

# The right **UPS.**

- UPS/AC Power supplies
- DC Power supplies
- Batteries
- Solar power





innovating power.

Innovation with a lot of experience in the reliable supply of power - that is what characterizes the products of EFFEKTA. We devise what is meaningful and technically proven for standard applications and for special solutions. Moreover, we are pleased to tackle that task with an additional quantum of safety, comfort and service. You can convince yourself of this by consulting the following pages of this catalog.

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# Company

What started out in 1984 as a small company by the name of HJ Elektronik is now one of the leading manufacturers of uninterruptible power supply (UPS) units: With around 80 employees, we work on a daily basis to provide ever better products and services.

Starting with uninterruptible power supply units as our core product, we have extended our portfolio over the years - expanding our expertise at the same time: As well as UPS units in the office sector and for mounting in 19" racks our product range now also includes rectifiers and inverters for solar power generation as well as power packs, accumulators and battery monitoring systems.

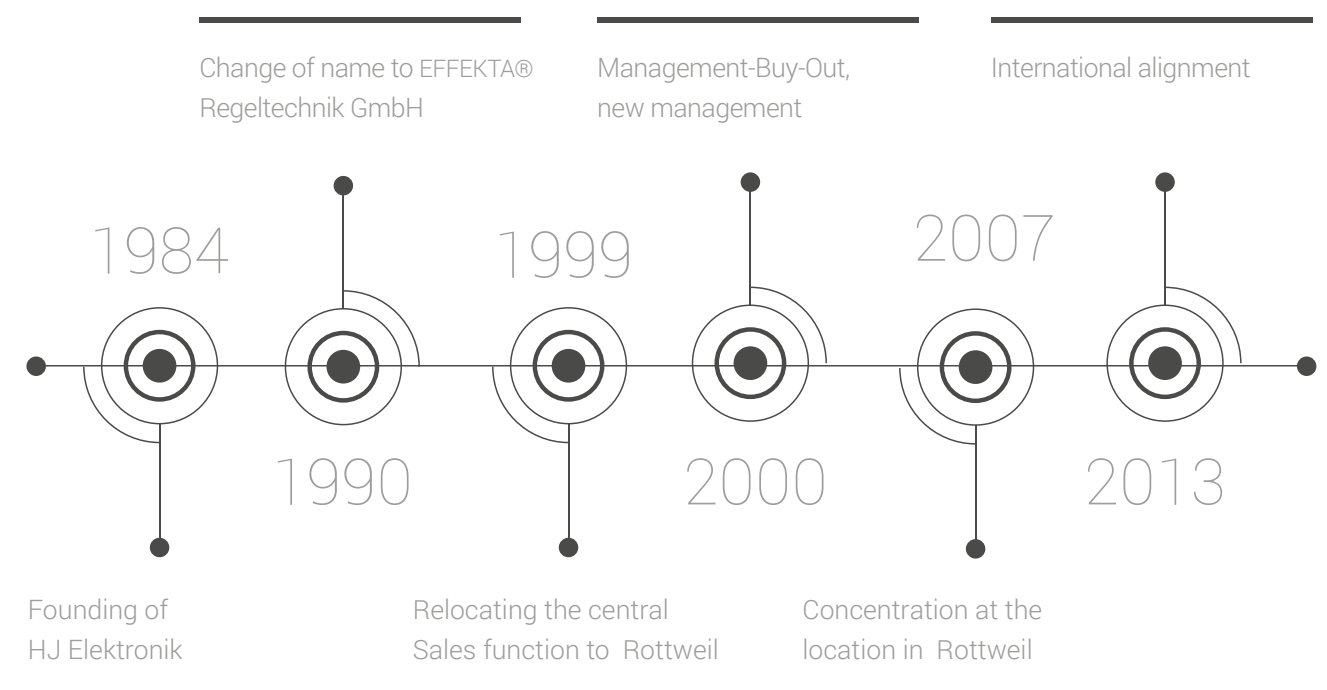
## Special units

Our commitment is embodied in more than innovative products in meaningful configurations for the data processing market: We also deliver conviction on a significant scale in industrial applications and in

other sensitive areas. We provide companies such as Berliner Verkehrsbetriebe, Daimler AG, Siemens AG, Deutsche Telekom AG, BASF AG, Bayer AG (Leverkusen) or the German Aerospace Institute [Deutsches Institut für Luft- und Raumfahrt] with bespoke uninterruptible power supply units. This enables our products to provide a vast array of devices, some of them extremely sensitive, with very reliable protection.

## Service

The high performance standard of our services is as central to us as the quality of our products: Maintenance, repair and emergency service for all of our products and systems comprise a firm part of what we offer – regardless of whether the order is for a small UPS unit for the office or for a bespoke system in a sensitive industrial environment. EFFEKTA has always defined service with this motto: You can depend upon us.





# Bespoke solutions

Special requirements often require special solutions: EFFEKTA has always set itself specialist tasks of this kind, and has consistently risen to the challenge supremely well. However, what is it that makes a special solution from EFFEKTA so beneficial for the customer?

## Customer-specific configuration

Other companies turn to their existing portfolio to assemble a solution that goes just some way to meeting customer requirements. In contrast, we at EFFEKTA go further and configure an entirely new UPS unit to meet the needs of a customer with targeted precision. We base what we do on more than the wishes of a single customer: We bring our experience to bear, and propose a design that is not only cost-effective but also technologically the most appropriate one, with the best credentials for a long-term future. After all, nothing is more aggravating than to find, year down the line, that a UPS unit configured at one point in time is no longer capable of meeting more recent requirements.

## Customer-specific service

The spectrum of services that EFFEKTA is capable of providing far exceeds the configuration, installation and commissioning of a customer-specific bespoke solution. We are always pleased to provide continuous inspection and maintenance of units installed by ourselves – your advantage as a customer with an EFFEKTA service contract: You can always be certain that your UPS units are always technically right up-to-date and are capable of meeting defined requirements. Furthermore, you can also depend upon us to keep you posted on sensible improvements to make to your unit – whether technical or commercial in nature.

## Complete packages for a complete price

You probably wish for more than a one-stop shop for the design, installation and maintenance of your UPS unit, specifically also wishing for peace of mind in terms of spare parts and battery replacement. Please ask us about our complete packages that cover all conceivable forms of service support for your desired period of time. If you so wish, also as a leasing package!





# Best practice

Nothing illustrates what is possible as effectively as an example: We have therefore put together, in concise format, a couple of Best Practice stories and references.

## Energy-saving elevator UPS in 'Climate House' in Bremerhaven

Albert Schenk GmbH & Co. KG was immediately faced by two basic requirements to satisfy in its project at 'Climate House Bremerhaven 8° East' (left photo), specifically in relation to the traditional OSMA elevators: The objective not only entailed implementing the energy efficiency stipulations of VDI standard 4707 for no fewer than seven elevators, but also to provide autonomous power to stationary elevators in a way that entails the lowest possible level of power consumption. There was also a question of resource conservation - a key promotional claim of this Climate House - the aim being to build an energy-efficient structure that delivers a low environmental impact. Through a consistent policy of optimization, EFFEKTA succeeded with its 'MTD Industry' version of UPS to develop an uninterruptible power supply system with a very low power consumption, positioning it by as much as 70% below the standard power consumption level of standard UPS units on the market.

## Standard power supply units for MERCK KGaA

Since 2008, UPS units from EFFEKTA have been deployed on the premises of MERCK parent company plant to protect the entire production site in the event of mains power failures. Until MERCK began its collaboration with EFFEKTA, it used units from a number of different manufacturers. This made the inspection and maintenance of their units a complex matter. Working jointly with the customer, EFFEKTA developed a complete UPS system

for this production location with features such as virtually indefinite scalability, maximum availability, optimum redundancy and simple troubleshooting. For MERCK, EFFEKTA implemented a comprehensive leasing package that includes the UPS units, their installation on the site, the commissioning process and a complete maintenance management system – giving this customer an extremely dependable and transparent overview of the costs involved.

## A scalable UPS, one able to meet the growing needs of the IT faculty at the Technical University of Vienna (TU Wien)

The dedicated main server at the IT faculty at the Technical University of Vienna is a central instrument all of its research, tuition and administration. It will come as no surprise to learn that the faculty needs very particular requirements to be satisfied for these technical service providers. As early as 2015, it became apparent that the 80 kVA unit installed in 2010 would soon become insufficiently powerful to meet growing levels of need. A new, modular UPS unit was therefore installed to meet future levels of demand. At that time, the initial performance rating of 160 kVA was sufficient to meet the forecast needs of the next 5 years. It therefore provided plenty of cover for initial needs and can be expanded up to 320 kVA. An external bypass is incorporated for problem-free maintenance of the new UPS unit to disengage the EFFEKTA UPS unit fully from the system whenever service is required, or a malfunction needs to be remedied.

**OSMA**  
AUFZÜGE

**MERCK**

**TU**  
WIEN



# Sector-based expertise

We are grateful to our many years of experience for the frequent opportunities these have provided for meeting customers from new sectors, other world regions and to get to know their needs. We have therefore gathered a great deal of expertise in the design of UPS units, all of which benefits our customers as we continue to perfect the design of the EFFEKTA range of UPS units. Here is a summary of some of the aspects we include when planning bespoke solutions or UPS units:



## Extreme temperatures

Depending on its planned location, an EFFEKTA UPS can also be prepared to cope with more extreme temperature ranges, enabling them to function reliably under conditions of extreme cold or of great heat.



## Extreme altitude

When air gets thinner, it has less of an insulating function: On request, we can adapt EFFEKTA UPS units to cope with installation locations at extreme altitudes. This involves a specialist design and optimum insulation.



## Humidity

If there is ever a risk of an EFFEKTA UPS being exposed to high levels of humidity and condensation, we can take due account of that in advance, at the design stage of a unit, to minimize the incidence of short circuits.



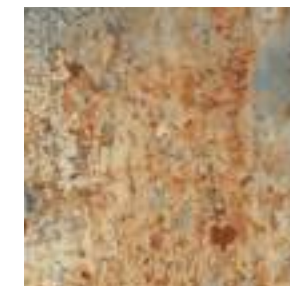
## Dust

In unusually dusty environments, we take special precautions to protect the electronic control unit. This ensures that EFFEKTA UPS units do not capitulate when faced with dirty environments.



## Mechanical loads

For environments in which mechanical loads can be applied to the EFFEKTA UPS we are able when called upon to do so to deliver a rugged design for the housing, with robust display, connection and operating technology.



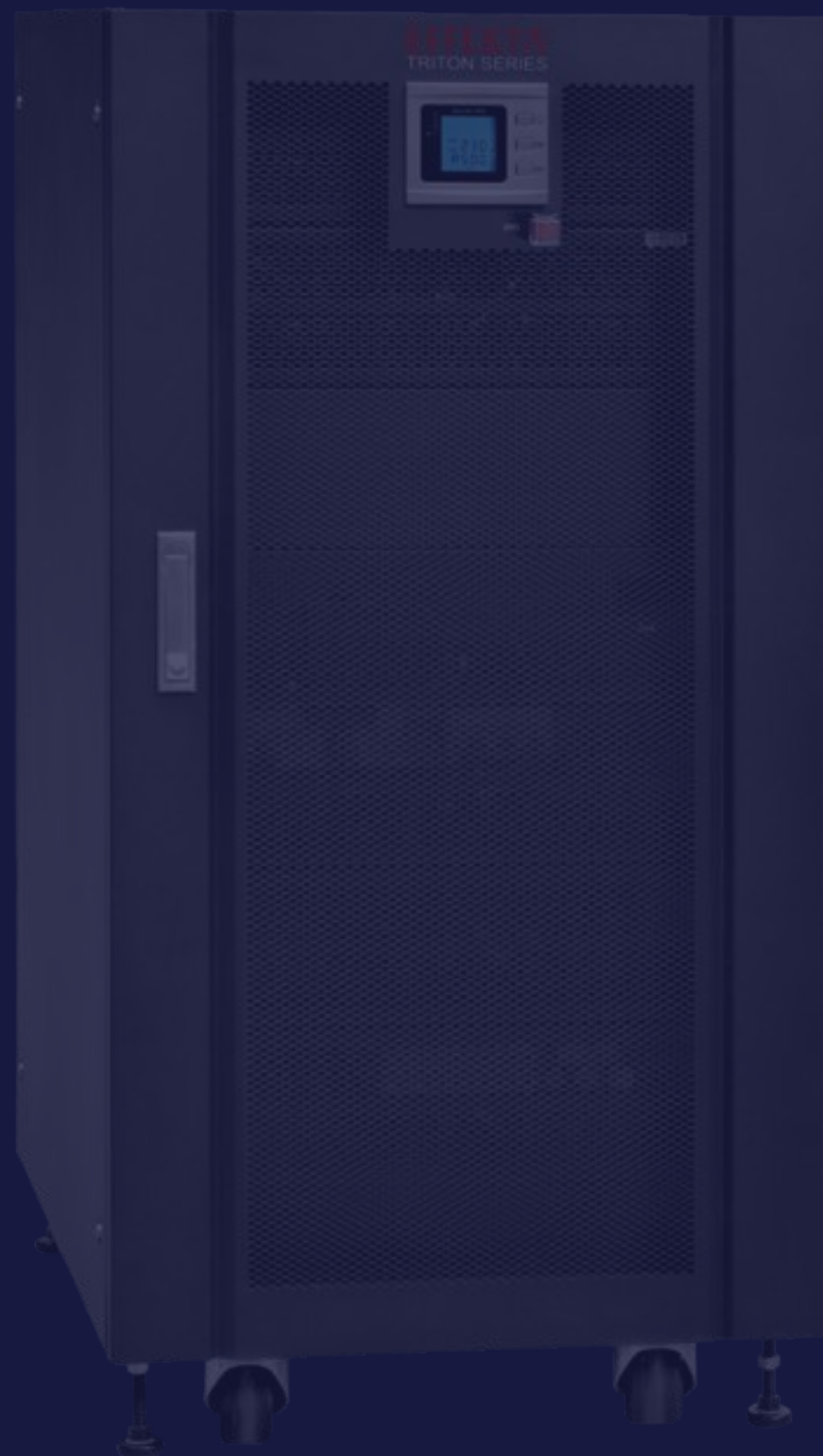
## Aggressive atmosphere

In environments where corrosion-provoking gases or other air-related factors are present, we use specialist materials in the design of your EFFEKTA UPS unit to assure functional durability.

Is stationary.

Is moving.





UPS/AC Power supplies





# UPS classification

Mains disturbances and the proper UPS								
For protection suitable UPS class	Mains disturbances							
	power failures >10ms	Voltage fluctuations < 16ms	Peaks 4-16ms	Continuous undervoltage	Continuous overvoltage	lightning effects	Voltage surges (Surge) <4ms	Frequency fluctuations
VFI	✓	✓	✓	✓	✓	✓	✓	✓
VI	✓	✓	✓	✓	✓	✗	✗	✗
VFD	✓	✓	✓	✗	✗	✗	✗	✗

To supply a load with uninterruptible power, different technologies are used. To distinguish them technically correct and to evaluate their protection, the standards EN 50091-3 and IEC 62040-3 are used:

- VFI    Output **V**oltage and **F**requency **I**ndependent from mains supply
- VI    Output **V**oltage **I**ndependent from mains supply
- VFD    Output **V**oltage and **F**requency **D**ependent from mains supply

## Comparison

New definition	Old definition
<b>VFI</b> UPS output frequency independent of power, voltage and frequency fluctuations within the limits according to IEC 61000-2-2	- On-line - Double conversion
<b>VI</b> UPS output frequency depending on the mains frequency, voltage (electronic / passive) stabilized within the limits of normal operation	- Single Conversion - Delta conversion - Line-Interactive
<b>VFD</b> UPS output frequency depending on voltage and frequency variations of the power grid	- Off-line - Stand-by

## Line Interactive Systems (VI)    Online double conversion (VFI)

### Features

- Short switchover time
- Bi-directional inverter
- Output voltage SINE WAVE predominantly / partly RECTANGULAR
- Good price performance ratio
- Booster function

### Applications

- PBXs
- Workstations
- CAD systems
- SPS systems
- Small Servers

### Models

- Office Home (VFD)
- Office series
- MI-RM series (19")
- MTX series
- MTD-RM series (19")
- MTD-XL-RT series

### Features

- Safest UPS technology
- Protection against all conducted disturbances
- Stable output voltage
- No switching delay period
- Bypass function

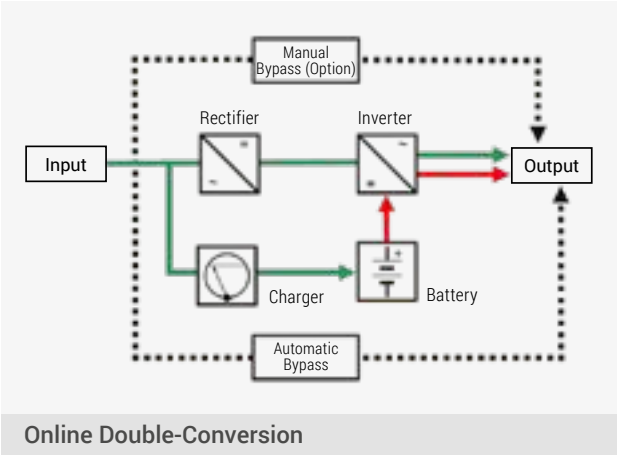
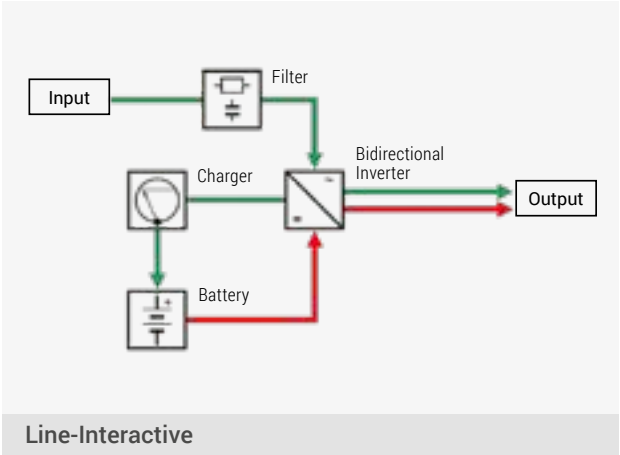
### Applications

- PBXs
- Workstations
- Servers
- Measuring systems
- Medical equipment (without life supporting!)
- Critical industrial / IT applications

### Models

- MCI series
- MKD-RT (Racktower)
- ADIRA
- MHD Modular
- TRITON
- THOR Modular

## Switching principle



# Line-Interactive / VFD Office-Home series

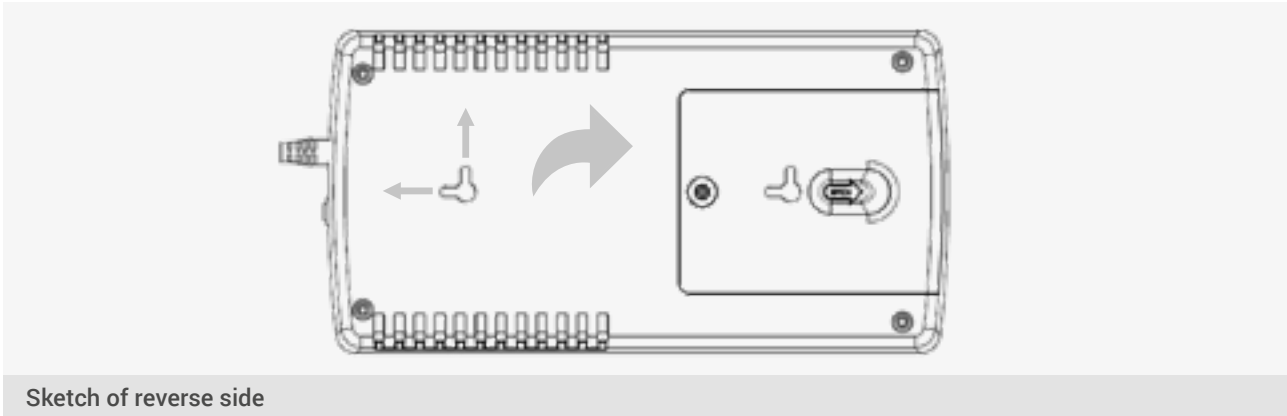
NEW

The OFFICE Home range made by EFFEKTA® protects your office equipment, such as PCs and their peripherals, from mains power failures. The compact dimensions of this UPS unit enable the UPS system to be incorporated elegantly in the most confined of spaces.

Another special feature of this UPS is its integrated multiple-function connector strip. It features 3 isolated ground receptacles with a UPS function and 3 isolated ground receptacles for overvoltage protection. All relevant information is displayed on a backlit LCD display with touchscreen.



## Details



## Characteristics

- UPS classification VFD-SY-333 (IEC 62040-3)
- Offline-technology
- Compact design
- Output modified sine wave
- Cold start function (starting in battery mode)
- Automatic reboot when power supply is restored
- Microprocessor control
- Automatic frequency detection
- Simple battery replacement
- USB interface as standard
- Management software
- 12 months warranty

## Special features

- LCD display with touchscreen
- Exceptionally compact design
- Suitable for wall mounting
- Multiple-function connector strip
- Programmable self-test, battery test
- Off-mode charging

## Specifications

Office Home			
Power	Power in VA	800	
	Power in W	480	
Autonomy time	PC load	15	
Technology	Offline	VFD-SY-333 in accordance with IEC 62040-3	
Phase	Input / Output	1-phase / 1-phase	
Input	Nominal input voltage	230 VAC	
	Input voltage range	180-270 VAC	
	Input frequency range	50/60 Hz (Auto-Sensing)	
	Output voltage	230 VAC	
Output	Voltage Regulation	±10%	
	Frequency Range	50 Hz oder 60 Hz ± 1 Hz	
	Transfer time	2-6 ms typical / 10 ms max.	
	Voltage form	Modified sine wave	
	Type	Maintenance free lead-acid battery	
Battery	Life time	5 years	
	Charging current (max)	0,5 A	
	Recharging time	ca. 8 h / 90% capacity	
	Interface	USB	
Communication	Display	LC-Display	
Dimensions / Weight	Dimensions (H x W x D in mm)	95 x 158,5 x 305	
	Weight	2,9 kg	
	Protection	IP 20	
Terminals	Input	Mains power cable with isolated ground two-pin grounded connector	
	Output	3 x isolated ground receptacles with UPS protection / 3 x isolated ground receptacles with overvoltage protection	
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended	
	Humidity	0-90 % RH @ 0- 40°C (non condensing)	
	Acoustic Noise	Normal mode nearly noiseless <40 dB	
Safety / Enclosure	Safety	EN 62040-1	
	EMC	EN 62040-2, class C2	
	Certifications	CE	



# Line-Interactive Office series

EFFEKTA®s OFFICE is suitable to protect your office equipment as PCs and peripherals from power outages. It is available in sizes 400, 600, 800, 1000, 1500 and 2000VA. With the compact dimensions of these UPS it finds its place even in the smallest office in your company or at home.

The availability of the power is significantly improved and operation could not be simpler. All relevant information is displayed on a backlit LCD display with touch screen.



## Rear view



Rear view of models with USB port and RJ11 surge protection.



Rear view of models with USB interface and RS232 interface.

\*\* 1000 VA without fan, otherwise identical housing form  
2000 VA with 6 IEC outputs, otherwise identical housing form

## Characteristics

- UPS classification VI-SY-333 (IEC 62040-3)
- Line-Interactive technology
- Compact design
- Output modified sine wave
- Cold start function (starting in battery mode)
- Microprocessor control
- Automatic frequency detection
- Automatic Voltage Regulation (AVR) with Boost and Buck function
- USB interface as standard
- Management software
- 12 months warranty

## Special features

- Off-mode charging
- Touch screen
- 400-1000 VA noiseless without fan
- Automatic restart after power returned

## Specifications

Office		400	600	800	1000	1500	1400
Power	Power in VA	400	600	800	1000	1400	2000
	Power in W	240	360	480	600	900	1200
Autonomy time	PC load	5 min	12 min	15 min	25 min	35 min	30 min
Technology	Line-Interactive	VI-SY-333 in accordance with IEC 62040-3					
Phase	Input / Output	1-phase / 1-phase					
Input	Nominal voltage	230 VAC					
	Input voltage range	170-280 VAC					
	Input frequency range	50/60 Hz (Auto-Sensing)					
Output	Output voltage	230 VAC					
	Voltage Regulation	±10%					
	Frequency Range	50 Hz or 60 Hz ± 1 Hz					
	Transfer time	4-6 ms typical / 10 ms max.					
Battery	Voltage form	modified sine wave					
	Type	Maintenance free lead-acid battery					
	Life time	5 years					
	Charging current (max)	1,0 A					
	Recharging time	ca. 8 h / 90% capacity					
Communication	Interface	USB, RS232 (RS variant)					
	Display	LC-Display					
Dimensions / Weight	Dimensions (H x W x D in mm)	142 x 105 x 300			182 x 130 x 320		
	Weight	3,7 kg	4,4 kg	5 kg	8,2 kg	10,4 kg	10,6 kg
	Protection	IP 20					
Terminals	Input	IEC (10 A)					
	Output	4 x IEC C13 (10 A)					
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended					
	Humidity	0-90 % RH @ 0- 40°C (non condensing)					
	Acoustic Noise	nearly noiseless <40 dB				<45 dbA	
Safety / Enclosure	Safety	EN 62040-1					
	EMC	EN 62040-2, class C2					
	Certifications	CE					

# Line-Interactive MI-RM series

MI-Series is a cost-effective line-interactive system, that protects sensitive consumers from power blackouts. Areas of application are computers and smaller servers and especially active network components in 19" switchboards.



## Rear view



MI 600 RM



MI 1200 RM

## Characteristics

- UPS-classification VI-SY-333 (IEC 62040-3)
- Line-interactive technology
- Output modified sine wave
- Microprocessor control
- Automatic frequency synchronisation
- Automatic Voltage Regulation (AVR) with Boost and Buck function
- RS232/Optokoppler interface as standard
- Management software
- 12 months warranty

## Special features

- Compact design
- Device height only 1U
- 600 VA model with 245 mm installation depth
- 1200 VA model with 350 mm installation depth
- Noiseless (without fan)

## Specifications

MI		600 RM	1200 RM
Power	Power in VA	600	1200
	Power in W	325	720
Autonomy time	nominal load (cos phi 0,6)	5	5
Technology	Line-Interactive	VI-SY-333 in accordance with IEC 62040-3	
Phase	Input / Output	1-phase / 1-phase	
Input	Nominal voltage	230VAC	
	Input voltage range	170-280 VAC	
	Input frequency range	50/60 Hz (Auto-Sensing)	
	Output voltage	230 VAC	
Output	Voltage Regulation	±10%	
	Frequency Range	50 Hz oder 60 Hz ± 1 Hz	
	Transfer time	4-6 ms typical / 10 ms max.	
	Voltage form	modified sine wave	
	Type	Maintenance free lead-acid battery	
Battery	Life time	5 years	
	Charging current (max)	0,4 A	
	Recharging time	ca. 8-10 h / 90% capacity	
Communication	Interface	RS232, Opto-coupler	
	Display	LED-Display	
Dimensions / Weight	Dimensions (H x W x D in mm)	1U x 19" x 245	1U x 19" x 350
	Weight	8,2 kg	13,2 kg
	Protection	IP 20	
Terminals	Input	1 x IEC (10 A)	
	Output	3 x IEC C13 (10 A)	
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended	
	Humidity	0-90 % RH @ 0- 40°C (non condensing)	
	Acoustic Noise	nearly noiseless <40 dB	
Safety / Enclosure	Safety	EN 62040-1	
	EMC	EN 62040-2, class C2	
	Certifications	CE	



# Line-Interactive MTX series

NEW

The MTX is a modern line-interactive UPS with a power factor of 0.9. It is available with power ratings of 800, 1100, 1500, 2000, and 3000 VA.

All of the important information about the UPS can be viewed easily on the illuminated LC display. The sleek design of this quiet unit blends seamlessly into any office environment.

To provide uninterruptible power for even longer periods, the capacity of MTX UPS units can be extended by adding external battery packs, available as optional extras.



## Details



Rear view of MTX 800/1100, 1500, 2000 and 3000



battery pack

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down

## Characteristics

- UPS-classification VI-SS-311 (IEC 62040-3)
- Line-Interactive technology
- Sine wave output
- High efficiency (> 97%)
- Automatic frequency detection & self-test
- Automatic restart when mains power is restored
- Cold start function (starting in battery mode)
- Hot-Swap
- Slot for additional (relay contacts / SNMP card)
- Management software
- 24 months' warranty

## Special features

- Excellent power factor of 0.9
- Equipped with RS-232 and USB port as standard
- Intelligent battery test with a display
- Nearly noiseless (Suitable for office environments)
- Programmable UPS outputs
- External battery packs can be added to all models
- User-friendly illuminated LC display
- Early detection of faults
- Silent ECO mode: When batteries are fully charged, it switches the fan(s) off
- Green Mode: UPS switches off in battery mode if no load is detected

## Specifications

MTX		800	1100	1500	2000	3000
Power	Power in VA	800	1100	1500	2000	3000
	Power in W	720	990	1350	1800	2700
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	7 / 17	5 / 12	7 / 17	5 / 12	6 / 14
	Internal batteries + 1 x battery pack	19 / 45	13 / 31	25 / 60	19 / 45	20 / 48
	Longer autonomy times on request					
Technology	Line-Interactive	VI-SS-311 in accordance with IEC 62040-3				
Phase	Input / Output	1-phase / 1-phase				
Input	Nominal voltage	208/220/230/240 VAC				
	Input voltage range	170-280 VAC				
	Input frequency range	50/60 Hz (Auto-Sensing)				
Output	Output voltage	208/220/230/240 VAC				
	Voltage Regulation	±1,5%				
	Frequency Range	50 Hz or 60 Hz ± 1 Hz				
	Transfer time	2-6 ms typical / 10 ms max.				
	Overload Capability (Line Mode)	< 120% 5 min.				
	Overload Capability (Battery Mode)	< 110% 1 min.				
	Voltage form	sine wave				
Efficiency	Utility mode	max. 97%				
	Battery					
Battery	Type	Maintenance free lead-acid battery				
	Life time	5 years, optional 10 years				
	Charging current (max)	1,5 A				
	Hot-Swappable	yes				
	Recharging time	ca. 6 h / 90% capacity				
Communication	Interface	RS232, USB, EPO				
	Slot for further communication cards	Optional relay contacts or SNMP card				
	Display	Multi language LC-Display				
Dimensions / Weight	Dimensions UPS (H x W x D in mm)	240 x 145 x 376		240 x 145 x 484		338 x 190 x 427
	Dimensions battery pack (HxBxT in mm) optional	240 x 145 x 397				338 x 190 x 416
	Weight (UPS)	12,7 kg	13,1 kg	20,4 kg	21,6 kg	30,5 kg
	Weight (battery pack)	depending on the quantity of batteries				
	Protection	IP 20 (optionally higher protection class possible)				
Terminals	Input	IEC (10 A)			IEC (16 A)	
	Output	8 x IEC C13 (10 A)				8xIEC C13 10A 1xIEC C19 16A
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended				
	Humidity	0-90 % RH @ 0- 40°C (non condensing)				
	Acoustic Noise	Normal mode: nearly noiseless <45 dB Battery-mode / charging < 55dB				
Safety / Enclosure	Safety	EN 62040-1				
	EMC	EN 62040-2, class C2				
	Certifications	CE				

# Line-Interactive MTD-RM series

The MTD-RM series is EFFEKTA®s' further development of the line-interactive MT-RM-series. It protects sensitive consumers from power blackouts, spikes and other disruptions. Areas of application are computers, remote telecommunications and other computer-aided systems.

The unit's compact and stable construction has been complemented by a convenient LCD display for easier operation.



## Rear view



MTD RM 1U (700-1500) or 2U (2000 VA)



MTD RM 3U (3000 VA)

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down

## Characteristics

- UPS-classification VI-SS-311 (IEC 62040-3)
- Line-interactive technology
- User-friendly LCD-display
- Compact design: only 1U (700/1000/1500VA), 2U (2000VA) and 3U (3000VA)
- Sine wave output
- Automatic frequency detection
- Equipped with RS-232 port as standard
- Slot for optional adapters: relay-card, opto-coupler, USB or SNMP
- Management software
- 24 months' warranty

## Specifications

MTD		700 RM	1000 RM	1500 RM	2000 RM	3000 RM
Power	Power in VA	700	1000	1500	2000	3000
	Power in W	438	625	938	1250	1875
Autonomy time	With internal batteries in minutes	4 / 9	3 / 8	2 / 5	4 / 9	3 / 6
	100% / 50% load (cos. phi 0,7)					
Technology	Line-Interactive	VI-SS-311 in accordance with IEC 62040-3				
Phase	Input / Output	1-phase / 1-phase				
Input	Rated Voltage	230 VAC				
	Input voltage range	170-300 VAC				
	Input frequency range	50/60 Hz (Auto-Sensing)				
	Output voltage	220/230/240 VAC				
Output	Voltage Regulation	±15%				
	Frequency Range	50 Hz oder 60 Hz ± 1 Hz				
	Transfer time	2-6 ms typical / 10 ms max.				
	Overload Capability (Line Mode)	< 120% 5 min.				
	Overload Capability (Battery Mode)	< 110% 1 min.				
	Voltage form	sine wave				
	Utility mode	max. 97 %				
Efficiency Battery	Type	Maintenance free lead-acid battery				
	Life time	5 years, optional 10 years				
	Charging current (max)	2,5 A				
	Recharging time	ca. 5 h / 90% capacity				
Communication	Interface	RS232				
	Slot for further communication cards	Optional relay contacts or SNMP card				
	Display	LC-Display				
Dimensions / Weight	Dimensions (H x W x D in mm)	44 (1U) x 440 x 515			88 (2U) x 440 x 465	133 (3U) x 440 x 465
	Weight (UPS)	18 kg	20,2 kg	24,5 kg	36,9 kg	
	Protection	IP 20				
Terminals	Input	IEC (10 A)			IEC (16 A)	
	Output (10 A)	5 x IEC C13			6xIEC C13	8xIEC C13
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended				
	Humidity	0-90 % RH @ 0-40°C (non condensing)				
	Acoustic Noise	< 55 dB				
Safety / Enclosure	Safety	EN 62040-1				
	EMC	EN 62040-2, class C2				
	Certifications	CE				



# Line-Interactive MTD-RT series

The MTD RT and MTD XL RT is EFFEKTA®’s high-end line-interactive version of the MTD series. The back-up time of the XL-models can be extended by additional external battery packs in a unified design.

Its RackTower housing and the rotating LCD display allow both the use as a tower unit as well as installation in 19” cabinets.



## Rear view



All MTD RT models offer at least 8 IEC C13 (10A) Consumer outputs.

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down

## Characteristics

- UPS-classification VI-SS-311 (IEC 62040-3)
- Line-interactive technology
- Excellent power factor of 0.9
- High efficiency (> 97%)
- „RackTower“ can be used both as a standalone unit, as well as a 19” rack mount unit
- XL-models expandable by external battery packs
- Huge input voltage range
- User-friendly LCD display with backlight
- Programmable outputs
- Hot swappable batteries
- Sine wave output
- Automatic frequency detection
- Equipped with RS-232 and USB port as standard
- Slot for optional adapters: relay-card or SNMP
- Management software
- 24 months’ warranty

## Specifications

MTD		1000 RT	1500 RT	2000 RT	3000 RT
Power	Power in VA	1000	1500	2000	3000
	Power in W	900	1350	1800	2700
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	7 / 15	5 / 11	7 / 15	5 / 11
	Internal batteries + 1 x battery pack	26 / 55	14 / 30	25 / 53	13 / 28
	Longer autonomy times on request (XL)				
Technology	Line-Interactive	VI-SS-311 in accordance with IEC 62040-3			
Phase	Input / Output	1-phase / 1-phase			
Input	Nominal voltage	220/230/240 VAC			
	Input voltage range	161-276 VAC			
	Input frequency range	50/60 Hz (Auto-Sensing)			
Output	Output voltage	220/230/240 VAC			
	Voltage Regulation	±5%			
	Frequency Range	50 Hz or 60 Hz ± 1 Hz			
	Transfer time	2-6 ms typical / 10 ms max.			
	Overload Capability (Line Mode)	< 110% for 3 min.			
	Overload Capability (Battery Mode)	< 110% for 30 sec.			
	Voltage form	sine wave			
Efficiency	Utility mode	max. 97%			
	Battery	Type	Maintenance free lead-acid battery		
Life time		5 years, optional 10 years			
Charging current (max)		1,5A standard / 4,5A XL version / ab. 2 battery pack 7A			
Hot-Swappable		Yes			
Recharging time		ca. 6 h / 90% capacity			
Communication	Interface	RS232, USB, EPO			
	Slot for further communication cards	Optional relay contacts or SNMP card			
	Display	LC-Display			
Dimensions / Weight	Dimensions (H x W x D in mm)	86,5 (2U) x 438 (19") x 430		86,5 (2U) x 438 (19") x 600	
	Dimensions of battery extension (HxBxT in mm) optional	86,5 (2U) x 438 (19") x 430		86,5 (2U) x 438 (19") x 600	
	Weight USV (Standard / XL)	16 kg / 12 kg		29,5 kg / 18,6 kg	
	Weight battery pack	depending on the quantity of batteries			
	Protection	IP 20 (optionally higher protection class possible)			
Terminals	Input	IEC (10 A)			IEC (16 A)
	Output	8 x IEC C13 (10 A)			8 x IEC C13 (10 A) 1 x IEC C19 (16 A)
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended			
	Humidity	0-90 % RH @ 0- 40°C (non condensing)			
	Acoustic Noise	< 52 dB			
Safety / Enclosure	Safety	EN 62040-1			
	EMC	EN 62040-2, class C2			
	Certifications	CE			

# Online double conversion

## MCI series

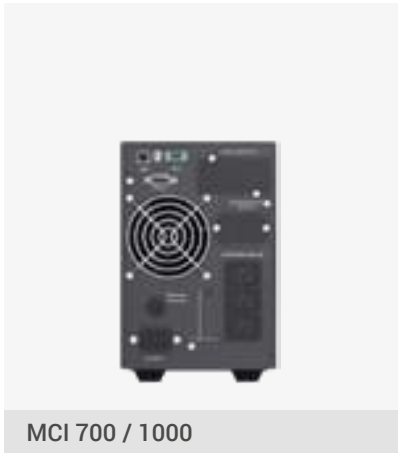
The MCI is EFFEKTA®'s newest online double-conversion UPS with power factor 0.9. It is equipped with an electronic bypass and is to be applied with supersensitive and critical applications like servers, workstations, measurement technology or industrial plants

For full control and monitoring, it provides each one USB and RS232 interface and can be supplemented via its slot by optional communication cards.

All models can be extended in the autonomy time through external battery packs. The XL versions increase this possibility by larger chargers.



### Rear view



MCI 700 / 1000



MCI 2000



MCI 3000

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements

## Characteristics

- UPS Classification VFI-SS-111 (IEC 62040-3)
- Online double-conversion
- All models with expandable batteries
- XL version with stronger charger
- Wide input voltage range (110-300VAC)
- Excellent power factor of 0.9
- Microprocessor controlled
- Automatic frequency detection
- With sinusoidal output switchable to ECO mode
- USB and RS232 as standard
- Slot for another optional adapter
- Management software for all popular OS
- 24 months' warranty

## Specifications

MCI		700	1000	2000	3000
Power	Power in VA	700	1000	2000	3000
	Power in W	630	900	1800	2700
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	11 / 25	7 / 15	7 / 15	6 / 13
	Internal batteries + 1 x battery pack	40 / 84	26 / 55	35 / 74	23 / 48
	Longer autonomy times on request (XL)				
Technology	Online double conversion	VFI-SS-111 in accordance with IEC 62040-3			
Phase	Input / Output	1-phase / 1-phase			
Input	Nominal voltage	220/230/240 VAC			
	Input voltage range	110-300 VAC			
	Input frequency range	50/60 Hz (Auto-Sensing)			
Output	Output voltage	220/230/240 VAC			
	Voltage Regulation	±2%			
	Frequency Range	50 Hz or 60 Hz ± 1 Hz			
	Transfer time	none			
	Overload Capability (Line Mode)	< 110% für 1 min. / < 150% für 30 sec.			
Efficiency	Voltage form	sine wave			
	ECO mode	max. 94 %			
	Battery	Type	Maintenance free lead-acid battery		
	Life time	5 years, optional 10 years			
	Charging current (max)	1,5 A Standard / 8 A XL-Version			
	Recharging time	ca. 6 h / 90% capacity / XL depending on the equipment			
Communication	Interface	RS232, USB, EPO			
	Slot for further communication cards	Optional relay contacts or SNMP card			
	Display	LC-Display			
Dimensions / Weight	Dimensions (H x W x D in mm)	220 x 145 x 400		347 x 192 x 460	
	Dimensions of battery extension (HxBxT in mm) optional	220 x 145 x 400		347 x 192 x 460	
	Weight USV (Standard / XL)	13 kg / 7 kg		31 kg / 13 kg	
	Weight battery pack	depending on the quantity of batteries			
Terminals	Protection	IP 20 (optionally higher protection class possible)			
	Input	IEC (10 A)		IEC (16 A)	
	Output	3 x IEC C13 (10 A)		6 x IEC C13 (10 A)	8 x IEC C13 (10 A) 1 x IEC C19 (16 A)
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended			
	Humidity	0-90 % RH @ 0- 40°C (non condensing)			
	Acoustic Noise	< 50 dB			
Safety / Enclosure	Safety	EN 62040-1			
	EMC	EN 62040-1			
	Certifications	CE			



# Online double conversion

## MKD-RT series

The MKD-RT is EFFEKTA®'s high-end model in the field of high-quality microprocessor-based online double conversion UPS's for your IT environment or metrology and industrial plants.

The MKD-RT is already equipped with extensive and specific features, which are usually provided in the UPS market by most expensive special UPSs. The programmable switch contacts, or the adjustable restart function are just two of countless examples. The XL versions also offer the possibility of battery extension.



### Rear view



With RS232 and USB interface, emergency contact (EPO) and individually programmable switch contacts.

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements

### Characteristics

- UPS Classification VFI-SS-111 (IEC 62040-3)
- Online double-conversion
- Can be used as tower as well as 19"-unit
- User-friendly rotating LCD display
- Wide input voltage range (120-276VAC)
- Excellent power factor of 0.9
- With sinusoidal output switchable to ECO mode
- Hot swappable batteries
- Programmable outputs
- Automatic frequency detection
- Output frequency preset
- Extensive communication & control
- Programmable switch contacts as standard
- Emergency power-off „EPO“ as standard
- Slot for another optional adapter
- Management software
- Operation of a frequency converter is possible
- 24 months' warranty

### Specifications

MKD		700 RT	1000 RT	1500 RT	2000 RT	3000 RT
Power	Power in VA	700	1000	1500	2000	3000
	Power in W	630	900	1350	1800	2700
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	9 / 20	7 / 15	5 / 11	5 / 11	7 / 15
	Internal batteries + 1 x battery pack	40 / 84	26 / 55	35 / 74	11 / 23	13 / 28
	Longer autonomy times on request (XL)					
Technology	Online double conversion	VFI-SS-111 in accordance with IEC 62040-3				
Phase	Input / Output	1-phase / 1-phase				
Input	Nominal voltage	220/230/240 VAC				
	Input voltage range	120-276 VAC				
	Input frequency range	50/60 Hz (Auto-Sensing)				
Output	Output voltage	220/230/240 VAC				
	Voltage Regulation	±1%				
	Frequency Range	50 Hz or 60 Hz ± 1 Hz				
	Transfer time	none				
	Overload Capability (Line Mode)	< 130%: 12 sec.. / < 150%: 1,5 sec.				
	Voltage form	Sine wave				
Efficiency	ECO mode	Max. 95%				
Battery	Type	Maintenance free lead-acid battery				
	Life time	5 years, optional 10 years				
	Charging current (max)	1,5A Standard / 6 A XL-Version				
Communication	Recharging time	ca. 6 h / 90% capacity / XL depending on the equipment				
	Interface	RS232, USB, EPO				
	Slot for further communication cards	Optional relay contacts or SNMP card				
Dimensions / Weight	Display	LC-Display				
	Dimensions UPS (H x W x D in mm) as a 19" installation variant	2U x 438 x 435				2U x 438 x 600
	Dimensions of battery extension (H x W x D in mm) optional	2U x 438 x 435				2U x 438 x 604
	Weight USV (Standard / XL)	13,2 kg / 8,4 kg		19,7 kg / 9,3 kg		27,8 kg / 13 kg
	Weight battery pack	depending on the quantity of batteries				
	Protection	IP 20 (optionally higher protection class possible)				
Terminals	Input	IEC (10 A)		IEC (16 A)		
	Output	8 x IEC C13 (10 A)				8 x IEC C13 (10 A) 1 x IEC C19 (16 A)
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended				
	Humidity	0-90 % RH @ 0- 40°C (non condensing)				
	Acoustic Noise	< 52 dB				
Safety / Enclosure	Safety	EN 62040-1				
	EMC	EN 62040-2, class C1				
	Certifications	CE				

# Online double conversion

## MKD-RT, 6-10 kVA

The compact MKD-RT models with 6 and 10kVA offer high power in a small space. It's already equipped with extensive and specific features, which are usually provided in the UPS market by most expensive special UPSs. The programmable switch contacts, or the adjustable restart function are just two of countless examples.

The XL versions also offer the possibility of battery extension.



### Details



With existing standard RS232 and USB interface as well as standard emergency contact (EPO).

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements
- Customer-oriented individual service and maintenance contracts

### Characteristics

- UPS Classification VFI-SS-111 (IEC 62040-3)
- Online double conversion
- Can be used as tower as well as 19"-unit
- User-friendly rotating LCD display
- Optional XL version with expandable batteries
- Wide input voltage range (120-276VAC)
- Excellent power factor of 0.9
- Hot-Swap: Batteries can be replaced while the system is operating
- With sinusoidal output switchable to ECO mode
- Microprocessor controlled
- Automatic frequency detection
- Output frequency preset
- Extensive communication & control
- Emergency power-off „EPO“ as standard
- Slot for another optional adapter
- Management software
- 24 months' warranty

### Specifications

MKD		6 kVA RT	10 kVA RT
Power	Power in VA	6000	10000
	Power in W	5400	9000
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	4 / 9	5 / 11
	Internal batteries + 1 x battery pack	20 / 42	17 / 36
	Longer autonomy times on request (XL)		
Technology	Online double conversion	VFI-SS-111 in accordance with IEC 62040-3	
Phase	Input / Output	1-phase / 1-phase	
Input	Nominal voltage	220/230/240 VAC	
	Input voltage range	120-276 VAC	
	Input frequency range	50/60 Hz (Auto-Sensing)	
	Output voltage	220/230/240 VAC	
Output	Voltage Regulation	±1%	
	Frequency Range	50 Hz or 60 Hz ± 1 Hz	
	Transfer time	none	
	Overload Capability (Line Mode)	< 130%: 2 min. / < 150%: 30 sec.	
	Voltage form	Sine wave	
Efficiency	ECO mode	Max. 97%	
	Battery		
Battery	Type	Maintenance free lead-acid battery	
	Life time	5 years, optional 10 years	
	Charging current (max)	1,0 A Standard / 8 A XL-Version	1,7 A Standard / 8 A XL-Version
	Recharging time	ca. 6 h / 80% capacity / XL depending on the equipment	
Communication	Interface	RS232, USB, EPO, Parallelport	
	Slot for further communication cards	Optional relay contacts or SNMP card	
	Display	LC-Display	
	Parallel switching	Max. 2 systems for redundancy or to boost performance	
Dimensions / Weight	Dimensions UPS (H x W x D in mm) as a 19" installation variant	3U x 438 x 725	5U x 438 x 732
	Dimensions of battery extension (H x W x D in mm) optional	3U x 438 x 589	3U x 438 x 624
	Weight UPS (Standard / XL)	46 kg / 19 kg	82,5 kg / 26 kg
	Weight battery pack	depending on the quantity of batteries	
Terminals	Protection	IP 20 (optionally higher protection class possible)	
	Input	Fixed connection on terminals	
	Output Standard	4 x IEC C13 (10 A) / 2 x IEC C19 (16 A)	8 x IEC C19 (16 A)
	Output XL	2 x IEC C13 (10 A) / 2 x IEC C19 (16 A)	2 x IEC C19 (16 A)
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended	
	Humidity	0-90 % RH @ 0- 40°C (non condensing)	
	Acoustic Noise	< 55 dB	
Safety / Enclosure	Safety	EN 62040-1	
	EMC	EN 62040-2, class C3	
	Certifications	CE	



# AC large UPS

## ADIRA 6-10 kVA

With its compact design, the ADIRA can be used on a very limited space. Its back-up time can be extremely flexible extended with external battery packs.

Due to the continuous development of our UPS technology the ADIRA offers you an improved sinus quality and a power factor of 0.9.

The usage of IGBT rectifiers reduces the distortion of dependent mains. The current drain is almost ideally sinusoidal.



### Rear view



### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements
- Customer-oriented individual service and maintenance contracts

### Characteristics

- UPS classification VFI-SS111 (IEC 62040-3)
- Online double conversion
- PFC rectifier with IGBT technology
- High efficiency
- Sine wave output
- Digital signaling processor
- Clearly arranged LCD display
- Compact design
- USB interface as standard
- Expansion Slot for SNMP card
- 24 months warranty

### Special features

- Huge input voltage range
- Power factor > 0,9
- Eco Mode (efficiency > 96 %)
- Low THD(i) even at partial load
- Frequency converter mode
- Relay contacts as standard

### Specifications

ADIRA		6 kVA	10 kVA
Power	Power in VA	6000	10000
	Power in W	5400	9000
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	8 / 18	6 / 13
	Internal batteries + 1 x battery pack	30 / 63	16 / 34
	Longer autonomy times on request (XL)		
Technology	Online double conversion	VFI-SS-111 in accordance with IEC 62040-3	
Phase	Input / Output	1-phase / 1-phase	
Input	Nominal voltage	208/220/230/240 VAC	
	Input voltage range	110-276 VAC	
	Input frequency range	50/60 Hz (Auto-Sensing)	
	Output voltage	208/220/230/240 VAC	
Output	Voltage Regulation	±1%	
	Frequency Range	50 Hz or 60 Hz ± 1 Hz	
	Transfer time	none	
	Overload Capability (Line Mode)	< 125%: 2 min. / < 150%: 30 sec.	
	Voltage form	sine wave	
	ECO mode	max. 95%	
Efficiency	Type	Maintenance free lead-acid battery	
	Life time	5 years, optional 10 years	
	Charging current (max)	1,4 A Standard / 4 A XL-Version - optional 12 A	
Communication	Recharging time	ca. 8 h / 90% capacity / XL depending on the equipment	
	Interface	USB, Switch contacts, EPO	
	Slot for further communication cards	Optional relay contacts or SNMP card	
	Display	LC-Display	
Dimensions / Weight	Parallel switching	Max. 4 systems for redundancy or to boost performance	
	Dimensions UPS (HxBxT in mm)	708 x 260 x 550	
	Dimensions of battery extension (H x W x D in mm) optional	708 x 260 x 550	
	Weight UPS (Standard / XL)	80 kg / 25,5 kg	84 kg / 29,5 kg
Terminals	Weight battery pack	depending on the quantity of batteries	
	Protection	IP 20 (optionally higher protection class possible)	
	Input	Fixed connection on terminals	
Environmental conditions	Output	Fixed connection on terminals	
	Temperature	0°C – 40°C, 20°C recommended	
	Humidity	0-90 % RH @ 0- 40°C (non condensing)	
Safety / Enclosure	Acoustic Noise	< 52 dB	
	Safety	EN 62040-1	
	EMC	EN 62040-2, class C3	
	Certifications	CE	

# AC large UPS

## ADIRA 10-20 kVA

With its compact design, the ADIRA can be used on a very limited space. Its back-up time can be extremely flexible extended with external battery packs. Due to the continuous development of our UPS technology the ADIRA offers you an improved sinus quality and a power factor of 0.9.

The usage of IGBT rectifiers reduces the distortion of dependent mains. The current drain is almost ideally sinusoidal.

In addition to all that the availability also increases due to the hot-swappable batteries.



### Rear view



Adira 10 kVA 3/1 ph



Adira 20 kVA 3/1 ph

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements
- Customer-oriented individual service and maintenance contracts

### Characteristics

- UPS classification VFI-SS111 (IEC 62040-3)
- Online double conversion
- PFC rectifier with IGBT technology
- High efficiency
- Sine wave output
- Digital signaling processor
- Clearly arranged LCD display
- Compact design
- USB interface as standard
- RS232 interface as standard
- Expansion Slot for SNMP card / relay contacts
- 24 months warranty

### Special features

- Huge input voltage range
- Power factor > 0,9
- Eco mode (efficiency > 96%)
- „Hot swappable“ batteries
- Low THD(i) even at partial load
- Frequency converter mode

### Specifications

ADIRA		10 kVA 3/1ph	20 kVA 3/1ph
Power	Power in VA	10000	20000
	Power in W	9000	18000
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	8 / 18	8 / 18
	Internal batteries + 1 x battery pack	20 / 43	14 / 30
	Longer autonomy times on request (XL)		
Technology	Online double conversion	VFI-SS-111 in accordance with IEC 62040-3	
Phase	Input / Output	3-phase / 1-phase	
Input	Nominal voltage	400 VAC	
	Input voltage range	190-478 VAC	
	Input frequency range	50/60 Hz (Auto-Sensing)	
	Output voltage	208/220/230/240 VAC	
Output	Voltage Regulation	±1%	
	Frequency Range	50 Hz or 60 Hz ± 1 Hz	
	Transfer time	none	
	Overload Capability (Line Mode)	< 130% für 60 sec. / < 150% für 10 sec.	
	Voltage form	sine wave	
	ECO mode	max. 97%	
Efficiency	Type	Maintenance free lead-acid battery	
	Life time	5 years, optional 10 years	
	Charging current (max)	2A	4A
Communication	Recharging time	ca. 8 h / 90% capacity	
	Interface	USB, RS232, EPO	
	Slot for further communication cards	Optional relay contacts or SNMP card	
	Display	LC-Display	
Dimensions / Weight	Parallel switching	Max. 4 systems for redundancy or to boost performance	
	Dimensions UPS (HxBxT in mm)	890 x 350 x 650	
	Dimensions of battery extension (H x W x D in mm) optional	708 x 260 x 550	
	Weight UPS (standart)	115 kg	183 kg
	Weight battery pack	depending on the quantity of batteries	
Terminals	Protection	IP 20 (optionally higher protection class possible)	
	Input	Fixed connection on terminals	
Environmental conditions	Output	Fixed connection on terminals	
	Temperature	0°C – 40°C, 20°C recommended	
	Humidity	0-90 % RH @ 0- 40°C (non condensing)	
Safety / Enclosure	Acoustic Noise	< 52 dB	
	Safety	EN 62040-1	
	EMC	EN 62040-2, class C3	
Certifications		CE	



# AC large UPS

## TRITON M1

With the TRITON EFFEKTA® offers a modern, modular design, online double-conversion UPS with 3-phase input & output.

The system is operated with a power module from 10 to a maximum of 40kVA. In this way, the TRITON achieves a very high power density. Further up to 4 of these systems can be operated in parallel.

10, 15 and 20 kVA are optionally available with a power factor of 1.0



### Details



Modules accessible from the front



Power modules

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements
- Customer-oriented individual service and maintenance contracts

### Characteristics

- UPS classification VFI-SS-111 (IEC 62040-3)
- Online double conversion with sinusoidal output
- Easy maintenance through modular design
- Parallel connection of up to 4 systems possible
- Large input voltage range
- High input power factor up to 1 (0.99)
- High efficiency (up to 95%)
- switchable to ECO mode (> 98%, line-interactive)
- High output power factor (0.9)
- 10, 15, 20kVA optionally with power factor 1,0
- EPO (remote shutdown)
- Temperature-controlled fan
- 3-step gentle battery charging method
- Extensive communication interfaces
- Management software for all common OS
- 24 months warranty

### Specifications

TRITON M1		10 kVA*	15 kVA*	20 kVA*	30 kVA	40 kVA
Power	Power in VA	10000	15000	20000	30000	40000
	Power in W	9000	13500	18000	27000	36000
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	9 / 21	2 / 5	9 / 21	2 / 5	7 / 17
	Longer autonomy times on request					
Technology	Online double conversion	VFI-SS-111 in accordance with IEC 62040-3				
Phase	Input / Output	3-phase / 3-phase				
Input	Nominal voltage	380/400/415 VAC				
	Input voltage range	208-478 VAC				
	Input frequency range	50/60 Hz (Auto-Sensing)				
	Circuit feedback THDI	< 3%				
	Output voltage	380/400/415 VAC				
Output	Voltage Regulation	±2%				
	Power factor*	0,9 (optional 1,0)				0,9
	Frequency Range	50 Hz or 60 Hz ± 1 Hz				
	Transfer time	none				
	Overload Capability (Line Mode)	< 125%: 10 min. / < 150%: 1 min				
Efficiency Battery	Voltage form	sine wave				
	Normal mode / ECO mode	max. 95 / 98%				
	Type	Maintenance free lead-acid battery				
	Life time	5 years, optional 10 years				
	Charging current (max)	6 A				10 A
Communication	Recharging time	2 h, dependent on accumulator capacity				
	Interface	RS232, RS485, EPO, REPO				USB, RS232, RS485, EPO, REPO dry contact, Temp.sensor
	Communication cards	Optional relay contacts or SNMP card				
	Slot for communication cards	1				2
	Display	multi language LC-Display				
Dimensions / Weight	Parallel switching	Max. 4 systems for redundancy or to boost performance				
	Dimensions UPS (H x W x D in mm)	1200 x 600 x 780				
	Weight UPS (With standard accumulator)	287 kg	291 kg	393 kg	402 kg	573 kg
	Weight battery pack	depending on the quantity of batteries				
Terminals	Protection	IP 20 (optionally higher protection class possible)				
	Input	Fixed connection on terminals				
	Output	Fixed connection on terminals				
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended				
	Humidity	0-90 % RH @ 0- 40°C (non condensing)				
	Acoustic Noise	< 55 dB				
Safety / Enclosure	Safety	EN 62040-1				
	EMC	EN 62040-2, class C3				
	Certifications	CE				

\* For the optionally available 10, 15, 20kVA models with power factor 1: kVA = KW

# AC large UPS

## TRITON M2

With the TRITON EFFEKTA® offers a modern, modular design, online double conversion UPS with 3-phase input & output.

The system is operated with two 30 or 40kVA power modules. Further up to 4 of these systems can be operated in parallel.

The power modules allow easy maintenance and replacement and therefore low service costs (very low MTTR value).



### Details



Modules accessible from the front

To make commissioning, operation and maintenance as simple as possible, the modules as well as all controls and interfaces can be accessed from the front.

The intelligent slots provide expansion options for additional communication boards.

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements
- Customer-oriented individual service and maintenance contracts

### Characteristics

- UPS classification VFI-SS-111 (IEC 62040-3)
- Online double conversion with sinusoidal output
- Easy maintenance through modular design
- Large input voltage range
- High input power factor up to 1 (0.99)
- High efficiency (up to 95%)
- Switchable to ECO mode (> 98%, line-interactive)
- High output power factor (0,9)
- EPO (remote shutdown)
- Temperature-controlled fan
- 3-step gentle battery charging method
- Extensive communication interfaces
- Management software for all common OS
- 24 months warranty

### Specifications

TRITON M2		60 kVA	80 kVA
Power	Power in VA	60000	80000
	Power in W	54000	72000
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	7 / 17	4 / 10
	Longer autonomy times on request		
Technology	Online double conversion	VFI-SS-111 in accordance with IEC 62040-3	
Phase	Input / Output	3-phase / 3-phase	
Input	Nominal voltage	380/400/415 VAC	
	Input voltage range	208-478 VAC	
	Input frequency range	50/60 Hz (Auto-Sensing)	
	Circuit feedback THDI	< 3%	
Output	Output voltage	380/400/415 VAC	
	Voltage Regulation	±2%	
	Power factor	0,9	
	Frequency Range	50 Hz or 60 Hz ± 1 Hz	
	Transfer time	none	
	Overload Capability (Line Mode)	< 125%: 10 min. / < 150%: 1 min.	
	Voltage form	sine wave	
	Normal mode / ECO mode	max. 95 / 98%	
Efficiency	Type	Maintenance free lead-acid battery	
	Life time	5 years, optional 10 years	
Battery	Charging current (max)	10A	
	Recharging time	8 h, dependent on accumulator capacity	
	Interface	USB, RS232, RS485, EPQ, REPO dry contact, Temp.sensor	
	Communication cards	Optional relay contacts or SNMP card	
Communication	Slot for communication cards	2	
	Display	multi language LC-Display	
	Parallel switching	Max. 4 systems for redundancy or to boost performance	
	Dimensions UPS (H x W x D in mm)	1200 x 600 x 780	
Dimensions / Weight	Weight UPS (without accumulators)	189 kg	195 kg
	Dimensions of battery extension (H x W x D in mm)	1200 x 600 x 780	
	Weight battery cabinet with standard configuration	606 kg	881 kg
	Protection	IP 20 (optionally higher protection class possible)	
Terminals	Input	Fixed connection on terminals	
	Output	Fixed connection on terminals	
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended	
	Humidity	0-90 % RH @ 0- 40°C (non condensing)	
	Acoustic Noise	< 55 dB	
Safety / Enclosure	Safety	EN 62040-1	
	EMC	EN 62040-2, class C3	
	Certifications	CE	



# AC large UPS

## TRITON M3

With the TRITON EFFEKTA® offers a modern, modular design, online double-conversion UPS with 3-phase input & output.

For simple commissioning, operation and maintenance of all controls, ports and the module are accessible from the front.



### Details



Modules accessible from the front

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements
- Customer-oriented individual service and maintenance contracts

### Characteristics

- UPS classification VFI-SS-111 (IEC 62040-3)
- Online double conversion with sinusoidal output
- Easy maintenance through modular design
- High efficiency (up to 95%)
- Switchable to ECO mode (> 98%, line-interactive)
- High output power factor (0,9)
- Temperature-controlled fan
- 100% suitable for load imbalances
- Programmable maintenance management
- Extensive communication interfaces
- 24 months warranty

### Specifications

TRITON M3		120 kVA	160 kVA	200 kVA
Power	Power in VA	120	160	200
	Power in W	108	144	180
Autonomy time 100% / 50% load (cos. phi 0,7)	With internal batteries in minutes	7 / 17	9 / 19	6 / 13
	Longer autonomy times on request			
Technology	Online double conversion	VFI-SS-111 in accordance with IEC 62040-3		
Phase	Input / Output	3-phase / 3-phase		
Input	Nominal voltage	380/400/415 VAC		
	Input voltage range	208-478 VAC		
	Input frequency range	50/60 Hz (Auto-Sensing)		
	Circuit feedback THDI	< 2%		
	Output	380/400/415 VAC		
Output	Voltage Regulation	±1%		
	Power factor	0,9		
	Frequency Range	50 Hz or 60 Hz ± 1 Hz		
	Transfer time	none		
	Overload Capability (Line Mode)	< 125%: 10 min. / < 150%: 1 min.		
	Voltage form	sine wave		
	Normal mode / ECO mode	max. 95 % / 98 %		
Efficiency	Battery	Maintenance free lead-acid battery		
	Type	10 years		
Battery	Life time	30 A		
	Charging current (max)	40 A	50 A	
	Recharging time	5 h, dependent on accumulator capacity		
	Interface	USB, RS232, RS485, EPQ, REPO dry contact, Temp. sensor contact		
Communication	Communication cards	Optional relay contacts or SNMP card		
	Slot for communication cards	2		
	Display	multi language LC-Display		
Dimensions / Weight	Parallel switching	Max. 4 systems for redundancy or to boost performance		
	Dimensions UPS (H x W x D in mm)	1600 x 600 x 850		
	Weight UPS (without accumulators)	345 kg	379 kg	413 kg
	Dimensions battery cabinet with standard configuration (H x W x D in mm)	2000 x 600 x 1100		
	Weight battery cabinet with standard configuration	1421 kg	2 x 1076 kg	2152 kg
Terminals	Protection	IP 20 (optionally higher protection class possible)		
	Input	Fixed connection on terminals		
	Output	Fixed connection on terminals		
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended		
	Humidity	0-90 % RH @ 0- 40°C (non condensing)		
	Acoustic Noise	< 70 dB		
Safety / Enclosure	Safety	EN 62040-1		
	EMC	EN 62040-2, class C3		
	Certifications	CE		

# Modular UPS system

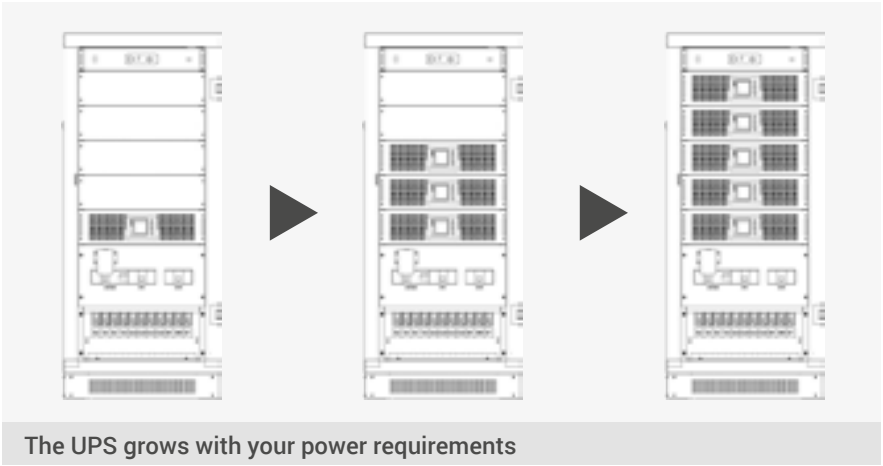
## THOR Modular

THOR Modular is EFFEKTA's new scalable online double-conversion UPS system with 3-phase in- and output. The system is available with a output power range of 10 up to 520kVA and can be equipped with modules from 10 up to 40kVA.

Further including up to 4 of these systems can be operated in parallel.



### ■ Details



The UPS grows with your power requirements



Cabinet with batteries

### ■ Characteristics

- UPS classification VFI-SS-111 (IEC 62040-3)
- Online double conversion with sinusoidal output
- Large input voltage range
- Excellent power factor of 0,9
- Power factor 1,0 at 10/20kVA/kW modules
- High input power factor up to 1 (0.99)
- High efficiency (up to 95%)
- Switchable to ECO mode (up to 98%, line-interactive)
- Modular N + X parallel redundancy
- Parallel operation for up to 13 modules per cabinet
- High power density (up to 520kVA/cabinet)
- Monitoring and control via touch screen LCD panel
- EPO (remote shutdown)
- Extensive communication interfaces
- Management software for all common OS
- Battery voltage adjustable
- 100% suitable for load imbalances
- Temperature-compensated battery charge
- Programmable „service indicator“
- 24 months warranty

### ■ Power module



Single power module



Back view (module 10/20kVA)

The THOR Modular can be equipped with modules 10 to 40kVA depending on the system series (see table on the next page).

The modules are extremely compact (only 3U) and provide high power density. Each module contains its own charger and remains independent operational even in case of failure of the control unit. They can be replaced during operation with little effort, maintained or can be extended by additional modules.

- Very wide input voltage range
- Low THDI <3%
- Output power factor 1 (10/20kVA modules) or  $\geq 0.99$  (30/40kVA modules)
- Large input voltage window
- Each module with its own mains and bypass
- Modular N + X parallel redundancy
- Compact modular design (3U)

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements
- Customer-oriented individual service and maintenance contracts



The modular and redundant design of the THOR system ensures high reliability and availability. When configuring N + X parallel-redundancy, the load is immediately redistributed without interruption on the remaining modules if one module fails.

In case of faults or to general maintenance the modules can be removed during operation and / or replaced by new ones. As well as all THOR Modular systems can be extended on the fly without much effort with additional modules. Because of this

„hot-swappable“ feature any reduction in the current operation of your consumer is avoided. This helps you to improve efficiency and avoid costs. The modules of the EFFEKTA THOR® Modular meet the highest technical standards of reliability and efficiency. The only 3 U high modules preserve sensitive loads from power blackouts, line noise, voltage and current peaks, frequency interference and disturbances caused by switching on the power grid and other risks.

## Cabinet module configurations

THOR Modular T1**				
Output power range*	Maximum power at N+1 redundancy	Possible module size	Max. no. of modules*	UPS cabinet size HxBxT in mm
10-40 kVA	30 kVA	10 kVA	4	1400 x 600 x 840
20-60 kVA	60 kVA	20 kVA	4 (3+1 redundant)	1400 x 600 x 840
20-100 kVA	80 kVA	20 kVA	5	1400 x 600 x 840
20-200 kVA	180 kVA	20 kVA	10	2000 x 600 x 1100

THOR Modular T2				
Output power range*	Maximum power at N+1 redundancy	Possible module size	Max. no. of modules*	UPS cabinet size HxBxT in mm
30-90 kVA	90 kVA	30 kVA	4 (3+1 redundant)	1400 x 600 x 840
30-150 kVA	120 kVA	30 kVA	5	1400 x 600 x 840
30-300 kVA	270 kVA	30 kVA	10	2000 x 600 x 1100

THOR Modular T3				
Output power range*	Maximum power at N+1 redundancy	Possible module size	Max. no. of modules*	UPS cabinet size HxBxT in mm
40-200 kVA	160 kVA	40 kVA	5	1600 x 600 x 860
40-320 kVA	280 kVA	40 kVA	8	2000 x 600 x 860
40-520 kVA	480 kVA	40 kVA	13	2000 x 1200 x 860

\* For N +1 redundancy in addition to the required total power another module is needed.

\*\* At 10/20kVA/kW modules kVA=kW (Power factor 1.0)  
On request, we shall be pleased to calculate the battery modules and appropriate cabinets best suited to your needs.

## Specifications T1 (10-200 kVA/kW, 10/20 kVA/kW modules)

THOR T1		10-40 kVA	20-60 kVA	20-100 kVA	20-200 kVA
Power	Power in kVA / kW	10-40 kVA/kW	20-60 kVA/kW	20-100 kVA/kW	20-200 kVA/kW
	Power per module	10 kVA/kW	20 kVA/kW	20 kVA/kW	20 kVA/kW
Autonomy time	THOR T1 UPS system	Can be configured to suit size and number of modules			
Technology	Online double conversion	n+x technology scalable / VFI-SS-111 in accordance with IEC 62040-3			
Phase	Input / Output	3-phase / 3-phase			
Input	Nominal voltage	380/400/415 VAC			
	Input voltage range	208-478 VAC			
	Input frequency range	50/60 Hz (Auto-Sensing)			
	Circuit feedback THDI	< 3%			
Output	Output voltage	380/400/415 VAC			
	Voltage Regulation	±1%			
	Power factor	1			
	Frequency Range	50 Hz or 60 Hz ± 5%			
	Transfer time	none			
	Overload Capability (Line Mode)	< 125%: 10 min. / < 150%: 1 min.			
	Voltage form	sine wave			
Efficiency	Normal mode / ECO mode	max. 95 % / 98 %			
Battery	Type	Maintenance free lead-acid battery			
	Life time	10 years			
	Charging current (max)	6 A per module			
	Recharging time	depending on the number of modules and accumulator capacity			
Communication	Interface	RS232, RS485, EPO button, REPO, parallel port, Temp. sensor contact			
	Communication cards	Optional relay contacts or SNMP card			
	Slot for communication cards	2			
	Display	multi language LC-Display			
	Parallel switching	Max. 4 systems for redundancy or to boost performance			
Dimensions / Weight	Dimensions UPS (H x W x D in mm)	1400 x 600 x 840			2000 x 600 x 1100
	Weight UPS (without modules and accumulators)	170 kg			270 kg
	Weight UPS module	26 kg (10 kW)	31 kg (20 kW)		
	Dimensions battery cabinet with standard configuration (H x W x D in mm)	2000 x 600 x 1100			
	Protection	IP 20 (optionally higher protection class possible)			
Terminals	Input	Fixed connection on terminals			
	Output	Fixed connection on terminals			
Environmental conditions	Temperature	0°C – 40°C, 20°C recommended			
	Humidity	0-90 % RH @ 0- 40°C (non condensing)			
Safety / Enclosure	Safety	EN 62040-1			
	EMC	EN 62040-2, class C3			
	Certifications	CE			

General data: THOR T1			10-40 kVA	20-60 kVA	20-100 kVA	20-200 kVA
Mechanical	Dimensions (H x W x D mm)	UPS	1400 x 600 x 840			2000 x 600 x 1100
		Modules	131 x 443 x 580			
	Weight in kg	UPS	170	170	170	270
		Modules	26 (10 kVA/kW)	31 (20 kVA/kW)	31 (20 kVA/kW)	31 (20 kVA/kW)
	Protection		IP20			
	Audible noise		< 60 dB @ 1 m			
	Communication	Status LED & LCD		Line mode, eco mode, bypass mode, battery low, battery bad, Overload & UPS Fault		
LCD display		Input Voltage, Input Frequency, Output Voltage, Output Frequency, Load Percentage, Battery Voltage & Inner Temperature				
Alarm (optical & acoustical)		Line failure, battery low, overload, system fault				
Interfaces			RS232, 2 x RS485, 2 x intelligent slot (SNMP or relay-option)			

■ Specifications T2 (30-300 kVA, 30 kVA modules)

THOR T2		30-90 kVA	30-150 kVA	30-300 kVA
Power	Power in kVA	30-90	30-150	30-300
	Power in kW	27-81	27-135	27-270
	Power per module	30 kVA / 27 kW		
Autonomy time	THOR T2 UPS system	Can be configured to suit size and number of modules		
Technology	Online double conversion	n+x technology scalable / VFI-SS-111 in accordance with IEC 62040-3		
Phase	Input / Output	3-phase / 3-phase		
Input	Rated Voltage configurable	380/400/415 VAC		
	Input voltage range	208-478 VAC		
	Input frequency range	50/60 Hz (Auto-Sensing)		
	Circuit feedback THDI	< 3%		
Output	Output voltage	380/400/415 VAC		
	Voltage Regulation	±1%		
	Power factor	0,9		
	Frequency Range	50 Hz or 60 Hz ± 5%		
	Transfer time	-		
	Overload Capability (Line Mode)	< 125%: 10 min. / < 150%: 1 min.		
Efficiency	Normal mode / ECO mode	max. 95 % / 98 %		
	Type	Maintenance free lead-acid battery		
Battery	Life time	10 years		
	Charging current (max)	10 A per module		
Communication	Recharging time	depending on the number of modules and battery capacity		
	Interface	RS232, RS485, EPO button, REPO, parallel port, Temp. sensor contact		
	Communication cards	Optional relay contacts or SNMP card		
	Slot for communication cards	2		
	Display	multi language LC-Display		
Dimensions / Weight	Parallel switching	Max. 4 systems for redundancy or to boost performance		
	Dimensions UPS (H x W x D in mm)	1400 x 600 x 840		2000 x 600 x 1100
	Weight UPS (without modules and accumulators)	149 kg	152 kg	290 kg
	Weight UPS module	32 kg		
	Dimensions battery cabinet with standard configuration (H x W x D in mm)	2000 x 600 x 1100		
Terminals	Protection	IP 20 (optionally higher protection class possible)		
	Input	Fixed connection on terminals		
Environmental conditions	Output	Fixed connection on terminals		
	Temperature	0°C – 40°C, 20°C recommended		
Safety / Enclosure	Humidity	0-90 % RH @ 0- 40°C (non condensing)		
	Safety	EN 62040-1		
	EMC	EN 62040-2, class C3		
Safety / Enclosure		EN 62040-2, class C3		
	Certifications	CE		

General data: THOR T2			30-90 kVA	30-150 kVA	30-300 kVA
Mechanical	Dimensions (H x W x D mm)	UPS	1400x600x840	1400x600x840	1400x600x840
		Modules	131x443x580		
	Weight in kg	UPS	149	152	290
		Modules	32		
Communication	Protection		IP20		
	Audible noise		< 60 dB @ 1 m		
	Status LED & LCD		Line mode, eco mode, bypass mode, battery low, battery bad, Overload & UPS Fault		
	LCD display		Input Voltage, Input Frequency, Output Voltage, Output Frequency, Load Percentage, Battery Voltage & Inner Temperature		
	Alarm (optical & acoustical)		Line failure, battery low, overload, system fault		
Interfaces			RS232, 2 x RS485, 2 x intelligent slot (SNMP or relay-option)		

■ Specifications T3 (40-520 kVA, 40 kVA modules)

THOR T3		40-200 kVA	40-320 kVA	40-520 kVA
Power	Power in kVA	40-200	40-320	40-520
	Power in kW	36-180	36-288	36-468
	Power per module	40 kVA / 36 kW		
Autonomy time	THOR T2 UPS system	Can be configured to suit size and number of modules		
Technology	Online double conversion	n+x technology scalable / VFI-SS-111 in accordance with IEC 62040-3		
Phase	Input / Output	3-phase / 3-phase		
Input	Nominal voltage	380/400/415 VAC		
	Input voltage range	208-478 VAC		
	Input frequency range	50/60 Hz (Auto-Sensing)		
	Circuit feedback THDI	< 3%		
Output	Output voltage	380/400/415 VAC		
	Voltage Regulation	±1%		
	Power factor	0,9		
	Frequency Range	50 Hz or 60 Hz ± 5%		
	Transfer time	none		
	Overload Capability (Line Mode)	< 125%: 10 min. / < 150%: 1 min.		
Efficiency	Normal mode / ECO mode	max. 95 % / 98 %		
	Type	Maintenance free lead-acid battery		
Battery	Life time	10 years		
	Charging current (max)	10 A per module		
Communication	Recharging time	depending on the number of modules and battery capacity		
	Interface	RS232, RS485, EPO button, REPO, parallel port, Temp. sensor contact		
	Communication cards	Optional relay contacts or SNMP card		
	Slot for communication cards	2		
	Display	multi language LC-Display		
Dimensions / Weight	Parallel switching	Max. 4 systems for redundancy or to boost performance		
	Dimensions UPS (H x W x D in mm)	1600 x 600 x 860	2000 x 600 x 860	2000 x 1200 x 860
	Weight UPS (without modules and accumulators)	205 kg	310 kg	450 kg
	Weight UPS module	34 kg		
	Dimensions battery cabinet with standard configuration (H x W x D in mm)	2000 x 600 x 1100		
Terminals	Protection	IP 20 (optionally higher protection class possible)		
	Input	Fixed connection on terminals		
Environmental conditions	Output	Fixed connection on terminals		
	Temperature	0°C – 40°C, 20°C recommended		
Safety / Enclosure	Humidity	0-90 % RH @ 0- 40°C (non condensing)		
	Safety	EN 62040-1		
	EMC	EN 62040-2, class C3		
Safety / Enclosure		EN 62040-2, class C3		
	Certifications	CE		

General data: THOR T3			40-200 kVA	40-320 kVA	40-520 kVA
Mechanical	Dimensions (H x W x D mm)	UPS	1600 x 600 x 860	2000 x 600 x 860	2000 x 1200 x 860
		Modules	131 x 443 x 580		
	Weight in kg	UPS	205	310	450
		Modules	34		
Communication	Protection		IP20		
	Audible noise		< 60 dB @ 1 m		
	Status LED & LCD		Line mode, eco mode, bypass mode, battery low, battery bad, Overload & UPS Fault		
	LCD Anzeige		Input Voltage, Input Frequency, Output Voltage, Output Frequency, Load Percentage, Battery Voltage & Inner Temperature		
	Alarm (optisch & akkustisch)		Strom-Ausfall, Batterie schwach, Überlast, Systemfehler		
Interfaces			RS232, 2 x RS485, 2 x intelligent slot (SNMP or relay-option)		

# Modular UPS system

## MHD Modular

MHD Modular is a scalable single phase or three-phase double-conversion UPS and can be configured to a capacity of 4-24kVA with maximum 6 modules. It can be configured to parallel redundancy which provides the maximum reliability. And delivers power output per modules from 4kVA to 24 kVA.

Each UPS system includes maximum six UPS modules that each module is operating independetly. If any one UPS module fails, the load is instantaneously redistributed among the remaining modules and the defective UPS module is automatically taken off-line from the system.



### Details



Retrofit expansion of the system is possible

Additional modules can be installed to the MHD Modular during normal operation without much time and effort. This hot swappable methode provides subsequent extension of the UPS system without any disturbance of normal operation of the users, so this system provides safing of costs.

Also the possibility to change defective modules during normal operation without any disturbance of the users leads to more safing of costs.

### Options for extended communication and maximum availability:

- SNMP/web or relay card for monitoring in network environments
- Additional battery modules to provide an uninterruptible power supply for up to several hours
- External manual bypass for planned UPS maintenance work or replacement of the UPS unit without shutting it down
- Extended warranty arrangements
- Customer-oriented individual service and maintenance contracts

### Characteristics

- UPS-classification VFI-SS-111 (IEC 62040-3)
- Online double conversion
- Modular design
- Scalable capacity in 4kVA steps up to 24kVA
- 1 or 3 phase input
- Hot swappable modules
- Sinewave output
- Digital signalprocessor
- Clearly arranged LCD display
- Modular battery extension
- Optionally incl. BACS battery management
- Compact design
- Little weight
- RS232, RS485 and expansion slots
- 24 months' warranty

### Specifications

MHD Modular		4-24 kVA
Power	Power in kVA	4-24
	Power in kW	2,8-16,8
	Power per module	4 kVA / 2,8 kW
Autonomy time	MHD Modular UPS system	Can be configured to suit size and number of modules
Technology	Online double conversion	n+x technology scalable / VFI-SS-111 in accordance with IEC 62040-3
Phase	Input / Output	1-phase / 1-phase or 3-phase / 1-phase
Input	Nominal voltage	230 VAC (1/N/PE) or 400 / 230 VAC (3/N/PE)
	Input voltage range	160 - 300 VAC (1-phase) or 277 - 520 VAC (3-phase)
	Input frequency range	50/60 Hz ± 4%
	Output voltage	220/230/240 VAC (adjustable)
Output	Voltage Regulation	± 2%
	Power factor	0,7
	Frequency Range	50 Hz / 60 Hz ± 0,2 Hz
	Transfer time	none
	Overload Capability (Line Mode)	< 125%: 30 sec. / < 130%: 2 sec.
	Voltage form	sine wave
	AC-AC	88%
Efficiency	Type	Maintenance free lead-acid battery
	Life time	10 years
	Charging current (max)	3,5 A per module
Battery	Recharging time	depending on the number of modules and battery capacity
	Interface	RS232, RS485
	Communication cards	Optional relay contacts or SNMP card
	Slot for communication cards	1
Communication	Display	LC-Display
	Dimensions UPS (H x W x D in mm)	965 x 442 x 700
	Weight UPS (without modules and accumulators)	75 kg
	Weight UPS module 4 kVA	15 kg
Dimensions / Weight	Dimensions battery cabinet with standard configuration (H x W x D in mm)	965 x 442 x 700
	Protection	IP 20 (optionally higher protection class possible)
	Input	Fixed connection on terminals
Terminals	Output	Fixed connection on terminals
	Temperature	0°C – 40°C, 20°C recommended
Environmental conditions	Humidity	0-90 % RH @ 0- 40°C (non condensing)
	Acoustic Noise	< 62 dB (A)
	Safety	EN 62040-1
Safety / Enclosure	EMC	EN 62040-2, class C3
	Certifications	CE



# Industrial specials

## PEGASUS II Industry EA1

PEGASUS II Industry IP54 Model EA1 is available in various versions from 10-40 kVA.

For industrial use or projects with special requirements on UPS technology, EFFEKTA® develops individual systems. Protection category IP54 means that the UPS system can also be installed in challenging industrial environments.

Other bespoke solutions, ones tailored to meet the requirements of an individual customer, such as special colors or warning colors, ventilation systems or others are possible.



### ■ Characteristics

- UPS classification VFI-SS111 (IEC 62040-3)
- Online double conversion
- Batteries inside the UPS cabinet
- PFC rectifier with IGBT technology
- Modular technology
- Output either 1- or 3-phase
- High efficiency
- Digital signaling processor
- Modules with progressive self diagnostics
- Clearly arranged LCD display
- RS232 and expandability for various interfaces
- 24 months warranty

### ■ Special features

- Protected IP 54 cabinet system
- Pull-UPS electronics for service purposes
- Socket for easy wiring
- Special ventilation system (optional cooling unit)

# Industrial specials

## PEGASUS II Industry GA1

EFFEKTA® develops individual systems for industrial use or projects that present unusual requirements on UPS technology.

This model is available in various versions, from 10-40 kVA. Protection category IP54 means that the UPS system can also be installed in challenging industrial environments.

Other bespoke solutions, ones tailored to meet the requirements of an individual customer, such as special colors or warning colors, ventilation systems or others are possible.



### ■ Characteristics

- UPS-classification VFI-SS-111 (IEC 62040-3)
- online double conversion
- PFC rectifier with IGBT technology
- Modular construction
- Pull-power modules
- Output either 1- or 3-phase
- Modules with comprehensive self-diagnostics
- High efficiency
- Sine wave output
- Digital signal processor
- Clearly arranged LCD display
- RS232 and expandability for various interfaces
- 24 months warranty

### ■ Special features

- Protected IP 54 cabinet system
- Special color according to customer specifications
- Pull-UPS electronics for service purposes
- Long periods of autonomy are possible
- Socket for easy wiring
- Special ventilation system (optional cooling unit)

# Industrial specials

## MTD Industry

The MTD industry for lifts is an EFFEKTA special production. This line-interactive UPS is specifically designed for the requirements of elevator controls.

The low internal power consumption of less than 10 watts helps operators of elevators to achieve a more favorable energy rating.

The batteries are housed in an external enclosure and can be replaced during operation. The entire UPS is extremely compact and prepared for wall mounting.



### ■ Characteristics

- UPS classification VI-SY-333 (IEC 62040-3)
- Output Power: 1200VA / 800W
- Input voltage: 230 (162-290) VAC, 50Hz
- Output modified sine
- Autonomy time: about 3 minutes at 80% load
- Batteries: 2 x 12V / 9Ah
- Maintenance-free sealed lead-acid batteries

### ■ Special features

- Automatic bypass
- Separately removable battery holder
- Messages via relay: Bypass status
- Messages via optocoupler: Battery LOW, UPS fault
- Programmable functions on input: Standby / power saving mode, Battery test

### ■ Details



Front view



Rear view



Battery (on the left) and USV (on the right)

# Special appliances

EFFEKTA® UPSs are not only suited for use in computers, but also for all sensitive, power-dependent units.

We have a solution for every kind of application. We are also experienced in custom designs and small production runs. All models are available in standard enclosures or can be supplied for switchboards or DIN rails.



GSV

The GSV is intended to provide the needed power to electric drive units for doors during powerfailures in emergency situations. The GSV provides up to 72 h standby mode and after that about 5 min with 500 W load. The system can be activated by an external dry contact. During a powerfailure after a delay (10 seconds default) a signal switch (500 ms impulse) will be sent to activate the electric drive unit. Back in normal mode the mains will be switched directly to the output. In normal mode the GSV-system is charging the internal batteries and in emergency mode it monitors the battery voltage.



UPS MTD-RT 1000 VA standard model

For customers with particular safety requirements, special versions of standard UPS units can be manufactured. Examples include devices with lockable IEC female connectors to protect connectors from being pulled out accidentally.



Identical UPS, but with lockable IEC female connectors



Powermanager

The Power Manager was specifically designed for industrial systems. Online double-conversion with integrated auto bypass. Mounting height 4U, to achieve a shortened modular depth of 300mm. All power lines, outputs and sockets for control signal (floating contacts) on hardwired Phoenix terminals. Optimised for 19" switch cabinet

# UPS management Software

The UPS management software solution PowerShut Plus runs as a client/server application for heterogeneous networks or local computers. It works on all common Windows OS, Novell, Linux and all current Unix derivatives. It also includes an SNMP agent for Windows NT and Novell. All Servers on the network can be shut down via RCCMD (Multiserver-Shutdown). The software provides all important UPS information such as battery level, temperature, condition of line-voltage and others in clear graphical displays. Disruptions can be reported by e-mail, mobile phone or fax.

## Software view



## Characteristics

- Available for Windows for all common Windows OS, Netware, Macintosh, UNIX and VMS
- UPS monitoring via floating contacts or serial interface
- Local or network shutdown on up to several hundred computers
- Integrated SNMP subagent (RFC 1628)
- Graphical interface with all UPS information
- Graphical interface on UNIX, MAC, VMS
- Event-based dispatch of network messages
- Event-based dispatch of e-mails and SMS
- Logging of all UPS status information and measurements in MS-Excel file
- Schedulers for time-controlled execution of reboot, shutdown etc.

# UPS management SNMP CS 141

CS141 adapters are available as stand-alone version and as a slot card. Both constructions are to have a fully equipped standard version and as a budget version is excluded functionality. For some UPS models you particularly compact and space saving of the CS 141 Mini available.



## Characteristics

- Compilation of data from EFFEKTA UPSs via one of the serial ports.
- Providing status information on several webpages through the embedded Web server.
- Execution of user-defined events, such as the controlled shutdown of multiple computers via RCCMD in case of system hazard.
- User notification via email, SMS, network messages
- status reports and event histories
- Data analysis with graphical display
- Termination of standard tasks
- Expandable by a SENSORMANAGER, for connecting various environmental sensors
- Optional: additional MODBUS functionality

## Specifications

CS 141	Professional		Budget		Mini
Design / Version	External	Slot	External	Slot	Slot
Power supply	12V (min. 9V, max. 30V DC), 150 mA				
Size W x L x H	69 x 126 x 35 mm	60 x 120 x 29 mm	69 x 126 x 35 mm	60 x 120 x 29 mm	42 x 80 x 26 mm
Weight	210 g	66 g	210 g	66 g	36 g
Ethernet	10/ 100 Mbit Base-T auto sense				
RS232 Interface	2	2	1	1	2
RS485 Interface	1	-	-	-	-
USB Interface	1	-	1	-	-
AUX Interface	1	1	-	-	-
MIB	RFC 1628 and private extension				



# Accessories

## ATS-16 / 30 A

The ATS-16 is a transfer switch for 1-phase electricity networks and switches between two power sources (manually or automatically). So it ensures a redundant power supply connected equipment up to 16A.

EFFEKTA recommends to use a VFI UPS system as power source.



### ■ Characteristics

- Break-Before-Make-Switching
  - Protection against backfeed (EN62310-1)
  - Overload and short circuit protection
  - Redundant power supply (source 1 and 2)
- AC source detection (voltage and current detection)
  - Output detection (current detection)
  - LED display
  - 24 months warranty

### ■ Specifications

ATS		16 HV	16K	32K
Power	Power in A	16	16	30
	Phase	Input / Output		
Input	Rated Voltage configurable	1-phase / 1-phase		
	Input voltage range	230VAC		
	Voltage Regulation	160-290 VAC	190 - 275 VAC	
	Input frequency range	± 12% ~ ± 20%	± 5%	
Output	Output voltage nom.	50/60 Hz ± 6Hz		
	Voltage Regulation	230 VAC		
	Frequency Range	± 12% ~ ± 20%	± 5%	
	Transfer time	50/60 Hz ± 6Hz		
	Interface	15 msec.	7,6 - 27 msec. (load-dependent)	
Communication	Display	RS232, REPO	none	
	Dimensions UPS (H x W x D in mm)	LED		
Dimensions / Weight	Weight UPS	44 x 430 x 430	44 x 430 x 285	
	Protection	4,5 kg	3,5 kg	
	Terminals	Input	IP 20	
Environmental conditions	Output	2 x IEC 16A	Fixed connection	
	Temperature	6 x IEC 10A, 1 x IEC 16A	Fixed connection, 1 x IEC 10A	
	Humidity	0°C – 40°C		
Safety / Enclosure	Acoustic Noise	0-90 % RH @ 0- 40°C (non condensing)		
	Safety	Almost noiseless < 40 dB		
	EMC	EN 62040-1		
	Certifications	EN 62040-2		
		CE		

# Accessories

## STS 100-800 A

The STS is used as a transfer switch in 3-phase power grids and switches between two power sources (manually or automatically). So it ensures power supply redundancy of connected devices from 100 to 800A. Break-Before-Make-switching prevents both power sources being connected simultaneously to the consumer.



### ■ Characteristics

- Permanent monitoring of the power sources
  - Break-Before-Make Switching
  - Automatic switching back
  - Manual switching possible
  - 3- or 4-pole versions available
  - Display: kVA, kW, CF, PF, A, V, Hz.
- Redundant cooling with monitored fans
  - Front access to all power components
  - Neutral with 2 x Inom
  - Interfaces: RS 232, RS 485 (MODBUS protocol)
  - Double maintenance bypass prevents cross connection

### ■ Specifications

STS		100 A	250 A	400 A	630 A	800 A
Power	Power	230V AC L-N, 400 VAC ph-ph, other voltages on request				
	Voltage window	± 10% (up to ± 20% on request)				
	Rated current	100 A	250 A	400 A	630 A	800 A
	Rated frequency, Frequency range	50/60Hz, ± 2Hz (up to ± 4Hz on request)				
	Transfer phase angle	Standard 10° (5° ÷ 30° on request)				
Output	Output voltage	Same as Input				
	Output frequency	Same as Input (50/60 Hz)				
	Output current	Same as Input				
	Maximum transfer time	4-15 ms depending on the phase angle				
Communication	Display	Graphical LCD display, mimic LED panel and keyboard				
	Connections	RS485 (Modbus RTU protocol), Standard: 4 SPDT relays, optional 6 additional SPDT relays				
Mechanic	Dimensions (H x W x D in mm)	1475 x 820 x 835			1900 x 1220 x 860	
	Weight	265 kg	290 kg	305 kg	615 kg	660 kg
	Input terminals	3-phase hardwired with neutral				
	Output terminals	3-phase hardwired with neutral				
Regulations / standards	Standards	EN62040-1				
	EMC	EN62040-2				
	Standards	CE				

# Accessories External Bypass

To ensure the highest possible availability of the EFFEKTA®- UPS systems, in particular in critical applications, bypasses are used which bypass the UPS during maintenance work and continue to supply power to the load without interruption after manual switching.



A



B



C



D



E

External Bypass	A	B	C	D	E
UPS connection type	1-phase IEC 16 A 6 x IEC 10 A 1 x IEC 16 A	1-phase (Schuko, IEC, terminals)	3/3p, 3/1p, 1/1p (hard-wired)	3/3p, 3/1p, parallel (hard-wired)	3/3p, parallel (hard-wired)
Current max.	16 A		63 A	100/125 A	160-800 A
Suitable UPS size in kVA	Up to 3kVA		Up to 30 kVA (3/3p)	40/60 kVA (parallel: 2x10 / 2x30 kVA)	Up to 500 kVA
Mounting / Construction	19" rack	Wall mounting			Wall mounting or cabinet
Dimensions (H x W x D in mm)	19", 1,5 U, 180 mm (depth)	200 x 200 x 130	290 x 250 x 155	500 x 450 x 165	Dependent on UPS power
special functions	Readiness indicator UPS (LED)	-	-	-	-

# Accessories EBU

The electronic breaker unit EBU is a selective protection of the loads.

The short-circuit current provided by UPSs is usually not enough to trigger a conventional thermal-magnetic overcurrent protection. If a load causes a short circuit, the entire UPS and thus each load is switched off. The EBU prevents this failure of the whole system. Only the affected load path is switched off, all other supply strings continue to operate.



# Accessories Relay cards

The relay card is an electronic module which is used for the potential-free exchange of signals between a UPS and a higher-level controller. The user thus has the possibility of receiving completely galvanically separated signals from the UPS and sending commands to the UPS.

The output signals remain until the UPS is switched off and de-energized. Generally speaking, the UPS (and thus the relay card) is de-energized, all contacts of the relay card open, regardless of whether they are configured as normally closed or normally open.





Has failed.

**Ready for operation.**





DC Power supplies



# DC UPS DIN rail DCH series

Reliability and availability in a small space. The DCH series power supplies with UPS function are the most compact of its kind and impress with extraordinary overload behavior. They are characterized by a variety of applications and their robust IP 20 housing is the perfect solution for all DIN rail applications. By the power boost mode, the DCH offers 300% of the rated power for 4 seconds or 200% for 4 minutes. Thus, it can be used as a reliable overload protection and is ideally suitable for consumers with high inrush currents, such as electric motors.



**Optionally temperature-controlled charging:** External temperature sensor for optimal temperature controlled charging voltage.

**One device for many battery types:** Since the user can select several predefined charging curves via jumper, the DCH series is suitable for all types of batteries. Standard open and sealed AGM or lead-acid batteries can be used. Ni-Cd and Li-ion batteries can be used optionally. Recharging is done via automatic 4-step battery charge according to IUoU. A “boost” charge is selectable.

**Wide range of applications:** A variety of certifications (including UL 60950-1, CE) enables the global use of the DCH series as well as in areas where specific standards are required.

**Extensive diagnostics:** Errors are detected early through comprehensive measurements, such as: battery not connected, sulfated battery, short circuit, reverse polarity of the connections or suitability of the type of battery (voltage test).

**Wide input voltage range:** The DC UPS can be operated in an extremely wide input voltage range of 90 to 305 V.

**Reliable technology:** The components of the DCH series represent a highly reliable and efficient technology with an MTBF of> 300,000 h according to IEC61709.

**Effective technology:** Thanks to the use of advanced technology, the DCH series reaches an efficiency of more than 91%.

**Communication and control:** Electrically isolated relay contacts are available to monitor the power supply. Further communication interfaces: MODBUS devices > 400W, Integration and configuration via separate software, Interface for parallel operation: redundancy or capacity expansion on certain models possible (see specifications).

## Specifications

DCH		12 V, 3 A	12 V, 6 A	12 V, 10 A	12 V, 35 A
Input	Rated voltage [VAC]	115-230-277	115-230-277	115/230-277	115/230-277
	Voltage range [VAC]	90 - 305	90 - 305	90 - 305	90-135, 180-305
Output (Normal mode)	Rated voltage [VDC]	12	12	12	12
	Rated current [A]	3	6	10	35
	Power max. [W]	36	72	120	420
	Efficiency (@ 50% In)	≥89%	≥89%	≥89%	≥90%
	Redundant operation / power enhancement available		No	No	Yes
	Voltage range [VDC] @ In		10 - 14,4	10 - 14,4	10 - 14,4
Output (Battery mode/ charging mode)	Peak current [A]	4 seconds	9	18	30
		4 minutes	6	12	20
	Deep discharge protection [VDC]		9,5 ± 0,5	9,5 ± 0,5	9,5 ± 0,5
	Charge current adjustment range		10-100%	10-100%	10-100%
	Relay contacts		Messages: normal power or backup operation, discharged or defective battery		
Communication	Aux Output (RJ 45)		No	No	No
	Dimensions WxHxD [mm]		115x65x135	115x65x135	115x150x135
	Weight [kg]		0,60	0,60	1,55
	Operating temperature		-25 ~ +70°C	-25 ~ +70°C	-25 ~ +70°C
	Humidity (non condensing)		95%	95%	95%
Mechanical/ environment					

DCH		24 V, 3 A	24 V, 5 A	24 V, 10 A	24 V, 20 A
Input	Rated voltage [VAC]	115-230-277	115-230-277	115/230-277	115/230-277
	Voltage range [VAC]	90 - 305	90 - 305	90-135/180-305	90-135, 180-305
Output (Normal mode)	Rated voltage [VDC]	24	24	24	24
	Rated current [A]	3	5	10	20
	Power max. [W]	72	120	240	480
	Efficiency (@ 50% In)	≥89%	≥89%	≥83%	≥90%
	Redundant operation or power enhancement available		Nein	Nein	Ja
	Voltage range [VDC] @ In		22 - 28,8	22 - 28,8	22 - 28,8
Output (Battery mode/ charging mode)	Peak current [A]	4 seconds	9	15	30
		4 minutes	6	10	20
	Deep discharge protection [VDC]		19,5 ± 0,5	19,5 ± 0,5	19,5 ± 0,5
	Charge current adjustment range		10-100%	10-100%	10-100%
	Relay contacts		Messages: normal power or backup operation, discharged or defective battery		
Communication	Aux Output (RJ 45)		No	No	No
	Dimensions WxHxD [mm]		115x65x135	115x65x135	115x100x135
	Weight [kg]		0,60	0,60	0,85
	Operating temperature		-25 ~ +70°C	-25 ~ +70°C	-25 ~ +70°C
	Humidity (non condensing)		95%	95%	95%
Mechanical/ environment					

DCH			48 V, 5 A	48 V, 10 A	Standards and certifications
Input	Rated voltage [VAC]		115/230-277	115/230-277	
	Voltage range [VAC]		90-135/180-305	90-135/180-305	Conformity: IEC / EN 60335-2-29 Chargers: EN60950 / UL 60950-1
Output (Normal mode)	Rated voltage [VDC]		48	48	
	Rated current [A]		5	10	
	Power max. [W]		240	480	
	Efficiency (@ 50% In)		≥83%	≥91%	DIN 41773 (charging cycle)
	Redundant operation or power enhancement available		No	Yes	
	Output (Battery mode/ charging mode)	Voltage range [VDC] @ In		44 - 57,6	44 - 57,6
Peak current [A]		4 seconds	15	30	
		4 minutes	10	20	Immunity for industrial environ- ments: EN 61000-6-2
Deep discharge protection [VDC]		39 ± 1,0	39 ± 1,0		
Charge current adjustment range		10-100%	10-100%		
Communication		Relay contacts		Messages: normal power or backup operation, discharged or defective battery	
	Aux Output (RJ 45)		No	Optional	
Mechanical/ environment	Dimensions WxHxD [mm]		115x100x135	115x150x135	Immunity to Surge (Surge): EN 61000-4-5
	Weight [kg]		0,85	1,55	
	Operating temperature		-25 ~ +70°C	-25 ~ +70°C	
	Humidity (non condensing)		95%	95%	

# DC power supply DC ST801

## DC ST801, 48 VDC, modular, up to 3 x 850 W

The DC ST801 power supply system is designed for various applications such as DC UPS systems or TPS applications. It provides superior reliability at an extremely compact space, including processor controlled battery charging, programmable relay contacts and configurable DC outputs. Numerous options provide solutions for global applications in different environments. This system is prepared for up to 3 rectifiers GR 850.

## Characteristics

- 19" / 1U shelf power system up to 2550 W
- Easy connection by screw terminals
- High efficiency up to 95,2%
- High power density
- Very short depth (for 300mm ETSI housing)
- Rectifier parallel-redundancy
- Rectifier GR 850 with temperature-controlled ventilation
- Integrated temperature sensor for temperature compensation
- Easy setup and programming via web browser
- The supply to the load through the rectifier is guaranteed even in case of failure of the controller
- 24 months' warranty

## Specifications

DC ST801		
General	Efficiency	≥ 95,2 %
	EMC	EN 55022, class B
	Safety	EN 300 386
	Cooling	Fan cooled, temperature controlled
	Protection	IP 20
Input	AC connection	1 x L/N/PE
	Nominal voltage	230 VAC
	Voltage range	80 ... 300 Vrms
	Voltage range, reduced power	80 ... 130 Vrms
	Frequency range	45-66 Hz
	Current nominal	5,8 Arms
	Recommended protection	16 A
Output	Nominal voltage	-53,5 VDC
	Voltage range	-42 ... -58 VDC
	Output current	47,4 ADC
	Power limitation	3 x 850 W
	Rated power	2550 W
	Power, redundant	1700 W
DC Output	Overload protection	Max. 6 pieces / 2 ... 30A
	Standard kit	each 1 x 2/6/10/16/20/30A
	LVD	F1 – F4
	PLD	F5 + F6
Battery connector	Fuses	2 x 50 A
Mechanics	Construction	Steel rack
	Cabinet standard	19 Zoll
	Width	430 mm
	Depth, overall	280 mm (excluding rectifier)
	Height, overall	44,45 mm (1 HE)
	Weight, system	4.5 kg (excluding rectifier)
	Weight, rectifier	each 0.6 kg
Environment	Operation temperature	-35 ... +60 °C (power reduction from 45°C)
	Relative humidity	95% max., non condensing
Control / monitoring	Controller	ORION

## Details



Front view DC ST801



Rear view DC ST801



# DC power supply DC ST802

## DC ST802, 48 VDC, modular, bis 6 x 850 W

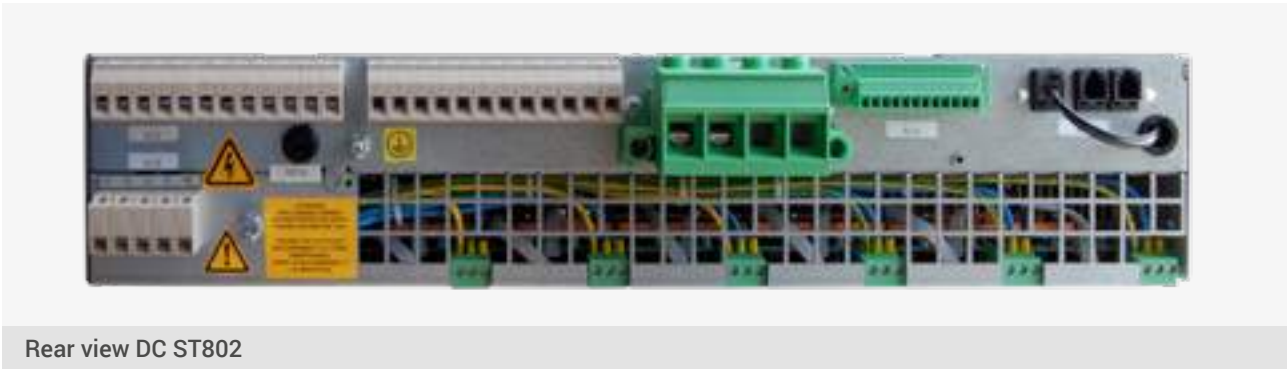
The ST802 DC power supply system is designed for various applications such as DC UPS or TPS applications. It offers high reliability at an extremely compact space, including processor controlled battery charging, programmable relay contacts and configurable DC outputs. This compact slide contains controllers, deep discharge protection (LVD), priority load shedding (PLD) current sensors, battery fuses and up to 12 separately fused DC outputs. These features together with the very short depth are the key factors for the success of this power system, offering cost-effective and reliable solutions.



### Details



Front view DC ST802



Rear view DC ST802

## Characteristics

- 19" / 2U shelf power system up to 5100 W
- Easy connection by screw terminals
- High efficiency up to 95,2%
- High power density
- Very short depth (for 300mm ETSI housing)
- Rectifier parallel-redundancy
- Rectifier GR 850 with temperature-controlled ventilation
- Integrated temperature sensor for temperature compensation
- Easy setup and programming via web browser
- The supply to the load through the rectifier is guaranteed even in case of failure of the controller
- 24 months' warranty

## Specifications

DC ST802		
General	Efficiency	≥ 95,2 %
	EMC	EN 55022, class B
	Safety	EN 300 386
	Cooling	Fan cooled, temperature controlled
	Protection	IP 20
Input	AC connection	3 x L/N/PE
	Nominal voltage	230 VAC
	Voltage range	80 ... 300 Vrms
	Voltage range, reduced power	80 ... 184 Vrms
	Frequency range	45-66 Hz
	Current nominal	4 A per rectifier
	Recommended protection	10A per rectifier
Output	Nominal voltage	-53,5 VDC
	Voltage range	-42 ... -58 VDC
	Output current @ U <sub>nenn</sub>	95,3 ADC
	Power limitation	6 x 850 W
	Rated power	5100 W
DC Output	Circuit breaker: Hydraulic-magnetic	Max. 12 pcs. / 2 ... 30 A
	Standard configuration	2 x 6 A, 9 x 16 A, 1 x 25 A
Battery connector	Fuses	2 x 100 A
Mechanics	Construction	Steel rack
	Cabinet standard	19 IN
	Width	430 mm
	Depth, overall	320 mm
	Height, overall	88,2 mm (2U)
	Weight, system	7kg (excluding rectifier)
	Weight, rectifier	Each 0,6 kg
Environment	Operation temperature	-35 ... +60 °C (power reduction from 45°C)
	Relative humidity	95 % max., non condensing
Control / monitoring	Controller	ORION

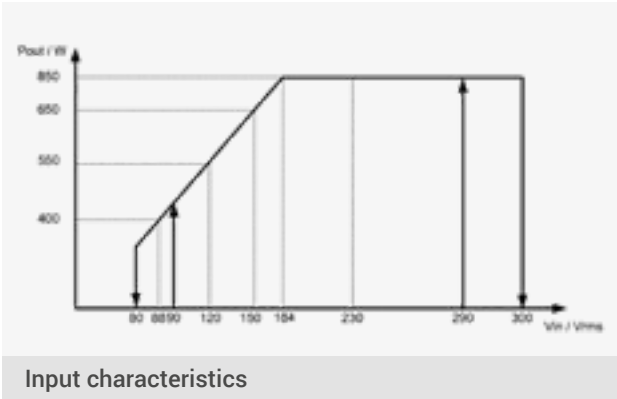
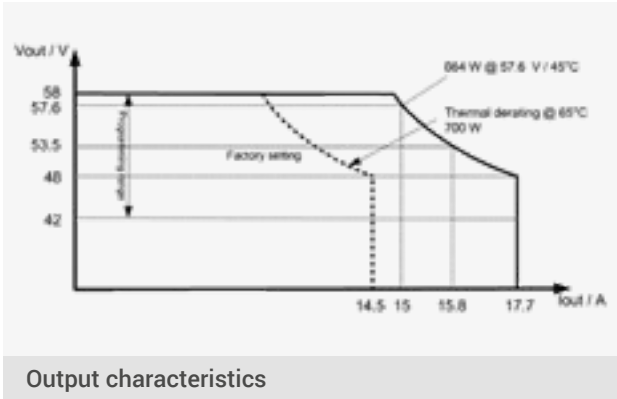
# Rectifier GR 850

The GR 850 is a singlephase, «hot-pluggable», fan-cooled rectifier. With its exceptional power density (30 W / in³) it offers optimal solutions for the 1 U' shelf DC ST801 and the 2 U' shelf DC ST802 in the power range from 850W up to 5100W.

The small installation depth and the large temperature range are further advantages of this modern rectifier. The high efficiency (up to 95, 2%) guarantees an energy-saving operation. In addition less cooling energy is needed. Due to the temperature- independent fan control, a low noise level is achieved.



## Characteristic curves



## Characteristics

- Space saving – very high power density
- Low inrush current
- Energy saving – High efficiency up to 95,2 %
- Simple installation - Hot pluggable
- Low noise level
- Wide input voltage range 80 ... 300 Vrms
- High reliability
- Power factor correction
- Optimized power availability
- Temperature range -40C° ...+70°C
- 24 months' warranty

## Specifications

GR 850		
General	Efficiency	≥ 95,2 %
	EMC, radiated	EN 55022, class B
	Safety	EN / IEC 60950, UL 60950, CAN / CSA - C22.2
	Environment	RoHS conform
	Cooling	Fan cooled
	Power density	30 W/in³
	Sound level	44 dB(A)
Input	Voltage range	80 ... 300 Vrms
	do., red. power	80 ... 184 Vrms
	Inrush current	20 Apeak
	Current maximum	6 Apeak
	Harmon. distortion THD	< 5 %
	Power factor	Mit PFC~ 1
	EMC, grid-bound	EN 55022, class B
Output	Supply input	Rear / pluggable
	Voltage, nominal	53,5 VDC
	Setting range	42 ... 58 VDC
	Surge protection	59 VDC
	EMC, grid-bound	EN 55022, class A
	Current limiting, nom.	17,7 ADC
	Power limitation	850 W
User interface	Circuit point output	Rear / pluggable
	Output protection	Internal fuse
	Status display	LED «ok» / LED «COM» / LED «LD» / LED «STA»
Environmental conditions	Temperature	-40...+70 °C
	With red. power	+45...+70 °C
	Rel. humidity	95% max., without condensation
Dimensions / weight	Width	51,8 mm
	Height	40 mm
	Depth	247,2 mm
	Weight	0,6 kg
Control / monitoring	System controller	ORION

# Controller Orion

The Orion System Controller is the latest release of the central control unit for the EFFEKTA® DC power systems. The user-friendly display provides the main information about the state of the power supply system. New features such as the „efficiency mode” can help to reduce operating costs of the systems. In this case are unused modules, for example at lower load shut down in order to increase the efficiency of the system. An integrated web server provides a user-friendly interface with a standard Web browser for both local and remote communication. The communication with the connected components via CAN bus.



## Details



## Characteristics

- Pluggable
- Replacement during operation
- Programmable relay contacts
- Easy system expansion
- Digital system bus
- Sophisticated battery management
- Remote monitoring via modem or LAN
- Integrated web server
- Energy saving features
- Monitoring of additional equipment
- Advanced system control / monitoring
- 24 months' warranty

## Specifications

Orion			
Input	Input voltage range	18 - 75 VDC	
	Current	0,75 ADC max.	
	Input protection	Fuse 2A, extern	
User interface	Status display	LED «ok», LED «alarm»	
Features	Rectifier interface	Digital, CAN-based	
	Number of rectifiers	Up to 128	
	Digital Inputs	Up to 225	
	Relay outputs	Up to 97	
	Temperature measurements	Up to 96	
	Voltage, current	Up to 96	
	Local monitoring / remote monitoring	LAN/RS232/WEB Browser	
	Remote alarm	Relay contacts / SNMP	
	SNMP-Management	Standard SNMP Manager	
	Funktionen	Temperature compensated float voltage	
		Battery-center measurement	
		Battery pack voltage, up to 256	
Battery charging current limit			
Quick charge, Equalizing charging			
Battery test, optionally with capacity measurement			
Partial load and battery shutdown up to 96			
Battery deep discharge protection			
Individual rectifier control			
Energy saving mode, cyclic rectifier operation			
Sequential rectifier startup			
PLC functionality			
Event generator, 200 log entries			
Environmental conditions		Temperature	-35 ... +60°C / -31 ... +140°F
	Relative humidity	0-90 % RH @ 0- 40°C (non condensing)	
General	Safety and Standards	EN 60950, class I, UL 60950, CAN / CSA - C22.2	
		EN 55022, class B	
		EN 300 386-2	
	Cooling	Konvektion	
	Installation direction	Alle	
	Protection class	IP 20	



# DC power supply DC ST2002

## DC ST2002, 24/48/60 VDC, modular, up to 3 x 2000 W

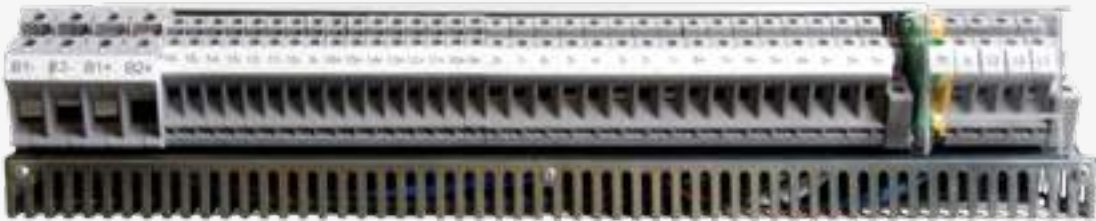
The power supply system DC ST2002 is designed for various applications such as DC UPS or TPS applications. The system is prepared for up to three rectifiers. The compact slide contains controllers, deep discharge protection (LVD), priority load shedding (PLD) optionally, current sensors, battery backups and up to 6 separately fused DC outputs. These features combined with the high efficiency and the very short depth are the key factors for its success. With this system we can offer a low-cost, compact and reliable solution.



## Details



Front view DC ST2002



Rear view DC ST2002 (model with 16 outputs)

## Characteristics

- 19" / 2U shelf power system up to 6000W
- Easy connection by screw terminals
- Extremely high efficiency of up to 96.5%
- High energy density
- Low installation depth
- Rectifier parallel-redundancy
- Rectifier with temperature-controlled ventilation
- Temperature compensation for gentle battery charge
- Easy setup and programming via web browser
- The supply to the load through the rectifier is guaranteed even in case of failure of the controller
- 24 months' warranty

## Specifications

DC ST2002		
General	Efficiency	≥ 96,5 %
	EMI, radiated	EN 55024, CISPR22
	Safety	EN 60950
	Cooling	Fan-cooled, temperature-controlled
	Housing protection class	IP 20
Input	AC connection	3 x L/N/PE
	Nominal voltage	230 VAC
	Voltage range	85 ... 300 Vrms
	Voltage range, non reduced power	175 ... 275 Vrms
	Frequency range	45-65 Hz
Output	Nominal current	12Arms per rectifier
	Nominal voltage	-24, -48 or -60 VDC
	Output current per rectifier at Unenn	41,7 A (24 VDC), 41,7 A (48 VDC), 30 A (60 VDC)
DC output	Nominal power	max. 6000 W (3 x 2000 W)
	Circuit breaker: hydraulic-magnetic	Max. 6 pcs. / 2 ... 63A
Battery connection	Standard kit	1 x 6 A, 2 x 16 A, 2 x 32 A, 1 x 63 A
Mechanics	Fuses	2 x 100 A
	Construction	Steel rack
	Cabinet standard	19IN
	Width	430 mm
	Depth	350mm (excl. cable clamp rail)
Environment	Height	88,2 mm (2U)
	Weight, system	9kg (without rectifiers)
	Weight, rectifier	Each 1,5 kg
	Operation temperature	-20 ... +65°C (reduced power at 50°C)
	Relative humidity	95% max., non condensing
Control / monitoring	Controller	SM32 / SM36

# DC power supply DC ST2005

## DC ST2005, 24/48/60 VDC, modular, up to 7 x 2000 W

The power supply system DC ST2005 is designed for various applications such as DC UPS or TPS applications. It offers high reliability in a highly compact space, including processor controlled battery charging, programmable relay contacts and configurable DC outputs. Numerous options provide solutions for global applications with different requirements. The system is prepared for up to 5 rectifiers GR 2000. With this system we can offer a low-cost, compact and reliable solution.



## Details



Front view DC ST2005



Rear view DC ST2005

## Characteristics

- 19" / 5U shelf power system up to 14 kW
- Easy connection by screw terminals
- Extremely high efficiency of up to 96.5%
- High energy density
- Low installation depth
- Rectifier parallel-redundancy
- Rectifier with temperature-controlled ventilation
- Temperature compensation for gentle battery charge
- Easy setup and programming via web browser
- The supply to the load through the rectifier is guaranteed even in case of failure of the controller
- 24 months' warranty

## Specifications

DC ST2005		
General	Efficiency	≥ 96,5 %
	EMI, radiated	EN 55024, CISPR22
	Safety	EN 60950
	Cooling	Fan-cooled, temperature-controlled
	Housing protection class	IP 20
Input	AC connection	3 x L/N/PE
	Nominal voltage	230 VAC
	Voltage range	80 ... 300 Vrms
	Voltage range, non reduced power	175 ... 275 Vrms
	Frequency range	45-65 Hz
Output	Nominal current	12Arms per rectifier
	Nominal voltage	-24, -48 or -60 VDC
	Output current per rectifier at Unenn	41,7 A (24 VDC), 41,7 A (48 VDC), 30 A (60 VDC)
	Nominal power	max. 14.000 W (7 x 2000 W)
DC output	Circuit breaker: hydraulic-magnetic	Max. 18 pcs. / 2 ... 63A
	Standard kit	2 x 6 A, 2 x 10 A, 4 x 16 A, 2 x 20 A, 2 x 30 A, 2 x 63 A
Battery connection	Fuses	2 x 125 A
Mechanics	Construction	Steel rack
	Cabinet standard	19IN
	Width	430 mm
	Depth	350mm (excl. cable clamp rail)
	Height	222,2 mm (5U)
	Weight, system	14kg (without rectifiers)
	Weight, rectifier	Each 1,5 kg
Environment	Operation temperature	-20 ... +65°C (reduced power at 50°C)
	Relative humidity	95% max., non condensing
Control / monitoring	Controller	SM32 / SM36

# Rectifier GR 2000E

GR 2000E is a single-phase, „hot-pluggable“, fan-cooled rectifier. With its exceptional power density, it enables optimal solutions for various system carriers with a total output of standard 1 to 14KW. The small installation depth and the large temperature range allow compact and flexible installations. The high efficiency guarantees energy-efficient backup solutions, thanks to the low losses less cooling energy is needed. With the advanced controller adds the power solution can optimize the running costs of the entire system.



## Details



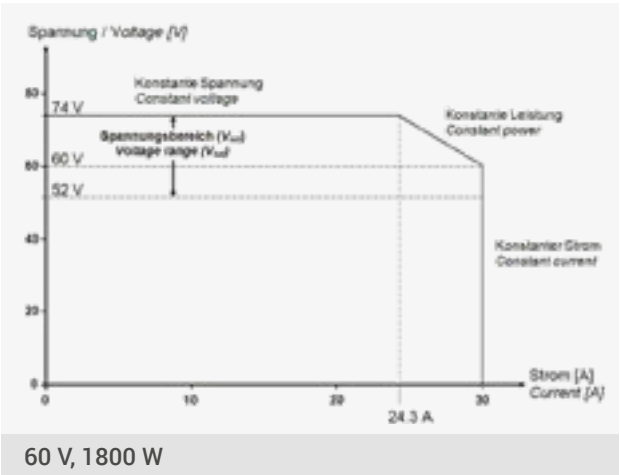
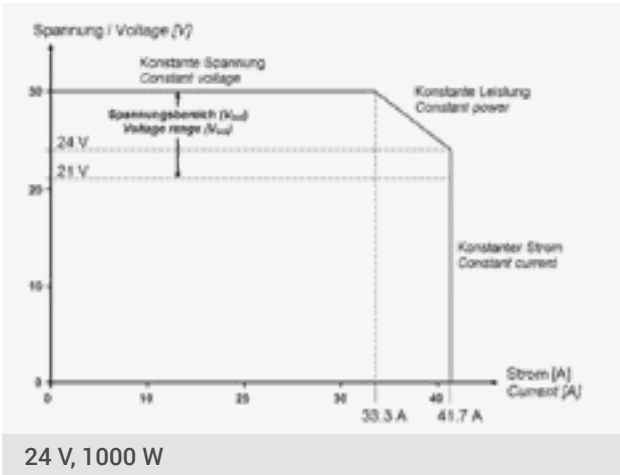
## Characteristics

- Space saving - very high power density
- Energy saving - High efficiency up to 94%
- imple installation - Hot pluggable,
- Low noise level
- Wide input voltage range 90...300Vrms
- Protection against loss of Neutral / AC overvoltage
- Power factor correction
- Optimized power availability
- Temperature range up to 70°C

## Specifications

GR 2000E		24 V, 1000 W	48 V, 2000 W	60 V, 1800 W
Generally	Efficiency	≥92 %	≥94 %	≥92 %
	Power dissipation max.	160 W	120 W	150 W
	Safety	EN 60950		
	EMC	EN61000-3-2		
Input	Voltage range	90 ... 300 Vrms		
	Do., red. performance	90 ... 175 Vrms		
	Inrush current	26 Apeak	24 Apeak	22 Apeak
	Current maximum	13 Arms	12 Arms	11 Arms
	Power factor	0,99		
	Input connections	On the rear side		
	Input Protection	Int. Fuse L+N		
Output	Surge Protection	Shutdown feature with automatic restart at correct voltage level		
	Voltage, nominal	26,8 VDC	53,5 VDC	69 VDC
	Do., setting	21 ... 30 VDC	43 ... 58 VDC	52 ... 74 VDC
	Current	41,7 A		30 A
	Power	1000 W	2000 W	1800 W
Mechanics	Output connections	On the rear side		
	Width	111,5 mm		
	Height	44,45 mm (1 HE)		
	Depth	282 mm		
	Cooling	fan-cooled		
	Weight	1,6 kg	1,5 kg	1,6 kg
	Temperature	-20...+70 °C		
	Temp. with reduced perf.	+50...+70 °C		
	Rel. Humidity	95 % max, non condensing		
	Status display	Various Status LED (UA and NUA)		
	Audible noise	<58 db (A)		

## Voltage characteristics





# Charger CHA series

The EFFEKTA® chargers offer a rapidly and gently charging process with IUoU-characteristics. Thereby they are ideal for charging lead-gel, lead-acid and AGM batteries. This 3-steps constant current charging in professional quality, batteries charge faster and more gently than comparable units on the market, whereby the service life of the batteries significantly increase. With the IUoU-characteristics, charge occurs with constant current until the gasing voltage.



## Details



Battery connections

## Characteristics

- Reverse polarity- and short circuit protection
- Overload protection
- IUoU-charging characteristic
- Temperature-controlled fan
- High efficiency (switching power supply-technology)
- 12 months' warranty

## Specifications

12 V	CHA 012-012	CHA 012-025
Input voltage	230 VAC ± 10%	
Frequency	50 Hz	
Output voltage	12 VDC	
Charging end voltage	14,4 VDC	
Charging maintenance voltage	13,6 VDC	
Charging current max.	12 A	25 A
Operating temperature	0-50° C	
Weight	2,1 kg	2,7 kg
Dimensions (H x W x D in mm)	82 x 205 x 230	82 x 205 x 290

24 V	CHA 024-008	CHA 024-014
Input voltage	230 VAC ± 10%	
Frequency	50 Hz	
Output voltage	24 VDC	
Charging end voltage	28,8 VDC	
Chrging maintenance voltage	27,2 VDC	
Charging current max.	8 A	14 A
Operating temperature	0-50° C	
Weight	2,1 kg	2,7 kg
Dimensions (H x W x D in mm)	82 x 205 x 230	82 x 205 x 290

48 V	CHA 048-008
Input voltage	230 VAC ± 10%
Frequency	50 Hz
Output voltage	48 VDC
Charging end voltage	57,6 VDC
Chrging maintenance voltage	54,4 VDC
Charging current max.	8 A
Operating temperature	0-50° C
Weight	2,7 kg
Dimensions (H x W x D in mm)	82 x 205 x 290

# Inverters WRS series

The EFFEKTA® WRS-series inverters are pure sine-wave inverters. They are suitable in the low and middle performance range as AC power supplies for industrial and mobile applications.



## Details



WRS-024-1500 front view



WRS-024-1500 rear view



WRS-012-0700



WRS-024-0350

## Characteristics

- Output voltage 230 V<sub>AC</sub>
- Input voltage 12, 24 or 48 V<sub>DC</sub>
- Battery low alarm
- Overload-/voltage reversal-/short circuit-safe
- Screwable terminals on the rear side

## Specifications

WRS	012-0200	024-0200	048-0200
Power	200 W		
Output voltage	200/220/230/240 V <sub>RMS</sub> ±3%, 50/60 Hz switchable		
Input voltage	12 V <sub>DC</sub>	24 V <sub>DC</sub>	48 V <sub>DC</sub>
Low.Bat-Shutdown	10,0 V <sub>DC</sub>	20,0 V <sub>DC</sub>	42,0 V <sub>DC</sub>
Dimensions HxWxD	71 x 119 x 230 mm		
Weight	1,2 kg		

WRS	012-0700	024-0700	048-0700
Power	700 W		
Output voltage	200/220/230/240 V <sub>RMS</sub> ±3%, 50/60 Hz switchable		
Input voltage	12 V <sub>DC</sub>	24 V <sub>DC</sub>	48 V <sub>DC</sub>
Low.Bat-Shutdown	10,0 V <sub>DC</sub>	20,0 V <sub>DC</sub>	42,0 V <sub>DC</sub>
Dimensions HxWxD	81 x 179 x 298 mm		
Weight	2,8 kg		

WRS	012-1500	024-1500	048-1500
Power	1500 W		
Output voltage	200/220/230/240 V <sub>RMS</sub> ±3%, 50/60 Hz switchable		
Input voltage	12 V <sub>DC</sub>	24 V <sub>DC</sub>	48 V <sub>DC</sub>
Low.Bat-Shutdown	10,0 V <sub>DC</sub>	20,0 V <sub>DC</sub>	42,0 V <sub>DC</sub>
Maße H x B x T	102 x 278 x 413 mm		
Weight	7,2 kg		

WRS	012-3000	024-3000	048-3000
Power	3000 W		
Output voltage	200/220/230/240 V <sub>RMS</sub> ±3%, 50/60 Hz switchable		
Input voltage	12 V <sub>DC</sub>	24 V <sub>DC</sub>	48 V <sub>DC</sub>
Low.Bat-Shutdown	10,0 V <sub>DC</sub>	20,0 V <sub>DC</sub>	42,0 V <sub>DC</sub>
Dimensions HxWxD	102 x 283 x 455 mm		
Weight	10,6 kg		

WRS	012-0350	024-0350	048-0350
Power	350 W		
Output voltage	200/220/230/240 V <sub>RMS</sub> ±3%, 50/60 Hz switchable		
Input voltage	12 V <sub>DC</sub>	24 V <sub>DC</sub>	48 V <sub>DC</sub>
Low.Bat-Shutdown	10,0 V <sub>DC</sub>	20,0 V <sub>DC</sub>	42,0 V <sub>DC</sub>
Dimensions HxWxD	71 x 119 x 230 mm		
Weight	1,6 kg		

WRS	012-1000	024-1000	048-1000
Power	1000 W		
Output voltage	200/220/230/240 V <sub>RMS</sub> ±3%, 50/60 Hz switchable		
Input voltage	12 V <sub>DC</sub>	24 V <sub>DC</sub>	48 V <sub>DC</sub>
Low.Bat-Shutdown	10,0 V <sub>DC</sub>	20,0 V <sub>DC</sub>	42,0 V <sub>DC</sub>
Dimensions HxWxD	81 x 179 x 334 mm		
Weight	3,8 kg		

WRS	012-2000	024-2000	048-2000
Power	2000 W		
Output voltage	200/220/230/240 V <sub>RMS</sub> ±3%, 50/60 Hz switchable		
Input voltage	12 V <sub>DC</sub>	24 V <sub>DC</sub>	48 V <sub>DC</sub>
Low.Bat-Shutdown	10,0 V <sub>DC</sub>	20,0 V <sub>DC</sub>	42,0 V <sub>DC</sub>
Dimensions HxWxD	102 x 278 x 413 mm		
Weight	7,2 kg		

Data lost.



Data  
backed up.





Batteries



# Batteries

## BT series

Our long-standing experience with emergency power systems and uninterruptible power supply units is our guarantee for the highest quality and reliability of EFFEKTA® batteries.

EFFEKTA® batteries are modern AGM (Absorbent Glass Mat) accumulators. Low levels of self-discharge are achieved by bonding the electrolyte in glass-fibre mat. A recharge is needed every six months unless the accumulator was stored at temperatures in excess of 20°C. AGM batteries are leak proof and can be installed in almost any location.

### Advantage

- Fully maintenance-free
- Excellent high-current capability
- Classified as non-dangerous in accordance with IATA
- Cycle-resistant
- Robust construction
- Location-independent
- Valve-regulated plastic container as overload protection

### Ideally suited for use in

- Uninterruptible power supplies (UPSs)
- Telecommunications systems
- Fire alarm and safety systems
- Medical equipment

### Models view



BT 12-5



BT 12-7



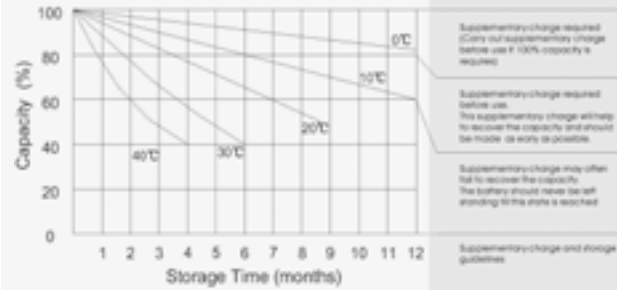
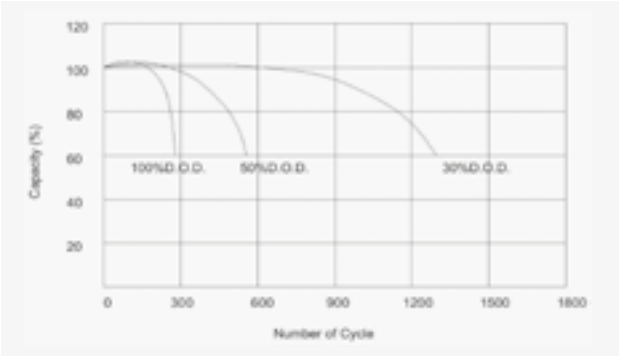
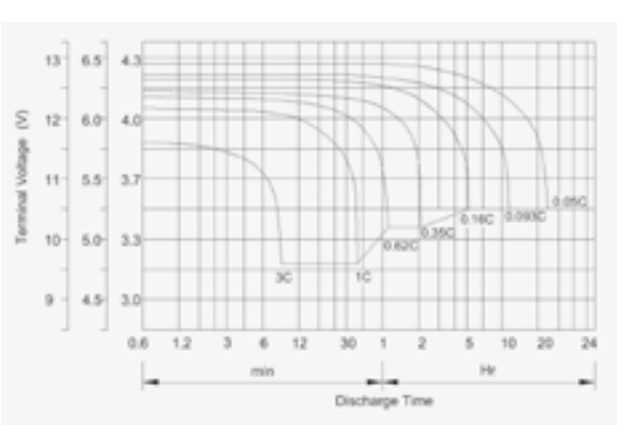
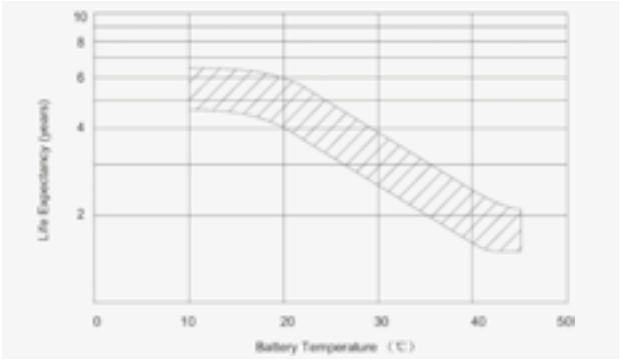
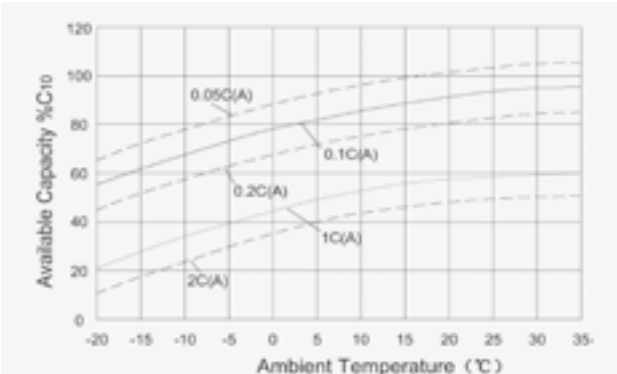
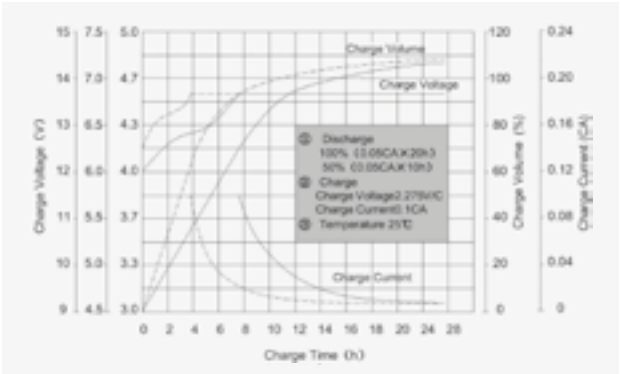
BT12-18



BT 12-28

### Specifications

Type	Voltage in (V)	Capacity in Ah (C20)	L (mm)	W (mm)	H (mm)	H (mm) Max.	Weight in kg	Terminal
12 V types								
BT 12-1,2	12	1,2	97	43	52	58	0,6	F1
BT 12-2,3	12	2,3	178	34,5	60,5	66,5	0,97	F1
BT 12-2,8	12	2,8	104,5	47,5	69,5	69,5	1	F2/F1
BT 12-3,2	12	3,2	134,5	67	59,5	65,5	1,3	F1
BT 12-5	12	5	90	70	101	107	1,7	F2/F1
BT 12-7 (VdS)	12	7	151	65	95	101	2,26	F2 / S type: F1
BT 12-9,5K	12	9,5	151	65	95	101	2,63	F2
BT 12-12	12	12	151	98	95	101	3,6	F2
BT 12-18	12	18	181	77	167	167	5	F3
BT 12-18i	12	18	181	77	167	167	5	F13
BT 12-20	12	20	181	77	167	167	5,9	F3 / F13
BT 12-28	12	28	166	175	125	125	8,6	F13
BT 12-28S	12	28	166	126	174	174	8,6	F11
6 V types								
BT 6-3,2	6	3,2	134	34	60,5	66,5	0,65	F1
BT 6-12	6	12	151	50	95	100	1,8	F2 / F1



# Batteries

## BTL series

Our long-standing experience with emergency power systems and uninterruptible power supply units is our guarantee for the highest quality and reliability of EFFEKTA® batteries.

EFFEKTA® batteries are modern AGM (Absorbent Glass Mat) accumulators. Low levels of self-discharge are achieved by bonding the electrolyte in glass-fibre mat. A recharge is needed every six months unless the accumulator was stored at temperatures in excess of 20°C. AGM batteries are leak proof and can be installed in almost any location.

### Advantage

- Absolutely maintenance-free
- Excellent high-current capability
- Classified as non-dangerous in accordance with IATA
- Long service life of approx. 10 years
- Robust construction
- Cycle-resistant
- Valve-regulated plastic container (overload protection)

### Ideally suited for use in

- Uninterruptible power supplies (UPSs)
- Telecommunications systems
- Fire alarm and safety systems
- Medical equipment
- Emergency lighting systems
- Data centers
- Electronic devices and systems

### Models view



BTL 12-12



BTL 12-18



BTL 12-28



BTL 12-33



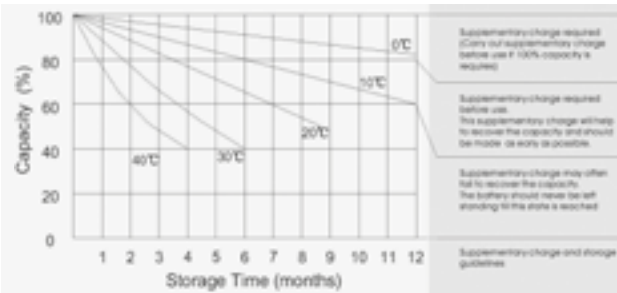
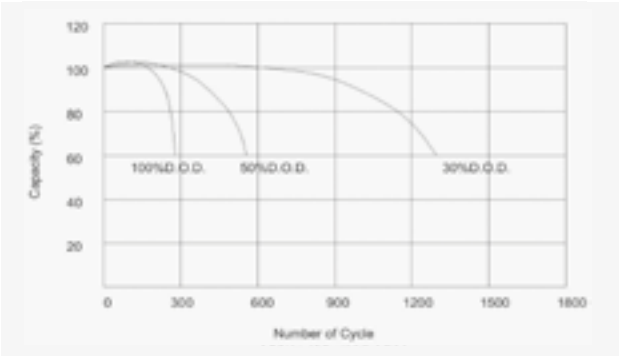
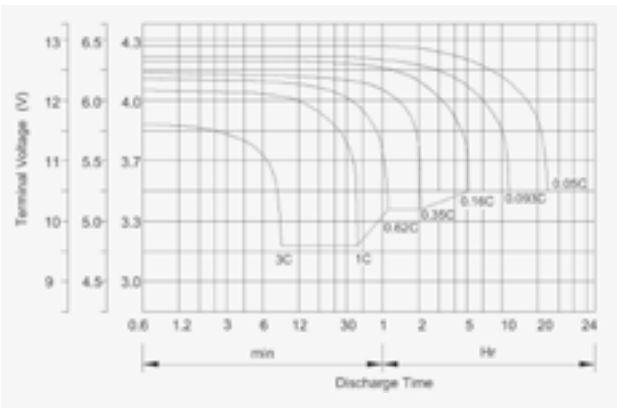
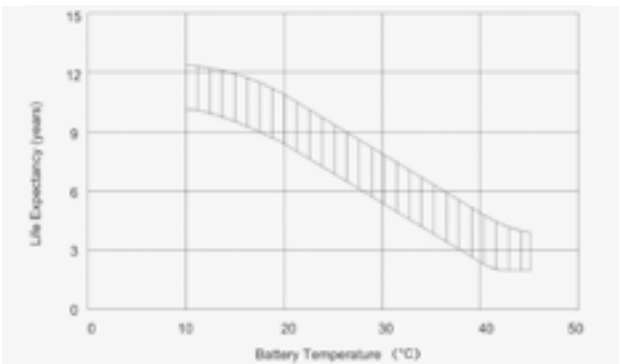
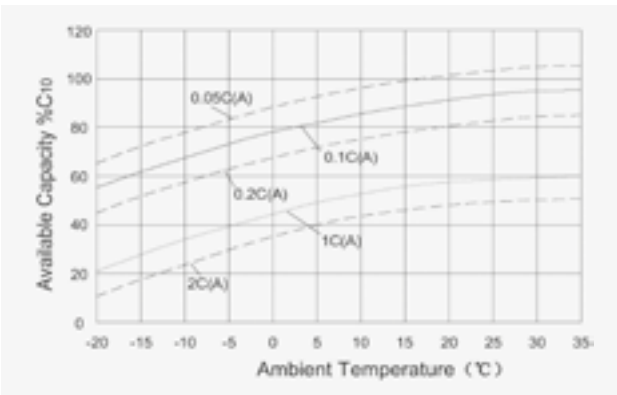
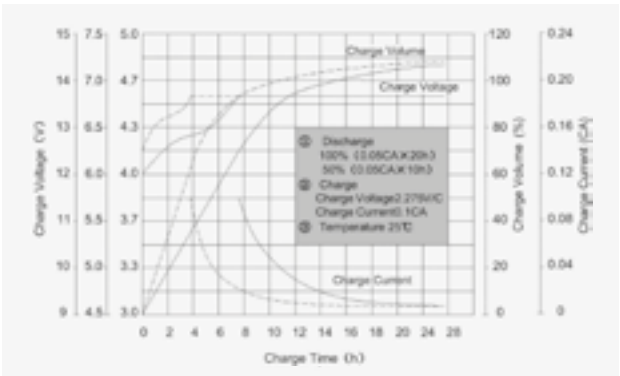
BTL 12-45



BTL 12-55

### Specifications

Type	Voltage in (V)	Capacity in Ah (C10)	L (mm)	W (mm)	H (mm)	H (mm) Max.	Weight in kg	Terminal
12 V types								
BTL 12-9	12	9	151	65	94	100	2,7	F2
BTL 12-12	12	12	151	98	95	101	3,8	F2
BTL 12-18	12	18	181	77	167	167	5,7	F13
BTL 12-28	12	28	166	175	125	125	8,6	F13
BTL 12-33	12	33	195	130	159	180	10,2	F11
BTL 12-45	12	45	198	166	170	170	13,2	F11
BTL 12-55	12	55	229	138	210	235	18	F11
BTL 12-60	12	60	260	169	210	235	20,5	F11
BTL 12-65	12	65	350	167	180	183	21	F11
BTL 12-75	12	75	260	169	210	235	23,5	F11
BTL 12-80	12	80	350	167	180	183	24	F11
BTL 12-90	12	90	306	169	210	217	28,5	F12 / F5
BTL 12-100	12	100	330	172	220	227	30	F12 / F5
BTL 12-120	12	120	407	177	227	227	35	F12 / F5
BTL 12-120 S	12	120	330	171	220	227	32	F12 / F5
BTL 12-150	12	150	483	170	240	240	44,5	F12 / F5
BTL 12-200	12	200	522	240	218	240	60	F12 / F5
BTL 12-260	12	260	520	268	220	225	75	F14





# Batteries

## Front terminal

BTL front terminal batteries from EFFEKTA® have the same construction as batteries of the BTL types. However the special dimensions of the batteries mean that they are compact and easy to maintain especially in 19" rack cabinets.

### Specifications

Typ	Spannung (V)	Kapazität in Ah (C10)	L (mm)	B (mm)	H (mm)	H (mm) Max.	Gewicht in kg	Terminal
BTL 12-55 FL	12	55	277	106	222	222	18	F11
BTL 12-90 F	12	90	563	114	188	188	26,5	F12
BTL 12-105 F	12	105	502	111	236	236	32,5	F11
BTL 12-110 FK	12	110	410	109	293	293	33	F9
BTL 12-150 FK	12	150	552	110	288	288	45	F12

### Models view



BTL 12-55FL

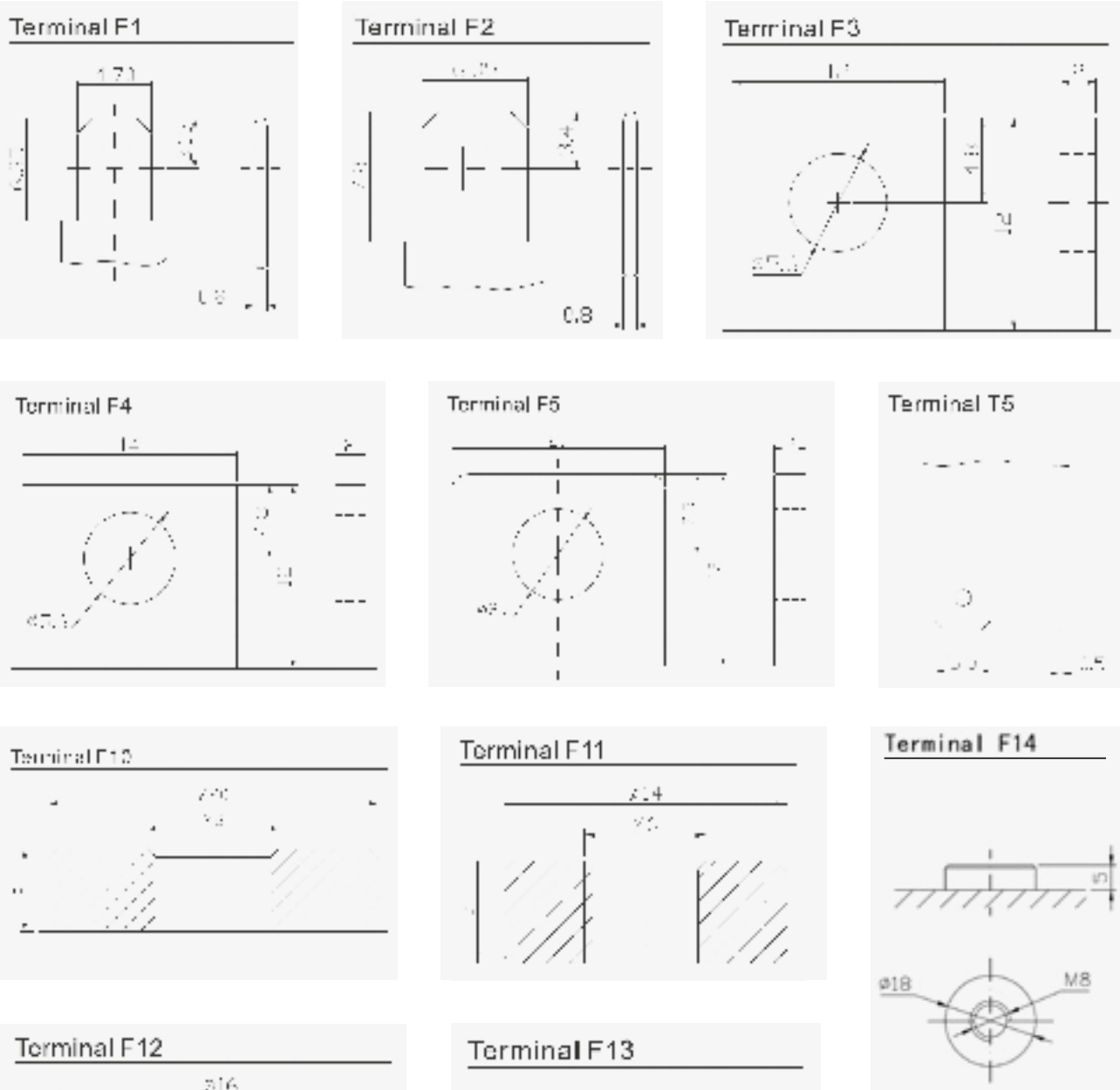


BTL 12-105F



BTL 12-150FK

### Terminal types



# Batteries US2000 Plus

NEW

## Solar lithium storage system, 48 V / 2.4 kWh

The US2000 Plus is a latest-generation lithium storage unit: Combining maximum safety with a long service life - even when at low levels of charge on a regular basis - it meets the demanding requirements for the storage of solar power. The characteristically fast charge and discharge properties of lithium batteries enable them to store or to release a large amount of power in a short period. The US2000 Plus is therefore predestined for use in solar storage solutions for private households.



## Characteristics

- Extremely resistant to cycles – anticipated service life in excess of 10 years with more than 4500 charge/discharge cycles at 90% DoD
  - Modular system for individual scaling of the storage system
  - High peak charge and discharge ratings of up to 4.8 kW per module can be achieved
  - Absolutely failsafe lithium technology – lithium iron phosphate / LiFePo4
- Very high storage capacity ratio – lightweight and compact design
  - Horizontal or vertical set-up, optionally also 19" rack mounting
  - Integrated battery management system
  - Compatible with Series AX solar inverters in the EFFEKTA range
  - 24 months' warranty



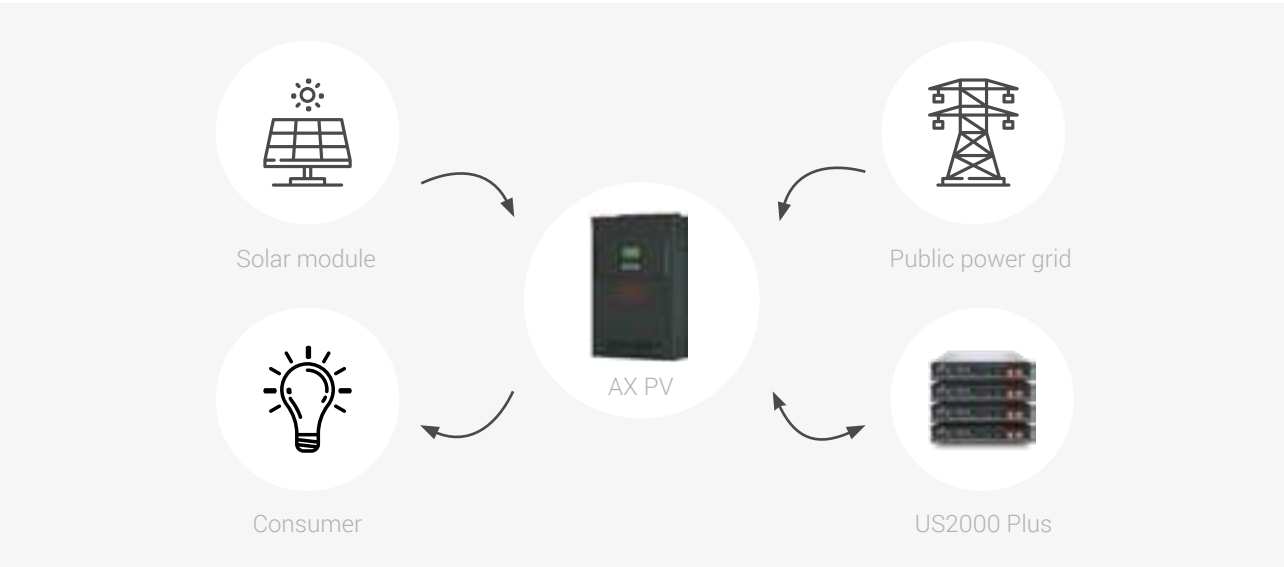
Very easy indeed to expand

The storage modules comprise a lithium iron phosphate (LiFePo4) accumulator and an integrated battery management system (BMS) which constantly monitors the status of individual cells and these also provide protection against excessive levels of charge, voltage and temperature. This is how the BMS prevents an accumulator from failing prematurely as a result of ambient factors or operator error.

The modular layout permits individual configuration of the storage system to achieve the required capacity level, simply by connecting the desired number of modules together.

US2000 Plus is the ideal energy memory in conjunction with the EFFEKTA AX PV inverters. These are superbly equipped as a storage solution for solar or standalone mode with battery support.

Consumers are supplied with electricity from the PV modules on a priority basis. In the first instance, if the PV power supply fails or is insufficient, the batteries deliver the required power. Once the batteries have discharged, the AC source (public power grid) cuts in. Surplus power from the PV modules is used to charge the batteries. Whenever the PV and AC power supply fails, consumers continue to be supplied by batteries.



## Specifications

US2000 Plus		
Technology	Lithium iron phosphate (LiFePo4)	
Nominal voltage	48 V	
Rated capacity	50 Ah / 2,4 kWh	
Usable capacity (90% DoD)	45 Ah / 2,2 kWh	
Discharge voltage range	45,0 ... 54,0 V	
Charging voltage range	52,5 ... 54,0 V	
Recommended charge / discharge current	25 A	
Maximum charge / discharge current	50 A / Peak: 100 A (2C) für 15 s.	
Communication	RS232, RS485, CAN	
Weight	24 kg	
Dimensions	440 x 410 x 89 mm	
Temperature range at charge	+0... +50°C	
Temperature range during discharge	-10... 50°C	
Life time	over 10 years	
Cycle life	over 4500 at 90% depth of discharge	
BMS / monitoring	Integrated battery management system in each module	
Certification	TüV / CE / UN38.8	

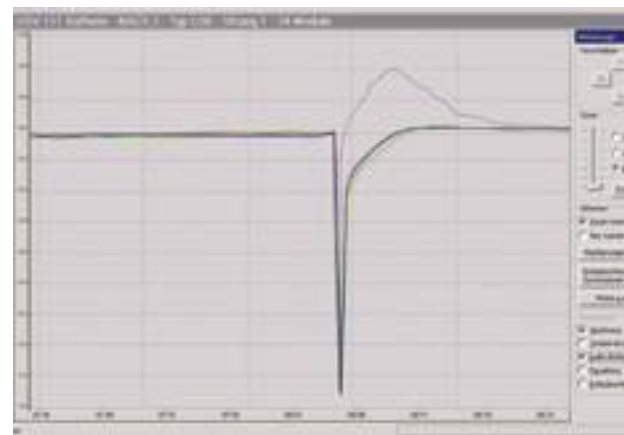
# Management BACS II

The second generation of patented "Battery Analysis & Care System" is the most innovative product on the market. It provides a battery monitoring and management system integrated in the network. On a cyclical basis, it tests the internal resistance, temperature and voltage from each individual accumulator and enables the individual batteries to be balanced or 'equalized'.

In addition, BACS can also manage ambient measurement values (temperature, humidity, acid level, hydrogen concentration etc.).

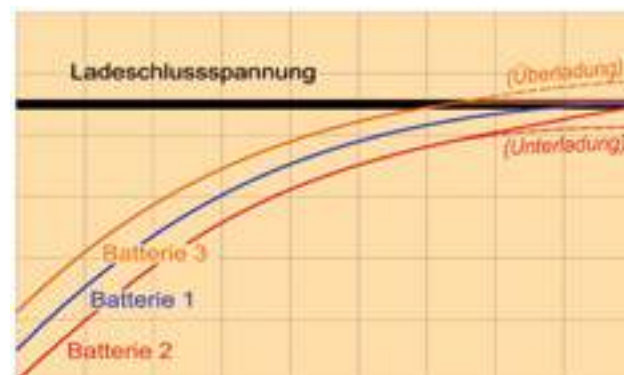


## Software view



The free BACS VIEWER software shows the EQUALIZING of a battery (wide purple line) during a discharge/charge process.

BACS EQUALIZING prevents the overcharging of this accumulator while other accumulators are in need of further charging.



Charging characteristics of accumulators with BACS-patented equalizing. This limitation prevents battery 3 from 'gassing'. Battery 2 continues to receive power until it reaches end-of-charge voltage. Battery 1 performs perfectly and is not controlled.

## Characteristics

- Monitoring, individual charging / discharging and alarm system for accumulators
- Avoid unnoticed or surprising battery failures
- Extend the battery life and maintain the functionality of the entire system

## Features

**Monitoring and feedback control of the charging process:** The system was developed to monitor and control lead-based accumulators that are supplied by a shared charger device in series connection.

**Individual block voltage control:** BACS® individually controls the voltage provided to each accumulator by the charger and UPS. The result is a homogenous system of accumulators that extends their service life and capacity as well as their resistance to sulfation and corrosion. This feedback control process is patented under the name of EQUALIZING.

**Protection against excessively high/low charge levels:** The EQUALIZING process protects against damage by undetected overcharging of accumulators (gases, drying out, overheating). The EQUALIZING process protects against undetected undercharging of accumulators (sulfation, loss of capacity).

**Signaling of battery problems:** Typical battery problems such as sulfation, corrosion, gassing, drying out, overheating etc. can be detected from an increase in impedance and temperature.

**Problems caused by sulfation:** These are typical of UPS batteries because they are continuously receiving a maintenance charge. In a conventional charging process for the accumulators where the boost charge switches to a maintenance charge, it is not possible to guarantee that every accumulator has reached its full charge capacity. This can lead to a few accumulators becoming overcharged while others never actually reach a full charge. EQUALIZING prevents sulfation by balancing out the overcharged and undercharged accumulators.

**Protection of neighboring batteries:** The EQUALIZING process balances out the different voltages and this prevents damage to the neighboring batteries.

**Optimization of capacity:** Through EQUALIZING, BACS® guarantees a full charge level and therefore the optimum capacity of the entire battery system.

**Early warning of battery replacement:** The impedance analysis achieves an early warning of accumulators that have been damaged previously and are therefore less powerful. The sooner these accumulators are replaced, the longer the anticipated service life of the entire system.

**Battery alarm system:** By monitoring key parameters from the accumulators and measurements with defined threshold values, the system is capable of generating advance warnings in visual and acoustic form via network messages to attract the attention of the user.

**Maintenance:** A BACS system optimizes the quality of service through remote monitoring via Internet, VPN or other networks and the download of real-time data and the battery history for long-term analysis. Single, individual battery tests are possible without the overhead of disconnecting the battery from the group and of shutting down the system.

**Power Manager:** A BACS system receives a fully qualified UPS/SNMP and MODBUS Manager.

**Free BACS VIEWER analysis software:** Facilitates the graphic display of BACS analysis and reports.



## Technology

The functional reliability of a power supply based on accumulators can only be assured if every accumulator is 100% available at all times.

The BACS® battery modules have a test circuit that performs a precise measurement of the internal resistance, temperature and voltage of every individual accumulator. The data are transmitted to the BACS WEBMANAGER by a bus system that also and at the same time takes charge of the management of UPS units, inverters, proximity sensors and other devices.

The BACS WEBMANAGER forms the control unit of the system that collects and evaluates all information and stores it on an internal, non-volatile memory unit. A web browser display presents the current status of accumulators while a second display shows the current UPS data and a third shows the ambient data and the alarm contact status. The interface for the web browser was specifically designed for convenient configuration and for the display of all current system data. The EVENT MANAGER is the programmable interface for automatically generated reactions in the event of an alarm.

The BACS® system limits the charge for overcharged accumulators to prevent gases and drying. Every accumulator receives the optimum charge voltage from the EQUALIZING process and this also prevents an undercharge scenario.

By limiting charge voltages on the accumulator blocks, a substantially higher service life and greater reliability of the entire system can be achieved.

This early warning system makes it possible for the user to be made aware of the weakness of individual batteries long before it is too late. If for example the onset of sulfate deposits is starting to cause an increase in impedance, the user can reverse this effect through several charge/discharge cycles. The outcome of this 'battery training' can be seen immediately from the internal resistance figure. Alongside the level of internal resistance, the system

monitors voltage, temperature, Equalizing activity and number of charge/discharge processes. Every time data limits are exceeded, corresponding alarms are forwarded by the network or by an (optional) modem, in the form of an e-mail, SMS, SNMP or RCCMD Trap. These other options are also available: e-mail-to-SMS, MODBUS, acoustic alarm, visual alarm (LED MATRIX), alarm contacts, PROFIBUS, LONBUS.

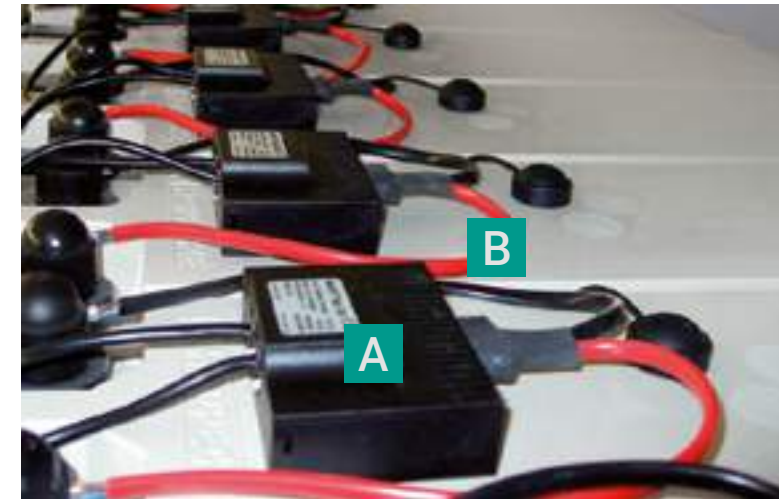
Whenever an alarm occurs, an acoustic warning signal is communicated to the user locally on the BACS device. An alarm LED on the module and on the BACS system also displays the alarm visually. Furthermore, an alarm contact transmits the signal to external monitoring devices.

The BACS WEBMANAGER units are equipped with large Flash-ROM memory units or SD memory boards that log all system data for at least 6 months and for up to 10 years, depending on the size of the BACS system. All data can be downloaded and archived by the network to release memory capacity for further data logging purposes. The data are analyzed by the BACS Viewer software.

The alarms on the other devices connected to the BACS WEBMANAGER (e.g. UPS) are also logged in separate files with a timestamp, and are also displayed on the web interface.

The BACS WEBMANAGER is equipped with a real-time clock for precise logging purposes. In addition, time is synchronized automatically with a network timeserver (SNTP). Rising levels of internal resistance in an accumulator caused by corrosion or sulfate deposits triggers an alarm. Alarm values can be defined to equalize different types of battery and charge curves.

## System components



### A C20, C30, C40 modules

- Battery modules for the monitoring of individual blocks and for optimum use of battery capacity and an increase in period of use
- Patented EQUALIZING function for charging and the distribution of voltages, Efficient balancing of voltages
- 12V, 6V and 2-4V version
- External, precise temperature sensor
- Measurements for every individual accumulator via voltage, temperature and impedance
- LED display for status and alarm statuses
- Central programming
- Closed and flame-resistant plastic housing
- Easy installation or retrofit with pre-configured cables and Velcro® mounting
- CE and ETL (and/or UL)-certified
- FCC Class A-tested

### B Cables

- Measuring cable with integrated DC fuses, as cable and module protection with high-ohm batteries
- Simple installation by plugging in the bus cables
- Specialist bus communication cables with high level of resistance to electromagnetic interference

### C Webmanagement

#### External and UPS slot version

- Administration of up to 256 BACS C modules in 1-10 parallel lines
- Individual management of the accumulators
- Power supply range 9-30V
- Includes a fully qualified UPS Web / SNMP Manager
- Simple installation with integrated DIN rail bracket

#### Interfaces

- COM 1 for management of a UPS / Inverter
- COM 2 for optional proximity sensors
- 1 programmable relay output

#### Administration and measurement

- Integrated configuration and status display
- Management of all threshold values
- Network notification system

#### Storage

- Data storage of all measurement values in log files

#### Options

- Power converter for evaluation of charge / discharge levels
- Modem analog/GSM for integration in UNMS II with tele-assistance system
- Alarm message via remote LED matrix display and acoustic signaling

Modules

General data	
Construction	Measuring modules with equalizing BACS patent no.: DE 102004013351.4
Power supply	30mA (normal operation) in „Sleep Mode“: < 1m A (REV 1.6)
Measuring tolerance	Internal resistance: < 10 %, voltage: < 0,1 %, temperature: < 5 %
Interfaces	2x RJ10 for BACS II Batterie Bus, intern RS232 Bus interface, 1x button for addressing, temperature sensor -35 to +85 °C, LED (alarms red/green, operation red/green)
Housing	80 x 55 x 27mm (HxWxD), 75g ABS housing (UL-certified, of low flammability, air slots), IP 30, Coated version (optional), IP 42 (dust and condensate)
Environmental conditions	Temperature 0 - 60°C max. humidity 90%, non condensing

Module BACS® C20	
Use	Module for 12Volt 7-600 Ah lead batteries 150m A equalizing
Measuring range	7V – 16V
RI range	0.5-100mOhm
Equalizing current	0.15 A

Module BACS® C30	
Use	Module for 6Volt 7-900 Ah lead batteries 300m A equalizing
Measuring range	3V – 9V
RI range	0.5-70mOhm
Equalizing current	0.3 A

Module BACS® C40	
Use	Module for 2-Volt 7-5000 Ah lead batteries such as C42, but with a high-precision resistance measurement in MicroOhm. With high-performance equalizing. (more than 850 mA)
Measuring range	0.6V – 6V
RI range	0.05-30mOhm
Equalizing current	1.0 A



Webmanager

BACS®II	WEBMANAGER BUDGET (external version)	WEBMANAGER BUDGET SC (slot version)	RAS WEBMANAGER BUDGET	WEBMANAGER BUDGET II (external version)
Processor	32-Bit RISC processor			
Memory	32 MB storage / 64 MB RAM			
Power consumption	At 12V/140mA, per BACS II module +10mA			At 12V/140mA, per BACS II module +10mA
Interfaces	3x RS-232 interfaces, (COM1= USV/UPS/power device, COM2 = multipurpose, COM3 = BACS battery bus), 1x RJ12 for battery bus converter, 1x RJ45, 10/100Mbit Ethernet		1x RS-232 interfaces, (COM1= UPS/power device, 1x Analog telephone connection, 1x battery bus converter extern, 1x RJ45, 10/100Mbit Ethernet	2x RS-232 interfaces, (COM1= UPS/power device, COM2 = power device), 2x battery bus outputs, 1x RJ45, 10/100Mbit Ethernet
Display / Signal	2x LED (Manager status, UPS/device alarm)		3x LED (Manager status, UPS/device alarm, 1x Buzzer with mute button	
Housing	PVC, RAL 7035 (light gray) ETL entered, FCC class A	'SC Format' integrated board for UPS devices with compatible slots, ETL entered, FCC class A	Aluminium, RAL 7035 (light gray) ETL entered, FCC class	
Dimensions (w x H x D)	69 x 30 x 126mm	60 x 20 x 130mm	130 x 125 x 30mm	
Weight	110 g	90 g	180 g	
Environmental conditions	Temperature 0 - 60°C, max. humidity 90%, non condensing			

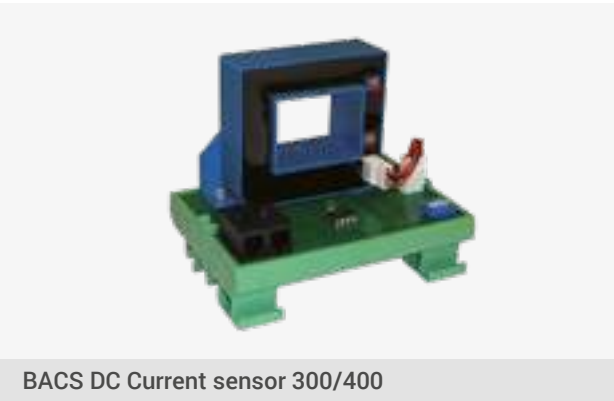


Accessories

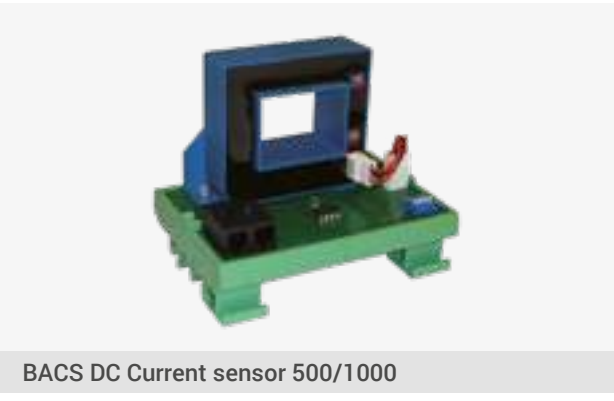
BACS®II	BUS CONVERTER 3
Design / Version	To adjust level and protocol from BACS Batterie Bus to BACS II WEBMANAGER Budget
Power supply	External connector mains unit 12V/800mA (standard, up to 160 module), optional 12V/1400mA, up to 256 module
Interfaces	2x RJ10 for BACS II Battery bus 1x RJ12 for COM3 WEBMANAGER Budget 1x Mini Din8/RS232 Interface for serial connection to the PC. On CONVERTER 3, an adapter is needed. 1x 2,1mm DC female barrel connector (external) 1x Potential-free contact (2-pin screw terminal for max. 1,0 mm², 125 VAC, 60 VDC and 1A)
Display / Signal	LED / Alarm buzzer with an Acknowledge button Optional: Adapter from mini-8 to RS232 for BACS CONVERTER 3, connection cable Mini-8 1.5m
Housing	Polystyrene housing, gray
Dimensions (w x H x D)	91,5 x 67 x 25mm
Weight	120 g
Environmental conditions	Temperature 0 - 60°C, max. humidity 90%, non condensing



Conversion and galvanic separation of the BACS battery bus to the BACS II WEB-MANAGER Budget. External wall wart 12V / 800mA (default for up to 160 modules), optional 12V/1400mA, for up to 256 modules. 2x RJ10 for BACS II battery bus, 1x RJ12 for COM3 WEBMANAGER Budget, 1x MiniDin8/RS232 interface for serial connection to workstation. For CONVERTER 3 an adapter is required (see below), 1x2,1mm DC connector socket for power supply (external).



DC Current sensor for measuring battery string discharge and charging process +/-300A or rather 400A DC. Viewable through Webbrowser and BACS VIEWER. Pluggable system.

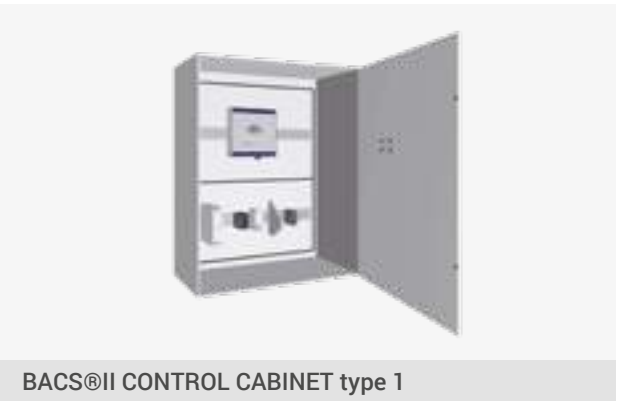


DC Current sensor for measuring battery string discharge and charging process +/-500A or rather 1000A DC. Viewable through Webbrowser and BACS VIEWER. Pluggable system.

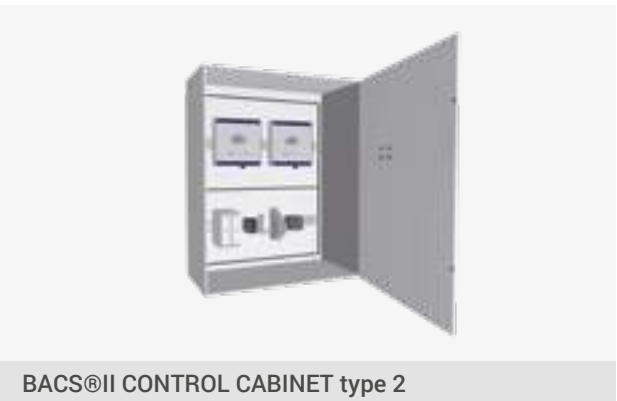
Control Cabinets



With optical and audible display on the outside door, protection class IP 56. Only power supply and Ethernet cable has to be provided by the customer. Easy connection of inputs and outputs through a strip terminal.



BACS®II CONTROL CABINET Type 1	
This includes	1x BACS WEBMANAGER BUDGET II, 1x 12V Power supply (100-240V, 50/60Hz), 1x CAT 6 Ethernet socket, 1x Alarm contact (potential-free)
Integrated into frontdoor:	1x POWER LED, 1 x BACS ALARM LED, 6 x spare bus communication cables
Dimensions	400 x 500 x 210 (WxHxD)



BACS®II CONTROL CABINET Type 2	
This includes	2x BACS WEBMANAGER BUDGET II, 2x 12V Power supply (100-240V, 50/60Hz), 2x CAT 6 Ethernet socket, 2x Alarm contact (potential-free)
Integrated into frontdoor:	2x POWER LED, 2x BACS ALARM LED, 8x spare bus communication cables
Dimensions	400 x 500 x 210 (WxHxD)



BACS®II CONTROL CABINET Type 3	
This includes	3x BACS WEBMANAGER BUDGET II, 3x 12V Power supply (100-240V, 50/60Hz), 3x CAT 6 Ethernet socket, 3x Alarm contact (potential-free)
Integrated into frontdoor:	3x POWER LED, 3x BACS ALARM LED, 10x spare bus communication cables
Dimensions	500 x 500 x 210 (WxHxD)





**U**  
Alexanderplatz

Is asleep.

Is awake.



Solar power



# Solar inverter

## KS series 1,5-5 KW

EFFEKTA KS solar inverters, as part of a photovoltaic system, convert direct current from solar modules into alternating current, and feed this into the electrical power grid. At the input end there is usually a DC converter with Maximum Power Point Tracker (MPPT) that supplies power to the intermediate circuit. There is a single-phase inverter at the output end that supplies power to the power supply grid and that is synchronized automatically with that power grid. The KS series of solar inverter with an output rating of 1500 to 5000 Watts is ideal for private use. These inverters are available as models with 1 MPP Tracker (ST) or 2 MPP Trackers (DT).



### Details



Control panel of DT



View of the underside

Bottom of the DT models (2 MPPT trackers) with DC connector panel, AC output, communication ports, and optional integrated DC disconnect switch (view without cooling fins)

### Characteristics

- Euro efficiency up to 96.8%
- High MPPT accuracy
- Fast MPPT calculation method
- Extreme low power loss at night
- Very high conversion efficiency
- Perfect cooling concept
- No derating up to 50°C during operation
- Easy to install
- DC cable connection without special tools
- Comprehensive electronic protection
- Monitoring of insulation resistance
- LCD panel with data (monitoring / operation)
- RS232/RS485 communication (optional WLAN)
- DC switch can be integrated into the housing

### Specification

KS		1500ST	2000ST	3000ST	3600ST	3000DT	3600DT	4200DT	5000DT	
Input (DC)	Nominal DC power	1650 WP	2200 WP	3100 WP	3900 WP	3100 WP	3900 WP	4300 WP	5100 WP	
	Max. DC power (±10~20%)	1800 WP	2400 WP	3300 WP	4000 WP	3300 WP	4000 WP	4600 WP	5500 WP	
	Max. DC voltage [V]	500 VDC				600 VDC				
	Max. input current [A]	11	13	19	22	2 x 12	2 x 14	2 x 16	2 x 17	
	Number of MPP tracker / Strings per MPP tracker	1 / 1	1 / 2			2 / 2				
	MPPT voltage range	150-450 VDC*				150-500 VDC*				
	Max. DC power per MPP tracker	1800 W	2400 W	3300 W	4000 W	1800 W	2200 W	2500 W	3000 W	
Output (AC)	Nominal AC power [W]	1500	2000	3000	3600	3000	3600	4200	5,0/4,6K**	
	Max. AC power [W]	1650	2200	3100	3700	3100	3700	4300	5,1/4,6K**	
	Max. output current [A]	9	11	15	18	15	18	21	24	
	Rated output current (rms) [A]	6,5	8,7	13	15,6	13	15,6	18,3	21,7	
	Wire / Nominal AC voltage	1 / N / PE, 230 VAC								
	AC voltage window	184 V~264 V								
	AC grid frequency / range [Hz]	50 / 60 Hz ± 5 Hz								
	Power factor (cosφ)	1				0.9 leading- 0.9 lagging				
	Total harmonic distortion (THDi)	< 3%								
	Efficiency	Max. efficiency	> 96,0 %	> 97,5 %						
		Euro-efficiency	> 95,0 %	> 96,5 %						
		MPPT efficiency	> 99,9 %							
	General data	Dimensions (W / H / D) [mm]	335 x 580 x 180				400 x 637 x 190			
Weight [kg]		15,8	18,2			22				
Operating temperature range		-20 C ~ +40 °C								
Ingress protection		IP65 (not intended for outdoor use)								
Topology		transformer-less								
Internal DC consumption (stand-by / night)		< 5 W / < 0,2 W				< 12 W / < 0,2 W				
Cooling concept		convection cooling								
Noise (typical) [dB]		< 25 dB								
LCD cisplay		Ja								
Interface		RS485 standard; RS232, external WIFI o. Ethernet (option)								
Standard warranty [year]		5								
DC switch		Option (can be integrated into the housing)								
Protection		DC reverse-polarity protection	Yes							
	All-pole fault current monitoring	Yes								
	AC short-circuit protection	Yes								
	Ground fault monitoring	Yes								
Regulations / standards	Safety	EN 62109-1, EN 62109-2, VDE V 0126-1-1, VDE V 0124-100, VDE AR N 4105								
	EMC	EN 61000-6-2, EN 61000-6-3								
	Certifications	CE								

\* Exceeding or outside of MPPT voltage range: Error message, no power feeding

\*\* Accordance to VDE-AR-N-4105



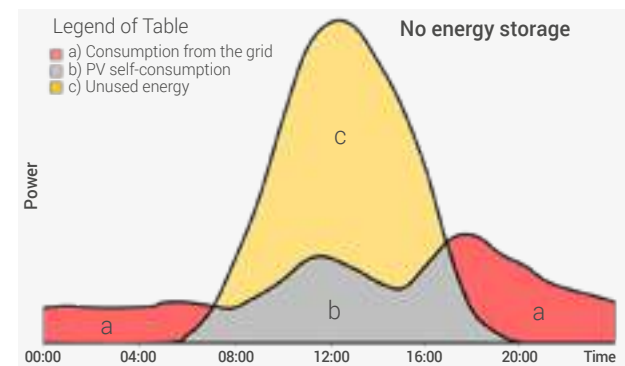
# Multifunction inverter

## AX series

The AX Series is a multi-function inverter / PV charger with the combined functions of an inverter and MPPT solar and battery charging device. These inverters are suitable for off-grid stand-alone operation with PV modules, but can also be operated with power from batteries, generators or the public power grid. With insufficient power from the PV modules, the device automatically adds on battery power or when the batteries are empty it switches over to the power grid. Three AX-inverter in combination can be configured for three-phase operation. For higher power requirements up to 6 units (4 or 5kVA models) with a maximum output of 24kW (30kVA) can be optionally connected in parallel.

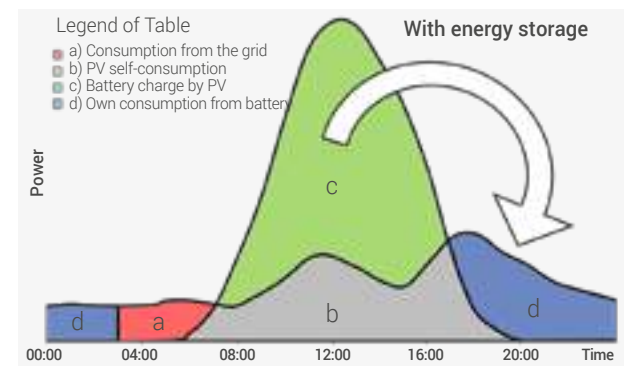


### Optimized own use of solar power



Typical hourly energy production and consumption in a household with photovoltaic system without energy storage:

At night the photovoltaic system produces no electricity, so the required energy is obtained from the public grid (a). During the day excess energy gets lost (c), because the complete amount of electricity produced cannot be consumed (b).



Typical Day course for a household with PV system and energy storage:

During the day the battery is charged with the excess energy (c). At night, a large part of the necessary energy is obtained from the energy storage device (d). The PV energy yield (b) + (d) is now much higher because the purchased energy from the grid is much lower (a). Depending on the configuration of the batteries, the energy loss can decrease to negligible values.

### Characteristics

- Parallel operation of several inverters possible
- 3-phase operation possible
- Pure sine wave output
- Built-in MPPT solar charge controller
- Configurable via LCD display or PC software
- Auto restart when mains power returns
- Overload / over temperature / short circuit protection
- Island operation possible
- Optimized charge process for perfect battery performance ("Smart Charger Design")
- 12 months warranty
- Solar power, AC Mains power supply, 24 o. 48 VDC battery (PWM auch 12 VDC)

### MPPT suitability

- Superior in temperate regions ( $\varnothing 25^{\circ} \text{C}$ )
- To prefer for services exceeding 500W
- Preferable with load fluctuations
- Suitable for higher yields
- Ideal for the optimal operating point to choose on the current-voltage curve

### PWM suitability

- Suitable for constant power / charge conditions
- Suitable for smaller PV systems
- More cost-effective variant
- Suitable for uniform, hot climate conditions

### AX-M series

- MPPT Solar Controller
- 800, 1600, 2400, 3200, 4000W rated power
- 24 / 48 V DC

### AX-P series

- MPPT Solar Controller
- With increased PV power (see specifications)
- 1600, 2400W rated power
- 24 / 48 V DC

### AX-K series

- PWM Solar Controller
- 800, 1600, 2400, 3200, 4000W rated power
- 12, 24, 48 V DC

Specifications (M & P series)

AX		M 1 kVA 24 V 1 kVA 48 V	M 2 kVA 24 V	M 3 kVA 24 V 3 kVA 48 V	P 2 kVA 24 V 3 kVA 24 V 2 kVA 48 V 3 kVA 48 V	M 4 kVA 48 V	M 5 kVA 48 V
Operating temperature		0 °C bis 50 °C					
Storage temperature		-15 °C bis 60 °C					
Humidity		< 95 % (non-condensing)					
Size (HxWxD) [mm]		355 x 272 x 128			479 x 295 x 140	540 x 295 x 140	
Weight [Kg]		7,4	7,6	8,0	11,5	12,5	13,5
Protection		IP 20					
Regulations / standards	Safety	EN 60950-1					
	EMC	EN 55022, class A, EN 55024					
	Certifications	CE					
Battery bank alarm contact-load capacity (DRYCONTACT)		2 A / 250 VAC					

AX		M 1 kVA 24 V M 2 kVA 24 V M 3 kVA 24 V M 1 kVA 48 V M 3 kVA 48 V	P 2 kVA 24 V P 3 kVA 24 V P 2 kVA 48 V P 3 kVA 48 V	M 4 kVA 48 V M 5 kVA 48 V
AC input	AC input waveform	Sine wave (Mains and generator)		
	AC input voltage	230 VAC		
	AC input voltage range	90-280 VAC configuration „general home applications“ 170-280 VAC configuration „Computer applications“ (UPS)		
	Max. AC-input voltage	300 VAC		
	AC input frequency	50 / 60 Hz (automatic)		
	AC input frequency range	40 – 65 Hz		
	Efficiency normal mode	> 95 % (at rated load and battery bank fully loaded)		
	Transfer time	typical 20ms configuration „general home applications“ typical 10ms configuration „Computer applications“ (UPS)		

AX		M 1 kVA 24 V M 2 kVA 24 V M 3 kVA 24 V P 2 kVA 24 V P 3 kVA 24 V	M 1 kVA 48V M 3 kVA 48V P 2 kVA 48V P 3 kVA 48V	M 4 kVA 48 V M 5 kVA 48 V
Output	Output voltage	230 VAC ± 5 %		
	Output frequency	50 Hz or 60 Hz, adjustable		
	Effective power	1 kVA / 0,8 kW 2 kVA / 1,6 kW 3 kVA / 2,4 kW	1 kVA / 0,8 kW 2 kVA / 1,6 kW 3 kVA / 2,4 kW	4 kVA / 3,2 kW 5 kVA / 4,0 k
	Max. Efficiency (Inverter)	90 %		
	Overload protection (behavior)	5 s @ >150% load, 10 s @ 110-150% load		
	Max. load	2x nominal load for 5s		
	Short circuit protection Output	Circuit breaker in the main power supply		
		Electronic fuse in the inverter operation		
Internal consumption	Sleep operation (STANDBY):	2 W		
	Energy saving mode	< 10 W		< 15 W
	Normal mode (no load):	< 25 W		< 50W
Battery Bank & charger	Nominal voltage	24 VDC	48 VDC	
	Cold start voltage	23,0 VDC	46,0 VDC	
	Voltage accuracy	±0,3 %		
	Charging algorithm	3 stage (I U o U)		

AX	M 1 kVA 24 V M 2 kVA 24 V M 3 kVA 24 V	M 1 kVA 48 V M 3 kVA 48 V	P 2 kVA 24 V P 3 kVA 24 V	P 2 kVA 48 V P 3 kVA 48 V M 4 kVA 48 V M 5 kVA 48 V
Charging power	600 W	900 W	1500 W	P: 3000 W, M: 4000 W
Efficiency	98%			
Nominal System voltage U <sub>N</sub>	24 VDC	48 VDC	24 VDC	48 VDC
Effective operating range MPPT U <sub>OP</sub>	30 - 66 VDC	60 – 88 VDC	30 – 115 VDC	60 – 115 VDC
Max. input voltage U <sub>OCV</sub>	75 VDC	102 VDC	145 VDC	
Min. battery bank voltage for PV-mode	17 VDC	34 VDC	17 VDC	34 VDC
PV- input accuracy	± 2V			

AX	M 1 kVA 24 V	M 2 kVA 24 V M 3 kVA 24 V P 2 kVA 24 V P 3 kVA 24 V	M 1 kVA 48 V M 3 kVA 48 V P 2 kVA 48 V P 3 kVA 48 V	M 4 kVA 48 V M 5 kVA 48 V
Charging current 230VAC	10/20 A	20/30 A	10/15 A	2/10/20/30/40/50/60 A

Specifications (K series PWM)

AX		K 1000-12	K 2000-24	K 3000-24	K 4000-48	K 5000-48
Power	Nominal power	1000VA / 800W	2000VA / 1600W	3000VA / 2400W	4000VA / 3200W	5000VA / 4000W
AC input	AC input voltage	230 VAC				
	AC input voltage range	90-280VAC configuration „general home applications“ 170-280VAC configuration „Computer applications“ (UPS)				
	AC input frequency	50Hz or 60Hz, adjustable				
Output	Output voltage	230 VAC ± 5 %				
	Max. power	2000 VA	4000 VA	6000 VA	8000 VA	10000 VA
	Max. efficiency	90 %				
	Output frequency	50Hz or 60Hz, adjustable				
	Transfer time	20 ms configuration „general home applications“ 10 ms configuration „Computer applications“ (UPS)				
Battery	Wave form	Sine wave				
	Battery voltage	12 VDC	24 VDC		48 VDC	
	Battery float voltage	13,5 VDC	27 VDC		54 VDC	
	Overload protection	15 VDC	30 VDC		60 VDC	
	Max. charging current	10 A or 20 A	20 A or 30 A		2 / 10 / 20 / 30 / 40 / 50 / 60 A	
Solar charger	Charging current	50 A				
	Effective operating range U <sub>OP</sub>	15-18 VDC	30-36 VDC		60-72 VDC	
	Max. input voltage U <sub>OCV</sub>	30 VDC	60 VDC		105 VDC	
	Standby power consumption	1 W	2 W		2 W	
General data	Size (HxWxD) [mm]	316 x 240 x 95	355 x 272 x 100		468 x 295 x 120	
	Weight (in kg)	5,0	6,4	6,9	9,8	9,8
	Humidity	5% bis 95% (non-condensing)				
	Operating temperature	0°C - 55°C				
	Storage temperature	-15°C - 60°C				
	Protection	IP 20				
Regulations / standards	Safety	EN 60950-1				
	EMC	EN 55022, class A, EN 55024				
	Certifications	CE				

# Multifunction inverter

## AX-M1

NEW

The devices in the AX M1 series with integrated MPPT solar charge controller are multi-function inverters / PV chargers with the combined functions of an inverter as well as a solar and battery charging device. These inverters are suitable for standalone operation independent of mains supply via PV modules but can also be operated with electrical power from accumulators, generators or the public power supply grid. If insufficient power is being supplied from the PV modules, the device automatically tops up the power level with battery current or, if the batteries are discharged completely, it switches over to the mains power grid. A network of three AX units can be configured for 3-phase operation.



### Details



View of the underside AX-M1



Monitoring Box (WiFi Box)

With the monitoring box (WiFi box), the power generation data can be called up via WLAN from a PC, smartphone or tablet PC in the web browser.

### Characteristics

- PV inverter without mains power supply
- Island operation possible
- 4000, 5000 W nominal load
- 24, 48 VDC Battery voltage
- PV- / Battery chargert with 3-stage charge
- Battery voltage thresholds can be adjusted individually
- No more external neutral-point emulation is required
- To be preferred for PV module performance levels
- Suitable for higher yields with MPPT
- Several power sources
- Parallel operation by up to 9 inverters
- 3-phase operation is possible
- Sine-wave output
- Can be configured via LCD display or PC software
- Automatic reboot when mains power is restored
- Protection against excessive loads and temperatures as well as short circuits
- 24 months' warranty

### Special features

- Power factor 1
- Larger LC display
- Equalizing (battery)
- Integrated neutral-point emulation (VDE AR-E 2510-2)
- Installed MPPT solar charge controller for maximum performance from PV modules

### Specifications

AX-M1		4000-48	5000-24	5000-48
Power	Power in VA	4000	5000	5000
	Power in W	4000	5000	5000
AC input	AC input voltage	230 VAC		
	AC input voltage range	100 – 270 VAC		
	AC input frequency	50 Hz / 60 Hz		
Output	Output voltage	230 VAC ± 5 %		
	Peak performance (5 seconds)	8000 VA	10000 VA	10000 VA
	Max. efficiency	95 %		
	Output frequency	50 Hz or 60 Hz, adjustable		
	Transfer time	20 ms configuration Domestic appliances / 10 ms bei Computer applications (UPS)		
Battery	Wave form	Sine wave		
	Battery voltage	48 VDC	24 VDC	48 VDC
	Charging voltage	48,0 – 58,4 VDC	24,0 – 29,2 VDC	48,0 – 58,4 VDC
	Overload protection	60 VDC	30 VDC	60 VDC
Solar charger / AC charger	Max. PV power	4000 W	2000 W	4000 W
	PV charging current	80 A		
	Max. AC charging current (adjustable)	60 A		
	Max. charging current (adjustable)	140 A		
	Effective operating range U <sub>OP</sub>	60- 115 VDC	30 – 115 VDC	60 – 115 VDC
	Max. input voltage U <sub>OCV</sub>	145 VDC		
	Standby power consumption	2 W		
	Size (HxWxD) [mm]	468 x 297 x 125	475 x 310 x 180	468 x 297 x 125
General data	Weight (in kg)	12,5		13,5
	Humidity	5-95% (non-condensing)		
	Operating temperature	0°C - 50°C		
	Storage temperature	-15°C - 60°C		
	Protection	IP20		
	Safety	EN 62109-1: 2010, EN 62109-2: 2011		
Regulations / standards	EMC	EN 55032: 2015, EN 55024: 2010+A1: 2015, class A		
	Certifications	CE		



# Multifunction inverter

## AX-P1

NEW

The devices in the AX P1 series with integrated MPPT solar charge controller are multi-function inverters / PV chargers with the combined functions of an inverter as well as a solar and battery charging device. These inverters are suitable for standalone operation independent of mains supply via PV modules but can also be operated with electrical power from accumulators, generators or the public power supply grid. If insufficient power is being supplied from the PV modules, the device automatically tops up the power level with battery current or, if the batteries are discharged completely, it switches over to the mains power grid. A network of three AX units can be configured for 3-phase operation.



### Details



View of the underside AX-P1



Monitoring Box (WiFi Box)

With the monitoring box (WiFi box), the power generation data can be called up via WLAN from a PC, smartphone or tablet PC in the web browser.

### Characteristics

- PV inverter without mains power supply
- Island operation possible
- 3000 W nominal load
- 24, 48 VDC Battery voltage
- PV- / Battery chargert with 3-stage charge
- Battery voltage thresholds can be adjusted individually
- No more external neutral-point emulation is required
- To be preferred for PV module performance levels
- Suitable for higher yields with MPPT
- Several power sources
- Sine-wave output
- Can be configured via LCD display or PC software
- Automatic reboot when mains power is restored
- Protection against excessive loads and temperatures as well as short circuits
- 24 months' warranty

### Special features

- Power factor 1
- Larger LC display
- Equalizing (battery)
- Integrated neutral-point emulation (VDE AR-E 2510-2)
- Installed MPPT solar charge controller for maximum performance from PV modules
- Increased charge power from charger for operation with higher levels of battery capacity – especially when suited to applications without a reliable supply of AC current

### Specifications

AX-P1		3000-24	3000-48
Power	Power in VA	3000	3000
	Power in W	3000	3000
AC input	AC input voltage	230 VAC	
	AC input voltage range	100 – 270 VAC	
	AC input frequency	50 Hz / 60 Hz	
Output	Output voltage	230 VAC ± 5 %	
	Peak performance (5 seconds)	6000 VA	
	Max. efficiency	95 %	
	Output frequency	50 Hz or 60 Hz, adjustable	
	Transfer time	20 ms configuration Domestic appliances / 10 ms bei Computer applications (UPS)	
Battery	Wave form	Sine wave	
	Battery voltage	24 VDC	48 VDC
	Charging voltage	24,0 – 29,2 VDC	48,0 – 58,4 VDC
	Overload protection	31 VDC	60 VDC
Solar charger / AC charger	Max. PV power	1500 W	
	PV charging current	60 A	
	Max. AC charging current (adjustable)	20 / 30 A	10 / 15 A
	Max. charging current (adjustable)	90 A	
	Effective operating range U <sub>OP</sub>	30~115 VDC	
	Max. input voltage U <sub>OCV</sub>	145 VDC	
General data	Standby power consumption	2 W	
	Size (HxWxD) [mm]	479 x 295 x 140	479 x 295 x 140
	Weight (in kg)	11,5	
	Humidity	5-95 % (non-condensing)	
	Operating temperature	0°C - 50°C	
	Storage temperature	-15°C - 60°C	
	Protection	IP20	
Regulations / standards	Safety	EN 62109-1: 2010, EN 62109-2: 2011	
	EMC	EN 61000-6-4: 2007+A1: 2011; EN 61000-6-2: 2005+AC: 2005	
	Certifications	CE	

# Multifunction inverter

## AX-K1

NEW

The devices in the AX K1 series with integrated MPPT solar charge controller are multi-function inverters / PV chargers with the combined functions of an inverter as well as a solar and battery charging device. These inverters are suitable for standalone operation independent of mains supply via PV modules but can also be operated with electrical power from accumulators, generators or the public power supply grid. If insufficient power is being supplied from the PV modules, the device automatically tops up the power level with battery current or, if the batteries are discharged completely, it switches over to the mains power grid. A network of three AX units can be configured for 3-phase operation.



### Details



View of the underside AX-P1 AX-K1



Monitoring Box (WiFi Box)

With the monitoring box (WiFi box), the power generation data can be called up via WLAN from a PC, smartphone or tablet PC in the web browser.

### Characteristics

- PV inverter without mains power supply
- Island operation possible
- Installed PWM solar charge controller
- 1000, 2000, 3000, 4000, 5000 W nominal load
- 12, 24, 48 VDC Battery voltage
- PV- / Battery chargert with 3-stage charge
- Battery voltage thresholds can be adjusted individually
- No more external neutral-point emulation is required
- Parallel operation by up to 9 inverters
- Several power sources
- 3-phase operation is possible
- Sine-wave output
- Can be configured via LCD display or PC software
- Automatic reboot when mains power is restored
- Protection against excessive loads and temperatures as well as short circuits
- 24 months' warranty

### Special features

- Power factor 1
- Larger LC display
- Equalizing (battery)
- Integrated neutral-point emulation (VDE AR-E 2510-2)

### Specifications

AX-K1		1000-12	2000-24	3000-24	4000-48	5000-48
Power	Power in VA	1000	2000	3000	4000	5000
	Power in W	1000	2000	3000	4000	5000
AC input	AC input voltage	230 VAC				
	AC input voltage range	100 – 270 VAC				
	AC input frequency	50 Hz / 60 Hz				
Output	Output voltage	230 VAC ± 5 %				
	Peak performance (5 seconds)	2000 VA	4000 VA	6000 VA	8000 VA	10000 VA
	Max. efficiency	95 %				
	Output frequency	50 Hz or 60 Hz, adjustable				
	Transfer time	20 ms configuration Domestic appliances / 10 ms bei Computer applications (UPS)				
	Wave form	Sine wave				
Battery	Battery voltage	12 VDC	24 VDC		48 VDC	
	Charging voltage (VDC)	12,0 - 14,6	24,0 - 29,2		48,0 - 58,4	
	Overload protection (VDC)	15,5	31,0		60,0	
Solar charger / AC charger	Max. PV power	600 W	1200 W		2400 W	
	PV charging current	50 A				
	Max. AC charging current (adjustable)	20 A	30 A		60 A	
	Max. charging current (adjustable)	50 A		110 A		
	Effective operating range U <sub>OP</sub>	15-18 VDC	30-32 VDC		60-72 VDC	
	Max. input voltage U <sub>OCV</sub>	50 VDC	60 VDC		105 VDC	
	Standby power consumption	1 W	2 W			
General data	Size (HxWxD) [mm]	316 x 240 x 95	355 x 272 x 100		468 x 297 x 125	
	Weight (in kg)	5,0	6,4	6,9	9,8	9,8
	Humidity	5%-95% (non-condensing)				
	Operating temperature	0°C - 50°C				
	Storage temperature	-15°C - 60°C				
	Protection	IP 20				
Regulations / standards	Safety	EN 62109-1: 2010, EN 62109-2: 2011				
	EMC	EN 61000-6-4: 2007+A1: 2011; EN 61000-6-2: 2005+AC: 2005				
	Certifications	CE				

# Application scenarios

## AX series

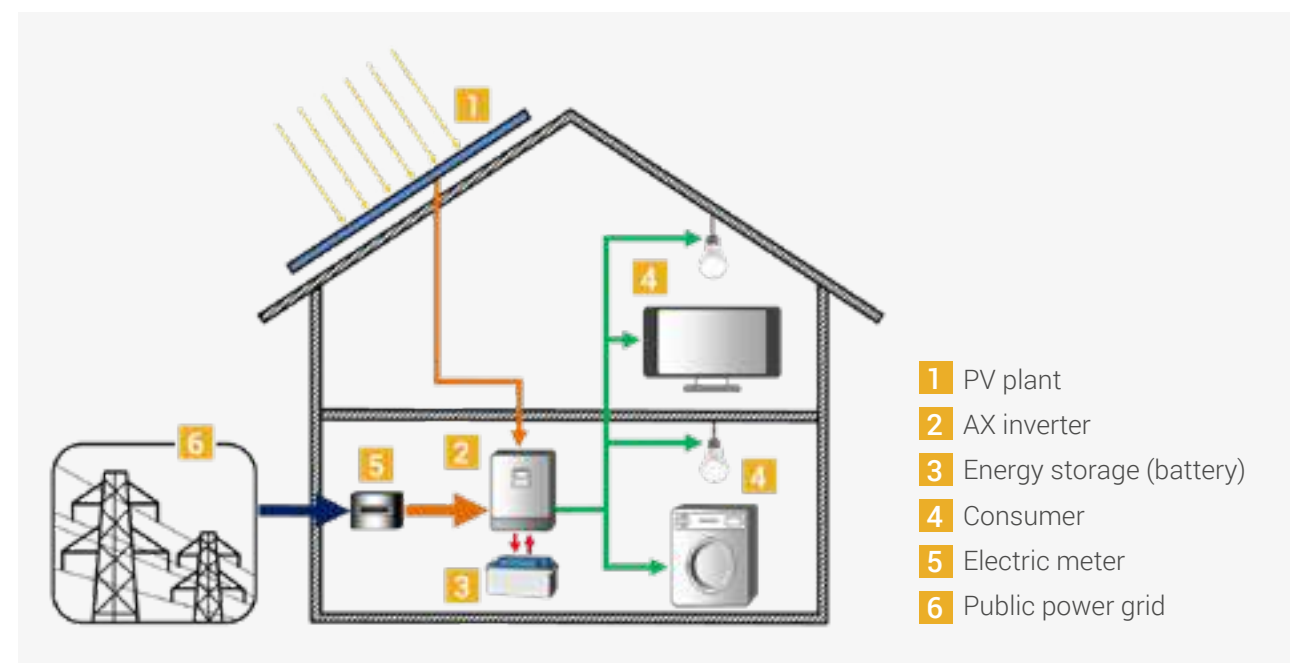
The operating principle of the AX-inverter includes the supply with batteries in case of failure of other energy sources.

Operation is possible with AGM, gel, NiCd, closed lead-acid battery (OpzS, OpzV...) and lithium. The batteries are charged via the integrated charger with 3-stage charge.

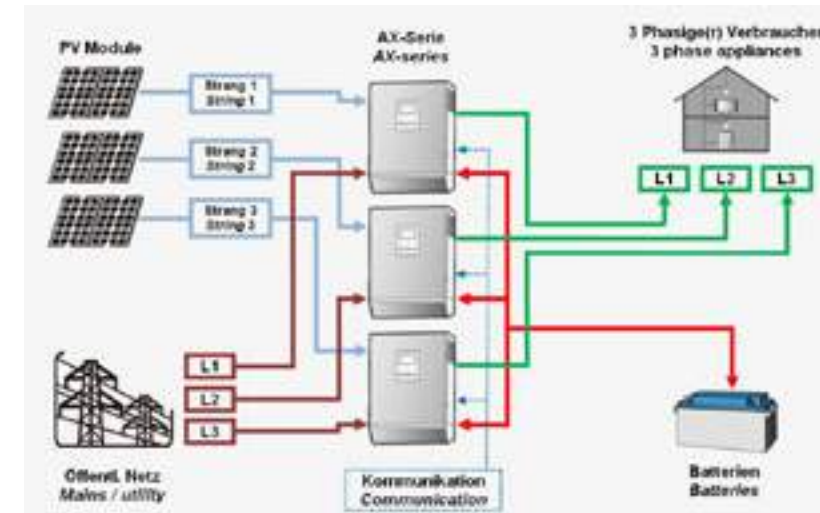
EFFEKTA® recommends the US2000 Plus lithium battery storage unit for the PV system. For further details, please refer to page 96.



### Basic principle



### Typical configurations



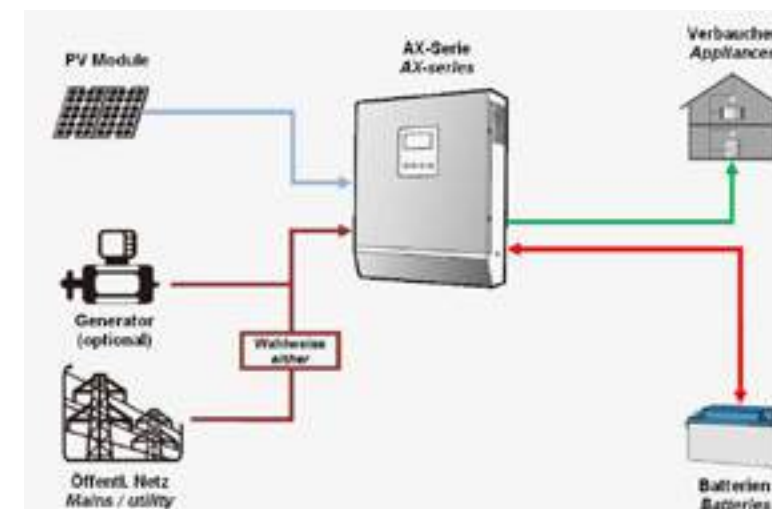
3-phase operation

A single AX inverter is required for each phase. Only one battery system is used and shared by all three inverters.

The inverters communicate with each other and generate a three phase current network.

With this configuration, an entire house can be supplied with three phase power easily through PV and energy storage.

At too low PV power, the energy required is first taken from the battery. If this is empty, the missing electricity is provided from the AC source.



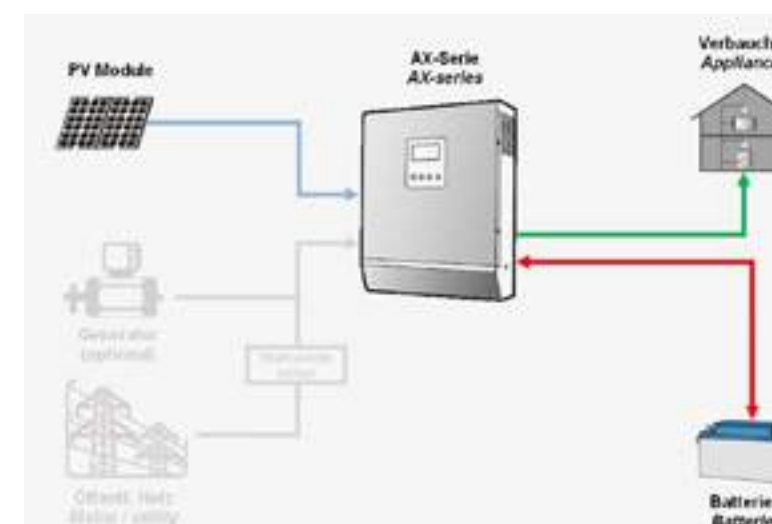
Solar powered with battery backup

PV modules and AC source (mains or generator) are required. Consumers primarily are powered from the PV modules.

When there is no or insufficient PV power initially, batteries provide the energy needed. When the batteries are empty the AC source jumps in.

Surplus energy of the PV modules is used to charge the batteries.

Upon failure of PV and AC power supply is powered on on batteries.



Stand-alone ("Island-") operation with battery backup

The load is supplied by the inverter, which draws the energy from the PV modules. There are no AC sources.

With sufficient PV power, the batteries are charged by PV. The charge is made exclusively with PV.

Upon failure of the PV supply (eg. night mode), consumers can be supplied via the batteries.

Missing PV power of inverter (low solar radiation) can be supplemented through the batteries.



# Service

## ■ Full maintenance contract

- Date: 1x annually
- Cleaning the installation
- Check-up of the mechanical condition and all installation parts
- Voltage check of AC current inter-circle
- Control and possible adjustment of oscillator-circles
- Examination and attitude of all electric control circuits of inverter and rectifier
- Control measurement of thyristors, diodes, transformers, filter elements etc, to guarantee a perfect operation of installation
- Capacity test of the batteries as customor requires
- Exchange of defective batteries
- Fault hotline (response time: 24 hours Mon-Fri 8am- 5pm)
- Spare parts and batteries via maintenance fee
- Minimum contract period: 4 years
- Invoice: via maintenance fee

## ■ Partial-maintenance contract

- Date: 1x annually
- Cleaning the installation
- Check-up of the mechanical condition and all installation parts
- Voltage check of AC current inter-circle
- Control and possible alignment of oscillator circles
- Examination and adjustment of all electric control circuits of inverter and rectifier
- Capacity test of the batteries as customor requires
- Spare parts covered by maintenance fee

## ■ Performance-based service

- Date: as customer requires
- Cleaning the installation
- Check-up of the mechanical condition and all installation parts
- Voltage check of AC current inter-circle
- Control and possible alignment of oscillator circles
- Examination and adjustment of all electric control circuits of inverter and rectifier
- Control measurement of thyristors, diodes, transformers, filter-elements etc, to guarantee a perfect operation of installation
- Capacity test of the batteries as customor requires
- Exchange of defective batteries after prior approval of cost estimate
- Invoice: at the valid EFFEKTA® cost rate

- Control measurement of thyristors, diodes, transformers, filter elements etc, to guarantee a perfect operation of installation
- Exchange of defective batteries after prior approval of cost estimate
- Fault hotline (response time: 24 hours Mon-Fri 8am- 5pm)
- 15% discount on batteries
- Minimum contract period: 4 years
- Invoice: via maintenance fee

# References

## Banks

Bank 1 Saar .....	Saarbrücken
BHF Bank .....	Frankfurt
Sparkasse .....	Bergkamen
Sparkasse .....	Dillenburg
Sparkasse .....	Friedrichshafen
Sparkasse .....	Weilburg
Volksbank .....	Altshausen
Volksbank .....	Biberach
Volksbank .....	Donaueschingen
Volksbank .....	Dreieich
Volksbank .....	Friedrichshafen
Volksbank .....	Gardeling
Volksbank .....	Saulgau
Volksbank .....	Tett nang
Volksbank .....	Weingarten

## Industry / corporations

Air Liquide DE GmbH .....	Krefeld
Alstom Turbinen .....	Nürnberg
BASF AG .....	Ludwigshafen
BASF AG .....	Willstätt
Bayer Leverkusen .....	Leverkusen
Bayer Vital .....	Fernwald
Bayer Höchst .....	Frankfurt Höchst
BMW AG .....	Munich
Bombardier .....	Braunschweig
Burda Druckzentrum .....	Offenburg
Burda Rechenzentrum .....	Munich
Daimler Chrysler .....	Stuttgart
Daimler Chrysler .....	Rastatt
Deutsche Bahn .....	Frankfurt
Deutsche Messe AG .....	Hannover
Deutscher Wetterdienst ....	Offenbach
DORMA GmbH + Co. KG ...	Ennepetal
Festo .....	Esslingen

Georg Fischer .....	Singen
Gerolsteiner Br. GmbH .....	Gerolstein
Hoechst AG .....	Frankfurt
Hoechst AG .....	Wiesbaden
Höft und Wessel AG .....	Hannover
KONE .....	Leipzig
Kaufhof .....	Köln
Klöckner Stahl GmbH .....	Bremen
Mattson .....	Plietzhausen
Mediamarkt .....	Velbert
Merck KG aA .....	Grafring
Mitropa .....	Berlin
Obi .....	Martinsried
Ravensburger Sp. GmbH ..	Ravensburg
Saeco .....	Eigeltingen
Salamander .....	Kornwestheim
Scheidt & Bachmann .....	Mönchengladbach
TNT .....	Troisdorf
VW .....	Wolfsburg
Walter AG .....	Tübingen

## Universities

Universität .....	Duisburg
Universität .....	Heidelberg
Universität .....	Konstanz
Universität .....	Regensburg
Universität .....	Tübingen
Universität .....	Ulm
Universität .....	Wuppertal
Universität .....	Würzburg
Uni der Bundeswehr .....	Hamburg
Uni. Gesamthochschule ...	Soest
Fachhochschule .....	Darmstadt
Fachhochschule .....	Dortmund
Fachhochschule .....	Frankfurt
Fachhochschule .....	Mainz
Fachhochschule .....	Mannheim

Fachhochschule ..... Stuttgart  
Techn. HS Mittelhessen .... Gießen

Authorities

Abfallbehandlung Nord ..... Bremen  
AOK Brandenburg ..... Potsdam  
Berliner Verkehrsbetriebe .. Berlin  
Bezirksverwaltung Obb. .... Munich  
Botschaft der VAE ..... Berlin  
Bundespolizeiamt ..... Stuttgart  
Bundespräsidialamt ..... Berlin  
Finanzamt ..... Schweinfurt  
Friedrich-Löffler-Institut .... Insel Riems  
FTZ ..... Eschborn  
Kläranlage ..... Griesheim  
Kläranlage ..... Langenhagen  
Kreisverwaltung ..... Mansfeld  
Landesvermessung ..... Dresden  
Landesvermessung ..... Potsdam  
Landeswohlfahrtsverb..... Kassel  
Landratsamt ..... Friedrichshafen  
Landratsamt ..... Mosbach  
Landtag Sachsen-Anhalt ... Magdeburg  
LVA ..... Karlsruhe  
Max-Planck-Institut ..... Göttingen  
Max-Planck-Institut ..... Golm  
Max-Planck-Institut ..... Stuttgart  
Messe AG ..... Hannover  
Polizeipräsidium ..... Wiesbaden  
Polizeipräsidium ..... Dortmund  
Sancura BKK ..... Wetzlar  
Stadtverwaltung ..... Frankfurt  
Stadtverwaltung ..... Halle  
Stadtverwaltung ..... Konstanz  
Stadtverwaltung ..... Schwalbach  
Stadtverwaltung ..... Stuttgart

Hospitals

Albklinik ..... Münsingen  
Bundeswehrkrankenhaus . Amberg

Kliniken Landkreis ..... Sigmaringen  
KH Bad Cannstatt ..... Stuttgart  
KH St. Martin ..... Duderstadt  
KH Stadt Chemnitz ..... Chemnitz  
KH Sachsenhausen ..... Frankfurt  
Städtisches KH ..... Friedrichshafen  
Städtisches KH ..... Dresden

Telecommunications

Broadnet Mediascape ..... Hamburg  
DeTe Mobil AG ..... Bonn  
Deutsche Telekom AG ..... Weilheim  
M“net GmbH ..... Munich  
Nokia ..... Heilbronn  
SCALTEL AG ..... Waltenhofen  
TeleData GmbH ..... Friedrichshafen  
T-Mobile ..... Leipzig

Sports facilities

Bayarena ..... Leverkusen  
Nürburgring ..... Eifel  
Stadion der Freundschaft . Cottbus  
SAP Arena ..... Mannheim  
Mercedes Benz Arena ..... Stuttgart

EFFEKTA Austria

Allg. österr. Bezirks KA ..... St. Johann in Tirol  
Breitenfeld Edelstahl AG ... Mitterdorf  
BTV AG ..... Innsbruck  
Bundespolizeidirektion ..... Vienna  
CGM Österreich ..... St. Pölten  
Donau-Universität Krems . Krems  
Dornbirner Messe GmbH .. Dornbirn  
Ebewe Pharma GesmH ..... Unterach  
Energie Control GmbH ..... Vienna  
ENI Austria AG ..... Vienna  
FH JOANNEUM GmbH ..... Graz, Kapfenberg  
Fiber Cable Technologie ... Gmünd  
Gartner KG ..... Lambach

Haus der Musik ..... Innsbruck  
Hypo Bank ..... Vienna  
IGM Robotersysteme ..... Vienna  
IKB ..... Innsbruck  
IMC FH Krems ..... Krems  
Nordkettenbahnen GmbH . Innsbruck  
Interwetten AG ..... Vienna  
Isovolta AG ..... Werndorf  
LG für Strafsachen ..... Vienna  
LSZ Burgenland ..... Eisenstadt  
Land Tirol ..... Tirol  
Linz AG ..... Linz  
Leopold-Franzens-Uni. .... Innbruck  
Linz AG ..... Linz  
Louis Vuitton ..... Vienna  
Medizinische Uni. Graz ..... Graz  
Norske SKOG Bruck ..... Bruck a.d. Mur  
Olympia Sport- & Veranst.-  
zentrum Innsbruck ..... Innsbruck, Igls  
Porsche Informatik GmbH .. Salzburg  
Prillinger GmbH ..... Wels  
Radio 88.6 ..... Burgenland  
REWE Group Austria AG ... Austria  
Schloss Schönbrunn ..... Vienna  
Schönbrunner Tiergarten ... Vienna  
Stora Enso Wood Products . Austria  
TU-Wien Gebäude/Technik . Vienna  
Veterinärmedizinische Uni. . Vienna  
Technische Universität ..... Vienna  
VOEST Alpine Stahl ..... Linz  
VOEST Alpine Group IT ..... Linz, Böhlerwerk

International

BGL Axento ..... Luxembourg  
CCK ..... Luxembourg  
CSSF ..... Luxembourg  
Deutsche Babcock ..... Utd. Arab Emirates  
Deutsche Botschaft ..... Nairobi  
Eurocash ..... Poland  
Euroforum Trade Center ... Luxembourg  
Messer Hungarogaz ..... Hungary

Migros Markt ..... Switzerland/Zurich  
Millicom ..... Luxembourg  
Osram ..... China  
PanTel Telecommunication . Hungary  
Philips ..... Israel  
Praktiker ..... Hungary  
Stadtverwaltung ..... Schwalbach  
Zollamt ..... Switzerland/Zurich

Othersiron city in Egypt, China, England,  
France, Latvia, the Netherlands, Saudi  
Arabia, Sweden, Switzerland, Spain,  
the Soviet Union, Sudan, Taiwan,  
the Czech Republic, Hungary, USA

# Terms & conditions

## Preamble

The following terms and conditions for sales and delivery form the basis of the delivery and service contracts of the contractor (user) and supplement the applicable law.

They are only applicable to businesses where the contract is made in the course of their business, legal entities of the public law or special authorities under public law.

## I. Application

1. Orders only become binding with regard to the type and scope of deliveries after the supplier confirms the order. Any changes and additions must be in writing.

2. Where ongoing business relationships subsist, these terms and conditions also apply to future transactions even where they are not expressly communicated to the orderer. The terms and conditions are deemed to be accepted at the latest when the order is placed or the delivery or service is accepted. If alternative provisions of the orderer or supplier are to apply instead of these terms and conditions, these must be expressly agreed by the partners.

3. Contrary or divergent sales terms of the orderer shall only be binding on the supplier if they have been expressly acknowledged by him in writing.

## II. Prices

1. A binding price shall only be deemed to have been set after the supplier confirms the order in writing. This is subject to the proviso that the order details on which the order confirmation is based remain unchanged. The supplier's prices are in EUR exclusive of any VAT applicable at the time of the delivery, unless other information is specified.

2. If, in the course of a delivery period of more than four months, a change to the price basis occurs (increase in the price of raw materials, change of salary and wage rates), the supplier reserves the right to adjust the price accordingly.

3. Packaging, postage and other shipping costs are not included and will be invoiced additionally.

4. The orderer shall bear the costs of any changes to the product he requests after the order has been confirmed.

5. Partial deliveries may be invoiced separately.

## III. Delivery quantity, delivery period

1. Production-related over- or underdeliveries of up to 10% of

the order quantity are permitted.

2. The supplier is permitted to make partial deliveries.

3. The delivery periods commence with the date of order confirmation by EFFEKTA - Regeltechnik GmbH. The delivery periods specified by the supplier refer to the shipping date of the goods. They shall be deemed to have been observed if at this time the goods are dispatched from the factory or the orderer is informed that they are ready to be shipped.

4. The agreed delivery time is only applicable after all technical and commercial details have been settled.

Accordingly, all delivery times are provisional. Delivery times are only binding where they have been confirmed to the orderer as such in writing.

5. If action on the part of the orderer is necessary for the manufacture of an item or the execution of a delivery, the delivery period shall not commence until the orderer has fully completed this action.

6. In the event of a delay in delivery, the orderer may withdraw from the contract should a reasonable grace period expire without results. In the event of impossibility of performance on the part of the supplier, this right is available without the supplementary period.

Delay in delivery is deemed to amount to impossibility if delivery does not occur for more than one month.

Claims for damages (incl. any consequential loss) are excluded, without prejudice to clause 7; the same applies to reimbursement of expenses.

7. The exclusion of liability regulated by clause 6 shall not apply where an exclusion or limitation of liability for damages for death, personal injury or damage to health resulting from a wilful or negligent breach of duty by the user or vicarious agents of the supplier has been agreed; further, it shall not apply where an exclusion or limitation of liability for other loss resulting from a wilful or grossly negligent breach of duty by the supplier or a wilful or grossly negligent breach of duty by a legal representative or a vicarious agent of the supplier has been agreed.

Liability shall not be excluded where the supplier culpably breaches a fundamental contractual duty or a "cardinal duty", but instead limited to the foreseeable damages typical for the type of contract.

The above applies correspondingly in the event of reimbursement of expenses.

8. The limitations of liability stipulated in clauses 6 and 7 do not apply insofar as a commercial firm deal was agreed; the same also applies where the orderer can assert that he no longer has an interest in fulfilling the contract due to a delay for which the supplier is at fault.

9. In the event of forces majeures experienced by the supplier or his sub-suppliers, the delivery time shall be prolonged by a corresponding amount. This shall also apply in the event of intervention by official bodies, difficulties with the supply of energy and raw materials, strikes, lockouts and unforeseen obstacles to delivery, insofar as these are not the fault of the supplier. The supplier shall inform the orderer of any such event without delay.

## IV. Transfer of risk, packaging and shipping

1. Where the orderer collects the goods from the supplier's premises, risk passes with transfer of the goods to the orderer. Where the goods are shipped, risk passes on transfer of the goods to the carrier. Where the goods are delivered, risk passes when the goods leave the supplier's premises.

2. In the event of delays to dispatch that are the fault of the orderer, risk passes on communication of readiness for shipping.

3. Insofar as nothing else has been agreed, the supplier shall select the packaging and shipping type to the best of his judgment. Where requested in writing by the orderer, the goods may be insured against breakage, transport and fire damage at the orderer's expense.

## V. Retention of title

1. The supplier shall retain title to the deliveries until all current and future amounts due from the business relationship have been settled, even where the purchase price of specifically designated amounts due has been paid. In the case of rolling invoices, the retained title of the deliveries (goods subject to retention of title) counts as a security for the payment of amounts due on the supplier's account.

2. In the event of conduct constituting a breach of contract on the part of the orderer, in particular late payment, the supplier is entitled to reclaim the goods. The orderer hereby agrees to the goods being reclaimed under these circumstances. Reclaiming the goods only represents a withdrawal from the contract where the supplier expressly declares this to be such. Any costs incurred by the supplier in reclaiming the goods

(in particular transport costs) shall be borne by the orderer. Further, the supplier is authorised to prevent the orderer from selling on or processing the goods subject to retention of title and to revoke any direct debit authorisation that may have been issued. Once the purchase price and all costs have been paid, the orderer can require any goods reclaimed without an express declaration of withdrawal to be despatched.

3. The orderer undertakes to handle the goods with care.

4. The orderer may neither mortgage, pledge as security nor assign the goods delivered and corresponding amounts due.

In the case of seizure or other third-party intervention, the orderer shall immediately inform the supplier in writing in order for him to file a claim in accordance with section 771 of the Civil Procedure Code. Any remaining costs outstanding to the supplier despite successful litigation as per section 771 of the Civil Procedure Code shall be borne by the orderer.

5. The orderer is permitted to sell on, process or mix the goods in the normal course of business. In doing so he hereby assigns to the supplier all amounts due from selling on, processing, mixing or other legal grounds (in particular from insurance or non-permitted actions) to the extent of the final invoice amount agreed with the supplier (incl. VAT).

The orderer remains authorised to collect these amounts due even after assignment, without prejudice to the authorisation of the supplier to collect the amounts due himself. However, the supplier undertakes not to collect the amounts due for such time as the orderer fulfils his payment obligations from the revenue received, is not in default of payment and no application to instigate insolvency proceedings has been made and no suspension of payment is in force.

If this is the case, the orderer is required to notify the supplier on request of the assigned amounts due and debtors, to provide all information required for collection, to deliver up the associated documents and to notify the debtor (third party) of the assignment.

The direct debit authorisation may be revoked by the supplier in the event of breaches of contract (in particular payment default) by the orderer.

6. The retention of title also extends to the products arising as a result of processing, mixing or combination of the delivered goods to the extent of their full value, whereby these processes shall be deemed by the supplier to constitute manufacture. In the event of processing, mixing or combination



of the goods with goods to which a third party retains title, the supplier obtains co-ownership in proportion to the objective values of these goods.

7. For the purpose of securing the amounts due against the supplier, the orderer also assigns to the supplier the amounts due which arise in favour of a third party through the combination of the delivered goods with land.

8. The securities owing to the supplier are not included where the value of his securities exceeds the value of the secured claims by more than 30%.

9. The enforceability of the retention of title in the event of default on payment or exposure to loss and seizure of the delivered goods by the supplier represents withdrawal from the contract.

VI. Terms of payment

1. All payments must be made in Euros exclusively to the supplier.

2. Insofar as nothing else has been agreed, the purchase price must be paid via cash on delivery or advance cheque. In the latter case delivery shall proceed once the cheque has cleared. In exceptional cases payment terms of 14 days strictly net may apply.

3. If the orderer defaults on payment, the supplier is permitted to demand default interest at eight percentage points above the base interest rate. The supplier may at any time produce evidence of higher interest damages and charge for these.

4. Failure to observe the terms of payment, default or circumstances that pose a risk of reducing the orderer's creditworthiness will result in all of the supplier's claims becoming due for payment immediately. Further, the supplier is permitted after a reasonable grace period to withdraw from the contract or demand damages instead of performance.

5. The orderer may only exercise offsetting rights if his counterclaims have been legally established, are indisputable or have been acknowledged by the supplier.

6. The orderer is permitted to exercise a right of retention insofar as his counterclaim is based on the same contractual relationship.

7. The supplier is under no obligation whatever to accept cheques and bills of exchange. Credit of this type is in all cases subject to redeemability (on account of payment, not on account of performance) and is deemed to be redeemed on the day that redemption value is available to the supplier. In the case of bills of exchange, any discount on presentation, stamp duty, bank charges and any direct debit charges shall be passed on by the supplier.

8. The right to pursue any further contractual or statutory claims in the event of default is reserved.

VII. Responsibility for defects

If the orderer fulfils the duty of inspection, notification and rejection required of him in accordance with section 377 of the Commercial Code, the supplier is liable for defects of the delivery to the following extent:

1. In the event of a not inconsiderable defect of the purchased goods, the supplier may choose either to correct the defect or supply a defect-free product (supplementary performance). In the event of failure of the supplementary performance, the supplier is authorised to undertake a further act of supplementary performance. Further, in the event of repeated supplementary performance, the supplier decides between re-supply or correction of the defect. Should one or both of these methods of supplementary performance be impossible or not proportionate, the supplier is permitted to refuse them. The supplier may also refuse supplementary performance for such time as the orderer does not fulfil his payment obligations towards him proportionate to the defect-free part of the performance.

2. If supplementary performance as per clause 1 is impossible or fails, the orderer has the right either to reduce the purchase price accordingly or withdraw from the contract in accordance with the statutory provisions. These rights are open to the purchaser particularly where the supplier culpably delays or refuses the supplementary performance or if it fails for a second time. Insofar as the following (clause 4) does not provide otherwise, further claims of the orderer, regardless of their legal ground (in particular claims arising from the breach of contractual conditions and warranties, reimbursement of expenses with the exception of that provided for in section 439 subsection 2 of the German Civil Code, unlawful acts and other tortious liability) are excluded. This applies in particular to claims for damages beyond the thing purchased and for claims for the reimbursement of lost profits. This also covers claims that do not result from the defectiveness of the thing purchased.

3. The above provisions also apply to the delivery of a different item or a lesser quantity.

4. The exclusion of liability under clause 2 does not apply where an exclusion or limitation of liability for damages for death, personal injury or damage to health caused as a result of a wilful or negligent breach of duty by the user or wilful or negligent breach of duty by a legal representative or vicarious agent of the user has been agreed. It also does not apply where an exclusion or limitation of liability for other damages caused as a result of a wilful or negligent breach of duty by the user or wilful or negligent breach of duty by a legal representative or vicarious agent of the user has been agreed. Liability shall not be excluded where the supplier breaches a fundamental con-

tractual duty or a "cardinal duty", but instead limited to the foreseeable damages typical for the type of contract. It is further excluded under clause 2.

The exclusion of liability shall not apply if liability for personal injury or material damage to privately used items in the event of defects to the thing supplied applies under the Product Liability Act.

Further, this also applies in cases covered by a guarantee by the supplier or where assurances were made as to specific properties of the goods purchased. Here a defect in this regard triggers the supplier's liability.

The above applies correspondingly in the event of reimbursement of expenses.

5. Claims for supplementary performance, damages and replacement goods/services are subject to a time limit of one year after delivery of the goods.

This does not apply to goods which have been deployed in a building in accordance with their standard application and have caused this to become defective. The time limit here is five years.

Claims for abatement and the exercise of the right to withdraw from the contract are excluded where the time limit for a claim for supplementary performance has been exceeded.

In the case of clause 3 the purchaser may refuse to pay the purchase price to the extent that he would be entitled in the event of withdrawal or abatement. In the case of an exclusion of withdrawal and subsequent refusal to pay, the supplier is permitted to withdraw from the contract.

6. Claims resulting from right of recourse to the producer are not affected by this section.

7. No liability is accepted for damage resulting from unsuitable or improper use, defective installation by the orderer or a third party, defective or negligent handling or natural wear. Further, the supplier bears no liability for any damages caused by unsuitable equipment, defective building work, replacement materials, chemical and electrochemical or electrical influences (insofar as these are not the fault of the supplier) and improper alterations or maintenance work made without prior approval of the manufacturer on the part of the orderer or third parties. The same applies to unauthorised re-working or improper handling.

8. Transport damages must be reported immediately to the delivering transport company. The carrier's instructions on subsequent procedure must be followed in all cases. Never should goods damaged in transit be sent to us either through us or the transport company without such instructions.

VIII. Breaches of duty

1. The supplier's liability for breach of duty is limited to grossly

negligent or wilful breaches of duty.

2. Any liability for the infringement of intellectual property rights of third parties is excluded, in particular when performing production tasks in accordance with the orderer's specifications. The supplier is not subject to a duty of scrutiny in regard to the intellectual property rights of third parties.

IX. Software

Insofar as programs are part of the scope of delivery, the orderer obtains individual unlimited usage rights, that is he may not copy them or use them for any other purpose. Multiple usage rights shall be subject to written agreement. In the event of an infringement of these usage rights, the purchaser shall be liable for the full extent of any resultant loss.

X. Place of performance, jurisdiction and applicable law

1. The place of performance is Rottweil.

2. The court of jurisdiction is Rottweil, insofar as the orderer is trading in the course of a business. The supplier is permitted to bring an action against the orderer in other permissible jurisdictions.

3. The law of the Federal Republic of Germany applies with regard to all claims and rights resulting from this contract. The application of UN sale of goods law (CISG) is expressly excluded.

XI. Closing provisions

1. Any changes to the contract or supplementary agreements are only effective if they have been approved in writing by the supplier.

2. Rights of the orderer arising from the legal transaction with the supplier are not transferable.

3. Should any individual provisions of these terms and conditions become partially or wholly ineffective or invalid, this shall not affect the validity of the remaining provisions. The parties to the contract undertake to agree to a ruling by means of which the purpose intended by the ineffective or invalid provision is largely achieved.

(As of: November 2006)

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