

## UPS Uninterruptible Power Supply MTD-XL

Operating Manual V. 1.4



Article number:

MTD1000XL ACX11MST1K0000XL  
MTD1500XL ACX11MST1K5000XL  
MTD2000XL ACX11MST2K0000XL  
MTD3000XL ACX11MST3K0000XL

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We reserve the right to make changes to the design and the system that will improve the system, the production process or the product

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# 1. Introduction

## 1.1 Introduction

Dear Operator,

You are about to operate an uninterruptible power supply.

This operating manual should provide you with support for working responsibly and basic information about the uninterruptible power supply, namely how it operates, its application and what you should do in the event of malfunctioning. Furthermore, this operating manual contains instructions for the transport and storage as well as the handling and installation of the uninterruptible power supply.

The plan guidelines in this operating manual only relate to special requirements for the uninterruptible power supply. During installation, make sure you follow the national and local requirements for electrical installations.

The content of this device description may change due to technological progress. We have tried to present the content correctly and clearly. If, however, we have made errors, we would be grateful for information about this.

We do not assume any liability for errors in this operating manual or any consequences resulting thereof.

The uninterruptible power supply is intended to protect sensitive electronic systems from interferences that could occur due to bad electric quality or grid failures.

**Please read this operating manual carefully and take note particularly of the safety instructions!**

If you have questions about the device, the technical supervisor in your company or our employees will be glad to help you.

Your

**EFFEKTA Regeltechnik GmbH**

## 1.2 Validity

The descriptions in this operating manual relate solely to the  
**uninterruptible power supply**



defined in the technical data as a whole or as it refers to modules, components and individual parts that were developed and built by **EFFEKTA Regeltechnik GmbH**.

### ★ 12. Technical Data

## 1.3 Storage

This operating manual for the device must be stored in the vicinity of the device at all times so it is immediately available if need be.

## 1.4 Symbols in this Manual

The abbreviation UPS in this manual stands for uninterruptible power supply.

- Read this documentation carefully and make yourself familiar with the product before using it.
- Store this operating manual in an easily accessible place to refer to it if necessary.
- Please pass this operating manual on to later users of the product.

### 1.4.1 Danger warning levels

**DANGER!**



**Text that is marked with DANGER! provides a warning about dangers. If accident prevention measures are not taken, these dangers may result in serious (irreversible) injuries or even death!**



---

## WARNING!



Text that is marked with **WARNING!** provides a warning about hazards. If accident prevention measures are not taken, these hazards may result in serious (irreversible) injuries or even death!

---

---

## CAUTION!



Text that is marked with **CAUTION!** provides a warning about hazards. If accident prevention measures are not taken, these dangerous situations can lead to slight or medium reversible injuries.

---

---

## ATTENTION!

Text that is marked with **ATTENTION!** contains very important instructions for situations that, if accident prevention measures are not taken, may result in damage to the product and / or its functions or an object in its vicinity.

---



This symbol indicates text that contains important instructions / comments or tips.

---



**1.4.2 Warning information**

**1.4.2.1 Warning about danger spots**



**General warning about danger spots!**

**1.4.2.2 Specific warning**



**Warning about dangerous electrical voltage!**



**Warning about proper handling of accumulators!**

**1.4.3 Instruction symbols**



**Take note of the provided documentation and/or instructions!**



**Disconnect before work!**

### 1.4.4 General symbols

- This dot marks descriptions of activities that you should carry out.
- This dash marks specification lists.
- ★ This arrow marks a cross reference.  
If a cross reference to another chapter is necessary in the text, this is shortened for clarity.

Example:           **★ OM, 2 Safety Instructions**

This means:       See Operating Manual,  
Chapter 2 Safety Instructions.

If the cross reference refers to a page, figure or position number, this information is added at the end of the cross reference.

Example:           **★ Fig. 4 - 4, Pos. 1**

This means:       See position number 1 in figure 4  
in Chapter 4 of this manual.

- (3) Numbers in brackets refer to the positions in the figures.



Identifies instructions for recycling.



Identifies components that are subject to the Electronic Scrap Regulation.



Identifies components or parts that must be disposed of. Do not throw these into the household waste.



Requirement that must be fulfilled:

- ✓ The DC circuit breaker is on "OFF".

## 1.5 Information Obligation

This operating manual must be read, understood and all its points must be taken note of by all persons that are responsible for the

- Operation
- Cleaning and
- Disposal

of this device.

**EFFEKTA Regeltechnik GmbH is not liable for damage incurred or caused by staff who have not been trained or who have been insufficiently trained!**

## 1.6 Warranty Conditions

The receipt of delivery is considered as the record for the initial purchase and should be kept in a safe place. It will be necessary for making use of the warranty. If the product is passed on to another user, he has the right to the warranty for the remainder of the warranty period. The purchase receipt as well as this declaration should also be given to the new owner if the device is passed on.

We guarantee that this device, upon delivery, is in a functional state and technically conforms to the descriptions in the appended documentation.

The warranty period for special devices corresponds to the minimum periods stipulated by law.

The warranty ceases to apply in the following cases:

In the event of defects caused by: freight damage, accident, natural catastrophes, misuse, vandalism, improper use, defective maintenance or incorrect repair by third parties.

- In the event of changes, unauthorised intervention, incorrect operation, another device or accessories, false installation or other modifications not approved by us.
- Improper use such as plugging the device into unsuitable energy sources, attempts to overload the UPS, use in an unsuitable environment, etc.
- In the event of failure to follow instructions in the provided documentation.

- In the event that the product is incompatible due to possible technical innovations or regulations that occur after the purchase.
- In the event of incompatibility or malfunctioning that was caused by product components we did not install.
- In the event of developments that are related to the normal ageing process of the product (wear parts).
- In the event of defects that were caused by external fixtures.

The warranty period for replaced and/or repaired parts as part of this warranty expires together with the original warranty for the product.

Devices that are supplied without accessories are replaced without accessories. The return of the device is only accepted if this is done in the original packaging.

Incurred transport costs are generally not included in the warranty.

You shall bear the cost of repair and exchange, and the company is not liable for damage, whether directly, unintentionally, specifically, or for subsequent damage, even if it was caused by negligence or other errors.

**EFFEKTA Regeltechnik GmbH** does not provide either explicit or implicit warranties related to this device and its quality, performance, saleability or suitability for a certain purpose. In some countries, the exclusion of implicit warranties is not permitted by law. In this case, the validity of all explicit and implicit warranties is limited to the warranty period. With the expiration of these periods, all warranties lose their validity. In some countries, a limitation of the validity period of implicit warranties is not permitted by law so that the aforementioned limitation does not take effect.

### 1.6.1 Limitation of liability

Claims to damage compensation are excluded unless they involve intent or gross negligence by **EFFEKTA Regeltechnik GmbH** or its employees. This does not affect liability according to the Product Liability Act. Under no circumstances are we liable for:

- Claims that third parties make against you due to losses or damage.
- Loss or damage of your records or data or the costs of recovering this data.
- Economic subsequent damage (including lost profits or savings) or concomitant damage, including in the event that we were informed of the possibility of such damage.

Under no circumstances is **EFFEKTA Regeltechnik GmbH** responsible for any accidental, indirect, specific, subsequent or other damage of any kind (including, without any limitation, damage related to a loss of profits, interruption of business, loss of business information, or any other losses) that result from use of the device or are connected with the device whether they are based on the contract, damage compensation, negligence, strict liability or other claims, even if **EFFEKTA Regeltechnik GmbH** was informed about the possibility of such damage in advance. This exemption also includes any liability that can result from the claims of third parties against the initial purchaser.

In some countries, the exemption or the limitation of concomitant or subsequent damage is not permitted by law so that the aforementioned declaration does not enter into force.

## 1.7 Transport and Storage

The UPS may only be transported to the intended location in the original packaging. The same applies to moves or returns.

The packaging plays no role as fall protection, so all fallen devices must be checked by **EFFEKTA Regeltechnik GmbH** before commissioning.

The device may not be transported or stored upside-down.

## 1.8 Positioning

# WARNING!



**Do not install in an area in which combustible vapours arise e.g. from petrol tanks, engine compartments, etc.**

The UPS is designed for operation in ventilated rooms with an ambient temperature of 0° to 40°C.

If the UPS is exposed to severe and quick temperature changes, there is danger of condensation. Before you take additional steps, an acclimatization period of at least 2 hours is to be observed.

Never place or operate the device in a moist environment. Keep liquids away from the device.

The UPS may not be placed in the vicinity of heat sources.

The horizontal positioning is to be observed.

Ensure that the back side and the front side of the device are at least 10 cm from other objects for ventilation in order to prevent trapped air and too much warming. Make sure that the air openings cannot be covered, e. .g. through sucked-in paper, material, etc.

## 2. Safety Instructions

### 2.1 Introduction



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The UPS is a device that has been produced according to the rules and regulations of technology for an uninterruptible power supply.

The device and related components, modules and units comply as a whole, as well as in individual parts, with the legal safety standards and conform with the EC-Machinery Directive 2006/42/EG.

The device is safe when used properly and under consideration of the safety requirements and instructions provided in this operating manual.

---

### 2.2 Proper Use

---

The UPS and its related components may only be used for purposes in accordance with its design – to provide a short-term supply for electrical devices (230 V AC) with the nominal power not exceeding the total.

Any other use is considered improper and can lead to personal injury or damage to the device!



Improper Use:

The device is not designed for use in

- explosive,
  - dusty,
  - radioactive or
  - biologically or chemically contaminated atmospheres!
- 

**ATTENTION!**

---

This class A equipment. This equipment can cause radio interference in residential areas. In this case, the operating company may be requested to take appropriate measures!

---

## 2.3 Avoiding Personal Injury / Property Damage

- Please read this operating manual carefully to familiarise yourself with the device.
- In particular, take note of the information regarding the installation and commissioning of the device.
- Only operate the product in an appropriate and proper way and within the parameters stated in the technical data.
- Only perform maintenance and service work that is described in the documentation. Observe the required steps. Only use original replacement parts from **EFFEKTA Regeltechnik GmbH**

## 2.4 Protecting the Environment

- Send the product back to **EFFEKTA Regeltechnik GmbH** after the end of its service life. We will ensure environmentally friendly disposal.



## 2.5 Connection

# DANGER!



The UPS may only be connected to a grounded isolated ground receptacle or if connected via terminals, the protective earth conductor must be connected without fail. The device may not be used without the PE under any circumstances.



The socket for the domestic installation must be easily accessible and in proximity to the UPS. Keep the cable length as short as possible in the case of permanent wiring.



During generator operations the pole-correct connection of the UPS must be ensured.

For the connection of the UPS to the socket of the domestic installation, only a power cable that is VDE-approved and labelled CE may be used. In the case of permanent wiring, an appropriate cable has to be used.

For the connection of the appliances with the UPS only a power cable that is VDE-approved and labelled CE may be used. In the case of permanent wiring of the appliances, an appropriate cable has to be used.

The safeguarding of any appliance must always be immediately in front of an appliance and may never be done centrally in front of the UPS.

Never operate any household devices or tools like e. g. fan heaters, vacuum cleaners, electric drills, toasters, etc. with the UPS.

Do not connect any appliance to the UPS that could overload the device (e.g. laser printer).

The sum total of the earth fault currents of all appliances connected to the UPS may not exceed 3.5 mA.

Keep the connecting cables as short as possible and always install them correctly. Avoid hazards to the cable like tripping, crushing, clipping etc.

For the connection of the appliances with the UPS only a power cable that is VDE-approved and labelled CE, with an appropriate cable cross-section may be used. The safeguarding of any appliance must always be immediately in front of an appliance and may never be done centrally in front of the UPS. Do not connect any appliance to the UPS that could overload the device. (Bear in mind the high start-up currents).

## 2.6 Operation

Before the appliances are connected to the outlet, the basic configuration must be completed. Especially the output voltage is of high importance regarding the appliances.

The UPS-system contains an energy storage (accumulators). This means that the outlet can be current-carrying even when the UPS is not connected to the mains input terminal.

To completely shut-down the UPS, first disconnect the mains connection and then hold the "OFF" button pressed for more than 3 seconds. Wait for the UPS to turn off, before disconnecting the power connection (feeder cable between the UPS and the appliance). Ensure that no liquids or foreign matter enter the UPS. Avoid a constant load of more than 80% on the output to protect the UPS. The displayed output load should only be taken as a reference point, separate measuring is necessary to determine the exact output load.

## 2.7 Working with Accumulators

---

**DANGER!**



**Attention – Danger of electric shocks and burns**

**Accumulators can cause electric shocks and have a high short-circuit current, which can cause burns.**



**Unauthorized persons should not have access to the accumulators.**

**Do not place accumulators in the vicinity of heat sources and do not throw them into a fire. Explosion hazard!**

**Do not open or destroy accumulators. The released electrolyte presents a great danger to health and the environment (chemical burns to skin and eyes, toxic).**

---



## WARNING!



- Defective accumulators have to be disposed of in an environmentally compatible manner.

Never dispose of accumulators with regular household waste.

Local disposal regulations must be observed.

## 2.8

### Maintenance, Service and Malfunctions



## DANGER!

Attention – Danger of electric shocks.

Even after switching off the supply with the power button or after disconnecting the accumulator feed respectively, parts of the UPS can still carry high voltages.

## ATTENTION!

Only trained electricians with sufficient knowledge of the required safety regulations may perform work on accumulators or supervise such work tasks.

Unauthorized persons should not have access to the accumulators.

The following precautions must be taken, when working on the UPS or the accumulators:

- Remove wrist watches, rings and other metallic objects;
- Use only isolated tools that comply with electrotechnical regulations;

- Wear personal protective equipment (safety glasses, gloves, face shield, etc.);
  - The UPS may not be disassembled.
-

### 3. UPS Device Description

This manual shall provide basic information about one-phase line-interactive UPS-systems, like the mode of operation, utilization of the different functions and what to do in case of malfunctions.

In addition, this manual contains instructions for the proper transportation and storage, as well as for the handling and installation of the UPS-equipment.

The planning guidelines in this manual refer only to the specific requirements of UPS-systems. National and regional regulations for electrical installations have to be adhered to, when installing the system.

The content of this device description may change due to technological progress. We have tried to present the content correctly and clearly. In case of any errors, we are grateful for advice and suggestions.

We do not assume any liability for any errors in this manual or any consequences resulting thereof.

The UPS-system (uninterruptible power supply) is designed to protect sensitive electronic equipment like computers, work stations, electronic cash registers, operations critical instruments, telecommunication systems, process controllers, etc. from interferences that can result from poor power quality or mains failures. Sensitive equipment of this sort needs comprehensive protection from all electrical interference. These may either be external interferences (like e.g. lightning, disruption of operations) or interferences from other devices in its vicinity (e.g. engines, air-conditioning, processing machines, welding facilities, or the like).

Power interferences can be summarized as follows:

- rapid or slow voltage peaks or fluctuations;
- mains failure;
- rapid or slow frequency peaks or fluctuations;
- power overlaps or transients

The UPS-system monitors the above mentioned grid parameters and protects all connected appliances through appropriate countermeasures (e. g. switching to bypass mode when temporary over- or under-voltage of the grid is detected, to protect the end device).

The uninterruptible power supply units of the MTD-XL series do not have internal accumulators. These are available as separate units.

Depending on the field of application, accumulator modules of up to a total power of maximum 100 AH can be connected to the device.

Please see the technical specifications for details (★ **12 Technical Data**).



- 1 Unit
- 2 Accumulator module

*Fig. 3 - 1 Frontal view MTD-XL*

The procedure for the connection of the accumulator modules is described in **chapter 3.4 Connection of the Accumulator Modules**.

### 3.1 Elements on the front of the device

On the front side of the device are all operating and display elements necessary for the normal operation of the UPS.












- 1 LCD-display
- 2 "Enter" button
- 3 "Select" button
- 4 "Alarm" button
- 5 "ON/ OFF"-button

Fig. 3-1 - 1 Frontal view MTD-XL

### 3.1.1 LCD-display

The LCD-Display shows the operating mode and a variety of status values. The following views can be selected with the help of the up and down buttons:

Display	Description	Function
	Input frequency and voltage	Shows the input frequency and voltage.
	Display input connector	Lights up when the input voltage is faultless.
	Output frequency and voltage	Shows the output frequency and voltage.
	Display output connector	The UPS has two groups of outputs. The display lights up, when the output voltage is correct.
	UPS status / user settings / display	Abbreviation for the UPS status. Abbreviation for the user settings.
	Warning	Lights up, when a fault or warning has been detected in the UPS.
	Settings	Lights up when the UPS is in settings mode.
	Battery charging volume display	Shows the current charging volume of a battery. Each displayed segment represents 20% of the charging volume.
	Battery load capacity display.	Shows the part of the load capacity. Each displayed segment represents 20% of the load capacity.



LCD-Display-Text	Description
STbY	The UPS is in standby mode.
IPVL	The input voltage is too low.
IPVH	The input voltage is too high.
IPFL	The input frequency is too low.
IPFH	The input frequency is too high.
NORM	The UPS operates in line mode.
AVR	The UPS operates in AVR mode.
bATT	The UPS operates in battery mode.
TEST	The UPS is in battery test / function mode.
OPVH	The output in battery mode is too high.
OPVL	The output in battery mode is too low.
OPST	Output too small.
OVL	Overload
bATH	The battery voltage is too high.
bATL	The battery voltage is too low.
OVTP	Internal temperature too high.
FNLK	The fan is blocked or does not work.
bTWK	The battery is too weak.
bTOP	No battery connected or the fuse of the battery module has been triggered.

### 3.1.2 Button



#### ON / OFF button

Please push the button for more than 3 seconds to turn the UPS on or off. To end the fault mode of the UPS, you have to disconnect the UPS from the input voltage and keep the ON / OFF button pressed for at least two seconds to turn off the UPS.



#### UPS test / turning off an alarm

To perform a basic functions test, keep the button pressed for at least 3 seconds.  
To perform a battery test, keep the button pressed for at least 10 seconds.  
To turn off a pending alarm, push the button for one second.



#### Selection

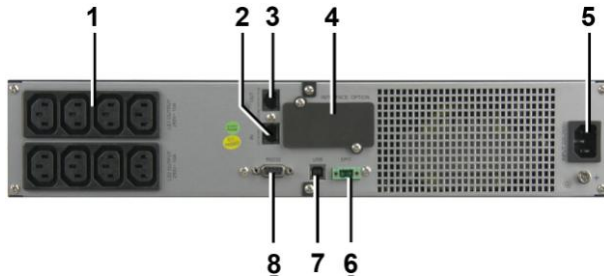
Press the selection button to change settings step by step.



#### Enter

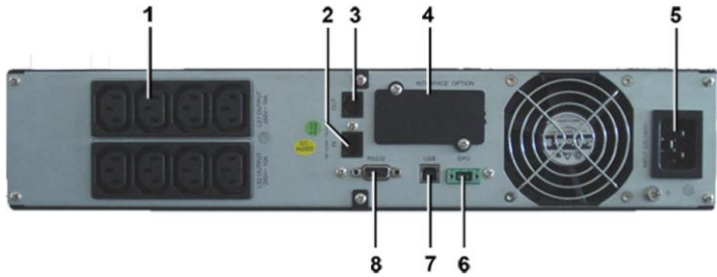
To enter the settings mode, keep the enter button pressed for 3 seconds.  
To change a value, keep the enter button pressed for at least one second. You can now change a current value and save the changes by pushing the enter button again.  
To exit the settings mode, either press the enter button for three seconds or press the ON / OFF button for half a second.

### 3.2 Elements on the back of the device



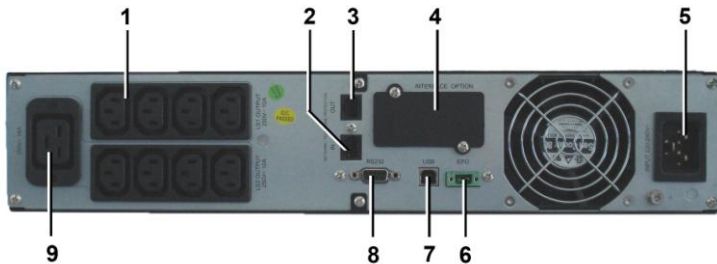
- 1 *UPS output 10A*
- 2 *Input overvoltage protection (RJ 45)*
- 3 *Output overvoltage protection (RJ 45)*
- 4 *Communication interface*
- 5 *Mains-input*
- 6 *"EPO"-port*
- 7 *USB-port*
- 8 *RS232-port*

Fig. 3-2 - 1 *Back panel MTD-XL 1000 and 1500*



- 1 UPS output 10A
- 2 Input overvoltage protection (RJ 45)
- 3 Output overvoltage protection (RJ 45)
- 4 Communication interface
- 5 Mains-input
- 6 "EPO"-port
- 7 USB-port
- 8 RS232-port

Fig. 3-2 - 1 Back panel MTD-XL 2000



- 1 UPS output 10A
- 2 Input overvoltage protection (RJ 45)
- 3 Output overvoltage protection (RJ 45)
- 4 Communication interface
- 5 Mains-input
- 6 "EPO"-port
- 7 USB-port
- 8 RS232-port
- 9 UPS output 16A

Fig. 3-2 - 1 Back panel MTD-XL 3000

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---

## DANGER!



The plug-in connectors "UPS-Output" and "Mains-Input" are on mains potential when connected.

However, there can still be a dangerously high voltage on the plug-in connectors even while disconnected, due to device-internally loaded capacities.

---



As soon as mains input voltage is present, the loading unit is automatically activated. I.e. the internal battery bank is already being charged, even though the UPS has not been switched on.

---

### 3.2.1

#### UPS-output

IEC connector sockets 10 A (MTD-XL 3000 version additionally a 16 A IEC connector socket) for the connection of appliances.

---

---

## DANGER!



The protective earth conductor must be connected!

Please always note the specified input voltage on the identification tag or in the technical specifications in this operating manual respectively.

---

### 3.2.2

#### Input and output overvoltage protection

Overvoltage protection for phone, fax or modem.

### 3.2.3 Communication interface

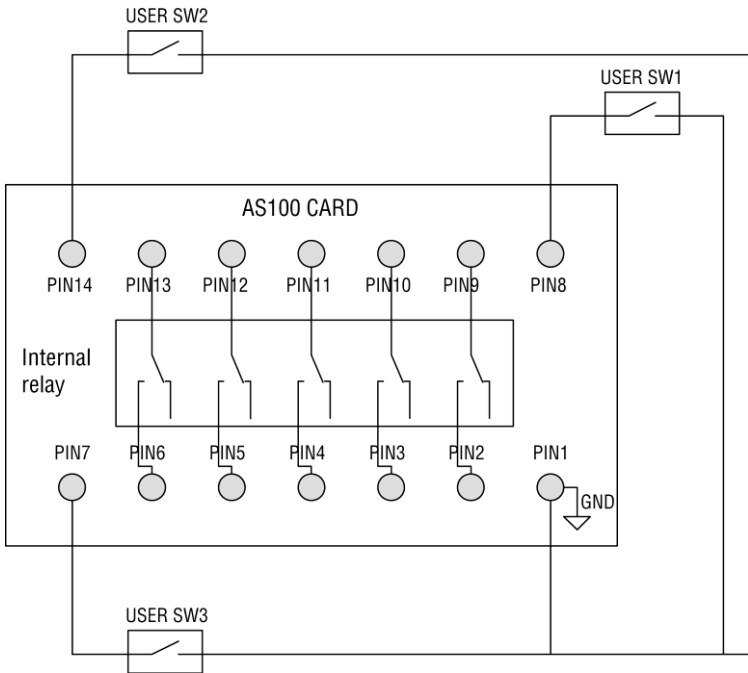
After unscrewing the cover, various additional expansion cards can be installed, e.g. a relay card.



*Fig. 3-2 - 2 Network port (SNMP-slot-card)*



Fig. 3-2 - 3 Relay slot-card



*Fig. 3-2 - 4 Relay card diagram*



### 3.2.4 Mains Input

IEC connector socket 10 A for MTD-XL 1000 and 1500.

IEC connector socket 16 A for MTD-XL 2000 and 3000.

Mains power supply connection with enclosed supply cable with two-pin earthed plug.

---

**DANGER!**

---



**The protective earth conductor must be connected!**

**Please always note the specified input voltage on the identification tag or in the technical specifications in this operating manual respectively.**

---

### 3.2.5 EPO-port

The remote shut-down port is used for turning off appliances. This function can be used, to turn of appliances via an external potential-free contact.

---

**WARNING!**

---



**This circuit has to be separated from high-voltage circuits by reinforced insulation.**

---

---

**CAUTION!**

---



The remote shut-down input may not be connected to circuits that are directly connected with the mains power supply.

Feeders must have reinforced insulation

The load capacity of the remote shut-down switch must be at least 24 V DC / 20 mA and it must be designed as a special snap-switch without any connection to any other circuit.

The shut-down signal must remain active for at least 20 ms, to ensure proper operation.

---

### **3.2.6 USB-port**

The USB-port serves to connect the UPS to a PC.

### **3.2.7 RS232-port**

The RS232-port serves to connect the UPS with a PC.

### **3.2.8 Input and output overvoltage protection**

Overvoltage protection for phone, fax or modem.

### 3.3 Device Modification

The UPS can be set up in different ways:

- vertical as a tower device on supporting feet
- horizontal mounting in a 19" rack.

Depending on the way of positioning, the LCD-Display has to be rotated and the assembly brackets have to be mounted for the 19"-slot.

#### 3.3.1 Setting up the UPS as a tower device



Fig. 3-3 - 1 Tower device

The following steps have to be taken:

- Rotate the display to a vertical position.
- Position the supporting feet.

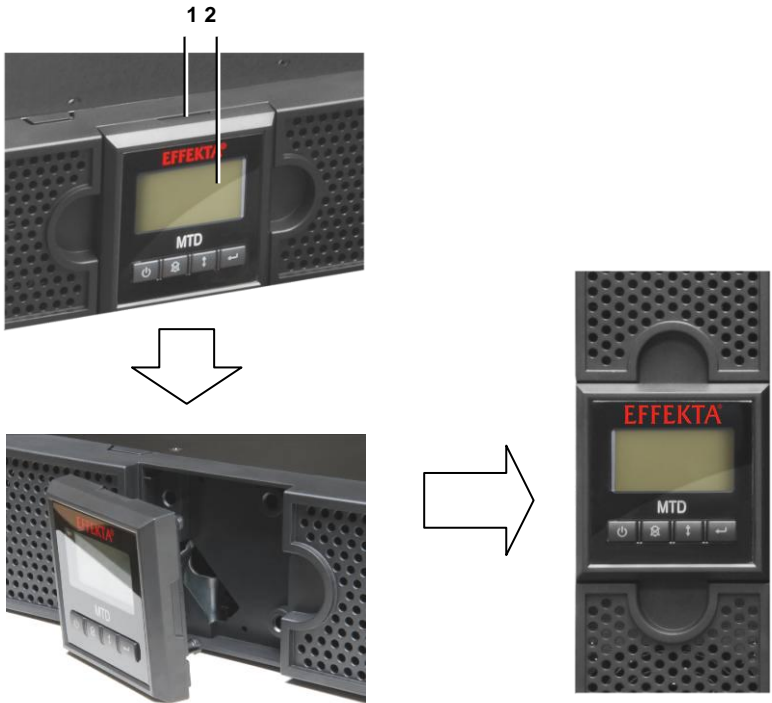
## ATTENTION!

**When setting up the device, keep in mind that the surface on which the UPS is placed must be level and horizontal.**

**The surface must have the appropriate load-bearing capacity.**

**Please note the weight of the UPS given in the technical data (★ chapter 11 Technical Data).**

Procedure for the rotation of the display:



- 1 Snap lock
- 2 Display

Fig. 3-3 - 2 Rotate display

- Press the snap lock (1).
- Pull the control panel (2) carefully forward and from the housing.
- Rotate the display 90°, so that it fits properly for a horizontal set-up.
- Push the display into the housing until it snaps into place.

# ATTENTION!

The display is connected through a flat ribbon cable.  
Do not pull the cable.



# DANGER!

Attention – Danger of electric shocks.

Perform this task only while the UPS is deenergized.

Even after switching off the supply with the power button or after disconnecting the accumulator feed respectively, parts of the UPS can still carry high voltages.



Fig. 3-3 - 3 Vertical set-up



*Fig. 3-3 - 4*    *Setting up the UPS*

- Mount the UPS on the supporting feet.

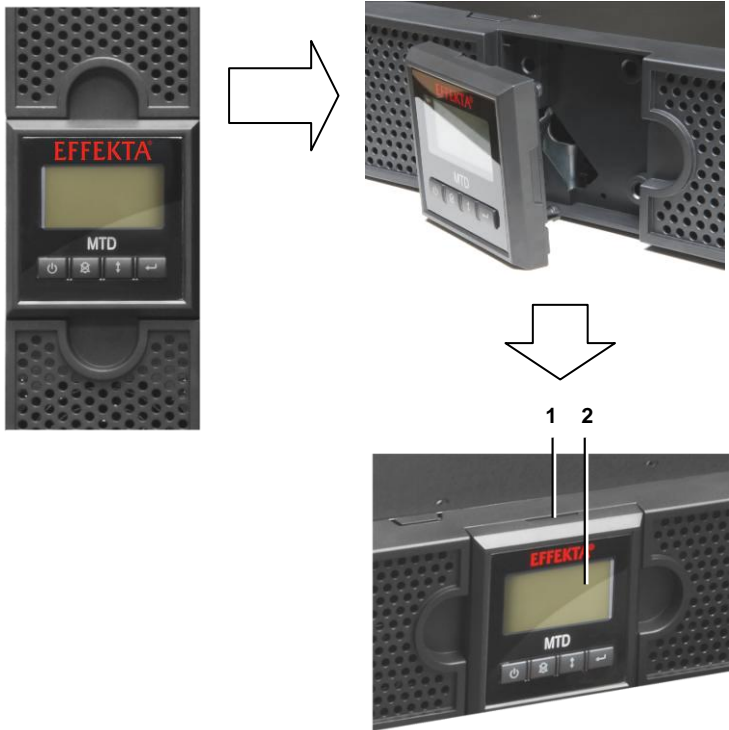
### 3.3.2 Setting-up the UPS as a rack-mounted device



*Fig. 3-3 - 5 Rack-mounted device*

The following steps have to be taken:

- Rotate the display to a horizontal position.
- Fit the mounting brackets.
- Mount the UPS in the slot of the 19" rack.

**Procedure for the rotation of the display:**

*Fig. 3-3 - 2 Rotate display*

- Press the snap lock (1).
- Pull the control panel (1) carefully forward and from the housing.
- Rotate the display 90°, so that it fits properly for a horizontal set-up.
- Push the display into the housing until it snaps into place.

**ATTENTION!**

**The display is connected through a flat ribbon cable.**

**Do not pull the cable.**







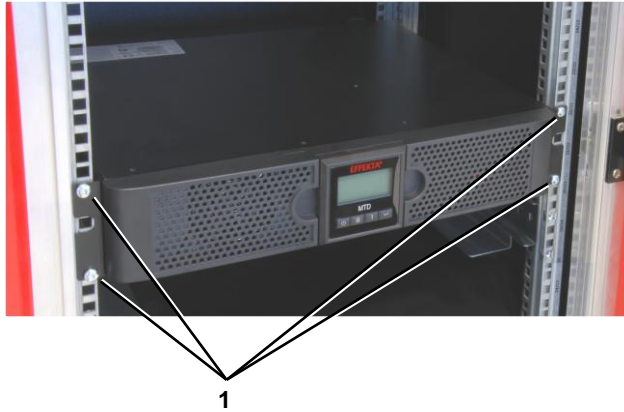
*Fig. 3-3 7*     *Mounting bracket*

- Fit the two mounting brackets to the sides of the housing.



*Fig. 3-3 - 8*     *19" rack*

- Slide the UPS into the slot of the 19" rack.



1 Screws

*Fig. 3-3 - 9 Mounting of the UPS in a 19" rack.*

- Fit the UPS with the 4 screws (1)

### 3.4 Connection of the Accumulator Modules

**DANGER!**



The connection of the accumulator modules may only be performed by a trained electrician who is familiar with the product and the inherent hazards.

The accumulator modules may only be connected while the units are switched off. Before connecting the accumulator modules, make sure that no appliances are connected to the UPS. Even when switched-off, the UPS and the accumulator modules can carry high voltages.

Please follow these steps for the connection of the accumulator modules:



- 1 Snap lock
- 2 Display

Fig. 3-4 - 1 Remove display

- Press the snap lock (1).
- Pull the control panel (2) carefully forward and from the housing.

# ATTENTION!

---

The display is connected through a flat ribbon cable.

Do not pull the cable.

---



1 Screws

Fig. 3-4 - 2 Fastening screws front panel

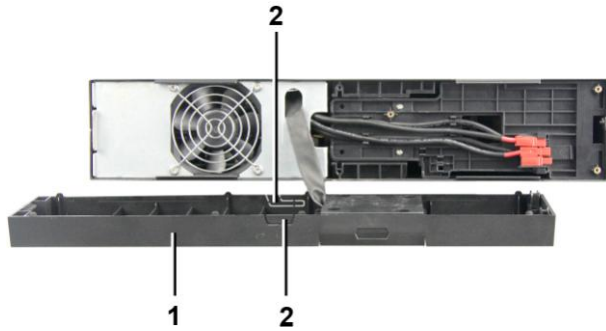
- Remove the fastening screws (1).



1 Connection cable

Fig. 3-4 - 3 Front panel

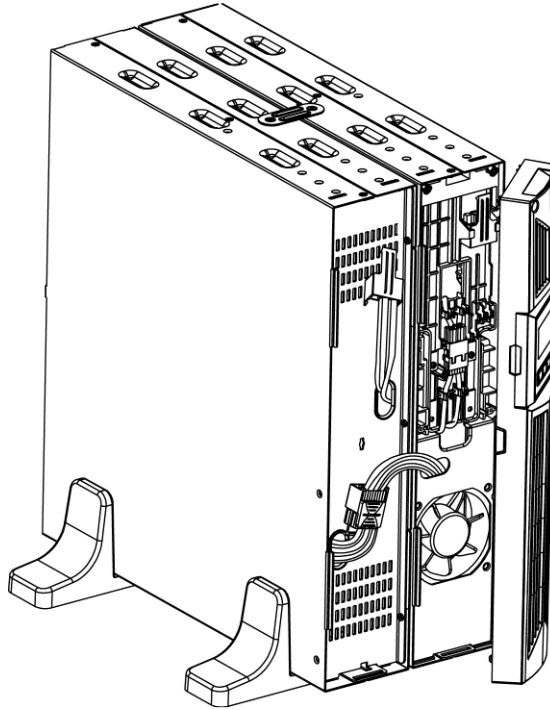
- Carefully fold down the front panel.
- Connect the connection cable (1) of the UPS with the accumulator module. Colour-coding and form prevent that the plugs could be connected the wrong way.



- 1 Front panel
- 2 Cable feedthrough

Fig. 3-4 - 4 Front panel - Cable feedthrough

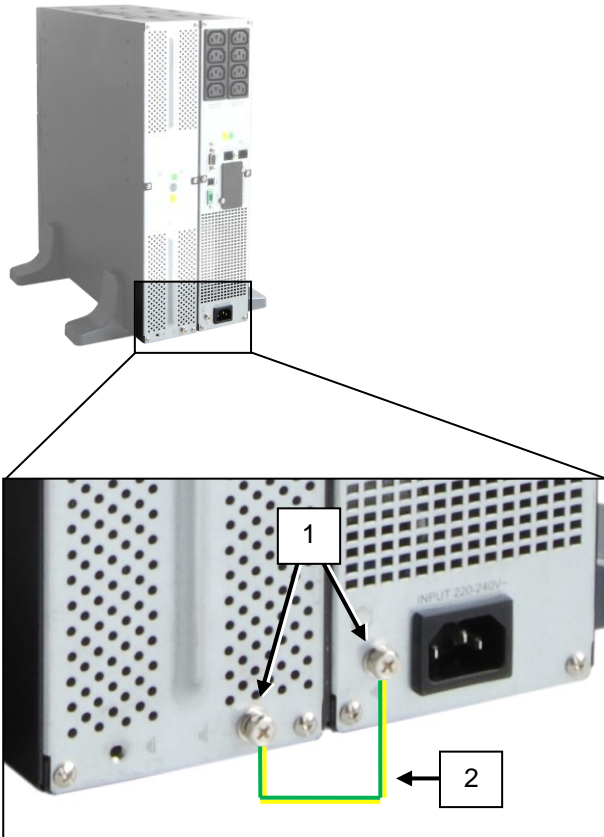
- At the front panel (1) of the UPS, as well as of the accumulator module you find cable feedthroughs (2) that are closed in the initial state, as delivered.
- Carefully break the plastic parts of the cable feedthroughs (2) open with pliers and remove it from the front panel.
- Make sure there are no sharp edges that could damage the cables.



*Fig. 3-4 - 5 Connection of the accumulator module*

- After the connection of the accumulator module, reassemble the front panel and display on the UPS and the accumulator module in reverse order.





- 1 Protective earth connection
- 2 Protective earth cable

Fig. 3-4 - 6 Earthing

- Connect the protective earth ports (1) of the UPS and the accumulator module with a protective earth cable (2) (at least 1.5 mm<sup>2</sup>).

## 4. Storage and Unpacking

### 4.1 Storage of the UPS

In case the device is not being installed immediately, please note the following:

- Always store the device and any accessories in their original packaging.
- The suggested ambience temperature for the storage is between:  
+ 0 °C ... + 40 °C.
- Protect the device and packaging from moisture and liquids.

If the storage period exceeds four months, the UPS and the corresponding battery bank (optional) have to be connected with the mains power supply for approximately 8 hours to avoid a total discharge of the accumulators.

### 4.2 Unpacking of the device

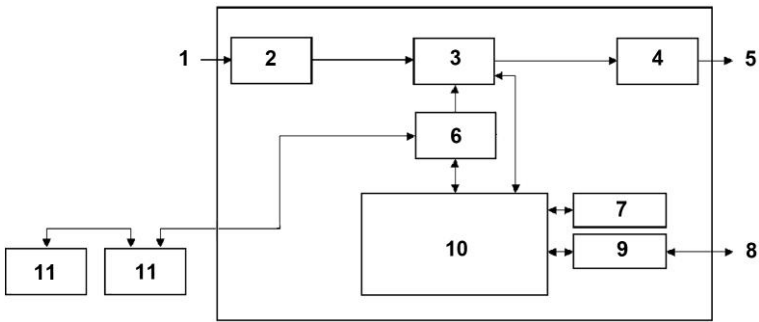
- Remove the dispatch box and packing material.
- Keep the device in a horizontal position at all times.
- Check the delivery for completeness according to the delivery note. If parts are missing or you received the wrong product, you must immediately notify the vendor.
- Check the delivery also for any damages. Any delivery damages have to be reported without delay.
  - Please keep all boxes and packaging material for examination purposes.
  - Immediately inform the manufacturer or your vendor.
  - Immediately inform the transportation company.

# 5. System Description

The UPS provides an uninterruptible one-phase voltage for operations critical appliances. In addition to providing power to the appliance, it also maintains the internal accumulators in charged condition.

In the case of a mains failure or interference (e.g. due to voltage fluctuation), the UPS continues to provide a clean supply voltage from the UPS-output without interruption.

During the backup mode, power is provided from the battery bank.



- |               |                                     |
|---------------|-------------------------------------|
| 1 Mains Input | 7 Control panel and display         |
| 2 Filter      | 8 LAN RS232                         |
| 3 AVR         | 9 Interface                         |
| 4 Filter      | 10 Control and monitoring           |
| 5 UPS-output  | 11 External battery bank (optional) |
| 6 Inverter    |                                     |

Fig. 5-1 - 1 Block diagram MTD series

The block diagram visualizes the individual modules of the device and illustrates their interaction.

If a mains failure continues beyond the backup time of the UPS, the UPS shuts down to avoid a total discharge of the accumulators. As soon as the mains power supply returns, the UPS automatically turns on again, supplies electricity to the appliance and controls the charging of the battery bank.

Prominent performance features of the MTD series are:

- Short switching period to backup mode in the event of a failure of the primary power supply.
- Real sinus-wave voltage on UPS output, low distortion factor.
- Powerful communication interface (RS232-interface).

## 6. UPS Installation and Connection

All requirements listed in the technical specifications concerning ambient and operating conditions must be met, to ensure proper operation of the UPS.

Please note the following during set-up / installation of the UPS:

- Avoid extreme temperatures and humidity.
- Ensure proper horizontal set-up.
- Allow adequate space for ventilation of the device. Ensure a proper flow channel.
- Pay attention to the system layout. When installing the device in superordinate systems (e.g. machine, switchboard), it has to be ensured, that the UPS is operated within the specified temperature range. In case of a heat build-up in the installation room, it must be removed through adequate powered ventilation.
- The UPS may only be fastened on the flange (base plate).

### 6.1 Connecting the UPS

The models of the MTD series are fitted with plug-connections.

**DANGER!**



**The UPS-system comprises components with high voltage and high current, improper handling can result in electrical accidents potentially resulting in death, or in property damages.**



**The protective earth conductor must be connected! If that is not the case, the appliances are not earthed.**

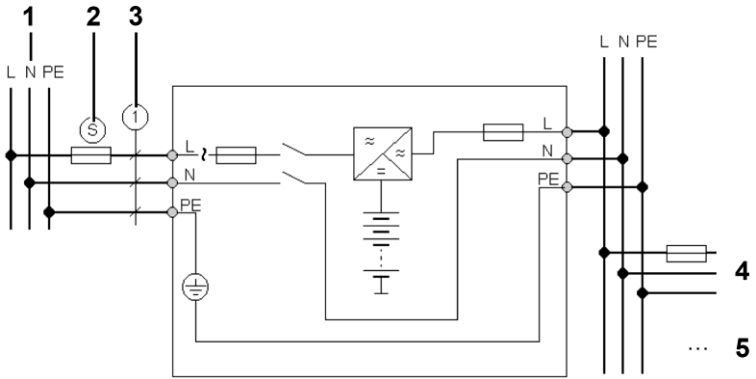
**During generator operations the pole-correct connection of the UPS must be ensured.**



If the UPS-system is installed within an emergency stop circuit, it has to be installed in such a manner that the UPS output will not be currentless if the emergency stop is activated.

The appliances will continue to be supplied with power for the duration of the backup time.

---



- 1 Mains power supply
- 2 10 A (for type 1000 / 1500) 16 A (for type 2000 / 3000)
- 3 0,75 mm<sup>2</sup> (for type 1000 / 1500) 1,5mm<sup>2</sup> (for type 2000 / 3000)
- 4 Load 1
- 5 Load 2

Fig. 6-1 - 1 Connection of UPS and appliances

MTD series		
	1000 / 1500	2000 / 3000
S:	10 A	16 A
1:	0,75 mm <sup>2</sup>	1,5 mm <sup>2</sup>

## 6.2 UPS communication port

The UPS is equipped with a convenient communication interface to facilitate the exchange of data with the UPS.

### 6.2.1 RS232 communication port

Only use the connection cable (1 : 1) that is listed in chapter "Accessories" for the connection.

Pin	Configuration	
2	RS232	Receiving line Rx or shut down SD
3	RS232	Sending line Tx
5	RS232	PE



The communication port is electrically absolutely isolated.



The UPS can also be forced into immediate shut-down during backup mode via the RS232 interface. This is triggered by a permanent + 12 V-signal on the input line RX ("shut down" function).

### 6.2.2 SNMP communication port

Optionally, the UPS can be equipped with a SNMP communication port.

### 6.2.3 Relay card

Optionally, the UPS can be equipped with a relay card.

### 6.2.4 USB-port

The USB-port serves to connect the UPS to a PC.



### 6.3 Connection sequence

- Connect the accumulator module with the UPS.
- Connect the UPS with the mains power supply; both, the mains and the UPS must be safely switched-off during this process.
- Before the appliances are connected to the outlet, the basic configuration must be completed.
- Connect the appliance/s with the UPS. Make sure that all appliances are switched-off.

#### 6.3.1 Configuration of the remote shut-down

Conductor function	Size of connecting wire	Recommended wire size
EPO	4 – 0.32 mm <sup>2</sup> (12 - 22 AWG )	0.82 mm <sup>2</sup> (18 AWG)



Leave the EPO-plug installed on the EPO-port of the UPS even if the EPO-function is not needed.

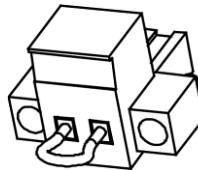


Fig. 6-3-1 EPO-plug



Please see the information regarding the connection of the EPO-contact in **chapter 3.2.5 EPO-port**.

If the contact is closed, the output is active.

If the contact is open, the output is turned off.

## 7. Operation

### 7.1 Operation of the UPS

# WARNING!



The operator of the UPS-system must always adhere to the instructions in this operating manual. The operator may only carry out the following measures and must always exercise particular care:

- Use of the operating controls: switching-on, starting and switching-off the UPS.
- Reading of the display messages and interpretation of the acoustic warning signals.
- Triggering the test mode.
- Using the communication interface, whereby the connection to the PC or other systems must already be established for UPS-devices with permanent wiring.

Due to the extensive protective functions the UPS-system performs in relation to the appliance/s, the UPS operates fully automatically. The operator only carries out the switching-on and starting or switching-off of the device. In addition, a data exchange can take place via the communication interface or the SNMP-adaptor, however, this is not absolutely necessary for the general operation of the system.

#### 7.1.1 UPS operating modes

##### Normal operating mode:

In normal operating mode the UPS operates with an input voltage of + / - 20 %.

##### Generator mode:

In generator mode the UPS operates with an input frequency between 40 Hz and 70 Hz. Outside of this range, the UPS switches to battery mode.

**Selection mode:**

In selection mode the UPS operates with input voltages between - 30 % and appr. + 20%.

**Battery mode:**

The UPS announces the battery mode by an acoustic signal in 4 seconds intervals. The display shows the message "bATT". If the load capacity of the batteries falls, an acoustic signal sounds every second and the display shows the message "bATL".

**Standby mode:**

The UPS is in standby mode when it is turned off and connected to the mains power supply and appliances.

The display shows the message "STbY".

**7.1.2****UPS settings****WARNING!**

Please take note of the following, before you make any changes to the basic settings:

- **Wrong settings can result in damage to the UPS and the appliances.**
- **Get information about the technical specifications of the connected appliances.**
- **Disconnect all appliances from the load output.**
- **Make sure the UPS is in a switched-off operating mode.**
- **Any changes to the settings only take effect after a complete rebooting of the device (turning it off; disconnection if from the mains power supply until the device shuts down; re-connecting the power plug).**

Menu	Description	Function	Values
OPV	Output voltage	Setting the output voltage	[220] = 220 V [230] = 230 V [240] = 240 V
AVR	Operating mode	Setting the operating mode	[000] = normal operating mode [001] = selection mode [002] = generator mode
EbM	External battery module	Details on the number of external battery modules	0 - 9 = Number of external battery modules
TEST	Self-test	UPS self-test activated or deactivated	[000] = deactivated [001] = activated
AR	Automatic reboot	Reboot on return of mains power supply after automatic shut-down in battery mode	[000] = deactivated [001] = activated
GF	ECO – MODE Energy saving mode	Automatic shut-down in battery mode at low output load	[000] = deactivated [001] = activated
bZ	Alarm / signal	Turning the acoustic signals on or off.	[000] = deactivated [001] = activated
LS1	Segment group 1	UPS-output segment group 1	[000] = outputs deactivated [001] = outputs activated
LS2	Segment group 2	UPS-output segment group 2	[000] = outputs deactivated [001] = outputs activated

### 7.1.3 Turning the UPS on / off

**Please follow these steps to turn the UPS on or off:**

- Connect the mains-input to the UPS.
- The UPS will start-up automatically.
- To turn the UPS on or off, press the ON / OFF button for 3 seconds.

### 7.1.4 Configuration of the UPS outputs

The UPS outputs are divided into two segment groups (LS1 and LS2).



- 1 UPS output LS1
- 2 UPS output LS2

*Fig. 7-1 - 1 Segment groups - UPS output*

You can activate or deactivate these segment groups individually.

**To configure the segment groups, follow these steps:**

- Press the "Enter" button for 3 seconds. The UPS switches into settings mode.
- Select either "LS1" or "LS2" with the "Select" button.
- Press the "Enter" button for one second. The setpoint starts blinking.
- You can now activate or deactivate the individual segment group with the "Select" button.




---

Please also see the table in **chapter 7.1.2 UPS settings**.

---

- Press the "Enter" button for three seconds or the "ON / OFF button" for 0.5 seconds to exit the settings menu.

### 7.1.5 Configuration of the external battery module

Before you can commission the UPS you have to configure the number of external battery modules.

**To set the number of external battery modules, follow these steps:**

- Press the "Enter" button for 3 seconds. The UPS switches into settings mode.
- Use the "Select" button to select the value "EBM".
- Press the "Enter" button for one second. The setpoint starts blinking.
- You can now set the number of external battery modules with the "Select" button.



---

Please also see the table in **chapter 7.1.2 UPS settings**.

---

- Press the "Enter" button for three seconds or the "ON / OFF button" for 0.5 seconds to exit the settings menu.

### 7.1.6 Green-mode (ECO –MODE)

The „ECO – MODE (energy saving mode)“ means that the UPS turns off the outputs in battery mode, in case the output load is getting too low. This function is deactivated in the factory settings.

**To activate this function, please follow these steps:**

- Press the "Enter" button for 3 seconds, and the UPS will switch to settings mode.
- Select the value "GF" with the "Select" button.
- Press the "Enter" button for one second. The setpoint starts blinking.
- You can now activate or deactivate the function with the "Select" button.



---

Please also see the table in **chapter 7.1.2 UPS settings**.

---

- Press the "Enter" button for three seconds or the "ON / OFF button" for 0.5 seconds to exit the settings menu.

### **7.1.7      Communication**

For the exchange of data between the UPS and a superior system, the respective software packages are required.

Please see chapter "Software" for the range of services.

## 8. Commissioning of the UPS-System

To ensure proper fault-free commissioning, these steps have to be followed:

- Connect the external battery module with the UPS.
- Connect the UPS with the enclosed connection cable to the mains power supply.
- Adjust the necessary settings on the UPS, like e.g. activation of outputs.
- Connect the appliances with the UPS-outputs and switch to normal operating mode.



# 9. Troubleshooting

**WARNING!**



**Only authorized trained personnel may perform troubleshooting tasks on the UPS.**

Fault	Cause	Measures
Alarm signal in 4 seconds intervals	The UPS is in battery mode.	Check the mains power supply input.
Alarm signal every second and the message "bATL" appears on the display.	The battery voltage is too low.	Save all data of the appliances and switch these off. Charge the battery for 24 hours.
Alarm signal every second and the message "OVLD" appears on the display.	Output is overloaded.	Check the appliances at the output. Keep the maximum load capacity of the UPS in mind.
Continuous alarm and red display.	UPS internal error.	Please contact your dealer.
The UPS cannot be turned on.	The fuse has been triggered.	Please contact your dealer.
The UPS is turned on but the outputs are not working.	The appliances are not connected correctly.	Check the connections of the appliances.
	The segment group of the UPS output is deactivated.	Activate the segment group ( <b>★ 7.14 Configuration of UPS outputs</b> ).
The backup times are too short.	The battery is empty	Charge the battery for 24 hours.
	The battery is faulty.	Replace the faulty battery module.
The buttons do not respond.	The settings are wrong.	Check the settings.
	The button is defective.	Please contact your dealer.

If the fault indicator you registered cannot be found in this table, please contact out service centre and provide the following information:

1. Model number, serial number.
2. Date on which the issue occurred.
3. Detailed description of the problem.

## 10. Software

With a suitable software package the configurations and operating statuses of the UPS can be determined and processed via the communication interface.

The software packages are available from the manufacturer / dealer or through the service hotline. Through these channels you can receive useful information about the suitable software packages for your UPS to fit your needs.

See also our website:

<http://www. effekta.com/>

The following basic functions are supported by all software packages:

- Detecting and displaying the UPS's power supply status
- Display of the UPS output status
- Detecting and displaying the charging status of the battery bank.
- Closing of open applications in the case of a mains failure.
- Shut down of the operating system.
- Creating log files.
- Basic monitoring of UPS-data and condition (diagnostic function).

For more information on the individual software packages, like installation, operation and range of services, see the respective software manuals.



---

In the chapter "Scope of Delivery / (Optional) Accessories" you will find suitable and tested software packages.

---

# 11. Maintenance and Service

You may expect a long service life and interference-free operation of your UPS at a minimum of maintenance effort.

However, the reliability of the UPS is greatly dependant on the ambient conditions. The ambient temperature and humidity must remain within the given range. In addition, the area around the UPS should be kept clean and free of dust.

At an ideal ambient temperature of about 22°C, the service life of the accumulators

is typically around 4 years. Through the use of special accumulators the service life can be significantly increased (about 8-10 years).

You should check periodically (every 6 - 12 months) whether the remaining backup time is sufficient for the intended purposes. Once that is no longer the case, the accumulators have to be replaced.

## 11.1 Measuring the backup-time (support time)



### WARNING!

Before you begin this procedure, please make sure to save all open data. Furthermore, inform all affected employees.

Basically there are two different methods for measuring the back-up time.

#### Method a)

measures the actual back-up time, which means that at the end of that backup time the appliances would be without a power supply.

#### Method b)

allows to determine the residual capacity after a defined backup-period. In this case the appliances will usually not be without power in the end.

To use either method, you have to force the UPS into backup mode, by simulating a mains failure (e.g. trip the fuse of the building). Do not, under any circumstances, remove the mains connection, as that would also disconnect the protective earth conductor. After the measurement has been carried out, turn the circuit breaker back on and turn on the UPS as usual, with the ON-button.



---

Remember that after the measuring the accumulators of the system will be discharged. I.e. the UPS-system must operate in line mode or charging mode respectively for several hours (min. 5 h), before it will again be operational at about 80% capacity.

---

If the backup time is not measured due to local conditions or instructions, we recommend a prophylactic replacement of the accumulators every two years, to avoid any risk of insufficient backup time because of degenerated accumulators.

## 11.2 Replacing the accumulators

---

### **DANGER!**

---



Please note the safety guidelines before you begin with this procedure. Complete the tasks in the specified sequence. You must use safety tools. Before you begin with the task, make sure the UPS is switched off and disconnected from the mains power supply.

Only authorized trained personnel may perform work on the battery bank. The electrician must be especially trained in working with accumulators.



Be advised that even after switching-off the device, it may still carry high voltages. This includes e.g. the voltage of the battery bank, load voltages of network capacitors. You have to take appropriate safety measures to avoid electrical shock.

Due to the risks mentioned above, this operating manual does not provide further details on how to replace accumulators.

The required authorized professional can receive a separate description on request.

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## 11.4 Service-Hotline

If unexpected problems occur with the photovoltaic solar inverter or you need safety information, please contact our service hotline by phone or fax:

Phone: 0049 / (0) 741 – 17451-52

Fax: 0049 / (0) 741 – 17451-29

If you cannot reach us by phone or fax, we have set up an e-mail contact for you:

[ups@effekta.com](mailto:ups@effekta.com)

In addition you can contact the central area or branch office directly as listed on our website:

<http://www.effekta.com/html/kontakt.html>

## 11.5 Maintenance and service contracts

**EFFEKTA Regeltechnik GmbH** offers the related maintenance services to ensure the highest possible reliability and availability of the UPS-system. In addition, we offer maintenance contracts to support and assist you in the following areas with our qualified staff:



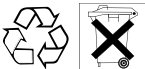
Regular testing of the equipment, in particular the accumulators, as well as timely replacement and proper disposal of accumulators.



Inspection of the UPS-installation.



Proper disposal of defective or degenerated components.



Environmentally acceptable disposal of accumulators.

You can find the complete range of our services on-line at:

<http://www.effekta.com/html/service.html>

or contact us directly at the addresses given above.

## 12. Technical Data

### 12.1 Specifications of the device

Model MTD-XL		1000	1500	2000	3000
Capacity	Watt	900 W	1350 W	1800 W	2700 W
Input	Input voltage range	161 - 276 VAC			
	Input frequency range	50/60 Hz $\pm$ 5 Hz for normal operating mode 40 - 70 Hz for generator mode			
Output	Output voltage	220 / 230 / 240 VAC			
	Voltage changes (battery mode)	$\pm$ 5 %			
	Frequency	50 Hz or 60 Hz			
	Voltage type	sine wave			
Overload	Normal operating mode	110 % - 0 %, + 8 %: shut down appliances after 3 minutes 150 % - 0 %, + 10 %: shut down appliances after 200 ms			
	Battery mode	110 % $\pm$ 6 %; shut down appliances after 30 seconds 120 % $\pm$ 6 %; shut down appliances after 100 ms			
Battery	Battery type	independent of battery banks			
	Charging current	4.5 A	4.5 A	4 A	4 A
	Charging time	independent of battery banks			
External battery mode (EBM)	Battery	12 V / 9 AH			
Interface	RS232	standard			
	Dry contact	optional			
	USB	standard			
	SNMP	optional			
	EPO	standard			



### 12.1.1 Displayed messages and acoustic alarm signals

Display	AC mode	NORM---normal operating mode
	Backup mode	Display: "bATT" acoustic signal in 4 seconds intervals
	Charging mode	LCD-display
	Fault mode	LCD-display, display red and message " **** "
	Overload	LCD-display, display red and message "OVLD"
	Low battery status	LCD-display, display red and message "bTLW"
Acoustic alarm	Backup mode	Acoustic signal in 4 seconds intervals
	Low battery status	Acoustic signal every second.
	Fault mode	continuous signal
	Overload	Acoustic signal every second.
	Replace batteries	Acoustic signal every second.

### 12.1.2 Ambient and operating conditions

Temperature	0° to 40 °C
Humidity	20 % - 80 % relative humidity (non condensing)
Altitude	< 1500 m
Storage temperature	- 15° to 45 °C




### 12.1.3 Dimensions, measures and weights

Model		1000	1500	2000	3000
UPS housing	net weight (kg)	10	10	16	16
	Dimensions (mm) (W x H x D)	438 x 86,5 x 436		438 x 86,5 x 608	
Battery housing	Dimensions (mm) W x H x D)	438 x 86.5 x 436		438 x 86,5 x 608	
	net weight (kg)	20.5		33.3	

## 12.2 Scope of Delivery / (Optional) Accessories

Below you find a list of components that have been approved and tested by **EFFEKTA Regeltechnik GmbH** especially for this UPS (Please check the delivery for completeness immediately after receiving the goods). Without accumulator module the UPS is non operative.

### 12.2.1 Scope of delivery MTD-XL

No	Description	Function / View:	Article number	Scope of delivery
1 x	UPS electronics		<b>MTD-XL:</b> MTD1000XL: ACX11MST1K0000XL MTD1500XL: ACX11MST1K5000XL MTD2000XL: ACX11MST2K0000XL MTD3000XL: ACX11MST3K0000XL	X
1 x	Operating Manual	Printed Operating Manual - English		X
	Software package "PowerShut Plus"	CD-ROM network compatible shut-down and diagnosis software 1 license Windows/Novell 1 license UNIX, LINUX, MAC 1 license RCCMD (network remote client)	LAN-PowerShut	X
	USB cable	USB connection cable		X
	LAN/RS232-connection	interface connection cable	M2505 (1:1)	X
1 x	connection cable (IEC 10 A straight) (IEC 16 A straight)		WSPSKSK10AG1M600 WSPSKSK16AG1M600	X
1 x	output cable (IEC 10 A straight)		WSPSKKK10AG1M500	X
2 x	Supporting feet	for stability		

**12.2.2 Accumulator Module (optional Accessories)**

Description	Article number
Battery extensions depending on backup time	ABCxxxxxxxxxx400

**12.2.3 Communication interfaces (optional accessories)**

Description	Article number
Relay slot-card	ZOC/AS400
SNMP-mini slot card	CE/cs121-SL Bdget

**12.3 Wearing parts list**

The following list of components related to regular wear and are therefore not subject to the warranty of the UPS:

Wearing part	Function	Article number
XXXX XX XX ** Accumulator (Battery) 12 V xx Ah	Energy storage	Depending on the assembly of the battery banks.

\*\* For the wear part description of the accumulators please see the assembled accumulators, or contact us.

## 13. Requirements of the Conformity Declaration

The UPS labelled CE complies with the following EU regulations and harmonized standards:

EC-guidelines: LVD 2006/95/EC  
EMC 2004/108/EC

Harmonised standards: EN 62040-1-1:2003  
EN 62040-2:2006

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An EC-conformity declaration for any product with CE-label can be requested at the following address:



**EFFEKTA Regeltechnik GmbH**

Rheinwaldstr. 34  
78628 Rottweil

Phone: 0049 / (0) 741 –17451-0

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