



## UP TO 4.54 MVA WITH FOUR MODULES OF 1.14 MVA

### AC-DC MODULAR CONVERTER FOR 1500 V BATTERY ENERGY STORAGE SYSTEMS

The INGECON® SUN STORAGE 3Power M Series is a three-phase bidirectional battery inverter that can be used in grid-connected and stand-alone systems. In addition, it will be matching any type of batteries at different range of hour of application. This one-of-a-kind battery inverter achieves a market-leading power density of 488 kW/m<sup>3</sup>, as it provides up to 1.14 MVA in just one power module.

#### Latest generation electronics

The INGECON® SUN STORAGE 3Power M Series battery inverter features an innovative control unit that performs a more efficient and sophisticated inverter control, as it uses a last-generation digital signal processor.

#### Liquid Cooling System (LCS)

Ingeteam has already supplied +57 GW of liquid -cooled wind power converters worldwide. It offers a greater thermal stability and a more optimized component usage. The LCS has been designed to refrigerate the IGBTs, the power phases and the IP65 / NEMA 3 compartment. It features less moving components, so it consumes a lower amount of power and it requires less maintenance works.

The LCS is a closed circuit supplied totally filled and purged, equipped with fast connectors with an anti-dripping system, so it offers zero risk of particle entrance. It has been designed to avoid siphons in order to easily purge it if necessary. The coolant used is a biodegradable glycol water mixture. There is no need of emptying the LCS in order to replace the phases, nor the sensors.

#### IP65 / NEMA 3 protection

A secondary liquid cooling system is used to refrigerate the air inside the IP65 / NEMA 3 protected compartment. A water-air heat exchanger is used for that. This compartment contains the power and control electronics, the DC fuses, the DC and AC protections, the busbars and the power phases.

**Standard 5 years, extendible upon request**

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### Real power related functionalities

Renewable resources integration:

- Ramp limits.
- Power smoothing / firming / curtailment.
- Time shifting.
- Micro grids.

Grid support / Ancillary services:

- Frequency regulation.
- Synthetic inertia.
- Black start.
- Frequency control / protection.
- Virtual "Synchronous Machine".

### Protections

- Short-circuits and overloads at the output.
- Anti-islanding with automatic disconnection.
- Insulation failure DC.
- Monitoring of the DC currents.
- Up to 5 pairs of fuse-holders.
- Lightning induced DC and AC surge arresters, type II.
- Motorized DC switch.
- Motorized AC circuit breaker.
- Hardware protection via firmware.
- Additional protection for the power stack, liquid cooled, IP65 rated and air cooled by a closed loop.

Investment deferral:

- Peak shaving.
- Load shifting / Load following.
- Real power response improvement of conventional power plants.

Power efficiency:

- Time shifting.
- Price arbitrage.
- Real power response improvement of conventional power plants.
- Peak shaving.

### Optional Accessories

- Heating kit, for operating at an ambient temperature between -20 °C and -40 °C.
- DC fuses in the positive pole or in both poles.
- DC surge arresters type I+II.
- AC surge arresters type I+II.
- AC measuring kit.

### Main features

- Nominal power at 40 °C ambient.
- Same charge / discharge power.
- Modularity, adapts to customer demand.

Safety and quality:

- "Un-interruptible" Power.
- Grid code compliance.
- Transmission congestion relief / Power quality-reliability.

### Reactive power related functionalities

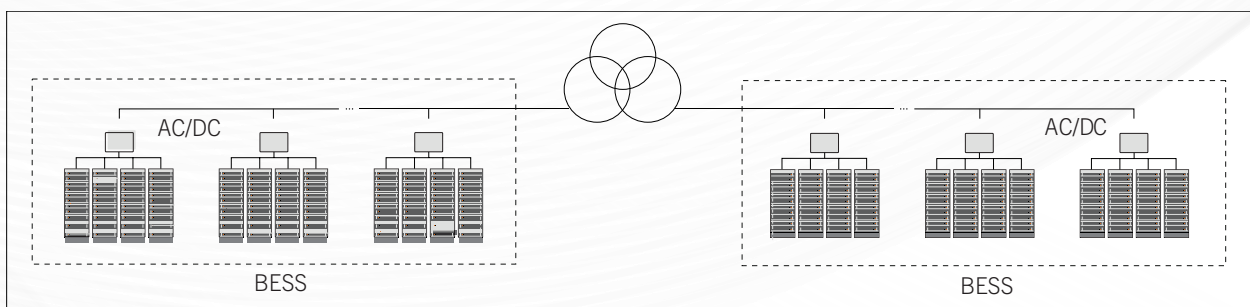
- Voltage control (Q/V).
- Voltage control / protection.
- Fixed power factor (QPF).
- Fixed reactive power output (Qref).
- Limitation of response of Reactive Power.

### Liquid cooling system

- LCS to refrigerate the IGBTs.
- More optimized component usage: greater thermal stability.
- Less moving components: lower power consumption and less maintenance works.
- No risk of particle entrance.
- Anti-corrosion protection with stainless steel components.
- LCS is used in many industries. Thus, it is very reliable, as its components are subject to many validation tests.
- Fast connectors with anti-dripping system.
- Biodegradable glycol water mixture.
- No need of emptying the LCS in order to replace the phases, nor the sensors.

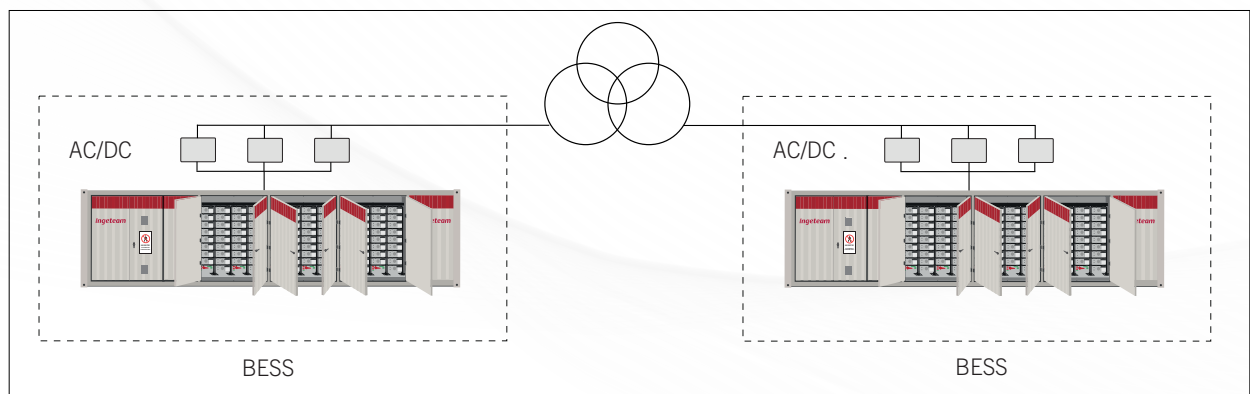
### Solution for independent Racks:

#### Modular inverter working independently to its battery racks



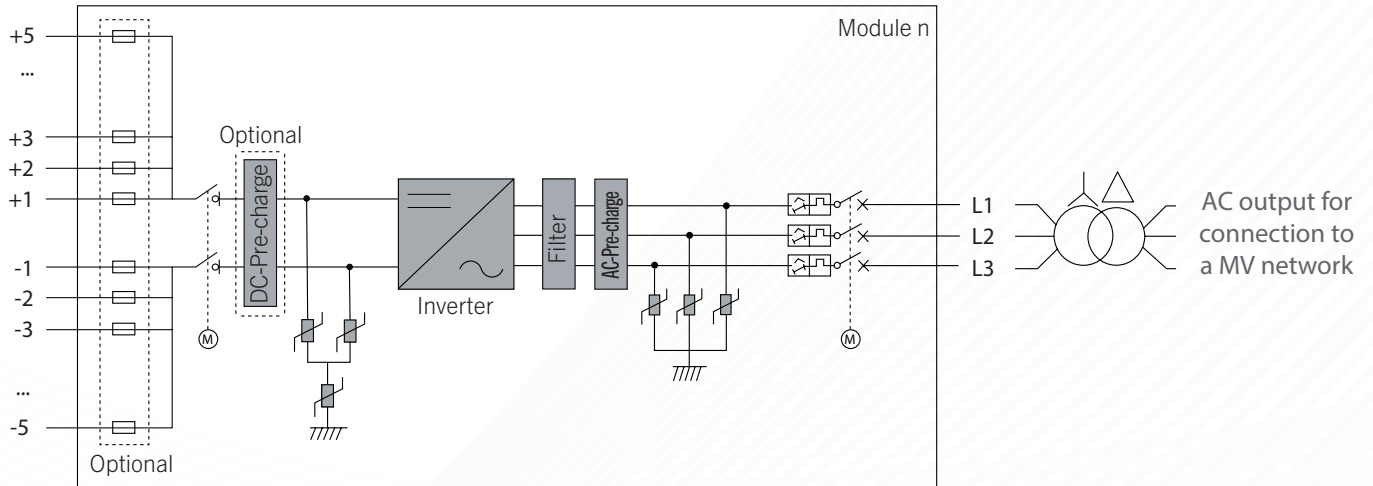
### Solution for battery containers with a single output:

#### Modular inverter working in parallel

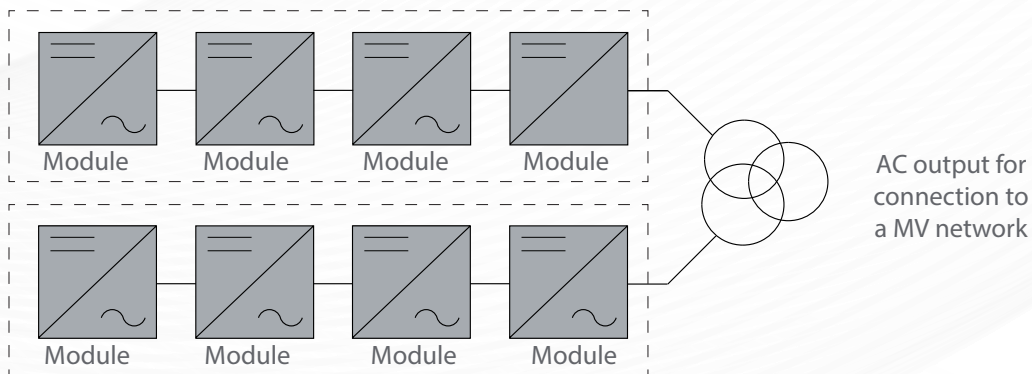


# UP TO 4.54 MVA WITH FOUR MODULES OF 1.14 MVA AC-DC modular converter for 1500 V battery storage systems

SLD (Single Line Diagram) of the inverter



SLD with 2 inverters per power station



Specifications included in this datasheet could change without notice. Please contact Ingeteam's sales department in case of any queries.

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## INGECON® SUN STORAGE 4540TL

INPUT (DC)	M600		M630		M660		M690	
	M3	M4	M3	M4	M3	M4	M3	M4
Battery voltage range for off-grid mode [V]	854 to 1,500		896 to 1,500		938 to 1,500		980 to 1,500	
Battery voltage for grid-tied mode <sup>(1)</sup> [V]	938 to 1,500		984 to 1,500		1,035 to 1,500		1,077 to 1,500	
N° DC inputs per module	5							
N° DC inputs per inverter	15	20	15	20	15	20	15	20
N° independent DC inputs	1/3	1/2/4	1/3	1/2/4	1/3	1/2/4	1/3	1/2/4
Fuse dimensions	Up to 630 A / 1,500 V / aR (optional)							
DC short circuit withstand capacity per DC Input [kA]	250 (< 5ms)							
Type of connection	Connection to copper bars							
<b>INPUT PROTECTION</b>								
Overvoltage protection	Type I+II surge arresters							
DC Switch	Motorized DC load break disconnect							
Other protections	Up to 5 pairs of DC fuses per power module (optional) / Reverse polarity / Insulation failure monitoring / Anti-islanding protection							
<b>OUTPUT (AC)</b>								
Discharge/charge power (40°C)[kVA]	2,961	3,948	3,111	4,148	3,258	4,344	3,405	4,540
Discharge/charge current (40°C) [A]	2,850	3,800	2,850	3,800	2,850	3,800	2,850	3,800
AC output voltage [V]	600		630		660		690	
Frequency [Hz]	50 / 60							
Power factor <sup>(2)</sup>	1							
Power factor adjustable	Yes, 0 - 1 (leading / lagging)							
THD (total harmonic distortion) <sup>(3)</sup>	<3%							
<b>OUTPUT PROTECTIONS</b>								
Overvoltage protections	Type II surge arresters (type I+II optional)							
AC breaker	Motorized AC circuit breaker							
Anti-islanding protection	Yes, with automatic disconnection							
Other protections	AC short-circuits and overloads							
<b>GENERAL INFORMATION</b>								
Maximum efficiency	98.9%							
CEC	98.5%							
Operating ambient temperature [°C]	-20 to +60							
Operating ambient temperature (with heating kit) [°C]	-40 to +60							
Relative humidity (non-condensing)	0-100% (Outdoor)							
Protection class	IP65							
Corrosion protection	C5M External corrosion protection							
Maximum altitude [m]	4,500 (for installations beyond 1,000 m, please contact Ingeteam's solar sales department)							
Cooling system	Liquid cooling system and forced air cooling system with temperature control (400V 3 phase + neutral power supply, 50/60 Hz)							
StandBy or no-switching [W]	925							
Air flow range [m³/h]	0–27,000							
Average air flow [m³/h]	18,000							
Dimensions (L x W x H) [mm]	5,200 x 900 x 2,200							
Marking	CE							
EMC and security standards	IEC 61477-1, IEC 60529, CISPR11, EN 55011, IEC 61000-6-2, IEC 61000-3-11, IEC 61000-3-12; IEC 62116, IEC 61683							
Grid connection standards <sup>(4)</sup>	IEC 61727, EN 50549-2, ES: NTS SEPE&SENP, ES: UNE 217002, DE: VDE-AR-N 4110/4120/4130, IT: CEI 016 (allegato N), IT: Allegato A68, UK: G99, FR: Arrete 9 du Juin, BE: C10/C11, RO: Ord 208, MEX: CRE, BR: SUBMODULO 2.10							

**Notes**

<sup>(1)</sup> Maximum voltage DC (VDC,min) for Vgrid,max= 1.1 pu and Power Factor=1. If Vgrid,max is higher than this value, minimum voltage should be corrected as VDC,min \* Vgrid,max / 1.1.

<sup>(2)</sup> For P<sub>out</sub>>25% of the rated power

<sup>(3)</sup> For P<sub>out</sub>>25% of the rated power and voltage in accordance with IEC 61000-3-4.

<sup>(4)</sup> If needed, ask for additional Grid Code compliance certificates.

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