ADVANCED ENERGY®

PHOTOVOLTAIC PRODUCT RANGE

Inverters – Accessories – Services

English Version 2014

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Photovoltaic product range
2014

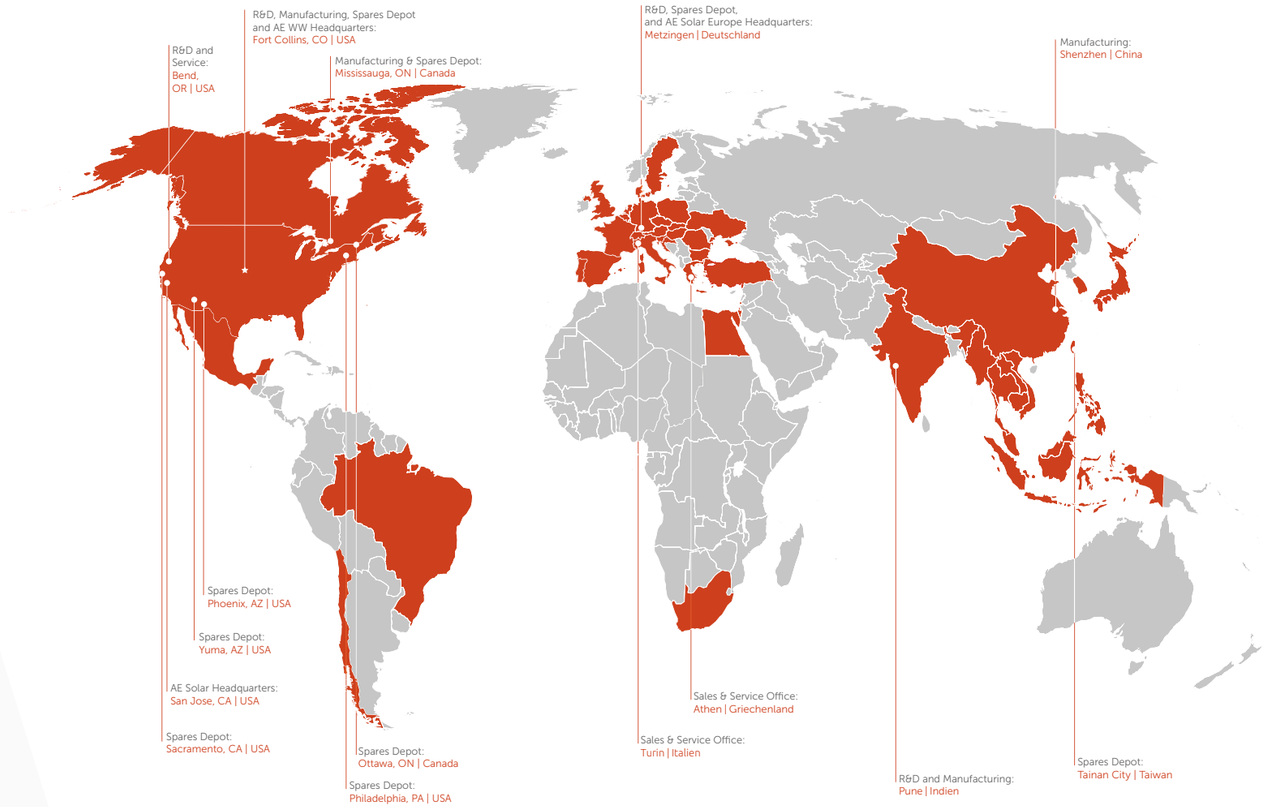
FORMED FOR THE FUTURE

Advanced Energy has been active in the energy generation market for over 30 years and is now one of the most important manufacturers of photovoltaic inverters in the world.

Our portfolio of string and central inverters covers all performance classes of photovoltaics – from 8 kW to 2 MW. Today, our products can be found in solar power systems and solar parks all over the world. Our wide range of accessories offers a whole range of expansion possibilities, for example in monitoring, analysis, system architecture, feed-in management, and grid security. With a peak efficiency of up to 98.7 %, Advanced Energy inverters are among the most efficient on the market. This is due to the sophisticated UltraEta® topology. It guarantees our customers optimal yields.

Advanced Energy is a highly innovative company in which a host of specialists work together interdisciplinarily. In addition, thanks to our size, we have sufficient financial means available to us to promote R&D. That puts us in a position not only to react to technological developments in photovoltaics, but also to guide development processes actively. We set the technological trends of tomorrow in the photovoltaic industry. Thanks to our global presence on all the important PV markets, we foster security and progress. Our products and services are available everywhere photovoltaic energy is produced – now and in the future.

Place your trust in the special combination of great ideas, market presence and a solidly formed structure. Trust Advanced Energy.



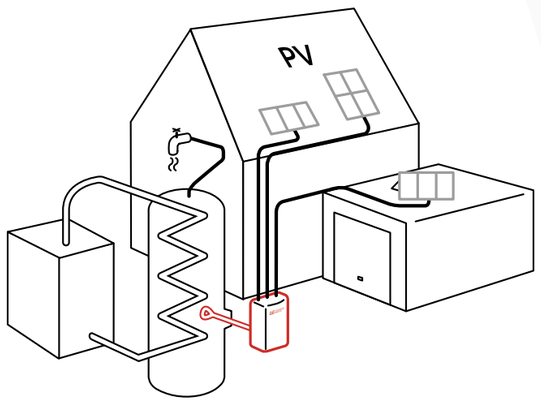
Range: Advanced Energy is there for you all over the world with subsidiaries, sales partners, and service partners.

AE PV Heater

Hot water from photovoltaics

- Cost-efficient
- Flexible
- Simple

The PV Heater uses the direct current produced by PV modules in a private home to heat the domestic hot water in heating systems. It boasts an efficiency grade of 99 % and saves hard cash. With the PV Heater a kilowatt hour of heat costs between 8 and 10 euro cents – which makes heat from the PV system cheaper than from an oil heating system. In addition, the heating system's CO_2 emissions are also lower, it does not use fossil fuels, and it is not tied to the price of oil. Six to twelve PV modules are sufficient for operating the PV Heater. The modules can even be aligned east to west or installed on facades. Extensive connection work is not required. No inverters, tubing, or similar is required. The only thing to do is to lay the cables. As the direct current voltage generated is only 50 V, you can even perform the connection yourself. There is no need to get to grips with bureaucracy, as the PV Heater is operated in your own home, completely independently of the grid. Energy efficiency was never so simple!



TECHNICAL DATA	AE PV Heater
Art. no.	401R1K5
ELECTRICAL DATA	
Recommended PV power, kWp	1.5 ... 2.7
Heating capacity, W	1,500
MPPT range, V	16 ... 40
DC start voltage, V	18
Max. voltage DC, V	50
Max. current DC, A	3 x 20 (over-configuration up to 30 A permitted)
Recommended module type	60, 66, or 72 cells, mono or poly
MPP trackers	3
Number of DC inputs	3 x spring terminals 2.5 ... 6 m^2
Max. efficiency, %	> 99
European efficiency, %	> 99
Production starting at, W	2
Self consumption in night operation, W	0
AMBIENT CONDITIONS	
Cooling	Natural convection
Ambient temperature, °C	-25 ... +50, derating 4 %/K up to 70 °C
Site altitude, m above sea level	4,000
Noise, dBA	< 35
STANDARDS AND APPROVALS	
Product standard	EN 60730-1:2011, EN 60730-2-11:2008
EMC	EN 61000-6-3, EN 61000-6-2
Internal overvoltage protection (EN 61643-11)	Type 3
Protection class	III (as per IEC 62103-1), protective extra-low voltage / PELV
Overvoltage category	DC: II (as per IEC 60664-1)
Certification, EC conformity	Current certificates can be found on our website
MANAGEMENT, COMMUNICATION	
Interfaces	6 status LEDs, Ethernet, 1 x inverter contact, (5 A, 30 VDC), digital input, 2 external PT1000 sensors
Monitoring	Integrated data logger, energy meter, AE SiteLink
Max. heating temperature (configurable), °C	Up to 80
Safety limit, °C	85
MECHANICAL DATA OF HOUSING	
Type of protection	IP21 as per EN 60529
Dimensions W x H x D, mm	210 x 235 x 90
Weight, kg	1.7
MECHANICAL DATA OF HEATING ELEMENT	
Material of heating element	High-quality nickel iron chrome alloy
Maximum operating pressure, bar	10
Unheated area, mm	100
Dimensions L x Ø, mm	400 x 40
Connection thread	1 1/2"
Fitting length, mm	14
Use	Drinking water, hot water
Weight, kg	1.0
ACCESSORIES	
External temperature sensor (Art. no. 34916)	3 m connection cable, PT1000

AE 3TL 8–23 kW

The new generation

- Future-proof
- Worldwide use
- Flexibly decentralized

The new generation is based on the successful platform which delivers maximum yields with no maintenance. Working hand-in-hand with our customers, we have further improved the devices, making them even more future-proof, user-friendly and reliable.

Whether you add accumulators in future, integrate the PV system in smart grids or the regulations change – the new software means you're well equipped for the future.

Plan and build your decentralized PV project flexibly. The simple layout can be rapidly multiplied, particularly with large systems. Partial systems connected to the grid during the construction phase provide early yields.

The devices are designed for worldwide use, with special versions for North America (UL version) and Japan (JP version). Even the most demanding requirements are met by our premium product, the AE 3TL 20-SCI. Thanks to silicon carbide technology, it achieves peak efficiency of 98.7 % and is ideal for high ambient temperatures.

Now with Sunclix DC connection technology: Permanently good contact with no special tools

- UL-version for North America available.
- JP-version for Japan available.

TECHNICAL DATA	AE 3TL 8	AE 3TL 10	AE 3TL 13	AE 3TL 17	AE 3TL 20	AE 3TL 23-MV
Art. Nr.	867R008.010	867R010.010	867R013.010	867R017.010	867R020.010	867R023.010
DC DATA						
Recommended max. PV power, kWp	9,9	12,0	15,6	20,4	24,0	27,6
MPPT range, V	370 ... 850	410 ... 850	480 ... 850	460 ... 850	490 ... 850	575 ... 850
DC start voltage, V	350	350	350	350	350	350
Max. voltage DC, V	1000	1000	1000	1000	1000	1000
Max. current DC, A	23,0	25,0	31,1	38,3	41,8	41
MPP trackers	1	1	1	1	1	1
Number of DC inputs	6 x Phoenix Sunclix®					
DC disconnection switch	Yes	Yes	Yes	Yes	Yes	Yes
AC DATA						
AC nominal power, kW	8,25	10,0	13,0	17,0	20,0	23,0
Max. apparent power, kVA	8,25	10,0	13,0	17,0	20,0	23,0
AC grid connection	L1, L2, L3, N, PE					
Nominal power factor / range	1 / 0,8i ... 0,8c					
Nominal voltage AC, V	400	400	400	400	400	460
Voltage range AC, V	320 ... 460	320 ... 460	320 ... 460	320 ... 460	320 ... 460	368 ... 529
Nominal frequency / frequency range, Hz	50, 60 / 45 ... 65					
Max. current AC, A	3 x 12	3 x 16	3 x 21	3 x 29,2	3 x 29,2	3 x 29,2
Max. THD, %	2,5	2,5	2,5	1,8	1,8	1,8
Max. efficiency, %	98,0	98,0	98,0	98,2	98,2	98,3
European efficiency, %	97,3	97,4	97,5	97,8	97,8	98,1
Feed-in starting at, W	20	20	20	20	20	20
Self consumption in night operation, W	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
CHARACTERISTICS						
Cooling	Natural convection					
Ambient temperature, °C	-25 ... +55	-25 ... +55	-25 ... +55	-25 ... +55	-25 ... +55	-25 ... +55
Relative ambient humidity, %	0 ... 100	0 ... 100	0 ... 100	0 ... 100	0 ... 100	0 ... 100
Site altitude	4000*	4000*	4000*	4000*	4000*	4000*
Noise, dBA	< 45	< 45	< 45	< 45	< 45	< 45
Internal overvoltage protection (EN 61643-11)	Type 3	Type 3	Type 3	Type 3	Type 3	Type 3
Protection class (IEC 62109)	I	I	I	I	I	I
Overvoltage category (EN 60664-1)	DC: II, AC: III	DC: II, AC: III	DC: II, AC: III	DC: II, AC: III	DC: II, AC: III	DC: II, AC: III
Environmental classification (IEC 721-3-4)	4K4H	4K4H	4K4H	4K4H	4K4H	4K4H
Certification, EC conformity	Current certificates can be found at http://www.advanced-energy.com/3TLcerts					
SZS or grid protection	Acc. to VDE 0126-1-1					
GENERAL DATA						
Interfaces	Ethernet, RS485, Einstrahlungs- und Temperatursensor					
Type of protection (IEC 60529)	IP65	IP65	IP65	IP65	IP65	IP65
Dimensions W x H x D, mm	535 x 601 x 277					
Weight, kg	38,4	38,4	38,4	38,4	38,4	38,4

* Derating der DC-Spannung beachten.

AE 3TL 40/46 kW

String inverter for large systems

- High return on investment
- Low weight
- Robust construction

Performance and reliability are what counts in large PV systems. The new string inverter AE 3TL 40/46 offers both. It is available in two performance classes: With 40 kW for 400 V AC voltage and with 46 kW for 460 V AC voltage. The AE 3TL complies with protection class IP65, is passively cooled and as such requires no maintenance – a reliable partner for decentralized outdoor concepts.

Both versions are equipped with Ultra-Eta topology. Even with partial loads, the efficiency of the AE 3TL is over 98 %. This speeds up the return on investment. 4-channel string monitoring and the integrated data logger allow you to keep track of yields at all times.

DC string fuses are already integrated in the DC connection box and the devices are light and handy despite their hefty advantages. This makes installation and operation very simple. We can also optionally fit the inverter with a DC overvoltage protection.

TECHNICAL DATA	AE 3TL 40	AE 3TL 46-MV
Art. no.	840R040.000	840R046.000
DC DATA		
MPPT range, V	490 ... 850	575 ... 850
Max. voltage DC, V	1,000	1,000
Max. operating current DC, A	84.0	82.0
MPP trackers	1	1
DC connection	4 x Plus, 4 x Minus Phoenix Sunclix®	4 x Plus, 4 x Minus Phoenix Sunclix®
String monitoring	4 measuring channels integrated	4 measuring channels integrated
AC DATA		
AC nominal power, kW	40.0	46.0
AC grid connection	L1, L2, L3, N, PE	L1, L2, L3, N, PE
Nominal power factor / range	1 / 0.8i ... 0.8c	1 / 0.8i ... 0.8c
Nominal voltage AC, V	400	460
Voltage range AC, V	320 ... 529	368 ... 529
Nominal frequency / frequency range, Hz	50, 60 / 45 ... 65	50, 60 / 45 ... 65
Max. current AC, A	3 x 59	3 x 59
Max. THD, %	< 3	< 3
Max. / Europ. efficiency, %	98.2 / 97.8	98.3 / 98.1
Self consumption in night operation, W	< 0.5	< 0.5
GENERAL DATA		
Interfaces	Ethernet, RS485, irradiation and temperature sensor, power supply to accessories, external switch-off	
Type of protection (IEC 60529)	IP65	IP65
Dimensions W x H x D, mm	760 x 820 x 300	760 x 820 x 300
Weight, kg	74	74
Cooling	Natural convection	Natural convection
Ambient temperature, °C	-25 ... +55	-25 ... +55
Relative ambient humidity, %	4 ... 100	4 ... 100
Site altitude, m above sea level	4,000*	4,000*
Noise, dBA	< 45	< 45
Certification, EC conformity	Current certificates can be found at http://www.advanced-energy.com/3TLcerts	
SZS or grid protection	Acc. to VDE 0126-1-1	Acc. to VDE 0126-1-1

AE CONNECTIONBOX	
Art. no.	934R210.1850
Dimensions W x H x D, mm	410 x 310 x 130
No. of string connections	12 x Plus, 12 x Minus
Max. current DC per 3 strings, A	32
DC connection type	Phoenix Sunclix®
DC connection diameter, mm^2	2.5 ... 6.0
String fuses	15 A (Plus)
Optional DC overvoltage protection	Cat II module
Weight approx., kg	5.0

* Pay attention to the max. DC voltage.

AE Utility Competence Center

Planning, components, systems for your success

Advanced Energy has many years of experience in the development of inverters and system accessories. In addition, we are also familiar with the practical aspects of system planning and system operation from many projects up into the two-figure MW range. Our experienced service technicians support you in all work phases of your project. Our precise planning allows us to cut the system, installation, maintenance and operating costs of PV systems. This allows you to benefit from higher energy yields, high investment safety and maximum cost-effectiveness.

AE is present in all the important PV markets in the world. We know the international standards and the statutory regulations of all the relevant markets. Our inverters comply with the grid feed-in standards in force in many countries. We are specially prepared for particular conditions. Our team reacts rapidly if inverters need to be configured individually or special documentation is required. We also analyze the requirements of the energy supplier and coordinate the park control system to them. On request, we can even accompany you right up to the commissioning on site.

The AE Utility Competence Center helps you to ensure that your PV project is a technological and economic success. We assess a PV project from a whole range of perspectives. With Advanced Energy Industries you are putting your trust in a sustainable and globally present partner, who can guarantee the problem-free operation of your PV system for many years to come. We will be happy to transfer our experience to you. Guarantee yourself the edge.

Contact us: +49 7123 969-102

Performance Spectrum System Solutions (UCC)

AE SiteLink

Online system monitoring

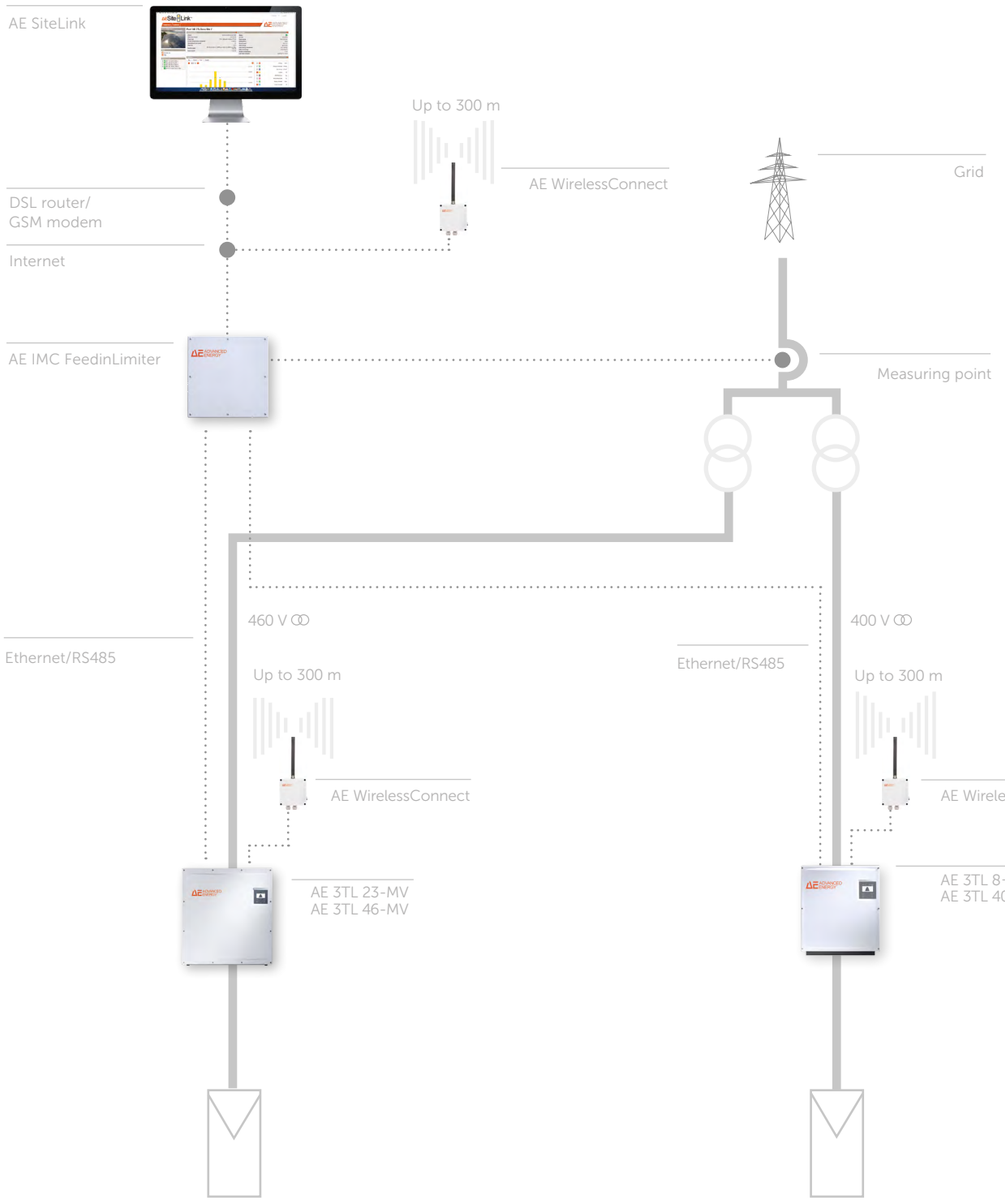
- Easy installation
- User-friendly analysis
- Secure data logging

It is a reassuring feeling to be able to see, whenever and wherever you are, how the yields of your own PV system are developing. The online monitoring solution AE SiteLink allows you to keep an eye on the data of your system irrespective of where you are at the present moment in time. Each AE inverter has an integrated data logger and can be connected to a local network or the Internet quickly and easily via plug&play. This allows you to access information about the productivity of your system at any time. By the way: the AE SiteLink app allows you to access all the data on your smartphone or tablet too.

www.aesitelink.com

TECHNICAL DATA	AE SiteLink
GENERAL	
Data-logger	Already integrated
PV plant installation	Plug&play installation via the use of a standard Ethernet network; optionally with AE WirelessConnect (300 m range)
Configuration of plants and sub-plants	Simple mounting of the inverters via unambiguous activation code, site data, system-specific data, system photo
Number of inverters	Unlimited
Administration	User and rights administration supported
Languages	EN, DE, IT, FR, ES, CZ, RO, GR, JP, RU, TR, NL, PO, HU, BG, KO, CN, TH with localized display of number formats, dates, etc.
Data dispatch	Automatic monitoring of functions
Protocol	TCP/IP
PERFORMANCE SPECTRUM	
Display of plant and inverter parameters	In clearly laid out lists for easier comparisons
Visualization of current parameter values per plant and per inverter	Total yields, daily yields (absolute and normalized), AC/DC power rating (absolute and normalized), AC/DC voltage, AC/DC current, AC frequency, device temperature, irradiation values, module temperature, performance ratio*
Graphic evaluation of the historical data	Day, month, year, and total sum view, display of relevant plant and inverter parameters, combination or various channels in one diagram using a freely configurable statistical view, Excel and PDF export available
Error management	Overview of inverter error messages and error notification by e-mail
Report dispatching	Daily, monthly, or yearly notification of monitored data by e-mail
ADVANCED FUNCTIONS (AE SITELINK PRO)	
Automatic monitoring	Ideal AC output*, statistical energy prognosis, daily energy fluctuation, current output
Statistical data tables	Energy, normalized energy, yield, and CO_2 savings for system, sub-system and inverter values, display of performance ratio*
File storage	Up to 50 MB per system
Big screen application	For the presentation of CO_2 savings, daily, monthly, yearly, and total yields

* available with temperature and irradiation sensor SI-13TC-T-K



ACCESSORIES

Focus on your system solution

AE Controller
Remote monitoring and power limitation

Statutory regulations stipulate that the operators of PV systems must take measures to ensure that the performance values of their PV systems can be adjusted if required. It must also be possible for grid operators to perform these adaptations. Select the ideal controller for your PV system from our range:

AE IMC FeedinLimiter: Limited feed-in output variable at down to 0 %

AE ParkControl: the individual park control system in four versions

AE IMC pmu: expands the connection possibilities for control and regulation functions.

You can discover more about the respective functions in the data sheet.

ADDITIONAL ACCESSORIES

Temperature and irradiation sensor
Valuable additional information

The external temperature and irradiation sensor collects an important ambient parameter which has a decisive effect on the performance of a PV system: light intensity. It is compatible with all AE inverters. These additional values allow you to display the operating conditions of your PV system even more accurately, and to identify system errors faster by means of a target-actual comparison.

AE WirelessConnect
Communication without cables

AE WirelessConnect allows you to connect up to 2,000 inverters in a solar park without any cables. The radio module's reach is around 300 meters, and a system of several modules can easily bridge distances of several kilometers. The radio modules are supplied with electricity by the inverter. The data connection is protected against external eavesdroppers. All the data remain where they are supposed to be: in your hands.

Outdoor-EthernetSwitch
Creating connections

Connect your PV system with ease and flexibility via Ethernet with the new Outdoor-EthernetSwitch. Its five ports offer you a variety of possible applications: your inverters can be connected to one another very easily, whether just in an Ethernet installation or in combination with wireless communication via AE WirelessConnect.
The Outdoor-EthernetSwitch can be connected to the 24 V sensor interface of your AE inverter by means of plug&play. Its low internal consumption of only 2.2 watts is supplied from the inverter.

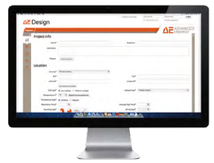
AE GridProtect
Protective measure for grid and system

For energy suppliers, energy customers, and grid operators, it is essential that photovoltaic systems and electricity grids are protected. AE GridProtect protects both sides of the energy infrastructure: PV system and power supply grid. AE GridProtect has been designed for low and medium voltage grids. It monitors the voltage and frequency over three phases. AE GridProtect complies with a range of national directives.

PowerCap
Breathable

If high power needs to be achieved where space is tight, AE inverters can be arranged on top of one another in three packs to save space. As convection cooling is no longer sufficient under these conditions, we have developed the active fan module PowerCap. It is designed for AE inverters with rated power from 8 to 23 kW. By supplementing the system with this fan, the permissible ambient temperature of the inverters is increased by 5° C.

AE Design
Plan your system



The performance and yield of a PV system are thus also a question of the right combination of modules and inverters. The AE Design system planning tool gives you access to an extensive database of PV modules. The tool helps you to select the best suite inverter for your system. You can calculate the energy yield, energy balance, and self consumption of your future PV system even before you make an investment.

AE SERVICE TEAM

We offer you support all over the world

Every day we employ our knowledge and expertise in PV technologies which set standards across the globe. Although our inverters are maintenance free and can be configured and commissioned via plug&play, you may still have questions or a technical problem which needs to be solved. Our team offers you support all over the world. With service centers in the U.S., Asia, and Europe, we are represented in the key PV markets.

If a device defect is reported on a working day a replacement string inverter leaves our company within 24 hours. When servicing is required, central inverters will be attended to by one of our service engineers within 48 hours. In addition, we also offer appropriate servicing and maintenance contracts for all AE central inverters.

AE training sessions

Held by experts, developed for experts

The AE training team keeps your expertise up to date. At a seminar you can find out everything there is to know about AE string and central inverters and the broad range of accessories on offer. You can also find out about the latest trends in photovoltaics, for example: self consumption, oil parity, and statutory framework conditions. Talk to specialists, as conversations give rise to new impulses for your future projects and offers to your customers.

The AE training sessions ensure that you are always in a position to advise your customers in accordance with the latest findings, experiences, and statutory framework conditions. AE training sessions are targeted at specialists, such as solar installers, system planners, architects, specialist tradespeople, or sales employees with previous knowledge of photovoltaics. On request, we can also offer individually tailored training sessions at your company.

PERFORMANCE SPECTRUM PHOTOVOLTAICS

Peace of mind: The weather and the position of the sun are always changing. It's good to know that some things are constant: Devices from Advanced Energy.

References
Tried and tested many times over

Since the introduction of the AE inverter, over 7 GW of PV capacity has been installed under very wide-ranging climatic and geographical conditions. The spectrum ranges from rooftop systems on industrial facilities right through to large-scale PV power plants. Inverters from AE and all accessories are technically sophisticated and use the latest technology. Their construction communicates value and reliability with their design being tailored to the difficult conditions found in everyday practical tasks. Our customers value the exceptional quality, which translates into high customer satisfaction.

Solar power is already a success story today. We pick up on new trends such as the use of photovoltaics for covering your own energy requirements and develop innovative solutions such as the AE PV Heater. As such, we are delighted to be part of the energy revolution. This motiviates us to make a good thing even better and to constantly refine our devices further.

ADVANCED ENERGY®

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