

DURAMax DC UPS



Uninterruptible power supply
Manual

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1 About the documentation

The documentation is part of the product. The documentation is intended for the operator of the product and for all persons who handle the product during its life cycle.

- ▶ Read the documentation completely before handling the product.
- ▶ Keep the documentation after reading.
- ▶ Ensure that the documentation is accessible to all persons who handle the product.
- ▶ If you pass on the product to a third party, also pass on the documentation and all applicable documents.

1.1 Graduated warnings

The warnings are graduated according to the severity of the hazard.



A note with the signal word DANGER warns of a hazard that will result in serious injury or death if not avoided.



A note with the signal word WARNING warns of a hazard that can result in serious injury or death if not avoided.



A note with the signal word CAUTION warns of a hazard that can result in injury if not avoided.



A note with the signal word ATTENTION warns of a hazard that can result in damage or malfunction to the product if not avoided.

1.2 Symbols used

The following symbols may be present in the documentation and on the product.

Symbol	Meaning
	Warning of dangerous electrical voltage
	Note on documentation or reference to additional documents
	The work described may only be performed by a qualified electrician.
	Note on required tool
	Information next to this symbol is not safety-relevant, but it supports correct and effective working practices.

1.3 Design elements

- The dash indicates a listing that does not include any action steps.
 - ◇ The rhombus indicates a prerequisite that must be met before the next action step.
 - ▶ The black triangle indicates an action step.
 - ☑ The checkbox symbol indicates a result or an intermediate result.
- [▶ Page 6] Square brackets enclosing a grey triangle and a reference target indicate a cross-reference within the document.

1.4 Complete documentation



Please also observe the following documents. You can find all documents in the Weidmüller Support Center or in the product catalogue.

- DURAmx DC UPS Manager software manual (3184840000)
- DURAmx DC UPS operating instructions (3075410000)
- DURAeco LA-BAT operating instructions (2814330000)
- CP DC UPS TF installation instructions (1477620000)



The declarations of conformity for the product can be found in the product catalogue.

1.5 Dimensions of the standard mounting position

The technical data include the height, width and depth of a device.

The dimensions and all position descriptions such as left, right, top and bottom refer to the standard mounting position.

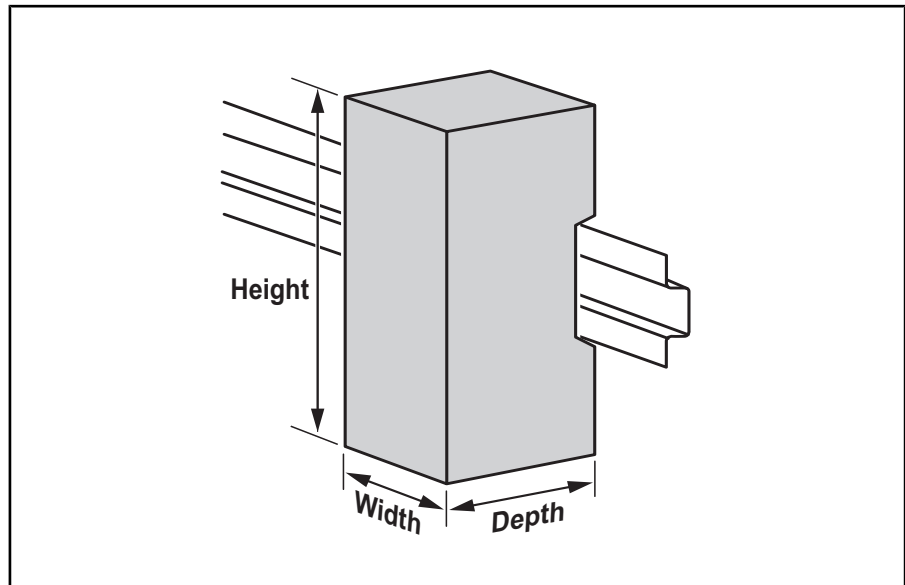


Figure 1 Device in standard mounting position

1.6 Described versions

This documentation describes the DURAmx DC UPS in the following hardware versions (HVN) and software versions (SVN):

Item No.	UPS	HVN	SVN
2934940000	DURAmx DC UPS 24V 5A	1.2.0	1.4.0
2934950000	DURAmx DC UPS 24V 10A	1.1.0	1.4.0
2934960000	DURAmx DC UPS 24V 20A	1.1.0	1.4.0
2934970000	DURAmx DC UPS 24V 40A	1.2.0	1.4.0

2 Safety

2.1 General safety notes

- The device must only be installed by qualified electricians who are familiar with national and international laws, provisions and standards.
- The device must not be opened, modified or converted. Repairs may only be completed by Weidmüller.
- The device becomes hot during operation.
- Before cleaning, the device must be de-energised.
- The device is only intended for the application described in this document, see **Intended use**. Any other use is not permitted and may result in accidents or damage to the device.
- If the device is used in a manner not specified by the manufacturer, the protection it provides may be impaired.
- The device conforms to degree of protection IP20. Adequate protection against contact with live parts and ingress of dust and water must be ensured through installation in a suitable housing (such as a control cabinet).
- The connection cables must be resistant to temperatures that are 50 K higher than the maximum ambient temperature.
- The electrical system must be installed in accordance with the general rules of electrical engineering and by qualified specialists:
 - Electric shocks can cause life-threatening injuries. Protect yourself by wearing the prescribed protective clothing and using insulated tools.
 - Before working on electrical installations, the absence of voltage must be verified. Make sure the system is secured against being switched on again.
 - When planning, ensure that the fuses and connection cables are adequately sized.
 - To ensure optimum functioning and safety of electrical devices, make sure that sufficient air circulation is available. Maintain at least 50 mm of free space for air intake both above and below the device.

UL: Safety instructions for installation and operation in CLASS I, DIVISION 2 environment

- For use with UL/C-UL listed devices only.
- Only suitable for use in environments where there is an explosion risk classified as CLASS I, DIVISION 2, GROUPS A, B, C and D, T4 or in environments where there is no risk of explosion.
- These devices are open-type devices that are to be installed in an enclosure suitable for the environment and can only be accessed with the use of a tool or key.
- **WARNING - Explosion hazard -** Do not disconnect equipment while the circuit is live or unless the area is known to be free of ignitable concentrations.
- **WARNING - Explosion hazard -** Substitution of any component may impair suitability for Class I, Division 2.

2.2 Cybersecurity

General notes In order to achieve an effective protection against cyberattacks, every operator of industrial plants must develop a comprehensive security strategy and implement a cybersecurity concept in practice. It is also the operator's responsibility to continuously adapt the implemented cybersecurity measures to technological developments. Weidmüller products and solutions are designed to be part of such a security strategy and help ensure a secure infrastructure.

Devices, systems, machines and networks must be protected against unauthorised access. Components should only be connected to a company network or the internet if necessary and only if appropriate security measures such as firewalls and network segmentation have been implemented.

Further information about the topic of cybersecurity can be found on the [Weidmüller industrial security website](#). Please observe the following documents:

- Industrial Product Security Guideline
- Security Data Sheets

For information on known vulnerabilities and current security advisories related to Weidmüller products, please visit the [Weidmüller Security Advisory Board](#).

If you have identified a potential security vulnerability related to a Weidmüller product, please report it via the [Coordinated Vulnerability Disclosure process](#).

Productspecific notes Please observe the following notes to minimise risks such as data loss, unauthorised access or system compromise.

- Install updates immediately to ensure that you are always using the latest supported version. Using outdated or unsupported versions can increase the risk of cyber attacks. You can download the latest software and firmware files from the [product catalog](#).
- Updates for the DURAmx DC UPS firmware and for the DURAmx DC UPS Manager will be provided for a period of five years. Detailed information on the update process can be found in the DURAmx DC UPS Manager manual.
- Ensure that the PC operating the UPS Manager software has the latest Windows update installed, that up-to-date virus protection is active, and that the PC is connected to a secure network. Please note that the data exchanged between the UPS control unit and the software is neither signed nor encrypted.
- Administrator rights are required to install the DURAmx DC UPS Manager. It is the operator's responsibility to revoke these rights after installation. Using the software with administrator rights poses significant cyber risks.
- After the first login to the DURAmx DC UPS Manager, you will be prompted to change the password. Choose a secure password in accordance with the Industrial Product Security Guideline. Always treat your login credentials as confidential. Never share your login credentials.
- The DURAmx DC UPS Manager is locked after 5 minutes of inactivity. You can log in again with your password.
- Lock the PC on which the DURAmx DC UPS Manager is installed when leaving your workplace.

- The operator is responsible for preventing unauthorised access to the USB port of the UPS control unit.

2.3 Intended use

The devices of the DURAmix DC UPS product family are control units used to establish an uninterruptible power supply (UPS). Short-term interruptions or dips in the mains voltage are bridged so that the connected loads continue to be supplied interruption-free. The DC UPS control unit is combined with a suitable power supply and at least one battery module to form a DC UPS system. The power supply used must be suitable for operation with the DC UPS control unit and the connected battery module in terms of output voltage, power range and dynamic behaviour. The battery module used must be suitable for operation with the DC UPS control unit in terms of battery type, capacity, charging and discharging behaviour, and required protective measures. For typical applications, power supplies from the PROtop or PROmax product families and a battery module from the DURAeco LA-BAT series are recommended. Direct operation on 24 V DC supply networks is not permitted. Only VRLA-AGM batteries may be used to operate the DC UPS control unit.

The device is designed for use in industrial environments and may only be operated within the technical specifications described, see the technical data for each device. The DURAmix DC UPS is intended exclusively for installation in locked areas (e.g. lockable control cabinets).

2.4 Personnel

Only persons who are qualified for the respective task may work with the products described in this documentation. Based on their training and experience, qualified personnel are capable of recognising risks and avoiding potential hazards when working with the products. Only trained personnel may operate the product and carry out maintenance work. Training also requires that the operating instructions have been read in full.



Please keep the operating instructions where they can be viewed by the operating personnel at all times.

3 System description

This chapter describes the product features that apply to all device variants. Individual descriptions can be found in the chapter Product descriptions [► Page 45].

3.1 Product family



Figure 2 Device variants

Product family The DURAmox product family consists of the following devices:

Product designation	Order number
DURAmox DC UPS 24V 5A	2934940000
DURAmox DC UPS 24V 10A	2934950000
DURAmox DC UPS 24V 20A	2934960000
DURAmox DC UPS 24V 40A	2934970000

System solution The DC UPS control unit is combined with a suitable power supply and at least one battery module to form a DC UPS system.

3.2 Functional principle

The DC UPS control unit detects a failure or drop in the DC input voltage and immediately switches to buffer mode. The battery module supplies the connected load for a defined period. As soon as the mains voltage returns to normal, the DC UPS control unit switches back to normal mode and recharges the battery module. Battery charging follows a temperature-compensated UI characteristic curve. The battery module can be charged at temperatures from -15 °C to +50 °C. Buffer mode is possible at temperatures from -15 °C to +60 °C. An LED display together with various signal outputs provides comprehensive status monitoring of the DC UPS system. The connected battery modules are tested cyclically for availability.

3.3 Type plate

The type plate is located on the side of the device.

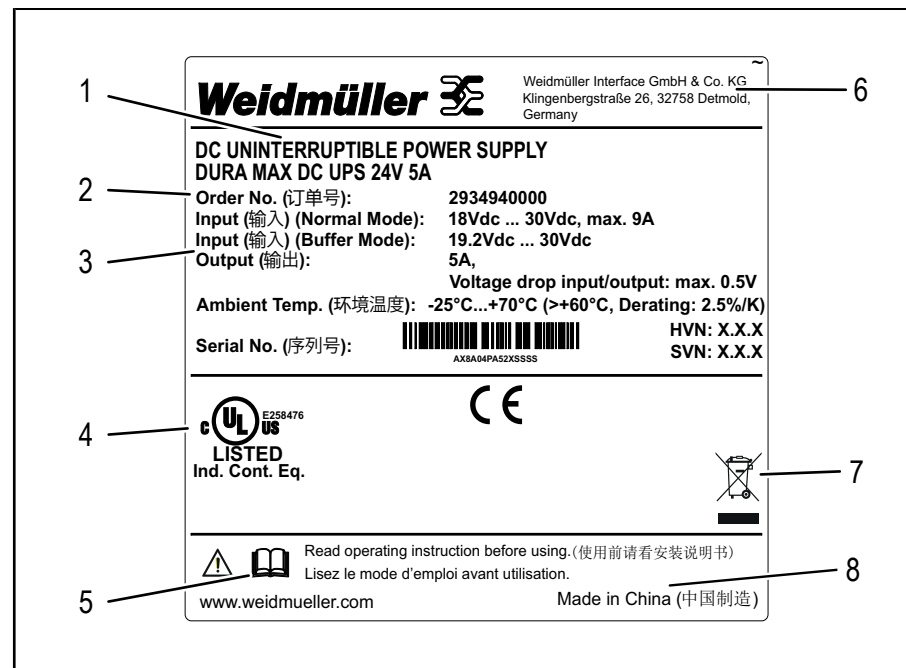


Figure 3 Type plate (example)

- | | |
|------------------------------------|------------------------|
| 1 Product designation | 5 Safety notes |
| 2 Order number | 6 Manufacturer |
| 3 Technical specifications | 7 Disposal symbol |
| 4 Approval and conformity markings | 8 Place of manufacture |

3.4 QR code

The QR code on the front leads to the product page of the respective device in the Weidmüller eShop.

3.5 Connections

All connections and interfaces are located on the front of the device.

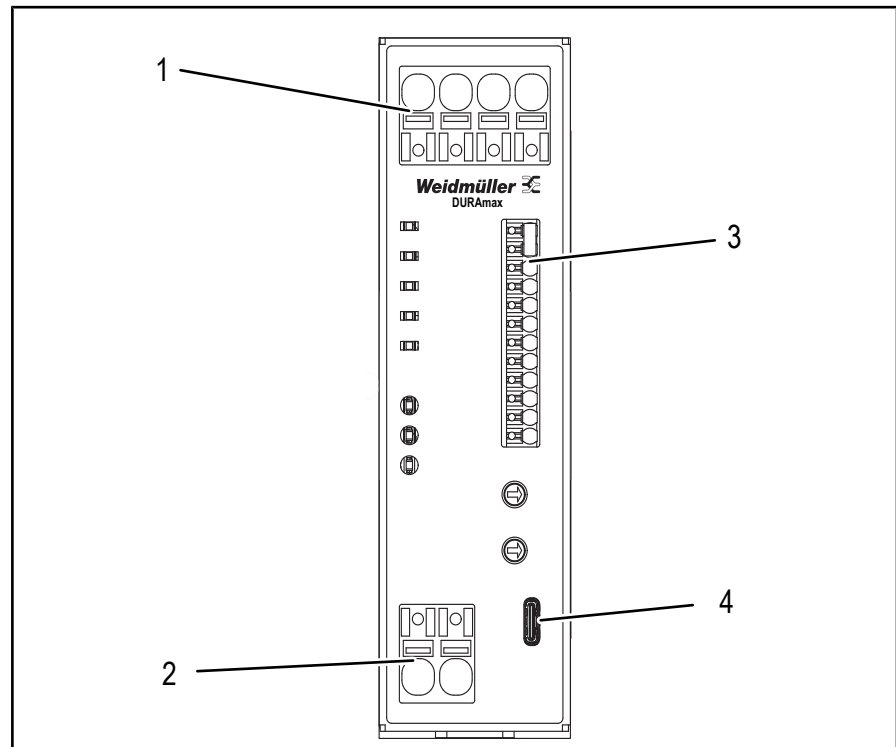


Figure 4 Connections and interfaces, schematic

- | | |
|------------------------------|---|
| 1 Supply connection (X1, X2) | 3 Signal connection (X3) with temperature sensor connection |
| 2 Battery connection (X4) | 4 Communication interface (USB-C) |

The terminals of the supply connection and the battery connection use the PUSH IN connection system.

Detailed connection data, such as conductor cross-section and stripping length, can be found in the technical data for the respective device.

Supply connection (X1, X2)

The input terminals (X1) of the UPS control unit are designed for connection to a DC input voltage. The output terminals (X2) are used to connect the buffered load. If the upstream power supply fails, the load is supplied by the stored energy of the battery module.

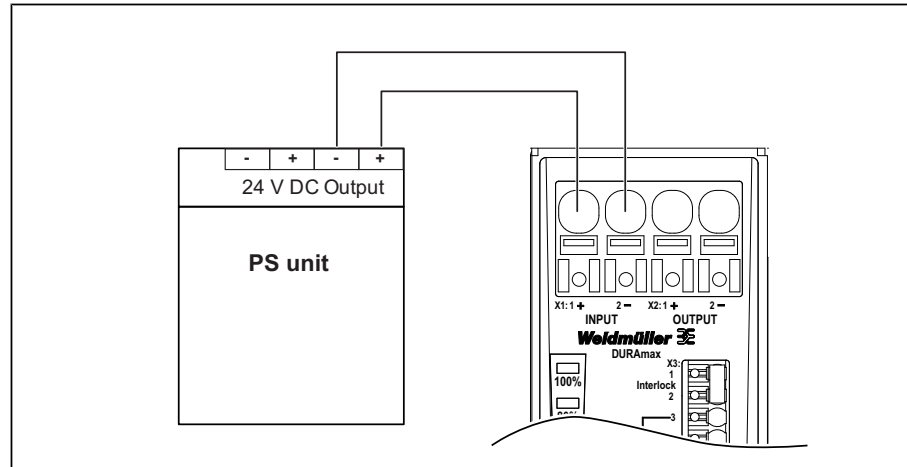


Figure 5 Basic circuit diagram: Input terminals X1 connected to power supply

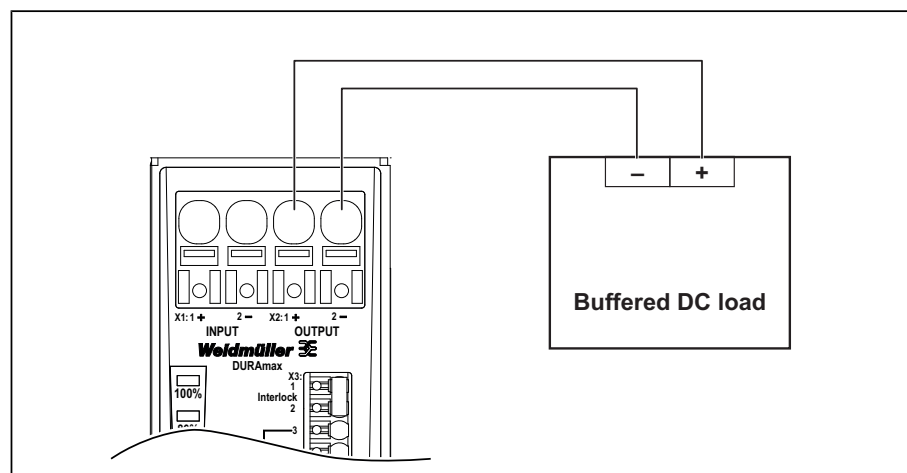
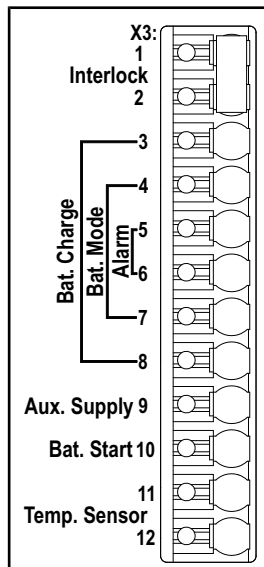


Figure 6 Basic circuit diagram: Output terminals X2 connected to load

Signal connection (X3)

Active 24 V signals can be used at the outputs for connection to a controller. Two terminals are provided for connecting the temperature sensor of the Weidmüller battery module.



Connection	Contacts	Signal characteristics
1 + 2	Interlock function [► Page 35]	Bridged: Normal mode Not bridged: Buffer mode not possible
3 + 8	Bat. Charge [► Page 17]	The relay contact is open when the battery module is more than 90 % charged or is in the float charge phase, and during buffer mode.
4 + 7	Bat. Mode [► Page 17]	The relay contact is closed when the DC UPS control unit is operating in buffer mode.
5 + 6	Alarm [► Page 17]	The relay contact opens as soon as a fault is detected.
9	Aux. Supply [► Page 36]	Source of the auxiliary voltage: in normal mode: input (X1) in buffer mode: battery (X4)
10	Bat. Start [► Page 34]	Cold start function (black start)
11 + 12	Temp. Sensor [► Page 18]	External temperature sensor connection

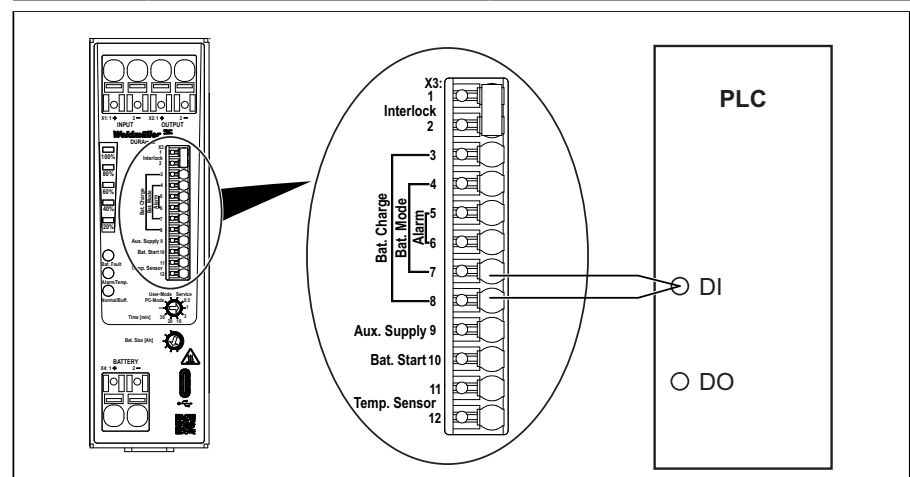


Figure 7 Basic circuit diagram: Signal connection to controller

Battery connection (X4)

The battery terminals are used for connecting the battery module. If the upstream power supply fails, the load is supplied interruption-free by the battery module.

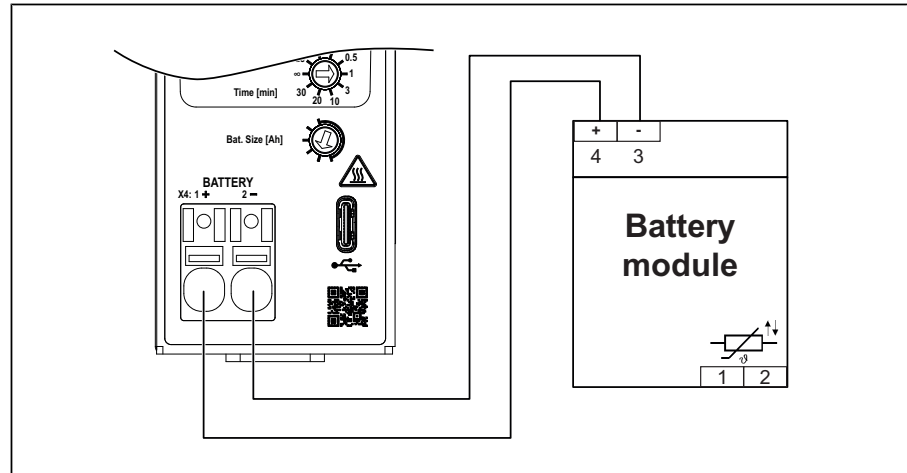
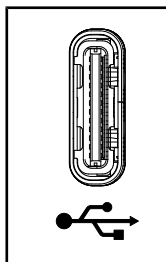


Figure 8 Basic circuit diagram: Battery connection

Communication interface



The communication interface is an isolated USB Type-C interface. The interface is intended for connection to a PC on which the **DURamax DC UPS Manager** software is installed [► Page 69].

The operation of the software is described in the software manual [► Page 6].

3.6 Status relay

Three status relays are provided at the signal connection (X3) for remote monitoring of the DC UPS control unit [► Page 15].

Bat. Charge

Status	Meaning
	Device de-energised
open	Battery in float charge phase or state of charge $\geq 90\%$
closed	Battery in constant current phase

Observe the information on battery charging behaviour [► Page 37].

Bat. Mode

Status	Meaning
	Device de-energised
open	Device in normal mode
closed	Device in buffer mode



Normal mode and the de-energised state are indicated by the same contact state.

Observe the information on the operating modes [► Page 22].

Alarm

Status	Meaning
	Temperature sensor error
	Input undervoltage protection error
	Input overvoltage protection error
	Output undervoltage protection error
	Output overvoltage protection error
	Internal charger overtemperature protection error
	Buffer mode error
	Short-circuit error
	Overcurrent protection error
	Internal charger short-circuit error
	Internal charger overcurrent protection error
	Device de-energised
closed	No error

Observe the information on the operating status LED [► Page 21].

3.7 Temperature sensor connection

All Weidmüller battery modules contain internal temperature sensors, which must be connected to connections 11 and 12 of the signal connection terminal (X3).

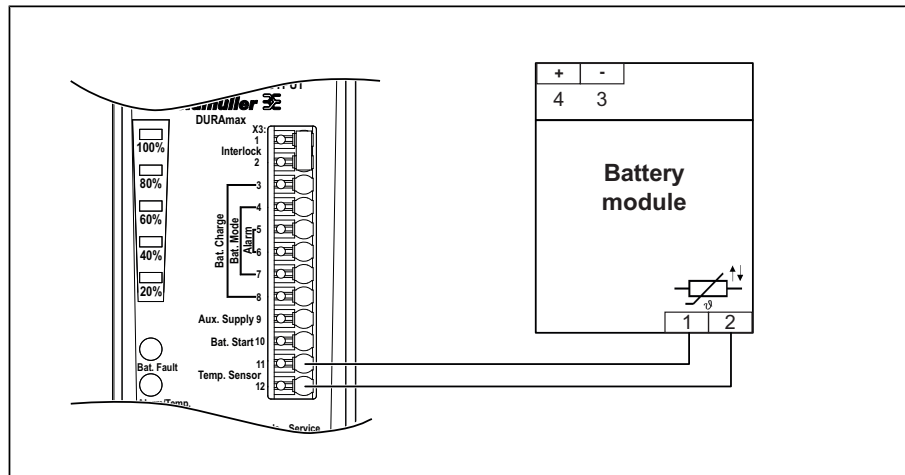


Figure 9 Temperature sensor connection

Operation with an external temperature sensor

If a different battery module or, alternatively, an external temperature sensor is used, the external temperature sensor must be connected between the DC UPS control unit and the battery module to ensure that the DC UPS control unit operates correctly.



We recommend using only Weidmüller temperature sensors [► Page 75].
If other temperature sensors are used, they must have a resistance of $100\text{ k}\Omega \pm 5\%$ [► Page 45].

Operation without temperature sensor

If no temperature sensor is used, terminals 11 and 12 must be connected with a fixed resistor of $100\text{ k}\Omega \pm 5\%$.



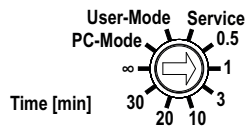
When a fixed resistor is used instead of a temperature sensor, the temperature-controlled adjustment of the charging curve is no longer carried out. In addition, the safety monitoring of the battery module is no longer active.

3.8 Rotary coding switch

The two rotary coding switches on the front of the device are used to select the operating mode of the DC UPS control unit and the settings for the connected battery module [► Page 66].

Operating mode rotary coding switch

The operating mode rotary coding switch is used to set the operating mode and the buffer time.



Setting	Meaning
∞ [► Page 31]	When the deep discharge threshold of 19.2 V DC is reached, the battery module is shut down.
PC-Mode [► Page 31]	The settings configured in DURAmox DC UPS Manager are active.
User-Mode [► Page 32]	The settings configured in DURAmox DC UPS Manager are active.
Service [► Page 32]	Setting for service and maintenance activities
0.5...30 min [► Page 33]	After the configured buffer time has elapsed ($\pm 2\%$), output X2 is switched off.

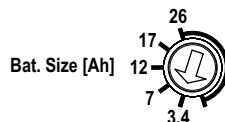
Observe the detailed description of the operating modes [► Page 31].

The load output is switched off when the configured buffer time expires or the deep discharge threshold is reached. If the deep discharge threshold is reached before the configured buffer time expires, shutdown occurs at that point.

If the configured buffer time is changed during operation, the timer restarts. The new value is applied immediately.

Battery selection rotary coding switch

This rotary coding switch is used to select different battery sizes. The available sizes depend on the device and are indicated directly next to the rotary coding switch [► Page 68].



3.9 State-of-charge LED

The battery charge status is indicated in stages by green LEDs.



The battery charge status only shows correct values if the correct battery size is set on the battery selection rotary coding switch.

ATTENTION

The setting on the battery selection rotary coding switch must correspond to the actual battery capacity. The only exception is for batteries between 38 Ah and 50 Ah. When using these batteries, the maximum possible setting must be selected (e.g. 38 Ah).

An incorrect setting negatively affects the charging and discharging behaviour of the battery and may trigger an error message in the DC UPS control unit.



Battery capacity	Green LED bar display	
	Charging	Discharging
100 %	On: 100 % charged Flashing: Charging	On: 100 % remaining
80 %	On: 80 % charged Flashing: Charging	On: 80 % remaining
60 %	On: 60 % charged Flashing: Charging	On: 60 % remaining
40 %	On: 40 % charged Flashing: Charging	On: 40 % remaining
20 %	On: 20 % charged Flashing: Charging	On: 20 % remaining

Observe the LED behaviour:

LED behaviour	Meaning
On	Status: Charged
Flashing	Status: Charging

Additionally, observe the status of the **Normal/Buf.** LED [► Page 21].

If the LED indicates the operating status **normal mode**, the battery module is being charged. In **buffer mode**, the battery module supplies connected loads with current. In the process, the battery module is discharged.

3.10 Operating status LED



The operating status LEDs indicate the operating state of the DC UPS control unit.

The following table explains the meaning of each LED behaviour.

LED	LED behaviour	Meaning
Battery fault (Bat. Fault)	Red	Battery connection reversed
		Battery module not connected
		Battery module defective
	Red, flashing	Time limit reached
		Battery module undervoltage protection error
		Battery module overcurrent protection error
Alarm/temperature sensor (Alarm/Temp.)	Yellow	Battery module overvoltage protection error
		No error / device de-energised
		Temperature sensor error
	Yellow, flashing	Input undervoltage protection error
		Input overvoltage protection error
		Output undervoltage protection error
		Output overvoltage protection error
		Internal charger overtemperature protection error
		Buffer mode error
		Short-circuit error
		Overcurrent protection error
		Internal charger short-circuit error
		Internal charger overcurrent protection error
	Off	No error / device de-energised
Normal mode/buffer mode (Normal/Buf.)	Green	Normal mode
	Green, flashing	Buffer mode
	Off	Buffer time expired / device de-energised

Refer to the further information on troubleshooting [► Page 70].

3.11 Operating modes

Normal mode

As long as the input voltage is within the permitted range and stable, the UPS control unit operates in normal mode. The connected devices are supplied directly from the external power source and, if necessary, the battery module is charged at the same time. This operating mode is the default state when the supply voltage is stable.

Buffer mode

In the event of a mains failure or if the input voltage falls below the switching threshold, the DC UPS control unit automatically switches to buffer mode and the battery takes over the supply without interruption. Buffer mode ends when the supply voltage is stable again, when the end-of-discharge voltage is reached, or when the configured buffer time expires. The maximum duration of buffer mode depends on three factors: the connected load, the battery capacity and the ambient temperature.

3.12 Peak current reserve

The DURAmix DC UPS can briefly supply currents above the rated output current. The available peak current reserve depends on the operating mode of the DC UPS control unit.

In normal mode, the available peak current reserve is determined by the connected power supply. The overload capability of the DURAmix DC UPS follows that of the power supply.

In buffer mode, the peak current reserve is determined by the connected battery module. The maximum available values are limited by the technical data of the DC UPS control unit and the battery module.

Overloads can cause the voltage of the power supply to drop. If the input voltage falls below the switching threshold of the DC UPS control unit, the DC UPS control unit automatically switches to buffer mode. From this point onwards, the buffer mode limit values apply. Lower limit values for overload and short circuit apply in buffer mode than in normal mode.

The values for the peak current reserve are specified in the technical data [► Page 45]. Further information on overload protection and short-circuit protection can be found in the chapter on protective functions [► Page 25].

3.13 Redundant mode



Redundant operation is possible in normal mode, provided the measures listed below are observed. In buffer mode, symmetrical load sharing cannot be guaranteed due to the battery characteristics.

In redundant operation, a maximum of two DC UPS control units operate in parallel, increasing availability and fault tolerance. If one DC UPS control unit fails, the remaining device automatically takes over the supply. Redundant operation is particularly recommended for safety-critical applications.

A diode or redundancy module is required for redundant operation.

Permissible combinations for redundant operation

	PRO DM 10	PRO DM 20	PRO RM 10	PRO RM 20	PRO RM 40
DURA MAX UPS 24V 5A	no	no	no	no	no
DURA MAX UPS 24V 10A	yes	yes	yes	yes	yes
DURA MAX UPS 24V 20A	no	yes	no	yes	yes
DURA MAX UPS 24V 40A	no	no	no	no	yes



The DURAmix DC UPS 24V 5A is not suitable for redundant operation and cannot be operated in parallel.

Observe the information on Weidmüller diode and redundancy modules [► Page 75].

Symmetrical load sharing

Only DC UPS control units of the same type may be connected in parallel. Load sharing and protective circuitry must be designed in accordance with the specifications. Symmetrical load sharing is required to ensure equal loading of both DC UPS control units. This is achieved by the following measures:

- Using cables with the same cross-section
- Ensuring equal cable lengths
- Matching the output voltages of the upstream power supplies to achieve symmetrical current sharing between the two DC UPS control units.

3.14 Derating

DURAmox devices are rated for 100 % load within the temperature range of $-25\text{ }^{\circ}\text{C}$ to $60\text{ }^{\circ}\text{C}$.

ATTENTION

The device may be damaged or its performance may deteriorate if it is operated permanently outside the permitted operating range. Operate the device only within the specified range, see the technical data for each device.

Once the ambient temperature at the device exceeds $60\text{ }^{\circ}\text{C}$, derating of $2.5\text{ } \%/ \text{K}$ applies.

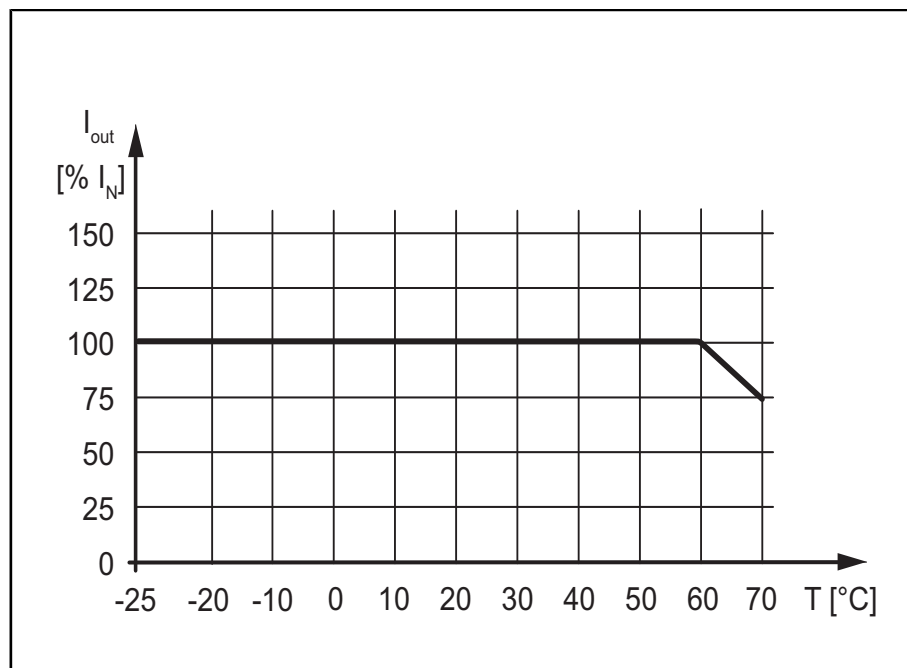


Figure 10 Derating



Use the DC UPS control unit only with a power supply that meets the specified rated values. If a power supply with deviating rated values is used, refer to the power supply's derating curve. Always use the lower value.

Observe the information on the required device clearances [► Page 41].

3.15 Protective functions

Overload protection

In normal mode, overload protection operates in hiccup mode. In the event of an overload, the output is switched off and then briefly switched on again at regular intervals to check whether the cause of the fault is still present. Hiccup mode also applies to the auxiliary outputs (Aux. Supply) and the output of the internal charger.

In buffer mode, the output is switched off in the event of an overload (latch-off). Observe the information on resuming operation [► Page 27].

The DC UPS control unit provides a peak current reserve in normal mode and buffer mode. An overload occurs when the output current reaches the following values:

- Normal mode: 105 % to 605 % of the rated output current
- Buffer mode: 105 % to 305 % of the rated output current

The output current comprises the current of the connected load and the additional charging current of the internal charger.

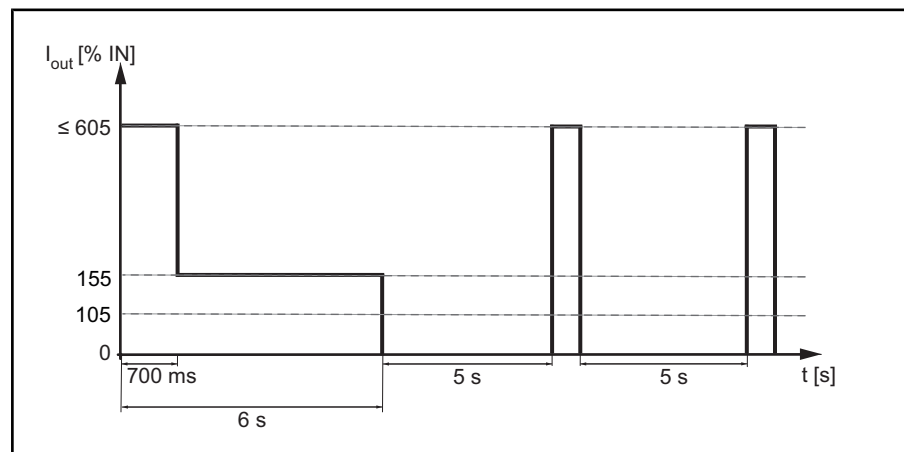


Figure 11 Peak current reserve in normal mode

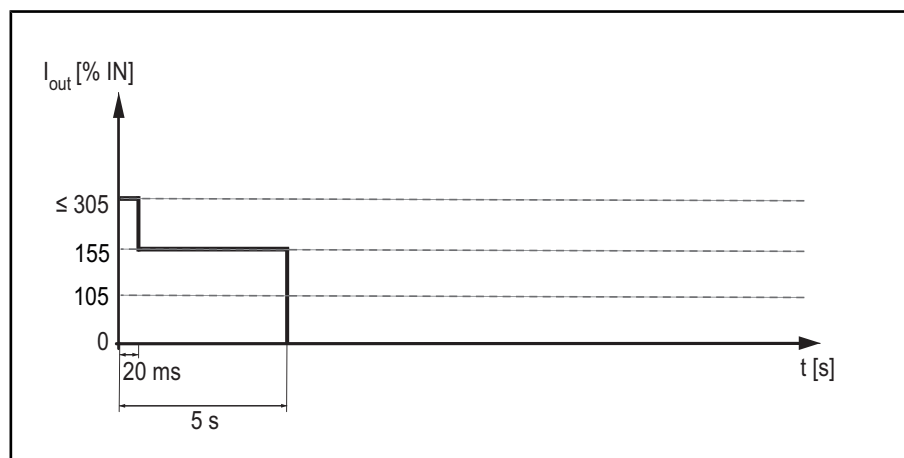


Figure 12 Peak current reserve in buffer mode

Short-circuit protection

In normal mode, short-circuit protection operates in hiccup mode. In the event of a short circuit, the output is switched off and then briefly switched on again at regular intervals to check whether the cause of the fault is still present.

In buffer mode, the output is switched off in the event of a short circuit (latch-off). Observe the information on resuming operation [► Page 27].

A short circuit occurs when the output current exceeds the following values:

- Normal mode: > 605 % of the rated output current
- Buffer mode: > 305 % of the rated output current

Overvoltage protection

The overvoltage protection of the DC UPS control unit is activated as soon as the input voltage exceeds 32 V DC. In this case, the DC UPS control unit switches off (latch-off).

Observe the information on resuming operation [► Page 27].

Over-temperature protection

The overtemperature protection of the DC UPS control unit is activated as soon as the operating temperature at 100 % load reaches the point at which derating begins. In this case, the power supply switches off automatically (latch-off). The power supply remains switched off until the ambient temperature has returned to the permissible operating range or the load has been reduced in accordance with the derating curve.

Observe the information on resuming operation [► Page 27].



The values specified in the derating curve must be observed to prevent the device from overheating.

Resuming operation

Operation can be resumed in different ways, depending on which protective function has been triggered.

The following measures are available for all protective functions:

- The latch reset function can be executed via the **DURAmix DC UPS Manager** software. Further information can be found in the software manual [► Page 6].
- Alternatively, the input supply (X1) and the connection to the battery module (X4) can be disconnected and then reconnected with pins 9 and 10 bridged [► Page 71].

Following a shutdown triggered by overload protection or short-circuit protection, the following additional measure is available:

- The DC UPS control unit can be restarted using the cold start function. To do this, press the external pushbutton for at least 3 seconds [► Page 34].

4 Buffer mode and functions

4.1 Battery modules

Weidmüller battery modules are available as accessories [► Page 74].



Only

VRLA-AGM batteries may be used to operate the DC UPS control unit. Using other battery types will cause the DC UPS control unit to malfunction.



26 Ah and 38 Ah batteries are user-specific VRLA-AGM batteries that are not included in the Weidmüller portfolio. We recommend using the Genesis NP series from the battery manufacturer EnerSys or the LP series from the manufacturer Leoch.

4.2 Parallel connection of battery modules

Connecting battery modules in parallel increases the total capacity and extends the maximum buffer time. Observe the following safety notes and requirements.

Safety notes

- There is a risk of explosion if the battery is short-circuited. Never short-circuit the positive and negative terminals of the battery directly. Ensure correct polarity during connection and insulate any exposed cable ends.
- Excessive charging current can cause the battery to overheat and may lead to fire or explosion. Ensure that the charging current is configured according to the battery capacity and the manufacturer's specifications.
- If customer-specific battery modules are used, check whether they have an internal overcurrent protection device. If a short circuit occurs without a suitable overcurrent protection device, fire and severe injuries may result. For battery modules without an internal overcurrent protection device, a suitable external overcurrent protection device must be installed. The number of external overcurrent protection devices, their fuse ratings and characteristics must be selected in accordance with the specifications for the DUR-Aeco LA BAT battery module [► Page 6]. For customer-specific battery modules with a capacity of 26 Ah or 38 Ah, the user is responsible for specifying the required external overcurrent protection device.



With Weidmüller battery modules, an external overcurrent protection device is not required, as this is already integrated in the battery modules.

The following requirements must be observed when establishing a parallel connection:

- Connect no more than two battery modules in parallel, and only modules of the same type.
- When connecting two battery modules in parallel, use cables of the same length.
- Only use batteries of the same type and size within a battery module.
- Use only batteries approved by Weidmüller.
- Use batteries with a maximum charging capacity of 50 Ah.



We recommend using two new battery modules to ensure even loading.



For parallel connection, set the battery selection rotary coding switch to the capacity of a single battery module.

Example For two battery modules of 1.2 Ah each, select the setting 1.2 Ah.



WARNING

Fire hazard due to high currents if no fuse protection is provided

In a parallel connection of battery modules with a capacity between 38 Ah and 50 Ah, very high balancing or short-circuit currents may occur if a fault arises in one of the batteries. Without separate fuse protection for each battery module, this can lead to overheating, cable fires and destruction of the batteries. This may result in severe injuries or life-threatening situations.

- Protect each battery module in a parallel connection using an appropriate external overcurrent protection device, such as an ATO fuse.

Fuse size Taking cable cross-sections and load conditions into account, we recommend the following fuse sizes:

- 15 A (time-lag) fuse per battery module for a 20 A DC UPS control unit
- 25 A (time-lag) fuse per battery module for a 40 A DC UPS control unit



An external temperature sensor must be connected to avoid functional limitations of the DC UPS control unit. As the DC UPS control unit has only one connection, only one temperature sensor can be connected [► Page 75]. The external temperature sensor is placed between the two battery modules [► Page 30]. Parallel or series connection of temperature sensors is not permitted.

Observe the further information on the temperature sensor [► Page 18].

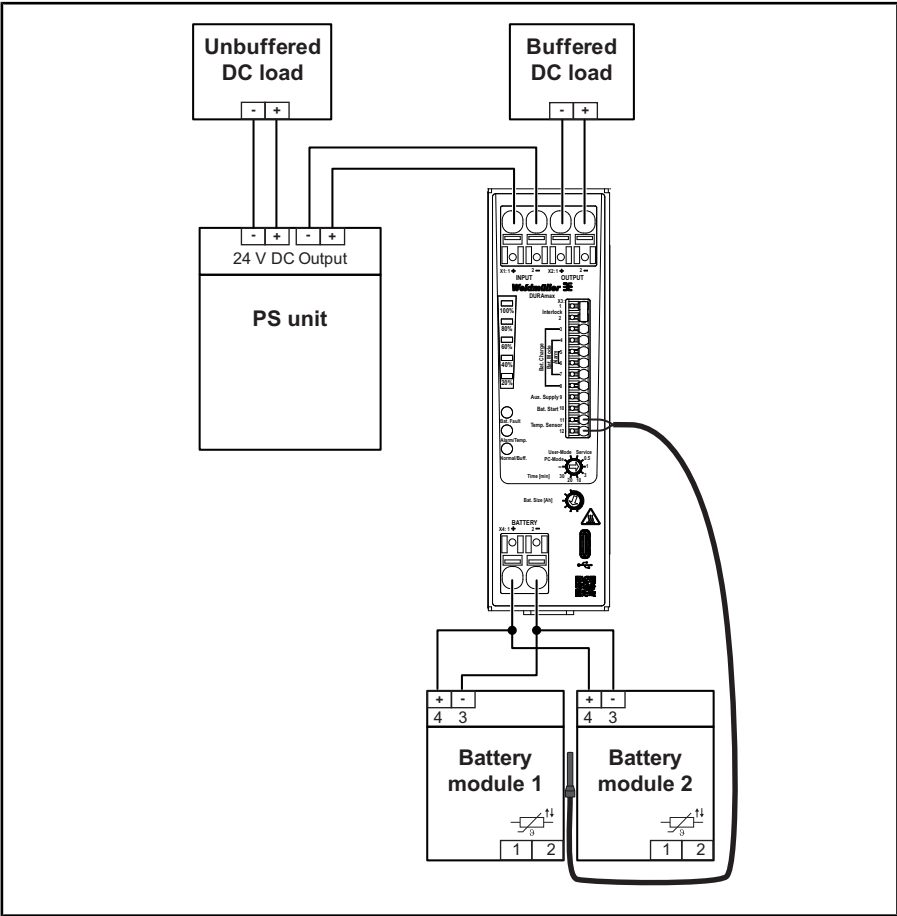
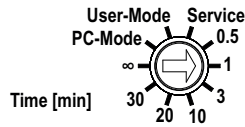


Figure 13 Parallel connection of battery modules

4.3 Modes of operation



The operating mode rotary coding switch is used to set the operating mode and the buffer time [► Page 19].

Battery shutdown when the deep discharge threshold is reached ∞

This function protects the battery from harmful deep discharge. Once the battery voltage falls to 19.2 V DC, the DC UPS control unit automatically stops supplying the loads. The protective threshold of 19.2 V DC applies regardless of the duration of buffer mode. Shutdown takes place immediately once the voltage falls below the limit value. This threshold protects the battery from deep discharge. At the same time, a minimal residual charge is retained, ensuring reproducible behaviour during prolonged mains failures.

Functionality If the battery voltage drops to 19.2 V DC due to the connected load and the battery condition, the DC UPS control unit detects that the voltage has fallen below the deep discharge threshold and immediately initiates a controlled shutdown of the loads. It then stops supplying energy from the battery and remains in a safe state until the mains supply is restored or a manual restart is performed. The voltage threshold takes precedence over time-based or state-based criteria: even if a different shutdown time or SOC limit value is configured, shutdown always occurs at 19.2 V DC.

ATTENTION

Once a battery module has been discharged to 19.2 V DC, it must be recharged promptly, as it may otherwise be destroyed.



For maximum availability, we recommend configuring sufficient buffer time and limiting the load so that the 19.2 V DC threshold is not reached under normal circumstances.

PC mode

PC mode is intended for a permanent connection between the DC UPS control unit and an IPC via the USB interface. In this operating mode, the **DURAmox DC UPS Manager** software allows the following actions:

- Monitoring real-time data of the DC UPS control unit
- Configuring the operating parameters of the DC UPS control unit
- Installing firmware updates

If the connection between the DC UPS control unit and the PC is interrupted, the following occurs:

- The DC UPS control unit automatically applies the last configured parameters
- Real-time data is no longer displayed
- System events are no longer logged

In the event of a mains failure, the DC UPS control unit sends a signal. This signal triggers a controlled and safe shutdown of the IPC to prevent data loss and system damage.



Further information can be found in the software manual [► Page 6].

User mode

User mode is intended for a temporary connection of the DC UPS control unit to a PC or IPC via the USB interface. In this operating mode, the **DURAmox DC UPS Manager** software allows the following actions:

- Monitoring real-time data of the DC UPS control unit
- Configuring the operating parameters of the DC UPS control unit
- Installing firmware updates

The configuration is saved permanently in the DC UPS control unit; the connection can then be disconnected.

Service mode



Service mode must only be used by qualified electricians who are familiar with national and international laws, provisions and standards.

Service mode enables safe commissioning and maintenance work on the DURAmox DC UPS. In service mode, the internal charger is deactivated so that work on the battery module can be carried out safely.

Observe the information on battery replacement [► Page 67].

Battery disconnection after the configured buffer time

The duration of the DURAmix buffer mode can be limited. Once the configured buffer time has elapsed, the DC UPS control unit switches off the connected loads in a controlled manner. This function protects the battery from deep discharge and ensures that a minimum capacity is retained for a restart or for an orderly shutdown. This ensures that the availability of the system remains predictable even during prolonged mains failures.

Functionality During a mains failure, the DC UPS control unit automatically switches to buffer mode and starts the timing process. Once the configured maximum duration is reached, the DC UPS control unit switches off the connected loads in a controlled manner. The DC UPS control unit remains in a safe state and awaits the restoration of the mains supply. The time-based shutdown is independent of the state of charge (SOC) or the battery voltage. If a protection limit is reached, such as undervoltage, the UPS control unit will also switch off before the configured buffer time expires.

Setting The shutdown time in buffer mode is set in minutes. Typical values depend on the load profile, the desired bridging time and the required safety margin. The configured buffer time should be selected at approximately 10 % to 20 % below the expected maximum duration. This takes ageing effects and temperature dependencies into account.



Regularly check the load, temperature, SOC and overall condition, as all these factors influence the service life of the DC UPS control unit and the battery module.

Observe the information provided in the **DURAmix DC UPS Manager** software.



When the device switches off after the configured buffer time, the battery voltage is monitored for the deep discharge threshold. The device will also switch off if the deep discharge threshold is reached before the time expires [► Page 31].

4.4 Cold start function (black start)

The DURAmix DC UPS has a cold start function that allows it to start without a supply voltage applied at the input. In this process, the DC UPS control unit uses the energy of the connected battery module to supply itself and the connected loads. After starting, the DC UPS control unit immediately operates in buffer mode.



To use the cold start function, a temperature sensor must be connected [► Page 18].

The cold start function can be triggered via an external pushbutton. The pushbutton must close the following signal contacts for at least 3 seconds:

- Pin 9 (Aux. Supply)
- Pin 10 (Bat. Start)

If no external pushbutton is used, pins 9 and 10 must be bridged.

The autonomous operation of the DC UPS control unit ends automatically when one of the following conditions is met:

- The supply voltage at the input becomes available again.
- A shutdown condition is triggered, for example by the battery's deep discharge protection.

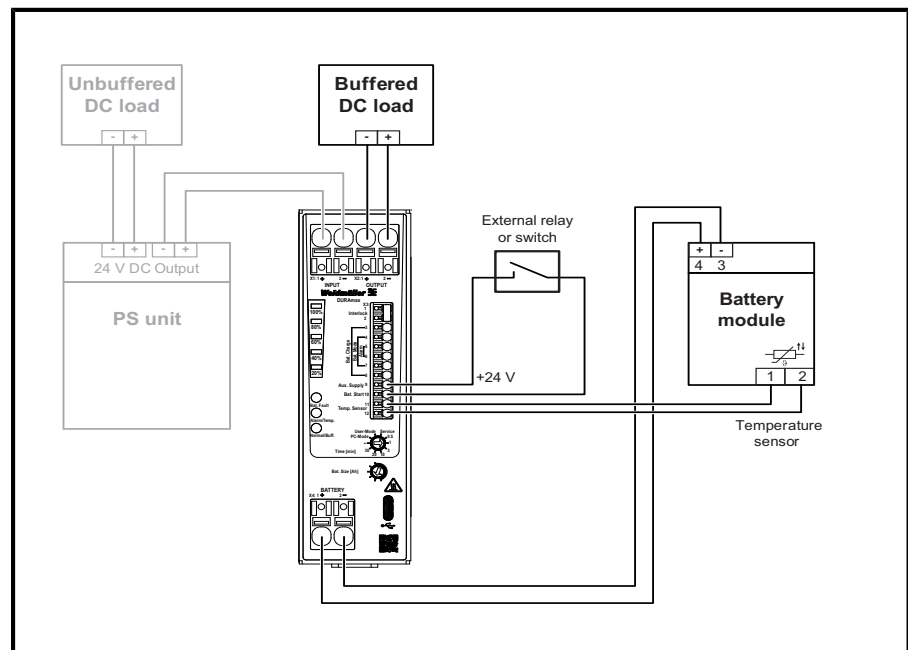


Figure 14 Cold start function

4.5 Interlock function

The interlock input is located at connections 1 and 2 of the signal connection terminal (X3). There are three ways to enable or block buffer mode:

- **Bridge between the connections**
By default, a bridge is installed between connections 1 and 2. This bridge enables buffer mode. If the bridge is removed, buffer mode is blocked.
- **External switch**
Alternatively, buffer mode can be enabled or blocked using an external switch.
- **Applying a voltage**
Buffer mode is also enabled when 24 V is applied to pin 2 of the signal connection terminal.

Further information can be found in the technical data of the respective device.



If buffer mode is blocked and the DC UPS control unit is not supplied via the input terminals (X1), the DC UPS control unit remains energised because the battery module supplies energy. To prevent the battery module from becoming deeply discharged, the ATO blade fuse of the battery module must be removed.

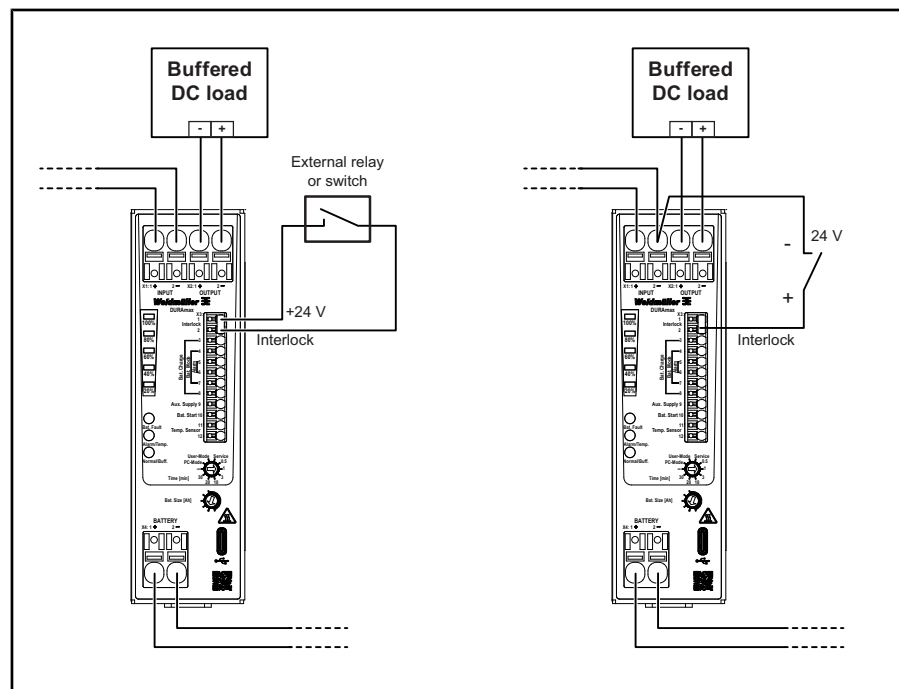


Figure 15 Interlock function

4.6 Auxiliary power supply (Aux. Supply)

General description of the auxiliary voltage

The potential for the auxiliary voltage is available at signal connection X3, contact 9 (Aux. Supply) [► Page 15].

The auxiliary voltage can supply a potential to the relay outputs Bat. Charge, Bat. Mode and Alarm. This potential can be evaluated by a controller. The auxiliary voltage can also supply smaller loads. These loads remain in operation even if output X2 fails. The permissible ratings must be observed.

The reference potential of the auxiliary voltage corresponds to the negative pole of the output at the supply connection (X2: 2 -).

Generation of the auxiliary voltage

The source of the auxiliary voltage depends on the operating mode of the DC UPS control unit. The auxiliary voltage follows the source voltage. The auxiliary voltage is maintained without interruption when the operating mode changes. The sources are not connected in parallel.

Operating mode	Source of the auxiliary voltage
Normal mode	Input (X1)
Buffer mode	Battery (X4)

Technical data for the auxiliary voltage

Characteristic	
Voltage range	18...30 V DC
Reference potential	Output (X2: 2 -)
Max. voltage difference from the source voltage	-0.5 V
Maximum output current	200 mA
Protective functions	Overload protection, short-circuit protection and overtemperature protection

4.7 Battery charging behaviour

The DURAmix DC UPS charges the connected battery in three phases:

- Constant current phase (Phase 1): In this phase, the battery is charged with constant current while the charging voltage continuously increases until it reaches the value V_{boost} . The state of charge (SOC) increases quickly and linearly. A battery is considered fully charged once its state of charge reaches 90 %.
- Constant voltage phase (Phase 2): As soon as the charging voltage reaches V_{boost} , the battery is charged at constant voltage. The charging current decreases steadily while the SOC continues to rise, approaching 100 %.
- Float charge phase (Phase 3): In this phase, the voltage is reduced to the value V_{float} to maintain the SOC. The charging current decreases to a low float current to prevent overcharging and to keep the battery in optimal condition over time.

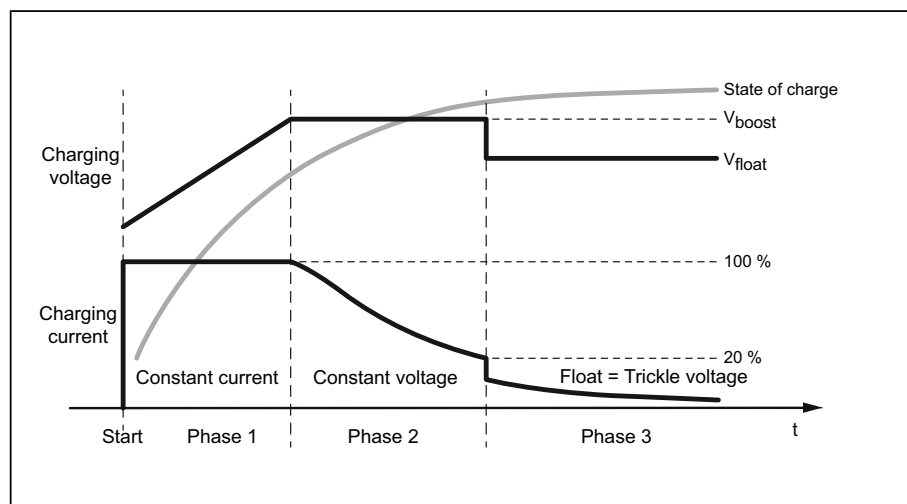


Figure 16 Example: Battery charging behaviour

4.8 Temperature-dependent battery behaviour

The maximum output current of the DURAmix UPS depends on the ambient temperature and the operating mode.



To avoid an overtemperature shutdown, the derating must be observed [► Page 24].

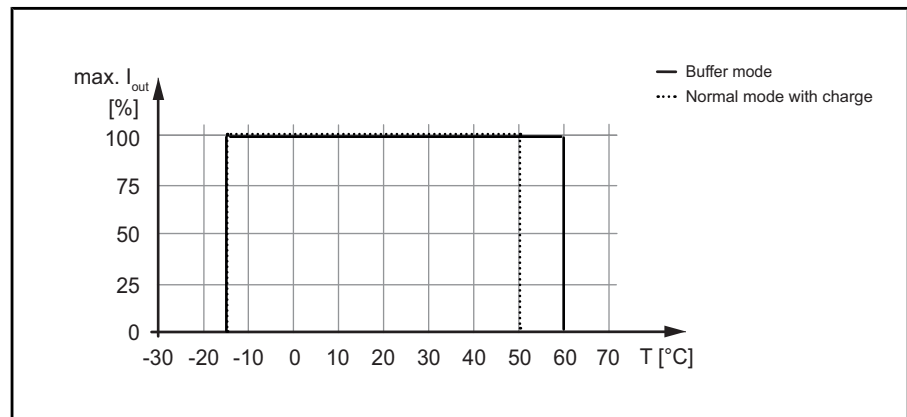


Figure 17 Temperature-dependent charging and discharging behaviour of the battery module

The DURAmix DC UPS automatically adjusts the charging voltage to the ambient temperature to ensure optimal charging and protection of the battery under varying conditions. At low temperatures, a higher voltage is used to improve charging capability. As the temperature increases, the system reduces the voltage to prevent the battery from overheating. A temperature sensor must be connected for temperature-controlled adjustment of the charging voltage [► Page 18].

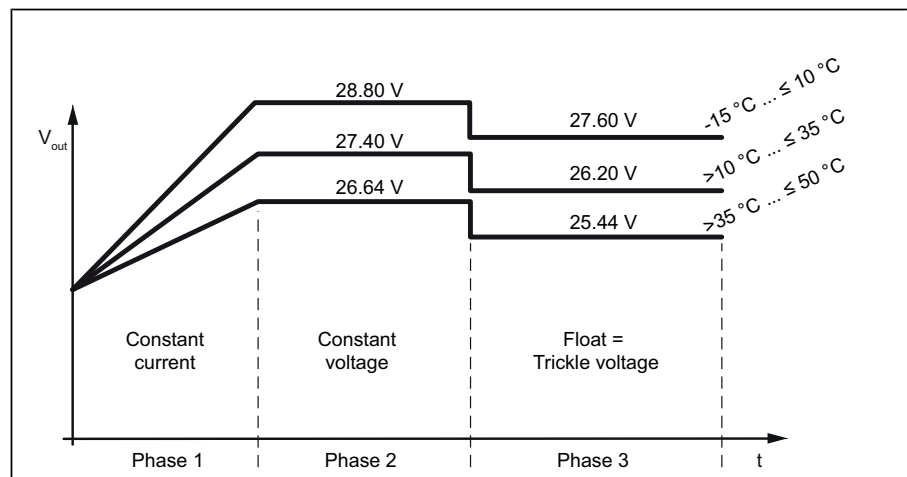


Figure 18 Battery charging voltage

4.9 Battery diagnostics

The DURAmix DC UPS automatically performs various battery diagnostics to monitor the connection, functionality and condition of the battery module.

Behaviour During battery tests, the behaviour of the DC UPS control unit may temporarily differ from its normal operating state. Test results are signalled via the operating status LED [► Page 21]. They are also signalled via the status relays [► Page 17].

During the tests, the battery charge status may temporarily differ from the actual state of charge. States resulting from the tests do not constitute a fault.

Duration It may take up to 2 minutes to perform all the battery tests. Once the tests are complete, the state of the status relays again corresponds to the current device state.

Scope Battery diagnostics comprise three test procedures that are performed at defined intervals.

Battery detection test

The battery detection test evaluates the applied battery voltage to determine whether the battery module is connected and functional.

Interval 1 x per minute

Battery voltage	Result
18...30 V DC	Battery module functional
< 18 V DC or > 30 V DC	Battery module not functional
< 2 V DC	Battery module not connected

Battery cell short-circuit test

The battery cell short-circuit test detects cell faults in the battery module.

Interval Once after 7 days and after each switch-on

- The test is only performed when the battery module is fully charged.
- If this condition is not met, the test is automatically postponed and performed later.

Battery state-of-health test

The battery state-of-health test (SOH) assesses the overall condition of the battery module over its service life. The test result forms the basis for ongoing condition assessment and maintenance planning.

Interval Once after 30 days

- The test is performed 5 minutes after the battery has been fully charged.
- If this condition is not met, the test is automatically postponed and performed later.

Initialization During SOH initialization, a reference value for the battery module is determined for assessing the battery condition. SOH initialization takes place after a battery replacement or successful commissioning [► Page 64]. The reference value determined forms the basis for all subsequent battery state-of-health tests.



If the full charging process is interrupted, determination of the reference value is delayed until the next full charging process.

Signalling Poor battery condition is not signalled via the LEDs of the DC UPS control unit. The PC application displays the SOH of the battery module.



Further information can be found in the software manual [► Page 6].

- Notes**
- If the battery condition is assessed as poor, the battery module must be replaced promptly.
 - A single SOH value is determined when batteries connected in parallel are used. The parallel connection may limit the accuracy of the SOH value determined.
 - SOH initialization must be repeated after a battery replacement. To do this, the DC UPS control unit must be disconnected from all power sources.

5 Installation planning

5.1 Device clearances

When mounting a DC UPS control unit, minimum clearances from other devices and enclosure parts must be maintained. This is the only way to ensure sufficient air circulation and a long service life for the DC UPS control unit. Also observe the temperature-dependent output power (derating) and the temperature behaviour of the device [► Page 24].

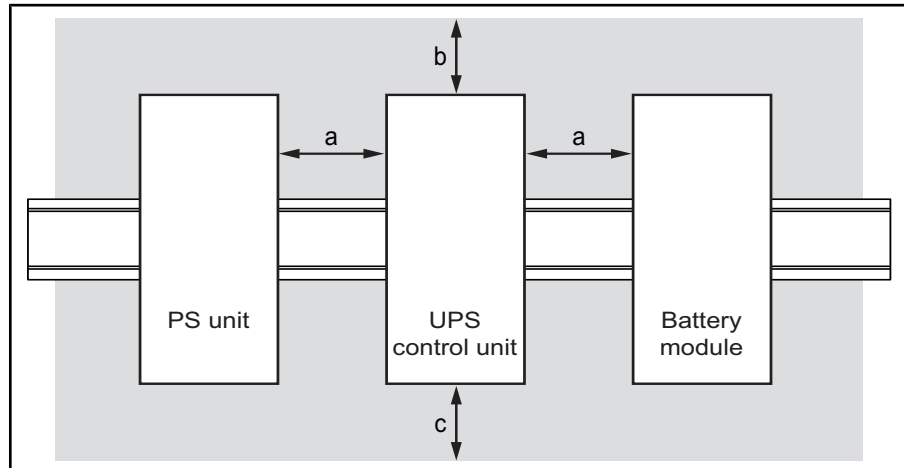


Figure 19 Minimum clearances

DURAmix DC UPS 24V 5A Active neighbouring components

Distance	Position	Minimum distance
a	Distance between devices	20 mm
b	Vertical clearance above	20 mm
c	Vertical clearance below	40 mm

Passive neighbouring components

Distance	Position	Minimum distance
a	Distance between devices	0 mm
b	Vertical clearance above	40 mm
c	Vertical clearance below	40 mm

DURAmox DC UPS 24V 10A Active neighbouring components

Distance	Position	Minimum distance
a	Distance between devices	5 mm
b	Vertical clearance above	40 mm
c	Vertical clearance below	40 mm

Passive neighbouring components

Distance	Position	Minimum distance
a	Distance between devices	0 mm
b	Vertical clearance above	40 mm
c	Vertical clearance below	40 mm

DURAmox DC UPS 24V 20A Active neighbouring components

Distance	Position	Minimum distance
a	Distance between devices	5 mm
b	Vertical clearance above	30 mm
c	Vertical clearance below	30 mm

Passive neighbouring components

Distance	Position	Minimum distance
a	Distance between devices	0 mm
b	Vertical clearance above	30 mm
c	Vertical clearance below	30 mm

DURAmox DC UPS 24V 40A Active neighbouring components

Distance	Position	Minimum distance
a	Distance between devices	5 mm
b	Vertical clearance above	30 mm
c	Vertical clearance below	30 mm

Passive neighbouring components

Distance	Position	Minimum distance
a	Distance between devices	0 mm
b	Vertical clearance above	30 mm
c	Vertical clearance below	30 mm

5.2 Installation position

The standard mounting position for a DC UPS control unit is on a horizontal DIN rail.



Alternatively, wall mounting is also possible [► Page 63].

Installation on a horizontal rail

For horizontal installation, adequate convection must be ensured, as well as compliance with the required device clearances.

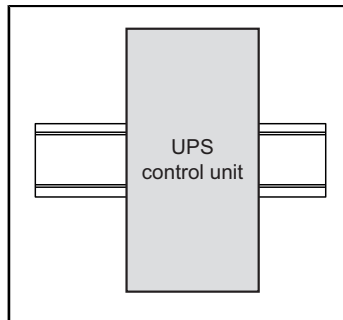


Figure 20 Horizontal installation

Observe the additional information on installation [► Page 61].

5.3 Selecting the power supply and battery module

The system components must be sized to work together to ensure reliable operation of the DURAmix DC UPS. System sizing covers the battery module and the upstream power supply.



When selecting the battery module and power supply, also observe the information in the Accessories [► Page 74] chapter.

Selecting the battery module

The battery module is selected according to the connected load and the required buffer time.



Weidmüller battery modules are designed for operation with the DURAmix DC UPS [► Page 74]. For battery modules from other manufacturers, check the technical data for the permissible battery capacity, maximum discharge current and required overcurrent protection measures.

As the battery capacity increases, the available bridging time in buffer mode increases. The permissible battery capacities are specified in the technical data for the respective DURAmix DC UPS device variant [► Page 45].

Sizing the power supply

The power supply must be sized to provide the maximum load current of the DC UPS control unit, the additional charging current of the internal charger and the current required by other internal functions (e.g. Aux. Supply). For stable operation, select a power supply with a rated current higher than that of the DURAmix DC UPS.

Example For a DURAmix DC UPS 5 A, a power supply in the next higher power class is recommended, e.g. a PROmax 7.5 A or a PROtop 10 A.

Selecting the next higher power class provides the required power reserves, for example to enable faster recharging of the battery module while supplying a high load. The maximum charging current is specified in the technical data for the respective DURAmix DC UPS device variant [► Page 45].

Use power supplies with an output voltage and power rating suitable for operation with the DURAmix DC UPS. Power supplies from the PROmax or PROtop product family are recommended for typical applications.

6 Product descriptions

6.1 DURAmox DC UPS 24V 5A

Device overview

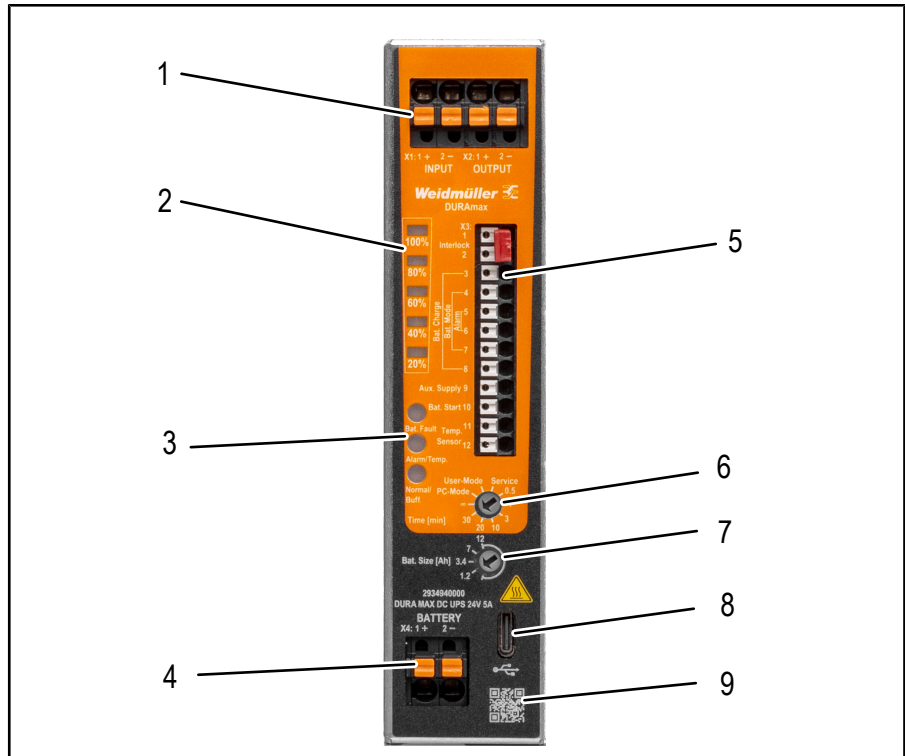


Figure 21 Overview of the DURAmox DC UPS 24V 5A (2934940000)

- | | |
|------------------------------|--|
| 1 Supply connection (X1, X2) | 6 Operating mode rotary coding switch |
| 2 State-of-charge LED | 7 Battery selection rotary coding switch |
| 3 Operating status LED | 8 Communication interface (USB-C) |
| 4 Battery connection (X4) | 9 QR code |
| 5 Signal connection (X3) | |

Block diagram

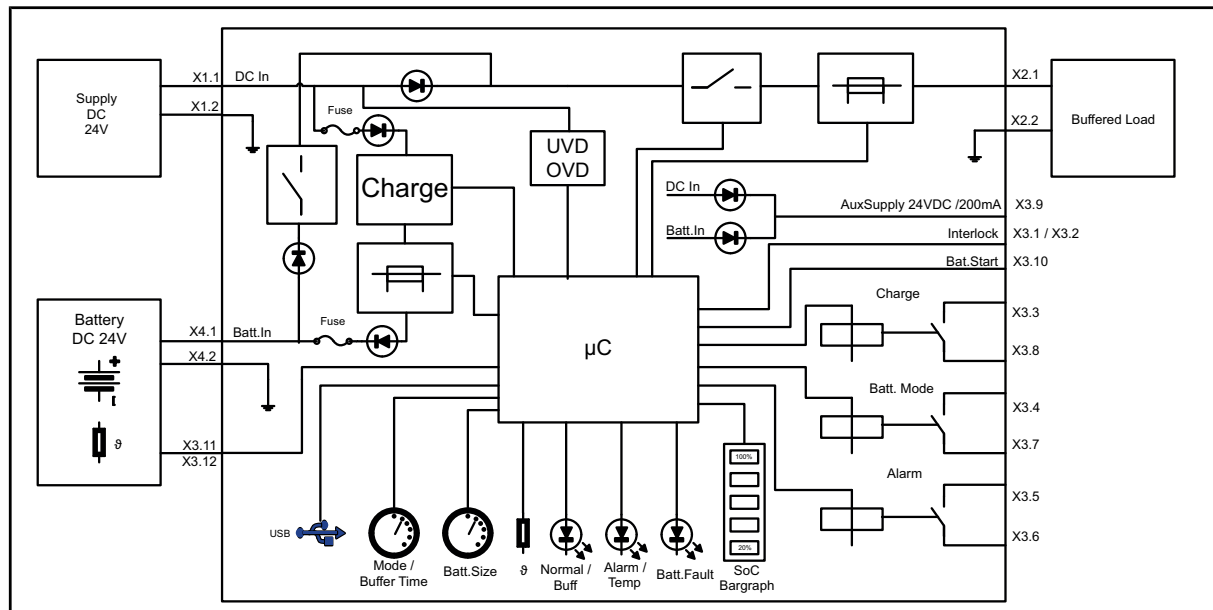


Figure 22 **Block diagram**

Connection data

	X1, X2, X4	X3
Connection system	PUSH IN	PUSH IN
Wire cross-section, solid (AWG)	1...2.5 mm² (18...14)	0.2...1.5 mm² (25...16)
Wire cross-section, flexible (AWG) ¹⁾	1...2.5 mm² (18...14)	0.2...1.5 mm² (25...16)
Stripping length	10 mm	8 mm
Max. cable length	≤ 1.5 m	–

1) Wire-end ferrules are required when using flexible conductors.

1) Wire-end ferrules are required when using flexible conductors.

Technical data

Input data

Rated input voltage	24 V DC $\pm 2\%$
Voltage range	18...30 V DC
Max. input current	≤ 9.0 A
Input fuse	Internal, for internal charger only
Switch-on time for DC output	< 2 s
Switch-on time for internal charger output	< 7 s
Ramp-up time for DC output / internal charger output / Aux. Supply	< 100 ms
Voltage drop during switchover (DC/battery input 24 V, threshold 21.6 V)	≥ 19.2 V DC
Current consumption charging / not charging	< 45 mA at 24 V DC / < 30 mA
Reverse polarity protection (input and battery)	yes

Output data

Output voltage range, normal/buffer mode	17.5...29.5 V DC, V_{in} -0.5 V DC at rated output current
--	--

Output data

Rated output current	max. 5 A $\pm 3\%$
Output fuse	Internal, for internal charger only
Derating ¹⁾	2.5 %/K above 60 °C...70 °C
Peak current reserve	
Normal mode	> 105...155 % I_{nom} for 6 ms / > 155...605 % I_{nom} for 700 ms ²⁾
Buffer mode	> 105...155 % I_{nom} for 5 ms / > 155...305 % I_{nom} for 20 ms

1) Derating curve [► Page 24]

2) Depending on the power supply

Internal charger

Charging characteristic	UI characteristic curve
Temperature coefficient	-48 mV/°C
Supported battery capacities	1.2 Ah / 3.4 Ah / 7 Ah / 12 Ah
Corresponding charging current for each battery capacity	1.2 Ah: 0.2 A (default) 3.4 Ah: 0.5 A 7 Ah: 1.0 A 12 Ah: 1.5 A (tolerance: ± 0.1 A)
Battery availability test	yes
Suitable for VRLA-AGM batteries (24 V battery modules)	yes
Parallel connection option for battery modules	Maximum of 2 units of the same size

Status indicators

Temperature sensor connection	NTC 100 k Ω $\pm 5\%$
Status relay	30 V DC / AC, 1.0 A
Battery charge status (green LED)	100 % / 80 % / 60 % / 40 % / 20 %
Operating status (LED)	Battery fault (Bat. Fault) Alarm/temperature sensor (Alarm/Temp.) Normal/buffer mode (Normal/Buf.)

Ambient conditions

Ambient temperature in operation	-25...+70 °C (-40 °C cold start)
Ambient temperature for storage, transport	-40...+85 °C
Max. perm. humidity, operation	5...95 % RH, non-condensing
Battery ambient temperature ¹⁾	-15...+50 °C

1) Battery charging and discharging behaviour [► Page 38]

General data

Height × width × depth (a × b × c) ¹⁾	130 × 30 × 125 mm
Weight	0.5 kg
Degree of protection	IP20
Protection class	III
Pollution severity	2
Operating altitude, max.	5000 m
Efficiency, typ.	98 % (normal mode, without internal charger)
MTBF according to IEC 61709	> 1,000,000 h at 25 °C

General data	
Protection against reverse voltages from the load	≤ 35 V DC
1) Device orientation ► Page 7]	

6.2 DURAmox DC UPS 24V 10A

Device overview

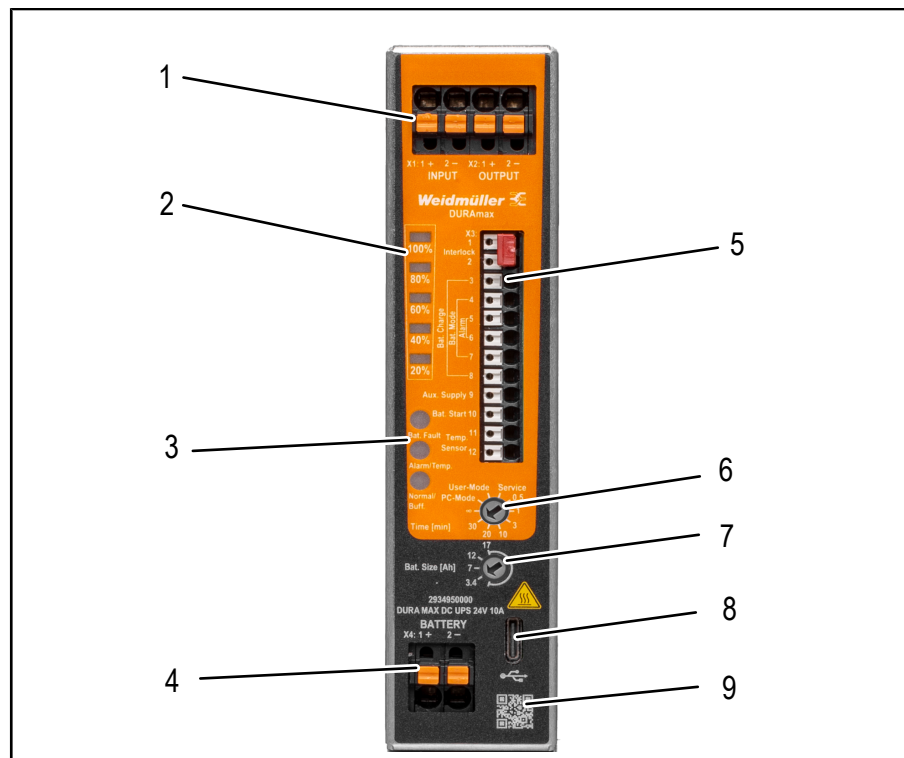


Figure 23 Overview of the DURAmox DC UPS 24V 10A (2934950000)

- | | |
|------------------------------|--|
| 1 Supply connection (X1, X2) | 6 Operating mode rotary coding switch |
| 2 State-of-charge LED | 7 Battery selection rotary coding switch |
| 3 Operating status LED | 8 Communication interface (USB-C) |
| 4 Battery connection (X4) | 9 QR code |
| 5 Signal connection (X3) | |

Block diagram

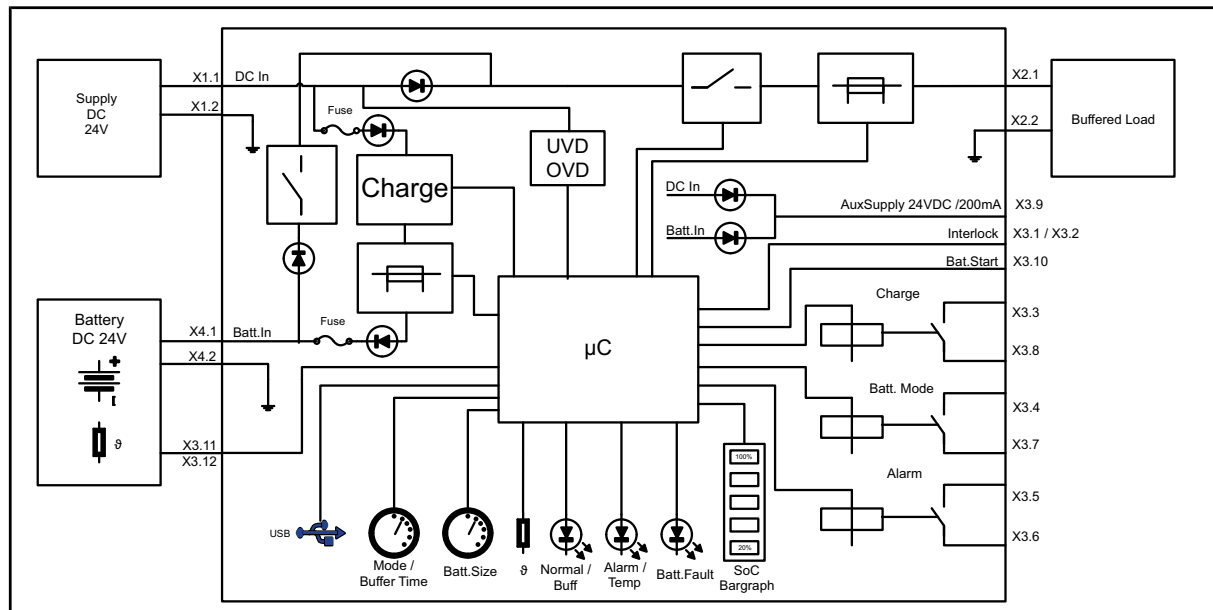


Figure 24 Block diagram

Connection data

	X1, X2, X4	X3
Connection system	PUSH IN	PUSH IN
Wire cross-section, solid (AWG)	1.5...2.5 mm ² (16...14)	0.2...1.5 mm ² (25...16)
Wire cross-section, flexible (AWG) ¹⁾	1.5...2.5 mm ² (16...14)	0.2...1.5 mm ² (25...16)
Stripping length	10 mm	8 mm
Max. cable length	≤ 1.5 m	–

1) Wire-end ferrules are required when using flexible conductors.

Technical data

Input data

Rated input voltage	24 V DC ±2 %
Voltage range	18...30 V DC
Max. input current	≤ 15.0 A
Input fuse	Internal, for internal charger only
Switch-on time for DC output	< 2 s
Switch-on time for internal charger output	< 7 s
Ramp-up time for DC output / internal charger output / Aux. Supply	< 100 ms
Voltage drop during switchover (DC/battery input 24 V, threshold 21.6 V)	≥ 19.2 V DC
Current consumption charging / not charging	< 45 mA at 24 V DC / < 30 mA
Reverse polarity protection (input and battery)	yes

Output data

Output voltage range, normal/buffer mode	17.5...29.5 V DC, $V_{in} - 0.5$ V DC at rated output current
--	---

Output data

Rated output current	max. 10 A $\pm 3\%$
Output fuse	Internal, for internal charger only
Derating ¹⁾	2.5 %/K above 60 °C...70 °C
Peak current reserve	
Normal mode	> 105...155 % I_{nom} for 6 ms / > 155...605 % I_{nom} for 700 ms ²⁾
Buffer mode	> 105...155 % I_{nom} for 5 ms / > 155...305 % I_{nom} for 20 ms

1) Derating curve [► Page 24]

2) Depending on the power supply

Internal charger

Charging characteristic	UI characteristic curve
Temperature coefficient	-48 mV/°C
Supported battery capacities	3.4 Ah / 7 Ah / 12 Ah / 17 Ah
Corresponding charging current for each battery capacity	3.4 Ah = 0.5 A (default) 7 Ah = 1.0 A 12 Ah = 1.5 A 17 Ah = 2.0 A all: ± 0.1 A
Battery availability test	yes
Suitable for VRLA-AGM batteries (24 V battery modules)	yes
Parallel connection option for battery modules	Maximum of 2 units of the same size

Status indicators

Temperature sensor connection	NTC 100 k Ω $\pm 5\%$
Status relay	30 V DC / AC, 1.0 A
Battery charge status (green LED)	100 % / 80 % / 60 % / 40 % / 20 %
Operating status (LED)	Battery fault (Bat. Fault) Alarm/temperature sensor (Alarm/Temp.) Normal/buffer mode (Normal/Buf.)

Ambient conditions

Ambient temperature in operation	-25...+70 °C (-40 °C cold start)
Ambient temperature for storage, transport	-40...+85 °C
Max. perm. humidity, operation	5...95 % RH, non-condensing
Battery ambient temperature ¹⁾	-15...+50 °C

1) Battery charging and discharging behaviour [► Page 38]

General data

Height × width × depth (a × b × c) ¹⁾	130 × 30 × 125 mm
Weight	0.5 kg
Degree of protection	IP20
Protection class	III
Pollution severity	2
Operating altitude, max.	5000 m
Efficiency, typ.	98 % (normal mode, without internal charger)
MTBF according to IEC 61709	> 1,000,000 h at 25 °C

General data	
Protection against reverse voltages from the load	≤ 35 V DC
1) Device orientation ► Page 7]	

6.3 DURAmox DC UPS 24V 20A

Device overview

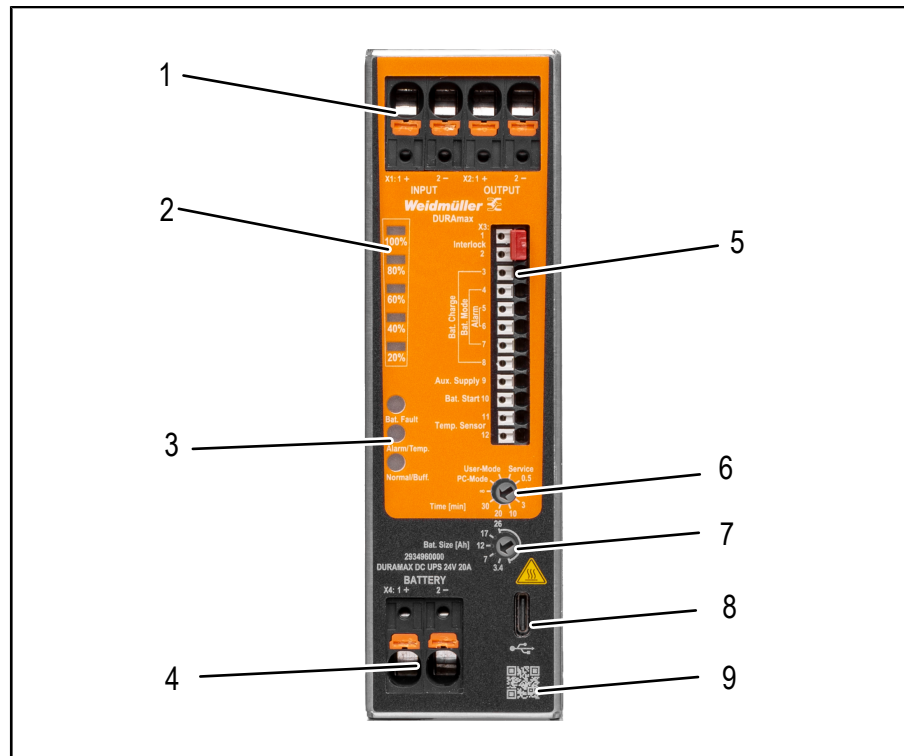


Figure 25 Overview of the DURAmox DC UPS 24V 20A (2934960000)

- | | |
|------------------------------|--|
| 1 Supply connection (X1, X2) | 6 Operating mode rotary coding switch |
| 2 State-of-charge LED | 7 Battery selection rotary coding switch |
| 3 Operating status LED | 8 Communication interface (USB-C) |
| 4 Battery connection (X4) | 9 QR code |
| 5 Signal connection (X3) | |

Block diagram

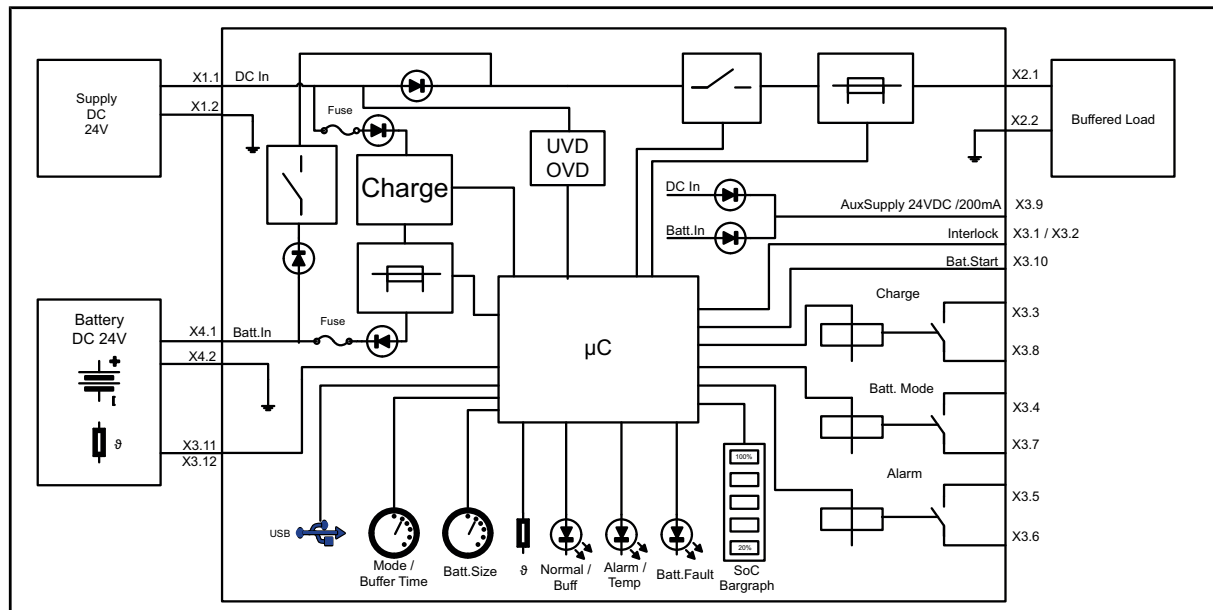


Figure 26 Block diagram

Connection data

	X1, X2, X4	X3
Connection system	PUSH IN	PUSH IN
Wire cross-section, solid (AWG)	4...6 mm ² (12...10)	0.2...1.5 mm ² (25...16)
Wire cross-section, flexible (AWG) ¹⁾	4...6 mm ² (12...10)	0.2...1.5 mm ² (25...16)
Stripping length	12 mm	8 mm
Max. cable length	≤ 1.5 m	—

1) Wire-end ferrules are required when using flexible conductors.

Technical data

Input data

Rated input voltage	24 V DC ±2 %
Voltage range	18...30 V DC
Max. input current	≤ 26.0 A
Input fuse	Internal, for internal charger only
Switch-on time for DC output	< 2 s
Switch-on time for internal charger output	< 7 s
Ramp-up time for DC output / internal charger output / Aux. Supply	< 100 ms
Voltage drop during switchover (DC/battery input 24 V, threshold 21.6 V)	≥ 19.2 V DC
Current consumption charging / not charging	< 60 mA at 24 V DC / < 30 mA
Reverse polarity protection (input and battery)	yes

Output data

Output voltage range, normal/buffer mode	17.5...29.5 V DC, $V_{in} - 0.5$ V DC at rated output current
--	---

Output data

Rated output current	max. 20 A ± 3 %
Output fuse	Internal, for internal charger only
Derating ¹⁾	2.5 %/K above 60 °C...70 °C
Peak current reserve	
Normal mode	> 105...155 % I_{nom} for 6 ms / > 155...605 % I_{nom} for 700 ms ²⁾
Buffer mode	> 105...155 % I_{nom} for 5 ms / > 155...305 % I_{nom} for 20 ms

1) Derating curve [► Page 24]

2) Depending on the power supply

Internal charger

Charging characteristic	UI characteristic curve
Temperature coefficient	-48 mV/°C
Supported battery capacities	3.4 Ah / 7 Ah / 12 Ah / 17 Ah / 26 Ah
Corresponding charging current for each battery capacity	3.4 Ah = 0.5 A (default) 7 Ah = 1.0 A 12 Ah = 1.5 A 17 Ah = 2.0 A 26 Ah = 3.0 A all: ± 0.1 A
Battery availability test	yes
Suitable for VRLA-AGM batteries (24 V battery modules)	yes
Parallel connection option for battery modules	Maximum of 2 units of the same size

Status indicators

Temperature sensor connection	NTC 100 k Ω ± 5 %
Status relay	30 V DC / AC, 1.0 A
Battery charge status (green LED)	100 % / 80 % / 60 % / 40 % / 20 %
Operating status (LED)	Battery fault (Bat. Fault) Alarm/temperature sensor (Alarm/Temp.) Normal/buffer mode (Normal/Buf.)

Ambient conditions

Ambient temperature in operation	-25...+70 °C (-40 °C cold start)
Ambient temperature for storage, transport	-40...+85 °C
Max. perm. humidity, operation	5...95 % RH, non-condensing
Battery ambient temperature ¹⁾	-15...+50 °C

1) Battery charging and discharging behaviour [► Page 38]

General data

Height $\times$ width $\times$ depth (a $\times$ b $\times$ c) ¹⁾	130 $\times$ 38 $\times$ 125 mm
Weight	0.6 kg
Degree of protection	IP20
Protection class	III
Pollution severity	2
Operating altitude, max.	5000 m
Efficiency, typ.	98 % (normal mode, without internal charger)

General data	
MTBF according to IEC 61709	> 700,000 h at 25 °C
Protection against reverse voltages from the load	≤ 35 V DC
1) Device orientation [► Page 7]	

6.4 DURAmox DC UPS 24V 40A

Device overview

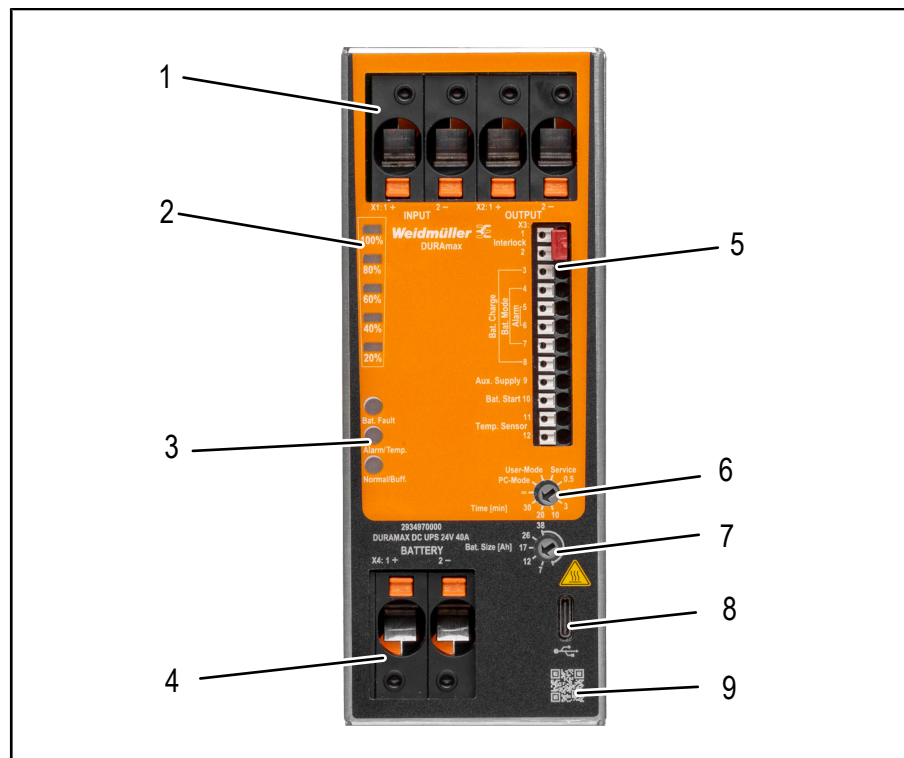


Figure 27 Overview of the DURAmox DC UPS 24V 40A (2934970000)

- | | |
|------------------------------|--|
| 1 Supply connection (X1, X2) | 6 Operating mode rotary coding switch |
| 2 State-of-charge LED | 7 Battery selection rotary coding switch |
| 3 Operating status LED | 8 Communication interface (USB-C) |
| 4 Battery connection (X4) | 9 QR code |
| 5 Signal connection (X3) | |

Block diagram

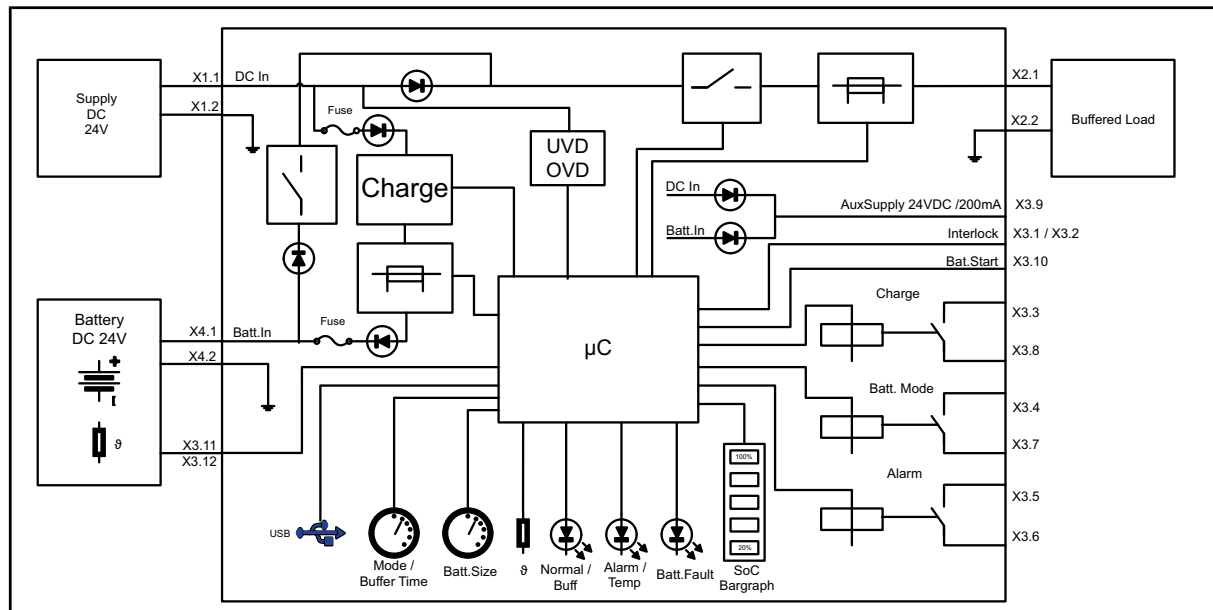


Figure 28 Block diagram

Connection data

	X1, X2, X4	X3
Connection system	PUSH IN	PUSH IN
Wire cross-section, solid (AWG)	10...16 mm ² (8...6)	0.2...1.5 mm ² (25...16)
Wire cross-section, flexible (AWG) ¹⁾	10...16 mm ² (8...6)	0.2...1.5 mm ² (25...16)
Stripping length	18 mm	8 mm
Max. cable length	≤ 1.5 m	–

1) Wire-end ferrules are required when using flexible conductors.

Technical data

Input data

Rated input voltage	24 V DC ±2 %
Voltage range	18...30 V DC
Max. input current	≤ 48.0 A
Input fuse	Internal, for internal charger only
Switch-on time for DC output	< 2 s
Switch-on time for internal charger output	< 7 s
Ramp-up time for DC output / internal charger output / Aux. Supply	< 100 ms
Voltage drop during switchover (DC/battery input 24 V, threshold 21.6 V)	≥ 19.2 V DC
Current consumption charging / not charging	< 82 mA at 24 V DC / < 30 mA
Reverse polarity protection (input and battery)	yes

Output data

Output voltage range, normal/buffer mode	17.5...29.5 V DC, V _{in} -0.5 V DC at rated output current
--	---

Output data

Rated output current	max. 40 A $\pm 3\%$
Output fuse	Internal, for internal charger only
Derating ¹⁾	2.5 %/K above 60 °C...70 °C
Peak current reserve	
Normal mode	> 105...155 % I_{nom} for 6 ms / > 155...605 % I_{nom} for 700 ms ²⁾
Buffer mode	> 105...155 % I_{nom} for 5 ms / > 155...305 % I_{nom} for 20 ms

1) Derating curve [► Page 24]

2) Depending on the power supply

Internal charger

Charging characteristic	UI characteristic curve
Temperature coefficient	-48 mV/°C
Supported battery capacities	7 Ah / 12 Ah / 17 Ah / 26 Ah / 38 Ah
Corresponding charging current for each battery capacity	7 Ah = 1.0 A (default) 12 Ah = 1.5 A 17 Ah = 2.0 A 26 Ah = 3.0 A 38 Ah = 4.0 A all: ± 0.1 A
Battery availability test	yes
Suitable for VRLA-AGM batteries (24 V battery modules)	yes
Parallel connection option for battery modules	Maximum of 2 units of the same size

Status indicators

Temperature sensor connection	NTC 100 k Ω $\pm 5\%$
Status relay	30 V DC / AC, 1.0 A
Battery charge status (green LED)	100 % / 80 % / 60 % / 40 % / 20 %
Operating status (LED)	Battery fault (Bat. Fault) Alarm/temperature sensor (Alarm/Temp.) Normal/buffer mode (Normal/Buf.)

Ambient conditions

Ambient temperature in operation	-25...+70 °C (-40 °C cold start)
Ambient temperature for storage, transport	-40...+85 °C
Max. perm. humidity, operation	5...95 % RH, non-condensing
Battery ambient temperature ¹⁾	-15...+50 °C

1) Battery charging and discharging behaviour [► Page 38]

General data

Height × width × depth (a × b × c) ¹⁾	130 × 50 × 125 mm
Weight	0.7 kg
Degree of protection	IP20
Protection class	III
Pollution severity	2
Operating altitude, max.	5000 m
Efficiency, typ.	98 % (normal mode, without internal charger)

General data	
MTBF according to IEC 61709	> 500,000 h at 25 °C
Protection against reverse voltages from the load	≤ 35 V DC
1) Device orientation [► Page 7]	

7 Installation

7.1 Included in delivery

- 1 DURAmix DC UPS
- 1 mounting adapter, pre-assembled [► Page 74]

7.2 Unpacking the delivery

- Check the delivery for completeness.
- Check the delivery for transport damage.
- Dispose of all packaging in accordance with the local disposal guidelines.
The cardboard packaging can be sent for paper recycling.

7.3 Notes on installation



WARNING

Risk of electric shock

Before working on the device, it should be completely disconnected from the mains and the absence of voltage must be verified.



ATTENTION

The device could be destroyed.

When handling the device, the protective measures against electrostatic discharge (ESD) have to be observed.



The device must only be installed by qualified electricians who are familiar with national and international laws, provisions and standards. The electrical system must be installed in accordance with the general rules of electrical engineering and by qualified specialists.

Observe the General safety notes [► Page 8].

7.4 Preparation for installation



Each device is factory-fitted with a mounting adapter for rail mounting. If the device is to be mounted directly on a wall, the mounting adapter must be removed and replaced with a wall adapter. Wall adapters are available as accessories [► Page 74].



A screwdriver max. 0.6 x 3.5 mm is required to carry out the work.

Fitting the mounting adapter

◇ No wall adapter is fitted on the device.

- ▶ Place the mounting adapter on the back of the device so that the fixing holes align.
- ▶ Screw the mounting adapter to the device.

Removing the mounting adapter

- ▶ Remove the screws securing the mounting adapter.
- ▶ Remove the mounting adapter from the device.

Fitting the wall adapter

◇ The mounting adapter has been removed.

- ▶ Place the wall adapter on the back of the device.
- ▶ Screw the wall adapter to the device.

Removing the wall adapter

- ▶ Remove the screws securing the wall adapter.
- ▶ Remove the wall adapter from the device.

7.5 Installing the device on a rail

◇ A mounting adapter is fitted to the device.

- ▶ Place the device from above onto a 35 mm DIN rail (e.g. Weidmüller TS 35x7.5).

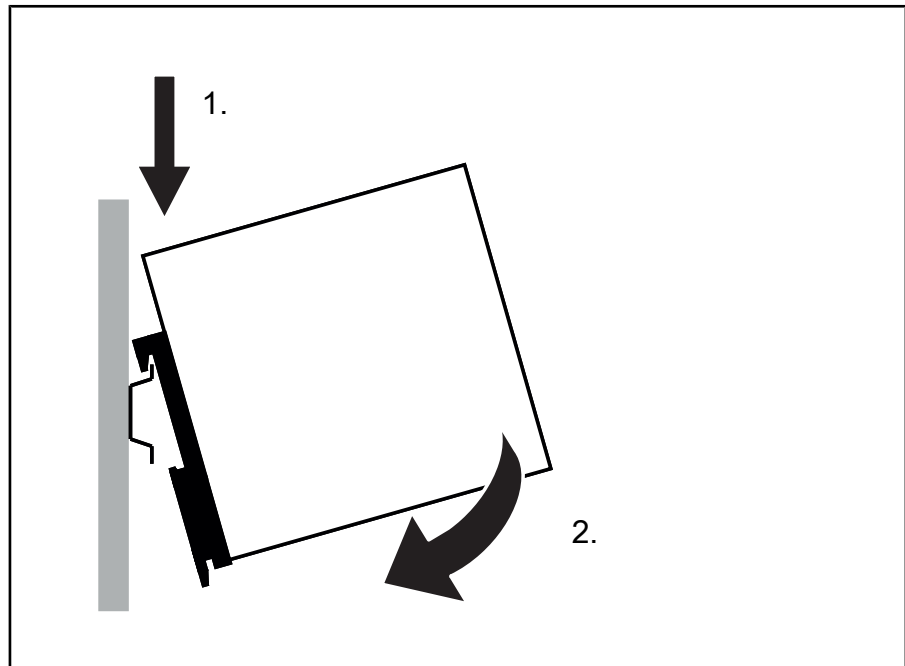


Figure 29 Installing the device on the DIN rail

- ▶ Swing the device downwards until it audibly locks into place.
- ▶ Ensure that the device is securely mounted.

7.6 Mounting the device on a wall

As an alternative to mounting the device on a DIN rail, it may be mounted directly on a wall.



A screwdriver max. 0.6 x 3.5 mm is required to carry out the work.

- ◇ A wall adapter is fitted to the device [▶ Page 62].
- ▶ Prepare the mounting screws on the wall.
- ▶ Hang the device onto the mounting screws and tighten the screws.
- ▶ Ensure that the device is securely mounted.

8 Commissioning

8.1 Commissioning procedure



WARNING

Dangerous contact voltage

Risk of fatal injury due to electric shock

- ▶ Carry out wiring work on the device only when the device is isolated from all voltage sources.
 - ▶ Ensure that the installation location (control cabinet, etc.) is isolated from all voltage sources.
-



WARNING

Risk of fatal injury due to short circuit

The battery module is an active voltage source with a high short-circuit current capability.

- ✓ Before working on the device, remove the battery fuses.
 - ▶ Select the charging current appropriate to the power of the battery module to prevent overheating of the battery module.
-



The device must only be put into operation by qualified electricians who are familiar with national and international laws, provisions and standards.



By default, the device is configured as follows:

- Buffer time: ∞
- Battery size: Smallest configurable value
- A bridge is inserted at the interlock input



A screwdriver max. 0.6 x 3.5 mm is required to carry out the work.

- ◇ The DC UPS control unit is mounted.
- ◇ The temperature sensor is connected, or a fixed resistor has been inserted instead [▶ Page 18].



Without a temperature sensor or a fixed resistor, the DC UPS control unit can neither charge the battery nor switch to buffer mode.

- ▶ Remove the bridge at the interlock input to prevent the buffer mode from being started unintentionally.



The bridge will be used again later in the commissioning process.

- ▶ Set the operating mode rotary coding switch to the **Service** position.
- ▶ Install the remaining system components and wire them completely.
- ▶ Check that all connections are firmly in place.



Ensure that the polarity of the connections matches the markings to guarantee the correct functioning of the device.

- ▶ Set the operating mode rotary coding switch to the desired position.
- ▶ Insert the bridge at the interlock input to enable buffer mode.
- ▶ Reinsert the fuses in the battery module.
- ▶ Switch on the power supply.
- ▶ Check the function of the DC UPS system.

8.2 Example application

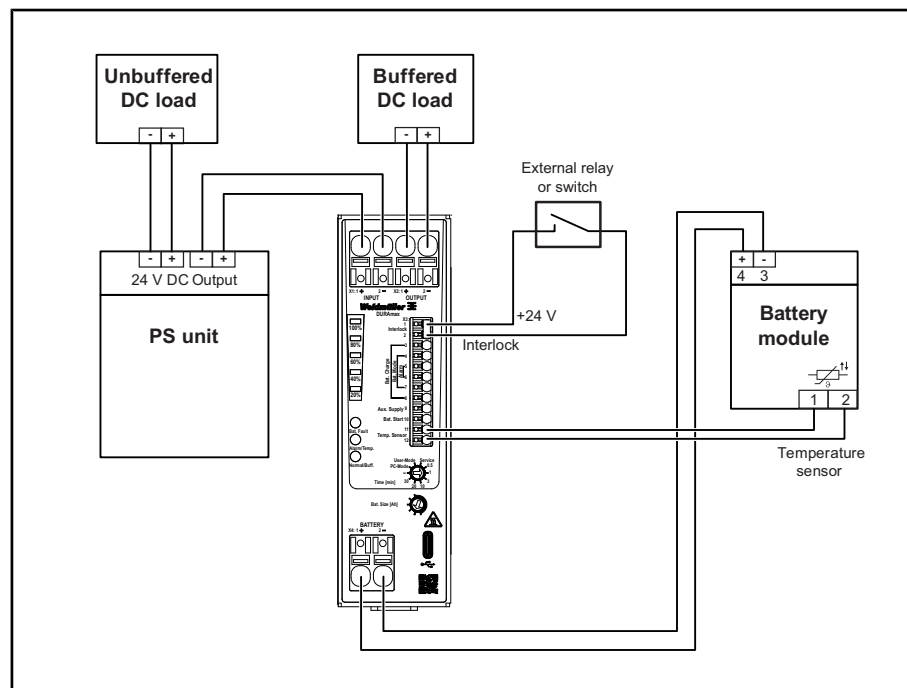


Figure 30 Example application

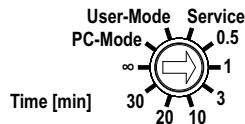
9 Operation

9.1 Setting the operating mode and buffer time

The operating mode rotary coding switch is used to set the operating mode and the buffer time. The possible settings are indicated directly next to the rotary coding switch [► Page 31].



A screwdriver max. 0.4 x 2.5 mm is required to adjust the rotary coding switch.



► Set the desired operating mode or buffer time on the rotary coding switch.

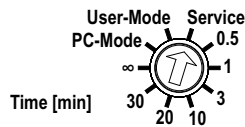


The default buffer time is 0 s if the operating mode rotary coding switch is set to PC-Mode or User-Mode and there is no connection to the GUI.

9.2 Setting Service mode

Observe the information on Service mode [► Page 32].

The following sequence must be observed when setting Service mode:



1. Set the operating mode rotary coding switch to the **Service** position.
2. Remove the fuses from the battery module.
3. Disconnect the wiring or battery connectors.



When recommissioning, proceed in the reverse order.

9.3 Replacing the battery module



WARNING

Risk of short circuit

A short circuit can cause damage to the device or result in injury.

- ▶ Make the connections with the correct polarity.
- ▶ Avoid short circuits at the battery connection terminals.
- ▶ Do not open the maintenance-free battery modules.



The battery module must only be replaced by qualified electricians who are familiar with national and international laws, provisions and standards.



Observe the latest commissioning date when storing the battery module. If stored for an extended period, recharge the battery module using a DC UPS control unit.

Observe the information on Service mode [▶ Page 32].



When connecting battery modules in parallel, we recommend using two new battery modules to ensure even load distribution [▶ Page 28].

To replace the battery module, proceed as follows:

- ◇ The operating mode rotary coding switch is set to **Service** [▶ Page 66].
- ▶ Remove the fuses from the battery module.
- ▶ Remove the electrical conductors from the battery module.
- ▶ Remove the temperature sensor from the battery module.
- ▶ Remove the battery module from the DIN rail and replace it with a new battery module.
- ▶ Connect the temperature sensor.
- ▶ Connect the battery module to the battery connection of the DC UPS control unit. Ensure correct polarity.
- ▶ If a different battery size is used after replacement of the battery module, set the battery size using the battery selection rotary coding switch [▶ Page 68].
- ▶ Insert the fuses into the battery module.

9.4 Setting the battery size



26 Ah and 38 Ah batteries are user-specific VRLA-AGM batteries that are not included in the Weidmüller portfolio. We recommend using the Genesis NP series from the battery manufacturer EnerSys or the LP series from the manufacturer Leoch.

ATTENTION

The setting on the battery selection rotary coding switch must correspond to the actual battery capacity. The only exception is for batteries between 38 Ah and 50 Ah. When using these batteries, the maximum possible setting must be selected (e.g. 38 Ah).

An incorrect setting negatively affects the charging and discharging behaviour of the battery and may trigger an error message in the DC UPS control unit.



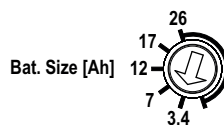
For parallel connection, set the battery selection rotary coding switch to the capacity of a single battery module.

Example For two battery modules of 1.2 Ah each, select the setting 1.2 Ah.

Observe the additional information on the parallel connection of battery modules [► Page 28].



A screwdriver max. 0.4 x 2.5 mm is required to adjust the rotary coding switch.



► Set the capacity of the connected battery module on the rotary coding switch.

9.5 Connecting the DC UPS control unit to a PC



The device must only be connected by qualified electricians who are familiar with national and international laws, provisions and standards.



Observe the information in the software manual for a successful and safe connection of the DC UPS control unit to a PC [► Page 6].



To connect the DC UPS control unit successfully, use a compatible USB-C cable that meets the following requirements:

- The cable is not a charge-only cable.
- The cable supports data transmission with at least USB 2.0.
- The cable is no longer than 3 metres.



The USB-C cable is used solely for data transmission. No power is transmitted.

Observe the information on User mode and PC mode [► Page 32].

◇ The operating mode rotary coding switch must be set to either User-Mode or PC-Mode.

- Connect the USB-C cable to the USB-C interface of the DC UPS control unit and to the USB interface of the PC.

9.6 Performing a firmware update

- Connect the DC UPS control unit to a PC [► Page 69].
- Perform the firmware update as described in the software manual [► Page 6].

10 Troubleshooting

10.1 Faults



The behaviour of the operating status LEDs indicates faults in the DC UPS control unit.

Observe the additional information on operating status [► Page 21].

Battery fault LED (Bat. Fault)

LED behaviour	Meaning	Action
Red	Battery connection reversed	Check the wiring and ensure the correct polarity (positive/negative).
	Battery module not connected	Connect the battery and check the wiring.
	Battery module defective	Check the battery module and replace it if necessary.
Red, flashing	Time limit reached	The buffer time has elapsed. No error. Supply power to the DC UPS control unit.
	Battery module undervoltage protection error	Fully charge the battery, check the connections and restart the device.
	Battery module overcurrent protection error	Disconnect the load, check the wiring and restart the device.
	Battery module overvoltage protection error	Disconnect the battery, use a suitable power supply and check the battery.
Off	No error / device de-energised	

Alarm/temperature sensor LED (Alarm/Temp.)

LED behaviour	Meaning	Action
Yellow	Temperature sensor error	Check the connection and wiring.
	Input undervoltage protection error	Check the input voltage and the power supply wiring.
	Input overvoltage protection error	Ensure the input voltage is correct and use a suitable power supply.
	Output undervoltage protection error	Check the wiring and the battery module.
	Output overvoltage protection error	Disconnect the load, check the wiring and restart the device.
	Internal charger overtemperature protection error	Ensure adequate ventilation and allow the device to cool down.
	Buffer mode error	Check the battery module and replace it if necessary.
	Short-circuit error	Disconnect the load, check the wiring and restart the device.
	Overcurrent protection error	Reduce the load.
	Internal charger short-circuit error	Restart the device; if the error occurs again, contact the service team.
	Internal charger overcurrent protection error	Restart the device; if the error occurs again, contact the service team.
Off	No error / device de-energised	

Normal/buffer mode LED

LED behaviour	Meaning	Action
Green	Normal mode	No action is required; the device is working correctly.
Green, flashing	Buffer mode	Check the input voltage. The device is supplied by the battery module because the mains supply has failed.
Off	Buffer time expired / device de-energised	Check the input voltage and the power supply wiring. Check that the connections have the correct polarity (positive/negative). Ensure that the battery module is not fully discharged.

10.2 Reset

If necessary, the DC UPS control unit can be restarted.



For a reset via the **DURAmox DC UPS Manager** software, refer to the software manual [► Page 6].

For a reset without the software, proceed as follows:

- Remove the bridge at the interlock input [► Page 35].
- ☑ The DC UPS control unit will not switch to buffer mode.

Carry out both of the following steps:

- Disconnect the input supply (X1).
- Disconnect the battery module (X4).
- ☑ The DC UPS control unit is now de-energised.



When recommissioning, proceed in the reverse order.

11 De-installation

11.1 Notes on de-installation



The device must only be de-installed by qualified electricians who are familiar with national and international laws, provisions and standards.



WARNING

Risk of electric shock

Before working on the device, it should be completely disconnected from the mains and the absence of voltage must be verified.

11.2 Removing the device from the rail

- Remove all cables.

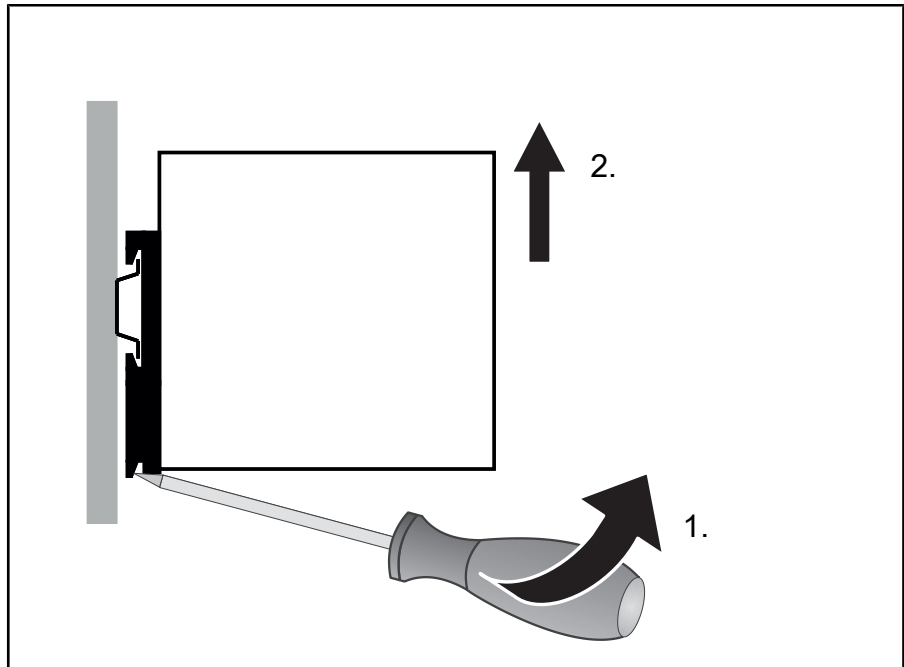


Figure 31 Removing the device from the rail

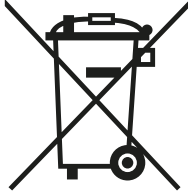
- Release the snap-in foot with a screwdriver.
- Lift the device off the rail.

11.3 Removing the device from the wall

- Remove all cables.
- Unscrew the mounting screws.
- Lift the device off the wall.

12 Disposal

12.1 Disposing of the device



Products marked with this symbol are subject to Directive 2012/19/EU: Collection and recycling of electrical and electronic equipment (WEEE). These products contain substances that may be harmful to the environment and human health. They also contain substances that can be reused through targeted recycling. Products marked with a crossed-out rubbish bin must not be disposed of in unsorted municipal waste or household waste!

13 Accessories

Further information on accessories can be found in the Weidmüller product catalogue.

13.1 Mounting accessories

	CP A WALLADAPTER 30 MM	CP A WALLADAPTER 45 MM	MTA 30 MF	MTA 45 MF
Item No.	1461870000	1461850000	1251320000	1251310000
Usage	Wall adapter	Wall adapter	Mounting adapter	Mounting adapter
				
DURAmix DC UPS 24V 5A Item No. 2934940000	✓	✗	✓	✗
DURAmix DC UPS 24V 10A Item No. 2934950000	✓	✗	✓	✗
DURAmix DC UPS 24V 20A Item No. 2934960000	✗	✓	✗	✓
DURAmix DC UPS 24V 40A Item No. 2934970000	✗	✓	✗	✓

13.2 Battery modules

Description	Item No.	Usage
DURA ECO LA-BAT 24V 1.2AH	2789890000	Load supply in the event of a power failure
DURA ECO LA-BAT 24V 3.4AH	2789900000	
DURA ECO LA-BAT 24V 7AH	2789910000	
DURA ECO LA-BAT 24V 12AH	2789920000	
DURA ECO LA-BAT 24V 17AH	2789930000	

13.3 Power supplies

To select a suitable PROmax or PROtop power supply from Weidmüller, refer to the information in the **Accessories** section for the DURAmx DC UPS in the Weidmüller Product Catalogue.

13.4 Diode and redundancy modules

Description	Item No.	Usage
PRO DM 10	2486070000	Connection of two power supplies to compensate for the failure of one device
PRO DM 20	2486080000	
PRO RM 10	2486090000	
PRO RM 20	2486100000	
PRO RM 40	2486110000	

13.5 Additional accessories

Description	Item No.	Usage
Temperature sensor CP DC UPS TF05	1444480000	Temperature monitoring
Temperature sensor CP DC UPS TF25	1444540000	Temperature monitoring
End bracket, width: 12 mm	1478990000	Secure seating on the rail
End bracket, width: 8 mm	1479000000	
Slotted screwdriver SDIS 0.4X2.5X75	2749790000	VDE-insulated screwdriver for working on the rotary coding switches
Slotted screwdriver SDIS 0.6X3.5X100	2749810000	VDE-insulated screwdriver for working on live parts

Glossary

Cold start function (black start)

Ability of the DC UPS control unit to start and supply loads solely from the battery module without an input voltage being applied.

Hiccup mode

Protective method in the event of an overload or short circuit. The affected output is switched off and briefly switched on again at regular intervals to check whether the cause of the fault is still present. Once the fault has been rectified, the device resumes operation automatically.

Interlock input

Control input for enabling or blocking buffer mode. The interlock input can be used to prevent the DC UPS control unit from switching to buffer mode if the supply voltage fails.

Latch-off

Protective function that keeps an output switched off after a fault occurs. Operation can only resume after a reset or after the supply voltage is reapplied.

SOC

The SOC (State of Charge) indicates the state of charge of the battery module as a percentage. This value shows how much energy is immediately available for buffer mode. It also supports runtime prediction. The SOC is determined by measuring the current or the voltage. It depends on the load, the temperature and the battery type. A high SOC does not guarantee a long bridging time if the battery module has aged.

SOH

The SOH (state of health) indicates the health of the battery module compared with its condition when new, usually as a percentage. The value takes into account capacity loss, internal resistance and power output. SOH is influenced by various factors, such as the usage profile, charging and discharging behaviour, temperature, ageing of the battery module and storage conditions. As a result, the condition of the battery module may develop differently over time. If the SOH value becomes low, timely replacement of the battery module should be planned.

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