

Beghelli SOLARE

energy

storage systems

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Beghelli

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energy storage systems

A choice of environmental sustainability, but also of economic convenience.

Photovoltaic is an ethical choice and have a lower impact on our activities on the environment. The switch to renewable sources is the only possible way to ensure a future to the planet and especially to our children. Beghelli, that always pays attention to environmental and energy saving issues, has designed an hybrid solar system for the management of the energy produced by photovoltaic systems: an energy station composed by a next-generation inverter that directly feeds the active loads, when these are not in operation, stores energy thanks to the latest lithium batteries to use it later when needed. The energy produced is never wasted, if not needed, it can be fed into the grid and remunerated by the electricity supplier.

The real technological revolution is played on the management of the energy produced and on the methods of energy storage itself.

Solar energy is thus optimized, allowing concrete savings in the bill and protecting against continuous increases of the electricity costs.

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Hybrid storage for photovoltaic systems

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ei·uno

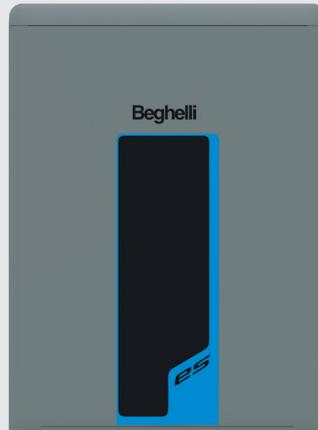
The ei-uno hybrid inverter is the single-phase model for ON-GRID connection, specifically designed for home applications, able to manage up to 17.3kW with monitoring of energy production and consumption via App and Beghelli cloud or directly in WiFi mode using built in module. AC output for the usage of the energy supply in case of network blackout.



SINGLE PHASE

WiFi

es·master es·slave



The energy storage module es-Master, usable both with the single-phase and three-phases inverter, has a capacity of 5.8kWh with integrated BMS. Possibility of Integration with three additional battery modules es-Slave for a total **nominal capacity of 46.1kWh using BMS.**

COMUNICATION INTERFACES

The system monitoring can be activated in WiFi mode using built in module in all **ei** inverters.

Further possibilities are available by inserting the relative module in the dongle port in both single-phase and three-phases inverters. The connection, if area is not covered by a WiFi hotspot, can be made directly to the 4G network by integrating the optional GPRS-4G module. In the presence of a LAN, the connection is made using the dedicated optional module for wired connection.

In any case, the remote connection can be implemented by activating the most suitable interface for the user.

ei-tre

The ei-tre hybrid inverter is the three-phases model, specifically designed for the tertiary sector and small industrial companies, able to manage up to 23kW with energy production monitoring and consumption via App and Beghelli cloud or directly in WiFi mode using built in module. AC output for the use of energy supply in case of a network blackout.



THREE PHASES

WiFi

INVERTER

BMS

The BMS module allows to create systems with large storage capacities. Up to 6 batteries for the single-phase inverter and 8 batteries for the three-phases inverter with a capacity of up to 34.6kWh in the first case and 46.1kWh in the second.



ENERGY STORAGE

GPRS 4G Module



LAN Module



MONITORING

Beghelli Solar hybrid, the energy that

THE ENERGY STATION OF THE FUTURE TO OPTIMIZE FV ENERGY

The Beghelli hybrid system bases its technology on a range of high-performance Inverter and Battery Modules capable of managing and storing the energy produced by a photovoltaic system with maximum efficiency. The typical system consists of an inverter and batteries, in which the Master is already

equipped with BMS, which can be integrated with additional Slave battery modules to obtain a capacity of up to 23 kW (three-phases). The system can be installed in both residential and industrial fields. Thanks to the BMS it is possible to expand the storage capacity of electricity up to a maximum of 46.1kW.

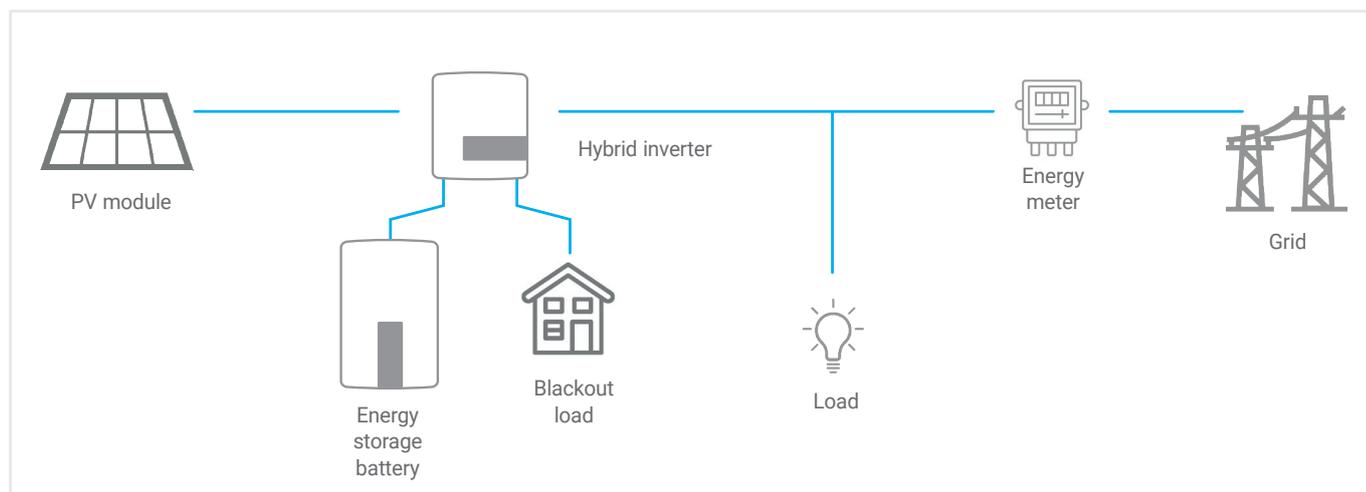


THE CONNECTION OF THE SYSTEM THAT NEVER WASTES ENERGY

The Beghelli solution is calibrated for a hybrid photovoltaic system with features that make it convenient to use both for homes and for companies. With this technology, the energy produced by photovoltaic panels is conveyed to users for instant self-consumption, the rest is stored in batteries and can be used in the evening and

night hours or when the system is not working.

Energy is never wasted, even when the storage batteries of the system are fully charged, the surplus energy is fed into the grid and resold to the energy services operator through exchange in place.



can be used whenever you want

CALIBRATED SOLUTIONS IN THE RESIDENTIAL AND TERTIARY SECTOR

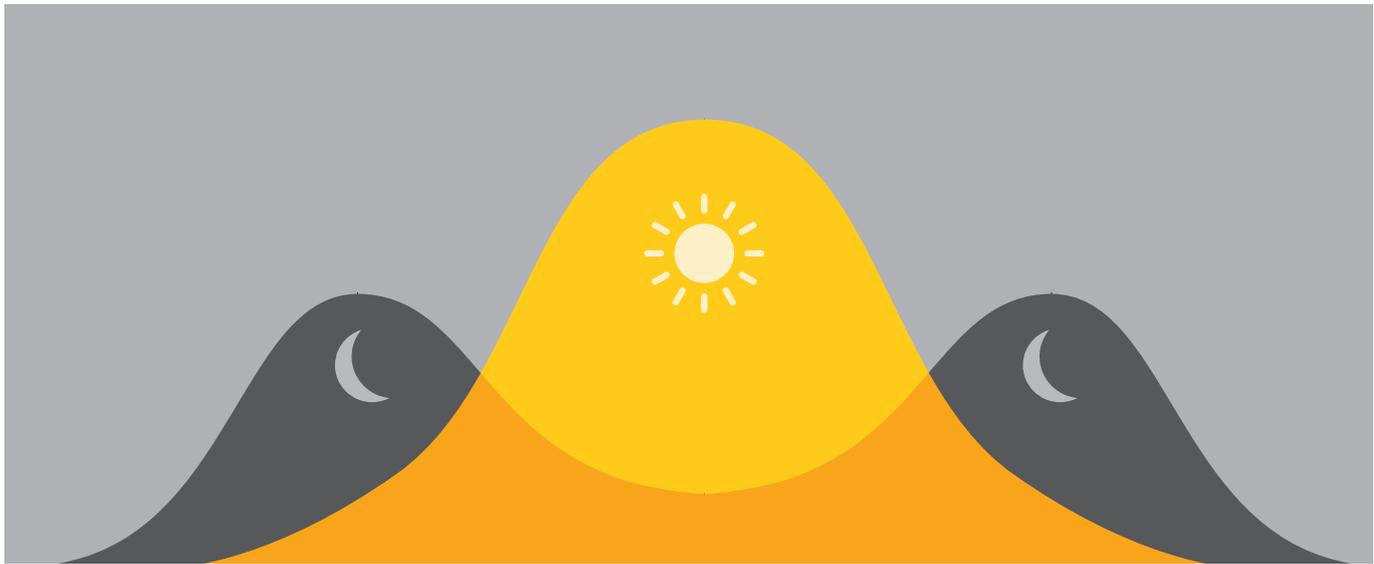
Not only solutions calibrated in the residential sector.

The Beghelli solution for high-performance photovoltaic systems is particularly suitable for the houses thanks to the very high reliability of the system, its modularity and to the small size of individual devices.

Hybrid solar Beghelli has been developed keeping as its primary focus the construction of a high-efficiency energy station able to support the latest generation or existing photovoltaic modules, making the produced energy stocks always available.

In addition, the Beghelli system can range in various areas: from the control of heat pumps and other smart loads to increase the energy generated by photovoltaic sources, up to the monitoring of electricity costs.

The Beghelli 360°energy solution allows users to manage their photovoltaic system in the most versatile way, storing and optimizing the energy produced during the hours of greatest solar radiation to make it always available when needed, even during night time.



■ ENERGY RESERVE USE

■ SOLAR ENERGY CONSUMPTION

■ SOLAR ENERGY

ABSOLUTE SECURITY EVEN IN THE CASE OF A BLACKOUT

For Beghelli, safety has always been an absolute value. In addition to constructive solutions that reflects the highest international standards of the solar hybrid system Beghelli, with its wide range of batteries for energy storage, always makes available a variable energy supply based on the battery packs installed. In case of a blackout, the system can power primary loads such as lighting, air conditioning and refrigerators to maintain the essential functionality of your home. Thanks to an emergency power supply "EPS" the system can completely operate off-grid, making the energy stored in the batteries available to be used in case of blackout.



Monitoring and remote management

energy storage systems

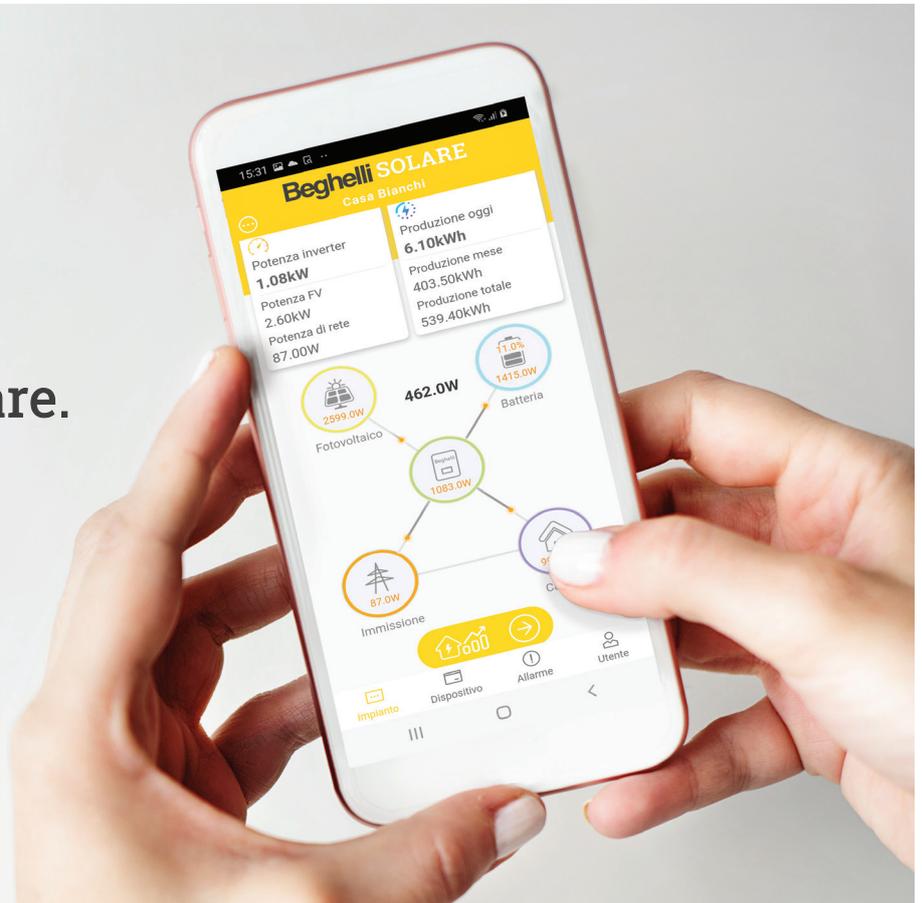
YOUR ENERGY IS ALWAYS UNDER CONTROL

Monitoring your photovoltaic system allows you to optimize performances and prevent any malfunctions and failures. The Beghelli solar energy storage system has a multifunctional monitoring and management service that can be activated both from a dedicated APP and from the Beghelli Cloud portal. An

intelligent system that allows remote access simply by inserting the appropriate connection accessory into the inverter to the network, both WiFi and LAN. Monitoring a system allows to understand how much energy is produced, how much is stored or transferred to the network and how much is withdrawn.

Manage the systems wherever you are.

Beghelli

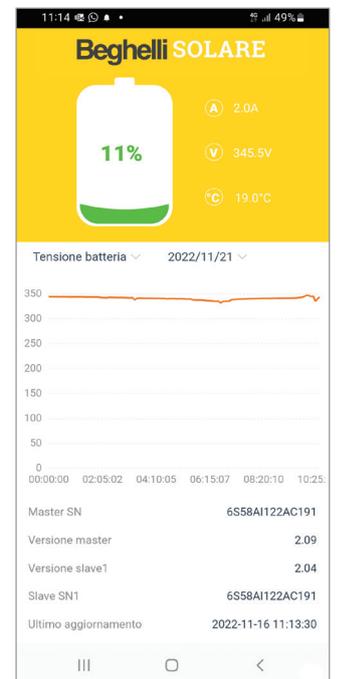
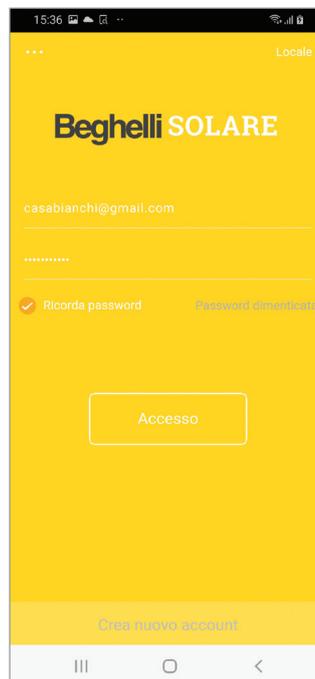


BEGHELLI APP, FAST, RESPONSIVE AND COMPLETE

The APP for Smartphone Beghelli, linked to solar storage systems, is available for both Android and IOS systems, allows remote control and monitoring of both residential and commercial photovoltaic systems. Free download from Google Play Store (Android) or App Store (IOS).



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ent of the photovoltaic system



BEGHELLI CLOUD, MANAGE, VERIFY AND REMOTELY MONITOR YOUR PHOTOVOLTAIC PRODUCTION

A **Cloud platform for accessing and managing the Beghelli photovoltaic storage system**, Available to the whole family or collaborators, it allows to manage and **keep under control the photovoltaic production of the solar storage system**, both for residential and commercial situations. Available free of charge for installers and users of the Beghelli system, it allows constant verification of daily, monthly and annual energy production, comparing it with other previous periods.

It checks the status of the batteries, how much has been sold to the electricity supplier and monetizes the photovoltaic production by keeping an eye on the saving of CO₂ and other environmental parameters.

Single-phase inverter: ei-uno

energy storage systems

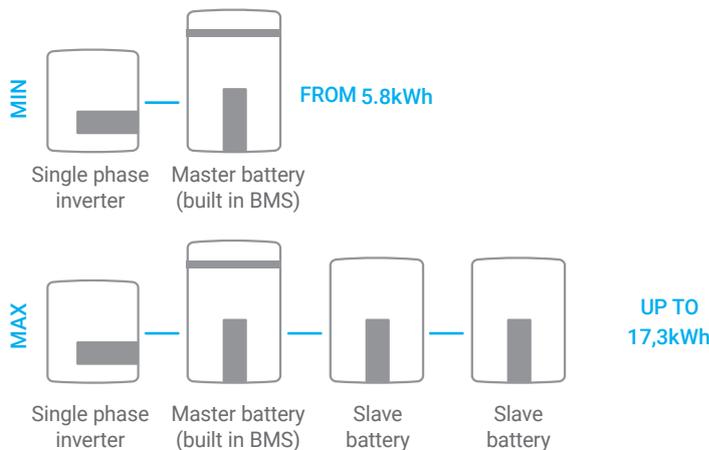


FEATURES

- Single-phase hybrid inverter connected in network (ON GRID) with battery management storage and emergency function EPS OFF GRID (disconnected from grid)
- High charge and discharge efficiency of the battery, up to 97%
- Management up to 150% of power rated PV input
- Low boot voltage on the photovoltaic field side (greater exploitation of solar energy)
- MPPT optimization function in case of the photovoltaic field shading
- Operating temperature from -35°C to 60°C (with derating above 45°C)
- SPD (overvoltage protection) integrated
- CT (current meter) supplied in endowment
- Possibility of connecting in parallel two inverters
- WiFi module included
- Free website and APP tracking
- Wall mounting brackets, cables and connectors included.

45°C DERATING

IP65 +60°C / -35°C 482x417x181mm (WxHxD) **SINGLE PHASE**



Order code	Description	Power W	MPPT	Emergency Output (UPS)	Power MAX FV
15775	ei-uno 3kW hybrid single phase inverter	3000	2	YES	4500
15770	ei-uno 3,7kW hybrid single phase inverter	3700	2	YES	5500
15771	ei-uno 6kW hybrid single phase inverter	6000	2	YES	9000

	3kW	3.7kW	6kW
DC INPUT			
Max. Power Input of the PV system [Wp]	4500	5500	9000
Max. Input voltage [V]	600	600	600
Starting voltage [V]	90	90	90
Rated input voltage [V]	360	360	360
MPP tracker voltage range [V]	70-550	70~550	70~550
Number of MPP Trackers/Strings per MPP Tracker	2(1/1)	2(1/1)	2(1/1)
Maximum input currents (input A/input B) [A]	16/16	16/16	16/16
Maximum short-circuit current (input A/input B) [A]	20/20	20/20	20/20
AC INPUT and OUTPUT (Inverter connected to the grid)			
Rated AC OUTPUT power [W]	3000	3680	6000
AC OUTPUT rated current [A]	14.4	16	26.1
Max. Apparent Power AC OUTPUT [VA]	6300	3680	6600
Max. AC OUTPUT current [A]	14.4	16	28.6
Max. Apparent AC Input Power [VA]	6300	7360	9200
Max. AC current input [A]	27,4	32	40
Rated voltage AC [V]	220/230/240		
Nominal grid frequency / grid frequency range [Hz]	50/60		
Power factor adjustment range	From 0.8 inductive to 0.8 capacitive		
THDi (rated power) [%]	<2		
BATTERY DATA			
Battery Type	Lithium iron battery LiFePO4		
Battery voltage range [V]	80-480		
Maximum continuous charge/discharge current [A]	30		
EPS AC OUTPUT (Inverter disconnected from the grid in blackout conditions)			
Rated output power [W]	3000	3680	6000
Peak apparent power [VA, s]	3600	4400, 60	7200, 10
Maximum current that can be supplied	13	16	26.1
Rated voltage [V]/Frequency [Hz]	230; 50/60		
THD with resistive load [%]	<2		
Switching time ON-GRID → OFF GRID in case of blackout	Internal switch <10ms;external switch<100ms		
Parallel operation	SI		
SYSTEM DATA			
Maximum efficiency [%]	97.6		
Euro efficiency [%]	97.0		
Battery charge/discharge efficiency [%]	95.0/95.0		
Standby consumption [W] @Night	<3		
IP degree of protection	IP65		
Operating temperature range [°C]	-35~+60 (reduction a 45°C)		
Maximum operating altitude [m]	<3000		
Humidity [%]	0-100		
Typical noise emission [dB]	<30		
Storage temperature [°C]	-40~+65		
Dimensions [WxHxD] [mm]	482x417x181		
Weight [kg]	24		
Inverter cooling mode	Natural convection		
Communication interfaces	CT (current meter) / COM RS485 / BMS port for battery connection (CAN, RS485) / CAN port (for connecting several inverters together) / port for WiFi or Ethernet module / USB for SW update / DRM (Demand Response Mode) port for network manager control		
STANDARD			
Safety	EN/IEC62109-1/-2		
EMC extension	EN61000-6-1/2/3/4;EN61000-3-2/3/n/12		
Certification	VDE4105 /G99 /G98/AS4777 / EN50549/ CEI 0-21 / IEC61727 RD1699/UNE 206007-1/NRS 097-2/VDE0124		

- EPS: Emergency Power Supply, output that is activated in case of a blackout by powering the loads connected in AC at 230V, using battery energy, if available
- BMS: Battery Management System, electronic battery controller, incorporated in the battery packs
- DRM: Demand Response Mode, standard and interface for any control of the inverter by the public grid operator

Three-phases inverter: ei-tre

energy storage systems

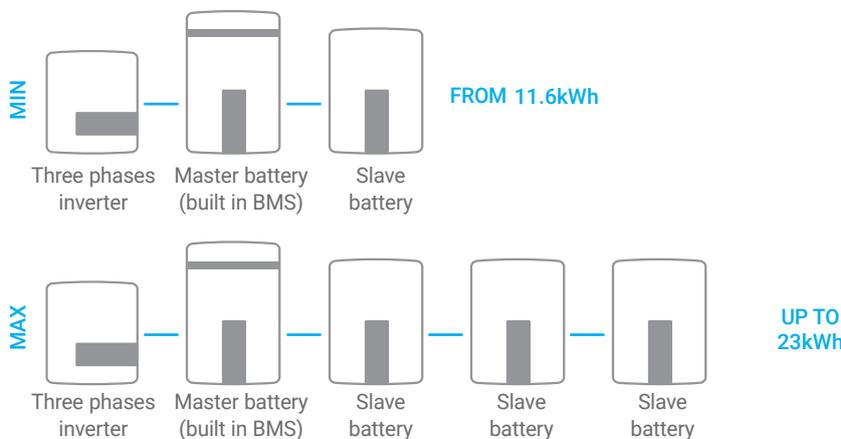


FEATURES

- Grid-connected three-phases hybrid inverter (ON GRID) with battery management accumulation and emergency function EPS OFF GRID (disconnected from grid)
- High charge and discharge efficiency of the battery, up to 97.5%
- Management up to 150% of power rated PV input
- Low start-up voltage on the photovoltaic field side (greater use of solar energy)
- MPP optimization function in case of field shading photovoltaic
- Operating temperature from -35°C at 60°C (with derating above 45°C)
- SPD (overvoltage protection) integrated
- CT (current meter) supplied in endowment
- Possibility to connect in parallel up to 10 inverters
- WiFi module included
- Free website and APP tracking
- Wall mounting brackets, cables and connectors included

45°C DERATING

IP65 +60°C / -35°C 503x503x199mm (WxHxD) **THREE PHASES**



Order code	Description	Power W	MPPT	Emergency output (UPS)	Power MAX PV
15772	ei-tre 8kW hybrid three phases inverter	8000	2	YES	12000
15773	ei-tre 10kW hybrid three phases inverter	10000	2	YES	15000
15774	ei-tre 15kW Hybrid three phases inverter	15000	2	YES	18000

	8kW	10kW	15kW
DC INPUT			
Max. Power Input of the PV system [Wp]	12000(A:7000/B:5000)	15000 (A:9000/B:6000)	18000 (A:11000/B:7000)
Max. Input voltage [V]	1000	1000	1000
Starting voltage [V]	200	200	200
Rated input voltage [V]	640	640	640
MPP tracker voltage range [V]	180~950	180~950	180~950
Number of MPP Trackers/Strings per MPP Tracker	2(2/1)	2(2/1)	2(2/1)
Maximum input currents (input A/input B) [A]	26/16	26/16	26/16
Maximum short-circuit current (input A/input B) [A]	30/20	30/20	30/20
AC INPUT and OUTPUT (Inverter connected to the grid)			
Rated AC OUTPUT power [W]	8000	10000	15000
AC OUTPUT rated current [A]	11.6	14.5	21.8
Max. Apparent Power AC OUTPUT [VA]	8800	11000	15000
Max. AC OUTPUT current [A]	12.9	16.1	24.1
Max. Apparent AC Input Power [VA]	16000	20000	20000
Max. AC current input [A]	25.8	32.0	32.0
Rated voltage AC [V]	415/240; 400/230; 380/220		
Nominal grid frequency / grid frequency range [Hz]	50/60		
Power factor adjustment range	From 0.8 inductive to 0.8 capacitive		
THDi (rated power) [%]	<3		
BATTERY DATA			
Battery Type	Lithium-ion battery		
Battery voltage range [V]	180~650		
Maximum continuous charge/discharge current [A]	30		
EPS AC OUTPUT (Inverter disconnected from the grid in blackout conditions)			
Rated output power [W]	8000	10000	15000
Peak apparent power [VA, s]	12000,60s	15000,60s	16500, 60s
Maximum current that can be supplied	11.6	14.5	21.8
Rated voltage [V]/Frequency [Hz]	400/230; 380/220; 50/60		
THD with resistive load [%]	<3		
Switching time ON-GRID → OFF GRID in case of blackout	<10ms		
Parallel operation	YES,10		
SYSTEM DATA			
Maximum efficiency [%]	98.00		
Euro efficiency [%]	97.70		
Battery charge/discharge efficiency [%]	95.0/95.0		
Standby consumption [W] @Night	<40W for hot standby <5W cold standby		
IP degree of protection	IP65		
Operating temperature range [°C]	-35~60 (reduction at +45°C, reduction charge +35°C)		
Maximum operating altitude [m]	3000		
Humidity [%]	0-100		
Typical noise emission [dB]	<35	<35	<45
Storage temperature [°C]	-40~+70		
Dimensions [WxHxD] [mm]	503x503x199		
Weight [kg]	30		
Inverter cooling mode	natural convection	blower	
Communication interfaces	CT (current meter) / COM RS485 / BMS port for battery connection (CAN, RS485) / CAN port (for connecting several inverters together) / port for WiFi or Ethernet module / USB for SW update / DRM (Demand Response Mode) port for network manager control		
STANDARD			
Safety	ENZIEC62109-1/-2		
EMC extension	EN61000-6-1/2/3/4; EN61000-3-2/3/U/12		
Certification	VDE4105/ G99/ G98/ AS4777/ EN50549/ CEI 0-21/ CEI 0-16/ IEC61727/ VDE 0124		

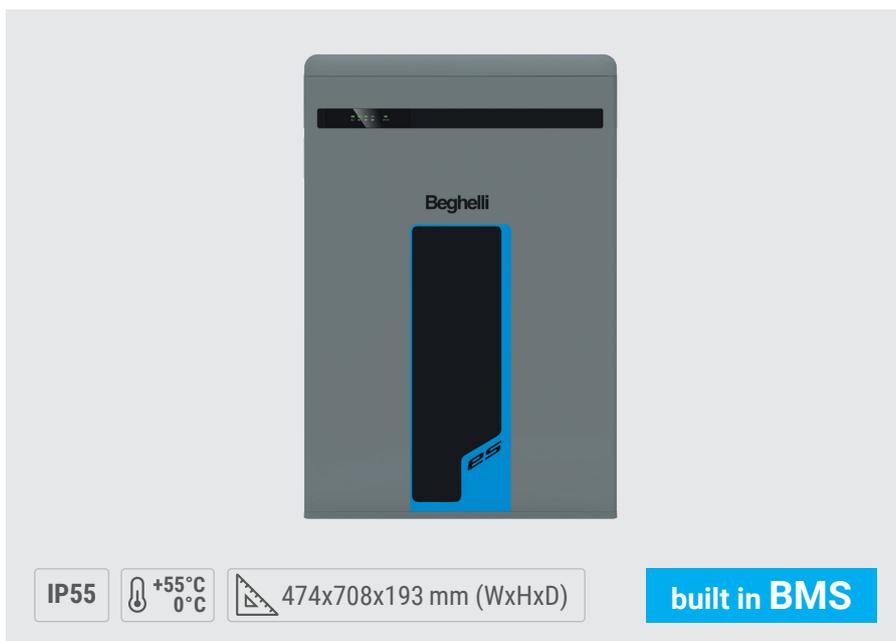
EPS: Emergency Power Supply, output that is activated in case of a blackout by powering the loads connected in AC at 230V using, if available, battery energy

- BMS: Battery Management System, electronic battery controller, incorporated in the battery packs

- DRM: Demand Response Mode, standard and interface for any control of the inverter by the public grid operator

es-master batteries

energy storage systems



FEATURES

- lithium iron (LiFePO4) high safety batteries with high reliability BMS
- Lifetime greater than 6000 cycles (more than 16 years with one cycle a day)
- Optimized to work with single-phase and three-phases hybrid inverters
- Intelligent management to avoid the overdischarge of the batteries
- Light bar with indicator of state of charge and operation
- Floor or wall mounting
- Wall mounting brackets, cables and connectors included

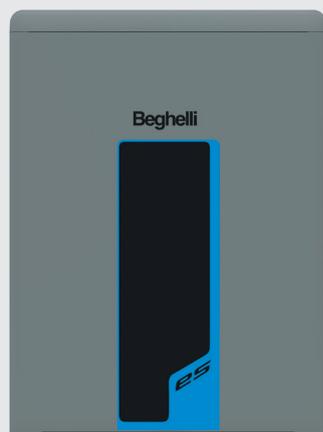
BUILT-IN BATTERY

Nominal tension	115.2
Operating voltage [V]	100~131
Battery Type	LiFePO4
Nominal capacity [kWh]	5.8
Usable capacity [kWh]	5.1
Battery charge/discharge efficiency	95%
Standard power [kW]	2.8
Maximum power [kW]	4.0
Recommended charge/discharge current [A]	25
Maximum charge/discharge current [A]	35
Maximum Depth of Discharge (DOD)	90%
Charge/discharge cycles	>6000 cycles
Warranty [Year]	10
Available operating temperature range [°C]	0~55
Operating temperature range at full load [°C]	5~48
Humidity [%]	5~95
Altitude [m]	Under 2000
Protection	IP55
Communication interface from inverter to BMS	CAN2.0
Battery to Battery/BMS	RS485
Data collection port / FW UPDATE	CAN2.0
Reset	Button
ON/OFF switch	Button*1+ Switch*1
Safety	CE/TUV(IEC62619)/UL1973/FCC/UN38.3
Transport classification	UN3840
Classification of hazardous materials	9 Class
Test requirement for transport	UN38.3
Dimensions (WxHxD) [mm]	474x708x193
Weight kg	72.2

Up to 4 batteries, one has to be master

	Order code	Description	Capacity kWh	BMS	Cycles	Charge and discharge efficiency
	15851	es-master batteria BMS 5,8kWh	5,8	si	>6000	95%

es-slave batteries



IP55

+55°C
0°C

474x647x193 mm (WxHxB)

FEATURES

- Lithium iron (LiFePO4) high safety batteries to expand the capacity of the es master module (expansion with max 3 es slaves) or of the **BMS** (expansion with max 8 es slaves)
- Lifetime greater than 6000 cycles (more than 16 years with one cycle a day)
- Optimized to work with single-phase and three-phases hybrid inverters
- light indicator for Operating status
- Floor or wall mounting
- Wall mounting brackets, cables and connectors included

ADDITIONAL BATTERIES:	2 nd BATTERY	3 rd BATTERY	4 th BATTERY
Nominal tension	230.4	345.6	460.8
Operating voltage [V]	200~262	300~393	400~524
Battery Type	LiFePO4	LiFePO4	LiFePO4
Nominal capacity [kWh]	11.5	17.3	23.0
Usable capacity [kWh]	10.4	15.5	20.7
Battery charge/discharge efficiency	95	95	95
Standard power [kW]	5.7	8.6	11.5
Maximum power [kW]	8.0	12.0	16.1
Recommended charge/discharge current [A]	25	25	25
Maximum charge/discharge current [A]	35	35	35
Maximum Depth of Discharge (DOD)	90%	90%	90%
Charge/discharge cycles	>6000 cycles	>6000 cycles	>6000 cycles
Warranty [Year]	10	10	10
Available operating temperature range [°C]		0~55	
Operating temperature range at full load [°C]		5~48	
Humidity [%]		5~95	
Altitude [m]		Under 2000	
Protection		IP55	
Battery to Battery/BMS		RS485	
Data collection port / FW UPDATE		CAN2.0	
Reset		Button	
ON/OFF switch		Button*1+ Switch*1	
Safety		CE/TUV(IEC62619)/UL1973/FCC/UN38.3	
Transport classification		UN3840	
Classification of hazardous materials		9 class	
Test requirement for transport		UN38.3	
Dimensions (WxHxD) [mm]		474x647x193	
Weight kg		68.5	

Order code	Description	Capacity kWh	BMS	Cycles	Charge and discharge efficiency
15852	es-slave batteria 5,8kWh	5,8	no	>6000	95%

Battery Management System: BMS



The charge monitoring system battery (commonly referred to as Battery Management System or BMS) allows to manage intelligently the autonomy and security of an accumulation system.

The main purpose of the BMS is the optimal battery management thanks to cell balancing to get the best possible performance in terms of duration, capacity and autonomy.

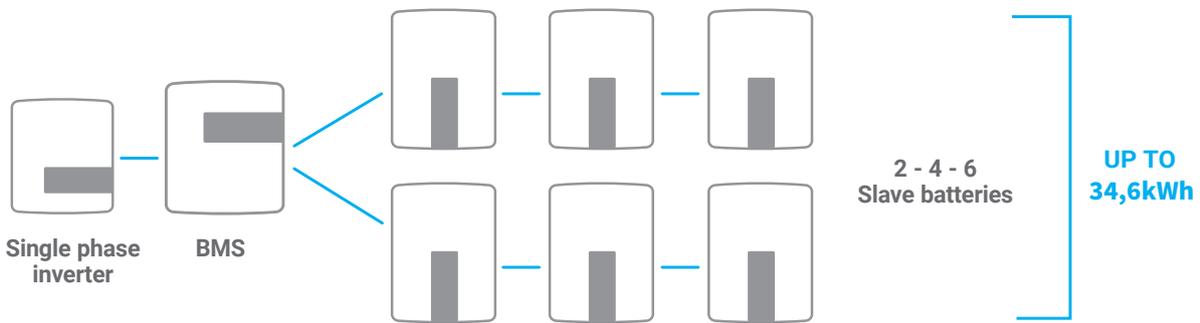
FEATURES

- Allows to pair up to 6 parcels batteries to a single-phase inverter and up to 8 battery packs to a three-phases inverter
- Extends storage capacity up to a maximum of **34.6 kWh** for single-phase and **46.1 kWh** for three-phases
- In the case of parallel (A+B) the packs must always be in even number
- Wall mounting brackets, cables and connectors included

IP55

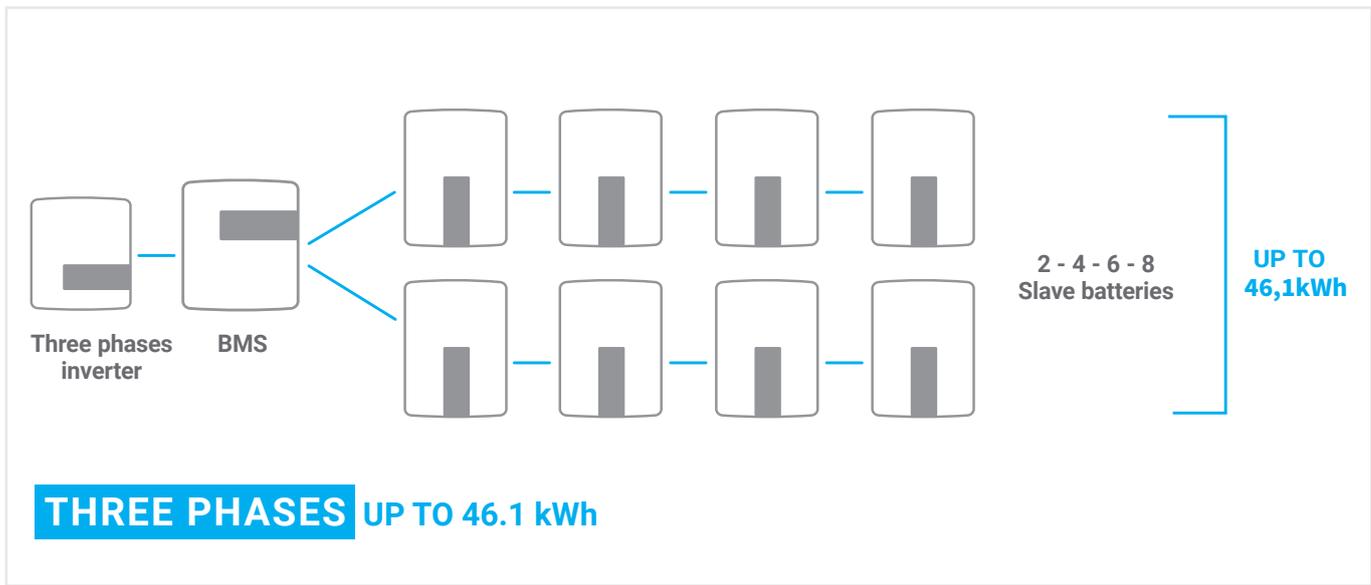
+55°C
0°C

368x310x140 mm (WxHxD)



SINGLE PHASE UP TO 34.6 kWh

Order code	Description	Management Capacity kWh	MPPT	Max batteries single phase	Max batteries three phases
15853	BMS	up to 46,1	-	up to 6	up to 8



ENVIRONMENTAL PERFORMANCE

Operating charge/discharge temperature range [°C]	0 ~ 55
Charge/discharge temperature range at full load [°C]	5 ~ 48
Storage temperature [°C]	-20 ~ +55 (3 months) 0 ~ 40 (1 year)
Humidity [%]	0 ~ 100
Altitude [m]	2000
Protection	IP55

COMMUNICATION

Communication interface from inverter to BMS	CAN2.0/RS485
Communication interface from BMS to batteries	RS485
BMS status indicator	3 LED (1 for each subset + 1 summary)
Master control capacity indicator	2*4 LED (25%, 50% 75%, 100%)
Battery module LEDs	2 LED
On/off switch	1 button + 1 switch

CERTIFICATION

Safety	IEC 62477-1, IEC 61439-1, IEC 61439-2
EMC extension	IEC 61000-6-1/2/3/4
Compliance with transport regulations	UN38.3

GENERAL

Dimensions (WxHxD) [mm]	368x310x140
Weight kg]	5.2
Expected life [years]	5

NOMINAL CHARACTERISTICS (of battery configurations)

	1MOD	2MOD.	3MOD.	4MOD.	2MOD. PARALL	4MOD. PARALL	6MOD. PARALL	8MOD. PARALL
Rated voltage [V]	115.2	230.4	345.6	460.8	115.2	230.4	345.6	460.8
Operating voltage [V]	100-131	200-262	300-393	400-524	100-131	200-262	300-393	400-524
Total energy [kWh]	5.8	11.5	17.3	23	11.5	23	34.6	46.1
Standard power [kW]	2.9	5.8	8.7	11.6	2.9	5.8	8.7	11.6
Maximum power [kW]	4.0	8.0	12.0	16.0	4.0	8.0	12.0	16.0
Pollution degree	PD3							
Overvoltage category (OVC)	II							
Protection class	I							
Recommended charge/discharge current [A]	25							
Maximum charge/discharge current [A]	35							
Usable charge/discharge cycles (at 90% DOD depth of discharge, at 25°C)	6000 Cycles							

Note: With BMS, master battery is no longer needed. Single-phase inverters can be connected to up to 6 batteries, three-phases inverters can be connected to up to 8 batteries.

GPRS 4G module



Thanks to the 4G GPRS module it is possible to connect the system to the telephone network even where it is not present in mode wired or WiFi. Remote monitoring and management via App and dedicated website.

Order code	Description	Power W	MPPT	Emergency Output (UPS)	Power MAX PV
15332	GPRS-4G module	-	-	-	-

LAN module



Thanks to the LAN module, it is possible to connect the system to the LAN network to monitor and manage it even remotely via the App and dedicated website.

Order code	Description	Power W	MPPT	Emergency Output (UPS)	Power MAX PV
15331	Lan module	-	-	-	-

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energy storage systems

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