AVAILABILITY SECURED

FOR POWER
GENERATION
TRANSMISSION
AND DISTRIBUTION

AEG
POWER SOLUTIONS

CUSTOM SOLUTIONS FOR VARYING OPERATIONAL NEEDS

AEG Power Solutions

- Can offer stand-alone solutions and complete project solutions supported by experienced engineers who understand your engineering challenges
- Can offer the resources of an applications engineer or a complete dedicated project team to assist in large or complex solutions worldwide
- Have an extensive product portfolio that can be engineered to provide an efficient compact and reliable system, including optimum sizing of batteries by our battery specialists as well
- Invest heavily in technology to achieve high MTBF industrial systems that are designed to meet the most challenging operational conditions
- Provide new technology combined with design experience equating to a system that can be comfortably supported by a global service team for a minimum of 20 years
- Provide consistency in design, which minimizes spare parts requirement and operational simplicity supported by optional product training

AEG Power Solutions helps customers worldwide meet their power challenges with innovative, world-class power solutions. Backed by more than a century of innovation and customer service, AEG Power Solutions offers a full-range of reliable, cost effective solutions, from power conversion modules and high reliability UPS systems to industrial chargers and DC systems. With operations in 16 countries worldwide, AEG Power Solutions designs manufactures, sells and services AC and DC power solutions for a wide variety of industrial and communications applications and for the renewable energy sector. The company's products, solutions and services are renowned for their reliability, especially in extremely challenging industrial and climatic environments. Consolidating the portfolios previously sold under the AEG, Saft Power Systems and Harmer & Simmons brands, AEG Power Solutions delivers value to customers by protecting mission-critical assets, ensuring business continuity and protecting people's safety.

The company provides the power solutions of choice for such demanding applications as off-shore oil and gas platforms, non-stop industrial processes, nuclear power plants, renewable energy generation, rail transportation, telecoms and data centers. AEG Power Solutions activities consist of two complementary operating segments: Renewable Energy Solutions and Energy Efficiency Solutions. Thanks to its distinctive expertise, bridging both AC and DC power technologies and spanning the worlds of both conventional and renewable energy, the company is uniquely positioned to benefit long-term from emerging demand for intelligent micro-energy grids.

Creation of AEG as the German equivalent of General Electric

1887

More than 100 years of innovation and customer service

Establishment of Saft as a battery manufacturer in France

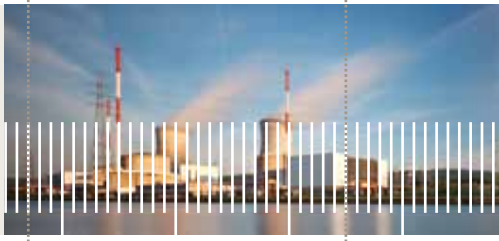
1917

Creation of AEG plant in Warstein-Belecke, Germany

1945

Development of power controllers by AEG Power Solutions

1969



Rely on AEG PS' power expertize

The power market is a very challenging segment, in which safety aspects are a major concern. Our specialists know that qualifications and plant licenses issued by the relevant authorities require the fulfillment of only the highest level of specifications. Due to the nature of this business and the consequent demand for high quality products, AEG PS formed a dedicated team of engineers to help you to design DC and AC UPS system solutions that meet your specific needs.

Since the creation of AEG in 1887, the company has established a continuous track record for serving customers with innovative, highly reliable systems and solutions. In the area of power generation, transmission and distribution (PTD), AEG PS has been providing robust and rugged power in a wide variety of PTD applications for over 60 years. In this sector the company offers a comprehensive range of world-class AC and DC power protection and control products with more than a 20-year lifetime delivering the industry-leading availability customers needing to protect their production processes, thus ensuring optimal uptime, maximum return on their investment and reduced lifetime costs. Whether you are a power company, an EPC, a project management consultant or an engineering and construction services provider, with AEG PS you partner with a power protection expert that is used to large international engineering projects and understands that safety, risk management, business continuity and operational excellence are the key elements of your business.

Acquisition of NIFE Group (Sweden)
1992

AEG Power Solutions introduces first UPS in the world with 100% digital control: Protect 3
1995

Acquisition of AEG SVS Power Supply Systems GmbH (Germany)
1998

SAFT Power Systems group, the power systems division of Alcatel, is acquired by Ripplewood Holdings
2005

Inauguration of first Chinese manufacturing facility, in Beijing
2006

Introduction of Protect RCS – Reliable Rectifiers, Chargers and DC Systems for all industrial applications, building on the success of its popular SPR/TPR range
2007

Introduction of Protect MIP – Modular, redundant and scalable rectifier system for all industrial applications
2008

Introduction of Protect 8, first "customer-ized", modular UPS
2009

Introduction of solar inverter Protect PV.250
2009

AEG Power Solutions become a publicly listed company
2009

AC & DC
PREMIUM POWER
PROTECTION

SOLUTIONS FOR ALL APPLICATIONS

Power solutions designed to meet tough power generation, transmission and distribution industry needs:

- Continuity of business operations
- Safety of personnel
- Environmental protection
- Critical installations
- High availability systems and processes
- Easy maintenance and long service life
- Reduced footprint
- Black start
- Remote & Automated UPS operation
- 1E applications

Outlook on electrical energy

Rising urbanization in upcoming economies and its demand for transport and other utility services, the growing worldwide middle class, increasing automated production and further electrification of personal supplies are a few key contributors for the growing demand in electrical energy. In short: the production of electrical energy is a key task for the development and prosperity of any country. The reliability and availability of this energy determines the degree of possible technical progress. A growing motivation to win this energy from renewable sources, as geothermal, wind and solar will continue to grow. Nevertheless, and in the coming years, the majority of energy will still come from fossil fuels such as coal, gas and oil. These energy sources will be the backbone of our energy supply, not forgeting that nuclear energy is also being expanded as some countries continue to improve there CO_2 balance. The requirements for power plants have increased enormously in recent years.

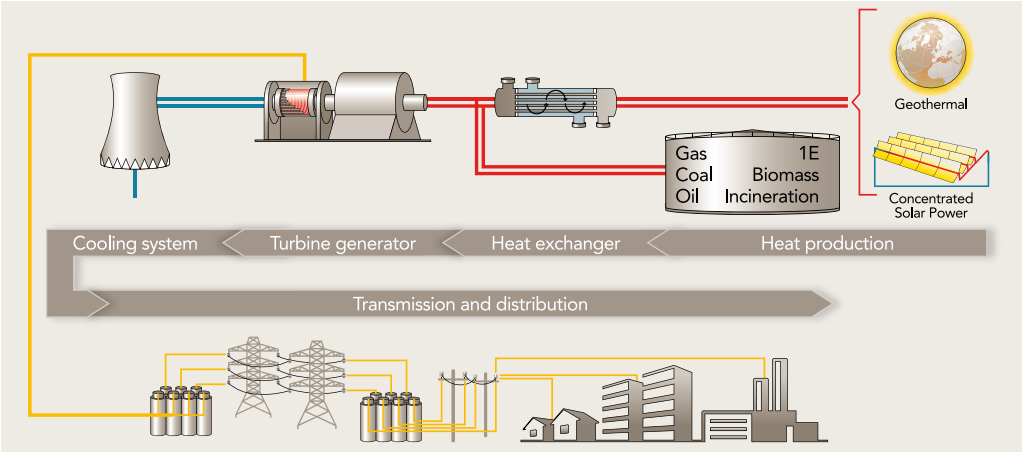
Whether it is:

- Flexibility in terms of safety
- Energy efficiency
- Improved running times
- Subsequent extraction of heat
- Preparing for CO_2 storage
- Reducing operating costs
- High durability
- Ease of use in service

these key points are important.

Helping our customers to face their challenges

Mission-critical applications in the power generation, transmission or distribution industry need 100% available highly reliable electrical power. The 'internal power supply' or 'power back-up' is redundant at least to the established n+1 criterion with self-monitoring devices that provide the plant manager with automatic messages when necessary. It is built independent of external energy feed and includes at least two independent emergency power generators, and at least two independent high-performance batteries. In case of power failure, the battery driven power back-up system is taken-over immediately and the generators are started accordingly. Once the generators have run through their start-up phase and deliver a stable voltage, they will take over overall power back-up supply. The main loads in a power plant are always connected to the DC safety rail and are normally supplied by the rectifier and the batteries in case of an emergency. The most important AC consumers are supplied indirectly via the inverter which in turn is supplied via the DC rail. Several DC voltages are realized by switching power supplies.



Comprehensive solutions

Benefit from a single source for all your power protection requirements. Get fully customized systems to meet your exact needs.

- AC & DC power supply systems:
  - UPS
  - Inverters
  - Rectifiers
  - Chargers and DC systems
  - Modular industrial power supplies
  - Switch mode power supplies
- Monitoring and control
- Batteries
  - Lead acid
  - Nickel cadmium
  - Lithium
- Power controllers
- Ancillary equipment
- Services

All of our products are designed and manufactured to meet the most stringent international safety and EMC standards.

Total system design

- Specification support
- Site surveys, with analysis of:
  - High and low voltage electrical distribution network
  - Load flow and load shedding
  - Failure and power quality
  - Short circuit and noise rejection
- Grounding/neutral networking
- Emergency and stand-by power requirements
- Battery configuration to meet load, environmental and aging requirements
- Seamless integration in existing electrical and mechanical environment
- Personal health and overall safety

AEG PS system principles

The rectifier is the core component of the emergency power supply, which is available in several implementations:

- Thyristor rectifier
- IGBT rectifier
- Switch mode power supplies

Depending on security requirements, these devices will be cooled naturally or via forced ventilation. Particular attention should be paid to the control here; there are variants, both software-based and analog. A rectifier in a power plant application must in all circumstances be rugged, durable and low maintenance. Robustness is required in two areas; first, mechanical (depending on application) for earthquake resistance and electromagnetic strength, and second, electrical resistance to voltage spikes or transients. In short the input transformer is one of the electrical components that contribute to a long lifetime.

To maximize lifetime the redundant rectifier is constructed so that each of the rectifiers is providing 50% capacity during normal operation. The rectifier must be capable of supplying the load and charging the battery. The inverter (with bypass) is one of the loads connected to the rectifier.

The inverter supplies the AC loads, ensuring that it will not suffer from a voltage drop. In the situation where the DC network fails or the inverter itself has a fault, it will switch after a synchronization check to the mains voltage, and will switch back when the error is removed again. Even when an output short circuit occurs, the inverter can automatically draw from the mains to help secure the power availability, but the device should provide this in any case by itself.

For small to medium loads, more and more switching power supplies are used in the power industry. With devices connected in parallel, the total required power is combined. The SMPS is used for charger applications as well as for DC to DC conversion, available in variations with or without fans, analog or digital (micro + software) control and optional earthquake resistance.

AC & DC PREMIUM POWER PROTECTION SOLUTIONS

Lifetime project management

- Engineering support in all stages including FEED
- Geographical customer teams
- Optimized technical advice
- Factory acceptance test and inspection
- Timely customization documentation
  - Engineering drawings
  - O&M manuals
- Technical training
- Installation
- Commissioning
- Maintenance
- Complete support for integrated solutions:
  - UPS, DC systems, batteries
  - Gensets, distribution, fire detection, control and monitoring
- Global service up to turnkey projects

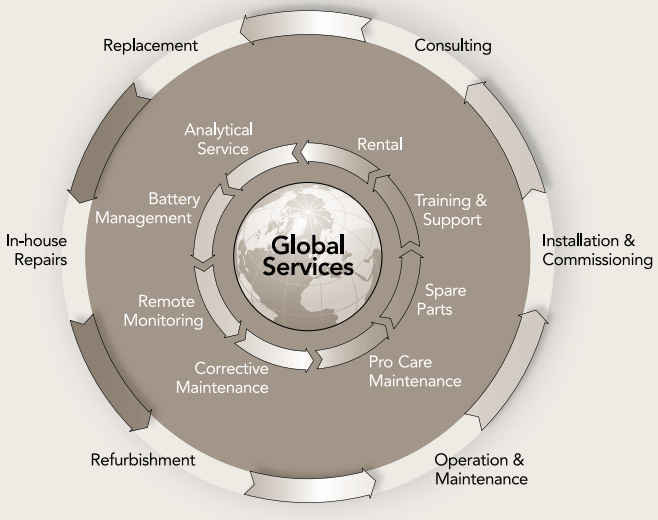
Global service

Our customers can rely on a global network of 20 service centers supported by over 150 field engineers and more than 100 certified service partners around the world, with both scheduled maintenance and 24/7 service to keep your business running and exceed HSE requirements. From system selection to commissioning our certified experts go beyond your expectations by offering service excellence that will ensure the lowest operational cost for your mission-critical equipment.

The reliability of your installed power solution is supported by a global service team renowned for its short response time and troubleshooting efficiency. Choosing one of the Pro Care™ maintenance programs gives you ultimate peace of mind providing reassurance of complete cost control, security and uninterrupted power supply in situations of the utmost criticality.

You can also benefit from a full range of professional services that will protect and ensure the durability of your investment and will take over when you need it most:

- Consulting
- Full range site servicing
- Installation and commissioning
- Operation and maintenance
  - Pro Care™ maintenance
  - Corrective maintenance
  - Remote monitoring
  - Battery management
  - Analytical services
  - Rental
  - Training and support
  - Spare parts
- Refurbishment
- In-house repairs
- Replacement



MEETING YOUR EXACT NEEDS

Sample customers

- CNPEC
- E-On
- Areva
- Cegelec
- ENBW

Unique design

Parallel operation for capacity and performance with proven long-term field experience.

Flexible Multi Master Technology and CAN bus communication enables up to 8 UPS' to be connected in parallel for increased power, redundancy or system upgrade. Parallel UPS' can be operated with a central battery. The three microprocessor control system is designed to provide trouble-free power, the microprocessors continuously monitor and control the rectifier, inverter and static switch units.

Complete with:

- N+1 fans
- Dual power sources for control boards
- Robust Industrial Chassis with easy access
- In-house PCB manufacture, not vulnerable to 3rd party obsolescence
- In-house software development essential in a 20-year design
- Applications chargers with SIL3
- Applications with analog control
- Battery monitoring

Unequalled flexibility and reliability

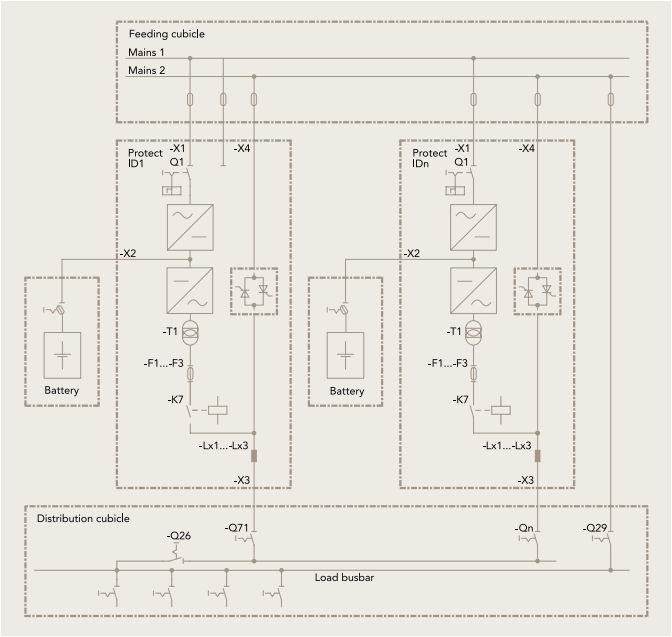
Complete solution combines ease of operation with numerous options.

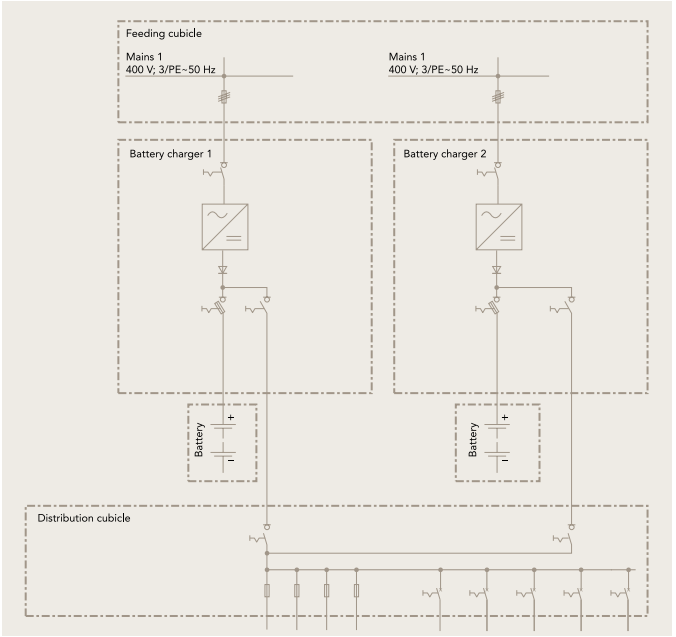
The communications system monitors and controls user defined parameters locally or remotely while customers enjoy a choice of battery types as well as battery testing operation and simplified maintenance.

Optimum electrical distribution

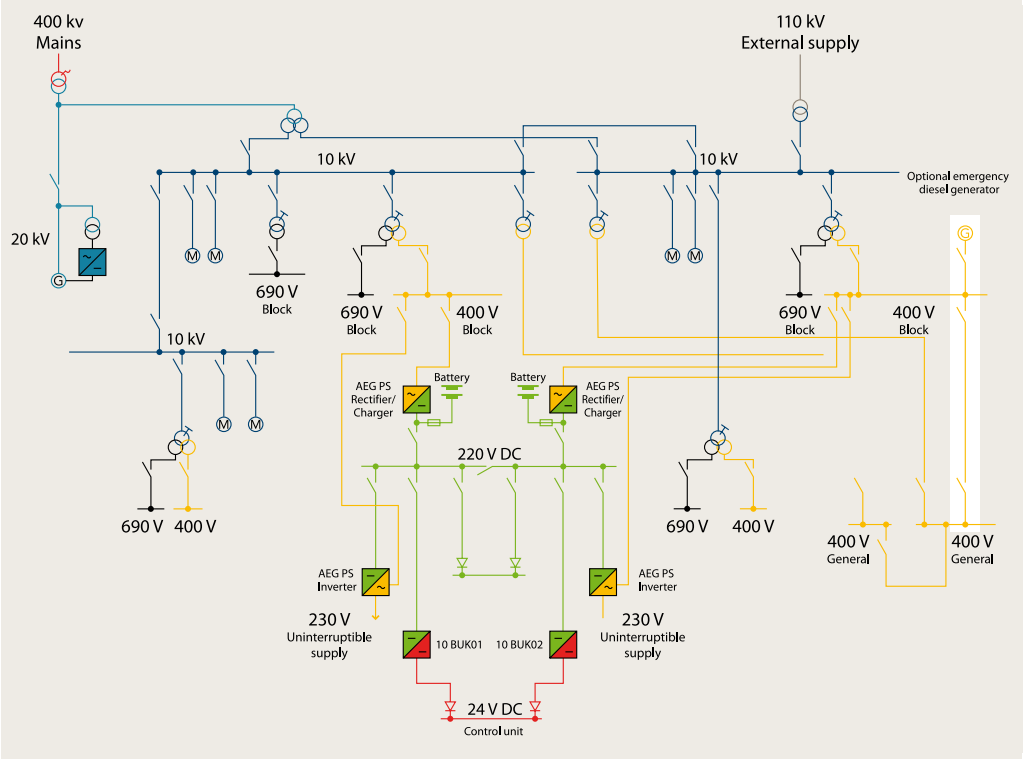
In-house expertise to define and design all kinds of distribution panels.

The panels ensure selectivity and clearance capacity for all load events; possibility of full customization meeting the various requirements in oil and gas applications.





POWER GENERATION PROTECTED BY OUR END-TO-END SOLUTIONS



	MAIN PRODUCT CHARACTERISTICS											SEGMENTS			
	Single-phase output voltage	Three-phase output voltage	Single-phase input	Three-phase input	Parallel operation	Motor starting	Convection cooling	Forced air cooling	Analog control	Digital control	Earthquake resistant	Power plant	Switchgear	Transmission substation	Distribution substation
Protect 3: UPS 10 – 120 kVA	■	■	■	■	■	■		■		■		■	■	■	■
Protect 8: UPS 10 – 500 kVA	■	■	■	■	■	■		■		■		■	■		
Protect 8: Inverter 10 – 120 kVA	■	■			■	■		■		■		■	■	■	■
Transokraft 3: Inverter 30 – 220 kVA				■	■	■		■	■		■	■	■		
Transokraft 1: Inverter 10 – 50 kVA			■		■	■		■	■		■	■	■	■	■
Profitec S: Battery-Charge Rectifier 63 – 1250 A				■	■	■	■		■		■	■	■	■	■
Protect RCS: Battery-Charge Rectifier 10 – 500 A (>500 A on request)			■	■	■	■	■	■		■	■	■	■	■	■
Protect MIP: Modular Rectifier 10 – 1320 A (>1320 A on request)			■	■	■	■		■		■		■	■	■	■

Environmentally responsible

AEG Power Solutions is committed to respecting the environment across all of its business activities, from operations to product design to the use of technology. For example, to comply with RoHS and WEEE European directives, hazardous substances are being eliminated from all components, products and manufacturing processes.

Registrations

As an established supplier to the oil and gas industry, AEG Power Solutions is an active participant in such industry groups as the Engineering Industry Council and the FPAL.

Member of EIC

GOST R certificate

RoK certificate

AEG Power Solutions is fully ISO accredited, with ISO certified suppliers and manufacturing locations worldwide.

AEG Power Solutions: your partner in each phase of the project

Being a power plant owner, a grid owner, an EPC, a project management consultant, a specifier, or an engineering and construction services provider, you should talk to a power protection company that is experienced and used to executing large international engineering projects and understands that safety, risk management, business continuity and operational excellence are the key elements of your business.

In short, world-class:

- Front end engineering & design (FEED)
- Detailed engineering
- Logistics and planning
- Execution
- Service

Is our promise to you!

INDUSTRIAL AC UPS SYSTEMS, INVERTERS AND POWER CONTROLLERS

PROTECT 3 UPS SINGLE & THREE PHASE OUTPUT

Nominal rating (at cos φ 0.8 lag) in kVA	10	20	30	40	60	80	100	120
RECTIFIER UNIT (no transformer)								
Input nominal voltage (V)	3 x 380 / 400 / 415							
INVERTER UNIT								
DC input (V)	384							
Nominal AC voltage (V)	1 x 220 / 230 / 240 and 3 x 380 / 400 / 415							

PROTECT 8 UPS SINGLE & THREE PHASE OUTPUT

Nominal rating (at cos φ 0.8 lag) in kVA	10	20	30	40	60	80	100	120	160	220	330	400	500
RECTIFIER UNIT													
Input nominal voltage (V)	3 x 380 / 400 / 415 / 480 (other voltages on request)												
INVERTER UNIT													
DC input (V)	220 / 384												
Nominal AC voltage (V)	1 x 120 / 220 / 230 / 240 and 3 x 380 / 400 / 415 / 480												

PROTECT 8 INVERTER SINGLE & THREE PHASE OUTPUT

Nominal rating (at cos φ 0.8 lag) in kVA	10	20	30	40	60	80	100	120
INVERTER UNIT								
DC input (V)	110 /125 / 220							
Nominal AC voltage (V)	1 x 120 / 220 / 230 / 240 and 3 x 380 / 400 / 415 / 480							

For further details please refer to individual product publications

TRANSOKRAFT 3 & TRANSOKRAFT 1

	Transokraft 3						**Transokraft 1**				
Nominal rating in kVA	30	50	80	120	170	200	10	20	40	60	80
Input voltages (V DC)	220 ±20 %										
Output voltage (V AC)	400 V AC (adjustable 380 – 420)						230 V AC (adjustable 220 – 240), other voltages on request				
Frequency, no mains synchronization	50 Hz ±0.1 % (60 on request)										
Synchronization range	49.5 – 50.5 Hz ±1 % (other on request)										
Nominal current (A)	43 / 72 / 116 / 173 / 245 / 289 / 317						43 / 87 / 174 / 261 / 348				

PROFITEC S

Input	Three Phase
Input voltages (V AC)	3 x 400 ±10 % (+15 % – 20 % functional)
Frequency	50Hz with N connector
Power factor	0.72 – 0.78
Output voltages (V DC)	24 / 60 / 110 / 220
Output current	9 –1320 A (higher curent ratings on request)
Voltage ripple	5 % SS wihtout parallel battery

INDUSTRIAL CHARGERS, DC SYSTEM AND MODULAR INDUSTRIAL POWER

PROTECT RCS/SPRE/TPRE: INDUSTRIAL CHARGERS, RECTIFIERS AND DC SYSTEMS

Input	Single and Three Phase
Input voltages (V AC)	1 x 120 / 220 / 230 / 240 and 3 x 380 / 400 / 415 / 480 other voltages available as option
Exceptional variations	+15 / -20 % (functional)
Frequency (Hz)	50 or 60 ±6 %
Output voltage (V DC)	12, 24, 32, 48, 60, 110, 125, 220, 250
Rectifier output current (A)	10 – 500 (>500 on request)

CABINETS

Wall mounted and floor standing cabinets available depending on system rating and options specified. Weights and dimensions on request. Also available:

- Dual system in single cabinet
- Battery integrated in system cabinet
- Matching battery cabinets

OPTIONS

To provide exact solutions for each application, AEG Power Solutions offers a wide range of options, amongst others:

Analog meters in front panel	Cabinet heater	Outdoor cabinet: up to IP65
Special treatment (tropicalization, relative humidity up to 95 %, etc)	Low smoke wiring (halogen-free)	Special markings
Customized cabinets (paints, etc.)	Blocking diode for parallel redundancy	Diode dropper
Battery temperature compensation	Battery fuse box	Ex enclosures

For further details please refer to individual product publications

PROTECT MIP: MODULAR INDUSTRIAL POWER

Input	Single and Three Phase
Input voltages	230 V ±20 % (+20 % -60 % functional) or 400 V ±10 % (+15 % -20 % functional)
Frequency	50 Hz or 60 Hz ±5 %
THDI	<5 %
Power factor float	0.99
Output voltage (V DC)	24 / 48 / 110 / 125 / 220
Output current (A)	9 – 1320 (higher current ratings on request)

OPTIONS

Alarms/signaling	Relay boards, battery monitoring, low electrolyte level alarm,high ripple voltage alarm, LED indicator	
Communications	RS232/RS485 interface, Modbus,Profibus DP, J-bus protocol, TCP/IP interface, monitoring & management software	
Input/battery/load options	DC distribution, integrated inverters, diode droppers, load or battery MCBs/fuses/switches	
Mechanical	Wall mounted or standalone cabinets, up to IP54, special color	
Additional options are available or request		
Battery temperature compensation	Battery fuse box	Ex enclosures

SWITCH MODE POWER SUPPLY MODULES AND 19" INVERTERS

	DC/DC Converters	AC/DC Power Supplies	19" Inverters
Input voltage (V AC)	110 / 220	230 / 3 x 400	24 – 220
Output voltage (V DC)	24 – 60	24 – 220	230
Output current (A)	15 – 100	7.5 – 250	
Output power (VA)			1500 – 3000

AEG Power Solutions

Approach your local AEG Power Solutions representative for further support.
Contact details can be found on:

www.aegps.com

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