

POWADOR.
Highest Performance.





Ariane Friedrich,
German high jump record holder.

Dear readers,

“Dare to do when others waver,
Where others whisper, dare to shout,
Dare to think what no-one is thinking,
What no-one starts, bring it about.”

These words by Lothar Zenetti are particularly appropriate to the corporate philosophy of KACO new energy. Our current product portfolio is proof indeed that we dare to think outside the box in order to combat increasing price pressure using intelligent technology. On pages 54 and 55 of our current catalogue, you will find two new systems for cost-effective solar parks that set global benchmarks with respect to power by weight and power by volume.

As a part of our political commitment to bringing about a global shift towards alternative energy, we are frequently outspoken where others choose to remain silent perhaps because they fear the impact on their share prices? For owner-managed family businesses such as KACO new energy, those considerations are of little importance.

But why has a world-class athlete decided to co-operate with one of the world's largest manufacturers of PV inverters? And what on earth does an inverter have to do with the high jump?

Even before the start of her partnership with us, it was clear to top sportswoman Ariane Friedrich that solar energy is the ideal solution for decentralised power generation. And her search for the best inverter for her own personal PV installation led her to KACO new energy. So what do we have in common? Just like an athlete, there is no stopping KACO new energy when we have set our sights on a goal, such as becoming a global player in photovoltaics. This creates a strong link between our company and world-class athlete Ariane Friedrich, who likewise refuses to let a ruptured Achilles tendon or other obstacles prevent her from returning to the world's elite.

Literally, we both aim high.

Sincerely,

Ralf Hofmann,
CEO KACO new energy



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new energy .

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Milestones

As the year changed from 1998 to 1999, Ralf Hofmann and a dozen employees left the old KACO group to start a separate company that was solely dedicated to photovoltaics: KACO GERÄTETECHNIK. With them, they brought decades of experience from KACO, which was already the world's largest supplier of electromechanical choppers in the 50s, the predecessors of today's inverters. With one of its first series productions, the transformerless inverters, the young company launched itself into the solar age with a bang. KACO helped with the successful launch of a technology that is now standard thanks to its high efficiency. The company is now one of the largest manufacturers of photovoltaic inverters in the world and is called KACO new energy GmbH.

Latest developments are the learning energy storage and management system Powador-gridsave as well as an integrated solution for the electrification of grid-remote regions, Powador-microGrid.



1998/99

The expanding KACO GERÄTETECHNIK profit centre reforms as an independent company under the name of KACO GERÄTETECHNIK GmbH.

2005

The development and logistics centre in Erlenbach opens, as does the research and development centre in Kassel.

2006

Plant 3, a production centre, is opened in Neckarsulm. The subsidiary in Greece is founded.

2007

The new research and development team for central inverters is created in South Korea.

2008

The new logistics centre is opened. Construction begins on the new headquarters.

2009

KACO GERÄTETECHNIK GmbH is renamed KACO new energy GmbH. The new headquarters opens for business. Founding of the sales office in China.

2010

The expansion of production capacity to 10 gigawatts begins. Subsidiaries in France and Italy are founded.

2011

The new plants in Neckarsulm and London, Ontario (Canada) begin production. Production also begins at San Jose, California (USA).

2012

KACO new energy introduces the Powador-gridsave to the market, a unique energy storage and management system to become a systems supplier instead of simply a supplier of components.

Philosophy

We turn passion into power.

We at KACO new energy are backing the energy turnaround 100%. And we actively support all of those who have committed themselves to becoming independent of fossil and nuclear power sources: In KACO new energy you have found the right partner to pave the way for the change to solar energy supply. Because there are two things you can depend on with KACO new energy: a high-quality, reliable product and a company that has internalised sustainability and environmental responsibility.

Our commitment goes far beyond climate protection. Part of our corporate philosophy is to allow the lesser-privileged to share in our company's success as well. For example, we support TARGET (Rüdiger Nehberg's organisation opposing female genital mutilation), the Peter Maffay Foundation, and the pae-

diatric clinic foundation "Große Hilfe für kleine Helden" (= "Big help for little heroes").

KACO new energy also bears a responsibility towards its employees. Their accomplishments and motivation have made our upwards climb much easier. That has been possible due to respectful, fair and open treatment of one another. Each employee is given the courage to develop and present new ideas. Without courage there is no change, and without change there is no progress.

The high quality of our products comes from the employees' sense of responsibility and their sharing in the company profits. All employees are expected to take part in our quality management system, to follow defined processes at all times and to strive for progress through continuous improvements.

The outstanding qualifications of our employees are an important prerequisite for the quality of our products. Because KACO new energy is known for its high standards: We provided a seven year warranty before anyone else in the business.

As you can see, there's more under the housing of an inverter from KACO new energy than just technology. You get our passion as well as our commitment to people and the environment as part of the package. Does that make you feel good, and do you share our convictions? Then let's work together towards a renewable future.

KACO



new energy.



Environment

The price of greatness is responsibility.

We work in an industry that generates power from sunlight: a renewable energy that protects the basis for life, a healthy environment. However, the responsibility we bear extends beyond that. Because of this, it is not only important WHAT we do, but also HOW we do it. That is absolutely critical for credibility. And this is why we are especially proud of our zero-emission production, which has been attested with a certificate from Steinbeis Transfer Centre.

KACO new energy purchases green electricity from Elektrizitätswerke Schönau and LichtBlick AG. Thus, we not only produce clean power with the Powador inverters – clean power is already incorporated in them during production. The bottom line is that we produce without emissions. In periods of high solar irradiation, our own photovoltaic systems, with 1,250 kilowatts of power themselves, supply more power than is needed in the plants. The heat for the production plants comes from a biomass block heating station.

KACO new energy not only generates climate-neutral power itself; according to their proofs of origin, our two certified green energy suppliers also generate power primarily from renewable energy sources, including biomass cogeneration units. Only a small proportion originates from gas-operated cogeneration. No coal-fired or nuclear power is used at KACO new energy.

Our plants are located in the Neckarsulm industrial area known as „Trendpark“. Employees travel between the sites using bicycles. There are electric cars available for transportation of light cargo. Employees who frequently travel on business receive a rail discount card (BahnCard). In order to compensate for emissions caused by business flights taken by employees, KACO new energy also participates in the international myclimate initiative (www.myclimate.org). It supports projects that lead to a direct reduction in greenhouse gases. We received the CSR Mobility Prize for environmentally aware business travel in 2010 from DMM, VCD and B.A.U.M for this commitment.

Locations



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Customer Service

More than service

Our Powador inverters, excluding the XP Series of central inverters, come with a five year standard warranty. To obtain the full seven year manufacturer's warranty simply register the inverter online for free. Powador XP central inverters have a three year warranty period, which can also be extended a further two years by registering online.

We also offer additional warranty extensions for inverters with AC rated power of less than 50 kW: During the standard warranty period, the manufacturer's warranty can be extended to 10, 15, 20 or 25 years, subject to additional cost.

Fixed-rate replacement fee

For a justifiable warranty claim on an inverter within five years of installation we will pay the installer a fixed-rate replacement fee, currently to the value of €100. Please note that the customer is responsible for any transportation costs, as stipulated in the warranty conditions.

Maintenance contracts

KACO new energy offers maintenance contracts with varying levels of service upon request. A maintenance contract can be terminated within the manufacturer's warranty period. Our sales department will be happy to assist you. Just call +49 7132 3818-220.

Remote monitoring

You will be continuously informed of the status of your system with our comprehensive range of monitoring accessories. Therefore, you can respond immediately to any anomalies.

Technical assistance

Is something wrong with your Powador inverter? If you are able to describe the fault in detail please use the form on our website. We will contact you as soon as possible once we have received your message. If you wish to contact our service hotline directly, please have the device number ready. Again, in order for us to help you effectively, please describe the fault in as much detail as possible.

Registration

Register a Powador inverter online within four weeks of the installation date to secure a further two years full manufacturer's warranty for free. The registration domain can be accessed via the following link: www.kaco-newenergy.de/registration.

Details regarding warranty and service can be found in our warranty conditions, which can be viewed at www.kaco-newenergy.de/warranty.

Service Hotlines

France	+33 6 33 32 63 79
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Spain	+34 916 740 798
USA	+1 866 KACO SOLAR
From other locations	+49 7132 3818 660



Academy

Getting ahead through further education

Would you like to be at the cutting edge of photovoltaic technology? Participate in one of our regular customer seminars and KACO new energy will help you to do just that!

The KACO Academy is currently offering:

- Practical and theoretical courses on our complete range of Powador inverters
- Special seminars for large-scale systems
- Basic and advanced tuition in system monitoring and software.

Levels range from introductory courses for PV newcomers, to practical, hands-on experience with our inverters under real conditions. These practical sessions are unique in the industry.

So what's new in 2012?

From mid-July 2012 the KACO Academy will be offering new half day courses on:

- Making the best use of the energy generated by your own PV system
- The principles of PV system design, and
- Designing photovoltaic systems with Powador PV-Pilot.

Or why not visit the Academy on the road?

The KACO new energy roadshow can accommodate up to 16 participants at any one time.

At home or abroad in English

Should you prefer a training course on your premises elsewhere in Germany or abroad, our trainers will gladly travel to you for groups of 10 or more. Seminars can be tailor-made to your specific requirements and are of course available in the English language too.

Whatever your needs, you can be sure that our seminars are constantly adapted to the latest market developments.

Please send your enquiries to academy@kaco-newenergy.de or call us on +49 7132 3818 0.

We will be pleased to send you full details about dates, times, places and conditions.

A warm welcome awaits you at the KACO Academy!



Inverters

22 Product overview

Transformerless string inverters
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 5300 | 5500 | 6600

28 Powador 5300 supreme

30 Powador 7700 | 7900 | 8600
 9600

34 Powador 7700 supreme
 7900 supreme | 8600 supreme
 9600 supreme

Galvanically isolated string inverters

38 Powador 2002 | 3002 | 4202
 5002 | 6002

Transformerless three-phase inverters

42 Powador 6.0 TL3 | 7.8 TL3 |
 9.0 TL3

46 Powador 10.0 TL3 | 12.0 TL3
 14.0 TL3 | 18.0 TL3

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

54 Powador 48.0 TL3 Park |
 72.0 TL3 Park

Galvanically isolated three-phase inverters

56 Powador 16.0 TR3 | 18.0 TR3

Powador-privatt

60 The profitable way to use your
 privately generated photovoltaic
 electricity.

Central inverters

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 XP200-HV | XP250-HV

66 Powador XP200-HV TL
 XP250-HV TL | XP350-HV TL
 XP500-HV TL | XP550-HV TL

70 Powador XP500-HV TL outdoor
 Powador XP550-HV TL outdoor

72 Powador 500 Kilowatt-Station
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String collectors

76 Generator junction Box
 77 Powador Mini-Argus

78 KACO Maximizer

Stand-alone inverters

82 KI 250 | KI 1000 | KI 2000

Power storage

86 Powador-gridsave



KACO 
 CO₂ NEUTRAL PRODUCTION

Products

Efficient and durable

Our Powador inverters cover a comprehensive output range for systems ranging from a single family house to huge solar parks with output in the megawatt range. The portfolio also includes inverters for island solutions and extensive monitoring accessories for PV systems.

Because above-average annual yields also depend on the reliability and durability of the units, KACO new energy uses only high-quality components. We are certified by TÜV (a German technical inspection agency) in accordance with ISO 9001:2008, and our products are manufactured in compliance with the terms of the RAL seal of approval for solar energy systems (RAL GZ 966).

Single-phase, transformerless inverters from KACO new energy are available for system power ranging from 3.2 to 9.6 kWp. This is the equivalent of AC rated power from 2.6 to 6.0 kVA.

Our single-phase, transformer units have an AC rated power of 1.65 to 4.6 kVA. KACO new energy offers these models because galvanic isolation is still required in some countries. They also provide advantages for many modules. In addition, they provide solutions for situations where dimensioning is complex.

Three-phase inverters

The KACO new energy product range now also offers three-phase inverters with medium power output. We offer the transformerless Powador 10.0 TL3 to 18.0 TL3 models with AC rated power from 9 to 15 kVA and Powador 30.0 TL3 to 60.0 TL3 models with 25 to 50 kVA. This group is rounded off with two galvanically isolated Powador 16.0 TR3 and 18.0 TR3 units with 13.5 and 15 kVA on the AC side.

We have also added to our range of central inverters. You can now choose exactly the unit that suits your purposes from an intelligently graduated power spectrum from 100 to 550 kVA AC rated power. We also offer central inverter stations with 500, 700 and 1000 kVA. All three are available as robust concrete stations. We recommend the Powador 48.0 TL3 Park and 72.0 TL3 Park for decentralised solutions.

With our inverters, you are optimally equipped to conform to the German Medium and Low Voltage Directives.

Powador
3200
4200
4400
5300
5500
6600



Capable of reactive power,
conforms to the German Low
Voltage Directive

Integrated potential-free
fault signal

Silent, maintenance-free
convection cooling

5-years factory warranty plus
2-years when the unit is registered

Preconfigured international
country settings

Menu language can be chosen
as required

Asymmetry monitoring via special
KACO Sym-Bus

Less is More: No Transformer, lots of Power.

The Powador 3200 – 6600 transformerless string inverters.

Our Powador 3200 to 6600* transformerless single-phase inverters are now equipped with digital controllers so that they can be used internationally. The appropriate country settings can easily be selected on-site; the country-specific settings are stored in the software, so the inverters can be quickly installed in any country. Users can also choose a menu language regardless of the selected country setting. The units also comply with the German Low Voltage Directive (starting with software version 1.10 and a manufacturing date from May 7, 2012 onwards). We have changed the product names in line with this improvement. The maximum PV generator power for which the particular unit is optimised can now

be read from the designation. All units operate with a full bridge without a step-up converter. Four IGBT power switches reproduce the sine-shaped voltage curve of the public power grid employing pulse width modulation. These are true single-stage, self-commutated units. However, the input voltage must be greater than the peak line voltage for them to be used.

The units are equipped with a wide MPP range of 350 V to 600 V. The open circuit voltage is 800 V, which simplifies the work of installers when laying out systems. The same is true for the integrated DC disconnect. Screw terminals make connecting to the grid easy. The units contain a single- or three-phase monitor-

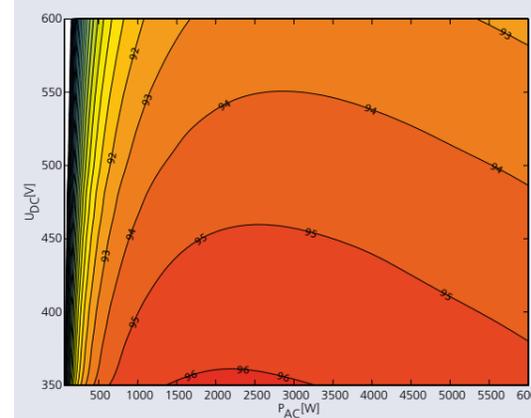
ing system conforming to VDE0126-1-1, including an AC/DC-sensitive residual current protector. The units can thus be connected to the grid without any additional measures, even in installations with several inverters.

In addition, the units operate using purely passive noiseless convection cooling. The heat that is lost is, to a great degree, dissipated via the heat sink on the rear of the unit. The rest of the heat is radiated from the surface of the aluminium housing. No fans, no problems, just long service life.

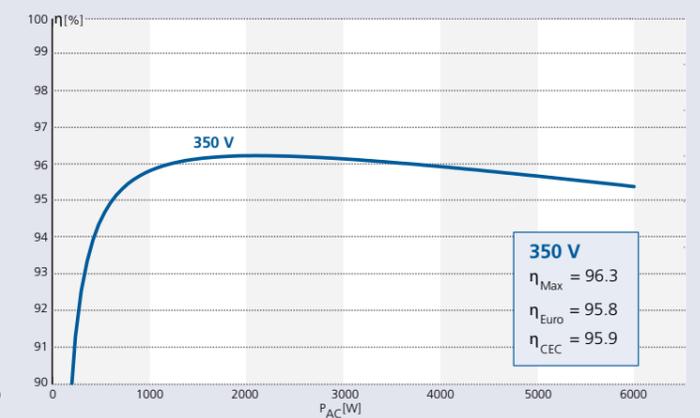
* Successors to Powador 2500xi – 5000xi inverters

Graphical display of efficiency

3D efficiency diagram for Powador 6600



Efficiency characteristic curve for Powador 6600



Technical data

Powador 3200 | 4400 | 5300 | 5500 | 6600

Electrical data	3200	4400
Input variables		
Max. recommended PV generator power	3200 W	4400 W
MPP range	350 V ... 600 V	350 V ... 600 V
No-load voltage	800 V	800 V
Max. input current	8.6 A	12.0 A
Number of strings	3	3
Number of MPP trackers	1	1
Inverse polarity protection	short-circuit diode	short-circuit diode
Output variables		
Rated output	2600 VA	3600 VA
Max. output	2850 VA	4000 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	11.3 A	15.6 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	1	1
General electrical data		
Max. efficiency	96.6 %	96.5 %
European efficiency	95.8 %	95.9 %
Night consumption	0 W	0 W
Switching plan	self-commutated, transformerless	self-commutated, transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
Mechanical data		
Display	LCD 2 x 16 characters	LCD 2 x 16 characters
Control units	2 buttons for display control	2 buttons for display control
Interfaces	RS232/RS485, S0	RS232/RS485, S0
Fault signalling relay	potential-free NOC max. 250 V / 1 A	potential-free NOC max. 250 V / 1 A
Connections	PCB terminals within the device (max. cross section: 10mm ²) cable supply via cable connections (DC connection M16, AC-connection M32)	PCB terminals within the device (max. cross section: 10mm ²) cable supply via cable connections (DC connection M16, AC-connection M32)
Ambient temperature	-20 °C ... +60 °C*	-20 °C ... +60 °C*
Temperature monitoring heat sink	> 75 °C temperature-dependent impedance matching / > 85 °C cut-out	> 75 °C temperature-dependent impedance matching / > 85 °C cut-out
Cooling	free convection / no fan	free convection / no fan
Protection class	IP54	IP54
Noise emission	< 35 dB (A) (noiseless)	< 35 dB (A) (noiseless)
DC switch	integrated	integrated
Casing	aluminium	aluminium
H x W x D	500 x 340 x 200 mm	550 x 340 x 220 mm
Weight	19 kg	21 kg

*Power derating at high ambient temperatures

5300	5500	6600
Input variables		
5300 W	5500 W	6600 W
350 V ... 600 V	350 V ... 600 V	350 V ... 600 V
800 V	800 V	800 V
14.5 A	15.2 A	18.0 A
3	3	3
1	1	1
short-circuit diode	short-circuit diode	short-circuit diode
Output variables		
4400 VA	4600 VA	5500 VA
4800 VA	5060 VA	6000 VA
acc. to local requirements	acc. to local requirements	acc. to local requirements
19.1 A	20.0 A	23.9 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
1	1	1
General electrical data		
96.4 %	96.3 %	96.3 %
95.8 %	95.7 %	95.8 %
0 W	0 W	0 W
self-commutated, transformerless	self-commutated, transformerless	self-commutated, transformerless
acc. to local requirements	acc. to local requirements	acc. to local requirements
Mechanical data		
LCD 2 x 16 characters	LCD 2 x 16 characters	LCD 2 x 16 characters
2 buttons for display control	2 buttons for display control	2 buttons for display control
RS232/RS485, S0	RS232/RS485, S0	RS232/RS485, S0
potential-free NOC max. 250 V / 1 A	potential-free NOC max. 250 V / 1 A	potential-free NOC max. 250 V / 1 A
PCB terminals within the device (max. cross section: 10mm ²) cable supply via cable connections (DC connection M16, AC-connection M32)	PCB terminals within the device (max. cross section: 10mm ²) cable supply via cable connections (DC connection M16, AC-connection M32)	PCB terminals within the device (max. cross section: 10mm ²) cable supply via cable connections (DC connection M16, AC-connection M32)
-20 °C ... +60 °C*	-20 °C ... +60 °C*	-20 °C ... +60 °C*
> 75 °C temperature-dependent impedance matching / > 85 °C cut-out	> 75 °C temperature-dependent impedance matching / > 85 °C cut-out	> 75 °C temperature-dependent impedance matching / > 85 °C cut-out
free convection / no fan	free convection / no fan	free convection / no fan
IP54	IP54	IP54
< 35 dB (A) (noiseless)	< 35 dB (A) (noiseless)	< 35 dB (A) (noiseless)
integrated	integrated	integrated
aluminium	aluminium	aluminium
550 x 340 x 220 mm	600 x 340 x 220 mm	600 x 340 x 220 mm
26 kg	28 kg	30 kg

*Power derating at high ambient temperatures

Powador 5300 supreme



Capable of reactive power,
conforms to the German Low
Voltage Directive

Power Boost on/off:
9 kHz / 17 kHz
(selectable clock frequency)

Integrated potential-free
fault signalling

Silent, maintenance-free
convection cooling

5-years factory warranty
plus 2-years when the unit
is registered

Peak output made simple.

The transformerless string inverter Powador 5300 supreme.

The Powador 5300 supreme* was designed with one goal in mind: The highest degree of efficiency and the highest yields. As a transformerless inverter, it already brings to the table the best possible prerequisites for reaching this goal. Its MPP range is from 350 V to 510 V and the no-load voltage is 600 V. That makes it an inverter for users who know exactly what they want.

With the standard setting, the Powador 5300 supreme works with a clock frequency of 17 kHz. For those who want to get even more from the unit, it operates in Power Boost Mode at a clock frequency of 9 kHz via a jumper on the control circuit board. That reduces even further the already low switching losses of the power semiconductor and makes the degree of efficiency even higher. This

operating mode is recommended for locations where the resulting operating noise will not matter.

The Powador 5300 supreme has the same basic features as the other transformerless KACO inverters (Powador 3200 to Powador 6600).

* Successor to Powador 4000 supreme inverter

Technical data

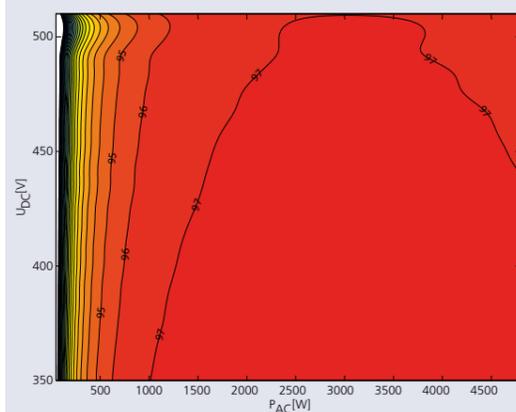
Powador 5300 supreme

Electrical data	5300 supreme
Input variables	
Max. recommended PV generator power	5 300 W
MPP range	350 V ... 510 V
No-load voltage	600 V*
Max. input current	14.5 A
Number of strings	3
Number of MPP trackers	1
Inverse polarity protection	short-circuit diode
Output variables	
Rated output	4 400 VA
Max. output	4 800 VA
Supply voltage	acc. to local requirements
Rated current	19.1 A
Rated frequency	50 Hz / 60 Hz
cos phi	0.80 inductive ... 0.80 capacitive
Number of grid phases	1
General electrical data	
Max. efficiency	97.2 % (97.6 % @ 9 kHz)
European efficiency	96.6 % (97.1 % @ 9 kHz)
Night consumption	0 W
Switching plan	self-commutated, transformerless
Grid monitoring	acc. to local requirements
Mechanical data	
Display	LCD 2 x 16 characters
Control units	2 buttons for display control
Interfaces	RS232 / RS485, S0
Fault signalling relay	potential-free NOC max. 250 V / 1 A
Connections	PCB terminals within the device (max. cross section: 10 mm ²). Cable supply via cable connections (DC connection M16, AC connection M32)
Ambient temperature	-20 °C ... +60 °C**
Temperature monitoring	> 75 °C temperature-dependent impedance matching / > 85 °C cut-out
Cooling	free convection / no fan
Protection class	IP54
Noise emission	< 35 dB (A) (noiseless) @ 17 kHz
DC switch	integrated
Casing	aluminium
H x W x D	550 x 340 x 220 mm
Weight	26 kg

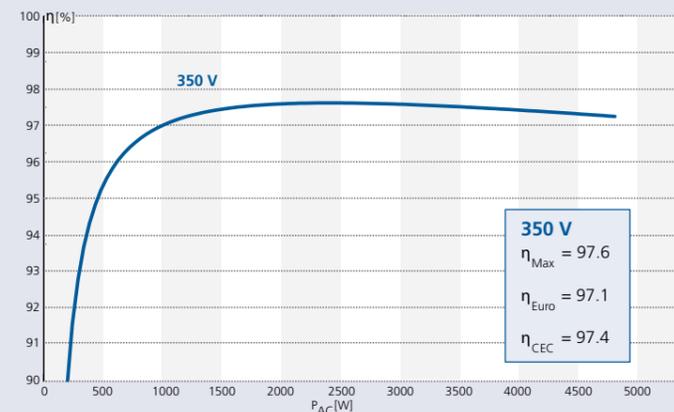
* To protect the hardware, the unit starts up at < 550 V / **Power derating at high ambient temperatures

Graphical display of efficiency

3D efficiency diagram for Powador 5300 supreme



Efficiency characteristic curve for Powador 5300 supreme



Powador
7700
7900
8600
9600

Capable of reactive power, conforms to the German Medium and Low Voltage Directives

Additional asymmetry monitoring via special KACO Sym-Bus

5-years factory warranty plus 2-years when the unit is registered

Preconfigured international country settings

Menu language can be chosen as required



Champions of the middleweights.

The transformerless string inverters Powador 7700 – 9600.

All Powador 7700 to 9600* units are equipped with digital controllers so that they can be used internationally. The appropriate country settings can easily be selected on-site; the country-specific settings are stored in the software, so the inverters can be quickly and easily installed anywhere in the world. The menu language can be selected independently from the country-specific settings. The units also comply with the German Low Voltage Directive and the Medium Voltage Directive.

All three units include transformerless topology without a step-up converter. DC switch is already integrated. This provides maximum safety and reliability for the system operator and makes the installer's job easier.

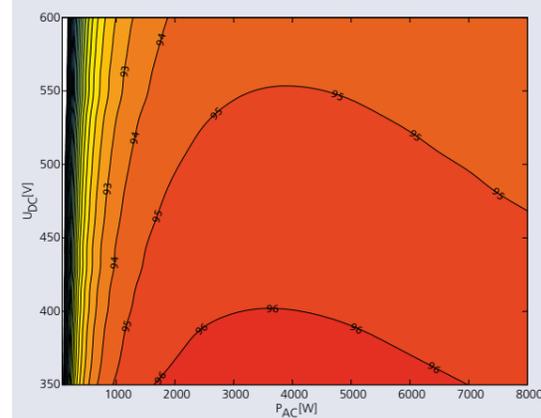
These inverters are designed as a trio, with each unit feeding into one of the three phases. This allows each unit to optimally utilise the voltage range of a photovoltaic system that has been divided into three sub-generators.

The integrated Sym-Bus ensures that any potential asymmetry does not exceed the maximum permitted limit of 4.6 kW, even when there is a fault in a unit. They represent an alternative to central inverters (depending on the system design). Since all of our transformerless string inverters can also be combined with one another as required, they allow you almost unlimited freedom in planning, from 2 kW up to the megawatt class.

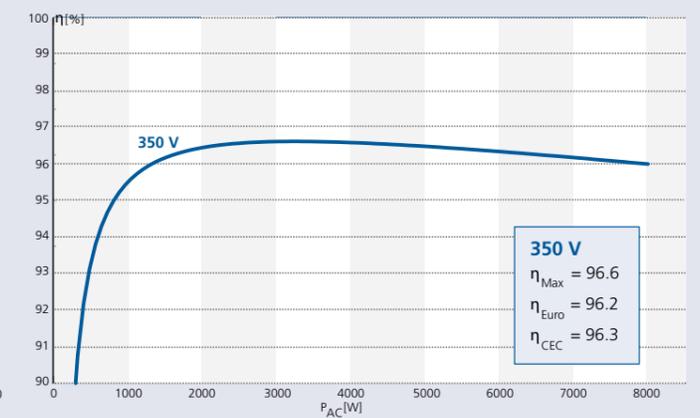
* Successors to Powador 6400xi – 8000xi inverters

Graphical display of efficiency

3D efficiency diagram for Powador 9600



Efficiency characteristic curve for Powador 9600



Technical data

Powador 7700 | 7900 | 8600 | 9600

Electrical data	7700	7900
Input variables		
Max. recommended PV generator power	7700 W	7900 W
MPP range	350 V ... 600 V	350 V ... 600 V
No-load voltage	800 V	800 V
Max. input current	19.0 A	19.7 A
Number of strings	4	4
Number of MPP trackers	1	1
String fuses	2 short-circuit bridges (fuses optional)	2 short-circuit bridges (fuses optional)
Inverse polarity protection	short-circuit diode	short-circuit diode
Output variables		
Rated output	6400 VA	6650 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	27.8 A	28.9 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	1	1
General electrical data		
Max. efficiency	96.6 %	96.7 %
European efficiency	96.2 %	96.2 %
Night consumption	0 W	0 W
Switching plan	self-commutated, transformerless	self-commutated, transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
Mechanical data		
Display	LCD 2 x 16 characters	LCD 2 x 16 characters
Control units	2 buttons for display control	2 buttons for display control
Interfaces	RS485, S0, Sym-Bus	RS485, S0, Sym-Bus
Fault signalling relay	potential-free NOC max. 250 V / 1 A	potential-free NOC max. 250 V / 1 A
Connections	AC connection: PCB terminals within device (max. cross section: 10 mm ²), cable supply via cable connection (M32). DC connection: 4 strings via PCB terminals (max. cross section: 6 mm ²), cable supply via cable connections (M16). Optional DC connection: 1 x Plus, 1 x Minus without string fuses via PCB terminals (max. cross section: 10 mm ²).	AC connection: PCB terminals within device (max. cross section: 10 mm ²), cable supply via cable connection (M32). DC connection: 4 strings via PCB terminals (max. cross section: 6 mm ²), cable supply via cable connections (M16). Optional DC connection: 1 x Plus, 1 x Minus without string fuses via PCB terminals (max. cross section: 10 mm ²).
Ambient temperature	-20 °C ... +60 °C*	-20 °C ... +60 °C*
Temperature monitoring power stage	temperature-dependent impedance matching with emergency cut-out when device errors occur	temperature-dependent impedance matching with emergency cut-out when device errors occur
Cooling	free convection / no fan	free convection / no fan
Protection class	IP54	IP54
Noise emission	< 35 dB (A) (noiseless)	< 35 dB (A) (noiseless)
DC switch	integrated	integrated
Casing	aluminium	aluminium
H x W x D	810 x 340 x 220 mm	810 x 340 x 220 mm
Weight	38 kg	38 kg

*Derating at higher temperatures

Electrical data	8600	9600
Input variables		
Max. recommended PV generator power	8600 W	9600 W
MPP range	350 V ... 600 V	350 V ... 600 V
No-load voltage	800 V	800 V
Max. input current	21.4 A	24.0 A
Number of strings	4	4
Number of MPP trackers	1	1
String fuses	2 short-circuit bridges (fuses optional)	2 short-circuit bridges (fuses optional)
Inverse polarity protection	short-circuit diode	short-circuit diode
Output variables		
Rated output	7200 VA	8000 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	31.3 A	35.0 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	1	1
General electrical data		
Max. efficiency	96.6 %	96.6 %
European efficiency	96.2 %	96.2 %
Night consumption	0 W	0 W
Switching plan	self-commutated, transformerless	self-commutated, transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
Mechanical data		
Display	LCD 2 x 16 characters	LCD 2 x 16 characters
Control units	2 buttons for display control	2 buttons for display control
Interfaces	RS485, S0, Sym-Bus	RS485, S0, Sym-Bus
Fault signalling relay	potential-free NOC max. 250 V / 1 A	potential-free NOC max. 250 V / 1 A
Connections	AC connection: PCB terminals within device (max. cross section: 10 mm ²), cable supply via cable connection (M32). DC connection: 4 strings via PCB terminals (max. cross section: 6 mm ²), cable supply via cable connections (M16). Optional DC connection: 1 x Plus, 1 x Minus without string fuses via PCB terminals (max. cross section: 10 mm ²).	AC connection: PCB terminals within device (max. cross section: 10 mm ²), cable supply via cable connection (M32). DC connection: 4 strings via PCB terminals (max. cross section: 6 mm ²), cable supply via cable connections (M16). Optional DC connection: 1 x Plus, 1 x Minus without string fuses via PCB terminals (max. cross section: 10 mm ²).
Ambient temperature	-20 °C ... +60 °C*	-20 °C ... +60 °C*
Temperature monitoring power stage	temperature-dependent impedance matching with emergency cut-out when device errors occur	temperature-dependent impedance matching with emergency cut-out when device errors occur
Cooling	free convection / no fan	free convection / no fan
Protection class	IP54	IP54
Noise emission	< 35 dB (A) (noiseless)	< 35 dB (A) (noiseless)
DC switch	integrated	integrated
Casing	aluminium	aluminium
H x W x D	810 x 340 x 220 mm	810 x 340 x 220 mm
Weight	38 kg	38 kg

*Derating at higher temperatures

Powador
7700 supreme
7900 supreme
8600 supreme
9600 supreme



Capable of reactive power, conforms to the German Low Voltage Directive

Additional asymmetry monitoring via special KACO Sym-Bus

5-years factory warranty plus 2-years when the unit is registered

Preconfigured international country settings

Menu language can be chosen as required

Top performance among the middleweights.

The transformerless string inverters Powador 7700 supreme – 9600 supreme.

With the standard setting, the Powador 7700 – 9600 supreme inverters* operate at a clock frequency of 17 kHz. Those who want to get even more out of these units can operate them in Power Boost mode, at a clock frequency of 9 kHz. That reduces the already-low switching losses of the power semiconductor even further and makes the degree of efficiency even higher. This operating mode is recommended for locations where the resulting operating noise is not a particular issue. All units are equipped with digital controllers so that they can be used internationally. The appropriate country settings can easily be selected on-site in the country's language; the country-specific settings are stored in the software, so

the inverters can be quickly easily installed anywhere in the world. The menu language can be selected independently from the country-specific settings. The units also comply with the German Low Voltage Directive. All units in this power class include transformerless topology without a step-up converter. DC disconnects and string fuses are already integrated. This provides maximum safety and reliability for the system operator and makes the installer's job easier.

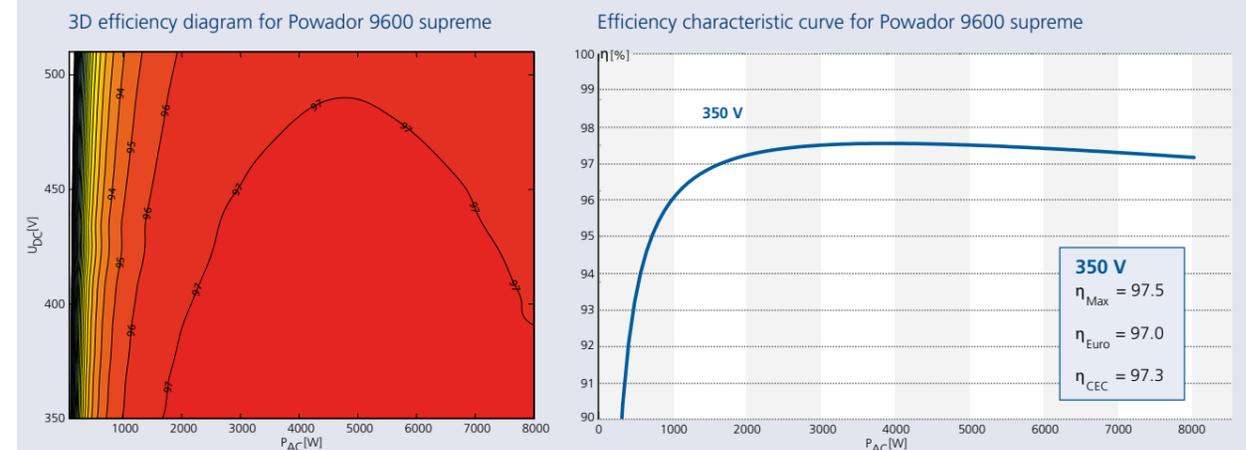
These inverters are designed as a trio, with each unit feeding into one of the three phases. This allows each unit to optimally utilise the voltage range of a photovoltaic system that has been

divided into three sub-generators. The integrated Sym-Bus ensures that any potential asymmetry does not exceed the maximum permitted limit of 4.6 kW, even when there is a fault in a unit. They represent an alternative to central inverters (depending on the system design). All inverters in the supreme series can be combined with one another as needed.

Thus, these units allow you almost unlimited freedom in planning, from medium-sized systems up to the megawatt class.

* Successors to Powador 6400 supreme – 8000 supreme inverters

Graphical display of efficiency



Technical data

Powador 7700 supreme | 7900 supreme | 8600 supreme | 9600 supreme

Electrical data	7700 supreme	7900 supreme
Input variables		
Max. recommended PV generator power	7700 W	7900 W
MPP range	350 V ... 510 V	350 V ... 510 V
No-load voltage	600 V*	600 V*
Max. input current	19.0 A	19.7 A
Number of strings	4	4
Number of MPP trackers	1	1
String fuses	2 short-circuit bridges (fuses optional)	2 short-circuit bridges (fuses optional)
Inverse polarity protection	short-circuit diode	short-circuit diode
Output variables		
Rated output	6400 VA	6650 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	27.8 A	28.9 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	1	1
General electrical data		
Max. efficiency	97.2 % (97.5 % @ 9 kHz)	97.4 % (97.5 % @ 9 kHz)
European efficiency	96.7 % (96.9 % @ 9 kHz)	96.9 % (97.0 % @ 9 kHz)
Night consumption	0 W	0 W
Switching plan	self-commutated, transformerless	self-commutated, transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
Mechanical data		
Display	LCD 2 x 16 characters	LCD 2 x 16 characters
Control units	2 buttons for display control	2 buttons for display control
Interfaces	RS485, S0, Sym-Bus	RS485, S0, Sym-Bus
Fault signalling relay	potential-free NOC max. 250 V / 1 A	potential-free NOC max. 250 V / 1 A
Connections	AC connection: PCB terminals within device (max. cross section: 10 mm ²), cable supply via cable connection (M32). DC connection: 4 strings via PCB terminals (max. cross section: 6 mm ²), cable supply via cable connections (M16). Optional DC connection: 1 x Plus, 1 x Minus without string fuses via PCB terminals (max. cross section: 10 mm ²)	AC connection: PCB terminals within device (max. cross section: 10 mm ²), cable supply via cable connection (M32). DC connection: 4 strings via PCB terminals (max. cross section: 6 mm ²), cable supply via cable connections (M16). Optional DC connection: 1 x Plus, 1 x Minus without string fuses via PCB terminals (max. cross section: 10 mm ²)
Ambient temperature	-20 °C ... +60 °C**	-20 °C ... +60 °C**
Temperature monitoring	temperature-dependent impedance matching with emergency cut-out when device errors occur	temperature-dependent impedance matching with emergency cut-out when device errors occur
Cooling	free convection / no fan	free convection / no fan
Protection class	IP54	IP54
Noise emission	< 35 dB (A) (noiseless) @ 17 kHz	< 35 dB (A) (noiseless) @ 17 kHz
DC switch	integrated	integrated
Casing	aluminium	aluminium
H x W x D	810 x 340 x 220 mm	810 x 340 x 220 mm
Weight	38 kg	38 kg

* To protect the hardware, the unit starts up at < 550 V / **Power derating at high ambient temperatures

Electrical data	8600 supreme	9600 supreme
Input variables		
Max. recommended PV generator power	8600 W	9600 W
MPP range	350 V ... 510 V	350 V ... 510 V
No-load voltage	600 V*	600 V*
Max. input current	21.4 A	24.0 A
Number of strings	4	4
Number of MPP trackers	1	1
String fuses	2 short-circuit bridges (fuses optional)	2 short-circuit bridges (fuses optional)
Inverse polarity protection	short-circuit diode	short-circuit diode
Output variables		
Rated output	7200 VA	8000 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	31.3 A	35.0 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	1	1
General electrical data		
Max. efficiency	97.3 % (97.4 % @ 9 kHz)	97.2 % (97.5 % @ 9 kHz)
European efficiency	96.9 % (97.0 % @ 9 kHz)	96.8 % (97.0 % @ 9 kHz)
Night consumption	0 W	0 W
Switching plan	self-commutated, transformerless	self-commutated, transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
Mechanical data		
Display	LCD 2 x 16 characters	LCD 2 x 16 characters
Control units	2 buttons for display control	2 buttons for display control
Interfaces	RS485, S0, Sym-Bus	RS485, S0, Sym-Bus
Fault signalling relay	potential-free NOC max. 250 V / 1 A	potential-free NOC max. 250 V / 1 A
Connections	AC connection: PCB terminals within device (max. cross section: 10 mm ²), cable supply via cable connection (M32). DC connection: 4 strings via PCB terminals (max. cross section: 6 mm ²), cable supply via cable connections (M16). Optional DC connection: 1 x Plus, 1 x Minus without string fuses via PCB terminals (max. cross section: 10 mm ²)	AC connection: PCB terminals within device (max. cross section: 10 mm ²), cable supply via cable connection (M32). DC connection: 4 strings via PCB terminals (max. cross section: 6 mm ²), cable supply via cable connections (M16). Optional DC connection: 1 x Plus, 1 x Minus without string fuses via PCB terminals (max. cross section: 10 mm ²)
Ambient temperature	-20 °C ... +60 °C**	-20 °C ... +60 °C**
Temperature monitoring	temperature-dependent impedance matching with emergency cut-out when device errors occur	temperature-dependent impedance matching with emergency cut-out when device errors occur
Cooling	free convection / no fan	free convection / no fan
Protection class	IP54	IP54
Noise emission	< 35 dB (A) (noiseless) @ 17 kHz	< 35 dB (A) (noiseless) @ 17 kHz
DC switch	integrated	integrated
Casing	aluminium	aluminium
H x W x D	810 x 340 x 220 mm	810 x 340 x 220 mm
Weight	38 kg	38 kg

* To protect the hardware, the unit starts up at < 550 V / **Power derating at high ambient temperatures

Powador
2002
3002
4002
5002
6002



Capable of reactive power, conforms to the German Low Voltage Directive

Degree of efficiency up to 96.0 %

Optimized MPP tracking for higher yield

Grounding of PV generator possible Optimally suited for thin-film modules

5-years factory warranty plus 2-years when the unit is registered

High flexibility. Easy installation.

The galvanically isolated string inverters Powador 2002–6002.

The inverters from the Powador 2002 to Powador 6002, with galvanic isolation, feature effortless installation, the highest degrees of efficiency, and optimum operation with thin-film modules – and make designing a PV system a piece of cake.

Installation is problem-free: All required connections for communication – RS485, S0 and fault signalling relay – are located on a single circuit board in the housing and can be connected easily. Due to the new MC4 connectors, the DC wiring can be handled by a safe and simple plug connection from the outside of the unit.

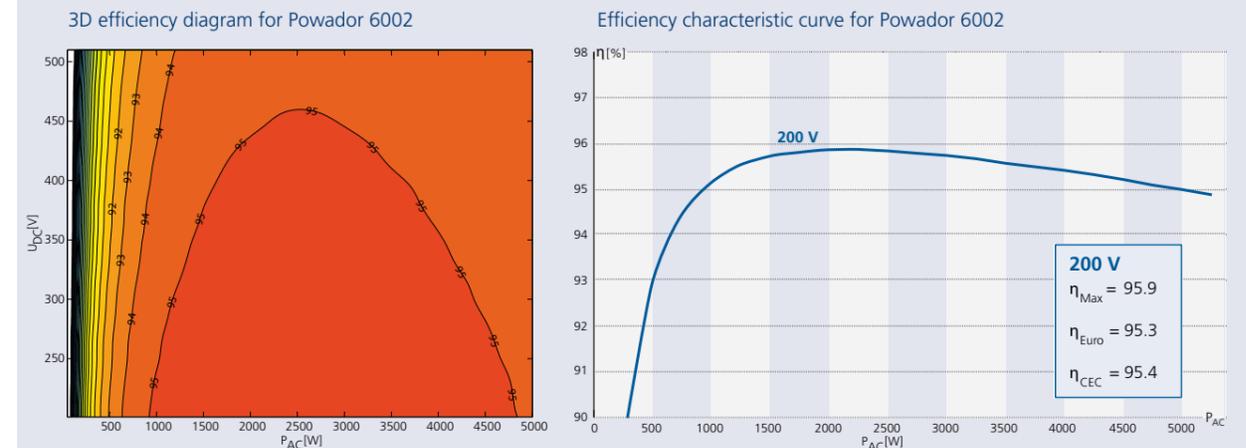
Thus the inverters can be installed even more quickly. The DC switch is integrated into the units as a matter of course. They achieve an outstanding efficiency of up to 96 %. Using a Powador 02 inverter, you can build your next PV installation wherever you want: The software knows the international requirements. This helps you to quickly and easily connect your PV installation to the grid – simply select the appropriate country setting and display language during installation.

The Powador 02 series skillfully makes use of the advantages of galvanically iso-

lated inverters. The wide input voltage range allows you to be extremely flexible in planning your PV installation. Where transformerless units are out of the question, the Powador 02 series can handle even complex PV system designs.

In addition, KACO new energy offers a generator earthing kit for this series. Thin-film modules often require generator earthing for a long service life. Moreover, the inverters can display the earthing status of the PV generator – important information especially for the safe operation of thin-film modules.

Graphical display of efficiency



Technical data

Powador 2002 | 3002 | 4202 | 5002 | 6002

Electrical data	2002	3002
Input variables		
Max. recommended PV generator power	2 000 W	3 000 W
MPP range	125 V ... 510 V	200 V ... 510 V
No-load voltage	600 V*	600 V*
Max. input current	14.3 A	13.5 A
Number of strings	3	3
Number of MPP trackers	1	1
Inverse polarity protection	short-circuit diode	short-circuit diode
Output variables		
Rated output	1 650 VA	2 500 VA
Max. output	1 650 VA	2 500 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	7.2 A	10.9 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	1	1
General electrical data		
Max. efficiency	95.9 %	96.0 %
European efficiency	95.3 %	95.4 %
Night consumption	0.4 W	0.4 W
Switching plan	self-commutated, galvanically isolated, HF transformer	self-commutated, galvanically isolated, HF transformer
Network monitoring	acc. to local requirements	acc. to local requirements
Mechanical data		
Display	LCD 2 x 16 characters, LED	LCD 2 x 16 characters, LED
Control units	2 buttons for display control	2 buttons for display control
Interfaces	RS485, S0	RS485, S0
Fault signalling relay	potential-free NOC max. DC 30 V / 3 A max. AC 250 V / 1.5 A	potential-free NOC max. DC 30 V / 3 A max. AC 250 V / 1.5 A
Connections	PCB terminals inside the unit (max. cross section. 6 mm ² flexible), Cable connection via cable fittings (DC: solar connector, AC fitting M32 and terminal)	
Ambient temperature	-20 °C ... +60 °C**	-20 °C ... +60 °C**
Cooling	free convection / no fan	free convection / no fan
Protection class	IP54	IP54
Noise emission	< 35 dB (A) (noiseless)	< 35 dB (A) (noiseless)
DC switch	integrated	integrated
Casing	aluminium	aluminium
H x W x D	450 x 340 x 200 mm	500 x 340 x 200 mm
Weight	14.5 kg	20 kg

Applicable standards and regulations are taken into account for each country version that is set.

*To protect the hardware, the inverter starts up only at voltages < 550 V

**Power derating at high ambient temperatures

4202	5002	6002
Input variables		
4 200 W	5 000 W	6 000 W
200 V ... 510 V	200 V ... 510 V	200 V ... 510 V
600 V*	600 V*	600 V*
18.5 A	22.4 A	26.5 A
3	3	3
1	1	1
short-circuit diode	short-circuit diode	short-circuit diode
Output variables		
3 500 VA	4 200 VA	5 000 VA (Germany: 4600 VA)
3 500 VA	4 200 VA	5 000 VA
acc. to local requirements	acc. to local requirements	acc. to local requirements
15.2 A	18.3 A	21.7 A (Germany: 20.0 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
1	1	1
General electrical data		
95.9 %	95.9 %	95.9 %
95.1 %	95.3 %	95.3 %
0.4 W	0.4 W	0.4 W
self-commutated, galvanically isolated, HF transformer	self-commutated, galvanically isolated, HF transformer	self-commutated, galvanically isolated, HF transformer
acc. to local requirements	acc. to local requirements	acc. to local requirements
Mechanical data		
LCD 2 x 16 characters, LED	LCD 2 x 16 characters, LED	LCD 2 x 16 characters, LED
2 buttons for display control	2 buttons for display control	2 buttons for display control
RS485, S0	RS485, S0	RS485, S0
potential-free NOC max. DC 30 V / 3 A max. AC 250 V / 1.5 A	potential-free NOC max. DC 30 V / 3 A max. AC 250 V / 1.5 A	potential-free NOC max. DC 30 V / 3 A max. AC 250 V / 1.5 A
PCB terminals inside the unit (max. cross section. 6 mm ² flexible, 10 mm ² rigid), Cable connection via cable fittings (DC: solar connector, AC fitting M32 and terminal)		
-25 °C ... +60 °C**	-25 °C ... +60 °C**	-25 °C ... +60 °C**
free convection / no fan	fan	fan
IP54	IP54	IP54
< 35 dB (A) (noiseless)	< 45 dB (A) (fan)	< 45 dB (A) (fan)
integrated	integrated	integrated
aluminium	aluminium	aluminium
600 x 340 x 240 mm	600 x 340 x 240 mm	600 x 340 x 240 mm
26 kg	28 kg	28 kg

Applicable standards and regulations are taken into account for each country version that is set.

*To protect the hardware, the inverter starts up only at voltages < 550 V

**Power derating at high ambient temperatures

Powador
 6.0 TL3 **NEW**
 7.8 TL3 **NEW**
 9.0 TL3 **NEW**



>97,0 % efficiency

Two MPP trackers, symmetrical and asymmetrical loading possible

Multilingual menu

Graphical display

Integrated web server

USB connection for updates

Conforms to the German Medium and Low Voltage Directives

Small power stations for the energy turnaround.

Transformerless three-phase inverters Powador 6.0 TL3 to 9.0 TL3.

With the new transformerless three-phase inverters Powador 6.0 TL3 to 9.0 TL3, now even small roof systems can be realised with the most flexible line of three-phase units on the market. With rated AC outputs of 5 kVA, 6.5 kVA and 7.5 kVA they now cover the 10 kW range.

They operate using two separate MPP trackers that can handle both symmetrical and asymmetrical loads to allow for optimum adjustment. Each tracker is able to process virtually all of the AC output. 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 rated input voltage range is particularly broad. The Powador 6.0 TL3 starts at 240 V, the Powador 7.8 TL3 at 310 V and the Powador 9.0 TL3 at 355 V. From 250 V the units switch to the mains and during 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 peak efficiency is over 97 % and the European efficiency is also above average. The compact design weighing only 30 kg combined with the DC connection via solar connectors makes installation very easy and economical. Protection class IP65 ensures the greatest possible flexibility when selecting the installation location.

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 show-

ing operating data and a USB port for installing firmware updates. The current software can be downloaded free of charge from the download area of www.kaco-newenergy.de/service. 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 the Powador web 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 inverters conform to the German Medium and Low Voltage Directives and support the functions of the Powador-protect for grid and plant protection and also power management in accordance with the German EEG 2012.

The units are available in Q1/2013.

Technical data

Powador 6.0 TL3 | 7.8 TL3 | 9.0 TL3

Electrical data	6.0 TL3 NEW	7.8 TL3 NEW
Input variables		
Max. recommended PV generator power	6 000 W	7 800 W
MPP range	240 V ... 800 V*	310 V ... 800 V*
Starting voltage	250 V	250 V
No-load voltage	1 000 V	1 000 V
Max. input current	2 x 11 A	2 x 11 A
Number of MPP trackers	2	2
Max. power/tracker	5 160 W	6 700 W
Number of strings	2 x 2	2 x 2
Output variables		
Rated output	5 000 VA	6 500 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	3 x 7.25 A	3 x 9.25 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	>97%	>97%
Europ. efficiency	>97%	>97%
Night consumption	≈ 1,5 W	≈ 1,5 W
Switching plan	transformerless	transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
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	Ethernet, USB, RS485, S0 output
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 M32 and terminal	DC: solar connector, AC: cable connection M32 and terminal
Ambient temperature	-25 °C ... +60 °C**	-25 °C ... +60 °C**
Cooling	temperature-dependent fan	temperature-dependent fan
Protection class	IP65	IP65
Noise emission	< 45 dB (A) (noiseless when operated without fan)	< 45 dB (A) (noiseless when operated without fan)
DC switch	integrated	integrated
Casing	aluminium casting	aluminium casting
H x W x D	520 x 360 x 230 mm	520 x 360 x 230 mm
Weight	30 kg	30 kg

* The possible input power is reduced at voltages lower than 350 V. The input current is limited to 11.0 A per input. / ** Power derating at high ambient temperatures. Conforms to the country-specific standards and regulations according to the country version that has been set.

Electrical data	9.0 TL3 NEW
Input variables	
Max. recommended PV generator power	9 000 W
MPP range	355 V ... 800 V*
Starting voltage	250 V
No-load voltage	1 000 V
Max. input current	2 x 11 A
Number of MPP trackers	2
Max. power/tracker	7 730 W
Number of strings	2 x 2
Output variables	
Rated output	7 500 VA
Supply voltage	acc. to local requirements
Rated current	3 x 10.9 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%
Europ. efficiency	>97%
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	Ethernet, USB, RS485, S0 output
Fault signalling relay	potential-free NOC max. 230 V / 1 A
Connections	DC: solar connector, AC: cable connection M32 and terminal
Ambient temperature	-25 °C ... +60 °C**
Cooling	temperature-dependent fan
Protection class	IP65
Noise emission	< 45 dB (A) (noiseless when operated without fan)
DC switch	integrated
Casing	aluminium casting
H x W x D	520 x 360 x 230 mm
Weight	30 kg

* The possible input power is reduced at voltages lower than 350 V. The input current is limited to 11.0 A per input. / ** Power derating at high ambient temperatures. Conforms to the country-specific standards and regulations according to the country version that has been set.

Powador
10.0 TL3
12.0 TL3
14.0 TL3
18.0 TL3 **NEW**

98.0 % efficiency

Two MPP trackers, symmetrical
and asymmetrical loading possible

Multilingual menu

Graphical display

Integrated web server

USB connection for updates

Conforms to the German Medium
and Low Voltage Directives



The power plants of the future.

The transformerless three-phase inverters Powador 10.0 TL3 to 18.0 TL3.

Photovoltaic systems of up to several hundred kilowatts can be designed extremely flexibly in small, highly efficient units with the transformerless three-phase inverters Powador 10.0 TL3 to 18.0 TL3.

They operate using two separate MPP trackers that can handle both symmetrical and asymmetrical loads to allow for optimum adjustment. Each tracker is able to process virtually all of the AC output. 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 rated input voltage range of 350 to 800 V is particularly broad (420 to 800 V for the Powador 18.0 TL3). 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 peak efficiency is 98 % and the European efficiency is also above average. The compact design weighing only 40 kg combined 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 soft-

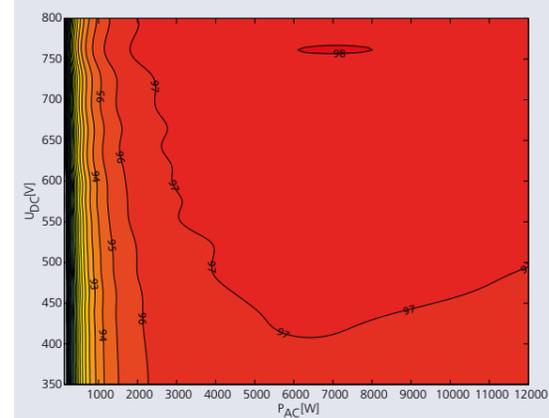
ware can be downloaded free of charge from the download area of www.kaco-newenergy.de/service. The yield data can be called from the web server or via USB for evaluation. The integrated data logger can also be connected directly to the Powador web internet portal for professional evaluation and visualisation 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 inverters conform to the German Medium and Low Voltage Directives and support the functions of the Powador-protect for grid and plant protection and also power management in accordance with the German EEG 2012.

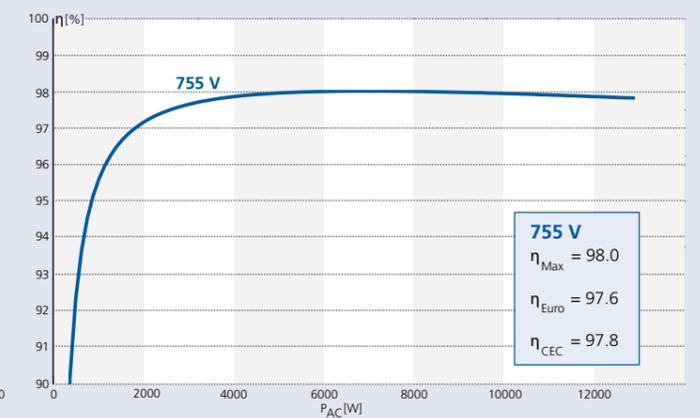
The Powador 18.0 TL3 is available from July 2012.

Graphical display of efficiency

3D efficiency diagram for Powador 14.0 TL3



Efficiency characteristic curve for Powador 14.0 TL3



Technical data

Powador 10.0 TL3 | 12.0 TL3 | 14.0 TL3 | 18.0 TL3

Electrical data	10.0 TL3	12.0 TL3
Input variables		
Max. recommended PV generator power	10000 W	12000 W
MPP range	200 V ... 800 V*	200 V ... 800 V*
Starting voltage	250 V	250 V
No-load voltage	1000 V	1000 V
Max. input current	2 x 18.6 A	2 x 18.6 A
Number of MPP trackers	2	2
Max. power/tracker	9.2 kW	10.2 kW
Number of strings	2 x 2	2 x 2
Output variables		
Rated output	9000 VA	10000 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	3 x 13.0 A	3 x 14.5 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	97.4 %	97.5 %
Night consumption	≈ 1.5 W	≈ 1.5 W
Switching plan	transformerless	transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
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	Ethernet, USB, RS485, S0 output
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	DC: solar connector, AC: cable connection M40 and terminal
Ambient temperature	-25 °C ... +60 °C***	-25 °C ... +60 °C***
Cooling	temperature-dependent fan	temperature-dependent fan
Protection class	IP65	IP65
Noise emission	< 52 dB (A) (noiseless when operated without fan)	< 52 dB (A) (noiseless when operated without fan)
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

* The possible input power is reduced at voltages lower than 350 V. The input current is limited to 18.6 A per input. / ** The possible input power is reduced at voltages lower than 420 V. The input current is limited to 18.6 A per input. *** Power derating at high ambient temperatures. / Conforms to the country-specific standards and regulations according to the country version that has been set.

Electrical data	14.0 TL3	18.0 TL3 NEW
Input variables		
Max. recommended PV generator power	14000 W	18000 W
MPP range	200 V ... 800 V*	200 V ... 800 V**
Starting voltage	250 V	250 V
No-load voltage	1000 V	1000 V
Max. input current	2 x 18.6 A	2 x 18.6 A
Number of MPP trackers	2	2
Max. power/tracker	12.8 kW	15.3 kW
Number of strings	2 x 2	2 x 2
Output variables		
Rated output	12500 VA	15000 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	3 x 18.1 A	3 x 21.8 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	97.6 %	97.7 %
Night consumption	≈ 1.5 W	≈ 1.5 W
Switching plan	transformerless	transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
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	Ethernet, USB, RS485, S0 output
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	DC: solar connector, AC: cable connection M40 and terminal
Ambient temperature	-25 °C ... +60 °C***	-25 °C ... +60 °C***
Cooling	temperature-dependent fan	temperature-dependent fan
Protection class	IP65	IP65
Noise emission	< 52 dB (A) (noiseless when operated without fan)	< 52 dB (A) (noiseless when operated without fan)
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

* The possible input power is reduced at voltages lower than 350 V. The input current is limited to 18.6 A per input. / ** The possible input power is reduced at voltages lower than 420 V. The input current is limited to 18.6 A per input. *** Power derating at high ambient temperatures. / Conforms to the country-specific standards and regulations according to the country version that has been set.

Powador
30.0 TL3
33.0 TL3
36.0 TL3
39.0 TL3
60.0 TL3 **NEW**



98.0 % efficiency

3 MPP trackers, symmetrical and asymmetrical loading possible

Multilingual menu

Cost-saving XL version with integrated combiner box

Graphical display

Integrated web server

USB connection for updates

Conforms to the German Medium and Low Voltage Directives

Efficient. Flexible. Future-oriented.

Transformerless three-phase inverters Powador 30.0 TL3 to 60.0 TL3.

The transformerless three-phase inverters Powador 30.0 TL3 to 60.0 TL3 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 (variant M) or four strings (variant XL) can be connected per MPP tracker. Each of the three MPP trackers of the Powador 60.0 TL3 XL can even be connected to five strings.

The rated input voltage range of 350 to 800 V is particularly broad (480 to 850 V for the Powador 60.0 TL3). 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. The peak efficiency is 98%. The European efficiency of 97.8% 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 free of charge from the download area of www.kaco-newenergy.de/service. 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 the Powador web in-

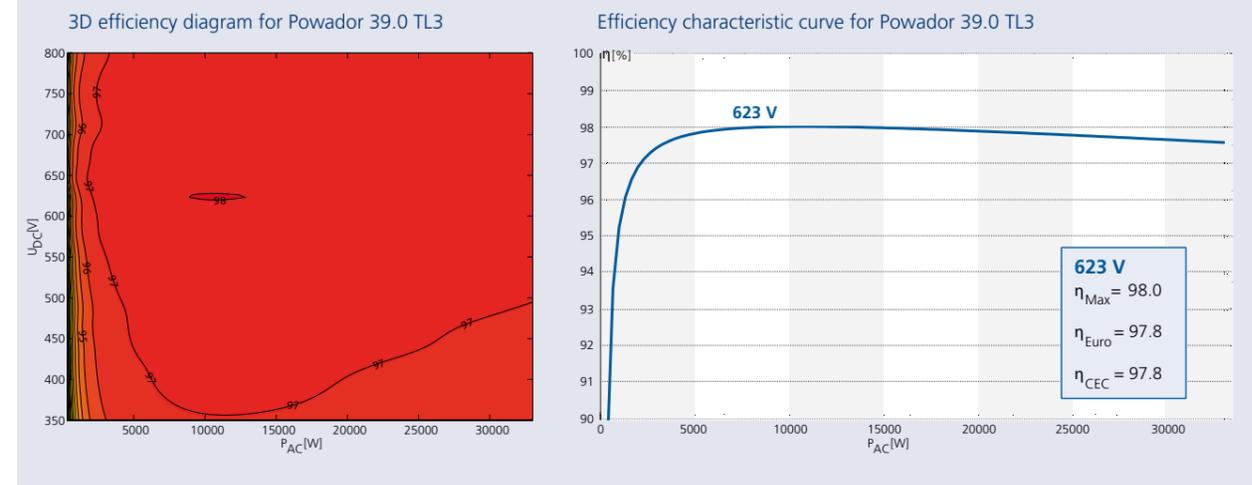
ternet portal for professional evaluation and visualisation of the inverter data.

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 inverters conform to the German Medium and Low Voltage Directives and support the functions of the Powador-protect for grid and plant protection and also power management in accordance with the German EEG 2012.

The integrated string collector with string fuses and overvoltage protection for the XL variant of the units opens up significant cost advantages. The M variants use the external Powador Mini-Argus string collector instead.

The Powador 60.0 TL3 is available from October 2012.

Graphical display of efficiency



Technical data

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

Electrical data	30.0 TL3	33.0 TL3
Input variables		
Max. recommended PV generator power	30 000 W	33 000 W
MPP range	200 V ... 800 V*	200 V ... 800 V*
Starting voltage	250 V	250 V
No-load voltage	1 000 V	1 000 V
Max. input current	3 x 34.0 A	3 x 34.0 A
Number of MPP trackers	3	3
Max. power/tracker	20 kW	20 kW
Number of strings	3 x 1 based on design M 3 x 4 based on design XL	3 x 1 based on design M 3 x 4 based on design XL
Output variables		
Rated output	25 000 VA	27 500 VA
Line voltage	acc. to local requirements	acc. to local requirements
Rated current	3 x 36.2 A	3 x 39.9 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
Switching plan	self-inverted, transformerless	self-inverted, transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
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	Ethernet, USB, RS485, S0 output
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 connection of M version: spring-type terminals 6-35 mm ² ***; DC connection of XL version: screw and spring-type terminals 10 mm ² , bushing 6 x M32	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 ***; DC connection of XL version: screw and spring-type terminals 10 mm ² , bushing 6 x M32
Ambient temperature	-20 °C ... +60 °C****	-20 °C ... +60 °C****
Temperature monitoring	> 75 °C temperature-dependent impedance matching, > 85 °C cut-out	> 75 °C temperature-dependent impedance matching, > 85 °C cut-out
Cooling	forced cooling/RPM-regulated fan. max. 600 m ³ / h	forced cooling/RPM-regulated 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
Casing	sheet steel	sheet steel
H x W x D	1 360 x 840 x 355 mm	1 360 x 840 x 355 mm
Weight	151 kg	151 kg

* The possible input power is reduced at voltages lower than 350 V. The input current is limited to 34.0 A per input. ** The possible input power is reduced at voltages lower than 480 V. The input current is limited to 36.0 A per input. *** Only in conjunction with external Powador Mini-Argus **** Power derating at high ambient temperatures. Conforms to the country-specific standards and regulations according to the country version that has been set.

36.0 TL3	39.0 TL3	60.0 TL3 NEW
Input variables		
36 000 W	39 000 W	60 000 W
200 V ... 800 V*	200 V ... 800 V*	200 V ... 850 V**
250 V	250 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 based on design M 3 x 4 based on design XL	3 x 1 based on design M 3 x 4 based on design XL	3 x 1 based on design M 3 x 5 based on design XL
Output variables		
30 000 VA	33 300 VA	49 900 VA
acc. to local requirements	acc. to local requirements	acc. to local requirements
3 x 43.5 A	3 x 48.3 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 %	98.0 %	98.0 %
97.8 %	97.8 %	97.8 %
≈ 1,5 W	≈ 1,5 W	≈ 1,5 W
self-inverted, transformerless	self-inverted, transformerless	self-inverted, transformerless
acc. to local requirements	acc. to local requirements	acc. to local requirements
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	Ethernet, USB, RS485, S0 output	Ethernet, USB, RS485, S0 output
potential-free NOC max. 230 V / 1 A	potential-free NOC max. 230 V / 1 A	potential-free NOC max. 230 V / 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 ***; DC connection of XL version: screw and spring-type terminals 10 mm ² , bushing 6xM32	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 ***; DC connection of XL version: screw and spring-type terminals 10 mm ² , bushing 6xM32	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 ***; DC connection of XL version: screw and spring-type terminals 10 mm ² , bushing 6xM32
-20 °C ... +60 °C****	-20 °C ... +60 °C****	-20 °C ... +60 °C****
> 75 °C temperature-dependent impedance matching, > 85 °C cut-out	> 75 °C temperature-dependent impedance matching, > 85 °C cut-out	> 75 °C temperature-dependent impedance matching, > 85 °C cut-out
forced cooling / RPM-regulated fan. max. 600 m ³ / h	forced cooling / RPM-regulated fan. max. 600 m ³ / h	forced cooling / RPM-regulated 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
sheet steel	sheet steel	sheet steel
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	165 kg

* The possible input power is reduced at voltages lower than 350 V. The input current is limited to 34.0 A per input. ** The possible input power is reduced at voltages lower than 480 V. The input current is limited to 36.0 A per input. *** Only in conjunction with external Powador Mini-Argus **** Power derating at high ambient temperatures. Conforms to the country-specific standards and regulations according to the country version that has been set.

Powador
48.0 TL3 Park **NEW**
72.0 TL3 Park **NEW**



98.0 % efficiency

3 MPP trackers, symmetrical
and asymmetrical loading possible

Multilingual menu

Cost-saving XL version with
integrated combiner box

Integrated web server

USB connection for updates

Conforms to the German Medium
and Low Voltage Directives

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 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. Every tracker of the Powador 48.0 TL3 Park can process 20 kW; the Powador 72.0 TL3 Park can process 30 kW per unit. This enables them to meet all the typical demands of more complex designs involved with inhomogenous installation of the photovoltaic generator. Three MPP trackers are also advantageous to 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 (va-

riant M) or four strings (variant XL) 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 rated input voltage range is from 410 to 800 V (Powador 48.0 TL3 Park) or 580 to 850 V (Powador 72.0 TL3 Park). 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%. The European efficiency of 97.8% 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.de/service. The yield data can be called via USB or the web server. The integrated data logger can also be connected directly to the Powador web 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. In addition, the inverters conform to the German Medium Voltage Directive.

The integrated string collector with string fuses and overvoltage protection for the XL variant of the units opens up significant cost advantages. The M variants use the external Powador Mini-Argus string collector instead.

Technical data

Powador 48.0 TL3 Park | 72.0 TL3 Park

Electrical data	48.0 TL3 Park NEW	72.0 TL3 Park NEW
Input variables		
Max. recommended PV generator power	48 000 W	72 000 W
MPP range	200 V ... 800 V*	200 V ... 850 V**
Starting voltage	250 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	30 kW
Number of strings	3x1 based on design M 3x4 based on design XL	3x1 based on design M 3x5 based on design XL
Output variables		
Rated output	40 000 VA	60 000 VA
Line voltage	480 V / 277 V	480 V / 277 V
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		
Max. efficiency	98.0 %	98.0 %
European efficiency	97.9 %	97.8 %
Night consumption	≈ 1,5 W	≈ 1,5 W
Switching plan	self-inverted, transformerless	self-inverted, transformerless
Grid monitoring	acc. to local requirements	acc. to local requirements
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	Ethernet, USB, RS485, S0 output
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 connection of M version: spring-type terminals 6-35 mm ² ***; DC connection of XL version: screw and spring-type terminals 10 mm ² , bushing 6 x M32	
Ambient temperature	-20 °C ... +60 °C****	-20 °C ... +60 °C****
Temperature monitoring	> 75 °C temperature-dependent impedance matching, > 85 °C cut-out	> 75 °C temperature-dependent impedance matching, > 85 °C cut-out
Cooling	forced cooling / RPM-regulated fan. max. 600 m ³ / h	forced cooling / RPM-regulated 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
Casing	sheet steel	sheet steel
H x W x D	1 360 x 840 x 355 mm	1 360 x 840 x 355 mm
Weight	151 kg	165 kg

* The possible input power is reduced at voltages lower than 410 V. The input current is limited to 34.0 A per input. ** The possible input power is reduced at voltages lower than 580 V. The input current is limited to 36.0 A per input. *** Only in conjunction with external Powador Mini-Argus **** Power derating at high ambient temperatures
Conforms to the country-specific standards and regulations according to the country version that has been set.

Inverters with integrated generator junction box (GJB).

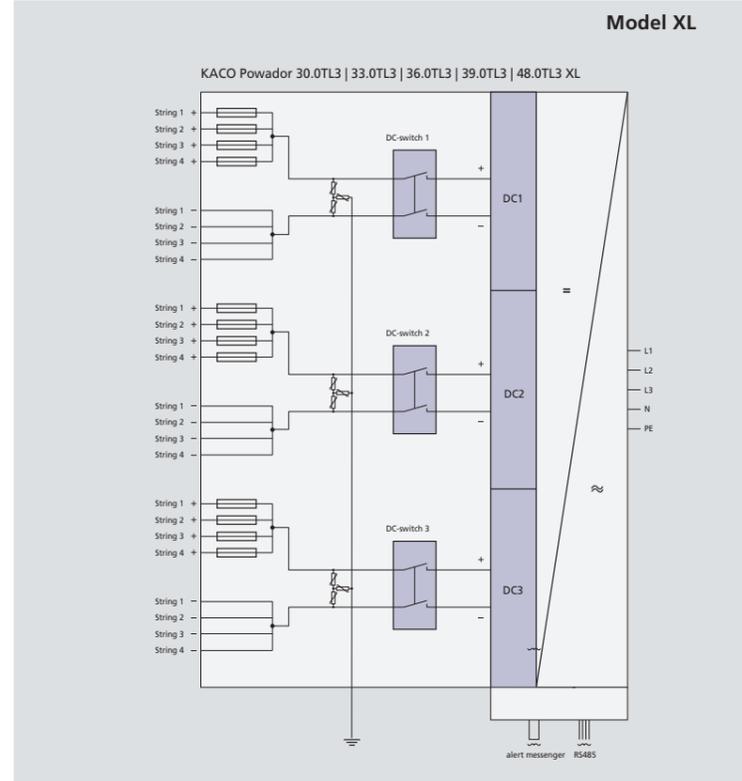
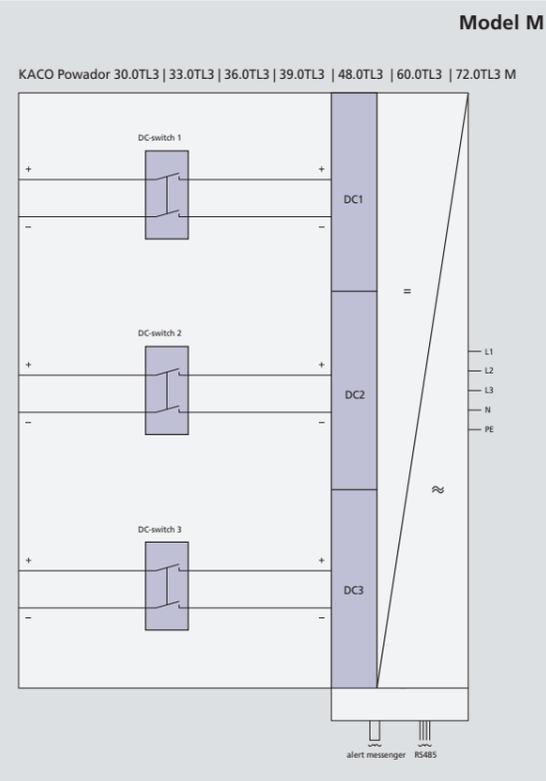
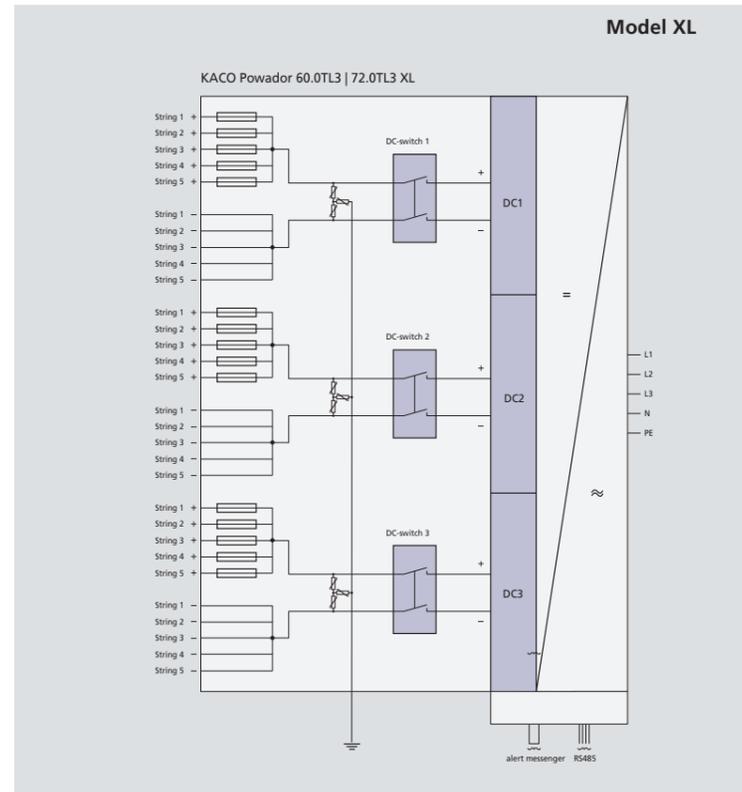
The Powador 30.0 TL3 to 60.0 TL3 as well as the Powador 48.0 TL3 Park and 72.0 TL3 Park inverters in the XL version come with an integrated generator junction box (GJB). In version M, these inverters can be wired to the external string collector Powador Mini-Argus (for specifications see facing page).

Configuration of Version M

- DC disconnect in the connection box
- 6 to 35 mm² connection terminal for each DC input

Configuration of Version XL

- DC disconnect in the connection box
- 10 mm² DC connection terminal in the connection box
- 4 string fuses (12 A) for each input, 5 string fuses for Powador 48.0 TL3 Park and Powador 72.0 TL3 Park
- Overvoltage protection



The external solution.

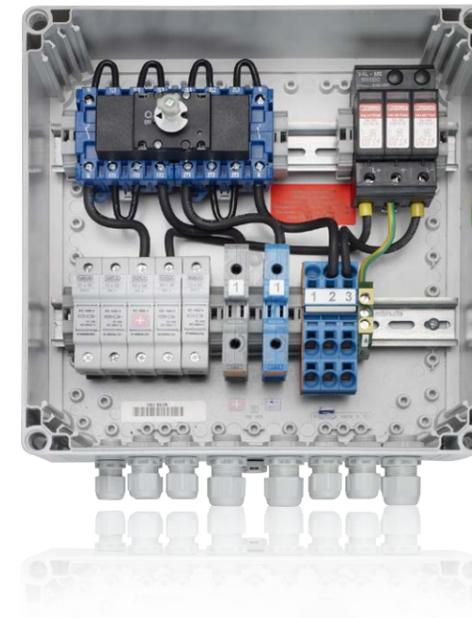
String collector Powador Mini-Argus.

If you would like to combine the module strings near the PV modules, we offer you for the M version of the inverters Powador 30.0 TL3 to 60.0 TL3 as well as the Powador 48.0 TL3 Park and 72.0 TL3

Park the custom-made generator junction box Powador Mini-Argus. It combines the string fuse, the overvoltage protection and the DC disconnect in a separate housing and can be installed

spatially separated from the inverters. It can be installed outdoors: the combiner boxes are dust-tight, completely contact-proof and protected against water jets from all directions (protection rating IP65).

The Powador Mini-Argus is generally used if there is a long distance between modules and inverters – they spare the laborious laying of cables for all module strings over the entire distance. 3 Mini-Argus with 5 strings each are used for each inverter.



Highlights

- DC disconnect
- Overvoltage protection
- String fuse
- 3 Mini-Argus with 5 strings each for each inverter
- Protection rating IP65

Technical data

Powador Mini-Argus

Electrical data	
U _{DC} max.	1,000 V
I _{MPP} max.	34 A
Inputs	5
String input terminal	Negative pole: 5 spring terminals up to 16 mm ² / Positive pole: 5 screw terminals up to 16 mm ²
Load disconnection point	Integrated, with external drive
String fuse	12 A in "+" potential 10 x 38 string fuse Module type may require use of other fuses
Overvoltage protection	Class II/"C" (medium protection)
Output terminals	Wide surface terminal 6 - 35 mm ² Grounding: Screw terminal 16 mm ²
Protection rating	IP65
Protection class	II
Housing	Polycarbonate, smoky grey transparent cover attached with screws
Cable entry points	DIN fittings/pressure compensator
H x W x D	300 x 300 x 130 mm

Also with DC negative fuse (DC via contact plug).

Powador
16.0 TR3
18.0 TR3



96.2% efficiency

Three MPP trackers

Multilingual menu

Graphical display

Integrated web server

USB connection for updates

Conforms to the German Medium and Low Voltage Directives

Grounding of PV generator possible – optimally suited for thin-film modules

The power plants of the future. With a transformer.

Galvanically isolated three-phase inverters Powador 16.0 TR3 and 18.0 TR3.

Are you designing a larger solar system with modules that need to be grounded? Powador 16.0 TR3 and 18.0 TR3 three-phase inverters are galvanically isolated units that provide the perfect solution for safely connecting your system to the grid. Since they are true three-phase units, they provide high-quality, sinusoidal alternating current with a 120-degree phase shift – a dream come true for all grid operators. It goes without saying that they meet all of the requirements of Germany’s new Medium Voltage Directive (“Mittelspannungsrichtlinie”) and they are also perfectly equipped to comply with the pending Low Voltage Directive (“Niederspannungsrichtlinie”).

Three strings can be connected per MPP controller, which means that the units

can process the solar power from nine strings. They operate with three separate MPP trackers to allow for optimum adjustment. The peak efficiency is 96.2%. Cooling is provided by demand-driven fans that are aimed directly at the temperature-sensitive components.

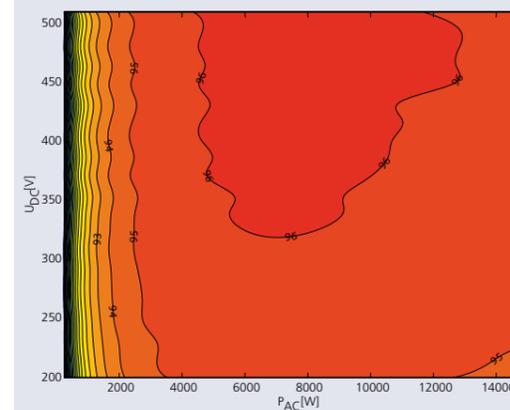
It is easy to achieve perfect communication with both units. In addition to the the normal RS485 interface, which enables you to query yield data with the Powador-proLOG, they offer innovations that provide a lot of convenience: an integrated web server for uninterrupted monitoring via Ethernet, a USB connection for installing software updates and a graphic display to view operating data. The latest software updates are available at www.kaco-newenergy.de/service. With

all of the equipment that is included, users no longer need a separate data logger. A number of country-specific default settings are programmed into the inverters. These are easy to select during on-site installation. Your choice of operating language is independent of these settings. You save money because the separation connection box makes installation extremely easy. All components needed for grounding the PV generator are included. You can find videos that quickly show you the installation procedures on our website.

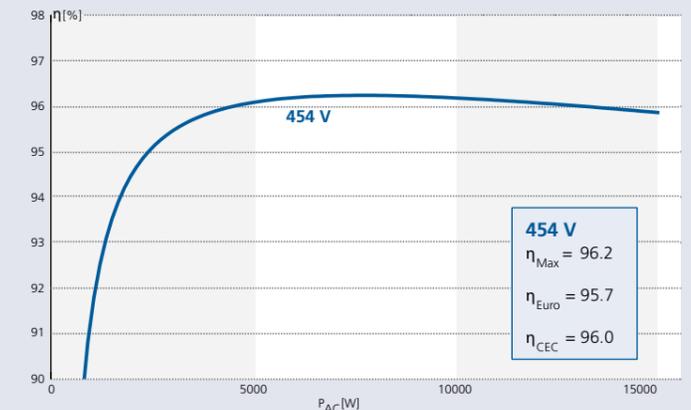
Naturally, our three-phase units can be combined with each other, so they are suitable for significantly higher power ratings. The connection is also prepared for standalone use.

Graphical display of efficiency

3D efficiency diagram for Powador 18.0 TR3



Efficiency characteristic curve for Powador 18.0 TR3

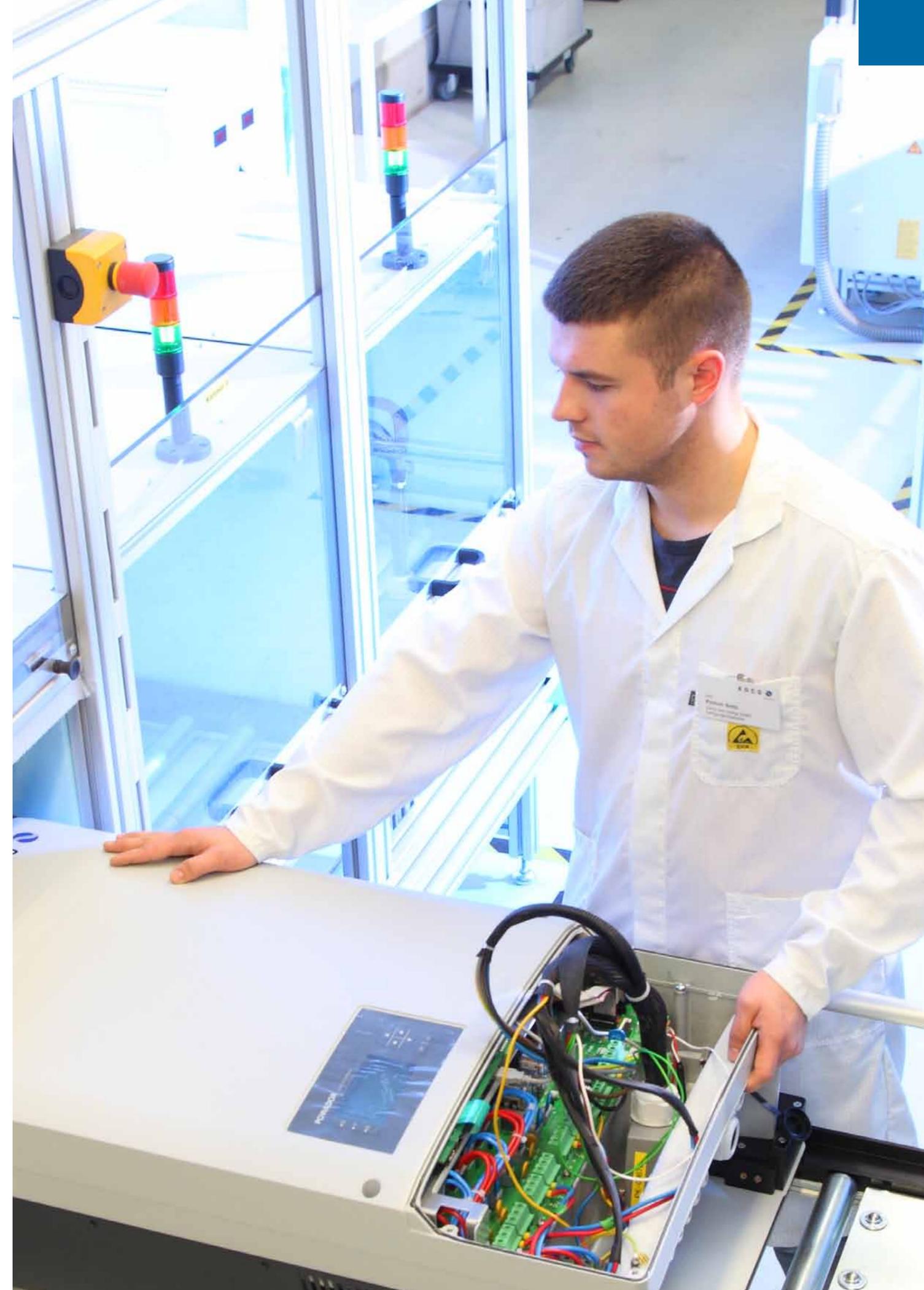


Technical data

Powador 16.0 TR3 | 18.0 TR3

Electrical data	16.0 TR3	18.0 TR3
Input variables		
Max. recommended PV generator power	16000 W	18000 W
MPP range	200 V ... 510 V	200 V ... 510 V
No-load voltage	600 V*	600 V*
Max. input current	3 x 26 A	3 x 26 A
Number of MPP trackers	3	3
Max. power/tracker	5,5 kW	5,5 kW
Number of strings	3 x 3	3 x 3
Output variables		
Rated output	13500 VA	15000 VA
Supply voltage	acc. to local requirements	acc. to local requirements
Rated current	3 x 19.5 A	3 x 21.7 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	96.2 %	96.2 %
European efficiency	95.6 %	95.7 %
Night consumption	1.9 W	1.9 W
Switching plan	self-commutated, galvanically isolated, HF transformer	self-commutated, galvanically isolated, HF transformer
Grid monitoring	acc. to local requirements	acc. to local requirements
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	Ethernet, USB, RS485, S0 output
Fault signalling relay	potential-free NOC max. 230 V / 1 A	potential-free NOC max. 230 V / 1 A
Connections	screw terminals within the device (max. cross section: 16 mm ² flexible) cable supply via cable connections (DC-connection M32, AC-connection M40)	screw terminals within the device (max. cross section: 16 mm ² flexible) cable supply via cable connections (DC-connection M32, AC-connection M40)
Ambient temperature	-25 °C ... +60 °C**	-25 °C ... +60 °C**
Cooling	fan	fan
Protection class	IP54	IP54
Noise emission	< 45 dB (A) (noiseless when operated without fan)	< 45 dB (A) (noiseless when operated without fan)
DC-switch	integrated	integrated
Casing	aluminium casting	aluminium casting
H x W x D	948 x 510 x 269 mm	948 x 510 x 269 mm
Weight	80 kg	80 kg

* To protect the hardware, the inverter starts up only at < 550 V / ** Power derating at high ambient temperatures
Applicable standards and regulations are taken into account for each country version that is set.



Powador-priwatt

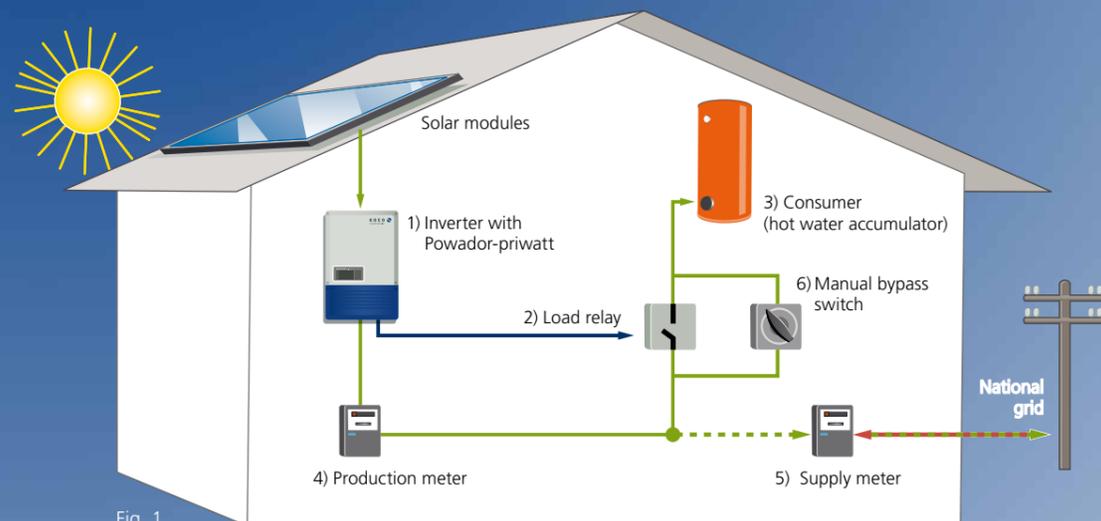


Fig. 1

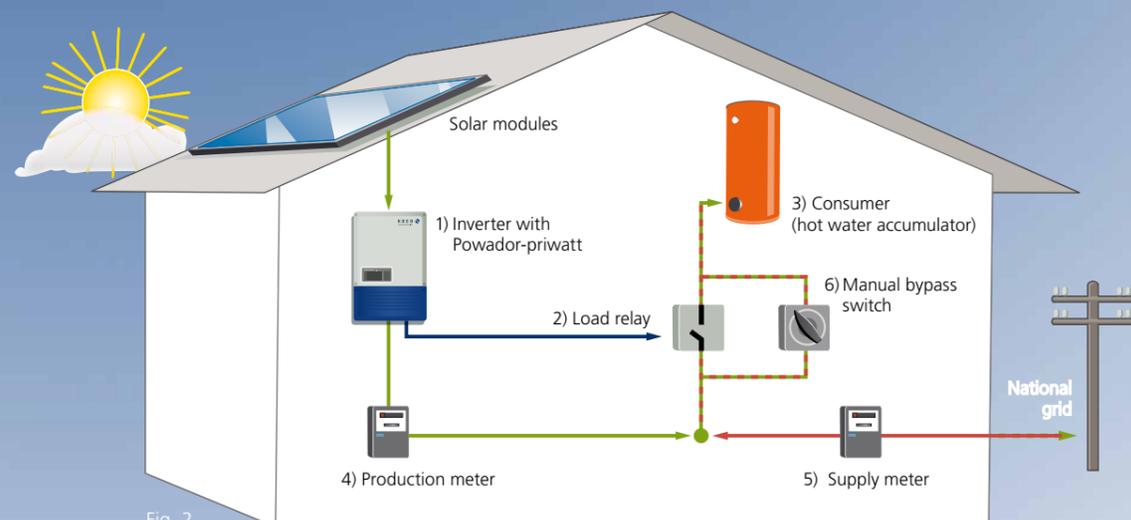


Fig. 2

Power your home before you feed into the grid.

Powador-priwatt: The profitable way to use your privately generated photovoltaic electricity.

KACO new energy is now offering an innovation to help you optimise private consumption of solar generated electricity. It's a software feature called "Powador-priwatt" and it is the solution to managing your electrical appliances. Our Powador inverters can detect the current amount of PV output and by means of a relay device can ensure that the electrical appliances in your home are powered by solar electricity whenever it is available. As usual, any solar electricity which isn't needed during this time will be exported to the National Grid (Fig. 1). Even if you have to import additional electricity from the Grid after using your personally generated solar electricity, your electricity bill will still be considerably lower than usual (Fig. 2).

This is how it works

In order to start the connected appliances, the Powador-priwatt (1) sends a control signal to an external load relay (2). This in turn switches the individual load (3) on. Before the appliance can operate, a stable threshold power must be available to the inverter. This can be set in 250 Watt increments. Once activated,

the timer can be set to up to 10 hours in individual one hour blocks. In the factory settings the Powador-priwatt is set to switch on when the AC power is constantly above the 250 W threshold over a thirty minute period. The operating time relay is set to one hour.

All the solar power registers on the production meter (4) as usual, but rather than exporting it to the Grid, it is consumed in your home, directly displacing the power you would have imported at your normal tariff as recorded by the supply meter (5). To put it another way, the more privately generated solar electricity that you use instead of imported grid electricity, the better. With the manual bypass switch (6) you can over-ride the load relay and connect the appliance to the grid supply at any time. Both the manual bypass switch and the load relay come as optional accessories with the "Powador-priwatt Switch".

Use it here

Not only owners of small rooftop arrays benefit from Powador-priwatt, but also farmers and businesses which have the

arrays on top of farm outbuildings or factory roofs. Powador-priwatt is especially geared at activating appliances which

- become necessary when irradiation is high, such as any form of cooling, ventilation or irrigation system. That means any situation in which solar radiation leads to a higher need for electricity. Examples of this are sunblinds, electric shutters and / or air-conditioning sets.

- can wait until high irradiation is available, such as dish-washers and washing machines, tumble driers or circulation pumps.

The list of possible applications is long: water heating, mills, plant illumination in greenhouses, aquarium and terrarium heating systems, charging units for all sorts of batteries such as electric cars or fork lift trucks.

How are you going to make use of Powador-priwatt?

Tell us about it at

priwatt@kaco-newenergy.de

Powador
XP100-HV
XP200-HV
XP250-HV

Ready for immediate use due to integrated transformer

Load-adaptive pulse-width modulation

Continuous, remote monitoring

Conforms to the German Medium and Low Voltage Directives



Extremely powerful. Extremely flexible.

The central inverters Powador XP100-HV to XP250-HV.

The central inverters of the Powador XP series are the first choice when it comes to usability and return on investment. 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: The Powador XP200-HV

and XP250-HV feature a secondary back-up power supply for the control board. In addition, all Powador XP inverters are equipped with 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 digital 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 and sends diagrams that guarantee rapid localisation of the source of the error.

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. You can also select from a variety of menu languages independent of the country of installation. In addition, the central inverters Powador XP100-HV to XP250-HV come with a transformer and are ready for immediate use.

All Powador XP central inverters conform to the German Medium and Low Voltage Directives.

Technical data

Powador XP100-HV | XP200-HV | XP250-HV

Electrical data	XP100-HV	XP200-HV	XP250-HV
Input variables			
Max. recommended PV generator power	120 kW	240 kW	300 kW
MPP range	450 V ... 830 V	450 V ... 830 V	450 V ... 830 V
No-load voltage	1000 V*	1000 V*	1000 V*
Max. input current	245 A	467 A	611 A
Ripple voltage	< 3 %	< 3 %	< 3 %
Ripple current	< 4 %	< 4 %	< 4 %
Output variables			
Rated output	100 kVA	200 kVA	250 kVA
Supply voltage	400 V (+/- 10 %)	400 V (+/- 10 %)	400 V (+/- 10 %)
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
Rated current	153 A	304 A	380 A
cos phi	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
Distortion factor	< 3 % at rated output power	< 3 % at rated output power	< 3 % at rated output power
General electrical data			
Max. efficiency	97.1 %	97.4 %	97.4 %
European efficiency	96.5 %	97.0 %	96.9 %
Consumption	< 1 % of rated output power	< 1 % of rated output power	< 1 % of rated output power
Standby consumption	< 40 W	< 100 W	< 100 W
Auxiliary power supply	230 V	230 V	230 V
Grid monitoring	acc. to local requirements	acc. to local requirements	acc. to local requirements
Mechanical data			
Display	TFT LCD Touchscreen	TFT LCD Touchscreen	TFT LCD Touchscreen
Interfaces	RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card	RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card	RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card
Ambient temperature	-20 °C ... +50 °C full rated power, no derating	-20 °C ... +50 °C full rated power, no derating	-20 °C ... +50 °C full rated power, no derating
Cooling	fan (max. 2 420 m³/h)	fan (max. 5 240 m³/h)	fan (max. 5 240 m³/h)
Protection class	IP21	IP21	IP21
Noise emission	< 70 dB (A)	< 70 dB (A)	< 70 dB (A)
EMC	acc. to EN 61000-6-2 / EN 61000-6-4	acc. to EN 61000-6-2 / EN 61000-6-4	acc. to EN 61000-6-2 / EN 61000-6-4
CE-conformity	yes	yes	yes
H x W x D	2 120 x 1 200 x 920 mm	2 120 x 2 400 x 870 mm	2 120 x 2 400 x 870 mm
Weight	1 150 kg	1 920 kg	1 950 kg

Conform to the country-specific standards and regulations according to what country version has been set.
* To protect the hardware, the inverter starts up only at voltages < 950 V



The image shows the KACO logo in large white letters on a blue background. The letters are 'K', 'A', 'C', 'O', followed by a stylized circular logo consisting of three curved lines.

Powador
 XP200-HV TL
 XP250-HV TL
 XP350-HV TL
 XP500-HV TL
 XP550-HV TL **NEW**

Maximum flexibility due to transformerless design

Load-adaptive pulse-width modulation

Continuous, remote monitoring

Conforms to the German Medium and Low Voltage Directives



Extremely powerful. Extremely flexible. Transformerless technology.

The central inverters Powador XP200-HV TL to XP550-HV TL.

The central inverters Powador XP200-HV TL to XP550-HV TL are the transformerless units within the Powador XP series. 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 secondary 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 digital 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 and sends diagrams that guarantee rapid localisation of the source of the error.

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. You can also select from a variety of menu languages independent of the country of installation. All Powador XP central inverters conform to the German Medium and Low Voltage Directives.

Technical data

Powador XP200-HV TL | XP250-HV TL | XP350-HV TL | XP500-HV TL | XP550-HV TL

Electrical data	XP200-HV TL	XP250-HV TL
Input variables		
Max. recommended PV generator power	240 kW	300 kW
MPP range	450 V ... 830 V	450 V ... 830 V
No-load voltage	1 000 V*	1 000 V*
Max. input current	467 A	611 A
Ripple voltage	< 3 %	< 3 %
Ripple current	< 4 %	< 4 %
Output variables		
Rated output	200 kVA	250 kVA
Voltage to external transformer	3 x 290 V (+/- 10 %)	3 x 290 V (+/- 10 %)
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Rated current	398 A	498 A
cos phi	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
Distortion factor	< 3 % at rated output power	< 3 % at rated output power
General electrical data		
Max. efficiency	98.2 %	98.1 %
European efficiency	97.8 %	97.8 %
Consumption	< 1 % of rated output power	< 1 % of rated output power
Standby consumption	< 100 W	< 100 W
Auxiliary power supply	230 V	230 V
Grid monitoring	acc. to local requirement	acc. to local requirement
Mechanical data		
Display	TFT LCD Touchscreen	TFT LCD Touchscreen
Interfaces	RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card	RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 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. 4 040 m³/h)	fan (max. 4 040 m³/h)
Protection class	IP21	IP21
Noise emission	< 70 dB (A)	< 70 dB (A)
EMC	acc. to EN 61000-6-2 / EN 61000-6-4	acc. to EN 61000-6-2 / EN 61000-6-4
CE-conformity	yes	yes
H x W x D	2 120 x 2 400 x 870 mm	2 120 x 2 400 x 870 mm
Weight	1 170 kg	1 200 kg

Conform to the country-specific standards and regulations according to what country version has been set.
* To protect the hardware, the inverter starts up only at voltages < 950 V

XP350-HV TL	XP500-HV TL	XP550-HV TL NEW
Input variables		
420 kW	600 kW	660 kW
450 V ... 830 V	550 V ... 830 V	550 V ... 830 V
1 000 V*	1 000 V*	1 000 V
856 A	1 091 A	1 200 A
< 3 %	< 3 %	< 3 %
< 4 %	< 4 %	< 4 %
Output variables		
350 kVA	500 kVA	550 kVA
3 x 290 V (+/- 10 %)	3 x 370 V (+/- 10 %)	3 x 370 V (+/- 10 %)
50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
697 A	780 A	858 A
0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
< 3 % at rated output power	< 3 % at rated output power	< 3 % at rated output power
General electrical data		
98.3 %	98.5 %	98.5 %
98.0 %	98.2 %	98.2 %
< 1 % of rated output power	< 1 650 W	< 1 650 W
< 100 W	< 110 W	< 110 W
230 V	230 V	230 V
acc. to local requirement	acc. to local requirement	acc. to local requirement
Mechanical data		
TFT LCD Touchscreen	TFT LCD Touchscreen	TFT LCD Touchscreen
RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card	2 x RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card	2 x RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card
-20 °C ... +50 °C full rated power, no derating	-20 °C ... +50 °C full rated power, no derating	-20 °C ... +50 °C full rated power, no derating
fan (max. 5 460 m³/h)	fan (max. 6 660 m³/h)	fan (max. 6 660 m³/h)
IP21	IP21	IP21
< 70 dB (A)	< 70 dB (A)	< 70 dB (A)
acc. to EN 61000-6-2 / EN 61000-6-4	acc. to EN 61000-6-2 / EN 61000-6-4	acc. to EN 61000-6-2 / EN 61000-6-4
yes	yes	yes
2 120 x 2 400 x 870 mm	2 120 x 2 400 x 870 mm	2 120 x 2 400 x 870 mm
1 370 kg	1 656 kg	1 656 kg

Conform to the country-specific standards and regulations according to what country version has been set.
* To protect the hardware, the inverter starts up only at voltages < 950 V

Powador
XP500-HV TL
outdoor **NEW**
XP550-HV TL
outdoor **NEW**



Maximum flexibility due to transformerless design

Load-adaptive pulse-width modulation

Continuous, remote monitoring

Conforms to the German Medium and Low Voltage Directives

High output. High reliability. High protection.

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

The central inverters Powador XP500-HV TL outdoor and Powador XP550-HV TL outdoor are specially designed for outdoor applications. 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 digital user interface makes control and monitoring of the units easy. You can monitor your system remotely over the internet. The operation of all critical components is continuously monitored

and potential faults are reported immediately. If a fault occurs, diagrams that guarantee rapid localisation of the source of the fault are generated.

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

It goes without saying that all units in the XP series fulfil the requirements of the German Low and Medium Voltage Directives.

The units are available in Q4/2012.

Technical data

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

Electrical data	XP500-HV TL outdoor NEW	XP550-HV TL outdoor NEW
Input variables		
Max. recommended PV generator power	600 kW	660 kW
MPP range	550 V ... 830 V	550 V ... 830 V
No-load voltage	1 000 V	1 000 V
Max. input current	1 091 A	1 200 A
Ripple voltage	< 3 %	< 3 %
Ripple current	< 4 %	< 4 %
Output variables		
Rated output	500 kVA	550 kVA
Voltage to external transformer	3 x 370 V (+/- 10 %)	3 x 370 V (+/- 10 %)
Rated frequency	50 Hz	50 Hz
Rated current	780 A	858 A
cos phi	0.80 inductive ... 0.80 capacitive	0.80 inductive ... 0.80 capacitive
Distortion factor	< 3 % at rated output power	< 3 % at rated output power
General electrical data		
Max. efficiency	98.5 %	98.5 %
European efficiency	98.2 %	98.2 %
Consumption	< 1 650 W	< 1 650 W
Standby consumption	< 110 W	< 110 W
Auxiliary power supply	230 V	230 V
Grid monitoring	acc. to local requirement	acc. to local requirement
Mechanical data		
Interfaces	2 x RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x SO input 1 x digital output 1 x SO output SD card	2 x RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x SO input 1 x digital output 1 x SO 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. 6 660 m³/h)	fan (max. 6 660 m³/h)
Protection class	enclosure: IP44, electronics: IP54	enclosure: IP44, electronics: IP54
Noise emission	< 70 dB (A)	< 70 dB (A)
EMC	acc. to EN 61000-6-2 / EN 61000-6-4	acc. to EN 61000-6-2 / EN 61000-6-4
CE-conformity	yes	yes
H x W x D	2 250 x 2 600 x 860 mm	2 250 x 2 600 x 860 mm
Weight	1 900 kg	1 900 kg

Conform to the country-specific standards and regulations according to what country version has been set.

Powador
500 Kilowatt-
Station
700 Kilowatt-
Station **NEW**
Megawatt-Station

Unique power electronics
control

Pulse-width modulation
adapted to the output

Continuous monitoring
Multi-language menu



High tech deluxe.

The Powador central inverter stations.

The high power, efficiency and reliability of Powador XP central inverters is also available in the form of robust central inverter stations. We offer the following stations, each consisting of two Powador XP units in a turnkey concrete station including a medium-voltage transformer: the 500 Kilowatt Station, the 700 Kilowatt Station and the Megawatt Station.

The completely digitally controlled stations can be configured for the widest possible variety of grid requirements worldwide. Apart from that, the language of the user interface can be freely set. Easy operation with the clearly laid-out TFT LCD touch screen and remote monitoring over the internet are also included.

Large systems can be installed anywhere in the world – even in extreme climates – and easily maintained with a small number of inverters.

All Powador stations comply with the requirements of the German Medium Voltage Directive.

Technical data

Powador 500 Kilowatt-Station | 700 Kilowatt-Station | Megawatt-Station

Electrical data	500 kW-Station	700 kW-Station
Input variables		
Max. recommended PV generator power	600 kW	840 kW
MPP range	450 V ... 830 V	450 V ... 830 V
No-load voltage	1 000 V*	1 000 V*
Max. input current	2 x 611 A	2 x 856 A
Ripple voltage	< 3 %	< 3 %
Ripple current	< 4 %	< 4 %
Output variables		
Rated power	500 kVA	700 kVA
Line voltage	acc. to local requirements	acc. to local requirements
Line current	14.4 A	20.2 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
Distortion factor	< 3 % at rated output power	< 3 % at rated output power
General electrical data		
Max. efficiency	98.1 %**	98.3 %**
European efficiency	97.8 %**	98.0 %**
Consumption	< 1 % of rated output power	< 1 % of rated output power
Standby consumption	< 200 W	< 200 W
Auxiliary power supply	230 V	230 V
Grid monitoring	acc. to local requirements	acc. to local requirements
Mechanical data		
Display	TFT LCD Touchscreen	TFT LCD Touchscreen
Interfaces	RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card	RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card
Ambient temperature	-20 °C ... +50 °C	-20 °C ... +50 °C
Cooling	fan (max. 8080 m³/h)	fan (max. 8080 m³/h)
EMC	acc. to EN 61000-6-2 / EN 61000-6-4	acc. to EN 61000-6-2 / EN 61000-6-4
CE-conformity	yes	yes
H x W x D	3560 x 4780 x 2980 mm	3560 x 4780 x 2980 mm
Weight	approx. 31 t	approx. 31 t

Conform to the country-specific standards and regulations according to what country version has been set.
* To protect the hardware, the inverter starts up only at voltages < 950 V. ** Inverter efficiency. Transformer efficiency may vary.

Electrical data	Megawatt-Station
Input variables	
Max. recommended PV generator power	1200 kW
MPP range	550 V ... 830 V
No-load voltage	1 000 V*
Max. input current	2 x 1091 A
Ripple voltage	< 3 %
Ripple current	< 4 %
Output variables	
Rated power	1 000 kVA
Line voltage	acc. to local requirements
Line current	28.9 A
Rated frequency	50 Hz / 60 Hz
cos phi	0.80 inductive ... 0.80 capacitive
Distortion factor	< 3 % at rated output power
General electrical data	
Max. efficiency	98.5 %**
European efficiency	98.2 %**
Consumption	< 1 % of rated output power
Standby consumption	< 220 W
Auxiliary power supply	230 V
Grid monitoring	acc. to local requirements
Mechanical data	
Display	TFT LCD Touchscreen
Interfaces	2 x RS485 / Ethernet / USB 4 x analog input 1 x digital input 1 x S0 input 1 x digital output 1 x S0 output SD card
Ambient temperature	-20 °C ... +50 °C
Cooling	fan (max. 13 320 m³/h)
EMC	acc. to EN 61000-6-2 / EN 61000-6-4
CE-conformity	yes
H x W x D	3 320 x 5 380 x 2 980 mm
Weight	approx. 35 t

Conform to the country-specific standards and regulations according to what country version has been set.
* To protect the hardware, the inverter starts up only at voltages < 950 V. ** Inverter efficiency. Transformer efficiency may vary.

KACO Maximizer



The KACO Maximizer powered by Tigo.

KACO Maximizer ES | EP | MMU.

The KACO Maximizer system consists of two main components: the Maximizer, a electronic component which is mounted directly on the module, and the Maximizer Management Unit, which represents the higher-level intelligence of the system.

The KACO Maximizer optimises the output power for each module, delivers all the relevant operating data for each module in real time, and allows you to disconnect each module for safe installation, maintenance, or when fighting a fire. All standard plug connectors can be used to connect the Maximizer and the module.

The Maximizer Management Unit (MMU) communicates with all of the module Maximizers (wirelessly), controls all processes in real time, and sends the operating data to an external server. This sums up to an online system monitoring for any number of users.

The yield-increasing principle of the system is based on intelligent impedance

adjustment for the output of each individual module, so that the best possible performance for the entire string is achieved even when the respective output powers are mismatched.

Depending on the size of the PV-plant a Maximizer system normally contains one MMU. For bigger PV-plants additional MMUs might be necessary. The MMU has a manual operating interface and a liquid crystal display, which is mounted in a housing (with protection rating IP65) for on-site programming. The MMU is mounted next to the inverter and communicates with each PV module in the system via the Maximizer. It provides management and control functions for the module Maximizers and serves as an interface to the data centre. The MMU is preconfigured with a CAT-5 Ethernet connection. It contains the PV safe switch – a unique, local safety function which is located on the front side of the MMU. If maintenance is to be performed or in the event of an emergency, the operator or emergency personnel can press this

button to disconnect all modules on-site (patent pending). PV Safe allows you to electrically disconnect each module from the string, thereby limiting the risk of electric shock, since only the no-load voltage of a single module is present (at the most). This function can be activated with the on-site safety switch or from an external control console. There is no danger of high voltages when then system is being installed or maintained or in the event that a fire on the system must be extinguished.

Fast, external access to the data of the MMU is possible from any computer that has an Internet connection. This allows installers, operators or emergency personnel to view all of the system data. Easy-to-read graphics allows for quick analysis of real time output and the power of the individual system that is behind it. They also help you to see and fix system failures, error codes, or warning messages.

Technical data

KACO Maximizer ES50 | ES75 | ES110 | ES170

Electrical Data	ES50	ES75	ES110	ES170	2ES50
Input Levels					
Max. power	300 W	350 W	300 W	300 W	300 W
Max. DC input voltage	52 V	75 V	110 V	170 V	52 V
Vmpp range*	16 V ... 48 V	30 V ... 65 V	30 V ... 89 V	30 V ... 140 V	16 V ... 48 V
Max. input current	10.0 A	7.5 A	5.0 A	3.0 A	10,0 A
Output Levels					
Max. output power	300 W	350 W	300 W	300 W	600 W
Max. direct current	9.5 A	6.5 A	4.7 A	2.6 A	9,5 A
Nominal voltage	variable	variable	variable	variable	variable
Mechanical Data					
Ambient temperature	-30 °C ... +70 °C				
Cooling	Free convection				
Protection rating	IP65, NEMA3R				

*Vmpp = Voltage at maximum power

KACO Maximizer EP35 | EP45 | EP65

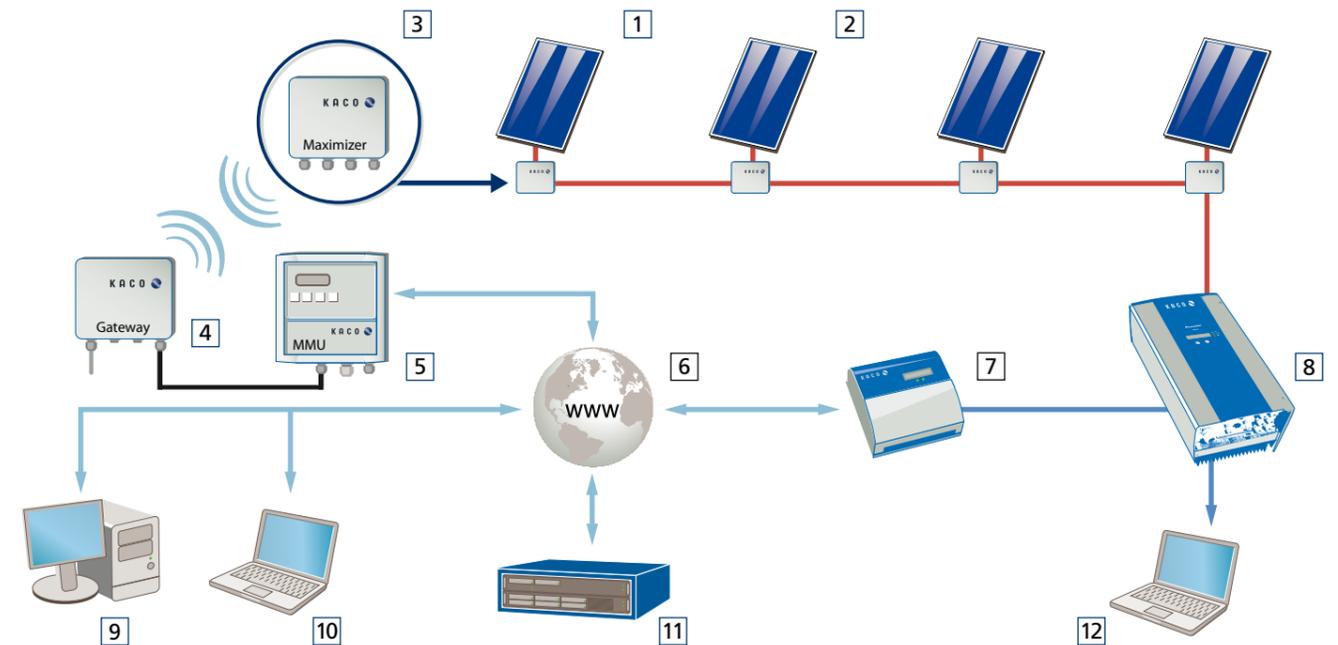
Electrical Data	EP35	EP45	EP65
Input Levels			
Max. power	200 W	200 W	200 W
Max. DC input voltage	55 V	54 V	60 V
Vmpp range*	28 V ... 42 V	39 V ... 54 V	53 V ... 60 V
Max. input current	6.5 A	5.0 A	4.0 A
Output Levels			
Max. output power	200 W	200 W	200 W
Max. direct current	0.55 A	0.55 A	0.55 A
Nominal voltage	375 V (+/- 1%)	375 V (+/- 1%)	375 V (+/- 1%)
Mechanical Data			
Ambient temperature	-30 °C ... +70 °C	-30 °C ... +70 °C	-30 °C ... +70 °C
Cooling	Free convection	Free convection	Free convection
Protection rating	IP65, NEMA3R	IP65, NEMA3R	IP65, NEMA3R

*Vmpp = Voltage at maximum power

KACO Maximizer Management Unit MMU

Electrical Data	MMU
Electrical specification	One MMU supports up to 360 module Maximizers (system-dependent)
Communication (MMU to Maximizer)	Wireless (1 Gateway for 60 Maximizer)
Communication (MMU to data centre)	Ethernet
Mechanical Data	
Ambient temperature	0 °C ... +70 °C
H x W x D	245 x 150 x 80 mm
Weight	1000 g

Maximizer diagram



- 1 2 PV modules with differing output power (mismatch)
- 3 The KACO Maximizer guarantees an optimum energy yield. It records the data for each module and transfers this data to the management unit.
- 4 The gateway receives and transmits all operating data of the Maximizer. It forms the communication interface between the Maximizer and the management unit.
- 5 The management unit is the heart of the KACO Maximizer system. It provides the communication link between the Maximizers and the inverter, as well as real-time process control, and it forwards the data to a remote server, which can also be used by multiple users to monitor the control system and interact with it.
- 6 Internet
- 7 Powador proLOG
- 8 KACO Powador inverter

- 9 10 Display for end consumer: Data analysis and monitoring
- 11 Data evaluation and data management
- 12 Display for technical personnel



KACO Maximizer

Stand-alone
inverters
KI 250
KI 1000
KI 2000



Top performance even in difficult situations.

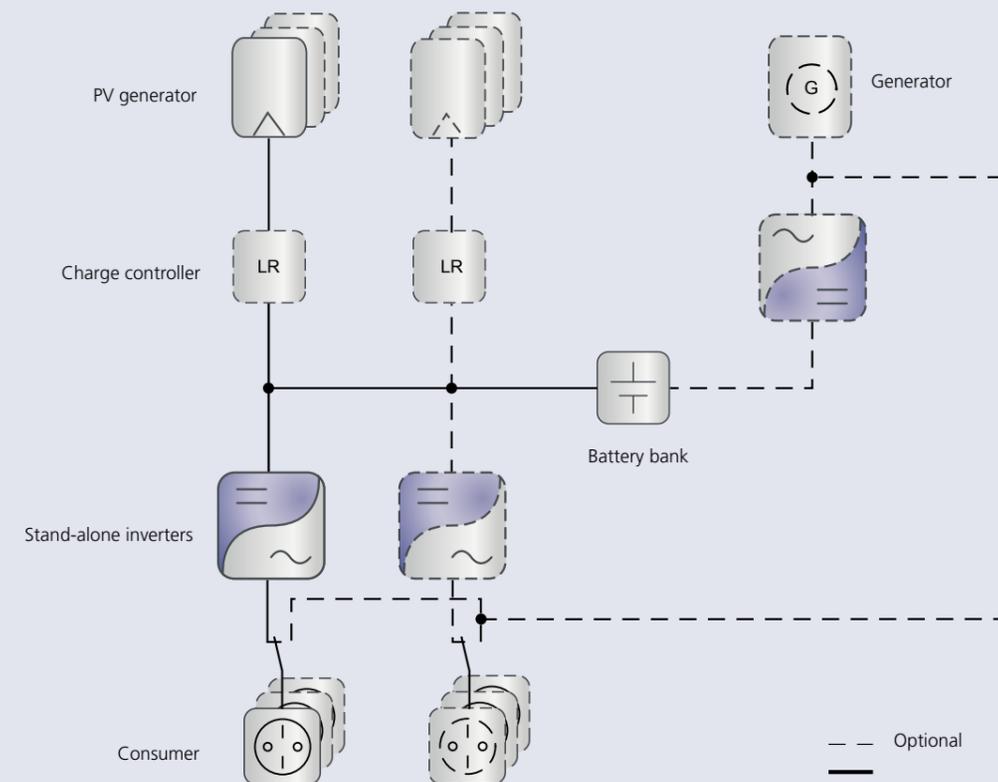
The stand-alone sine-wave inverters of the KI series.

The future belongs to decentralised power generation, especially in areas without a reliable public power grid. Stand-alone inverters allow local power grids to be formed in which any kind of AC consumer can be operated. The requirements placed on stand-alone inverters are high: conversion efficiency, high overload ability, tolerance to fluctuations in battery voltage and an economical operating state ... None of this is a problem for our KI series stand-alone inverters! They supply power independently under extreme conditions in areas remote from the grid.

The KI series consists of galvanically isolated units with MOSFET semiconductors. They convert the DC voltage (e.g. 12 V, 24 V or 48 V) of a battery into AC voltage with 230 V / 50 Hz or 100 V / 60 Hz. You can even run sensitive electronics like energy-saving light bulbs or laptops with them. Using our stand-alone inverter is often more economical than purchasing low performance 12 V DC units. Caution: solutions with "modified sinusoidal voltage" (trapezoidal or triangle form) or square wave voltage can even damage sensitive appliances.

The schematic diagram shows the modularly expandable system of the DC coupling with an external or integrated charge regulator.

DC coupling with external charge controller

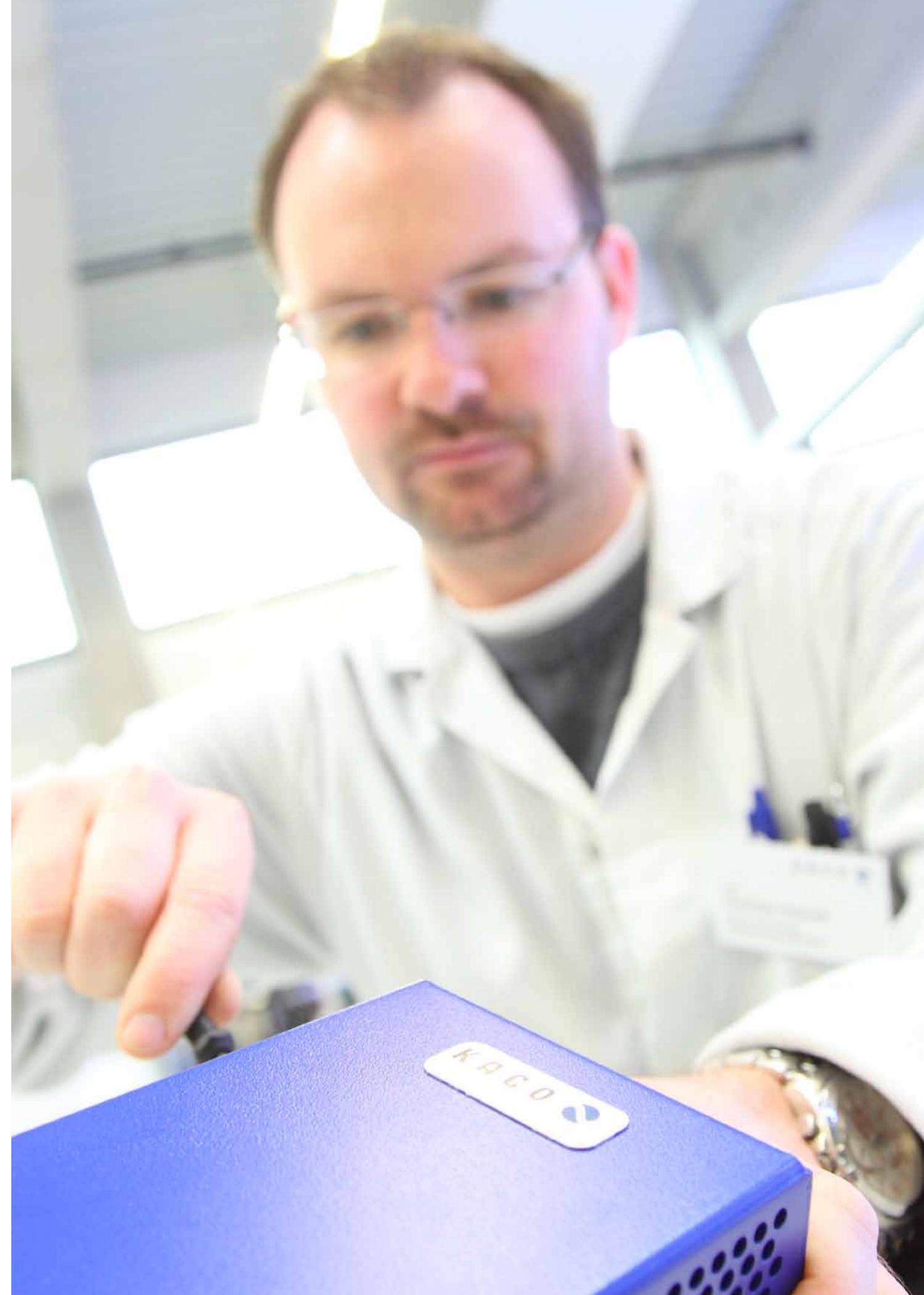


Technical data

Stand alone inverters KI 250 | KI 1000 | KI 2000

Electrical data	KI 250	KI 1000	KI 2000
Input variables			
Input voltage	12 V	12 V / 24 V**	24 V / 48 V**
Over and undervoltage shutdown	-15 % ... +35 %	-15 % ... +35 %	-15 % ... +35 %
Max. input voltage	+50 %	+50 %	+50 %
Output variables			
Rated power	0.2 kW / kVA*	0.8 kW / kVA*	1.6 kW / kVA*
Rated power 30 min	0.25 kW / kVA*	1.0 kW / kVA*	2.0 kW / kVA*
Rated power 5 min	0.36 kW / kVA*	1.3 kW / kVA*	2.88 kW / kVA*
Peak power 5 sec	0.46 kW / kVA*	2.2 kW / kVA*	4.8 kW / kVA*
Current limit	electronically regulated	electronically regulated	electronically regulated
Output voltage	230 V / 115 V**	230 V / 115 V**	230 V / 115 V**
Type of output voltage	sinusoidal voltage, galvanically isolated between input and output	sinusoidal voltage, galvanically isolated between input and output	sinusoidal voltage, galvanically isolated between input and output
Safety shutdown	0.7 kW	2.8 kW	5.6 kW
Rated frequency	50 Hz / 60 Hz**	50 Hz / 60 Hz**	50 Hz / 60 Hz **
cos phi	every value is allowed	every value is allowed	every value is allowed
Distortion factor at rated power	< 3 %	< 3 %	< 3 %
General electrical data			
Max. efficiency	91 %	93 %	94 %
Rated efficiency	80 %	88 %	91 %
Internal consumption: Standby	0.5 W	1.0 W	1.0 W
Internal consumption: No-load	2.0 W	10 W	20 W
Load-dependent starting and shutdown	approx. 15 VA	> 10 VA adjustable	> 10 VA adjustable
Standards	EN60950, EN55014, EN61000-6-3, EN61000-3-2, EN55022	EN60950, EN55014, EN61000-6-3, EN61000-3-2, EN55022	EN60950, EN55014, EN61000-6-3, EN61000-3-2, EN55022
Mechanical data			
Displays	LED	LCD	LCD
Interfaces (remote starting, status messages)	-	optional	optional
Connections	cable	cable	cable
Ambient temperature	-15 °C ... +60 °C***	-15 °C ... +60 °C***	-15 °C ... +60 °C***
Cooling	temperature-controlled fan	temperature-controlled fan	temperature-controlled fan
Protection class	IP20	IP20	IP20
H x W x D	130 x 88 x 216 mm	274 x 125 x 354 mm	274 x 125 x 454 mm
Weight	3.3 kg	15 kg	23 kg
Integrated charge regulator / charge current	optional / 15 A	optional / 30 A	optional / 30 A

* in environments up to 30 °C / ** different inverter types / *** Power derating at high ambient temperatures



Powador-gridsave



Storing energy. Managing energy.

Solar independence with the Powador-gridsave system.

Complete solar power supply – flexible and reliable

Now nothing stands in the way of environmentally friendly solar power that is available around the clock. The Powador-gridsave stores solar power during the day and makes it available for later use. Thus, the Powador-gridsave closes the time gap between power generation and power consumption.

The Powador-gridsave is an energy storage system that is suitable for integration in both new and existing photovoltaic

plants. It combines the battery, controller and of the photovoltaic plant into one compact system.

Independence from the grid

A stable supply of power is taken for granted, but local power failures throughout Europe, including Germany, cannot be ruled out. Conventional grid-connected photovoltaic plants cannot guarantee a reliable supply of power at the present time, since feed-in inverters are immediately disconnected from the grid for safety reasons when there is a

power failure. Integrating the Powador-gridsave in a grid-connected system remedies this situation. The grid-connected photovoltaic plant is turned into a solar-fed energy centre: In case of a power failure, the energy management system (EMS) switches to standalone mode and disconnects the in-house grid from the public power grid. The photovoltaic plant and the Powador-gridsave are now used as an energy source that can directly supply power to electrical devices or charge batteries.

Features of the Powador-gridsave

- Modern lithium-ion batteries allow it to feed the current that is generated by the PV plant into the in-house grid.
- It combines the battery, controller and inverter of the PV plant into a single compact unit.
- It lets you increase the personal consumption of solar power for a single-family home from the current maximum level of 30% to approximately 70%.
- It has an integrated, intelligent energy management system.
- In the event of a public grid failure, it becomes a solar emergency power supply.

Technical Data

Powador-gridsave

Input variables	
Max. recommended PV generator power	7,7 kW
MPP range	350 V ... 600 V
Non-load voltage	800 V
Max. input current	19,0 A
Number of strings / MPP trackers	2
Number of MPP trackers	1
Polarity safeguard	short-circuit diode
Battery sizes	
Type	lithium-ion
Rated current	69 A
Battery voltage	48 V
Capacity / component*	1.35 kWh - 6.75 kWh, 1-5 battery units
Cycles*	4,000 (with 100 % discharge depth)
Service life	15 years
Output variables	
Rated output / peak output	6,4 kVA / 7 kVA
Line voltage	190 V ... 264 V
Rated current	27,8 A
Rated frequency	50 Hz
cos-phi	0,80 inductive ... 0,8 capacitive (feed-in)
Number of feed-in phases / connection-phases	1/3
Emergency mode **	supply of 3 connection-phases
General electrical data	
Grid monitoring in feed-in mode	VDE V 0126-1-1:2006+E A1:2011, VDE AR-N 4105, BDEW-MSR-conforming
Mechanical data	
Display	LCD touchscreen
Interfaces	RS485 / ModBus, Sym-Bus, Ethernet, USB, digital inputs/outputs
Ambient temperature	0 °C ... +40 °C
Temperature monitoring	temperature-dependent impedance matching with shutdown if the temperature is too high
Connections for DC PV	2 strings via spring-type terminals (max. cross section: 6 mm ²)
AC connections	via spring-type terminals (max. cross section: 16 mm ² , house- and public grid connection)
Cable connection	via cable feed through system
Cooling	active cooling
Protection class	IP54
DC switch	integrated
Housing	aluminium
H x W x D	complete system 1600 x 600 x 600 mm
Weight	200 kg in standard model

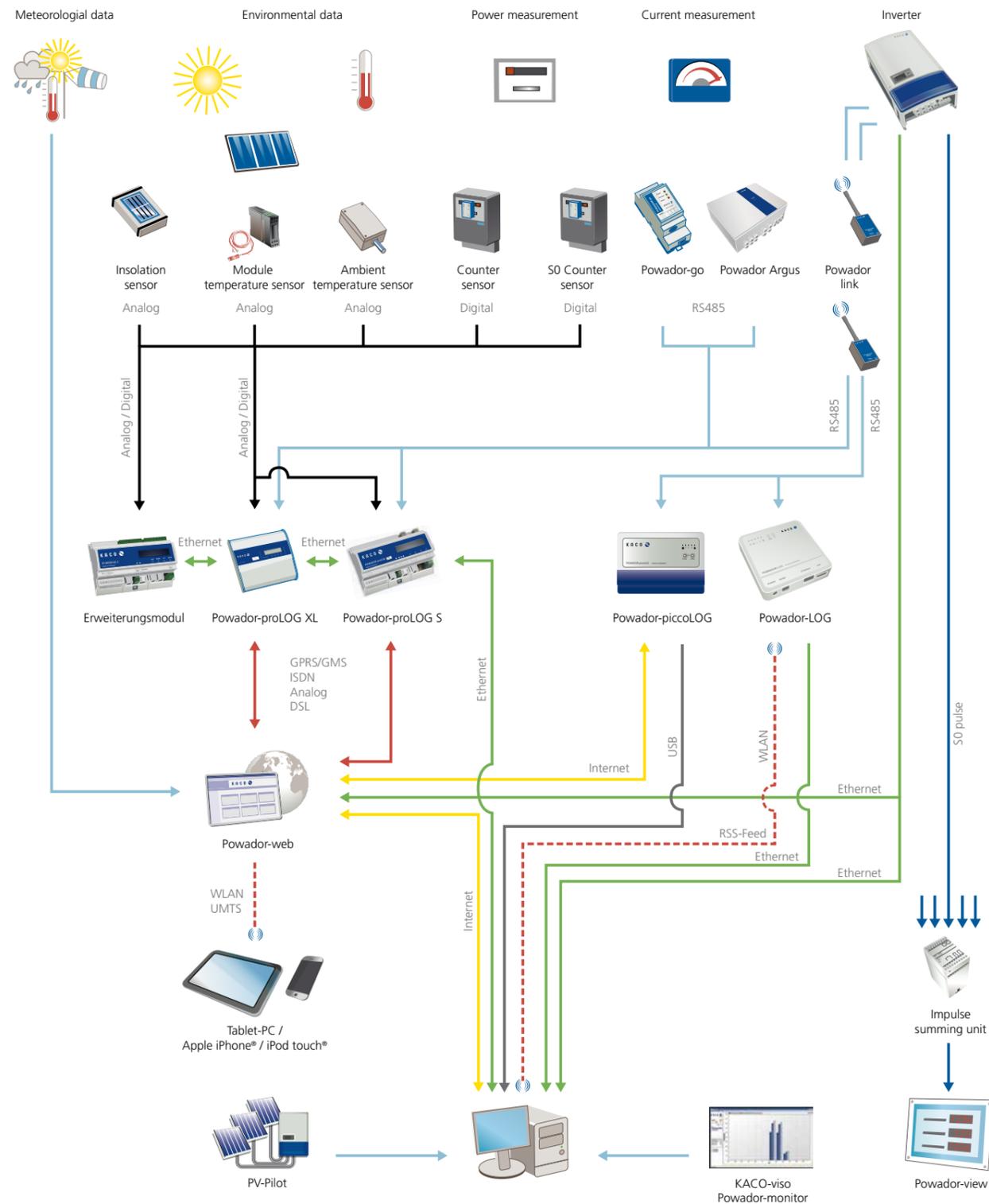
* Depending on battery type / ** without 120° phase shift



 88-99

Monitoring and Software

- 90 Monitoring in all situations
- 92 Powador-proLOG
- 96 Powador-piccoLOG
- 98 Powador Argus



Monitoring in all situations.

A summary of symbols.

The buyer of a photovoltaic system wants to be sure that the system produces the maximum electrical current yield when operating optimally. Long-lasting and reliable. Whether you keep an eye on a small system at home or want to control an entire solar park from afar, you can master any situation with KACO new energy data loggers and accessories.

We will be glad to help you put together a customised solution so that you can immediately start keeping an eye on your yields. The following symbols should make it easier to get an overview of the features of our products:

	The number "X" stands for the maximum number of inverters to be monitored		Energy counter		Connection by modem		Recording of the module temperature
	Maximum system size		Recording of energy using counter sensor		Compatible with Mac OS X, Windows and Linux		Recording of the ambient temperature
	RS485 interface		Contact		GSM/GPRS		Calculation of irradiance
	Number of analogue and digital inputs		Powador-view		Alarm		Recording of the wind speed and direction
	Number of analogue and digital inputs		LAN connection via Ethernet		String monitoring		

Powador-proLOG.

The professional data logger for every application.



The Powador-proLOG is a data logger that provides extensive options for local and remote monitoring on the PC. It records the currents, voltages, temperatures, power outputs and yields of every individual inverter. External sensors can also be connected to it. The stored system data is transmitted every day to an e-mail address of your choice as a text file. The data logger also automatically reports by e-mail, fax or SMS if the system exits the operating states specified by the user. The alarm parameters can be customised to fit the technical properties of the system perfectly.

The current measured values can be viewed at any time via the PC. They can be viewed using either the free Powador-monitor software, which enables you to graphically display system data, or the Powador-web Internet portal, which enables you to access system data from anywhere around the world. The Powador-web provides the user with extensive data on the past and current performance of the PV system and offers the option of using alarm notification.

Powador-proLOG S

- For systems of up to max. 50 kWp

Powador-proLOG M | XL

- Max. 31 Powador inverters

Highlights

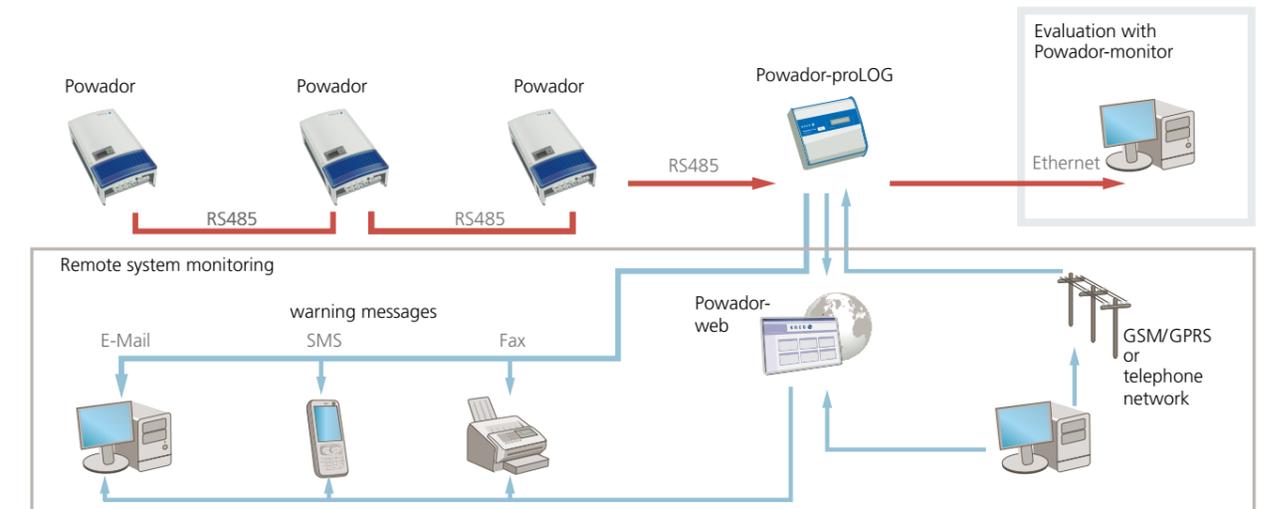
- All units with Ethernet, RS485 and display
- Configuration via web browser
- Independent of operating system
- Installation wizard
- Saving interval: 5-60 minutes
- 128 MB data storage/ring buffer 1 year
- Data transmission via e-mail
- Display of measured data (text)
- Graphical display with Powador-monitor
- Graphical display and alarm notification with Powador-web (optional)



Electrical Data	Powador-proLOG S	Powador-proLOG M XL
Input Levels		
Power supply AC	230 V/50 Hz	230 V/50 Hz
Max. power consumption	7.5 W	9.0 W
Analogue inputs (configurable)	0 V to 10 V 0 mA to 20 mA PT 1000 resistance measurement	0 V to 10 V 0 mA to 20 mA PT 1000 resistance measurement
Digital inputs	low = 0 V to 7 V high = 9 V to 24 V	low = 0 V to 7 V high = 9 V to 24 V
Output Levels		
Digital output S0	70 V/50 mA (optocoupler)	70 V/50 mA (optocoupler)
Internal battery (internal clock)	Lithium cell/type Li2032	Lithium cell/type Li2032
Mechanical Data		
H x W x D	110 x 160 x 63 mm	217 x 220 x 87 mm
Mounting	Top hat rail/wall	Wall
Protection rating	IP20	IP21
Weight	436 g	900 g
Ambient Temperature		
Operation	0 °C to +55 °C	0 °C to +55 °C
Storage and shipment	-22 °C to +65 °C	-22 °C to +65 °C

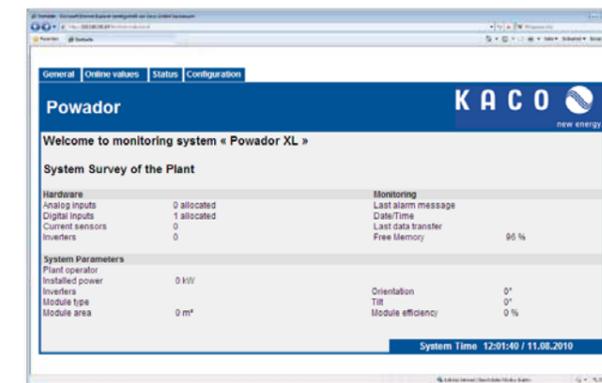
Powador-proLOG.

Functional diagram for system monitoring.

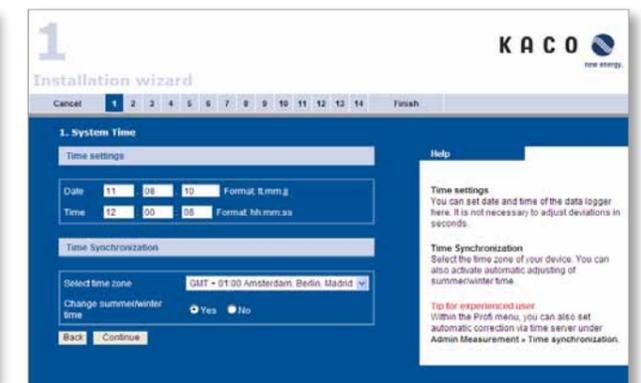


Configuration | Online Values

Powador-proLOG web server



Profi page



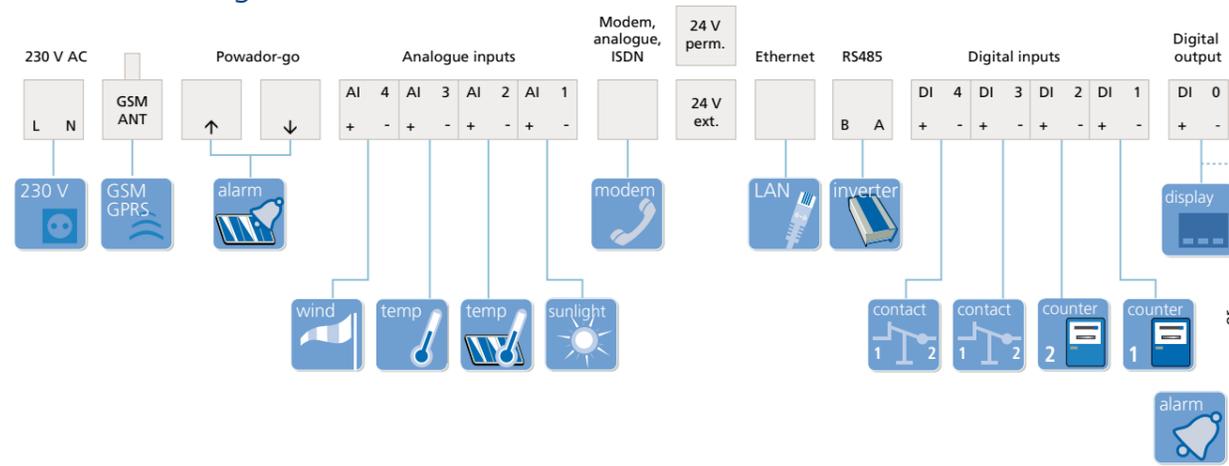
Installation wizard

Alarm notification options of the Powador-proLOG

Version	Direct connection: PC to Powador-proLOG	Alarm notification via	Special feature
Ethernet	PC with network card	E-mail	You must be able to send e-mail messages over the network.
Analogue	PC with analogue modem	E-mail/SMS/Fax	
ISDN	PC with ISDN modem	E-mail/SMS	Connect to telephone system or directly to the S0 interface (NTBA)
GSM/GPRS	PC with GSM modem	E-mail/SMS/Fax	GPRS data card available from KACO new energy

Powador-proLOG.

Connection diagram.



Overview of features for all models

Overview of Features	Powador-proLOG S	Powador-proLOG M	Powador-proLOG XL
Variants	1. Ethernet/DSL 2. Analogue	1. Ethernet/DSL	1. Ethernet/DSL 2. Analogue 3. ISDN 4. GSM/GPRS
Access to Powador proLOG data via	Ethernet Dial-up (modem) Compact Flash card reader (CF)	Ethernet Compact Flash card reader (CF)	Ethernet Dial-up (modem) Compact Flash card reader (CF)
Inverter interface	RS485	RS485	RS485
Number of inverters/ 25–33000xi and Park	31 (50 kWp)	31/10	31/10
Inverter address range	1 to 32	1 to 32	1 to 32
Number of Powador-go units that can be connected	100	100	100
Powador-go address range	0 to 99	0 to 99	0 to 99
Analogue inputs	1	1	4
Digital inputs	1	1	4
Alarm or SO output	1	1	1
Displays on unit	4 LEDs Display with 2 x 16 characters	4 LEDs Display with 2 x 16 characters	4 LEDs Display with 2 x 16 characters
Integrated power supply (230 V/24 V)	Yes	Yes	Yes
Storage medium	Compact Flash: 128 MB	Compact Flash: 128 MB	Compact Flash: 128 MB
Saving interval	5-60 minutes	5-60 minutes	5-60 minutes
Software needed for configuration	Any web browser	Any web browser	Any web browser
Software for local evaluation	Powador-monitor	Powador-monitor	Powador-monitor
Evaluation and alarm notification	Powador-web	Powador-web	Powador-web



Powador-piccoLOG.

The auto-learning data logger system.



This monitoring and control unit is suitable for photovoltaic systems from 1 to 15 kWp and for a maximum of three inverters. The data logger is easy to configure and commission. The Powador-piccoLOG uses an intelligent algorithm to detect faults and deviations from normal operation during run time and provides operator information with the integrated status lights. Acoustic alarms can also be set. The fault memory can be read out for analysis and configuration with a USB connection to a computer. The unit can be connected to the internet over Ethernet for convenient evaluation and analysis of operating data in the Powador-web Public internet portal. The Powador-piccoLOG with its digital-in interface and the power control function enables implementation of power control in accordance with the latest revision of the German Renewable Energy Act (EEG 2012). This reduces the possibility of yield losses resulting from inverter restriction to 70% of the installed DC power.

Features

- Records system production
- Intelligent algorithm, which also detects partial system failures
- Visual and acoustic fault alarms
- Graphical evaluation in the Powador-web Public portal
- Detailed operational guidance possible with the Powador-web Profi portal

Benefits

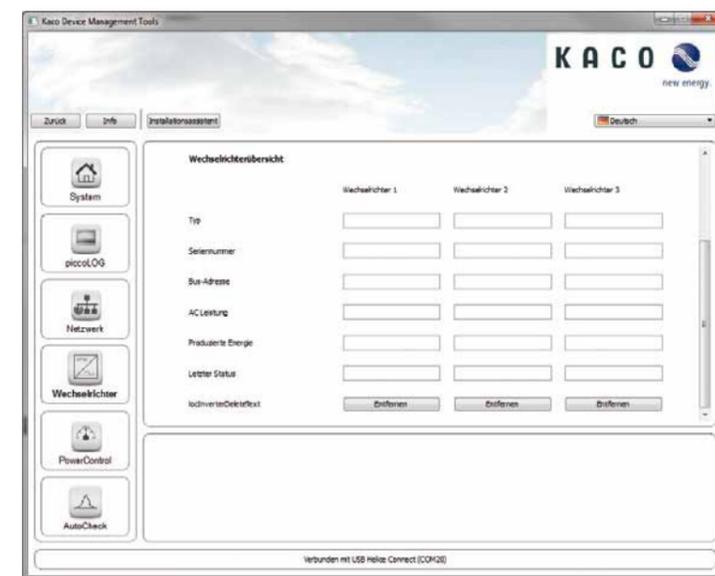
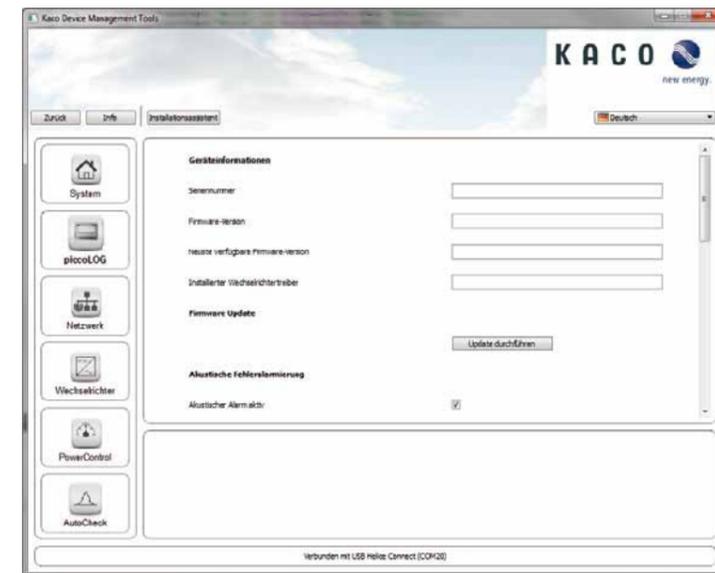
- Economical base package
- Very easily commissioned
- Automatic fault detection
- Also usable locally without internet connection
- Yield assured with data analysis in the Powador-web portals

Powador-web Public

- Clear, up-to-the-minute view of yield and environmental information
- Performance evaluation for fast yield monitoring
- Can be integrated into public internet sites and social networks
- Customisable view

Highlights

- Flexible application
- Records inverter and system data
- Auto-learning algorithm for automatic fault detection
- Comprehensive evaluation and visualisation with the Powador-web (optional)
- Economical monitoring of small systems



Electrical Data	Powador-piccoLOG
Input	1 x RS485/RS422 2 x RS232 1 x Digital-In (4 digital inputs) Ethernet Micro-USB
Supply voltage	DC 24 V
Power consumption	typically 1 W, max. 9,2 W
Bus termination	integrated (cannot be switched off)
Mechanical Data	
Ambient temperature	0 °C ... +55 °C
Protection rating	IP21
H x W x D	107 x 152 x 37 mm
Weight	203 g

Powador Argus.

Intelligence in a box.

For connecting large solar fields to our central inverters, we recommend the use of an “intelligent” generator junction box (GJB) – our Powador Argus string monitoring box. Versions 16S DCS and 24S DCS make ideal companions to Powador XP series central inverters. This is the ideal companion to Powador XP series central inverters and is available in several versions to meet the requirements.

With the Argus, the PV generator can be monitored in detail, faults are detected and are directly evaluated using the Powador-proLOG. Of course, the string fuse and overvoltage protector are included. Yet another feature: the string current can be read directly in the box. Field use has shown that the dimensions of DC lines can vary greatly due to the long cable lengths in systems with central inverters in the upper power range. Thus, the integrated bolt terminals provide universal connection options for various cable diameters. The communication

line is connected using spring terminals. All cable connections are located on the underside of the unit and ensure that neither dirt nor moisture can enter, even if the unit is installed improperly.

Highlights

- Separate monitoring for each string
- For 16 or 24 strings
- Overvoltage Protection
- DC switch integrated
- Steel housing (IP65)



Technical data

Powador Argus 16S DCS | 24S DCS

Electrical data	Argus 16S DCS	Argus 24S DCS
Max. input voltage	1 000 V	1 000 V
Number of DC inputs	16	24
String current with a fuse size of 8 A	max. 5.2 A	max. 5.2 A
String current with a fuse size of 10 A	5.3 A – 6.4 A	5.3 A – 6.4 A
String current with a fuse size of 12 A	6.5 A – 7.7 A	6.5 A – 7.7 A
String current with a fuse size of 15 A	7.8 A – 9.6 A	7.8 A – 9.6 A
String current with a fuse size of 20 A	9.7 A – 12.8 A	9.7 A – 12.8 A
Max. output current	256 A	384 A
Auxiliary power supply	24 V DC*	24 V DC*
Power consumption	250 mA	325 mA
Interface	RS485	RS485
DC surge arrester	Type 2 / II	Type 2 / II
Connections		
String connection +	Screw terminals up to 16 mm ² M40 cable fitting with sealing insert for multiple cables	Screw terminals up to 16 mm ² M40 cable fitting with sealing insert for multiple cables
String connection –	Spring terminals no larger than 16 mm ² M40 cable fitting with sealing insert for multiple cables	Spring terminals no larger than 16 mm ² M40 cable fitting with sealing insert for multiple cables
DC connection to the inverter	Bolt terminals M12 connection no larger than 240 mm ² M50 cable fitting	Bolt terminals M12 connection no larger than 240 mm ² M50 cable fitting
RS485 and auxiliary power supply	Spring terminals no larger than 2.5 mm ² M20/25 cable fitting	Spring terminals no larger than 2.5 mm ² M20/25 cable fitting
Earth connection	Protective earth terminal no larger than 16 mm ² M20 cable fitting	Protective earth terminal no larger than 16 mm ² M20 cable fitting
DC switch	2	3
Mechanical data		
Permitted ambient temperature	-25 °C ... +40 °C	-25 °C ... +40 °C
Relative humidity (non-condensing)	15 % ... 95 %	15 % ... 95 %
Protection rating according to EN 60529	IP65	IP65
W x H x D	approx. 800 x 600 x 300 mm	approx. 800 x 600 x 300 mm
Weight	approx. 38 kg	approx. 40 kg

* External power supply is required, stabilised, +/- 10% on Powador Argus. Also available with DC negative fuse.



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References

102 References

106 Publication details

Residential systems.



Hanover, Germany

Plant size: 21.24 kW
 Inverter: Powador 12.0 TL3
 Commissioning: 2011



Hardthausen, Germany

Plant size: 14.85 kW
 Inverter: Powador 3600xi, Powador 5000xi
 Commissioning: 2010



Pfaffenhofen, Germany

Plant size: 8.65 kW
 Inverter: Powador 3600xi
 Commissioning: 2010



St. Petersburg (Florida), USA

Plant size: 4.0 kW
 Inverter: blueplanet 3601xi
 Commissioning: 2008



Billigheim, Germany

Plant size: 9.4 kW
 Inverter: Powador 10.0 TL3
 Commissioning: 2011

Large scale systems.



Monti di Eboly, Italy

Plant size: 24 MW
 Inverter: 72 x Powador XP350-HV TL
 Commissioning: 2012



Quintanar del Rey, Spain

Plant size: 1.9 MW
 Inverter: 19 x Powador XP100-HV
 Commissioning: 2008



Negev desert, Israel

Plant size: 2.0 MW
 Inverter: 250 x Powador 8000xi
 Commissioning: 2010



San Floro, Italy

Plant size: 23,8 MW
 Inverter: 633 x Powador 39.0 TL3
 Commissioning: 2012



Stribro, Czech Republic

Plant size: 13.6 MW
 Inverter: 12 x Powador Megawatt-Station
 Commissioning: 2009



Lechstedt, Germany

Plant size: 1.0 MW
 Inverter: 1 x Powador Megawatt-Station
 Commissioning: 2011



Berga, Germany

Plant size: 12.0 MW
 Inverter: 12 x Powador Megawatt-Station
 Commissioning: 2010

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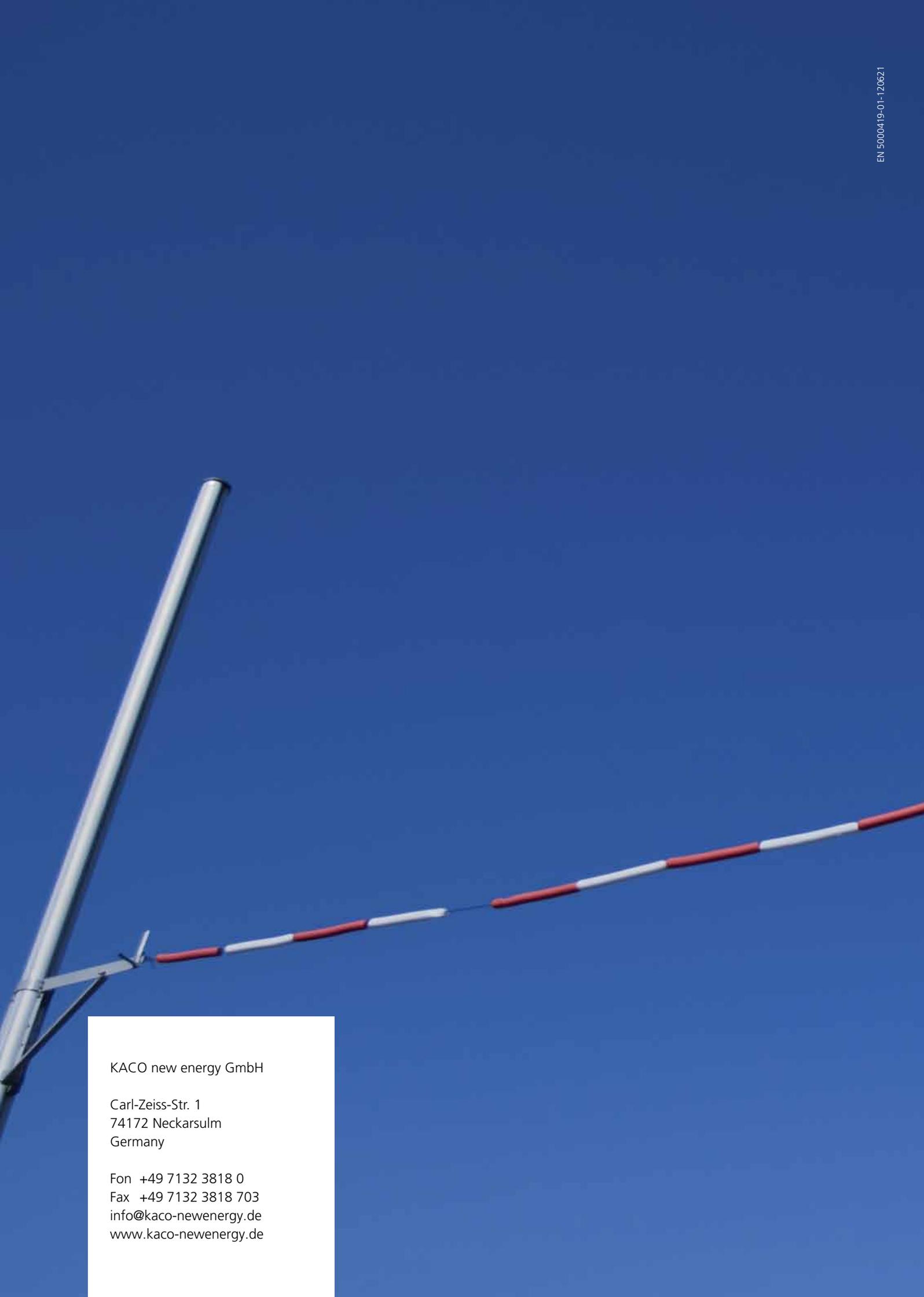
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