

blueplanet.
powerful solutions.



“THE NEW BLUEPLANET 50.0 TL3 IS A REAL GAME-CHANGER.”

Never before have I seen a more compact or more economic inverter guaranteeing you optimised TCO.”

Mustafa Özer, Application Engineer Power Plant Solutions
13 years of experience at KACO new energy



Dear readers,

“Space, the final frontier. These are the voyages of the photovoltaic pioneer KACO new energy. Its continuing mission: to explore photovoltaic energy, to seek out new forms of energy supply and to make it available to all civilizations, to boldly go where no one has gone before.” Many light years away from the imaginary world of the old carbon-based technology henchmen, we are advancing into a world of thought to secure life in harmony with nature for all future generations.

If I review the last 17 years in photovoltaic history, I recognise just how much we all, as solar pioneers, have achieved for the world against all odds. When we set out in 1999 with the firm objective of establishing a photovoltaic-based energy supply in Germany, we really did enter realms of thought that had never previously been explored. Only by “thinking outside the box” were we able to shape such bold thoughts about photovoltaic energy supply.

Thoughts that not too long ago were dismissed by high-ranking officials of the old-guard energy sector, like Jürgen Großmann (the boss of German utility RWE AG), who stated that photovoltaic will NEVER contribute more than 1% to energy supply in Germany. That was around 2008, and we at KACO new energy had already been enjoying completely CO₂-neutral production for two years.

First photovoltaic was only for the green weirdos, then it was too weak, then it was too expensive, then it was responsible for grid instability; when all this was finally exposed as being a pack of lies, then it was only really dangerous for the established carbon-atomic complex.

So we thought, sooner or later these times will pass, but we underestimated the obstinate opponents of economic, CO₂ neutral energy supply. Yes, these have even flocked together in Germany in a political party called the AfD (Alternatives for Germany), which actually personifies energy-policy idiocy with the intention of getting it politically established. As part of its party manifesto, it wants to free CO₂ of its “bad image”: “Car-

bon dioxide is not a harmful substance, it is an indispensable component of all life.” The severe storms in Europe at the end of May and beginning of June, yet again with numerous fatalities and damages running into the millions, don’t need to be commented in this connection... Maybe the AfD party has some comfort for the flood victims too: “Water is not a harmful substance, it is an indispensable component of all life.”

In the face of such “popular” argumentation, the established parties don’t want to stand on the sidelines and so they too are fighting off the planetary expansion of the cheapest and environmentally-friendliest type of energy generation, photovoltaics, with great vigour.

So, what does a technological company like KACO new energy do? The same as in real life, there are only two possibilities: fight or flee. On the political side, KACO new energy has decided to position itself for the fight against a wrongful energy-policy and technological ignorance. On the technological front, to fight against cheap technology and to fight for innovation leadership. So, following our company philosophy: better two fights than one flight.

You can’t follow the political fight against energy ignorance in the new catalog. You can, however, explore here the defence of our global innovation leadership with an outstanding product range from the blueplanet TL1 series for residential PV right up to a 2.2 MVA compact station for large-scale applications. Follow us to new technological galaxies. Captain’s Log, KACO new energy, Stardate 2016.06.

Sincerely,

Ralf Hofmann,
Managing Director and Majority Shareholder
KACO new energy



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History.

100 years of innovation and quality

1914 The factory was founded in Heilbronn by Gustav Bach, Albert Hirth and Gustav Klein. The company's purpose: The manufacture of engine gaskets.

1915 The company was registered in the Commercial Register as Kupfer-Asbest Co., Gustav Bach. Gustav Bach took over management of the company.

1934 The electro technical range already included accessories for radios.

1939 Alongside engine gaskets and shaft seals, the product range focused on choppers, the predecessors of today's inverters.

1944 The main factory in Heilbronn and branches in Böckingen, Unterheinriet and Sontheim were destroyed in the war on December 4.

1948 Gasket production was resumed. Chopper and inverter production was expanded. The destroyed factories were rebuilt and extensive improvements to the main plant in Heilbronn were undertaken.

1950 KACO was the world's largest manufacturer of electromechanical choppers.

1953 The first thyristor inverter was manufactured by KACO.

1964 The use of transistors eliminated the need for choppers. The foresighted development of small relays guaranteed seamless continuation in electrical production. The emphasis moved to the production of electrical components, and in particular to, relays, pin-and-socket connectors, inverters and printed circuit boards.

1970 The previous general partnership was reorganised into two companies, GmbH + Co. KGs. This was the beginning of Kupfer-Asbest-Co. Gustav Bach, Heilbronn, and Bach & Co., KACO Elektrowerk, Heilbronn.

1978 The company Kupfer-Asbest-Co. Gustav Bach was renamed KACO GmbH + Co. Heilbronn (KACO Dichtungswerke). The Bach & Co. company was renamed BACH GmbH + Co. Heilbronn (KACO Elektrowerk).

1983 KACO acquired a share in the Japanese company Tokusaku in Akita and also founded a new company based in St. Michael, Austria, called KACO Dichtungstechnik Ges.m.b.H.

1988 Start-up of the new company KACO Elektrotechnik Ges.m.b.H. in Tamsweg, Austria.

1993 KACO became part of the Brazilian Sabo Group.

1994 First developments in photovoltaics. The former KACO Elektrowerk broke away from the KACO Group. Registered under the new name of KACO ELEKTROTECHNIK Bach GmbH + Co, the business was built on 30 years of experience in the field of relay technology. The "KACO" trademark represented impeccable quality standards, confirmed by certification according to DIN EN ISO 9001/2.

1997 KACO Elektrotechnika s.r.o was founded in Kezmarok, Slovakia.





1998/99 KACO GERÄTETECHNIK GmbH. The expanding Gerätetechnik profit center, together with ten employees, separated from the KACO Elektrotechnik company and founded KACO Gerätetechnik GmbH based in Sontheim, Heilbronn. Dipl.-Ing Ralf Hofmann took over management of the new company. KACO Elektrotechnik closed shortly afterwards. KACO Gerätetechnik GmbH launched the first transformerless PV inverter. This achieved higher energy yields than circuits with transformers, and furthermore guaranteed reliable operation.

2003 KACO Gerätetechnik GmbH moved to its new site in Neckarsulm

2005 Opening of KACO new energy USA in San Francisco, California.

2006 Plant 3, a production center, opened in Neckarsulm. The subsidiary in Greece was founded.

2007 Opening of KACO new energy South Korea, initially as a research and development team for central inverters.

2009 KACO Gerätetechnik GmbH was renamed KACO new energy GmbH and a sales office was founded in China. Powador 02 series, the 2nd generation of galvanically isolated string inverters

2010 Subsidiaries were founded in France and Italy. The automotive division was renamed Energy Systems Technology Division with products such as Powador-gridsave, Powador-micro-grid and the solar-powered residential area in Weinsberg.



2011 A scalable factory was constructed at the site in Neckarsulm. As a result, the peak production capacity of KACO new energy increased to ten gigawatts. Opening of KACO new energy Canada.

2012 KACO new energy Dubai (ZEA) was opened. Opening of KACO new energy UK.

2013 In San Antonio, Texas, a new manufacturing site opened and construction began on the then largest solar utility power plant in the world (400 MW) using the Integrated Power Station (photo). KACO new energy South Africa opened.



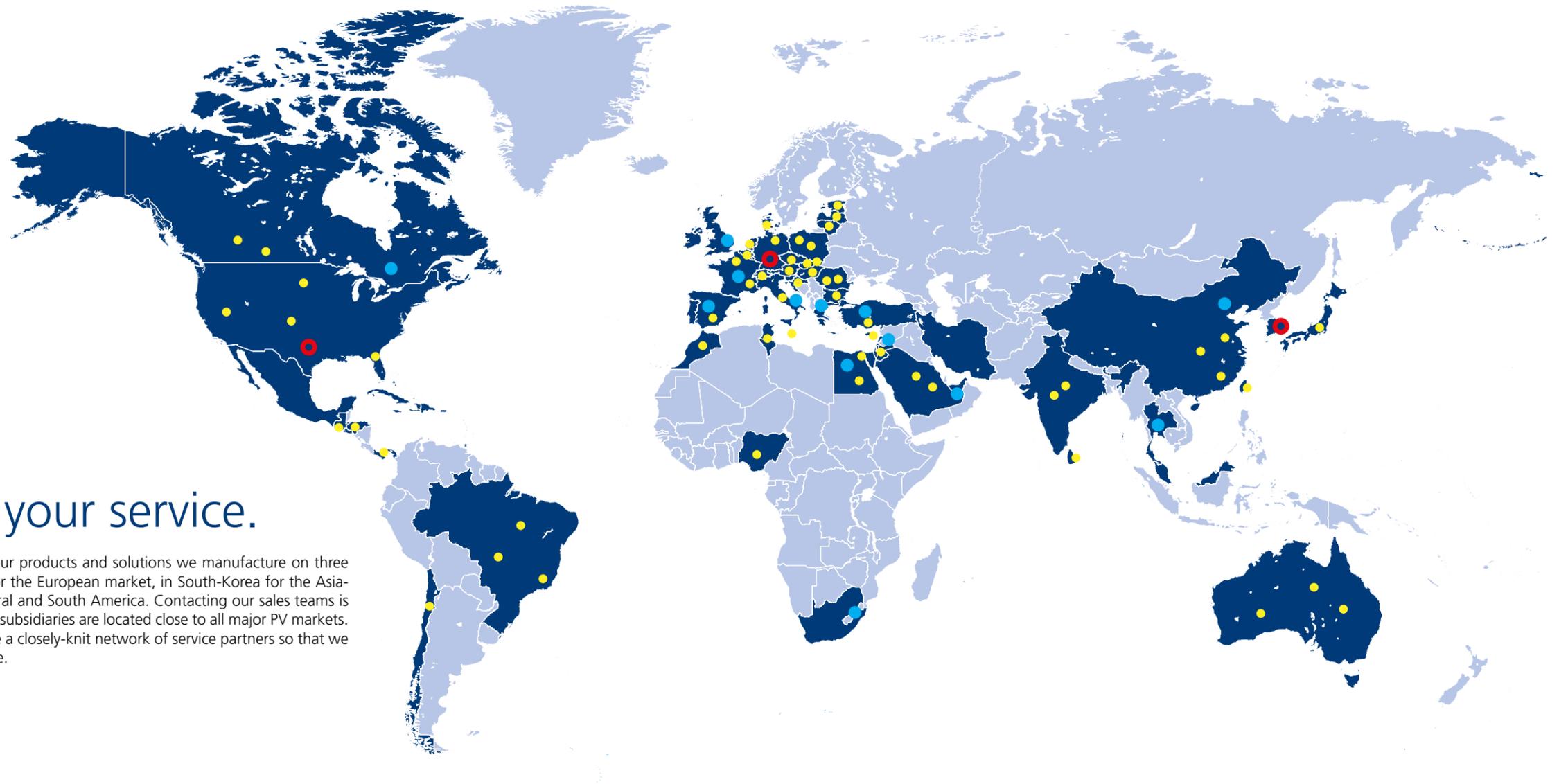
2014 Double anniversary: 100 years KACO and 15 years KACO new energy. Opening of the Turkish sales offices. Re-location of the US headquarters to San Antonio.

2015 Certified to ISO 14001 standards for exemplary environmental management and re-certification to ISO 9001. KACO new energy Thailand opened.

2016 KACO new energy Jordan opened. Sales activities were promoted in North Africa, South America and the Asia-Pacific region.

We turn passion into power.

With a dense network of facilities on four continents, KACO new energy is today one of the largest manufacturers of solar PV inverters worldwide. The company is driven by a desire to maximise the use and optimise the performance of its products all over the world. This means manufacturing according to German quality standards not only on our national sites but, also in all of our international locations. KACO new energy was the first vendor to offer a seven-year warranty for its inverters. The age of the safe, clean, decentralised energy supply is dawning and brings with it increasingly complex challenges. With this in mind, our developers and designers are working on new solutions which will really promote and accelerate this process around the globe. Among our most recent innovations are complete solutions for the management of electric, as well as thermal accumulators that are charged with solar power, and the KACO FuelSave, our intelligent approach to bringing together PV and efficient diesel technology in hybrid power plants. Additionally: The Ultraverter system, which combines the advantages of DC optimizers as well as conventional micro- and string inverters into a revolutionary concept for the simple, safe, efficient construction of smaller residential and commercial PV plants; awarded an Innovation Prize at the „30th Photovoltaic Solar Energy Symposium“.



Worldwide at your service.

In order to satisfy the global demand for our products and solutions we manufacture on three continents. In Germany we manufacture for the European market, in South-Korea for the Asia-Pacific region, and in Texas for North, Central and South America. Contacting our sales teams is just a stone's throw away: our international subsidiaries are located close to all major PV markets. Apart from our own locations, we also have a closely-knit network of service partners so that we can get to you quickly should the need arise.

Canada	☎ \$
USA	☎ 🏭 \$
Mexico	☎ \$
Brazil	☎ \$
Germany	☎ 🏭 \$
Spain	☎ \$
France	☎ \$
United Kingdom	☎ \$
Italy	☎ \$
Poland	☎ \$
Greece	☎ \$

Turkey	☎ \$
South Africa	☎ \$
Egypt	☎ \$
Tunisia	☎ \$
Jordan	☎ \$
United Arab Emirates	☎ \$
Saudi Arabia	☎ 🏭 \$
China	☎ \$
India	☎ \$
Thailand	☎ \$
South Korea	☎ 🏭 \$

- 🏭 Production
- \$ Sales
- ☎ Worldwide service network
- Central service hub
- Own service affiliate
- Certified service partner

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Products.

Always the right solution for any type of PV application

Whether for roof systems, solar power plants, power storage or heat storage systems: KACO new energy has solutions to meet every demand for solar energy, allowing you to secure the cost advantages of photovoltaics.

Our blueplanet and Powador lines cover a comprehensive range of on-grid solar PV inverters for solar power systems of every size – from a single-family home to large solar parks with output in the megawatt range. Our solutions for the storage and self consumption of solar power are aimed at anyone who wishes to have maximum freedom from their energy supply or wishes to save costs using intelligent load management. We support the combination of different energy sources with systems for managing the energy of major consumers as well as for PV-diesel hybrid applications. Solutions for system monitoring and grid management round off the portfolio.

Are you involved in Repowering projects? KACO new energy can deliver synchronised solutions to replace existing inverters, regardless of brand, in PV installations of every size.

A guide to selecting from our portfolio

Due to numerous specifications which vary from country to country (reactive power requirements, power limitations, etc.), we made the decision – with the introduction of our blueplanet line – to return to naming devices in terms of AC and not to provide any DC recommendations. During the design phase, the factors for each location must be taken into account for maximum annual yield. The experts are primarily concerned with the input current of the inverters.

Inverters for small PV systems

Single-phase, transformerless inverters by KACO new energy are available in ranges from 3.0 kVA to 5.0 kVA of AC nominal

power. Three-phase inverters without transformers are available between 5.0 kVA and 10.0 kVA.

Inverters for decentrally designed solar parks

Use inverters from the transformerless TL3 series to construct decentral solar systems on commercial rooftops and open areas. The portfolio ranges from 10.0 kVA up to 60.0 kVA inverters and includes versions for thrifty connection plans, or with 3 MPP trackers for complex layouts or “reduced to the max.” for optimised TCO (total cost of ownership).

Central inverters

With respect to central inverters, you can choose from an intelligently gradated power spectrum of 500 to 2200 kVA AC nominal power. Indoor and outdoor variants make them suitable for use in Integrated Power Stations or container solutions

which are designed in line with the specifications you define with our project team.

Criteria to help you decide whether a centralised or decentralised design would work best for your large-scale solar park can be found under the headline “Turnkey solutions”.

With all devices from KACO new energy, you are best equipped for the grid access conditions that apply at your installation location.



blueplanet
3.0 TL1
3.5 TL1
3.7 TL1
4.0 TL1
4.6 TL1
5.0 TL1

2 MPP trackers, wide MPP range

Lightweight, straightforward mounting

Convenient AC and DC cabling thanks to plug-in connectors

Data logger with web server

Graphical display, intuitive menu navigation

Priwatt function for the self-consumption of solar power, ready for storage



Small system? Big convenience. Highest yields!

The transformerless string inverters blueplanet 3.0 TL1 to 5.0 TL1.

Newly developed, and, constructed from scratch, the blueplanet TL1 fulfil each and every requirement expected of modern solar PV inverters for use in residential PV systems: they are light and can be installed quickly; all essential technical features are included in the price; reliable operation and yields are guaranteed.

The finely-differentiated output of the blueplanet TL1 ranges from 3.0 to 5.0 kVA, so that even operators of the smallest PV systems will find the right inverter. The gradation of the output power therefore takes into consideration all current output limits stipulated in European network access provisions.

A wide voltage range starts at as little as 125 V and goes up to 550 V which allows for a multitude of string designs. Having 2 MPP trackers, which can each process the whole AC power, system layout is now a breeze (blueplanet 3.0 TL1 also available with 1 MPPT). Angled roofs or sub-arrays with different orientations? That is no problem for the flexible blueplanet TL1 inverters.

With their low weight, they are almost fun to mount. Using plug-in connectors on the DC and on the AC side, they are just as quickly connected as they are mounted. The inverters incorporate a small, maintenance-free, interior cooler (the blueplanet 3.0 TL1 is fanless!) which achieves uniform cooling without taking in ambient air. That means that the blueplanet TL1 is left completely free to achieve maximum output.

The standard incorporation of RS485, Ethernet and USB ensures elegant communication and convenient monitoring – even more interfaces are optionally available. In order to assure perfect link-up, the inverters have the same integrated data logger and web server as their 3-phase siblings. For commissioning and checking on the current operating data, they also feature the same easy-to-use, clearly laid out, graphical display. An extension module with 4 digital inputs allows performance targets sent by the grid operator via ripple control receiver to be put into action by the inverters themselves; this does away with an in-

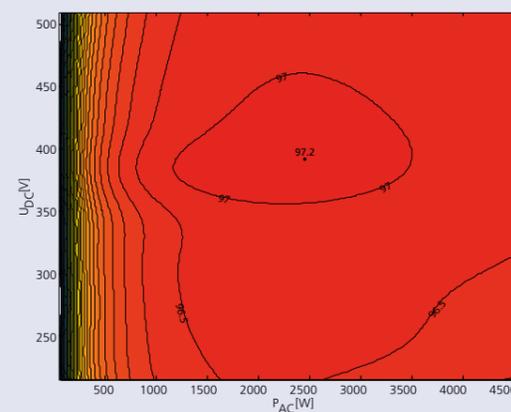
termediate data logger. Please find more information about the extension module on our website.

If you want to use your self-generated solar power in your own home, the blueplanet TL1 also come with our Priwatt function for managing self-consumption.

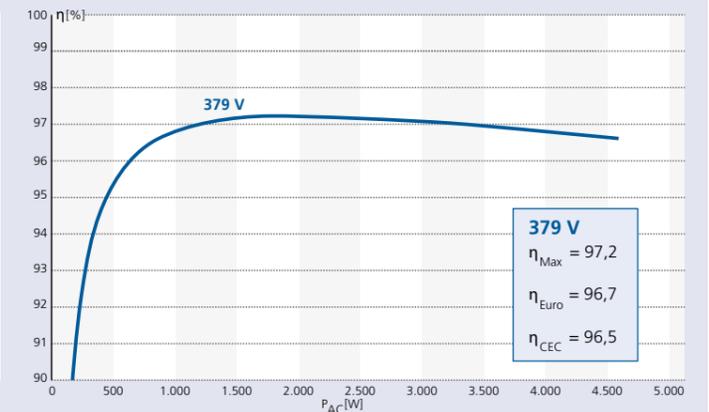
Your declaration of solar independence becomes complete when you use an intelligent energy storage system; it allows you to use your own clean energy whenever you want to. Fitted with a blueplanet TL1, your private solar power plant can be upgraded with a storage system at any time. And, our blueplanet gridsave eco 5.0 TR1 battery inverter will take care of the energy management of your PV storage system too. Anything less would be a thing of the past!

Graphical display of efficiency

3D efficiency diagram for blueplanet 4.6 TL1



Efficiency characteristic curve for blueplanet 4.6 TL1



Technical data

blueplanet 3.0 TL1 | 3.5 TL1 | 3.7 TL1 | 4.0 TL1 | 4.6 TL1 | 5.0 TL1

Electrical data	3.0 TL1 M1	3.0 TL1	3.5 TL1
DC input			
MPP range@Phom	280 V ... 510 V	140 V ... 510 V	165 V ... 510 V
Operating range	125 V - 550 V	125 V - 550 V	125 V - 550 V
Min. DC voltage/starting voltage	125 V/150 V	125 V/150 V	125 V/150 V
No-load voltage	600 V ¹⁾	600 V ¹⁾	600 V ¹⁾
Max. input current	1 x 11,0 A	2 x 11,0 A	2 x 11,0 A
Number of MPP trackers	1	2	2
Max. power/tracker	3.1 kW	3.1 kW	3.6 kW
Number of strings	1	2	2
AC output			
Rated output	3 000 VA	3 000 VA	3 450 VA
Supply voltage	230 V (1/N/PE)	230 V (1/N/PE)	230 V (1/N/PE)
Rated current	13.0 A	13.0 A	15.0 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
cos phi	0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive
Number of grid phases	1	1	1
General electrical data			
Max. efficiency	97.2 %	97.2 %	97.2 %
Europ. efficiency	96.5 %	96.5 %	96.4 %
Night consumption	3 W	3 W	3 W
Circuitry topology	transformerless	transformerless	transformerless
Mechanical data			
Display	graphical display + LEDs	graphical display + LEDs	graphical display + LEDs
Control units	4-way navigation + 2 buttons	4-way navigation + 2 buttons	4-way navigation + 2 buttons
Interfaces	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI
Fault signalling relay	potential-free NOC max. 30 V/1 A	potential-free NOC max. 30 V/1 A	potential-free NOC max. 30 V/1 A
Connections	DC: SUNCLIX AC: connection plug	DC: SUNCLIX AC: connection plug	DC: SUNCLIX AC: connection plug
Ambient temperature	-25 °C ... +60 °C ²⁾	-25 °C ... +60 °C ²⁾	-25 °C ... +60 °C ²⁾
Cooling	natural convection	natural convection	natural convection
Protection class	IP54	IP54	IP54
Noise emission	< 35 dB(A)	< 35 dB(A)	< 35 dB(A)
DC switch	integrated	integrated	integrated
Casing	innovative ASA/PC casting	innovative ASA/PC casting	innovative ASA/PC casting
H x W x D	560 x 367 x 227 mm	560 x 367 x 227 mm	560 x 367 x 227 mm
Weight	15 kg	16.5 kg	18 kg
Certifications			
Safety	EN 61000-6-1/-2/-3, IEC 62109-1/-2		
Grid compliance	VDE-AR-N 4105, VDE0126-1-1, ÖVE/ÖNORM E 8001, UTE C 15-712-1, G83-2, G59/3, CEI-021, EN 50438, C10/11, ... for more see homepage/download area		

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾ Feed in starts at less than 550 V. ²⁾ Power derating at high ambient temperatures.

3.7 TL1	4.0 TL1	4.6 TL1	5.0 TL1
170 V ... 510 V	185 V ... 510 V	215 V ... 510 V	235 V ... 510 V
125 V - 550 V	125 V - 550 V	125 V - 550 V	125 V - 550 V
125 V / 150 V	125 V / 150 V	125 V / 150 V	125 V / 150 V
600 V ¹⁾	600 V ¹⁾	600 V ¹⁾	600 V ¹⁾
2 x 11.0 A	2 x 11.0 A	2 x 11.0 A	2 x 11.0 A
2	2	2	2
3.8 kW	4.1 kW	4.7 kW	5.1 kW
2	2	2	2
3 680 VA	4 000 VA	4 600 VA	5 000 VA
230 V (1/N/PE)	230 V (1/N/PE)	230 V (1/N/PE)	230 V (1/N/PE)
16.0 A	17.5 A	20.0 A	21.7 A
50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive
1	1	1	1
97.2 %	97.2 %	97.2 %	97.2 %
97.9 %	97.9 %	96.7 %	96.6 %
3 W	3 W	3 W	3 W
transformerless	transformerless	transformerless	transformerless
graphical display + LEDs	graphical display + LEDs	graphical display + LEDs	graphical display + LEDs
4-way navigation + 2 buttons	4-way navigation + 2 buttons	4-way navigation + 2 buttons	4-way navigation + 2 buttons
standard: 2xEthernet, USB, RS485 Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485 Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485 Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485 Error relay optional: 4-DI
potential-free NOC max. 30 V/1 A	potential-free NOC max. 30 V/1 A	potential-free NOC max. 30 V/1 A	potential-free NOC max. 30 V/1 A
DC: SUNCLIX AC: connection plug	DC: SUNCLIX AC: connection plug	DC: SUNCLIX AC: connection plug	DC: SUNCLIX AC: connection plug
-25 °C ... +60 °C ²⁾	-25 °C ... +60 °C ²⁾	-25 °C ... +60 °C ²⁾	-25 °C ... +60 °C ²⁾
maintenance-free interior fan	maintenance-free interior fan	maintenance-free interior fan	maintenance-free interior fan
IP54	IP54	IP54	IP54
< 35 dB(A)	< 35 dB(A)	< 35 dB(A)	< 35 dB(A)
integrated	integrated	integrated	integrated
innovative ASA/PC casting	innovative ASA/PC casting	innovative ASA / PC casting	innovative ASA / PC casting
560 x 367 x 227 mm	560 x 367 x 227 mm	560 x 367 x 227 mm	560 x 367 x 227 mm
18 kg	18 kg	18 kg	18 kg
Certifications			
EN 61000-6-1/-2/-3, IEC 62109-1/-2			
VDE-AR-N 4105, VDE0126-1-1, ÖVE/ÖNORM E 8001, UTE C 15-712-1, G83-2, G59/3, CEI-021, EN 50438, C10/11, ... for more see homepage/download area			C10/11, EN 50438, IEC 61727, IEC 62116, RD 1699, NRS-097

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾ Feed in starts at less than 550 V. ²⁾ Power derating at high ambient temperatures.

blueplanet
 5.0 TL3
 6.5 TL3
 7.5 TL3
 8.6 TL3
 9.0 TL3
 10.0 TL3

NEW

NEW

Up to 98.3 % efficiency

Two MPP trackers, symmetrical and asymmetrical loading possible

Multilingual menu

Graphical display

Data logger with web server

Priwatt function for the self-consumption of solar power, ready for storage



Your quickest way to the highest yields.

The transformerless, three-phase inverters blueplanet 5.0 TL3 to 10.0 TL3.

All of the advantages of the larger 3-phase inverters can now be found in one power class which is just perfect for private roof systems as well as small commercial applications.

The blueplanet 5.0 TL3 to 10.0 TL3 come, without exception, with 2 MPP trackers which can get to grips with all imaginable design configurations of a modular PV generator. As such, each MPP tracker can process the whole AC output. If you also consider the extremely wide input voltage range from 200 V to 950 V, multiple string configurations become possible. So, with these characteristics, the blueplanet TL3 present themselves as the most flexible three-phase inverters in their power class on the market.

The DC and AC periphery of the blueplanet TL3 ensures the quickest cabling thanks to plug-in connectors and the

menu selection is performed conveniently using the graphic display. So that the appliances can stand up to the harshest conditions out in the open, their compact housing is built to IP65 protection class. Nevertheless, weighing just 30 kg they can still be carried easily.

The standard incorporation of RS485, Ethernet and USB ensures elegant communication and convenient monitoring – even more interfaces are optionally available. The data logger and the web server are already integrated as standard! As a result, these inverters offer complete monitoring and strong communication in any environment.

An extension module with 4 digital inputs allows performance targets sent by the grid operator via ripple control receiver to be put into action by the inverters themselves; this does away with an in-

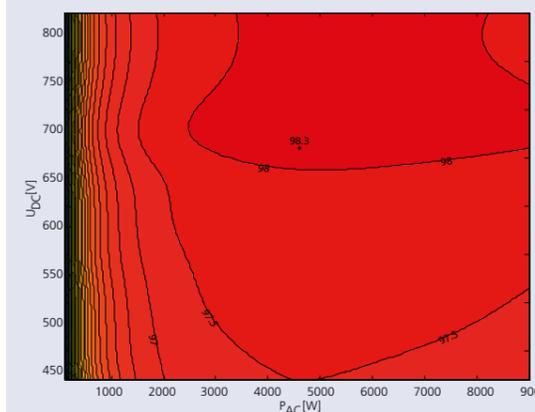
termediate data logger. Please find more information about the extension module on our website.

If you want to use your self-generated solar power in your own home, the blueplanet 5.0 TL3 to 10.0 TL3 also come with our Priwatt function for managing self-consumption.

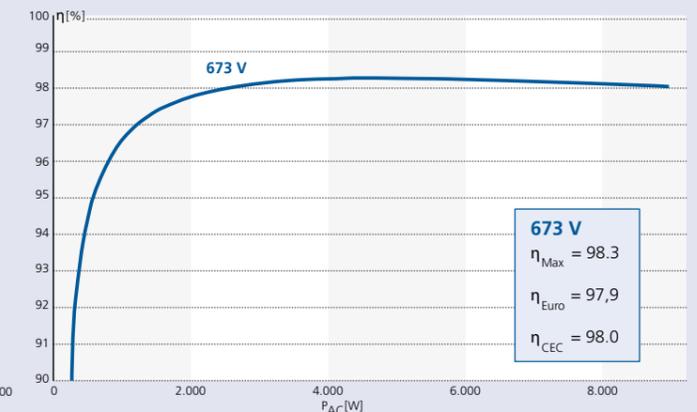
Your declaration of solar independence becomes complete when you use an intelligent energy storage system; it allows you to use your own clean energy whenever you want to. Fitted with these blueplanet TL3, your private solar power plant can be upgraded with a storage system at any time. And, our blueplanet gridsave eco 5.0 TR1 battery inverter will take care of the energy management of your PV storage system too.

Graphical display of efficiency

3D efficiency diagram for blueplanet 9.0 TL3



Efficiency characteristic curve for blueplanet 9.0 TL3



Technical data

blueplanet 5.0 TL3 | 6.5 TL3 | 7.5 TL3 | 8.6 TL3 | 9.0 TL3 | 10.0 TL3

Electrical data	5.0 TL3	6.5 TL3	7.5 TL3
DC input			
MPP range@Phom	240 V ... 800 V	310 V ... 800 V	350 V ... 800 V
Operating range	200 V - 950 V	200 V - 950 V	200 V - 950 V
Min. DC voltage/starting voltage	200 V / 250 V	200 V / 250 V	200 V / 250 V
No-load voltage	1000 V	1000 V	1000 V
Max. input current	2x11.0 A	2x11.0 A	2x11.0 A
Number of MPP trackers	2	2	2
Max. power/tracker	5.2 kW	6.7 kW	7.7 kW
Number of strings	2	2	2
AC output			
Rated output	5000 VA	6500 VA	7500 VA
Supply voltage	acc. to local requirements	acc. to local requirements	acc. to local requirements
Rated current	3x7.25 A	3x9.5 A	3x10.9 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
cos phi	0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive
Number of grid phases	3	3	3
General electrical data			
Max. efficiency	98.3 %	98.3 %	98.3 %
Europ. efficiency	97.4 %	97.6 %	97.7 %
Night consumption	1.5 W	1.5 W	1.5 W
Circuitry topology	transformerless	transformerless	transformerless
Mechanical data			
Display	graphical display + LEDs	graphical display + LEDs	graphical display + LEDs
Control units	4-way navigation + 2 buttons	4-way navigation + 2 buttons	4-way navigation + 2 buttons
Interfaces	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI
Fault signalling relay	potential-free NOC max. 30 V / 1 A	potential-free NOC max. 30 V / 1 A	potential-free NOC max. 30 V / 1 A
Connections	DC: SUNCLIX AC: plug	DC: SUNCLIX AC: plug	DC: SUNCLIX AC: plug
Ambient temperature	-25 °C ... +60 °C ¹⁾	-25 °C ... +60 °C ¹⁾	-25 °C ... +60 °C ¹⁾
Cooling	temperature-dependent fan	temperature-dependent fan	temperature-dependent fan
Protection class	IP65	IP65	IP65
Noise emission	< 45 dB(A)	< 45 dB(A)	< 45 dB(A)
DC switch	integrated	integrated	integrated
Casing	aluminium casting/ innovative ASA/PC	aluminium casting/ innovative ASA/PC	aluminium casting/ innovative ASA/PC
H x W x D	522 x 363 x 246 mm	522 x 363 x 246 mm	522 x 363 x 246 mm
Weight	30 kg	30 kg	30 kg
Certifications			
Safety	EN 61000-6-1/-2/-3, IEC 62109-1/ -2		
Grid compliance	VDE-AR-N 4105, VDE0126-1-1, ÖVE/ÖNORM E 8001, UTE C 15-712-1, G83/2, G59/3, CEI-021, EN 50438, C10/11, ... for more see homepage/download area		

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾ Power derating at high ambient temperatures.

8.6 TL3 NEW	9.0 TL3	10.0 TL3 NEW
DC input		
403 V ... 800 V	420 V ... 800 V	470 V ... 800 V
200 V - 950 V	200 V - 950 V	200 V - 950 V
200 V / 250 V	200 V / 250 V	200 V / 250 V
1000 V	1000 V	1000 V
2 x 11,0 A	2 x 11.0 A	2 x 11.0 A
2	2	2
8,8 kW	8.8 kW	8.8 kW
2	2	2
AC output		
8600 VA	9000 VA	10000 VA
400 V / 230 V (3/N/PE)	acc. to local requirements	acc. to local requirements
3 x 12,5 A	3 x 13.0 A	3 x 14.5 A
50 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive	0.30 inductive ... 0.30 capacitive
3	3	3
General electrical data		
98,3 %	98.3 %	98.3 %
97,9 %	97.9 %	97.9 %
1,5 W	1.5 W	1.5 W
transformerless	transformerless	transformerless
Mechanical data		
graphical display + LEDs	graphical display + LEDs	graphical display + LEDs
4-way navigation + 2 buttons	4-way navigation + 2 buttons	4-way navigation + 2 buttons
standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI
potential-free NOC max. 30 V / 1 A	potential-free NOC max. 30 V / 1 A	potential-free NOC max. 30 V / 1 A
DC: SUNCLIX AC: plug	DC: SUNCLIX AC: plug	DC: SUNCLIX AC: plug
-25 °C ... +60 °C ¹⁾	-25 °C ... +60 °C ¹⁾	-25 °C ... +60 °C ¹⁾
temperature-dependent fan	temperature-dependent fan	temperature-dependent fan
IP65	IP65	IP65
< 45 dB(A)	< 45 dB(A)	< 45 dB(A)
integrated	integrated	integrated
aluminium casting/ innovative ASA/PC	aluminium casting/ innovative ASA/PC	aluminium casting/ innovative ASA/PC
522 x 363 x 246 mm	522 x 363 x 246 mm	522 x 363 x 246 mm
30 kg	30 kg	30 kg
Certifications		
EN 61000-6-1/-2/-3, IEC 62109-1/ -2		
VDE-AR-N 4105, VDE0126-1-1, ÖVE/ÖNORM E 8001, UTE C 15-712-1, G83/2, G59/3, CEI-021, EN 50438, C10/11, ... for more see homepage/download area		

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾ Power derating at high ambient temperatures.

Powador
12.0 TL3
14.0 TL3
18.0 TL3
20.0 TL3



Up to 98.0 % efficiency

2 MPP trackers, symmetrical
and asymmetrical loading possible

Multilingual menu and
graphical display

Data logger with web server

Priwatt function for the self-
consumption of solar power

Turn your roof into a power station.

The transformerless, three-phase inverters Powador 12.0 TL3 to 20.0 TL3.

Photovoltaic systems of up to several hundred kilowatts can be designed extremely flexibly in small, highly efficient units with the transformerless, three-phase Powador 12.0 TL3 to 20.0 TL3 inverters.

They operate using two separate MPP trackers that can handle both symmetrical and asymmetrical loads to allow for optimum adjustment. This allows for all typical requirements of complex designs to be fulfilled; on the one hand, for example, full configuration of an east/west-facing roof (symmetrical load) or, on the other hand, the regular configuration of a south-facing roof without having to dispense with the solar yield of a dormer (asymmetrical load). The MPP trackers can also be connected in parallel: installation costs less (you do not need an additional external disconnecter) when strings need to be combined before the

inverter. Two strings can be connected per MPP controller, i.e. 4 strings for each unit.

The input voltage range is particularly broad: the inverters switch to the grid from 250 V, and, when in operation, they still feed in at 200 V. This means that solar yields are optimum for comparatively small areas such as dormers or carports but they also operate for more of the day. The compact design with the DC connection via solar connectors makes installation very easy and economical.

It is easy to achieve perfect communication with these units. They are fitted with an integrated data logger with web server, a graphical display for showing operating data and a USB port for installing firmware updates. The current software can be downloaded free of charge from the download area of our homepage.

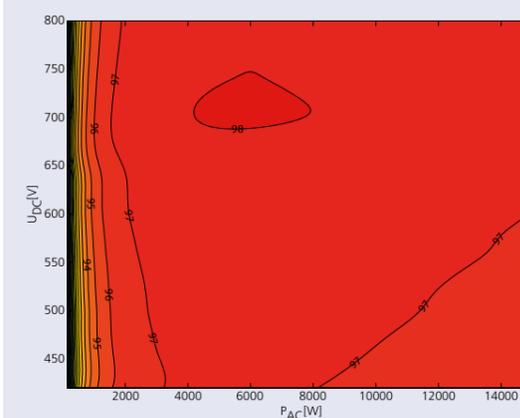
The yield data can be called from the web server or via USB for evaluation. The integrated data logger can also be connected directly to an internet portal for professional evaluation and visualisation of the inverter data.

A number of country-specific default settings are programmed into the inverters. These are easy to select during on-site installation. The interface language can be selected separately.

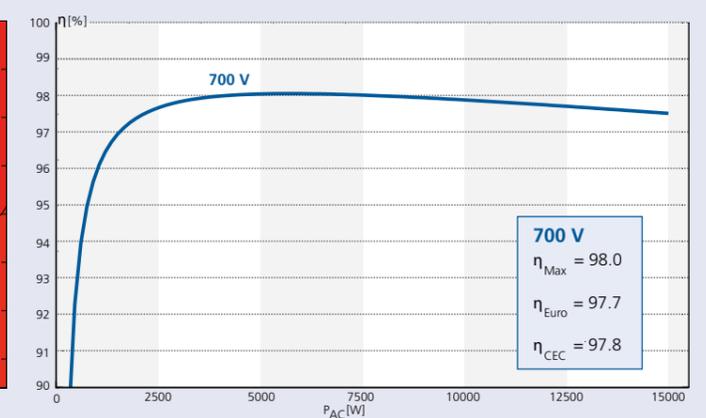
And, if you want to use your self-generated solar power in your own home, the Powador 12.0 TL3 to 20.0 TL3 also come with our Priwatt function for managing self-consumption.

Graphical display of efficiency

3D efficiency diagram for Powador 18.0 TL3



Efficiency characteristic curve for Powador 18.0 TL3



Technical data

Powador 12.0 TL3 | 14.0 TL3 | 18.0 TL3 | 20.0 TL3

Electrical data	12.0 TL3	14.0 TL3
DC input		
MPP range@Phom ¹⁾	280 V ... 800 V	350 V ... 800 V
Operating range	200 V - 950 V	200 V - 950 V
Min. DC voltage/start voltage	200 V / 250 V	200 V / 250 V
No-load voltage	1 000 V	1 000 V
Max. input current	2 x 18.6 A	2 x 18.6 A
Number of MPP trackers	2	2
Max. power/tracker	10.2 kW	12.8 kW
Number of strings	2 x 2	2 x 2
AC output		
Rated output (@230 V)	10 000 VA	12 500 VA
Line voltage	acc. to local requirements	acc. to local requirements
Rated current	3 x 14.5 A	3 x 18.1 A
Rated frequency	50 Hz/60 Hz	50 Hz/60 Hz
cos phi	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
Number of grid phases	3	3
General electrical data		
Max. efficiency	98.0 %	98.0 %
Europ. efficiency	97.5 %	97.6 %
Night consumption	1.5 W	1.5 W
Circuitry topology	transformerless	transformerless
Mechanical data		
Display	graphical display + LEDs	graphical display + LEDs
Control units	4-way navigation + 2 buttons	4-way navigation + 2 buttons
Interfaces	Ethernet, USB, RS485, S0 output, digital input „inverter off“	Ethernet, USB, RS485, S0 output, digital input „inverter-off“
Fault signalling relay	potential-free NOC max. 230 V / 1 A	potential-free NOC max. 230 V / 1 A
Connections	DC: solar connector AC: cable connection M40 and terminal (max. cross-section: 16 mm ²)	DC: solar connector AC: cable connection M40 and terminal (max. cross-section: 16 mm ²)
Ambient temperature	-25 °C ... +60 °C ²⁾	-25 °C ... +60 °C ²⁾
Cooling	temperature-dependent fan	temperature-dependent fan
Protection class	IP65	IP65
Noise emission	< 52 dB(A)	< 52 dB(A)
DC switch	integrated	integrated
Casing	aluminium casting	aluminium casting
H x W x D	690 x 420 x 200 mm	690 x 420 x 200 mm
Weight	40 kg	40 kg
Certifications		
Safety	IEC 62109-1/-2, EN 61000-6-1/-2/-3/-4, EN 61000-3-2/-3	IEC 62109-1/-2, EN 61000-6-1/-2/-3/-4, EN 61000-3-11/-12
Grid compliance	VDE 0126, C 10/11, VDE-AR-N 4105, BDEW, G83-2, G59/3, IEC 61727, IEC 62116, CEI-016, EN 50438, ... for more see homepage/download area	VDE 0126, C 10/11, VDE-AR-N 4105, BDEW, G83-2, G59/3, IEC 61727, IEC 62116, CEI-016, EN 50438, ... for more see homepage/download area

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾Symmetrical assignment of both MPP trackers. ²⁾Power derating at high ambient temperatures.

18.0 TL3	20.0 TL3
420 V ... 800 V	470 V ... 800 V
200 V - 950 V	200 V - 950 V
200 V / 250 V	200 V / 250 V
1 000 V	1 000 V
2 x 18.6 A	2 x 18.6 A
2	2
14.9 kW	14.9 kW
2 x 2	2 x 2
AC output	
15 000 VA	17 000 VA
acc. to local requirements	acc. to local requirements
3 x 21.8 A	3 x 24.6 A
50 Hz/60 Hz	50 Hz/60 Hz
0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
3	3
General electrical data	
98.0 %	97.9 %
97.7 %	97.6 %
1.5 W	1.5 W
transformerless	transformerless
Mechanical data	
graphical display + LEDs	graphical display + LEDs
4-way navigation + 2 buttons	4-way navigation + 2 buttons
Ethernet, USB, RS485, S0 output, digital input „inverter off“	Ethernet, USB, RS485, S0 output, digital input „inverter off“
potential-free NOC max. 230 V / 1 A	potential-free NOC max. 230 V / 1 A
DC: solar connector AC: cable connection M40 and terminal (max. cross-section: 16 mm ²)	DC: solar connector AC: cable connection M40 and terminal (max. cross-section: 16 mm ²)
-25 °C ... +60 °C ²⁾	-25 °C ... +60 °C ²⁾
temperature-dependent fan	temperature-dependent fan
IP65	IP65
< 52 dB(A)	< 52 dB(A)
integrated	integrated
aluminium casting	aluminium casting
690 x 420 x 200 mm	690 x 420 x 200 mm
44 kg	44 kg
Certifications	
IEC 62109-1/-2, EN 61000-6-1/-2/-3/-4, EN 61000-3-11/-12	IEC 62109-1/-2, EN 61000-6-1/-2/-3/-4, EN 61000-3-11/-12
VDE 0126, C 10/11, VDE-AR-N 4105, BDEW, G83-2, G59/3, IEC 61727, IEC 62116, CEI-016, EN 50438, ... for more see homepage/download area	VDE 0126, C 10/11, VDE-AR-N 4105, BDEW, G83-2, G59/3, IEC 61727, IEC 62116, CEI-016, EN 50438, ... for more see homepage/download area

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾Symmetrical assignment of both MPP trackers. ²⁾Power derating at high ambient temperatures.

blueplanet 20.0 TL3 INT

NEW



97.9 % efficiency

2 MPP trackers, symmetrical and asymmetrical loading possible

Wide input voltage range
200 V – 950 V

Protection class IP65 for outdoor use

Graphical display, multilingual menu, pre-configured country settings

Data logger with web server

Versatile on the roof, powerful in the park.

The transformerless, three-phase inverter blueplanet 20.0 TL3 INT.

The new blueplanet 20.0 TL3 INT gives you plenty of flexibility in the medium power range. Firstly, the inverter rounds off the 10 to 17 kVA power range led by its Powador brothers: The name being based on its AC output, the device identifies itself as a genuine 20 kVA unit.

Following on from the blueplanet 50.0 TL3 INT, the blueplanet 20.0 TL3 INT is also the next wall-mounted unit that can be used up to the threshold between commercial and utility applications.

As is the case with the Powador 12.0 TL3 to 20.0 TL3, the blueplanet 20.0 TL3 INT has extensive features and hits the mark if you are planning projects with a challenging system design.

The blueplanet 20.0 TL3 INT operates using two separate MPP trackers that can handle both symmetrical and asymmetrical loads. You will be able to deal with east/west facing roofs (symmetrical load), factory roofs which are shaded or inconsistently designed and open spaces

(asymmetrical load). Two strings can be connected per MPP tracker, but a parallel tracker connection is also possible.

The wide input voltage range emphasises the flexibility of the blueplanet 20.0 TL3 INT. The inverter starts at 250 V, and, when in operation, continues to feed in at 200 V. What's more, it will work right up to 950 V. In this way, the unit's long working hours will result in high profitability for your solar power system.

Technical data

blueplanet 20.0 TL3 INT

Electrical data	20.0 TL3 INT	NEW
Input variables		
Maximum PV generator power	24 000 W	
MPP range@Pnom	550 V ... 800 V	
Operating range	200 V - 950 V	
Min. DC voltage / starting voltage	200 V / 250 V	
No-load voltage	1 000 V	
Max. input current	2 x 18.8 A	
Number of MPP trackers	2	
Max. power/tracker	15.0 kW	
Number of strings	2 x 2	
Output variables		
Rated output (@ 220 V)	20 000 VA@230 V	
Line voltage	400 V / 230 V (3 / N / PE)	
Rated current	3 x 29 A	
Rated frequency	50 Hz / 60 Hz	
cos phi	0.80 inductive ... 0.80 capacitive	
Number of grid phases	3	
General electrical data		
Max. efficiency	97.9 %	
Europ. efficiency	97.6 %	
Night consumption	1.5 W	
Switching plan	transformerless	
Grid monitoring	acc. to local requirements	
Mechanical data		
Display	graphical display + LEDs	
Control units	4-way navigation + 2 buttons	
Interfaces	standard: 2xEthernet, USB, RS485, Error relay optional: 4-DI	
Fault signalling relay	potential-free NOC max. 30 V / 1 A	
Connections	DC: solar connector, AC: cable connection M40 and terminal (max. cross-section: 16 mm ² flexible, 10 mm ² rigid)	
Ambient temperature	-25°C ... +60°C ¹⁾	
Cooling	forced convection	
Protection class	IP65	
Noise emission	< 53 dB (A)	
DC switch	integrated	
Casing	aluminium casting	
H x W x D	690 x 420 x 200 mm	
Weight	46.6 kg	

¹⁾ Power derating at high ambient temperatures.

Powador
30.0 TL3
33.0 TL3
36.0 TL3
39.0 TL3
40.0 TL3
60.0 TL3

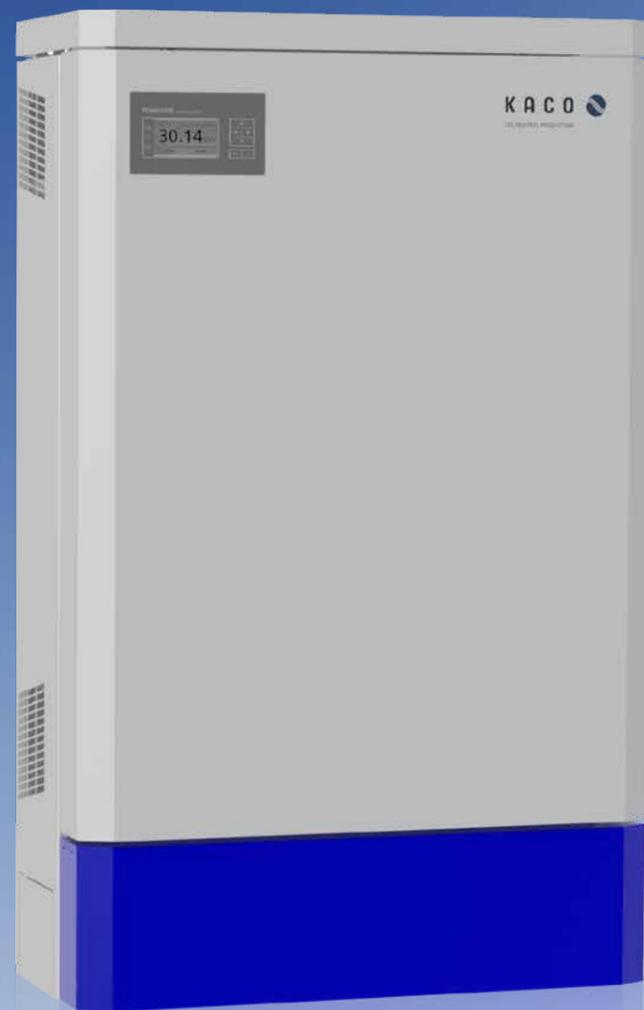
Up to 98.0 % efficiency

3 MPP trackers, symmetrical
and asymmetrical loading possible

Multilingual menu

Cost-saving DC input configurations
available

Integrated data logger with
web server



Efficient. Flexible. Proven.

The transformerless, three-phase inverters Powador 30.0 TL3 to 60.0 TL3.

The transformerless, 3-phase Powador 30.0 TL3 to 60.0 TL3 inverters are designed specifically for decentralised installation of photovoltaic systems for commercial and industrial applications, such as hangars and factory roofs.

These units give you extreme flexibility in designing your PV system. They operate using three separate MPP trackers that can handle both symmetrical and asymmetrical loads to allow for optimum adjustment. Each tracker is able to process 20 kW. This enables them to meet all the typical demands of more complex designs involved with inhomogenous installation of the photovoltaic generator. Three MPP trackers can also compensate for mismatches between modules, such as those resulting from temperature differences and uneven solar radiation. Depending on the design of the units, one string (M version) or four strings (XL ver-

sion) can be connected per MPP tracker. The input voltage range is particularly broad: the inverters switch to the grid from 250 V, and, when in operation, they still feed in at 200V to ensure the solar yield from comparatively small areas. Maximum efficiency amounts to approx. 98 %, and up to 97.8% European efficiency is furthermore quite remarkable. At just 5 % rated power they operate at 95 % efficiency.

It is easy to achieve perfect communication with these units. They are fitted with an integrated data logger with web server, a graphical display for showing operating data and a USB port for installing firmware updates. The current software can be downloaded free of charge from the download area of our homepage. The yield data can be called from the web server or via USB for evaluation. The integrated data log-

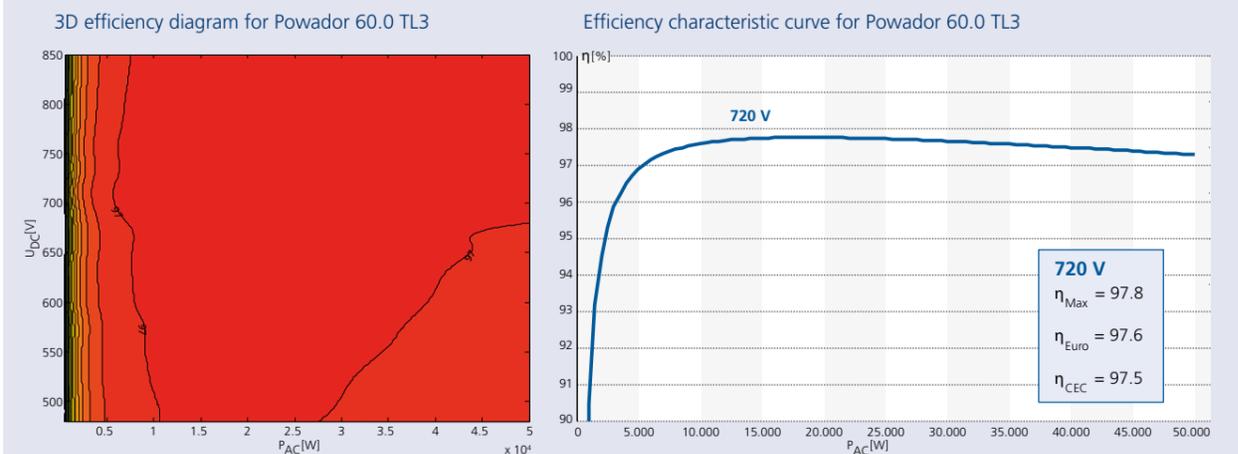
ger can also be connected directly to an internet portal for professional evaluation and visualisation of the inverter data.

A number of country-specific default settings are programmed into the inverters. These are easy to select during on-site installation. The interface language can be selected separately.

The integrated string collector with string fuses and overvoltage protection for the XL version of the units opens up significant cost advantages. Extraordinary flexibility is provided by the following variants:

- XL-F with fusing at the plus and minus inputs
- XL-SPD 1+2 with type 1 & 2 surge protection devices in front of each MPP tracker.

Graphical display of efficiency



Technical data

Powador 30.0 TL3 | 33.0 TL3 | 36.0 TL3 | 39.0 TL3 | 40.0 TL3 | 60.0 TL3

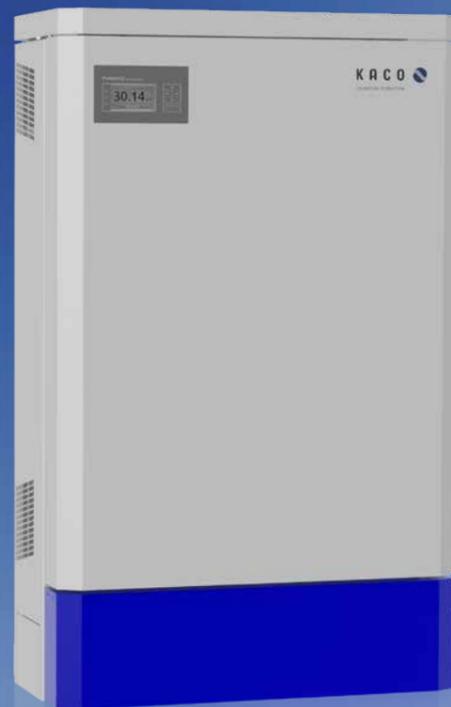
Electrical data	30.0 TL3	33.0 TL3	36.0 TL3
DC input			
MPP range@Phom ¹⁾	260 V ... 800 V	280 V ... 800 V	310 V ... 800 V
Operating range	200 V ... 950 V	200 V ... 950 V	200 V ... 950 V
Min. DC voltage/start voltage	200 V / 250 V	200 V / 250 V	200 V / 250 V
No-load voltage	1 000 V	1 000 V	1 000 V
Max. input current	3 x 34.0 A	3 x 34.0 A	3 x 34.0 A
Number of MPP trackers	3	3	3
Max. power/tracker	20 kW	20 kW	20 kW
Number of strings	3 x 1 (version M) / 3 x 4 (version XL)		
AC output			
Rated output (@230 V)	25 000 VA	27 500 VA	30 000 VA
Line voltage	acc. to local requirements	acc. to local requirements	acc. to local requirements
Rated current	3 x 36.2 A	3 x 39.9 A	3 x 43.5 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
cos phi	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
Number of grid phases	3	3	3
General electrical data			
Efficiency max. / european	98.0 % / 97.8 %	98.0 % / 97.8 %	98.0 % / 97.8 %
Night consumption	1.5 W	1.5 W	1.5 W
Circuitry topology	transformerless	transformerless	transformerless
Mechanical data			
Display	graphical display + LEDs	graphical display + LEDs	graphical display + LEDs
Control units	4-way navigation + 2 buttons	4-way navigation + 2 buttons	4-way navigation + 2 buttons
Interfaces	Ethernet, USB, RS485, S0 output, digital input "inverter off"		
Fault signalling relay	Potential-free NO contact, max. 30 V DC / 1 A or 230 V AC / 1 A		
Connections	AC connection via screw terminals, bushing 1 x M50, max cross section: 50 mm ² (flexible); DC connection of M version: spring-type terminals 6-35 mm ² ³⁾ ; DC connection of XL version: screw and spring-type terminals 10 mm ²		
Ambient temperature	-20 °C ... +60 °C ²⁾	-20 °C ... +60 °C ²⁾	-20 °C ... +60 °C ²⁾
Cooling	fan, max. 600 m ³ / h	fan, max. 600 m ³ / h	fan, max. 600 m ³ / h
Protection class	IP54	IP54	IP54
Noise emission	58 dB(A) (only fan noise)	58 dB(A) (only fan noise)	58 dB(A) (only fan noise)
DC switch	integrated	integrated	integrated
H x W x D	1 360 x 840 x 355 mm	1 360 x 840 x 355 mm	1 360 x 840 x 355 mm
Weight	151 kg	151 kg	151 kg
Product variants			
Version M	DC switch		
Version XL	DC switch / fuse protection DC input plus / overvoltage protection type 2		
Version XL-SPD 1+2	DC switch / fuse protection DC input plus / overvoltage protection type 1 + 2		
Version XL-F	DC switch / fuse protection DC input plus and minus / overvoltage protection type 2		
Version XL-F-SPD 1+2	DC switch / fuse protection DC input plus and minus / overvoltage protection type 1+2		
Certifications			
Safety	IEC 62109-1/-2, EN 61000-6-1/-2/-3, EN 61000-3-12/-11		
Grid compliance	VDE 0126, VDE-AR-N 4105, BDEW, G59/3, IEC 61727, IEC 62116, EN 50438, ... for more see homepage/download area		

¹⁾ Symmetrical assignment of the MPP trackers. ²⁾ Power derating at high ambient temperatures.

39.0 TL3	40.0 TL3	60.0 TL3
DC input		
340 V ... 800 V	370 V ... 800 V	480 V ... 850 V
200 V ... 950 V	200 V ... 950 V	200 V ... 950 V
200 V / 250 V	200 V / 250 V	200 V / 250 V
1 000 V	1 000 V	1 000 V
3 x 34.0 A	3 x 34.0 A	3 x 36.0 A
3	3	3
20 kW	20 kW	20 kW
3 x 1 (version M) / 3 x 4 (version XL)		
AC output		
33 300 VA	36 000 VA	49 900 VA
acc. to local requirements	acc. to local requirements	acc. to local requirements
3 x 48.3 A	3 x 52.2 A	3 x 72.2 A
50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
3	3	3
General electrical data		
98.0 % / 97.8 %	97.5 % / 97.2 %	97.8 % / 97.6 %
1.5 W	1.5 W	1.5 W
transformerless	transformerless	transformerless
Mechanical data		
graphical display + LEDs	graphical display + LEDs	graphical display + LEDs
4-way navigation + 2 buttons	4-way navigation + 2 buttons	4-way navigation + 2 buttons
Ethernet, USB, RS485, S0 output, digital input "inverter off"		
Potential-free NO contact, max. 30 V DC / 1 A or 230 V AC / 1 A		
AC connection via screw terminals, bushing 1 x M50, max cross section: 50 mm ² (flexible); DC connection of M version: spring-type terminals 6-35 mm ² ³⁾ ; DC connection of XL version: screw and spring-type terminals 10 mm ²		
-20 °C ... +60 °C ²⁾	-20 °C ... +60 °C ²⁾	-20 °C ... +60 °C ³⁾
fan, max. 600 m ³ / h	fan, max. 600 m ³ / h	fan, max. 600 m ³ / h
IP54	IP54	IP54
58 dB(A) (only fan noise)	58 dB(A) (only fan noise)	58 dB(A) (only fan noise)
integrated	integrated	integrated
1 360 x 840 x 355 mm	1 360 x 840 x 355 mm	1 360 x 840 x 355 mm
151 kg	151 kg	173 kg
Product variants		
DC switch		
DC switch / fuse protection DC input plus / overvoltage protection type 2		
DC switch / fuse protection DC input plus / overvoltage protection type 1 + 2		
DC switch / fuse protection DC input plus and minus / overvoltage protection type 2		
DC switch / fuse protection DC input plus and minus / overvoltage protection type 1+2		
Certifications		
IEC 62109-1/-2, EN 61000-6-1/-2/-3, EN 61000-3-12/-11		
VDE 0126, VDE-AR-N 4105, BDEW, G59/3, IEC 61727, IEC 62116, EN 50438, ... for more see homepage/download area		

³⁾ Possible power derating at temperatures above 40 °C. Conforms to the country-specific standards and regulations according to the country version that has been set.

Powador
36.0 TL3 M1
39.0 TL3 M1



98.0 % efficiency

DC-side surge protection type 2
serially integrated

Multilingual menu

Wide input voltage range
for flexible system design

Integrated data logger with
web server

Efficient. Flexible. Proven.

The transformerless, three-phase inverters Powador 36.0 and 39.0 TL3 M1 for use with string collectors.

The Powador 36.0 and 39.0 TL3 M1 are particularly suitable for the decentralised installation of photovoltaic systems for commercial and industrial applications, such as hangars and factory roofs. These units give you extreme flexibility in designing your PV system when used in combination with string collectors.

The input voltage range is particularly broad and the inverters switch to the grid from 250 V onwards. Maximum efficiency amounts to 98% and the 97.8% European efficiency is also quite remarkable. Even in the lower performance ranges, the appliances achieve very high partial load efficiency: At just 5% rated power they operate at 95% efficiency.

It is easy to achieve perfect communication with these units too. They are fitted with an integrated data logger with web server, a graphical display for showing operating data and a USB port for installing firmware updates. The current software can be downloaded free of charge from the download area of our homepage. The yield data can be called up using a USB stick, as well as via the web server for evaluation. The integrated data logger can also be connected directly to an internet portal for professional evaluation and visualisation of the inverter data. A number of country-specific default settings are already programmed into the inverters and these can easily be selected during on-site installation. The

interface language can be selected independently of these.

The inverters fulfil all guidelines and fully support the Powador-protect functions for the purposes of protecting the grid and the array, as well as carrying out performance management.

The optimised DC connection area with serially-integrated type 2 surge protection opens up a number of cost advantages.

Technical data

Powador 36.0 TL3 M1 | 39.0 TL3 M1

Electrical data	36.0 TL3 M1	39.0 TL3 M1
DC input		
MPP range@Pnom	310 V ... 800 V	340 V ... 800 V
Operating range	200 V ... 950 V	200 V ... 950 V
Min. DC voltage/start voltage	200 V / 250 V	200 V / 250 V
No-load voltage	1000 V	1000 V
Max. input current	102 A	102 A
Number of MPP trackers	1	1
Number of strings	1	1
AC output		
Rated output (@230 V)	30 000 VA	33 300 VA
Line voltage	400 V / 230 V (3 / N / PE)	400 V / 230 V (3 / N / PE)
Rated current	3 x 43.5 A	3 x 48.3 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
cos phi	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
Number of grid phases	3	3
General electrical data		
Max. efficiency	98.0 %	98.0 %
European efficiency	97.8 %	97.8 %
Night consumption	1.5 W	1.5 W
Topology	transformerless	transformerless
Surge protection	DC: type 2 / AC: type 3	DC: type 2 / AC: type 3
Mechanical data		
Display	graphical display + LEDs	graphical display + LEDs
Control units	4-way navigation + 2 buttons	4-way navigation + 2 buttons
Interfaces	Ethernet, USB, RS485, S0 output, digital input "inverter off"	Ethernet, USB, RS485, S0 output, digital input "inverter off"
Fault signalling relay	potential-free NOC max. 230 V / 1 A	potential-free NOC max. 230 V / 1 A
Connections	AC connection via screw terminals, bushing 1 x M50, max. cross section: 50 mm ² (flexible); DC connects via the DC switch directly, bushing 2 x M40, max. cross section: 70 mm ²	
Ambient temperature	-20 °C ... +60 °C ¹⁾	-20 °C ... +60 °C ¹⁾
Cooling	speed controlled fan, max. 600 m ³ / h	speed controlled fan, max. 600 m ³ / h
Protection class	IP54	IP54
Noise emission	58 dB(A) (only fan noise)	58 dB(A) (only fan noise)
DC switch	integrated	integrated
H x W x D	1 360 x 840 x 355 mm	1 360 x 840 x 355 mm
Weight	151 kg	151 kg
Certifications		
Safety	IEC 62109-1/-2, EN 61000-6-1/-2/-3, EN 61000-3-12/-11	
Grid compliance	VDE 0126, VDE-AR-N 4105, BDEW, G59/3, ... for more see homepage/download area	

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾Power derating at high ambient temperatures.

blueplanet
50.0 TL3 INT



Compact and lightweight for wall mounting

IP65 aluminium housing for outdoor installation

Wide MPP range for longer strings

Up to 40% inverter oversizing possible

Input voltage up to 1,100 V for flexibility and safety in the DC design

Cost-saving DC and AC input configurations

Large cable cross-sections possible for copper and aluminium cables

Adjustable cos phi from 0.3 ind. to 0.3 cap. for special reactive power requirements

External coupler circuit breakers unnecessary if used with Powador-protect

Up with economy, down with costs.

The transformerless, three-phase inverter blueplanet 50.0 TL3 INT.

For the blueplanet 50.0 TL3 INT we have further developed the configuration of the proven Powador 60.0 TL3: 50 reliable kVA which weigh a mere 71 kilograms and fit on the wall with ease. This inverter demonstrates its strengths in particular in solar power stations on a commercial and industrial scale.

The blueplanet 50.0 TL3 INT comes in three versions and is specifically geared towards your respective cost strategy:

- The Basic version offers you everything you need if you are installing string collectors and overvoltage protection externally. There are no double costs in store for you.
- Rely on the M version if you intend to use external string collectors. Sockets for the DC and the AC side plug-and-play combined arrestors are already fitted.

- The XL version comes fitted with 10 string fuses and includes the DC side type 1 and 2 combined arrestor, as well as the socket for the AC side plug-and-play combined arrestor.

The DC-switch is of course preinstalled in all versions. The blueplanet 50.0 TL3 Basic and M support large cable cross-sections on the DC and AC side. The benefit to you: reduced cabling loss, less sub-distribution. You can lay copper cable as before, or seize the opportunity of using aluminium ones that are less expensive. On the AC side, you also have your choice of cables with the blueplanet 50.0 TL3 XL. On the DC side, Sunclix plug connectors simplify the installation process.

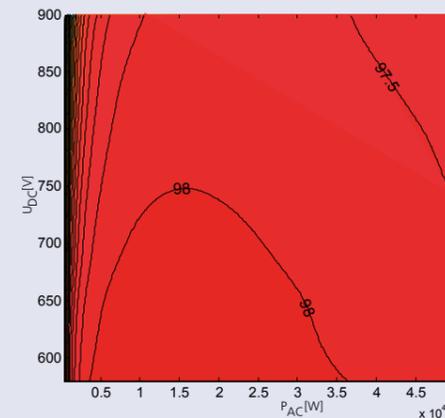
Due to the compact design, the blueplanet 50.0 TL3 INT is easy to transport,

hang up and take down - even on the module support. The durable aluminium housing is suitable for outdoor installation.

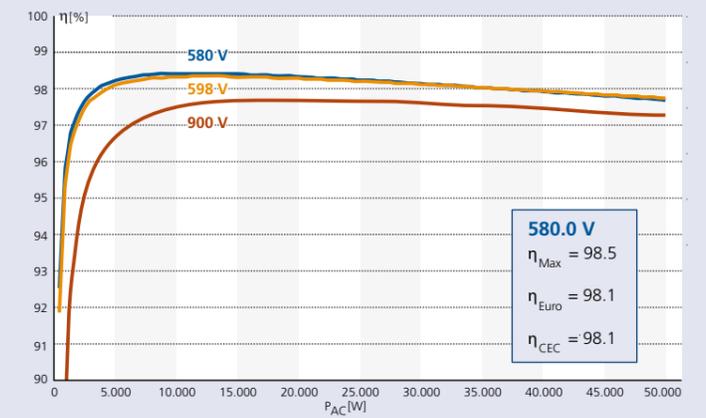
Do you require network and system protection or remote-controlled power regulation for your PV plant? KACO new energy is offering you a uniquely affordable and lean combined solution with blueplanet 50.0 TL3 INT and Powador-protect. The inverter is factory-fitted with coupler circuit breakers, which are actuated by Powador-protect. You will save yourself the cost of acquiring, installing and operating external coupler circuit breakers.

Graphical display of efficiency

3D efficiency diagram for blueplanet 50.0 TL3



Efficiency characteristic curve for blueplanet 50.0 TL3



Technical data

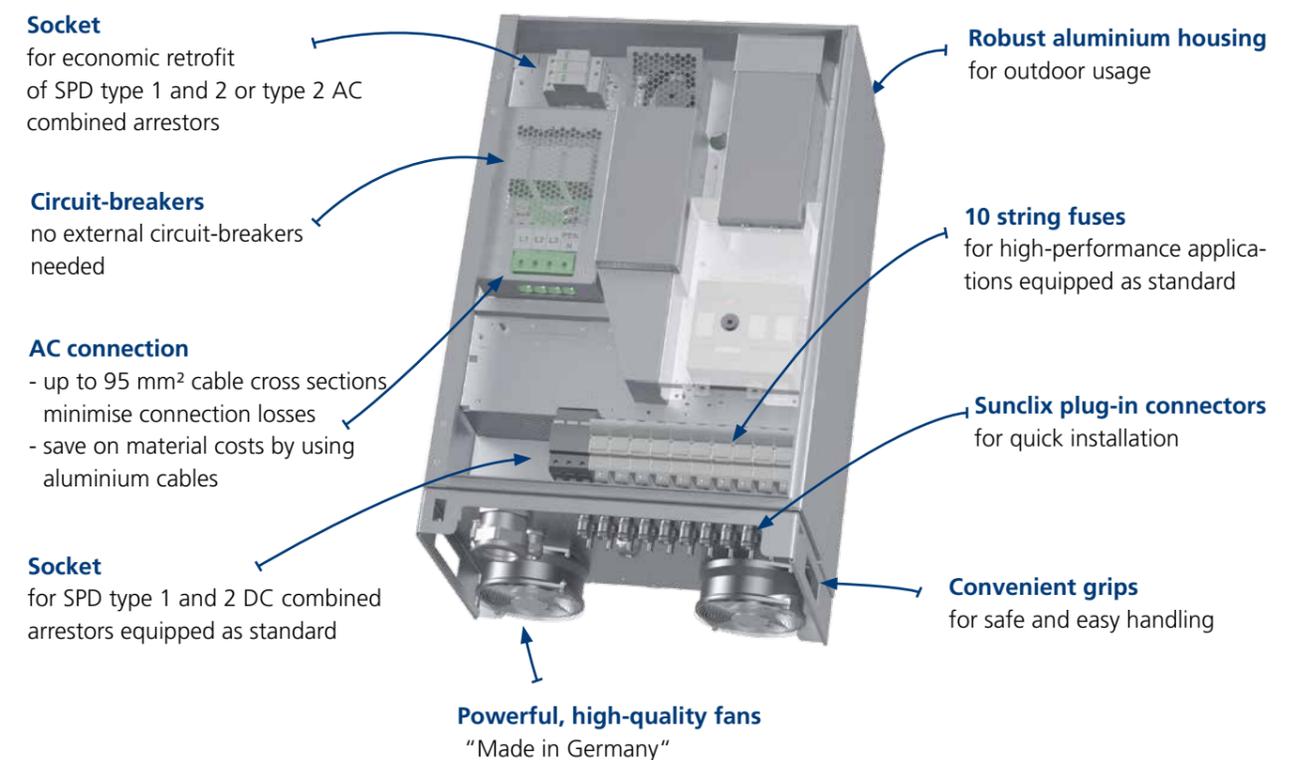
blueplanet 50.0 TL3 INT

Electrical data	50.0 TL3 INT
DC input	
MPP range@Pnom	580 V ¹⁾ ... 900 V
Operating range	580 V ¹⁾ ... 1050 V
Rated DC voltage/start voltage	600 V / 670 V
No-load voltage	1100 V
Max. input current	90 A
Max. short circuit current I _{sc max}	150 A
Number of MPP trackers	1
AC output	
Rated output (@230V / 220V)	50000 VA
Line voltage	400 V / 230 V; 380 V / 220 V; 415 V / 240 V (3 / N / PE or 3 / PEN)
Rated current	3 x 72.4 A @ 230 V
Max. current	3 x 75.8 A
Rated frequency	50 Hz / 60 Hz
cos phi	0.30 inductive ... 0.30 capacitive
Number of grid phases	3
General electrical data	
Max. efficiency	98.5 %
European efficiency	98.1 %
Standby consumption	2.5 W
Topology	transformerless
Mechanical data	
Display	graphical display + LEDs
Control units	4-way navigation + 2 buttons
Interfaces	standard: 2 x Ethernet, USB, RS485, error relay optional: 4-DI
Fault signalling relay	potential-free NOC max. 30 V / 1 A
Connections	AC: screw terminals, max. cross section: 95 mm ² Cu or Al DC: Basic or M: cable plug, max. cross section: 120 mm ² Cu or Al XL: DC plugs (SUNCLIX)
Ambient temperature	-20 °C ... +60 °C ²⁾
Cooling	forced convection / speed controlled fan
Protection class	IP65
Noise emission	<61 db(A)
H x W x D	760 x 500 x 425 mm
Weight	71 kg (Basic, M), 73 kg (XL)
Certifications	
Safety	IEC 62109-1/-2, EN 61000-6-1/-2/-3, EN 61000-3-11/-12
Grid compliance	overview: see homepage/download area

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾ 570V@380V/220V; 600V@415V/240V ²⁾ Power derating at high ambient temperatures.

Versions	Basic	M	XL
Number of DC inputs	1	1	10
DC switch	integrated	integrated	integrated
String protection	-	-	DC plus input 10 x 15A
DC surge protection	-	upgradeable	SPD type 1 + 2
AC surge protection	-	upgradeable	upgradeable

Profitability and reliability that you can see:
 Inside the blueplanet 50.0 TL3 INT XL.



Powador
48.0 TL3 Park
72.0 TL3 Park

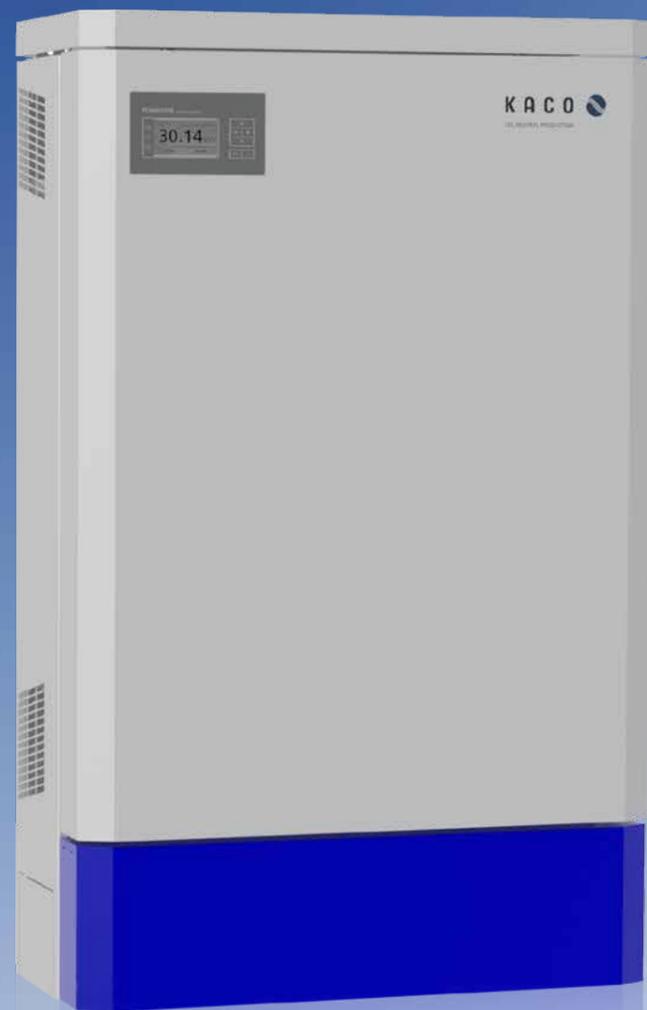
Up to 98.3 % efficiency

3 MPP trackers, symmetrical and asymmetrical loading possible

Multilingual menu

Cost-saving DC input configurations available

Data logger with web server



The Park has the power.

The transformerless, three-phase inverters Powador 48.0 TL3 Park and 72.0 TL3 Park.

The Powador 48.0 TL3 Park and 72.0 TL3 Park are transformerless three-phase inverters that, with their output voltage of 480 V, are particularly suitable for connection to external transformers of large decentralised systems.

These units give you flexibility in designing your PV system. They operate using three separate MPP trackers that can handle both symmetrical and asymmetrical loads to allow for optimum adjustment. Every tracker of the Powador 48.0 TL3 Park can process 20 kW; the Powador 72.0 TL3 Park can process 24 kW per unit. This enables them to meet all the typical demands of more complex designs involved with inhomogenous installation of the photovoltaic generator. Depending on the design of the units, one string (M version) or four strings (XL version) can be connected per MPP tracker. Each of the three

MPP trackers of the Powador 72.0 TL3 Park XL can even be connected to five strings.

The inverters switch to the grid from 250 V, and, when in operation, they still feed in at 200 V. The peak efficiency is 98.3 %. The European efficiency is also worth noting and is due to the fact that the unit has a very high partial load efficiency in the lower power ranges. Even at just 5 % rated power they operate at 95 % efficiency.

It is easy to achieve perfect communication with these units. They are fitted with an integrated data logger with web server, a graphical display for showing operating data and a USB port for installing firmware updates. The current software can be downloaded from the download area of www.kaco-newenergy.com. The yield data can be called up via USB or the

web server. The integrated data logger can also be connected directly to an internet portal for professional evaluation and visualisation of the operating data.

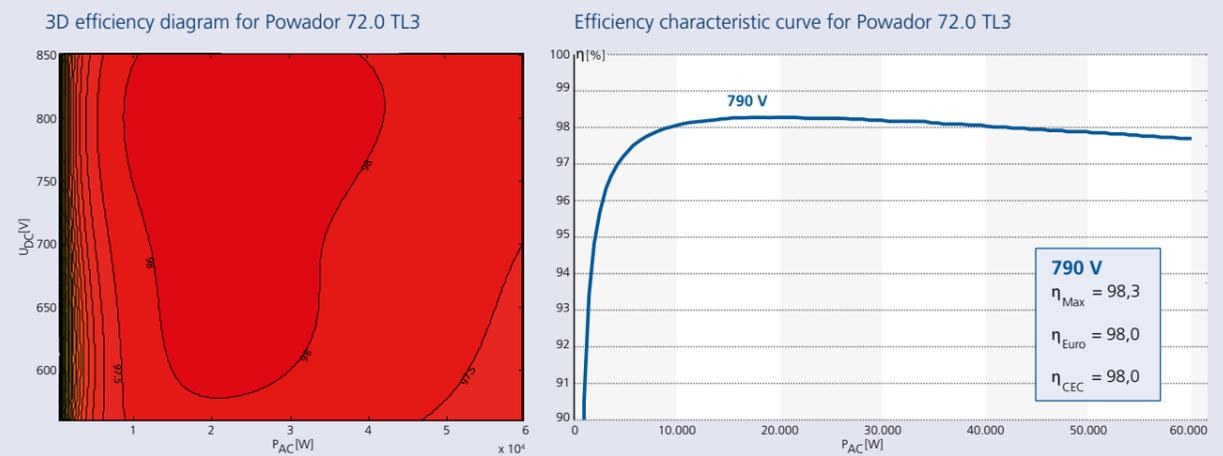
A number of country-specific default settings are programmed into the inverters. These are easy to select during on-site installation. The interface language can be selected separately.

The integrated string collector with string fuses and overvoltage protection for the XL version of the units opens up significant cost advantages.

Two additional versions provide extraordinary flexibility:

- XL-F with fusing at the plus and minus inputs,
- XL-SPD 1+2 with type 1 & 2 surge protection devices in front of each MPP tracker.

Graphical display of efficiency



Technical data

Powador 48.0 TL3 Park | 72.0 TL3 Park

Electrical data	48.0 TL3 Park	72.0 TL3 Park
DC input		
MPP range@Pnom ¹⁾	410 V ... 800 V	580 V ... 850 V
Operating range	200 V - 950 V	200 V - 950 V
Min. DC voltage/start voltage	200 V / 250 V	200 V / 250 V
No-load voltage	1 000 V	1 000 V
Max. input current	3x34.0 A	3x36.0 A
Number of MPP trackers	3	3
Max. power/tracker	20 kW	24 kW
Number of strings	3x1 version M / 3x4 version XL	3x1 version M / 3x5 version XL 3x4 version XL-F
AC output		
Rated output (@ 277 V)	40 000 VA	60 000 VA
Line voltage	480 V / 277 V (3 / N / PE)	480 V / 277 V (3 / N / PE)
Rated current	3x48.1 A	3x72.2 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
cos phi	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
Number of grid phases	3	3
General electrical data		
Efficiency max. / european	98.0 % / 97.9 %	98.3 % / 98.0 %
Night consumption	1.5 W	1.5 W
Topology	transformerless	transformerless
Mechanical data		
Display	graphical display + LEDs	graphical display + LEDs
Control units	4-way navigation + 2 buttons	4-way navigation + 2 buttons
Interfaces	Ethernet, USB, RS485, S0 output, digital input "inverter off"	Ethernet, USB, RS485, S0 output, digital input "inverter off"
Connections	AC connection via screw terminals, bushing, 1 x M50, max cross section: 50 mm ² (flexible); DC connection of M version: spring-type terminals 6-35 mm ² 2); DC connection of XL version: screw and spring-type terminals 10 mm ²	
Ambient temperature	-20 °C ... +60 °C ³⁾	-20 °C ... +60 °C ³⁾
Cooling	fan, max. 600 m ³ / h	fan, max. 600 m ³ / h
Protection class	IP54	IP54
Noise emission	58 dB(A) (only fan noise)	58 dB(A) (only fan noise)
DC switch	integrated	integrated
H x W x D	1 360 x 840 x 355 mm	1 360 x 840 x 355 mm
Weight	151 kg	173 kg
Product variants		
Version M	DC switch	
Version XL	DC switch / fuse protection DC input plus / overvoltage protection type 2	
Version XL-SPD 1+2	DC switch / fuse protection DC input plus / overvoltage protection type 1 + 2	
Version XL-F	DC switch / fuse protection DC input plus and minus / overvoltage protection type 2	
Version XL-F-SPD1+2	DC switch / fuse protection DC input plus and minus / overvoltage protection type 1 + 2	
Certifications		
Safety	IEC 62109-1/-2, EN 61000-6-1/-2/-3/-4, EN 61000-3-12/-11	
Grid compliance	VDE 0126, BDEW, G59/3, CEI 016, ... for more see homepage/download area	

¹⁾ by symmetrical assignment of the MPP trackers. ²⁾ Only in conjunction with external Powador Mini-Argus. ³⁾ Power derating at high ambient temperatures.

Powador inverters with integrated generator junction box.

You can get the Powador 30.0 TL3 to 60.0 TL3 inverters, as well as the Powador 48.0 TL3 Park and the 72.0 TL3 Park in XL versions, with an integrated PV generator junction box. The M versions of these inverters can be cabled using the Powador Mini-Argus external string

collector. Select the right one depending on whether the inverter should be mounted near the module or near the transformer. In order to correspond ideally to the conditions of the country of destination, you can also select the "XL-F" version with fusing of the DC in-

puts on the plus and minus side, or the "XL-SPD 1+2" version with integrated type 1+2 DC surge protection device.

Configuration of the Versions

Version M

- DC disconnect in the connection box

Version XL

- DC disconnect in the connection box
- 4 string fuses per DC-plus input (5 String fuses in the Powador 72.0 TL3 Park)
- Type 2 DC surge protection

Version XL-F

- DC disconnect in the connection box
- 4 string fuses on the DC inputs on the plus and minus
- Type 2 DC surge protection

Version XL-SPD 1+2

- DC disconnect in the connection box
- 4 string fuses per DC-plus input (5 String fuses in the Powador 72.0 TL3 Park)
- Type 1+2 DC surge protection

Inverter	Version	DC switch	Strings per tracker	String protection	DC overload protection
Powador 30.0 TL3 - 60.0 TL3 Powador 48.0 TL3 Park + 72.0 TL3 Park	M	yes	1	no	no
Powador 30.0 TL3 - 60.0 TL3	XL	yes	4	DC plus input	Type 2
Powador 72.0 TL3 Park	XL	yes	5	DC plus input	Type 2
Powador 30.0 TL3 - 60.0 TL3 Powador 48.0 TL3 Park + 72.0 TL3 Park	XL-F	yes	4	DC plus and minus inputs	Type 2
Powador 30.0 TL3 - 60.0 TL3	XL-SPD 1+2	yes	4	DC plus input	Type 1+2
Powador 72.0 TL3 Park	XL-SPD 1+2	yes	5	DC plus input	Type 1+2
Powador 30.0 TL3 - 60.0 TL3 Powador 48.0 TL3 Park + 72.0 TL3 Park	XL-F-SPD 1+2	yes	4	DC plus and minus inputs	Type 1+2

Powador
XP500-HV TL
indoor
XP550-HV TL
indoor



Highest efficiency

Maximum power density

Maximum flexibility due to
transformerless design

Load-adaptive pulse-width
modulation

Continuous, remote monitoring

Extremely powerful. Extremely reliable. Transformerless technology.

The central inverters Powador XP500-HV TL indoor and XP550-HV TL indoor.

The Powador XP500-HV TL and XP550-HV TL are our indoor central inverters for very flexible, efficient implementation of commercial and utility-scale solar power plants. State-of-the-art, DSP-based technology offers highest performance, reliability and efficiency. A digital interface enables user-friendly operation, maintainability and highly advanced monitoring and communication.

The unique control of power electronics clearly increases the switching efficiency of the power transistors: Depending on the input power that is currently present, one of several pulse-width modulation methods is used. This means higher levels of efficiency and better yields.

The Powador XP series guarantees highest reliability due to the use of a second-

ary backup power supply for the control board, and a highly efficient cooling system for critical components. The fans are monitored and operated based on load and ambient temperature.

The devices excel with a powerful, user-friendly graphical interface. The "all-inclusive" concept allows convenient operation and monitoring without requiring any additional equipment. A clearly structured, large TFT LCD color touchscreen shows detailed operating data in several languages.

You can also monitor your plant via the internet. This feature allows permanent monitoring of all critical components. The error tracing function reports potential error statuses of the units immediately.

The Powador XP central inverters meet global standards – with just the push of a button the parameters can be adjusted to meet local rules and regulations.

And of course, all XP inverters are able to feed in reactive power when needed.

Technical data

Powador XP500-HV TL indoor | Powador XP550-HV TL indoor

Electrical data	XP500-HV TL ID	XP550-HV TL ID
DC input		
MPP range	550 V ... 830 V	550 V ... 830 V
Operating range	550 V ... 1000 V	550 V ... 1000 V
No-load voltage	1 100 V ¹⁾	1 100 V ¹⁾
Max. input current	1 091 A	1 200 A
Number of DC inputs	6	6
AC output		
Rated output	500 kVA	550 kVA
Voltage to external transformer	3 x 370 V (+/- 10%)	3 x 370 V (+/- 10%)
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Rated current	780 A	858 A
cos phi	0 inductive – 0 capacitive (adjustable)	0 inductive – 0 capacitive (adjustable)
General electrical data		
Max. efficiency	98.7 %	98.7 %
European efficiency	98.5 %	98.5 %
Consumption	< 1 650 W	< 1 650 W
Standby consumption	< 110 W	< 110 W
Auxiliary power supply	230 V	230 V
Mechanical data		
Display	TFT LCD Touchscreen	TFT LCD Touchscreen
Interfaces	2 x RS485 / Ethernet / USB 1 x digital input / -output SD card	2 x RS485 / Ethernet / USB 1 x digital input / -output SD card
Ambient temperature	-20 °C ... +50 °C full rated power, no derating	
Cooling	fan (max. 6 940 m ³ /h)	fan (max. 6 940 m ³ /h)
Protection class	IP21	IP21
Noise emission	< 70 dB(A) ²⁾	< 70 dB(A) ²⁾
H x W x D	2 120 x 2 400 x 870 mm	2 120 x 2 400 x 870 mm
Weight	1 656 kg	1 656 kg
Extras		
Ground fault detection	yes	yes
Protection against moisture	integrated hygostat and heating combination	
Emergency stop	yes	yes
Overvoltage protection DC/AC/Ethernet/control unit	yes	yes
Certifications		
CE-conformity	yes	
EMC	EN 61000-3-3/EN 61000-3-12/EN 61000-6-2/EN 61000-6-4	
Grid compliance	BDEW, ... for more see homepage/download area	

Conform to the country-specific standards and regulations according to what country version has been set.
¹⁾ To protect the hardware, the inverter starts up only at voltages < 1000 V. ²⁾ Measured at a 10 m distance.

Powador
XP500-HV TL
outdoor
XP550-HV TL
outdoor



Highest efficiency

Maximum power density

Maximum flexibility due to
transformerless design

Load-adaptive pulse-width
modulation

Continuous, remote monitoring

Designed for outdoor use

High output. High reliability. High protection.

The central inverters Powador XP500-HV TL outdoor and XP550-HV TL outdoor.

The Powador XP500-HV TL outdoor and the Powador XP550-HV TL outdoor have been especially conceived for outdoor use. With the protection class IP54 they do not require a separate enclosed room for installation. This means that both units offer an alternative to central inverter stations depending on the project requirements. The latest signal-processing technology offers maximum performance, efficiency and reliability. The fully digital controller makes operation and maintenance user-friendly and offers a multitude of options for monitoring and communications.

Our unique power electronics control increases the switching efficiency of the power transistors: Depending on the

input power currently present, one of several pulse-width modulation methods is used. This means higher levels of efficiency and better yields. The Powador XP series also offers maximum reliability: the internal power supply of the controller is designed redundantly and an extremely powerful cooling system protects sensitive components. The speed of the cooling fan is variably controlled depending on the load and ambient temperature.

The Powador XP500-HV TL outdoor and XP550-HV TL outdoor feature a powerful Human Machine Interface (HMI). It provides for local data logging via SD card as well as remote control and online monitoring via RS485 generic or Modbus TCP/IP protocol. The operation of all critical

components is continuously monitored and potential faults are reported immediately.

The Powador XP is an inverter for the world: country-specific settings can be activated at the press of a button.

Technical data

Powador XP500-HV TL outdoor | Powador XP550-HV TL outdoor

Electrical data	XP500-HV TL OD	XP550-HV TL OD
DC input		
MPP range	550 V ... 830 V	550 V ... 830 V
Operating range	550 V ... 1000 V	550 V ... 1000 V
No-load voltage	1 100 V ¹⁾	1 100 V ¹⁾
Max. input current	1 091 A	1 200 A
Number of DC inputs	6	6
AC output		
Rated output	500 kVA	550 kVA
Voltage to external transformer	3 x 370 V (+/- 10%)	3 x 370 V (+/- 10%)
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Rated current	780 A	858 A
cos phi	0 inductive ... 0 capacitive (adjustable)	0 inductive ... 0 capacitive (adjustable)
General electrical data		
Max. efficiency	98.7 %	98.7 %
European efficiency	98.3 %	98.3 %
Consumption	< 1 650 W	< 1 650 W
Standby consumption	< 110 W	< 110 W
Mechanical data		
Interfaces	2 x RS485 / Ethernet / Wi-Fi 1 x digital input / -output SD card	22 x RS485 / Ethernet / Wi-Fi 1 x digital input / -output SD card
Ambient temperature	-20 °C ... +50 °C full rated power, no derating	-20 °C ... +50 °C full rated power, no derating
Cooling	fan (max. 6 940 m ³ /h)	fan (max. 6 940 m ³ /h)
Protection class	IP54	IP54
Noise emission	< 70 dB(A) ²⁾	< 70 dB(A) ²⁾
H x W x D	2 125 x 2 600 x 860 mm	2 125 x 2 600 x 860 mm
Weight	2 200 kg	2 200 kg
Extras		
Ground fault detection	yes	yes
Protection against moisture	integrated hygrostat and heating combination	
Emergency stop	yes	yes
Overvoltage protection DC/AC/Ethernet	yes	yes
Certifications		
Safety	IEC 62109-1/IEC 62109-2/EN 61000-6-2/EN 61000-6-4/EN 61000-3-3/EN 61000-3-12	
Grid compliance	BDEW, ... for more see homepage/download area	

Conform to the country-specific standards and regulations according to what country version has been set.
¹⁾ To protect the hardware, the inverter starts up only at voltages < 1000 V. ²⁾ Measured at a 10 m distance.

NEW

blueplanet
750 TL3 indoor
875 TL3 indoor
1000 TL3 indoor

Very precise, innovative solutions
for large PV projects

Highest degree of efficiency

1100 V system voltage

Continuous full output power
at ambient temperatures of
up to +50°C



The be-all and end-all for inverter stations.

The central inverters blueplanet 750 TL3 indoor to 1000 TL3 indoor.

Make these indoors inverters your choice whenever you are equipping your solar park to a centralised concept. The appliances have been conceived so that they can be integrated into concrete or steel stations together with medium voltage transformer and other components with absolute ease and simplicity.

This inverter series comes in a range of outputs which makes it easy for you to use available space in your solar park to the full. The blueplanet 750 TL3 and 875 TL3 with their corresponding rated outputs of 750 kW and 875 kW can boast an apparent AC power of 1,000 kVA. These characteristics make it easy to overcome hurdles if your park is

subject to requirements governing reactive power or excess current.

The innovative signal-processing technology ensures maximum performance, efficiency and reliability. The internal power supply of the controller is redundantly designed and an extremely powerful cooling system protects all temperature-sensitive components.

As with all KACO new energy inverters, these appliances really score when it comes to absolute user-friendliness – irrespective of whether they are operated on site or remotely via the internet. They are equipped with both full digital control, as well as a digital user interface.

This provides you with:

- easy operation and quick maintenance
- a multitude of options for system monitoring and universal communications
- activation of country-specific pre-configured settings at the push of a button.

Technical data

blueplanet 750 TL3 indoor | 875 TL3 indoor | 1000 TL3 indoor

Electrical data	blueplanet 750 TL3 ID NEW	blueplanet 875 TL3 ID NEW	blueplanet 1000 TL3 ID NEW
DC input			
MPP range	550 V ... 830 V	550 V ... 830 V	550 V ... 830 V
Operating range	550 V ... 1 000 V	550 V ... 1 000 V	550 V ... 1 000 V
No-load voltage	1 100 V ¹⁾	1 100 V ¹⁾	1 100 V ¹⁾
Max. input current	1 433 A	1 671 A	1 910 A
Number of DC inputs	12 (standard) / 9 (optional)	12 (standard) / 9 (optional)	12 (standard) / 9 (optional)
AC output			
Max. output power / rated power	1 000 kVA / 750 kW	1 000 kVA / 875 kW	1 000 kVA / 1 000 kW
Voltage to external transformer	3 x 370 V (+/-10 %)	3 x 370 V (+/-10 %)	3 x 370 V (+/-10 %)
Max. output current	1 560 A	1 560 A	1 560 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
cos phi	0 inductive ... 0 capacitive (adjustable)		
General electrical data			
Max. efficiency	98.5 %	98.5 %	98.5 %
European efficiency	98.2 %	98.2 %	98.3 %
Internal consumption	< 2 800 W	< 2 800 W	< 2 800 W
Mechanical data			
Interfaces	TFT LCD display with touchpanel 2 x RS485 / Ethernet / Wi-Fi / USB 1 user digital input / output		
Protocol	Modbus TCP/IP, SOAP (Simple Object Access Protocol), KACO RS485 protocol		
Ambient temperature	-20°C ... +50°C full rated power, no derating		
Cooling	fan	fan	fan
Audible noise	< 70 db(A) ²⁾	< 70 db(A) ²⁾	< 70 db(A) ²⁾
Protection class	IP21	IP21	IP21
H x W x D	2 120 x 3 110 x 1 000 mm	2 120 x 3 110 x 1 000 mm	2 120 x 3 110 x 1 000 mm
Weight	2 700 kg	2 700 kg	2 700 kg
Extras			
RPO mode	provision of reactive power out of normal operation (optional)		
Ground fault detection	yes	yes	yes
Protection against moisture	integrated hygrostat and heating combination		
Emergency stop	yes	yes	yes
DC reverse polarity protection	yes	yes	yes
Anti islanding	yes	yes	yes
FRT	yes	yes	yes
Oversvoltage protection	DC side: type 2 / Ethernet: type 2 / Control: type 2		
Certifications			
Safety	IEC 62109-1/-2 / EN 61000-6-2/-4 / EN 61000-3-11/-12		
Grid compliance	BDEW, ... for more see homepage/download area		

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾To protect the hardware, the inverter starts up only at voltages < 1 000 V.
²⁾Measured in 10m distance.

blueplanet
750 TL3 outdoor
875 TL3 outdoor
1000 TL3 outdoor

Very precise, innovative solutions
for large PV projects

Highest degree of efficiency

1100 V system voltage

Continuous full output power at
ambient temperatures of up to
+50 °C

Developed for outdoor use



All good things come in threes.

The central inverters blueplanet 750 TL3 outdoor to 1000 TL3 outdoor.

The blueplanet 1000 TL3 outdoor is your economical central inverter for large-scale PV systems.

The device has protection class IP54. It is therefore particularly suitable for use outdoors – saving you the costs of a separate enclosed room. This, combined with maximum power density, makes it a real alternative to central inverter stations.

The innovative signal-processing technology ensures maximum performance, efficiency and reliability. The internal power supply of the controller is redundantly designed and an extremely powerful cooling system protects all temperature-sensitive components.

Moreover, the blueplanet 1000 TL3 outdoor scores highly thanks to its maximum user-friendliness – irrespective of whether you operate it locally or by means of remote access over the Internet. The inverter is equipped with both full digital control, as well as a digital user interface. This provides you with:

- easy operation and quick maintenance
 - a multitude of options for system monitoring and universal communications
 - activation of country-specific preconfigured settings at the push of a button
- Its smaller siblings, the blueplanet 750 TL3 outdoor and 875 TL3 outdoor also impress with the same performance characteristics as their megawatt brother.

On top of that, they are able to provide additional reactive power or overcurrent when required.

Thanks to the different output gradings in the blueplanet central inverter portfolio, it is really easy for planners to make optimum use of available park surfaces.

Technical data

blueplanet 750 TL3 outdoor | 875 TL3 outdoor | 1000 TL3 outdoor

Electrical data	blueplanet 750 TL3 OD	blueplanet 875 TL3 OD	blueplanet 1000 TL3 OD
DC input			
MPP range	550 V ... 830 V	550 V ... 830 V	550 V ... 830 V
Operating range	550 V ... 1000 V	550 V ... 1000 V	550 V ... 1000 V
No-load voltage	1100 V ¹⁾	1100 V ¹⁾	1100 V ¹⁾
Max. input current	1433 A	1671 A	1910 A
Number of DC inputs	12 (standard) / 9 (optional)	12 (standard) / 9 (optional)	12 (standard) / 9 (optional)
AC output			
Max. output power / rated power	1000 kVA / 750 kW	1000 kVA / 875 kW	1000 kVA / 1000 kW
Voltage to external transformer	3 x 370 V (+/-10%)	3 x 370 V (+/-10%)	3 x 370 V (+/-10%)
Max. output current	1560 A	1560 A	1560 A
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
cos phi	0 inductive ... 0 capacitive (adjustable)		
General electrical data			
Max. efficiency	98.5%	98.5%	98.5%
European efficiency	98.2%	98.2%	98.3%
Internal consumption	< 2800 W	< 2800 W	< 2800 W
Mechanical data			
Interfaces	TFT LCD display with touchpanel 2 x RS485 / Ethernet / Wi-Fi / USB 1 user digital input / output		
Protocol	Modbus TCP/IP, SOAP (Simple Object Access Protocol), KACO RS485 protocol		
Ambient temperature	-20 °C ... +50 °C full rated power, no derating		
Cooling	fan	fan	fan
Audible noise	< 70 db(A) ²⁾	< 70 db(A) ²⁾	< 70 db(A) ²⁾
Protection class	IP54, for outdoor installation	IP54, for outdoor installation	IP54, for outdoor installation
H x W x D	2120 x 3110 x 1000 mm	2120 x 3110 x 1000 mm	2120 x 3110 x 1000 mm
Weight	3140 kg	3140 kg	3140 kg
Extras			
RPO mode	provision of reactive power out of normal operation (optional)		
Ground fault detection	yes	yes	yes
Protection against moisture	integrated hygrostat and heating combination		
Emergency stop	yes	yes	yes
DC reverse polarity protection	yes	yes	yes
Anti islanding	yes	yes	yes
FRT	yes	yes	yes
Oversvoltage protection	DC side: type 2 / AC side: type 3 / Ethernet: type 2 / Control: type 2		
Certifications			
Safety	IEC 62109-1/-2 / EN 61000-6-2/-4 / EN 61000-3-11/-12		
Grid compliance	BDEW, ... for more see homepage/download area		

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾To protect the hardware, the inverter starts up only at voltages < 1000 V.
²⁾Measured in 10m distance.

NEW

blueplanet 2200 TL3 indoor



1 100 V system voltage for flexible design

98.8 % efficiency for maximum yields

Three power stacks for high availability

Fully equipped on AC and DC side for immediate connection

Reactive power at night (RPO) optional

2.2 MVA turnkey container solution available

High power. High reliability. High flexibility

The central inverter blueplanet 2200 TL3 indoor.

Designed with utility-grade PV installations in mind, the new blueplanet 2200 TL3 is the largest solar PV inverter in the KACO new energy product range.

The maximum DC input voltage of the blueplanet 2200 TL3 is 1 100 V. This offers you high design flexibility. On the AC side, large cable cross sections reduce cabling losses.

The inverter integrates all conversion, distribution as well as protective devices on both AC and DC side. It is therefore fully equipped for connection and saves you the effort of acquiring additional accessories.

This adds up to smooth, cost-effective installation and commissioning of the blueplanet 2200 TL3. Once in operation,

your investment security has top priority. The efficiency reaches outstanding 98.8% for highest energy yields. Three power stacks offer effective protection against yield losses: In the rare event of a power electronics failure, two power stacks remain operative to process two thirds of the available input power.

As an option, the inverter can also provide reactive power at night (Reactive Power Optimisation, RPO). You do not need to purchase any expensive reactive power or to invest in a power factor correction system. On the contrary: You can even negotiate to supply reactive power to your grid operator.

The blueplanet 2200 TL3 is an indoor inverter. It was created to blend perfectly in PV power plant designs that are based

on a container solution. Accordingly, KACO new energy offers its own unique, compact 2.2 MVA turnkey container.

The blueplanet 2200 TL3 also provides maximum user-friendliness – irrespective of whether you operate it locally or by means of remote access over the Internet. The inverter is equipped with both fully digital control and digital user interface. Your advantages are:

- easy operation, quick maintenance
- a multitude of options for system monitoring and communication
- activation of country-specific settings at the push of a button.

Technical data

blueplanet 2200 TL3 indoor

Electrical data	blueplanet 2200 TL3 ID NEW
DC input	
MPP range	550 V ... 830 V
Operating range	550 V ... 1 000 V
No-load voltage	1 100 V ¹⁾
Max. input current	3 818 A
Number of DC inputs	24 (250 A DC fuse) 18 (400 A DC fuse)
AC output	
Max. output power / rated power	2 200 kVA / 2 000 kW
Voltage to external transformer	3 x 370 V (+/-10 %)
Max. output current	3 468 A
Rated frequency	50 Hz / 60 Hz
cos phi	0 inductive – 0 capacitive (adjustable)
General electrical data	
Max. efficiency	98.8 %
European efficiency	98.6 %
Internal consumption operation	< 1% of rated power (3 000 W)
Internal consumption standby	< 150 W
Mechanical data	
Interfaces	Color TFT LCD with touchpanel 2 x RS485 / Ethernet / USB 1 user digital input / output
Protocol	Modbus (with Sunspec), SOAP (Simple Object Access Protocol), KACO RS485 protocol
Ambient temperature	-20 °C ... +50 °C full rated power, no derating
Cooling	fan
Audible noise	< 70 db(A) ²⁾
Protection class	IP21
H x W x D	2 150 x 3 100 x 1 400 mm
Weight	4 500 kg
Extras	
Ground fault detection	yes
Emergency stop	yes
Overvoltage protection	DC side, Ethernet
Certifications	
Safety	EN 61000-6-2/-4 / EN 61000-3-11/-12
Grid compliance	BDEW, ... for more see homepage/download area

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾ 1 100 VDC is no-load voltage. Start-up at under 1 000 VDC and max. operating voltage is 1 000 VDC.
²⁾ Measured in 10 m distance.

NEW

blueplanet 2200 TL3 outdoor



98.8% maximum efficiency for highest yields

NEMA 3R enclosure for outdoor use

Continuous full output power at ambient temperatures up to +50 °C

Continuous, remote monitoring

7" color TFT LCD with touch panel for convenient operation

Sunspec Modbus TCP and RTU for flexible monitoring and control

Turnkey solution available with inverters, disconnection units, transformer, and accessories

Big is powerful.

The central inverter blueplanet 2200 TL3 outdoor.

The new blueplanet 2200 TL3 outdoor has been designed with the economic development of utility-scale PV installations in mind.

The central inverter features the protection class NEMA 3R and is therefore safe to install outdoors. It is also available as part of an Integrated Power Station (IPS). It thus caters for the growing need for fast and efficient execution of large-scale solar farms. Inverters, medium voltage transformer and disconnection units for the DC and AC side are mounted together on a single base plate, known as a "skid", to create a ready-to-use, functional unit. Plus, the skid offers extra space for additional equipment such as monitoring accessories, weather stations, or tracker control units.

The blueplanet 2200 TL3 outdoor provides unique user-friendliness – irrespective of whether you operate it locally or by means of remote access over the Internet. The inverter is equipped with fully digital control and communicates via Sunspec Modbus TCP and RTU protocol, among others. The user interface consists of a large, graphical color LCD with touch panel. Your advantages are:

- easy operation, quick maintenance
- a multitude of options for monitoring, control and communication
- activation of country-specific settings at the push of a button.

This adds up to smooth, cost-effective installation and commissioning of the blueplanet 2200 TL3 outdoor. Once in

operation, your investment security has top priority: The efficiency reaches outstanding 98.8%. What is more, the inverter delivers its full rated power in a broad ambient temperature range from -20 to +50 °C, making it perfectly suitable for use in desert-like as well as cold climates.

Technical data

blueplanet 2200 TL3 outdoor

Electrical data	blueplanet 2200 TL3 OD NEW
DC input	
MPP range	550 V ... 830 V
Operating range	550 V ... 1 000 V
No-load voltage	1 000 V
Max. input current	3 818 A
Number of DC inputs	24 (250 A DC fuse) 18 (400 A DC fuse)
AC output	
Max. output power / rated power	2 200 kVA / 2 000 kW ¹⁾
Voltage to external transformer	3 x 370 V (+/-10 %)
Max. output current	3 468 A
Rated frequency	50 Hz / 60 Hz
cos phi	0 inductive ... 0 capacitive (adjustable)
General electrical data	
Max. efficiency	98.8 %
European efficiency	98.2 %
Internal consumption operation	< 1% of rated power (2 000 W)
Internal consumption standby	< 150 W
Mechanical data	
Interfaces	Color TFT LCD with touchpanel 1 x RS485 / Ethernet / USB 1 user digital input / output
Protocol	Modbus TCP/RTU (with Sunspec), SOAP (Simple Object Access Protocol), KACO RS485 protocol
Ambient temperature	-20 °C ... +50 °C full rated power, no derating
Max. altitude above mean sea level	2 000 m ²⁾
Cooling	forced fan
Audible noise	< 70 db(A) ³⁾
Protection class	NEMA 3R
H x W x D	2 150 x 3 400 x 1 400 mm
Weight	5 000 kg
Extras	
Ground fault detection	yes
Emergency stop	yes
Overvoltage protection	DC side type 2 / self-supply type 2 / Ethernet AC side optional
Certifications	
EMC	FCC Part 15 Class A
Grid compliance	UL1741-2010 IEEE1547, IEEE1547.1 CSA C22.2 No. 107.1

Conforms to the country-specific standards and regulations according to the country version that has been set.
¹⁾ 2 200 kVA@AC voltage \geq 370 V, PV input \geq 630 ²⁾ Power derating above MSL 2 000 m up to MSL 5 000 m
³⁾ Measured in 10m distance.

Turnkey solutions for centrally designed solar parks.



2.2 MVA turnkey container solution



2.2 MVA Integrated Power Station



blueplanet 2200 TL3 outdoor and compact transformer station

System components.

2.2 MVA turnkey container solution

Container type	20 Feet High Cube, corrugated weathering steel ISO 12944 classification: C3, CSC safety approval, anti-rodent system
Inverters	blueplanet 2200 TL3 indoor
Transformer	2.2 MVA oil MV / LV transformer 36 / 0.37 kV 10kVA LV / LV transformer (other capacities possible)
Switchgear	MV switchgear Siemens 8DJH-36 RRT (based on application)
Power distribution	Power distribution panel for loads, lighting, wall socket, etc.
Monitoring	Monitoring / SCADA equipment (optional unit according to the requirements e.g. Meteocontrol, Zebotec, Skytron, etc.)
UPS	optional
Thermal management	Forced air cooling with fans and filters / Climate control unit (optional)

2.2 MVA Integrated Power Station

Skid	Steel platform with bus bar connection between inverter and MV/LV transformer
Inverters	blueplanet 2200 TL3 outdoor
Transformer	2.2 MVA oil MV/LV transformer 34.5 / 0.37 kV (other medium voltage available). 15 kVA LV/LV transformer (other capacities possible)
Switchgear	Included in MV/LV transformer
Power distribution	Power distribution panel for loads, lighting, wall socket, trackers, etc.
Monitoring	Monitoring / SCADA equipment

blueplanet 2200 TL3 outdoor and compact transformer station

Inverters	blueplanet 2200 TL3 outdoor
Compact Transformer Station	NDV2500 mit Nominal Power 2.200 kVa, steel housing, IP23 D
Transformer	2.2 MVA oil MV / LV transformer 36 / 0.37 kV 10kVA LV / LV transformer (other capacities possible)
Switchgear	MV switchgear Siemens 8DJH-36 RRT (based on application)
Power distribution	Power distribution panel for loads, lighting, wall socket, etc.
Monitoring	Monitoring / SCADA equipment (optional unit according to the requirements e.g. Meteocontrol, Zebotec, Skytron, etc.)

Measuring. Controlling. Protecting.

Grid management with Powador-protect.

Powador-protect is a voltage and frequency protection device and a control unit for PV systems that feed into the medium- or low-voltage grid. If an interface protection test is not possible due to a large number of string inverters or lack of inverter test terminals, Powador-protect can be used as central interface protection according to VDE-AR-N 4105 and CEI 0-21. Powador-protect also offers the functionality for feed-in management. It evaluates potential free contacts provided by the control system of the distribution network operator and transmits configurable feed-in commands as defined by the distribution network operators.

As a protection device, Powador-protect constantly measures the voltage and frequency grid parameters. If a limit violation of grid parameters is detected, Powador-protect triggers the interface switch and disconnects the PV System from the grid. This function is available with inverters from any manufacturer. The best results are achieved when

Powador-protect is operated with KACO new energy three-phase inverters or transformerless single-phase inverters: KACO new energy inverters are equipped with internal interface switches that are controlled directly by Powador-protect.* No external interface switches are necessary.

As a voltage and frequency protection device, Powador-protect provides a single-fault tolerance (redundant design). This means that if a single error occurs in the device, the safety functions always remain intact; the fault is detected and signaled for maintenance.

For smaller systems, Powador-protect is the ideal solution because some distribution network operators require voltage drops between the inverter and meter to be taken into account. If there are long distances, shutdowns may occur in grids with high voltages because of the voltage drop between inverter and meter. Powador-protect is installed in the main distribution system and measures the

voltage directly at the meter. The internal protection setting on the inverter can therefore be set higher.

Powador-protect also offers another important feature: feed-in management. In some countries, law requires managed, remote-controlled power reduction of PV systems above a certain installed power. Formerly, a separate device was required for this purpose to send the corresponding signals of a ripple control receiver to the inverter as a control command. Powador-protect combines the functions of grid and system protection and feed-in management, saving space and money.

During feed-in management, Powador-protect can manage the signals of the ripple control receiver for up to 31 inverters.

* Please note the Application note "Powador protect" for compatibility.

Technical data

Powador-protect

Electrical data	Powador-protect
Supply	
Power supply	100–264 V AC
Rated voltage	230 V AC
Max. power consumption	2.5 W
Measurement	
r.m.s. value of grid voltage	0 – 300 V AC
Frequency	40-70 Hz
Rated frequency	50 Hz
Actuation of external tie circuit-breaker	
Max. AC current	2.0 A
Max. AC voltage:	250 V
Max. AC current	8.0 A
Max. DC voltage:	30 V
Mechanical data	
Interfaces	
Measurement	Screw terminals, 4-pole (L1/L2/L3/N)
Switch contacts	2 changeover contacts for connecting external tie circuit-breakers
Ripple control receiver	Screw terminals
Inverter	Screw terminals for inverter off Screw terminals and RJ45 port for RS485
General mechanical data	
Display	LCD 2 x 16 characters, 3 LEDs (operating status)
Controls	2 control buttons, 1 release test
Mounting	Top-hat rails or wall mounts
Ambient temperature	-20 °C ... +70 °C
Protection class	IP20
Housing	Polycarbonate
H x W x D	89.5 x 107 x 63 mm
Weight	310 g



Highlights

Grid and system protection as per VDE-AR-N 4105, CEI 0-21 and G59/3

Individual voltage and frequency adjustment options via the "User Defined" menu selection

Triggers the inverter's integrated coupler circuit-breaker

Also as a supplement to Powador-proLOG

Temporary protection according to the German Medium Voltage Directives

blueplanet
gridsave eco
5.0 TR1



Flexible integration in existing systems thanks to AC connection

Variable battery capacity, can be used with all types of lead batteries

Convenient set-up and visualisation via PC access

Grid monitoring with switch-over to emergency power supply without virtually any interruption in the event of a grid failure

Off-grid capacity (1- and 3-phase)

Compatible with all commercially available inverters

Control of energy sources possible

Flexible. Modular. Intelligent.

The bidirectional battery inverter blueplanet gridsave eco 5.0 TR1.

Environmentally-friendly, reliable solar power supply around the clock – it's easy with the blueplanet gridsave eco 5.0 TR1. Save your solar power during the day and use it whenever you want with our battery inverter. This helps you bridge the gaps during the times between power generation and power consumption for private and small-scale commercial purposes – in both grid-parallel and off-grid operation. Thanks to its AC coupling, the blueplanet gridsave eco 5.0 TR1 is not only suitable for new plants but also ideal for expanding existing PV systems, regardless of the brand of the solar PV inverter in use.

This intelligent energy manager uses efficient control logic to communicate between the solar PV inverter, the PV array, the lead-based battery and the public power grid. This ensures that the entire system is operating as efficiently as possible and that you are achieving optimal energy consumption for your solar power.

You select the battery capacity according to your needs. With this modular approach, blueplanet gridsave eco 5.0 TR1 also provides you with the highest level of flexibility.

A special highlight is the capacity to switch to back-up power, virtually without interruption in the event that the public grid fails. In pure off-grid networks, the blueplanet gridsave eco 5.0 TR1 is the heart of the whole system and takes charge of energy management including the actuation of additional energy sources such as emergency backup generators or diesel generators. On top of that, an emergency power supply from stored solar power is also possible when combined with KACO new energy solar PV inverters: the battery is recharged by the PV array.

Of course, with an appropriate number of components, the blueplanet gridsave eco 5.0 TR1 also allows synchronised

three-phase systems with the same features to be established. It can control up to five solar PV inverters.

Thanks to the monitoring software included in the delivery scope you can conveniently access your system at any time; also included: a temperature sensor. By continuously measuring the temperature and the midpoint, the blueplanet gridsave eco 5.0 TR1 keeps track of the status of the batteries much more precisely than the majority of our competitors' products. This guarantees the maximum service life of the batteries.

To make the subsequent integration of this storage solution as simple as possible, we offer you, in addition to the individual product, system upgrade packages that contain all the parts you need.

Technical data

blueplanet gridsave eco 5.0 TR1

Electrical data	blueplanet gridsave eco 5.0 TR1
Power	
Rated output and charging current (25 °C)	5 kVA / 104 A
Peak output power (< 30 s)	12 kVA
Max. recommended power of AC-coupled solar inverter (off-grid/emergency power)	10 kVA
DC side	
Battery voltage (nominal)	48 V
DC input voltage range	40 V ... 68 V
Rated currents (25 °C)	104 A
AC side	
Nominal voltage	230 V
Rated current	22 A
Rated frequency	50/60 Hz
THD	< 3 %
Emergency power supply	yes
Transfer switch	
AC transfer current capacity	32 A
Switching time	< 30 ms
General electrical data	
Max. efficiency	96 %
Stand-by losses	8 W
Safety	IEC 62040-1-1:2002
EMC	EN 61000.6.3:2007
Certifications	overview: see homepage / download area
Mechanical data	
Display	LED, acoustic warning
Interfaces	USB, RS485, RS232, ethernet, 3 analog inputs, 4 analog outputs, 4 digital inputs, 3 digital outputs
Battery/inverter connection cable*	max. length: 3 m at 50 mm ² 10 m at 70 mm ²
Connection for battery/inverter: circuit breaker*	2-pole, 160 A
Ambient temperature	-10 °C ... +60 °C
Protection class	IP43
Cooling	fan
H x W x D	690 x 375 x 220 mm
Weight	40 kg
System upgrade package*	
Includes: Lead-acid battery system plus connection kit, External measuring point for optimising personal consumption, 3-phase grid monitoring and system protection, external interface converter	

NEW

blueplanet
gridsave 1000 TL3



Static and dynamic grid support

1,000 kVA rated power

Scalable system

AC-coupled

Various battery types possible

Modbus communication interface
for use with different controllers

Technical data

blueplanet gridsave 1000 TL3

Electrical data		blueplanet gridsave 1000 TL3 NEW
DC side		
DC input range		750 – 1100 V
Max. battery current		1 467 A
Number of DC inputs		4
AC side		
Max. output power / rated power		1 000 kVA / 1 000 kW
Voltage to external transformer		3 x 440 V (+/- 10%)
Max. output current		1 312 A
THD		< 3 %
Cos phi		> 0.01
General electrical data		
Max. efficiency inverter		98.2 %
Internal consumption		< 1 % of rated power
Inverter control		external controller
Mechanical data		
Interfaces		TFT LCD display with touchpanel, RS485 / Ethernet / USB, 1 user digital input / output
Protocol		Modbus TCP/IP, Modbus RTU, CAN
Ambient temperature		-20 ... +40 °C full rated power, no derating
Cooling		fan
Audible noise		< 70 db(A)
Protection class		IP21
H x W x D		2 030 x 4 000 x 700 mm
Weight		2 940 kg
Supported functions		
Operation mode		
Constant current		yes
Constant power		yes
Static grid support		
Active power related frequency P(f)		yes
Reactive power related voltage Q(U)		yes
Dynamic grid support		
FRT		yes
Certifications		
Safety		EN61000-6-2, EN61000-6-4, EN61000-3-3, EN61000-3-12
Marking		CE

Mega storage. Constant energy. Stable grid.

The bidirectional battery inverter blueplanet gridsave 1000 TL3.

KACO new energy is opening up a whole new dimension with the blueplanet gridsave 1000 TL3, a storage solution in the megawatt class. Public utilities, distribution system operators, EPCs and large businesses alike will profit from its grid management capabilities in order to balance generation and load of power networks.

The blueplanet gridsave 1000 TL3 is a bidirectional battery inverter with a rated power of 1,000 kVA. By charging and discharging batteries it provides static and dynamic grid support in order to regulate the frequency. It thus contributes to keep the grid operating reliably at every second.

The grid in question can be the national grid as well as a grid-tied power supply of a small town or industrial facility: The

size of the storage system is scalable according to requirements.

The blueplanet gridsave 1000 TL3 communicates via Modbus. This widespread interface allows for a large number of available controllers to manage the battery inverter. It can therefore easily meet individual requirements in the design of a storage system.

The blueplanet gridsave 1000 TL3 is compatible with all common battery technologies. Another advantage is the flexible composition of the energy mix: the blueplanet gridsave 1000 TL3 can handle conventional energy sources as well as wind and solar.

Speaking of solar, KACO new energy is your one-stop storage and PV provider when you make the economically and

ecologically sound decision for including PV into the energy mix. The Germany-based company has a track record of over 75 years of engineering expertise in solar PV inverter technology and is one of the few manufacturers with a full program of solutions from 250 watts right up to the megawatt class.

With this long-lasting experience come appropriate Operation and Maintenance Services for the entire life cycle of our inverters. A modular approach allows you to individually define the support you need in advance. Our field service is on stand-by any time, as well.

Residential-scale PV solutions.

Example: Using self-generated photovoltaic in Villingendorf. All managed perfectly thanks to monitoring and control of self-consumption.

The technological heart of your PV system beats in our inverters, like in this single-family home in Villingendorf, Germany. Apart from feeding in solar power they also:

- Coordinate the system monitoring
- Trigger the operation of household appliances to optimise your self-consumption
- Communicate with the grid operator as regards grid management

For you as the owner this means: Sit back and relax, everything is being taken care of! Easy system monitoring can be achieved without additional devices and costs. Our inverters in the Powador TL3 range and all of the new blueplanet inverters come equipped with data logger and web server, and offer all current interfaces.

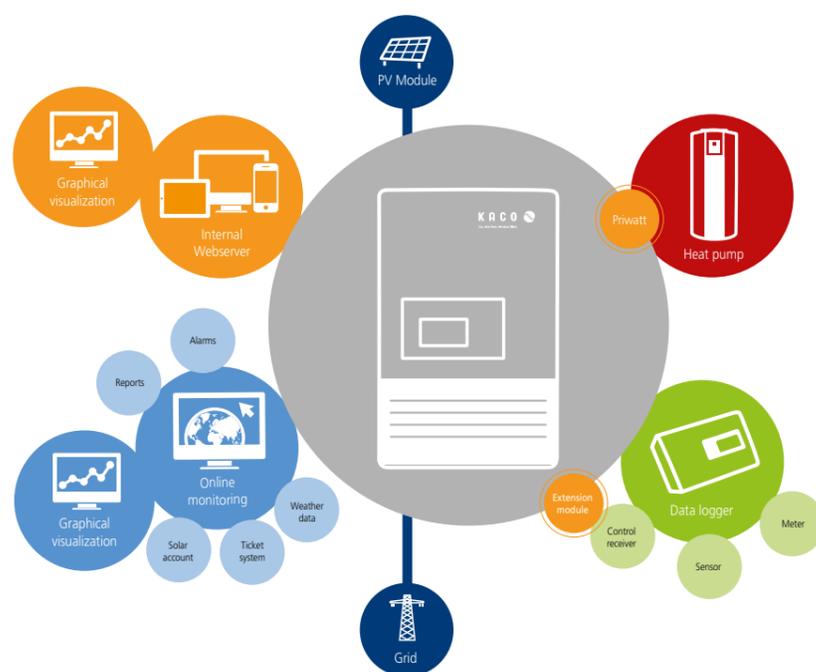
Would you like to combine the built-in advantages with the comfort of a professional online monitoring portal? Simply keep track of your PV array using our Powador-web! You can also connect the data logger of your choice, regardless



of brand, to our inverters. In that way, your PV array can be extended to include additional accessories such as sensors for collecting environmental data, or it can be displayed on the monitoring portals of alternative providers.

We offer an extension module for the blueplanet TL1, 5.0 to 9.0 TL3 and the blueplanet 20.0 TL3 which allows performance targets sent by the grid operator via ripple control receiver to be put into action by the inverters themselves.

Why not make use of your own self-generated solar power? You can define just how independent your energy supply should be: by using Priwatt you can enhance your direct self-consumption. If you are thinking of extending your PV array to include a storage system, the blueplanet gridsave eco 5.0 TR1 is your appropriate energy manager. Find out more overleaf.



Overview of the plant management of smaller PV systems.

Good for the wallet. Good for the energy turnaround. Good for the environment.

PV self-consumption with Priwatt and blueplanet gridsave eco.

As the owner of a photovoltaic system you produce environmentally-friendly electricity much more economically than electricity from the grid. Why not take that decisive step forward then? Use your own self-generated solar energy: You become more independent in terms of your energy supplies and are taking the next step in the direction of the energy turnaround. With our Priwatt self-consumption controller we offer you a simple energy management system as an alternative to expensive smart-home solutions. Priwatt is free of charge and is pre-installed in all KACO new energy inverters of up to 50 kVA.

Priwatt is an interface within the inverter which allows you to systematically operate your household appliances with solar energy. You can configure the appropriate settings using the inverter display in a few steps:

- Using the activation mode you decide how often the appliance should be switched on: once a day, continuously or just once.
- With the monitoring time you determine how long the required solar power needs to be available before the appliance is switched on. Settings of between 1 and 60 minutes.
- The power threshold is used to determine how much power the appliance needs in order to be started. Settings of 100 watts up to the full rated output of the inverter in 10 watt increments.
- The operating mode can be selected depending on output or duration. The time-dependent function is normally chosen when the household appliance calls for a minimum run-time.
- In selecting the time-dependent operating mode, you enter the duration of the appliance's operating time. Settings from 1 to 600 minutes.

Tip: Add the local base load to the power threshold of the household appliances that you want to switch on with Priwatt. In this way you also use your solar power to operate the rest of the appliances in

the home as long as Priwatt is activated. You can thereby reduce the amount of electricity drawn from the grid together with the related costs.

Example:

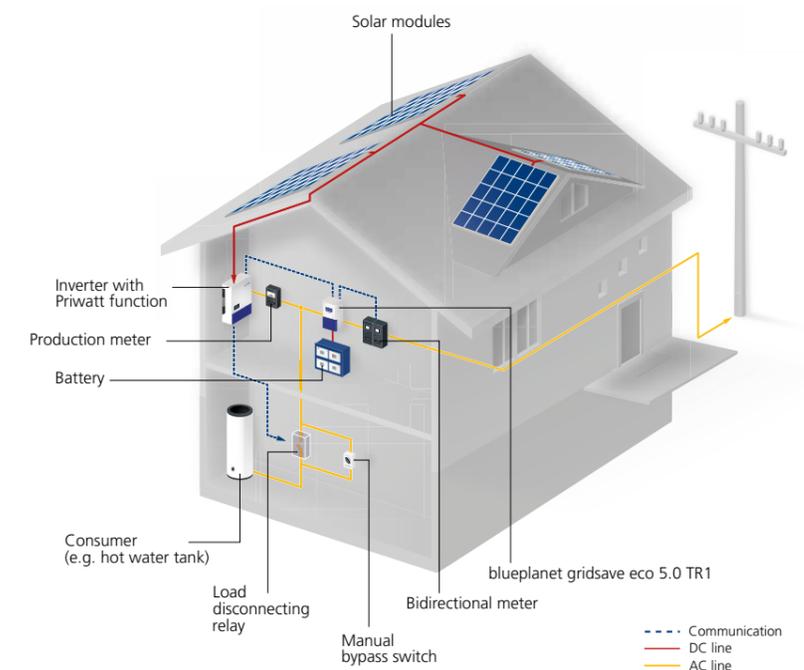
If you want to use Priwatt to heat your hot water boiler, use the following settings in the inverter menu: The correct activation mode is continuous, the monitoring time is just 1 minute and the operating mode is dependent on output since Priwatt will power your warm water boiler as often and as long as possible with the amount of available solar energy. The power threshold is 2,400 W.; 2,000 W for the tank and 400 W for the local base load (assumed values). The operating time is not shown in output dependent operating mode.

Using an override switch you can also revert to operating the appliance from

the grid at any time. Above all else, Priwatt is economic for generating heat, or for switching on appliances which are needed if solar irradiation is higher, or to charge batteries. Obvious examples of use are:

- Heating pumps
- Hot water tanks
- Pool filtering systems
- Air-conditioning
- Irrigation systems

Put the finishing touch to your declaration of solar independence with an intelligent energy storage system; it will allow you to make deferred use of your own green electricity. Equipped with our blueplanet TL1 and TL3 inverters of up to 10 kilowatt output you can turn your PV array into a storage system at any time. The blueplanet gridsave eco 5.0 TR1 battery inverter will take care of the energy management.



Priwatt and blueplanet gridsave eco 5.0 TR1 functional diagram

Industrial-scale PV solutions.

Example: The UK's largest solar rooftop is powered by Powador 60.0 TL3.

The Marks & Spencer retail chain has set an impressive example of how to realise PV solutions in industrial dimensions with KACO new energy. The location: Its East Midland distribution centre in Castle Donington in the county of Leicestershire.

24,272 PV modules are spread across the whole roof area. The installation company, SBC Renewables (SBC) designed a de-centralised system using 90 Powador 60.0 TL3 and four Powador 18.0 TL3 inverters. The installation of the PV system was easily carried out during ongoing distribution centre operations. "We settled on the perfect size 50 kVA inverter from KACO new energy as these ticked all the boxes in terms of quality and reliability. They were also an ideal size to lower into the roof hatches above the plant rooms. Each has three MPP trackers ideally sized for the proposed layout. They

also added shadow tolerance, redundancy and traceability in the event of any string problem", said Dr. Clive Weatherby, Technical Director at SBC, concerning the advantages of our products.

The solar power from this "rooftop solar park" amounts to 6.1 megawatts. This now takes the crown as the largest PV installation on a single rooftop in the United Kingdom. To give an example in terms of figures, the PV array covers the energy supply of 2,000 households. The inverters convert the solar energy into alternating current to be used directly on-site.

Marks & Spencer, one of the most established and largest retail chains in the country has therefore created a prime example of commercial self-use of solar power. The backdrop to this is "Plan A", in which Marks & Spencer has set itself

the target of covering the entire energy needs of all of their buildings in the United Kingdom and Ireland from 100% renewable energy sources by 2020.

At the UK Solar Power Portal Awards in October 2015, the project won the "Commercial-scale rooftop over 250 kW" category. The application for the award by SBC Renewables included monitoring data that shows the plant consistently performing above predicted levels.

Our inverters in the power range from 15 to 50 kVA, as well as our corresponding monitoring and storage units are perfect pillars around which to build your industrial-scale PV projects. Do you need planning support? Don't hesitate to contact us.

Reliable energy supplies for businesses.



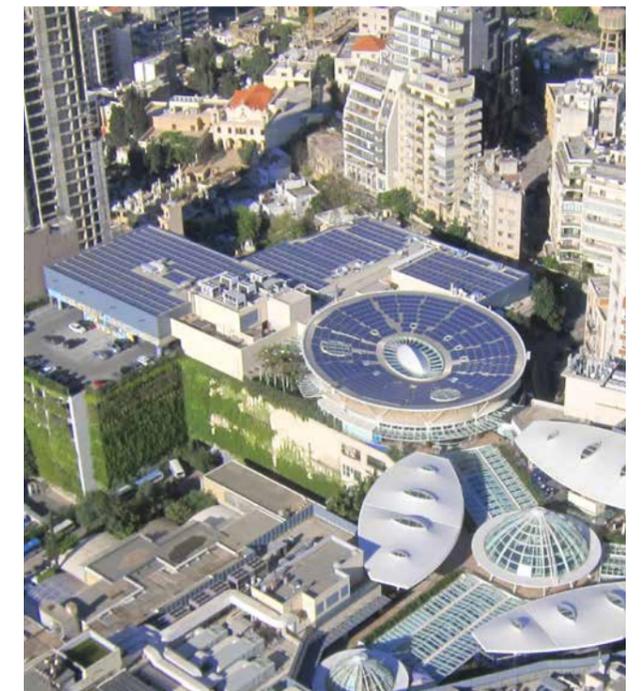
France, Port de la Rochelle, 250 kWp, Powador 60.0 TL3



The largest rooftop system in the United Kingdom: 6.1 MW in Castle Donington.



Austria, Salzburg, 500 kWp, Powador 18.0 TL3



Lebanon, Beirut, 443 kWp, Powador 60.0 TL3 and Powador 20.0 TL3

Utility-scale PV solutions.

Example: IPS 1.1 and IPS 2.0 provide 400 MW of solar power to 70,000 households.

One of the most important PV projects of our time is currently being developed in San Antonio, Texas. The contract to build this ambitious mega-project was awarded by CPS Energy, which supplies power to the seventh largest city in the USA, to OCI Solar Power, the American subsidiary of South Korea's OCI Enterprises.

When searching for the best possible inverter, OCI turned to the well-established central inverters by KACO new energy. Outdoor versions of the devices are mounted on a base plate (also called a skid) together with external transformers, disconnectors and other accessories to form a functional unit, the IPS (Integrated Power Station).

The total of seven Alamo solar power plants, named after the famous fort, supply 400 megawatts to 70,000 house-

holds. Alamo 1, a 41 MW solar park, is the first of the major facilities that will develop around San Antonio by 2016. The park has been supplying solar energy for 7,000 households to CPS Energy since the end of 2013. Alamo 5 was completed at the end of 2015 and feeds 95 megawatts into the grid.

On completion of the project in 2016, the largest publicly-owned electric company in the USA will reach its target of 1,500 MW of clean power by 2020 several years earlier than expected.

Pioneer of the environmental movement and world-famous author Jeremy Rifkin dedicates an entire chapter of his 2011 book "The Third Industrial Revolution" to the lighthouse project in the Texas Triangle. His conclusion is that San Antonio "could become America's first low-emis-

sion city". Including power plant technology from KACO new energy.

The Alamo 1 to 4 solar parks are equipped with the IPS 1.1 with 1.1 MVA. The remaining parks will use a 2.0 MVA strong IPS. The basis for the IPS 2.0 is provided by two blueplanet 1000 TL3 outdoor. As the TL3 family of central inverters has expanded further with the addition of the blueplanet 750 TL3 and 875 TL3 outdoor, we are supplying the IPS on request in intermediate sizes, including asymmetrical inverter power. The most powerful station is the IPS 2.2, based on the new blueplanet 2200 TL3 outdoor. Talk to us about your next project!



The largest communal PV power plant in the world: The San Antonio Public Utility Company in Texas is building a 400 MW solar power plant using the IPS 1.1 and IPS 2.0.

Clever networking.

Plant management of solar power stations.

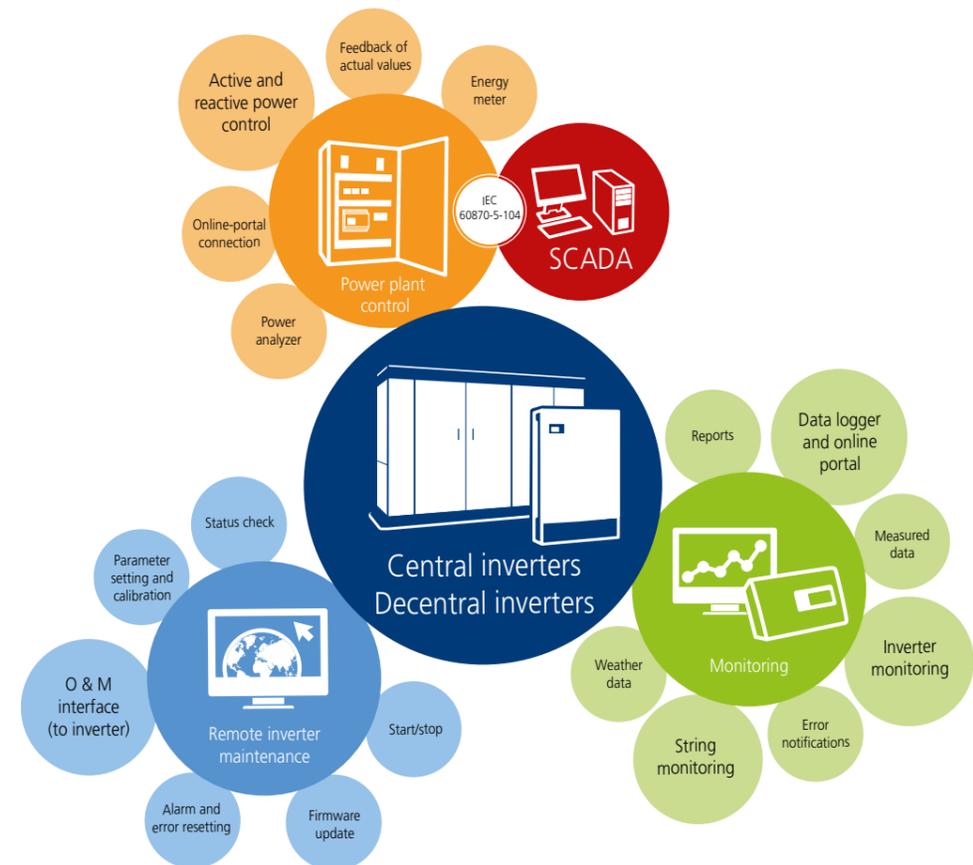
In solar power stations on a commercial and industrial scale, our inverters are the key to flexible monitoring and system management – whether centralised or decentralised. If you choose KACO new energy, you can select additional components and suppliers entirely at will: our inverters are compatible with all commercially available products; we will develop a tailor-made solution for you from the available options.

Our inverters are supplied equipped with data logger, web server and standard interfaces. You can of course connect data loggers of different brands to our inverters, enabling you to expand your

PV system with the addition of numerous supplementary accessories (to measure weather data or meet power specifications by the grid operator, for example). Adding I/O interfaces to a data logger enables you to customise the functions of peripheral equipment. It is of course also possible to include string collectors.

Have you had a good experience with a particular monitoring portal? You can use an external data logger to create a virtual impression of your solar park in a familiar online portal at any time, giving you a platform for the use of professional tools for everything from performance comparison to ticket system.

Our devices are also ideal for use in solar power stations which are connected to a grid operator's control room. The inverters send their data to the grid operator's control system (SCADA) for evaluation via the data station, which houses the data logger equipment for the solar power station. In the opposite direction, the grid operator sends commands for individual power regulation of the plant which are implemented by the inverters.



Overview of the plant management of large-scale solar power plants.

Turnkey solutions.

Highest yields and availability for commercial and utility-scale solar power plants.

From pioneer to institution

If you choose KACO new energy when building large solar power stations, you are choosing the right partner for safeguarding your investment. As far back as the 1950s, KACO was the world's largest manufacturer of electromechanical choppers, the predecessors of today's inverters. With the know-how acquired from its many years of experience, from 1999 KACO new energy also quickly established itself in the leading group of pioneering PV inverter manufacturers worldwide. The company has remained in this position to this day – with products and services which we have constantly developed further to satisfy our customers and market requirements.

From the power plant boom in Spain to the world's largest municipal solar power plant in San Antonio, Texas, our inverters provide yields which live up to all expectations – often even surpassing them. Over the years, we have es-

tablished a sophisticated quality management system and a reliable delivery chain, and these are what have led our products to be genuinely worthy of the "Made in Germany" title.

Meeting your needs

No matter whether you decide on a centralised or decentralised design, we offer a variety of perfectly matched components with which we can flexibly meet your needs. Our aim is to find the optimum solution to provide you with a secure return on investment. With transformer stations, sub-stations, low-voltage distribution, AC sub-distributors and DC combiners, as well as inverters, KACO new energy provides you with everything you need from one source.

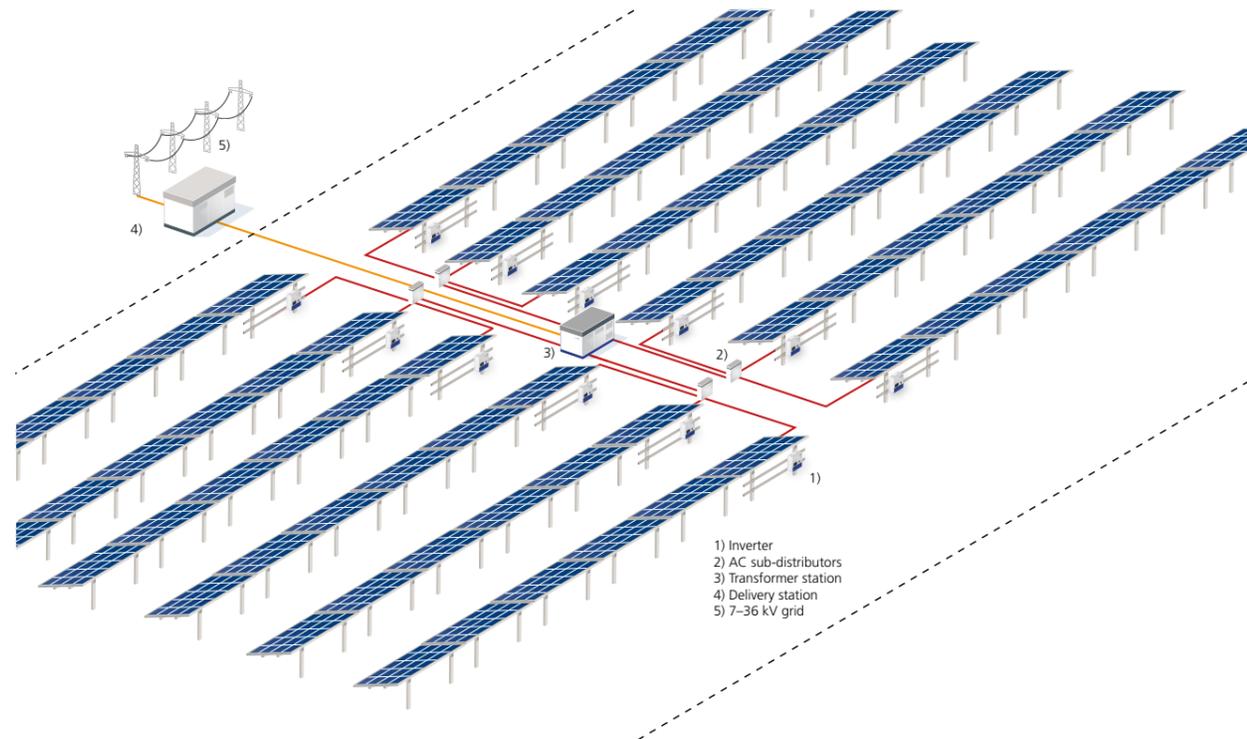
Decentralised: for flexibility

For the decentralised installation of your solar power plant, why not use our inverters with AC power between 25 and

60 kVA. In this class, we offer numerous inverters with finely graded outputs which are not available from any other manufacturer.

Advantages of a decentralised design with solutions from KACO new energy

- Versions for thrifty connection plans
- Highly adjustable thanks to versions with 3 MPP trackers
- Quick to install without heavy machinery
- Easy to install
- High availability
- Easy to maintain
- Detailed monitoring



Decentralised layout of a solar power plant.



Example of a decentrally-designed solar power plant with the blueplanet 50.0 TL3 INT.

Turnkey solutions.

Highest yields and availability for commercial and utility-scale solar power plants.

Centralised: for clarity

With their high effectiveness and a high degree of protection against failure, our central inverters are the right choice for centralised systems. Our central inverters are available as indoor and outdoor models. We can thus deliver them as part of an Integrated Power Station (IPS), together with a transformer compact station, or in a container solution.

The positives of personality

The "hardware" we deliver is accompanied by a multitude of services, which we use to support the construction of solar power plants in every phase of the project up to completion:

- advice on various inverter concepts
- system dimensioning
- description of system configuration

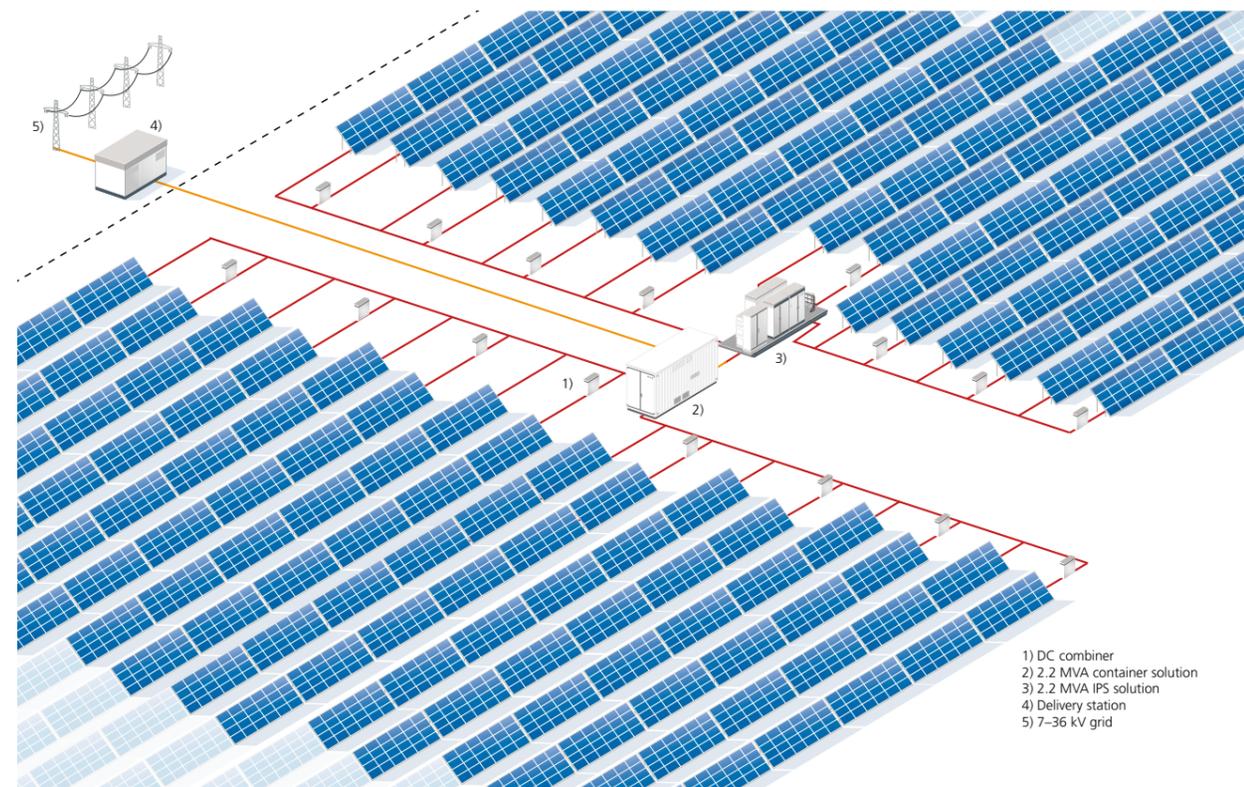
- provision of all technical specifications and documents
- preparation of park control and monitoring solutions
- performance analysis
- commissioning support

In short – we provide you with the system technology for your solar power plant as a turnkey solution from a single source. It goes without saying that this also includes comprehensive advice, as well as all the necessary Operation and Maintenance services over the entire life span of the project – allowing us to respond to anything that may happen.

Let us know how we can help you: send your queries to pv-projects@kaco-newenergy.de at any time.

Advantages of a centralised design with solutions from KACO new energy

- large variety of indoor and outdoor versions
- IPS and container solutions available
- inverters with the maximum efficiency
- simple wiring at the AC end
- easy control and monitoring of the inverters due to comparatively few devices



Centralised layout of a solar power plant.



Examples of centrally-designed solar utility plants. Top left, Japan, 1.8 MWp / Top right, USA, 400 MWp / Bottom, UK, 20 MWp.

Repowering solutions.

Example: A 3.6 MW photovoltaic system on the Island of Rügen is re-equipped using the new Powador 39.0 TL3 M1 inverters.

The manufacturer of the previous inverters ceased to exist, no one wanted to do maintenance, and repairs were stretching the local installers to their limits. This is a true recount of an instance that happened on the German Island of Rügen, in the Baltic Sea. Not an isolated case, the

solution called for here is: repowering. When selecting new inverters, the prime question was: Which manufacturer can one rely on now? Trusting longevity and „Made in Germany“ quality, the operating company of the solar park finally decided on KACO new energy.

Located in one of Germany's sunniest regions, the solar park is now enjoying highest yields and complete service following re-equipping with Powador 39.0 TL3 M1 inverters.



Just made for each other: The 3.6 MW solar power plant after repowering with KACO new energy inverters.

Increase the performance of your photovoltaic system.

Millions of solar plants supply clean solar power worldwide. After many years of use, sometimes under the harshest conditions, even the most robust technology such as the PV inverter can show signs of wear. The market shake-out has also taken its toll: some manufacturers have disappeared, there is no service, warranties are worthless and spare parts are no longer available.

If this is the case, then repowering will offer you the chance of securing and optimising the performance of your system by installing new inverters. Repowering is definitely advisable if any of the following sound familiar

- Your inverter is faulty and the guarantee has expired

- You benefit from high feed-in tariffs and could profit even more from a powerful, new inverter.
- The components which were originally installed are no longer available on the market.

With its seamless portfolio, KACO new energy can offer you compatible repowering solutions for photovoltaic systems of all sizes using inverters of all performance classes. In most cases, you can also replace appliances manufactured by other companies with an appropriate Powador or blueplanet inverter.

Our experts will support you in choosing the correct inverter for your particular system layout. Equipped with highest quality, sophisticated technology to

guarantee a long service-life, your photovoltaic system will start meeting all of your expectations again. Tap into numerous benefits by targeted repowering using KACO new energy inverters:

- Long-term increase of yields
- Best system performance
- Reduced maintenance costs
- Raised reliability
- State-of-the-art technology
- 100 years on the market means long-term certainty

Please turn page over for a chart indicating how to replace KACO new energy inverters with units from our current portfolio.

Our experts will gladly advise you on any questions concerning repowering.

Contact us:

 repowering@kaco-newenergy.de

 +49 7132 3818 660

 www.kaco-newenergy.com/repowering

Repowering solutions for PVI and Powador inverters.

Previous inverter	Repowering inverter	Comment
PVI 00 series, transformerless		
PVI 2600 - 2.0 kW	Powador 4400 - INT blueplanet 3.0 TL1 M1	max. input voltage of repowering inverter: 600 VDC
PVI 2600 - 2.6 kW	Powador 4400 - INT blueplanet 3.0 TL1 M1	max. input voltage of repowering inverter: 600 VDC
PVI 4000 - RS485 (IP21)	Powador 5500 - INT blueplanet 4.6 TL1 blueplanet 5.0 TL3	max. input voltage of repowering inverter: 600 VDC repowering inverter: 3-phase
PVI 5000 - RS485 (IP21)	Powador 6600 - INT blueplanet 6.5 TL3	repowering inverter: 3-phase
PVI 00i series, transformerless		
PVI 2500i	Powador 4400 - INT blueplanet 3.0 TL1 M1	max. input voltage of repowering inverter: 600 VDC
PVI 4000i - RS485	Powador 5500 - INT blueplanet 4.6 TL1 blueplanet 5.0 TL3	max. input voltage of repowering inverter: 600 VDC repowering inverter: 3-phase
PVI 4500i - RS485	Powador 5500 - INT blueplanet 5.0 TL1 blueplanet 5.0 TL3	max. input voltage of repowering inverter: 600 VDC repowering inverter: 3-phase
PVI 5000i	Powador 6600 - INT blueplanet 6.5 TL3	repowering inverter: 3-phase
Powador 00xi series, transformerless		
Powador 2500xi	Powador 4400 - INT blueplanet 3.0 TL1 M1 blueplanet 3.0 TL1 M2	max. input voltage of repowering inverter: 600 VDC
Powador 3500xi	Powador 4400 - INT	
Powador 3600xi	Powador 4400 - INT blueplanet 3.7 TL1	max. input voltage of repowering inverter: 600 VDC
Powador 4000xi	Powador 5500 - INT blueplanet 4.6 TL1 blueplanet 5.0 TL3	max. input voltage of repowering inverter: 600 VDC repowering inverter: 3-phase
Powador 4500xi	Powador 6600 - INT blueplanet 4.6 TL1 blueplanet 5.0 TL3	max. input voltage of repowering inverter: 600 VDC repowering inverter: 3-phase
Powador 5000xi	Powador 6600 - INT blueplanet 6.5 TL3	repowering inverter: 3-phase
Powador 6400xi	Powador 9600 - INT blueplanet 6.5 TL3	repowering inverter: 3-phase
Powador 6650xi	Powador 9600 - INT blueplanet 7.5 TL3	repowering inverter: 3-phase
Powador 7200xi	Powador 9600 - INT blueplanet 7.5 TL3	repowering inverter: 3-phase
Powador 8000xi	Powador 9600 - INT blueplanet 9.0 TL3	repowering inverter: 3-phase

Previous inverter	Repowering inverter	Comment
Powador 00 series, transformerless		
Powador 3200 - INT	Powador 4400 - INT blueplanet 3.0 TL1 M1	max. input voltage of repowering inverter: 600 VDC
Powador 4200 - INT	Powador 4400 - INT blueplanet 3.7 TL1	max. input voltage of repowering inverter: 600 VDC
Powador 4400 - INT	Powador 4400 - INT	
Powador 5300 - INT	Powador 5500 - INT blueplanet 4.6 TL1 blueplanet 5.0 TL3	max. input voltage of repowering inverter: 600 VDC repowering inverter: 3-phase
Powador 5500 - INT	Powador 5500 - INT blueplanet 4.6 TL1 blueplanet 5.0 TL3	max. input voltage of repowering inverter: 600 VDC repowering inverter: 3-phase
Powador 6600 - INT	Powador 6600 - INT blueplanet 6.5 TL3	repowering inverter: 3-phase
Powador 7700 - INT	Powador 9600 - INT blueplanet 6.5 TL3	repowering inverter: 3-phase
Powador 7900 - INT	Powador 9600 - INT blueplanet 7.5 TL3	repowering inverter: 3-phase
Powador 8600 - INT	Powador 9600 - INT blueplanet 7.5 TL3	repowering inverter: 3-phase
Powador 9600 - INT	Powador 9600 - INT blueplanet 9.0 TL3	repowering inverter: 3-phase
Powador 00xi series, transformerless		
Powador 25000xi	Powador 30.0 TL3	
Powador 30000xi	Powador 33.0 TL3	
Powador 33000xi	Powador 36.0 TL3	
Powador 01xi series, galvanically isolated		
Powador 1501xi	Powador 2002 - INT	
Powador 2501xi	Powador 3002 - INT	min. input voltage of repowering inverter: 200 VDC
Powador 3501xi	Powador 4202 - INT	min. input voltage of repowering inverter: 200 VDC
Powador 4501xi	Powador 6002 - INT	min. input voltage of repowering inverter: 200 VDC
Powador 5001xi	Powador 6002 - INT	min. input voltage of repowering inverter: 200 VDC
Powador 02 series, galvanically isolated		
Powador 2002 - INT	Powador 2002 - INT	
Powador 3002 - INT	Powador 3002 - INT	
Powador 4202 - INT	Powador 4202 - INT	
Powador 5002 - INT	Powador 5002 - INT	
Powador 6002 - INT	Powador 6002 - INT	

Nonbinding examples of repowering possibilities for older KACO new energy inverter models, other system-specific characteristics (e.g. string configuration, grid code requirements, system balance, monitoring concept, mechanical dimensions, etc.) have to be checked individually.

Solar power storage: for small loads.

Example: Grid-remote electricity supplied to a desert clinic by means of solar power.

TARGET is a human rights organisation founded by Annette and Rüdiger Nehberg that primarily supports women's rights. Defying building and bureaucratic hurdles with great perseverance and tenacity, the association built a childbirth clinic among the Afar people in the middle of Ethiopia's Danakil desert. The energy supply to the area was provided by means of solar power with the help of KACO new energy.

The photovoltaic system has a 60.5 kilowatt output and it was complemented by a 109 kWh storage system. During the day the system supplies electricity directly to the electrical appliances in the clinic and the operating theatre, as well as to the kitchen and laundry. Excess power is stored and, when required, is taken from the batteries to contribute towards the electricity supply at night. Occasionally a diesel generator comes into action if, for example, the batteries are empty. Since the commissioning of the PV storage system in June 2015, the clinic's energy supply has been reliably, permanently and sustainably based on the sun.

Careful use of natural resources and minimum environmental impact were crucial pre-considerations for TARGET. From this

ecological point of view alone, solar energy is preferable in comparison to diesel as an alternative. Moreover, purchasing diesel is expensive and a recurring task. Particularly in remote, sun-rich regions, the price advantages of locally-generated solar energy lend themselves as an ideal replacement for conventional diesel generators: Photovoltaics can be easily integrated into existing systems, contributes the lion's share to energy provision and is independent of rising oil prices.

The automatic energy supply management is performed by the bidirectional blueplanet gridsave eco battery inverter. Three of its 20 kilowatt versions are deployed in the clinic. TARGET attaches enormous importance on the operating theatre being ready for use at all times. Thanks to its superior energy management capabilities, the blueplanet gridsave eco controls all electrical appliances which are connected to the mini-grid and switches the remaining ones off in sequence when the PV power is diminishing, thus driving the storage system to greater autonomy. If the solar energy reserve becomes critical, then it switches the diesel generator on as a back up to enable continued use of the operating theatre.

Plans to connect to the public grid are currently in progress. As soon as this becomes available, the blueplanet gridsave eco will effortlessly adapt itself to the new situation: It will stop the gaps in the energy supply with electricity from the public grid so that the diesel generator can continue to be used as the very last link in the chain.

Can new electrical appliances be added if the hospital is extended? The simple answer is: yes. The blueplanet gridsave eco flexibly integrates additional electrical appliances into the electricity network. The threshold values governing the switching off of appliances can be adjusted at a later date. Thanks to its AC coupling, the blueplanet gridsave eco allows for the extension of existing PV systems and for selection of the battery capacity according to needs.

In this spirit, we wish TARGET and the clinic a successful future!

Read more about TARGET here: www.target-nehberg.de



Energy Tank: Battery inverters, solar inverters and switchgear are all safely housed in a container. The necessary cooling is provided by fans.



Highly anticipated: The container arrives safely in the Danakil desert with the help of heavy machinery. In 1977, Rüdiger Nehberg (seen left in the photo together with Lars Brehm, the TARGET Project Manager) crossed the desert on foot and thus got to know the Afar people.



The clinic seen from the bird's eye view: An oasis of help for the women and children of the Afar.

Solar power storage: for large loads.

Example: Energy management of electrical and thermal accumulators for maximum self-consumption in a residential area.

23 households, 145 kW PV power, one central electrical storage system and several thermal storage systems: in a flagship project in the German town of Weinsberg, KACO new energy is showing that it is possible to completely meet energy requirements with photovoltaics. Winning the 2015 "Smart Grids-Quartier-Award" proves that we are on the right track.

A bidirectional battery inverter with 120 kVA works as driver of the power distribution. Due to its enormous efficiency level, and especially due to it having the shortest response times possible, the bidirectional battery inverter ensures that the power supply to the households is uninterrupted, including off-grid operation of the entire development in the event that the public distribution grid fails.

Power to heat: Solar power which is not stored for use as electricity is sent to the thermal storage system; on the one hand, it drives a heat pump with 35 kW(el) of power which charges a

20,000 litre buffer tank. In addition, 18 decentralised smaller water tanks are heated directly; they are positioned on the individual buildings to cover the daily demand for hot water.

KACO new energy has created an energy management system for the entire residential complex, which assumes control of all electrical and thermal components. Through the perfect synchronisation of current needs and long-term usage patterns, this energy management system achieves the ideal balance between direct usage and both storage technologies. In short, this means maximum personal consumption and a high level of energy self-sufficiency, i.e. independence from external energy import to the greatest possible extent.

A comprehensive measuring and monitoring system records all of the development's electrical and thermal energy flows. The regular analysis of this data serves to continually optimise energy management. Ultimately, the decentralised production and storage of electricity

covers 97% of electricity demands and around half of the heating demands of the model development. Our simulations show that covering heating requirements in full is merely a question of the standard of the insulation used.

In our model development, we show you how a decentralised photovoltaic energy supply can help you to:

- optimise the use of solar power
- achieve a high level of energy self-sufficiency
- implement a system concept which is beneficial to the grid

All components and control instruments of the model development can be transferred to projects of almost any size: from large commercial and public buildings such as hotels, swimming pools and municipal facilities, right up to new housing estates and apartment buildings.



Maximising self-consumption in a residential estate: 145 kW PV output for electrical and thermal storage.

PV and diesel: the power of two.

Example: The KACO new energy FuelSave solution manages the hybrid system of a packaging manufacturer in Lebanon.

Freely attributed to Socrates, it is said that: If you draw the right conclusions, you take the right action. And just that happened in Bikfaya, a suburb of Beirut: There, Gemayel Freres, a packaging and corrugated cardboard producer, was pondering the question of the factory's future energy supply. Connection to the public grid meant longer-term power cuts and the diesel generator as emergency generator was proving to be expensive.

The company soon came to the conclusion that solar energy is the way out of the dilemma – and the FuelSave solution from KACO new energy the appropriate management of the energy supply. A photovoltaic array can be integrated into the energy supply system relatively

easily, it can be operated effortlessly, is low-maintenance, and environmentally-friendly. For the processing company in a sun-rich region, it reliably supplies the energy which is needed during normal working hours.

Apart from that, Gemayel Freres ensured from the very outset that the PV array could be modularly extended. It can therefore keep pace with the development of the company and its future energy needs. 300 kilowatt output might just be the beginning ...

The FuelSave controller ensures that the new PV-diesel hybrid system functions without a hitch. So, in one fell swoop the company covers 70 percent of its energy requirements from the sun and its own

diesel generator stops the remaining gap. The controller permanently keeps the generator in its optimum operational state so that it uses diesel economically and is conducive to a long life-span.

In contrast, the dependency on electricity from the grid has sunken drastically – together with the related costs. Excess solar energy is even fed into the grid by net metering and public grid power cuts no longer pose challenges to the company: It can rely to a great extent on the photovoltaic and diesel hybrid energy supply. We can therefore conclude: They took the right action!



Blue skies over Bikfaya: Clean energy covers 70 per cent of energy needs. Additional roof space is available for an extension of the PV system.

Grid management: for utility loads.

Example: Eight blueplanet gridsave 1000 TL3 charge and discharge batteries to regulate the frequency of the South Korean electricity grid.

From the top of the Korean peninsula, South Korea has developed into one of the world's most progressive countries. The isolated location poses challenges to the necessary power supply: Apart from having no energy resources of its own, there is also no integrated cross-border grid to compensate energy supply fluctuations. The consequences: Problems with grid frequency and power cuts. In order to solve this problem, South Korea is now the pioneer in the use of large-scale storage systems for grid management.

Since June 2014, a further four strikingly-painted containers stand in the grounds of Yong-In City voltage transformation substation near Seoul. They house the hardware of the pilot project which the state utility company, KEPCO (Korea Electric Power Corp.), is examining to establish the suitability of storage sets for regulating grid frequency.

KACO new energy was successful in the tendering process and thus despatched

eight bidirectional blueplanet gridsave 1000 TL3 battery inverters, each with 1,000 kVA output, to Yong-In. Two containers each house four units. The remaining two containers are home to the Samsung SDI lithium-ion batteries with a capacity totalling 4 MWh.

By charging and discharging the batteries, the battery inverters provide static grid support in the form of active and reactive power. It is also possible to support the grid dynamically by means of Fault Ride Through (FRT). The battery inverters receive the commands on how they should react to the grid from a superordinate energy management system.

The project ran for one year until June 2015. The experience was convincing and KEPCO is already at work on further storage systems.

On what type of storage project can we support you? The "grid" could be the public grid or even a grid-connected

energy supply to a small town or industrial plant. The size of the storage system can be adapted to requirements.

The blueplanet gridsave 1000 TL3 is compatible with all conventional battery technology. Another advantage is the flexible composition of the energy mix: The blueplanet gridsave 1000 TL3 can be used with conventional energy sources, as well as with wind and photovoltaic.

Talking about photovoltaic: The integration of solar energy is of course the most obvious decision when it comes to the economic, ecologic design of such storage systems for grid management and a more independent energy supply. And KACO new energy is your best partner when it comes to single-source system solutions.



Four containers, housing the battery inverters and storage, stand at the end of the lane.



Project Location: The voltage transformation substation of Yong-In City, a town of one million inhabitants near Seoul.



The blueplanet gridsave 1000 TL3 has been designed to be operated and serviced in narrow spaces.



The 4 MW "Power Conditioning System" (PCS) container with the blueplanet gridsave 1000 TL3.

KACO



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