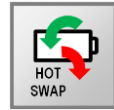


UPS Uninterruptible Power Supply MKD 700 – 3000 VA RT (XL)

Operating Manual V 2.6



Device:

MKD 700 RT
MKD 1000 RT
MKD 1500 RT
MKD 2000 RT
MKD 3000 RT
MKD 700 RT XL
MKD 1000 RT XL
MKD 1500 RT XL
MKD 2000 RT XL
MKD 3000 RT XL

Article number:

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ACX11MKT3K000000
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ACX11MKT1K500RXL
ACX11MKT2K000RXL
ACX11MKT3K000RXL

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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 Preface

Dear Operator,

This manual is required for the operation of the uninterruptible power supply described herein.

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

The planning guidelines in this operating manual only relate to special requirements and characteristics of the uninterruptible power supply. All national and local provisions and regulations for electrical installations have to be adhered to in the installation process. The same applies to the operation of the device.

The content of this operating manual may change due to technological progress. We have done our best to present the content correctly and clearly. If, however, we have made errors, we would be grateful if you would let us know.

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 and equipment from interferences that could occur due to poor electric quality or network failures.

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

If you have questions about the device, the technical supervisor at your company or our employees will gladly assist you.

Your
EFFEKTA Regeltechnik GmbH

1.2 Validity

The descriptions in this operating manual relate solely to the uninterruptible power supply (UPS) 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 (□ Chapter 13. Technical data).



Read this documentation carefully and familiarize yourself with the product before you begin operating it.

1.3 Storage

The 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.

Pass this manual on to any subsequent users of the product.

1.4 Abbreviations, terms and symbols

In this manual, the abbreviation **UPS** stands for: ninterruptible power supply.

Typically, **accumulators** are used as energy storage of the UPS-equipment. Colloquially, these are referred to as batteries or rechargeable batteries. A **battery bank** is then the term for the centralization of several accumulators into a group that forms the energy storage.

Danger, Warning, and Attention references are explicitly marked by the respective symbols (pictograms) and must be adhered to without fail. See the following list and explanations:

Danger / Warning levels / Notes:

DANGER!

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

WARNING!

Text 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 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 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 notices or instructions / comments or hints.

Warning about danger areas:



General warning about danger areas!

Specific warnings:



Warning about dangerous electrical voltage!



Warning about proper handling of accumulators!



Warning about handling explosive materials!

Instruction symbols:



Take note of the provided documentation and/or instructions!



Disconnect before working!

Environmental symbols:



Identifies instructions for recycling.



Identifies components that are subject to the Electronic Scrap Regulation.



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

Text symbols:

- This dot indicates descriptions of activities that you should carry out.
- ✓ A requirement that must be fulfilled, for example:
 - ✓ The DC circuit breaker is "OFF".
- 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 (in this manual in Chapter 4) in
 Figure 4, the position number 1.
- (3) Numbers in brackets refer to the positions in the figures.
- ** Annotations within the text are marked with ** and explained accordingly.

1.5 Information obligation

This operating manual must be read and understood by all persons and qualified personnel working with this device (this equipment).

This applies, in particular, to maintenance, operating and cleaning personnel including persons responsible for transportation and/or disposal.

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 to be 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, this user 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 enclosed documentation.

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

The warranty ceases to apply in the following cases:

- if the defect is caused by: freight damage, accident, natural disasters, misuse, vandalism;
- in case of improper use, defective maintenance or incorrect repair by third parties;
- in the event of changes, unauthorized intervention, improper operation, false installation or other modifications not approved by us;
- in the case of improper use such as the connection of the device to unsuitable energy sources or unsuitable loads, or in general use in an unsuitable environment, etc.;
- in the event of failure to follow instructions in the provided documentation;
- for any defects caused by a lack of due care, e.g. splash water, etc.;
- in the event that the product is incompatible due to possible technical innovations or regulations (policies) that occur after the purchase;
- in the case of malfunctions or damage caused by the connection to incompatible devices or accessories;
- in the event of developments that are related to the normal ageing process of the product (wear parts); e.g., shortened life span due to batteries at increased (higher than 25°C) ambient temperature.
- in the event of defects that were caused by external fixtures, e.g. electrical outlets;
- in the event of failure to provide due maintenance and care for the product;

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 it is sent in the original packaging.

Incurred transport costs are generally not included in the warranty.

In general, you shall bear the cost of repair and exchange of the device.

We are not liable for damage or consequential damage, whether directly, unintentionally or caused by negligence.

EFFEKTA Regeltechnik GmbH does not provide either explicit or implicit warranties related to this device and its quality, performance, salability 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.

1.7 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;
- Subsequent economic damage (including lost profits or savings) or concomitant damage, even 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, consequential 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 the 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 consequential damage is not permitted by law so that the aforementioned declaration does not enter into force.

2. Safety instructions

2.1 Introduction



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

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 primary energy source for electrical devices and a short-term supply from a secondary energy source for electrical devices which does not exceed the nominal power in its entirety. Any other use is considered **improper** and can lead to injury of person or property and/or damage to the device!

WARNING!

The device is not designed for use

- in explosive;
- in dusty or humid;
- in radioactive or;
- in biologically or chemically contaminated atmospheres!

For information about the respective IP protection class of the device please contact our service centers.



In addition, the device class must be noted with regard to “electromagnetic compatibility” (EMC). For this, see the standard DIN EN 62040-2. The UPS is a **Class C2 or C3** device. Take note of the information about the device class in the provided specifications (⇒13 Technical dat). UPS systems

intended for the so-called “second setting” belong to this class. These UPS systems are appropriate for use in commercial or industrial facilities with a minimum distance of 10 m (C2) or 30 m (C3) from other buildings that belong to the “first setting.”

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

2.3 Prevention of personal injury / property damage

- Please read this operating manual carefully to familiarize yourself with the device. Under no circumstances should you ignore the safety information.
- Pay particular attention during the installation and initial operation of the device.
- Operate this product only in the proper and appropriate manner and always within the mandated performance parameters (⇒13 **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 Environmental protection

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

2.5 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 has a very good device-specific protective function. However, all devices damaged during transport must be checked by EFFEKTA Regeltechnik GmbH before the initial operation. The same generally applies for any damages to the device.

Should the device be in storage for more than 4 months, the battery bank of the UPS device must be charged urgently. For more, see ⇒ 4.1 Storage of the UPS.

WARNING!



Due to the possibility of existing energy storage (accumulators) within a UPS, devices must generally be inspected by EFFEKTA Regeltechnik GmbH or a qualified service center after transportation damages. In the case of transportation damages, there is a high risk that the energy storage units and/or their electrical connections have been affected. As a result, short circuits and/or the leaking of electrolytes cannot be ruled out. For this reason, the unit must be isolated until an inspection has been performed.

In addition, the device should not be transported or stored upside-down.

2.6 Positioning

Only operate the UPS in well-ventilated rooms, ensuring the specified ambient temperature range (according to ↗13 Technical dat).

The UPS should not be placed in the vicinity of heat sources. In the event of increased ambient temperature (higher than 25°C), the life span of the battery will decrease considerably; as a result, the battery's warranty will be terminated.

Always take the operating conditions into account when positioning the device.

Maintain the minimum distance to adjacent equipment and walls necessary for ventilation purposes (see ↗13 Technical dat and ↗5 Installation and connection of the UPS ensure that the necessary air circulation is provided.

Never place or operate the device in a moist environment. Liquids must, as a rule, be kept away from the device.



Due to major temperature differences, condensation or dew effects may occur after the positioning of the UPS. Therefore, an acclimatization period of at least two hours must be observed before any further steps are taken. Make sure the temperature adjustment has been completed and that any surfaces with condensation inside and outside the device have completely dried.

WARNING!

Never operate the UPS in an explosive and/or unventilated setting.

2.7 Connection

Always use the connection terminals or blocks provided for the purpose of connecting the UPS.



DANGER!

To avoid electrical hazards, the connection of the unit must only be made under de-energized conditions.

The PE (protective earth) conductor must be connected without fail. The UPS-device, as well as the connected loads, must not be used without the PE conductor under any circumstances!

The UPS output is supplied with power even in the event of a power outage; according to the provisions included in EN62040-1, the lines and power outlets supplied by the UPS must be clearly labelled!

In addition, the following points must always be followed when connecting the UPS:

- Install all connections appropriately and keep the cable length as short as possible;
- Only use suitable power cables when connecting the UPS to the mains power supply and pay attention to the required current carrying capacity;
- Only use suitable power cables when connecting appliances to the UPS and pay attention to the required current carrying capacity;
- The safeguarding of any appliance must always be performed immediately in front of an appliance and may never be performed centrally in front of the UPS;
- Never operate any household devices or tools such as e. g. fan heaters, vacuum cleaners, electric drills, hairdryers, toasters, etc. by means of the UPS;
- Do not connect any appliance to the UPS that could overload the device;
- In general, only use appropriate tools for the installation.

2.7.1 EPO, Emergency Power Off for loads



WARNING!

Should an emergency power-off circuit “EPO” or “REPO” (REMOTE EMERGENCY POWER OFF) be installed, this control circuit must unconditionally be separated from all other electrical circuits by reinforced insulation.

The purpose of an EPO connection is for emergency power off and the release of the loads.

2.8 Operation

Only qualified personnel are permitted to access and operate the device.

WARNING!

In all situations, it must be kept in mind that the UPS includes an energy storage or is connected to an external energy storage unit. This means that the UPS outlet can be current-carrying even when the UPS has already been disconnected from the mains power supply.

Consequently, the UPS output is guaranteed to be de-energized only when the device has completely shut down and has been disconnected from the mains power supply.

2.9 Working with accumulators

When handling accumulators, there is always a risk of electric shock, burns and/or chemical burns.

For this reason, unauthorized personnel should not have access to accumulators.

DANGER!

Accumulators or their current points can cause electric shock.

In the event of a short-circuit of the accumulators, touching the current-carrying parts can result in severe burns.

Do not place accumulators in the vicinity of heat sources and do not bring them into contact with open fire. Explosion hazard!

Accumulators should never be opened or destroyed. The electrolyte released presents a great danger to your health and the environment. It could result in chemical burns to skin and eyes; moreover, the electrolyte is very toxic.





WARNING!

Defective accumulators must be disposed of in an environmentally friendly manner!

Never dispose of accumulators with regular household waste!

Local disposal regulations must be observed!

2.10 Maintenance, service and malfunctions

DANGER!



Attention – risk of electric shock.

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

ATTENTION!

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

- Before beginning work on the UPS, it must first be switched off and disconnected from the mains power supply and the loads.
 - Remove wristwatches, jewelry and other metallic objects;
 - Use only isolated tools;
 - Work on live equipment must only be performed by specially trained personnel. These persons must wear the appropriate personal protective equipment (PPE) at all times;
 - The UPS may not be disassembled;
 - Work on the accumulators must only be carried out and supervised by personnel with the required expertise concerning safety regulations;
 - Unauthorized personnel are to be kept away from the UPS and the accumulators.
-

3. UPS device description

This UPS device is an ONLINE UPS after the double conversion principle. Based on the outstanding performance according to EN 62040-3, the UPS receives “Class 1” (VFI-SS-111) classification. This way subsequently connected appliances will be optimally provided for, irrespective of how a primary source of power (mains power supply) performs.

Malfunctions such as: mains power failure, power supply undervoltage, power supply overvoltage, temporary mains voltage changes (transients), subtle mains power deviations, frequency changes, etc. will not be transferred to the connected loads in standard operating mode.

The UPS is used to support sensitive devices and facilities such as, e.g.: computers, servers, emergency systems, electronic cash registers, instruments critical to operation critical, telecommunication facilities, processor control systems, surveillance and management systems, etc.

A conversion to autonomous time follows by way of the adaption of an external battery bank or its capacity.

3.1 Topology and operating modes

The following figure (

Fig. 3-1), a block diagram of the UPS device, clearly shows the double conversion principle. The mains power supply is converted to the DC intermediate circuit whereby the energy storage (battery bank) is charged. The loads, or appliances, on the UPS output are fed without failures or interruptions by an additional conversion (INVERTER).

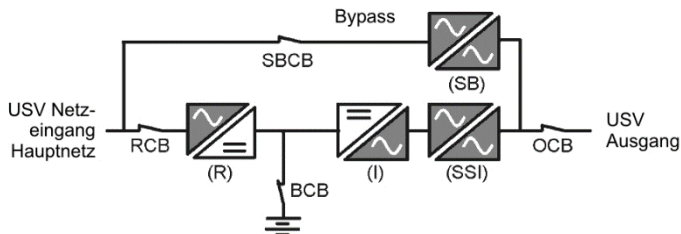


Fig. 3-1 Topology, function groups for the UPS device.

It is clear that, within the mains power supply, failures do not reach the UPS output and, consequently, the load. Furthermore, all operation modes of the UPS device can be derived from and represented by the above mentioned block diagram:

Standard operation mode (INVERTER MODE)

The standard operation mode is characterized here by a classic double conversion. The supply network is converted to the DC intermediate circuit which then feeds the UPS output through an inverter (DC/AC converter). The by-pass is inactive here.

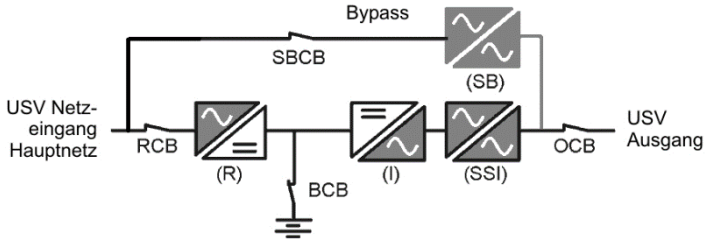


Fig. 3-2 Operating mode: standard operation.

Support or autonomous mode (BATTERY MODE)

In the event the supply network temporarily fails, the inverter draws power directly from the battery bank and thereby supplies the UPS output without interruption. The autonomous mode is limited by the capacity of the battery bank and its charging status.

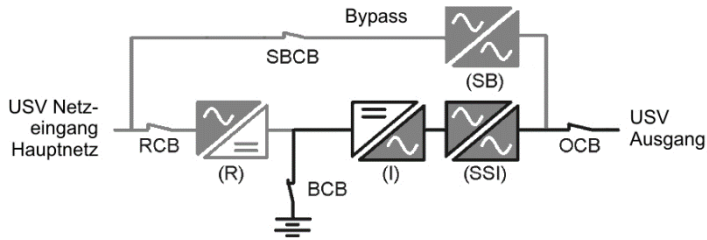


Fig. 3-3 Operating mode: autonomous mode.

Static by-pass operation mode (FAULT MODE)

Often in the case of a device fault (fault mode) with the inverter, the UPS automatically and without interruption of the UPS output switches to the static by-pass operation mode. In doing so, the load feed is securely maintained over the power supply, albeit without the support function of the UPS. Once the fault

has been eliminated, the device returns to normal operation mode. Malfunctions can also be caused by the loads such as when the UPS is overloaded.

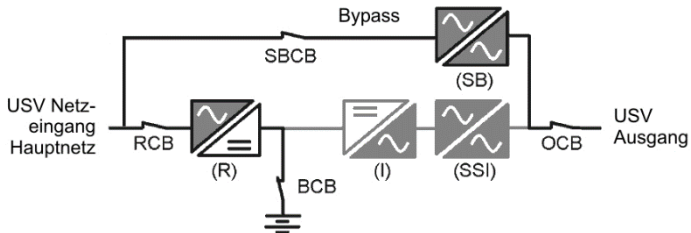


Fig. 3-4 Operating mode: static by-pass.

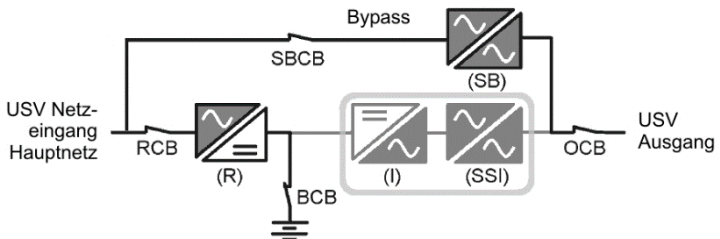
WARNING!

Never leave the UPS in the static by-pass mode, or the fault mode, for a long period of time. The loads will continue to be supplied yet without any support function from the UPS.

The static by-pass mode can also be intentionally switched on, e.g. for screening.

Power saving mode (ECO MODE)

The “power-saving mode,” called ECO MODE, is a feature of the MKD series. The UPS device is intentionally operated in the static by-pass mode for this purpose. In this, the inverter remains inactive but operation ready whereby the UPS consumes considerably less power (LINE INTERACTIVE). The device automatically converts to autonomous mode only in the event of power failures / faults. However, the use of the ECO-MODES is then only sensible when the loads are robust” devices which have low tolerance for switch and power supply fluctuations during the by-pass mode.



Inverter in Bereitschaft!

Fig. 3-5 Operating mode: ECO MODE (static by-pass).



The operating mode (ECO-MODE) is not recommended for sensitive loads as many malfunctions such as, e.g. transients, penetrates the by-pass and could affect the loads. The same applies as long as the UPS is not fed over the public network but rather by a generator.

Converter mode (CVF MODE)

In addition to the customary operating modes, the UPS can also be switched to the converter mode. In this, the UPS performance is functionally equivalent to the standard operating mode but the UPS output is not mapped to the power input. Rather, the INVERTER (converting) works according to fixed output values, regardless of the network size is on the input. In this way, a load that was not initially fit for the available power supply can be supported and operated here.

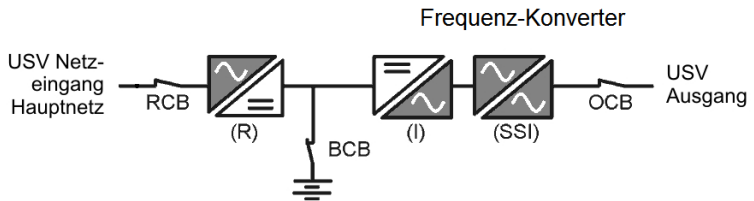


Fig. 3-6 Operating mode: CVF MODE



In the event the converter mode is used, there should not be any by-pass connection to the output because the adjusted output parameters here would be lost in the event of a by-pass switch.

3.2 The device series, format and housing sizes

The MKD 700 – 3000 VA series is manufactured in various performance versions and with an XL variant for each version. All versions are housed in a combined housing format (RACK / TOWER). A housing size (2 HE) employs the corresponding power values.



Fig. 3-7 Die MKD RT series can be used as a conventional RACK mounting unit (top) or as a TOWER standing unit (bottom).

All devices can fundamentally be operated with an external battery bank whereby the entire capacity through the addition comes from the internal and external battery banks. However, connecting an external battery bank to a standard device is not recommended due to the low charging current.

Therefore, the XL versions of the devices have been specially equipped with a more efficient charging unit to also charge external battery banks (high capacity) within a reasonable charging period and, consequently, achieve an acceptable duration for continuity of service.

3.3 The device components and connection areas

The MKD series is based on 19" rack housing. All device components for operation are arranged on the front of the device and those for the connection are on the back of the device. The only exception to this is the external battery bank connection which is found under the respective front panel on both of the devices (UPS and battery bank). Additionally, some differences exist in the respective XL variants in comparison to the standard versions. This concerns varying assemblies and functionalities. For this, see the following figures and descriptions:

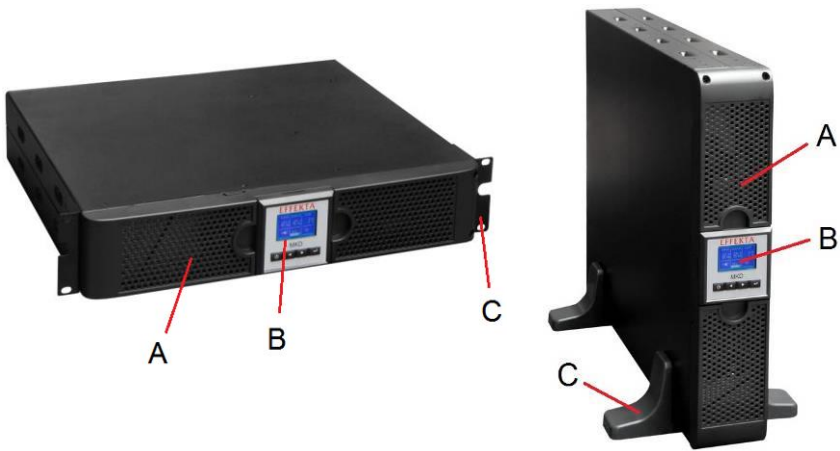


Fig. 3-8 Perspective view of the MKD 700 - 3000 VA series (Standard and XL Version).

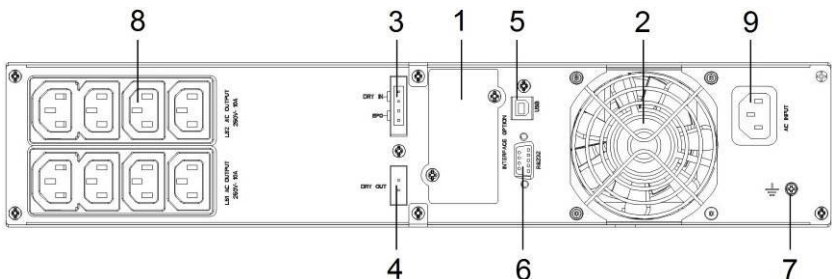


Fig. 3-9 View of the back side of the MKD 700 - 2000 VA (Standard) and 700 - 1500 VA (XL version).

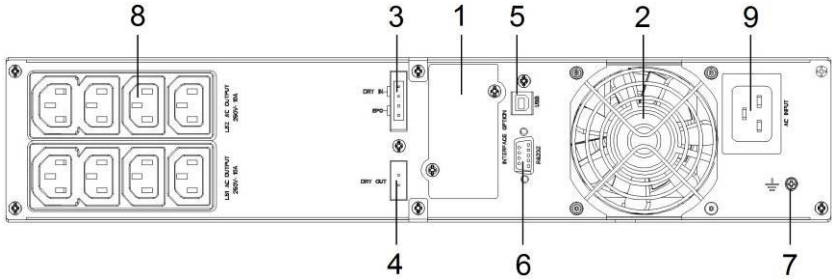


Fig. 3-10 View of the back side of the MKD 2000 VA (XL-Variant).

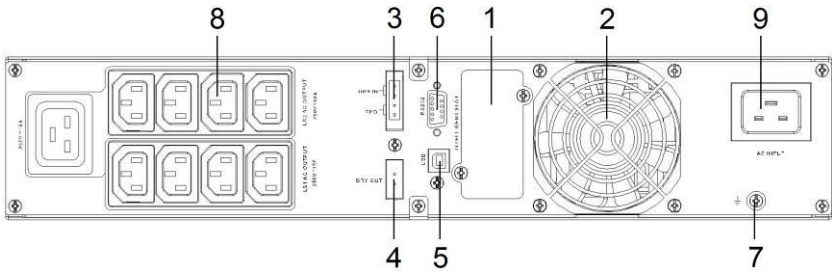


Fig. 3-11 View of the back side of the MKD 3000 VA (Standard Version).

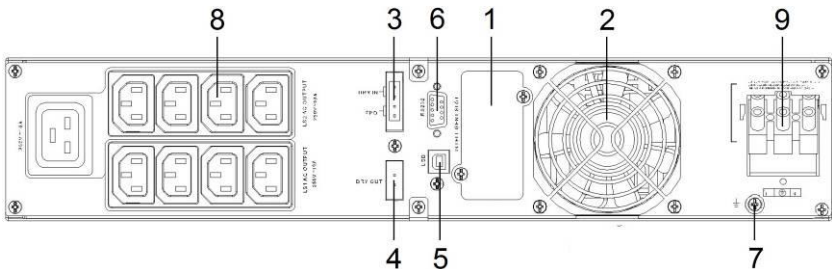


Fig. 3-12 View of the back side of the MKD 3000 VA (XL version).

Front side:

- (A) Front panel of the UPS;
- (B) Control panel for the UPS;

Back side:

- (1) Slot for expansion module;
- (2) axial fan units (FAN);
- (3) EPO connection and contact input;
- (4) Contact output connection;
- (5) USB port;

- (C) RACK mounting bracket /
Base for the TOWER version;
- (6) RS232 port;
- (7) Earth connections;
- (8) UPS outputs (cold devices);
- (9) UPS inputs (cold devices or
Festanschluss);

All operation and display components for the device are reduced to the control panel (PANEL) which can be obtained on the front of the device. The control panel (A) makes a clear display of all status data or device information and the operation of the UPS (system) possible.

In addition to the information displayed, several operation, warning and alarm messages and key activation are acoustically supported by the built-in signal generator (BUZZER). Please see ⇒ 8 Me actions for the coding of the acoustic messages.

Some heat loss naturally can arise during the operation of the UPS which must be convectively lead away. There are ventilation ducts available for this which enable a sufficient airflow in the longitudinal direction of the device. The integrated fans (2) assist the circulation when necessary.

The ports and interfaces for the device are marked accordingly and described further under ⇒ 5 Installation and connection of the UPS.

In the standard version, the system has a by-pass switch for maintenance work (MAINTENANCE). Generally, we, however, recommend external manual by-pass for use. This BY-PASS switch is independent from the UPS variant and, when switched on, builds a bridge between the mains power supply and the loads. At the same time, the UPS is disconnected from both the input and output sides and thereby disconnected from the installation. Maintenance work can now be performed without difficulty. For this, see also chapter ⇒ 15.3 External by-pass.

3.3.1 Device label

The following information can be found on the label for the UPS:



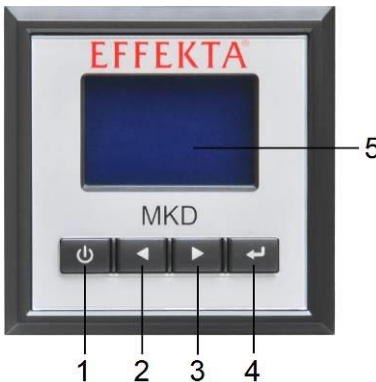
- the model name;
- the data for connection values;
- the article number;
- CE label;
- serial number (Barcode) for the device;
- weight information.

ATTENTION!

As a basic principle, compare the label on the device and the present operating manual for conformity with the device. As a result, this invariably prevents the improper use of the operation manual and the UPS.

3.3.2 UPS control panel

All important data can be represented, retrieved or set on the control panel of the UPS. This primarily includes operation parameters, status data or error codes. The LC display serves as an adequate visual display. The navigation and input is performed on the keypad below the display. A complete array of all status messages about all UPS operation modes is summarized under ⇒ 8 Me.



- (1) ON/OFF button (ON/OFF);
- (2) Navigation button “up/back” (UP/BACK);
- (3) Navigation button “down/next” (DOWN/NEXT);
- (4) Confirm / select button (ENTER)
- (5) Device display (LCD), with back lighting

Control panel keypad (1), (2), (3), (4) (Navigation):



On/Off and start button (ON/OFF): The UPS can be switched on or off by activating the button. Also, the button facilitates starting and stopping the UPS.



Up button (UP): By activating this button the parameters increase or the menu moves forward.



Down button (DOWN): By activating this button the parameters decrease or the menu moves back.



Enter button (ENTER): By activating this button, selection or jumping into the menu or parameter selection can be performed.



Acoustic Signaler: The UPS provides appropriate messages acoustically (BUZZER). This includes confirmation of input as well as operation, warning or alarm messages.

3.3.2.1 Standard messages for the system

The status and additional information about the system can be called up or important parameters can be set through the control panel, or the LC display (5). Current information pertaining to the operation and the existing alarm codes in the case of failure are particularly significant.

The general standard display of the UPS contains various information:

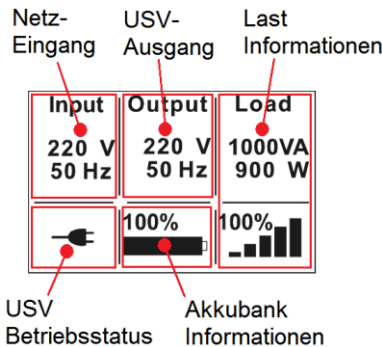


Fig. 3-13 Standard display of the MKD 700-3000 VA RT (XL) series.

The standard page is not only generated by the UPS as output page when switching it on but, rather, the UPS also automatically returns to this page after longer pauses in input.

The following presents the contents of the standard page in detail:






Due to advancing improvements of the software, additional information could already exist that has not yet been addressed in detail here.

The display image during device initialization:






When switching on or initializing, the UPS first generated a welcome page on the display. Then the display jumps directly to the standard display which first shows the actual operating status (OPERATING MODE).




Operating status and standard display on the UPS:

Input	Output	Load
220 V 60 Hz	0 V 0 Hz	0VA 0 W
	100% 	0% 




Standby mode (STANDBY): The USV has been switched on and the battery bank is already being charged. However, the UPS operation has not yet begun; the UPS output is still off.

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000VA 900 W
	100% 	100% 




Power supply mode (LINE MODE): the UPS has been switched on and started. The power supply mode is also called standard mode. The power supply is connected, the battery bank is charged and the UPS-output supplies the loads.

Input	Output	Load
0 V 0 Hz	220 V 50 Hz	1000VA 900 W
	100% 	100% 




Inverter mode (BATTERY MODE): Provided the power supply is disabled, the UPS immediately switches to inverter mode. The UPS output is now temporarily being supplied by the battery bank. During this operation mode, an acoustic signal is given (beep every 4 seconds; if the battery bank is almost drained, the signal sounds: beep every second).

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000 VA 900 W
	100% 	100% 



By-pass mode (BY-PASS MODE): The device is in by-pass mode, i.e. the UPS output (the load) is fed directly by the power supply. During this operation mode, the UPS scarcely carries out a protective or support function. An acoustic signal is given during this operation mode (Beep every 2 minutes).

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000VA 900 W
+ 	100% 	100% 




Power-saving mode (ECO MODE): The device is permanently in static by-pass mode. The protective functions are limited but the UPS support functions remain intact. If the power supply is instable, the UPS switches to the inverter mode. The switchover time is to be considered here. The ECO-MODE can be set via the parameter settings or the software application.

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	700VA 630 W
	100% 	100% 

Converter mode (CONVERTER MODE): The converter mode can be set via the parameter settings or the software application. An adaption of voltage and frequency for specific loads which deviate from the power supply can occur here. The inverter is always in operation during this operation mode. Mind that the UPS output is loaded to a maximum of 80%.




Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000VA 900 W
✓	100% 	100% 

Test mode (TESTING MODE): When the test mode is initiated, the UPS switches to the inverter mode for approximately 10 seconds and performs a battery bank test.




Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000 VA 900 W
	100% 	100% 

Warning mode (WARNING MODE): In the event of an irregular state occurring in the UPS, e.g. the temperature is too high, the UPS issues a warning. This must be taken seriously, and corrective actions should be taken even if the UPS still possess full functional capability for a significant time.




An acoustic signal is given during this operation mode (beep every second).

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1200VA 1080 W
	100% 	110% 

Overload mode (OVERLOAD MODE): The overload message belongs strictly to the warning messages. Depending on the current overload, the UPS will tolerate this overload for a short period. An acoustic signal is given during this operation mode (beep every second).

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000 VA 900 W
	0% 	100% 

Battery bank failure (BATTERY FAILURE): The battery bank failure also belongs to the warning messages because, as long as a power failure does not occur, the UPS output is supplied. The support function of the UPS is not possible. An acoustic signal is given during this operation mode (beep every second).

Input	Output	Load
220 V 50 Hz	0 V 0 Hz	0VA 0 W
	100% 	0% 

Alarm mode (FAULT MODE): In the event of a dire fault status of the UPS, this mode switches the UPS output off and sounds the alarm. An acoustic signal is given during this operation mode (constant tone).

A complete array of all messages about all UPS operation modes is summarized under ⇒ 8 Me actions.

3.3.2.2 Interfaces and connection areas

Please see details about interfaces and the connection areas under ⇒ 5 Installation and connection of the UPS.

3.3.2.3 Intelligent expansions

All devices of the MKD RT series have an intelligent expansion slot (SLOT). In general, a number of various communication cards (adapter cards) are available to couple the device with a network or a superior system. Further information about this is under ⇒ 15 Optional accessories.



Fig. 3-14 Intelligent expansion slot for the MKD RT series.

4. Storage and unpacking

4.1 Storage of the UPS

If the UPS and/or the separate battery bank are to be stored after delivery, the following points must be observed:

ATTENTION!

- Always leave the UPS and the accessories in the original packaging;
- The recommended storage temperature should be between 10 – 25°C. In any event, it is not allowed to exceed or fall below the maximum temperature limits (see here ⇒ 13 Technical data);
- The delivered goods must also be protected against moisture. The device must therefore be stored in a dry area;
- If the storage period exceeds 4 months, the battery bank (internal/external) must be charged via the UPS for a period of approximately 24 hours to avoid a total discharge of the accumulators which would result in irreversible damage to the accumulators.
- The UPS must be connected to the mains power supply for this.

4.2 Transport to the installation site

As the point of delivery is usually not the point of installation, the equipment must be transported to the installation site. Please note the following when transporting:

ATTENTION!

- Always transport the delivery in the original packaging as close as possible to the installation site;
- In addition, mind the center of gravity when transporting. As an explicit transport position is not stipulated for the device, it is preferable to transport the device flat. This way, the possibility of the device being tipped is ruled out;



- There is always a general risk of tipping or tilting with devices with a high center of gravity.

4.3 Unpacking and positioning the UPS

Remove the packaging at the installation site with the utmost care to avoid causing any possible damage to the device and the packaging material.

ATTENTION!

Check the scope of delivery (see ⇒ 14 Scope of delivery / accessories).

Check all packaging materials to ensure that no items are missing.

Inspect the appearance of the UPS after unpacking to see if any visible damage incurred during transportation.

Do not turn on the unit if you detect any damages or if any parts are missing, but rather notify the carrier and dealer immediately.



The shipping materials are recyclable. After unpacking, save them for later use or dispose of them appropriately.

Pay attention to the following information (steps) when unpacking.

Step 1: Open the outer box and remove the accessories and the padding surrounding it.

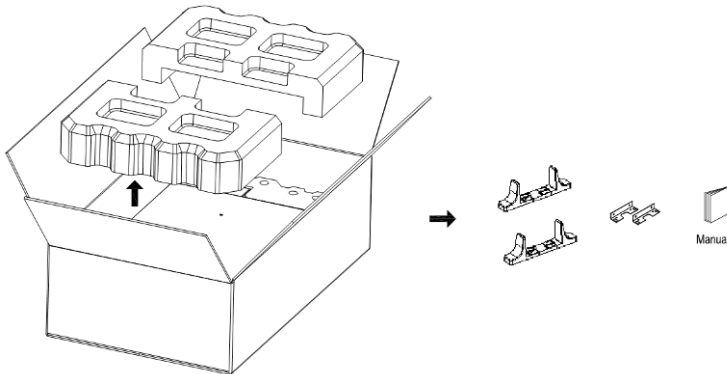


Fig. 4-1 Accessories and padded parts of the MKD RT (XL) series.

Step 2: Now lift the device out of the box and place it on a solid, flat base for further processing.

CAUTION!

Two persons should always lift the device together. The devices are equipped with accumulators and therefore too heavy for one person!

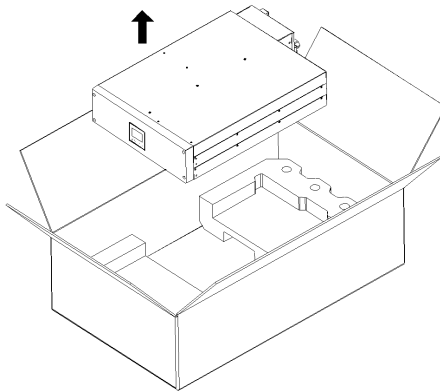


Fig. 4-2 Removal process from the box, MKD RT (XL) series.

When positioning the device, make sure it is standing securely with enough open space for further processing and installation

5. Installation and connection of the UPS

All limit values listed in the technical data regarding the ambient and operation conditions are to be maintained in order to ensure the proper functioning of UPS.

ATTENTION!

The system must only be installed and switched on by trained electricians in compliance with the corresponding safety regulations, standards and within the national guidelines! This also includes the safety regulations for handling accumulators.

WARNING!

The UPS must be installed in a well-ventilated environment, far from liquids, inflammable gases and corrosive agents.

5.1 Installation in 19" cabinet (RACK)

In general, the following rules apply for installing the UPS in a switch cabinet:

- Always mind that there is sufficient space behind the UPS in order to be able to perform the necessary connection work and use appropriate guide rails based on the weight of the UPS. The carrying capacity of the guide rails / base must on all accounts be guaranteed;
- Observe the prescribed mounting position and fasten the device only on the established screw points (**Fehler! Verweisquelle konnte nicht gefunden werden.**);
- Make sure that the ventilation of the device is safeguarded. Because this UPS will be aired lengthwise, a minimum distance of 50 mm in front of and behind the UPS from the fitted cabinet. Pay attention to the corresponding current channel;
- Mind the set-up of the device. Due to the heat build-up in the device, the battery bank should always be installed under the UPS. When installing the UPS in superior systems (e.g. machines, systems), be noted that the UPS is operated in the specified temperature range. In the event of heat accumulation in the installation room, this must be resolved with sufficient external ventilation;
- The UPS must only be installed in a clean, dust-free and dry area;

- Avoid extreme temperature and moisture. A maximal service life, especially with regard to the battery bank, will be achieved at an ambient temperature of 15 – 25°C.

5.1.1 Preparations for the installation

Before you begin with the actual installation, you should prepare the following steps in advance:

Step 1: Remove the accumulators from the UPS or the external battery bank in order to reduce the weight of the devices for installation. Remove the front panels of the devices according to the following illustrations.

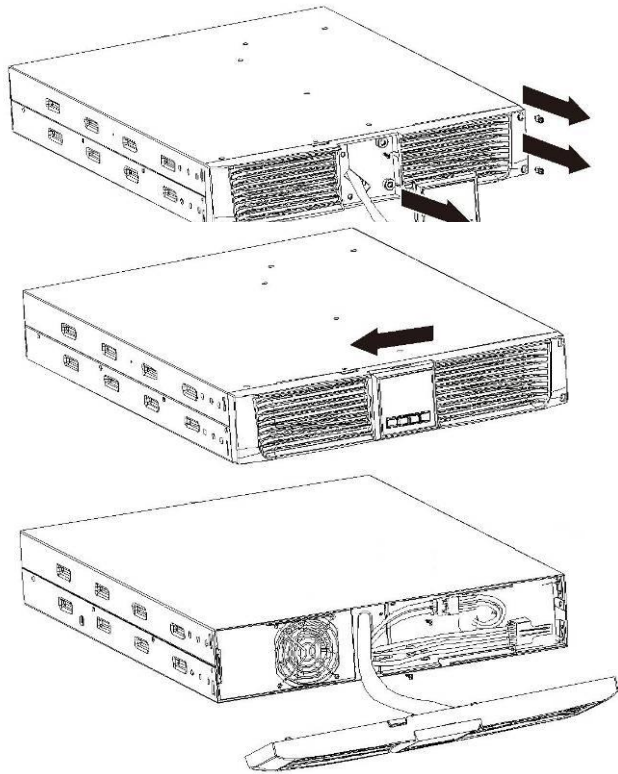


Fig. 5-1 Removal of the front panel, MKD 700-3000 RT (XL). The same process is used for the battery bank.

Once the control panel have been detached from the mounting (also see FigFig. 5-10 here), the screws can be removed from the front panel. Now lift the front panel from the left.

Step 2: Now disengage the battery pack connection from the UPS.

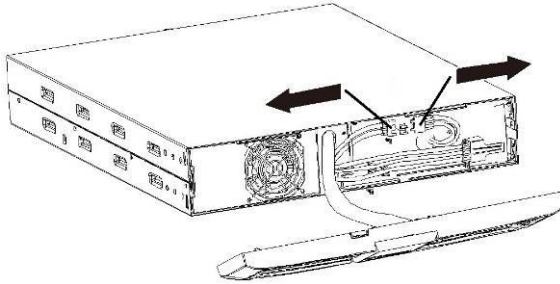


Fig. 5-2 Disengage the battery bank connection from the MKD 700-3000 RT (XL).

Step 3: Remove the safety cover from the UPS and extract the battery pack according to the following illustration.

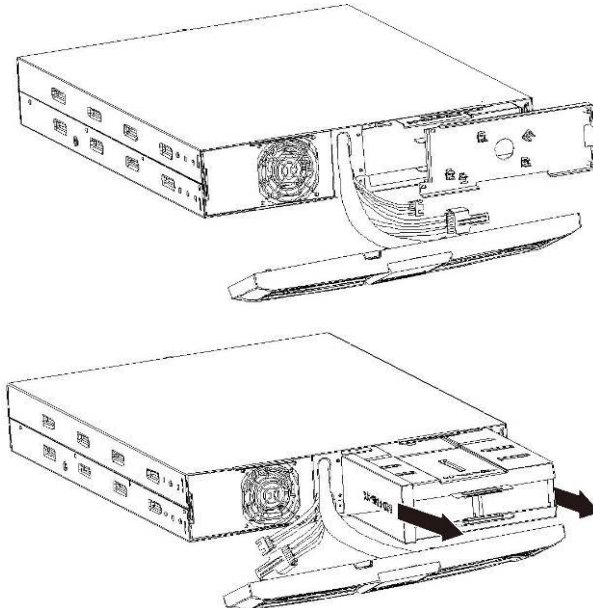


Fig. 5-3 Extracting the battery pack MKD 700-3000 RT (XL).

Step 4: Mount the brackets on the right and left of the device.

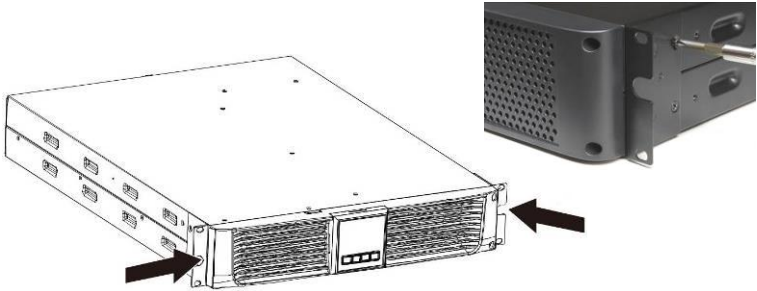


Fig. 5-4 Attaching the brackets on the right and left.

ATTENTION!

The procedures performed in the illustrations above can also be performed on an existing external battery bank.

5.1.2 RACK installation of the UPS (or the external battery bank)

As long as the preparations for the installation are completed, the installation can begin.

Step 1: Install the guide rails correspondent to the device position in the 19" cabinet. Then lift the device into the cabinet and mount it on the guide rails.

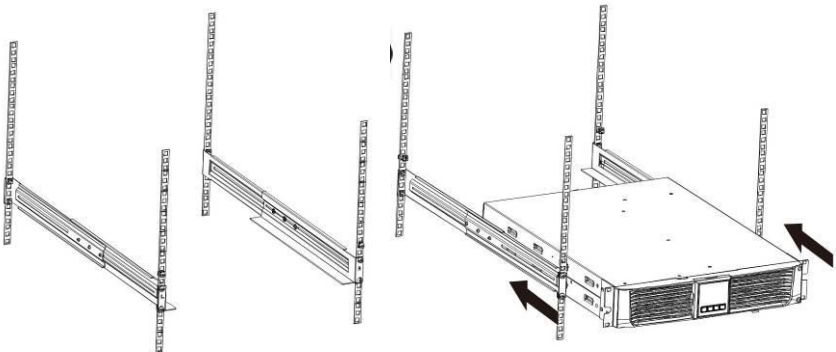


Fig. 5-5 Installation of the guide rails and insertion of the UPS.

Step 3: If the UPS (or the battery bank) is properly integrated, it should be secured on the mounting bracket. See the following illustration for this.

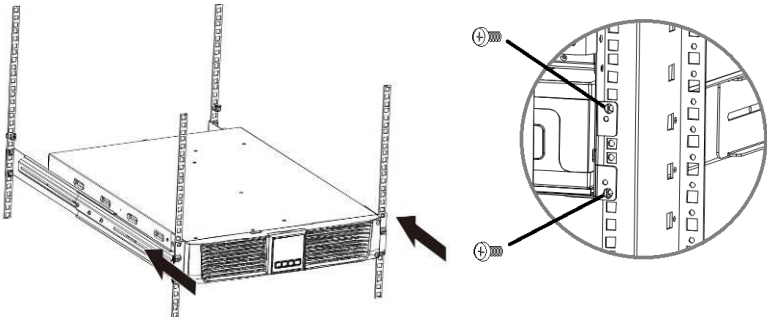


Fig. 5-6 Securing all devices on the brackets.

Step 4: Equip the respective UPS (and the external battery bank) with the previously removed battery packs, reattach the safety cover and connect the battery pack with the UPS or the external battery bank with the UPS. Finally, reattach the front panels and fasten these with the screws provided (according to 5.1.1 in reverse order).

ATTENTION!

Also note that the external battery bank must always be installed under the UPS on account of the waste heat from the UPS.

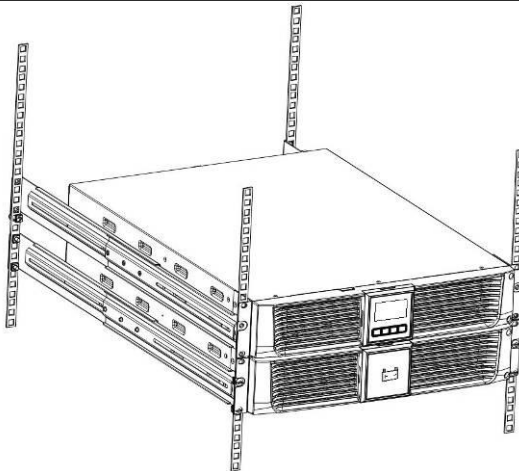


Fig. 5-7 Model RACK installation of the UPS and an external battery bank (MKD RT).

5.2 Installation as a standing device (TOWER)

In general, the following rules apply to the installation of the UPS as a standing device:

- Always mind that there is sufficient space behind the UPS in order to be able to perform the necessary connection work;
- Ensure that the carry capacity of the installation site is adequate; always place the device on a flat surface;
- Make sure that the ventilation of the device is safeguarded. Because this UPS will be aired lengthwise, a minimum distance of 150 mm from adjacent equipment or walls in accordance with the airflow must be maintained;
- The UPS must only be installed in a clean, dust-free and dry area;
- Avoid extreme temperatures and moisture. A maximal service life, especially with regard to the battery bank, will be achieved at an ambient temperature of 15 – 25°C.

5.2.1 Installation of the UPS and an external battery bank as TOWER device

In using the device as a standing device, the positioning should follow the order listed below:

Step 1: Mount the base (1) following the method below and stand the devices (UPS and battery bank) up;

Step 2: Secure both devices on the metal brackets provided (2);

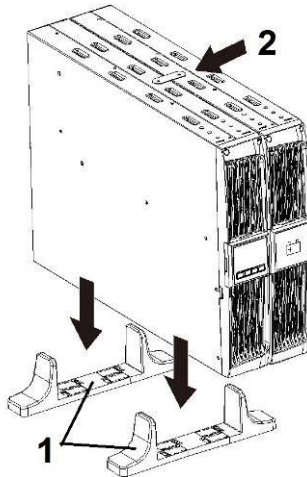


Fig. 5-8 Positioning and securing the devices in the standing format (TOWER).

CAUTION!

Mind that the UPS is in a stable position during and after the installation of the device base. By all means, prevent the device from tipping over.

At the conclusion, check the stable position of the device.

Step 3: To avoid malfunctions, both devices **must** be connected via the respective earth connection.

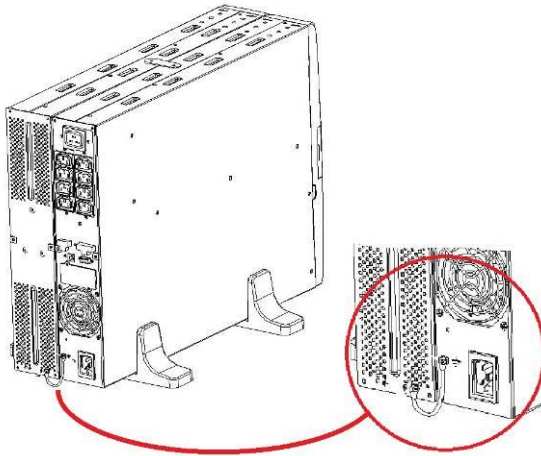


Fig. 5-9 Connection of the earth connections for both devices.

Step 4: To maintain the usual readability and ease of operation, turn the control panel 90°. Proceed here according to the illustration (Fig. 5-10).

Carefully remove the control panel from the front panel. For this purpose, hold the panel by the designated recesses with your fingers.

ATTENTION!

When removing mind that the control panel is still connected to the UPS with a flat ribbon cable. Mind that the cable does not become damaged.

Turn the control panel to the readable position in accordance with your installation and reinsert it.

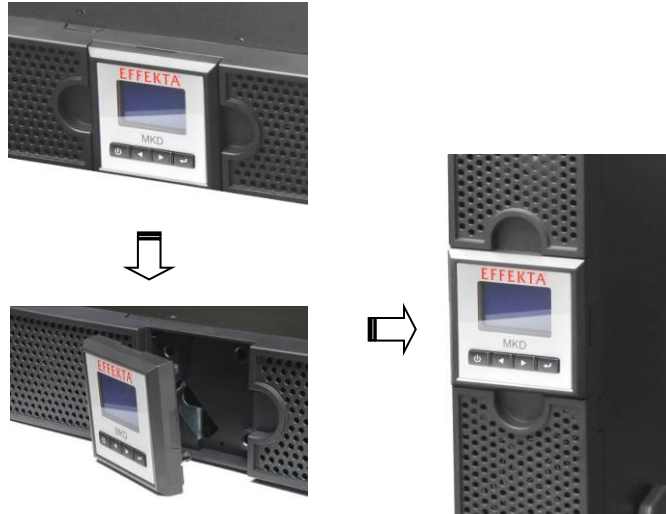


Fig. 5-10 Turn the control panel according to the installation.

5.3 Preparations for connection

The following ambient conditions and sanctions must be considered before the device can be connected.

5.3.1 Input protection for the UPS



WARNING!

It is generally guaranteed that the UPS device is connected to a suitable power supply network according to EN 62040. Usually, this includes the TN-S network. In the event of a power failure, the reference conductor is device internally interrupted. The TN-S network becomes an IT network for the duration of the support period.

The supply isolation on the side of the main power supply (power outlet, circuit breaker) should be available for maintenance and service purposes.

We generally do not recommend the use of a GFCI (ground fault circuit interrupter) on the power supply side in connection with a UPS device. On the contrary, the GFCI should be installed on the UPS output or better directly prior to the loads. For the duration of the support period, this is, however, also ineffective due to the interruption of the reference conductor.

In the event that you still operate a UPS device on an upstream GFCI, some sanctions are to be observed:

- It must be considered that in triggering an upstream GFCI, the reference conductor and with it the TN-S network are lost.
- Specific GFCI are to be recommend based on the operating characteristics of the UPS devices as well as the quality of the supplying network. The GFCI must be sensitive to universal currents, suitable for pulsating DC fault currents and short-time delayed;
- The leakage current of a securely connected UPS device may account for maximum 5% of the nominal output current under unfavorable conditions! Because the filter is radially connected to the network, a leakage current will occur under normal conditions due to tolerance of the radio interference suppression capacitor in the range of up to approximately 0.5 A. Therefore, we recommend applying GFCI with a sensitivity starting at 500mA. We make this recommendation only as a precaution to prevent an undefined triggering of the GFCI. Based on our experience, this happens very frequently.

5.3.2 Final inspection and safety precautions

WARNING!



Before beginning with the connection work, please observe the 5-point rule in accord with the safety regulations (⇒ **Fehler! Verweisquelle konnte nicht gefunden werden.** Connection) for all components to be connected including the network connection.

Generally, check that all connections are de-energized before beginning with further work.



This especially applies to the external accumulators. If the battery bank does not have a switchable output fuse, make sure that the output plug-in connector is constantly energized.

Ensure again that the temperature equalization between UPS / battery bank and the surroundings has been completed fully in order to rule out any condensation effects (⇒ **Fehler! Verweisquelle konnte nicht gefunden werden.** Installation).

Check that the installation and wiring conforms with the local safety regulations for electricity.

5.3.3 Notice for external battery bank and its connection cable



This UPS device is possibly operated with a separate battery bank as energy storage. Before carrying out a coupling of the UPS and battery bank, please

read the battery bank operating manual in its entirety and observe the notices, warning and connection data listed there.

ATTENTION!

Always make sure that the UPS and the battery bank are compatible. A corresponding product is inspected by EFFEKTA Regeltechnik GmbH and listed in → 14 Scope of delivery / accessories.

5.4 Connecting the UPS device

The MKD 700-3000 RT (XL) series is equipped with cold device connections according to IEC 60320. Thus it is possible to connect the UPS with the provided power cable to the common wall socket (network). Only the MKD 3000 XL version unconditionally requires a fixed connection on the input side.



Fig. 5-11 Cold device line or fixed connection MKD 3000 XL variant.

CAUTION!

Once the UPS is connected to the mains power supply, it switches to the bypass mode, the status display appears, the charging mode is active and the loads are already being supplied.

WARNING!

In general, ensure that the wall socket is properly secured and the PE connection is present.

Additionally, the load(s) can, as a rule, be connected to the UPS with an appropriate cold device line.



WARNING!

Ensure here that the PE connection and the corresponding fuse for the loads are also present.

In the event that a fixed connection for the UPS occurs (e.g. MKD 3000 XL), please observe the following connection diagram and the connection values listed.

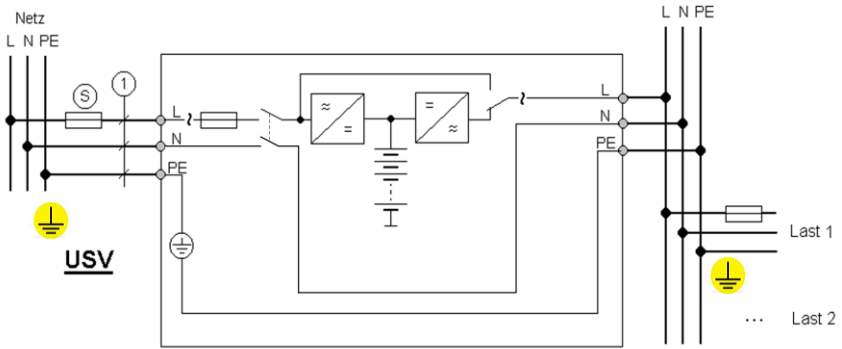


Fig. 5-12 Connection diagram for the MKD 3000 XL on the power supply and the loads.

The following table generally depicts the possible connection variants as well as the necessary fuse:

Device:	Input connection:	Conductor diameter (1):	Circuit breaker (S):	Output connection:
MKD 700 - 2000	IEC C14	1.5 mm ²	10 A	8x IEC C13
MKD 700 - 1500 XL	IEC C14	1.5 mm ²	10 A	8x IEC C13
MKD 2000 XL	IEC C20	2.5 mm ²	16 A	8x IEC C13
MKD 3000	IEC C20	2.5 mm ²	20 A	8x IEC C13 1x IEC C19
MKD 3000 XL	Fixed connection	2.5 mm ²	25 A	8x IEC C13 1x IEC C19

WARNING!



It is implicit to connect the protective conductor here and to maintain the loop resistance all the way to the last load.

It is likewise possible to secure the loads separately against over and fault currents and to directly ground them.

Always pay attention to the correct polarity (L, N) between input and output for the UPS.



If the UPS is in the midst of an emergency stop circuit, it must be observed that the UPS output is not completely currentless after the emergency stop circuit operation. The loads will continue to be supplied for the duration of the UPS autonomy time.

WARNING!



Components of the UPS device carry high voltage and current strength.

Improper use can thus result in electrical accidents with fatal outcomes or cause property damage.

5.4.1 Connection to the external battery bank

The battery bank for this device series usually employs the required connection cable for the coupling. An extension of this connection is not intended.

Furthermore, these battery banks are equipped with an additional parallel connection (DC) in order to apply several external battery banks until the desired capacity (or autonomous time) has been reached.

ATTENTION!

The MKD **Standard** is suitable for a maximum of 2 battery strings for coupling the UPS with external battery banks and the MKD **XL variants** is suitable for more than 2 battery strings because this commands a powerful charging unit.

Always ensure that the connection data of both devices (battery bank and UPS) conform to each other.

The external battery bank connection is completed in a few steps with the quality equipment of the MKD devices (PLUG AND PLAY). Follow the preceding description for this.

External battery bank connection on the example of the standing device

In general, the battery bank connection on the MKD devices can be executed on the front side of the device:



Step 1: Remove the front panel of both devices (UPS and battery bank);

See the instructions under 5.1.1 Preparations for installation here.

Step 2: Connect the battery bank with the intended plug connection of the UPS (1) or an additional battery bank according to the following illustration;

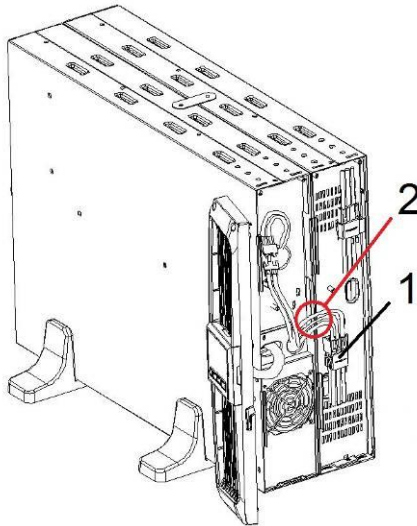


Fig. 5-13 Model coupling of the UPS with an external battery bank.

Step 3: The respective front panels must be removed from the area (2) as the connection cable of the battery bank connection are here. The plastic edge is already perforated at this point.

Step 4: Reattach the front panels of all devices (UPS and battery bank (s));

In the case of a connection of an additional battery bank, the procedure is generally the same.

With this the connection work for the connection of one or more external battery banks is concluded.

ATTENTION!

Provided the coupling of the UPS to the battery bank has followed according to the instructions above, a reaction in the UPS should not occur. Neither a display on the control panel appears nor is the UPS active.

Only use devices also indicated in the accessories as external battery banks. Models of another make are not permissible!

5.4.2 Connection for emergency shutdown, disconnection of the loads

The function of the emergency shutdown EPO or REPO (REMOTE EMERGENCY POWER OFF) serves to immediately disconnect the connected loads from a distance of known dimensions. An external emergency power off button must be connected (potential-free contact) to the signal input REPO for this purpose.



Function:	Switching behavior:	PIN, Connection:	Description:
REPO		3	Emergency shutdown (opener) closed in resting state
		4	

Fig. 5-14 Connection plug for the REPO function (and DRY-IN 1, 2).

ATTENTION!

The emergency power off button must be executed as “opener” for the MKD series! In the event the REPO remote release is not used, the connection must remain **closed** (bridge).



WARNING!

The control circuit emergency shutdown (EPO, REPO) must without fail be executed with an enhanced isolation. The EPO switch (emergency power off button) must have a load-bearing capacity of at least 24 VDC / 20 mA and be designed as a special engagement

switch (potential-free). The EPO signal must remain active for at least 20 ms in order to guarantee the release of the loads.

5.4.3 Connection of the communication interfaces

The serial port RS232 and the USB port serve to connect the equipment with a PC or rather the application (software) installed on it. However, only one of the two interfaces can be used.

Serial port RS232

The connection is also established for a serial standard cable. The configuration is as follows (unlisted pins are not assigned):

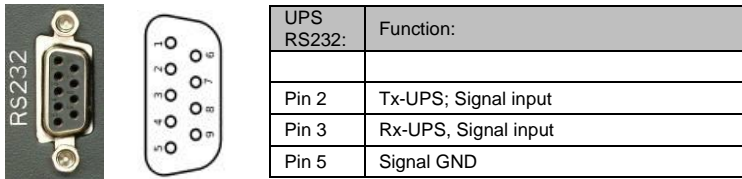


Fig. 5-15 RS232 device connection (SubD 9pole, female).

The serial port RS232 of the UPS works with the following interface parameters:

- Data rate: 2400 Baud;
- Data bits: 8;
- Stop bits: 1;
- Parity bit: none.

USB port



Connect the USB port via a USB cable (Type A to Type B) to your PC or a suitable, superior control system. The port functions according to the USB Protocol 1.1.

Both communication interfaces support the complete „MegaTec Extended“-protocol (August 2000 version).

Internal contact interface (DRY CONTACT, configurable)

The MKD 700 – 3000 RT (XL) series already has a simple contact interface each with a signal input or a signal output. The relative function is configurable on the control panel or the software application. Further information is under 6.2.6 UPS settings.

The signal input must be connected potential free, and the corresponding signal must be in contact for at least 1 s for the registration.



WARNING!

The signal input (DRY-IN) must be unconditionally executed with a strengthened isolation to all other circuits.



Function:	Switching behavior:	PIN, Connection:	Description:
DRY-IN		1	Contact input (opened in resting state)
		2	

Fig. 5-16 Connection plug for the DRY-IN Function (and REPO 3, 4).

The signal output (DRY-OUT) is already being run as relay contact (potential-free) and is available for the direct connection to a superior system.



Function:	Switching behavior:	PIN, Connection:	Description:
DRY-OUT		1	Contact output (opened in resting state)
		2	

Fig. 5-17 Connection plug for the DRY-OUT function.

The load capacity of the output contact can be seen in the technical data of this operation manual under 13.2 Load-bearing capacity of the internal interface. We recommend a wire diameter of 0.82 mm² (18 AWG) for connecting to the interface connections.

The available signals of the interface are listed in the following table. The factory settings are marked accordingly (bold type):

Signal input (DRY-IN):	Signal output (DRY-OUT):
---	Collective alarm (SUMMERY ALARM)
Signal input „deactivated“	Autonomous mode (ON BATTERY)
UPS „switch on“ (ON)	Battery bank low (BATTERY LOW)
UPS „switch off“ (OFF)	UPS without errors (UPS OK)
BY-PASS „switch on“ (ON)	BY-PASS mode (BY-PASS MODE)

5.4.4 Connecting the relay contact extension card (DRY CONTACT)

The relay card is an intelligent extension card. All inputs and outputs have protective insulation (potential-free). The relay card can easily be slid into the adapter slot (INTELLIGENT SLOT) of the UPS and couples via a signaling cable with the superior control system. For the connection of the relay contact card, please see the versions in the card operation manual. This chapter also provides a summary of the functionality ⇒ 15.1 Communications adapter: Relay card (AS400) here in this manual.

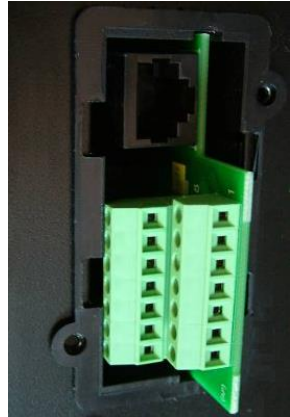


Fig. 5-18 View of a model relay card inserted.

5.4.5 Connecting the SNMP adapters

The SNMP adapter can likewise easily be slid into the adapter slot (INTELLIGENT SLOT) of the UPS and only needs to be connected with the network via a network cable (patch cable, category 5e or better). Further information for connection configuration is found in the respective adapter manual. A rough summary of the functionality is provided in chapter ⇒ 15.2 Communication adapter SNMP in this manual.

6. Operation of device and service

Due to the comprehensive protective functions which the device performs regarding the loads, the UPS runs completely automatically. This reduces the operation of the device to a few steps and this as well in the boundary of the power. As a result, the operation of the UPS is divided into "general operation" and "maintenance or service operation."

ATTENTION!

In general, the operating personnel should inform affected employees (keyword: consumer network) about any scheduled tasks concerning the UPS system.

Have chapter 8 ⇒ Meredy to facilitate the immediate interpretation of the operation display and possibly occurring errors.

6.1 Operation and performance of the UPS

As a rule, the switching on or starting up and shutting down of the system is done by the operating personnel.

WARNING!

The operator of the UPS-system must always adhere to the instructions in this operating manual. Only the operator can perform the following actions and must always exercise particular care:

- Switching the UPS on and off;
- Reading the display messages and interpreting the acoustic warning signals;
- Switching from standard mode to autonomous mode and vice versa.

ATTENTION!




The operation of the UPS / system generally assumes that all previous chapters in this operating manual have already been successfully processed and controlled.

6.1.1 Switching on and starting the UPS device with the mains power supply


Starting the UPS device ensues through the following procedure. Observe the indicated sequence for this:




- ✓ The precondition is that a mains power supply does not exist.
- ✓ The EPO (REPO connection) must be closed.

Switch the mains power supply on or connect the UPS with the wall socket. The UPS initializes itself and switches the charging mode on. The UPS output is switched on at this point; the UPS remains in the BY-PASS mode (or in STANDBY mode depending on the settings);

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000 VA 900 W
	100% 	100% 

The display pictured here occurs as long as the UPS device is in BY-PASS mode. The charging mode and ventilation are already active. The current input and battery bank data are shown.

- Now start the UPS up by pressing the On/Off button (1)  for longer than 1 s. The signaler confirms the selection with one 1 s beep, and, after a brief test (self-test), the UPS starts up. The output and, with it, the loads are now being supplied;

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000VA 900 W
	100% 	100% 




The standard mode (INVERTER) is displayed. The output data can be read here.

With this, the starting procedure with the mains power supply is concluded. The UPS and device can remain in this state; switching on the loads may still have to be controlled.


6.1.2 Switching off the UPS with the mains power supply




Switching off the UPS device ensues with the following procedure. Observe the indicated sequence for this:

- ✓ The device should be in standard mode!

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000VA 900 W
	100% 	100% 

The standard mode (INVERTER) is displayed. Input, output and battery bank data can also now be read here.

- First, switch off all loads one at a time to ensure that these are switched off in a controlled manner;
- Now stop the UPS by pressing the On/Off button (1)  for longer than 3 s. The signaler confirms the selection with a 3 s beep and, after a brief test, switches the UPS to the by-pass mode (or STANDBY mode depending on the settings);

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000 VA 900 W
	100% 	100% 

The by-pass mode (BYPASS) is displayed. The input, output and battery bank data can also now be read here.




- Now interrupt the mains power supply for the UPS. After a brief test, the UPS automatically shuts down. The device display (DISPLAY) goes out completely. The UPS output is now powerless;
- The UPS continues to remain active and the UPS output is still being supplied as long as all loads have not been switched off. In this case, separate all loads or switch them off. Only then will the UPS also completely shut itself down.

With this, the shutdown procedure is concluded; the UPS device can remain in this state.

6.1.3 Switch to autonomous mode




In the event of an interruption of the mains power supply, the UPS is forced into the autonomous mode. Following the instructions below for this:

- ✓ The device should be in standard mode!

Input	Output	Load
220 V 50 Hz	220 V 50 Hz	1000VA 900 W
	100% 	100% 

The standard mode (INVERTER) is displayed. The input, output and battery bank data can also now be read here.

- Interrupt the mains power supply on the UPS. The UPS switches to the autonomous mode directly, without interruption of the load feed.

Input	Output	Load
0 V 0 Hz	220 V 50 Hz	1000VA 900 W
	100% 	100% 

The LC DISPLAY shows the autonomous mode as well as the current status data. The signaler sounds briefly every 4 s.


The UPS switches back to standard mode provided the mains power supply for the UPS has been switched on again.



ATTENTION!

A switch to the autonomous mode is often intentionally applied to determine the autonomous period (support time) of the UPS device.


6.1.4 Direct switching on/off in the autonomous mode (COLD START)




Also when there is not a mains power supply, the UPS device can be directly switched on in the autonomous mode. Follow the instructions below for this:

- ✓ To begin, the device must be fully switched off without a mains power supply connection.
- ✓ The EPO (REPO connection) must be closed.
- Briefly press the On/Off button (1) . The UPS will start up immediately in the standby mode after a brief test (self-test);


Input	Output	Load
0 V 0 Hz	0 V 0 Hz	0VA 0 W
	100% 	0%

The display here appears provided the UPS device is in standby mode. The UPS is fed by the battery bank.

- Now start the UPS up by pressing the On/Off button (1)  for longer than 1 s. The signaler confirms the selection with a 1 s beep, and the UPS starts in the autonomous mode after a brief test (self-test). The loads are now being supplied;

Input	Output	Load
0 V 0 Hz	220 V 50 Hz	1000VA 900 W
	100% 	100% 

The LC DISPLAY shows the autonomous mode as well as the current battery bank and output data. The signaler sounds briefly every 4 s.

- Stopping and shutting down the UPS occurs here by pressing the On/Off button (1)  for longer than 3 s. The signaler confirms the selection with a 3 s beep, and the UPS shuts down after a brief test. The display goes out.

ATTENTION!

A COLD START, also called a BLACK START, is frequently applied to perform a few load or stress tests in advance.

6.2 Menu navigation, settings and commands

In general, all settings are carried out, alarm data (LOGGING) and status data obtained and operation commands for the UPS executed via the UPS control panel. The following submenus are available in the main menu:

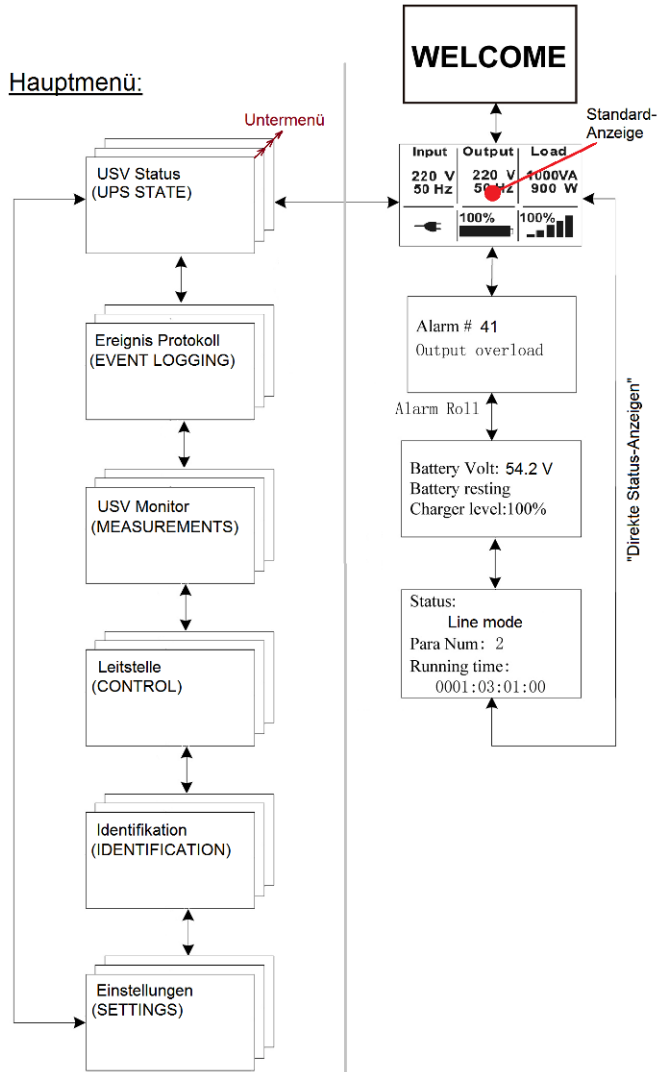


Fig. 6-1 Navigation and main menu for the MKD 6-10 kVA RT series.

The arrow keys (2) ◀, (3) ▶ can aid in navigating the menu accordingly whereby the page or parameter selection occurs by pressing the ENTER button (4) ↵.

By briefly pressing the arrow keys (< 1 s) during the standard mode, the status pages can be directly observed without navigating in the submenu via the main menu.

By pressing the up button ◀ (arrow key (2)) longer than 1 s, the display proceeds to the main menu which is arranged in the following submenus: UPS status, event log, UPS monitor, control center, identification, settings. Also select the desired submenu with the arrow keys and open this by pressing the ENTER button ↵.

Selecting, choosing and changing a parameter also occurs according to the same model: arrow keys (select) -> ENTER button (confirm) or arrow keys (move up or down) -> ENTER button (confirm).

Exiting a submenu or the main menu occurs anew by pressing the up button ◀ (arrow key (2)) longer than 1 s.

6.2.1 UPS Status

The status pages of the submenu “UPS STATUS” can be seen via the standard display and by pressing an arrow key (◀ ▶) or by jumping to the main menu (◀ > 1 s) and confirming the submenu (↵). Either way, the contents are identical. Information about alarm or error states, battery bank data and the system status is displayed. See the illustration in Fig

Fig. 6-1 for this.

By pressing the up button (◀ > 1 s), the display returns to the main menu from the submenu, and by pressing the up button (◀ > 1 s) again, the display exits the main menu to return to the standard display.

6.2.2 Event log

By pressing the ENTER button (↵) on the “EVENT LOG” submenu, you will reach the event log. The pages displayed here are preceding events and alarm or warning messages.

Browse through the list with the arrow keys (◀ ▶). A message and message code as well as the exact time at which the event occurred is displayed.

The event log contains a capacity of 50 previous messages. The following illustration shows the procedure.

By pressing the up button (◀ > 1 s), you reach the main menu again from the submenu.

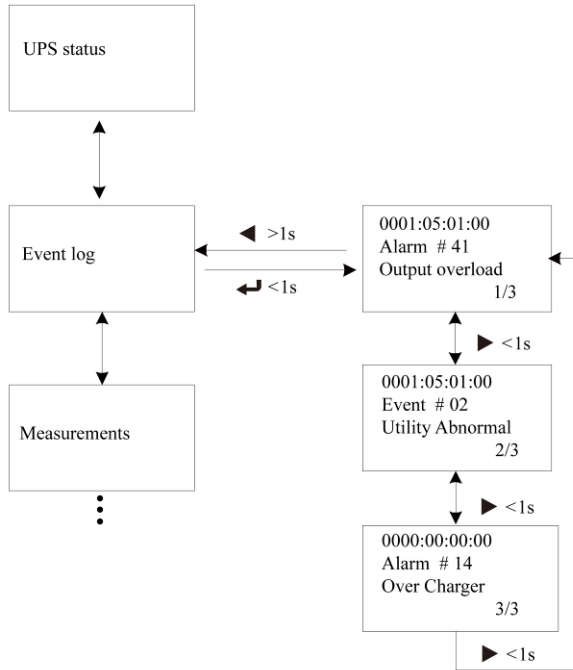


Abb. 6-2 Model navigation in the "EVENT LOG" submenu.

ATTENTION!

A complete list of the messages represented can be seen in chapter ⇒ 8 Me.

6.2.3 UPS Monitor

By pressing the ENTER button (↵) on the "MEASUREMENTS" submenu, you will arrive at the UPS monitor. All important, current operation data for the UPS, supply and consumer load are presented here.

The following illustration shows the navigation and the available menu pages.

By pressing the up button (⬆ > 1 s), you arrive at the main menu again from the submenu.

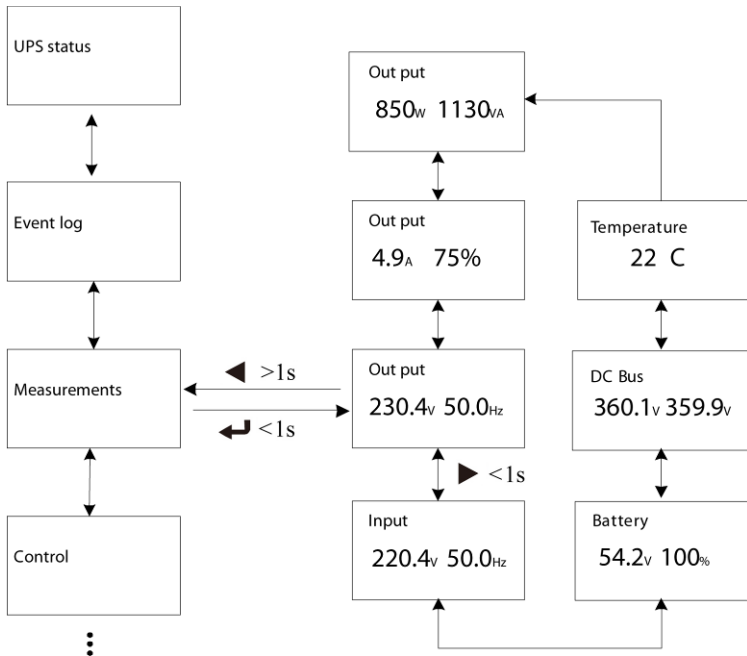


Fig. 6-3 Model navigation in the “MEASUREMENTS” submenu.

6.2.4 UPS control center

By pressing the ENTER button (↵) on the “CONTROL” submenu, you arrive in the UPS control center. Here tasks can be initiated or basic settings carried out. These include:

- **Muting the acoustic signaler:** This setting is important when the signaler is malfunctioning.
- **Initiating the battery bank test:** This action is usually conducted to switch the UPS to the autonomous mode and to briefly test the battery bank (approximately 10 s).
- **Resetting the EPO status:** In the event the EPO or REPO (REMOTE EMERGENCY POWER OFF) is triggered, the UPS output is compulsorily switched off and the loads disconnected. In order to operate the UPS in standard mode again afterwards, the EPO must first be shut down again and the function “resetting the EPO status” must be executed. With this, the UPS switches again to the bypass mode and can be started again.
- **Resetting the error status:** In the event, a correlated alarm or error arises in the UPS, the device pauses in error status until the error has

been eradicated and the error status reset. Then the UPS switches again to the bypass mode and can be started again.

- **Deleting the event log:** The UPS event log can be deleted here.
- **Resetting the UPS to the original factory settings:** If the UPS does not work properly after you have entered your settings, the original settings can be recalled here. This task, like many other settings, can only be performed when the device is in the STANDBY mode.

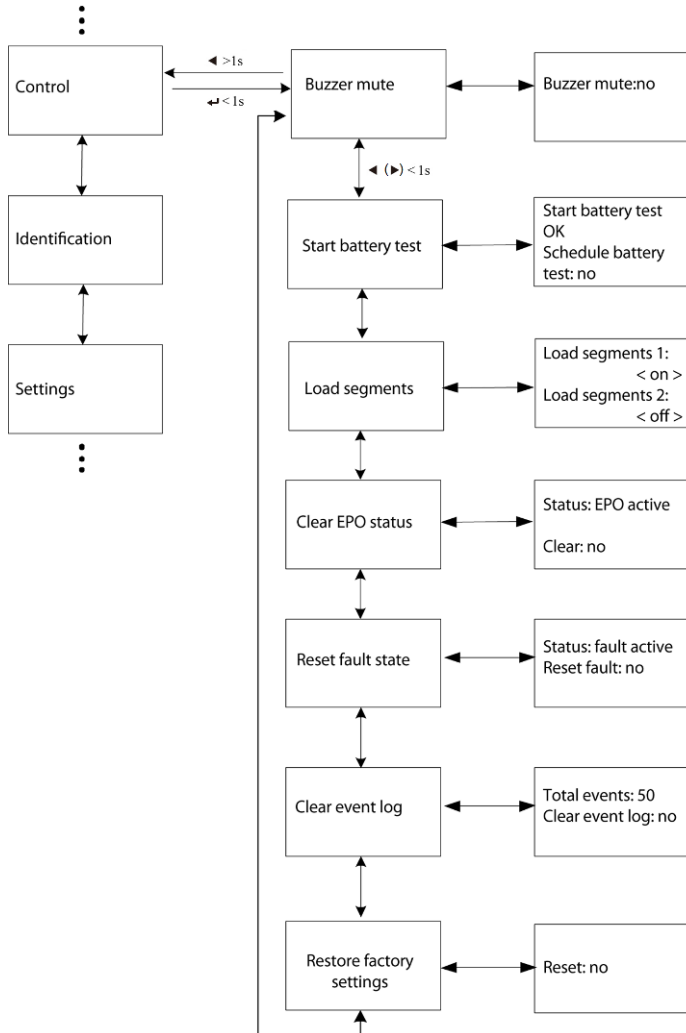


Fig. 6-4 Model navigation in the "CONTROL" submenu.

6.2.5 UPS identification

By pressing the ENTER button (↵) on the “IDENTIFICATION” submenu, you arrive at UPS identification. Data about the type of UPS, the device serial number and the current firmware (device software) is listed here.

By pressing the up button (⬅ > 1 s), you arrive again at the main menu from the submenu.

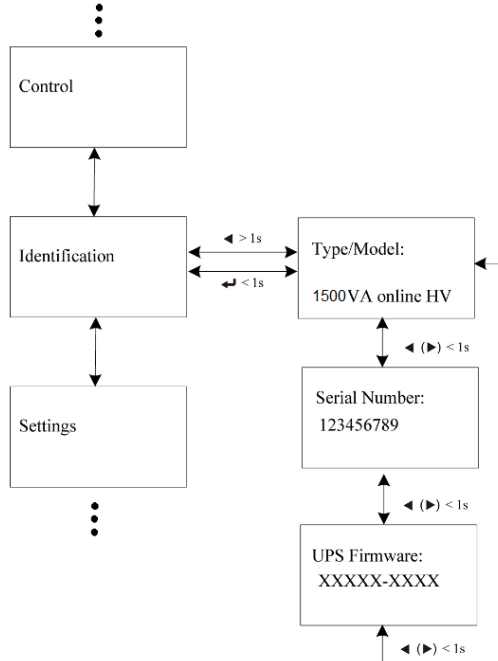


Fig. 6-5 Model navigation in the “IDENTIFICATION” submenu.

6.2.6 UPS settings

By pressing the ENTER button (↵) on the “SETTINGS” submenu, you arrive at the UPS settings. Far-reaching functions can be called up here or parameters can be changed.

CAUTION!

Only qualified personnel can carry out changes in the settings as incorrect settings can result in grave malfunctions or even destruction of the UPS and the connected loads.

Password: xxxx

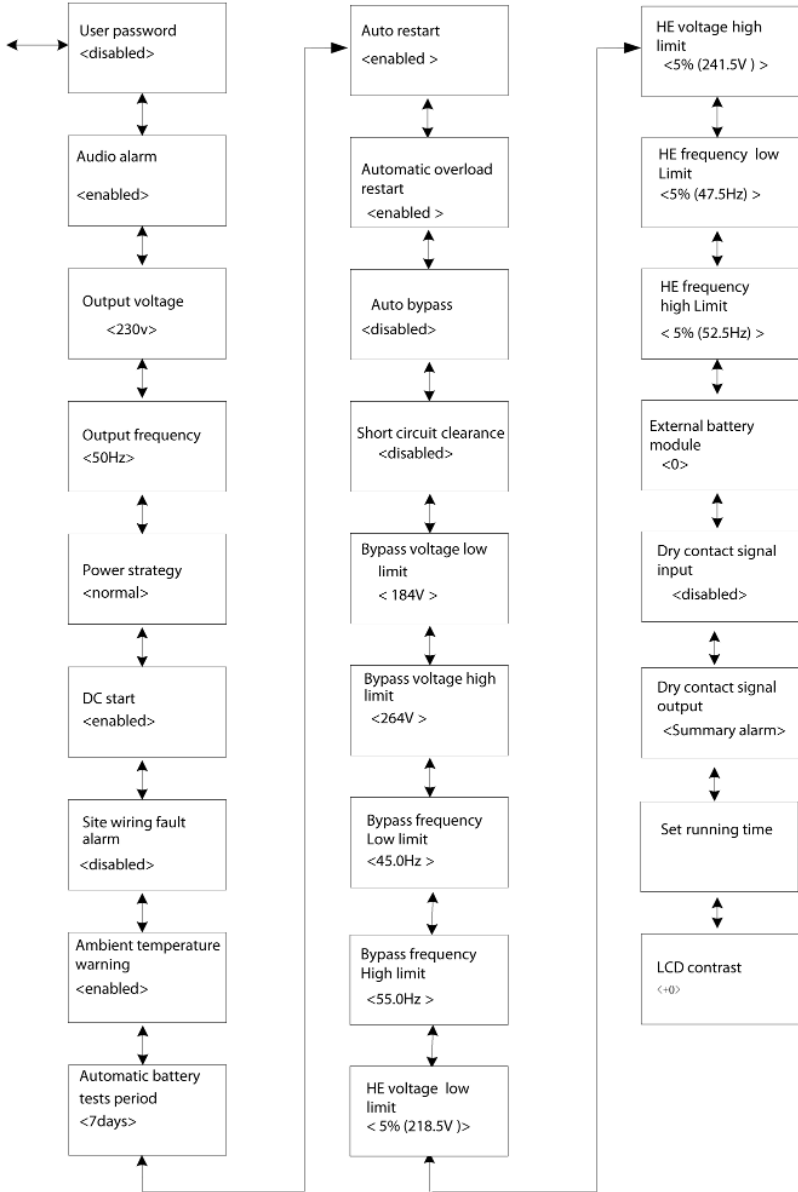


Fig. 6-6 Model navigation in the "SETTINGS" submenu.

ATTENTION!

Most settings can be and are permitted to be performed only when the device is in STANDBY mode.
The setup menu can be password protected; however, this deactivated by the factory.

Navigate to the desired menu page (parameter) here only with the arrow keys (◀ ▶) as well. By pressing the up button (⏏ > 1 s), you will arrive again at the main menu from the submenu.

Example of a parameter change

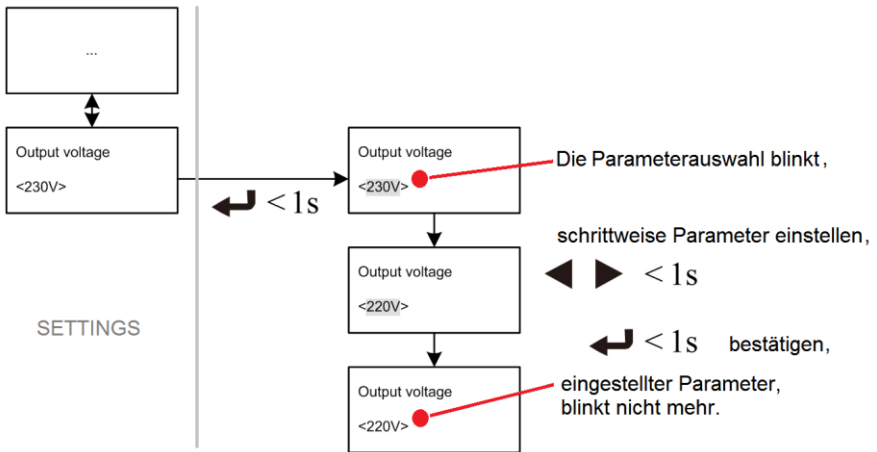


Fig. 6-7 Example of “output voltage” parameter change.

In accordance with the example pictured above, first select the desired parameter and confirm this with the ENTER button.
The parameter selection blinks.
Define the new parameter value using the arrow keys, and again conform the setting with the enter button.
After the conclusion of the setting, the parameter display remains static.

Possible settings and ranges of the different parameters

Parameter (Display)	Setting options / Value ranges	Default
User password	[<enable><disable>] If <enable> is set, a password must also be entered.	disable
Audio alarm	[<enable><disable>] If <disable> is set, the acoustic signaler is then deactivated.	enable
Output voltage	[<208V> <220V> <230V> <240V>]	230V
Output frequency	[<50Hz> <60Hz> < Auto-sensing>]	50Hz
Power strategy	[<normal><high efficiency> <converter>] If <high efficiency> is set, the UPS operates in ECO mode. If <converter> is set, the UPS operates in CVF mode.	normal
DC start	[<enable><disable>] If <enable> is set, then the cold start is possible for the UPS.	enable
Site wiring fault alarm	[<enable><disable>] If <enable> is set, the UPS emits a warning signal as soon as the phase and neutral conductor are exchanged in the power input.	disable
Ambient temperature warning	[<enable><disable>] If <enable> is set, the UPS emits a warning signal as soon as the ambient temperature becomes too high.	enable
Automatic battery tests period	[<0days>...<31days>] If <0days> is set, the automatic battery test is deactivated.	7days
Auto restart	[<enable><disable>] If <enable> is set, the UPS starts up immediately in the standard mode when it had been switched off after the autonomous mode.	enable
Automatic overload restart	[<enable><disable>] If <enable> is set, the UPS automatically switches back to standard mode from the bypass mode after an output overload (the load must fall under 70% of the normal load for this).	enable
Auto bypass	[<enable><disable>]	disable

Parameter (Display)	Setting options / Value ranges	Default
	<p>If <enable> is set, the UPS switches directly to the by-pass mode after being switched on.</p> <p>If <disable> is set, The UPS does not switch to the by-pass mode after being switched on but switches to the by-pass mode when an error or overload occurs.</p>	
Short circuit clearance	<p>[<enable><disable>]</p> <p>If <enable> is set, the output is reactivated for 4 s during a short circuit. If the output voltage reaches more than 50 % of the normal voltage, the UPS device remains on.</p> <p>If <disable> is set, the UPS switches the output off after 100 ms in the case of a short circuit.</p>	disable
Bypass voltage low limit	[<120V>...<215V>]	184V
Bypass voltage high limit	[<245V>...<276V>]	264V
Bypass frequency low limit	[<40.0Hz>...<49.5Hz>]	45.0Hz
Bypass frequency high limit	[<50.5Hz>...<70.0Hz>]	55.0Hz
HE voltage low limit	[<5%(218.5V)> ...<10%(207.0V)>]	5% (218.5V)
HE voltage high limit	[<5%(241.5V)> ...<10%(253.0V)>]	5% (241.5V)
HE frequency low limit	[<5%(47.5Hz)> ...<10%(45.0Hz)>]	5% (47.5Hz)
HE frequency high limit	[<5%(52.5Hz)> ...<10%(55.0Hz)>]	5% (52.5Hz)
External battery module	<p>[<0>...<9>]</p> <p>The selected value indicates the number of external battery banks. At <0> none are connected.</p>	0
Dry contact signal input	see below: Configuration of the internal signal interface.	---
Dry contact signal output	see below: Configuration of the internal signal interface.	---
Set running time	Day:0000-9999 Hour:00-23 Minute:00-59 Second:00-59 Settings for the operation hours meter.	Day:0000 Time: 00:00:00
LCD contrast	[<-5>...<+5>]	0

Parameter (Display)	Setting options / Value ranges	Default
	The contrast of the LC display can be set from – 5 to + 5.	

Configuration of the internal signal interface

The functions of the input for the signal interface can be selected under the menu item „DRY CONTACT SIGNAL INPUT.”


The functions of the output are likewise under the menu item „DRY CONTACT SIGNAL OUTPUT.”

The following table declares the possible settings for the interface in this case:

Signal input (DRY-IN):	Description:
Signal input „deactivated“	The signal input is deactivated; a selection has no effect.
UPS „switched on“ (ON)	The UPS can be switched on by a remote control.
UPS „switched off“ (OFF)	The UPS can be switched off by a remote control.
BY-PASS „switched on“ (ON)	The UPS can be switched to the BY-PASS mode by remote control. A return out of the BY-PASS mode is only manually possible; here the signal must not be on.

Signal output (DRY-OUT):	Description:
Collective alarm (SUMMERY ALARM)	The signal is on when the UPS is experiencing an error status.
Autonomous mode (ON BATTERY)	The signal is on when the UPS is in the autonomous mode.
Low battery bank (BATTERY LOW)	The signal is on when the battery bank voltage is low.
UPS error free (UPS OK)	The signal is on when the UPS is error free.
BY-PASS mode (BY-PASS MODE)	The signal is on when the UPS is in the BY-PASS mode.

6.2.7 Alarm mode of the UPS

Line		Output
220 V	180V	0 V
60HZ	0%	0HZ
		0 W

The UPS switches the output off provided the UPS switches to the error mode due to an internal problem. The loads will no longer be supplied; the display pictured here appears (for example). An acoustic signal (constant tone) is emitted during this mode of operation.

CAUTION!

For security reasons, the UPS cannot automatically execute a return from the error mode. It is necessary here to reset the error status in the “control center” submenu. This can, however, only be carried out if the source of the error has first been eliminated.

A complete list of all error codes is summarized under ⇨ 8 Me.

7. Initial operation of the UPS

WARNING!



The initial operation generally requires that all previous chapters of this manual have already been successfully read or processed. Additionally, check that all connected loads are switched off.

The initial operation of UPS devices is exclusively reserved for accredited personnel.

Please conduct the initial operation in the following order:

- Switch on the mains power supply (circuit breaker) or connect the UPS input to a wall socket;

The UPS automatically proceeds to the BY-PASS mode and also switches the charging mode on. The loads are already being supplied.

ATTENTION!

In any case, it is possible to operate the device in the charging mode for a few hours in order to conserve the complete charging status of the battery bank before the UPS is started up and assumes its support function.

- Check all the status information and parameters on the display;
- Now start the device up; as a result, the USP switches to standard mode (network mode);
- Switch the loads on one at a time while observing the power values displayed;
- Briefly test the autonomous mode as well while observing the power values and status information;
- Now leave the UPS in standard mode (network mode); the loads are fully secured by the UPS.
- Follow the order in reverse to shut down the UPS.

WARNING!

In the event that errors occur during the initial operation, these must first be analyzed and removed before the initial operation can be continued.

8. Messages, error codes and corrective actions

The following table contains the possible alarm, warning or status messages and their code numbers (ALARM CODES).

The messages can be called up either on the standard display or on the “event log” submenu (see: ↪ 6.2 Menu).

8.1 Messages for specific operating modes:

Alarm/Status (CODES):	Reason:	Procedure / Corrective actions:
Low battery bank voltage, Alarm code: 12	The UPS is in autonomous mode, and the battery bank voltage is low.	The battery bank has been almost completely drained in the autonomous mode. Shut down of the UPS output threatens.
EPO (REPO) active, Alarm code: 71	Emergency shutdown (release of the loads) has been activated.	Reset the emergency power off switch as well as the message (control center); start up the UPS again.

8.2 Error messages on the UPS:

Alarm/Status (CODES):	Grund:	Maßnahme/Abhilfe:
Site fail, ground error detected, Alarm code: 04	Phase and neutral conductors were interchanged, possibly shifted at the wall socket.	Check the installation up to the loads. The detection can be deactivated in the settings.
Battery open, battery bank connection opened, Alarm code: 11	The battery bank voltage is very low, the battery bank fuse is triggered, or the connection to the UPS released.	Check the battery bank, its current battery bank voltage and the connection to the UPS.
Service battery, check the battery bank, Alarm code: 13	A battery bank asymmetry has occurred. The charging unit is switched on as a result.	Report this to the customer service.
Overload, overload on the UPS output, Alarm code: 41	Overload on the UPS output. Possibly, the UPS switches to the by-pass mode or shuts down	Remove a few loads and pay attention to the load display while doing so. The message disappears automatically as

Alarm/Status (CODES):	Grund:	Maßnahme/Abhilfe:
	immediately depending on the overload.	soon as the consumer load is in the normal range.
Overload, overload on the UPS output, "INVERTER," Alarm code: 42	Overload on the UPS INVERTER; the UPS switches to by-pass or error mode.	Remove a few loads and pay attention to the load display while doing so. If the UPS was in error mode, it must be RESET (control center).
Overload, overload on the UPS output, "BY-PASS," Alarm code: 43	Overload on the UPS BY-PASS; the UPS switches immediately to the error mode.	Remove a few loads and pay attention to the load display while doing so. If the UPS was in error mode, it must be RESET (control center).
Inverter short, short circuit on the UPS output, Alarm code: 31	Short circuit on the UPS output detected; the UPS switches immediately to the error mode.	Remove all loads and check them. If the UPS was in error mode, it must be RESET (control center). Switch the UPS on again and check the UPS first without loads.
Fan fail, fan error, Alarm code: 84	The fan(s) are not working properly.	Check the fan for foreign objects. Otherwise report this to customer service.
Inverter temperature, Inverter temperature is too high, Alarm code: 81, 86	The heat sink temperature is too high; the UPS switches to the by-pass or error mode.	Switch the UPS off in a controlled manner or activate the static / external by-pass. Report this to the customer service. Provide good ventilation.
Ambient temperature, ambient temperature is too high, Alarm code: 82	The ambient temperature is higher than the permissible operation temperature.	Provide good ventilation for the area and adhere to the specifications.
Bus fault, intermediate circuit overvoltage (DC), Alarm code: 21	The UPS detects an intermediate circuit with voltage that is too high and immediately switches to the by-pass mode.	Switch the UPS off in a controlled manner or activate the manual / external by-pass. Report this to the customer service.
Bus fault, intermediate circuit undervoltage (DC), Alarm code: 22	The UPS detects an intermediate circuit with voltage that is too low and immediately switches to the by-pass mode.	Switch the UPS off in a controlled manner or activate the manual / external by-pass. Report this to the customer service.
Bus fault, intermediate circuit asymmetry (DC), Alarm code: 23	The UPS detects asymmetry in the intermediate circuit and immediately switches to the by-pass mode.	Switch the UPS off in a controlled manner or activate the manual / external by-pass. Report this to the customer service.

Alarm/Status (CODES):	Grund:	Maßnahme/Abhilfe:
Bus fault, intermediate circuit short (DC), Alarm code: 24	The UPS detects a short circuit in the intermediate circuit and immediately switches to the by-pass mode.	Switch the UPS off in a controlled manner or activate the manual / external by-pass. Report this to the customer service.
Bus fault, intermediate circuit SOFT START error (DC), Alarm code: 25	Error in the soft start of the intermediate circuit voltage.	Switch the UPS off in a controlled manner or activate the manual / external by-pass. Report this to the customer service.
Inverter fault, overvoltage on the UPS INVERTER, Alarm code: 32	The UPS detects an overvoltage in the INVERTER circuit and immediately switches to the by-pass mode.	Switch the UPS off in a controlled manner or activate the manual / external by-pass. Report this to the customer service.
Inverter fault, undervoltage on the UPS INVERTER, Alarm code: 33	The UPS detects an undervoltage in the INVERTER circuit and immediately switches to the by-pass mode.	Switch the UPS off in a controlled manner or activate the manual / external by-pass. Report this to the customer service.
Inverter fault, INVERTER SOFT START error, Alarm code: 34	The UPS detects a SOFT START error in the INVERTER circuit and immediately switches to the by-pass mode.	Report this to customer service.
Charge fail, charging unit error, Alarm code: 15	The UPS detects an error in the charging unit and switches it off.	Switch the UPS off in a controlled manner or activate the manual / external by-pass. Report this to the customer service.
Battery overvoltage, battery bank overvoltage, Alarm code: 16	The UPS detects an overvoltage in the battery bank and switches the charging unit off until the battery bank voltage is within the operation limits again.	Report this to the customer service.
NTC open, component interrupted Alarm Code:87	Internal error on the UPS.	Report this to the customer service.

ATTENTION!

Never attempt to start the UPS up when there is an error status. First remove the error source and then switch the device on again.

9. Troubleshooting

Over the course of time, failures or malfunctions of the UPS, the accumulator or their surroundings can arise. In this event, please contact our customer service (service hotline) as soon as possible.

When contacting the service center, please provide the following information to ensure swift resolution:

- Model number, serial number and configuration of the device;
- Progress of the issue and date on which the it first occurred
- Control panel LCD display information (status or warning or alarm messages);
- Condition of the mains power supply, load condition, environment conditions, temperature and moisture, ventilation conditions;
- Information of the condition, such as the age, of the accumulator;

Most importantly, name the respective qualified contact persons for the clarification of the issue and its resolution.

10. Service Hotline

Should you encounter any general problems or require any information regarding safety, please contact our service hotline:

Phone: 0049 / (0) 741 – 17451-52

Fax: 0049 / (0) 741 – 17451-29

You can also reach us via email at:

kundendienst@effekta.com

In addition, you can contact the relevant department or branch office directly as listed on our website:

<http://www.effekta.com>

11. Software

The UPS management software runs as a client / server application for heterogeneous networks or on a local computer.

It works on any common platform (Win, Linux, UNIX).

Remote access to the UPS and its data is possible and recordable.

The software shows all relevant UPS data such as the accumulator condition, temperature, condition of the mains power supply, etc. in a clear graphic interface.

Malfunctioning of the system can be reported easily via e-mail, mobile phone or fax.

The range of services can roughly be summarized as follows:

- The availability for Windows 95/98/2000/NT/XP/Vista/Win7, Novell, Linux etc.;
- Local or network SHUTDOWN;
- The integrated SNMP-sub-agent;
- The graphic interface with all UPS information;
- Event-based sending of network news;
- Event-based sending of emails and text messages;
- Recording (LOGGING) all UPS status data and measurements;
- The timetable (SCHEDULER) for time controlled execution of functions such as REBOOT, SHUTDOWN, etc.



A software package is included in the scope of delivery of the device. Please see the respective manual on the CD for additional information on the performance, installation, use, etc.

12. Maintenance and Service

You can expect a long service life and interference-free operation from this product. The service life and reliability of the UPS is greatly dependent on the conditions of its environment. The ambient temperature and humidity in the vicinity of the device must remain within the specified range. In addition, the area around the UPS should preferably be kept clean and free of dust.

At an ideal ambient temperature of approximately 20-15°C, the service life of an accumulator is typically about 4 years. An increased ambient temperature (higher than 25°C) will significantly reduce the battery life which consequently cancels the warranty on the batteries. Through the use of special accumulators, the service life can be significantly increased.

It should be regularly checked (6-12 months) if the remaining autonomy time (support time) is sufficient for the intended purposes. Should this no longer be the case, the accumulators will have to be replaced.

12.1 Measuring the support time (autonomous time)

WARNING!

Before beginning with this procedure, it is obligatory that all open data files must be secured. Also, inform all involved employees of your intentions. The battery bank for the UPS should be completely charged in any event!

There are essentially two methods to measure the support time.

Method a) is suitable for measuring the actual back-up duration whereby the loads are required to be currentless at the end of the autonomous time.

Method b) allows for the determination of the remaining capacity after a defined support period. Here the loads are usually not currentless. In order to use one of the mentioned methods, force the UPS in the autonomous mode by switching off the mains power supply for the UPS (disconnect the plug). Switch the mains power supply on again after the measuring procedure (connect the plug) and/or switch the UPS on as usual.

Please remember that after measuring the autonomous period, the accumulator may be discharged. This means that the UPS device must remain in standard mode for several hours (min. 6 h) to recharge the battery bank accordingly, before this is again approximately 80 % operational (capable of supporting).



ATTENTION!

If the support time is not measured due to local conditions or regulations, we recommend the prophylactic replacement of the accumulators every other year to avoid any risk of an insufficient autonomous period (support time) caused by degenerated accumulators.



In addition, the fans and ventilation ducts of the device should be inspected regularly and cleaned, if needed, to ensure full output power. The frequency of the inspection and cleaning depends very much on the environment of the equipment. (key word: dust).

12.2 Replacing components / accumulators

DANGER!

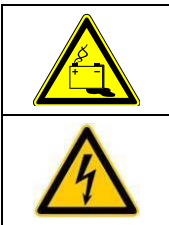
Replacing the accumulators and other UPS components must only be performed by personnel from EFFEKTA Regeltechnik GmbH or an accredited service center.

WARNING!

During the replacement of the accumulators and other UPS components, the loads are directly connected to the mains power supply via an external by-pass whereby a support function cannot occur at this time. Power failures and other grid disturbances are directly transferred to the loads.

12.3 Maintenance and service contracts

The EFFEKTA Regeltechnik GmbH offers corresponding maintenance and service contracts to guarantee the best possible reliability and availability of your UPS equipment. Under a maintenance contract, our service personnel can also support and assist you in the following areas:



Periodical inspection of the equipment, in particular, the accumulators, and their timely replacement.

Inspection of the UPS installation and its functionality.

13. Technical data

MKD model:		700 RT	1000 RT	1500 RT	2000 RT	3000 RT
Power	Maximum power (kVA)	700	1000	1500	2000	3000
	Maximum power (kW)	630	900	1350	1800	2700
Input	Nominal voltage	230 V AC				
	Input voltage range	120 VAC – 276 VAC				
	THDi	< 5 % with linear load				
	Input Power Factor	≥ 0,99 with 100 % nominal load				
	Input frequency range	(45–55) / (54–66) Hz				
Output	Output voltage	208, 220, 230, 240 VAC				
	Voltage tolerance	± 1 %				
	Frequency tolerance	± 0,2 Hz (autonomous mode)				
	Voltage wave form	pure sine				
	Crest factor	3 (CREST FACTOR)				
	Switchover time standard mode	Network <> INVERTER: 0 ms				
	Switchover time (BY-PASS, ECO)	By-pass <> INVERTER: maximum 10 ms				
Efficiency	Efficiency rate with full load	LINE MODE	> 89 % with charged battery bank			
		BATTERY MODE	> 84 %			
		ECO MODE	> 95 %			
Internal battery bank	Battery type	12 VDC / 7 Ah			12 VDC / 9 Ah	
	Number of battery blocks	3		4		6
	Battery bank voltage	36 VDC		48 VDC		72 VDC
	Charging time	ca. 6 h to 80 %				
	Charging time for XL variants	Dependent on the external battery bank(s)				
Device	LC display	Backlit alphanumeric LC display				
	Communication	Intelligent adapter slot (for AS400, SNMP)				
	Device protection	Overload, deep discharge, overcharge				
	Device class	C2				
	Protection class	IP20				
	Housing	Sheet steel, plastic front panel				
	Weight with batteries (Standard)	16.2kg	16.2kg	19.7kg	19.7kg	28.6kg
	Weight without batteries (XL variants)	8.4kg	8.4kg	9.3kg	9.3kg	13.2kg

	Housing dimensions 19" 2HE (HxWxD in mm) incl. the respective XL variants	86.5 x 438 x 435	86.5 x 438 x 604
	Cooling	Fan cooling, convective;	
	Standards / Guidelines	Safety: EN 62040-1 EMV: EN 62040-2 Service: EN 62040-3	
Environment	Temperature ranges	Operation: 0 ... 40 °C Recommended: + 15 ... + 25 °C exceeding the recommended range reduces the battery life Storage: -25 ... 55 °C (without battery bank!)	
	Influence of the operation altitude	< 1000 m MSL nominal power	
		> 1000 m MSL -> Verlust: ca. 1 % pro 100 m	
	Humidity	0 – 95 % non-condensing	
Operation noise level	< 52 dB		

13.1 Typical autonomous times


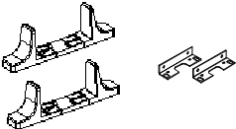



MKD:	700	1000	1500	2000	3000
UPS autonomous times:					
Load 50 %	ca. 16 Min.	ca. 15 Min.	ca. 12 Min.	ca. 10 Min.	ca. 10 Min.
Load 100 %	ca. 6 Min.	ca. 5 Min.	ca. 4 Min.	ca. 4 Min.	ca. 4 Min.
XL Variants	Depending on the mounting and number of battery banks				

13.2 Load-bearing capacity of the internal interface (DRY CONTACT)

Connection:	Load-bearing capacity:	
	Voltage	Current:
Output (DRY-OUT):	30 VDC 60 VAC	2 A 1 A
Input (DRY-IN):	---	ca. 20 mA

14. Scope of delivery / accessories

Below you find the list of the scope of delivery, please check your delivery for completeness. Please let us know immediately if any items or components are missing in your delivery.

No.	Article or Article-No.	Function / view:	Description:
1 x	UPS		MKD series, according to your order and power: MKD ... RT, MKD ... RT XL
1 x	Mounting material, Base		Base and brackets according to the MKD series 700-3000 VA
1 x	Output cable:		Cold device cable according to IEC 60320 (C13/C14);
1 x	PowerShut Plus, and RS 232 connection cable.		Software package: Power Shut Plus CD-ROM network-based shutdown and diagnosis software 1 license for Windows/Novell 1 license for UNIX, LINUX, MAC 1 license for RCCMD (Network Remote Client); Cable: M2505 (1:1)
1 x	Operating Manual		Operating Manual - English V 2.5;

15. Optional accessories

The components, devices and/or equipment listed below are accessories that fit the MKD series and that have been tested and approved by EFFEKTA Regeltechnik GmbH.

15.1 Communications adapter: Relay card (AS400)

The relay card also belongs to the intelligent extension card and is used for the direct and potential-free contact with external controls and/or machines. This allows for the UPS status to be transmitted to higher-level controls in real time.

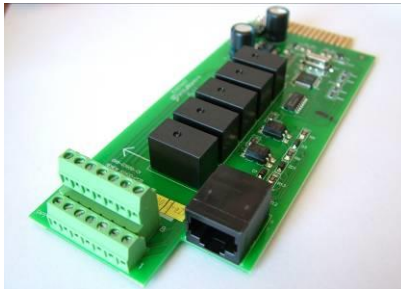


Fig. 15-1 Relay card AS400 for real time monitoring of the UPS.

The following signals are available with this for monitoring and control:

Function:	Connection type:
Mains failure	Output
Low battery bank voltage	Output
BY-PASS mode	Output
UPS error	Output
SHUT DOWN process	Output
UPS alarm	Output
Test mode	Output
Overload	Output
Remote trigger: SHUT DOWN	Input
EPO	Input
Remote trigger UPS On/Off	Input

All inputs and outputs have protective insulation or are potential-free. The relay card can easily be slid into the adapter slot (INTELLIGENT SLOT) of the UPS and has to be connected with a superior control unit via a signaling cable. The

card is also configurable so that the configuration and switching performance can essentially be defined.

Details about the card and the connection can be found in the operating manual for the relay card.

15.2 Communication adapter SNMP

The SNMP adapter integrates the UPS into a network and communicates via TCP/IP, Telnet or FTP. After assigning an individual IP-address, the UPS can be accessed from any location, which is of particular interest for remote administration and maintenance of the equipment.

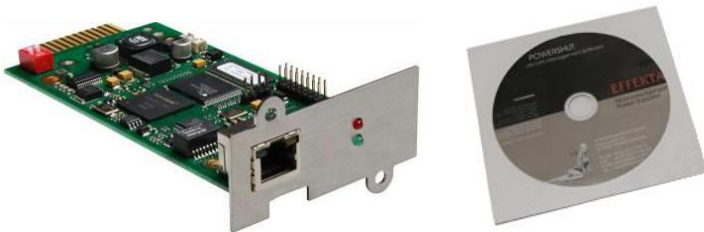


Fig. 15-2 SNMP adapter for connecting the UPS to a network.

The SNMP adapter can easily be slid into the adapter slot (INTELLIGENT SLOT, SNMP) of the UPS device and only has to be connected with a network cable.

For additional information about this product and the associate software please contact our sales and service center.

15.3 External by-pass

An external by-pass system allows the operation of the loads in two different paths. In UPS operating mode (Fig. 15-3) the UPS system is integrated into the current path and the loads are protected in the usual manner. In by-pass mode (Fig. 15-4), the loads are directly connected to the mains power supply and the UPS input and output are isolated.

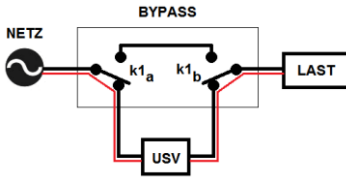


Fig. 15-3 UPS mode

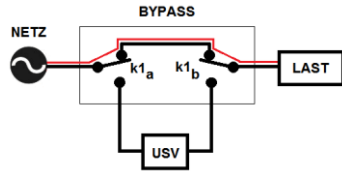


Fig. 15-4 By-pass mode

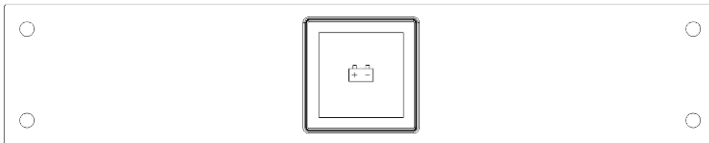
In this case, maintenance and service tasks on the UPS or the accumulator bank can be performed faster and safer.

On rare occasions, the UPS or its components can also be replaced without interrupting the loads. Furthermore, the application of an external by-pass enables an economical and clear installation of the UPS device.

15.4 External battery bank

Each UPS system needs an energy storage to supply the stored power to the loads during a power failure. The external accumulator cabinets can either be used as the sole energy storage or in addition to an internal accumulator bank to extend the autonomous period and/or adjust the necessary load balance.

The following battery banks are available as standard units:



		UPS:		
		MKD 700, 1000 RT XL	MKD 1500, 2000 RT XL	MKD 3000 RT XL
Battery bank	Article number	ABC4X(1/2)03009...	ABC4X(1/2)04009...	ABC3X(1/2)06009...
	Connection voltage	36 VDC nominal	48 DC nominal	72 DC nominal
	Mounting/Capacity	3/6 x 12V/9Ah	4/8 x 12V/9Ah	6/12 x 12V/9Ah
	Weight	14.7 kg / 22.8 kg	17.7 kg / 28.5 kg	24.5 kg / 40.7 kg
	Dimensions 19" 2HE (W x D x H)	438 x 430 x 86.5 mm		438 x 608 x 86.5 mm

These battery banks (same type) can be switched on parallel without difficulty to, in turn, meet the requirements (load, autonomous time).

Please contact our sales and service center to develop a suitable accumulator bank concept for your needs

ATTENTION!

Always keep in mind that, for connecting the UPS to an external battery bank, only the MKD **XL Variant** is suitable because this device commands a powerful charging unit.

Always ensure that the connection data (voltages) of both devices (battery bank and UPS) conform with each other.

16. Wear parts

The components listed below can show regular wear and are excluded from the warranty for this UPS:

Wear part	Function	Article number
XXXX XX XX ** Accumulator (BATTERY) 12 V xx Ah	Energy storage	Depending on assemby!

** Please check your accumulator delivery documents for the battery bank for the name and identification of the accumulators, or contact the service hotline.

17. Declaration of conformity

All units labeled with a CE sign fulfill the EU harmonized standards and regulations.

The EU-declaration of conformity for this product is available upon request. Please contact our ⇨ 10 Service hotline.

You can also find the declaration of conformity for this product on our website:

<http://www. efekta.com>

EFFEKTA[®]

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