EFFEKTA®

UPS
Uninterruptible Power Supply

USV MTX Series 800 - 3000 VA
(Line-Interactive)

Operating Manual V 1.5

Versions / part number:

800 VA	/	ACX11MXS80000000
1100 VA	/	ACX11MXS1K100000
1500 VA	/	ACX11MXS1K500000
2000 VA	/	ACX11MXS2K000000
3000 VA	/	ACX11MXS3K000000

Translation of original operating manual

Legal notice

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

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1. Introduction

1.1 Preface

Dear Operator,

This operating manual is required for the operation of the uninterruptible power supply described herein.
It should provide you with support for working responsibly and give basic information about the uninterruptible power supply, namely how it works, its application and, in addition, what you should do in the event of malfunctions. 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 must be adhered to during 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 electrical quality or network failures.

Please read this operating manual carefully and take 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 dataa).

Read this documentation carefully and familiarize yourself with the product before you begin with its operation.

1.3 Storage of the manual

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: uninterruptible power supply.

Typically, accumulators are used for energy storage of the UPS device. 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:

Identification for dangers / warnings / attention:

!Danger!: Indicates an immediate threat of danger. If it is not avoided, it can result in death or severe injuries!

!Warnnig!: Indicates a possibly imminent danger. If it is not avoided, it can result in death or severe injuries!

!Caution!: Indicates a possibly imminent danger. If it is not avoided, it can result in slight or minor injuries!

ATTENTION!

Attention: Indicates a potentially harmful situation. If it is not avoided, the device or objects in its vicinity could be damaged.

This symbol indicates text passages that contain notices / comments or comprehensive tips.

Warning symbols for the identification of danger areas:

General warning about danger areas!

Symbols of specific warnings:

Warning about dangerous electrical voltage!

Warning about proper handling of accumulators/batteries!

Instruction symbols:

Take note of the documentation(s) and/or instructions provided!

Disconnect before working, maintenance or repair!

Environmental symbols:

Identifies instructions for recycling.

Identifies components that are subject to the Electronic Swap 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 should be carried out.
✓	A requirement that must be fulfilled to continue operation, for example: ✓The circuit breaker is “OFF.”
–	This dash marks specification lists.
⇨	This arrow marks a cross reference.
(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 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.

This warranty ceases to apply in the following cases:

- if the defect is caused by: freight damage, accident, natural disasters, misuse, vandalism;
- in cases 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 general use in an unsuitable environment, etc.;
- in the event of failure to follow instructions in the documentation provided;
- 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 of the accumulators under high ambient temperatures (greater than 25°C);
- 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/or exchange of the device.

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

EFFEKTA Regeltechnik GmbH provides neither explicit nor 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 for damage compensation are excluded unless they involve intent or gross negligence by EFFEKTA Regeltechnik GmbH or its employees. This does not affect the 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 damages of any kind (including, without any limitation, damages 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 of 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 in compliance with 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 according to its design – for the supply of electrical devices from a primary power source and for the short-term supply for loads from a secondary power source without exceeding the nominal power in its entirety. Any other use above and beyond this 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 the operating principle of the UPS. For this, see the standard DIN EN 62040-3 (UPS Classifications). **Class VI** devices are not designed to support sensitive devices because, for example, the configurations of the switchover times could cause malfunctions. The same applies to the use of medical devices as loads.
Please always note the information about the UPS class in the specifications provided (⇨13 Technical data) with respect to its use.

2.3 Prevention of personal injury / property damage

- Please read this operating manual carefully to familiarize yourself with the device and its function. Under no circumstances should you ignore the safety information.
- Pay particular attention to the information regarding 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 prescribed instruction 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 can 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, charging the accumulator of the device becomes imperative. 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 for transportation damages.

In the case of transportation damages, there is generally 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. Furthermore, the UPS 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 data).

The UPS should not be placed in the vicinity of heat sources. 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 data 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, effects of condensation or dew 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 and cables provided for the purpose of the 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 under any circumstances without the PE conductor!

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

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

- Install all connections properly 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 loads to the UPS and pay attention to the required current carrying capacity;
- The safeguarding of loads should, whenever possible, be performed directly in front of a load, less centrally in front of the UPS;

- Never operate any household devices or tools such as, e.g. heaters, vacuum cleaners, electric drills, hairdryers, toasters, or sensitive devices such as, e.g., scanners or medical devices by means of the UPS;

- Do not connect any loads or appliances to the UPS that could overload the device, such as, e.g., printers, copiers, etc.;
- In general, use appropriate tools for the installation.

2.8 Operation

Only qualified personnel are permitted to access and operate the device, especially if the UPS is supporting sensitive loads.

WARNING!

In all situations, it must be kept in mind that the UPS contains an energy storage unit. This means that the UPS can also be carrying a current at the output even when the UPS has already been disconnected from the mains power supply. The UPS output is first de-energized 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 connection lines 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. Risk of explosion!

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 power supply with the power button or after disconnecting the accumulator feed, parts of the UPS could still be carrying 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 and 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

Sensitive loads require comprehensive protection against power supply disruptions. These include: temporary power failure, mains voltage fluctuations, mains voltage peaks, changes in frequency, etc. The uninterruptible power supply is intended to protect mains-powered, electronic devices such as, computers, work stations, cash registers, telecommunication devices, process control systems, etc., against power supply disruptions. In doing so, the UPS monitors the above-mentioned net sizes and protects the loads in critical times. The support time or autonomous period here depends on the size and status of the built-in or adapted energy storage (accumulator) and the connected load.

3.1 Topology and operating modes

The devices of the MTX series are a so-called “VI” (VOLTAGE INDEPENDENT) device of the UPS category C2. The device is characterized by the fact that the load is supplied directly by the mains power supply in the **standard operating mode** (supply mode) (see Fig. 3-1). Minor mains failures are then suppressed by the mains filter.

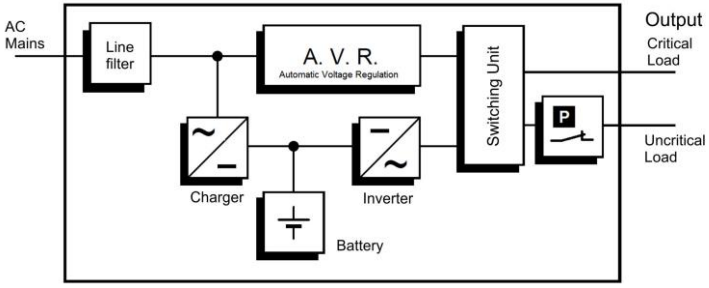


Fig. 3-1 Block diagram or setup of the MTX series.

In the event of a massive, mains disruption, the switching unit switches to the i**nverter mode** (invertor mode or autonomous mode). The loads are now being directly operated in the inverter mode for the duration of the mains disruption. Non-critical loads can be programmed to be prematurely dropped to extend the support time for the critical loads. During this autonomous period, the inverter draws the required power from the accumulator. Once the mains failure has ended, the switchover unit switches again to the standard operating mode and the possibly dropped loads are switched on again.
If the device is connected to the network, the accumulator is charged by the charging unit (**STANDBY** or **charging mode**). The maximum autonomous time for the UPS always depends on the charging status, the capacity of the accumulator and the connected load. For details on this, please see the chapter on technical data in this operating manual.

3.2 Format, housing sizes and design

The MTX series is available in various capacity variants. All devices already have an internal energy storage unit (power bank). In addition, external battery banks with the same front format are delivered to enable an adaption to the autonomous time.
For details, see the following list:

Name:	Format:	Housing: [D x W x H] mm	Comment:
MTX 800 VA MTX 1100 VA	Tower	376x**145x240**	External battery bank with same front format available!
MTX 1500 VA MTX 2000 VA	Tower	484x**145x240**	
MTX 3000 VA	Tower	427x**190x338**	External battery bank with same front format available!

The device or the system can be set up in the combinations pictured below:

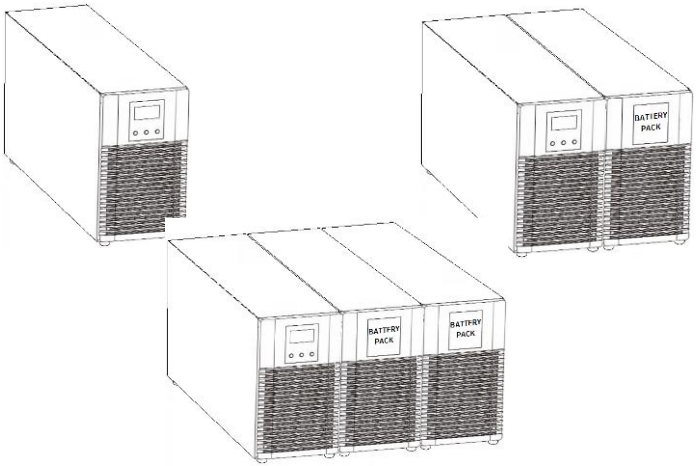


Fig. 3-2 Combination of the MTX series and the external battery bank.

All devices can be operated autonomously or complemented with one or more battery banks. The total capacity of the energy storage is generated by the addition of the internal battery bank with the externally adapted battery banks. Nevertheless, the limited charging current should always be taken into consideration in these arrangements. Accordingly, the application of many battery banks means a high autonomous period but also, at the same time, a correspondingly increasing charging period and, with it, a significantly higher recovery time.

3.3 Device components of the UPS

The complete MTX device series is integrated in a free-standing enclosure (TOWER). All device elements for the operation and display are accessible on the front of the device. The elements for the connection and extensions of the device are arranged on the back side. All communication connections are also located on the back of the device.

3.3.1 The operating panel of the UPS

In this device series, the control panel is reduced to three buttons and the device display:

All information is shown on the device display during operation. A summary of the device messages is found in chapter ⇨ 8 Messages and error codes.

There are 3 buttons for the operation of the device. Each of these are assigned several functions. An overview of this follows, an exact description is found under ⇨ 6 Operation of device and service.

⏻ , ▲	This button switches the device on (ON), mutes acoustic alarms (MUTE) or starts the self-test mode of the device. Also, touching the button can scroll backwards within the setting menu or perform upwards counting.
▼	This button selects an information display (INPUT, OUTPUT, BATTERY etc.). It also takes you to the setting mode. Furthermore, touching the button can scroll forwards within the setting menu or perform downwards counting.
↵	The UPS can be switched off with this button. In addition, this button serves as the confirm button or the enter button in the setting mode.
▲ + ▼	By simultaneously pressing on both these buttons (ON, SELECT) during the setting mode, you will go to the previous menu. If you are already at the first menu item, you can exit the setting mode with the button combination.
🔊	In addition to the information displayed, several operation, warning and alarm messages are supported acoustically by the built-in signal generator (BUZZER).

3.3.2 UPS Display

The status and additional information about the system can be called up on the LC display or critical parameters can be set. Primarily, the current status infor-

mation or operating information and the available alarm codes in the case of failure are important. The total display contains various information areas and pictograms.

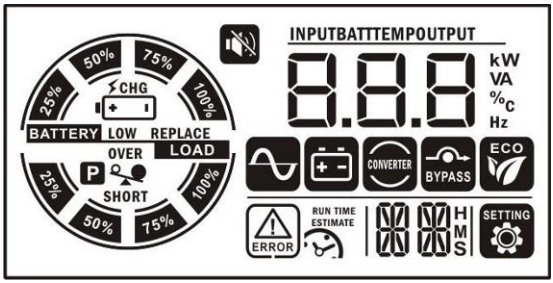


Fig. 3-3 Example of view of total display.

In the following, the meaning of the information shown is explained in detail. Additional and supplementary information for the display and notices can be seen under ⇨ 8 Messages and error codes:

Due to progressive improvements in the software, additional information can already exist that has not yet been addressed in detail here. It is thus possible that some page content has been changed accordingly.

Operation data of the UPS:	
	Value display: here the input data (voltage, frequency), the output data (voltage, frequency, charging current or load in %) and the device temperature are displayed.
Load information for the UPS:	
	The lower circle bar display also shows the load in %. The gradations are: 2-24%, 25-49%, 50-74%, 75-100%.
	This symbol indicates that the UPS output is switched on.
OVER	This symbol indicates that the UPS output is overloaded.
SHORT	This symbol indicates that the UPS output has a short circuit.
Battery bank information of the UPS:	

	The upper circle bar graph shows the charging status of the battery bank in %. The gradations are: 2-24%, 25-49%, 50-74%, 75-100%.
CHG	The UPS is in the charging mode.
	Indicator for the battery bank.
LOW	Low battery bank status.
REPLACE	The battery bank should be replaced.
Operating mode information of the UPS:	
	This symbol indicates that the UPS is in standard operating mode.
	This symbol indicates that the UPS is in autonomous mode.
	This symbol indicates that the acoustic alarm of the UPS is switched off (MUTE).
	This symbol indicates that the non-critical UPS outputs that can be switched off are programmed.
	This time display states the remaining autonomous time of the current support instance.
	This time display states the autonomous time of the current support instance that has already passed.
Setting mode of the UPS:	
	This symbol indicates that the UPS is in setting mode whereby the number displayed represents the menu item.
Error mode of the UPS:	
	This symbol indicates that the UPS is in fault mode whereby the number displayed represents the error code.

Acoustic information:	
 Autonomous mode:	Signal (BEEP), every 10 seconds;
LOW Battery bank charge low:	Signal (BEEP), every 2 seconds;
OVER Overload at output:	Signal (BEEP), every second;
 Fault mode:	Permanent signal (BEEP);
General button confirmation:	Short signal (BEEP).

3.3.3 Device elements of all device variants on the back of the UPS

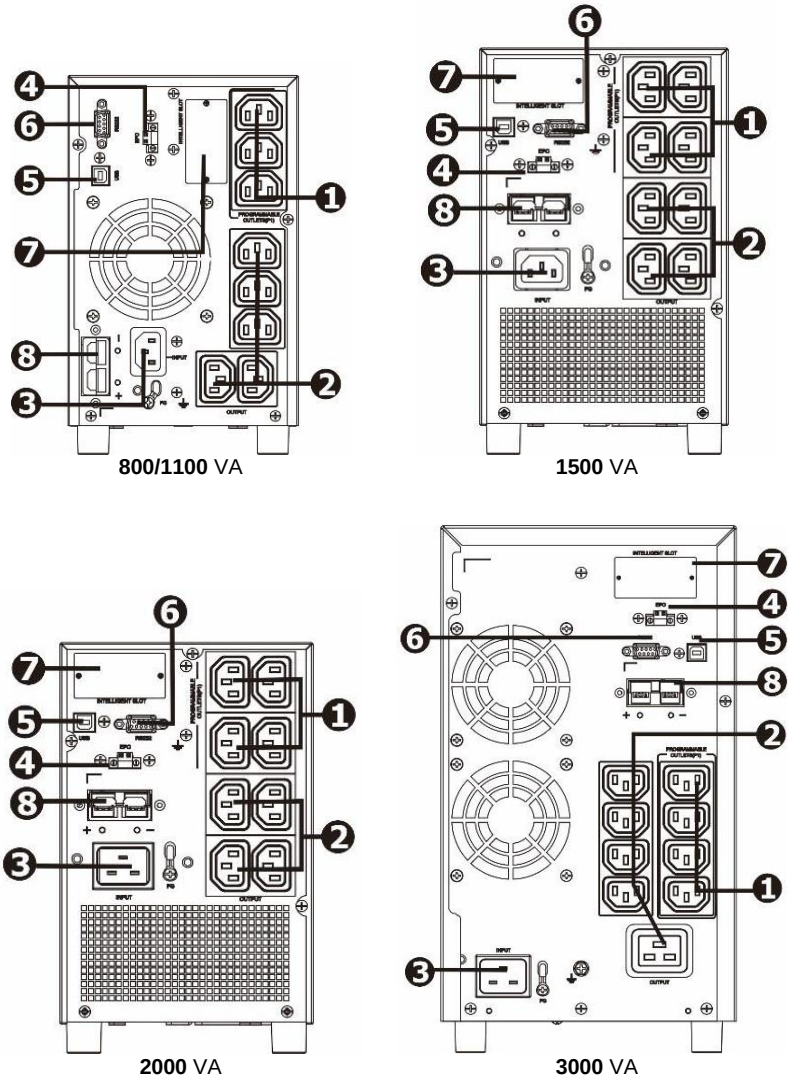
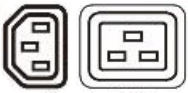


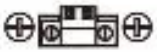
Fig. 3-4 Arrangement of the device elements on the back of the UPS.

❶ Programmable UPS outputs (C13 socket). The outputs are generally intended for non-critical loads that can be dropped relatively quickly (programmable) during the support phase.



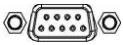
❷UPS outputs (C13, C19 socket). These outlets are generally intended for critical loads because they are energized during the entire support phase.

❸ UPS inputs (cold-device plugs C14, C20) serve to connect the UPS with the mains power supply.



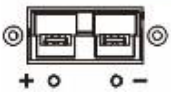
❹ EPO (EMERGENCY POWER OFF), emergency dropping of the UPS outputs in a case of emergency. This input should be controlled by an external emergency switch.

❺ Communication port of the UPS, USB port for the exchange of device data and the signals for shutting down sensitive loads (PC, SHUT DOWN). If the USB-port is used, the serial port remains inactive.



❻ RS232 communication port: RS232 port for the exchange of device data and the signals for shutting down sensitive loads (PC, SHUT DOWN). If the serial port is used, the USB-port remains inactive. The RS232 port supports the MODBUS protocol.

❼ Intelligent expansion slot (INTELLIGENT SLOT). As a rule, a series of different communication cards (adapter cards) are available to connect the device, for example, with a network or a superordinate system.
See detailed information for this under ⇨ 15 Optional accessories.



❽ The UPS DC input serves to connect the UPS to an external energy storage, the battery bank (BATTERY). The cover must first be removed to access this connector.

USP ground connection.

3.3.1 The device label, the device identification

Example image

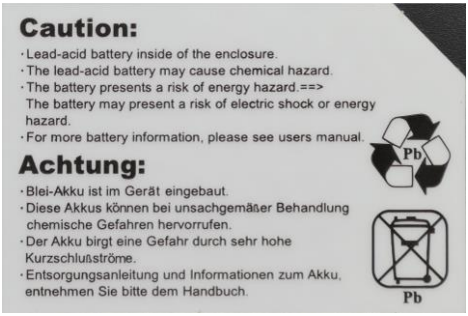
The following information is found on the label:

- the model name;
- the data on the connection values;
- the CE, ROHS labels and the serial number for the device;
- the manufacturer's address.

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 can eliminate the improper use between the operating manual and the device.

3.3.2 The danger label on the device



The danger label indicates that a lead accumulator is located in the device as energy storage.
Due to this, mind the proper handling of the accumulators.

<- Example image

WARNING!

Always mind the safety instructions, the handling and disposal requirements for the accumulators.

4. Storage and unpacking

4.1 Storage of the UPS

If the UPS is to be stored after delivery, the following points must be observed:

ATTENTION!

- Always leave the UPS and accessories in the original packaging;
- Never store the UPS upside-down;
- 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 Chapter ⇨ 13 Technical data);
- The delivered goods must also be protected from moisture. The device must therefore be stored in a dry area;
- If the storage period exceeds 4 months, the UPS must be connected to the network for a period of ca. 24 to avoid a total discharge of the accumulators and, as a result, irreversible damage.

4.2 Unpacking and positioning the UPS

Remove the packaging at the installation site with the utmost care to avoid causing damage to the UPS and the packaging material. Check the scope of delivery (see ⇨ Chapter 14). Check all packaged items to ensure that no device parts are missing. Generally, inspect the delivered goods after unpacking for visible damages that may have occurred during transportation.

CAUTION!

Two people should usually lift and transport the device. The MTX series is too heavy for one person on account of the internal battery bank.
Under no conditions should the device be switched on if you have detected damages or if parts are missing but rather immediately notify the supplier and dealer.

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

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 the UPS.

ATTENTION!

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

In general, the following rules apply for the installation of the UPS:

- The device is designed as a tabletop/standing device;
- The installation of the device should only occur on a solid, stable surface (table, shelf);
- Observe the prescribed vertical standing installation position (see Fig. 5-1);
- The UPS must only be installed in a clean, dust-free and dry location;
- Additionally, an air exchange in accordance with EN62040-1, Annex M for devices with accumulators must be maintained.

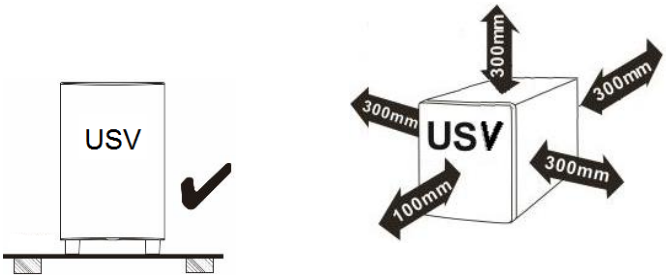


Fig. 5-1 The complete MTX series is suitable for installation as a tabletop or standing device (TOWER).

Also mind that the ventilation ducts of the UPS are not obstructed and that there is sufficient clearance to devices, furniture or walls to ensure the cooling of the device. The clearances regarding other devices illustrated above shall be maintained for the MTX series. If there is forced or compulsive ventilation, the clearances can be somewhat reduced.

5.1 Connecting the UPS device

5.1.1 Input and output connection for the UPS

The MTX series is usually connected to the supply network with the cold device cable provided on the input side. This can connect the UPS with the customary wall socket (Schuko).

ATTENTION!

If the UPS has been connected to the mains power supply, it automatically starts up in the STANDBY or charging mode. The relevant display follows. The fan starts momentarily; the UPS output is not active.

WARNING!

In any case, ensure that the wall socket is properly secured and the PE conductor is present.

In the next step, the load(s) can be reconnected to the UPS with the cold device cable provided (C13/C14 or C19/C20).

If a fixed connection for the USP should follow, please note the following connection scheme and the connection data of the table.

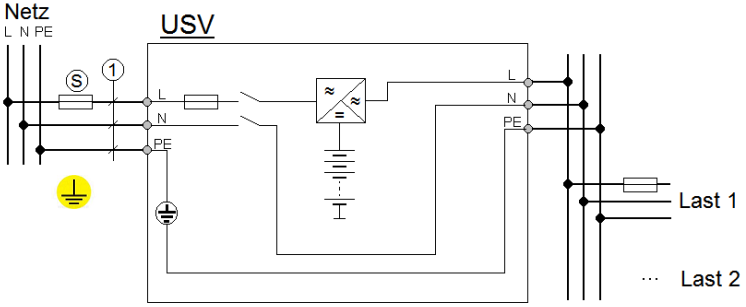


Fig. 5-2 Fixed connection scheme of the UPS to the network and the loads.

Fuse on the input side:	USV-Type [VA]:					Com-ment:
	800	**1100**	**1500**	**2000**	**3000**	
Circuit breaker (S):	10 A	10 A	10 A	13 A	16 A	Type „C“
Cable cross section (1) :	3x 0.75 mm²	3x 0.75 mm²	3x 0.75 mm²	3x 1.00 mm²	3x 1.50 mm²	max. 20 m

WARNING!

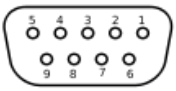
Without fail, the PE conductor must be connected in the fixed connection and the loop resistance be maintained until the last load. It is also possible to separately secure and to directly ground the loads against excess and residual current.
Always pay attention to the correct polarity between the in- and output of the UPS. If the UPS is located in an emergency stop circuit, it must be noted that, after the activation of the emergency stop circuit, the UPS output is not without current. The loads will continue to be supplied during the duration of the UPS autonomous period.

5.1.2 Connection of the communication port USB

Please use the USB cable (type A to type B) for connecting the USB communication port and use it to connect the UPS to your PC or hub. The USB port is a “PLUG & PLAY” connection (HID-DEVICE). Further actions are not necessary. Additional information can be found under Chapter ⇨ 11 Monitor software.

5.1.3 Connection of the communication port RS232

The serial port RS232 serves to couple the system with a PC or the application installed on it (software).
The connection is likewise designed for a serial standard cable and the allocation is described below (pins not listed are unallocated):



USV RS232:	USV RS232:	Function:
Pin 2	Pin 2	Tx UPS, Rx PC
Pin 3	Pin 3	Rx UPS, Tx PC
Pin 5	Pin 5	GND

The communication here follows the MODBUS protocol. Additional information can be found under Chapter ⇨ 11 Monitor software.

5.1.4 Connection of the emergency shutdown, dropping of the loads

The function of the emergency shutdown EPO or REPO (REMOTE EMERGENCY POWER OFF) serves the immediate dropping of the connected loads from a distance of known dimensions. For this, an external emergency release button must be connected to the signal input EPO (isolated contact).

Fig. 5-3 Connector plug of the EPO function.

Function:	Switching behavior:	PIN, connection:	Comment:
EPO		1 2	Emergency shutdown (Opener) closed in resting state.

ATTENTION!

The emergency shutdown button must be realized as standard “opener” in the MTX series! If the EPO remote triggering is not used, the connection must remain **closed** (bridge). However, the input logic can be changed in the device setting so that a “normally open contact” behavior is also possible.

5.1.5 Connection to the external battery bank

Generally, the external battery bank of this device series has the required connection cable for the UPS coupling. A lengthening of this connection is not intended. These battery banks are also equipped with an additional parallel port (DC) in order to be able to additionally employ an external battery bank until the desired capacity (or autonomous time) is achieved. See the corressponding illustration (Fig. 5-4).

ATTENTION!

As a rule, always ensure that the connection data of both devices (battery bank and USV) conform with each other before making a connection.

Also check that the circuit breaker(s) of the battery bank(s) are switched off during the coupling.

The connection to the battery bank only occurs by means of the battery bank cable and the grounding of the battery bank:

- First, connect the protective conductors of the UPS system to the battery banks (enclosed ground wire, 1.5mm² with cable eye, in each battery bank).

- Connect the battery bank cable with the plug-in connector intended for this to the UPS and the battery bank according to the following figure. In doing so, please remove the covers of the connector plugs on the UPS and the battery bank.

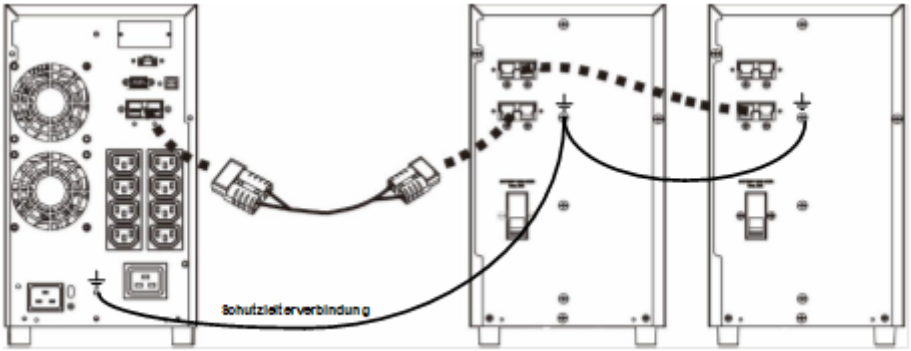


Fig. 5-4 Connection of the UPS (left) to the external battery bank(s).

The device arrangement can be supplemented by an additional battery bank at any time. For this, connect the respective battery banks with each other:

- Couple the available socket on the first battery bank (BATTERY EXTENSION) with the battery bank output (UPS) of the second battery bank.

With this, the connection work for the connection of one or more external battery banks has been completed.

ATTENTION!

If the UPS has been coupled with the battery bank according to the instructions described above, a reaction of the UPS should not occur. Neither a display in the operating field occurs nor is the UPS active.
Also only use devices listed in the accessories as an external battery bank. Products from other manufacturers are not permitted.

5.1.6 Extension of the system (INTELLIGENT SLOT)

The UPS device can be functionally extended with an adapter card at any time. This includes the coupling to a network (SNMP) or the signal exchange to a superordinate control system (DRY CONTACT) via a relay card. Please see here for additional information ⇨ 15 Optional accessories.

6. Operation of device and service

Due to the comprehensive protective functions which the device performs regarding the load(s), the UPS operates nearly completely automatically. This reduces the operation of the device to a few steps.

ATTENTION!

The operating personnel should always inform affected employees (keyword: consumer network) about any scheduled tasks concerning the UPS.
In general, keep the chapters ⇨ 8 Messages and error codes and ⇨ 9 Troubleshooting in the operating manual available to facilitate the immediate interpretation of the operation display and possibly occurring errors.

6.1 Service and operating modes of the UPS

As a rule, the switching on or starting up and shutting down of the system is performed 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 when:

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

Furthermore, a data exchange with the UPS can occur via the communication port which is, nevertheless, not crucial for the general operation of the device.

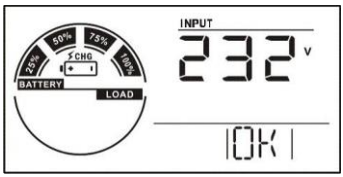
ATTENTION!

However, particular diligence must prevail here as well because, for example, the shutting down of the UPS can be triggered by the software.

6.1.1 Standby mode (STANDBY) of the UPS

✓ The device is switched off and not yet connected to the supply network.

If the UPS is coupled with the supply network (UPS input), the UPS initializes and switches directly to the standby mode. The battery bank of the device is already charged by this time.



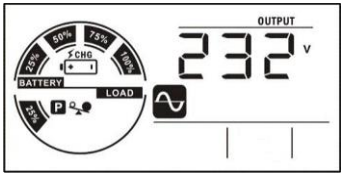
The display pictured here appears and directly indicates the input voltage (mains voltage). The UPS output has not yet been switched on. The symbol for charging activity appears.

A short acoustic signal is emitted during the initialization of the device.

6.1.2 Starting or switching the UPS on in standard operating mode / charging mode

✓ The device is in STANDBY status (6.1.1).

Once the ON button has been activated for more than 3 seconds, the device automatically starts up.



The device starts up and automatically switches to the **standard operating mode** or the **charging mode**. In the meantime, the information is **ON** in the lower right-hand corner.
The operating parameters can be viewed with the **SELECT button**.

A short acoustic signal occurs in this start-up process.

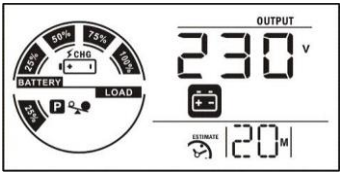
ATTENTION!

It is always critical to keep the device in the charging more for several hours (min. 8 hrs.) to achieve the complete charging status of the accumulator before the device can assume its proper support function.

6.1.3 Autonomous mode of the UPS

✓ The device is in standard operating mode (6.1.2).

In the event of a power failure, the UPS immediately switches to the a**utonomous mode**. This situation can be simulated by interrupting the power supply to the device.



The display pictured here appears and directly indicates the autonomous mode via the battery symbol. In the example here, the still present output voltage is indicated.

The autonomous mode is further supported by a repeating acoustic signal. The rhythm depends on the charging status.

ATTENTION!

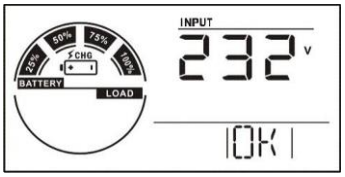
The UPS output remains on; the loads continue to be supported for the duration of the autonomous period.

Through restoring the network connection, the UPS automatically returns to the standard operating mode / charging mode.

6.1.4 Switching the UPS off in the STANDBY mode

✓ The device is in standard operating mode (6.1.2).

Switching the UPS off occurs with the activation of the OFF button. In doing so, the UPS is not completely switched off but rather switches to the STANDBY mode. The UPS output is, of course, switched off.



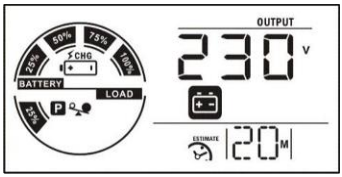
The operation display pictured here occurs according to (6.1.1).

A constant acoustic signal occurs during the switching off procedure.

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

✓ The device is switched off and not connected to the supply network.

Without the UPS network connection, the UPS can directly switch to the **autonomous mode** by activation of the ON button. The loads will be, as usual, switched on.



The operation display (green) here blinks in 10 second intervals if the accumulator still has sufficient charge. If the battery bank is almost completely empty, the display blinks at second intervals.

The acoustic signaling accompanies the autonomous mode as usual.

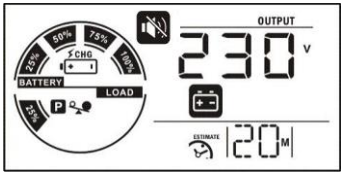
If the OFF button is now activated during this operating mode, the UPS switches off completely again.

If, however, the mains power supply is switched on during this operating mode, the UPS autonomously switches to the standard operating mode according to (6.1.2).

6.1.6 Muting the UPS

✓ The device is in autonomous mode (6.1.3).

The acoustic signaling can be switched off during the autonomous mode. To do so, the ON button must only be activated for roughly 3 seconds.



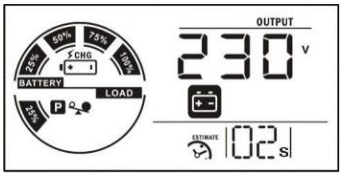
The operation display pictured here occurs and indicates the signalling has been switched off.

At this point, no acoustic signal will occur for the duration of this autonomous time.

6.1.7 Test mode

✓ The device is in standard operating mode (6.1.2).

By activating the ON button for roughly 3 seconds, the UPS switches to the test mode for roughly 10 seconds (autonomy).



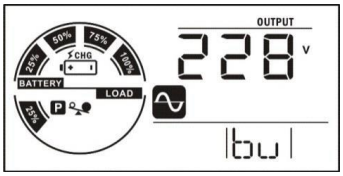
The operation display pictured here occurs. The time display in the lower right-hand corner shows the duration of the test in seconds.

The signaling accompanies the test mode in accord with the autonomous mode. The completion of the test mode is likewise announced with a signal.

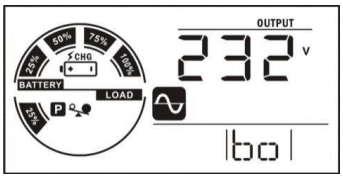
The device automatically returns to standard operating mode after the completion of the test mode.

6.1.8 AVR operation mode (AUTOMATIC VOLTAGE REGULATION)

✓ The device is in standard operating mode (6.1.2).



If the supply voltage increases over a defined threshold, the UPS switches to buck mode (BUCK) so that the loads are protected against high voltage.



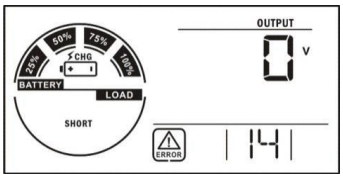
If the supply voltage falls below a defined threshold, the UPS switches to boost mode (BOOST) so that the loads are protected against voltage that is too low.

This regulation by the supply is not signaled acoustically.

If the supply voltage is again within the tolerance range, the return to standard operating mode occurs seamlessly.

6.1.9 Fault mode of the UPS

✓ The device can be in any mode.



If an error or a massive overload of the UPS is present, the device switches to **fault mode**. The UPS output is then switched off and an error code is shown in the lower right-hand corner. Please see all messages or error codes for the device under ⇨ 8 Messages and error codes.

The error code is supported by a continuous acoustic signal.

WARNING!

A return from the fault mode is not conducted automatically. At this point, it is necessary to switch the UPS on or off. This, however, can only happen if the error source that occurred is first eliminated.

6.2 Setting the operation parameters (SETTINGS)

In general, the UPS must be in standby mode (STANDBY) in order to be able to switch to the setting mode from there.

ATTENTION!

Generally, ensure that a battery bank, either internal or external, is connected to the UPS and ready for operation during the setting work.

The setting mode can only be reached by a prolonged activation of the SELECT button (longer than 3 seconds). The following display or the SETTING symbol appears. The lower number sequence indicates the current menu page and the upper number sequence indicates the corressponding parameters or value.

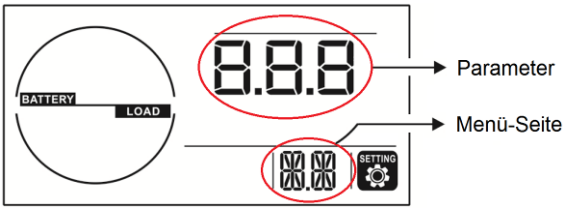


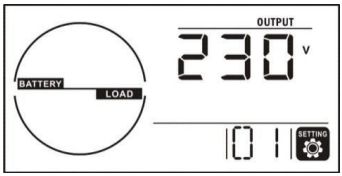
Fig. 6-1 Display of the setting mode of the UPS.

In order to be able to navigate within the setting mode or to change a parameter, use the keypad according to the instructions under ⇨ 3.3.1 The operating panel of the UPS.

6.2.1 Settings of the UPS

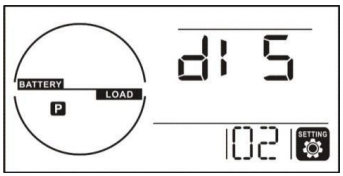
✓ The device is in the setting mode (6.2).

Menu page 1: UPS output voltage



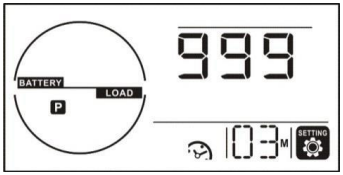
The output voltage can be set here. The values available are: 200/208/220/230/240 VAC, whereby **230 VAC** is determined as the standard setting.

Menu page 2: Activate/deactivate programmable outputs



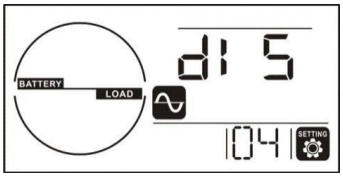
The programmable UPS outputs listed under ❶ can be activated or deactivated with these parameters. The options available are:
ENA (ENABLE): activated;
DIS (DISABLE): deactivated;

Menu page 3: Programmable outputs, support time



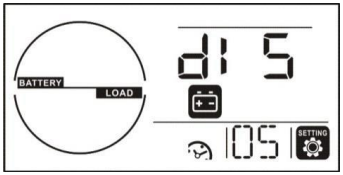
If the programmable UPS outputs in menu page 2 are activated, the support period can be defined here. The value range of 0…999 minutes can be selected; **999** is the standard setting.

Menu page 4: Polarity detection for the UPS



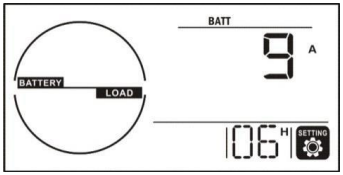
If, for example, the mains plug (UPS input) is disconnected from the wall socket and, rotated 180°, plugged in again, the device registers a polarity (SITE FAULT). This function can be activated with ENA and deactivated with **DIS** (standard).

Menu page 5: Definition of the support time (autonomous time)



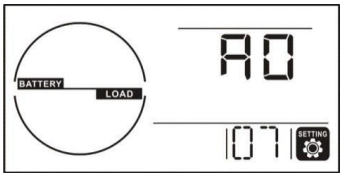
The support time for all outputs can be defined here. The following settings are available:
0…999: Support time in minutes;
DIS: no setting => maximum support time (standard setting);
Com.: at 0, the support time is 10 seconds.

Menu page 6: Total capacity of the UPS (+ external battery bank)



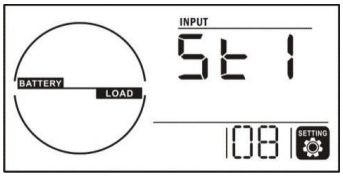
Please enter the total capacity of the system battery bank here (UPS battery bank + external battery bank). The value range of 0…999 Ah is available for selection.
A correct setting is important for the internal calculations!

Menu page 7: Logic setting “EPO” (EMERGENCY POWER OFF)



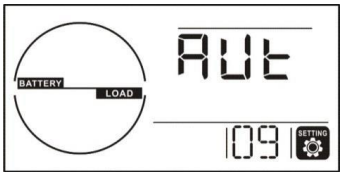
It can be determined here how the EPO input will be fail safe handled. Either as “normally open contact” AC (ACTIVE CLOSED) or as “opener” AO (ACTIVE OPEN). The standard setting is **AO**.

Menu page 8: Sensitivity of the detection signal form, UPS input



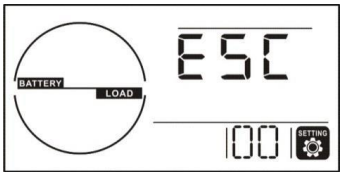
The UPS permanently analyzes the form of input voltage and switches to the autonomous mode in anomalies. The sensitivity can bet set here: St1 high sensitivity, St2 medium sensitivity, St3 low sensitivity. The standard setting is **St1**.
Com.: St3 is used, e.g., for a generator mode (as power supply).

Menu page 9: Display backlight



The backlight is either permanent or switches on for only a few seconds. The following are available as parameters: Aon: the light is always on, Aut: the light is active for 60 seconds after pressing the button. The standard setting is **Aon**.

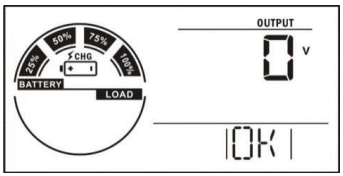
Menu page 0: Exiting the setting mode (**ESC**)



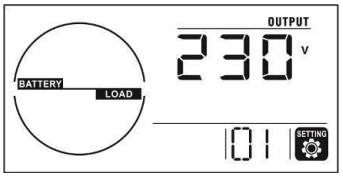
You can exit the setting mode from this menu page.

6.2.2 Examples of setting and process

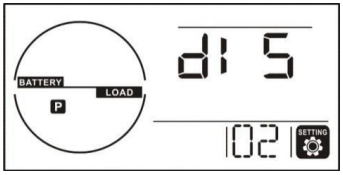
- ✓ The device is in standby mode (6.1.1).



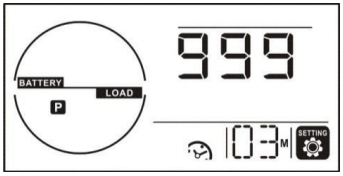
Step 1: Before switching to the setting mode, the UPS must be in STANDBY mode and the battery bank must be connected and charged in accord with the display pictured here.



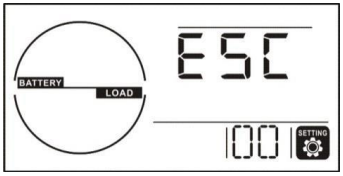
Step 2: Activate the SELECT button for more than 3 seconds; the device switches to the setting mode in accord with the display pictured here.



Step 3: Choose the corresponding menu page 02 with the ▲▼ buttons. Also select with ↵ (ENTER) in the parameter selection. The display pictured here appears. Now choose (▲▼) the ENA (ENABLE) setting and confirm it with ↵.



Step 4: Choose the corresponding menu page 03 with the ▲▼ buttons, then again press ↵ (ENTER). Enter the desired support time and again confirm it with ↵ (ENTER).



Step 5: Choose the corresponding menu page 04 with the ▲▼ buttons. By confirming this with ↵ (ENTER), you will exit the setting mode.

ATTENTION!

The settings performed first become active when the UPS is **completely switched off** and then switched on again. To do so, the UPS (STANDBY mode) must be separated from the supply network.

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:

- Connect the UPS to the mains power supply;

The UPS then starts automatically. The UPS output remains switched off. The operation display appears, accompanied by a signal tone.

- Connect the UPS to the load(s);
- Now switch the UPS on. The UPS immediately switches to the standard operating mode, the UPS is active, the load(s) is/are switched on. Watch for a possible overload of the UPS;
- Monitor the operation display and messages of the UPS;
- Briefly test the autonomous mode under observation of the operation display. Again, watch for a possible overload of the UPS;
- Switch the UPS back to the standard operating mode / charging mode. You can now leave the UPS in this operating mode.

If the accumulator has been charged sufficiently, the UPS can carry out is support function accordingly.

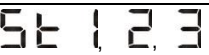
- The sequence is conducted in reverse order to shut down the UPS.

WARNING!

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

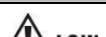
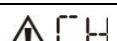
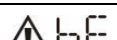
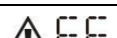
8. Messages and error codes

For a quick evaluation of the operating status or a message or a parameter of the UPS, the following table summarizes the significant abbreviations of the display once again.

Abbreviation:	Representation:	Meaning:
ENA		activated (ENABLE)
DIS		deactivated (DISABLE)
ESC		exit (ESCAPE)
AC		opener (ACTIVE OPEN)
AO		normally open contact (ACTIVE CLOSED)
ST 1, 2, 3		sensitivity of the UPS input
AUT		automatically
AON		always switched on (ALWAYS ON)
ON		switched on (ON)
EP		emergency dropping of the UPS output (EPO)
TP		temperature
CH		charging unit (CHARGER)
BF		battery bank fault (BATTERY FAULT)
EE		storage error (EEPROM ERROR)
BO		boosting (BOOST)
BU		bucking (BUCK)

8.1 Warning and error messages of the device

The following table explains the warning and error messages of the device as well as, among other things, their error numbers.

Warning / error	Symbol (blinking)	Acoustic signal	Error number
Low battery bank status (LOW BATTERY)		Signal every 2 sec.	-
Overload (OVERLOAD)		Signal every sec.	-
Overload (OVERLOAD)		Constant signal	43
Short circuit of UPS output (SHORT)		Constant signal	14
Battery bank not connected (NO BATTERY)		Signal every 2 sec.	-
Overcharge (OVER CHARGE)		Signal every 2 sec.	-
Polarity fault (SITE WIRING FAULT)		Signal every 2 sec.	-
Emergency dropping active (EPO ACTIVE)		Signal every 2 sec.	-
Overtemperature (OVER TEMPERATURE)		Signal every 2 sec.	41
Error with charging unit (CHARGER FAILURE)		Signal every 2 sec.	45
Battery bank fault (BATTERY Fault)		Signal every 2 sec.	-
Replace the battery bank (BATTERY REPLACE)		Signal every 2 sec.	-
Battery bank voltage too low (BAT TO LOW)		Constant signal	28
Battery bank voltage too high (BAT TO HIGH)		Constant signal	27
Storage error (EEPROM ERROR)		Signal every 2 sec.	-
DC link startup error (BUS START FAIL)		Constant signal	01
DC link overvoltage (BUS OVER)		Constant signal	02
DC link undervoltage (BUS UNDER)		Constant signal	03
Inverter error, startup (INVERTER START FAIL)		Constant signal	11
Inverter overvoltage (INVERTER VOLT HIGH)		Constant signal	12
Inverter undervoltage (INVERTER VOLT LOW)		Constant signal	13

9. Troubleshooting

Over the course of time, failures or malfunctions of the UPS, accumulators or their surroundings can arise. In the event the UPS device is not working properly, please first check the current operation information in the display. Then attempt to identify the problem by means of the following information:

Problem/display:	Possible cause:	Corrective action:
No display on the UPS although the network is present.	The power supply or the UPS input is not properly connected.	Check the network connection in the wall socket or the fixed connection at the UPS input.
The warning indicator ⚠ EPO is blinking.	The emergency dropping (UPS output) is active (EPO).	Remove the EPO triggering and restart the system.
The warning indicator ⚠ ∿ is blinking.	Phase and neutral conductors (UPS input) are reversed.	Rotate the connector plug (Schuko) in the wall socket by 180°. In the case of a fixed connection, exchange the phase and neutral conductors.
The warning indicator ⚠ ▭ is blinking.	The internal or external battery bank is not properly connected.	Check the connection of the internal and/or external battery bank.
The error code 27 appears.	The battery bank voltage is too high or the charging unit is defective.	Contact customer service.
The error code 28 appears.	The battery bank voltage is too low or the charging unit is defective.	Contact customer service.
The warning indicator ⚠ OVER is blinking.	The UPS output is overloaded. Depending on the overload, the loads are supplied by the bypass.	Remove the high load on the UPS output.
The error code 43 and the symbol OVER appear.	The UPS switches off automatically due to serious overload at the output.	Remove the very high load at the output and restart the UPS.
The error code 14 and the symbol SHORT appear.	The UPS switches off automatically due to the short circuit at the output.	Resolve the short circuit at the UPS output and restart the UPS.
The error codes 01, 02, 03, 11, 12, 13, 41, 45 appear.	The UPS indicates an internal error.	Contact customer service.
The autonomous time is shorter than expected.	The battery bank is not fully charged.	Charge the battery bank completely regarding the capacity and the charge current. Check the autonomous time again.
	The batteries in the battery bank are degenerate or defective.	Contact customer service to replace the battery bank or the batteries.

ATTENTION!

Try to never start the UPS when an error status is present. First eliminate the error source and then restart the device.

If the above-mentioned actions are unsuccessful, please contact our customer service (Service Hotline) immediately.
In doing so, have the following information ready to ensure swift resolution:

- Model, serial number and configuration of the device;
- Progress of the issue and time at which it first occurred;
- Displayed information in the LCD/LED area of the control panel (status or warning and alarm messages);
- Power supply status, load condition, environmental conditions of temperature and moisture, ventilation conditions;
- Status data such as, e.g., 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:

Telephone: 0049 / (0) 741 – 17451-52
Telefax: 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. Monitor software

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

It works on all common platforms (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 battery status, temperature, condition of the mains power supply, etc., in a clear graphic interface.

Actions are definable and, e.g. malfunctions of the systems can be reported easily via email, mobile phone or fax.

RCCMD (Remote Console Command) presents a software extension for this model ensuring the connection of numerous clients without burdening the availability of the network.

The range of services can be roughly summarized as follows:

- Monitoring of the UPS systems;
- Local or network shutdowns of up to several hundred computers;
- Integrated RFC 1628 SNMP agent
- Event-based sending of network news, emails and text messages;
- Recording of all UPS status data and measurements;
- Planner for time-controlled execution of functions such as reboot, shutdown, etc.;
- Password protection for remote UPS functionality;
- Available in 11 languages;
- Available for Windows NT/XP/2k/2003/2008 Server x86/x64, MAC OS 10.4 and higher, 10.5x Leopard, UNIX, SUN solaris, VMS.

The UPS management software for downloading, UPSMAN Suite from the company Generex, can be found under the following link:

https://www.generex.de/content/view/62/102/lang,ge/

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 20-25°C, the service life of an accumulator is typically about 4 years. An increased ambient temperature (greater than 25°C) can significantly reduce the service life of the accumulators, resulting in invalidating the warranty. The service life can be considerably increased with the use of special accumulators (up to ca. 8 years). It should be regularly checked (6-12 months) whether the remaining autonomous 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 databases must be secured. Also, inform all involved employees of your intentions in case sensitive loads are connected to the UPS.

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. To this end, force the UPS to return to the autonomous mode and measure the time until the automatic shutdown of the UPS.
Method b) allows for the determination of the remaining capacity after a defined support period. For this method as well, first force the UPS into the autonomous mode for a specific time. As it returns to the supply mode, record the remaining capacity. Then calculate the autonomous time through an estimation (linear).

Please remember that after measuring the autonomous time, the accumulator of the device is partly or possibly fully discharged. This means that the UPS must remain operating in standard operation mode for several hours (min. 6 h) to recharge the battery bank accordingly before the UPS is approximately 90 % operational (capable of supporting). This information only pertains to the internal battery bank.

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 insufficient autonomous time (support time) caused by degenerated accumulators.

If the UPS internally identifies a defective accumulator, an operation message is sent.

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!

The replacement of accumulators and possibly other UPS components must only be performed by personnel from EFFEKTA Regeltechnik GmbH or an accredited service center.

WARNING!

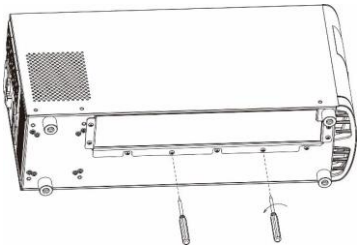
During the replacement of the accumulators and other UPS components, the loads are directly connected to the mains power supply via an external bypass whereby other support functions of the UPS cannot occur at this time. Power failures and other grid disturbances are directly transferred to the loads.

ATTENTION!

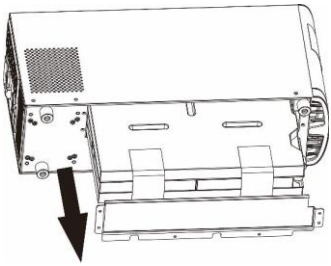
The UPS is essentially capable of a “HOT PLUG.” This means that the battery bank can be replaced during ongoing operation. This is generally not a problem for an external battery bank. However, when replacing an internal battery bank, it is more reasonable to switch the system off and replace the battery bank. In that case, if problems should arise, this possibly influences the supply of the loads.

Please follow the instructions below to replace the internal battery bank. The following applies for the **MTX series with 800-2000 VA**:

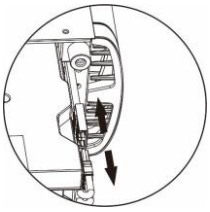
Step 1: Remove the safety plate on the device base of the UPS.



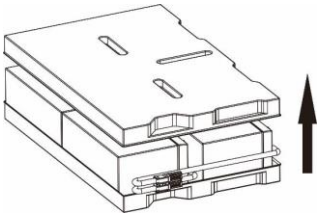
Step 2: Pull the battery bank slightly out of the UPS.



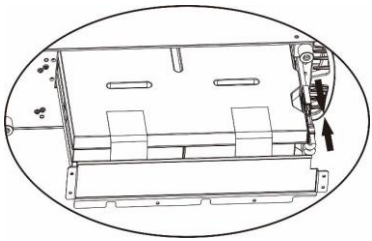
Step 3: Open the electrical connection.



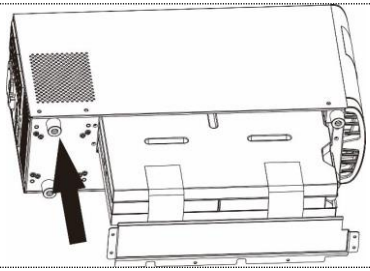
Step 4: Pull the battery bank completely out of the UPS. The battery bank trays must be open to replace the batteries.

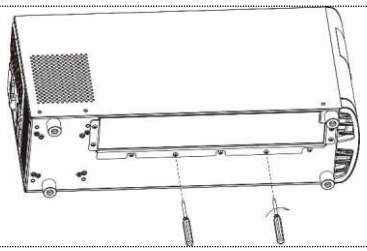


Step 5: Slide the new battery bank into the UPS shaft again and close the connection.



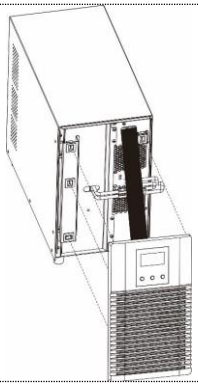
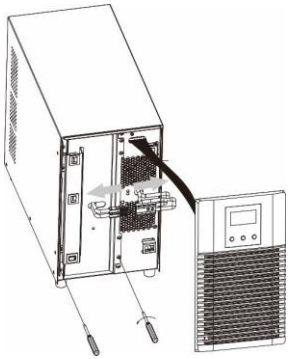
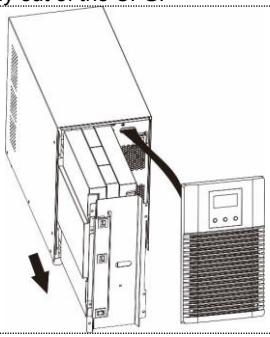
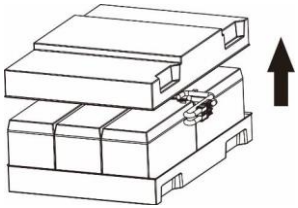
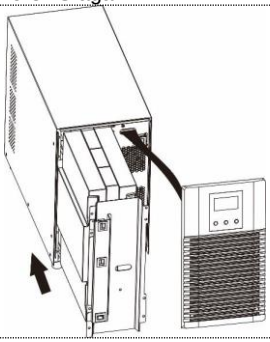
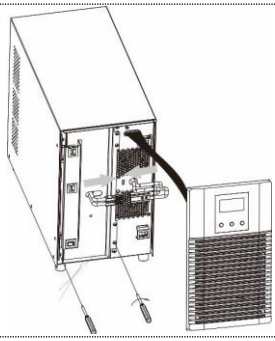
Step 6: Slide the battery bank completely into the UPS.

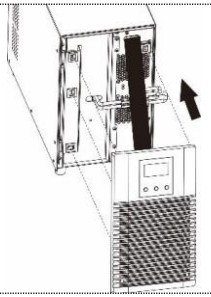




Step 7: Secure the battery bank by screwing on the safety plate.

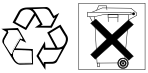
The following applies for the **MTX series with 3000 VA**:

Step 1: Remove the front cover of the UPS.	Step 2: Open the electrical connection and remove the battery bank cover.
	
Step 3: Pull the battery bank completely out of the UPS.	Step 4: The battery bank trays must be open to replace the batteries.
	
Step 5: After the battery replacement, slide the new battery bank completely into the UPS again.	Step 6: Attach the battery bank cover and connect the electrical connection.
	

	Step 7: Put the front cover on the device again.

12.3 Maintenance and service contracts

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

	Regular inspection of the UPS, in particular, the accumulators and their timely replacement.
	Inspection of the UPS installation and functionality.
	Measurements of the remaining autonomous time.
	Professional cleaning, of particular importance for the ventilation areas.
	Proper disposal of defective or degenerate components.
	Environmentally sound disposal of accumulators.

Please contact our service hotline listed above for a complete list of our services or send us an email request.

12.4 Service log

Please always enter all maintenance and service work performed on the UPS device into the service log.

Date	Tasks performed	Performed by

13. Technical data

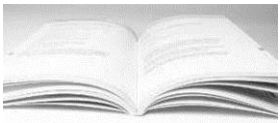
	MTX:	**800** 800 VA / 720 W	**1100** 1100 VA / 990 W
UPS input	Mains power supply	1 phase, neutral conductor and PE conductor	
	Nominal voltage	230 VAC	
	Voltage ranges	150-234/156-243/162-268/170-280/177-290 VAC	
	Frequency range	50/60 Hz ± 5 Hz (automatic detection)	
UPS output	Mains power supply	1 phase, neutral conductor and PE conductor	
	Nominal voltage	200, 208, 220, 230, 240 VAC	
	Voltage accuracy	±1.5 % (inverter mode)	
	AVR (BOOST) supply mode	+10%	
	AVR (BUCK) supply mode	-15% (-13% at 200, 208 VAC)	
	Frequency	50 or 60 Hz ± 0.1 % (inverter mode)	
	Wave form	sine	
	Crest factor	3	
	Switchover time	typically 4-6 ms, maximum 10 ms	
	Overload/Alarm time	103-120% / 5 min. supply mode, 1 min. inverter mode 120-150% / 10 s ≥ 150% / immediate shutdown of the UPS	
Effi-ciency	Economy mode	97.5%	
	AVR mode	95%	
	Autonomous mode	≥ 88% to 90%	
Battery bank (internal)	Voltage nom.	24 VDC	
	Capacity	2x 9 Ah	
	End charging voltage	27.4 VDC ± 1%	
	Maximum charging current	1.5 A	
	Charging time	after 6 h, 90 % of the capacity is reached (internal battery bank)	
Device	Device protection	Overload, deep discharge, overcharge	
	Dimensions (D x W x H) mm	376 x 145 x 240	
	Weight	12.70 kg	13.10 kg
	Communication	USB, RS232 (Modbus protocol) Slot for expansion cards, e.g. SNMP	
	Standards / Guidelines	Safety: EN 62040-1 EMV: EN 62040-2, Class C2 Operation: EN 62040-3	
Environment	Temperatue ranges	Operation: 0 .. 40 °C Storage: -25 .. 55 °C (without accumulators) Storage: 0 .. 40 °C (with accumulators)	
	Rel. humidity	0 – 90 % (non-condensing)	
	Noise level	< 45 dB in standard operating mode, < 55 dB during battery mode / charging	

	MTX:	**1500** 1500 VA / 1350 W	**2000** 2000 VA / 1800 W	**3000** 3000 VA / 2700 W
UPS input	Mains power supply	1 phase, neutral conductor and PE conductor		
	Nominal voltage	230 VAC		
	Voltage ranges	150-234/156-243/162-268/170-280/177-290 VAC		
	Frequency range	50/60 Hz ± 5 Hz (automatic detection)		
UPS output	Mains power supply	1 phase, neutral conductor and PE conductor		
	Nominal voltage	200, 208, 220, 230, 240 VAC		
	Voltage accuracy	±1.5 % (inverter mode)		
	AVR (BOOST) supply mode	+10%		
	AVR (BUCK) supply mode	-15% (-13% at 200, 208 VAC)		
	Frequency	50 or 60 Hz ± 0,1 % (inverter mode)		
	Wave form	sine		
	Crest factor	3		
	Switchover time	typical 4-6 ms, maximum 10 ms		
	Overload/Alarm time	103-120% / 5 min. supply mode, 1 min. inverter mode 120-150% / 10 s ≥ 150% / immediate shutdown of the UPS		
Effi-ciency	Economy mode	97.5%		
	AVR mode	95%		
	Autonomous mode	≥ 88% to 90%		≥ 91% to 92%
Battery bank (internal)	Voltage nom.	48 VDC		72 VDC
	Capacity	4x 9 Ah		6x 9 Ah
	End charging voltage	54.8 VDC ± 1%		82.1 VDC ± 1%
	Maximum chargng current	1.5 A		
	Charging time	after 6 h, 90 % of the capacity has been reached (internal battery bank)		
Device	Device protection	Overload, deep discharge, overcharge		
	Dimensions (D x W x H) mm	484 x 145 x 240		427 x 190 x 338
	Weight	20.40 kg	21.60 kg	30.50 kg
	Communication	USB, RS232 (Modbus protocol) Slot for expansion cards, e.g. SNMP		
	Standards / Guidelines	Safety: EN 62040-1 EMV: EN 62040-2, Class C2 Operation: EN 62040-3		
Environment	Temperature ranges	Operation: 0 .. 40 °C Storage: -25 .. 55 °C (without accumulators) Storage: 0 .. 40 °C (with accumulators)		
	Rel. humidity	0 – 90 % (non-condensing)		
	Noise level	< 45 dB in standard operating mode, < 55 dB in inverter mode		

The entire output capacity for the MTX series is calculated up to an operation height maximum of 1000 m MSL. Furthermore, this results in approximately 1.5% loss per 100 m in height (=> 85 % output capacity is available at 2000 m).

14. Scope of delivery / Accessories

The following is a list of the scope of delivery; please compare this with the received goods. Please inform us immediately if any items or components are missing.

No.	Article (No.)	Function / view:	Description:
1 x	UPS		MTX series, according to your order;
1 x	Operating manual		Operating manual - English V 1.4;
1 x	Cold device cable		Connection cable (Supply network / UPS input);
1 x	Cold device cable		Connection cable (consumer network / UPS output);
1 x 1 x	USB cable RS232 cable		Interface connection between UPS and PC (etc.);
1 x	Note on software package (Download) as a supplement	https://www.generex.de/content/view/62/102/lang,ge/	UPSMAN (GENEREX) Network-compatible shutdown, monitor and diagnosis software

15. Optional accessories

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

15.1 Signal adapter: Relay card (AS400) ZBBVTBRELMTXWK00

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:

Funktion:	Anschlussart:
Line fail / battery mode	Ausgang
Battery voltage low / battery empty	Ausgang
Normal operating mode / UPS on	Ausgang
Standby / UPS off	Ausgang
Bypass / Inverter mode	Ausgang
Remote shutdown	Eingang

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. The relay outputs have a common relay contact (Common)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 associated 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.

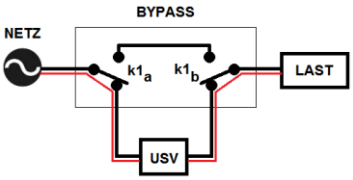


Fig. 15-3 UPS mode

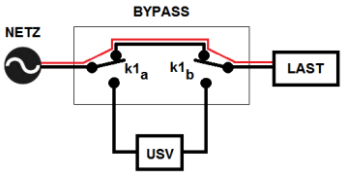


Fig. 15-4 By-pass mode

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 battery bank units can either be used as the sole energy storage or in addition to the internal battery bank of the UPS to extend the autonomous period and/or adjust the necessary load balance.

The following types of battery banks are available for the MTX series:

		UPS [VA]				
		800	1100	1500	2000	3000
Battery bank	Connection voltage [VDC]	**24**		**48**		**72**
	Capacity [Ah]	9 / 18 / 27		9 / 18		9 / 18
	Weight [kg]	11 / 17 / 23		17 / 29		32 / 50
	Dimensions (W x D x H) [mm]	145 x 397 x 240		145 x 397 x 240		190 x 416 x 338

These battery banks (of the same type) can be switched parallel to each other without, in turn, causing difficulty,

in meeting the requirements (load, autonomous time).

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

ATTENTION!

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

Always check that the battery bank concept or the capacity of the battery bank and the current capability of the UPS charging unit are compatible with each other concerning the recovery time.

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 9 Ah	Energy storage	Depending on assembly!

** 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.effekta.com.

EFFEKTA®

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