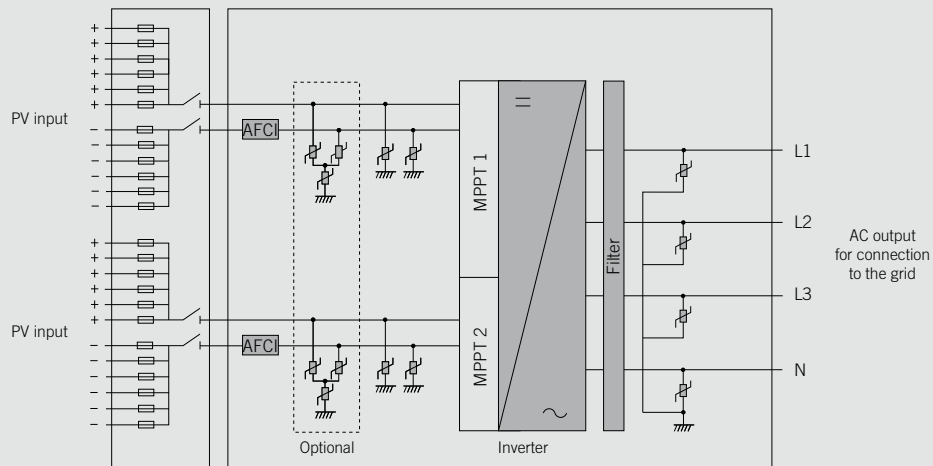
PROTECTIONS

- Reverse polarity.
- DC arc-fault circuit interruption.
- Shortcircuits and overloads at the output.
- Anti-islanding with automatic disconnection.
- Insulation faults.

OPTIONAL ACCESSORIES

- Inter-inverter communication via Ethernet, Bluetooth, GSM / GPRS or Wi-Fi.
- Combiner Box with DC fuses and DC switch.
- DC surge arresters, type 2.

3Play TL U M (40 kW)



Combiner Box

The Combiner Box is supplied with four or six inputs per MPPT with fuses on each pole and a DC switch. It can be located immediately under the PV inverter or in a different place.

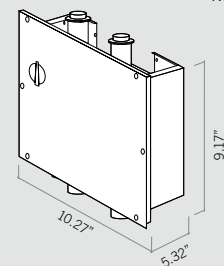
COMBINER BOX MAIN FEATURES

- DC switch.
- 2 MPPTs (4 inputs / MPPT for the 18 kW and 24 kW models, and 6 inputs / MPPT for the 40 kW model).
- 4 fuses per pole for the 18 kW and 24 kW models and 6 fuses per pole for the 40 kW model.
- Maximum current per input: 12 A.



Size and weight (inches)

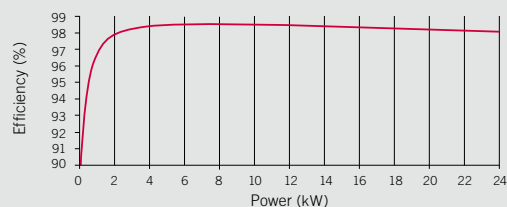
Combiner Box
7.5 lbs



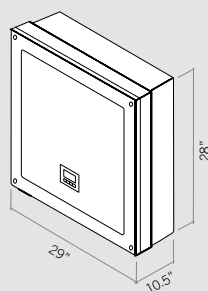
	18TL U M480	24TL U M480	40TL U M480
Input (DC)			
Recommended PV array power range ⁽¹⁾	18.6 - 24.1 kW	24.7 - 32.2 kW	41.2 - 53.6 kW
Voltage range MPP1 ⁽²⁾	200 - 820 V	200 - 820 V	200 - 820 V
Voltage range MPP2 ⁽²⁾	200 - 820 V	200 - 820 V	200 - 820 V
Min. voltage for Pnom with parallel inputs	375 V	460 V	520 V
Maximum voltage ⁽³⁾	1,000 V	1,000 V	1,000 V
Maximum current (Input 1 / Input 2)	30 / 20 A	27 / 27 A	40 / 40 A
Inputs (Input 1 / Input 2)	1 / 1	1 / 1	1 / 1
MPPT	2	2	2
Output (AC)			
Rated power	18 kW	24 kW	40 kW
Temperature at rated power ⁽⁴⁾	131 °F	131 °F	113 °F
Maximum current	22 A	29 A	48 A
Rated voltage	480 V	480 V	480 V
Frequency	60 Hz	60 Hz	60 Hz
Phi Cosine ⁽⁵⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=18 kVA	Yes. Smax=24 kVA	Yes. Smax=40 kVA
THD	<3%	<3%	<3%
Efficiency			
Maximum efficiency	98.5%	98.5%	98.5%
CEC - Weighted efficiency	98%	98%	98%
General Information			
Refrigeration system	Forced ventilation		
Air flow	200 m³/h	200 m³/h	400 m³/h
Stand-by consumption ⁽⁶⁾	10 W	10 W	20 W
Consumption at night	1 W	1 W	1 W
Ambient temperature	-13 °F to 149 °F	-13 °F to 149 °F	-13 °F to 149 °F
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	NEMA 4	NEMA 4	NEMA 4
DC AFCI	✓	✓	✓
Marking	CE, ETL		
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2		
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location ⁽²⁾ The output power will be conditioned by the voltage and current configuration selected at each input ⁽³⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures ⁽⁴⁾ The output power will be reduced at the rate of 1% for each 1 °F of increase ⁽⁵⁾ For Pout>25% of the rated power ⁽⁶⁾ Consumption from PV field.

Efficiency INGECON® SUN 24TL U M480 $V_{DC} = 720 V$



Size and weight (inches)



18TL U M / 24TL U M / 40TL U M
127.4 / 129 / 137.8 lbs

With transformer



50 / 60 / 70 / 80 / 90 / 100

Three phase inverter for medium and large power outputs on-roof applications and also for ground-based multi-megawatt applications

Maximum efficiency at high temperatures

Advanced maximum power point tracker system (MPPT). Low voltage ride through capability, active power control and reactive power control. Suitable for medium voltage installations.

Easy to install

No additional items are required. Manual disconnection from the grid. Complete electrical protection equipment supplied as standard.

Easy to maintain

Internal datalogger for up to 3 months data storage. Control from either a remote PC or on-site from the inverter front key pad. Status and alarm LED indicators. LCD Screen. Useful life of more than 20 years.

Software included

Included at no extra cost are the INGECON[®] SUN Manager, INGECON[®] SUN Monitor and its iSun Monitor smartphone version for monitoring and recording the inverter data over the internet.

Standard 5 year warranty, extendable for up to 25 years

PROTECTIONS

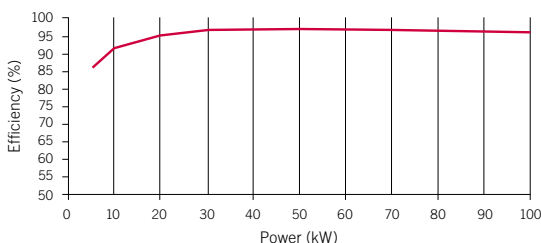
- Galvanic isolation between the DC and AC side.
- Reverse polarity.
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.
- DC switch.
- DC fuses.
- AC circuit breaker.
- DC and AC surge arresters type 2.

OPTIONAL ACCESSORIES

- Inter-inverter communication via RS-485, Ethernet or Bluetooth.
- GSM / GPRS remote communication.
- PV array string current monitoring. INGECON[®] SUN String Control.
- Grounding kit if required for the PV modules.

EFFICIENCY

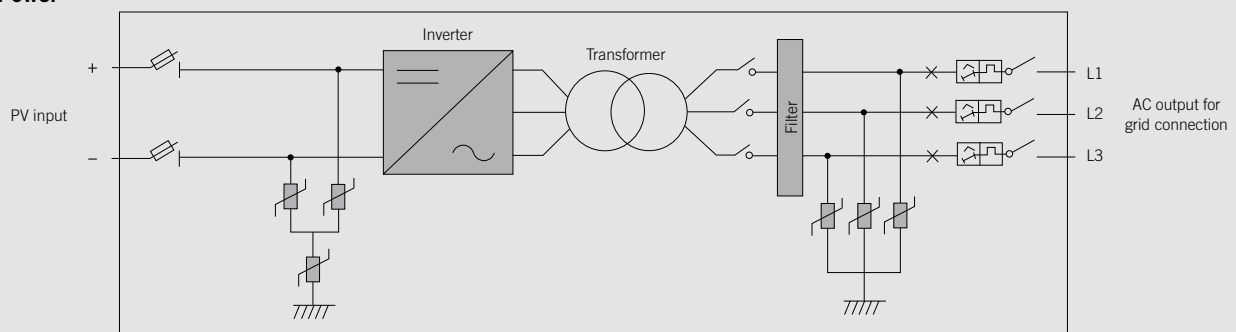
INGECON[®] SUN 100
V_{dc} = 450 V



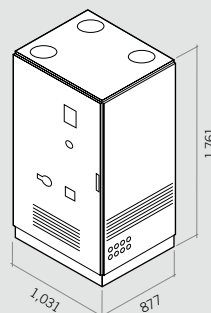
	50	60	70	80	90	100
Input (DC)						
Recommended PV array power range ⁽¹⁾	52 - 65 kWp	63 - 78 kWp	73 - 91 kWp	83 - 104 kWp	93 - 117 kWp	104 - 130 kWp
Voltage range MPP	405 - 750 V	405 - 750 V	405 - 750 V	405 - 750 V	405 - 750 V	405 - 750 V
Maximum voltage ⁽²⁾	900 V	900 V	900 V	900 V	900 V	900 V
Maximum current	130 A	156 A	182 A	208 A	234 A	260 A
Inputs	4	4	4	4	4	4
MPPT	1	1	1	1	1	1
Output (AC)						
Rated power ⁽³⁾	55 kW	66 kW	77 kW	88 kW	99 kW	110 kW
Maximum current	93 A	118 A	131 A	156 A	161 A	161 A
Rated voltage	400 V	400 V	400 V	400 V	400 V	400 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1	1	1	1
Phi Cosine adjustable	Yes. Smax=55 kVA	Yes. Smax=66 kVA	Yes. Smax=77 kVA	Yes. Smax=88 kVA	Yes. Smax=99 kVA	Yes. Smax=110 kVA
THD ⁽⁵⁾	<3%	<3%	<3%	<3%	<3%	<3%
Efficiency						
Maximum efficiency	96.3%	96.4%	97.2%	97.5%	96.9%	96.8%
Euroefficiency	94.3%	94.7%	96.1%	96.2%	95.8%	95.7%
General Information						
Air cooling	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h
Stand-by consumption ⁽⁶⁾	30 W	30 W	30 W	30 W	30 W	30 W
Consumption at night	1 W	1 W	1 W	1 W	1 W	1 W
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20	IP20	IP20	IP20	IP20	IP20
Marking	CE					
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100					
Grid connection standards	IEC 62116, RD1699/2011, DIN V VDE V 0126-1-1, CEI 0-16 Ed. III, CEI 0-21, G59/2, VDE-AR-N 4105:2011-08, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code, Chilean Grid Code, Romanian Grid Code, IEEE929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code					

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⁾ AC Power for 40 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field.

Power



Size and weight (mm)



50 / 60
900 kg.
70 / 80
1,026 kg.
90 / 100
1,162 kg.

Transformerless



110TL B220 / 140TL B220 / 175TL B275 / 190TL B300 / 200TL B320 / 220TL B345 / 230TL B360 / 250TL B400

Three phase inverter for medium and large power outputs on-roof applications and also for ground-based multi-megawatt applications

Maximum efficiency at high temperatures

Advanced maximum power point tracker system (MPPT). Low voltage ride through capability, active power control and reactive power control. Suitable for medium voltage installations.

Easy to install

No additional items are required. Manual disconnection from the grid. Complete electrical protection equipment supplied as standard.

Easy to maintain

Internal datalogger for up to 3 months data storage. Control from either a remote PC or on-site from the inverter front key pad. Status and alarm LED indicators. LCD Screen. Useful life of more than 20 years.

Software included

Included at no extra cost are the INGECON[®] SUN Manager, INGECON[®] SUN Monitor and its iSun Monitor smartphone version for monitoring and recording the inverter data over the internet.

Standard 5 year warranty, extendable for up to 25 years

PROTECTIONS

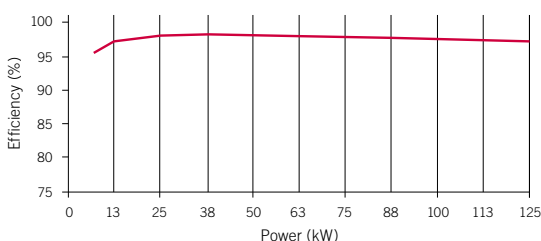
- Reverse polarity.
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.
- DC switch.
- DC fuses.
- AC circuit breaker.
- DC and AC surge arresters, type 2.

OPTIONAL ACCESSORIES

- Inter-inverter communication via RS-485, Ethernet or Bluetooth.
- GSM / GPRS remote communication.
- PV array string current monitoring. INGECON[®] SUN String Control.
- Grounding kit if required for the PV modules.
- Synchronization available with other inverters, to connect to the same MV transformer.

EFFICIENCY

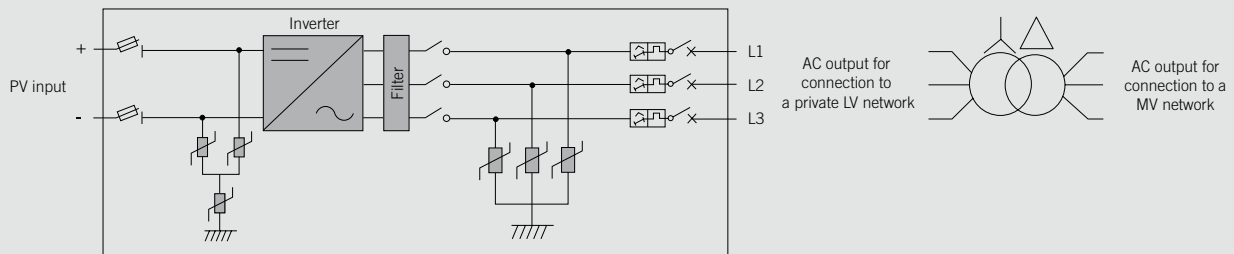
INGECON[®] SUN 125TL
V_{dc} = 450 V



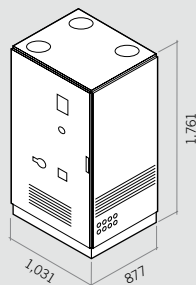
	110TL B220	140TL B220	175TL B275	190TL B300	200TL B320	220TL B345	230TL B360	250TL B400
Input (DC)								
Recommended PV array power range ⁽¹⁾	103 - 130 kWp	141 - 163 kWp	169 - 195 kWp	193 - 224 kWp	205 - 238 kWp	224 - 260 kWp	233 - 273 kWp	254 - 295 kWp
Voltage range MPP	405 - 820 V	405 - 820 V	420 - 820 V	437 - 820 V	468 - 820 V	502 - 820 V	524 - 820 V	578 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V
Maximum current	400 A	400 A	400 A	400 A	400 A	400 A	400 A	450 A
Inputs	4	4	4	4	4	4	4	4
MPPT	1	1	1	1	1	1	1	1
Output (AC)								
Rated power ⁽³⁾	110 kW	137.5 kW	173 kW	189.2 kW	201.3 kW	220 kW	229 kW	250 kW
Maximum current	368 A	368 A	368 A	368 A	368 A	368 A	368 A	368 A
Rated voltage	220 V IT System	220 V IT System	275 V IT System	300 V IT System	320 V IT System	345 V IT System	360 V IT System	400 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1	1	1	1	1	1
Phi Cosine adjustable	Yes. Smax=110 kVA	Yes. Smax=137 kVA	Yes. Smax=173 kVA	Yes. Smax=189.2 kVA	Yes. Smax=201.3 kVA	Yes. Smax=220 kVA	Yes. Smax=229 kVA	Yes. Smax=250 kVA
THD ⁽⁵⁾	<3%	<3%	<3%	<3%	<3%	<3%	<3%	<3%
Efficiency								
Maximum efficiency	98.4%	98.1%	98.5%	98.6%	98.7%	98.8%	98.8%	98.9%
Euroefficiency	97.5%	97.7%	98.2%	98.3%	98.4%	98.5%	98.6%	98.6%
General Information								
Air cooling	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h
Stand-by consumption ⁽⁶⁾	30 W	30 W	30 W	30 W	30 W	30 W	30 W	30 W
Consumption at night	<5 W	<5 W	<5 W	<5 W	<5 W	<5 W	<5 W	<5 W
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20
Marking	CE							
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100							
Grid connection standards	IEC 62116, RD1699/2011, DIN V VDE V 0126-1-1, CEI 0-16, G59/2, VDE-AR-N 4105:2011-08, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code, Chilean Grid Code, Romanian Grid Code, IEEE929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code							

Notes: ⁽¹⁾ Depending on the type of installation and geographical location ⁽²⁾ Never exceed 1,000 V. Consider the voltage increase of the "Voc" at low temperatures ⁽³⁾ AC Power for 40 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field.

Power TL



Size and weight (mm)



110TL B220 / 140TL B220 / 175TL B275 / 190TL B300
200TL B320 / 220TL B345 / 230TL B360 / 250TL B400
600 kg.

With transformer



125 U 208 Outdoor / 125 U 480 Outdoor

The best performance at medium and large outdoor installations

Designed for ease of maintenance, capable of withstanding extreme temperatures, and featuring full electric protections as a standard supply, the INGECON[®] SUN Power 125 U Outdoor inverter is one of the latest Ingeteam's developments. It has been especially designed for medium and large outdoor installations.

Easy to install and maintain

The INGECON[®] SUN Power 125 U inverter has been manufactured with components which offer a useful life of more than 20 years. This inverter is equipped with an advanced maximum power point tracking system (MPPT) to obtain the maximum power from the PV

array. No additional items are required and it can be manually disconnected from the grid.

Software included

It includes, without any extra cost, RS-485 communications as well as the software INGECON[®] SUN Manager, INGECON[®] SUN Monitor and its iSun Monitor Smartphone version for monitoring, displaying and recording the data from the inverter through the Internet. Each inverter incorporates an internal datalogger for up to 3 months data storage, which can be accessed from either a remote PC or on-site from the inverter front panel, through a keypad.

Standard 5 year warranty, extendable for up to 20 years

PROTECTIONS

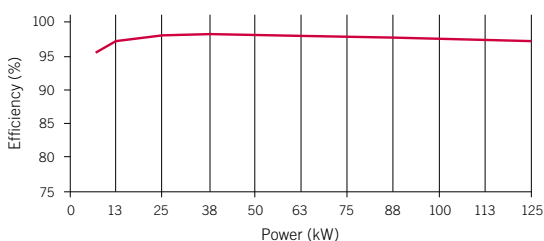
- Reverse polarity.
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.
- AC circuit breaker.
- DC switch.
- AC and DC surge arresters, type 2.
- Plus / minus grounding PV modules.
- Galvanic isolation between the DC and AC sides.

OPTIONAL ACCESSORIES

- Inter-inverter communication via Ethernet. For other communications, please check availability.
- DC fuses.
- Motorization of the AC breaker.
- Auxiliary services kit.
- Low voltage ride-through kit.
- -30 °C (-22 °F) operating kit.
- Night supply.
- INGECON[®] SUN String Control for PV array string current monitoring.

EFFICIENCY

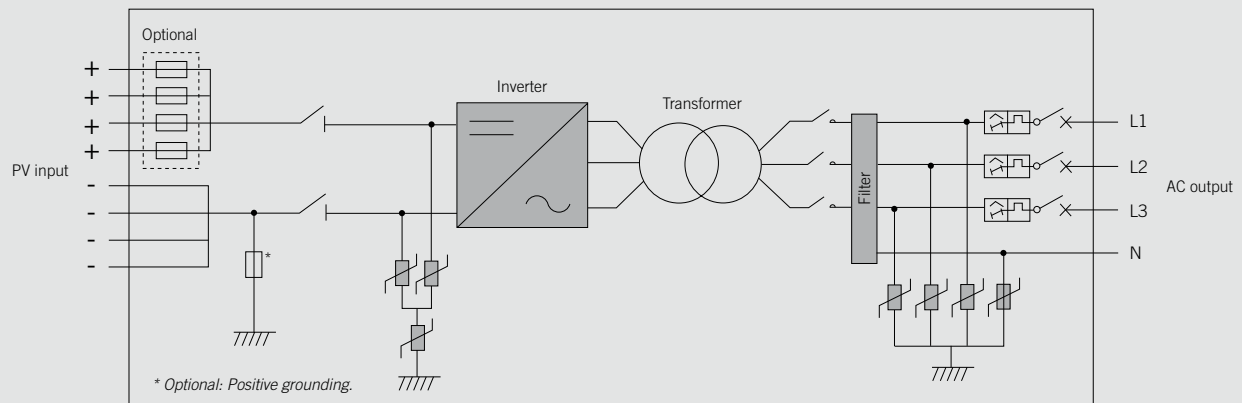
INGECON[®] SUN 125 U 208 Outdoor
V_{dc} = 350 V



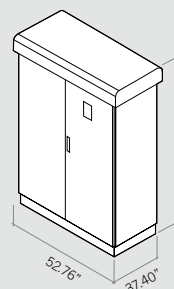
	125 U 208 Outdoor	125 U 480 Outdoor
Input (DC)		
Recommended PV array power range ⁽¹⁾	128.5 - 167.1 kWp	129.2 - 168 kWp
Voltage range MPP	330 - 820 V	330 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V
Maximum current	390 A	390 A
Inputs	4	4
MPPT	1	1
Output (AC)		
Rated power ⁽³⁾	125 kW	125 kW
Maximum current	347 A	150 A
Rated voltage	208 V	480 V
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1
Phi Cosine adjustable	Yes. Smax=125 kVA	Yes. Smax=125 kVA
THD ⁽⁵⁾	<3%	<3%
Efficiency		
Maximum efficiency	98.4%	97.3%
CEC - Weighted efficiency	96.5%	96.5%
General Information		
Air cooling	15.2 ft³/s	15.2 ft³/s
Stand-by consumption ⁽⁶⁾	30 W	30 W
Consumption at night	1 W	1 W
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Max. altitude ⁽⁷⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Marking	CE, ETL	
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE	

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⁾ AC power for 122 °F (50 °C) ambient temperature. The output power will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEEE 1547.1 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 3,280 ft (1,000 m) temperature for rated power (122 °F / 50 °C) is reduced 2.42 °F each 1,000 ft.

Power U Outdoor



Size and weight (inches and lbs)



125 U Outdoor
2,645 lbs

Transformerless



125TL U 208 Outdoor / 165TL U 275 Outdoor / 200TL U 330 Outdoor / 220TL U 360 Outdoor

The best performance at medium and large outdoor installations

Designed for ease of maintenance, capable of withstanding extreme temperatures, and featuring full electric protections as a standard supply, the INGECON[®]SUN Power TL U Outdoor inverters are one of the latest Ingeteam's developments. They have been especially designed for medium and large outdoor installations.

Easy to install and maintain

The INGECON[®]SUN Power TL U Outdoor inverters have been manufactured with components which offer a useful life of more than 20 years. These inverters are equipped with an advanced maximum power point tracking system (MPPT) to obtain the maximum power from the PV array. No additional items

are required and they can be manually disconnected from the grid.

Software included

They include, without any extra cost, RS-485 communications as well as the software INGECON[®] SUN Manager, INGECON[®] SUN Monitor and its iSun Monitor Smartphone version for monitoring, displaying and recording the data from the inverter through the Internet. Each inverter incorporates an internal datalogger for up to 3 months data storage, which can be accessed from either a remote PC or on-site from the inverter front panel, through a keypad.

Standard 5 year warranty, extendable for up to 20 years

PROTECTIONS

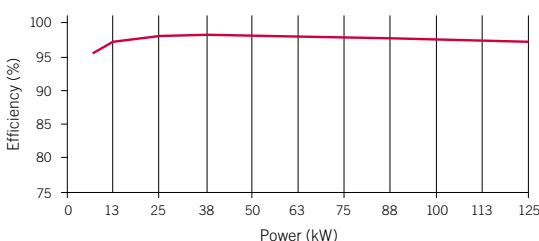
- Reverse polarity.
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.
- AC circuit breaker.
- DC switch.
- AC and DC surge arresters, type 2.
- Plus / minus grounding PV modules.

OPTIONAL ACCESSORIES

- Inter-inverter communication via Ethernet. For other communications, please check availability.
- DC fuses.
- Motorization of the AC breaker.
- Auxiliary services kit.
- Low voltage ride-through kit.
- -30 °C (-22 °F) operating kit.
- Night supply.
- INGECON[®] SUN String Control for PV array string current monitoring.
- Synchronization available with other inverters, to connect to the same MV transformer.

EFFICIENCY

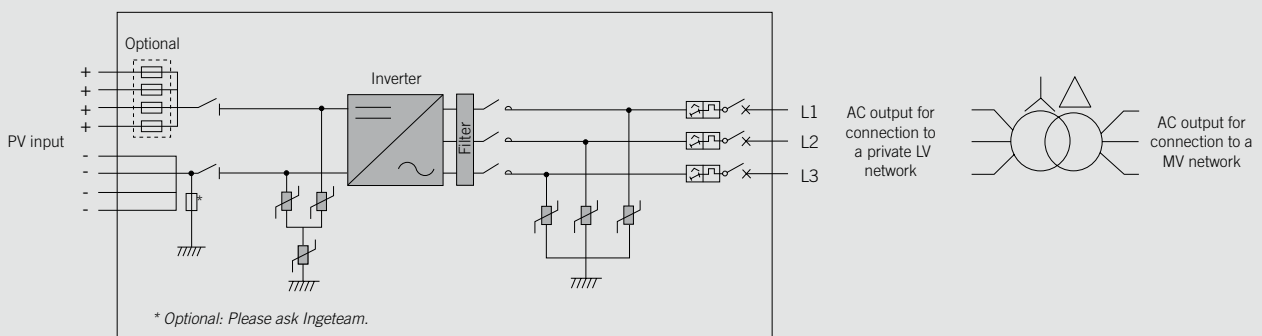
INGECON[®]SUN 125TL U 208 Outdoor
V_{dc} = 330 V



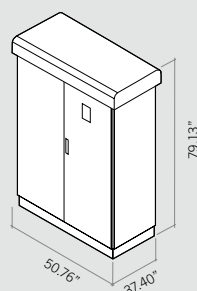
	125TL U 208 Outdoor	165TL U 275 Outdoor	200TL U 330 Outdoor	220TL U 360 Outdoor
Input (DC)				
Recommended PV array power range ⁽¹⁾	128.5 - 167.1 kWp	168.6 - 219.2 kWp	203.9 - 265.1 kWp	223.9 - 291.1 kWp
Voltage range MPP	330 - 820 V	440 - 820 V	525 - 820 V	570 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V	1,000 V	1,000 V
Maximum current	390 A	390 A	390 A	390 A
Inputs	4	4	4	4
MPPT	1	1	1	1
Output (AC)				
Rated power ⁽³⁾	125 kW	165 kW	200 kW	220 kW
Maximum current	347 A	346 A	350 A	353 A
Rated voltage	208 V IT System	275 V IT System	330 V IT System	360 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1	1
Phi Cosine adjustable	Yes. Smax=125 kVA	Yes. Smax=165 kVA	Yes. Smax=200 kVA	Yes. Smax=220 kVA
THD ⁽⁵⁾	<3%	<3%	<3%	<3%
Efficiency				
Maximum efficiency	98.4%	98.6%	98.7%	98.7%
CEC	97.5%	98%	98.5%	98.5%
General Information				
Air cooling	15.2 ft³/s	15.2 ft³/s	15.2 ft³/s	15.2 ft³/s
Stand-by consumption ⁽⁶⁾	30 W	30 W	30 W	30 W
Consumption at night	1 W	1 W	1 W	1 W
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Max. altitude ⁽⁷⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R
Marking	CE, ETL			
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2			
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE			

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⁾ AC power for 122 °F (50 °C) ambient temperature. The output power will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase ⁽⁴⁾ For $P_{out} > 25\%$ of the rated power ⁽⁵⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEEE 1547.1 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 3,280 ft (1,000 m) temperature for rated power (122 °F / 50 °C) is reduced 2.42 °F each 1,000 ft.

Power TL U Outdoor



Size and weight (inches and lbs)



125TL U 208 Outdoor / 165TL U 275 Outdoor
200TL U 330 Outdoor / 220TL U 360 Outdoor
1,435 lbs

Transformerless central inverters from 300 to 1164 kVA

The PV inverter family installed in the world's largest PV plants

The INGECON® SUN PowerMax central inverters are designed for multi-megawatt plants with a direct connection to a medium voltage transformer. The economies of scale achieved with the development of installations of this type, make it possible to reduce and optimise the \$/Wp ratio.

Enhanced performance

The key strengths of the Ingeteam central inverters lie in their high maximum efficiency rating which can be as high as 99.1%.

Furthermore, the improved cooling system allows for a greater air flow through the inverter's most critical electronic

components, such as the IGBTs, ensuring that the rated power can be delivered up to an ambient temperature of 50 °C (122 °F).

Grid support

This family of central inverters performs grid support functions and complies with the grid connection requirements for countries throughout the world, contributing to the quality and stability of the electricity system.

The INGECON® SUN PowerMax family offers a low voltage ride-through capability, allowing for continuous operation through short periods of low grid voltage.

Working in combination with the INGECON® EMS Plant Controller, the inverters are able to control the active power delivered to the grid.

Model versatility

These central inverters can be supplied in a number of topologies, making them suitable for all kinds of projects. The inverters are available in three configurations: monoblock (B series), master-slave (X series) and multi-MPPT (M series).

Further options include indoor or outdoor models, and inverters with an integrated DC-AC cabinet or without the AC lines.



– B Series

Inverters with a single power block. This new inverter has been designed to be cost effective and to facilitate maintenance tasks.

Available in a range of power outputs from 830 to 1164 kVA.



– X Series

Modular inverters with a master-slave configuration. The inverter has either two, three or four power blocks connected in parallel to the same PV array and to the same MV transformer.

Available in a wide range of power outputs from 300 to 1164 kVA.



– M Series

Modular inverters with a multi-MPPT configuration. The inverter can be supplied with either two, three or four independent power blocks, each with its own maximum power point tracking system (MPPT). It is possible to connect up to two 4-block inverters to the same medium voltage transformer winding.

Available from 300 to 1164 kVA.



Jasper PV Plant (South Africa). 75 MW PV plant with INGECON® SUN PowerMax inverters

B Series



Transformerless central inverters with a single power block

DC and AC supplies in the same cabinet

The input and output lines are integrated into the same cabinet, facilitating maintenance and repair work.

Maximum protection

These three phase inverters are equipped with a motorized DC switch to decouple the PV generator from the inverter. Optionally, these inverters can be supplied with an AC circuit breaker with door control, in addition to fuses, grounding kit and input current monitoring.

Maximum efficiency values

Through the use of innovative electronic conversion topologies, efficiency values of up to 99% can be achieved. Thanks to a sophisticated control algorithm, this equipment can guarantee maximum efficiency depending on the PV power available.

This maximizes the efficiency and service life of the equipment. In this way, in periods of low irradiance, it is able to increase performance by up to 1.8 points.

A complete range of equipment for all types of projects

Versions available:

- Indoor inverters with integrated DCAC cabinet.
- Outdoor inverters with integrated DCAC cabinet.
- Symmetrical indoor inverters, with the connection cabinet on the opposite side, to make it possible to install two inverters facing each other, with a common power supply point.

Enhanced functionality

This new INGECON® SUN PowerMax range features a revamped, improved enclosure which, together with its innovative air cooling system, makes it possible to increase the ambient operating temperature to deliver its rated power up to 50 °C.

Long-lasting design

The inverters have been designed to guarantee a service life of more than 20 years, as demonstrated by the stress tests they are subjected to. Standard 5 year warranty, extendable for up to 25 years.

Grid support

The INGECON® SUN PowerMax B Series has been designed to comply with the grid connection requirements in different countries, contributing to the quality and stability of the electric system. These inverters therefore feature a low voltage ride-through capability, and can deliver reactive power and control the active power delivered to the grid.

Ease of maintenance

All the elements can be removed or replaced directly from the inverter's front side, thanks to its new design.

Easy to operate

The INGECON® SUN PowerMax inverters feature an LCD screen for the simple and convenient monitoring of the inverter status and a range of internal variables. The display also includes a number of LEDs to show the inverter operating status with warning lights to indicate any incidents. All this helps to simplify and facilitate maintenance tasks.

Monitoring and communication

Ethernet and RS-485 communications supplied as standard. The following applications are included at no extra cost: INGECON® SUN Manager, INGECON® SUN Monitor and its Smart-phone version iSun Monitor, available on the App Store. These applications are used for monitoring and recording the inverter's internal operating variables through the

Internet (alarms, real time production, etc.), in addition to the historical production data.

Two communication ports available (one for monitoring and one for plant controlling), allowing fast and simultaneous plant control.

PROTECTIONS

- DC Reverse polarity.
- Short-circuits and overloads at the output.
- Anti-islanding with automatic disconnection.
- Insulation failure DC.
- 15 pairs of fuse-holders.
- Lightning induced DC and AC surge arrestors, type 2.
- Motorized DC switch to automatically disconnect the inverter from the PV array.
- Low voltage ride-through capability.

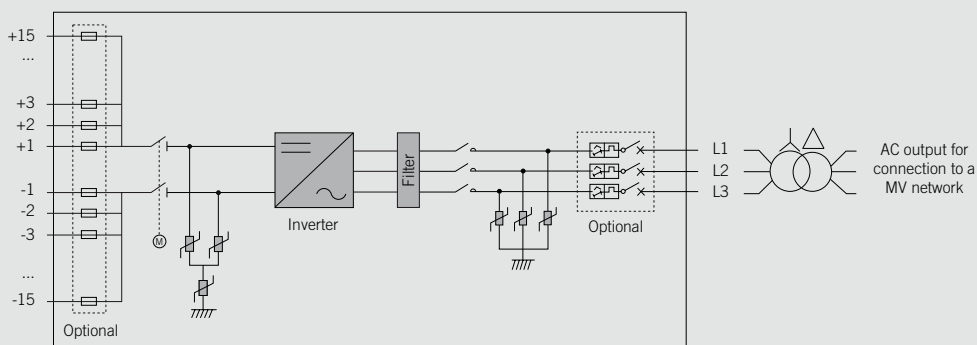
OPTIONAL ACCESSORIES

- AC circuit breaker.
- Motorization kit for the AC circuit breaker.
- Insulation failure AC.
- Grounding kit.
- Heating kit, for operating at an ambient temperature of down to -30 °C.
- DC fuses.
- Monitoring of the group currents at the DC input.
- Remote tripping of the AC protection.
- Wattmeter on the AC side.
- Lightning induced DC and AC surge arrestors, type 1.

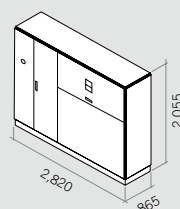
ADVANTAGES OF THE MONOBLOCK VERSION

- Enhanced performance.
- Easier maintenance thanks to its new design and enclosure.
- Lightweight spares.
- It allows to ground the PV array.
- Components easily replaceable.

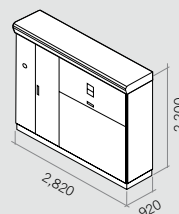
PowerMax B Series



Size and weight (mm)



Indoor inverter
1,860 kg.

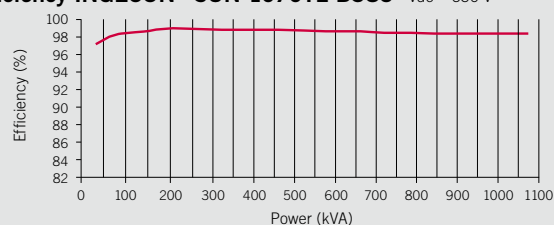


Outdoor inverter
1,920 kg.

	830TL B300	1000TL B360	1070TL B385
Input (DC)			
Recommended PV array power range ⁽¹⁾	845 - 1,081 kWp	1,013 - 1,297 kWp	1,084.3 - 1,387 kWp
Voltage Range MPP	440 - 820 V	524 - 820 V	560 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	2,000 A	2,000 A	2,000 A
N° inputs with fuse holders	15	15	15
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V fuses		
Type of connection	Connection to copper bars		
Number of power blocks	1	1	1
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Inputs protection			
Overvoltage protections	Type 1-2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reverse polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @50 °C ⁽³⁾	831.4 kVA / 765 kVA	997.7 kVA / 918 kVA	1,066.9 kVA / 981.8 kVA
Current @30 °C / @50 °C	1,600 A / 1,472 A	1,600 A / 1,472 A	1,600 A / 1,472 A
Rated voltage	300 V IT System	360 V IT System	385 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=831.4 kVA	Yes. Smax=997.7 kVA	Yes. Smax=1,066.9 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 1-2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	98.8%	98.8%	98.8%
Euroefficiency	98.5%	98.5%	98.5%
Stand-by consumption ⁽⁶⁾	60 W	60 W	60 W
Consumption at night	60 W	60 W	60 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁷⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	7,200 m³/h (fans: 2,500 VA)	7,200 m³/h (fans: 2,500 VA)	7,200 m³/h (fans: 2,500 VA)
Acoustic emission	<70 dB (A) at 1 m		
Marking	CE		
EMS and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Ecuadorian Grid Code, Peruvian Grid code, Thailand PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For each °C of increase between 30 °C and 50 °C, the output power will be reduced at the rate of 0.4%. Over 50 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

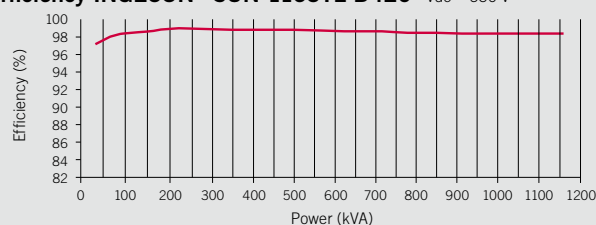
Efficiency INGECON® SUN 1070TL B385 Vdc = 650 V



	1110TL B400	1140TL B410	1165TL B420
Input (DC)			
Recommended PV array power range ⁽¹⁾	1,124.2 - 1,441.1 kWp	1,151 - 1,476.8 kWp	1,179.3 - 1,513.2 kWp
Voltage Range MPP	580 - 820 V	595 - 820 V	610 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	2,000 A	2,000 A	2,000 A
N° inputs with fuse holders	15	15	15
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V fuses		
Type of connection	Connection to fuse-holder copper bars		
Number of power blocks	1	1	1
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Inputs protection			
Overvoltage protections	Type 1-2 surge arresters		
DC switch	Motorized DC switch		
Other protections	Reverse polarity, DC insulation monitor with alarm, emergency pushbutton		
Output (AC)			
Power @30 °C / @50 °C ⁽³⁾	1,108.5 kVA / 1,020 kVA	1,136.2 kVA / 1,045.5 kVA	1,163.9 kVA / 1,071 kVA
Current @30 °C / @50 °C	1,600 A / 1,472 A	1,600 A / 1,472 A	1,600 A / 1,472 A
Rated voltage	400 V IT System	410 V IT System	420 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=1,108 kVA	Yes. Smax=1,136.2 kVA	Yes. Smax=1,163.9 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 1-2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99%	99%	99%
Euroefficiency	98.7%	98.7%	98.7%
Stand-by consumption ⁽⁶⁾	60 W	60 W	60 W
Consumption at night	60 W	60 W	60 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁷⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	7,200 m³/h (fans: 2,500 VA)	7,200 m³/h (fans: 2,500 VA)	7,200 m³/h (fans: 2,500 VA)
Acoustic emission	<70 dB (A) at 1 m		
Marking	CE		
EMS and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Ecuadorian Grid Code, Peruvian Grid code, Thailand PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For each °C of increase between 30 °C and 50 °C, the output power will be reduced at the rate of 0.4%. Over 50 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁴⁾ For $P_{out} > 25\%$ of the rated power ⁽⁵⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

Efficiency INGECON® SUN 1165TL B420 Vdc = 650 V



X Series

Indoor / Outdoor



Central inverters with a Master-Slave configuration and integrated DCAC cabinet

DC and AC supplies in the same cabinet

The input and output lines are integrated into the same cabinet, facilitating maintenance and repair work.

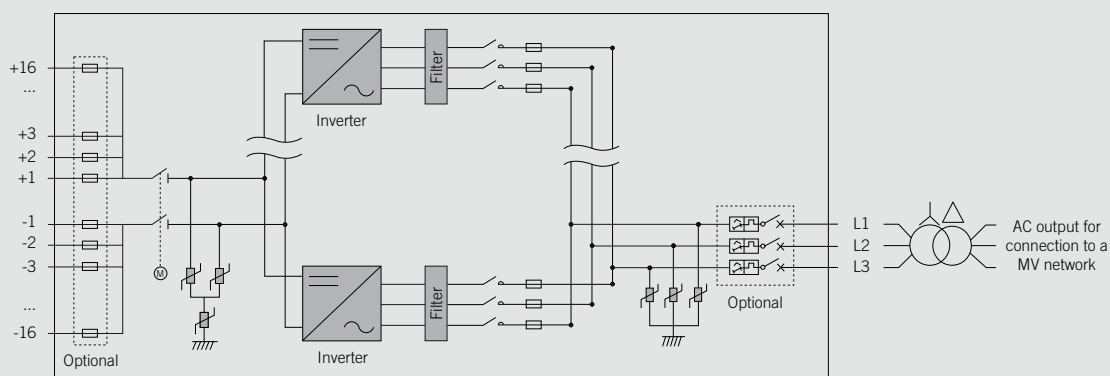
Available in indoor and outdoor versions

These Master-Slave central inverters feature an innovative ventilation system for the internal circulation of fresh air. Furthermore, the selection of casings makes these inverters suitable for indoor (IP20) and outdoor (IP54) installation.

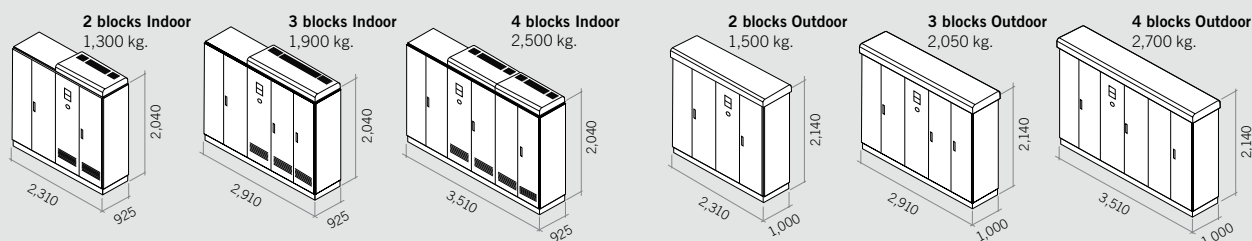
Maximum protection

These three phase inverters are equipped with a motorized DC switch to decouple the PV generator from the inverter. Optionally, the inverters can be supplied with an AC circuit breaker with door control, in addition to fuses, grounding kit and input current monitoring.

PowerMax X DCAC



Size and weight (mm)





Central inverters with a Master-Slave configuration and DC cabinet

Optimised space and investment

This model requires less space as the AC supply is not grouped together. This is a versatile solution, which is particularly advantageous for medium voltage transformer substations with two inverters and limited space. In this

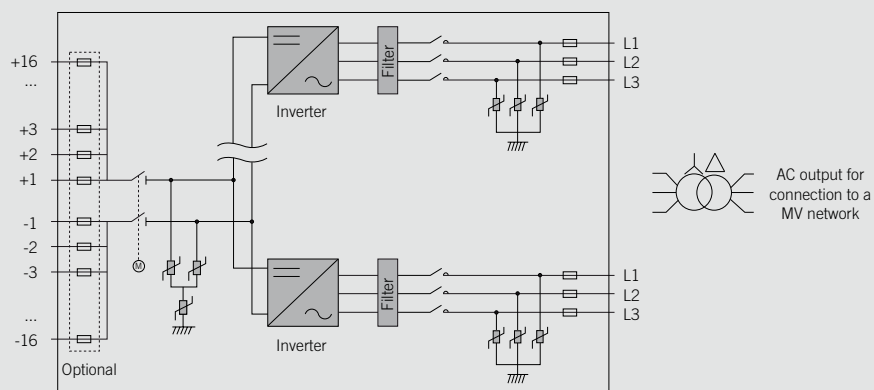
way, investment is optimised by constructing enclosures housing a number of inverters.

Integrated protections

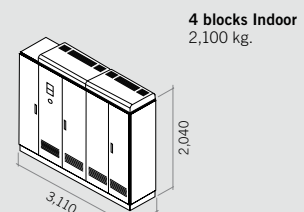
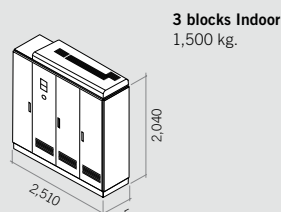
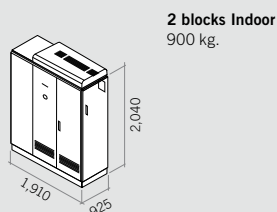
The Master-Slave INGECON® SUN PowerMax DC inverters are supplied

with DC fuse-holders as standard and, optionally, they can come with DC fuses and a grounding kit. In addition, they have a motorized DC switch to decouple the PV generator from the inverter.

PowerMax X DC



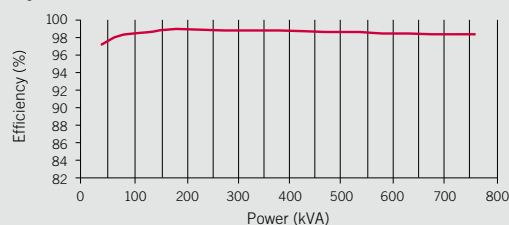
Size and weight (mm)



	380TL X300	570TL X300	760TL X300
Input (DC)			
Recommended PV array power range ⁽¹⁾	388.6 - 497.1 kWp	583 - 745.8 kWp	777.3 - 994.4 kWp
Voltage Range MPP	437 - 820 V	437 - 820 V	437 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽³⁾	415.7 kVA / 382.4 kVA	623.5 kVA / 573.7 kVA	831.4 kVA / 764.9 kVA
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	300 V IT System	300 V IT System	300 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=415.7 kVA	Yes. Smax=623.5 kVA	Yes. Smax=831.4 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	98.9%	98.9%	98.9%
Euroefficiency	98.7%	98.7%	98.8%
Stand-by consumption ⁽⁶⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁷⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

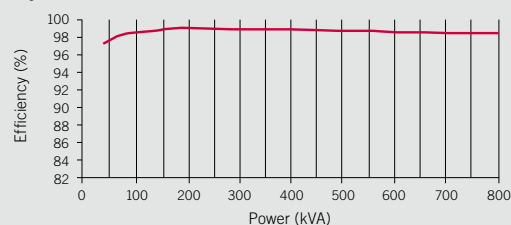
Efficiency INGECON® SUN 760TL X300 V_{dc} = 575 V



	400TL X320	605TL X320	800TL X320
Input (DC)			
Recommended PV array power range ⁽¹⁾	413.7 - 530.3 kWp	620.6 - 795.5 kWp	827.5 - 1,060.7 kWp
Voltage Range MPP	468 - 820 V	468 - 820 V	468 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽³⁾	443.4 kVA / 407.9 kVA	665.1 kVA / 611.9 kVA	886.8 kVA / 815.9 kVA
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	320 V IT System	320 V IT System	320 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=443.4 kVA	Yes. Smax=665.1 kVA	Yes. Smax=886.8 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99%	99%	99%
Euroefficiency	98.8%	98.8%	98.9%
Stand-by consumption ⁽⁶⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁷⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards x	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

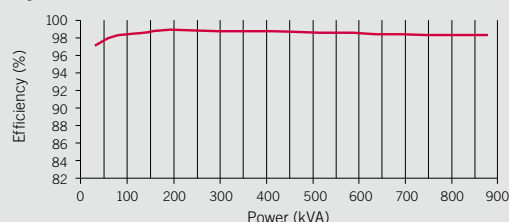
Efficiency INGECON® SUN 800TL X320 V_{dc} = 550 V



	440TL X345	660TL X345	880TL X345
Input (DC)			
Recommended PV array power range ⁽¹⁾	445.8 - 571.7 kWp	668.7 - 857.6 kWp	891.6 - 1,143.5 kWp
Voltage Range MPP	502 - 820 V	502 - 820 V	502 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽³⁾	478 kVA / 439.8 kVA	717.1 kVA / 659.7 kVA	956.1 kVA / 879.6 kVA
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	345 V IT System	345 V IT System	345 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=478 kVA	Yes. Smax=717.1 kVA	Yes. Smax=956.1 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.8%	98.9%	98.9%
Stand-by consumption ⁽⁶⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁷⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

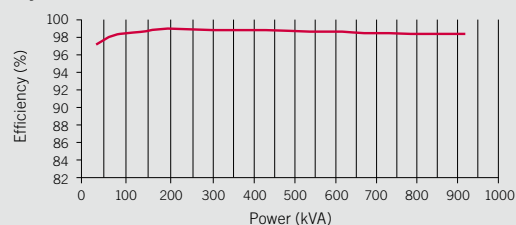
Efficiency INGECON® SUN 880TL X345 V_{dc} = 600 V



	460TL X360	690TL X360	920TL X360
Input (DC)			
Recommended PV array power range ⁽¹⁾	464.7 - 596.6 kWp	697.1 - 894.9 kWp	928.9 - 1,193.1 kWp
Voltage Range MPP	524 - 820 V	524 - 820 V	524 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽³⁾	498.8 kVA / 458.9 kVA	748.2 kVA / 688.4 kVA	997.7 kVA / 917.8 kVA
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	360 V IT System	360 V IT System	360 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=498.8 kVA	Yes. Smax=748.2 kVA	Yes. Smax=997.7 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.8%	98.9%	99%
Stand-by consumption ⁽⁶⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁷⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

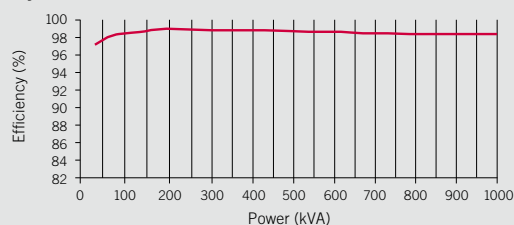
Efficiency INGECON® SUN 920TL X360 V_{dc} = 625 V



	500TL X400	750TL X400	1000TL X400
Input (DC)			
Recommended PV array power range ⁽¹⁾	515.8 - 662.9 kWp	773.7 - 994.4 kWp	1,031.6 - 1,325.7 kWp
Voltage Range MPP	578 - 820 V	578 - 820 V	578 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽³⁾	554.3 kVA / 509.9 kVA	831.4 kVA / 764.9 kVA	1,108.5 kVA / 1,019.8 kVA
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	400 V IT System	400 V IT System	400 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=554.3 kVA	Yes. Smax=831.4 kVA	Yes. Smax=1,108.5 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.8%	98.9%	99%
Stand-by consumption ⁽⁶⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁷⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

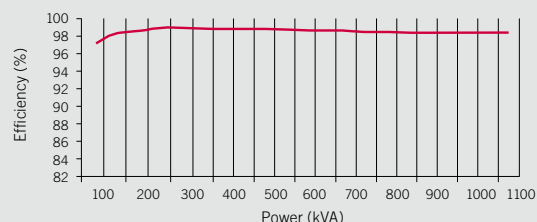
Efficiency INGECON® SUN 1000TL X400 V_{dc} = 650 V



	535TL X420	805TL X420	1070TL X420
Input (DC)			
Recommended PV array power range ⁽¹⁾	541.1 - 696 kWp	811.7 - 1,044 kWp	1,082.3 - 1,392 kWp
Voltage Range MPP	607 - 820 V	607 - 820 V	607 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽³⁾	582 kVA / 535.4 kVA	873 kVA / 803.1 kVA	1,163.9 kVA / 1,070.8 kVA
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	420 V IT System	420 V IT System	420 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=582 kVA	Yes. Smax=873 kVA	Yes. Smax=1,163.9 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.8%	98.9%	98.9%
Stand-by consumption ⁽⁶⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁷⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

Efficiency INGECON® SUN 1070TL X420 V_{dc} = 625 V



M Series

Indoor / Outdoor



Central multi-MPPT inverters with an integrated DCAC CABINET

DC and AC supplies in the same cabinet

The input and output lines are integrated into the same cabinet, facilitating maintenance and repair work, whilst still maintaining the highest level of safety.

Available in indoor and outdoor versions

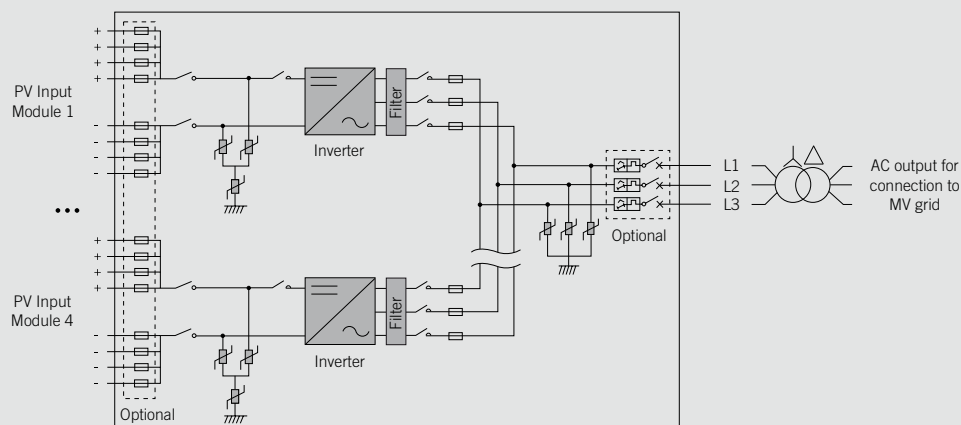
These multi-string central inverters can be supplied with either an indoor (IP20) or outdoor (IP54) casing.

Maximum protection

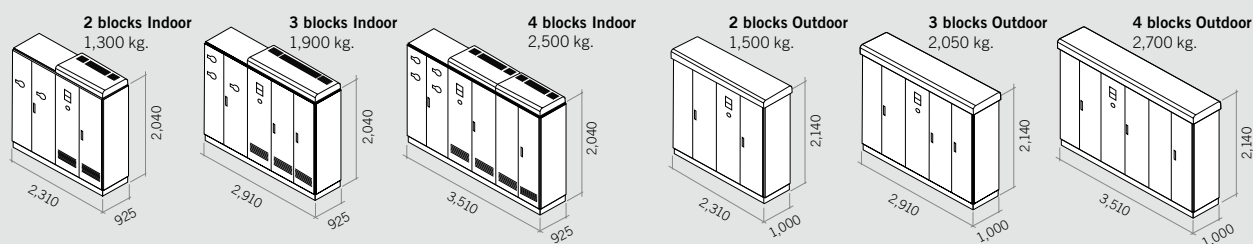
These three phase inverters are equip-

ped with a manual DC switch and a DC automatic contactor for each power block, in order to decouple the PV generator from the inverter. Optionally, the inverters can be supplied with an AC circuit breaker with door control, in addition to fuses and current monitoring.

PowerMax M DCAC



Size and weight (mm)





Central multi-MPPT inverters with a DC CABINET

Optimised space and investment

This model requires less space as the AC supply is not grouped together. This is a versatile solution, which is particularly advantageous for medium voltage transformer substations with two inverters and limited space. In this

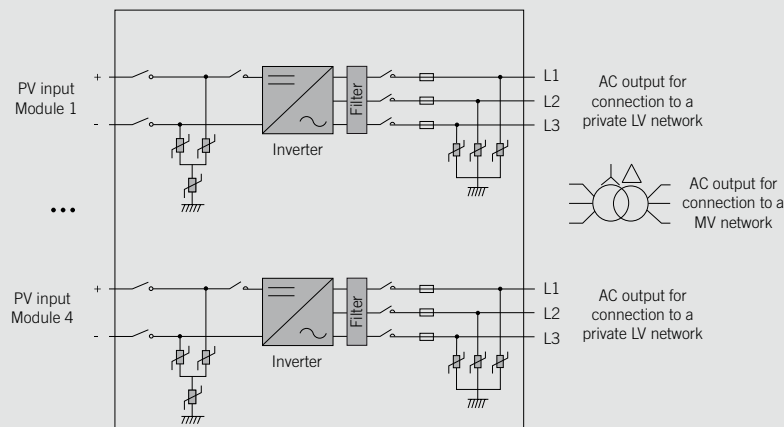
way, investment is optimised by constructing enclosures housing a number of inverters.

Integrated protections

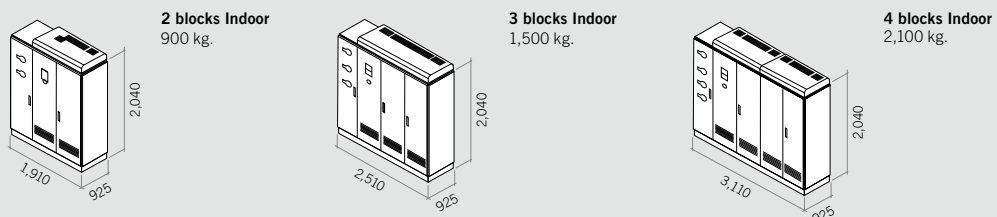
The INGECON® SUN PowerMax DC multi-string inverters are supplied with

manual DC switch and an automatic DC contactor for each power block, in order to decouple the PV generator from the inverter.

PowerMax M DC



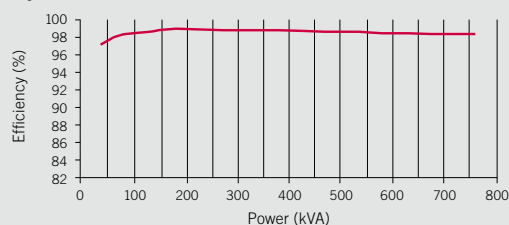
Size and weight (mm)



	380TL M300	570TL M300	760TL M300
Input (DC)			
Recommended PV array power range ⁽¹⁾	388.6 - 197.1 kWp	583 - 745.8 kWp	777.3 - 994.4 kWp
Voltage Range MPP	437 - 820 V	437 - 820 V	437 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions ⁽³⁾	63 A / 1,000 V to 400 A / 1,000 V fuses		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT ⁽⁴⁾	2	3	4
Max. current at each input	From 40 A to 260 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽⁵⁾	415.7 kW / 382.4 kW	623.5 kW / 573.7 kW	831.4 kW / 764.9 kW
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	300 V IT System	300 V IT System	300 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁶⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=415.7 kVA	Yes. Smax=623.5 kVA	Yes. Smax=831.4 kVA
THD (Total Harmonic Distortion) ⁽⁷⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	98.9%	98.9%	98.9%
Euroefficiency	98.5%	98.5%	98.5%
Stand-by consumption ⁽⁸⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁹⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For other configurations, consult with Ingeteam ⁽⁴⁾ The MPPT connected to the same transformer through TL inverters must have the same voltage configuration ⁽⁵⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁶⁾ For P_{out}>25% of the rated power ⁽⁷⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁸⁾ Consumption from PV field ⁽⁹⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

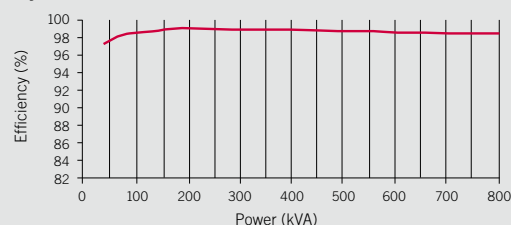
Efficiency INGECON® SUN 760TL M300 V_{dc} = 550 V



	400TL M320	605TL M320	800TL M320
Input (DC)			
Recommended PV array power range ⁽¹⁾	413.7 - 530.3 kWp	620.6- 795.5 kWp	827.5 - 1,060.7 kWp
Voltage Range MPP	468 - 820 V	468 - 820 V	468 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions ⁽³⁾	63 A / 1,000 V to 400 A / 1,000 V fuses		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT ⁽⁴⁾	2	3	4
Max. current at each input	From 40 A to 260 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽⁵⁾	443.4 kW / 407.9 kW	665.1 kW / 611.9 kW	886.8 kW / 815.9 kW
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	320 V IT System	320 V IT System	320 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁶⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=443.4 kVA	Yes. Smax=665.1 kVA	Yes. Smax=886.8 kVA
THD (Total Harmonic Distortion) ⁽⁷⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99%	99%	99%
Euroefficiency	98.6%	98.6%	98.6%
Stand-by consumption ⁽⁸⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁹⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For other configurations, consult with Ingeteam ⁽⁴⁾ The MPPT connected to the same transformer through TL inverters must have the same voltage configuration ⁽⁵⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁶⁾ For P_{out}>25% of the rated power ⁽⁷⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁸⁾ Consumption from PV field ⁽⁹⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

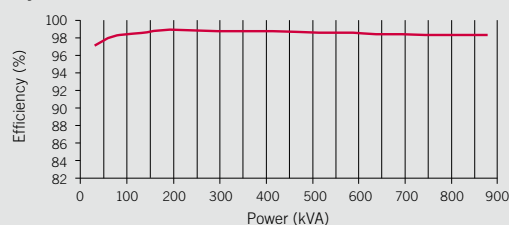
Efficiency INGECON® SUN 800TL M320 V_{dc} = 550 V



	440TL M345	660TL M345	880TL M345
Input (DC)			
Recommended PV array power range ⁽¹⁾	445.8 - 571.7 kWp	668.7 - 857.6 kWp	891.6 - 1,143.5 kWp
Voltage Range MPP	502 - 820 V	502 - 820 V	502 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions ⁽³⁾	63 A / 1,000 V to 400 A / 1,000 V fuses		
Type of connection		Connection to copper bars	
Power blocks	2	3	4
MPPT ⁽⁴⁾	2	3	4
Max. current at each input	From 40 A to 260 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽⁵⁾	478 kW / 439.8 kW	717.1 kW / 659.7 kW	956.1 kW / 879.6 kW
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	345 V IT System	345 V IT System	345 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁶⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=478 kVA	Yes. Smax=717.1 kVA	Yes. Smax=956.1 kVA
THD (Total Harmonic Distortion) ⁽⁷⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.7%	98.7%	98.7%
Stand-by consumption ⁽⁸⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁹⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For other configurations, consult with Ingeteam ⁽⁴⁾ The MPPT connected to the same transformer through TL inverters must have the same voltage configuration ⁽⁵⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁶⁾ For P_{out}>25% of the rated power ⁽⁷⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁸⁾ Consumption from PV field ⁽⁹⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

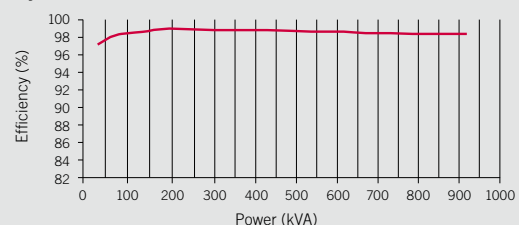
Efficiency INGECON® SUN 880TL M345 V_{dc} = 600 V



	460TL M360	690TL M360	920TL M360
Input (DC)			
Recommended PV array power range ⁽¹⁾	464.7 - 596.6 kWp	697.1 - 894.9 kWp	929.4 - 1,193.1 kWp
Voltage Range MPP	524 - 820 V	524 - 820 V	524 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions ⁽³⁾	63 A / 1,000 V to 400 A / 1,000 V fuses		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT ⁽⁴⁾	2	3	4
Max. current at each input	From 40 A to 260 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽⁵⁾	498.8 kW / 458.9 kW	748.2 kW / 688.4 kW	997.7 kW / 917.8 kW
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	360 V IT System	360 V IT System	360 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁶⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=498.8 kVA	Yes. Smax=748.2 kVA	Yes. Smax=997.7 kVA
THD (Total Harmonic Distortion) ⁽⁷⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.7%	98.7%	98.7%
Stand-by consumption ⁽⁸⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁹⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For other configurations, consult with Ingeteam ⁽⁴⁾ The MPPT connected to the same transformer through TL inverters must have the same voltage configuration ⁽⁵⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁶⁾ For P_{out}>25% of the rated power ⁽⁷⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁸⁾ Consumption from PV field ⁽⁹⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

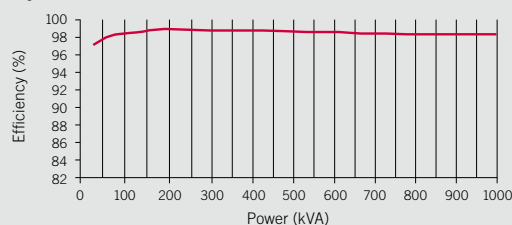
Efficiency INGECON® SUN 920TL M360 V_{dc} = 625 V



	500TL M400	750TL M400	1000TL M400
Input (DC)			
Recommended PV array power range ⁽¹⁾	515.8 - 662.9 kWp	773.7 - 994.4 kWp	1,031.6 - 1,325.7 kWp
Voltage Range MPP	578 - 820 V	578 - 820 V	578 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions ⁽³⁾	63 A / 1,000 V to 400 A / 1,000 V fuses		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT ⁽⁴⁾	2	3	4
Max. current at each input	From 40 A to 260 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽⁵⁾	554.3 kW / 509.9 kW	554.3 kW / 509.9 kW	1,108.5 kW / 1,019.8 kW
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	400 V IT System	400 V IT System	400 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁶⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=554.3 kVA	Yes. Smax=554.3kVA	Yes. Smax=1,108.5 kVA
THD (Total Harmonic Distortion) ⁽⁷⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.7%	98.7%	98.7%
Stand-by consumption ⁽⁸⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁹⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For other configurations, consult with Ingeteam ⁽⁴⁾ The MPPT connected to the same transformer through TL inverters must have the same voltage configuration ⁽⁵⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁶⁾ For P_{out}>25% of the rated power ⁽⁷⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁸⁾ Consumption from PV field ⁽⁹⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

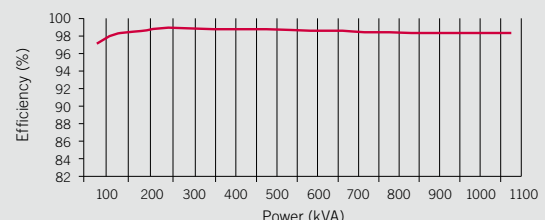
Efficiency INGECON® SUN 1000TL M400 V_{dc} = 650 V



	535TL M420	805TL M420	1070TL M420
Input (DC)			
Recommended PV array power range ⁽¹⁾	541.1 - 696 kWp	811.7 - 1,044 kWp	1,028.3 - 1,392 kWp
Voltage Range MPP	607 - 820 V	607 - 820 V	607 - 820 V
Maximum voltage ⁽²⁾	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
N° inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions ⁽³⁾	63 A / 1,000 V to 400 A / 1,000 V fuses		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT ⁽⁴⁾	2	3	4
Max. current at each input	From 40 A to 260 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reversible polarity / insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C ⁽⁵⁾	582 kW / 535.4 kW	582 kW / 803.1 kW	1,163.9 kW / 1,070.8 kW
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	420 V IT System	420 V IT System	420 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁶⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=582 kVA	Yes. Smax=582 kVA	Yes. Smax=1,163.9 kVA
THD (Total Harmonic Distortion) ⁽⁷⁾	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.6%	98.6%	98.6%
Stand-by consumption ⁽⁸⁾	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁹⁾	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ For other configurations, consult with Ingeteam ⁽⁴⁾ The MPPT connected to the same transformer through TL inverters must have the same voltage configuration ⁽⁵⁾ For each °C of increase between 30 °C and 45 °C, the output power will be reduced at the rate of 0.4%. Over 45 °C, the output power will be reduced at the rate of 1.8% / °C ⁽⁶⁾ For P_{out}>25% of the rated power ⁽⁷⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁸⁾ Consumption from PV field ⁽⁹⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

Efficiency INGECON® SUN 1070TL M420 V_{dc} = 650 V





Transformerless central inverters with a Master-Slave configuration

The central inverter with a Master-Slave configuration, in any of its versions, is equipped with three to four power blocks, connected in parallel to the same PV generator and to the same medium voltage transformer

DC and AC supplies in the same cabinet

The input and output lines are integrated into the same cabinet, facilitating maintenance and repair work.

Maximum efficiency values

Through the use of innovative electronic conversion topologies, efficiency values up to 98.6% can be easily achieved. Thanks to a sophisticated control algorithm, this equipment can guarantee maximum efficiency through the selective operation of its power blocks, based on the PV power available. This maximizes the efficiency and service life of the equipment. In this way, in periods of low irradiance, it is able to increase performance by up to 1.8 points.

Enhanced functionality

This new INGECON® SUN PowerMax U inverter range features a revamped, improved enclosure which, together with its innovative air cooling system, makes it possible to increase the ambient operating temperature to deliver its rated power up to 122 °F (50 °C).

A complete range of equipment for all types of projects

The PowerMax U inverters are fully adaptable to all types of engineering projects. This is made possible thanks to their wide range of power outputs and to the variety of possible configurations.

Maximum protection

These three-phase inverters are equipped with a motorized DC switch to decouple the PV generator from the inverter. Optionally, the PowerMax U inverters can be supplied with DC fuses. Optional positive or negative grounding, or non-grounded.

Long-lasting design

The inverters have been designed to guarantee a service life of more than 20 years, as demonstrated by the stress tests they are subjected to. Standard 5 year warranty, extendable for up to 20 years.

Grid support

The INGECON® SUN PowerMax U family has been designed to comply with the grid connection requirements in different countries, contributing to the quality and stability of the electric system. These inverters therefore can deliver reactive power and control the active power delivered to the grid.

Ease of maintenance

Easily replaceable modular power blocks for shorter maintenance times.

Easy to operate

The INGECON® SUN PowerMax U inverters feature an LCD screen for the simple and convenient monitoring of the inverter status and a range of internal variables. The display also includes a number of LEDs to show the inverter operating status with warning lights to indicate any incident. All this helps to simplify and facilitate maintenance tasks.

Monitoring and communication

RS-485 communications supplied as standard for monitoring the internal operating variables (alarms, real time production, etc.) in addition to the historical production data. Ethernet, GSM / GPRS and Bluetooth are also available. The following applications are included at no extra cost: INGECON® SUN Manager, INGECON® SUN Monitor and its iSun Monitor Smartphone version for monitoring and recording the inverter data over the Internet.



PROTECTIONS

- DC reverse polarity.
- Short-circuits and overloads at the output.
- Anti-islanding with automatic disconnection.
- Insulation failure.
- 4 DC fuse-holders per power block. Non-grounded inverters have both poles protected.
- DC and AC surge arresters, type 2.
- Motorized DC switch for the automatic disconnection of the inverter from the PV array.
- AC fuses.

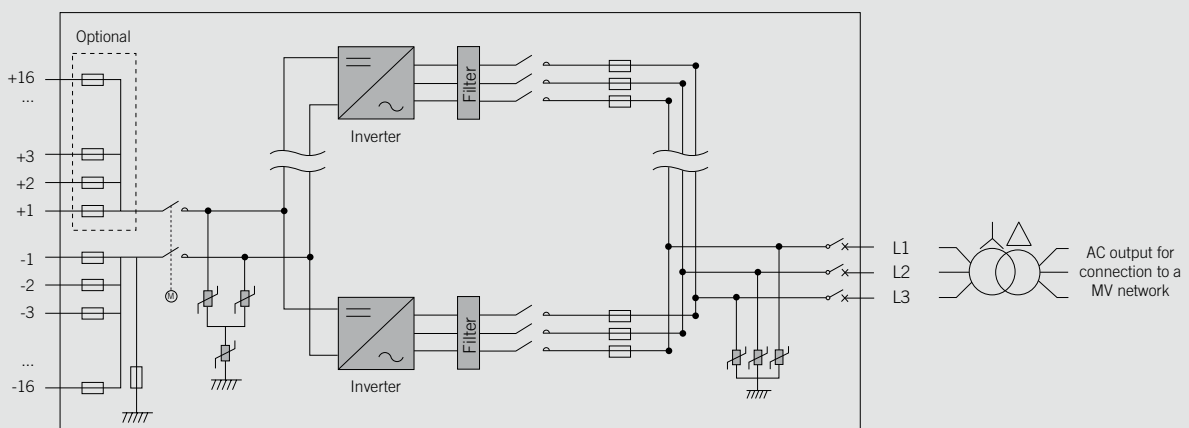
OPTIONAL ACCESSORIES

- GSM / GPRS remote communication.
- Inter-inverter communication via Ethernet or Bluetooth.
- Kit for operating at an ambient temperature of -22 °F (-30 °C).
- DC fuses.
- Monitoring of the input DC currents.
- Wattmeter on the AC side.
- Low voltage ride-through kit.
- Auxiliary services kit.
- AC breaker.

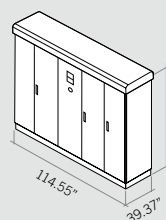
ADVANTAGES OF THE MASTER-SLAVE VERSION

- Enhanced performance.
- In the event of the failure of one of the blocks, the power is then distributed amongst the remaining blocks.
- Lightweight spares, for shorter delivery times.
- It allows to ground the PV array, either the positive or the negative pole.

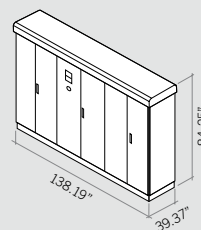
PowerMax TL U X Series



Size and weight (inches and lbs)



660TL U X360 Outdoor
4,520 lbs

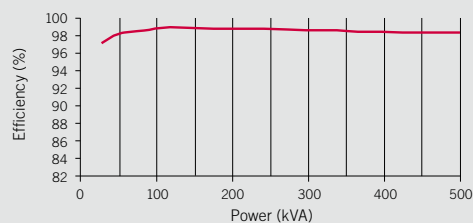


880TL U X360 Outdoor
5,950 lbs

	375TL U X208 Outdoor	500TL U X208 Outdoor
Input (DC)		
Recommended PV array power range ⁽¹⁾	382.1 - 502.1 kWp	509.5 - 669.5 kWp
Voltage Range MPP	311 - 820 V	350 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V
Maximum current	1,170 A	1,560 A
N° inputs with fuse holders	12 (24 for floating configuration)	16 (32 for floating configuration)
Fuse dimensions	125 A / 1,000 V to 400 A / 1,000 V fuses, maximum current from 82 to 260 A for positive and negative poles	
Type of connection	Connection to copper bars	
Power blocks	3	4
MPPT	1	1
Current at each input	82 to 260 A	82 to 260 A
Input protections		
Overvoltage protections	DC surge arresters, type 2	
DC switch	Motorized DC switch	
Other protections	DC insulation monitor with alarm. Optionally, from 8 to 16 pairs of DC fuses (16 to 32 pairs for floating configuration)	
Output (AC)		
Rated power ⁽³⁾	375 kW	500 kW
Maximum current	1,050 A	1,400 A
Rated voltage	208 V IT System	208 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1
Phi Cosine adjustable	Yes. Smax=375 kVA	Yes. Smax=500 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%
Output protections		
Overvoltage protections	AC surge arresters, type 2	
AC breaker	Yes	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.1%	98.1%
CEC	97.5%	97.5%
Stand-by consumption ⁽⁶⁾	90 W	120 W
Consumption at night	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁷⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)	
Air flow	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans:1,500 VA)
Acoustic emission	< 55 dB (A) at 4 m and < 67 dB (A) at 1 m with fans working at maximum power	
Marking	CE, ETL	
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE	

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ AC Power for 122 °F (50 °C) ambient temperature. The output power will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEEE 1547.1 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F each 1,000 ft.

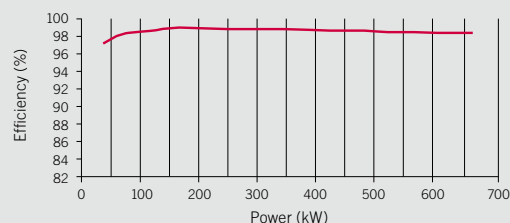
Efficiency INGECON® SUN 500TL U X208 Outdoor V_{dc} = 311 V



	500TL U X275 Outdoor	660TL U X275 Outdoor
Input (DC)		
Recommended PV array power range ⁽¹⁾	508.4 - 669.5 kWp	671.1 - 897.1 kWp
Voltage Range MPP	403 - 820 V	403 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V
Maximum current	1,170 A	1,560 A
N° inputs with fuse holders	12 (24 for floating configuration)	16 (32 for floating configuration)
Fuse dimensions	125 A / 1,000 V to 400 A / 1,000 V fuses, maximum current from 82 to 260 A for positive and negative poles	
Type of connection	Connection to copper bars	
Power blocks	3	4
MPPT	1	1
Current at each input	82 to 260 A	82 to 260 A
Input protections		
Overvoltage protections	DC surge arresters, type 2	
DC switch	Motorized DC switch	
Other protections	DC insulation monitor with alarm. Optionally, from 8 to 16 pairs of DC fuses (16 to 32 pairs for floating configuration)	
Output (AC)		
Rated power ⁽³⁾	500 kVA	660 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	275 V IT System	275 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1
Phi Cosine adjustable	Yes. Smax=500 kVA	Yes. Smax=500 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%
Output protections		
Overvoltage protections	AC surge arresters, type 2	
AC breaker	Yes	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.3%	98.3%
CEC	98%	98%
Stand-by consumption ⁽⁶⁾	90 W	120 W
Consumption at night	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁷⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)	
Air flow	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans:1,500 VA)
Acoustic emission	< 55 dB (A) at 4 m and < 67 dB (A) at 1 m with fans working at maximum power	
Marking	CE, ETL	
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE	

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ AC Power for 122 °F (50 °C) ambient temperature. The output power will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase ⁽⁴⁾ For $P_{out} > 25\%$ of the rated power ⁽⁵⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEEE 1547.1 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F each 1,000 ft.

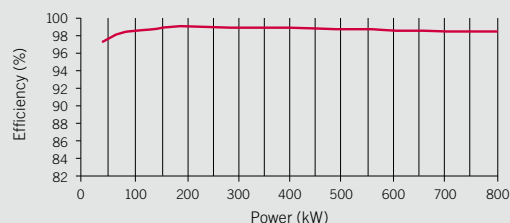
Efficiency INGECON® SUN 660TL U X275 Outdoor $V_{dc} = 403 \text{ V}$



	600TL U X330 Outdoor	800TL U X330 Outdoor
Input (DC)		
Recommended PV array power range ⁽¹⁾	609.2 - 803.4 kWp	812 - 1,071.2 kWp
Voltage Range MPP	484 - 820 V	484 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V
Maximum current	1,170 A	1,560 A
N° inputs with fuse holders	12 (24 for floating configuration)	16 (32 for floating configuration)
Fuse dimensions	125 A / 1,000 V to 400 A / 1,000 V fuses, maximum current from 82 to 260 A for positive and negative poles	
Type of connection	Connection to copper bars	
Power blocks	3	4
MPPT	1	1
Current at each input	82 to 260 A	82 to 260 A
Input protections		
Overvoltage protections	DC surge arresters, type 2	
DC switch	Motorized DC switch	
Other protections	DC insulation monitor with alarm. Optionally, from 8 to 16 pairs of DC fuses (16 to 32 pairs for floating configuration)	
Output (AC)		
Rated power ⁽³⁾	600 kVA	800 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	330 V IT System	330 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1
Phi Cosine adjustable	Yes. Smax=600 kVA	Yes. Smax=800 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%
Output protections		
Overvoltage protections	AC surge arresters, type 2	
AC breaker	Yes	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.5%	98.5%
CEC	98%	98%
Stand-by consumption ⁽⁶⁾	90 W	120 W
Consumption at night	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁷⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)	
Air flow	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans:1,500 VA)
Acoustic emission	< 55 dB (A) at 4 m and < 67 dB (A) at 1 m with fans working at maximum power	
Marking	CE, ETL	
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE	

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ AC Power for 122 °F (50 °C) ambient temperature. The output power will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEEE 1547.1 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F each 1,000 ft.

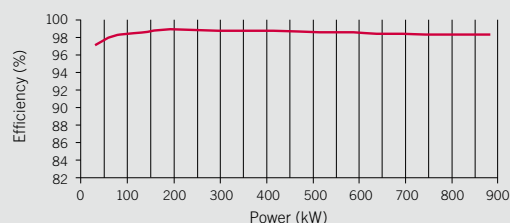
Efficiency INGECON® SUN 800TL U X330 Outdoor V_{dc} = 480 V



	660TL U X360 Outdoor	880TL U X360 Outdoor
Input (DC)		
Recommended PV array power range ⁽¹⁾	670 - 884 kWpV	892.6 - 1,178.3 kWp
Voltage Range MPP	528 - 820 V	528 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V
Maximum current	1,170 A	1,560 A
N° inputs with fuse holders	12 (24 for floating configuration)	16 (32 for floating configuration)
Fuse dimensions	125 A / 1,000 V to 400 A / 1,000 V fuses, maximum current from 82 to 260 A for positive and negative poles	
Type of connection	Connection to copper bars	
Power blocks	3	4
MPPT	1	1
Current at each input	82 to 260 A	82 to 260 A
Input protections		
Overvoltage protections	DC surge arresters, type 2	
DC switch	Motorized DC switch	
Other protections	DC insulation monitor with alarm. Optionally, from 8 to 16 pairs of DC fuses (16 to 32 pairs for floating configuration)	
Output (AC)		
Rated power ⁽³⁾	660 kVA	880 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	360 V IT System	360 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1
Phi Cosine adjustable	Yes. Smax=660 kVA	Yes. Smax=880 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%
Output protections		
Overvoltage protections	AC surge arresters, type 2	
AC breaker	Yes	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.5%	98.6%
CEC	98.5%	98.5%
Stand-by consumption ⁽⁶⁾	90 W	120 W
Consumption at night	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁷⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)	
Air flow	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans:1,500 VA)
Acoustic emission	< 55 dB (A) at 4 m and < 67 dB (A) at 1 m with fans working at maximum power	
Marking	CE, ETL	
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE	

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ AC Power for 122 °F (50 °C) ambient temperature. The output power will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase ⁽⁴⁾ For P_{out}>25% of the rated power ⁽⁵⁾ For P_{out}>25% of the rated power and voltage in accordance with IEEE 1547.1 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F each 1,000 ft.

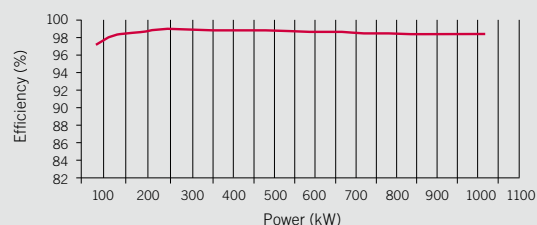
Efficiency INGECON® SUN 880TL U X360 Outdoor V_{dc} = 520 V



	750TL U X400 Outdoor	1000TL U X400 Outdoor
Input (DC)		
Recommended PV array power range ⁽¹⁾	670 - 884 kWp	892.6 - 1,178.3 kWp
Voltage Range MPP	581 - 820 V	581 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V
Maximum current	1,350 A	1,800 A
N° inputs with fuse holders	12 (24 for floating configuration)	16 (32 for floating configuration)
Fuse dimensions	125 A / 1,000 V to 400 A / 1,000 V fuses, maximum current from 82 to 260 A for positive and negative poles	
Type of connection	Connection to copper bars	
Power blocks	3	4
MPPT	1	1
Current at each input	82 to 260 A	82 to 260 A
Input protections		
Overvoltage protections	DC surge arresters, type 2	
DC switch	Motorized DC switch	
Other protections	DC insulation monitor with alarm. Optionally, from 8 to 16 pairs of DC fuses (16 to 32 pairs for floating configuration)	
Output (AC)		
Rated power ⁽³⁾	765 kVA	1,020 kVA
Maximum current	1,104 A	1,472 A
Rated voltage	400 V IT System	400 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1
Phi Cosine adjustable	Yes. Smax=765 kVA	Yes. Smax=1,020 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%
Output protections		
Overvoltage protections	AC surge arresters, type 2	
AC breaker	Yes	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.5%	98.6%
CEC	98.5%	98.5%
Stand-by consumption ⁽⁶⁾	90 W	120 W
Consumption at night	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁷⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)	
Air flow	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans:1,500 VA)
Acoustic emission	< 55 dB (A) at 4 m and < 67 dB (A) at 1 m with fans working at maximum power	
Marking	CE, ETL	
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE	

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ AC Power for 122 °F (50 °C) ambient temperature. The output power will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase ⁽⁴⁾ For $P_{out} > 25\%$ of the rated power ⁽⁵⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEEE 1547.1 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F each 1,000 ft.

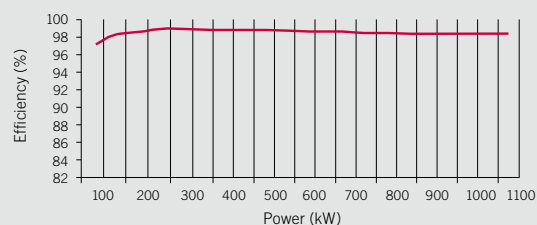
Efficiency INGECON® SUN 1000TL U X400 Outdoor $V_{dc} = 578 \text{ V}$



	805TL U X420 Outdoor	1070TL U X420 Outdoor
Input (DC)		
Recommended PV array power range ⁽¹⁾	818.9 - 1,044 kWp	1,091.5 - 1,392 kWp
Voltage Range MPP	611 - 820 V	611 - 820 V
Maximum voltage ⁽²⁾	1,000 V	1,000 V
Maximum current	1,350 A	1,800 A
N° inputs with fuse holders	12 (24 for floating configuration)	16 (32 for floating configuration)
Fuse dimensions	125 A / 1,000 V to 400 A / 1,000 V fuses, maximum current from 82 to 260 A for positive and negative poles	
Type of connection	Connection to copper bars	
Power blocks	3	4
MPPT	1	1
Current at each input	82 to 260 A	82 to 260 A
Input protections		
Overvoltage protections	DC surge arresters, type 2	
DC switch	Motorized DC switch	
Other protections	DC insulation monitor with alarm. Optionally, from 8 to 16 pairs of DC fuses (16 to 32 pairs for floating configuration)	
Output (AC)		
Rated power ⁽³⁾	803.1 kVA	1,070.8 kVA
Maximum current	1,104 A	1,472 A
Rated voltage	420 V IT System	420 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽⁴⁾	1	1
Phi Cosine adjustable	Yes. Smax=803.1 kVA	Yes. Smax= 1,070.8 kVA
THD (Total Harmonic Distortion) ⁽⁵⁾	<3%	<3%
Output protections		
Overvoltage protections	AC surge arresters, type 2	
AC breaker	Yes	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.5%	98.6%
CEC	98.5%	98.5%
Stand-by consumption ⁽⁶⁾	90 W	120 W
Consumption at night	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁷⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)	
Air flow	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans:1,500 VA)
Acoustic emission	< 55 dB (A) at 4 m and < 67 dB (A) at 1 m with fans working at maximum power	
Marking	CE, ETL	
EMC and security standards	UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE1547, IEEE1547.1, NEC CODE	

Notes: ⁽¹⁾ Depending on the type of installation and geographical location. Data for STC conditions ⁽²⁾ Consider the voltage increase of the 'Voc' at low temperatures ⁽³⁾ AC Power for 122 °F (50 °C) ambient temperature. The output power will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase ⁽⁴⁾ For $P_{out} > 25\%$ of the rated power ⁽⁵⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEEE 1547.1 ⁽⁶⁾ Consumption from PV field ⁽⁷⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F each 1,000 ft.

Efficiency INGECON® SUN 1070TL U X420 Outdoor $V_{dc} = 607 \text{ V}$





1 MW installation in Maryland (USA) with two INGECON® SUN 500TL U X275 Outdoor Inverters

From 750 to 2140 kVA

Fully integrated turnkey solution, customized up to 2.14 MVA

All the devices required for a multi-megawatt system are incorporated into a single structure.

Maximize your investment with minimal effort

INGECON® SUN PowerStation U is a compact, customizable and flexible solution that can be configured to suit each customer's requirements. It features PV central inverters for outdoor installation, so there is no need of any kind of housing. Maximum efficiency thanks to the selective work of its power stages depending on the available PV power.

Plug & Play technology

This Medium Voltage turnkey solution integrates power conversion equipment –up to 2140 kVA–, step up transformer, switchgear, low voltage distribution panels and monitoring equipment. It is delivered fully furnished for Plug & Play integration at the site.

Software included

It includes, without any extra cost, the software INGECON® SUN Manager, INGECON® SUN Monitor and its iSun Monitor Smartphone version for monitoring, displaying and recording the data from the inverter through Internet.

SYSTEM FEATURES

- 2 IS PowerMax TL U Outdoor inverters with an output power AC up to 2140 kVA.
- Liquid filled MV Pad Mounted transformer up to 35 kV with integrated switch disconnect, customized for each particular project.
- Electrical gear: low voltage distribution panels, auxiliary transformers.
- Complete integration of all electrical components for faster installation at project site.

CONSTRUCTION

- Steel Channel base-frame.
- Skid platform grounded or pier mounted.

Size and weight

(ft and lbs)

Dimensions approx.

20' to 26' L x 11' W x 9' 11" H

Weight approx.

30000 to 38000 lbs

Complete accessibility

Thanks to the lack of housing, the inverters can have immediate access. Furthermore, the INGECON® SUN PowerMax Outdoor inverters feature a modular system that distributes the load between the various power stages, facilitates the maintenance, and controls the voltage dips, the active power and the reactive power.

Protections and communications included

Active power control, reactive power control and voltage dips. RS-485 communications by default for inverter control and monitorization (alarms, real time production, etc.).

OPTIONS

- Medium Voltage switchgear.
- Metering equipment.
- Reduced loss transformer.
- Remote communications.
- SCADA for system supervision.
- Start-up at the system site.



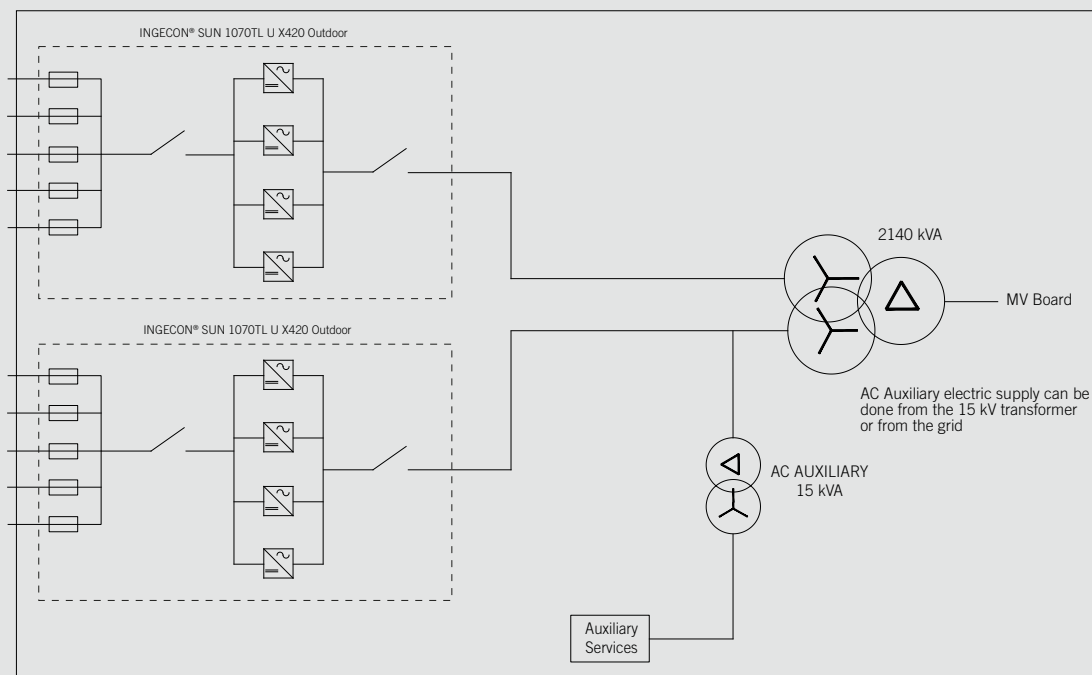
Front view



Back view

Configuration with PowerMax TL U Outdoor inverters

Example 2 x 1070 kVA





From 300 to 2330 kVA

The comprehensive turnkey solution

Equipped with everything necessary

Ingeteam has developed a comprehensive turnkey Medium Voltage solution that integrates all the energy conversion equipment up to 2140 kW, PV inverters, LV/ MV transformer, Low Voltage parallel cabinet, auxiliary services panel and monitoring equipment that can be customized according to each specific user.

It is supplied totally equipped with a complete integration of the enclosure, the inverters, the controls and the transformer in a single unit or platform, for its Plug & Play installation on-site.

Perfect refrigeration

This Medium Voltage solution, concrete made for a perfect isolation and durability, features an advanced air forced cooling system that, together with the inverters' internal fans, guarantees the correct operation of all the equipment inside the cabin. Moreover, the Power-Station fans also feature some filters that avoid the entrance of water and particles.

SYSTEM FEATURES

- 2 INGECON® SUN inverters with a combined output AC power from 300 to 2,140 kVA.
- Oil transformer up to 36 kV with an integrated breaker.
- Electric switching: Low Voltage parallel cabinet, auxiliary transformers.
- Complete integration of all the electrical elements for a quick on-site installation.
- Heat dissipation system for an optimal inverter performance.
- Illumination system.

CONSTRUCTION

- Steel basement in U shape with walls and ceiling in galvanized aluminium panels.
- The platform is fixed to the ground or mounted over the foundations.

OPTIONAL

- Medium Voltage equipment.
- Air conditioning system.
- Measuring equipment.
- Reduced losses transformer.
- Remote communication.
- SCADA for system supervision.
- On-site start up.

Weight and dimensions of the housing

(Without inverters)

Dimensions

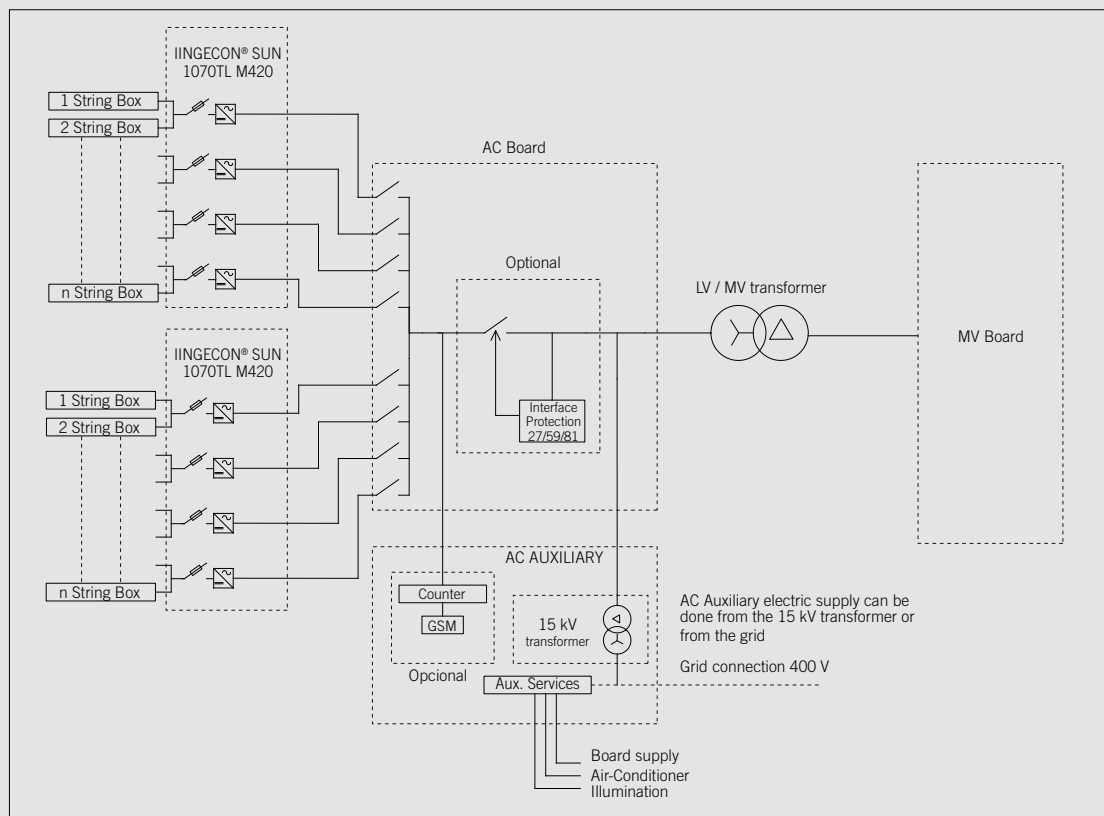
8,300 mm L x 2,500 mm H x 2,170 mm W

Weight

19,000 kg.



Scheme with two inverters with Multi-MPPT configuration (also available with Master-Slave or Monoblock configuration)
2 x 1,070 kVA





From 300 to 4660 kVA / 6 to 36 kVA

Medium voltage transformer box designed for outdoor installation, ideal for large multi-megawatt plants

Simplifies the PV installation procedure

Equipped with everything required to complete the connection of the INGECON® SUN PowerMax outdoor inverters to the utility company's MV grid, including the LV / MV transformer, the MV switchgear and the LV auxiliary services switchgear. A range of accessories are available to configure the INGECON® SUN MV Box to suit the requirements of each specific customer.

Ease of maintenance

A low-maintenance structure with a useful life of more than 20 years. In the event of a failure, the doors ensure ease of access to the internal components, shortening repair times and lowering maintenance costs.

Designed for outdoor installation

Suitable for direct outdoor installation thanks to its compact, weatherproof enclosure. Simple mounting on a cement base, telescopic guides for the access conduits to the cable protection. The varnish used guarantees maximum protection against adverse weather conditions.



MAIN FEATURES

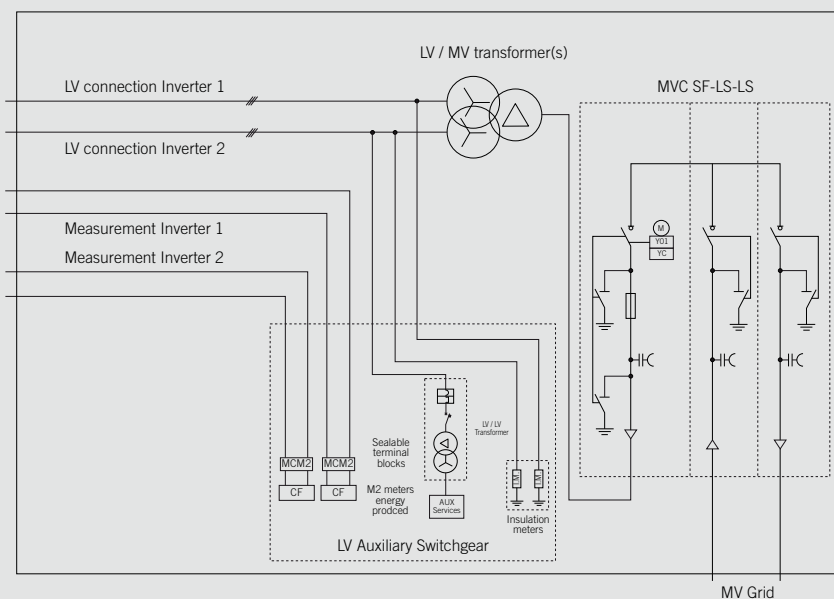
- Suitable for outdoor installation and IP54 / NEMA 3R protection degree for use in any climatic conditions.
- Available with LV / MV transformer up to 4660 kVA and 36 kV output voltage.
- Compatible with cast resin and oil immersed LV / MV transformers.
- Forced Air ventilation system for transformer compartment with temperature probes and central thermometric control.
- Complete accessibility for ease of maintenance.
- Ease of access to the LV / MV transformer to connect the cables running from the PV array.
- Hot galvanised structure for a useful life of more than 20 years.
- Built-in Low Voltage auxiliary services switchgear with everything required to complete the PV installation.
- Extensive range of Medium Voltage switchgears for chain or ring connection.
- Lower installation and connections costs.

- Standard opto-isolated RS-485 communication infrastructure for direct connection to INGECON® SUN PowerMax outdoor inverters and INGECON® SUN String Control string combiner boxes.
- Complete internal lighting system with emergency lights from 60 minutes onwards.
- Compliance with the principal medium and high voltage directives and regulations.
- Medium Voltage safety kit: Class 3 gloves and 30 kV insulating footboard.
- Fire safety kit: portable 5 kg CO₂ fire extinguisher.
- Manufacturer's 2 year warranty, extendible up to 25 years on request.

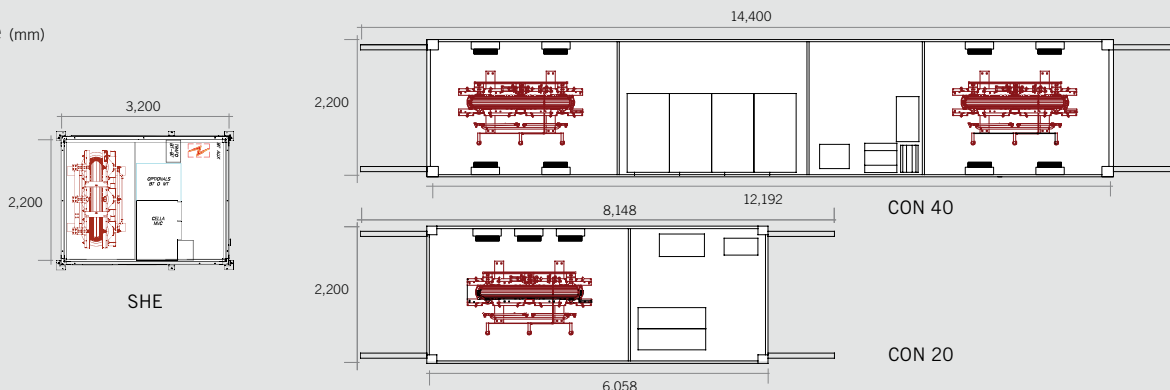
OPTIONAL EQUIPMENT

- LV / LV transformer for the power supply to the auxiliary services panel.
- UPS for auxiliary services.
- Energy meter with GSM / GPRS system for remote metering.
- Metering of the AC energy produced by means of approved TV voltage sensors and TA current sensors.
- Meteo station.
- INGECON® SUN String Control 16 / 32 string combiner boxes.
- High-speed Ethernet / Fiber Optic communication infrastructure for Plug & Play connection to PV Plant Controller and SCADA systems.
- SCADA supervision, control and data acquisition system.
- PV Plant Controller compliant with the most widely international Grid Codes.
- Gateway for monitoring and control of the PV Plant by the Grid Operator using standard protocols (like IEC 61850, IEC 60870-5-101/104, DNP 3.0, etc.).

MV Box



Size (mm)



SHE 22



From 300 to 2330 kVA

The complete turnkey solution, customized & fully equipped up to 2.8 MWp, 22 ft. shelter with Forced Air cooling system

The very latest technological development by Ingeteam. All the devices required for a multi-megawatt system incorporated into a single shelter with three separate compartments and different cooling systems, easily transportable by road thanks to its small dimensions and low weight.

Maximize your investment with minimal effort

INGECON® SUN PowerStation SHE 22 is a compact, customisable and flexible solution that can be configured to suit each customer's requirement. Thanks to its panel-based structure, the internal layout can be customised to incorporate various INGECON® SUN inverters. Ideal for low environmental impact applications.

Extremely robust and long-lasting

The shelter can be easily transported by road, thanks to its small dimensions and low overall weight. The hot galvanised steel structure is designed to guarantee maximum mechanical strength and durability. The walls and roof contain a 50 mm rigid fire-proof polyurethane foam filling, to guarantee perfect water resistance and correct thermal insulation.

Equipped with everything necessary

High efficiency inverters, auxiliary services switchgear, Medium Voltage cubicle and LV / MV transformer. Available with High-speed Ethernet / Fiber Optic communication infrastructure for Plug & Play connection to PV Plant Controller, monitoring and SCADA systems.

Maximum stability

All the devices are anchored to the base, to guarantee the maximum stability of the structure. The varnish used guarantees maximum protection against adverse weather conditions.

Complete accessibility

Thanks to its innovative design, all devices are readily accessible, thereby making it easier to inspect, maintain and repair the INGECON® SUN PowerStation SHE 22. The MV transformer compartment door is equipped with AREL safety lock with a blocking code.

Innovative ventilation system

The internal temperature of inverter compartment is controlled by high efficiency hot air extraction plenums and centrifugal fan systems. A number of internal and external probes guarantee a constant ambient temperature. The incoming air is filtered through special grids mounted on the bottom of the walls.



SHE 22 TUNNEL FA / NA



SHE 22 TUNNEL FA / FA



SHE 22 WING FA / NA



SHE 22 WING FA / FA

MAIN FEATURES

- Output power up to 2330 kVA.
- Available up to 36 kV output voltage.
- Available with cast resin or oil immersed hermetically sealed LV / MV transformers.
- Protection degree: IP54 / NEMA 3R for inverter compartment.
- Extremely compact design.
- Plug & Play solution.
- Maximum reliability, higher safety and reduced maintenance thanks to flexible copper busbars for Low Voltage power distribution.
- Fully customizable.
- Operating Temperature Range: from -20 °C to +60 °C.⁽¹⁾
- Relative Humidity: 0 - 95%.
- Installation Altitude: 3000 m above sea level.⁽¹⁾

⁽¹⁾ Refer to Technical Characteristics table for further details.

ELECTRICAL PROTECTIONS

- Reverse polarity.
- Output short-circuits and overloads.
- DC fuses.
- DC switch with door control.
- AC circuit breaker with door control.
- DC and AC overvoltage suppressors.
- Anti-islanding monitoring system with automatic disconnection.
- Insulation monitoring system.
- Automatic disconnection system in case of LV / MV transformer overheat.
- Emergency disconnection button, accessible from outside.

STANDARD EQUIPMENT

- Internal lighting system.
- Emergency lighting system.
- Auxiliary power outlet.
- Fire detection system with automatic disconnection (both DC and AC sides).
- Safety interlocks for MV transformer compartment door.
- Fire safety kit.
- Medium Voltage safety kit.
- First aid kit and safety signals.

OPTIONAL EQUIPMENT

In addition to the standard equipment, the INGECON® SUN PowerStation can be supplied with the following options:

- LV / MV transformer for the power supply to the auxiliary services panel.
- UPS for auxiliary services.
- INGECON® SUN String Control 16 / 32 string combiner boxes.
- Energy meter with GSM / GPRS system for remote metering.
- Meteo station.
- High-speed Ethernet / Fiber Optic communication infrastructure for Plug & Play connection to PV Plant Controller and SCADA systems.
- SCADA supervision, control and data acquisition system.
- PV Plant Controller compliant with the most widely international Grid Codes.
- Gateway for monitoring and control of the PV Plant by the Grid Operator using standard protocols (like IEC 61850, IEC 60870-5-101/104, DNP 3.0, etc.).
- HV surge arresters.
- Anti-rodent system.
- Human intrusion detection system.
- External lighting system.

SHE 22

Perfect **water resistance**
and **thermal insulation**

IP21 high efficiency
natural air ventilation
MV Transformer
compartment

Air extraction
anti-rain covers

Wing side doors for easy
access to the inverters

Air Intake filtered
sand trap grids

Extremely compact solution

IP54 / NEMA 3R forced
air ventilation
Inverter compartment

High efficiency hot air extraction
plenums for the inverters

Flexible copper busbars
for LV power distribution

IP55 / NEMA 3R
forced air ventilation
MV Cubicle compartment

INGECON[®] SUN
PowerMax inverters
up to **2330 kVA**

Oil immersed hermetically sealed
MV Transformer up to 36 kV

Easily adaptable to
different ground surfaces

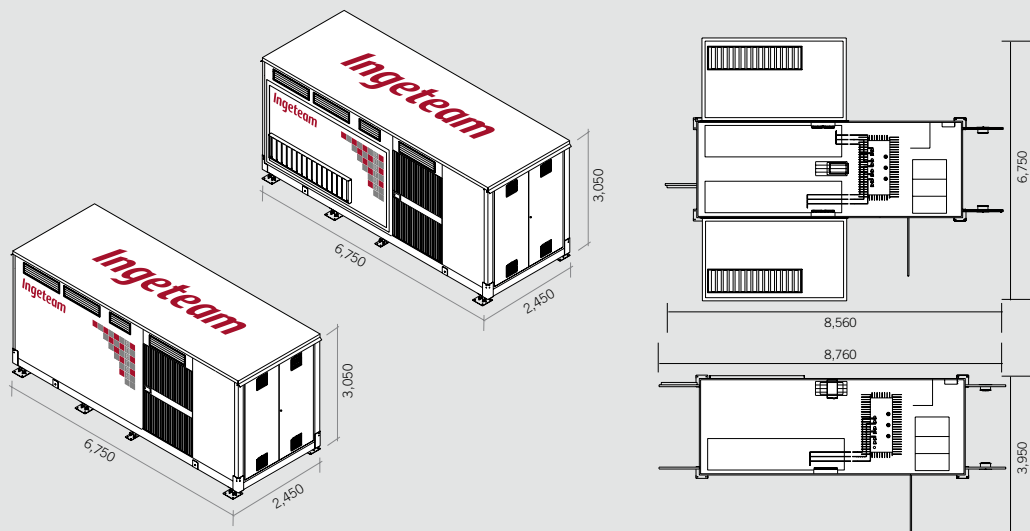
	SHE 22 - FA / FA		SHE 22 - FA / NA
General Information			
Inverter Compartment	Cooling system	Forced air with temperature control	
	Air extraction / Air intake	Overpressure dampers with anti-rain covers / Filtered sand trap grids	
	Max. power consumption	400 W	
	Protection degree	IP54 / NEMA 3R	
Tranformer Compartment	Cooling system	Forced air with temperature control	Natural air ventilation
	Air extraction / Air intake	Overpressure dampers with anti-rain covers / Filtered sand trap grids	Protective metal grids
	Max. power consumption	2,720 W	0 W
	Protection degree	IP54 / NEMA 3R	IP21
MV Cubicle compartment ⁽²⁾	Cooling system	Forced air with temperature control	
	Air extraction / Air intake	Filtered anti-rain grids	
	Max. power consumption	130 W	
	Protection degree	IP55 / NEMA 3R	
Operating temperature range ⁽³⁾		from -30 °C to +60 °C	
Relative humidity		0 - 95%	
Installation altitude ⁽⁴⁾		3,000 m above sea level	
Equipment			
Inverter version		X series (Master-Slave), M series (Multi-MPPT), B series (Monoblock)	
BT-AUX switchgear		BASE version (FULL version and high-speed communication infrastructure optional)	
LV / MV Transformer		Dry type cast resin or Oil immersed hermetically sealed	
MV Switchgear		1P-1L or 1P-2L protection cells	
Mechanical Information			
Structure Material		Steel	
Insulation		Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling	

Notes: ⁽¹⁾ Equipped with oil immersed hermetically sealed LV / MV transformers ⁽²⁾ Including instrumentation, auxiliary services switchgear, monitoring systems ⁽³⁾ INGECON® SUN PowerMax, "M" and "X" series: rated output power indicated in the Technical Characteristics tables is guaranteed up to 45 °C operating temperature. Derating above 45 °C of 1.8% for each °C of increase until 60 °C operating temperature. -30 °C with optional kit ⁽³⁾ INGECON® SUN PowerMax, "B" series: rated output power indicated in the Technical Characteristics tables is guaranteed up to 50 °C operating temperature. Derating above 50 °C of 1.8% for each °C of increase until 60 °C operating temperature. -30 °C with optional kit ⁽⁴⁾ Please contact Ingeteam for altitudes higher than 1,000 m.

	Length	Width	Height
Size (mm)			
Body dimensions	6,750	2,450	3,050
Overall dimensions with doors open (Tunnel)	8,760	3,950	3,050
Overall dimensions with doors open (Wing)	8,560	6,750	3,050
Foundation dimensions	9,000	5,000	300

SHE 22 Wing

SHE 22 Tunnel



CON 40**From 300 to 3500 kVA**

The complete turnkey solution, customized up to 4.2 MWp, 40 ft. container with innovative forced air or air conditioned cooling systems for adverse environmental conditions

Thanks to its CSC approval for overseas shipment, The INGECON[®] SUN PowerStation CON 40 can be marketed and installed everywhere in the world. It is a fully equipped container with three separate compartments and different cooling systems (up to 2330 kVA) or two separate compartments with different cooling systems and outdoor mounted LV / MV transformer (up to 3500 kVA).

Robust and long-lasting design

The INGECON[®] SUN PowerStation CON 40 is a standard solution specifically designed for dusty areas with innovative cooling systems to ensure the nominal output power up to 60 °C. Moreover, this solution avoids any problem regarding the corrosion generated from sandstorms. To ensure the maximum protection against weather conditions, external sides are coated with a galvanized layer and painted with polyurethane lacquer. The load-bearing structure is single-block made of welded steel, to ensure top resistance and durability over time. Roof-top and walls are coated with insulated sandwich panels. The sandwich panels are made of galvanized painted steel, filled with a 50 mm layer of rigid fire-proof polyurethane foam, ensuring perfect waterproofness over time and efficient thermal insulation.

Equipped with everything necessary

High efficiency inverters, auxiliary services switchgear, Medium Voltage cubicle and LV / MV transformer. Available with High-speed Ethernet / Fiber Optic communication infrastructure for Plug & Play connection to PV Plant Controller, monitoring and SCADA systems.

Complete accessibility

Thanks to its innovative design, all devices are readily accessible, thereby making it easier to inspect, maintain and repair the INGECON[®] SUN PowerStation CON 40. The transformer compartment door is equipped with AREL safety lock with a blocking code.

Ideal for adverse environments

The INGECON[®] SUN PowerStation CON 40 is a standard solution able to withstand adverse environmental conditions without any loss of performance. Thanks to its recirculation air conditioning system, the "RC" version can provide its rated power up to 60 °C (ambient temperature) without derating and IP65 / NEMA 4 protection degree.

Innovative cooling system

FA type: the internal temperature of inverters compartment is controlled by high efficiency hot air extraction plenums and centrifugal fan systems. A number of internal and external probes

guarantee a constant ambient temperature. The incoming air is filtered through special sand trap grids mounted on the bottom of the walls.

AC type: the container is equipped with an internal cooling system featuring a Free Cooling function for inverters compartment. The air conditioning units, sized for each of the inverters, feature the following operating modes:

- **Pure Free Cooling:** Compressor in OFF mode. The outdoor air temperature is low and the conditioner operates like a ventilation system, with an air inflow and outflow.
- **Assisted Free Cooling:** Compressor operates in ON-OFF mode. The outdoor air temperature is relatively low to allow operation in Free Cooling mode. However, it is not low enough to maintain the desired interior temperature.
- **Cooling Compressor in ON mode:** The system operates like a normal air conditioner.

RC type: the container is equipped with an internal Recirculation Air Conditioning system for inverters compartment, to maintain the correct internal temperature over the entire operating temperature range.



CON 40 RT FA / NA



CON 40 RT FA / FA



CON 40 RT AC-RC / NA



CON 40 RT AC-RC / FA

MAIN FEATURES

- Output power up to 3500 kVA.
- Available up to 36 kV output voltage.
- Available with cast resin or oil immersed hermetically sealed LV / MV transformer (up to 2330 kVA).
- Available with outdoor mounted hermetically sealed LV / MV transformer (up to 3500 kVA).
- Up to IP65 / NEMA 4 protection degree for inverter compartment. ⁽¹⁾
- Rated power up 60 °C ambient temperature. ⁽¹⁾
- Protected against solar and sand corrosion.
- CSC certification for container shipping.
- Plug & Play solution.
- Maximum reliability, higher safety and reduced maintenance thanks to solid aluminium and flexible copper busbars for Low Voltage power distribution.
- Different cooling systems for inverter compartment ⁽¹⁾:
 Type FA: Forced Air ventilation, operating temperature range from -20 °C to +60 °C.
 Type AC: Free Cooling Air Conditioning system, operating temperature range from -20 °C to +55 °C without derating.
 Type RC: Recirculation Air Conditioning system, operating temperature range from -20 °C to +60 °C without derating.
- Relative Humidity: 0 - 95%.
- Installation Altitude: 3000 m above sea level. ⁽¹⁾

ELECTRICAL PROTECTIONS

- Reverse polarity.
- Output short-circuits and overloads.
- DC fuses.
- DC switch with door control.
- AC circuit breaker with door control.
- DC and AC overvoltage suppressors.
- Anti-islanding monitoring system with automatic disconnection.
- Insulation monitoring system.
- Automatic disconnection system in case of LV / MV transformer overheating.
- Emergency disconnection button, accessible from outside.

STANDARD EQUIPMENT

- Internal lighting system.
- Emergency lighting system.
- Auxiliary power outlet.
- Fire detection system with automatic disconnection (both DC and AC sides).
- Safety interlocks for MV transformer compartment door.
- Fire safety kit.
- Medium Voltage safety kit.
- First aid kit and safety signals.

OPTIONAL EQUIPMENT

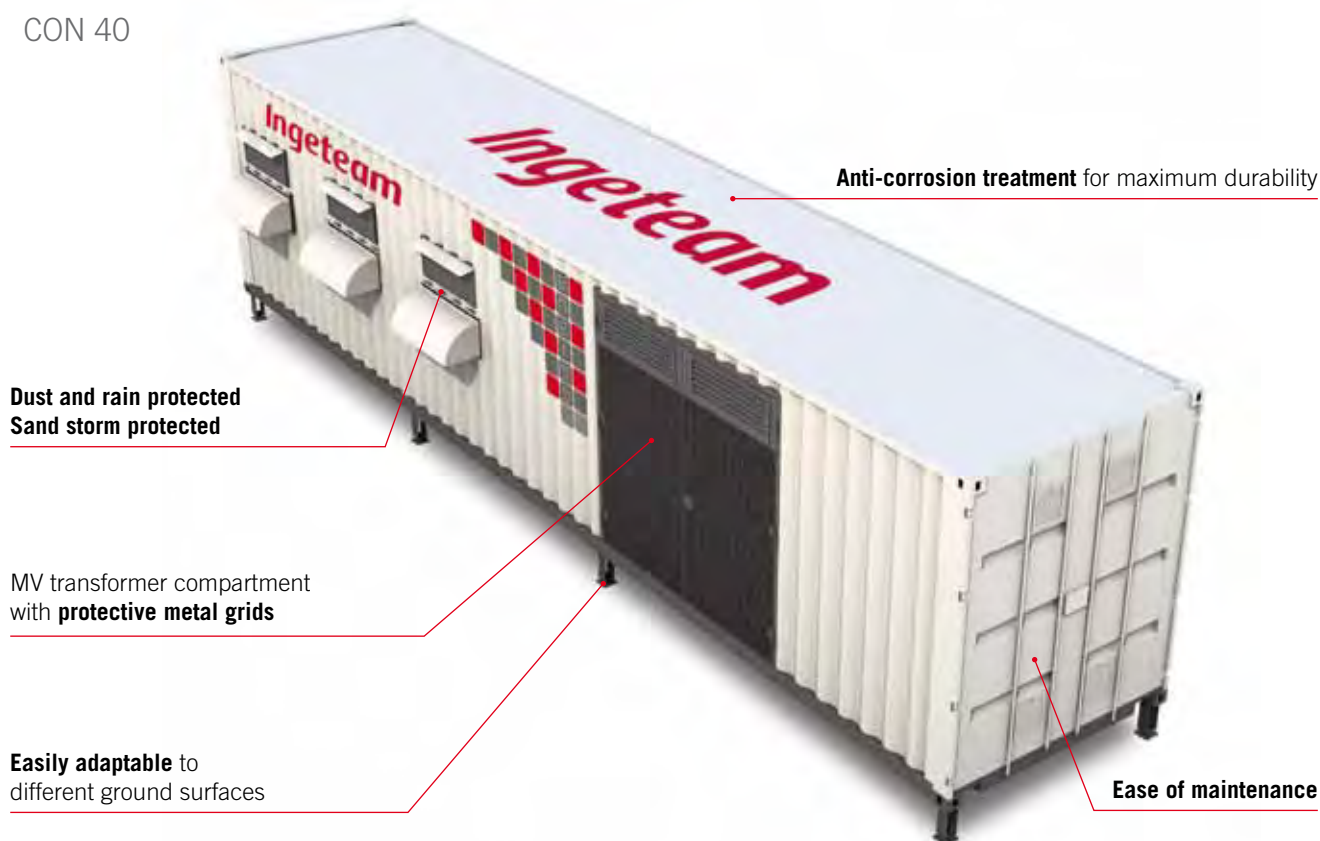
In addition to the standard equipment, the INGECON® SUN PowerStation CON 40 can be supplied with the following options:

- LV / LV transformer for the power supply to the auxiliary services panel.
- UPS for auxiliary services.
- INGECON® SUN String Control 16 / 32 inputs string combiner boxes.
- Meteo station.
- Energy meter with GSM / GPRS system for remote metering.
- High-speed Ethernet / Fiber Optic communication infrastructure for Plug & Play connection to PV Plant Controller and SCADA systems.
- SCADA supervision, control and data acquisition system.
- PV Plant Controller compliant with the most widely international Grid Codes.
- Gateway for monitoring and control of the PV Plant by the Grid Operator using standard protocols (like IEC 61850, IEC 60870-5-101/104, DNP 3.0, etc.).
- HV surge arresters.
- Anti-rodent system.
- Human intrusion detection system.
- External lighting system.

⁽¹⁾ Refer to Technical Characteristics tables for further details.

INGECON[®] SUN PowerStation

CON 40

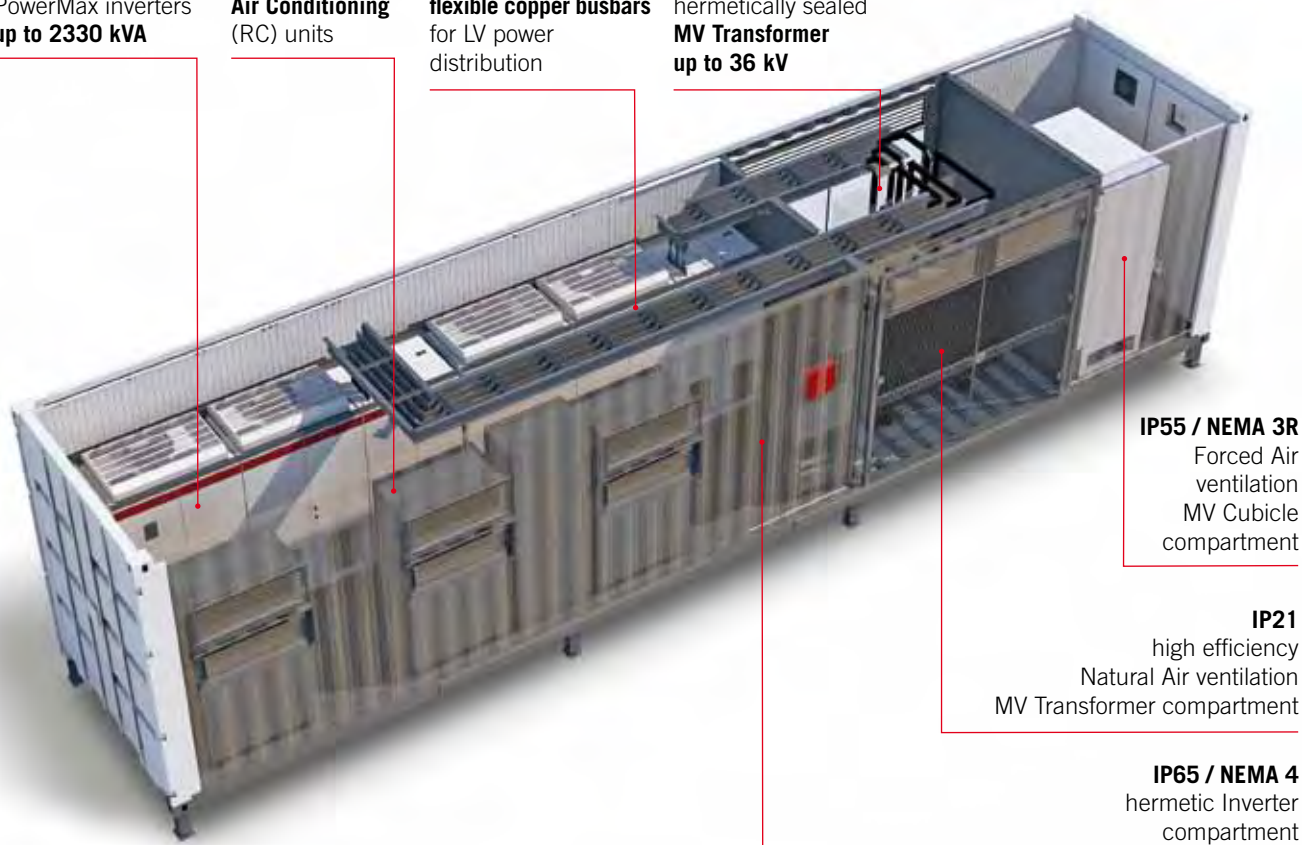


INGECON[®] SUN
PowerMax inverters
up to 2330 kVA

**Recirculation
Air Conditioning**
(RC) units

Solid aluminium and
flexible copper busbars
for LV power
distribution

Oil immersed
hermetically sealed
MV Transformer
up to 36 kV



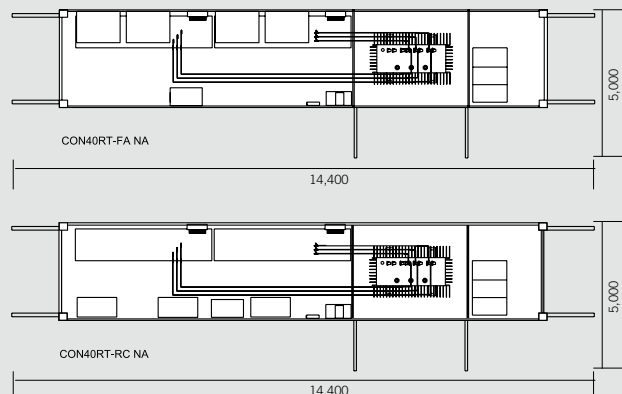
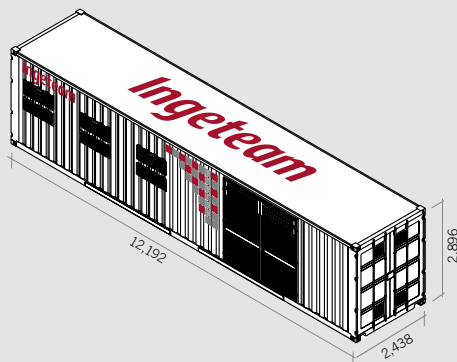
** Illustrative image. It might not correspond with the basic configuration.*

		CON 40 RT - FA / xx	CON 40 RT - AC / xx	CON 40 RT - RC / xx
General Information				
Inverter Compartment ⁽¹⁾	Cooling system	Forced air ventilation	Air conditioning with Free Cooling function	Recirculation air conditioning
	Air extraction / Air intake	Overpressure Dampers with anti-rain covers / Filtered sand trap grids	Overpressure Dampers / Filtered grids with anti-rain covers	
	Max. power consumption	420 W	5,400 / 18,000 W ⁽²⁾	18,000 W
	Protection degree	IP54 / NEMA 3R	IP54 / NEMA 3R	IP65 / NEMA 4
LV / MV Transformer compartment CON 40 RT - xx / FA	Cooling system	Forced air with temperature control		
	Air extraction / Air intake	Overpressure dampers with anti-rain covers / Filtered sand trap grids		
	Max. power consumption	2,720 W		
	Protection degree	IP54 / NEMA 3R		
LV / MV Transformer compartment ⁽³⁾ CON 40 RT - xx / NA	Cooling system	Natural air ventilation		
	Air extraction / Air intake	Protective metal grids		
	Max. power consumption	0 W		
	Protection degree	IP21		
MV Cubicle compartment	Cooling system	Forced air with temperature control		
	Air extraction / Air intake	Filtered anti-rain grids		
	Max. power consumption	65 W		
	Protection degree	IP55 / NEMA 3R		
Operating temperature range ⁽⁵⁾		from -20 °C to +60 °C ⁽⁴⁾	from -20 °C to +55 °C	from -20 °C to +60 °C
Relative humidity		0 - 95%		
Installation altitude ⁽⁶⁾		3,000 m above sea level		
Equipment				
Inverter version		X series (Master-Slave), M series (Multi-MPPT), B series (Monoblock)		
BT-AUX switchgear		BASE version (FULL version and high-speed communication infrastructure optional)		
LV / MV Transformer		Dry type cast resin or Oil immersed hermetically sealed		
MV Switchgear		1P-1L or 1P-2L protection cells		
Mechanical Information				
Structure Material		Steel		
Insulation		Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling		

Notes: ⁽¹⁾ Including inverters, instrumentation, auxiliary services switchgear, monitoring systems ⁽²⁾ Pure Free Cooling function / Cooling function ⁽³⁾ Equipped with oil immersed hermetically sealed LV / MV transformers ⁽⁴⁾ For INGECON® SUN PowerMax, "M" and "X" series: rated output power indicated in the Technical Characteristics tables is guaranteed up to 45 °C operating temperature. Derating above 45 °C of 1.8% for each °C of increase until 60 °C operating temperature ⁽⁴⁾ For INGECON® SUN PowerMax, "B" series: rated output power indicated in the Technical Characteristics tables is guaranteed up to 50 °C operating temperature. Derating above 50 °C of 1.8% for each °C of increase until 60 °C operating temperature ⁽⁵⁾ -30 °C with optional kit ⁽⁶⁾ Please contact Ingeteam for altitudes higher than 1,000 m.

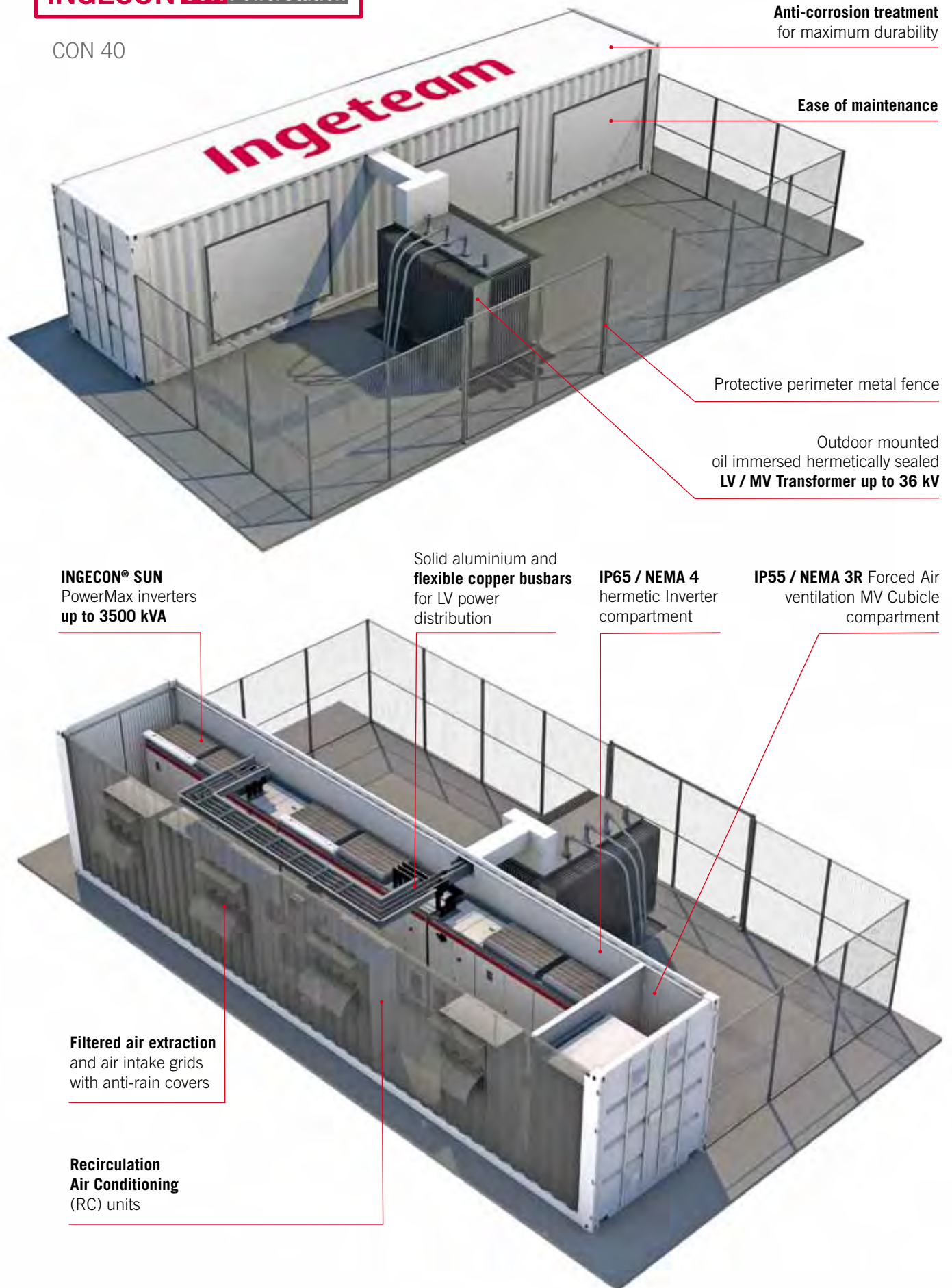
	Length	Width	Height
Size (mm)			
Body dimensions	12,192	2,438	2,896
Overall dimensions with all doors open	14,400	3,700	2,896
Foundation dimensions	14,142	5,000	300

CON 40



INGECON[®] SUN PowerStation

CON 40



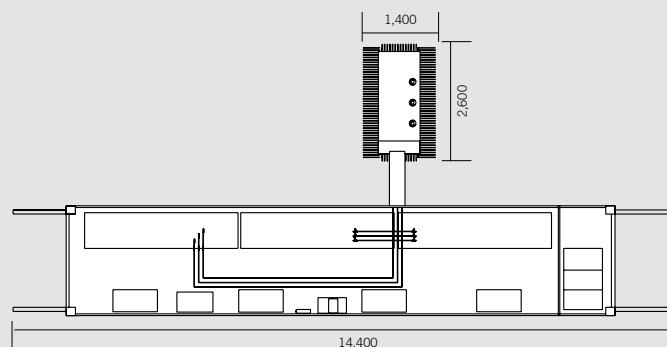
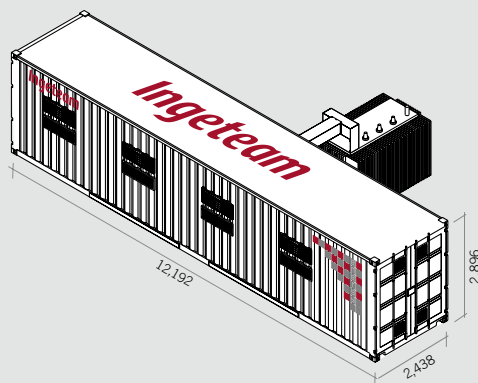
* Illustrative image. It might not correspond with the basic configuration.

		CON 40 RT - FA / OT	CON 40 RT - AC / OT	CON 40 RT - RC / OT
General Information				
Inverter Compartment ⁽¹⁾	Cooling system	Forced air ventilation	Air conditioning with Free Cooling function	Recirculation air conditioning
	Air extraction / Air intake	Overpressure dampers with anti-rain covers / Filtered sand trap grids	Overpressure Dampers / Filtered grids with anti-rain covers	Overpressure Dampers / Standard grids with anti-rain covers
	Max. power consumption	630 W	7,200 / 24,000 W ⁽²⁾	24,000 W
	Protection degree	IP54 / NEMA 3R	IP54 / NEMA 3R	IP65 / NEMA 4
MV Cubicle compartment	Cooling system	Forced air with temperature control		
	Air extraction / Air intake	Filtered anti-rain grids		
	Max. power consumption	65 W		
	Protection degree	IP55 / NEMA 3R		
LV / MV Transformer	Mounting type	Outdoor mounting with protective perimeter metal fence		
	Cooling system	Natural air ventilation		
Operating temperature range ⁽⁴⁾		from -20 °C to +60 °C ⁽³⁾	from -20 °C to +55 °C	from -20 °C to +60 °C
Relative humidity		0 - 95%		
Installation altitude ⁽⁵⁾		3,000 m above sea level		
Equipment				
Inverter version		M series (Multi-MPPT), B series (Monoblock)		
BT-AUX switchgear		BASE version (FULL version and high-speed communication infrastructure optional)		
LV / MV Transformer		Oil immersed hermetically sealed		
MV Switchgear		1P-1L or 1P-2L protection cells		
Mechanical Information				
Structure Material		Steel		
Insulation		Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling		

Notes: ⁽¹⁾ Including inverters, instrumentation, auxiliary services switchgear, monitoring systems ⁽²⁾ Pure Free Cooling function / Cooling function ⁽³⁾ For INGECON® SUN PowerMax, "M" series: rated output power indicated in the Technical Characteristics tables is guaranteed up to 45 °C operating temperature. Derating above 45 °C of 1.8% for each °C of increase until 60 °C operating temperature. ⁽³⁾ For INGECON® SUN PowerMax, "B" series: rated output power indicated in the Technical Characteristics tables is guaranteed up to 50 °C operating temperature. Derating above 50 °C of 1.8% for each °C of increase until 60 °C operating temperature. ⁽⁴⁾ -30 °C with optional kit ⁽⁵⁾ Please contact Ingeteam for altitudes higher than 1,000 m.

	Length	Width	Height
Size (mm)			
CON 40 dimensions	12,192	2,438	2,896
CON 40 overall dimensions with doors open	14,400	3,700	2,896
LV / MV transformer indicative dimensions	2,600	1,400	2,700
Foundation dimensions	14,142	7,500	300

CON 40

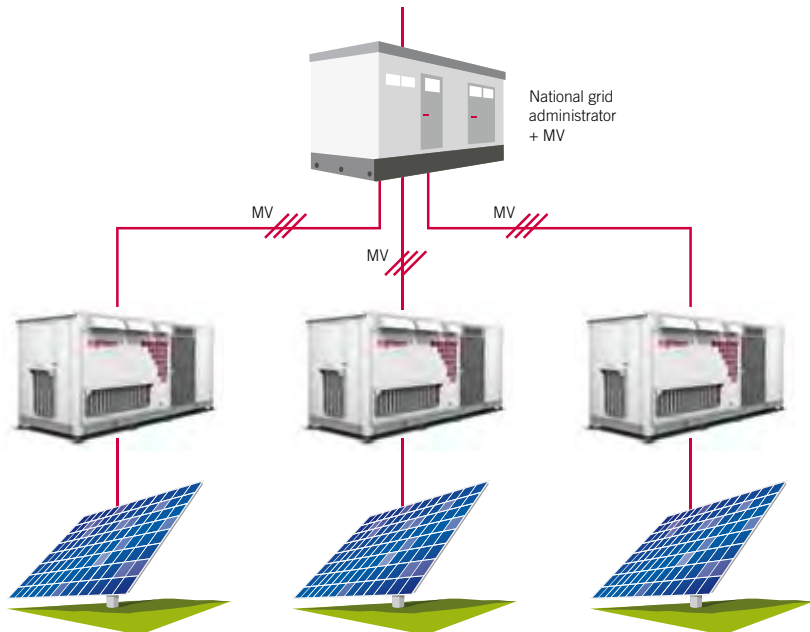


Different installation configurations

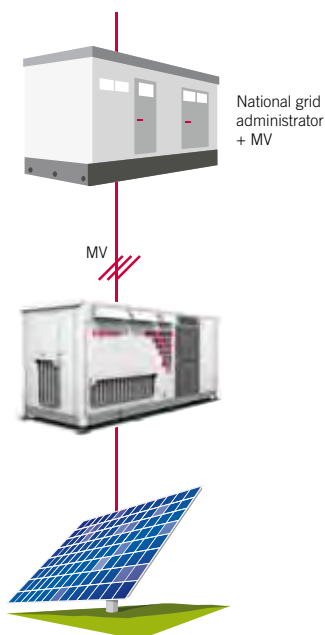
Configuration

This system is very flexible and offers different configuration possibilities. A single component can control all the elements, reducing production times, facilitating the maintenance and making repairing processes more efficient.

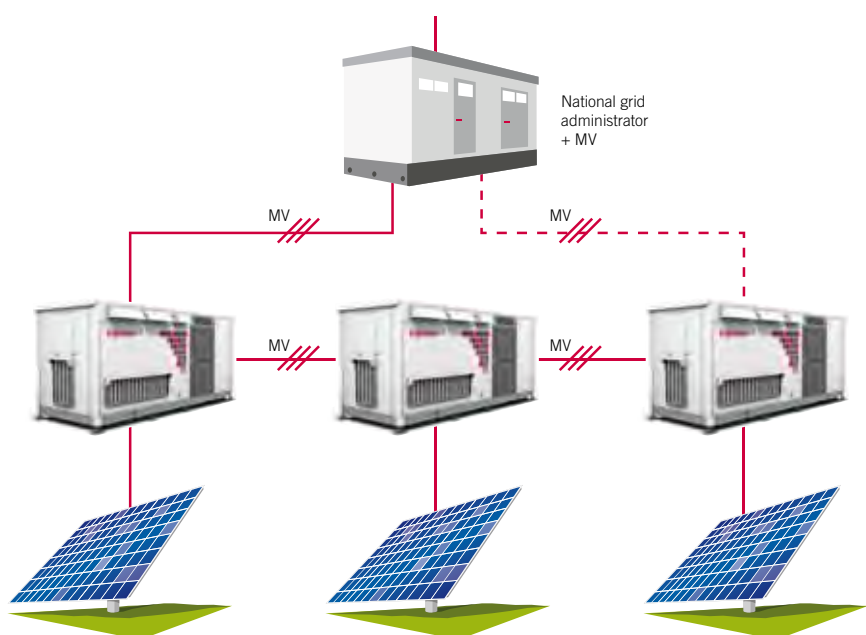
Installation with multiple INGECON® SUN PowerStations in star connection



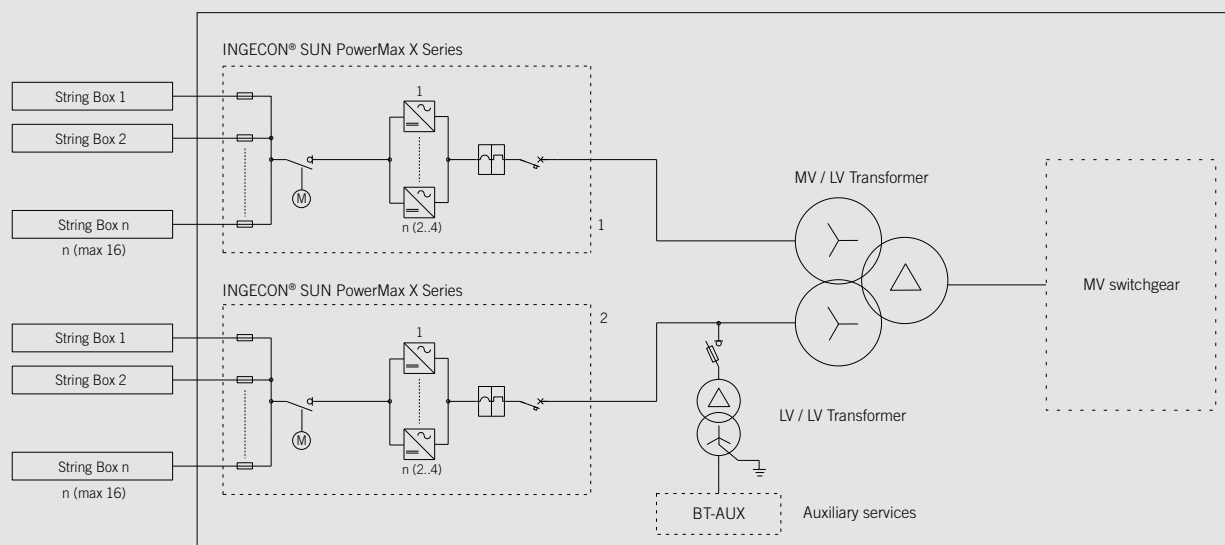
Installation with single INGECON® SUN PowerStation



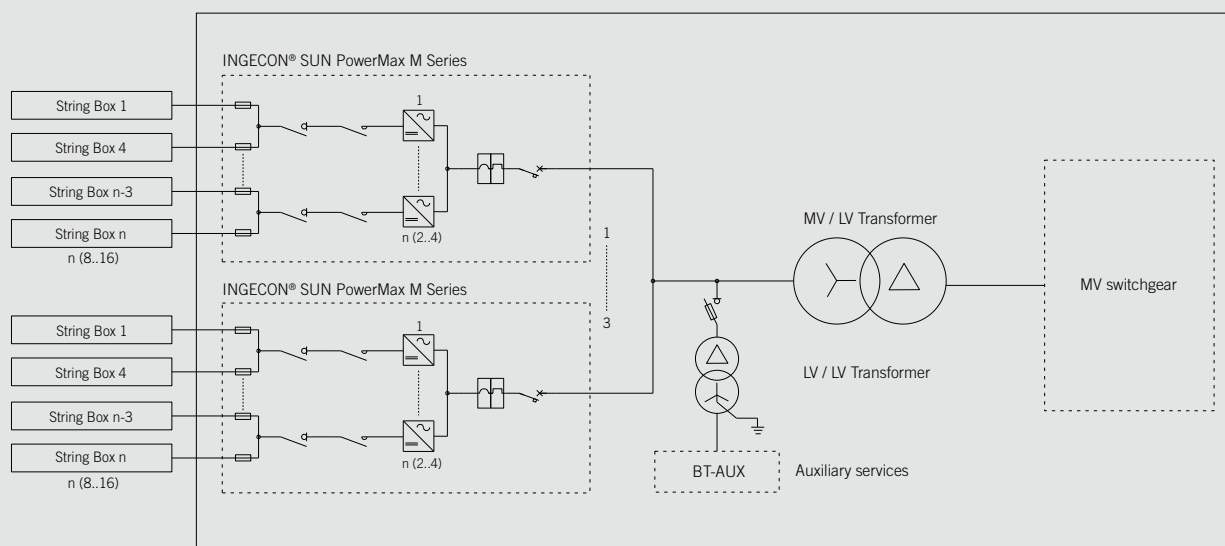
Installation with multiple INGECON® SUN PowerStations in delta connection



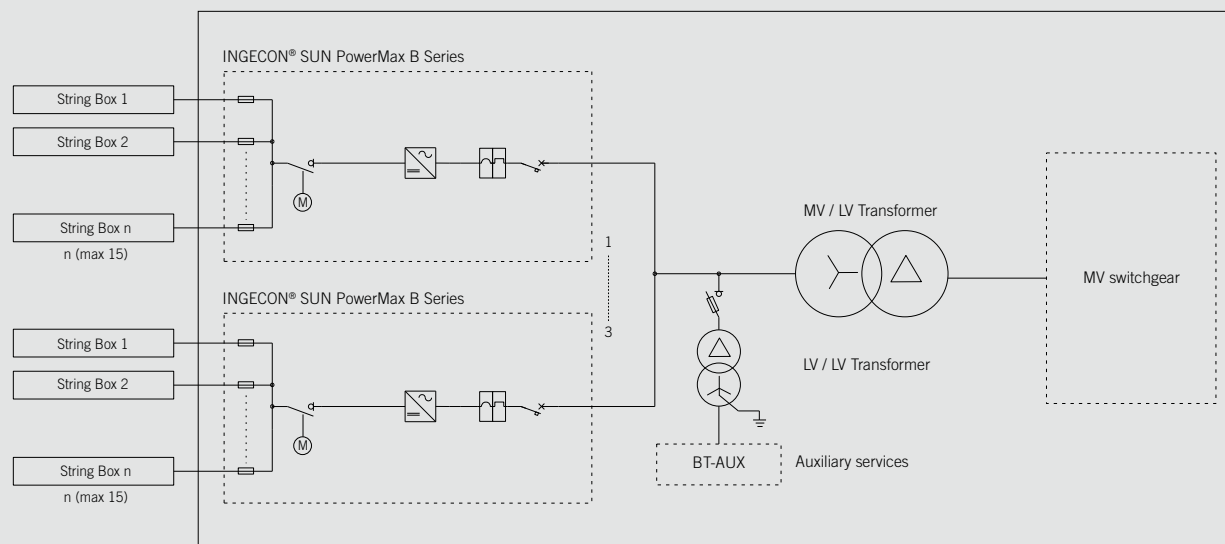
Configuration with PowerMax X Series (Master-Slave) inverters



Configuration with PowerMax M Series (Multi-MPPT) inverters



Configuration with PowerMax B Series (Monoblock) inverters







INGECON SUN STORAGE

BATTERY INVERTERS

The AC-Link Concept



Smart solutions for stand-alone systems

A large number of remote villages all over the world are still forced to resort to alternative energy generation solutions to supply their needs. Due to economic factors, pollution and, of course, dependence, the power generation systems based solely on fossil fuels, no longer appear to be the best option.

Ingeteam has applied all its experience in the electrical engineering sector in order to develop solutions for these alternative energy generation systems.

As a result, Ingeteam is proud to offer a wide range of products capable of meeting all types of needs and requirements.

Based on the premise of making an uninterrupted energy supply available, Ingeteam has designed some robust, easy-to-install equipment, with priority given to the generation of electricity through renewable energy sources.

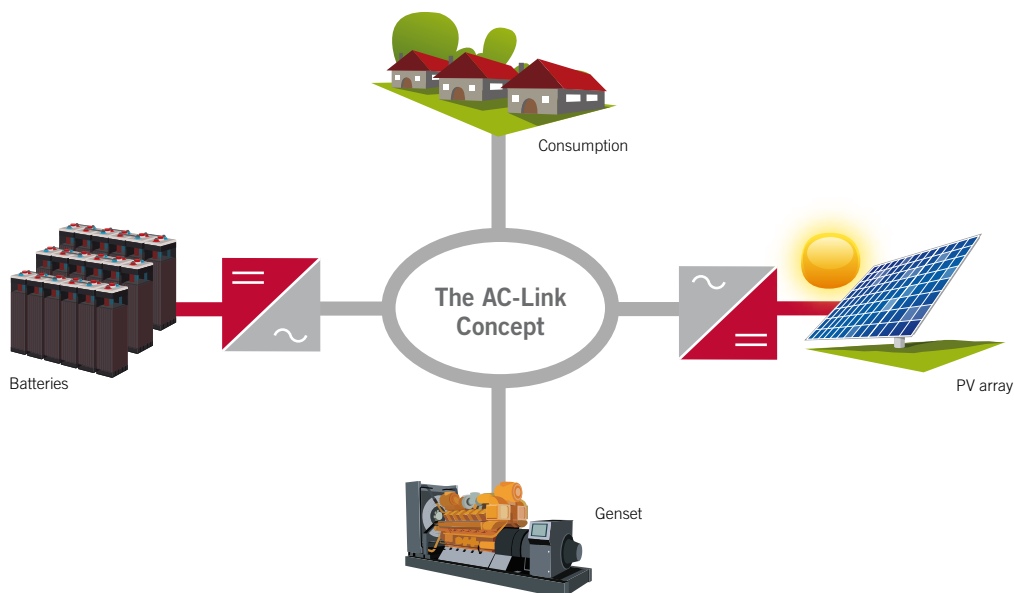
The sun and the wind are resources that are as old as they are plentiful in our environment and, as such, they form the base that supports our systems.

We are referring to converters capable of generating energy by means of these resources, and supported by a system of batteries in order to ensure that power is delivered to the mini-grid whenever the photovoltaic and wind power systems are unable to power the loads.

Within our range of products for off-grid systems we include single-phase and three-phase solutions being able to fit in all type of load demands.

The AC-Link Concept

The AC-Link Concept consists of an off-grid AC network to which the loads and the renewable energy sources are coupled. This AC grid is generated by a battery inverter that acts as a grid manager by establishing the voltage's amplitude and frequency.



The INGECON® SUN STORAGE battery inverter controls the energy coming from the sources and the energy flows inside the AC grid, by modifying the frequency of the grid voltage. As a result, it guarantees the correct balance between generation, consumption and the storage system.

Apart from that, the battery inverter manages the batteries' state of charge and the operation of an optional auxiliary AC source (a genset or the public grid).

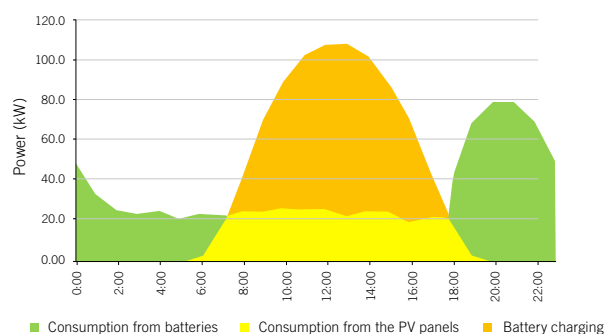
When the renewable sources are available the energy generated feeds the loads, while the excess is stored in the batteries. But if the loads demand more

energy than the one available, the batteries will provide the amount of energy needed.

Regarding the operation of an auxiliary genset, it will only be connected when the batteries' state of charge is lower than a certain programmable threshold.

ADVANTAGES

- 100% Renewable energy.
- The AC-Link Concept allows to use standard grid-connected INGECON® SUN PV inverters.
- Thanks to the management system that controls the power generated, no communication is required between the PV and the battery inverters.
This enables to locate the energy generation sources in a distributed manner, e.g., rooftop installations in an island, where there is not much land available.
- The AC-Link concept allows connecting in parallel battery inverters rather than power generation inverters, thus adjusting the system's total power to every specific case.
If the energy demand increases in the future, the storage capacity could be also enlarged, as well as the installed renewable power.
- If the public grid reaches the installation, the micro-grid could be coupled to it. In that case, the energy coming from renewable sources will be prioritised to satisfy the demand of the loads.



INGECON SUN STORAGE 1Play

With transformer



3 / 6

Single-phase battery inverter with transformer

The INGECON® SUN STORAGE 1Play TL battery inverter is a single-phase, two-way unit that can either be used in off-grid systems or connected to the general supply network.

Battery management

The INGECON® SUN STORAGE 1Play inverters feature cutting-edge technology to control the charging and discharging of the storage system in order to maximise the battery service life. The battery temperature could be controlled at all times, ensuring correct battery operation and durability. The inverter incorporates a pre-charge system to avoid battery inrush currents.

Back-up genset

The INGECON® SUN STORAGE 1Play permits the connection of a back-up genset, should this be necessary. Furthermore, the inverter can be started-up using this generator, in order to charge the batteries when these are completely discharged.

PV input

Optionally, the new INGECON® SUN STORAGE 1Play inverters can incorporate a PV input. Thanks to this input, the PV array can be connected directly to the inverter.

Maximum compatibility

This inverter is fully compatible with the INGECON® SUN and INGECON® μWIND inverters. Furthermore, the scale of the system created and managed by the INGECON® SUN STORAGE 1Play can be increased through the parallel connection of a number of grid-connected converters to the AC grid. It is also possible to create three phase grids with three single-phase inverters.

3 year warranty, extendible up to 25 years.

PROTECTIONS

- Galvanic isolation between the DC and AC sides.
- AC overvoltages.
- Insulation faults.
- Output shortcircuits and overloads.

OPTIONAL ACCESSORIES

- Inverter communication via RS-485 and Ethernet.
- PV input.
- DC switch for the PV field.
- AC pre-charge system.
- INGECON® SUN STORAGE Box.

ACCESSORIES SUPPLIED AS STANDARD

- CAN communication for smart batteries.
- Configurable potential free input.
- Configurable potential-free outputs, some for the connection and disconnection of the back-up genset.
- DC pre-charge system.
- Battery temperature measurement circuit built-in. PT100 (3-wire) needed.

Operating modes:

– Stand-alone

The INGECON® SUN STORAGE 1Play inverter generates a stand-alone AC grid and acts as a grid manager, guaranteeing the correct balance between generation, consumption and the storage system. To do so, it controls the energy flow between the grid and the batteries, based on the status at any given time.

The INGECON® SUN STORAGE 1Play inverter makes it possible to integrate a solar energy source into the grid, through the use of INGECON® SUN inverters. An advanced control system, requiring no communications, manages the power generated by the PV inverters, based on consumption data and the battery charge status. The back-up power source (a genset or the public grid) only connects when the battery state of charge is below a certain programmable threshold.

Optionally, this unit can incorporate a PV input. As a special operating case within the stand-alone mode, it is possible to implement the **Direct Panel Mode**.

In this mode, there is no storage system and the system only operates when the solar resource is available, always providing the energy directly from the PV panel.

– Back-up mode

This operating mode has been designed for grid-connected systems, where grid outages are long and frequent, meaning that a back-up power source is required. The INGECON® SUN STORAGE 1Play inverter operates through a connection to the AC grid. In order to guarantee a power source, the inverter maintains the batteries charged. During a grid outage, the battery inverter generates the AC network and the energy stored in the batteries is used to power the loads. If any renewable energy sources are connected to the grid and the energy generated is greater than the one demanded, then the surplus could be injected into the grid. Furthermore, this mode also makes it possible to implement **peak shaving** strategies in order to shave consumption peaks and reduce the contracted power.

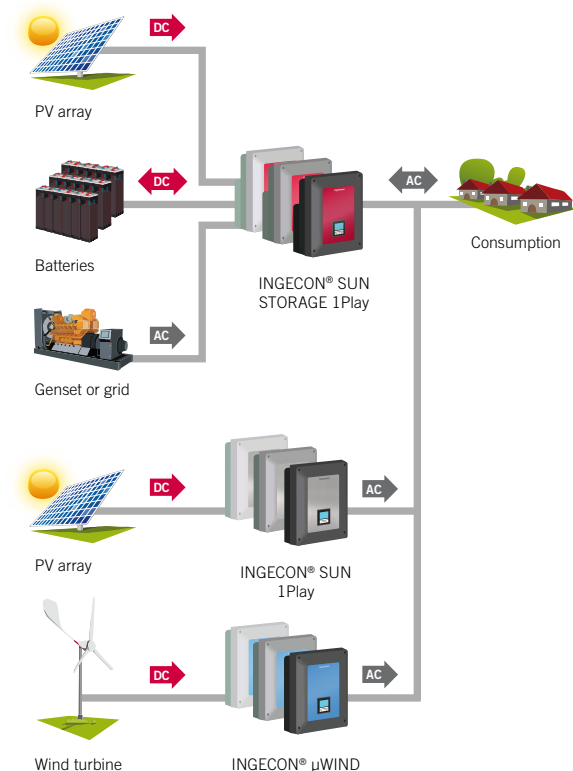
– Self-consumption mode

This operating mode is conceived for grid-connected systems with renewable energy sources, in order to minimise grid consumption. If the energy generated is greater than the one demanded, any surplus energy could charge the batteries or, if they are fully charged, the energy could be injected into the grid. If the loads demand more energy than the one produced by the renewable sources, then the batteries would cover this demand, increasing the self-consumption ratio. In this mode, it is also possible to implement **peak shaving** strategies in order to shave consumption peaks and lower the electricity bill.

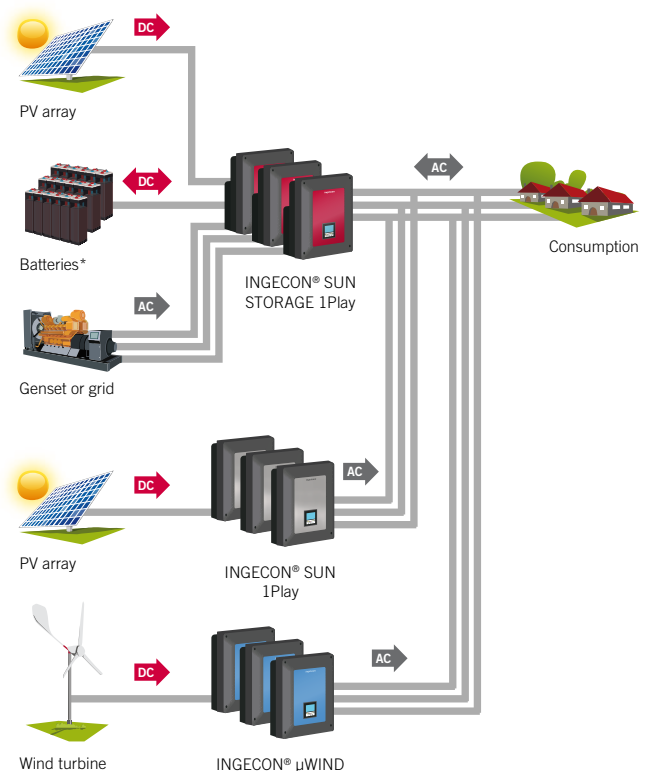
– Grid support

In combination with the INGECON® EMS Manager, the INGECON® SUN STORAGE 1Play inverter is able to adapt the output power from the PV plant to a pre-established value, in order to maintain a constant power output or to control the ramp rate.

Schema for the Stand-alone mode Single-phase



Three-phase



* It must be a single battery bank.

INGECON SUN STORAGE 1Play

Transformerless



3TL / 6TL

Single-phase transformerless battery inverter

The INGECON® SUN STORAGE 1Play TL battery inverter is a single-phase, two-way unit that can either be used in off-grid systems or connected to the general supply network.

Battery management

The INGECON® SUN STORAGE 1Play TL inverters feature cutting-edge technology to control the charging and discharging of the storage system in order to maximise the battery service life. The battery temperature could be controlled at all times, ensuring correct battery operation and durability. The inverter incorporates a pre-charge system to avoid battery inrush currents.

Back-up genset

The INGECON® SUN STORAGE 1Play TL permits the connection of a back-up genset, should this be necessary. Furthermore, the inverter can be started-up using this generator, in order to charge the batteries when these are completely discharged.

PV input

Optionally, the new INGECON® SUN STORAGE 1Play TL inverters can incorporate a PV input. Thanks to this input, the PV array can be connected directly to the inverter.

Maximum compatibility

This inverter is fully compatible with the INGECON® SUN and INGECON® μWIND inverters. Furthermore, the scale of the system created and managed by the INGECON® SUN STORAGE 1Play TL can be increased through the parallel connection of a number of grid-connected converters to the AC grid.

3 year warranty, extendible up to 25 years.

PROTECTIONS

- AC overvoltages.
- Insulation faults.
- Output shortcircuits and overloads.

OPTIONAL ACCESORIES

- Inverter communication via RS-485 and Ethernet.
- PV input.
- DC switch for the PV field.
- AC pre-charge system.
- INGECON® SUN STORAGE Box.

ACCESSORIES SUPPLIED AS STANDARD

- CAN communication for smart batteries.
- Configurable potential free input.
- 2 configurable potential-free outputs, some for the connection and disconnection of the back-up genset.
- DC pre-charge system.
- Battery temperature measurement circuit built-in. PT100 (3-wire) needed.

Operating modes:

– Stand-alone mode

The INGECON® SUN STORAGE 1Play TL inverter generates a stand-alone AC grid and acts as a grid manager, guaranteeing the correct balance between generation, consumption and the storage system. To do so, it controls the energy flow between the grid and the batteries, based on the status at any given time.

The INGECON® SUN STORAGE 1Play TL inverter makes it possible to integrate solar energy source into the grid, through the use of INGECON® SUN inverters. An advanced control system, requiring no communications, manages the power generated by the PV inverters, based on consumption data and the battery charge status. The back-up power source (a genset or the public grid) only connects when the battery state of charge is below a certain programmable threshold.

Optionally, this unit can incorporate a PV input. As a special operating case within the stand-alone mode, it is possible to implement the **Direct Panel Mode**.

In this mode, there is no storage system and the system only operates when the solar resource is available, always providing the energy directly from the PV panel.

– Back-up mode

This operating mode has been designed for grid-connected systems, where grid outages are long and frequent, meaning that a back-up power source is required. The INGECON® SUN STORAGE 1Play TL inverter operates through a connection to the AC grid. In order to guarantee a power source, the inverter maintains the batteries charged. During a grid outage, the battery inverter generates the AC network and the energy stored in the batteries is used to power the loads. If any renewable energy sources are connected to the grid and the energy generated is greater than that demanded, then the surplus could be injected into the grid. Furthermore, this mode also makes it possible to implement **peak shaving** strategies in order to shave consumption peaks and reduce the contracted power.

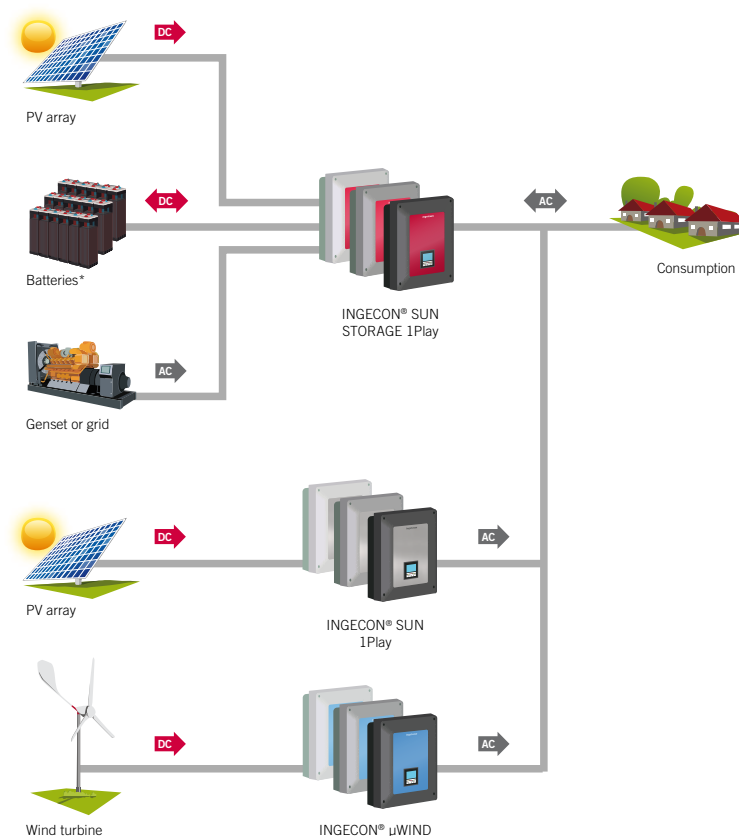
– Self-consumption mode

This operating mode is conceived for grid-connected systems with renewable energy sources, in order to minimise grid consumption. If the energy generated is greater than the one demanded, any surplus energy could charge the batteries or, if they are fully charged, the energy could be injected into the grid. If the loads demand more energy than the one produced by the renewable sources, then the batteries would cover this demand, increasing the self-consumption ratio. In this mode, it is also possible to implement **peak shaving** strategies in order to shave consumption peaks and lower the electricity bill.

– Grid support

In combination with the INGECON® EMS Manager, the INGECON® SUN STORAGE 1Play TL inverter is able to adapt the output power from the PV plant to a pre-established value, in order to maintain a constant power output or to control the ramp rate.

Schema for the Stand-alone mode



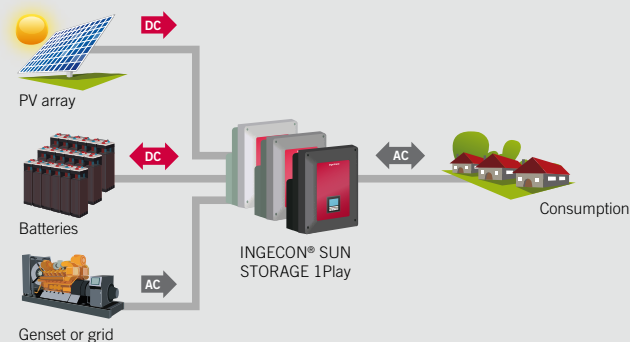
* Each inverter will have its own battery bank.

	3	6
PV Input (DC)		
PV array max. power	6.5 kWp	10 kWp
Voltage range MPP	300 - 450 V	300 - 450 V
Voltage range ⁽¹⁾	300 - 550 V	300 - 550 V
Maximum current	20 A	30 A
Inputs	2	2
MPPT	1	1
Battery Input (DC)		
Rated Battery voltage ⁽²⁾	48 - 300 V	96 - 300 V
Extended battery voltage ⁽³⁾	48 - 420 V	96 - 420 V
Minimum operation voltage ⁽²⁾	40 V	40 V
Maximum charge / discharge current	50 A	50 A
Battery type	Lead, Ni-Cd, Li-ion	Lead, Ni-Cd, Li-ion
Generator / Grid Input (AC)		
Rated voltage	230 V	230 V
Voltage range	172 - 264 V	172 - 264 V
Rated frequency	50 / 60 Hz	50 / 60 Hz
Frequency range	40 - 70 Hz	40 - 70 Hz
Charge current range	0 - 13 A	0 - 26 A
Generator or grid maximum power	11.500 W	11.500 W
Output (AC)		
Rated power ⁽⁴⁾	3 kW	6 kW
Power (25 °C) 30 min, 2 min, 3 s ⁽⁵⁾	3.500 / 3.900 / 5.080 W	6.400 / 6.900 / 7.900 W
Current	13 A	26 A
Rated voltage ⁽⁶⁾	220 - 240 V	220 - 240 V
Rated frequency ⁽⁶⁾	50 / 60 Hz	50 / 60 Hz
Efficiency		
Maximum efficiency	95,5%	96%
General Information		
Stand-by consumption	<10 W	<10 W
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	IP65	IP65

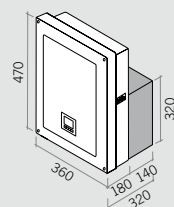
Compliance with standards: EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-12, EN 61000-3-11, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS 3100, RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2⁽⁷⁾, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, IEEE 929, Thailand MEA & PEA requirements

Notes: ⁽¹⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures ⁽²⁾ The inverter's maximum power will be the battery voltage multiplied by the maximum discharge current (50 A) ⁽³⁾ Only possible if PV energy is not present ⁽⁴⁾ AC power up to 40 °C ambient temperature ⁽⁵⁾ This power is only available if the battery voltage multiplied by the maximum discharge current reaches these values ⁽⁶⁾ This parameter is configurable through the display ⁽⁷⁾ Related only to inverters up to 16 A.

SUN STORAGE 1Play



Size and weight (mm)



3
43.3 kg.

6
65 kg.

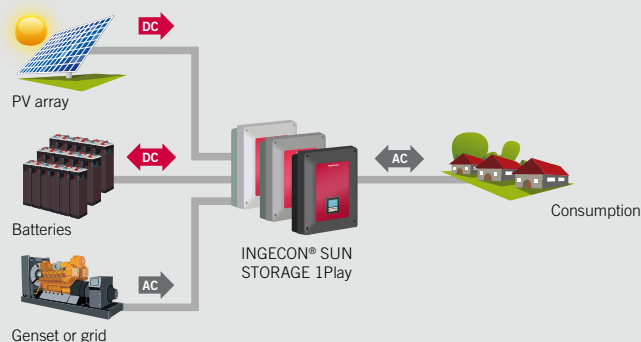
Transformer

	3TL	6TL
PV Input (DC)		
PV array max. power	6.5 kWp	10 kWp
Voltage range MPP	300 - 450 V	300 - 450 V
Voltage range ⁽¹⁾	300 - 550 V	300 - 550 V
Maximum current	20 A	30 A
Inputs	2	2
MPPT	1	1
Battery Input (DC)		
Rated Battery voltage ⁽²⁾	48 - 300 V	96 - 300 V
Extended battery voltage ⁽³⁾	48 - 420 V	96 - 420 V
Minimum operation voltage ⁽²⁾	40 V	40 V
Maximum charge / discharge current	50 A	50 A
Battery type	Lead, Ni-Cd, Li-ion	Lead, Ni-Cd, Li-ion
Generator / Grid Input (AC)		
Rated voltage	230 V	230 V
Voltage range	172 - 264 V	172 - 264 V
Rated frequency	50 / 60 Hz	50 / 60 Hz
Frequency range	40 - 70 Hz	40 - 70 Hz
Charge current range	0 - 13 A	0 - 26 A
Generator or grid maximum power	11,500 W	11,500 W
Output (AC)		
Rated power ⁽⁴⁾	3 kW	6 kW
Power (25 °C) 30 min, 2 min, 3 s ⁽⁵⁾	3,500 / 3,900 / 5,080 W	6,400 / 6,900 / 7,900 W
Current	13 A	26 A
Rated voltage ⁽⁶⁾	220 - 240 V	220 - 240 V
Rated frequency ⁽⁶⁾	50 / 60 Hz	50 / 60 Hz
Efficiency		
Maximum efficiency	95.5%	96%
General Information		
Stand-by consumption	<10 W	<10 W
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	IP65	IP65

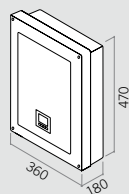
Compliance with standards: EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-12, EN 61000-3-11, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS 3100, RD1699/2011, DIN V VDE V 0126-1-1, EN 50438, CEI 0-21, VDE-AR-N 4105:2011-08, G59/2, G83/2⁽⁷⁾, AS4777.2, AS4777.3, IEC 62116, IEC 61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, South African Grid code, IEEE 929, Thailand MEA & PEA requirements

Notes: ⁽¹⁾ Must not be exceeded under any circumstances. Consider the voltage increase of the 'Voc' at low temperatures ⁽²⁾ The inverter's maximum power will be the battery voltage multiplied by the maximum discharge current (50 A) ⁽³⁾ Only possible if PV energy is not present ⁽⁴⁾ AC power up to 40 °C ambient temperature ⁽⁵⁾ This power is only available if the battery voltage multiplied by the maximum discharge current reaches these values ⁽⁶⁾ This parameter is configurable through the display ⁽⁷⁾ Related only to inverters up to 16 A.

SUN STORAGE 1Play TL



Size and weight (mm)



3TL
18.3 kg.
6TL
23.3 kg.



Acciona PV Plant with an INGECON® SUN STORAGE 1000TL X400 DC Indoor

Power management at large PV plants with an energy storage system

Smart solutions for seamless integration into the electricity grid

Ingeteam has developed the INGECON® SUN STORAGE PowerMax (EMS: *Energy Management Solutions*) family of inverters, designed to integrate energy storage systems into PV plants.

Integration of batteries into PV plants

The use of energy storage systems at PV plants helps to improve the integration of solar energy into the electricity grid, particularly in the case of a weak grid or one with a high solar energy penetration.

The INGECON® SUN STORAGE PowerMax inverters are compatible with the range of battery technologies currently available, such as Lead, Ni-Cd, Redox and Lithium, ensuring that the most suitable technology can be used for each specific application.

The use of energy storage systems makes it possible to implement different plant operating strategies, such as the control of the plant power output variability or the generation of a constant power output.

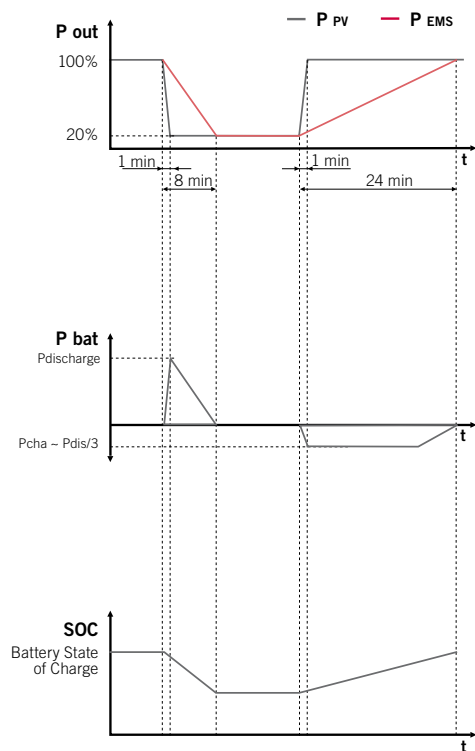
Control of the power output variability

The variation in irradiance caused by passing clouds produces power output variations that can be as great as 80% of the rated power of the plant per minute, depending on the size of the plant and the weather conditions at the site.

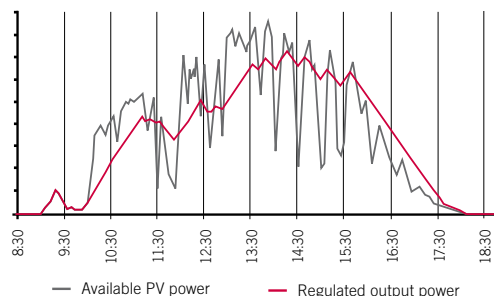
The use of INGECON® SUN STORAGE PowerMax inverters, together with their corresponding batteries, makes it possible to reduce the dynamics of these variations and to adapt to the requirements imposed by grid operators, im-

proving the quality of supply and ensuring the high integration of solar energy into the electricity system.

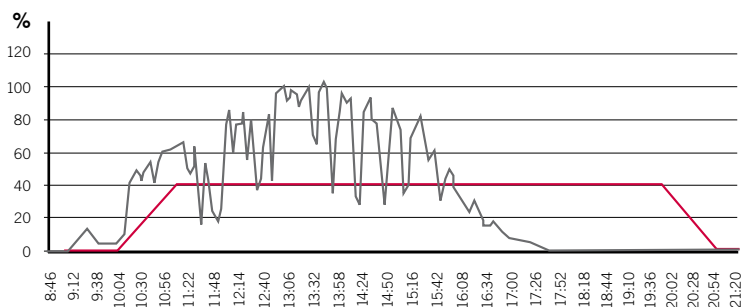
An energy storage system makes it possible to control the plant power output ramps, based on pre-established values. Whenever a cloud passes over, with the subsequent loss of irradiance, the storage system provides the energy required to offset the energy shortfall, whilst the power output is progressively reduced until it is equal to the PV power. Once the cloud has gone, the available power increases sharply and this is used to charge the batteries whilst smoothly increasing the power output.



Example of the system performance in the face of an 80%/min fluctuation in irradiance (up and down), in accordance with the 10%/min output power variation requirement.



Output power at an actual 1 MW PV plant on a day with scattered clouds, with and without energy storage systems, implementing output power regulation.



Output power on a day with scattered clouds, with and without energy storage systems, implementing constant power control.

Constant power control. Shifting the power curve

With the INGECON® SUN STORAGE PowerMax inverters, it is also possible to control the plant output power to ensure that this remains at a constant, pre-determined value. This value can be calculated on the basis of grid operator requirements or weather forecasts. Furthermore, the power curve can be shifted if required by the grid operator.

High penetration for diesel-PV hybrid plants

The INGECON® SUN STORAGE PowerMax inverters can be used to support diesel-PV hybrid systems, to achieve high PV penetration levels. In this way, the PV production variations caused by passing clouds are offset with the power supplied from the storage systems, thereby allowing greater response time

to either vary the diesel load balance system or to start up new generators.

DC and AC supplies together

The input and output supplies are integrated into the same cabinet, facilitating maintenance and repair works.

Solutions available

- Indoor inverters with an integrated DCAC cabinet.
- Indoor inverters with a DC cabinet.
- Outdoor inverters with an integrated DCAC cabinet.

This system is based on conventional grid-connected inverters for PV generation and dedicated inverters to connect the batteries to the electricity grid. This option can be installed in PV plants that are already operating. It also offers the possibility of providing reactive energy with the battery inverters, thereby avoiding the need to over-size the PV inverters should there be strict reactive power delivery requirements. For this topology, a plant controller manages the energy flow between the grid and the batteries, adjusting the plant generation to a pre-established pattern.

INGECON SUN STORAGE Power

With transformer



60 / 80 / 100 / 125 / 150 / 200 / 250

Three-phase battery inverter with transformer

The INGECON® SUN STORAGE Power battery inverter is a three-phase, two-way unit that can either be used in off-grid systems or connected to the general supply network. This inverter offers a high power density in a single power block, providing a choice of configurable operating modes.

Battery management

The INGECON® SUN STORAGE Power features high-tech battery management in order to maximise the useful life of the storage system. The battery temperature can be monitored at all times, guaranteeing a correct operation.

Back-up genset

Furthermore, the INGECON® SUN STORAGE Power permits the connection of a back-up generator, should this be necessary. It is possible to start-up the inverter by using the genset, in order to charge the batteries.

Maximum compatibility

This inverter is 100% compatible with the INGECON® SUN inverters, making it possible to integrate a solar energy source into the AC grid. To do so, additional PV inverters are required.

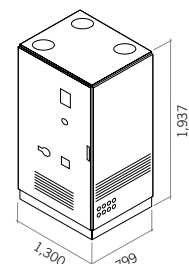
Software included

The INGECON® SUN Manager software is included at no extra charge. This can be used to monitor and record the inverter data over the Internet. The RS-485 communications are supplied as standard.

The INGECON® SUN STORAGE Power three-phase inverter complies with the most demanding international standards and regulations.

Standard 3 year warranty, extendable for up to 25 years

Size (mm)





With transformer

Operating modes:

– Stand-alone mode

The INGECON[®] SUN STORAGE Power generates a stand-alone AC grid and acts as a grid manager, guaranteeing the correct balance between generation, consumption and the storage system. To achieve this, the INGECON[®] SUN STORAGE Power is able to control the energy flows between the grid and the batteries, based on the status at any given time. The INGECON[®] SUN STORAGE Power inverter allows a solar energy source to be integrated into the grid, through the use of INGECON[®] SUN inverters.

An advanced control system, requiring no communications, manages the power generated by the INGECON[®] SUN inverters, based on consumption data and the battery state of charge status. The back-up power source (a genset or the public grid) only connects when the battery state of charge is below a certain programmable threshold.

– Back-up mode

This operating mode has been designed for grid-connected systems, where grid outages are long and frequent, meaning that a back-up power source is required. The INGECON[®] SUN STORAGE Power inverter operates through a connection to the AC grid. In order to guarantee a power source, the inverter maintains the batteries charged. During a grid outage, the battery inverter generates the AC network and the energy stored in the batteries is used to power the loads. If any renewable energy sources are connected to the grid and the energy generated is greater than that demanded, then the surplus could be injected into the grid. Furthermore, this mode also makes it possible to implement **peak shaving** strategies, in order to shave consumption peaks and reduce the contracted power.

– Self-consumption mode

This operating mode is conceived for grid-connected systems with renewable energy sources, in order to minimise grid consumption. If the energy generated is greater than demand, then any surplus energy could charge the batteries or, if they are fully charged, the energy could be injected into the grid. If the loads demand more energy than that produced by the renewable sources, then the batteries would cover this demand, increasing the self-consumption ratio. This mode also allows for the implementation of **peak shaving** strategies in order to shave consumption peaks and lower the electricity bill.

– Grid support

In combination with the INGECON[®] EMS Plant Controller, the INGECON[®] SUN STORAGE Power inverter is able to adapt the output power from the PV plant to a pre-established value, in order to maintain a constant power output or to control the ramp rate.

PROTECTIONS

- Galvanic isolation between the DC and AC sides.
- Short-circuits and overloads at the output.
- Insulation faults.
- DC switch.
- AC circuit breaker.

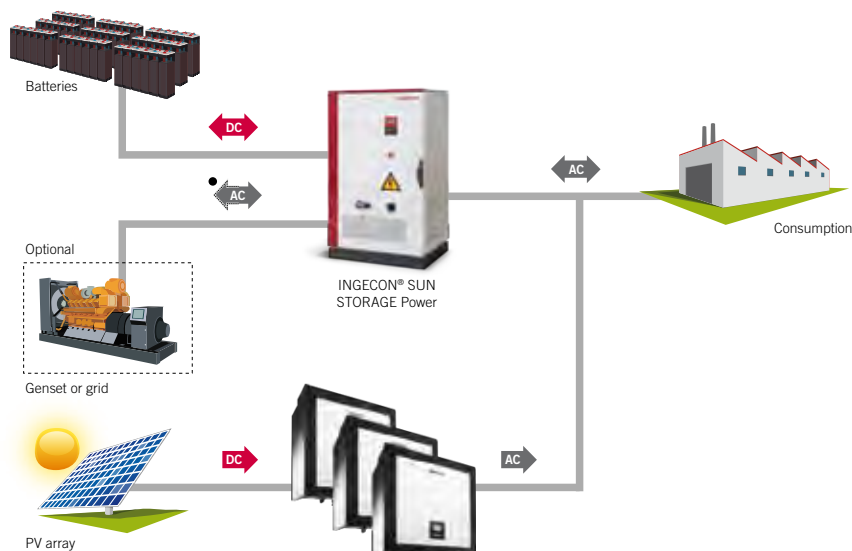
ACCESSORIES SUPPLIED AS STANDARD

- RS-485 communication.
- CAN communication for smart batteries.
- Configurable potential free inputs.
- Configurable potential-free outputs, some for the connection and disconnection of a back-up genset.
- DC pre-charge system.
- Type 2, AC surge arresters.

OPTIONAL ACCESSORIES

- Inverter communication via Ethernet.
- DC fuses.
- Type 2, DC surge arresters.
- AC pre-charge system.
- AC wattmeter and switch for the auxiliary AC input.

Schema for the Stand-alone mode



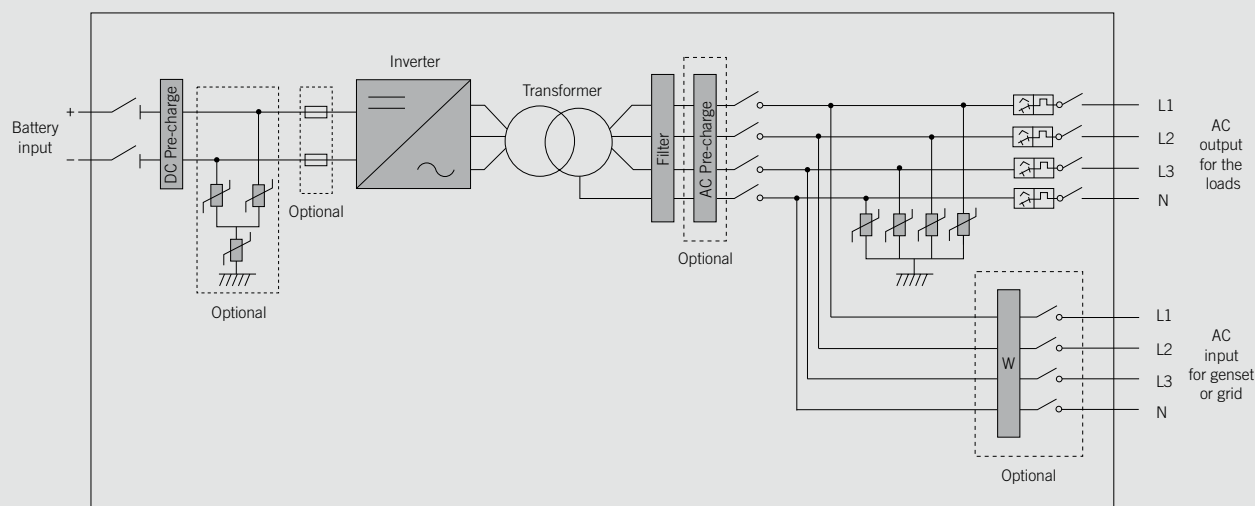
• Bidirectional only when grid is connected.

	60	80	100	125	150	200	250
Batteries (DC)							
Nominal Power	≥ 62 kW	≥ 82 kW	≥ 103 kW	≥ 129	≥ 155 kW	≥ 206 kW	≥ 258 kW
Voltage range	330 - 820 V	330 - 820 V	330 - 820 V	330 - 820 V	347 - 820 V	462 - 820 V	578 - 820 V
Maximum voltage ⁽¹⁾	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V	1,000 V
Maximum current	191 A	255 A	318 A	398 A	450 A	450 A	450 A
Inputs	4	4	4	4	4	4	4
Type of battery	Lead, Ni-Cd, Li-ion	Lead, Ni-Cd, Li-ion	Lead, Ni-Cd, Li-ion	Lead, Ni-Cd, Li-ion	Lead, Ni-Cd, Li-ion	Lead, Ni-Cd, Li-ion	Lead, Ni-Cd, Li-ion
Input (AC)							
Rated voltage	400 V	400 V	400 V	400 V	400 V	400 V	400 V
Voltage range	320 - 480 V	320 - 480 V	320 - 480 V	320 - 480 V	320 - 480 V	320 - 480 V	320 - 480 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Frequency Range	40 - 70 Hz	40 - 70 Hz	40 - 70 Hz	40 - 70 Hz	40 - 70 Hz	40 - 70 Hz	40 - 70 Hz
Charging current range	0 - 96 A	0 - 128 A	0 - 160 A	0 - 200 A	0 - 241 A	0 - 321 A	0 - 368 A
Maximum power	250 kW	250 kW	250 kW	250 kW	250 kW	250 kW	250 kW
Output (AC)							
Rated power ⁽²⁾	60 kW	80 kW	100 kW	125 kW	150 kW	200 kW	250 kW
Maximum current	96 A	128 A	160 A	200 A	241 A	321 A	368 A
Rated voltage	400 V	400 V	400 V	400 V	400 V	400 V	400 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Efficiency							
Maximum efficiency	96.4%	96.6%	96.8%	96.9%	97.3%	97.4%	97.5%
General Information							
Galvanic isolation	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Air cooling	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h	2,600 m³/h
Stand-by consumption	30 W	30 W	30 W	30 W	30 W	30 W	30 W
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative Humidity (Non-condensing)	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%
Maximum altitude ⁽³⁾	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Protection Class	IP20	IP20	IP20	IP20	IP20	IP20	IP20
Weight	900 kg	1,026 kg	1,162 kg	1,162 kg	1,325 kg	1,400 kg	1,500 kg

Compliance with standards: EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-12, EN 61000-3-11, EN 62109-1, EN 62109-2, IEC 62103, EN 50178, FCC Part 15, EN 50438, IEC 62116, IEC 61727, VDE 0126-1-1

Notes: ⁽¹⁾ Above 820 V, the maximum current decreases gradually ⁽²⁾ AC Power for 40 °C ambient temperature ⁽³⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1,000 m.

SUN STORAGE Power



B Series

**1000TL B400 DCAC Indoor**

Three-phase transformerless battery inverter

The INGECON® SUN STORAGE PowerMax is a three-phase bidirectional battery inverter that can be used in both, grid-connected or stand-alone systems. This inverter offers a high-power density in a single power block, providing different configurable operating modes.

Easy maintenance

String inverter philosophy has been applied in the design of this central inverter, facilitating the inverter usage. Moreover, the input and output lines are

integrated into the same cabinet, in order to make maintenance work easier.

Battery management

The INGECON® SUN STORAGE PowerMax features a highly advanced battery control technology, ensuring the maximum life of the storage system. The battery temperature could be controlled at all times ensuring an enhanced lifespan of the accumulator. This inverter is 100% compatible with the INGECON® SUN inverters.

Software included

Included at no extra cost the software INGECON® SUN Manager for monitoring and recording the inverter data over the Internet. Ethernet communications are supplied as standard.

The INGECON® SUN STORAGE PowerMax three-phase inverter complies with the most demanding international standards.

Standard 3 year warranty, extendable for up to 25 years



B Series

Operating modes:

- Stand-alone mode

The INGECON® SUN STORAGE PowerMax inverter generates an off-grid AC network and acts as a grid manager, guaranteeing the correct balance between generation, consumption and the storage system. To do so, the INGECON® SUN STORAGE PowerMax can control the energy flow between the grid and the batteries, based on the situation at any given time. The INGECON® SUN STORAGE PowerMax allows the integration of a solar energy source into the grid using INGECON® SUN PV inverters.

An advanced control system, requiring no communications, manages the power generated by the INGECON® SUN inverters, based on consumption and the battery state of charge. The auxiliary source (a genset or the public grid) is only connected when the batteries' state of charge is lower than a certain programmable threshold.

- Back-up mode

This operation mode is conceived for grid-connected systems where grid outages are long and frequent, and an auxiliary energy source is required. The INGECON® SUN STORAGE PowerMax inverter works connected to the AC grid. In order to guarantee an energy source the inverter keeps the batteries charged. During grid outages, the INGECON® SUN STORAGE PowerMax generates an AC grid and the energy stored in the batteries is used to feed the loads.

If renewable energy sources are connected to the grid and the energy generated is bigger than the one demanded, the surplus could be injected into the grid.

- Self-consumption mode

This operating mode is conceived for grid-connected systems with renewable energy sources in order to minimise the consumption from the grid. If the energy generated is bigger than the one demanded, the surplus could be used to charge the batteries or to inject into the grid if the batteries are fully charged. If the loads demand more energy than the one produced by the renewable sources, the batteries would satisfy the demand, increasing the self-consumption ratio.

- Grid support

In combination with the INGECON® EMS Plant Controller, the INGECON® SUN STORAGE PowerMax inverter can adapt the output power of a PV plant to a pre-established requirement, such as power ramp control or constant output power.

PROTECTIONS

- Output short-circuits and overloads.
- Insulation failures.
- DC switch.
- IP64 protection class for the electronics.

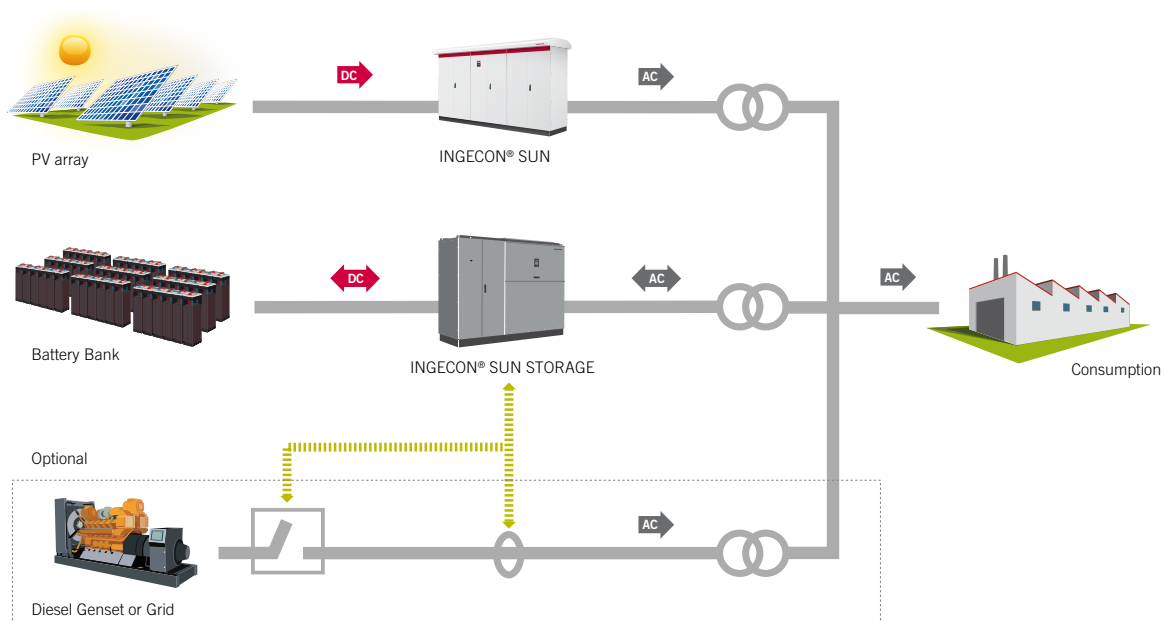
INTEGRATED ACCESSORIES

- Ethernet communication.
- CAN communication for smart batteries.
- Configurable potential-free inputs.
- Configurable potential-free outputs, some of them for connection and disconnection of the back-up generators.
- DC pre-charge system.
- AC surge arresters, type 2.

OPTIONAL ACCESSORIES

- DC fuses.
- DC surge arresters, type 2.
- AC pre-charge system.
- Heating kit, for operating at an ambient temperature of -40 °C (-40 °F).
- AC circuit breaker.

Schema for the Stand-alone mode

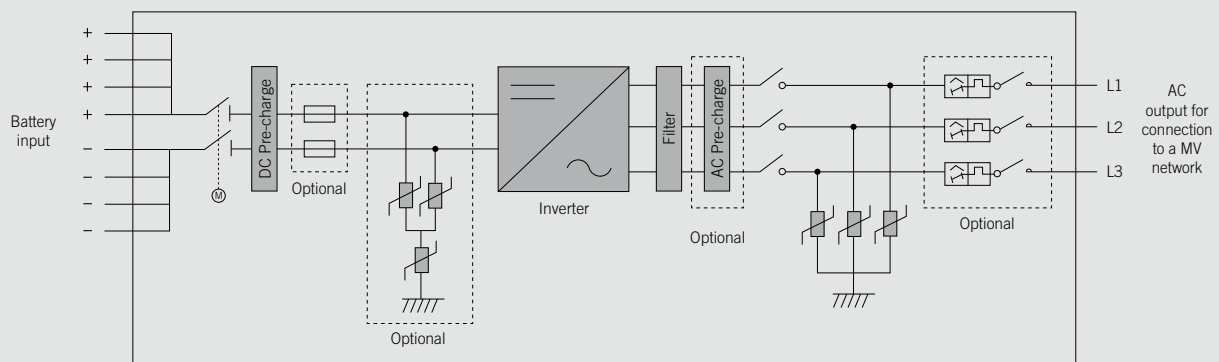


1000TL B400 DCAC Indoor	
Batteries (DC)	
Nominal Power	≥ 1,030 kW
Voltage range for stand-alone mode	578 - 820 V
Voltage range for grid-connected modes ⁽¹⁾	636 - 820 V
Maximum voltage ⁽²⁾	1,050 V
Maximum current	2,000 A
Inputs	8
Type of battery	Lead, Ni-Cd, Li-ion
Output (AC)	
Rated power (@ 50 °C)	1,000 kVA
Maximum power (@ 30 °C)	1,108 kVA
Maximum current	1,600 A
Rated voltage	400 V
Frequency	50 / 60 Hz
Efficiency	
Maximum efficiency	98.9%
General Information	
Galvanic isolation	No
Air cooling	8,000 m³/h
Stand-by consumption	60 W
Ambient temperature	-20 °C to +65 °C
Relative Humidity (Non-condensing)	0 - 95%
Maximum altitude ⁽³⁾	3,000
Protection Class	IP20
Electronics' protection class	IP64
Weight	1,860 kg

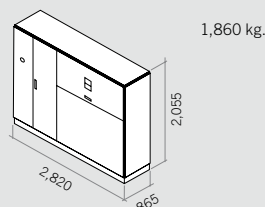
Compliance with standards: EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-12, EN 61000-3-11, EN 62109-1, EN 62109-2, IEC 62103, EN 50178, FCC Part 15, EN 50438, IEC 62116, IEC 61727

Notes: ⁽¹⁾ Grid-connected modes include Back-up, Self consumption and Grid Support. Minimum voltage DC ($V_{DC, min}$) for $V_{grid, max} = 1.1$ p.u. If $V_{grid, max}$ is higher than this value, minimum voltage should be corrected as $V_{DC, min} * V_{grid, max} / 1.1$ ⁽²⁾ Above 820V, the maximum current decreases gradually ⁽³⁾ Over 1,000 m temperature for rated power is reduced at the rate of 4.5 °C for each 1000 m.

SUN STORAGE PowerMax



Size (mm)



INGECON SUN STORAGE PowerMax

X Series

Indoor / Outdoor



Battery inverters with a DCAC cabinet

The INGECON® SUN STORAGE PowerMax battery inverter family operates in a wide range of output voltages: 220, 275, 300, 320, 345, 360 and 400 Vac. For any of the operating voltages, these inverters have from two to four independent power blocks.

Battery management

This battery inverter contemplates a power converter dedicated to each ESS. This converter delivers direct current to

the batteries for charging purposes whilst it feeds alternating current into the grid when it discharges the ESS. The battery inverter either delivers or absorbs the power required to ensure that the overall plant power is controlled. The equipment can change from charging to discharging the batteries in a matter of seconds.

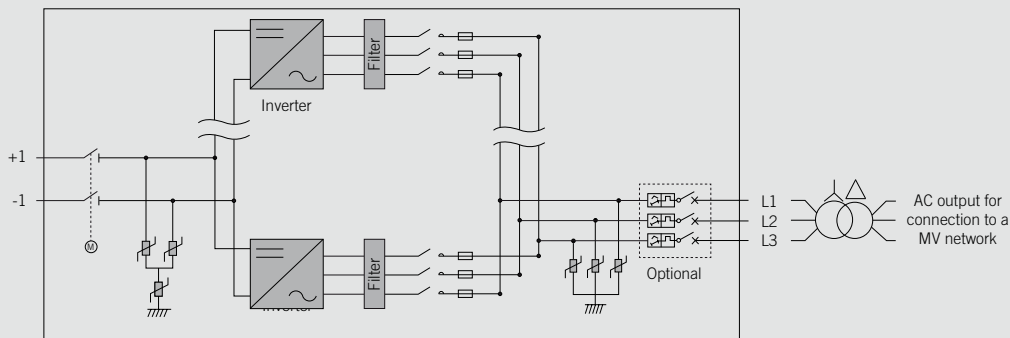
Performance qualities

For this topology, a plant controller man-

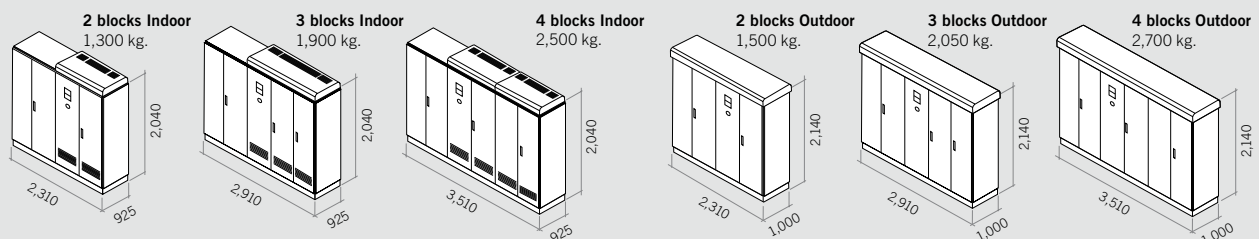
ages the energy flow between the grid and the batteries, adjusting the plant generation to a pre-established pattern. Therefore, the plant controller is responsible for adding up the power outputs from the PV inverters and for calculating the power received by the battery inverters as a set point.

Standard 5 year warranty, extendible up to 25 years

SUN STORAGE PowerMax DCAC



Size and weight (mm)





Battery inverters with a DC cabinet

Available in a DC version

This model has no AC cabinet and therefore takes up less space. This is a flexible solution, particularly suited to medium voltage transformer substations with two inverters. The construction of enclosures to house a number of inverters, maximises the investment made.

System highlights

This battery inverter can be installed in PV plants that are already operating. It

is also possible to provide reactive energy with the battery inverters, thereby avoiding the need to over-size the PV inverters should there be strict reactive power delivery requirements.

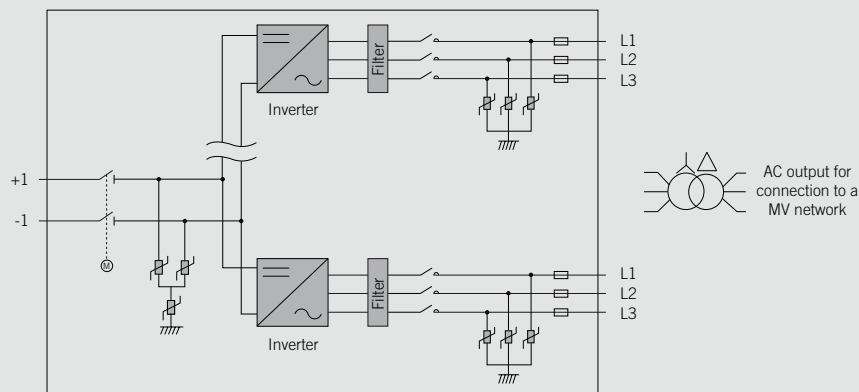
Software included

The INGECON® SUN Manager and INGECON® SUN Monitor applications for monitoring and recording the inverter data over the internet, are included at no extra cost.

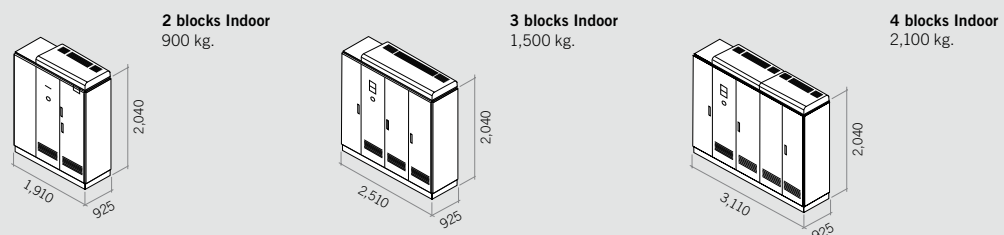
Protections and communications included

The INGECON® SUN STORAGE PowerMax family has a low-voltage ride through capability and is equipped with an active and reactive power control system. RS-485 communications supplied as standard for inter-inverter communications, and inverter monitoring (alarms, real time production, etc.). Featuring status and alarm LED indicators and the possibility of remote control from a PC or local control from the inverter display.

SUN STORAGE PowerMax DC



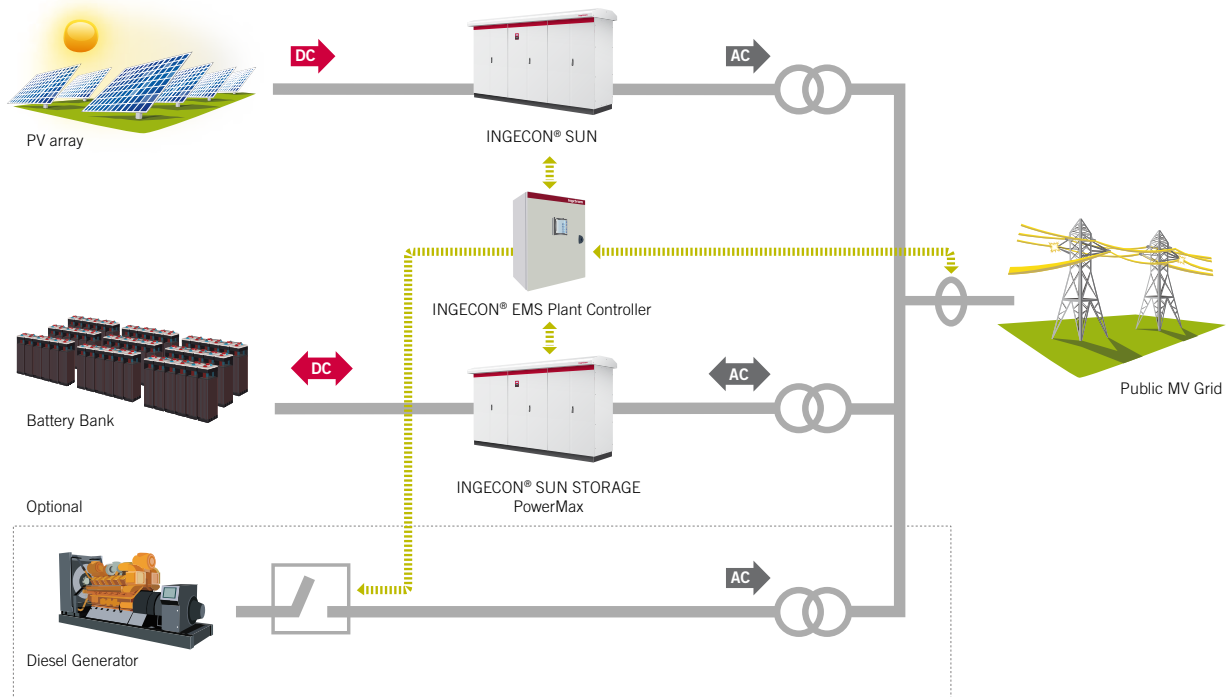
Size and weight (mm)



INGECON SUN STORAGE PowerMax

X Series

Indoor / Outdoor



This option is based on conventional grid-connected inverters for the PV generation and dedicated inverters to connect the batteries to the electricity grid. This option can be installed in PV plants that are already operating. It offers the possibility of providing reactive

energy with the battery inverters, thereby avoiding the need to over-size the PV inverters should there be strict reactive power delivery requirements. For this topology, a plant controller manages the energy flow between the grid and the batteries, adjusting the plant generation to a pre-established pattern.

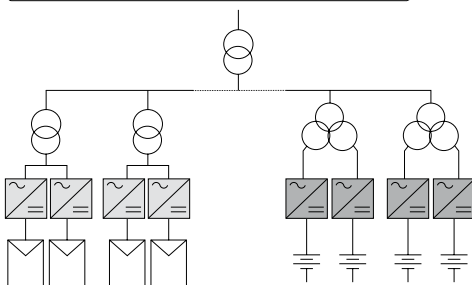
PROTECTIONS

- Short-circuits and overloads at the output.
- Anti-islanding with automatic disconnection.
- Isolation monitor.
- DC load break switch.
- Lightning induced DC and AC surge arresters, type 2.

OPTIONAL ACCESSORIES

- Inter-inverter communications via Ethernet, Bluetooth or GSM / GPRS.
- Remote tripping of the AC protection.
- AC circuit breaker with door control (only in DCAC units).

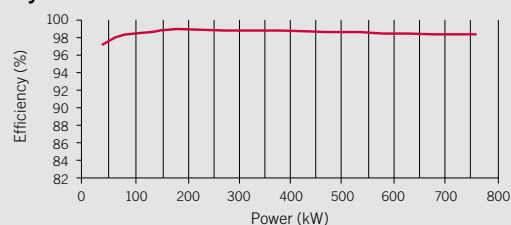
DIAGRAM OF A PV PLANT WITH A STORAGE SYSTEM



	380TL X300	570TL X300	760TL X300
Input (DC) (Battery)			
Battery voltage range	480 - 820 V	480 - 820 V	480 - 820 V
Maximum current	900 A	1,350 A	1,800 A
Type of battery	Li-ion, lead, Ni-Cd		
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Input protections			
Overvoltage protections	Type 2 DC surge arresters (for each power stage)		
DC switch	Motorized DC switch with door control		
Other protections	Up to 16 pairs of DC fuses, DC insulation monitor with alarm, emergency pushbutton		
Output (AC)			
Rated power ⁽¹⁾	378 kW	568 kW	757 kW
Maximum current	736 A	1,104 A	1,472 A
Rated voltage	300 V IT System	300 V IT System	300 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=378 kVA	Yes. Smax=568 kVA	Yes. Smax=757 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Output protections			
Overvoltage protections	Type 2 AC surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only available for DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC fuses, AC short circuits and overloads (for each power stage)		
Features			
Maximum efficiency	98.6%	98.6%	98.6%
Euroefficiency	98.4%	98.4%	98.4%
CEC	97.9%	97.9%	97.9%
Stand-by consumption ⁽⁴⁾	120 W	120 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁵⁾	3,000 m	3,000 m	3,000 m
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)		
Air volume	2,670 m³/h (fans: 1,230 W)	4,640 m³/h (fans: 2,050 W)	5,340 m³/h (fans: 2,460 W)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power		
Marking	CE		
EMC & Security standards	EN 50178, IEC 61000-6-2, IEC 61000-6-4, FCC Part 15		
Grid connection standards	BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 0-16, Allegato 70 TERNA, Arrêté 23-04-2008, IEEE 1547, G59/2		

Notes: ⁽¹⁾ AC Power for 45 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽²⁾ For $P_{out}>25\%$ of the rated power ⁽³⁾ For $P_{out}>25\%$ of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁴⁾ Consumption from PV field ⁽⁵⁾ Over 1,000 m temperature for rated power (45 °C) is reduced at the rate of 4.5 °C for each 1,000 m.

Efficiency INGECON® SUN STORAGE 760TL X300 $V_{dc} = 550 \text{ V}$

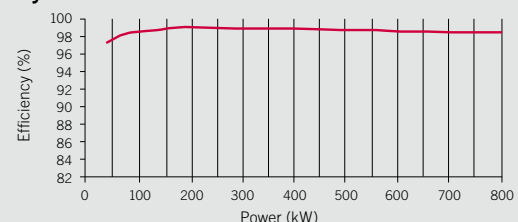


SUN STORAGE PowerMax X Series 320 Vac

	400TL X320	605TL X320	800TL X320
Input (DC) (Battery)			
Battery voltage range	515 - 820 V	515 - 820 V	515 - 820 V
Maximum current	900 A	1,350 A	1,800 A
Type of battery	Li-ion, lead, Ni-Cd		
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Input protections			
Overvoltage protections	Type 2 DC surge arresters (for each power stage)		
DC switch	Motorized DC switch with door control		
Other protections	Up to 16 pairs of DC fuses, DC insulation monitor with alarm, emergency pushbutton		
Output (AC)			
Rated power ⁽¹⁾	401 kW	605 kW	803 kW
Maximum current	736 A	1,104 A	1,472 A
Rated voltage	320 V IT System	320 V IT System	320 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=401 kVA	Yes. Smax=605 kVA	Yes. Smax=803 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Output protections			
Overvoltage protections	Type 2 AC surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only available for DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC fuses, AC short circuits and overloads (for each power stage)		
Features			
Maximum efficiency	98.7%	98.7%	98.7%
Euroefficiency	98.5%	98.5%	98.5%
CEC	97.9%	97.9%	97.9%
Stand-by consumption ⁽⁴⁾	120 W	120 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁵⁾	3,000 m	3,000 m	3,000 m
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)		
Air volume	2,670 m³/h (fans: 1,230 W)	4,640 m³/h (fans: 2,050 W)	5,340 m³/h (fans: 2,460 W)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power		
Marking	CE		
EMC & Security standards	EN 50178, IEC 61000-6-2, IEC 61000-6-4, FCC Part 15		
Grid connection standards	BDEW MT, RD 661/2007, P.0.12.3, CEI 11-20, CEI 0-16, Allegato 70 TERNA, Arrêté 23-04-2008, IEEE 1547, G59/2		

Notes: ⁽¹⁾ AC Power for 45 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽²⁾ For P_{out}>25% of the rated power ⁽³⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁴⁾ Consumption from PV field ⁽⁵⁾ Over 1,000 m temperature for rated power (45 °C) is reduced at the rate of 4.5 °C for each 1,000 m.

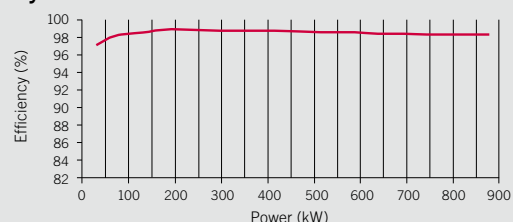
Efficiency INGECON® SUN STORAGE 800TL X320 V_{dc} = 550 V



	440TL X345	660TL X345	880TL X345
Input (DC) (Battery)			
Battery voltage range	552 - 820 V	552 - 820 V	552 - 820 V
Maximum current	900 A	1,350 A	1,800 A
Type of battery	Li-ion, lead, Ni-Cd		
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Input protections			
Overvoltage protections	Type 2 DC surge arresters (for each power stage)		
DC switch	Motorized DC switch with door control		
Other protections	Up to 16 pairs of DC fuses, DC insulation monitor with alarm, emergency pushbutton		
Output (AC)			
Rated power ⁽¹⁾	440 kW	660 kW	880 kW
Maximum current	736 A	1,104 A	1,472 A
Rated voltage	345 V IT System	345 V IT System	345 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=440 kVA	Yes. Smax=660 kVA	Yes. Smax=880 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Output protections			
Overvoltage protections	Type 2 AC surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only available for DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC fuses, AC short circuits and overloads (for each power stage)		
Features			
Maximum efficiency	98.8%	98.8%	98.8%
Euroefficiency	98.6%	98.6%	98.6%
CEC	98%	98%	98%
Stand-by consumption ⁽⁴⁾	120 W	120 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁵⁾	3,000 m	3,000 m	3,000 m
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)		
Air volume	2,670 m³/h (fans: 1,230 W)	4,640 m³/h (fans: 2,050 W)	5,340 m³/h (fans: 2,460 W)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power		
Marking	CE		
EMC & Security standards	EN 50178, IEC 61000-6-2, IEC 61000-6-4, FCC Part 15		
Grid connection standards	BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 0-16, Allegato 70 TERNA, Arrêté 23-04-2008, IEEE 1547, G59/2		

Notes: ⁽¹⁾ AC Power for 45 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽²⁾ For $P_{out} > 25\%$ of the rated power ⁽³⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁴⁾ Consumption from PV field ⁽⁵⁾ Over 1,000 m temperature for rated power (45 °C) is reduced at the rate of 4.5 °C for each 1,000 m.

Efficiency INGECON® SUN STORAGE 880TL X345 $V_{dc} = 600 V$

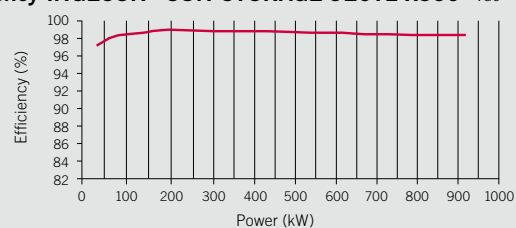


SUN STORAGE PowerMax x Series **360 Vac**

	460TL X360	690TL X360	920TL X360
Input (DC) (Battery)			
Battery voltage range	576 - 820 V	576 - 820 V	576 - 820 V
Maximum current	900 A	1,350 A	1,800 A
Type of battery	Li-ion, lead, Ni-Cd		
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Input protections			
Overvoltage protections	Type 2 DC surge arresters (for each power stage)		
DC switch	Motorized DC switch with door control		
Other protections	Up to 16 pairs of DC fuses, DC insulation monitor with alarm, emergency pushbutton		
Output (AC)			
Rated power ⁽¹⁾	458 kW	688 kW	917 kW
Maximum current	736 A	1,104 A	1,472 A
Rated voltage	360 V IT System	360 V IT System	360 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=458 kVA	Yes. Smax=688 kVA	Yes. Smax=917 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Output protections			
Overvoltage protections	Type 2 AC surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only available for DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC fuses, AC short circuits and overloads (for each power stage)		
Features			
Maximum efficiency	98.8%	98.8%	98.8%
Euroefficiency	98.6%	98.7%	98.7%
CEC	98.1%	98.1%	98.1%
Stand-by consumption ⁽⁴⁾	120 W	120 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁵⁾	3,000 m	3,000 m	3,000 m
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)		
Air volume	2,670 m³/h (fans: 1,230 W)	4,640 m³/h (fans: 2,050 W)	5,340 m³/h (fans: 2,460 W)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power		
Marking	CE		
EMC & Security standards	EN 50178, IEC 61000-6-2, IEC 61000-6-4, FCC Part 15		
Grid connection standards	BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 0-16, Allegato 70 TERNA, Arrêté 23-04-2008, IEEE 1547, G59/2		

Notes: ⁽¹⁾ AC Power for 45 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽²⁾ For P_{out}>25% of the rated power ⁽³⁾ For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁴⁾ Consumption from PV field ⁽⁵⁾ Over 1,000 m temperature for rated power (45 °C) is reduced at the rate of 4.5 °C for each 1,000 m.

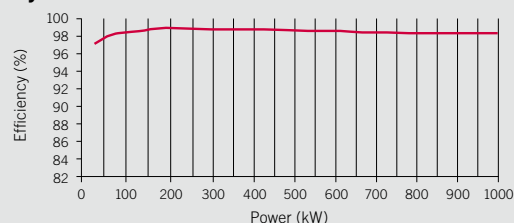
Efficiency INGECON® SUN STORAGE 920TL X360 V_{dc} = 625 V



	500TL X400	750TL X400	1000TL X400
Input (DC) (Battery)			
Battery voltage range	636 - 820 V	636 - 820 V	636 - 820 V
Maximum current	900 A	1,350 A	1,800 A
Type of battery	Li-ion, lead, Ni-Cd		
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Input protections			
Overvoltage protections	Type 2 DC surge arresters (for each power stage)		
DC switch	Motorized DC switch with door control		
Other protections	Up to 16 pairs of DC fuses, DC insulation monitor with alarm, emergency pushbutton		
Output (AC)			
Rated power ⁽¹⁾	510 kW	764 kW	1,019 kW
Maximum current	736 A	1,104 A	1,472 A
Rated voltage	400 V IT System	400 V IT System	400 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1	1
Phi Cosine adjustable	Yes. Smax=510 kVA	Yes. Smax=764 kVA	Yes. Smax=1,019 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)		
Output protections			
Overvoltage protections	Type 2 AC surge arresters		
AC breaker	Optional AC circuit breaker with door control, motorized or remote trip (only available for DCAC models)		
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)		
Other protections	AC fuses, AC short circuits and overloads (for each power stage)		
Features			
Maximum efficiency	98.8%	98.8%	98.8%
Euroefficiency	98.6%	98.6%	98.6%
CEC	98.1%	98.1%	98.1%
Stand-by consumption ⁽⁴⁾	120 W	120 W	120 W
General Information			
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20 / IP54	IP20 / IP54	IP20 / IP54
Max. altitude ⁽⁵⁾	3,000 m	3,000 m	3,000 m
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)		
Air volume	2,670 m³/h (fans: 1,230 W)	4,640 m³/h (fans: 2,050 W)	5,340 m³/h (fans: 2,460 W)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power		
Marking	CE		
EMC & Security standards	EN 50178, IEC 61000-6-2, IEC 61000-6-4, FCC Part 15		
Grid connection standards	BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 0-16, Allegato 70 TERNA, Arrêté 23-04-2008, IEEE 1547, G59/2		

Notes: ⁽¹⁾ AC Power for 45 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8% ⁽²⁾ For $P_{out} > 25\%$ of the rated power ⁽³⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁴⁾ Consumption from PV field ⁽⁵⁾ Over 1,000 m temperature for rated power (45 °C) is reduced at the rate of 4.5 °C for each 1,000 m.

Efficiency INGECON® SUN STORAGE 1000TL X400 $V_{dc} = 650 V$

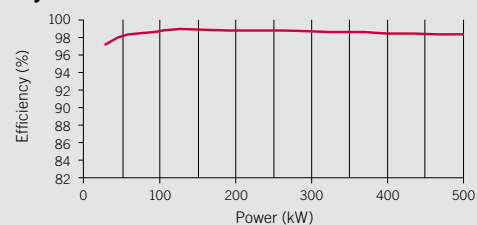


SUN STORAGE PowerMax U x Series **208 Vac**

	375TL U X208 Outdoor	500TL U X208 Outdoor
Input (DC) (Battery)		
Battery voltage range	340 - 864 V	340 - 864 V
Maximum current	1,170 A	1,560 A
Type of battery	Li-ion, lead, Ni-Cd	
Connection type	Cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Power Blocks	3	4
Input protections		
Overvoltage protections	Type 2 DC surge arresters (for each power stage)	
DC switch	Motorized DC switch with door control	
Other protections	DC insulation monitor with alarm. Door control. DC fuses are optional	
Output (AC)		
Rated power ⁽¹⁾	375 kVA	500 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	208 V IT System	208 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1
Phi Cosine adjustable	Yes. Smax=375 kVA	Yes. Smax=500 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Output protections		
Overvoltage protections	Type 2 AC surge arresters	
AC breaker	AC circuit breaker with door control	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.1%	98.1%
Stand-by consumption ⁽⁴⁾	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁵⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)	
Air volume	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans: 1,500 VA)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power	
Certification	CE, ETL	
EMC & Security standards	UL9540, UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE 1547, IEEE 1547.1, NEC CODE	

Notes: ⁽¹⁾ AC power for 122 °F (50 °C) ambient temperature. The output will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase. ⁽²⁾ For $P_{out} > 25\%$ of the rated power ⁽³⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁴⁾ Consumption from the battery ⁽⁵⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F for each 1,000 ft.

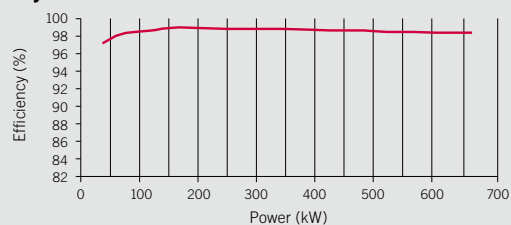
Efficiency INGECON® SUN STORAGE 500TL U X208 Vdc = 340 V



	500TL U X275 Outdoor	660TL U X275 Outdoor
Input (DC) (Battery)		
Battery voltage range	442 - 864 V	442 - 864 V
Maximum current	1,170 A	1,560 A
Type of battery	Li-ion, lead, Ni-Cd	
Connection type	Cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Power Blocks	3	4
Input protections		
Overvoltage protections	Type 2 DC surge arresters (for each power stage)	
DC switch	Motorized DC switch with door control	
Other protections	DC insulation monitor with alarm. Door control. DC fuses are optional	
Output (AC)		
Rated power ⁽¹⁾	500 kVA	660 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	275 V IT System	275 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1
Phi Cosine adjustable	Yes. Smax=500 kVA	Yes. Smax=660 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Output protections		
Overvoltage protections	Type 2 AC surge arresters	
AC breaker	AC circuit breaker with door control	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.3%	98.3%
Stand-by consumption ⁽⁴⁾	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁵⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)	
Air volume	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans: 1,500 VA)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power	
Certification	CE, ETL	
EMC & Security standards	UL9540, UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE 1547, IEEE 1547.1, NEC CODE	

Notas: ⁽¹⁾ Potencia AC hasta 122 °F (50 °C) de temperatura ambiente. La potencia de salida se reducirá un 1% por cada 1 °F (0,56 °C) de incremento ⁽²⁾ Para P_{AC}>25% de la potencia nominal ⁽³⁾ Para P_{AC}>25% de la potencia nominal y tensión según IEC 61000-3-4 ⁽⁴⁾ Consumo desde baterías ⁽⁵⁾ Por encima de 3.300 ft, la temperatura para potencia nominal 122 °F (50 °C) se reduce a razón de 2,42 °F por cada 1.000 m adicionales.

Efficiency INGECON® SUN STORAGE 660TL U X275 V_{dc} = 526 V

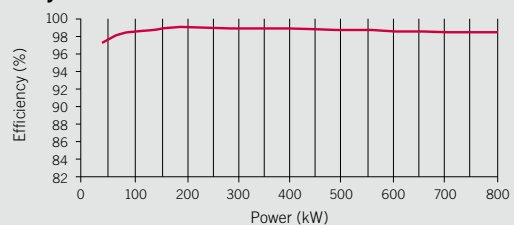


SUN STORAGE PowerMax U x Series **330 Vac**

	600TL U X330 Outdoor	800TL U X330 Outdoor
Input (DC) (Battery)		
Battery voltage range	526 - 864 V	526 - 864 V
Maximum current	1,170 A	1,560 A
Type of battery	Li-ion, lead, Ni-Cd	
Connection type	Cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Power Blocks	3	4
Input protections		
Overvoltage protections	Type 2 DC surge arresters (for each power stage)	
DC switch	Motorized DC switch with door control	
Other protections	DC insulation monitor with alarm. Door control. DC fuses are optional	
Output (AC)		
Rated power ⁽¹⁾	600 kVA	800 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	330 V IT System	330 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1
Phi Cosine adjustable	Yes. Smax=600 kVA	Yes. Smax=800 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Output protections		
Overvoltage protections	Type 2 AC surge arresters	
AC breaker	AC circuit breaker with door control	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.5%	98.5%
Stand-by consumption ⁽⁴⁾	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁵⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)	
Air volume	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans: 1,500 VA)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power	
Certification	CE, ETL	
EMC & Security standards	UL9540, UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE 1547, IEEE 1547.1, NEC CODE	

Notes: ⁽¹⁾ AC power for 122 °F (50 °C) ambient temperature. The output will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase. ⁽²⁾ For $P_{out}>25\%$ of the rated power ⁽³⁾ For $P_{out}>25\%$ of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁴⁾ Consumption from the battery ⁽⁵⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F for each 1,000 ft.

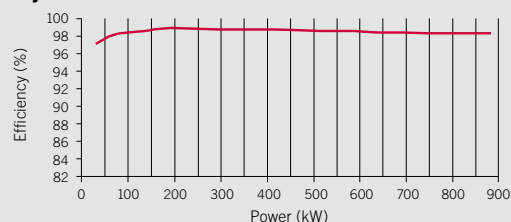
Efficiency INGECON® SUN STORAGE 800TL U X330 V_{dc} = 526 V



	660TL U X360 Outdoor	880TL U X360 Outdoor
Input (DC) (Battery)		
Battery voltage range	572 - 864 V	572 - 864 V
Maximum current	1,170 A	1,560 A
Type of battery	Li-ion, lead, Ni-Cd	
Connection type	Cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Power Blocks	3	4
Input protections		
Overvoltage protections	Type 2 DC surge arresters (for each power stage)	
DC switch	Motorized DC switch with door control	
Other protections	DC insulation monitor with alarm. Door control. DC fuses are optional	
Output (AC)		
Rated power ⁽¹⁾	660 kVA	880 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	360 V IT System	360 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1
Phi Cosine adjustable	Yes. Smax=660 kVA	Yes. Smax=880 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Output protections		
Overvoltage protections	Type 2 AC surge arresters	
AC breaker	AC circuit breaker with door control	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.5%	98.6%
Stand-by consumption ⁽⁴⁾	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁵⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)	
Air volume	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans: 1,500 VA)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power	
Certification	CE, ETL	
EMC & Security standards	UL9540, UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE 1547, IEEE 1547.1, NEC CODE	

Notas: ⁽¹⁾ Potencia AC hasta 122 °F (50 °C) de temperatura ambiente. La potencia de salida se reducirá un 1% por cada 1 °F (0,56 °C) de incremento ⁽²⁾ Para P_{AC}>25% de la potencia nominal ⁽³⁾ Para P_{AC}>25% de la potencia nominal y tensión según IEC 61000-3-4 ⁽⁴⁾ Consumo desde baterías ⁽⁵⁾ Por encima de 3.300 ft, la temperatura para potencia nominal 122 °F (50 °C) se reduce a razón de 2,42 °F por cada 1.000 m adicionales.

Efficiency INGECON® SUN STORAGE 880TL U X360 V_{dc} = 572 V

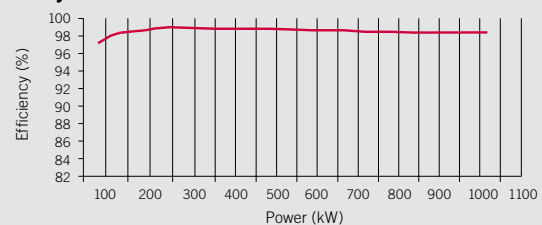


SUN STORAGE PowerMax U x Series 400 Vac

	750TL U X400 Outdoor	1000TL U X400 Outdoor
Input (DC) (Battery)		
Battery voltage range	635 - 864 V	635 - 864 V
Maximum current	1,170 A	1,560 A
Type of battery	Li-ion, lead, Ni-Cd	
Connection type	Cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Power Blocks	3	4
Input protections		
Overvoltage protections	Type 2 DC surge arresters (for each power stage)	
DC switch	Motorized DC switch with door control	
Other protections	DC insulation monitor with alarm. Door control. DC fuses are optional	
Output (AC)		
Rated power ⁽¹⁾	765 kVA	1,020 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	400 V IT System	400 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1
Phi Cosine adjustable	Yes. Smax=765 kVA	Yes. Smax=1,020 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Output protections		
Overvoltage protections	Type 2 AC surge arresters	
AC breaker	AC circuit breaker with door control	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.5%	98.6%
Stand-by consumption ⁽⁴⁾	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁵⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)	
Air volume	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans: 1,500 VA)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power	
Certification	CE, ETL	
EMC & Security standards	UL9540, UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE 1547, IEEE 1547.1, NEC CODE	

Notes: ⁽¹⁾ AC power for 122 °F (50 °C) ambient temperature. The output will be reduced at the rate of 1% for each 1 °F (0.56 °C) of increase. ⁽²⁾ For $P_{out} > 25\%$ of the rated power ⁽³⁾ For $P_{out} > 25\%$ of the rated power and voltage in accordance with IEC 61000-3-4 ⁽⁴⁾ Consumption from the battery ⁽⁵⁾ Over 3,300 ft temperature for rated power 122 °F (50 °C) is reduced 2.42 °F for each 1,000 ft.

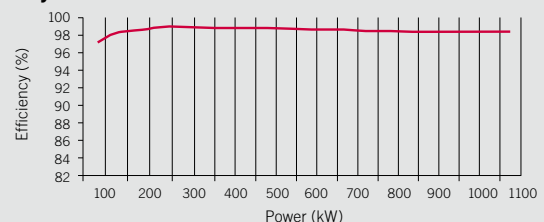
Efficiency INGECON® SUN STORAGE 1000TL U X400 V_{dc} = 635 V



	805TL U X420 Outdoor	1070TL U X420 Outdoor
Input (DC) (Battery)		
Battery voltage range	666 - 864 V	666 - 864 V
Maximum current	1,170 A	1,560 A
Type of battery	Li-ion, lead, Ni-Cd	
Connection type	Cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Power Blocks	3	4
Input protections		
Overvoltage protections	Type 2 DC surge arresters (for each power stage)	
DC switch	Motorized DC switch with door control	
Other protections	DC insulation monitor with alarm. Door control. DC fuses are optional	
Output (AC)		
Rated power ⁽¹⁾	803 kVA	1,070 kVA
Maximum current	1,050 A	1,400 A
Rated voltage	420 V IT System	420 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz
Phi Cosine ⁽²⁾	1	1
Phi Cosine adjustable	Yes. Smax=803 kVA	Yes. Smax=1,070 kVA
THD (Total Harmonic Distortion) ⁽³⁾	<3%	<3%
Connection type	Connection to fuse holder copper bars, cable entry from the bottom through D40 cable glands (max. cable diameter: 40 mm)	
Output protections		
Overvoltage protections	Type 2 AC surge arresters	
AC breaker	AC circuit breaker with door control	
Anti-islanding protection	Yes, with automatic disconnection (for each power stage)	
Other protections	AC fuses, AC short circuits and overloads (for each power stage)	
Features		
Maximum efficiency	98.5%	98.6%
Stand-by consumption ⁽⁴⁾	90 W	120 W
General Information		
Ambient temperature	-4 °F to 149 °F (-20 °C to 65 °C)	-4 °F to 149 °F (-20 °C to 65 °C)
Relative humidity (non-condensing)	0 - 95%	0 - 95%
Protection class	NEMA 3R	NEMA 3R
Max. altitude ⁽⁵⁾	9,842 ft (3,000 m)	9,842 ft (3,000 m)
Cooling system	Forced air with temperature control (230 V phase + neutral power supply)	
Air volume	37.96 ft³/s (fans: 1,300 VA)	45.56 ft³/s (fans: 1,500 VA)
Noise emission	<55 dB(A) at 4 m and <67 dB(A) at 1 m with fans working at maximum power	
Certification	CE, ETL	
EMC & Security standards	UL9540, UL1741, FCC Part 15, IEEE C37.90.1, IEEE C37.90.2	
Grid connection standards	IEC 62116, UL1741, IEEE 1547, IEEE 1547.1, NEC CODE	

Notas: ⁽¹⁾ Potencia AC hasta 122 °F (50 °C) de temperatura ambiente. La potencia de salida se reducirá un 1% por cada 1 °F (0,56 °C) de incremento ⁽²⁾ Para P_{AC}>25% de la potencia nominal ⁽³⁾ Para P_{AC}>25% de la potencia nominal y tensión según IEC 61000-3-4 ⁽⁴⁾ Consumo desde baterías ⁽⁵⁾ Por encima de 3.300 ft, la temperatura para potencia nominal 122 °F (50 °C) se reduce a razón de 2,42 °F por cada 1.000 m adicionales.

Efficiency INGECON® SUN STORAGE 1070TL U X420 V_{dc} = 666 V





A Plug & Play solution for energy storage

All-in-one battery box

All the necessary equipment is integrated in a single enclosure, facilitating the installation and supply. The metallic pre-galvanized enclosure is suitable for indoor and outdoor applications.

Maximum security

The system includes an overload and short-circuit protection, by means of magneto-thermic breaker. This equipment is supplied with the batteries already integrated and ready to use.

Greatest compatibility

The battery box features a pre-charge logic to direct connect with INGECON® SUN STORAGE 1Play converters, obtaining a totally compatible range of products from Ingeteam.

Modular system

It is possible to connect together many battery boxes increasing the total capacity of the whole storage system. Both series (suggested) and parallel compositions are supported. Thanks to its modularity, the original schema is scalable and it can be adapted to suit the requirements of any kind of project.

Battery Technologies

The INGECON® SUN STORAGE Box can be equipped with two different battery solutions:

OPZV-GEL BLOCK

OPzV Block batteries belong to the highest EUROBAT classification for maintenance-free lead-acid batteries: >12 years long life.

- Capacity: 110Ah C10 (52 kg) or 167Ah C10 (74 kg).
- Sealed and maintenance-free operation.
- Maximum temperature up to 45 °C.
- Up to 3000 cycles at 50% DOD.
- Optimal solution for deep cycle applications.

AGM BATTERIES

AGM series batteries designed for deep discharge application, with special chemical formula for plates active paste material, slightly stronger electrolyte and low temperature design, which can withstand repeated deep cyclic application.

- Capacity: 95Ah C10 (30 kg) or 150Ah C10 (37 kg).
- Sealed and maintenance-free operation.
- Maximum temperature up to 40 °C.
- Up to 2000 cycles at 30% DOD.
- Low self-discharge characteristic.

PROTECTIONS

- Magneto-thermal protection.
- DC pre-charge.

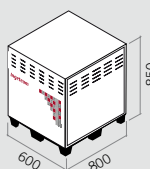
Configuration with OPzV-GEL Block

	Nominal Capacity	Nominal Voltage	Size (LxWxH)	Weight	Applications	
					Single-phase	Three-phase
Small enclosure						
Medium enclosure	6.6 kWh	60 V	600x800x850 mm	290 kg	✓	—
	7.9 kWh	72 V	600x800x850 mm	342 kg	✓	—
Large enclosure	14 kWh	84 V	800x1200x850 mm	549 kg	✓	✓
	16 kWh	96 V	800x1200x850 mm	624 kg	✓	✓
	18 kWh	108 V	800x1200x850 mm	698 kg	✓	✓
	20 kWh	120 V	1000x1200x850 mm	772 kg	✓	✓
	22 kWh	132 V	1000x1200x850 mm	846 kg	✓	✓
	24 kWh	144 V	1000x1200x850 mm	920 kg	✓	✓

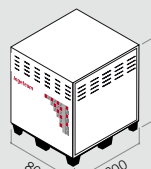
Configurations AGM Battery

	Nominal Capacity	Nominal Voltage	Size (LxWxH)	Weight	Applications	
					Single-phase	Three-phase
Small enclosure						
Medium enclosure	5.7 kWh	60 V	600x800x850 mm	180 kg	✓	—
	6.8 kWh	72 V	600x800x850 mm	210 kg	✓	—
	9 kWh	60 V	600x800x850 mm	215 kg	✓	—
	10.8 kWh	72 V	600x800x850 mm	252 kg	✓	—
Large enclosure	12.6 kWh	84 V	800x1200x850 mm	289 kg	✓	✓
	14.4 kWh	96 V	800x1200x850 mm	326 kg	✓	✓
	16.2 kWh	108 V	800x1200x850 mm	363 kg	✓	✓
	18 kWh	120 V	800x1200x850 mm	400 kg	✓	✓
	19.8 kWh	132 V	800x1200x850 mm	437 kg	✓	✓
	21.6 kWh	144 V	800x1200x850 mm	474 kg	✓	✓
	23.4 kWh	156 V	1000x1200x850 mm	511 kg	✓	✓
	25.2 kWh	168 V	1000x1200x850 mm	548 kg	✓	✓
	27 kWh	180 V	1000x1200x850 mm	585 kg	✓	✓
	28.8 kWh	192 V	1000x1200x850 mm	622 kg	✓	✓

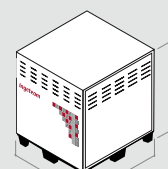
Different sizes (mm)



Small enclosure
Single-phase applications



Medium enclosure
Single-phase and three-phase applications



Large enclosure
Single-phase and three-phase applications





INGECON **WIND**

MICRO-WIND INVERTERS



With transformer



2.5 / 3.3 / 5

The best option for managing and isolating small micro-wind systems

Maximum energy extraction at all times

Designed to control and convert the energy captured and deliver it to a single phase grid. Adaptable to suit a wide range of wind turbines from 2.5 to 5 kW.

Complete micro-wind system safety

Featuring the communication and monitoring interfaces required for local and remote system surveillance.

Wind turbine adaptable

Possibility of adjusting the maximum power point tracking (optimal speed of rotation) by means of a Power-Voltage curve of up to 15 points.

Maximum efficiency

MPP control of the system, and energy conversion for delivery to the grid. It can be installed either by itself or together with the INGECON[®] µWIND Interface.

Easy to install

Fast on connectors for the DC and AC sides, and RS-485 communications. No additional items required. Manual grid disconnection feature.

Ease of maintenance

Internal datalogger for up to 3 months data storage, which can be controlled from either a remote PC or on-site from the inverter front keypad. LED status and alarm indicators and LCD screen. Useful life of more than 20 years.

Software included

Included at no extra cost are the INGECON[®] SUN Manager, INGECON[®] SUN Monitor and its iSun Monitor smartphone version for monitoring and recording the inverter data over the internet.

Standard 5 year warranty, extendable for up to 25 years

PROTECTIONS

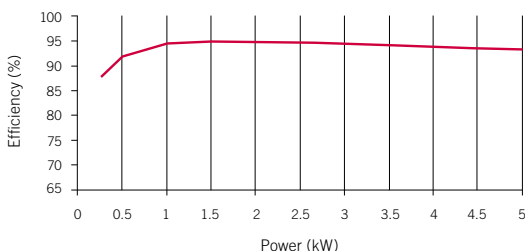
- Galvanic isolation between the DC and AC side.
- Reverse polarity.
- Input and output overvoltage.
- Output short-circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic disconnection.

OPTIONAL ACCESSORIES

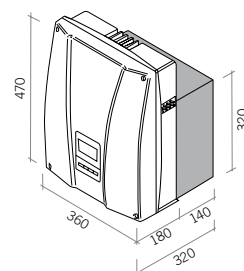
- DC switch.
- Inter-inverter communication via Ethernet or Bluetooth.
- Modem for GSM / GPRS remote communication.
- Potential free contact for insulation fault indication (by default) or inverter connected to the grid (optional).

EFFICIENCY

INGECON[®] µWIND 5
V_{dc} = 330 V



Size and weight (mm)



2.5
43.3 kg.
3.3
44.7 kg.
5
65 kg.

Transformer

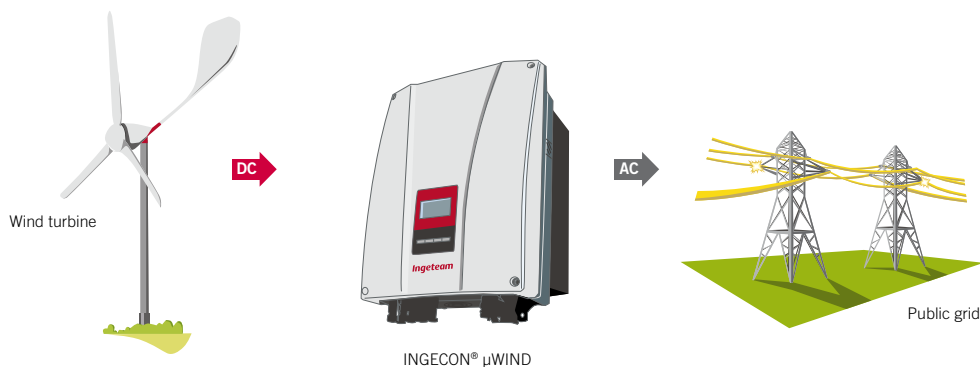
	2.5	3.3	5
Input (DC)			
Voltage range MPP	45 - 450 V	45 - 450 V	40 - 550 V
Maximum voltage ⁽¹⁾	40 - 550 V	40 - 550 V	40 - 550 V
Maximum current	16 A	22 A	33 A
MPPT	1	1	1
Output (AC)			
Rated power ⁽²⁾	2.5 kW	3.3 kW	5 kW
Maximum current	12 A	16 A	22 A
Rated voltage	230 V	230 V	230 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine	1	1	1
Phi Cosine adjustable	Yes. Smax=2.7 kVA	Yes. Smax=3.7 kVA	Yes. Smax=5.5 kVA
THD	3%	3%	3%
Efficiency			
Maximum efficiency	94.7%	95%	95.1%
Euroefficiency	93.8%	94%	94.3%
General Information			
Stand-by consumption	<10 W	<10 W	<10 W
Ambient temperature	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP65	IP65	IP65

Compliance with standards: EN50178, EN61000-6-2, EN61000-6-3, EN62109-1-2, VDE-AR-N 4105, G83/1-1, CEI0-21, CEI 11-20, RD1699/2011, VDE0126-1-1, EN50438, CE Mark

Notes: ⁽¹⁾ Never exceed 550 V. With no auxiliary supply, the minimum start-up voltage is 80 V ⁽²⁾ AC Power for 45 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8%.

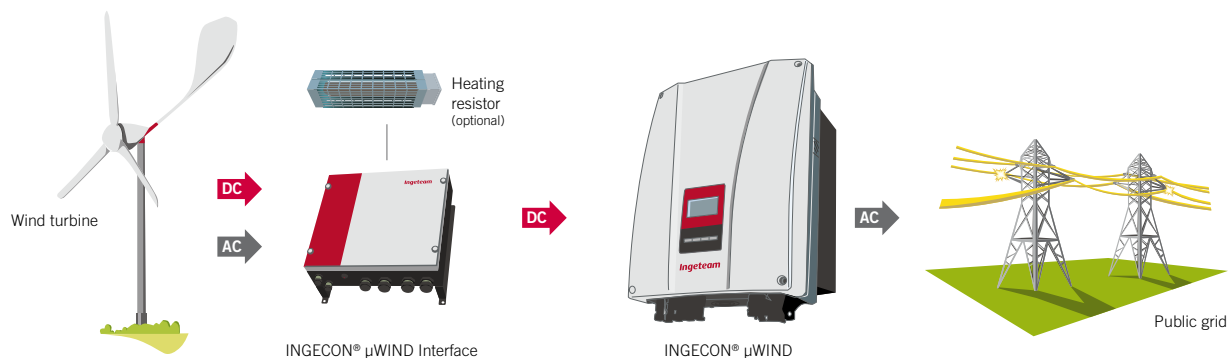
Wiring diagram

without INGECON® μ WIND Interface



Wiring diagram

with INGECON® μ WIND Interface



Transformerless



2.5TL / 3TL / 3.3TL / 3.68TL / 3.8TL / 4.6TL / 5TL / 6TL

The best option for managing small micro-wind systems

Maximum energy extraction at all times

Designed to control and convert the energy captured and deliver it to a single phase grid. Adaptable to suit a wide range of wind turbines from 2.5 to 6 kW.

Complete micro-wind system safety

Featuring the communication and monitoring interfaces required for local and remote system surveillance.

Wind turbine adaptable

Possibility of adjusting the maximum power point tracking (optimal speed of rotation) by means of a Power-Voltage curve of up to 15 points.

Maximum efficiency

MPP control of the system, and energy conversion for delivery to the grid. It can be installed either by itself or together with the INGECON[®] μWIND Interface.

Easy to install

Fast on connectors for the DC and AC sides, and RS-485 communications. No additional items required. Manual grid disconnection feature.

Ease of maintenance

Internal datalogger for up to 3 months data storage, which can be controlled from either a remote PC or on-site from the inverter front keypad. LED status and alarm indicators and LCD screen. Useful life of more than 20 years.

Software included

Included at no extra cost are the INGECON[®]SUN Manager, INGECON[®]SUN Monitor and its iSun Monitor smartphone version for monitoring and recording the inverter data over the internet.

Standard 5 year warranty, extendable for up to 25 years

PROTECTIONS

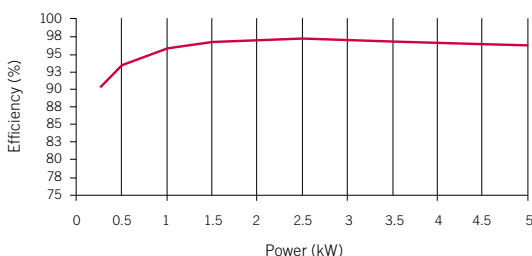
- Reverse polarity.
- Input and output overvoltage.
- Output short circuits and overloads.
- Insulation failures.
- Anti-islanding with automatic shutdown.

OPTIONAL ACCESSORIES

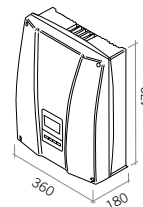
- DC switch.
- Inter-inverter communication via Ethernet or Bluetooth.
- Modem for GSM / GPRS remote communication.
- Potential free contact for insulation fault indication (by default) or inverter connected to the grid (optional).

EFFICIENCY

INGECON[®] μWIND 5TL
V_{dc} = 330 V



Size and weight (mm)



2.5TL / 3TL
18.3 kg.
3.3TL / 3.68TL
19.7 kg.
4.6TL / 5TL / 6TL
23.3 kg.
7.5TL / 8.2TL / 8.6TL / 10TL
25.2 kg.

	2.5TL	3TL	3.3TL	3.68TL	3.8TL	4.6TL	5TL	6TL
Input (DC)								
Voltage range MPP	45 - 450 V	45 - 450 V	45 - 450 V	45 - 450 V	45 - 450 V	45 - 450 V	45 - 450 V	45 - 450 V
Maximum voltage ⁽¹⁾	40 - 550 V	40 - 550 V	40 - 550 V	40 - 550 V	40 - 550 V	40 - 550 V	40 - 550 V	40 - 550 V
Maximum current	16 A	16 A	22 A	22 A	33 A	33 A	33 A	33 A
MPPT	1	1	1	1	1	1	1	1
Output (AC)								
Rated power ⁽²⁾	2.5 kW	3 kW	3.3 kW	3.68 kW	3.8 kW	4.6 kW	5 kW	6 kW
Maximum current	13 A	13.5 A	17 A	17 A	18.8 A	24.2 A	25.5 A	26.2 A
Rated voltage	230 V	230 V	230 V	230 V	230 V	230 V	230 V	230 V
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine	1	1	1	1	1	1	1	1
Phi Cosine adjustable	Yes. Smax=2.7 kVA	Yes. Smax=3 kVA	Yes. Smax=3.7 kVA	Yes. Smax=3.68 kVA	Yes. Smax=3.9 kVA	Yes. Smax=5 kVA	Yes. Smax=5.5 kVA	Yes. Smax=6 kVA
THD	3%	3%	3%	3%	3%	3%	3%	3%
Efficiency								
Maximum efficiency	96.6%	96.6%	96.8%	96.8%	97%	97%	97%	97%
Euroefficiency	95%	95.1%	95.2%	95.2%	95.6%	96%	96.1%	96.1%
General Information								
Stand-by consumption	<10 W	<10 W	<10 W	<10 W	<10 W	<10 W	<10 W	<10 W
Ambient temperature	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C	-20 °C to +70 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%	0 - 95%
Protection class	IP65	IP65	IP65	IP65	IP65	IP65	IP65	IP65

Compliance with standards: EN50178, EN61000-6-2, EN61000-6-3, EN62109-1-2, VDE-AR-N 4105, G83/1-1, CEI 0-21, CEI 0-16, RD1699/2011, VDE0126-1-1, EN50438, CE Mark

Notes: ⁽¹⁾ Never exceed 550 V. With no auxiliary supply, the minimum start-up voltage is 80 V ⁽²⁾ AC Power for 45 °C ambient temperature. For each °C of increase, the output power will be reduced at the rate of 1.8%.

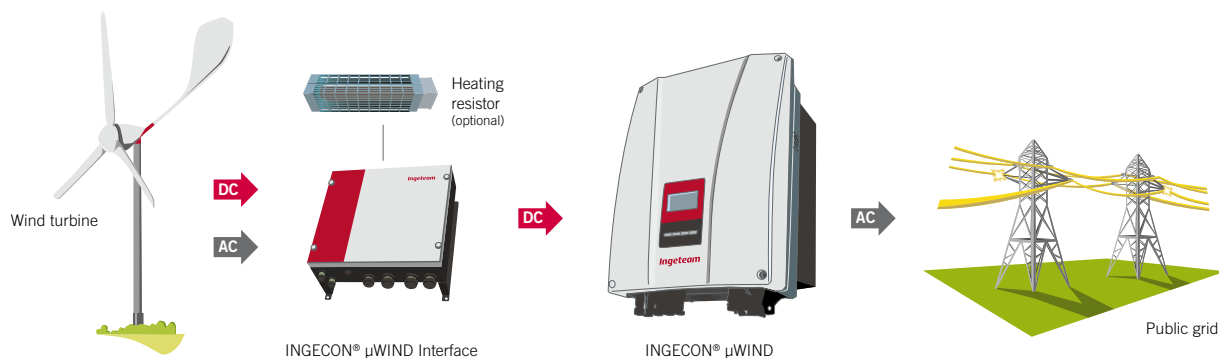
Wiring diagram

without INGECON® μ WIND Interface



Wiring diagram

with INGECON® μ WIND Interface





System protection and AC / DC conversion in a single unit

Maximum protection and safety for the wind turbine and inverter

The INGECON® μ Wind Interface provides overpower and overvoltage protection for the inverter whilst also protecting the wind turbine against overspeeding through a PWM progressive braking system with a high capacity discharge resistor. It extends the wind turbine operating range to include high wind speeds, for increased productivity.

It is also equipped with interlocking contactors to short-circuit and block the wind turbine.

Greater control features

Remote control and additional monitoring of meteorological variables. Measurement of the wind turbine speed of rotation. Remote operation of the wind turbine start-stop system.

Suitable for wind turbines with AC or DC outputs

AC / DC conversion between the wind turbine output and the inverter input. Also valid for DC wind turbines.

Standard 5 year warranty, extendable for up to 25 years

PROTECTIONS

- Against overvoltage.
- Against overspeeding.
- Against power boosts.
- Braking system and positive latching (HW resistor).

OPTIONAL

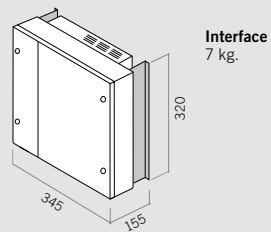
- Two 0 - 24 V digital inputs.
- Two digital outputs, of type NO potential free contact and with an opening capacity of 250 V / 2 A.

	Interface
Input values	
Power range	2.5 - 18 kW
Maximum AC voltage	450 Vrms
Maximum AC current	23 Arms
Maximum DC voltage	600 V
Maximum DC current	30 A
Wind turbine speed capture range ⁽¹⁾	0 - 600 rpm
Analog inputs	
Number	2
Type	0 - 10 V / 0 - 20 mA (configurable)
General information	
Communication system	RS-485 and bus CAN
Remote control system	Through Ethernet and PC application

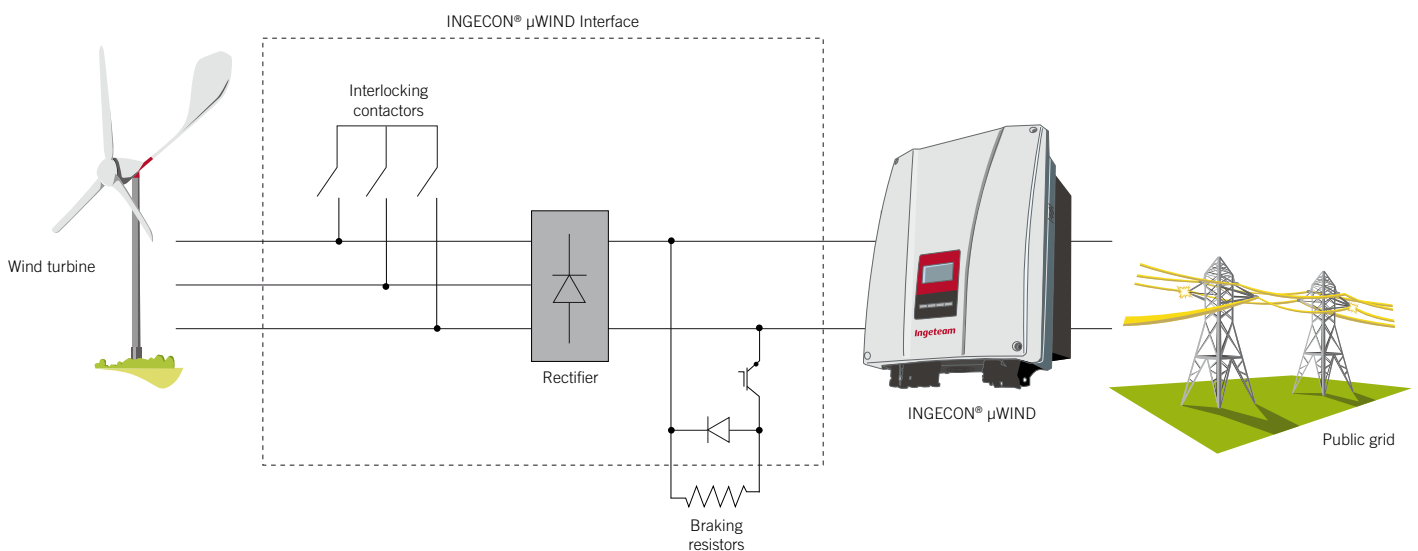
Compliance with standards: EN 50178, EN61000-6-2, EN61000-6-3, CE Mark

Notes: ⁽¹⁾ The maximum limit will depend on the electrical characteristics of the wind turbine.

Size and weight (mm)



Wiring diagram





A close-up photograph of a person's hand firmly gripping a dark wooden ship's steering wheel. The hand is positioned in the upper right quadrant of the frame. A portion of a green, textured wristband is visible on the person's wrist. The background is a clear, bright blue sky. The lower third of the image is overlaid with a solid yellow-green banner containing white text.

INGECON EMS

ENERGY MANAGEMENT SOLUTIONS

Ingeteam Smart House

Complete self-consumption and energy management solutions for homes and industries

SYSTEM HIGHLIGHTS

- Savings in energy consumption.
- Optimisation and maximum use of own production
- Shorter investment pay-back times for the renewable system.
- Customised consumption strategy adapted to the specific circumstances of each installation.
- Easy installation.

MINIMUM ELEMENTS FOR THE CONNECTION DIAGRAM

- INGECON® EMS Manager.
- INGECON® EMS Power Meter.
- Renewable generation (INGECON® SUN and / or INGECON® μWIND).

ADDITIONAL ELEMENTS

- INGECON® SUN STORAGE 1Play.

- 1 PV panel
 - 2 Wind turbine
 - 3 Public grid
 - 4 Monitoring software
INGECON® EMS Tools
 - 5 Energy manager
INGECON® EMS Manager
 - 6 Loads
 - 7 Radiator
 - 8 Boiler
 - 9 Battery inverter
INGECON® SUN STORAGE 1Play
 - 10 Wind converter
INGECON® μWIND
 - 11 Protection system
INGECON® μWIND Interface
 - 12 PV inverter
INGECON® SUN 1Play
 - 13 Charging station
INGEREV® GARAGE
 - 14 Two-way meter
INGECON® EMS Power Meter
 - 15 Electric vehicle
 - 16 Batteries
- DC
— AC



Load control

For those plants in which generation is not in line with demand, the self-consumption ratio can be increased, including load control in order to activate consumption at times of peak production. The INGECON® EMS Manager manages the connection and disconnection of controllable loads and the energy production, based on the generating data obtained from the power converters and from the total plant consumption.

The INGECON® EMS Manager allows you to select the times for the connection and disconnection of the various loads coupled to the system, such as electric boilers, radiators, pumps, electric vehicles, etc. by adjusting total plant consumption to the renewable energy production. The INGECON® EMS Manager can be configured so that zero energy is delivered to the grid.

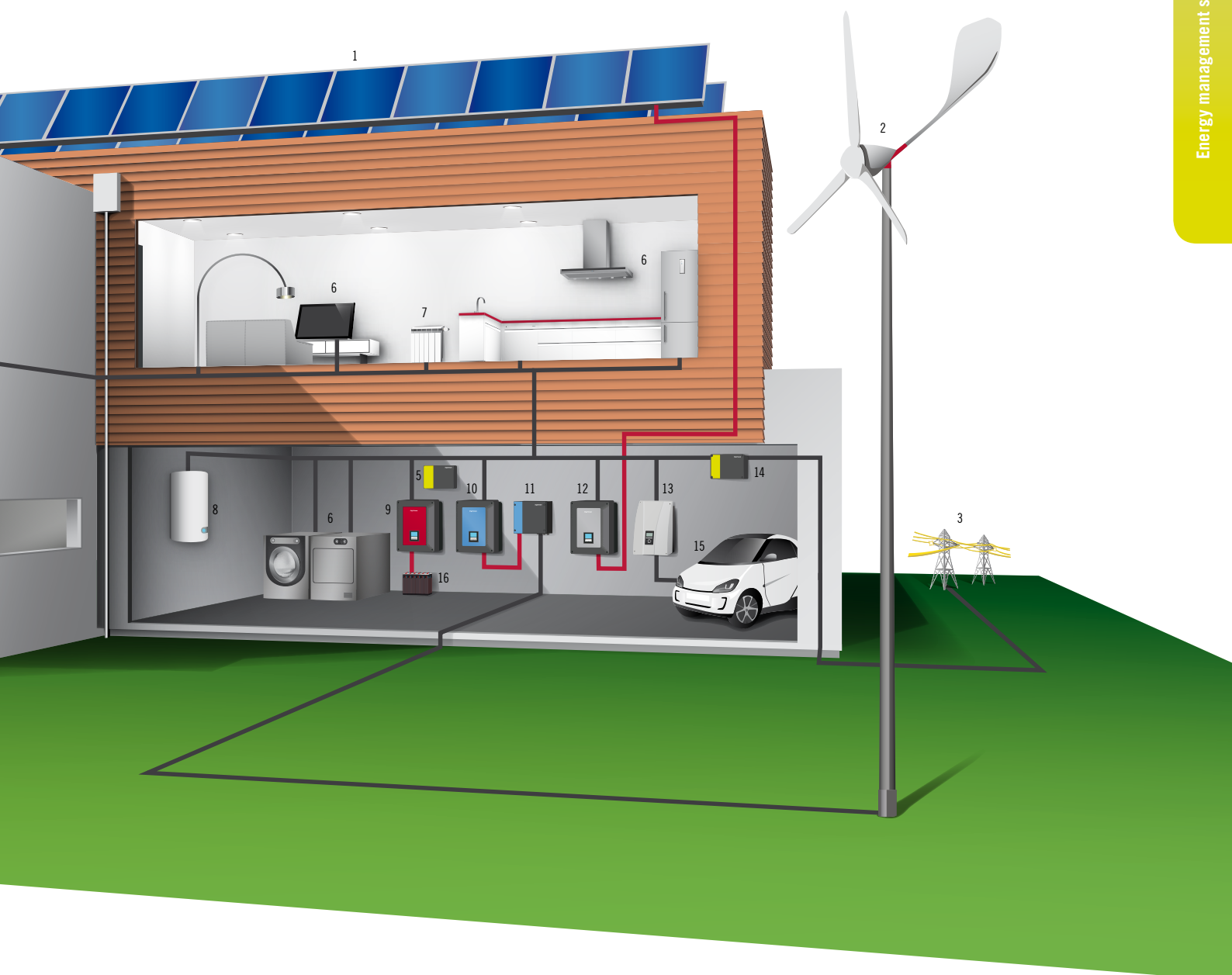
Maximum energy control

Thanks to the INGECON® EMS Power Meter, the system continuously measures the two-way power flow between the public grid and the plant. In addition, this advanced wattmeter makes it

possible to decouple the system from the grid, to become a stand-alone system. For this purpose, a battery system needs to be coupled to the plant.

Energy storage system

This system supports the inclusion of a battery system, controlled through the INGECON® SUN STORAGE 1Play two-way inverter, making it possible to operate in back-up mode, in the event of power failures. Furthermore, this system offers a wider range of possibilities for a more efficient management of own energy production.



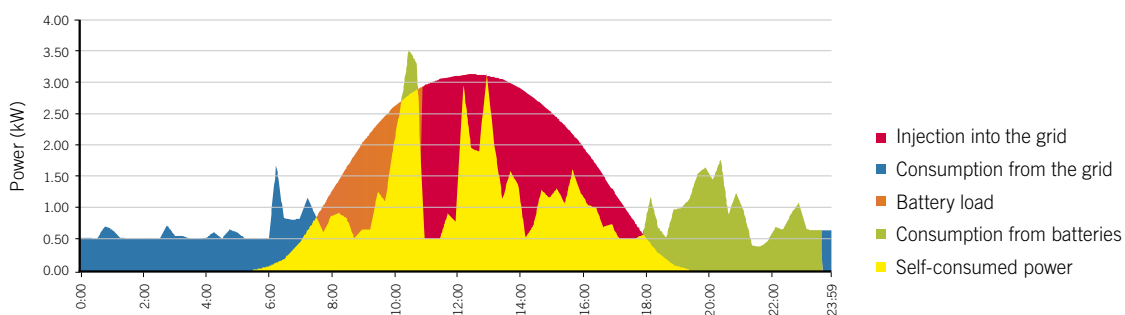
Maximum self-consumption

As can be seen in the graph, the implementation of a system of this type makes it possible to achieve high levels of self-consumption, given the fact that it is possible to store the energy produ-

ced for use at peak consumption times. The INGECON® EMS Manager always seeks to minimize grid consumption, with the subsequent reduction in the user's electricity bill.

Fast investment pay-back

In addition the plant payback period is much shorter, due to the fact that the excess energy produced during the middle of the day (when energy consumption is lower) can be delivered to the grid.





The most efficient energy management solution for self-consumption

This innovative energy management solution developed by Ingeteam Power Technology, for the domestic, commercial and industrial markets, allows for increased self-consumption, by matching energy production and consumption.

The smart energy manager

The INGECON® EMS Manager controls the energy generation from renewable sources, based on the power production data obtained from the power converters and on total system consumption. Furthermore, it allows the connection and disconnection of controllable loads. The INGECON® EMS Manager implements management strategies based on the different devices connected to the system, making it possible to plan how and when to consume the power produced. The INGECON® EMS Manager is designed to optimise any electricity system in terms of energy usage and cost savings.

Consumption management

Consumption management is the basis of a truly effective energy management system. Thanks to the potential-free outputs it is possible to determine the connection and disconnection times for the various loads coupled to the

system. This allows for the connection of electric boilers, radiators, pumps, electric vehicles etc, constantly adapting total system consumption to the renewable energy produced.

Maximum control of the energy consumed

The system energy manager constantly controls the amount of energy exchanged with the public grid. Thanks to the potential-free outputs it is possible the system constantly meters the two-way power flow between the grid and the system. This information is transferred in real time to the INGECON® EMS Manager. Furthermore, the INGECON® EMS Power Meter allows the system to be decoupled from the grid, to become an off-grid network. In order to do so, the INGECON® Home battery inverter is required, associated with a storage system.

Continuous communication

The INGECON® EMS Manager also acts as a communications centre, constantly exchanging information with the INGECON® EMS Power Meter and the system converters. It also sends orders to the INGECON® EMS Load Control through Bluetooth or RS-485 to control the loads.

EMS Manager

Power supply

Input voltage	100 - 240 Vac
Nominal frequency	50 / 60 Hz
Power consumption	5 - 8 W

Connectivity

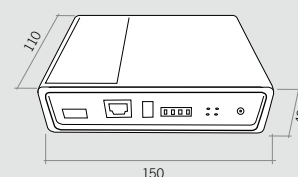
Ethernet	1
RS-485	1
USB	1
Potential free outputs	2 x (250 V, 6 A)

Communication interface with other equipment

Ingeteam inverters	RS-485, Ethernet, Bluetooth
Monitoring systems	Ethernet, GPRS
INGECON® EMS Power Meter	RS-485
INGECON® EMS Load Control	Bluetooth

Size and weight (mm)

280 g.





Solutions for Self-consumption

Self-consumption allows the consumer to have his own energy supply by installing a renewable energy source (photovoltaic or wind) on his own installation.

The new solution for energy management is called INGECON® EMS Manager. Thanks to this device, self-consumption rates of 100% are achieved during the central hours of the day. The power excess can be then injected into the grid, obtaining an economic benefit and shortening payback times. These two graphics show the consumption, injection and self-consumption profiles of a residential photovoltaic installation.

When do I need it?

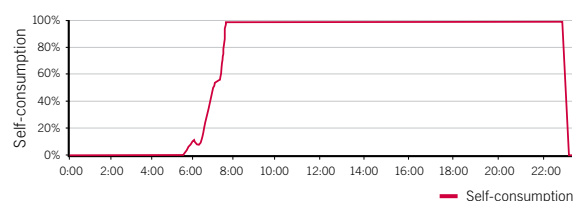
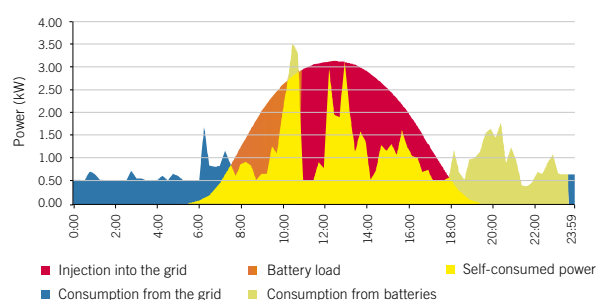
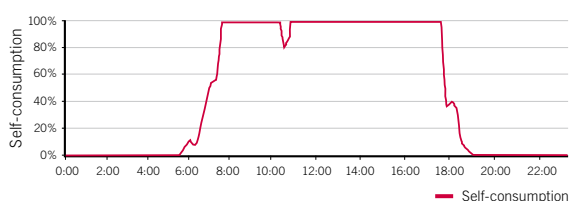
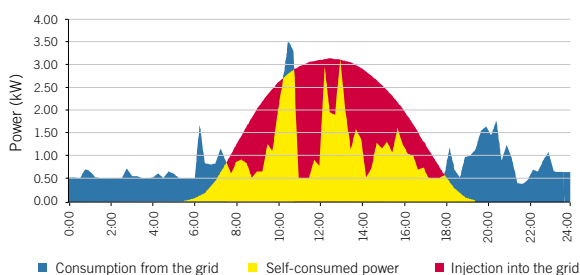
The INGECON® EMS Manager is necessary when:

- it is needed to monitor the installation,
- it is wanted to include an energy storage system,
- there are several inverters,
- it is a three-phase installation,
- a load management is desired,
- it is needed to combine different renewable energy sources (PV and micro-wind).

How does it work?

This equipment analyses the power flow at the connection point of the installation through a wattmeter and it determines the power instructions for the operation of the PV inverters. This power instruction is sent in a linear way between 0 and 100% of the inverter's rated power, so that the manager can adjust the energy production to match the instruction with total precision.

Standard 3 year warranty





PV plant control system

The INGECON® EMS Plant Controller helps the grid operator to predict the PV plant performance and to guarantee the quality and stability of the electricity supply.

Maximum PV plant control

An advanced control algorithm combined with a fast and efficient communications system, with response times of less than one second, permit precise control of the active and reactive power delivered by the plant to the grid.

The INGECON® EMS Plant Controller controls the PV inverters, ensuring compliance with the grid operator's requirements at the PV plant connection point. It is also possible to manage energy storage systems and other devices such as diesel generators, through the use of INGECON® SUN STORAGE PowerMax inverters.

This is a flexible system that can easily be adapted to the needs and configurations of each particular plant, whilst complying with the country-specific standards and regulations.

Description of the complete system

A PV plant with plant controller typically consists of:

- INGECON® EMS Plant Controller:
Comprising two basic systems: measurement and control. It can additionally incorporate a communication channel with the grid operator in order to receive the operating setpoints.
- INGECON® SUN PV inverters connected to the PV array.
- INGECON® SUN STORAGE PowerMax battery inverters connected to the energy storage system. Only when energy storage systems are required to cover situations in which the solar radiation is too low or to provide energy for night-time use.
- SCADA, plant monitoring system.
- Communications network: Connecting the INGECON® EMS Plant Controller with the different inverters, transmitting the operating setpoints and monitoring the status of the equipment.

Continuous communication with all devices

The INGECON® EMS Plant Controller permits the dynamic modification of the

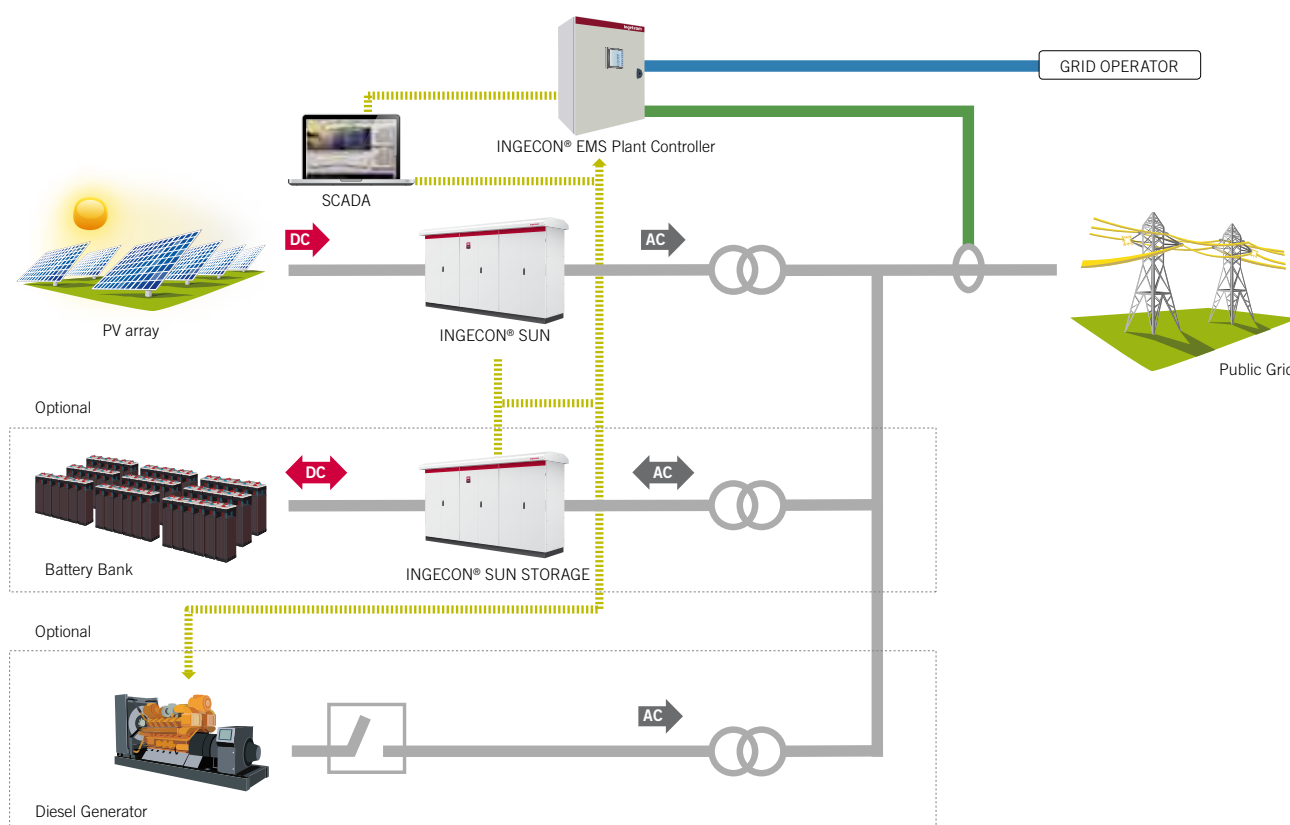
grid operator setpoints. For this purpose, a number of communication protocols are incorporated such as Modbus TCP / RTU, IEC 61850, IEC 60870-5-101 and IEC 60870-5-104. Likewise, it is also possible to add digital and analogue I / O modules in order to extend the communication capabilities with third-party devices.

Furthermore, the INGECON® EMS Plant Controller permits communication with the plant SCADA to transmit the connection point data.

Operating mode

For the control, the INGECON® EMS Plant Controller takes the following data:

- Active power, reactive power, voltage and frequency at the connection point, provided by the integrated measurement unit.
- Grid operator requirements. To establish references for parameters such as voltage at the point of connection, active and reactive power, power ramps, active power reserve, etc. These requirements can be predetermined either by the grid operator or by the plant operator or dynamically modified through an external setpoint.



- Instantaneous active and reactive power values from the various inverters.
- With all this data, the control unit can determine the operating setpoints for each inverter integrated into the system and transmit the setpoints through the communications network.

Active power control

Some of the active power control functions that can be implemented in the INGECON® EMS Plant Controller are:

- Continuous control of the power at the output. To control the PV plant power output, limiting it to the desired value.
- Regulation of the active power variation rate. To control the power generated by the inverters, ensuring that the variation in the plant power output conforms to the established setpoint. So as to control variations in power shortfalls, it is necessary to add energy storage systems and INGECON® SUN STORAGE PowerMax inverters to the plant in order to deliver energy to the system when no PV resources are available.

- Power regulation in the event of a frequency variation.
- Active power reserve. The INGECON® EMS Plant Controller incorporates a patented innovative control strategy (PCT/ES 2008/000560) to guarantee an active power reserve with no need to include storage systems (depending on the availability of the PV resource).

Reactive power control

Some of the reactive power control functions that can be implemented in the INGECON® EMS Plant Controller are:

- Regulation of the reactive power output. To control the plant reactive power output, adjusting it to a given reference, including the possibility of providing reactive power at night time.
- Regulation of the power factor at the connection point.
- Voltage control The INGECON® EMS Plant Controller controller makes it possible to regulate the plant voltage at the connection point.

ITEMS INCLUDED

- PLC.
- Power meter.
- Communications switch.
- Power supply.
- Protections.

SYSTEM HIGHLIGHTS

- Frequency regulation.
- Active power reserve regulation.
- Constant active power level at the output.
- Active power ramp regulation.
- Reactive power control.
- Power factor control.
- Voltage control.





DIESEL-PV SOLUTIONS



Evolution of the price of Diesel and Solar systems



Diesel-PV Solutions

Integration of photovoltaics into diesel grids

The power generation from diesel gensets plays a key role for industrial companies and rural communities all over the world, especially in remote regions without a good grid infrastructure. They permit to create simple off-grid networks with a moderate initial investment.

However these applications have some disadvantages. First, the grid they create is totally dependent on diesel, which is a non-renewable and scarce energy source. On the other hand, the energy generated is expensive due to high prices of fuel and the difficulty of supplying and storing it. Furthermore, diesel-based systems have to face constant price increases and high OPEX - Operational Expenditures- directly related to the use of fuel.

Apart from that, CO₂ emissions increase with the use of gensets. This fact has to be taken into account, not only as a moral exigence towards global warming, but also because it could entail governmental fines, affecting operational expenditures.

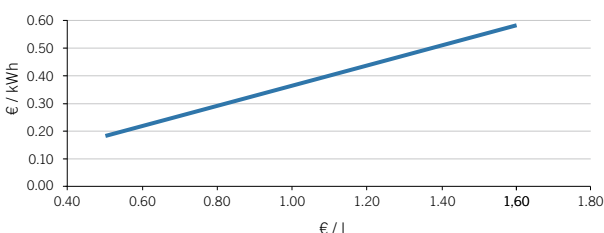
PV system prices have fallen in the last years, allowing nowadays generating energy to a more competitive cost compared to fuel. In regions with high solar irradiation levels and expensive fuel prices, PV systems can be amortized in less than four years. Furthermore, PV plants require little maintenance and they can be configured according to specific energy demands. Moreover, photovoltaics do not produce CO₂ emissions.

The integration of PV systems into diesel grids offers large industries and rural communities a way of saving fuel with a natural and renewable resource. This can be achieved by adding INGECON® SUN PV inverters and Ingeteam's Diesel-PV controllers to the diesel grid. The use of photovoltaics reduces the energy generated by the gensets and, therefore, the fuel consumption.

Challenges of Diesel-PV integration:

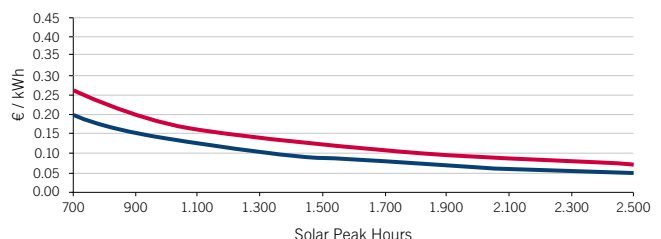
- To guarantee a minimum load for the generators, to ensure longer engine life.
- To protect against reverse power, in case of a total load disconnection.
- To ensure stability against irradiance variations due to cloud shading.

Levelized cost of energy on genset systems

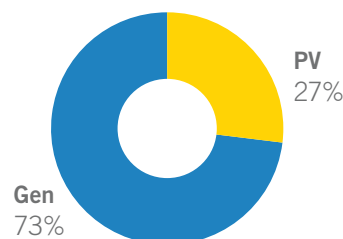
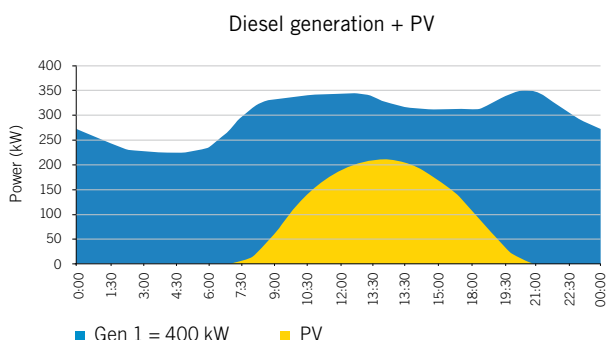


PV_{CapEX} = 2 - 1.5 €/Wp (> 1 MW); PV_{OPEX}: 1.5% annual; Degradation: 0.4 annual; PR=0.85;
 Diesel CapEX=0.3 €/W (> 1 MW); O&M=3% annual; Diesel cost: actual price + 3% annual
 Interest loan= 6.4%; 12 years
 Time: 20 years

Levelized cost of energy on PV based systems



— 2.00 €/Wp — 1.50 €/Wp



A scalable system to satisfy every project needs

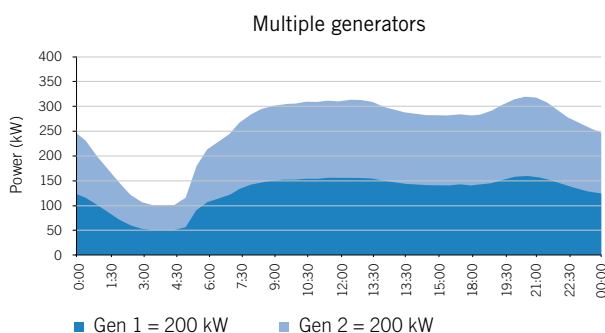
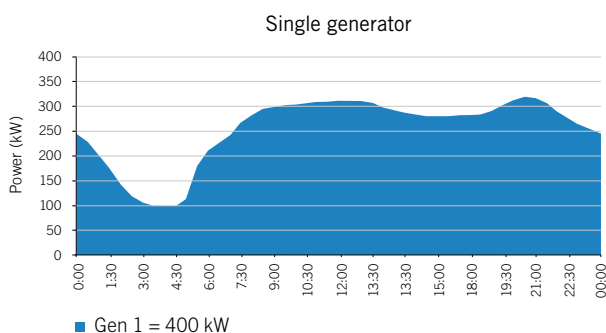
Ingeteam's Diesel-PV controllers monitor the power flows of the system and manage the PV injected to the diesel grid in order to guarantee the system stability, allowing achieving up to a 70 percent of PV penetration compared to the total diesel capacity.

Diesel systems can be classified in two main types depending on the generators operation: continuous operation diesel systems or on-demand diesel systems. Continuous operation diesel systems are based on one or more gensets operating permanently, no matter the load level. On-demand diesel systems fea-

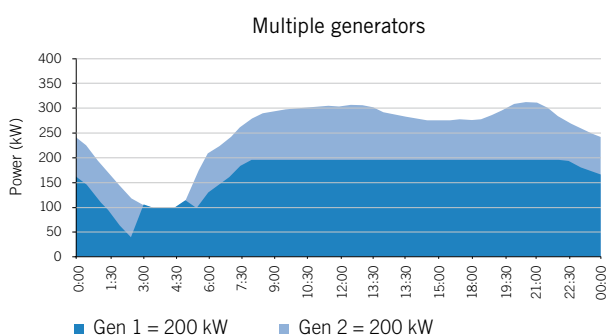
ture an external controller that selects the number of gensets that will operate depending on the load requirement.

Ingeteam has developed different solutions for each system type that can be easily implemented in both new and already existing diesel systems.

Continuous operation diesel systems

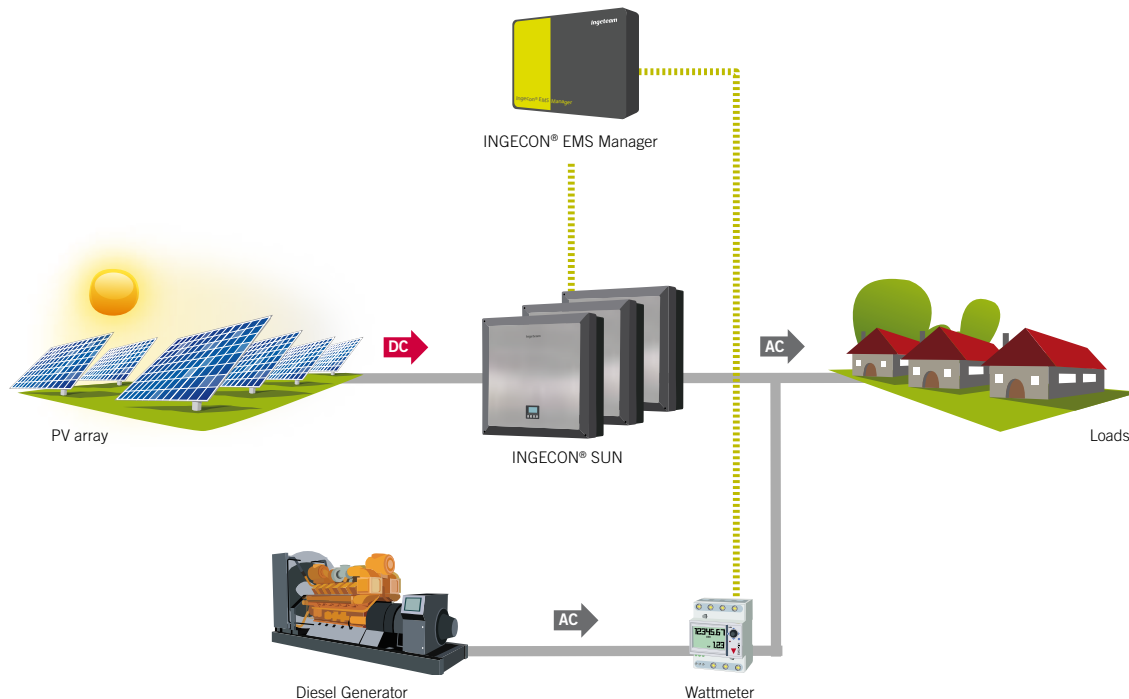


On-demand diesel systems



Continuous operation diesel systems

Schema with INGECON® EMS Manager



Operating mode

In those cases in which one or more gensets are operating permanently to satisfy the energy demand, the INGECON® EMS Manager can be used to control the PV inverters.

Photovoltaic inverters inject current to the diesel grid, being detected by the genset as a load reduction. INGECON® EMS Manager will control the energy production of the PV inverters depending on the energy required by the loads. Moreover, it will also act as a communications center, as it enables to remotely access all the system's relevant data.

Elements of the Diesel-PV Solution:

- INGECON® SUN PV inverters
- INGECON® EMS Manager
- Wattmeter

System features:

- **Minimum diesel load**
It guarantees that the diesel generator does not operate under a minimum load level, in order to ensure a longer engine life.
- **Reverse power protection**
It avoids a power flow from the inverter to the genset, for example, in the event of a total load disconnection.
- **Stability against irradiance variations**
In continuous operation diesel systems, stability against irradiance variation it is guaranteed by the spinning reserve of the genset, previously sized for the maximum possible load.

- Monitoring

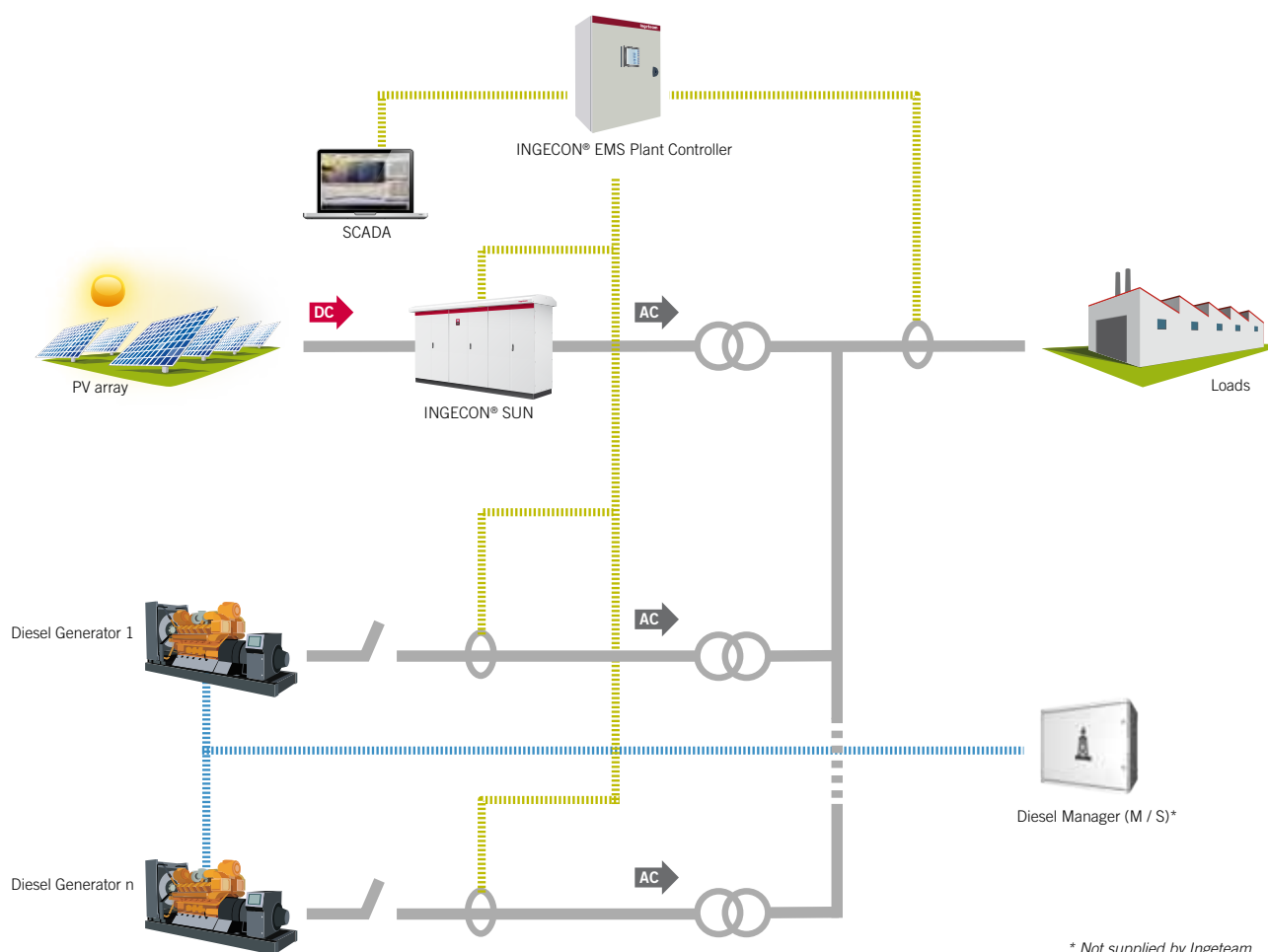
The installation can be monitored by using the software INGECON® EMS Tools. Also, an internal datalogger allows to store more than 30 days historical data.

- Load control

The INGECON® EMS Manager allows switching loads on when the genset load level is low and there is a PV generation surplus.

On-demand diesel systems

Schema with INGECON® EMS Plant Controller



* Not supplied by Ingeteam.

Operating mode

In those cases in which an external diesel controller determines the number of operating gensets, the INGECON® EMS Plant Controller is used to guarantee a proper PV integration in the diesel grid.

Photovoltaic inverters inject current to the diesel grid, being detected by the genset as a load reduction. INGECON® EMS Plant Controller monitors the genset units, obtaining which ones are operating as well as their load level. This information is used to determine the maximum power that the solar inverters can supply in order to guarantee the system stability, i.e. in a cloud shading event.

The monitoring process of the genset units can be made by a Power Meter device or by an Ethernet Modbus / TCP straight from the genset (if available). The general system can be monitored via SCADA or dedicated software.

The INGECON® EMS Plant Controller features an auto-learning algorithm that allows maximizing the PV energy injected and minimizing the number of connections and disconnections of the gensets.

Elements of the Diesel-PV Solution:

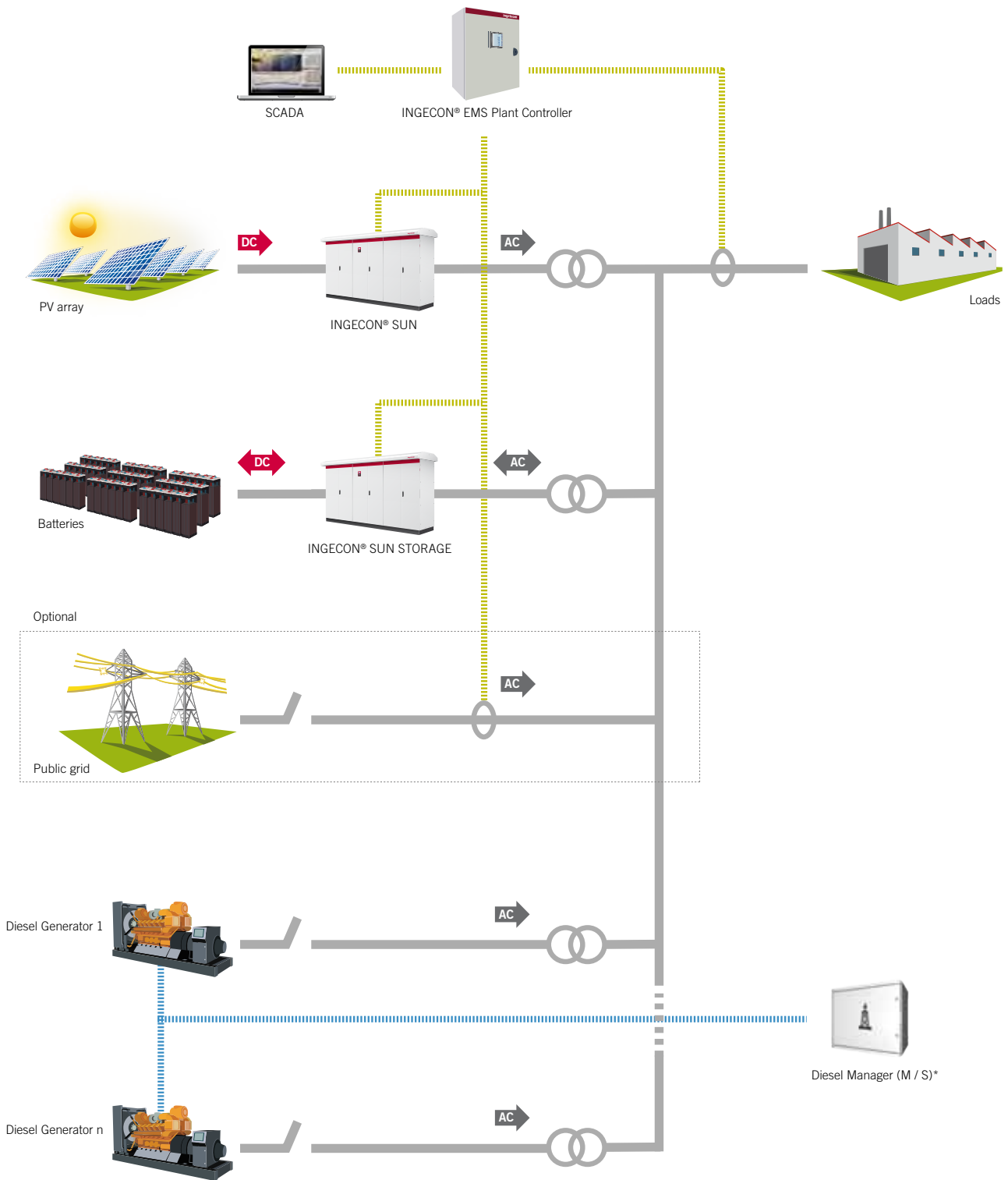
- INGECON® SUN PV inverters
- INGECON® EMS Plant Controller (PLC, communication switch, power supply and protections).
- Power Meter Unit (Wattmeter, communication switch, power supply and protections).

System features:

- **Minimum diesel load**
It guarantees that the diesel generators do not operate under a minimum load level, in order to ensure a longer engine life.
- **Reverse power protection**
It avoids a power flow from the inverter to the genset, for example, in the event of a total load disconnection.
- **Stability against irradiance variations**
INGECON® EMS Plant Controller limits the PV output power to guarantee that the available spinning reserve is enough to meet the energy demand in a cloud shading event.
- **Monitoring**
The installation can be monitored by using a SCADA.
- **Reactive Power Support**
from the PV inverters, for those installations with high reactive power consumption.

On-demand diesel systems

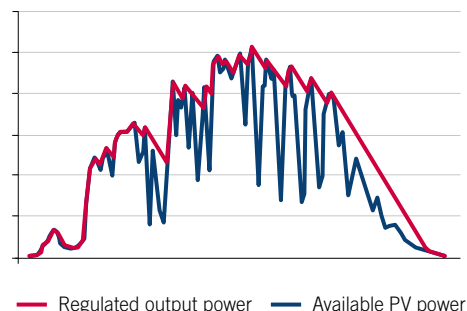
Schema with INGECON® EMS Plant Controller and energy storage



* Not supplied by Ingeteam.

A battery bank adds many advantages

The addition of an energy storage system allows increasing the PV penetration. In this case, the spinning reserve is not needed to absorb the irradiance variations in the plant, because the batteries supply the necessary power when PV generation decreases due to passing clouds.



Operating mode

Photovoltaic inverters inject current to the diesel grid, being detected by the genset as a load reduction. INGECON® EMS Plant Controller monitors the loads and determines the maximum PV power that can be injected into the diesel grid. Furthermore, in a cloud shading event, the INGECON® EMS Plant Controller together with the battery inverters INGECON® SUN STORAGE Power-Max, reduce the output power with a established ramp rate, that will allow to the diesel controller to switch-on the required generators.

In these installations, the storage system has to provide the energy needed for the genset start-up.

The system can be monitored via SCADA or dedicated software.

The INGECON® EMS Plant Controller features an auto-learning algorithm that

allows maximizing the PV energy injected and minimizing the number of connections and disconnections of the gensets.

Elements of the Diesel-PV Solution:

- INGECON® SUN PV inverters
- INGECON® EMS Plant Controller (PLC, communication switch, power supply and protections).
- INGECON® SUN STORAGE Power-Max battery inverters
- Power Meter Unit (Wattmeter, communication switch, power supply and protections).

System features:

- Minimum diesel generation. It guarantees that the diesel generators provide a minimum energy level, in order to guarantee the grid stability when load steps happen, or the loads are unbalanced or they present current harmonics.

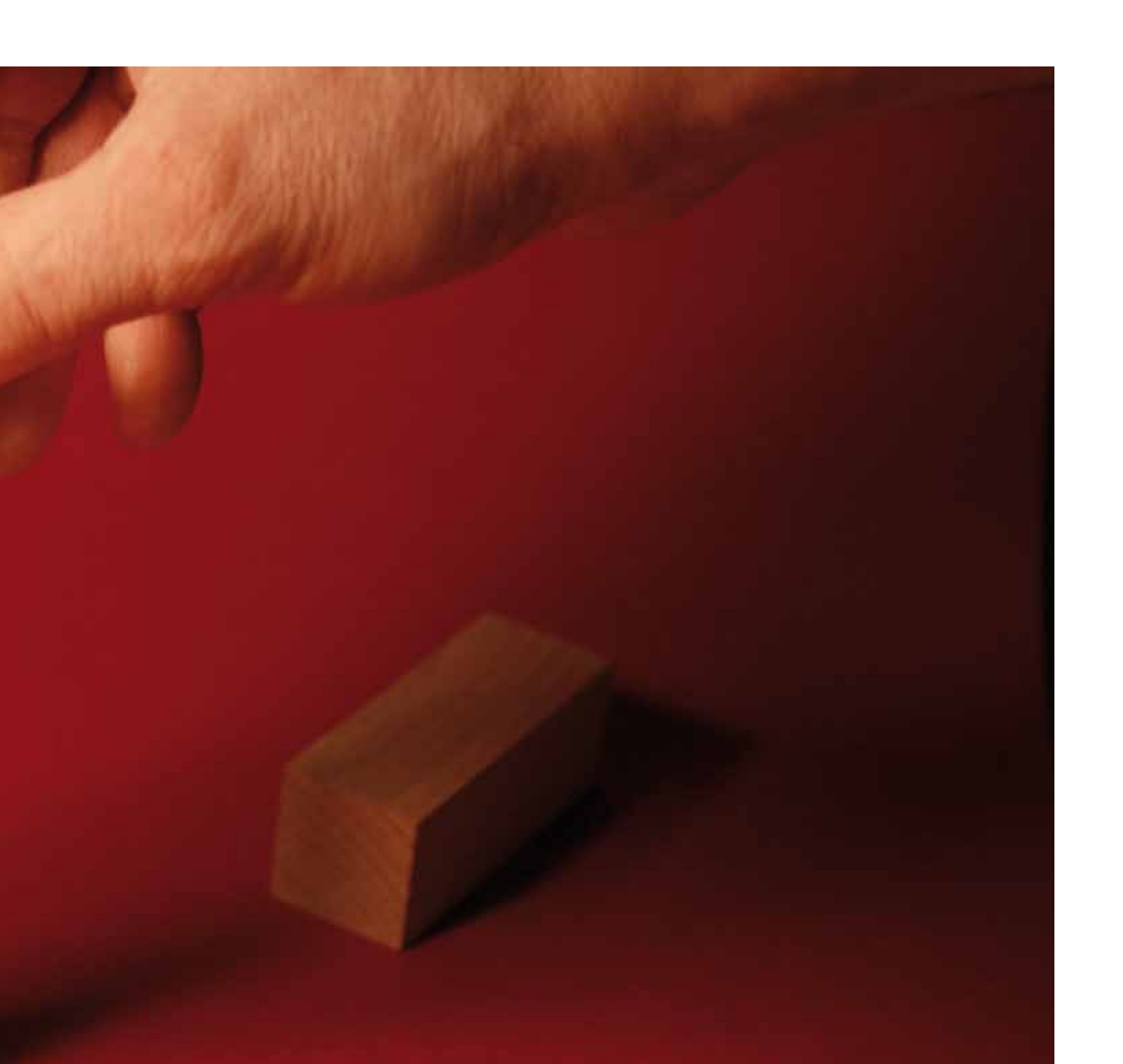
- Reverse power protection
It avoids a power flow from the inverter to the genset, for example, in the event of a total load disconnection.
- Stability against irradiance variations
INGECON® EMS Plant Controller together with the battery inverters INGECON® SUN STORAGE Power-Max, guarantee system stability in a cloud shading event.
- Monitoring
The installation can be monitored by using a SCADA.
- Reactive Power Support
from the PV inverters, for those installations with high reactive power consumption.

OPTIONAL

- Public grid power flow management (if available).







Accessories

**MULTI-OPTIONS FOR PV PLANT CONTROL
AND MONITORING**



Communications centre

The INGECON® SUN ComBox enables remote communication with the inverters in a number of standards, thanks to its versatility to jointly process data coming from Ethernet, RS-485, GSM / GPRS, radio or Bluetooth networks.

The datalogger is able to store meteorological information and power setpoint data for one month.

Measurement of meteorological variables

For the measurement of meteorological variables, the INGECON® SUN ComBox

analogue input data storage and reading functions are far more accurate than those of standard cards.

The following inputs are available:

- 2 inputs for PT100.
- 4 inputs 0..10 V or 0..20 mA.

Media converter

For added versatility when selecting the means of communication with the plant.

Power setpoint control

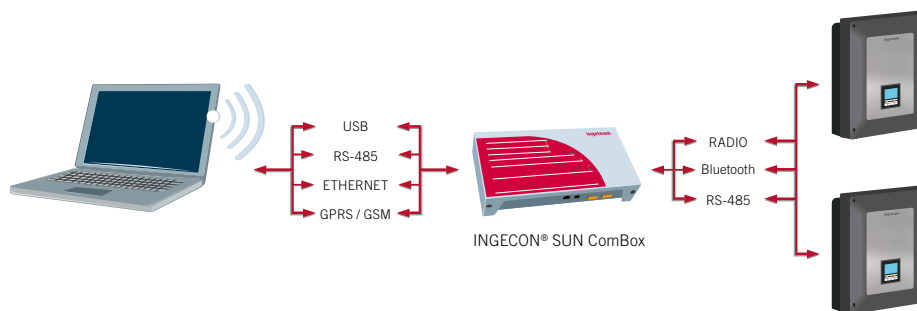
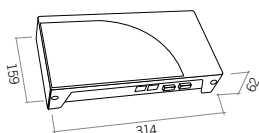
Due to the need to improve the grid integration of the energy generated by renewable sources, the new grid regulations

now require these sources to help maintain the stability of the power grid, as is already demanded of conventional generation.

With 4 digital inputs and control software especially developed by Ingeteam Power Technology, the INGECON® SUN ComBox manages, for the entire plant, all the power setpoints established by the grid operators.

Size and weight (mm)

2.48 kg.



INGECON[®] SUN WeatherBox



Maximum control over the PV system parameters

INGECON[®] SUN WeatherBox offers the possibility of storing meteorological data for up to 30 days.

Outdoor installation

The INGECON[®] SUN WeatherBox has been especially designed for outdoor installation, with a protection rating of IP65. Sensors can be connected to measure a number of parameters such

as module irradiation, wind speed, module temperature, etc., for optimum PV plant control.

Easy communication

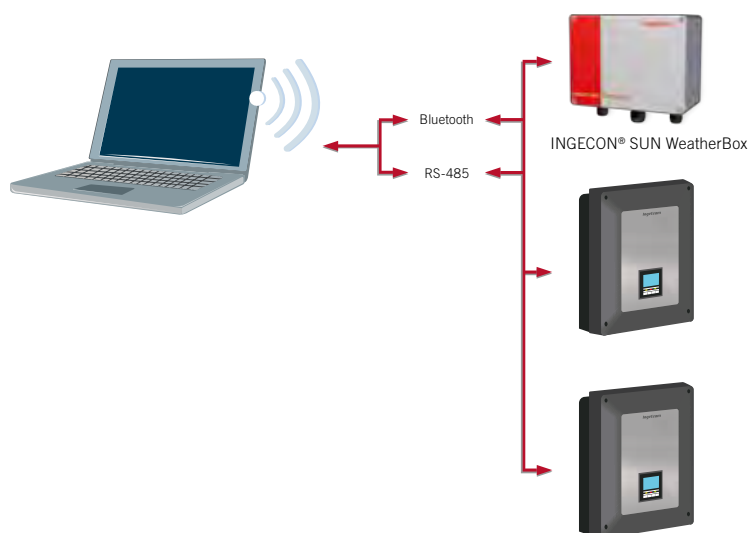
INGECON[®] SUN WeatherBox acts as one more slave in the communication network, in addition to the PV inverters. Communication with the INGECON[®] SUN WeatherBox can be established either by RS-485 cable or with the Bluetooth wireless version.

Meteorological values measurement

The WeatherBox integrates the functions of measuring and storing data received from analog inputs with a greater precision than normal boards.

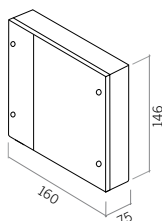
The following inputs are available:

- 2 inputs for PT100.
- 4 inputs 0..10 V o 0..20 mA.



Size and weight (mm)

340 g.





A range of PC-to-Inverter communication options

Ingeteam offers its customers the very latest technology in communication boards. Thanks to the hardware developed by the Ingeteam engineers, it is possible to establish local communication with the PV inverters and / or remote communication through a PC. In this way, all the PV system variables (operating parameters and historical data files) can be monitored simply and conveniently. This communication can be made through a number of boards that can be incorporated into the inverter.

All these boards feature a unified connector in order to facilitate the connection of any of them in every inverter from Ingeteam's product range.

RS-485 communication is the easiest and fastest way to interconnect a number of inverters and is supplied as standard in many inverter families. For those inverters that do not feature standard RS-485 communication, Ingeteam can optionally supply an RS-485 board to provide this.

Mention should be made of communication via **Ethernet**, for which Ingeteam has two different boards. Both include conversion to RS-485. One is an **Ethernet-RS485** communication gateway whilst the other also adds the possibility of inverter communication via Modbus-TCP.

One of Ingeteam's latest developments in communication boards is the **Wi-Fi** board, for wireless communication, and which also includes conversion to RS-485.

For its part, the **Bluetooth** board offers the possibility of creating communication networks between various inverters, in order to establish wireless contact with a PC located in the vicinity. This inverter network can also be connected via Bluetooth with the INGECON® SUN ComBox in order to communicate with any PC over the Internet. This board includes conversion to RS-485.

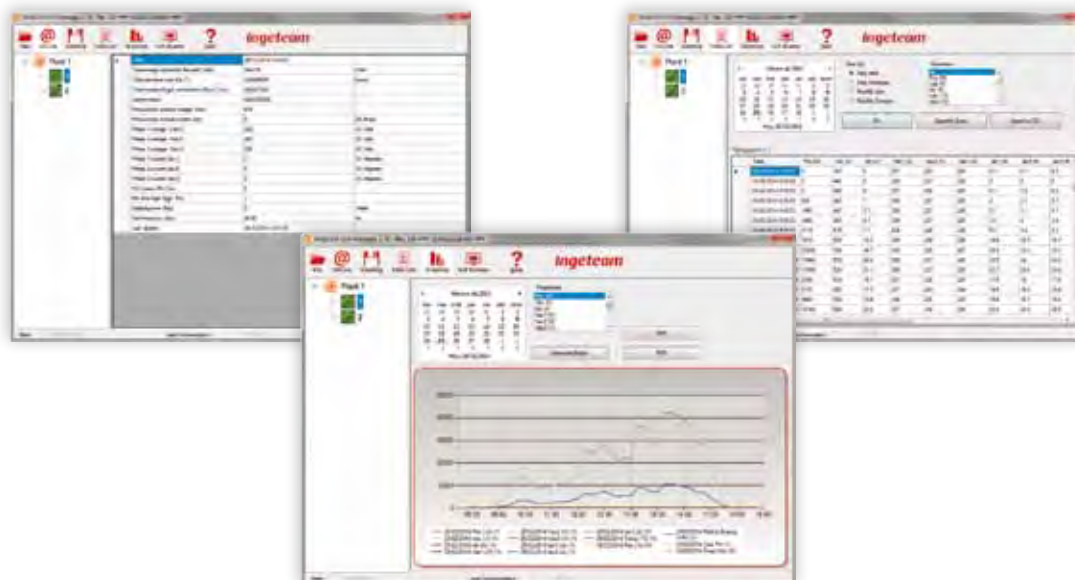
Finally, the **GSM / GPRS** board permits remote communication with the inverters through a GSM / GPRS network and also includes conversion to RS-485.

Wireless communications designed by Ingeteam



Communication boards by Ingeteam





PV plant monitoring software

PC software operating in a Windows® graphical environment for PV plant management and monitoring.

Integration of single phase and three phase inverters and string control devices in a single software package.

Communication through different ways: RS-485, Ethernet and modem.

This software can be downloaded, free of charge, from the www.ingetteam.com website.

SOFTWARE FEATURES

- Individual configuration of each PV plant inverter.
- On-line display of the inverter internal variables.
- Display of all the plant inverters on a single screen.
- Multi-PV plant management from a single PC.
- Historical data capture and disc storage possibility.
- Data log display in a number of graph or table formats.
- Data storage in XML format.
- Modem configuration for receiving SMS alarm messages.
- Available in English, Spanish, German, French, Italian, Czech and Chinese.
- Configuration of the INGECON® EMS Manager.

ON-SCREEN DATA DISPLAY

Full-screen data display, with customisable wallpaper, for viewing the most important plant parameters:

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

** If a ComBox with the appropriate sensors has been installed.*

VARIABLES VIEWABLE ON-LINE

List of the variables that are viewable on-line, stored in the inverter memory:

- Total energy delivered to the grid.
- Total time in operating status.
- Total number of grid connections.
- Total number of errors.
- Alarm status.
- Internal operating status.
- Solar panel voltage.
- Solar panel current and power.
- Output current and power to the grid.
- Phi cosine.
- Phi sine positive / negative.
- Grid voltage.
- Grid frequency.
- Actual date and time.



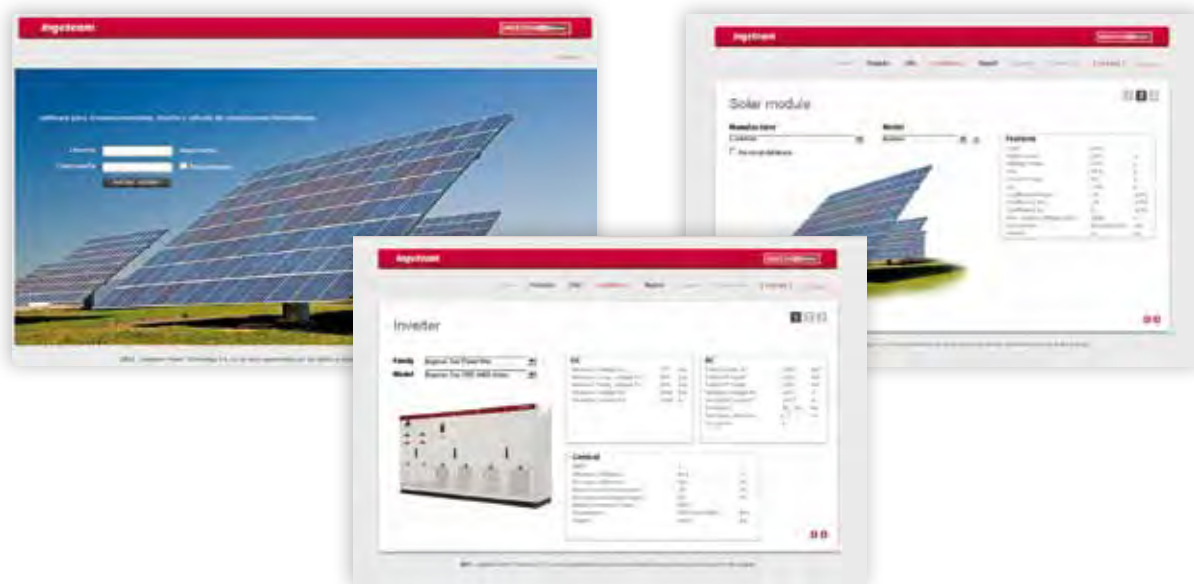
Web portal for PV plant access

With the INGECON® SUN Monitor software, PV plant data can be accessed from any PC with an Internet connection (www.ingeconsunmonitor.com). 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. This software has been designed to facilitate owner, installer or promoter plant control, providing information on the PV plant status in the form of lists and graphs,

whilst there is also the possibility of receiving an e-mailed production report. Data are recorded and stored throughout the useful life of the inverter. An iSun Monitor iPhone application is available at the App Store.





PV plant dimensioning

The new INGECON® SUN Planner software offers the possibility of optimally customising each specific project. In just three fast, simple steps users can correctly dimension a PV plant, by selecting the type of PV module and

INGECON® SUN inverter that best suits the system, using a database comprising an extensive range of different modules for each manufacturer. There is also the option of selecting different parameters for the plant, for customized dimensioning, to meet the end customer's requirements. Registration and access are free of charge and can be quickly and easily made

through one of the following web-sites: **www.ingeconsunplanner.com** or **www.ingetteam.com**, to quickly enjoy all the advantages offered by this software tool from any web browser, iPod, iPhone, iPad or Android tablet.

Plant configuration in just 3 simple steps





Software to configure and monitor self-consumption systems

The INGECON® EMS Tools software is the PC application for the monitoring and configuration of self-consumption systems governed by the INGECON® EMS Manager.

This tool seeks to offer users a software close to the Plug & Play philosophy: a very simple, intuitive interface with regard to installation and operation.

This program can be downloaded free of charge from our website: www.ingeteam.com. Compatible with 32 and 64 bit configurations, the software requires the Microsoft .NET Framework 4.0 platform (normally included as part of the operating system) and Windows XP or higher.

Operating modes

- **On-line mode:** a direct connection is established with the INGECON® EMS Manager device with all functionalities available to the user. Communication with the INGECON® EMS Manager can either be made remotely through the Ingeteam servers or directly by TCP / IP using the device IP address.
- **Off-line mode:** users can view the parameters configured and the historical data previously downloaded.

THE SOFTWARE ALLOWS USERS TO

- Configure the INGECON® EMS Manager.
- Individually configure each PV plant inverter and other devices.
- Control the loads.
- View the plant wiring diagrams and communications network.
- View the production data.
- Start-up and manage the various PV plants from a PC.
- Data capture, save a file to the disc and get a graphic display of the historical data.

Configuration of the system in 3 simple steps



Step 1

Installation of the software

Step 2

Configuration of the INGECON® EMS Manager

Step 3

Plant configuration and start-up



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).

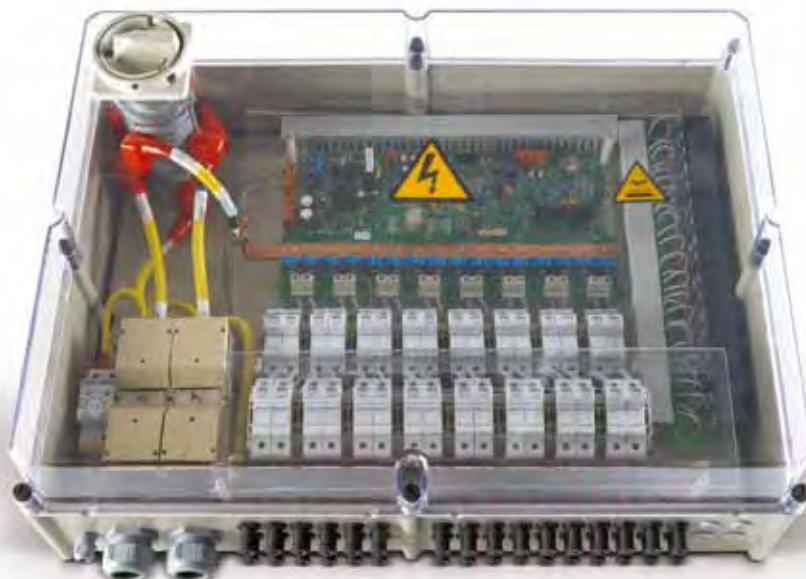
Remote Communication

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 PowerMax Inverters, this remote would need to be installed in the AC and auxiliary services enclosure.

SOME POSSIBLE COMMUNICATION PROTOCOLS

- Interbus-S.
- Profibus-DP.
- CAN.
- OPC DA & OPC XML Data Client and Server.
- IEC 61850 Client and Server.
- IEC 61400-25 Client and Server.
- IEC 60870-5- 101/104 – 102 Master-Slave.
- DNP 3.0 Master-Slave.
- Modbus ASCII-RTU/TCP Master-Slave.
- Other protocols can be done through a Client / Server architecture based on OPC.

INGECON SUN StringControl



String current monitoring

The INGECON® SUN String Control is a device for measuring each PV generator string current and detecting defective string currents through INGECON® SUN Manager software.

String currents can be monitored through the RS-485 communication cards, GSM / GPRS, Ethernet or Wi-Fi.

It is easy to mount and is suitable for outdoor installations.

It is particularly recommended for three phase inverters.

PROTECTIONS

- Individual string fuse protection.
- IP65 protection for outdoor installation.

OPTIONAL

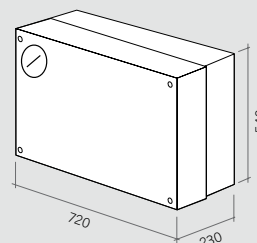
- SMS alarm functionality for any faulty currents.
- DC overvoltage dischargers.
- DC switch.

	String Control 160	String Control 320
Maximum number of connectable strings	16	32*
Maximum number of measurable channels	16	16
Maximum current per string	10 Adc	20 Adc
Maximum total current	160 Adc	320 Adc
Number of protection fuses	16	16
Maximum voltage	1,000 Vdc	1,000 Vdc
Inlet connectors	PV connectors type 4	PV connectors type 4
Outlet connectors	PG M55 (up to 300 mm ²)	PG M55 (up to 2 x 300 mm ²)
Communications	RS-485, GSM / GPRS, Ethernet, Wi-Fi, fibre optics card	RS-485, GSM / GPRS, Ethernet, Wi-Fi, fibre optics card
Ambient temperature	-20 °C to +65 °C	-20 °C to +65 °C
Protection class	IP65	IP65
Grounding connector	PG M16 (35 mm ²)	PG M16 (35 mm ²)

* Type 4 PV connectors with T connection excluded from supply.

Size and weight (mm)

15 kg.



INTEGRATED AND OPTIONAL ACCESSORIES

	SUN 1Play TL M	SUN 1Play HF	SUN 1Play TL U M	SUN 1Play HF U	SUN Lite TL	SUN 3Play TL	SUN 3Play TL M	SUN 3Play TL U M	SUN Power	SUN Power TL	SUN Power U Outdoor	SUN Power TL U Outdoor	SUN PowerMax TL B	SUN PowerMax TL M	SUN PowerMax TL X	SUN PowerMax TL U X
Protections																
Galvanic isolation DC-AC	—	✓	—	✓	—	—	—	—	✓	—	✓	—	—	—	—	—
Reverse Polarity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Input overvoltage (type 2 surge arresters)	—	—	—	—	—	○	○	○	✓	✓	✓	✓	✓	✓	✓	✓
Output overvoltage (type 2 surge arresters)	—	—	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓
Output shortcircuits and overloads	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Insulation failure DC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Insulation failure AC	—	—	—	—	—	—	—	—	—	—	—	—	○	○	○	—
Anti-islanding with automatic shutdown	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DC fuse-holders	—	—	—	—	—	○	○	○	✓	✓	✓	✓	○	✓	✓	✓
DC fuses	—	—	—	—	—	○	○	○	✓	✓	✓	✓	○	○	○	○
DC switch	○	○	○	○	○	○	○	○	✓	✓	✓	✓	✓	✓	✓	✓
AC circuit breaker	—	—	—	—	—	—	—	—	✓	✓	✓	✓	○	○	○	✓ ³
Accessories																
Multicontact 4	✓	✓	✓	✓	✓	○	○	—	—	—	—	—	—	—	—	—
Potential-free contact	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Self-consumption kit	○	○	○	○	○	○	○	○	—	—	—	—	—	—	—	—
Self-consumption kit with EMS Manager	○	○	○	○	○	○	○	○	○	○	—	—	—	—	—	—
Heating kit (-30°C/-22°F)	○	○	○	○	○	—	—	—	○	○	○	○	○	○	○	○
Grounding kit	—	○	—	○	—	—	—	—	○	○	—	—	○	—	○	—
Sync kit	—	—	—	—	—	—	—	—	—	○ ¹	—	○	✓ ¹	✓ ¹	✓ ¹	✓
Night-time power supply	○	○	○	○	○	○	○	○	○	○	○	○	✓	○	○	✓
AC wattmeter	—	—	—	—	—	—	—	—	—	—	—	—	○	○	○	○
DC string current measurement	—	—	—	—	—	○	○	—	—	—	—	—	○	○	○	○
Blown fuse detector	—	—	—	—	—	—	—	—	—	—	—	—	—	○	○	✓
Firmware updatable via SD card	✓	✓	✓	✓	—	✓	✓	✓	—	—	—	—	—	—	—	—
Firmware updatable via communication	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Low voltage ride-through capability	✓	✓	✓	✓	✓	✓	✓	✓	○	○	○	○	✓	○	○	○
Digital inputs	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—
Communications																
RS-485	○	○	○	○	✓	✓	✓	✓	✓	○	○	○	✓	✓	✓	✓
Ethernet	○	○	○	○	○	○	○	○	✓	○	○	○	✓	○	○	○
GPRS	○	○	○	○	○	○	○	○	✓	○	○	○	—	○	○	○
USB	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—
Wi-Fi	○	○	○	○	○	○	○	○	—	—	—	—	—	—	—	—
Bluetooth	○	○	○	○	○	○	○	○	—	—	—	—	—	—	—	—
Plant power control ⁽²⁾	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Software																
INGECON® SUN Manager for plant management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
INGECON® SUN Monitor for plant monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: ⁽¹⁾ For inter-inverter synchronization, request a quote ⁽²⁾ Equipment prepared. An external control is required ⁽³⁾ AC switch, not circuit breaker ⁽⁴⁾ For other output options, please contact Ingeteam ⁽⁵⁾ It also integrates digital outputs and analogue inputs.

	STORAGE IPlay	STORAGE IPlay TL	STORAGE Power	STORAGE PowerMax TL X	STORAGE PowerMax TL U X	STORAGE PowerMax TL B	µWind	µWind TL	µWind Interface	EMS Manager	EMS Plant Controller	SUN ComBox	SUN WeatherBox	SUN StringControl
Protections														
Galvanic isolation DC-AC	✓	—	✓	—	—	—	✓	—	—	—	—	—	—	—
Reverse Polarity	—	—	—	—	✓	—	✓	✓	✓	—	—	—	—	—
Input overvoltage (type 2 surge arresters)	—	—	○	✓	✓	✓	—	—	✓	—	—	—	—	○
Output overvoltage (type 2 surge arresters)	✓	✓	✓	✓	✓	✓	—	—	✓	—	—	—	—	—
Output shortcircuits and overloads	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—
Insultaion failure DC	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—
Insultaion failure AC	—	—	—	○	—	—	—	—	—	—	—	—	—	—
Anti-islanding with automatic shutdown	—	—	—	✓	✓	—	✓	✓	—	—	—	—	—	—
DC fuse-holders	—	—	○	✓	✓	—	—	○	—	—	—	—	—	✓
DC fuses	—	—	○	○	○	○	—	○	—	—	—	—	—	✓
DC switch	○	○	✓	✓	✓	✓	○	○	—	—	—	—	—	○
AC circuit breaker	—	—	✓	○	✓ ³	○	—	—	—	—	—	—	—	—
Accessories														
Multicontact 4	○	○	—	—	—	✓	✓	✓	—	—	—	—	—	✓ ⁴
Potential-free contact	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	—	—
Self-consumption kit	○	○	—	—	—	—	○	○	—	—	—	—	—	—
Self-consumption kit with EMS Manager	○	○	—	—	—	—	○	○	—	—	—	—	—	—
Heating kit (-30°C/-22°F)	—	—	○	○	○	○	○	○	—	—	○	—	—	—
Grounding kit	—	—	○	○	—	○	—	—	—	—	—	—	—	—
Sync kit	—	—	—	✓ ¹	✓	—	—	—	—	—	—	—	—	—
Night-time power supply	○	○	✓	○	✓	✓	○	○	○	—	—	—	—	—
AC wattmete	—	—	○	○	○	○	—	—	—	—	✓	—	—	—
DC string current measurement	—	—	—	○	○	—	—	—	—	—	—	—	—	✓
Blown fuse detector	—	—	—	○	✓	—	—	—	—	—	—	—	—	—
Firmware updatable via SD card	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Firmware updatable via communication	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Low voltage ride-through capability	—	—	—	○	○	—	✓	✓	—	—	○	—	—	—
Digital inputs	✓	✓	✓	—	—	✓	✓	✓	✓	—	✓ ⁵	✓	—	—
Communications														
RS-485	○	○	✓	✓	✓	○	✓	✓	✓	✓	○	✓	✓	○
Ethernet	○	○	○	○	○	✓	○	○	○	✓	✓	✓	✓	○
GPRS	○	○	○	○	○	○	○	○	○	○	—	○	—	○
USB	—	—	—	—	—	—	—	—	—	○	✓	✓	—	—
Wi-Fi	—	—	—	—	—	—	○	○	○	—	○	○	—	—
Bluetooth	—	—	—	—	—	—	○	○	○	—	—	○	—	○
Plant power control ⁽²⁾	—	—	—	✓	✓	—	✓	✓	✓	—	—	—	—	—
Software														
INGECON® SUN Manager for plant management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	✓	✓	✓
INGECON® SUN Monitor for plant monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	—	✓

✓ Integrated ○ Optional — Not available





INGECON **SUN** Training

**THE BEST TRAINING PLATFORM
FOR PROFESSIONALS**



Training for professionals in the PV sector

INGECON® SUN Training is a training platform directed at facilitating the work of all those professionals whose job involves handling the Ingeteam PV inverters.

At INGECON® SUN Training, we aim to share our knowledge and experience in the belief that this is the best way for all of us to progress together.

What's more, the site is intended to serve as a meeting point for all those professionals working in the PV sector, whatever their area of specialisation.

More info at:

www.ingeconsuntraining.com
training.energy@ingeteam.com

TRAINING COURSES

On-site courses

General and specific, commercial and technical; free and subsidised. Get more information on the training available at: **www.ingeconsuntraining.com**

Tailored courses

Tell us your needs and we'll design a customised training program. We can even give the course at your facilities.

Live webinars

You can also do a course from your own home or office. You simply need a computer, Internet connection and a microphone headset.

ADDITIONAL SUPPORT

Visits

You're welcome to visit our facilities. We'd like you to get to know our equipment right from its origins.

Audiovisual material

Our website offers access to videos, presentations and technical documentation with relevant information on technological developments, technical support etc.

FAQ

The FAQ section on our website allows you to check out the answers to the main doubts raised by our customers. You even have the opportunity to ask us about any other doubts or question you may have.

Technical articles

Keep up-to-date with technical articles on the very latest technological developments achieved by our team of engineers.



Efficiency

Our goal is to ensure that our inverters deliver the highest energy efficiency rates possible. We'll help you to get the most out of our products.

Certification

Our training courses are certified by the most reputed solar education and renewable energy training organizations worldwide.

Flexibility

We can adapt to suit your own particular needs and circumstances, with customised courses, either online or face-to-face, depending on your own specific requirements.

Excellence

Our training personnel are involved in R&D work, and are therefore always up-to-date with the very latest PV technology.



INGECON SUN

Service partner

Becoming an INGECON® SUN Service Partner is fast and easy. You simply need to attend a special course and meet the minimum requirements.

You will get a certification which licences you to perform specific handling and manipulation tasks on the INGECON® SUN equipment.

BENEFITS OF BEING A SERVICE PARTNER

- Technical support 24 hours a day, 365 days a year.
- Access to specific technical documentation.
- Specific training courses.
- Immediate availability of spares.
- Authorisation to use our logo on your communications.
- Marketing and Merchandising support.
- Worldwide authorised installers.





SERVICE AND MAINTENANCE



CHOOSE FROM A COMPLETE PORTFOLIO OF SERVICE SOLUTIONS

At Ingeteam, as well as the design and manufacture of PV plant Inverters, we are also concerned with providing an excellent maintenance service to guarantee an increased equipment lifespan and maximum performance.

Ingeteam offers solutions for any PV system configuration, ensuring that our inverters maintain their robustness, reliability and efficiency.

Our concept is based on providing a tailored, flexible service. Combine the modules as you please, to ensure that all your maintenance requirements are covered.

Select your combination



Extended warranty



Commissioning



Online supervision



Maintenance



Diagnostics and repair



Spares guarantee



Availability

Ingeteam Service

We offer you 7 service modules to cover each and every PV inverter maintenance requirement. Select those modules that are best suited to your system and combine them to ensure a reliable operation.



Services offered after-sales

Extended Warranty:

- A full guarantee for your inverter.
- Repair of parts under warranty.
- Return expenses included.
- Diagnostic and advisory services.

Commissioning:

- Commissioning based on the manufacturer's protocol.
- Assistance in planning the commissioning process.
- Troubleshooting during commissioning.

Online Supervision:

- Support service through our call centre.
- Pro-active service from the control centre.
- Regular monitoring reports.

Maintenance:

- All costs included.
- Manufacturer's protocol.
- Flexibility when selecting the type of maintenance.

Diagnostics and Repair:

- On-site assistance at your plant.
- Assistance within 24 hours¹.

Spares guarantee:

- Guaranteed stock for the contract duration.
- Shipping costs included.
- Supply in less than 48 hours².
- Diagnostic and advisory service.

Availability:

- Compensation for loss of the established availability.

¹ Depending on the contract conditions.

² For the countries selected in the map.

Ingeteam Service Centers

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.

TAILORED SOLUTIONS

As well as designing and manufacturing the power and control electronics for PV plants and other renewable energy generation systems, Ingeteam has also been concerned with offering the best possible maintenance service to ensure optimum plant performance and continuous operation.



Maximum performance

The PV plant must achieve maximum performance, with as few interruptions as possible. Get the most from your PV plant through correct maintenance.

At Ingeteam, efficiency is a core value.

Right from commissioning and start-up, and throughout the entire useful life of your plant, we can offer you an all-inclusive maintenance service that is the result of our experience, assurance and specialization. Our secret is based on proactivity.

A key factor that sets us apart from the rest.

Guaranteed optimization

In the knowledge that it is essential to get the best performance out of the PV plant at the lowest operating cost, the maintenance service provided by Ingeteam allows you to adjust and lower your operating costs, for greater profitability.

Our strategy is based on an optimum all-inclusive maintenance policy, to ensure the continuous operation of your plant.

Risk-free financial returns

The solvency, technical capability and financial standing of a sector leader, such as Ingeteam, with its extensive track record and experience, represent a real guarantee when considering plant profitability.

With its expertise in maintenance engineering, on-going investment in R&D&I and commitment to developing optimum programs that adequately cover the existing risk, Ingeteam is ideally positioned to work alongside its customers.

Optimum plant maintenance also signifies maintaining the business risk well under control.



Spares always on hand

A smooth running supply chain and the continuous availability of all those parts required for your PV system, are both key aspects in our all-inclusive maintenance service. You can rest assured in the knowledge that we will handle all the logistics to ensure the rapid replacement of any equipment parts. We offer continuous status monitoring and information reporting so as to anticipate your needs.

Ingeteam can always guarantee the supply of parts, regardless of the system technology.

True adaptability

The solutions provided by Ingeteam for any type of PV system, guarantee reliability and maximum efficiency.

Tell us what you want, and we will tailor our service to meet your requirements, right from the contract conclusion stage, to offer you the best possible service at all times.







REFERENCES



OVER 4 GW INSTALLED

EQUIPPED WITH INGECON® SUN INVERTERS

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 broadened its scope to encompass the PV solar energy sector as well.

Since then we have provided our customers with more than 4 GW of power with INGECON® SUN pho-

tovoltaic 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 on-grid inverters for power ratings ranging from 2.5 to 1000 kW, for large-scale PV plants. We also specialize in the design and manufacture of highpower battery inverters for stand-alone installations, having supplied this type of inverters principally to the regions of Pacific Asia and Africa.

One of our key benchmark projects is the PV plant at San Bellino (Italy); this plant is one of the largest of its kind in the world, having an installed rated power of 70 MWp.

The 60 MWp Nobesol solar plant situated in Olmedilla de Alarcón (Spain) is another important project in which Ingeteam has participated, supplying more than 450 INGECON® SUN 100 inverters.

Ingeteam has also supplied on-grid PV inverters to some of the most relevant commercial installations, like the world's largest PV greenhouse, a 20 MWp installation in Sardinia (Italy).



1. ISOLUX CORSÁN

PV plant at San Bellino (Italy)

70 MWp (60 INGECON® SUN PowerMax)

2



3



FRV
2. Royalla Solar Farm (Australia)
20 MW (10 INGECON® SUN PowerStation)

ACCIONA SOLAR
3. PV array at Amareleja (Portugal)
46 MWp (70 INGECON® SUN PowerMax)

4



4. CANTIERI ITALIANI
Concrete housing at Sardegna (Italy)
9 MW (10 INGECON® SUN PowerMax)

5



5. NOBESOL
PV array at Olmedilla de Alarcón (Spain)
60 MWp (452 INGECON® SUN Power)

REFERENCES



6. M+H POWER

Stand alone PV array at
Innawonga Bellary (Australia)
20 kWp (INGECON® SUN STORAGE)

7. GENERAL ELECTRIC AND MOSER BAER CLEAN ENERGY

Installation in Sardegna (Italy)
20 MWp (14 INGECON® SUN PowerStation with
28 INGECON® SUN PowerMax inverters)

8. RISING SUN SOLAR

PV array at Hawaii (USA)
250 kW (2 INGECON® SUN Power U,
2 INGECON® SUN Smart U)



9

9. SINERGIA SISTEMI

PV on-roof installation at the Lamborghini factory in Sant'Agata Bolognese (Italy)

1.2 MWp (20 INGECON®SUN Lite, 2 INGECON®SUN PowerMax, 1 INGECON®SUN Power)



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10. GMN

Stand alone PV away at Nembrala (Indonesia)

21 kWp (1 INGECON®SUN STORAGE)



11

11. GRUPOTEC SOLAR

PV array on an industrial roof at Molina de Segura (Spain)

990 kWp (9 INGECON®SUN Power)



12

12. ISOLUX CORSÁN

Installation in the county of Cornwall (England)

15 MWp (24 INGECON®SUN PowerMax)

REFERENCES



13. MPX
PV array at Tauá (Brasil)
1 MWp (9 INGECON® SUN Power)

14. EMCO LIMITED
PV array at Fatepur (Gujarat, India)
5 MW (7 INGECON® SUN PowerMax)

15. SOLARTIA
PV array at Viana (Spain)
8.7 MWp (223 INGECON® SUN Lite,
106 INGECON® SUN Smart,
40 INGECON® SUN Power)

16. GES s.p.a
PV plant at Villasor (CA) (Italy)
20 MW (27 INGECON® SUN PowerMax)



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17. EOSOL

PV plant at Villeneuve de Marsan (France)
8 MWp (14 INGECON® SUN PowerMax)

18. ASSYCE

PV array at Mae Chan (Thailand)
8 MW (16 INGECON® SUN PowerMax)

19. CEGELEC

PV array at Midi-Pyrénées (France)
8 MWp (13 INGECON® SUN PowerMax)

REFERENCES



20. SUNEDISON
PV array at Copiapó (Chile)
46.7 MW (68 INGECON® SUN PowerMax)

21. MARTIFER
PV on-roof installation at Mineirao
Stadium (Brazil)
1.5 MW (89 INGECON® SUN Smart TL)

22. GREEN APPLE ENERGY
Domestic installation at
New Jersey (USA)
25 kW (5 INGECON® SUN Lite TL U)

23. SUNCO Sistemi Fotovoltaici
PV array at Pichincha (Ecuador)
2 MW (1 INGECON® SUN PowerStation
CON 20)



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24. SYDIS

Stand-alone installation at Albacete (Spain)
5 kW FV + 45 kWh batteries (3 INGECON® SUN STORAGE 1Play, 3 INGECON® SUN Lite)

25. SUNPOWER

PV industrial system for self-consumption at Valdemoro (Spain)
100 kW (18 INGECON® SUN Lite, 2 INGECON® EMS Manager)

26. INGENIERÍA Y SOLUCIONES FOTOVOLTAICAS

PV domestic system for self-consumption at Zizur Mayor (Spain)
3.3 kW (1 INGECON® SUN Lite, 1 INGECON® EMS Manager)

REFERENCES



27. AKUO ENERGY

PV installation with energy storage in La Réunion island (France)
9 MW PV + 9 MWh batteries (10 INGECON® SUN PowerMax,
6 INGECON® SUN STORAGE PowerMax)



28. GROUPE VALECO

PV installation in Gers (France)
10 MWp (9 INGECON® SUN PowerMax)

29. ABM

PV plant in Baltimore, MD (USA)
1 MW (2 INGECON® SUN PowerMax TL U)



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30. ACCIONA

Sishen Solar (South Africa)
78 MW (39 INGECON® SUN PowerStation)

31. HALF MOON VENTURES

PV plant in Jefferson, WI (USA)
1.2 MW (2 INGECON® SUN PowerMax TL U)

32. ENERPRO

Diesel-PV installation in Baltra airport (Galapagos, Ecuador)
75 kW (3 INGECON® SUN Smart U)

33. WINDMAR RENEWABLE ENERGY INC.

PV plant in Aguada (Puerto Rico)
500 kW (1 INGECON® SUN PowerMax T U)

NOTES

This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, leaving small margins at the top and bottom. There are no vertical margin lines, no text, and no other markings on the page. It appears to be a standard piece of notebook paper or a template for writing practice.

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