

INGECON SUN Power Station



Photovoltaic Energy

A Complete Range of Power Stations
for Grid-connected Photovoltaic Plants

Ingeteam

Photovoltaic Energy

Ingeteam

A New Generation of Power Stations





After years of success in the photovoltaic market, **INGETEAM** has further improved its product offering introducing a new line of power stations named **Ingecon@Sun Power Station**, suitable for any PV installation site.

The **Ingecon@Sun Power Station** is an integrated equipment that manages the power produced by medium and large scale solar photovoltaic plants for medium voltage grid-connected applications.



Plug&Play Installation



Top Efficiency and Cost Reduction



Flexibility and Modularity



Accessibility

MEDIUM VOLTAGE PV Inverter

275....2000 kWac - 3....36kV

INGETEAM has developed a new line of the **Ingecon®Sun Power Stations** with power ratings from 300 to 2.300kWp with all the necessary equipment to adapt the energy produced by the plant to the MV grid of the local distributor.

The **Ingecon®Sun Power Station** solutions offer top flexibility and an easy-to-install configuration, and can be adapted to suit the standards of any countries globally.

Comparing to the other photovoltaic solutions to be assembled on site, the **Ingecon®Sun Power Stations** are easy to transport, time- and cost-efficient and offer leading results in reliability.

The **Ingecon®Sun Power Stations** are supplied with all the internal wiring and fully tested by Ingeteam's highly qualified technicians.



Available in four versions:

Ingecon®Sun Power Station SHE15
15ft insulated shelter

Ingecon®Sun Power Station SHE20
20ft insulated shelter

Ingecon®Sun Power Station CON20
20ft insulated container

Ingecon®Sun Power Station CON40
40ft insulated container



Plug&Play Installation

The **Ingecon®Sun Power Station** equipments are easy and rapid to install. Designed and manufactured to avoid the need of assembly operations on-site, they significantly reduce the time and costs of installation. The connection to the photovoltaic inverters and to the distribution grid requires only few simple steps.



Top Efficiency and Cost Reduction

Manufactured with high-quality materials, our products allow to maximize performances and reliability, as well as to optimize the costs. The **INGETEAM** inverters, the heart of the **Ingecon®Sun Power Station**, ensure industry-leading results in terms of performance and durability.



Flexibility and Modularity

The great flexibility of the **Ingecon@Sun Power Station**, combined with the modularity of INGETEAM inverters, allows to optimize the configuration of the photovoltaic plant to meet any customer's needs and installation requirements, thanks to their modular design in both POWER MAX "M" series with multi-MPPT configuration and "X" series with Master/Slave configurations.



Accessibility

The **Ingecon@Sun Power Station** products are designed to provide full access to the equipment inside, making inspection and maintenance activities easier and significantly reducing service down times and costs.

The system includes

- **Ingecon@Sun PowerMax** Photovoltaic inverters in multi-MPPT configuration or in Master/Slave configuration up to 2.3 MWp.
- LV parallel switchgear protecting the interconnection between the inverters and the transformer.
- LV/MV transformer up to 36 kV.
- MV switchgears, available in different configurations according to the type of application.
- Auxiliary Services switchgear.
- Cooling system.
- Complete wiring (power supply lines, lighting system, plugs, earthing, etc.)
- Safety devices.

Optional equipment:

In addition to the standard equipment, the **Ingecon@Sun Power Station** can be supplied with the following options:

- Fiscal energy meter with GSM communication module for remote monitoring.
- LV/LV transformer for BTAUX auxiliary services switchgear power supply.
- UPS for auxiliary services.
- **Ingecon@Sun ComBox** centralized communication system with RS485/USB/ETHERNET interfaces.
- GSM/GPRS modem.
- **SCADA** system for photovoltaic plant monitoring.
- On-site plant start-up.

SHE15



The most compact solution on the market designed by Ingeteam. All the devices required for a multi-megawatt system incorporated into a single shelter.

Maximize your investment with minimal effort

Ingecon® Sun PowerStation SHE 15 is a compact, customisable and flexible solution that can be configured to suit each customer's requirements. 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.

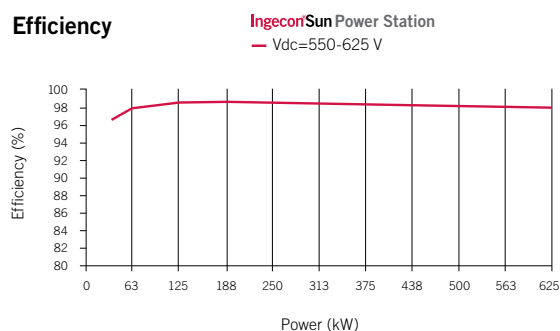
Equipped with everything necessary

Inverters, Low Voltage parallel cabinet, auxiliary services panel, medium voltage cubicle and LV/MV transformer.

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.

Efficiency



Main Features

- Power from 300 to 1.150 kWp.
- Compact design.
- Plug&Play solution.
- Customizable.

Benefits

- Extremely versatile.
- Industry-leading performances.
- Maximum return of investment.
- Guarantee of quality.

Electrical Protections

- DC and AC Class II surge arresters.
- DC breaker with door control.
- DC fuses.
- AC thermal magnetic circuit breaker with door control.
- DC insulation monitor.
- Anti-islanding monitoring system with automatic disconnection.
- Protection against short-circuits and output overloads.
- Emergency button for the inverters.
- Disconnection system in case of LV/MV transformer overheat.
- Emergency disconnecting pushbutton accessible from the outside.

SHE15 Wing



Complete accessibility

Thanks to its innovative design, all devices are readily accessible, thereby making it easier to inspect, maintain and repair the Ingecon® Sun Power-Station SHE 15. The transformer compartment door is equipped with an Arel safety lock with a blocking code.

Innovative ventilation system

The internal temperature is controlled by a centrifugal fan system. 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.

Optional equipment

In addition to the standard equipment, the **Ingecon®Sun Power Station SHE15** can be supplied with the following options:

- Fiscal energy meter with GSM communication module for remote monitoring.
- LV/LV transformer for auxiliary services switchgear power supply.
- UPS for auxiliary services.
- **Ingecon®Sun ComBox** centralized communication system with RS485/USB/ETHERNET interfaces.
- GSM/GPRS modem
- **SCADA** system for photovoltaic plant monitoring.
- On-site plant start-up.

Dimensions

(mm)

Dimensions			
SHE15 version			
Body dimensions [mm] LxDxH	4400	2438	2896
Overall dimensions with all doors open [mm]	6700	4658	2896
Foundation dimensions [mm]	6500	4000	300

SHE15 Wing

Physical, Electrical and Environmental characteristics

Number of power modules			2	3	4
Cooling System					
Type			Forced air cooling by thermally-controlled centrifugal fans		
IP43 Ventilated version	Inverter compartment ⁽¹⁾	Air flow	6000 m ³ /h	6000 m ³ /h	6000 m ³ /h
		Power Consumption	1950 W	2770 W	3180 W
	Transformer compartment	Air flow	6000 m ³ /h	6000 m ³ /h	6000 m ³ /h
		Power Consumption	720 W	720 W	720 W
Extraction and intake air grid			Anti-rain model		
General Information					
Auxiliary power supply			(400V standard) 400±480 V three phase with neutral 50/60Hz		
Operating Temperature Range ⁽²⁾⁽³⁾			From -30°C to +50°C		
Relative Humidity			0 - 95 %		
Installation Altitude ⁽⁴⁾			3000 m above sea level		
Certifications			Calculation report		
Safety and EMC standards			CE, EN 50178, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, FCC part 15		
Grid Standards			BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 11-20 V1, CEI 0-16, Annexes A68 e A70 TERNA, CEI 0-21, IEEEE1547, Arrêté 23-04-08, 659/2		
Equipment					
Inverter versions			M series (Multi MPPT) or X series (Master/Slave)		
BT POWER LV switchgear			One automatic switchgear for each inverter		
BT-AUX switchgear			BASE version (FULL version optional)		
LV/MV transformer			Dry type cast resin or oil insulated		
MV switchgear			Protection cells 1P or 1P-2L		
Internal lighting			2 x 28 W fluorescent lamps		
Emergency lighting			2 x 36 W fluorescent lamps		
Auxiliary power outlet			(220V standard) 110±240V single phase 50/60Hz		
Safety interlocks			AREL security lock for LV/MV transformer compartment door		
Fire safety kit			5 Kg CO ² fire extinguisher		
MV safety kit			Class 3 insulated gloves and 30 kV insulated footboard		
Safety kit			First aid kit and signals		
Support system			n. 8 30x30 cm brackets		
Mechanical Details					
Structure			Steel		
Insulation			Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling		

Notes:

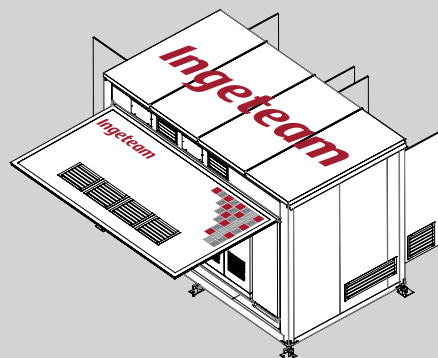
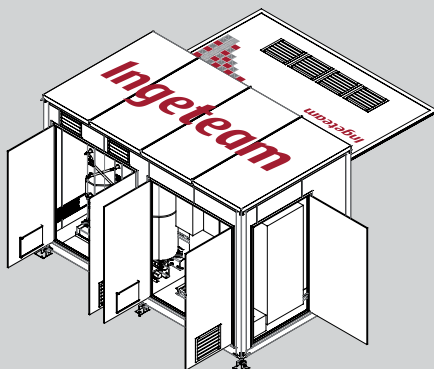
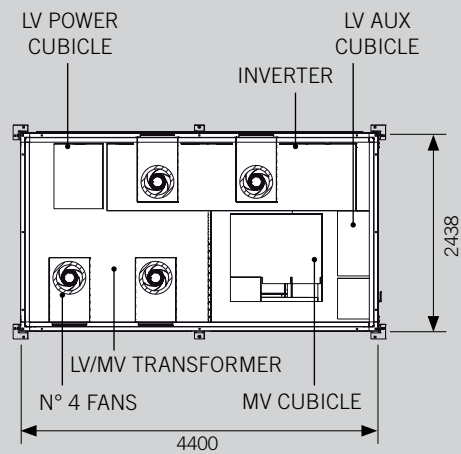
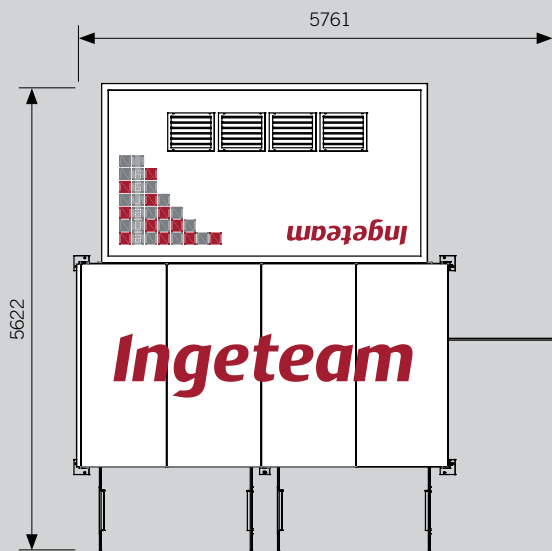
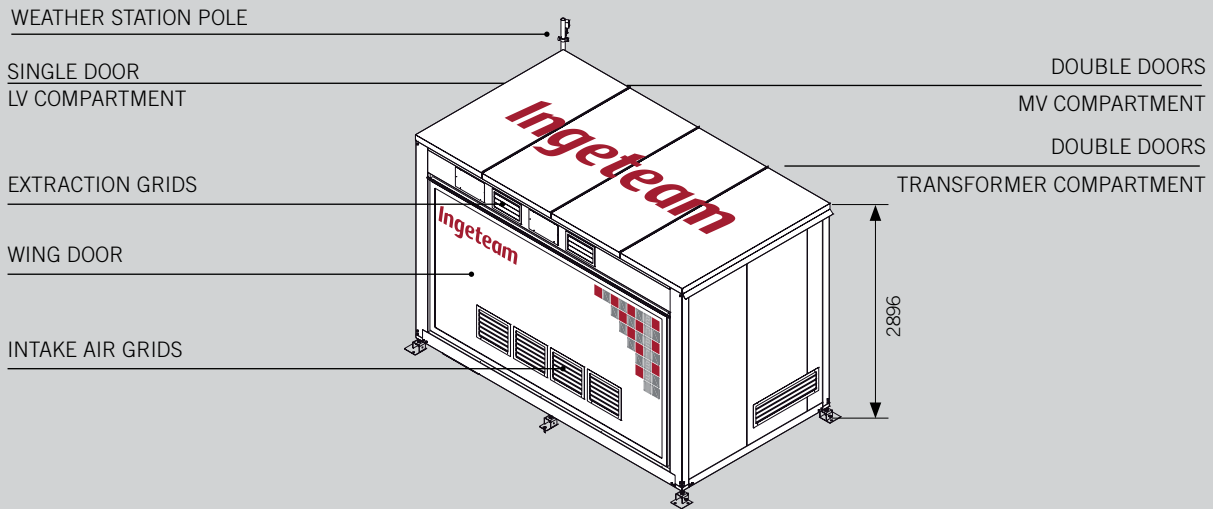
⁽¹⁾ Consumption inverter ventilation system included.

⁽²⁾ 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 50 °C operating temperature.⁽³⁾ Temperatures below -20°C, requires optional heater.

⁽⁴⁾ For altitudes above 1000 mt the nominal power temperature is derated of 4.5°C every 1000 mt.

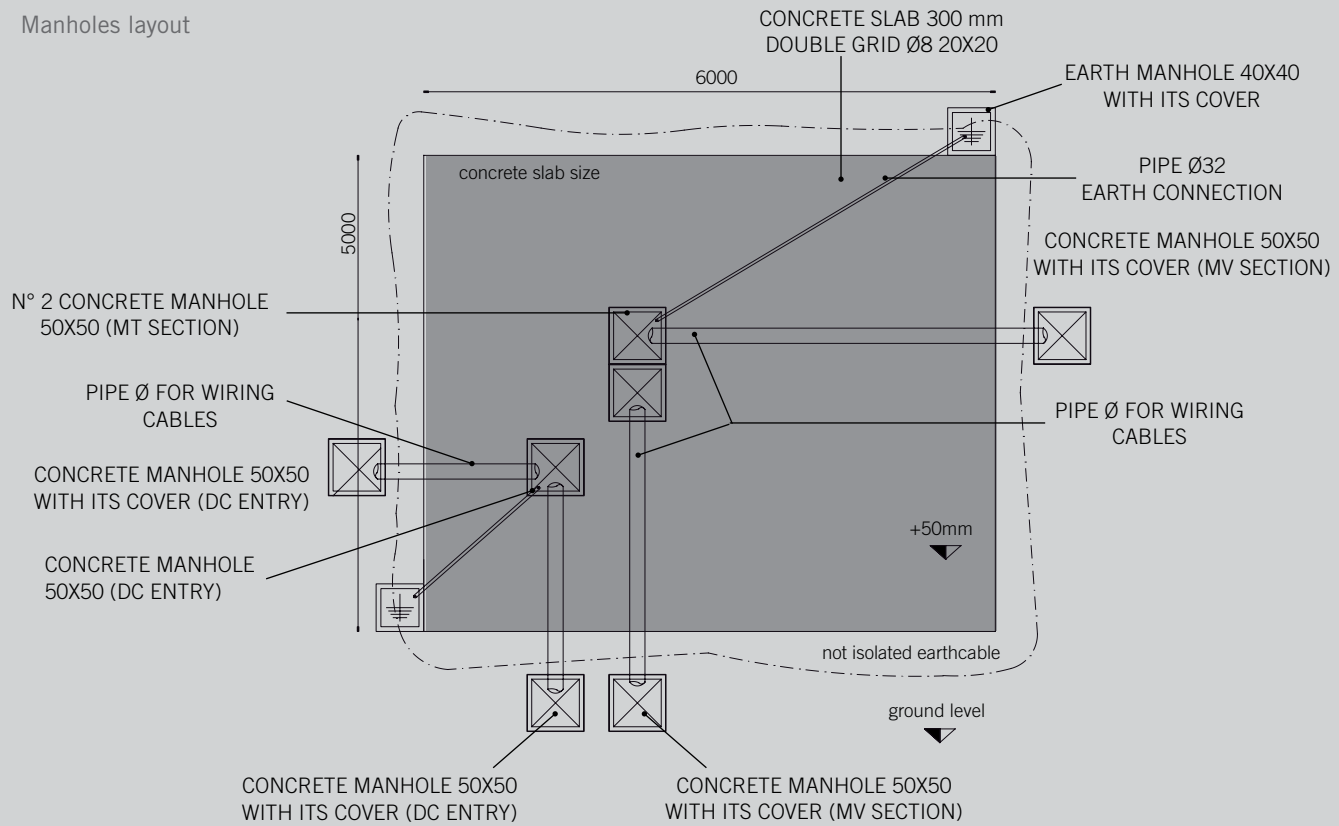
SHE15 Wing

Layout

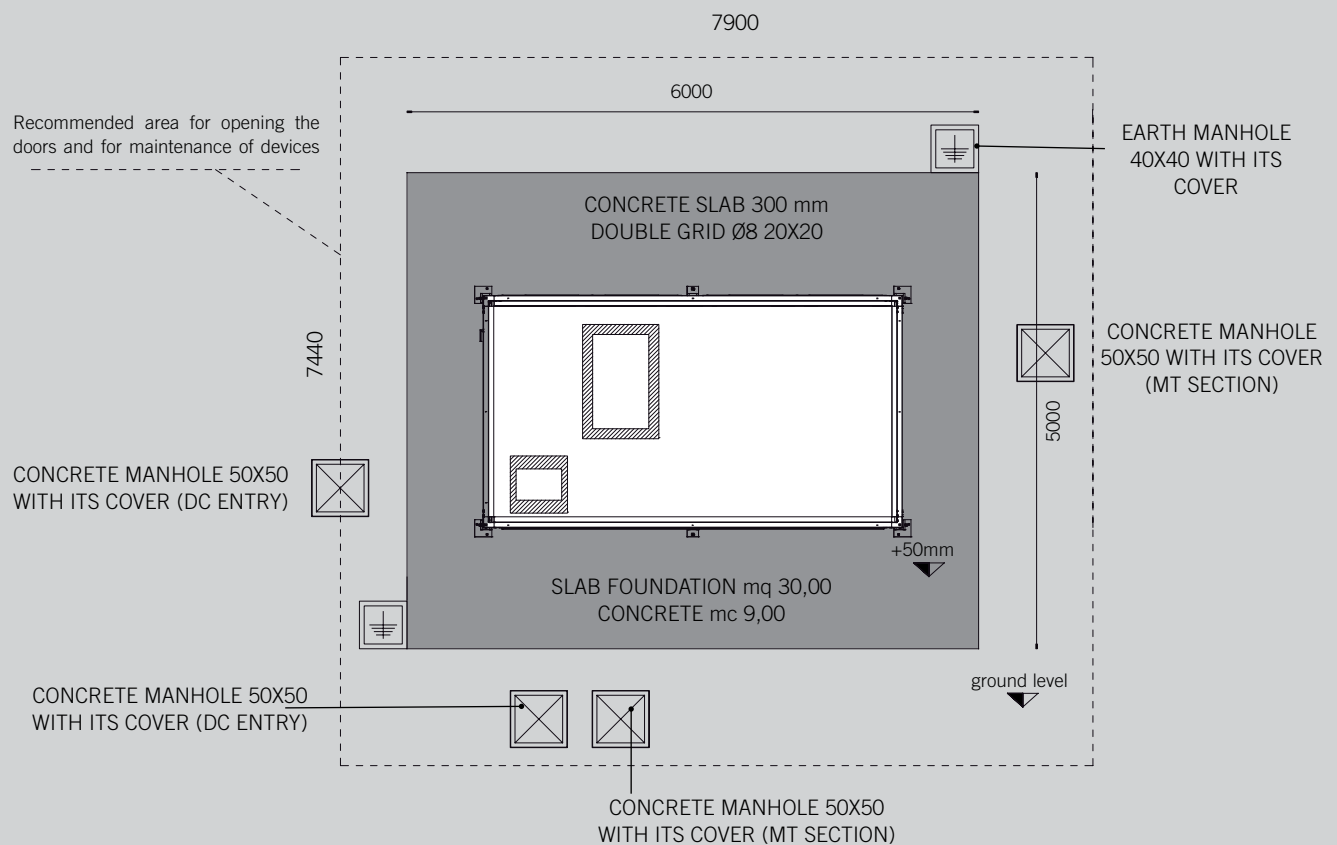


SHE15 Wing

Manholes layout

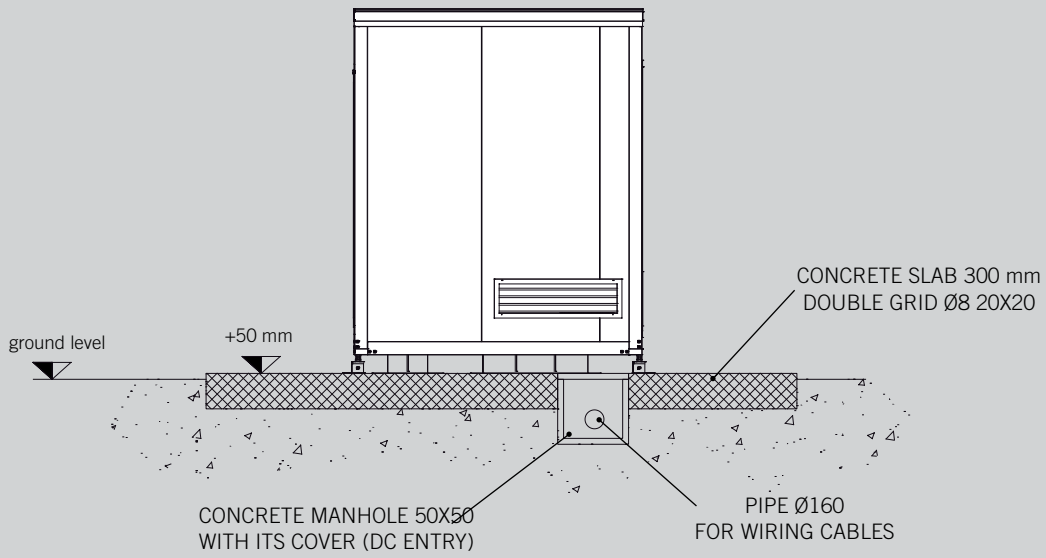


Plan view

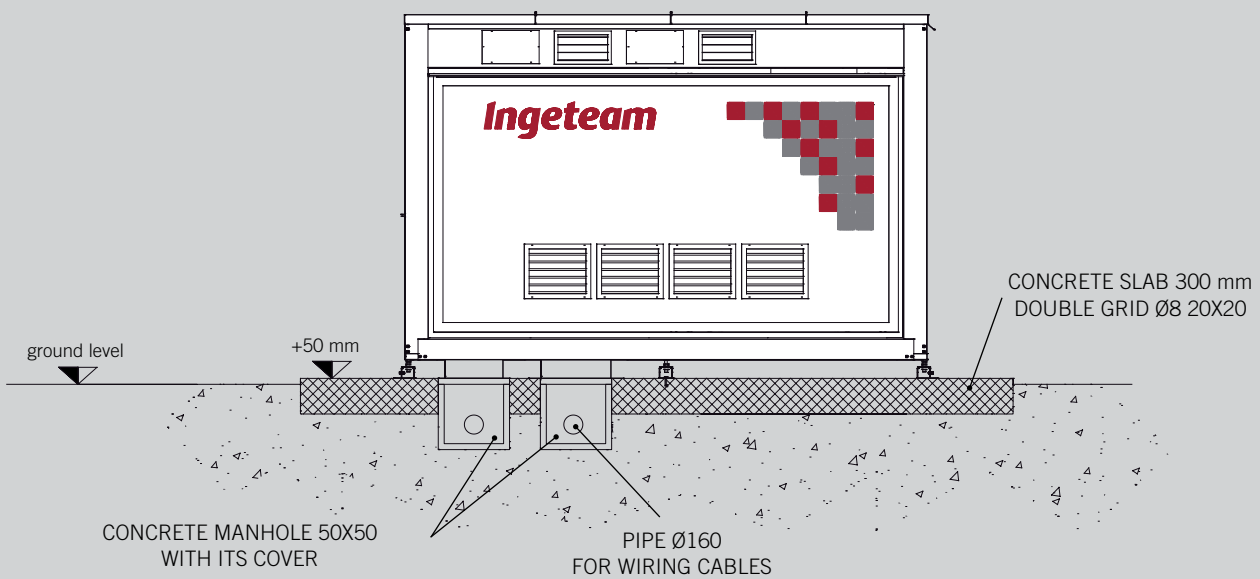


Foundation

Left side view



Frontal view



SHE20



The very latest technological development by Ingeteam. All the devices required for a multi-megawatt system incorporated into a single shelter.

Maximize your investment with minimal effort

Ingecon® Sun PowerStation SHE 20 is a compact, customisable and flexible solution that can be configured to suit each customer's requirements. 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.

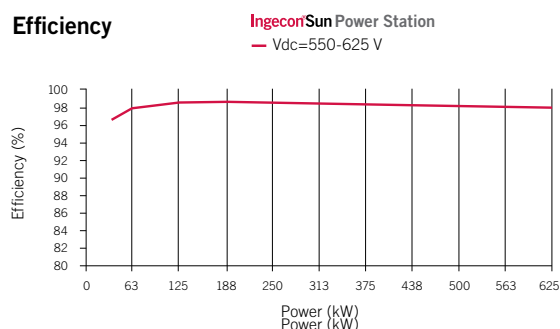
Equipped with everything necessary

Inverters, Low Voltage parallel cabinet, auxiliary services panel, medium voltage cubicle and LV/MV transformer.

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.

Efficiency



Main Features

- Power from 300 to 2.300 kWp.
- Compact design.
- Plug&Play solution.
- Customizable.

Benefits

- Extremely versatile.
- Industry-leading performances.
- Maximum return of investment.
- Guarantee of quality.

Electrical Protections

- DC and AC Class II surge arresters.
- DC breaker with door control.
- DC fuses.
- AC thermal magnetic circuit breaker with door control.
- DC insulation monitor.
- Anti-islanding monitoring system with automatic disconnection.
- Protection against short-circuits and output overloads.
- Emergency button for the inverters.
- Disconnection system in case of LV/MV transformer overheat.
- Emergency disconnecting pushbutton accessible from the outside.

SHE20 Wing



Complete accessibility

Thanks to its innovative design, all devices are readily accessible, thereby making it easier to inspect, maintain and repair the Ingecon® Sun Power-Station SHE 20. The transformer compartment door is equipped with an Arel safety lock with a blocking code.

Innovative ventilation system

The internal temperature is controlled by a centrifugal fan system. 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.

Optional equipment

In addition to the standard equipment, the **Ingecon®Sun Power Station SHE20** can be supplied with the following options:

- Fiscal energy meter with GSM communication module for remote monitoring.
- LV/LV transformer for auxiliary services switchgear power supply.
- UPS for auxiliary services.
- **Ingecon®Sun ComBox** centralized communication system with RS485/USB/ETHERNET interfaces.
- GSM/GPRS modem
- **SCADA** system for photovoltaic plant monitoring.
- On-site plant start-up.

Dimensions

(mm)

Dimensions			
	SHE20 version		
Body dimensions [mm] LxDxH	6058	2438	2896
Overall dimensions with all doors open [mm]	9364	6831	2896
Foundation dimensions [mm]	8000	5000	300

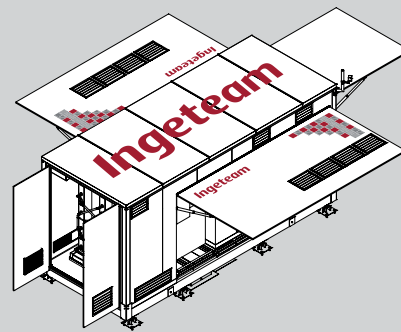
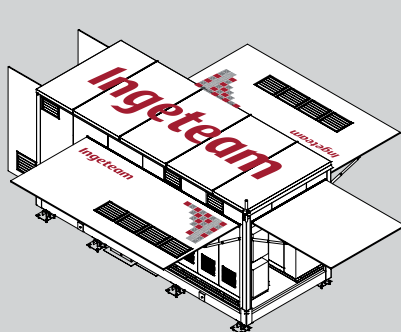
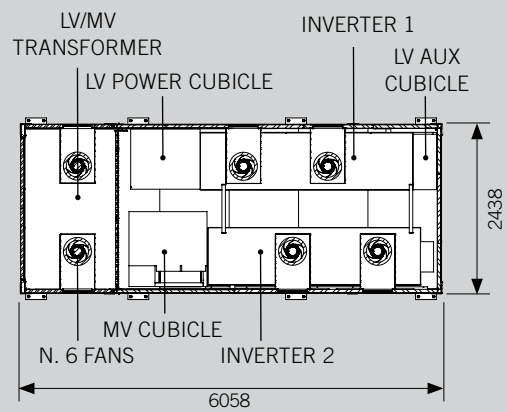
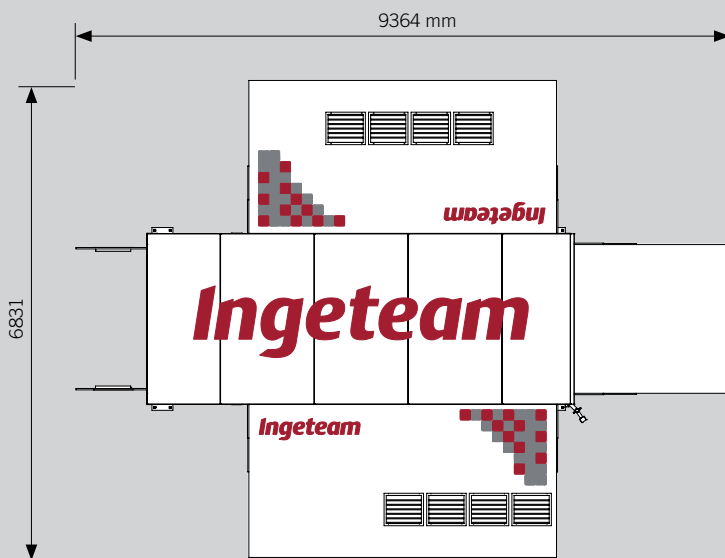
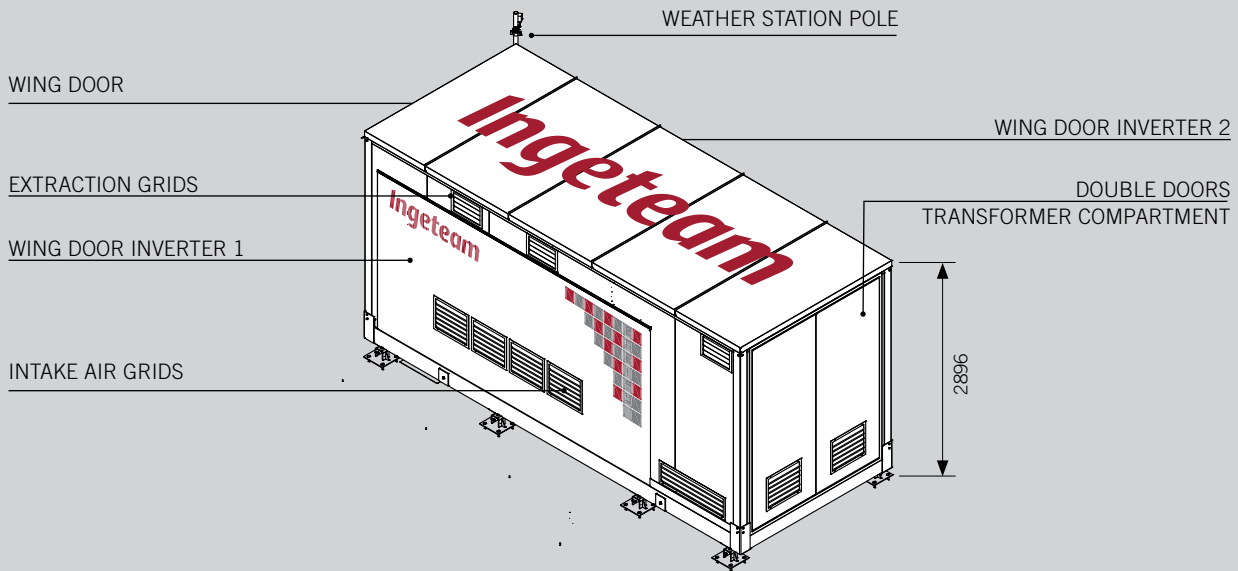
SHE20 Wing

Physical, Electrical and Environmental characteristics

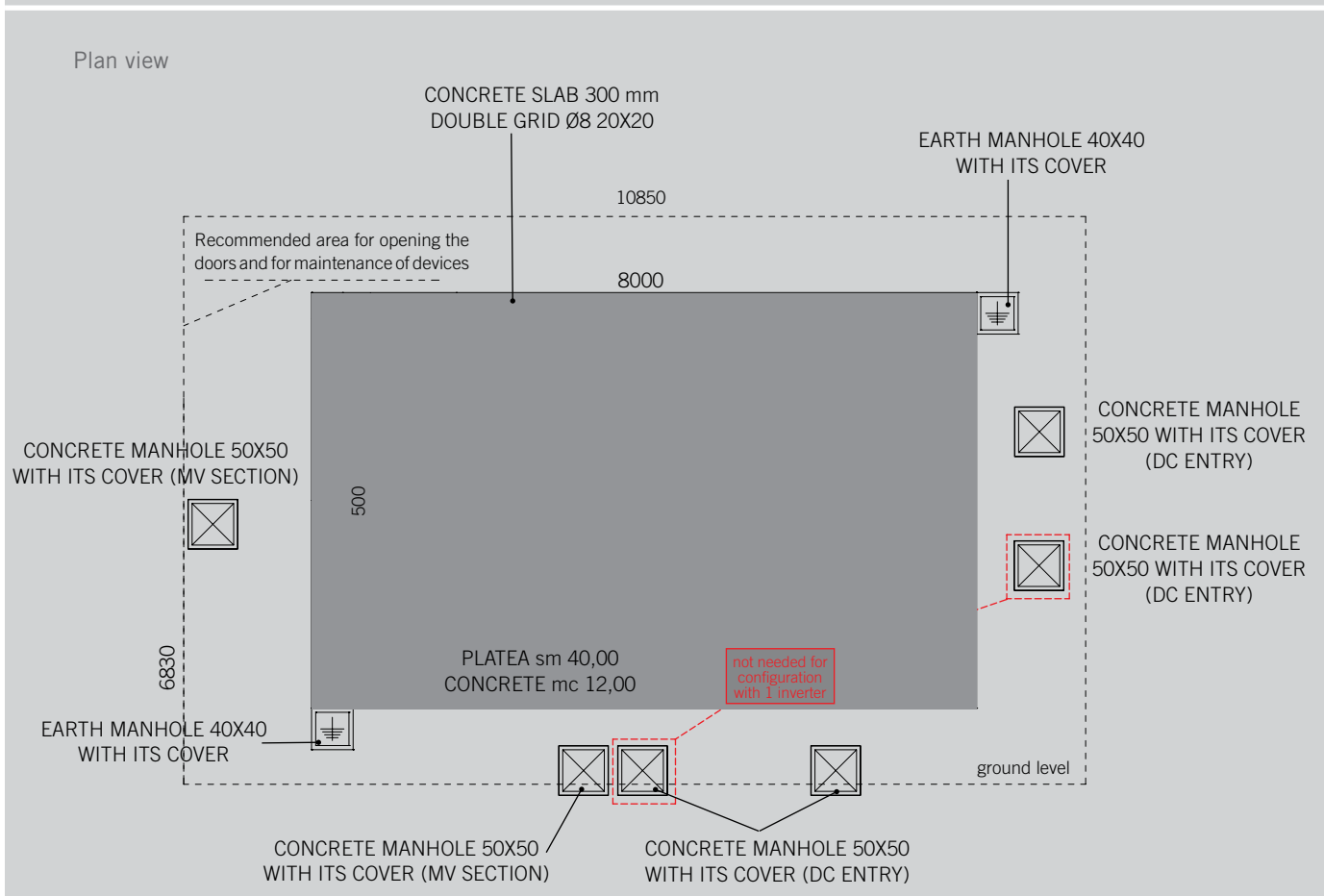
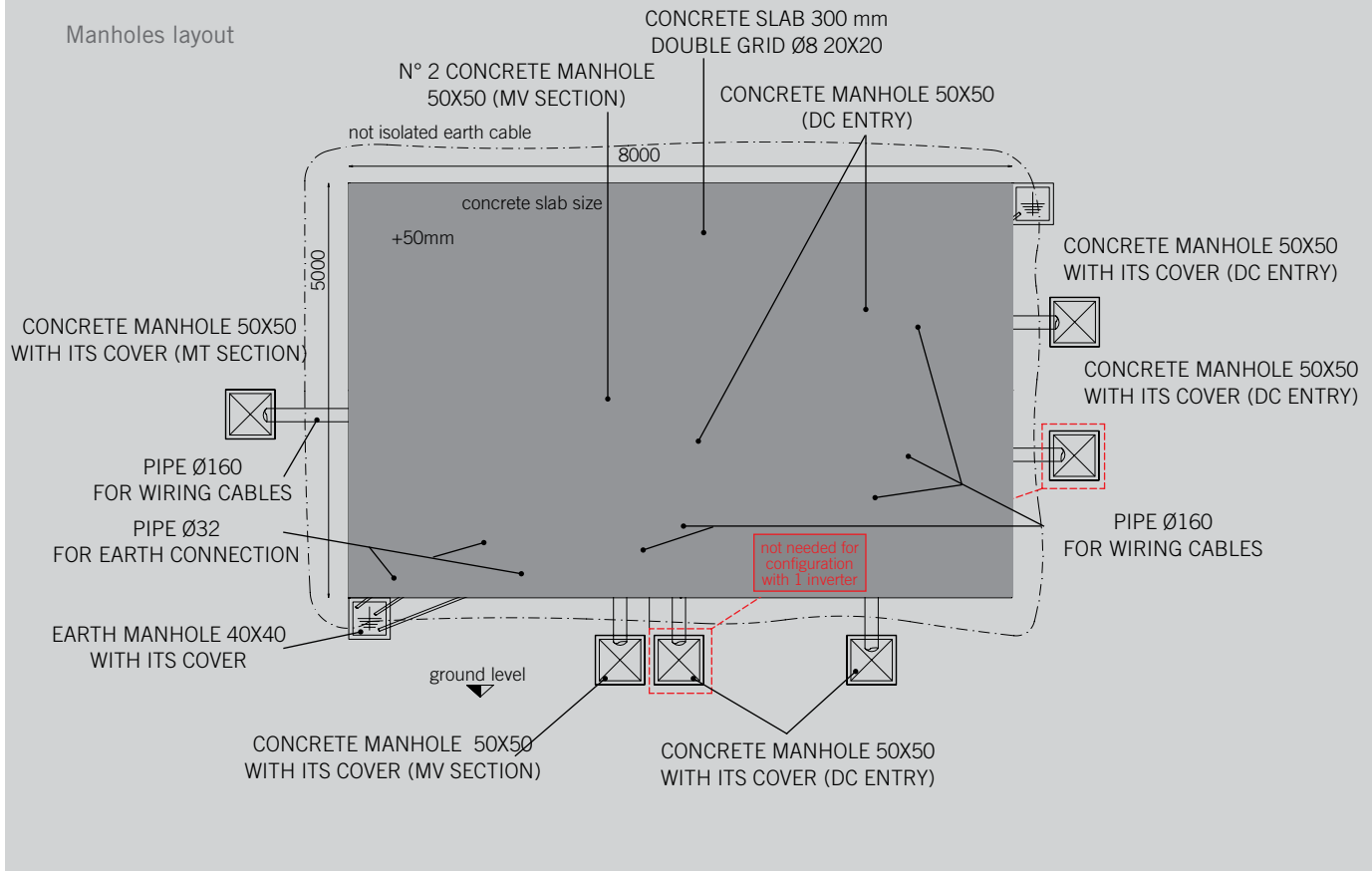
Number of power modules			2	3	4	5	6	7	8
Cooling System									
Type			Forced air cooling by thermally-controlled centrifugal fans						
IP43 Ventilated version	Inverter compartment ⁽¹⁾	Air flow	6000 m3/h	6000 m3/h	6000 m3/h	12000 m3/h	12000 m3/h	12000 m3/h	12000 m3/h
		Power Consumption	1950 W	2770 W	3180 W	4720 W	5540 W	5950 W	6360 W
	Transformer compartment	Air flow	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h
		Power Consumption	720 W	720 W	720 W	720 W	720 W	720 W	720 W
	Extraction and intake air grid		Anti-rain model						
General Information									
Auxiliary power supply			(400V standard) 400-480 V three phase with neutral 50/60Hz						
Operating Temperature Range ⁽²⁾⁽³⁾			From -30°C to +50°C						
Relative Humidity			0 - 95 %						
Installation Altitude ⁽⁴⁾			3000 m above sea level						
Certifications			Calculation report						
Safety and EMC standards			CE, EN 50178, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, FCC part 15						
Grid Standards			BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 11-20 V1, CEI 0-16, Annexes A68 e A70 TERNA, CEI 0-21, IEEE1547, Arrêté 23-04-08, 659/2						
Equipment									
Inverter versions			M series (Multi MPPT) or X series (Master/Slave)						
BT POWER LV switchgear			One automatic switchgear for each inverter						
BT-AUX switchgear			BASE version (FULL version optional)						
LV/MV transformer			Dry type cast resin						
MV switchgear			Protection cells 1P or 1P-2L						
Internal lighting			2 x 28 W fluorescent lamps						
Emergency lighting			2 x 36 W fluorescent lamps						
Auxiliary power outlet			(220V standard) 110±240V single phase 50/60Hz						
Safety interlocks			AREL security lock for LV/MV transformer compartment door						
Fire safety kit			5 Kg CO2 fire extinguisher						
MV safety kit			Class 3 insulated gloves and 30 kV insulated footboard						
Safety kit			First aid kit and signals						
Support system			n. 8 30x30 cm brackets						
Mechanical Details									
Structure material			Steel						
Insulation			Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling						
Notes:									
⁽¹⁾ Consumption inverter ventilation system included.									
⁽²⁾ 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 50 °C operating temperature. ⁽³⁾ Temperatures below -20°C, requires optional heater .									
⁽⁴⁾ For altitudes above 1000 mt the nominal power temperature is derated of 4.5°C every 1000 mt.									

SHE20 Wing

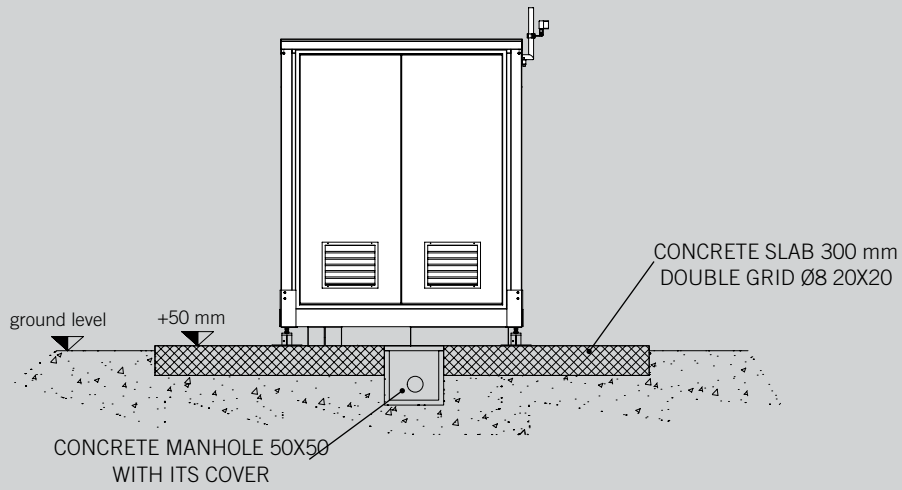
Layout



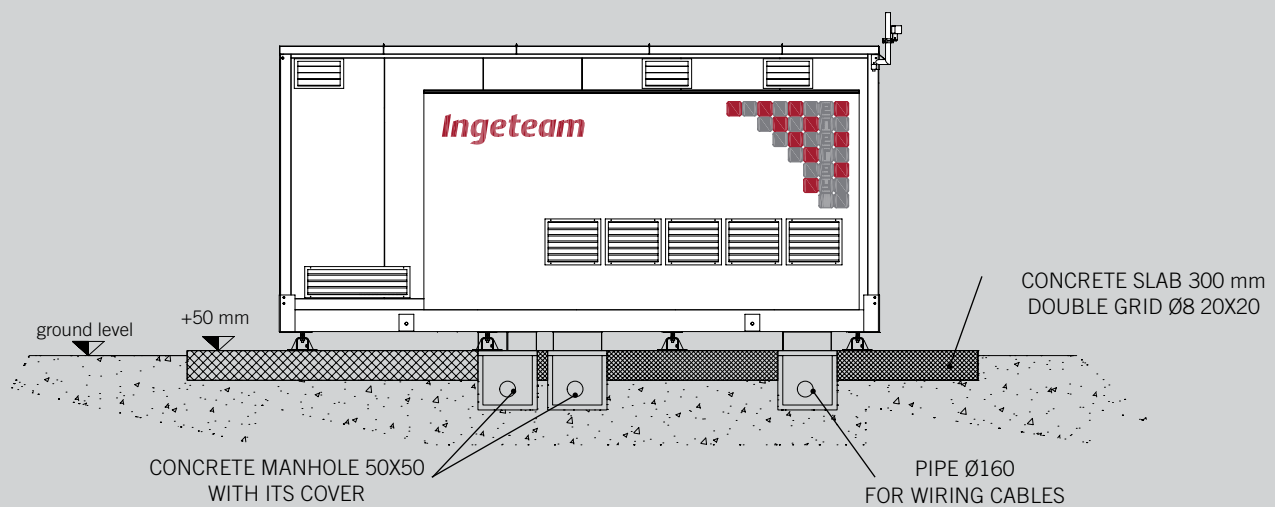
SHE20 Wing



Left side view



Front view



SHE20 Tunnel

Physical, Electrical and Environmental characteristics

Number of power modules			2	3	4
Cooling System					
Type			Forced air cooling by thermally-controlled centrifugal fans		
IP43 Ventilated version	Inverter compartment ⁽¹⁾	Air flow	6000 m3/h	6000 m3/h	6000 m3/h
		Power Consumption	1950 W	2770 W	3180 W
	Transformer compartment	Air flow	6000 m3/h	6000 m3/h	6000 m3/h
		Power Consumption	720 W	720 W	720 W
	Extraction and intake air grid		Anti-rain model		
General Information					
Auxiliary power supply			(400V standard) 400±480 V three phase with neutral 50/60Hz		
Operating Temperature Range ⁽²⁾⁽³⁾			From -30°C to +50°C		
Relative Humidity			0 - 95 %		
Installation Altitude ⁽⁴⁾			3000 m above sea level		
Certifications			Calculation report		
Safety and EMC standards			CE, EN 50178, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, FCC part 15		
Grid Standards			BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 11-20 V1, CEI 0-16, Allegati A68 e A70 TERNA, CEI 0-21, IEEE1547, Arrêté 23-04-08, 659/2		
Equipment					
Inverter versions			M series (Multi MPPT) or X series (Master/Slave)		
BT POWER LV switchgear			One automatic switchgear for each inverter		
BT-AUX switchgear			BASE version (FULL version optional)		
LV/MV transformer			Dry type cast resin		
MV switchgear			Protection cells 1P or 1P-2L		
Internal lighting			2 x 28 W fluorescent lamps		
Emergency lighting			2 x 36 W fluorescent lamps		
Auxiliary power outlet			(220V standard) 110±240V single phase 50/60Hz		
Safety interlocks			AREL security lock for LV/MV transformer compartment door		
Fire safety kit			5 Kg CO ² fire extinguisher		
MV safety kit			Class 3 insulated gloves and 30 kV insulated footboard		
Safety kit			First aid kit and signals		
Support system			n. 8 30x30 cm brackets		
Mechanical Details					
Structure material			Steel		
Insulation			Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling		

Notes:

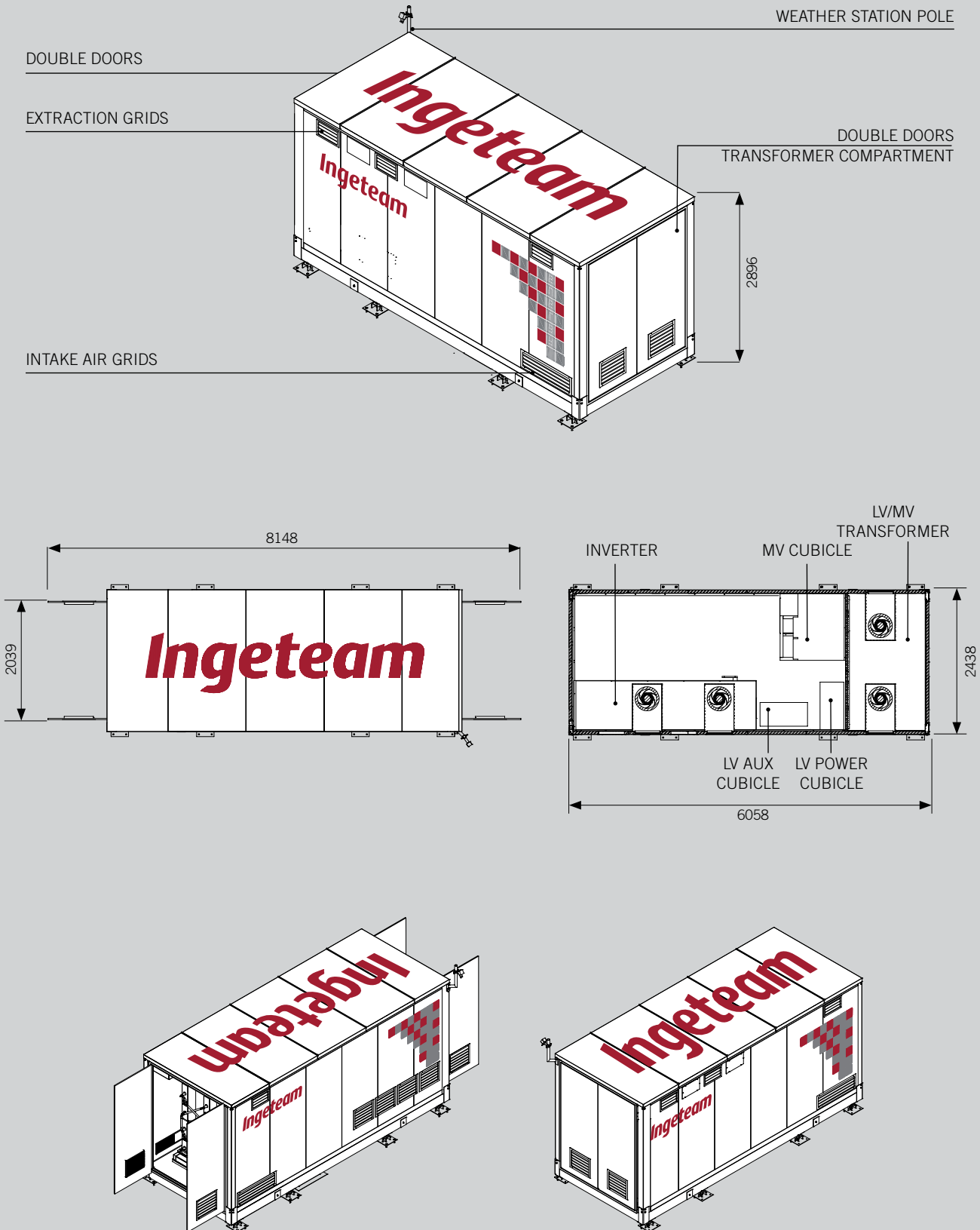
⁽¹⁾ Consumption inverter ventilation system included.

⁽²⁾ 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 50 °C operating temperature. ⁽³⁾ Temperatures below -20°C, requires optional heater .

⁽⁴⁾ For altitudes above 1000 mt the nominal power temperature is derated of 4.5°C every 1000 mt.

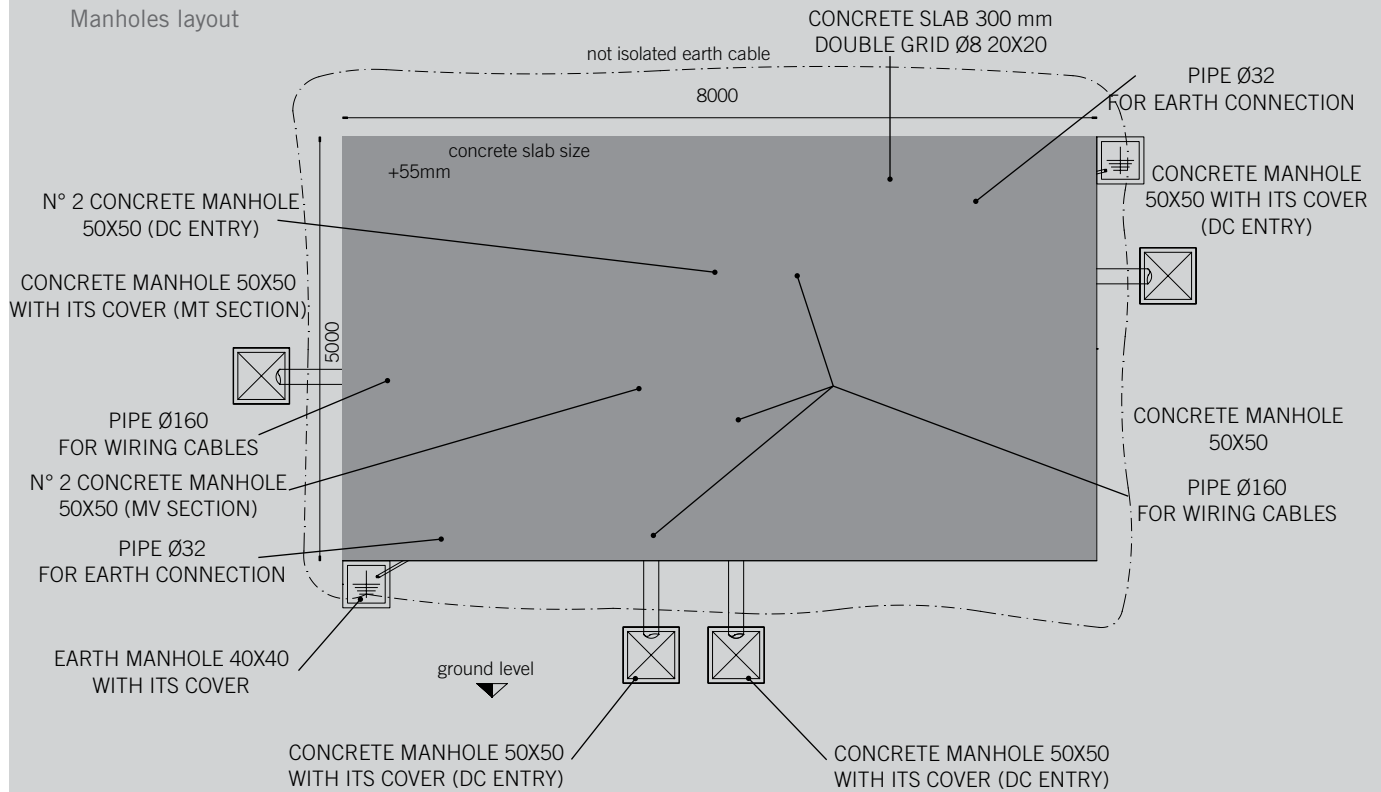
SHE20 Tunnel

Layout

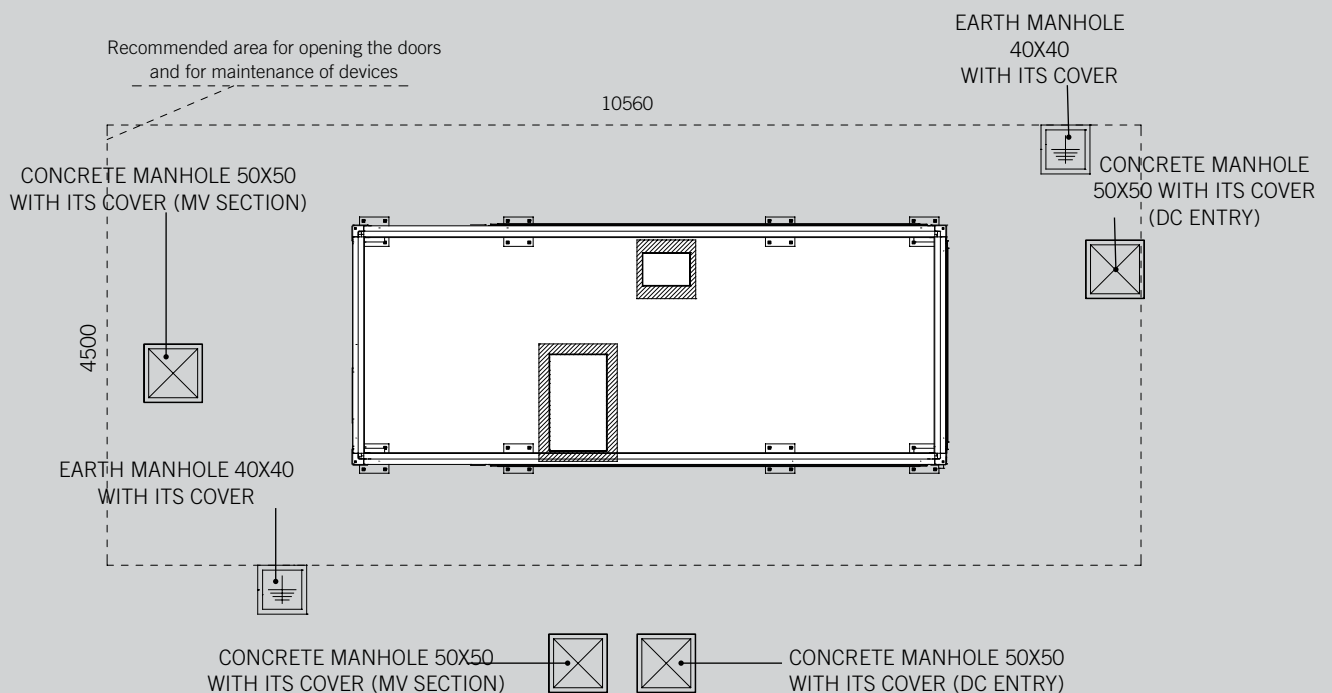


SHE20 Tunnel

Manholes layout

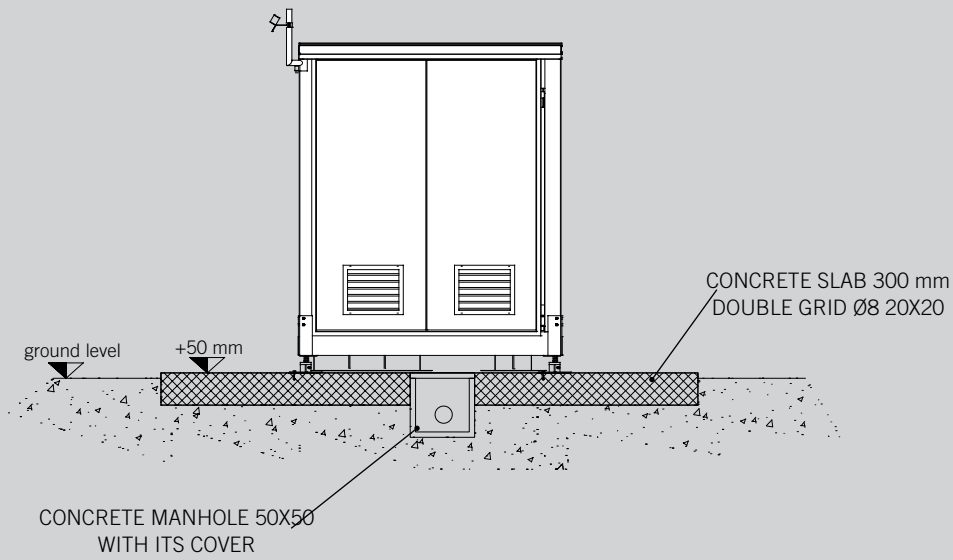


Plan view

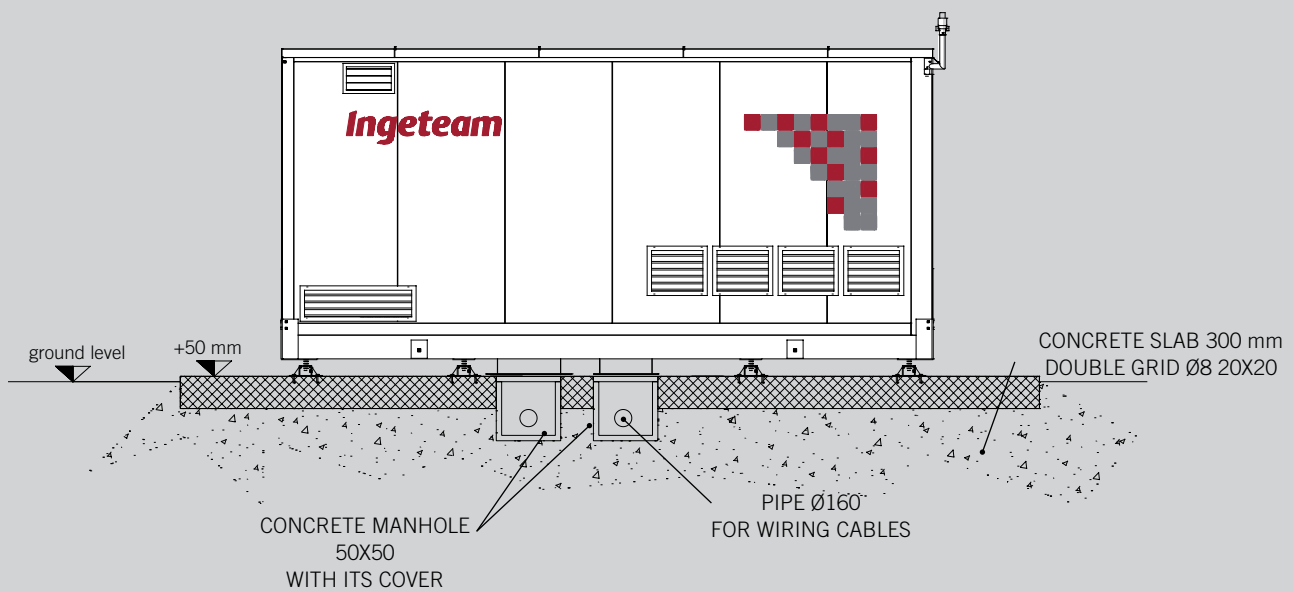


Foundation

Left side view



Front view



INGECON SUN Power Station

CON20



The Ingecon® Sun PowerStation CON 20 offers a standard solution, designed to be marketed at a world level. Thanks to its optional CSC RINA certification, it can be shipped by sea to anywhere in the world.

Robust and long-lasting design

Its welded galvanised steel monoblock structure guarantees maximum mechanical strength and durability. The walls and roof contain a 50 mm rigid fire-proof polyurethane foam feeling, to guarantee perfect water resistance and correct thermal insulation.

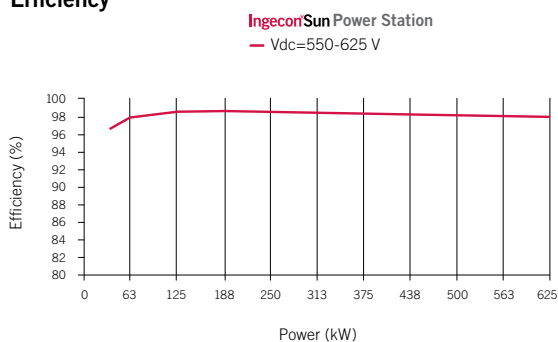
Equipped with everything necessary

Inverters, Low Voltage parallel cabinet, auxiliary services panel, medium voltage cubicle and LV/MV transformer.

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.

Efficiency



Main Features

- Power from 300 to 2,300 kWp.
- Extremely compact design.
- Plug & play solution.

Benefits

- Extremely versatile.
- High efficiency.
- Maximum returns on investment.
- Guarantee of quality.

Electrical Protections

- Reverse polarity.
- Output short-circuits and overloads.
- DC breaker with door control.
- DC fuses.
- AC thermal-magnetic breaker with door control.
- DC and AC voltage surge suppressors.
- Anti-islanding monitoring system with automatic disconnections.
- Insulation control.
- Emergency button.
- Disconnection system should the LV/MV transformer overheat.
- Emergency disconnection button, accessible from outside.

CON20 Wing



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 20. The transformer compartment door is equipped with an Arel safety lock with a blocking code.

Innovative ventilation system

The internal temperature is controlled by a centrifugal fan system. 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.

Optional equipment

In addition to the standard features, each Ingecon® Sun PowerStation can be supplied with the following options:

- Energy meter with GSM system for remote metering.
- LV/LV transformer for the power supply to the BT-AUX auxiliary services panel.
- UPS for auxiliary services.
- Ingecon® Sun ComBox, centralised communication system with RS-485/USB/
- ETHERNET interfaces.
- GSM/GPRS Modem.
- SCADA monitoring system.
- Start-up at the place of installation.
- CSC RINA certificate.

Dimensions

(mm)

Dimensions			
CON20 version			
Body dimensions [mm] LxDxH	6058	2424	2896
Overall dimensions with all doors open [mm]	9364	6831	2896
Foundation dimensions [mm]	8000	5000	300

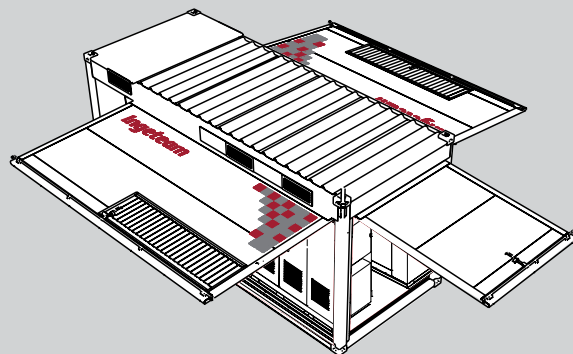
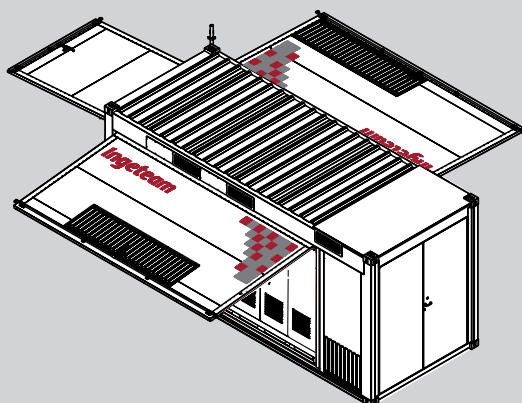
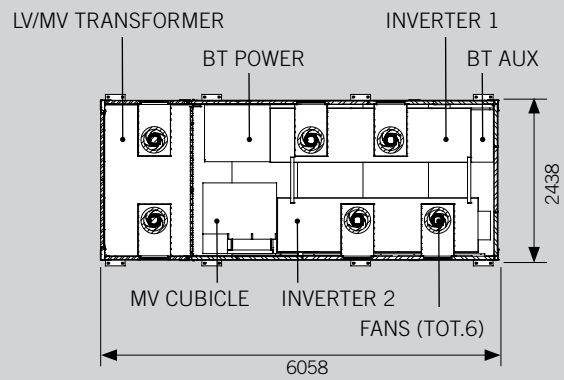
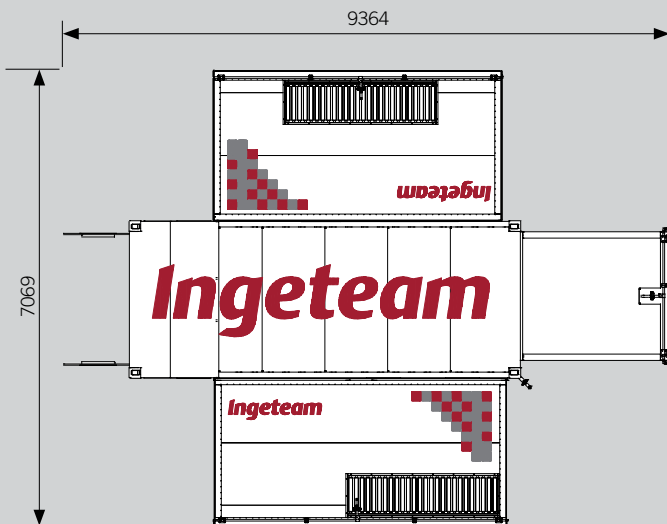
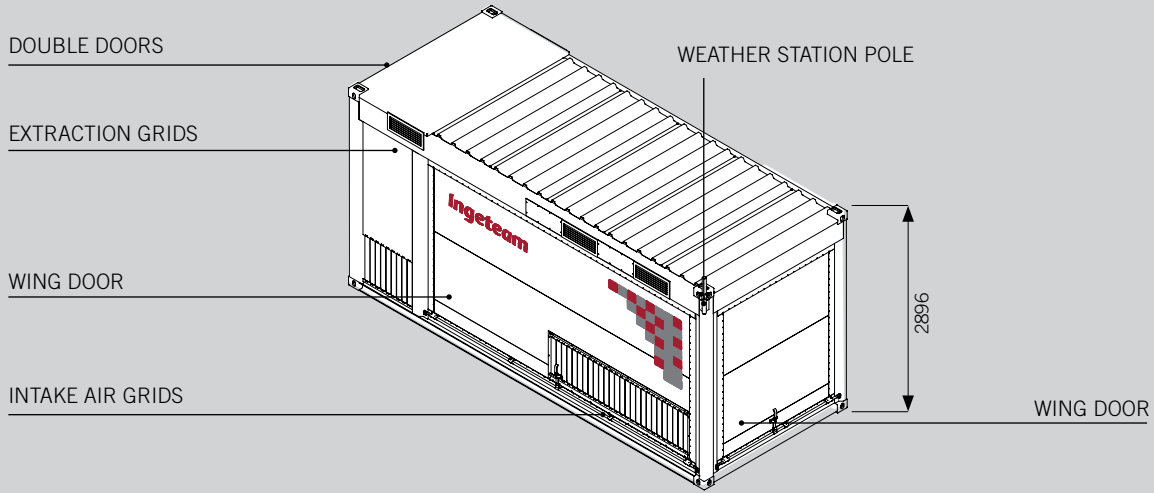
CON20 Wing

Physical, Electrical and Environmental characteristics

Number of power modules			2	3	4	5	6	7	8
Cooling System									
Type			Forced air cooling by thermally-controlled centrifugal fans						
IP54 Ventilated version	Inverter compartment ⁽¹⁾	Air flow	6000 m3/h	6000 m3/h	6000 m3/h	12000 m3/h	12000 m3/h	12000 m3/h	12000 m3/h
		Power Consumption	1950 W	2770 W	3180 W	4720 W	5540 W	5950 W	6360 W
	Transformer compartment	Air flow	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h
		Power Consumption	720 W	720 W	720 W	720 W	720 W	720 W	720 W
Extraction and intake air grid			Anti-rain & Sand Trap model						
General Information									
Auxiliary power supply			(400V standard) 400÷480 V three phase with neutral 50/60Hz						
Operating Temperature Range ⁽²⁾⁽³⁾			From -30°C to +50°C						
Relative Humidity			0 - 95 %						
Installation Altitude ⁽⁴⁾			3000 m above sea level						
Certifications			Calculation report						
Safety and EMC standards			CE, EN 50178, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, FCC part 15						
Grid Standards			BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 11-20 V1, CEI 0-16, Allegati A68 e A70 TERNA, CEI 0-21, IEEE1547, Arrêté 23-04-08, 659/2						
Equipment									
Inverter versions			M series (Multi MPPT) or X series (Master/Slave)						
BT POWER LV switchgear			One automatic switchgear for each inverter						
BT-AUX switchgear			BASE version (FULL version optional)						
LV/MV transformer			Dry type cast resin						
MV switchgear			Protection cells 1P or 1P-2L						
Internal lighting			2 x 28 W fluorescent lamps						
Emergency lighting			2 x 36 W fluorescent lamps						
Auxiliary power outlet			(220V standard) 110÷240V single phase 50/60Hz						
Safety interlocks			AREL security lock for LV/MV transformer compartment door						
Fire safety kit			5 Kg CO ² fire extinguisher						
MV safety kit			Class 3 insulated gloves and 30 kV insulated footboard						
Safety kit			First aid kit and signals						
Support system			n. 8 30x30 cm brackets						
Mechanical Details									
Structure material			Steel						
Insulation			Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling						
Notes:									
⁽¹⁾ Consumption inverter ventilation system included.									
⁽²⁾ 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 50 °C operating temperature. ⁽³⁾ Temperatures below -20°C, requires optional heater .									
⁽⁴⁾ For altitudes above 1000 mt the nominal power temperature is derated of 4.5°C every 1000 mt.									

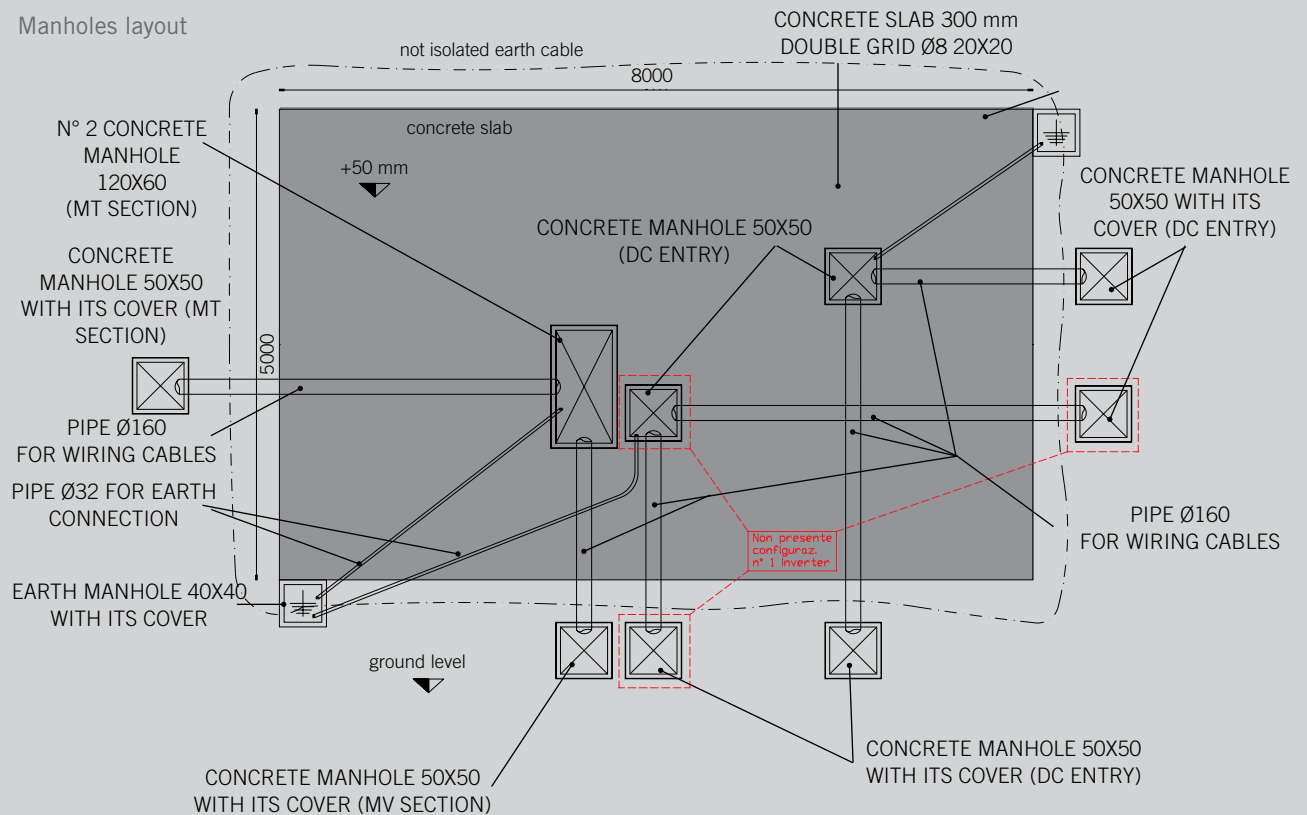
CON20 Wing

Layout

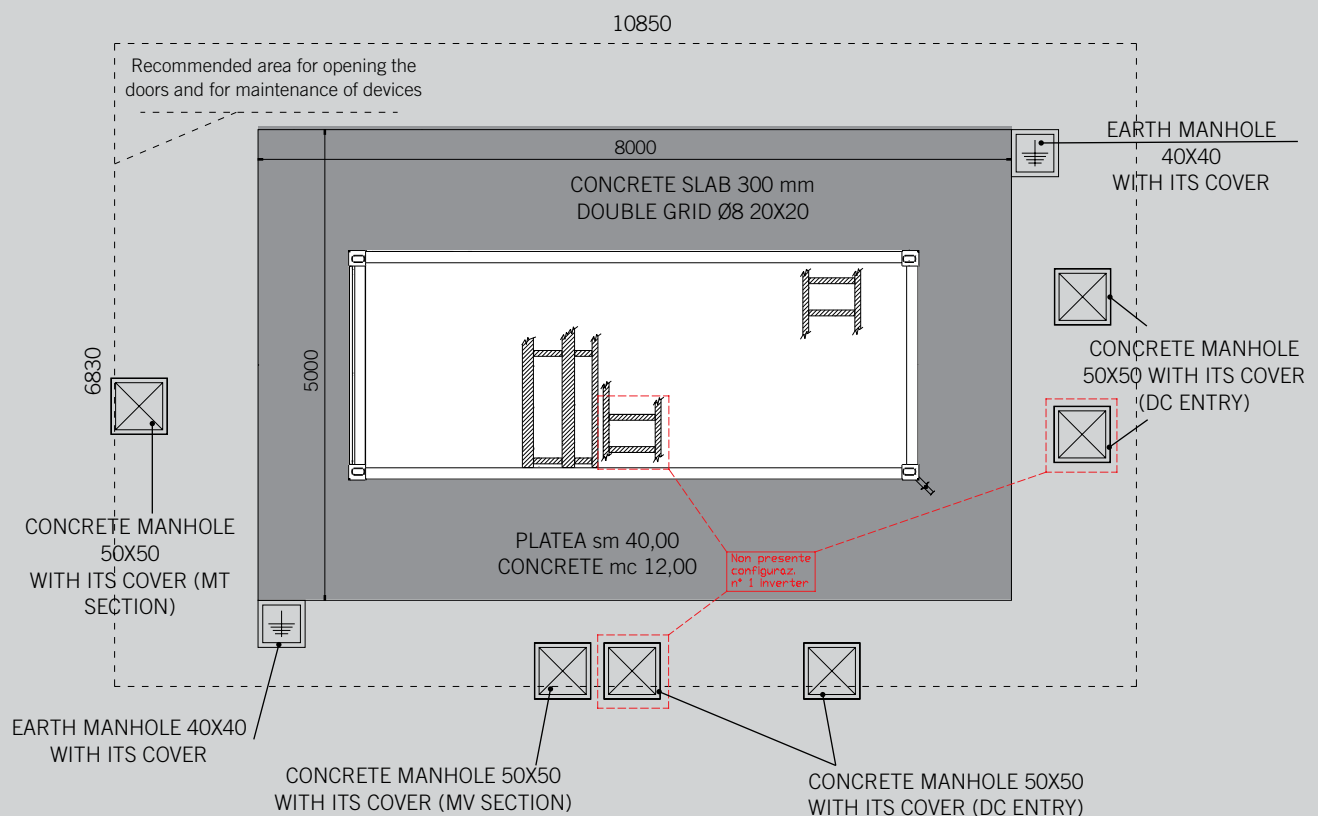


CON20 Wing

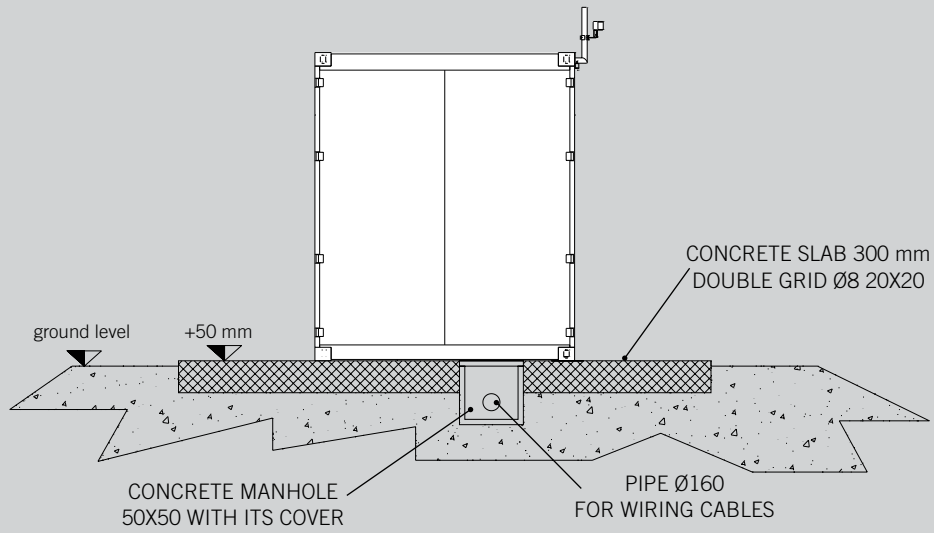
Manholes layout



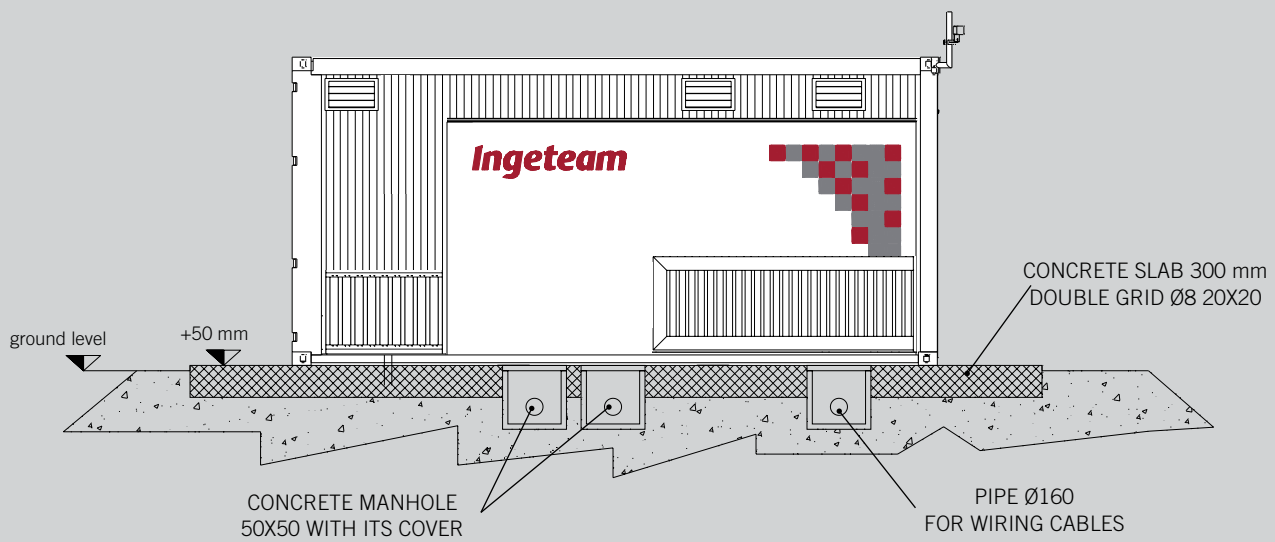
Plan view



Left side view



Front view



CON20 Tunnel

Physical, Electrical and Environmental characteristics

Number of power modules			2	3	4
Cooling System					
Type			Forced air cooling by thermally-controlled centrifugal fans		
IP54 Ventilated version	Inverter compartment ⁽¹⁾	Air flow	6000 m3/h	6000 m3/h	6000 m3/h
		Power Consumption	1950 W	2770 W	3180 W
	Transformer compartment	Air flow	6000 m3/h	6000 m3/h	6000 m3/h
		Power Consumption	720 W	720 W	720 W
	Extraction and intake air grid			Anti-rain model	
General Information					
Auxiliary power supply			(400V standard) 400±480 V three phase with neutral 50/60Hz		
Operating Temperature Range ⁽²⁾⁽³⁾			From -30°C to +50°C		
Relative Humidity			0 - 95 %		
Installation Altitude ⁽⁴⁾			3000 m above sea level		
Certifications			Calculation report		
Safety and EMC standards			CE, EN 50178, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, FCC part 15		
Grid Standards			BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 11-20 V1, CEI 0-16, Allegati A68 e A70 TERNA, CEI 0-21, IEEE1547, Arrêté 23-04-08, 659/2		
Equipment					
Inverter versions			M series (Multi MPPT) or X series (Master/Slave)		
BT POWER LV switchgear			One automatic switchgear for each inverter		
BT-AUX switchgear			BASE version (FULL version optional)		
LV/MV transformer			Dry type cast resin		
MV switchgear			Protection cells 1P or 1P-2L		
Internal lighting			2 x 28 W fluorescent lamps		
Emergency lighting			2 x 36 W fluorescent lamps		
Auxiliary power outlet			(220V standard) 110±240V single phase 50/60Hz		
Safety interlocks			AREL security lock for LV/MV transformer compartment door		
Fire safety kit			5 Kg CO ² fire extinguisher		
MV safety kit			Class 3 insulated gloves and 30 kV insulated footboard		
Safety kit			First aid kit and signals		
Support system			Directly on raft foundation (n. 8 30x30 cm brackets optional)		
Mechanical Details					
Structure material			Steel		
Insulation			Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling		

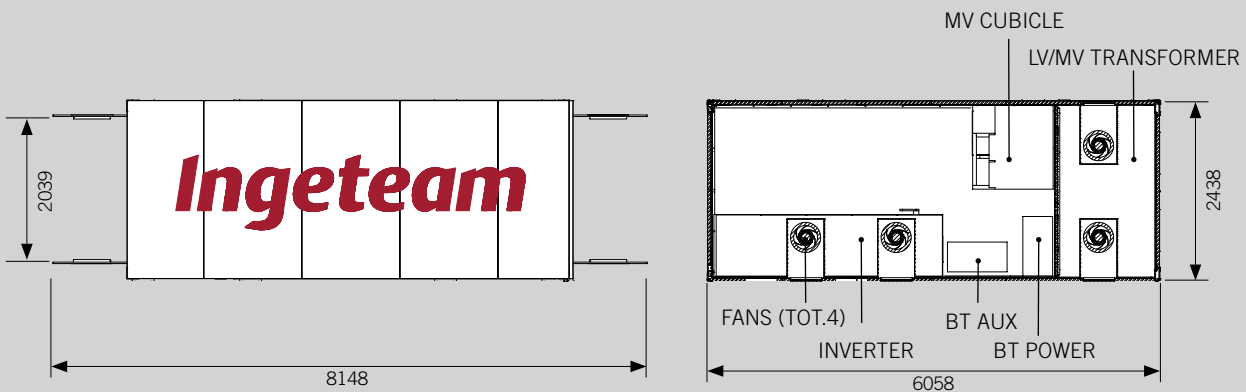
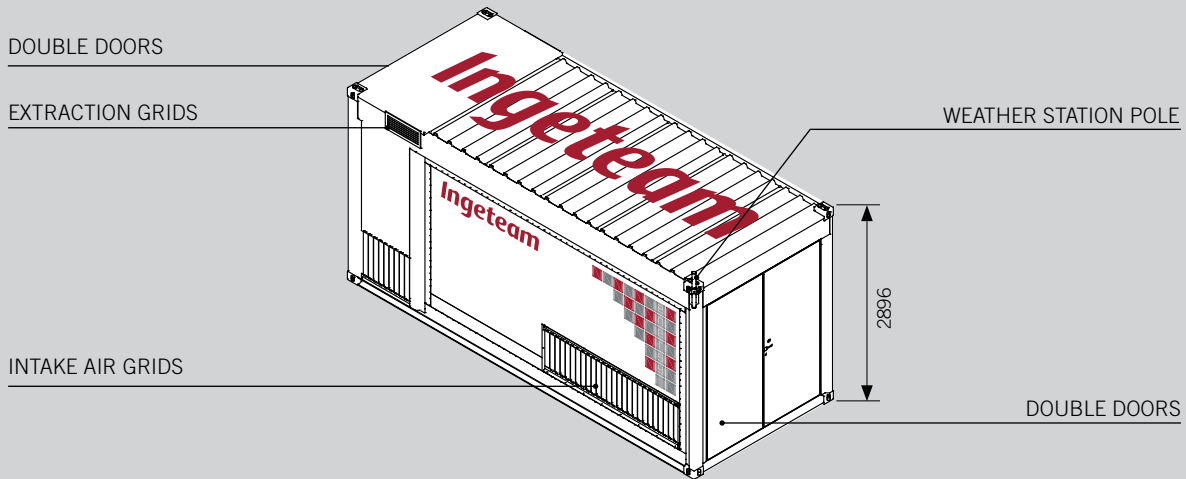
Notes:

⁽¹⁾ Consumption inverter ventilation system included.

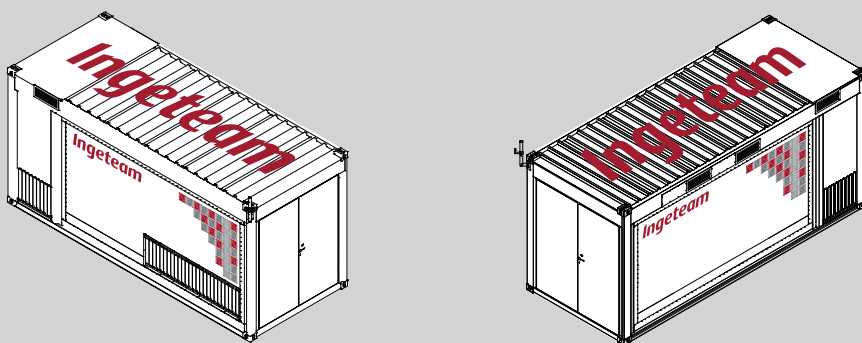
⁽²⁾ Ventilated version: rated output power indicated in the Technical Characteristics tables is guaranteed up to 45°C operating temperature. Derating above 45°C of 1.8% for each °C of increase until 50 °C operating temperature. ⁽³⁾ Temperatures below -20°C, requires optional heater .

⁽⁴⁾ For altitudes above 1000 mt the nominal power temperature is derated of 4.5°C every 1000 mt.

CON20 Tunnel

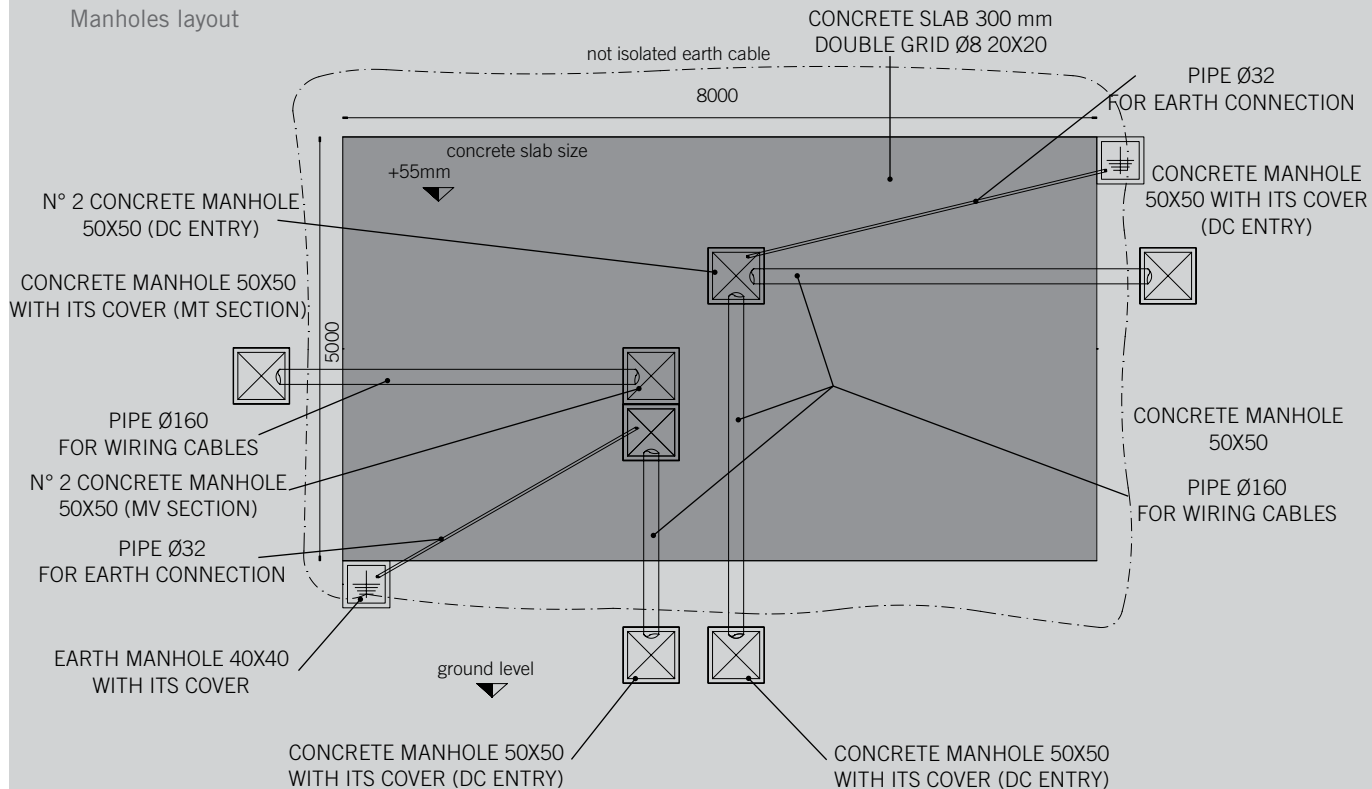


2039 mm

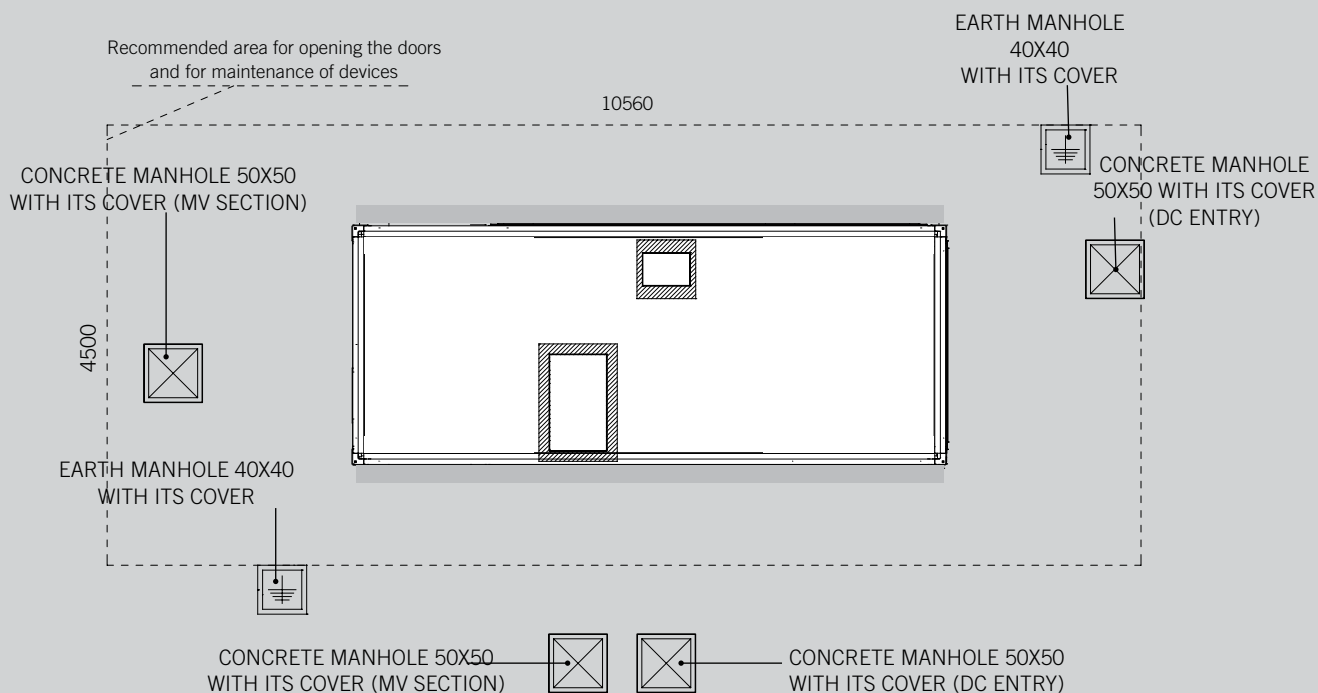


CON20 Tunnel

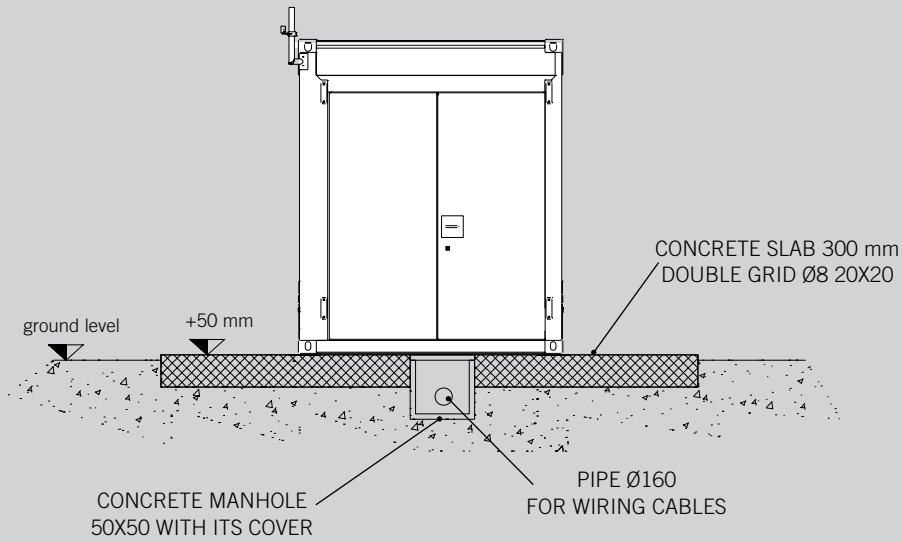
Manholes layout



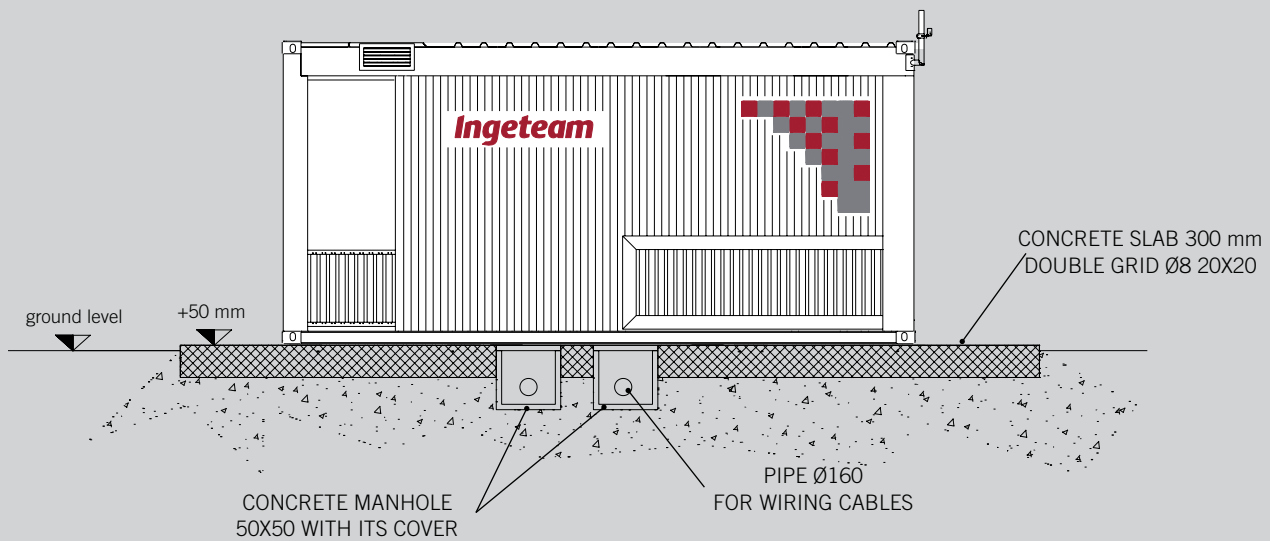
Plan view



Left side view



Front view



CON40



A technological solution designed to be marketed and installed all over the world at sites with particularly adverse environmental conditions. Thanks to its CSC RINA certification it can be shipped by sea to anywhere in the world.

Ideal for extreme environmental conditions

Its welded galvanized steel monoblock guarantees maximum mechanical strength and durability. The container inverter area can optionally be equipped with an interior climate control system, using industrial air conditioners with a Free Cooling function (IP54 version) or air recirculation system (IP65 version).

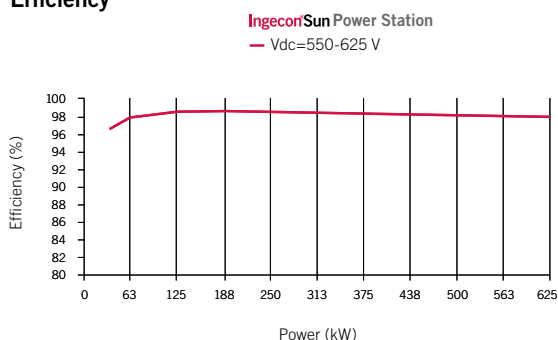
Perfect water resistance and thermal insulation

The entire container exterior is galvanised and varnished with polyurethane enamel for maximum protection against adverse weather conditions. The walls and roof contain a 50 mm rigid fire-proof polyurethane foam feeling, to guarantee perfect water resistance and correct thermal insulation.

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 CON40. The transformer compartment door is equipped with an Arel safety lock with a blocking code.

Efficiency



Main Features

- Power from 300 to 2,300 kWp.
- Extremely compact design.
- Plug & play solution.
- Forced air cooling.
Free Cooling air conditioning.
Air recirculation conditioning.
- Available up to 36 kV.
- CSC RINA certification.

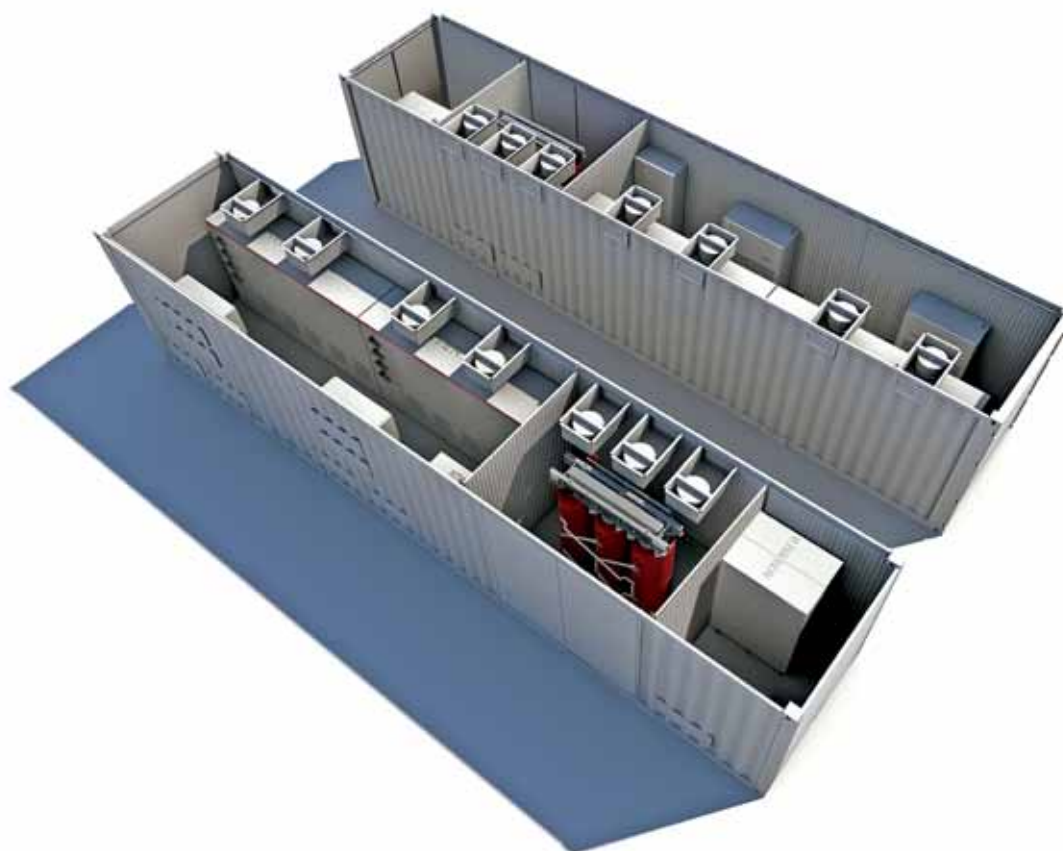
Benefits

- Extremely versatile.
- High efficiency.
- Maximum returns on investment.
- Guarantee of quality.

Electrical Protections

- Reverse polarity.
- Output short-circuits and overloads.
- DC breaker with door control.
- DC fuses.
- AC thermal-magnetic breaker with door control.
- DC and AC voltage surge suppressors.
- Anti-islanding monitoring system with automatic disconnections.
- Insulation control.
- Emergency button.
- Disconnection system should the LV/MV transformer overheat.
- Emergency disconnection button, accessible from outside.

CON40 Tunnel



Innovative ventilation system

The internal temperature is controlled by a centrifugal fan system. 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. Optionally, the container can be ordered with an internal cooling system featuring a Free Cooling function (only in IP54 conditioned version), with an air conditioner sized for each of the inverters, and with the following functions:

- **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.

Optional equipment

In addition to the standard features, each Ingecon® Sun PowerStation can be supplied with the following options:

- Energy meter with GSM system for remote metering.
- LV/LV transformer for the power supply to the BT-AUX auxiliary services panel.
- UPS for auxiliary services.
- Ingecon® Sun ComBox, centralised communication system with RS-485/USB/
- ETHERNET interfaces.
- GSM/GPRS Modem.
- SCADA monitoring system.
- Start-up at the place of installation.

Dimensions

(mm)

Dimensions			
Version	CON40		
Body dimensions [mm] LxDxH	12192	2438	2896
Overall dimensions with all doors open [mm]	14357	3578	2896
Foundation dimensions [mm]	14000	5000	300

CON40 Tunnel

Physical, Electrical and Environmental characteristics

Number of power modules			2	3	4	5	6	7	8
Cooling System									
Type			FA= Forced air cooling by thermally-controlled centrifugal fans - AC= Air conditioning with free cooling function - RC= Air conditioning with recirculation system						
IP54 Ventilated version (FA)	Inverter compartment	Air flow	6000 m3/h	6000 m3/h	6000 m3/h	12000 m3/h	12000 m3/h	12000 m3/h	12000 m3/h
		Power consumption ⁽¹⁾	1950 W	2770 W	3180 W	4720 W	5540 W	5950 W	6360 W
	Transformer compartment	Air flow	9000 m3/h	9000 m3/h	9000 m3/h	9000 m3/h	9000 m3/h	9000 m3/h	9000 m3/h
		Power consumption	1080 W	1080 W	1080 W	1080 W	1080 W	1080 W	1080 W
Extraction and intake air grids			Anti-rain and sand trap model						
IP54 Conditioned version (AC)	Inverter compartment Free Cooling	Air flow	3800 m3/h	3800 m3/h	3800 m3/h	7600 m3/h	7600 m3/h	7600 m3/h	7600 m3/h
		Power consumption ⁽¹⁾	3030 W	3850 W	4260 W	6880 W	7700 W	8110 W	8520 W
	Inverter compartment Cooling functions	Cooling capacity	17.8 kW	17.8 kW	17.8 kW	35.6 kW	35.6 kW	35.6 kW	35.6 kW
		Power consumption ⁽¹⁾	10330 W	11150 W	11560 W	21480 W	22300 W	22710 W	23120 W
	Transformer compartment	Air flow	9000 m3/h	9000 m3/h	9000 m3/h	9000 m3/h	9000 m3/h	9000 m3/h	9000 m3/h
		Power consumption	1080 W	1080 W	1080 W	1080 W	1080 W	1080 W	1080 W
Extraction and intake air grids			Anti-rain and sand trap model						
IP65 Conditioned version (RC)	Inverter compartment Cooling functions	Cooling capacity	17.8 kW	17.8 kW	17.8 kW	35.6 kW	35.6 kW	35.6 kW	35.6 kW
		Power consumption ⁽¹⁾	10330 W	11150 W	11560 W	21480 W	22300 W	22710 W	23120 W
	Transformer compartment	Air flow	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h	6000 m3/h
		Power consumption	720 W	720 W	720 W	720 W	720 W	720 W	720 W
Extraction and intake air grids			Anti-rain and sand trap model						
General Information									
Auxiliary power supply			(400V standard) 400÷480 V three phase with neutral 50/60Hz						
Operating Temperature Range ⁽²⁾⁽³⁾			from -30°C to +55°C						
Relative Humidity			0 - 95 %						
Installation Altitude ⁽⁴⁾			3000 m above sea level						
Certifications			Calculation report						
Safety and EMC standards			CE, EN 50178, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, FCC part 15						
Grid Standards			BDEW MT, RD 661/2007, P.O.12.3, CEI 11-20, CEI 11-20 V1, CEI 0-16, Annexes A68 e A70 TERNA, CEI 0-21, IEEEE1547, Arrêté 23-04-08, 659/2						
Equipment									
Inverter versions			M series (Multi MPPT) or X series (Master/Slave)						
BT POWER LV switchgear			One automatic switchgear for each inverter (optional parallel switchgear or disconnecter)						
BT-AUX switchgear			BASE version (FULL version optional)						
LV/MV transformer			Dry type cast resin / oil insulated						
MV switchgear			Protection cells 1P or 1P-2L						
Internal lighting			5 x 2 x 36 W fluorescent lamps						
Emergency lighting			5 x 1 x 36 W fluorescent lamps						
Auxiliary power outlet			(220V standard) 110÷240V single phase 50/60Hz						
Safety interlocks			AREL security lock for LV/MV transformer compartment door						
Fire safety kit			5 Kg CO ² fire extinguisher						
MV safety kit			Class 3 insulated gloves and 30 kV insulated footboard						
Safety kit			First aid kit and signals						
Support system			Directly on raft foundation						
Mechanical Details									
Structure material			Steel						
Insulation			Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling						

Notes:

⁽¹⁾ Consumption inverter ventilation system included.

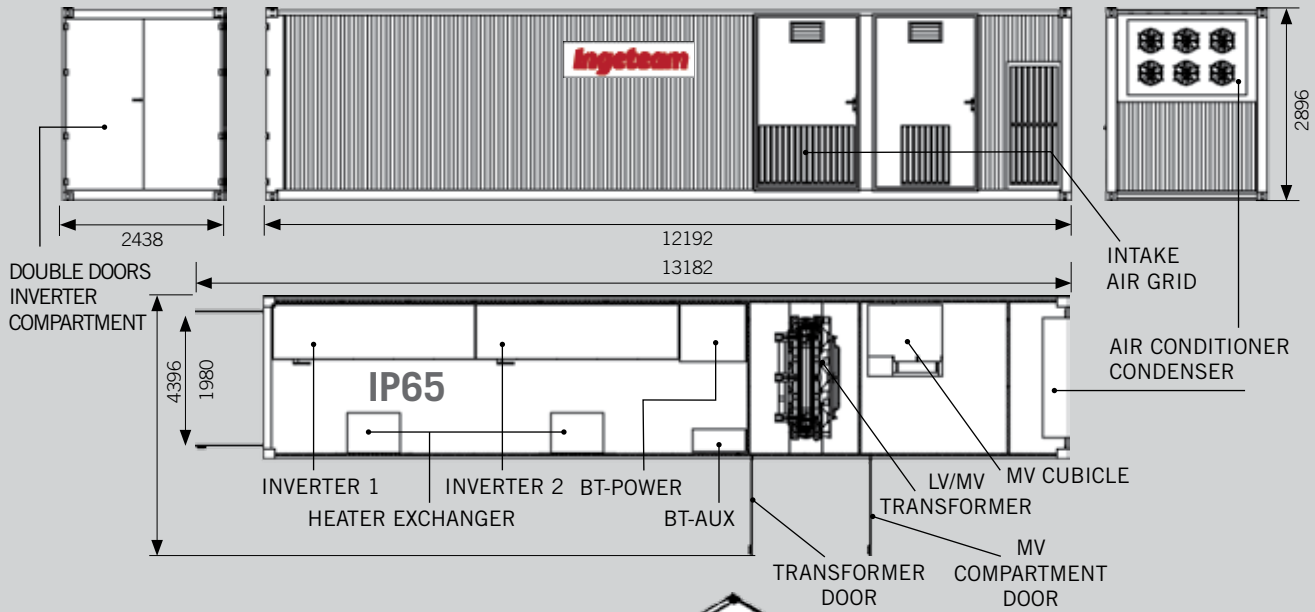
⁽²⁾ Ventilated version: rated output power indicated in the Technical Characteristics tables is guaranteed up to 45°C operating temperature. Derating above 45°C of 1.8% for each °C of increase until 50°C operating temperature.

⁽³⁾ Temperatures below -20°C, requires optional heater.

⁽⁴⁾ For altitudes above 1000 mt the nominal power temperature is derated of 4.5°C every 1000 mt.

CON40 Tunnel

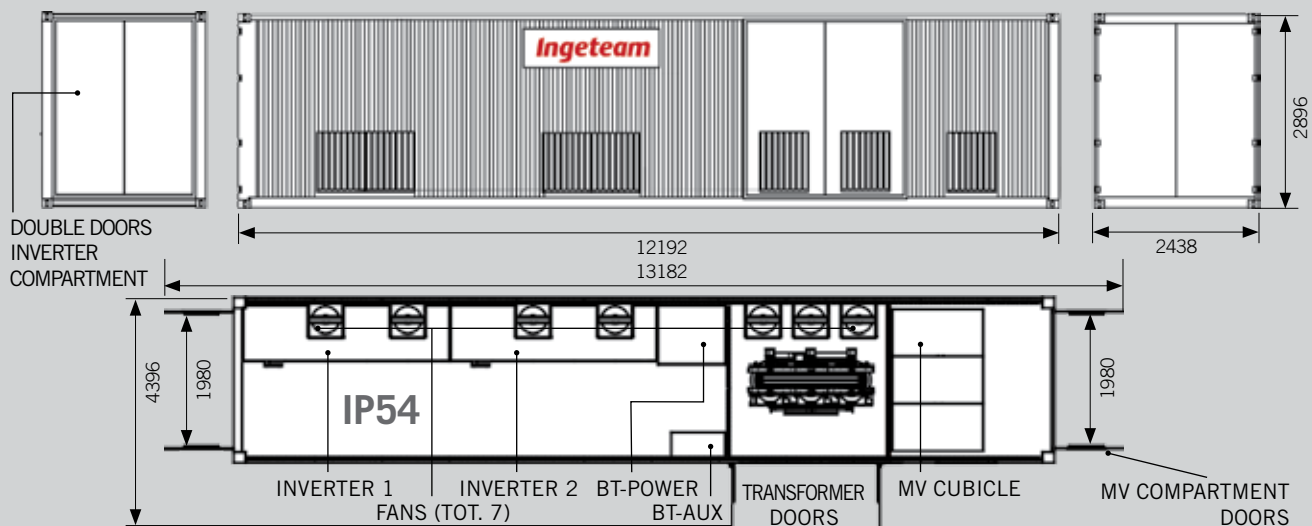
Layout



IP65

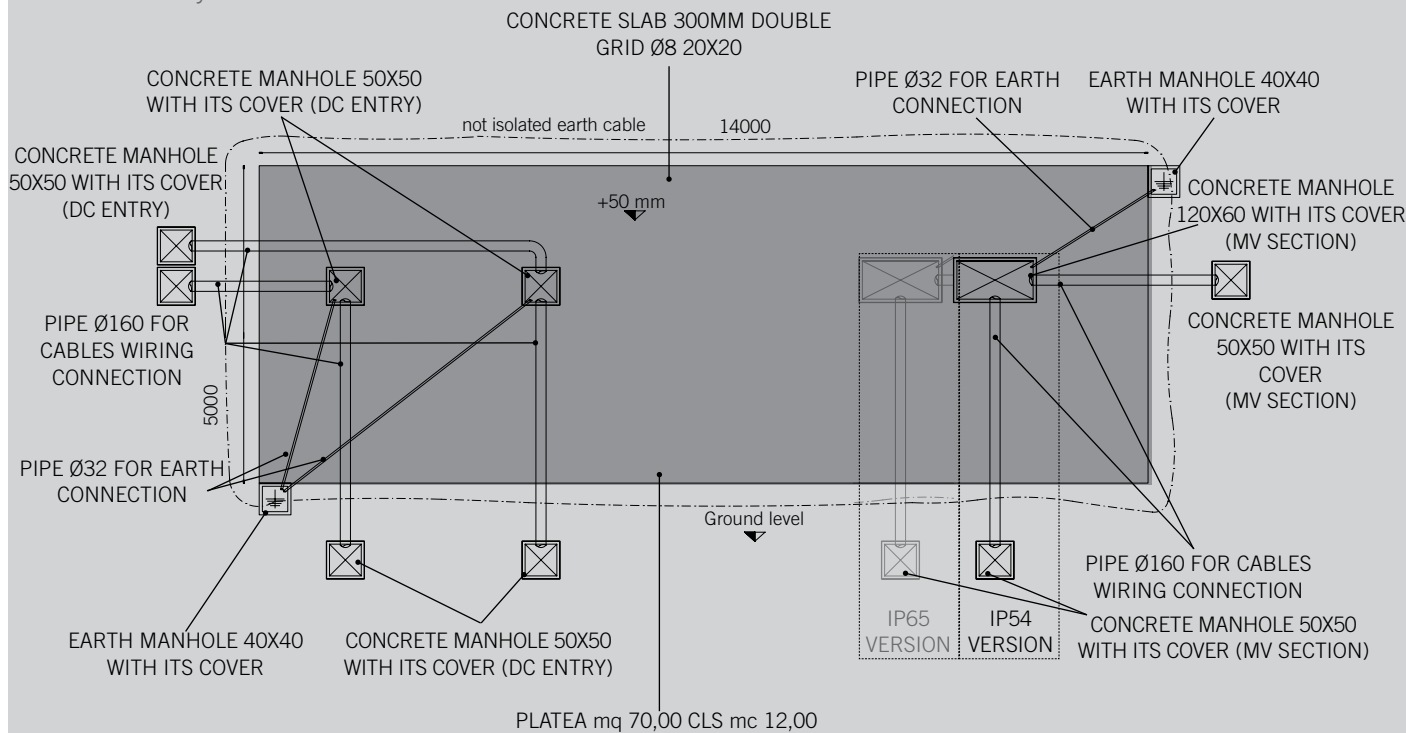


IP54

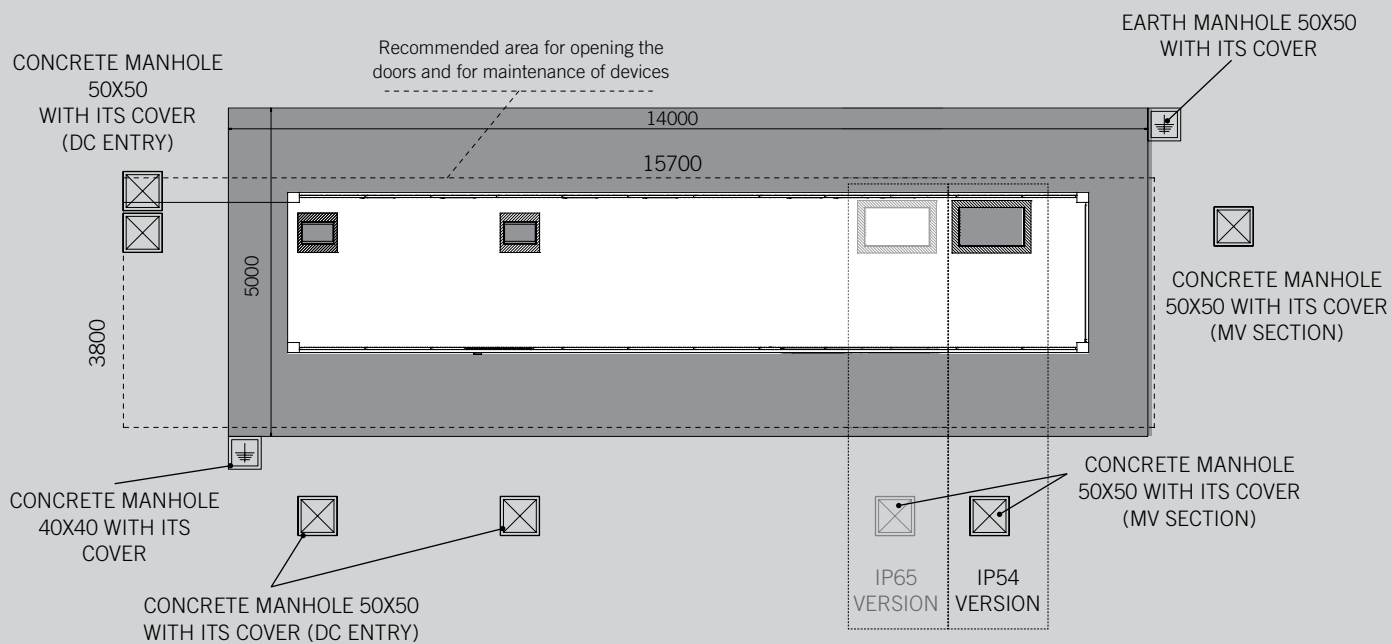


CON40 Tunnel

Manholes layout

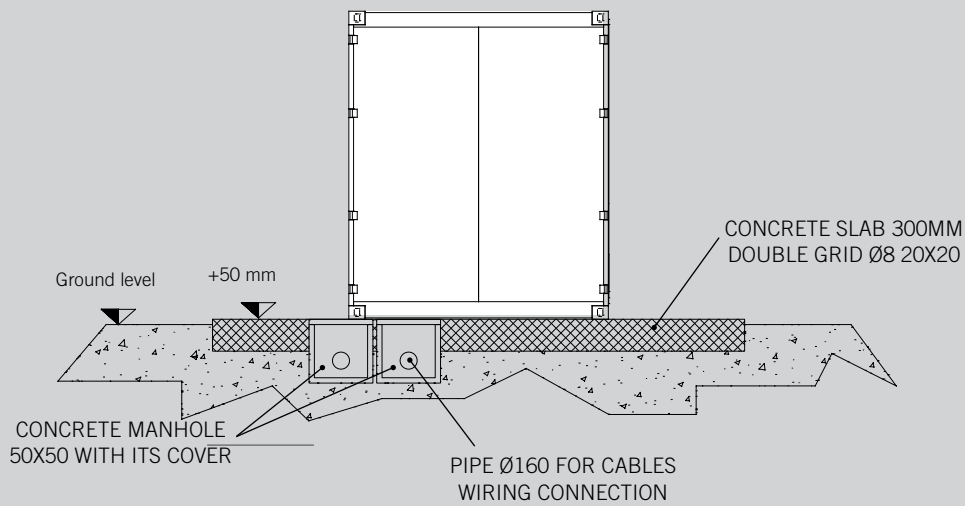


Plan view



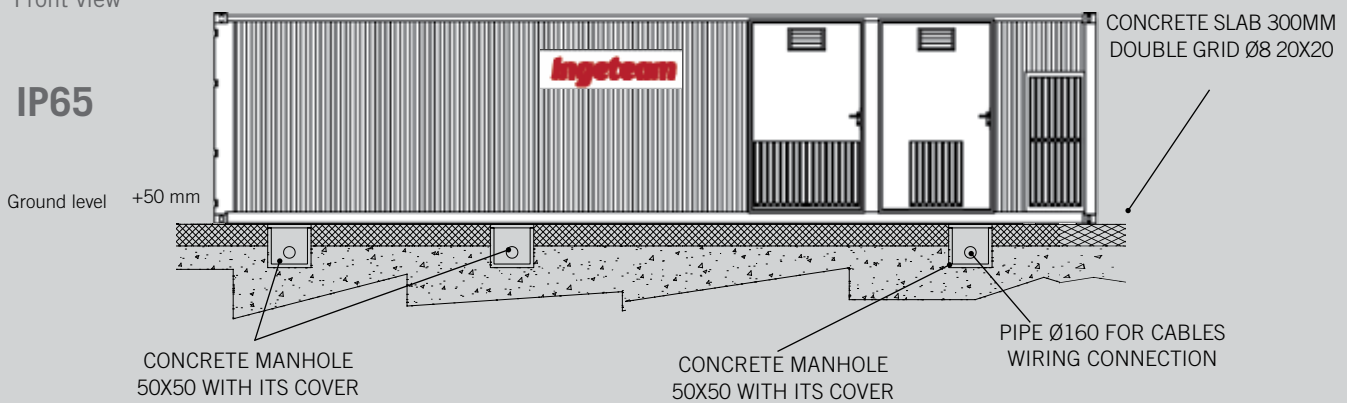
Foundation

Left side view

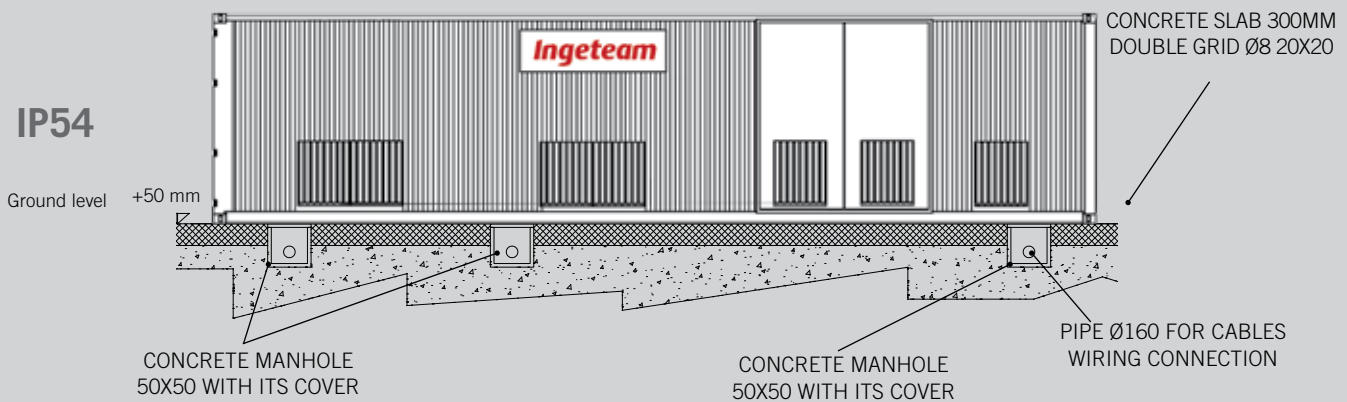


Front view

IP65



IP54





DATA SHEETS

M220 INVERTER SERIES

MULTI-MPPT CONFIGURATION

Technical Characteristics

Model	275	410	550	685	820	960	1100
Ingecon®Sun Power Max	275 M220 Indoor	410 M220 Indoor	550 M220 Indoor	275 M220 Indoor + 410 M220 Indoor	410 M220 Indoor + 410 M220 Indoor	410 M220 Indoor + 550 M220 Indoor	550 M220 Indoor + 550 M220 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	283 - 325 kWp	424 - 488 kWp	566 - 650 kWp	707 - 813 kWp	848 - 976 kWp	990 - 1138 kWp	1132 - 1300 kWp
MPPT Voltage Range	405 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	2	3	4	5	6	7	8
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	275 kW	412.5 kW	550 kW	687.5 kW	825 kW	962.5 kW	1100 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.1 %						
European Efficiency / CEC Efficiency	97.7 % / 97.3 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5 t	5.5 t	6 t				
SHE20	5.5 t	6 t	7 t	8.5 t	9 t	9.5 t	10.5 t
CON20	7 t	7.5 t	8.5 t	10 t	10.5 t	11 t	12 t
CON40	10 t	11 t	11.5 t	13 t	13.5 t	14 t	15 t

Notes:

- ⁽¹⁾ Depending on the type of installation and geographical location.
- ⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.
- ⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.
- ⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.
- ⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

M275 INVERTER SERIES MULTI-MPPT CONFIGURATION

Technical Characteristics

Model	350	520	695	870	1040	1215	1390
Ingecon®Sun Power Max	350 M275 Indoor	520 M275 Indoor	695 M275 Indoor	350 M275 Indoor + 520 M275 Indoor	520 M275 Indoor + 520 M275 Indoor	520 M275 Indoor + 695 M275 Indoor	695 M275 Indoor + 695 M275 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	345 - 410 kWp	531 - 650 kWp	709 - 819 kWp	885 - 1060 kWp	1062 - 1300 kWp	1240 - 1469 kWp	1418 - 1638 kWp
MPPT Voltage Range	445 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	2	3	4	5	6	7	8
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	346.5 kW	519.75 kW	693 kW	866.25 kW	1039.5 kW	1212.75 kW	1386 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.5 %						
European Efficiency / CEC Efficiency	98.2 % / 97.7 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5 t	5.5 t	6.5 t				
SHE20	6 t	6.5 t	7.5 t	9 t	9.5 t	10 t	11 t
CON20	7 t	7.5 t	8.5 t	10 t	10.5 t	11.5 t	12 t
CON40	10.5 t	11 t	12 t	13.5 t	14 t	14.5 t	15.5 t

Notes:

- ⁽¹⁾ Depending on the type of installation and geographical location.
⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.
⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.
⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.
⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

M300 INVERTER SERIES

MULTI-MPPT CONFIGURATION

Technical Characteristics

Model	380	570	760	950	1140	1330	1520
Ingecon®Sun Power Max	380 M300 Indoor	570 M300 Indoor	760 M300 Indoor	380 M300 Indoor + 570 M300 Indoor	570 M300 Indoor + 570 M300 Indoor	570 M300 Indoor + 760 M300 Indoor	760 M300 Indoor + 760 M300 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	386 - 447 kWp	579 - 671 kWp	772 - 894 kWp	965 - 1118 kWp	1158 - 1342 kWp	1351 - 1565 kWp	1544 - 1788 kWp
MPPT Voltage Range	456 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	2	3	4	5	6	7	8
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	378.5 kW	568 kW	757 kW	946.5 kW	1136 kW	1325 kW	1514 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.6 %						
European Efficiency / CEC Efficiency	98.3 % / 97.8 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5 t	5.5 t	6.5 t				
SHE20	6 t	6.5 t	7.5 t	9 t	9.5 t	10.5 t	11.5 t
CON20	7.5 t	7.5 t	9 t	10 t	10.5 t	12 t	12.5 t
CON40	10.5 t	11 t	12 t	13.5 t	14 t	15 t	16 t

Notes:

⁽¹⁾ Depending on the type of installation and geographical location.

⁽²⁾ Never to be exceeded. Consider the voltage increase of the "VOC" no-load voltage at low temperatures.

⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.

⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.

⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

M320 INVERTER SERIES MULTI-MPPT CONFIGURATION

Technical Characteristics

Model	400	605	800	1005	1210	1405	1600
Ingecon®Sun Power Max	400 M320 Indoor	605 M320 Indoor	800 M320 Indoor	400 M320 Indoor + 605 M320 Indoor	605 M320 Indoor + 605 M320 Indoor	605 M320 Indoor + 800 M320 Indoor	800 M320 Indoor + 800 M320 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	409 - 475 kWp	617 - 715 kWp	819 - 949 kWp	1026 - 1190 kWp	1234 - 1430 kWp	1436 - 1664 kWp	1638 - 1898 kWp
MPPT Voltage Range	468 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	2	3	4	5	6	7	8
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	401.5 kW	602 kW	803 kW	1006.5 kW	1210 kW	1408 kW	1606 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.7 %						
European Efficiency / CEC Efficiency	98.4 % / 97.7 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5,5 t	6 t	7 t				
SHE20	6 t	7 t	8 t	9.5 t	9.5 t	10.5 t	11.5 t
CON20	7.5 t	8 t	9 t	10.5 t	11 t	11.5 t	12.5 t
CON40	10.5 t	11 t	12 t	14 t	14.5 t	15 t	16 t

Notes:

- ⁽¹⁾ Depending on the type of installation and geographical location.
⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.
⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.
⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.
⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

M345 INVERTER SERIES

MULTI-MPPT CONFIGURATION

Technical Characteristics

Model	440	660	880	1100	1320	1540	1760
Ingecon®Sun Power Max	440 M345 Indoor	660 M345 Indoor	880 M345 Indoor	440 M345 Indoor + 660 M345 Indoor	660 M345 Indoor + 660 M345 Indoor	660 M345 Indoor + 880 M345 Indoor	880 M345 Indoor + 880 M345 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	448 - 520 kWp	672 - 780 kWp	896 - 1040 kWp	1120 - 1300 kWp	1344 - 1560 kWp	1568 - 1820 kWp	1792 - 2080 kWp
MPPT Voltage Range	502 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	2	3	4	5	6	7	8
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	440 kW	660 kW	880 kW	1100 kW	1320 kW	1540 kW	1760 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.8 %	98.8 %	98.8 %	98.8 %	98.8 %	98.8 %	98.8 %
European Efficiency / CEC Efficiency	98.5 % / 98 %	98.5 % / 98 %	98.5 % / 98 %	98.5 % / 98 %	98.5 % / 98 %	98.5 % / 98 %	98.5 % / 98 %
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5.5 t	6 t	7 t				
SHE20	6 t	6.5 t	7.5 t	9.5 t	10 t	10.5 t	11.5 t
CON20	7.5 t	8 t	9 t	10.5 t	11 t	12 t	13 t
CON40	10.5 t	11 t	12 t	14 t	14.5 t	15.5 t	16 t

Notes:

- ⁽¹⁾ Depending on the type of installation and geographical location.
- ⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.
- ⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.
- ⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.
- ⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

M360 INVERTER SERIES MULTI-MPPT CONFIGURATION

Technical Characteristics

Model	460	690	920	1150	1380	1610	1840
Ingecon®Sun Power Max	460 M360 Indoor	690 M360 Indoor	920 M360 Indoor	460 M360 Indoor + 690 M360 Indoor	690 M360 Indoor + 690 M360 Indoor	690 M360 Indoor + 920 M360 Indoor	920 M360 Indoor + 920 M360 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	466 - 546 kWp	700 - 819 kWp	933 - 1092 kWp	1166 - 1365 kWp	1400 - 1638 kWp	1633 - 1911 kWp	1866 - 2184 kWp
MPPT Voltage Range	524 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	2	3	4	5	6	7	8
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	458 kW	688 kW	917 kW	1146 kW	1376 kW	1605 kW	1834 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Phom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.8 %						
European Efficiency / CEC Efficiency	98.6 % / 98.1 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5,5 t	6 t	7 t				
SHE20	6 t	6.5 t	7.5 t	9.5 t	10 t	10.5 t	11.5 t
CON20	7.5 t	8 t	9 t	10.5 t	11 t	12 t	13 t
CON40	10,5 t	11t	12 t	14 t	14.5 t	15.5 t	16 t

Notes:

- ⁽¹⁾ Depending on the type of installation and geographical location.
- ⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.
- ⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.
- ⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.
- ⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

M400 INVERTER SERIES

MULTI-MPPT CONFIGURATION

Technical Characteristics

Model	500	750	1000	1250	1500	1750	2000
Ingecon®Sun Power Max	500 M400 Indoor	750 M400 Indoor	1000 M400 Indoor	500 M400 Indoor + 750 M400 Indoor	750 M400 Indoor + 750 M400 Indoor	750 M400 Indoor + 1000 M400 Indoor	1000 M400 Indoor + 1000 M400 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	518 - 607 kWp	777 - 940 kWp	1036 - 1213 kWp	1295 - 1517 kWp	1554 - 1820 kWp	1813 - 2123 kWp	2072 - 2426 kWp
MPPT Voltage Range	502 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	2	3	4	5	6	7	8
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	510 kW	765 kW	1019 kW	1275 kW	1530 kW	1784 kW	2038 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.8 %						
European Efficiency / CEC Efficiency	98,6 % - 98,1 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5.5 t	6 t	7 t				
SHE20	6 t	6.5 t	7.5 t	9.5 t	10 t	10.5 t	12 t
CON20	7.5 t	8 t	9 t	10.5 t	11 t	12 t	13 t
CON40	10.5 t	11 t	12 t	14 t	14.5 t	15.5 t	16.5 t

Notes:

- ⁽¹⁾ Depending on the type of installation and geographical location.
- ⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.
- ⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.
- ⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.
- ⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

X220 INVERTER SERIES MASTER/SLAVE CONFIGURATION

Technical Characteristics

Model	275	410	550	685	820	960	1100
Ingecon®Sun Power Max	275 M220 Indoor	410 M220 Indoor	550 M220 Indoor	275 M220 Indoor + 410 M220 Indoor	410 M220 Indoor + 410 M220 Indoor	410 M220 Indoor + 550 M220 Indoor	550 M220 Indoor + 550 M220 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	283 - 325 kWp	424 - 488 kWp	566 - 650 kWp	707 - 813 kWp	848 - 976 kWp	990 - 1138 kWp	1132 - 1300 kWp
MPPT Voltage Range	405 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	1	1	1	2	2	2	2
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	275 kW	412.5 kW	550 kW	687.5 kW	825 kW	962.5 kW	1100 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.1 %						
European Efficiency / CEC Efficiency	97.9 % / 97.4 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5 t	5.5 t	6.5 t				
SHE20	5.5 t	6t	7 t	8.5 t	9 t	9.5 t	10.5 t
CON20	7 t	7.5 t	8.5 t	9.5 t	10 t	10.5 t	11.5 t
CON40	10 t	10.5 t	11.5 t	13 t	13.5 t	14 t	15 t

Notes:

⁽¹⁾ Depending on the type of installation and geographical location.

⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.

⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.

⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.

⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

X275 INVERTER SERIES MASTER/SLAVE CONFIGURATION

Technical Characteristics

Model	350	520	695	870	1040	1215	1390
Ingecon®Sun Power Max	350 M275 Indoor	520 M275 Indoor	695 M275 Indoor	350 M275 Indoor + 520 M275 Indoor	520 M275 Indoor + 520 M275 Indoor	520 M275 Indoor + 695 M275 Indoor	695 M275 Indoor + 695 M275 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	345 - 410 kWp	531 - 650 kWp	709 - 819 kWp	885 - 1060 kWp	1062 - 1300 kWp	1240 - 1469 kWp	1418 - 1638 kWp
MPPT Voltage Range	445 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	1	1	1	2	2	2	2
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	346.5 kW	519.75 kW	693 kW	866.25 kW	1039.5 kW	1212.75 kW	1386 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.5 %						
European Efficiency / CEC Efficiency	98.3 % / 97.8 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5 t	5.5 t	6.5 t				
SHE20	6 t	6.5 t	7.5 t	9 t	9 t	10 t	11 t
CON20	7 t	7.5 t	8.5 t	10 t	10.5 t	11.5 t	12 t
CON40	10 t	11 t	12 t	13.5 t	14 t	14.5 t	15.5 t

Notes:

⁽¹⁾ Depending on the type of installation and geographical location.

⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.

⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.

⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.

⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

X300 INVERTER SERIES MASTER/SLAVE CONFIGURATION

Technical Characteristics

Model	380	570	760	950	1140	1330	1520
Ingecon®Sun Power Max	380 M300 Indoor	570 M300 Indoor	760 M300 Indoor	380 M300 Indoor + 570 M300 Indoor	570 M300 Indoor + 570 M300 Indoor	570 M300 Indoor + 760 M300 Indoor	760 M300 Indoor + 760 M300 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	386 - 447 kWp	579 - 671 kWp	772 - 894 kWp	965 - 1118 kWp	1158 - 1342 kWp	1351 - 1565 kWp	1544 - 1788 kWp
MPPT Voltage Range	456 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	1	1	1	2	2	2	2
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	378.5 kW	568 kW	757 kW	946.5 kW	1136 kW	1325 kW	1514 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.6 %						
European Efficiency / CEC Efficiency	98.4 % / 97.9 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5.5 t	5.5 t	6.5 t				
SHE20	6 t	6.5 t	7.5 t	9 t	9.5 t	10.5 t	11.5 t
CON20	7.5 t	7.5 t	8.5 t	10 t	10.5 t	11.5 t	12.5 t
CON40	10.5 t	11 t	12 t	13.5 t	14 t	15 t	16 t

Notes:

⁽¹⁾ Depending on the type of installation and geographical location.

⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.

⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.

⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.

⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

X320 INVERTER SERIES MASTER/SLAVE CONFIGURATION

Technical Characteristics

Model	400	605	800	1005	1210	1405	1600
Ingecon®Sun Power Max	400 M320 Indoor	605 M320 Indoor	800 M320 Indoor	400 M320 Indoor + 605 M320 Indoor	605 M320 Indoor + 605 M320 Indoor	605 M320 Indoor + 800 M320 Indoor	800 M320 Indoor + 800 M320 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	409 - 475 kWp	617 - 715 kWp	819 - 949 kWp	1026 - 1190 kWp	1234 - 1430 kWp	1436 - 1664 kWp	1638 - 1898 kWp
MPPT Voltage Range	468 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	1	1	1	2	2	2	2
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	401.5 kW	602 kW	803 kW	1006.5 kW	1210 kW	1408 kW	1606 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.7 %						
European Efficiency / CEC Efficiency	98,5 % - 97,9 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5.5 t	5.5 t	6.5 t				
SHE20	6 t	6.5 t	7.5 t	9.5 t	9.5 t	10.5 t	11.5 t
CON20	7.5 t	8 t	9 t	10.5 t	11 t	11.5 t	12.5 t
CON40	10.5 t	11 t	12 t	14 t	14.5 t	15 t	16 t

Notes:

⁽¹⁾ Depending on the type of installation and geographical location.

⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.

⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.

⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.

⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

X345 INVERTER SERIES MASTER/SLAVE CONFIGURATION

Technical Characteristics

Model	440	660	880	1100	1320	1540	1760
Ingecon®Sun Power Max	440 M345 Indoor	660 M345 Indoor	880 M345 Indoor	440 M345 Indoor + 660 M345 Indoor	660 M345 Indoor + 660 M345 Indoor	660 M345 Indoor + 880 M345 Indoor	880 M345 Indoor + 880 M345 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	448 - 520 kWp	672 - 780 kWp	896 - 1040 kWp	1120 - 1300 kWp	1344 - 1560 kWp	1568 - 1820 kWp	1792 - 2080 kWp
MPPT Voltage Range	502 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	1	1	1	2	2	2	2
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	440 kW	660 kW	880 kW	1100 kW	1320 kW	1540 kW	1760 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.8 %						
European Efficiency / CEC Efficiency	98.6 % / 98 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5.5 t	5.5 t	6.5 t				
SHE20	6 t	6.5 t	7.5 t	9.5 t	10 t	10.5 t	11.5 t
CON20	7.5 t	8 t	9 t	10.5 t	11 t	12 t	13 t
CON40	10.5 t	11 t	12 t	14 t	14.5 t	15.5 t	16 t

Notes:

⁽¹⁾ Depending on the type of installation and geographical location.

⁽²⁾ Never to be exceeded. Consider the voltage increase of the 'VOC' no-load voltage at low temperatures.

⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.

⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.

⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).

X360 INVERTER SERIES MASTER/SLAVE CONFIGURATION

Technical Characteristics

Model	460	690	920	1150	1380	1610	1840
Ingecon®Sun Power Max	460 M360 Indoor	690 M360 Indoor	920 M360 Indoor	460 M360 Indoor + 690 M360 Indoor	690 M360 Indoor + 690 M360 Indoor	690 M360 Indoor + 920 M360 Indoor	920 M360 Indoor + 920 M360 Indoor
Input (DC)							
Recommended PV Array Power Range ⁽¹⁾	466 - 546 kWp	700 - 819 kWp	933 - 1092 kWp	1166 - 1365 kWp	1400 - 1638 kWp	1633 - 1911 kWp	1866 - 2184 kWp
MPPT Voltage Range	524 - 820 V						
Max DC Voltage ⁽²⁾	1000 V						
Max DC Current	800 A	1200 A	1600 A	2000 A	2400 A	2800 A	3200 A
DC Inputs	8	12	16	20	24	28	32
DC Connection Type	From below by means of telescopic trapdoors, connection on bars through D40 cable glands (max cable diameter 40 mm)						
Number of Power Modules	2	3	4	5	6	7	8
Number of MPPT	2	3	4	5	6	7	8
Input Protections (Inverter)							
Overvoltage protection	DC Class II surge arresters with removable cartridge						
DC switch	DC load circuit breaker with door control (for each independent module)						
Other protections	DC fuses, DC contactor for PV array disconnection (for each independent module), DC insulation monitor, emergency pushbutton						
Output (AC)							
Rated AC Power ⁽³⁾	458 kW	688 kW	917 kW	1146 kW	1376 kW	1605 kW	1834 kW
Max AC Current (Low Voltage)	736 A	1104 A	1472 A	1840 A	2208 A	2576 A	2944 A
Rated AC Voltage	3 x 3 ... 36 kV IT						
AC Frequency	50 / 60 Hz						
Cos Phi ⁽⁴⁾	1						
Adjustable Cos Phi	± 0.9 a Pnom						
THD (Total Harmonic Distortion) ⁽⁴⁾	< 3%						
AC Connection Type	From below by means of telescopic trapdoor						
Output Protections (Inverter)							
Overvoltage protection	AC Class II surge arresters with removable cartridge						
AC switch	AC thermal magnetic breaker (for each independent module, not available in NAC models)						
Anti-islanding protection	Yes, with automatic disconnection						
Other protections	AC output short-circuit and overvoltage protections						
Operating Performance (Inverter)							
Max Efficiency	98.8 %						
European Efficiency / CEC Efficiency	98.7 % / 98.1 %						
Power Consumption in Stand-by Mode ⁽⁵⁾	60 W	90 W	120 W	150 W	180 W	210 W	240 W
Night-time Consumption	< 5 W	< 5 W	< 5 W	< 10 W	< 10 W	< 10 W	< 10 W
Total Weight							
SHE15	5.5 t	5.5 t	6.5 t				
SHE20	6 t	6.5 t	7.5 t	9.5 t	10 t	10.5 t	11.5 t
CON20	7.5 t	8 t	9 t	10.5 t	11 t	12 t	12.8 t
CON40	10.5 t	11.5 t	12.5 t	14 t	14.5 t	15.5 t	16.5 t

Notes:

⁽¹⁾ Depending on the type of installation and geographical location.

⁽²⁾ Never to be exceeded. Consider the voltage increase of the "VOC" no-load voltage at low temperatures.

⁽³⁾ The rated AC power is guaranteed at the ambient temperature pointed in the technical specs.

⁽⁴⁾ For Pout > 25% of the rated power and voltage according to IEC 61000-3-4.

⁽⁵⁾ Power consumption from PV array (not including LV/MV transformer no-load losses).





Accessories



INGECON SUN Power Station

Remote control and monitoring optionals

INGEPAC PL70FV Relay PI

This Kit is composed by all the devices necessary for voltage and frequency grid protection according with CEI016 standard.

Ingepac@PL70FV relay provide RS 485 Modbus RTU, Ethernet interface with protocol IEC 61850 GOOSE and automatic reclosing function.



INGECON SUN Fiscal meter Kit

The **fiscal meter kit** is composed by a fiscal meter and its voltage and current transformer.

It allows to record the energy produced from the PV plant. It could be provided with RS485 communication and modem GSM for remote monitoring. It is also available for double or more measuring system, depending on the plant's features.



INGESYS GW Gateway

Ingesys@Gateway solutions offer both data concentrator and protocol converter features as well as advanced features to perform logical simple operation using the collected data.

Ingesys@Gateway can be easily configured through its user-friendly configuration tool.

This tool offers a wide range of features to facilitate the definition of the protocol models and profiles, together with online monitoring option to optimize commissioning and maintenance tasks.



INGESYS IT 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, fiber optics, radio, microwaves and satellite**).



Remote control and monitoring optionals

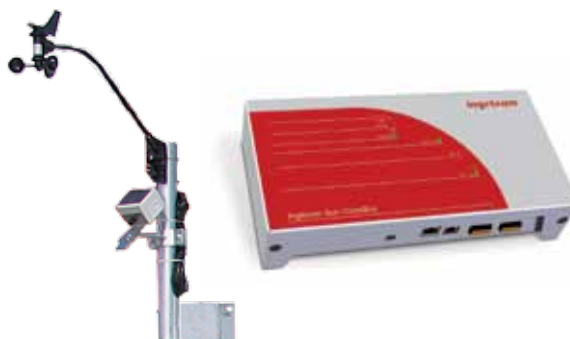
INGECON SUN String Control

The **Ingecon@Sun String Control** is a device for measuring each PV array string current and detecting defective string currents. String currents can be monitored by means of **RS485, GSM/GPRS, Ethernet or Wireless** communication boards. It is easy to mount and suitable for outdoor installations thanks to its **IP65 protection class**.



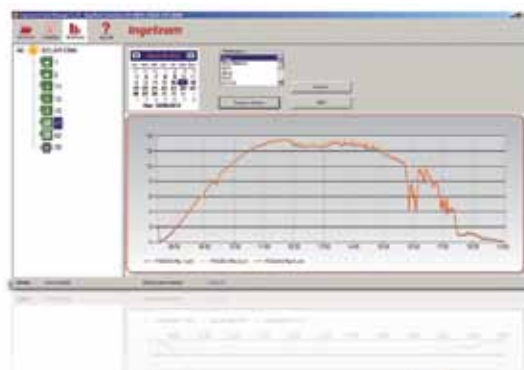
INGECON SUN ComBox

The **Ingecon@Sun ComBox** allows remote communication with the inverters in a number of standards, thanks to its versatility to jointly process data coming from **Ethernet, RS485, GSM/GPRS, wireless or Bluetooth** networks. The **Ingecon@Sun ComBox** includes analogue input data storage and re-ading functions for the measurement of **meteorological variables**.



INGECON SUN Manager

The **Ingecon@Sun Manager** is a PC software operating in a Windows® graphical environment allowing **PV plants management and monitoring**. It allows the integration of three phase inverters installed inside the power station with string control devices in a single plant and multiple PV plants management from a single PC. Communication can be realized by means of **RS485, GSM/GPRS and Ethernet** communication boards.



INGECON SUN Monitor

The **Ingecon@SUN Monitor** web portal <http://www.ingeconsunmonitor.com> provides access to a PV plant equipped with Ethernet or GPRS connection from any PC with an Internet connection. Its ease of access facilitates owner, installer or promoter plant control. This software provides information about the PV plant status and production, either in list and graphic format or through an e-mailed production report. The data recording and storage are made throughout the entire inverter service life.



BT-POWER Low Voltage Parallel Switchgear



The **BT-POWER** low voltage parallel switchgear allows connecting the inverters of the **Ingecon@Sun** Power Station to the LV/MV step-up transformer.

Upon request, it can be supplied with voltage transformers and current transformers for fiscal energy metering. Moreover, it can also be equipped with a circuit breaker operating as an interface device, if a LV interface protection is required, or with a manual disconnecter.

Standard functions:

- Automatic circuit breaker for each inverter (800 to 1600A)
 - Current-operated release coil (for backup function)

Functions available upon request:

- Manual switch disconnecter
- General motorized circuit breaker from 1600 A to 3200 A
 - Current-operated release coil (for backup function)
 - Minimum voltage coil (as interface protection device)
 - RS485 communication system for the motorized switch
 - Measurement module on motorized switch
 - Voltage transformer (VT) and current transformer (CT) for fiscal energy metering

BT-POWER Low Voltage Parallel Switchgear

LEGEND
OPTIONAL

INCOMING
INVERTER 1

INCOMING
INVERTER 2

MAIN PARALLEL
CIRCUIT BREAKER

FREQUENCY/VOLTAGE
RELAY PROTECTION

24 VDC

OUTGOING
TRASFORMER LV/MV

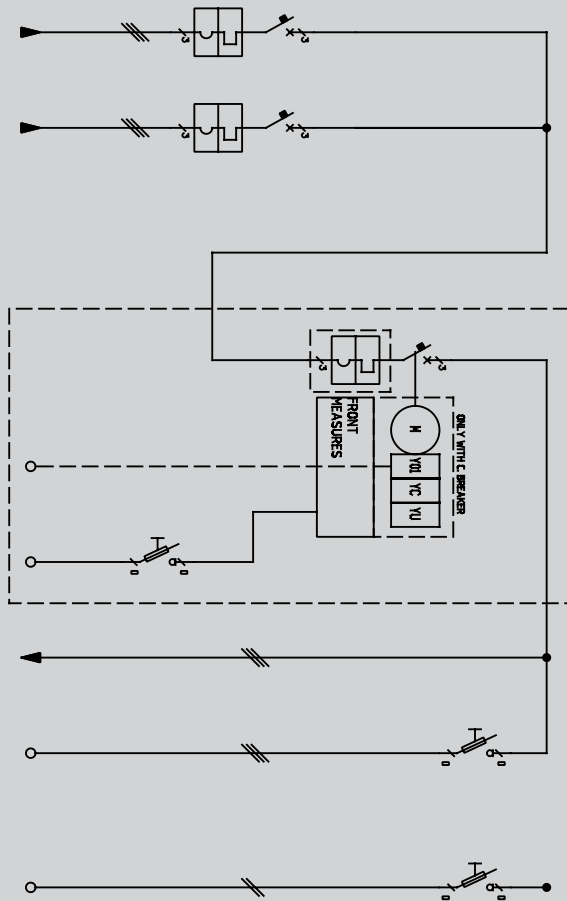
OUTGOING
LV/LV AUXILIARY TRANSFORMAER

PRIVILEGED
POWER SUPPLY

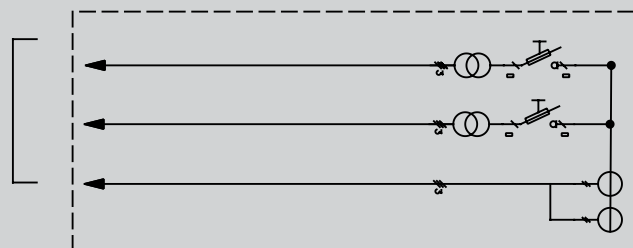
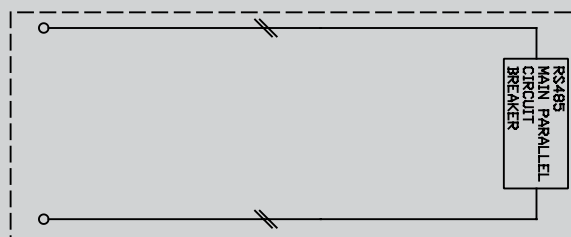
RS 485
MOD BUS INCOMING

RS 485
MOD BUS OUTGOING

OUTGOING AMPEROMETRIC
AND VOLTMETRIC MEASURE
TO LV AUX CUBICLE
FOR FISCAL MEASUREMENTS
(DOUBLE MEASUREMENTS
FOR TRANSFORMER WITH TWO SECONDARY)



EXAMPLE LOW VOLTAGE POWER CUBICLE 2 INPUT



BT-AUX BASE Auxiliary Services Switchgear



The **BT-AUX BASE** auxiliary services switchgear is an added value for the **Ingecon@Sun** PowerStation since it makes it unnecessary to implement any further wiring for the operation and monitoring of the additional equipment. Besides the wide range of standard functions, other options can be requested when ordering the product.

Standard functions:

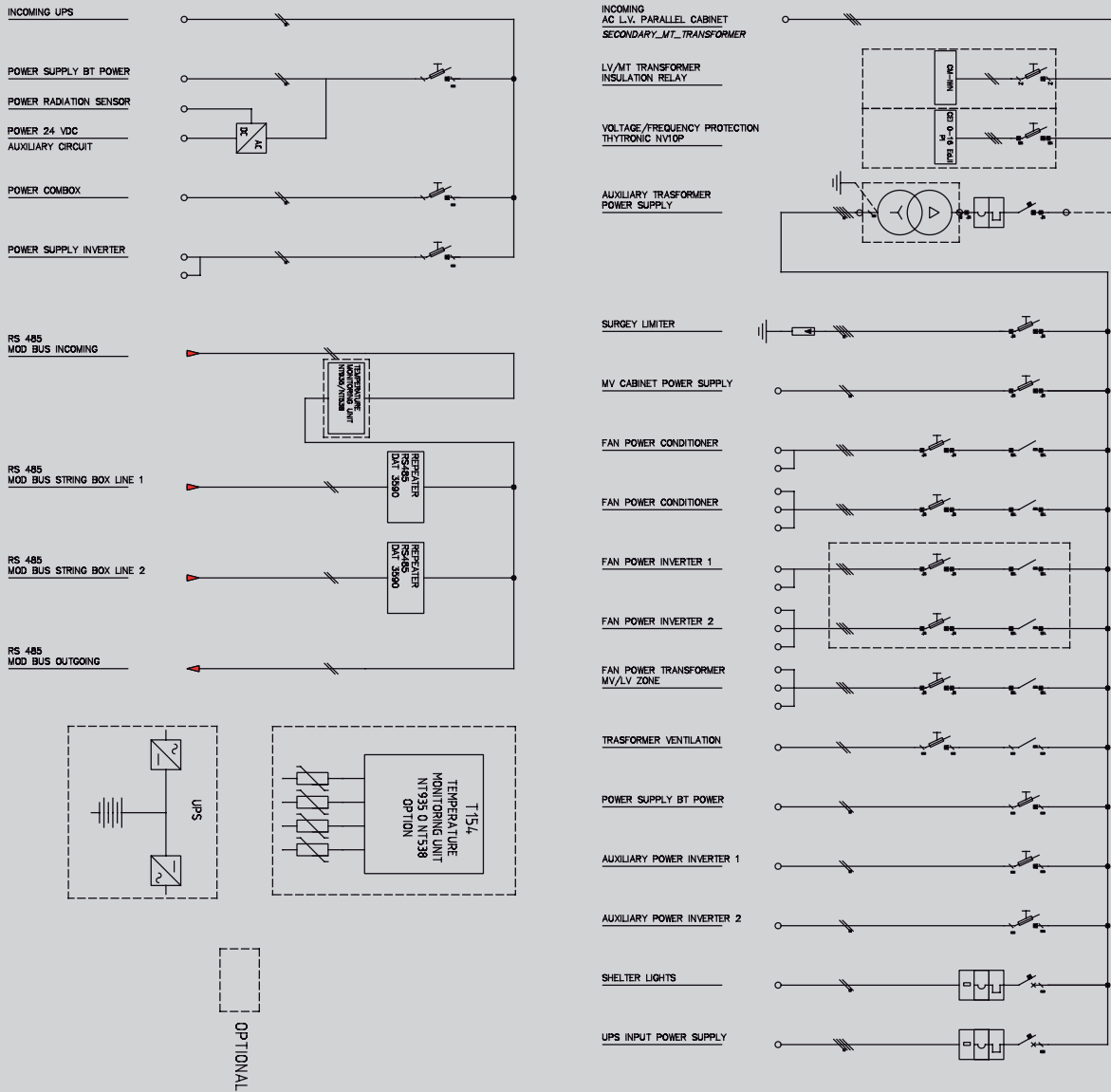
- General circuit breaker on the power supply of the BT-AUX BASE switchgear.
- Class II surge arresters with removable cartridge.
- AC/DC 24V power supply for the auxiliary circuits of the instruments and monitoring devices.
- Fuses and contactors on the power supply of the Ingecon@Sun Power Station ventilation system, which is automatically powered only under specific thermal conditions.
- Fuses on the power supply of the BT POWER switchgear auxiliary services.
- Fuses on the power supply of the Inverter auxiliary services.
- Fuses on the power supply of the MV switchgear auxiliary services.
- Residual current device on the power supply of the internal lighting system and power outlets.
- Fuses on the UPS power supply (UPS excluded)
 - Fuses on the power supply of the BT-POWER privileged circuits;

- Fuses on the power supply of the Ingecon@Sun Combox and monitoring system;
- Fuses on the power supply of the privileged circuits of the Inverters;
- RS485 Modbus RTU network with DAT3590 signal amplifier (x2 DAT3590 for Ingecon@Sun Power Station with number of Power Blocks ≥ 5)
- Ready for the implementation of a NT154 or NT935 thermometric control unit (NT538 in case of transformers with double secondary winding) for the protection of the MV transformer, including:
 - MV line disconnection in case of overheating;
 - Alarm contact wired to the terminal board;
 - RS485 Modbus RTU serial communication.
- Ready for the implementation of a 1000Vdc insulation detector on the secondary winding of the MV transformer (x2 for transformers with double secondary winding):
 - Light indicator on the front of the boards;
 - Alarm contact wired to the terminal board.

Functions available upon request:

- NT154 or NT935 thermometric control unit (NT538 in case of transformers with double secondary winding).
- LV/LV transformer for the powering of the auxiliary switchgear BT-AUX BASE.
- 1000 Vdc insulation detector on the secondary winding of the MV transformer (x2 for transformers with double secondary winding).
- UPS for auxiliary services.

BT-AUX BASE Auxiliary Services Switchgear



BT-AUX FULL Auxiliary Services Switchgear



The **BT-AUX FULL** auxiliary services switchgear is an added value for the **Ingecon@Sun Power Station** since it makes it unnecessary to implement any further wiring for the operation and monitoring of the additional equipment. Besides the wide range of standard functions, other options can be requested when ordering the product.

Standard functions:

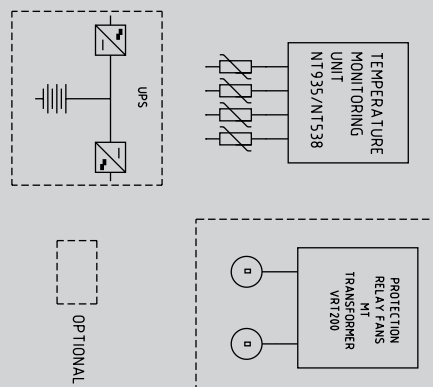
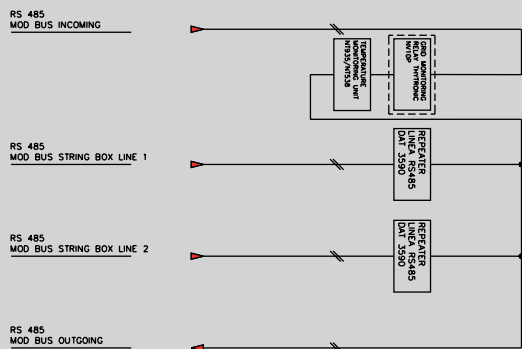
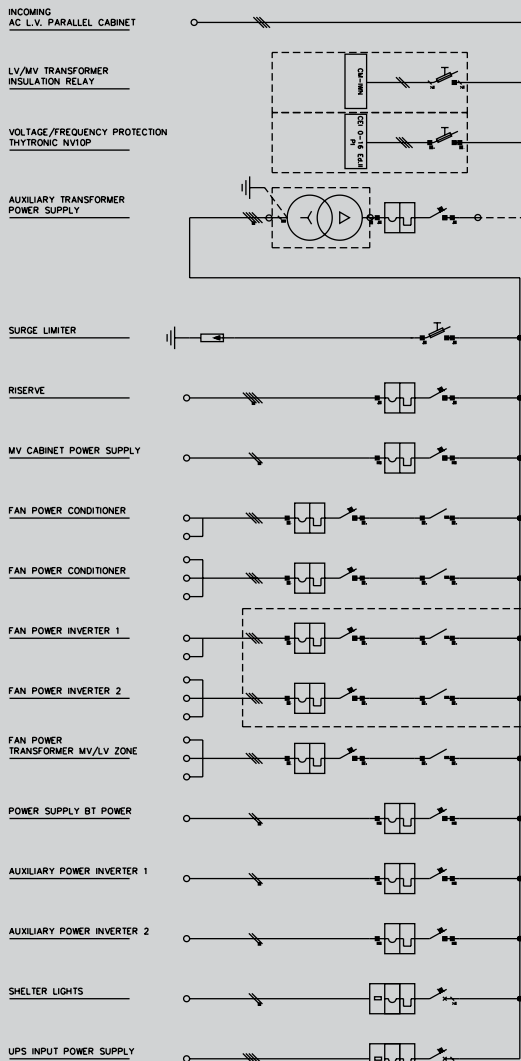
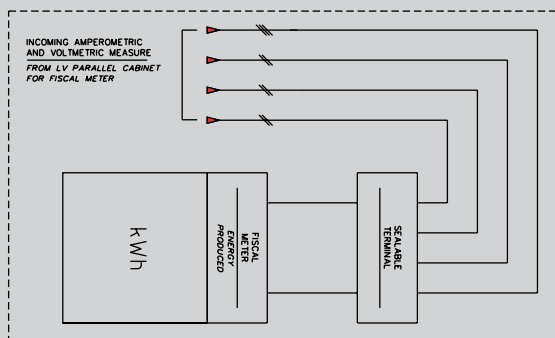
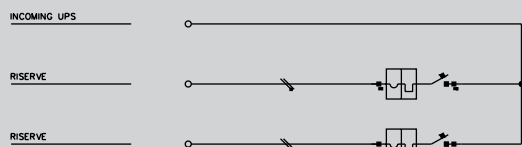
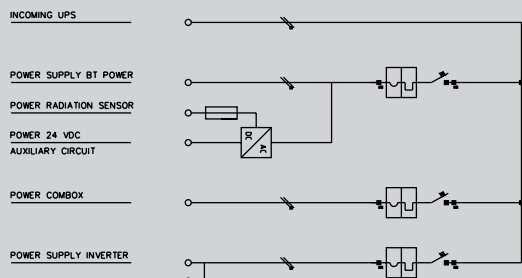
- General circuit breaker on the power supply of the BT-AUX FULL switchgear.
- Class II surge arresters with removable cartridge.
- AC/DC 24V power supply for the aux circuits of the instruments and monitoring devices.
- Circuit breakers and contactors on the power supply of the Ingecon@Sun Power Station cooling system, which is automatically powered only under specific thermal conditions.
- Circuit breaker on the power supply of the BT-POWER switchgear auxiliary services.
- Circuit breakers on the power supply of the Inverter auxiliary services.
- Circuit breaker on the power supply of the MV switchgear auxiliary services.
- Three-phase backup circuit breaker.
- Residual current device on the power supply of the internal lighting system and power outlets.
- Three-phase residual current device on the UPS power supply (UPS excluded);
 - Circuit breaker on the power supply to the BT-POWER privileged circuits;
 - Circuit breaker on the power supply of the Ingecon@Sun Combox and monitoring system;
 - Circuit breaker on the power supply of the Inverters privileged circuits;
 - x2 single-phase backup circuit breakers
- RS485 Modbus RTU network with DAT3590 signal amplifier (x2 DAT3590 for Ingecon@Sun Power Station with number of Power Blocks \geq 5)

- Ready for the implementation of a NT935 thermometric control unit (NT538 in case of transformers with double secondary winding) for the protection of the MV transformer, including:
 - MV line disconnection in case of overheating;
 - Alarm contact wired to the terminal board;
 - RS485 Modbus RTU serial communication.
- Ready for the implementation of a VRT200 control unit managing the cooling fans of the MV transformer, including:
 - Fans fault detection;
 - alarm contact wired to the terminal board.
- Ready for the implementation of a 1000Vdc insulation detector on the secondary winding of the MV transformer (x2 for transf. with double sec.winding):
 - Light indicator on the front of the boards;
 - alarm contact wired to the terminal board.
- Ready for the implementation of an interface relay for CEI 0-16 function:
 - x1 RS485 Modbus RTU interface;
 - x1 Ethernet interface - IEC 61850 protocol;
 - Automatic reset system.

Functions available upon request:

- NT935 thermometric control unit (NT538 in case of transformers with double secondary winding).
- VRT200 control unit for the control of the cooling fans of the MV transformer.
- LV/LV transformer for the powering of the auxiliary switchgear BT-AUX FULL.
- 1000 Vdc insulation detector on the secondary winding of the MV transformer (x2 for transformers with double secondary winding).
- UPS for auxiliary services.
- Energy fiscal meter with GSM system for remote monitoring (x2 for transformers with double secondary winding).
- Energy fiscal meter for the auxiliary services with GSM system for the remote monitoring, with voltage and current measurement transformers.
- RS485 Modbus RTU communication module for energy fiscal metering.
- Interface relay for CEI 0-16 function, with open delta voltage measurement on MV side, via voltage transformer or sensors.

BT-AUX FULL Auxiliary Services Switchgear



Medium Voltage Transformer Cast resin

Ingeteam provides highly performing LV/MV three phase dry type transformers, with epoxy resin vacuum cast windings. Power ratings are available up to 2 MVA, with voltage ratings (MV side) from 10 up to 24 kVA (up to 36 kVA on the Ingecon@Sun Power Station CON40).

The transformers are F1-C2-E2 classified as per the CEI EN 60076-11 standard, offering the following benefits:

- Self-extinguishing, with low smoke emission (F1);
- Resistance to climatic variations (C2);
- Resistance to humidity and atmospheric pollution (E2);
- Reduced maintenance needs;
- Flexibility: no foundations required, easy handling.

The voltage value at the secondary winding (LV side) is compatible with the inverter output voltage: 220 V, 275 V, 300 V, 320 V, 345 V, 360 V, 400V; Double windings transformers available.

Standard functions:

- Standard losses;
- Electrostatic shield reducing disturbances, distortions and overvoltages.



Functions available upon request:

- Reduced losses; CEI-EN50541-1
- Forced ventilation;
- Copper windings.

Medium Voltage Transformer					
Category		Cast-resin transformer			
Rated frequency		50 / 60Hz			
Primary voltage regulator		± 2 x 2.5 %			
Insulation class	Primary winding	12 kV: 12 / 28 / 75 kV	17,5 kV: 17,5 / 38 / 95 kV	24 kV: 24 / 50 / 125 kV	36 kV ⁽¹⁾ : 36 / 70 / 170kV
	Secondary winding	1.1/3 kV			
Primary / secondary conductive material		Aluminium / Aluminium (Copper optional)			
Primary / secondary winding protection		Cast resin / Resin impregnated			
Vector group		Dyn11			
Primary connection		Delta			
Secondary connection		Star + Neutral			
Environmental, climatic and fire classes		E2 / C2 / F1 (CESI certification as per the new standard IEC 60076-11 year 2004)			
Thermal class		F / F			
Max overtemperature for primary / secondary windings		100 / 100 K			
Installation		Indoor			
Cooling type		Natural air			
Cooling system (optional)		Forced ventilation			
Altitude above sea level⁽²⁾		≤ 1000 m			
Short-circuit impedance at 75°C		6% (24kV)			
Partial discharge level		≤ 10 pC			
General features		x3 terminal boards for primary voltage adjustment (5 positions), x4 LV connection plates, x2 earthing terminal boards, x2 lifting lugs, x4 rotating wheels, x1 connection box, x3 PT100 temperature probes, electrostatic shield.			

Notes: ⁽¹⁾ CON40 models only. - ⁽²⁾ For Higher altitudes, please contact Ingeteam.

24 kV CLASS

Single winding

Cast resin standard losses

RS

Electrical specifications											
Power	kVA	315	400	500	630	800	1000	1250	1600	1800	2000
No-load loss	W	980	1200	1350	1650	1850	2300	2650	3100	3300	3600
Load loss (75°C)	W	3750	4800	5950	6800	8200	9600	10900	13950	15650	16500
Impedance Voltage (75°C)	%	6	6	6	6	6	6	6	6	6	6
No-load current (75°C)	%	1.4	1.3	1.2	1.2	1.1	1	1	0.9	0.9	0.9
Sound level LwA	dB(A)	67	68	68	70	72	73	74	76	76	80
Sound level LpA	dB(A)	55	56	56	57	58	59	60	62	63	64

Cast resin reduced losses

RR

Electrical specifications											
Power	kVA				630	800	1000	1250	1600	1800	2000
No-load loss	W				1100	1300	1550	1800	2200	2400	2600
Load loss (75°C)	W				6200	7000	7850	9600	11350	12650	13950
Impedance Voltage (75°C)	%				6	6	6	6	6	6	6
No-load current (75°C)	%				1.2	1.1	1	1	1	0.9	0.9
Sound level LwA	dB(A)				62	64	65	67	68	69	70
Sound level LpA	dB(A)				49	50	51	52	53	54	55

Double winding

Cast resin standard losses

RS

Electrical specifications											
Power	kVA	315	400	500	630	800	1000	1250	1600	1800	2000
No-load loss	W	900	1200	1350	1650	2000	2300	2800	3100	3600	4000
Load loss (75°C)	W	4500	4800	5700	6600	8200	9600	11300	13900	15300	15700
Impedance Voltage (75°C)	%	6	6	6	6	6	6	6	6	6	6
No-load current (75°C)	%	1.4	1.3	1.2	1.2	1.1	1	1	0.9	0.9	0.9
Sound level LwA	dB(A)	67	68	69	70	72	73	75	76	77	78
Sound level LpA	dB(A)	55	56	56	57	58	59	60	62	62	63

Cast resin reduced losses

RR

Electrical specifications											
Power	kVA				630	800	1000	1250	1600	1800	2000
No-load loss	W				1100	1300	1550	1800	2200	2400	2600
Load loss (75°C)	W				6200	7000	7800	9600	11300	12600	13900
Impedance Voltage (75°C)	%				6	6	6	6	6	6	6
No-load current (75°C)	%				1.2	1.1	1	1	0.9	0.9	0.9
Sound level LwA	dB(A)				62	64	65	67	68	69	70
Sound level LpA	dB(A)				51	52	52	54	54	55	56

36 kV CLASS

Single winding

Cast resin standard losses

RS

Electrical specifications											
Power	kVA	315	400	500	630	800	1000	1250	1600	1800	2000
No-load loss	W	1450	1750	2000	2200	2600	3000	3250	3800	4200	4500
Load loss (75°C)	W	4350	5250	5650	6950	7850	9150	11350	15250	16300	17400
Impedance Voltage (75°C)	%	6	6	6	6	6	7	8	8	8	8
No-load current (75°C)	%	1.8	1.6	1.5	1.4	1.2	1	0.9	0.8	0.8	0.8
Sound level LwA	dB(A)	70	70	72	73	74	75	76	80	80	81
Sound level LpA	dB(A)	57	57	58	59	60	61	62	64	65	67

Cast resin reduced losses

RR

Electrical specifications											
Power	kVA	315	400	500	630	800	1000	1250	1600	1800	2000
No-load loss	W	1100	1200	1300	1400	1650	1900	2200	2550	2750	3000
Load loss (75°C)	W	3570	4350	5250	6100	7350	8700	10450	12200	13500	14800
Impedance Voltage (75°C)	%	6	6	6	6	6	6	6	6	6	6
No-load current (75°C)	%	1.4	1.3	1.2	1.2	1.1	1	1	0.9	0.9	0.9
Sound level LwA	dB(A)	60	61	62	64	64	65	67	68	70	72
Sound level LpA	dB(A)	50	50	51	52	52	53	54	55	57	59

Double winding

Cast resin standard losses

RS

Electrical specifications										
Power	kVA			630	800	1000	1250	1600	1800	2000
No-load loss	W			2200	2700	3100	3600	4200	4600	5000
Load loss (75°C)	W			6500	7800	9600	11300	13900	16200	18500
Impedance Voltage (75°C)	%			6	6	6	6	6	6	6
No-load current (75°C)	%			1.2	1.1	1	1	0.9	0.9	0.9
Sound level LwA	dB(A)			71	72	73	75	76	77	78
Sound level LpA	dB(A)			60	61	62	64	65	66	67

Cast resin reduced losses

RR

Electrical specifications										
Power	kVA			630	800	1000	1250	1600	1800	2000
No-load loss	W			1400	1650	1900	2200	2550	2800	3000
Load loss (75°C)	W			6100	7300	8700	10500	12000	14000	16000
Impedance Voltage (75°C)	%			6	6	6	6	6	6	6
No-load current (75°C)	%			1.2	1.1	1	1	0.9	0.9	0.9
Sound level LwA	dB(A)			63	64	65	67	68	70	72
Sound level LpA	dB(A)			52	53	54	55	56	58	60

Medium voltage transformer hermetic oil insulated

Ingeteam provides highly performing LV/MV three phase oil insulated type transformers. Power ratings are available up to 2 MVA, with voltage ratings (MV side) from 10 up to 24 kVA (up to 36 kVA on the Ingecon@Sun Power Station CON40).

The transformers are classified as per the CEI 14-4 and EN 60076-11 standard, offering the following benefits:

- Low losses ready in standard model, reduced losses model available;
- Reduced maintenance needs;
- Flexibility: no foundations required, easy handling.
- Suitable both for internal or external use;

The voltage value at the secondary winding (LV side) is compatible with the inverter output voltage: 220 V, 275 V, 300 V, 320 V, 345 V, 360 V, 400V; Double windings transformers available.



Standard functions:

- Standard losses;
- Electrostatic shield reducing disturbances, distortions and overvoltages.

Functions available upon request:

- Reduced losses; CEI-EN50541-1
- Copper windings.

Medium Voltage Transformer					
Category		Hermetic oil insulated transformer			
Rated frequency		50 / 60Hz			
Primary voltage regulator		± 2 x 2.5 %			
Insulation class	Primary winding	12 kV: 12 / 28 / 75 kV	17,5 kV: 17,5 / 38 / 95 kV	24 kV: 24 / 50 / 125 kV	36 kV ⁽¹⁾ : 36 / 70 / 17
	Secondary winding	1.1/3 kV			
Primary / secondary conductive material		Aluminium / Aluminium (Copper optional)			
Vector group		Dyn11			
Primary connection		Delta			
Secondary connection		Star + Neutral			
Max overtemperature for primary / secondary windings		60 / 65 K			
Installation		indoor or outdoor			
Cooling type		ONAN			
Altitude above sea level⁽²⁾		≤ 1000 m			
Short-circuit impedance at 75 °C		6% (24kV)			
General features		Terminal board for primary voltage adjustment, Lifting lugs, Tow hooks, RIS device, x2 earthing terminal, x4 rotating wheels, 1x thermowell, 1x wasted oil valve, electrostatic shield, 1x wasted oil tank.			

Notes:⁽¹⁾ CON40 models only. - ⁽²⁾ For Higher altitudes, please contact Ingeteam.

24 kV CLASS

Single winding

Oil standard losses

OS

Electrical specifications											
Power	kVA	315	400	500	630	800	1000	1250	1600	1800	2000
No-load loss	W	770	930	1100	1200	1400	1700	2100	2200	2600	2800
Load loss (75°C)	W	3900	4600	5500	6750	8400	10500	13500	17000	21000	24000
Impedance Voltage (75°C)	%	4	4	4	6	6	6	6	6	6	6
No-load current (75°C)	%	2	2	1.9	1.9	1.7	1.7	1.5	1.4	1.2	1.2
Sound level LwA	dB(A)	67	68	69	70	71	73	74	75	76	77
Sound level LpA	dB(A)	57	58	59	60	61	62	63	64	65	66

Oil reduced losses

OR

Electrical specifications											
Power	kVA	315	400	500	630	800	1000	1250	1600	1800	2000
No-load loss	W	520	610	720	800	930	1100	1350	1700	1900	2000
Load loss (75°C)	W	3900	4600	5500	6750	8400	10500	13500	17000	21000	24000
Impedance Voltage (75°C)	%	4	4	4	6	6	6	6	6	6	6
No-load current (75°C)	%	0.9	0.9	0.85	0.8	0.8	0.7	0.6	0.5	0.5	0.5
Sound level LwA	dB(A)	57	58	59	60	61	63	64	66	67	68
Sound level LpA	dB(A)	49	50	51	52	53	55	55	57	58	59

Double winding

Oil standard losses

OS

Electrical specifications									
Power	kVA								
No-load loss	W				1400	1700	2200	2600	2800
Load loss (75°C)	W				13000	15000	18000	21000	24000
Impedance Voltage (75°C)	%				6	6	6	6	6
No-load current (75°C)	%				1.7	1.5	1.4	1.2	1.2
Sound level LwA	dB(A)				73	74	75	76	77
Sound level LpA	dB(A)				62	63	64	65	66

Oil reduced losses

OR

Electrical specifications									
Power	kVA								
No-load loss	W				1100	1350	1700	1900	2000
Load loss (75°C)	W				13000	15000	18000	21000	24000
Impedance Voltage (75°C)	%				6	6	6	6	6
No-load current (75°C)	%				1.7	1.5	1.4	1.2	1.2
Sound level LwA	dB(A)				63	64	66	67	68
Sound level LpA	dB(A)				55	55	57	58	59

36 kV CLASS

Single winding

Oil standard losses

OS

Electrical specifications											
Power	kVA	315	400	500	630	800	1000	1250	1600	1800	2000
No-load loss	W	900	1120	1300	1450	1700	2000	2400	2800	3200	3400
Load loss (75°C)	W	3900	4600	5500	6750	8400	10500	13500	17000	21000	24000
Impedance Voltage (75°C)	%	4	4	4	6	6	6	6	6	6	6
No-load current (75°C)	%	2	2	1.9	1.9	1.7	1.7	1.5	1.4	1.2	1.2
Sound level LwA	dB(A)	67	68	69	70	71	73	74	75	76	77
Sound level LpA	dB(A)	57	58	59	60	61	62	63	64	65	66

Oil reduced losses

OR

Electrical specifications											
Power	kVA	315	400	500	630	800	1000	1250	1600	1800	2000
No-load loss	W	600	790	950	1100	1300	1450	1750	2200	2400	2700
Load loss (75°C)	W	3900	4600	5500	6750	8400	10500	13500	17000	21000	24000
Impedance Voltage (75°C)	%	4	4	4	6	6	6	6	6	6	6
No-load current (75°C)	%	2	2	1.9	1.9	1.7	1.7	1.5	1.4	1.2	1.2
Sound level LwA	dB(A)	57	58	59	60	61	63	64	66	67	68
Sound level LpA	dB(A)	49	50	51	52	53	55	55	57	58	59

Double winding

Oil standard losses

OS

Electrical specifications								
Power	kVA			1000	1250	1600	1800	2000
No-load loss	W			2000	2400	2800	3200	3400
Load loss (75°C)	W			13000	15000	18000	21000	24000
Impedance Voltage (75°C)	%			6	6	6	6	6
No-load current (75°C)	%			1.7	1.5	1.4	1.2	1.2
Sound level LwA	dB(A)			73	74	75	76	77
Sound level LpA	dB(A)			62	63	64	65	66

Oil reduced losses

OR

Electrical specifications								
Power	kVA			1000	1250	1600	1800	2000
No-load loss	W			1450	1750	2200	2400	2700
Load loss (75°C)	W			13000	15000	18000	21000	24000
Impedance Voltage (75°C)	%			6	6	6	6	6
No-load current (75°C)	%			1.7	1.5	1.4	1.2	1.2
Sound level LwA	dB(A)			63	64	66	67	68
Sound level LpA	dB(A)			55	55	57	58	59

Medium Voltage Switchgear

Standard Features:

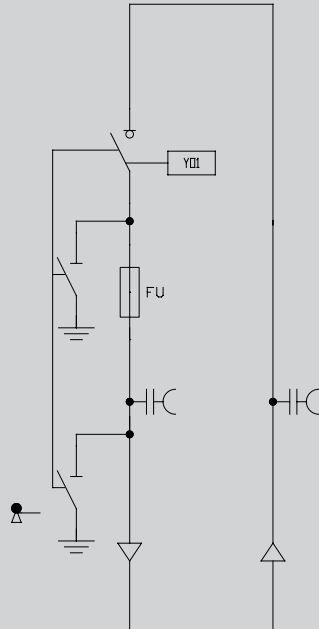
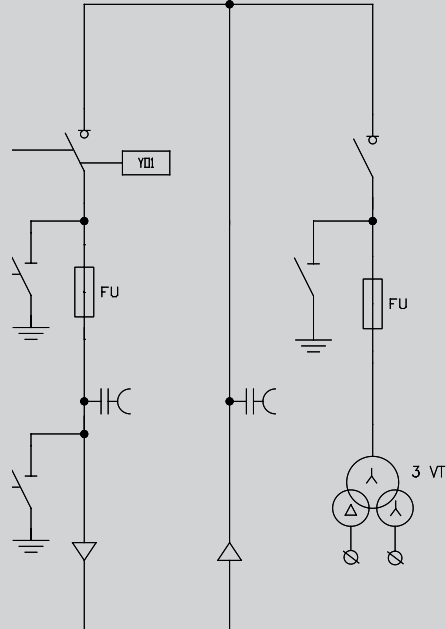
- 24 kV rated voltage (up to 36 kV for CON40).
- Voltage 50Hz: 50 kV.
- Pulse voltage: 125 kV (up to 170 kV for CON40).
- Bar bus rated current: 630 A.
- Short time current (1s): 16 kA.
- Resistance to internal arc for 0.7s: 16 kA.
- Cut-off power: 16 kA.
- Inspection door.
- Door locking.
- Relative Humidity: 0 - 90 %.
- Altitude above sea level: max 1000 m ⁽¹⁾.

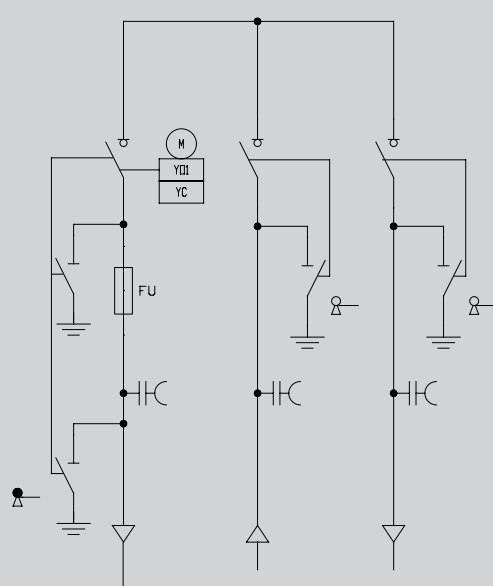
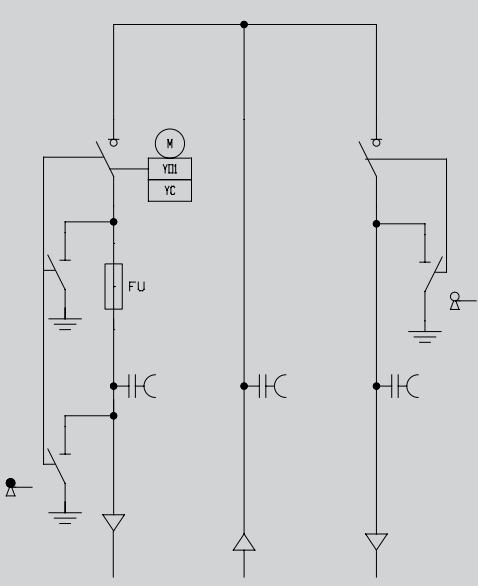
Features available upon request:

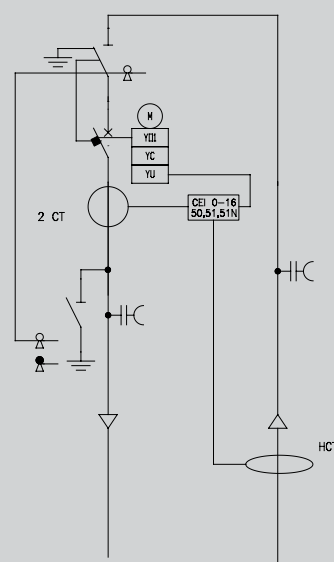
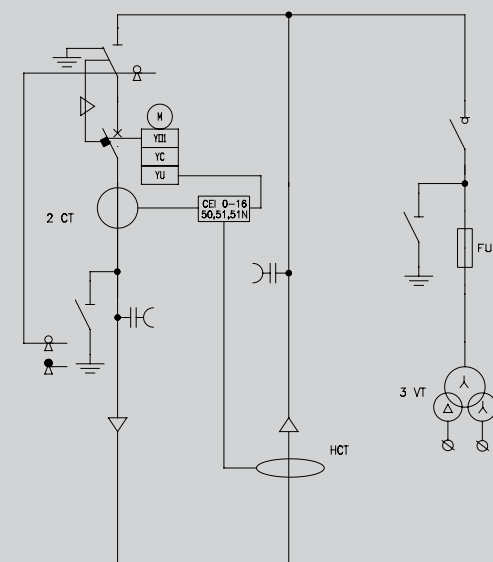
- Anti-condensation heater.
- Internal lighting system.
- Voltage transformer (VT) for voltage measurement.

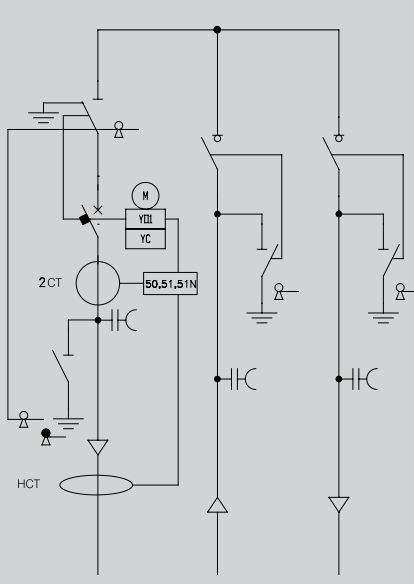
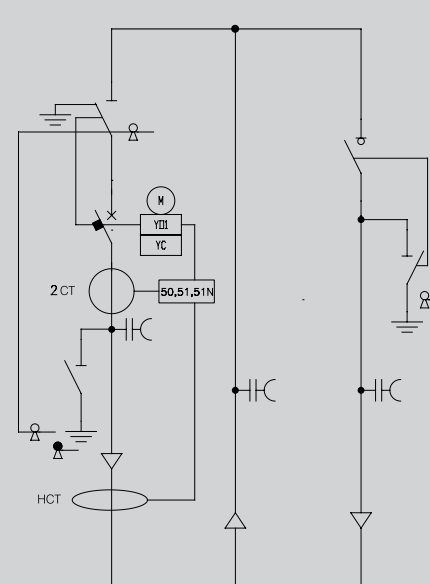


Notes: ⁽¹⁾ For Higher altitudes, please contact Ingeteam.

Type	SF-L	SF-L-M
Description	Load break switch disconnecter with fuses and earth disconnecter + outgoing line (1P 1L).	Load break switch disconnecter with fuses and earth disconnecter + outgoing line + voltage measurement (CEI 0-16) (1P 1L).
	<p>Star configuration</p> 	<p>Star configuration</p> 

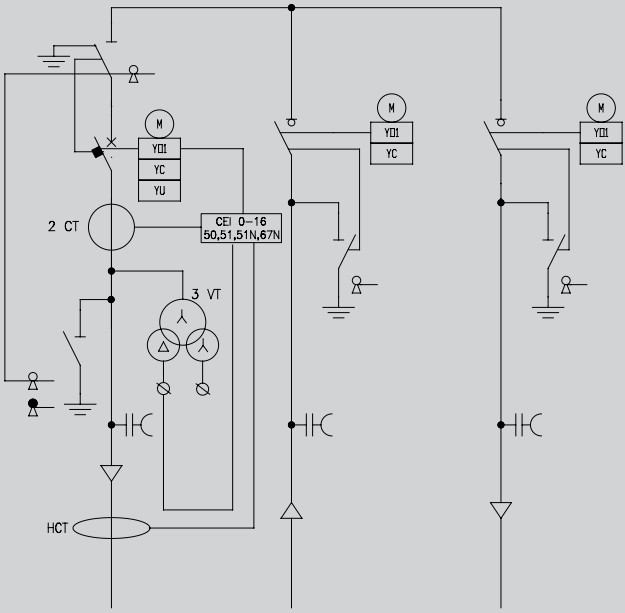
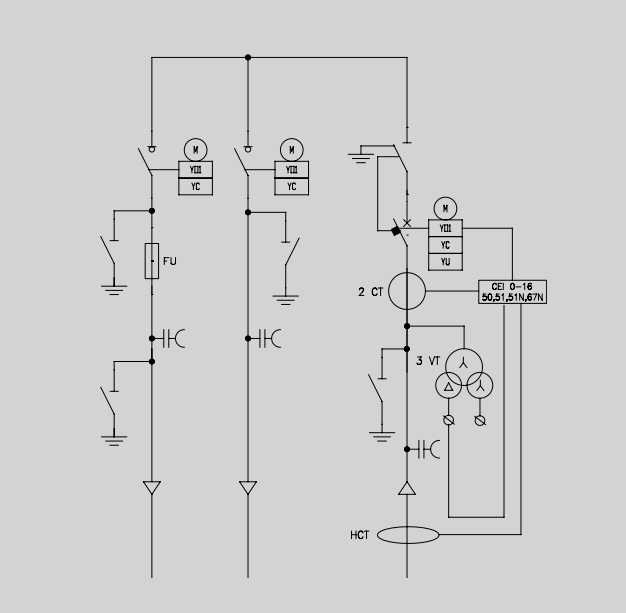
Type	SF1-LS-LS	SF1-L-LS
Description	Motorized load break switch disconnecter with fuses and earth disconnecter + 2 line with load break switch disconnecter and earth disconnecter (1P 2L).	Motorized load break switch disconnecter with fuses and earth disconnecter + 1 incoming line + 1 outgoing line with load break switch disconnecter and earth disconnecter (1P 2L).
	<p>Ring or chain configuration</p> 	<p>Ring or chain configuration</p> 

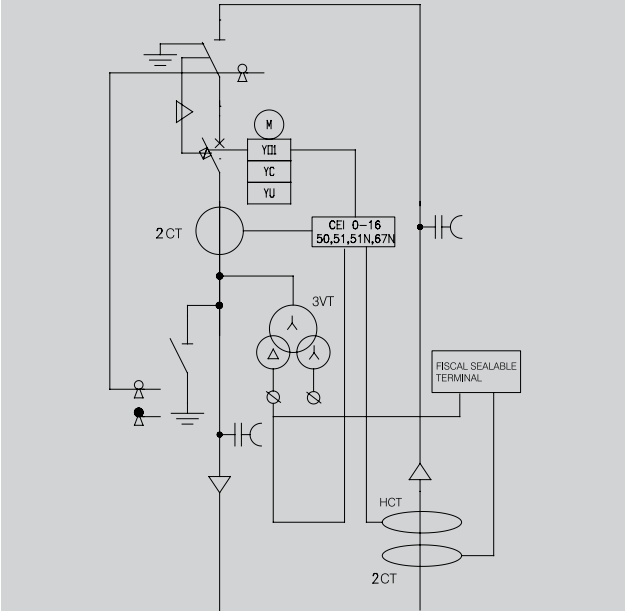
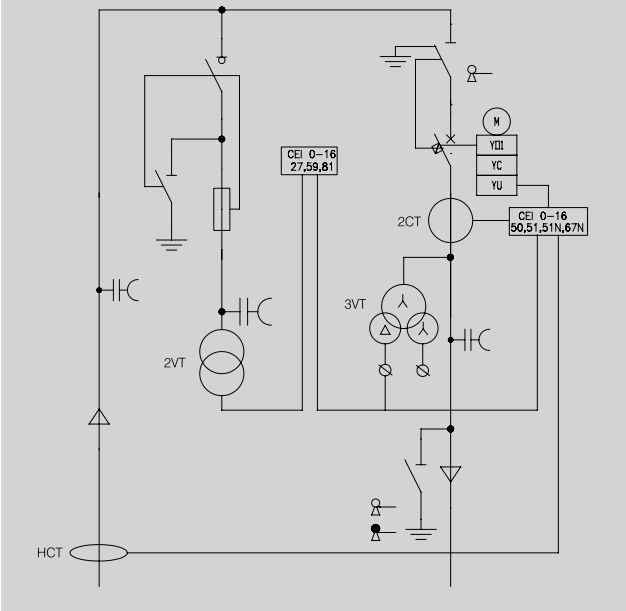
Type	E2-L	E2-L-M
Description	<p>Automatic motorized circuit breaker with functions 50, 51 and 51N CEI 0-16 and earth disconnector + outgoing line (1P 1L).</p> <p>Star configuration</p> 	<p>Automatic motorized circuit breaker with 50, 51 and 51N CEI 0-16 and earth disconnector + outgoing line + voltage measurement (CEI 0-16) (1P 1L).</p> <p>Star configuration</p> 

Type	E2-LS-LS	E2-L-LS
Description	<p>Automatic motorized circuit breaker with 50, 51 and 51N functions and earth disconnector + 2 line with load break switch disconnector and earth disconnector (1P 2L).</p> <p>Ring or chain configuration</p> 	<p>Automatic motorized circuit breaker with functions 50, 51 and 51N and earth disconnector + 1 incoming line + 1 outgoing line with load break switch disconnector and earth disconnector (1P 2L).</p> <p>Ring or chain configuration</p> 

Type	E21-L	E22-L
Description	Automatic motorized circuit breaker functions 50, 51 and 51N CEI 0-16 with CT and VT for energy metering and earth disconnector + outgoing riser (1P 1L).	Automatic motorized circuit breaker with functions 50, 51 and 51N, interface protection CEI 0-16 and earth disconnector + voltage measurement (CEI 0-16) + outgoing line (1P 1L).
	Star configuration	Star configuration
	<p>The diagram for E21-L shows a motorized circuit breaker (M) with terminals YDI, YC, and YU. It is connected to a star configuration of three phases. Two current transformers (2 CT) are used for energy metering. Three voltage transformers (3 VT) are connected in a star configuration. A Fiscal Sealable Terminal is connected to the CT secondary. An earth disconnector (HCT) is shown at the bottom. The CEI 0-16 (50,51,51N) module is connected to the CT secondary.</p>	<p>The diagram for E22-L shows a motorized circuit breaker (M) with terminals YDI, YC, and YU. It is connected to a star configuration of three phases. Two current transformers (2 CT) are used for energy metering. Two voltage transformers (2 VT) are connected in a star configuration. A fuse (FU) is connected in series with the CT secondary. An earth disconnector (HCT) is shown at the bottom. The CEI 0-16 (27,59,81) module is connected to the CT secondary.</p>

Type	E23-L	E3-L
Description	Automatic motorized circuit breaker functions 50, 51 and 51N, interface protection CEI 0-16 with CT and VT for energy metering and earth disconnector + voltage measurement (CEI 0-16) + outgoing line (1P 1L).	Automatic motorized circuit breaker with functions 50, 51, 51N and 67N CEI 0-16 and earth disconnector + outgoing line (1P 1L).
	Star configuration	Star configuration
	<p>The diagram for E23-L shows a motorized circuit breaker (M) with terminals YDI, YC, and YU. It is connected to a star configuration of three phases. Two current transformers (2 CT) are used for energy metering. Three voltage transformers (3 VT) are connected in a star configuration. A Fiscal Sealable Terminal is connected to the CT secondary. An earth disconnector (HCT) is shown at the bottom. Two CEI 0-16 modules (27,59,81 and 50,51,51N) are connected to the CT secondary.</p>	<p>The diagram for E3-L shows a motorized circuit breaker (M) with terminals YDI, YC, and YU. It is connected to a star configuration of three phases. Two current transformers (2 CT) are used for energy metering. Three voltage transformers (3 VT) are connected in a star configuration. An earth disconnector (HCT) is shown at the bottom. The CEI 0-16 (50,51,51N,67N) module is connected to the CT secondary.</p>

Type	E3-LS1-LS1	SF1-LS1-E3
Description	Automatic motorized circuit breaker with functions 50, 51, 51N and 67N CEI 0-16 and earth disconnector + 2 line with load break switch disconnector and earth disconnector (1P 2L).	Motorized load break switch disconnector with fuses and earth disconnector + 1 incoming line with load break switch disconnector and earth disconnector + automatic motorized circuit breaker with functions 50, 51, 51N and 67N CEI 0-16 and earth disconnector (1P 2L).
	Ring or chain configuration	Ring or chain configuration
		

Type	E31 - L	E32 - L
Description	Automatic motorized circuit breaker with functions 50,51,51N,67N CEI 016 and earth disconnector + energy metering + outgoing line (1P1L)	Automatic motorized circuit breaker with functions 50,51,51N,67N CEI 016 and earth disconnector + functions 27,59,81 Interface Protection CEI016 - A70 + outgoing line (1P1L)
	Star configuration	Star configuration
		

Type	E33 – L	E22 – L2
Description	Automatic motorized circuit breaker with functions 50,51,51N,67N CEI 016 and earth disconnector + functions 27,59,81 Interface Protection CEI016 – A70 and energy metering + outgoing line (1P1L)	Automatic motorized circuit breaker with functions 50,51,51N,67N CEI 016 and earth disconnector + functions 27,59,81 Interface Protection CEI016 – A70 + outgoing line with surge arrester (1P1L)
	Star configuration	Star configuration

Type	E32 – L2	E33 – L2
Description	Automatic motorized circuit breaker with functions 50,51,51N,67N CEI 016 and earth disconnector + functions 27,59,81 Interface Protection CEI016 – A70 + outgoing line with surge arrester (1P1L)	Automatic motorized circuit breaker with functions 50,51,51N,67N CEI 016 and earth disconnector + functions 27,59,81 Interface Protection CEI016 – A70 and energy metering + outgoing line with surge arrester. (1P1L)
	Star configuration	Star configuration

Power Station Coding

Example: Ingecon®Sun Power Station



POWER STATION type	
SHELTER 15'	SHE 15 W
SHELTER 20'	SHE 20 T
	SHE 20 W
CONTAINER 20'	CON 20 T
	CON 20 W
	CON 20 RT
	CON 20 RW
CONTAINER 40'	CON 40 RT
W= wing doors, T= standard doors, R= CSC RINA certified	

POWER STATION cooling	
Forced air	FA
Air conditioning	AC
Recirculation conditioning	RC

POWER STATION size	
Total inverter power (AC)	275.... 2000

INVERTER Ingecon Sun Power Max	
Multi MPPT	M220...M400
Master/Slave	X220...X360

Power Block INVERTER	
Number of Power Block	2...8

MPPT INVERTER	
Number of MPPT	1...8

INVERTER inputs	
Number of inverter inputs	
F(n°)=couple of fuses per input 63...250A	F8...F32
B(n°)=couple of fuses every four inputs 550A	B8...B32





MV switchgear	
not present	0
Example code	SF-L
See pages 70 to 75 for details	
Legend	
L	Line Incoming
L2	Line + Arrester
LS	Line Switch disconnecter/Earth
LS1	Line Switch disconnecter/Earth Motorized
LS2	Line Switch disconnecter/Earth + Arrester
SF	Switch disconnecter with Fuses
SF1	Switch disconnecter with Fuses Motorized
M	Switch disconnecter with Fuses and Voltage Transformer
E2	Circuit Breaker func. 50/51/51N CEI016
E3	Circuit Breaker func. 50/51/51N/67N CEI016
E21	Circuit Breaker func. 50/51/51N CEI016, energy metering
E31	Circuit Breaker func. 50/51/51N/67N CEI016, energy metering
E22	Circuit Breaker func. 50/51/51N-27/59/81 CEI016
E32	Circuit Breaker func. 50/51/51N/67N-27/59/81 CEI016
E23	Circuit Breaker func. 50/51/51N-27/59/81 CEI016, energy metering
E33	Circuit Breaker func. 50/51/51N/67N-27/59/81 CEI016, energy metering

MV transformer	
Resin standard losses	RS
Resin reduced losses	RR
Oil standard losses	OS
Oil reduced losses	OR

MV transformer	
Voltage kV	10...36

MV transformer	
Power kVA	315...2000

BT AUX auxiliary services switchgear	
B= Base model	B
F= Full model	F

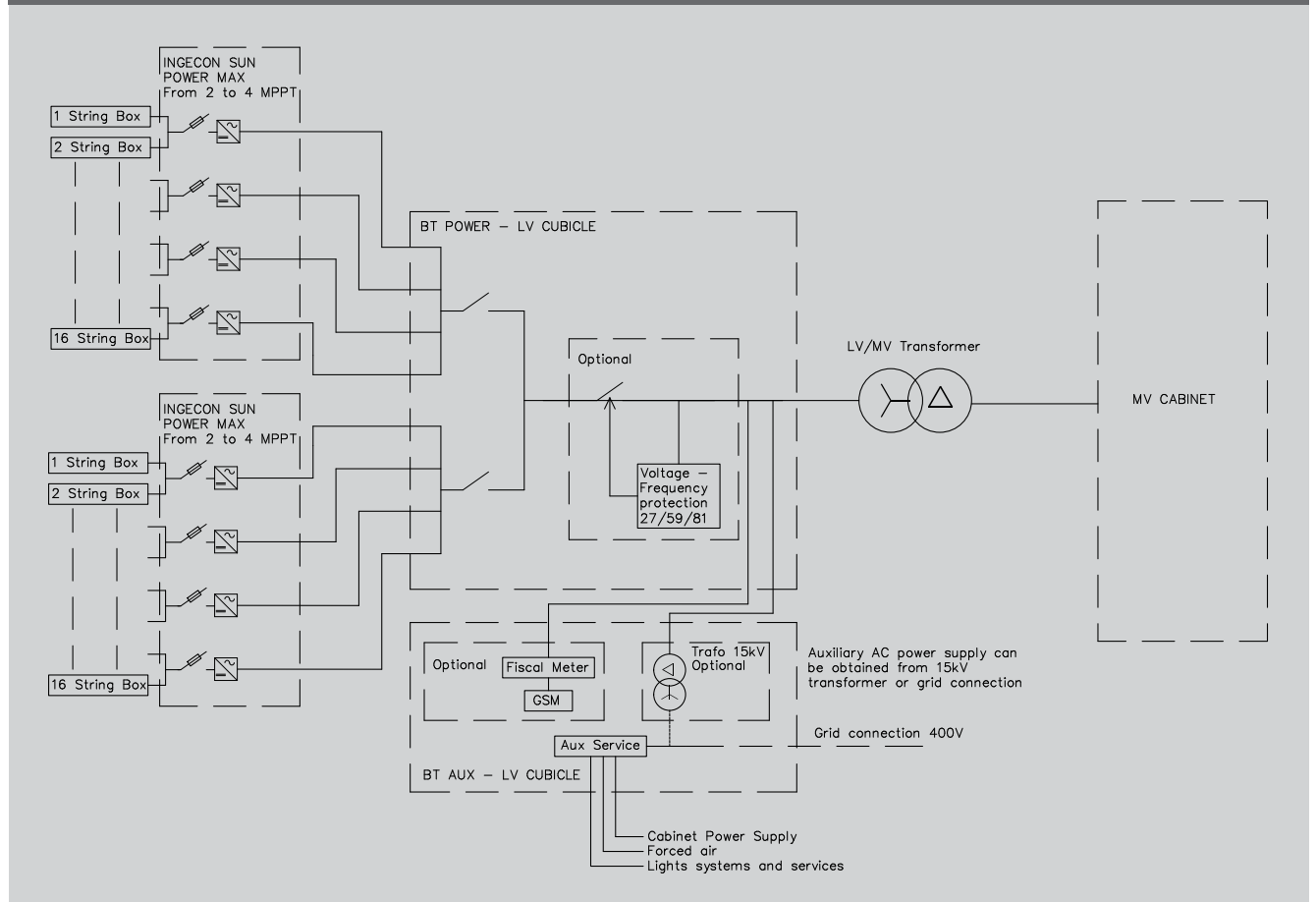
BT POWER disconnection device, MV transformer side	
0= not present	0
CB= automatic circuit breaker	CB
SD= switch disconnecter	SD

BT POWER parallel switchgear	
BT POWER inputs quantity	
CB(n°)= automatic circuit breaker 800....1600A	0...CB2

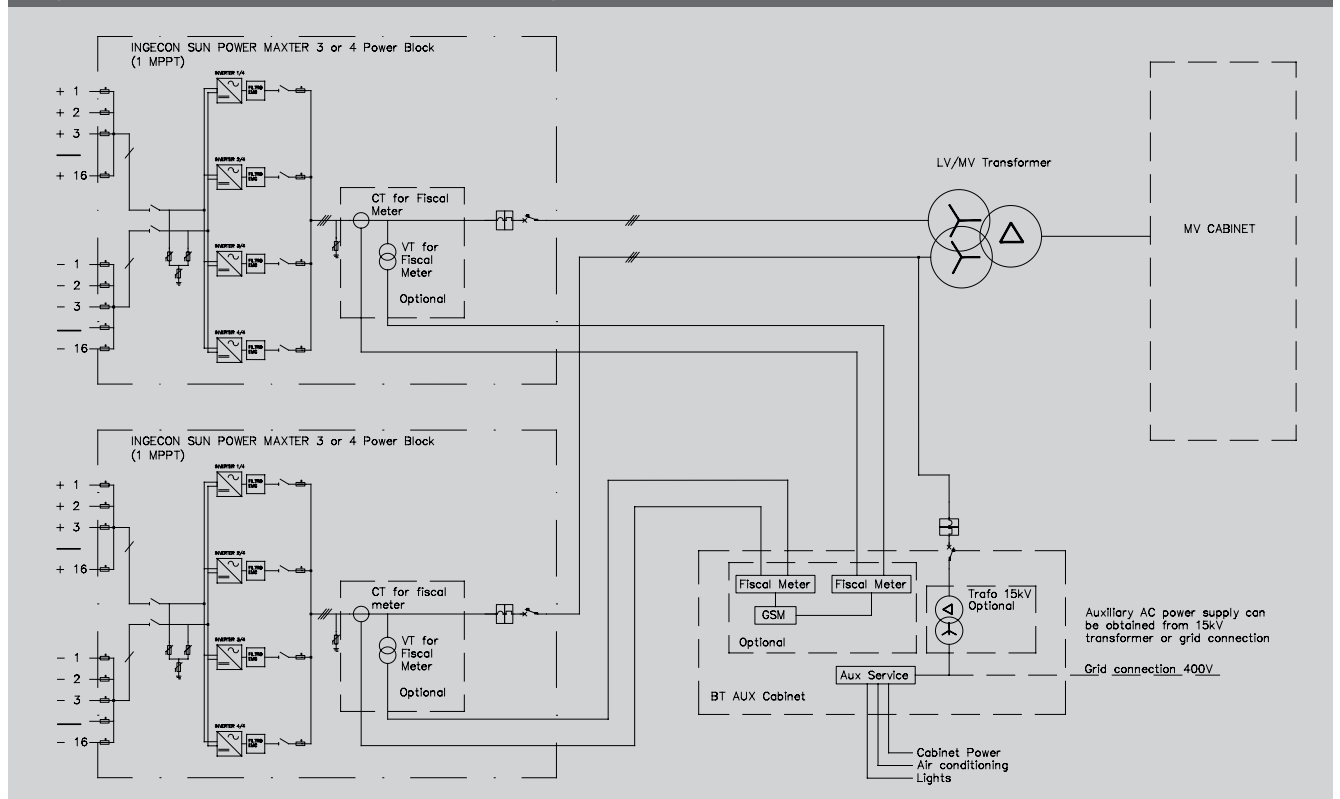
INGECON SUN Power Station

Basic wiring diagrams

Ingecon®Sun Power Station Multi MPPT configuration



Ingecon®Sun Power Station Master/Slave configuration



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