

Rexroth IndraControl VAU 01.1U UPS with USB interface

R911323872
Edition 03

Project Planning Manual



Title Rexroth IndraControl
VAU 01.1U
UPS with USB interface

Type of Documentation Project Planning Manual

Document Typecode DOK-SUPPL*-VAU*01.1U**-PR03-EN-P

Internal File Reference RS-63f14a7a7429dc0f0a6846a00117a35b-3-en-US-3

Purpose of Documentation This documentation describes the uninterruptible power supply VAU 01.1U with USB interface.

Record of Revision

Edition	Release Date	Notes
First edition	09.2008	-
Second edition	03.2009	Revised edition (EMC)
Third edition	09.2011	Revised edition

Copyright © Bosch Rexroth AG 2011

This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth AG. It may not be reproduced or given to third parties without its consent.

Liability The specified data is intended for product description purposes only and shall not be deemed to be a guaranteed characteristic unless expressly stipulated in the contract. All rights are reserved with respect to the content of this documentation and the availability of the product.

Published by Bosch Rexroth AG
Bgm.-Dr.-Nebel-Str. 2 ■ 97816 Lohr am Main, Germany
Phone +49 (0)93 52/ 40-0 ■ Fax +49 (0)93 52/ 40-48 85
<http://www.boschrexroth.com/>
Development Control Platform GW (CS)

Note This document has been printed on chlorine-free bleached paper.

Table of Contents

	Page
1 System Presentation.....	5
1.1 Brief Description VAU 01.1U.....	5
1.2 Permitted Devices.....	6
1.3 Software.....	6
1.4 Further Documentation.....	6
1.5 Steps for Commissioning.....	6
2 Important Instructions on Use	7
2.1 Intended Use	7
2.1.1 Introduction.....	7
2.1.2 Areas of Use and Application.....	7
2.2 Unintended Use.....	8
3 Safety Instructions for Electric Drives and Controls.....	9
3.1 Definitions of Terms.....	9
3.2 General Information.....	10
3.2.1 Using the Safety Instructions and Passing Them on to Others.....	10
3.2.2 Requirements for Safe Use.....	10
3.2.3 Hazards by Improper Use.....	11
3.3 Instructions with Regard to Specific Dangers.....	13
3.3.1 Protection Against Contact With Electrical Parts and Housings.....	13
3.3.2 Protective Extra-Low Voltage as Protection Against Electric Shock	14
3.3.3 Protection Against Dangerous Movements.....	15
3.3.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting.....	16
3.3.5 Protection Against Contact With Hot Parts.....	16
3.3.6 Protection During Handling and Mounting.....	17
3.3.7 Battery Safety.....	17
3.3.8 Protection Against Pressurized Systems.....	18
3.4 Explanation of Signal Words and the Safety Alert Symbol.....	18
4 Technical Data.....	21
4.1 Degree of Protection and Weight.....	21
4.2 Input Voltage and Output Voltage.....	21
4.2.1 Input Voltage+24 V.....	21
4.2.2 Output Voltage.....	21
4.3 Ambient Conditions.....	22
4.4 Standards.....	22
4.4.1 Used Standards.....	22
4.4.2 CE Marking.....	23
Declaration of Conformity	23
Note for the Machine Manufacturer.....	23
4.4.3 UL and CSA certified.....	24
4.5 Wear Parts.....	24

Table of Contents

	Page
4.6 Compatibility Test.....	24
5 Dimensions, Mounting and Dismounting.....	25
5.1 Task.....	25
5.2 Housing Dimensions.....	25
5.3 Mounting and Dismounting.....	25
5.3.1 Mounting Notes.....	25
5.3.2 Mounting.....	26
5.3.3 Dismounting.....	27
6 Operating and Display Components.....	29
6.1 Task.....	29
6.2 Connector Panel.....	29
6.2.1 General Information.....	29
6.2.2 Overview of the LEDs for Operating and Error Display.....	30
6.3 Fuse F1.....	31
6.4 Rotary Switch S1.....	32
6.4.1 Position of S1 Rotary Switch.....	32
6.4.2 General Information.....	32
6.4.3 Timing Depending on the Position of S1 Rotary Switch.....	32
6.4.4 Timing Depending on the Position of Rotary Switch S1 and Settings in the UPS-NT Control Software	33
7 Interfaces and Wiring	39
7.1 Task.....	39
7.2 Connector Panel.....	39
7.2.1 General Information.....	39
7.2.2 Overview of the Connections.....	40
7.3 Voltage Connection.....	41
7.3.1 General Information.....	41
7.3.2 Wiring the Power Connection.....	41
7.3.3 Wiring of the VAU 01.1U, Cable Lengths and Cable Cross-Sections.....	44
7.4 Interface XUSB In.....	44
7.4.1 General Information.....	44
8 Maintenance, Storage and Transport.....	47
8.1 Task.....	47
8.2 General Information.....	47
8.3 Replacing Batteries.....	48
8.4 Storing the VAU 01.1U.....	51
8.5 Transporting the VAU 01.1U.....	51
9 Ordering Information.....	53
9.1 Type Designation Code.....	53

Table of Contents

	Page
9.2 Accessories.....	54
9.3 Further Documentation.....	54
10 Environmental Protection and Disposal	55
10.1 Environmental Protection.....	55
10.2 Disposal.....	55
11 Service and Support.....	57
Glossary VAU 01.1U.....	59
Index.....	61

1 System Presentation

1.1 Brief Description VAU 01.1U

The VAU 01.1U is a UPS (Uninterruptible Power Supply), which provides power to the connected device for a limited time if the supply voltage fails (DC 24 V).

The VAU 01.1U is able to provide the connected device with 24 V and 10 A for max. three minutes. The communication between VAU 01.1U and connected device is realized via a USB interface (XUSB In). The VAU 01.1U consists of the following components:

- Enclosed metal housing.
- A battery integrated in the device.
- Display and operating components on the front panel.
- Integrated burst and surge protection for the connected device.

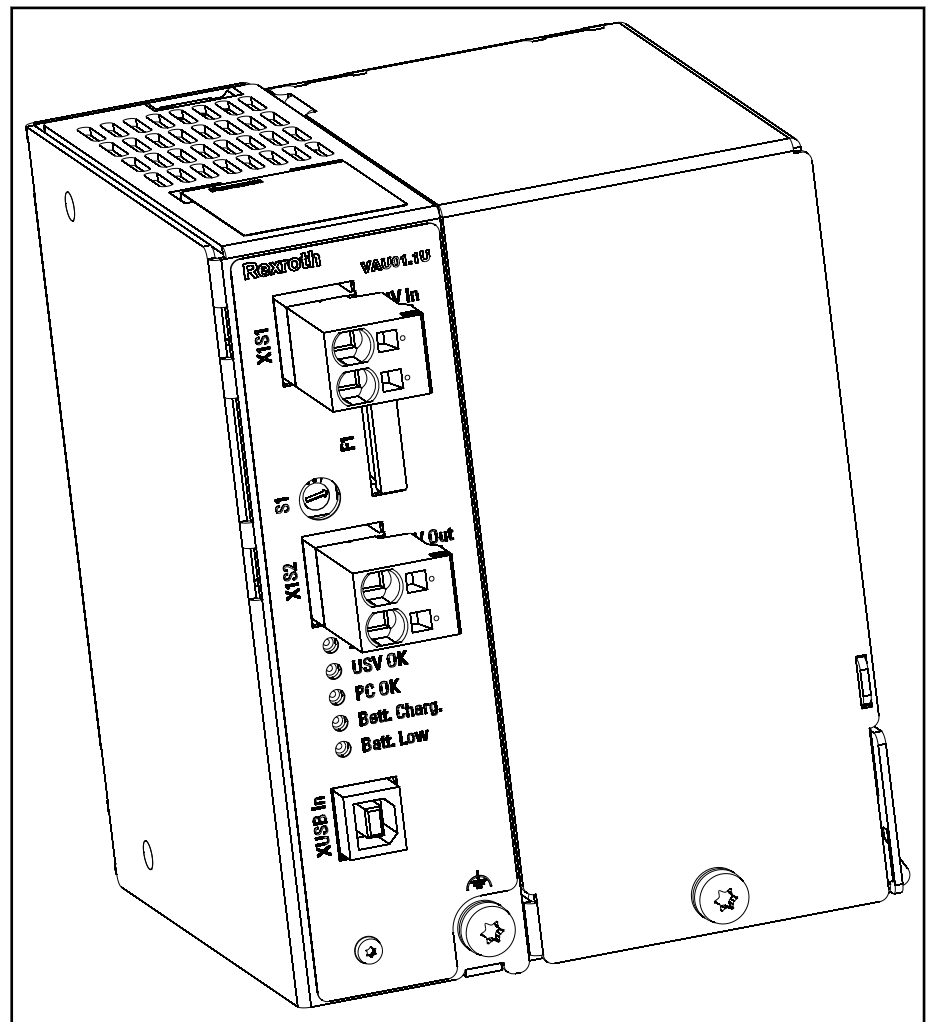


Fig. 1-1: View, VAU 01.1U with USB interface



This documentation describes only the uninterruptible power supply (UPS) VAU01.1U-024-024-240-NN.

System Presentation

1.2 Permitted Devices

The following permitted devices can be connected to the VAU 01.1U:

- Control cabinet PC **Rexroth IndraControl VPB 40.3**
- Panel PC **Rexroth IndraControl VPP 16.3/40.3/60.3**
- Control cabinet PC **Rexroth IndraControl VSB 40.3**
- Panel PC **Rexroth IndraControl VSP 16.3/40.3/60.3**

1.3 Software

The communication between VAU 01.1U and connected control cabinet PC is realized via the USB interface (XUSB In). Therefore, the UPS software has to be installed on the connected device. The installation is described in the relevant documentation of the control cabinet PC or of the panel PC, see also [chapter 1.4 "Further Documentation" on page 6](#).

1.4 Further Documentation

Documentation	Order code of the documentation	Parts number
Rexroth IndraControl VPB 40.3	DOK-SUPPL*-VPB*40.3***-PRxx-EN-P	R911323876
Rexroth IndraControl VPP 16.3/40.3/60.3	DOK-SUPPL*-VPP*XX.3***-PRxx-EN-P	R911323511
Rexroth IndraControl VSB 40.3	DOK-SUPPL*-VSB*40.3***-PRxx-EN-P	R911323880
Rexroth IndraControl VSP 16.3/40.3	DOK-SUPPL*-VSP*XX.3***-PRxx-EN-P	R911323882

Fig. 1-2: Further documentation for devices which are permitted for the VAU 01.1U

1.5 Steps for Commissioning

Before using the UPS, ensure that

- the device to be connected is permitted for the VAU 01.1U,
- the required software (**UPS NT Control**) is installed,
- the switch positions are correct,
- the correct order for mounting, connection and cabling is kept.

2 Important Instructions on Use

2.1 Intended Use

2.1.1 Introduction

The Rexroth products represent state-of-the-art developments and manufacturing. They are tested prior to delivery to ensure operating safety and reliability.

WARNING

If the products are not used as intended, situations occur that can result in damage to property and injury to persons.

The products are designed for the use in an industrial environment and may therefore only be used for the intended purpose. If they are not used as intended, situations causing personal injury as well as material damage can occur.



Rexroth is not liable for damages resulting from unintended use. In such cases, the guarantee and the right to payment of damages resulting from unintended use are forfeited. The user alone carries all responsibility of the risks.

Before using Bosch Rexroth products, the following requirements must be met to ensure intended use of the products:

- Personnel who in any way, shape, form or use one of our products must first read and understand the relevant safety instructions and be familiar with the intended use of the products.
- If the product takes the form of hardware, then they must remain in the original state; in other words, no structural changes are permitted. The decompilation of software products or the alteration of source codes is not permitted.
- Do not install or operate damaged or faulty products.
- Ensure that the products have been installed in the manner described in the relevant documentation.

2.1.2 Areas of Use and Application

NOTICE

Danger of destruction of the device if not expressly stated accessories, mounting parts and other components, cables, lines, software and firmware is used.

The VAU 01.1U may only be used with the accessories and mounting parts listed in this documentation. Components that are not expressly mentioned must neither be attached nor connected. The same is valid for cables and lines.

Operation must only be carried out with the hardware component configurations and combinations that are expressly specified and with the software and firmware indicated and specified in the respective documentation and functional descriptions.

Important Instructions on Use

The UPS may only be operated under the mounting and installation conditions, the position, and the ambient conditions (temperature, degree of protection, humidity, EMC etc.) specified in the related documentation.

2.2 Unintended Use

The use of the UPS in applications other than those specified or described in the documentation and the technical specifications is considered as "unintended".

The UPS must not be used if

- it is exposed to operation conditions which do not correspond to the specified ambient conditions. Operation under water, extreme temperature fluctuations or extreme maximum temperatures is prohibited.
- the intended applications have not expressly been allowed by Bosch Rexroth. Please read the information given in the general safety instructions!

3 Safety Instructions for Electric Drives and Controls

3.1 Definitions of Terms

Application Documentation	Application documentation comprises the entire documentation used to inform the user of the product about the use and safety-relevant features for configuring, integrating, installing, mounting, commissioning, operating, maintaining, repairing and decommissioning the product. The following terms are also used for this kind of documentation: User Guide, Operation Manual, Commissioning Manual, Instruction Manual, Project Planning Manual, Application Manual, etc.
Component	A component is a combination of elements with a specified function, which are part of a piece of equipment, device or system. Components of the electric drive and control system are, for example, supply units, drive controllers, mains choke, mains filter, motors, cables, etc.
Control System	A control system comprises several interconnected control components placed on the market as a single functional unit.
Device	A device is a finished product with a defined function, intended for users and placed on the market as an individual piece of merchandise.
Electrical Equipment	Electrical equipment encompasses all devices used to generate, convert, transmit, distribute or apply electrical energy, such as electric motors, transformers, switching devices, cables, lines, power-consuming devices, circuit board assemblies, plug-in units, control cabinets, etc.
Electric Drive System	An electric drive system comprises all components from mains supply to motor shaft; this includes, for example, electric motor(s), motor encoder(s), supply units and drive controllers, as well as auxiliary and additional components, such as mains filter, mains choke and the corresponding lines and cables.
Installation	An installation consists of several devices or systems interconnected for a defined purpose and on a defined site which, however, are not intended to be placed on the market as a single functional unit.
Machine	A machine is the entirety of interconnected parts or units at least one of which is movable. Thus, a machine consists of the appropriate machine drive elements, as well as control and power circuits, which have been assembled for a specific application. A machine is, for example, intended for processing, treatment, movement or packaging of a material. The term "machine" also covers a combination of machines which are arranged and controlled in such a way that they function as a unified whole.
Manufacturer	The manufacturer is an individual or legal entity bearing responsibility for the design and manufacture of a product which is placed on the market in the individual's or legal entity's name. The manufacturer can use finished products, finished parts or finished elements, or contract out work to subcontractors. However, the manufacturer must always have overall control and possess the required authority to take responsibility for the product.
Product	Examples of a product: Device, component, part, system, software, firmware, among other things.
Project Planning Manual	A project planning manual is part of the application documentation used to support the sizing and planning of systems, machines or installations.
Qualified Persons	In terms of this application documentation, qualified persons are those persons who are familiar with the installation, mounting, commissioning and operation of the components of the electric drive and control system, as well as with the hazards this implies, and who possess the qualifications their work

Safety Instructions for Electric Drives and Controls

requires. To comply with these qualifications, it is necessary, among other things,

- 1) to be trained, instructed or authorized to switch electric circuits and devices safely on and off, to ground them and to mark them
- 2) to be trained or instructed to maintain and use adequate safety equipment
- 3) to attend a course of instruction in first aid

User A user is a person installing, commissioning or using a product which has been placed on the market.

3.2 General Information

3.2.1 Using the Safety Instructions and Passing Them on to Others

Do not attempt to install and operate the components of the electric drive and control system without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with these components. If you do not have the user documentation for the components, contact your responsible Bosch Rexroth sales partner. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the components.

If the component is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the component in the official language of the user's country.

Improper use of these components, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, could result in property damage, injury, electric shock or even death.

3.2.2 Requirements for Safe Use

Read the following instructions before initial commissioning of the components of the electric drive and control system in order to eliminate the risk of injury and/or property damage. You must follow these safety instructions.

- Bosch Rexroth is not liable for damages resulting from failure to observe the safety instructions.
- Read the operating, maintenance and safety instructions in your language before commissioning. If you find that you cannot completely understand the application documentation in the available language, please ask your supplier to clarify.
- Proper and correct transport, storage, mounting and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of the component.
- Only qualified persons may work with components of the electric drive and control system or within its proximity.
- Only use accessories and spare parts approved by Bosch Rexroth.
- Follow the safety regulations and requirements of the country in which the components of the electric drive and control system are operated.
- Only use the components of the electric drive and control system in the manner that is defined as appropriate. See chapter "Appropriate Use".
- The ambient and operating conditions given in the available application documentation must be observed.
- Applications for functional safety are only allowed if clearly and explicitly specified in the application documentation "Integrated Safety Technolo-

Safety Instructions for Electric Drives and Controls

gy". If this is not the case, they are excluded. Functional safety is a safety concept in which measures of risk reduction for personal safety depend on electrical, electronic or programmable control systems.

- The information given in the application documentation with regard to the use of the delivered components contains only examples of applications and suggestions.

The machine and installation manufacturers must

- make sure that the delivered components are suited for their individual application and check the information given in this application documentation with regard to the use of the components,
- make sure that their individual application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Commissioning of the delivered components is only allowed once it is sure that the machine or installation in which the components are installed complies with the national regulations, safety specifications and standards of the application.
- Operation is only allowed if the national EMC regulations for the application are met.
- The instructions for installation in accordance with EMC requirements can be found in the section on EMC in the respective application documentation.

The machine or installation manufacturer is responsible for compliance with the limit values as prescribed in the national regulations.

- The technical data, connection and installation conditions of the components are specified in the respective application documentations and must be followed at all times.

National regulations which the user must take into account

- European countries: In accordance with European EN standards
- United States of America (USA):
 - National Electrical Code (NEC)
 - National Electrical Manufacturers Association (NEMA), as well as local engineering regulations
 - Regulations of the National Fire Protection Association (NFPA)
- Canada: Canadian Standards Association (CSA)
- Other countries:
 - International Organization for Standardization (ISO)
 - International Electrotechnical Commission (IEC)

3.2.3 Hazards by Improper Use

- High electrical voltage and high working current! Danger to life or serious injury by electric shock!
- High electrical voltage by incorrect connection! Danger to life or injury by electric shock!
- Dangerous movements! Danger to life, serious injury or property damage by unintended motor movements!
- Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric drive systems!

Safety Instructions for Electric Drives and Controls

- Risk of burns by hot housing surfaces!
- Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!
- Risk of injury by improper handling of batteries!
- Risk of injury by improper handling of pressurized lines!

3.3 Instructions with Regard to Specific Dangers

3.3.1 Protection Against Contact With Electrical Parts and Housings



This section concerns components of the electric drive and control system with voltages of **more than 50 volts**.

Contact with parts conducting voltages above 50 volts can cause personal danger and electric shock. When operating components of the electric drive and control system, it is unavoidable that some parts of these components conduct dangerous voltage.

High electrical voltage! Danger to life, risk of injury by electric shock or serious injury!

- Only qualified persons are allowed to operate, maintain and/or repair the components of the electric drive and control system.
- Follow the general installation and safety regulations when working on power installations.
- Before switching on, the equipment grounding conductor must have been permanently connected to all electric components in accordance with the connection diagram.
- Even for brief measurements or tests, operation is only allowed if the equipment grounding conductor has been permanently connected to the points of the components provided for this purpose.
- Before accessing electrical parts with voltage potentials higher than 50 V, you must disconnect electric components from the mains or from the power supply unit. Secure the electric component from reconnection.
- With electric components, observe the following aspects:
Always wait **30 minutes** after switching off power to allow live capacitors to discharge before accessing an electric component. Measure the electrical voltage of live parts before beginning to work to make sure that the equipment is safe to touch.
- Install the covers and guards provided for this purpose before switching on.
- Never touch electrical connection points of the components while power is turned on.
- Do not remove or plug in connectors when the component has been powered.
- Under specific conditions, electric drive systems can be operated at mains protected by residual-current-operated circuit-breakers sensitive to universal current (RCDs/RCMs).
- Secure built-in devices from penetrating foreign objects and water, as well as from direct contact, by providing an external housing, for example a control cabinet.

High housing voltage and high leakage current! Danger to life, risk of injury by electric shock!

- Before switching on and before commissioning, ground or connect the components of the electric drive and control system to the equipment grounding conductor at the grounding points.

Safety Instructions for Electric Drives and Controls

- Connect the equipment grounding conductor of the components of the electric drive and control system permanently to the main power supply at all times. The leakage current is greater than 3.5 mA.
- Establish an equipment grounding connection with a minimum cross section according to the table below. With an outer conductor cross section smaller than 10 mm² (8 AWG), the alternative connection of two equipment grounding conductors is allowed, each having the same cross section as the outer conductors.

Cross section outer conductor	Minimum cross section equipment grounding conductor Leakage current ≥ 3.5 mA	
	1 equipment grounding conductor	2 equipment grounding conductors
1,5 mm ² (AWG 16)	10 mm ² (AWG 8)	2 × 1,5 mm ² (AWG 16)
2,5 mm ² (AWG 14)		2 × 2,5 mm ² (AWG 14)
4 mm ² (AWG 12)		2 × 4 mm ² (AWG 12)
6 mm ² (AWG 10)		2 × 6 mm ² (AWG 10)
10 mm ² (AWG 8)		-
16 mm ² (AWG 6)	16 mm ² (AWG 6)	-
25 mm ² (AWG 4)		-
35 mm ² (AWG 2)		-
50 mm ² (AWG 1/0)	25 mm ² (AWG 4)	-
70 mm ² (AWG 2/0)	35 mm ² (AWG 2)	-
...	...	...

Fig.3-1: Minimum Cross Section of the Equipment Grounding Connection

3.3.2 Protective Extra-Low Voltage as Protection Against Electric Shock

Protective extra-low voltage is used to allow connecting devices with basic insulation to extra-low voltage circuits.

On components of an electric drive and control system provided by Bosch Rexroth, all connections and terminals with voltages between 5 and 50 volts are PELV ("Protective Extra-Low Voltage") systems. It is allowed to connect devices equipped with basic insulation (such as programming devices, PCs, notebooks, display units) to these connections.

Danger to life, risk of injury by electric shock! High electrical voltage by incorrect connection!

If extra-low voltage circuits of devices containing voltages and circuits of more than 50 volts (e.g., the mains connection) are connected to Bosch Rexroth products, the connected extra-low voltage circuits must comply with the requirements for PELV ("Protective Extra-Low Voltage").

3.3.3 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:

- Improper or wrong wiring or cable connection
- Operator errors
- Wrong input of parameters before commissioning
- Malfunction of sensors and encoders
- Defective components
- Software or firmware errors

These errors can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring functions in the components of the electric drive and control system will normally be sufficient to avoid malfunction in the connected drives. Regarding personal safety, especially the danger of injury and/or property damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

Dangerous movements! Danger to life, risk of injury, serious injury or property damage!

A **risk assessment** must be prepared for the installation or machine, with its specific conditions, in which the components of the electric drive and control system are installed.

As a result of the risk assessment, the user must provide for monitoring functions and higher-level measures on the installation side for personal safety. The safety regulations applicable to the installation or machine must be taken into consideration. Unintended machine movements or other malfunctions are possible if safety devices are disabled, bypassed or not activated.

To avoid accidents, injury and/or property damage:

- Keep free and clear of the machine's range of motion and moving machine parts. Prevent personnel from accidentally entering the machine's range of motion by using, for example:
 - Safety fences
 - Safety guards
 - Protective coverings
 - Light barriers
- Make sure the safety fences and protective coverings are strong enough to resist maximum possible kinetic energy.
- Mount emergency stopping switches in the immediate reach of the operator. Before commissioning, verify that the emergency stopping equipment works. Do not operate the machine if the emergency stopping switch is not working.
- Prevent unintended start-up. Isolate the drive power connection by means of OFF switches/OFF buttons or use a safe starting lockout.
- Make sure that the drives are brought to safe standstill before accessing or entering the danger zone.

Safety Instructions for Electric Drives and Controls

- Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example,
 - mechanically securing the vertical axes,
 - adding an external braking/arrester/clamping mechanism or
 - ensuring sufficient counterbalancing of the vertical axes.
- The standard equipment **motor holding brake** or an external holding brake controlled by the drive controller is **not sufficient to guarantee personal safety!**
- Disconnect electrical power to the components of the electric drive and control system using the master switch and secure them from reconnection ("lock out") for:
 - Maintenance and repair work
 - Cleaning of equipment
 - Long periods of discontinued equipment use
- Prevent the operation of high-frequency, remote control and radio equipment near components of the electric drive and control system and their supply leads. If the use of these devices cannot be avoided, check the machine or installation, at initial commissioning of the electric drive and control system, for possible malfunctions when operating such high-frequency, remote control and radio equipment in its possible positions of normal use. It might possibly be necessary to perform a special electromagnetic compatibility (EMC) test.

3.3.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors or permanent magnets of electric motors represent a serious danger to persons with heart pacemakers, metal implants and hearing aids.

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric components!

- Persons with heart pacemakers and metal implants are not allowed to enter the following areas:
 - Areas in which components of the electric drive and control systems are mounted, commissioned and operated.
 - Areas in which parts of motors with permanent magnets are stored, repaired or mounted.
- If it is necessary for somebody with a heart pacemaker to enter such an area, a doctor must be consulted prior to doing so. The noise immunity of implanted heart pacemakers differs so greatly that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids, must consult a doctor before they enter the areas described above.

3.3.5 Protection Against Contact With Hot Parts

Hot surfaces of components of the electric drive and control system. Risk of burns!

Safety Instructions for Electric Drives and Controls

- Do not touch hot surfaces of, for example, braking resistors, heat sinks, supply units and drive controllers, motors, windings and laminated cores!
- According to the operating conditions, temperatures of the surfaces can be **higher than 60 °C** (140 °F) during or after operation.
- Before touching motors after having switched them off, let them cool down for a sufficient period of time. Cooling down can require **up to 140 minutes!** The time required for cooling down is approximately five times the thermal time constant specified in the technical data.
- After switching chokes, supply units and drive controllers off, wait **15 minutes** to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications, and in accordance with the respective safety regulations, the manufacturer of the machine or installation must take measures to avoid injuries caused by burns in the final application. These measures can be, for example: Warnings at the machine or installation, guards (shieldings or barriers) or safety instructions in the application documentation.

3.3.6 Protection During Handling and Mounting

Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!

- Observe the relevant statutory regulations of accident prevention.
- Use suitable equipment for mounting and transport.
- Avoid jamming and crushing by appropriate measures.
- Always use suitable tools. Use special tools if specified.
- Use lifting equipment and tools in the correct manner.
- Use suitable protective equipment (hard hat, safety goggles, safety shoes, safety gloves, for example).
- Do not stand under hanging loads.
- Immediately clean up any spilled liquids from the floor due to the risk of falling!

3.3.7 Battery Safety

Batteries consist of active chemicals in a solid housing. Therefore, improper handling can cause injury or property damage.

Risk of injury by improper handling!

- Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
- Do not attempt to recharge the batteries as this may cause leakage or explosion.
- Do not throw batteries into open flames.
- Do not dismantle batteries.
- When replacing the battery/batteries, do not damage the electrical parts installed in the devices.
- Only use the battery types specified for the product.

Safety Instructions for Electric Drives and Controls



Environmental protection and disposal! The batteries contained in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separately from other waste. Observe the national regulations of your country.

3.3.8 Protection Against Pressurized Systems

According to the information given in the Project Planning Manuals, motors and components cooled with liquids and compressed air can be partially supplied with externally fed, pressurized media, such as compressed air, hydraulics oil, cooling liquids and cooling lubricants. Improper handling of the connected supply systems, supply lines or connections can cause injuries or property damage.

Risk of injury by improper handling of pressurized lines!

- Do not attempt to disconnect, open or cut pressurized lines (risk of explosion).
- Observe the respective manufacturer's operating instructions.
- Before dismounting lines, relieve pressure and empty medium.
- Use suitable protective equipment (safety goggles, safety shoes, safety gloves, for example).
- Immediately clean up any spilled liquids from the floor due to the risk of falling!



Environmental protection and disposal! The agents (e.g., fluids) used to operate the product might not be environmentally friendly. Dispose of agents harmful to the environment separately from other waste. Observe the national regulations of your country.

3.4 Explanation of Signal Words and the Safety Alert Symbol

The Safety Instructions in the available application documentation contain specific signal words (DANGER, WARNING, CAUTION or NOTICE) and, where required, a safety alert symbol (in accordance with ANSI Z535.6-2006).

The signal word is meant to draw the reader's attention to the safety instruction and identifies the hazard severity.

The safety alert symbol (a triangle with an exclamation point), which precedes the signal words DANGER, WARNING and CAUTION, is used to alert the reader to personal injury hazards.



In case of non-compliance with this safety instruction, death or serious injury will occur.

Safety Instructions for Electric Drives and Controls

⚠ WARNING

In case of non-compliance with this safety instruction, death or serious injury **could** occur.

⚠ CAUTION

In case of non-compliance with this safety instruction, minor or moderate injury could occur.

NOTICE

In case of non-compliance with this safety instruction, property damage could occur.

4 Technical Data

4.1 Degree of Protection and Weight

Degree of protection	IP 20
Weight	3.5 kg

Fig.4-1: Degree of protection and weight

4.2 Input Voltage and Output Voltage

4.2.1 Input Voltage+24 V

Nominal input voltage	DC 24 V
Input voltage range	DC 24 V +20 %, -15 %
Emitted interference and surge immunity	$U_{\max} = 35 \text{ V}$ (for $t < 100 \text{ ms}$)
Current consumption for U_N	Max. 12 A (2 A for charging the battery)
Input fuse	None
Switch-on threshold	22 V $\pm 5 \%$
Switch-off threshold	19 V $\pm 5 \%$
Maximum power consumption	288 W (48 W for charging the battery)
Reverse voltage protection	Yes

Fig.4-2: Input voltage 24 V

4.2.2 Output Voltage

Nominal output voltage	DC 24 V
Output voltage range	DC 24 V +20 %, -15 %
Current output at U_N	10 A max.
Switching time	< 1 ms
Bridging time	3 minutes max.
Max. output power	240 W
Short-circuit protection	No
Max. capacitive load	5600 μF

Fig.4-3: Output voltage

NOTICE

Overheating and possible damage to the VAU 01.1U if the max. power consumption is exceeded.

The maximum power consumption of the connected control cabinet PC or panel PC must not exceed the maximum output power of the VAU 01.1U.

Technical Data

4.3 Ambient Conditions

	In operation	Transport	Storage
Ambient temperature	+5 °C to +45 °C	-20 °C to +60 °C	-20 °C to +60 °C
Maximum temperature gradient	Temporal temperature changes up to 3 °C per minute	Temporal temperature changes up to 3 °C per minute	Temporal temperature changes up to 3 °C per minute
Relative humidity	Climatic class 3K3 according to EN 60721, condensation not permissible. Max. 80 % humidity at 25 °C	Climatic class 3K3 according to EN 60721, condensation not permissible. Max. 80 % humidity at 25 °C	Climatic class 3K3 according to EN 60721, condensation not permissible. Max. 80 % humidity at 25 °C
Air pressure	Up to 3000 m above sea level acc. to EN 61131-2	Up to 3000 m above sea level acc. to EN 61131-2	Up to 3000 m above sea level acc. to EN 61131-2
Mechanical strength	Maximum vibration Frequency range: 10 Hz to 150 Hz Excursion: 0.075 mm at 10 Hz to 57 Hz Acceleration: 1 g at 57 Hz to 150 Hz Test duration for each axis: 10 frequency cycles Frequency sweep rate: 1 octave/min According to EN 60068-2-6, test Fc	Maximum shock: 15 g according to EN 60 068-2-27, no disturbance of the function	Maximum shock: 15 g according to EN 60 068-2-27, no disturbance of the function
Degree of pollution	2	2	2

Fig.4-4: Ambient Conditions

4.4 Standards

4.4.1 Used Standards

The system components of the VAU 01.1U comply with the following standards:

Standard	Meaning
EN 60 61000-6-4	Generic standard, emitted interference (industrial environment)
EN 60 61000-6-2	Generic standard, noise immunity (industrial environment)

Technical Data

Standard	Meaning
EN 61558-2-6	Transformer for 24 V power supply unit, protective separation
EN 60664-1	Overvoltage category II
EN 60 529	Degrees of protection (including housings and installation compartments)
EN 60 068-2-6	Vibration test
EN 60068-2-27	Shock test
EN 60721-3-3	Classification of ambient conditions, operation
EN 60721-3-2	Classification of ambient conditions, transport
EN 60721-3-1	Classification of ambient conditions, storage
UL 508	Industrial Control Equipment

Fig. 4-5: Used standards

4.4.2 CE Marking Declaration of Conformity



The electronic products described in this project planning manual comply with the requirements and goals of the following EC directive and with the harmonized European standards:

EMC guideline 2004/108/EC

The electronic products described in this project planning manual comply with the requirements on the operation within the industrial environment:

Standard	Title	Edition
DIN EN 61000-6-4 (VDE 0839-6-4)	Electromagnetic compatibility (EMC) Volume: 6-4: Generic standards – emitted interference for industrial environments (IEC 61000-6-4:2006)	September 2007
DIN EN 61000-6-2 (VDE 0839-6-2)	Electromagnetic compatibility (EMC) Volume: 6-2: Generic standards – noise immunity for industrial environments (IEC 61000-6-2:2005)	March 2006

Fig. 4-6: Electromagnetic compatibility (EMC) standards

Note for the Machine Manufacturer

The electronic products described in this project planning manual do not fall under the machines listed in the EC machinery directive. Therefore, explanations are not required for the 2006/42/EC machinery directive and do not exist.

2006/42/EC, the EU directive for machines, specifies the requirements on a machine. In this directive, a machine is defined as a combination of the components or mechanisms combined with each other. The described products belong to the electrical equipment of a machine. Therefore, they have to be included in the declaration of conformity of the machine manufacturer.

Technical Data

The standard EN 60204-1 (safety of machinery, general requirements on the electrical equipment of the machines) can be used for the electrical equipment of the machines.

NOTICE

Loss of CE conformity due to modifications of the device.

The CE marking is only valid for the device in its delivery status (ex works). After modifying the device, the CE conformity has to be verified.

4.4.3 UL and CSA certified



The devices of the VAU 01.1U product family are certificated according to

- **UL508** (Industrial Control Equipment) and
- **C22.2 no. 142-M1987** (CSA)

UL file no. E210730

However, there can be combinations or stages of expansions with limited or missing certification. Therefore verify the certification by using the UL label on the device.



To guarantee an UL- and CSA-compliant operation, the following conditions have to be fulfilled:

- Use only insulated copper wire suitable for at least 60/75 °C.

NOTICE

Loss of UL and CSA compliance due to changes on the device.

The UL- and CSA- marking is only valid for the device in its delivery status. After having modified the device the UL and CSA compliance must be verified.

4.5 Wear Parts

The service life of the battery is approximately ten years at +25 °C. The service life is halved with each 10 °C temperature rise. For storing the VAU 01.1U, please do observe [chapter 8.4 "Storing the VAU 01.1U" on page 51](#).

4.6 Compatibility Test

All Rexroth controls and drives are developed and tested according to the latest state-of-the-art of technology.

As it is not possible to follow the continuing development of all materials (e. g. lubricants in machine tools) which may interact with our controls and drives, it cannot be completely ruled out that any reactions with the materials used by Bosch Rexroth might occur.

For this reason, before using the respective material a compatibility test has to be carried out for new materials (e. g. lubricants and cleaning agents) and our housing or our housing materials.

5 Dimensions, Mounting and Dismounting

5.1 Task

Target This chapter contains information on dimensions and describes how to mount and dismount the VAU 01.1U.

- Requirement**
- VAU 01.1U is present.
 - Mounting rail, steel (TH 35-7.5 and TH 35-15) according to EN 60715 is present.
 - End clamps are present.
 - Further tools are present (screwdriver, cable channel etc.).

5.2 Housing Dimensions

The VAU 01.1U has the following dimensions:

Width	123 mm
Height	145 mm
Depth (without plug)	128 mm

Fig.5-1: Dimensions of the VAU 01.1U

5.3 Mounting and Dismounting

5.3.1 Mounting Notes

- The VAU 01.1U is provided for mounting on a mounting rail.

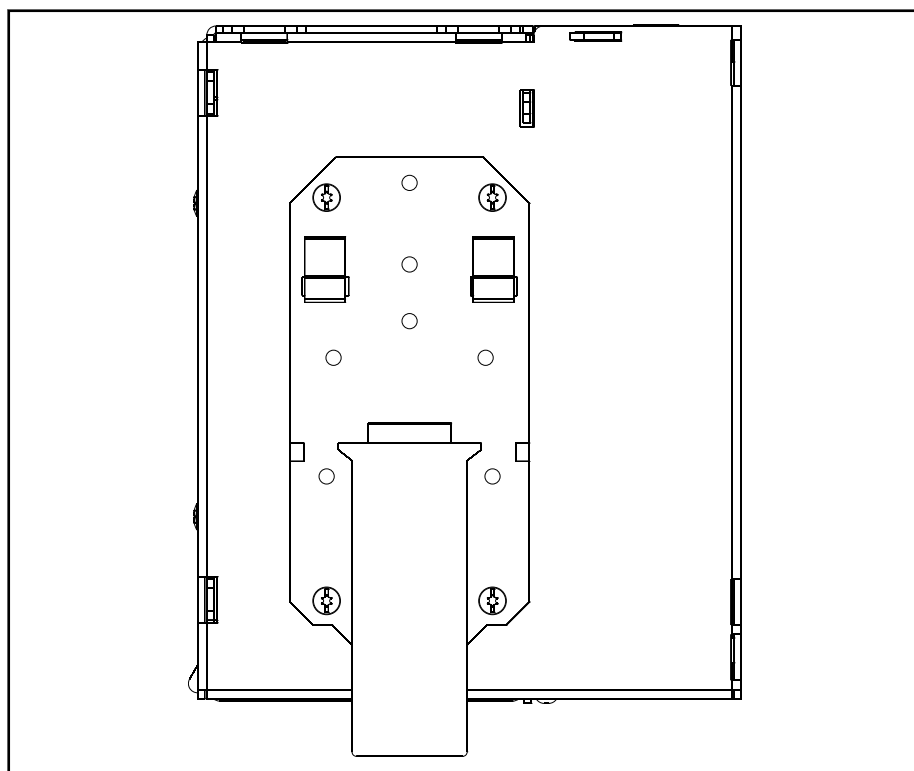


Fig.5-2: Mounting rail holders on the rear panel of the VAU 01.1U

- Avoid installation positions that are exposed to direct UV/sunlight.

Dimensions, Mounting and Dismounting

- The LED displays must not be covered.
- Provide the following minimum distances for installation and sufficient cooling:
 - To the bottom side 50 mm
 - To the top side 80 mm
- Lay all connecting cables in loops.
- Use strain reliefs for the cables.
- Keep as much distance as possible to noise sources, when installing the VAU 01.1U.

5.3.2 Mounting

Mounting the UPS on the mounting rail



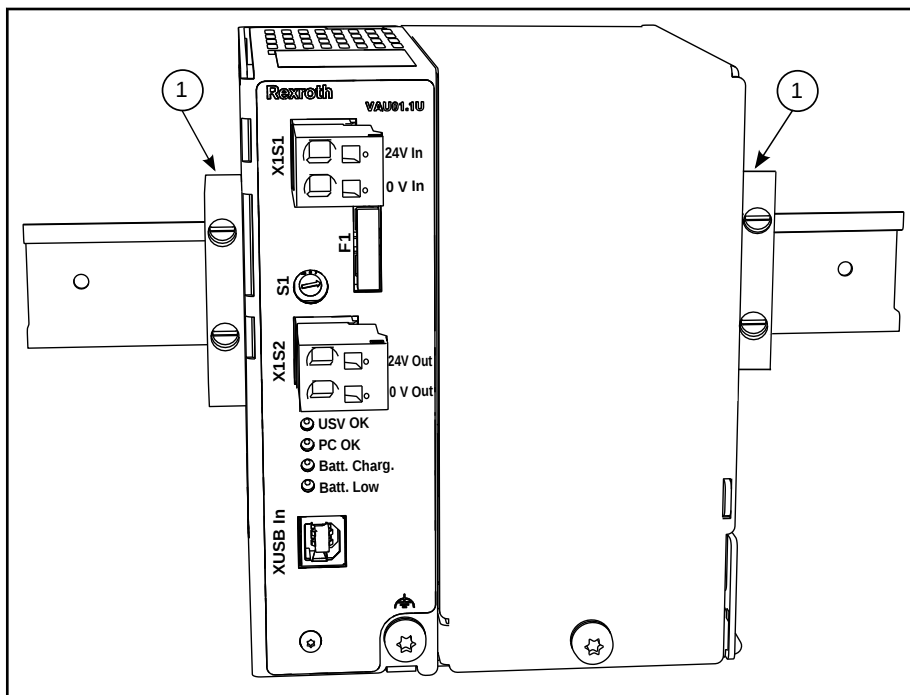
Only mounting rails TH 35-7.5 and TH 35-15 made of steel according to EN 60715 are permitted.

Determine the distance of the mounting holes according to EN 60715 appendix B.

Hang the UPS onto the mounting rail from above. Then exert slight pressure to engage the UPS in the lower section of the housing.

Attaching the end clamps

Mount end clamps on the mounting rail on both sides of the VAU 01.1U to avoid lateral moving of the UPS if vibrations occur. The end clamps are available as accessories, see [chapter 9.2 "Accessories" on page 54](#).



① End clamps on the mounting rail
Fig.5-3: End clamps

⚠ CAUTION

Possible personal injury and material damage due to a VAU 01.1U that loosens from the mounting rail caused by insufficient fastening.

Fasten the VAU 01.1U on a stable mounting rail. A mounting rail which is not stable enough can deform during transport, and therefore the VAU 01.1U can get loose.

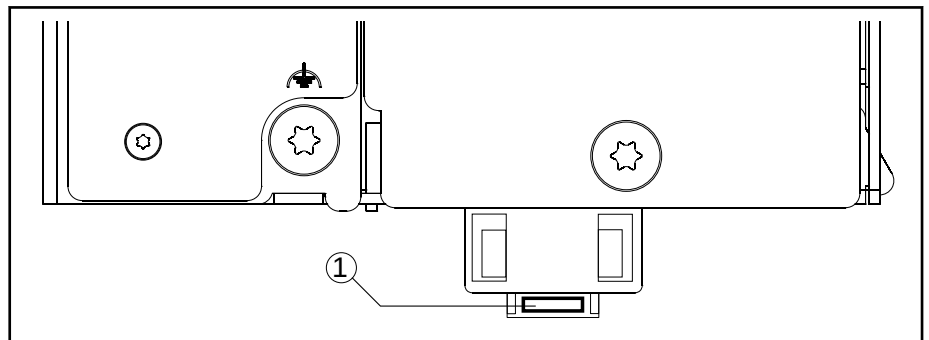
Fixing the cables

Unfixed cables are not permitted. An appropriate fixing (e. g. installation in a cable channel) and a strain relief of the cables is required.

5.3.3 Dismounting

Before dismounting the VAU 01.1U, ensure that

- the PC is shutdown,
 - the VAU 01.1U has been disconnected from the voltage supply,
 - the cables of the VAU 01.1U have been removed.
- Unlocking the UPS**
- Unlock the VAU 01.1U from the mounting rail by pulling the release lever to the bottom side by using a screwdriver, see [fig. 5-4 "Position of the release lever of the mounting rail holder" on page 27](#).



① Release lever

Fig. 5-4: Position of the release lever of the mounting rail holder

Removing the UPS from the mounting rail

- Pull off the VAU 01.1U from the mounting rail.
- Finally, remove the VAU 01.1U in upwards direction.

6 Operating and Display Components

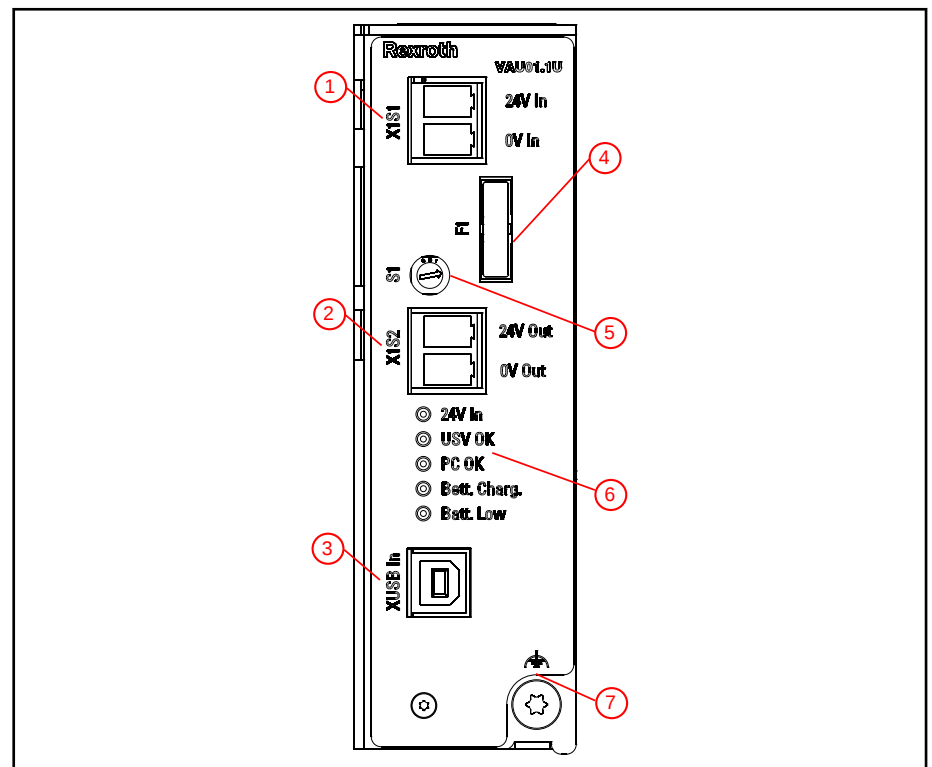
6.1 Task

- Target** This chapter provides an overview of the LED operating and error displays. It contains more information on the F1 fuse. It provides detailed information on the functioning and timing of the S1 rotary switch so that the device can be operated conveniently and can be adapted individually to your requirements.
- Requirement**
- Slot-head screwdriver for S1 rotary switch is present.
- Summary**
- Ensure that fuse F1 is inserted.
 - Set the S1 rotary switch and the control time in the UPS-NT software "before" using the UPS.

6.2 Connector Panel

6.2.1 General Information

In addition to the connection terminals, display and operating elements are arranged on the connector panel.



- ① Voltage connection, X1S1
- ② Voltage output, X1S2
- ③ USB interface, XUSB In
- ④ Fuse, F1
- ⑤ Rotary switch, S1
- ⑥ LEDs for operating and error display
- ⑦ Functional earth ground

Fig. 6-1: Connector panel of the VAU 01.1U with USB interface

Operating and Display Components

6.2.2 Overview of the LEDs for Operating and Error Display

On the front panel of the VAU 01.1U five LEDs are arranged to display the device states.

Take one of the following measures if one of the succeeding LEDs displays an error or a note, see [fig. 6-2 "Description of the LEDs" on page 30](#).

LED	Designation	Meaning	Measure
24 V IN	LED lights green	Normal mode	-
	LED is off	DC 24 V missing	Check the cable of the voltage supply which is connected to X1S1.
UPS OK	LED lights green	Normal mode	-
	LED is off	Internal voltages missing	For further information please contact the Bosch Rexroth Service, see chapter 11 "Service and Support" on page 57 .
PC OK	LED flashes green (5 s on, 1 s off)	Normal mode	-
	LED is off	Connected PC is booting	Wait until the boot process of the connected PC is finished.
		- Interface cable (between UPS and PC) is not plugged (XUSB In) or - The cable is defective	Check the interface cable.
		- Connected PC power supply unit has no supply voltage or - Connected PC power supply has not started yet.	Check the PC cable connected to X1S2.
		- UPS software has not started or - UPS software is not installed	- Check the connected PC. - Check that the UPS software has been installed and started.
Batt. Charg.	LED lights green	Battery is charged. Guaranteed UPS bridging time cannot be kept.	Wait until the battery is loaded (LED is off or is flashing).
	LED is off or is flashing	Battery is charged. The UPS is ready to operate.	-

Operating and Display Components

LED	Designation	Meaning	Measure
Batt. Low	LED lights red (more than 500 ms)	Battery is either discharged, not connected or fuse F1 (front side) is activated. (The LED is triggered by the UPS software)	- Keep the UPS switched on so that the battery can be loaded (max. five hours). If the LED continues flashing after this time, check the battery and, if necessary, replace the battery. - Check the fuse F1.
	LED lights red (500 ms after switching on)	Battery is defective or the deep discharge threshold of 18 V is reached. (The LED is independently triggered by the UPS software)	Check if the battery still works. Check if the battery is connected to the circuit board. Keep the UPS switched on so that the battery can be loaded (max. five hours). If the LED continues flashing after this time, check the battery and, if necessary, replace the battery.
	LED is off	Normal mode	-

Fig. 6-2: Description of the LEDs

6.3 Fuse F1

The FKS fuse (20 A, 32 V) is located on the front panel (connection F1). The F1 fuse protects the battery. Without fuse F1 no UPS operation is possible.



Ensure that the fuse is set "before" using the UPS.

Operating and Display Components

6.4 Rotary Switch S1

6.4.1 Position of S1 Rotary Switch

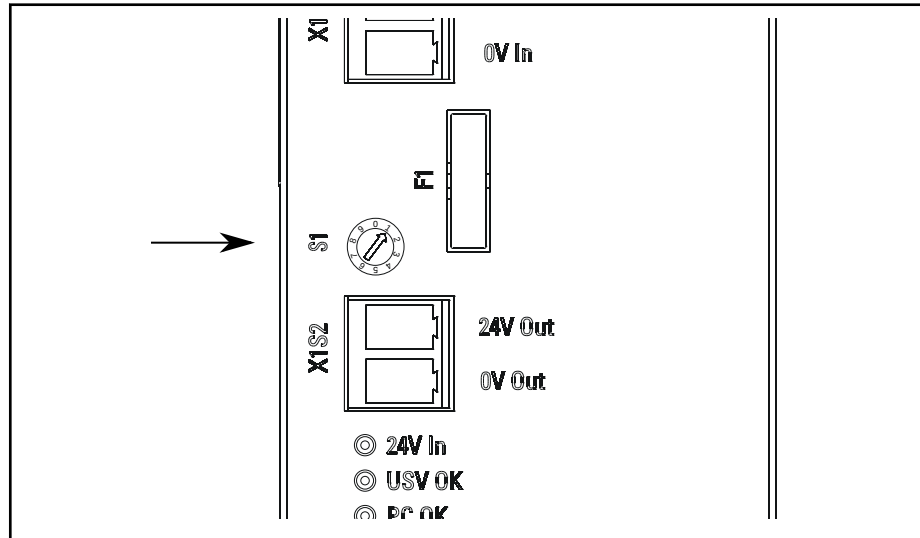


Fig.6-3: Position of S1 rotary switch

6.4.2 General Information

The switch position is in the delivery status "1".



The time, which is set by the switch, has to ensure that the system/station including the applications can shutdown **completely**.

UPS times Set different UPS times by S1 rotary switch . Change UPS times in steps of 60 seconds by switch positions 0 to 3. The UPS time is the time period in which the connected device is provided with output voltage of the UPS VAU 01.1U – after switching off the input voltage.

6.4.3 Timing Depending on the Position of S1 Rotary Switch

Switch position 1 to 3 (for production mode)

If switch positions 1 to 3 are used, the timer (time delay of 120 seconds) is triggered, which is integrated in the VAU 01.1U. This time delay prevents that UPS operation is signaled to the connected PC and initiated during the first 120 seconds after switching on if the input voltage is switched off within these 120 seconds. Nevertheless, the output voltage of the VAU 01.1U is buffered by the integrated battery and thus remains available for the connected PC. After the first 120 seconds time delay, UPS operation is signaled to the connected PC and is initiated if the input voltage remains switched off. When a voltage breakdown occurs, the set UPS time applies (switch position 0 to 3). Thus, it is ensured that a voltage breakdown of the supply voltage does not effect the initialization phase of the connected PC in any way.



We recommend switch positions 1 to 3 for the production mode.

Operating and Display Components

Switch position	UPS time
0	5 seconds
1	60 seconds
2	120 seconds
3	180 seconds

Fig. 6-4: Switch position 0 to 3

Switch position 4 to 7 (for commissioning)

If switch positions 4 to 7 are used, the timer (time delay of 120 seconds) integrated in the UPS is switched off. Thus, unnecessary waiting times, e.g. during commissioning, are avoided. After commissioning reset the switch to the switch positions 0 to 3.



We recommend switch positions 4 to 7 **exclusively** for commissioning to avoid waiting times.

Switch position	UPS time
4	5 seconds
5	60 seconds
6	120 seconds
7	180 seconds

Fig. 6-5: Switch position 4 to 7

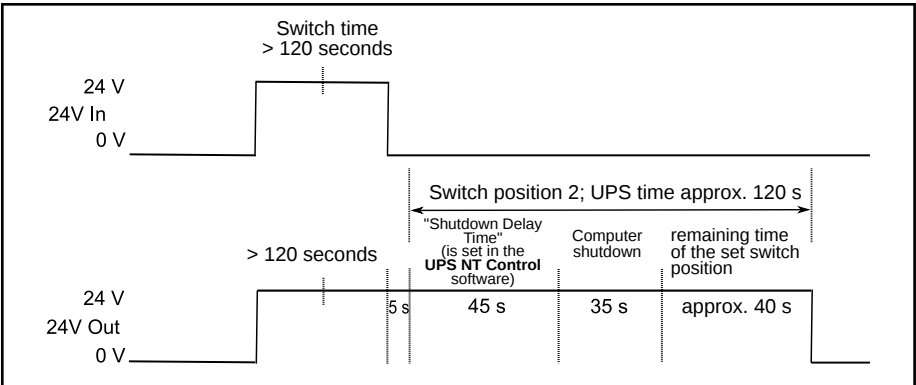
- Switch position 0** If the rotary switch is set to 0, UPS operation is 5 seconds with a time delay of 120 seconds.
- Switch position 1** If the rotary switch is set to 1, UPS operation is 60 seconds with a time delay of 120 seconds.
- Switch position 2** If the rotary switch is set to 2, UPS operation is 120 seconds with a time delay of 120 seconds.
- Switch position 3** If the rotary switch is set to 3, UPS operation is 180 seconds with a time delay of 120 seconds.
- Switch position 4** If the rotary switch is set to 4, UPS operation is 5 seconds without time delay.
- Switch position 5** If the rotary switch is set to 5, UPS operation is 60 seconds without time delay.
- Switch position 6** If the rotary switch is set to 6, UPS operation is 120 seconds without time delay.
- Switch position 7** If the rotary switch is set to 7, UPS operation is 180 seconds without time delay.

6.4.4 Timing Depending on the Position of Rotary Switch S1 and Settings in the UPS-NT Control Software

For further information on the UPS-NT Control software, please refer to the relevant documentation of the connected device, see also [chapter 1.2 "Permitted Devices" on page 6](#).

Overview **Example:** Switch position 2, Shutdown Delay Time = 45 seconds

Operating and Display Components

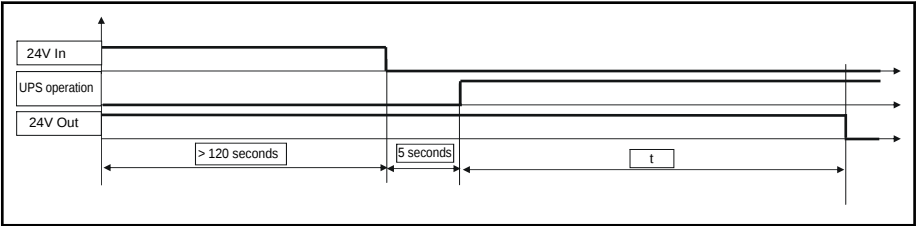


24V In Input voltage DC 24 V on the UPS of the power supply unit.
24V Out Output voltage DC 24 V of the UPS to supply the connected PC.
Fig. 6-6: Timing depending on the position of S1 rotary switch: Overview

Switch position 0 to 3 => for production mode
Switch position 0 => UPS time "t" = 5 seconds
Switch position 1 => UPS time "t" = 60 seconds
Switch position 2 => UPS time "t" = 120 seconds
Switch position 3 => UPS time "t" = 180 seconds

Observe that the timing behavior depends on the switch position "and" on the "Shutdown Delay Time", which is set in the "UPS-NT Control" software. Via this software times from 1 second to 45 seconds can be set.

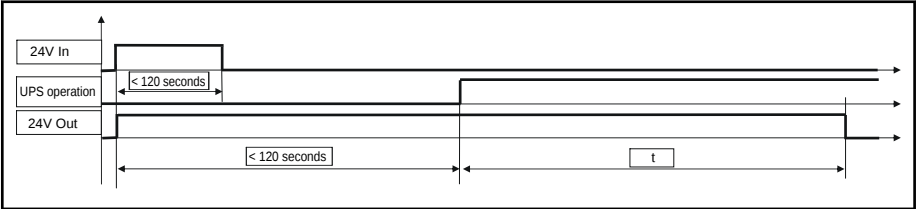
Switching off the VAU 01.1U after a switch-on duration > 120 seconds



24V In Input voltage DC 24 V on the UPS of the power supply unit.
UPS operation Signal to the connected PC that the UPS is in the buffer mode and that the supply voltage "24V Out" switches off after a set time.
24V Out Output voltage DC 24 V of the UPS to supply the connected PC.
Fig. 6-7: Timing

If the input voltage on the UPS drops "after" the time delay of 120 seconds has expired, the output voltage is buffered via the battery and UPS operation is signaled to the connected PC. After the UPS time "t" has expired, the VAU 01.1U switches off the output voltage.

Switching off the UPS after a switch-on duration < 120 seconds for switch positions 0 to 3



24V In Input voltage DC 24 V on the UPS of the power supply unit.
UPS operation Signal to the connected PC that the UPS is in the buffer mode and that the supply voltage "24V Out" switches off after a set time.
24V Out Output voltage DC 24 V of the UPS to supply the connected PC.
Fig. 6-8: Timing

If the input voltage on the UPS drops "before" the time delay of 120 seconds has expired, the output voltage is buffered via the battery. However, this is

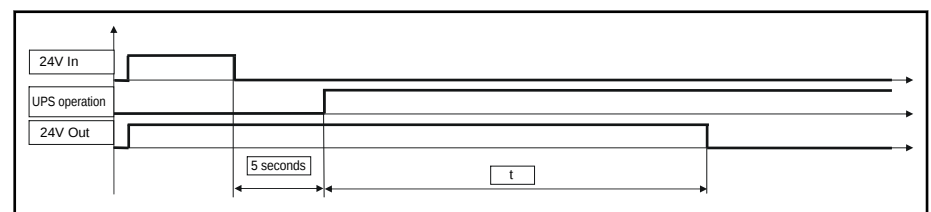
Operating and Display Components

"not" signaled to the connected PC. Firstly, after this time delay has expired, UPS operation is signaled to the connected PC. As soon as the UPS time "t" has expired, the output voltage on the VAU 01.1U is switched off.

Switch position S1	UPS time "t"
0	5 seconds
1	60 seconds
2	120 seconds
3	180 seconds

Fig. 6-9: Switch position S1

Switching off the UPS after a switch-on duration < 120 seconds for switch positions 4 to 7



24V In Input voltage DC 24 V on the UPS of the power supply unit.
UPS operation Signal to the connected PC that the UPS is in the buffer mode and that the supply voltage "24V Out" switches off after a set time.
24V Out Output voltage DC 24 V of the UPS to supply the connected PC.

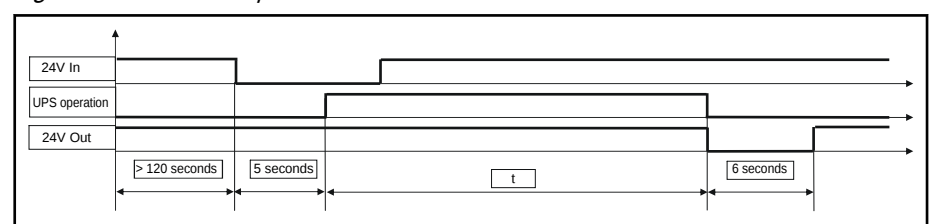
Fig. 6-10: Timing

If the input voltage on the UPS VAU 01.1U drops, the output voltage is buffered via the battery and signaled to the connected PC. After the UPS time "t" has expired, the output voltage on the VAU 01.1U is switched off.

Switch position S1	UPS time "t"
4	5 seconds
5	60 seconds
6	120 seconds
7	180 seconds

Fig. 6-11: Switch position S1

Activation of the supply voltage during UPS operation



24V In Input voltage DC 24 V on the UPS of the power supply unit.
UPS operation Signal to the connected PC that the UPS is in the buffer mode and that the supply voltage "24V Out" switches off after a set time.
24V Out Output voltage DC 24 V of the UPS to supply the connected PC.

Fig. 6-12: Timing

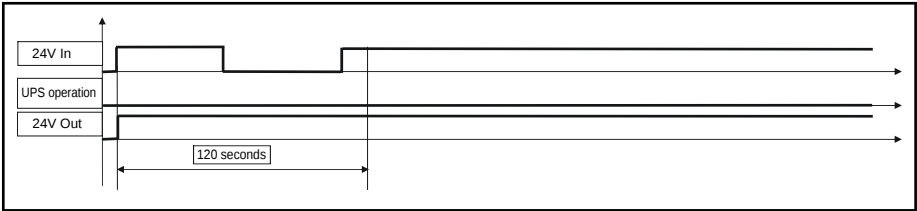
If after initiated UPS operation, the supply voltage is switched on again, the UPS operation is not interrupted. In this case, after the set UPS time has expired the UPS output voltage of the VAU 01.1U ("24V Out") is switched off and is switched on again after approx. 6 seconds.

Operating and Display Components

Switching on, switching off and
and switching on again for switch
positions 0 to 3

Switch position S1	UPS time "t"
0	5 seconds
1	60 seconds
2	120 seconds
3	180 seconds
4	5 seconds
5	60 seconds
6	120 seconds
7	180 seconds

Fig.6-13: Switching on the supply voltage during UPS operation



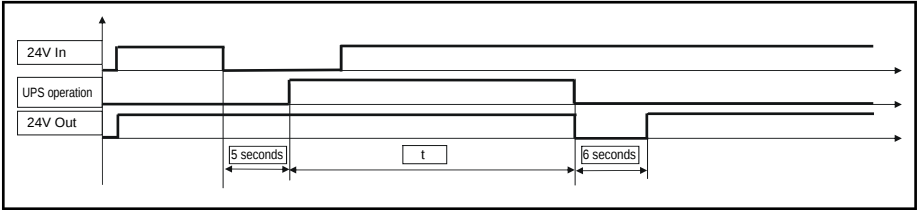
24V In Input voltage DC 24 V on the UPS of the power supply unit.
UPS operation Signal to the connected PC that the UPS is in the buffer mode and that the supply voltage "24V Out" switches off after a set time.
24V Out Output voltage DC 24 V of the UPS to supply the connected PC.

Fig.6-14: Timing

Switching on, switching off and
and switching on again for switch
positions 4 to 7

Switch position S1	UPS time "t"
0	5 seconds
1	60 seconds
2	120 seconds
3	180 seconds

Fig.6-15: Switching on, switching off and switching on again for switch positions 0 to 3



24V In Input voltage DC 24 V on the UPS of the power supply unit.
UPS operation Signal to the connected PC that the UPS is in the buffer mode and that the supply voltage "24V Out" switches off after a set time.
24V Out Output voltage DC 24 V of the UPS to supply the connected PC.

Fig.6-16: Timing

Switch position S1	UPS time "t"
4	5 seconds
5	60 seconds

Operating and Display Components

Switch position S1	UPS time "t"
6	120 seconds
7	180 seconds

Fig.6-17: Switching on, switching off and and switching on again for switch positions 4 to 7

If the input voltage on the UPS drops, the VAU 01.1U switches into the buffer mode or into UPS operation and signals this to the connected PC. After the UPS time "t" has expired, the output voltage "24V Out" switches off at the VAU 01.1U.

7 Interfaces and Wiring

7.1 Task

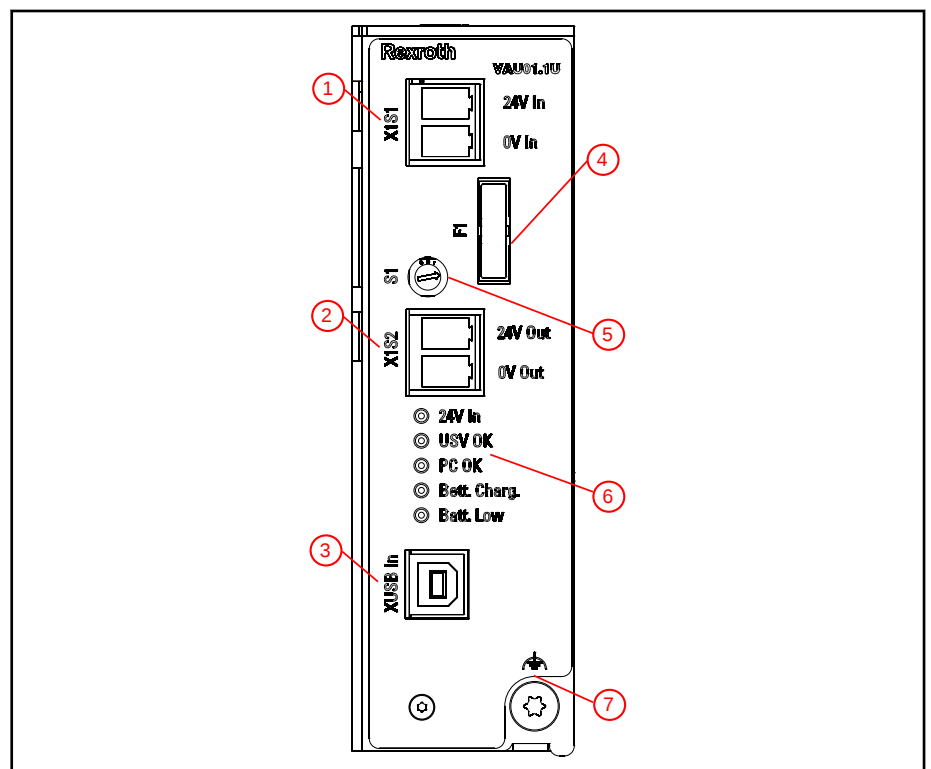
Target This chapter contains an overview of the interfaces. Additionally, this chapter informs how to wire the power connection and which cable lines and cross-sections have to be taken into consideration. It also informs on the USB connection XUSBIn.

- Requirement**
- The VAU 01.1U has to be already mounted.
 - Tools for electrical installation are present.
 - Ensure that fuse F1 is inserted (see also [chapter 6.3 "Fuse F1" on page 31](#)).
 - Set S1 rotary switch "before" using the VAU 01.1U (see also [chapter 6.4 "Rotary Switch S1" on page 32](#)).

7.2 Connector Panel

7.2.1 General Information

The terminals for the voltage connection, the voltage output and the USB interface as well as the display and operating components are arranged on the connector panel.



- ① Voltage connection, X1S1
- ② Voltage output, X1S2
- ③ USB interface, XUSB In
- ④ Fuse, F1
- ⑤ Rotary switch, S1
- ⑥ Display components
- ⑦ Functional earth ground

Fig.7-1: Connector panel of the VAU 01.1U with USB interface

7.2.2 Overview of the Connections

Designa- tion at the housing	Connection type	Connector type (in- tegrated)	Mating connector or cable (from outside)
X1S1	Voltage supply DC 24 V	Phoenix connector terminal, PC4/2-G-7.62, 2- pin	Phoenix female connector terminal, PC4/2-St-/-7.62, 2- pin
X1S2	Output voltage DC 24 V	Phoenix connector terminal, PC4/2-G-7.62, 2- pin	Phoenix female connector terminal, PC4/2-St-/-7.62, 2- pin
XUSB In	USB2.0 connection to the control cabi- net PC. Maximum 3 m. Use only a high- speed USB2.0 ca- ble, see chapter 9.2 "Accessories" on page 54 .	USB female con- nector, 4-pin, type B	USB plug, 4-pin, type B
	Functional earth ground (FE)	M5	Ring cable lug

Fig. 7-2: Interfaces on the VAU 01.1U

7.3 Voltage Connection

7.3.1 General Information

The 24 V supply voltage is connected to the X1S1 interface; the 24 V output voltage is provided at the X1S2 interface.

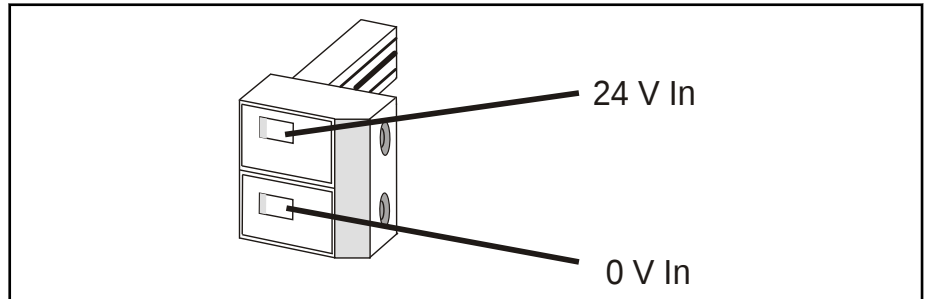


Fig. 7-3: Connection of the 24 V voltage supply at the connector

NOTICE

Destruction of screw terminals, insufficient contact and loss of UL certification if no copper wire is used and/or wrong torque.

For wiring connection terminals use copper wire only. Tighten the screws of the screw terminal blocks with a torque of 5.5 lb in (0.6 Nm):

7.3.2 Wiring the Power Connection

The VAU 01.1U is specified for overvoltage category 1.

⚠ WARNING

High electrical voltage due to wrong connections! Danger to life, risk of injury by electric shock!

Do observe the overvoltage categories, see [chapter 7.3.2 "Wiring the Power Connection"](#) on page 41, [fig. 7-5 "Wiring of the DC 24 V power connection to the VAU 01.1U at 400 V voltage supply of the 24 V power supply unit"](#) on page 43 and [fig. 7-4 "Wiring of the DC 24 V power connection to the VAU 01.1U at 230 V voltage supply of the 24 V power supply unit"](#) on page 42.

Interfaces and Wiring

Wiring 230 V

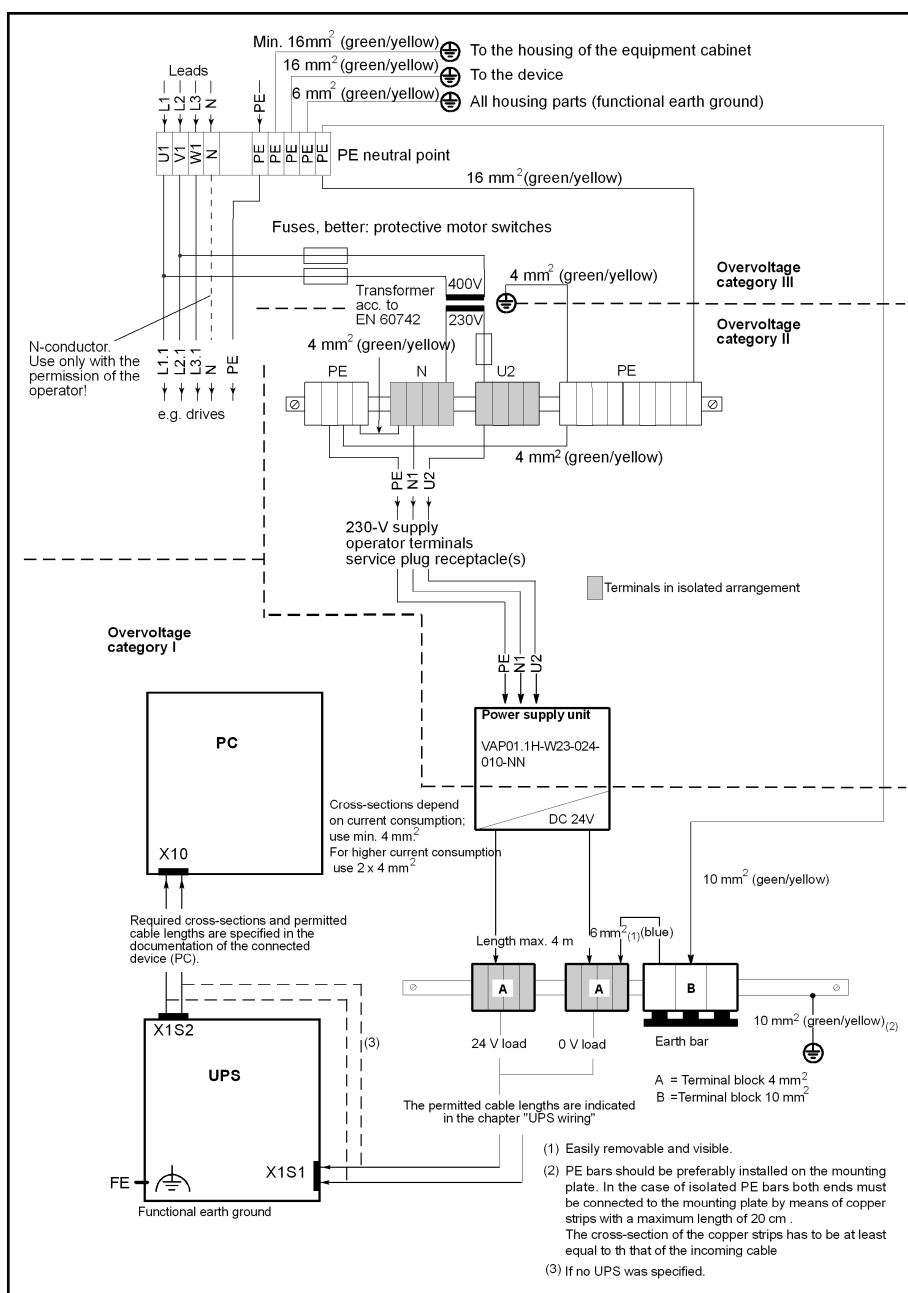


Fig. 7-4: Wiring of the DC 24 V power connection to the VAU 01.1U at 230 V voltage supply of the 24 V power supply unit

⚠ DANGER

Danger of death by high electric voltage

- Connect power supply units, which generate protective extra-low voltage (PELV) (24 V), only to supply voltages for which they are designed. Do observe the overvoltage categories, see [chapter 7.3.2 "Wiring the Power Connection"](#) on page 41 and [fig. 7-4 "Wiring of the DC 24 V power connection to the VAU 01.1U at 230 V voltage supply of the 24 V power supply unit"](#) on page 42.
- Do not apply the supply voltage to the protective extra-low voltage (PELV).

Interfaces and Wiring

Wiring 400 V

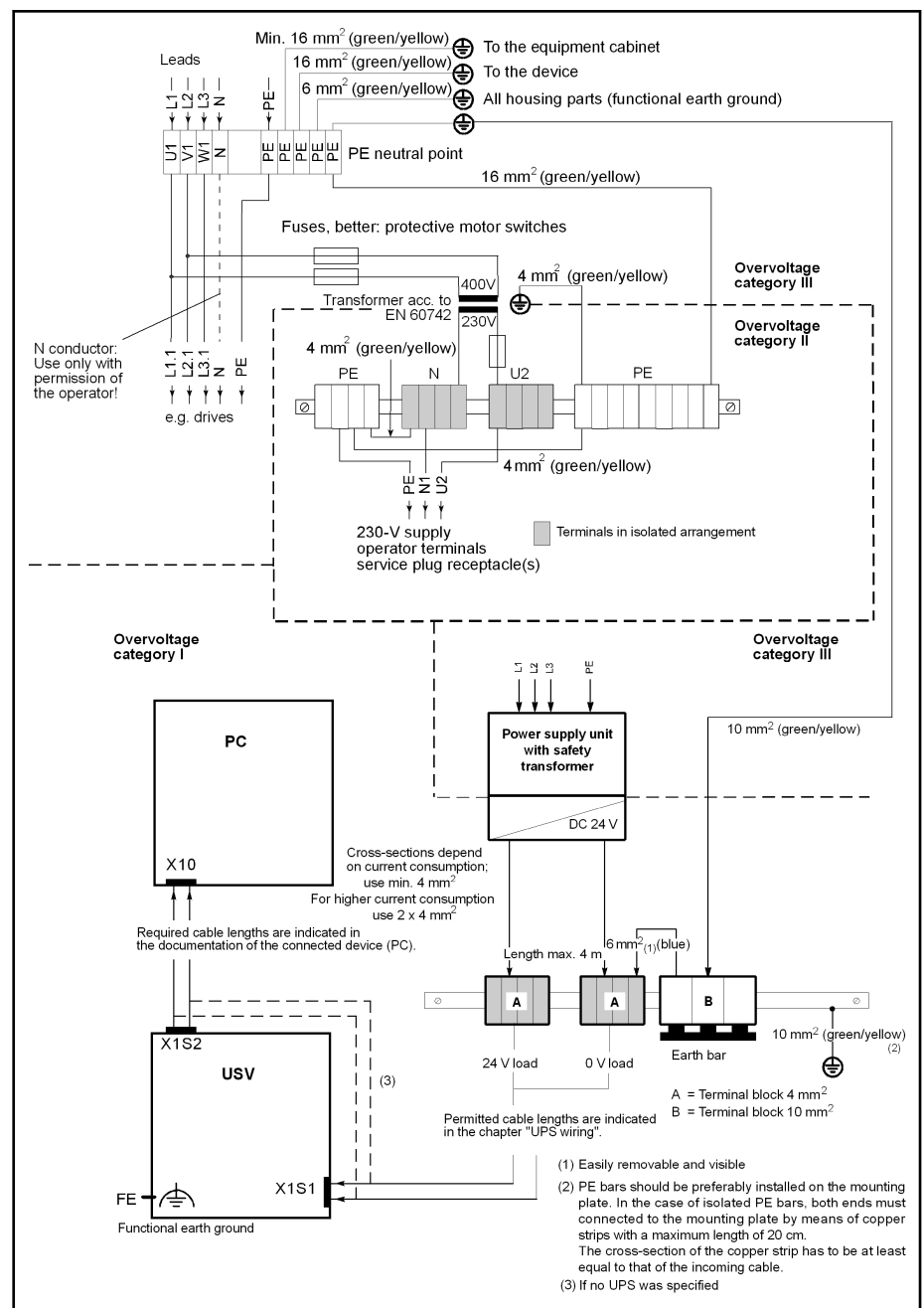


Fig. 7-5: Wiring of the DC 24 V power connection to the VAU 01.1U at 400 V voltage supply of the 24 V power supply unit

⚠ DANGER

Danger of death by high electric voltage

- Connect power supply units, which generate protective extra-low voltage (PELV) (24 V), only to supply voltages for which they are designed. Do observe the overvoltage categories, see [chapter 7.3.2 "Wiring the Power Connection"](#) on page 41 and [fig. 7-5 "Wiring of the DC 24 V power connection to the VAU 01.1U at 400 V voltage supply of the 24 V power supply unit"](#) on page 43.
- Do not apply the supply voltage to the protective extra-low voltage (PELV).

Interfaces and Wiring

7.3.3 Wiring of the VAU 01.1U, Cable Lengths and Cable Cross-Sections

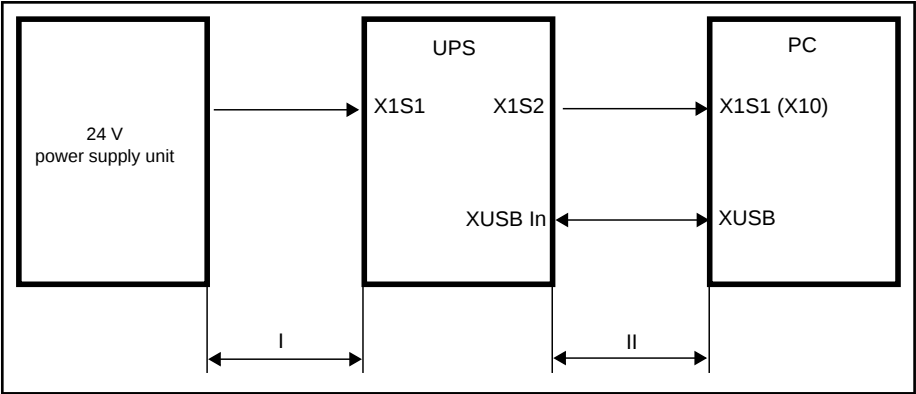


Fig.7-6: Wiring the VAU 01.1U

Cable length I	Cross-sections indicated in mm ² when wired firmly
1 m to 7 m	2.50 (AWG13)
8 m to 10 m	4.00 (AWG11)

Fig.7-7: Required cable cross-sections for the DC 24 V voltage supply depending on cable length and output power when wired firmly



The following data applies if the load changes immediately caused by connecting or disconnecting loads at the VAU 01.1U:

Cable length I: Maximum 2 m with minimum 5 mm² (AWG10) cross-section.

Cable length II: Maximum 2 m with minimum 2.5 mm² (AWG13) cross-section.

7.4 Interface XUSB In

7.4.1 General Information

During the connection of a VAU 01.1U to an USB interface at a PC, the information regarding the existence as well as the state of the VAU 01.1U are communicated to the PC via a USB connection. The communication is established via a virtual COM interface provided by the USB interface.

The electrical properties of the XUSB In interface correspond to the properties of the standard USB interface.



The driver for the VAU 01.1U has to be installed.

Cable type for XUSB In

Permitted cable lengths	0.5 m 1 m 3 m (maximum length)
Cable type	Shielded, cross-section min. 2 x 0.08 mm ² (AWG28), 2 x 0.25 mm ² (AWG24)
Maximum current consumption	200 mA

Fig.7-8: Cable type XUSB In

Malfunctions

NOTICE

Malfunctions due to insufficient shielding!

Use only shielded cables and metallic or conductive connector or coupling covers with large-area shield support.

NOTICE

Malfunctions due to too long cables!

Use short USB cables, if possible.

Use one of the following cables, see also [chapter 11 "Service and Support" on page 57](#):

- USB_A/B_EMV_3M cable; parts number: R911171414 or
- USB_A/B_EMV_1M cable; parts number: R911171627

These cables feature additional shield connectors which are connected to the functional earth ground connections of the control and of the VAU 01.1U. Additionally, the VAU 01.1U features a ferrite clamp between USB connection of the VAU 01.1U and the bonding clip of the VAU 01.1U.

Connecting the USB cable

- At first, attach the shield connector of the USB cable to the functional earth ground connection (FE) of the VAU 01.1U (see ② in the following figure).



①

USB interface

②

Shield connector of the USB cable

Fig. 7-9:

Attaching the USB cable to the functional earth ground of the VAU 01.1U

Pin assignment of the USB connector

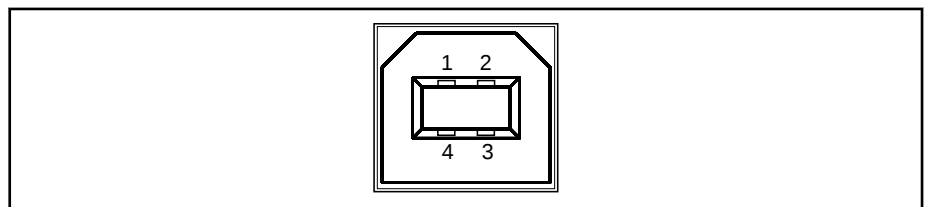


Fig. 7-10:

Interface XUSB In

Pin	Function
1	USB power supply
2	Data -

Interfaces and Wiring

Pin	Function
3	Data +
4	USB ground

Fig.7-11: Pin assignment of the XUSB In connector

8 Maintenance, Storage and Transport

8.1 Task

Target This chapter contains notes and information on the maintenance of the VAU 01.1U. This chapter describes e.g. how to replace the battery. Furthermore, it contains information on storage and transportation of the VAU 01.1U.

Requirement For replacing the battery, the following have to be present:

- A T10 Torx screwdriver
- A T25 Torx screwdriver
- A battery permitted by Bosch Rexroth (e.g. "AKKU24V/2,5Ah", parts number: 1070923287)

8.2 General Information

The VAU 01.1U is maintenance-free. However, a few parts are subject to wear and have to be replaced after a certain number of operating hours.

CAUTION

Only qualified persons may perform maintenance work in the device!

If hardware or software components have to be replaced, please contact the Bosch Rexroth Service (see [chapter 11 "Service and Support" on page 57](#)) or ensure that only qualified persons replace the respective components.

Maintenance Include the following measures in your maintenance schedule:

- At least once a year, check all plug and terminal connections of the components regarding proper tightness and possible damage. Verify that lines and cables are not broken or squeezed. Replace damaged parts immediately.



The used batteries are recyclable and can be returned to Bosch Rexroth after replacement. They must not be disposed in the standard household refuse!

WARNING

Batteries can cause fire, explosions or chemical burn.

Do not load, remove, destroy, burn or heat batteries over 100 °C. Dispose old batteries immediately and properly. Keep away from children!

8.3 Replacing Batteries

If the battery is replaced by your own skilled staff, observe the following instructions:

⚠ DANGER

Fire or explosion hazard by use of wrong battery types!

Replace the battery only by a battery type permitted by Bosch Rexroth.

⚠ DANGER

Fire, explosions or burns due to wrong battery treatment!

The battery must not be charged externally, opened, heated over 80 °C and burnt.

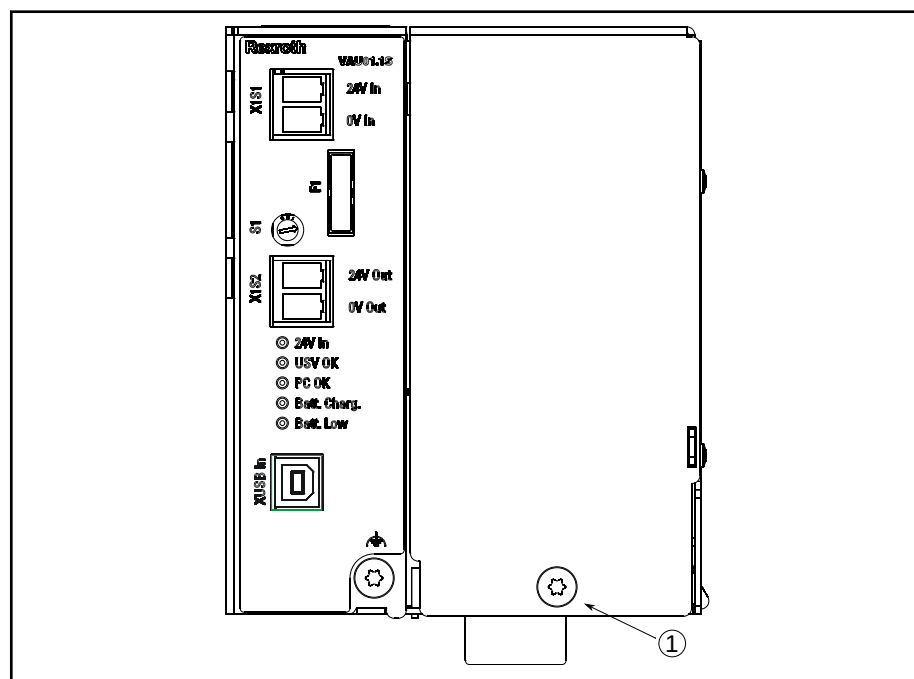


The battery is designed for the use under normal temperature conditions. The temperatures to be expected must not exceed values of 60 °C.

To exchange the battery, proceed as described in the following sections.

Steps for replacing the battery

1. Shut down the PC.
2. Disconnect the supply voltage of the VAU 01.1U.
3. Remove fuse F1 on the front side.
4. Open the cover by loosening the M5 screw at the VAU 01.1U, see [fig. 8-1 "Position of the M5 screw for opening the VAU 01.1U" on page 48.](#)



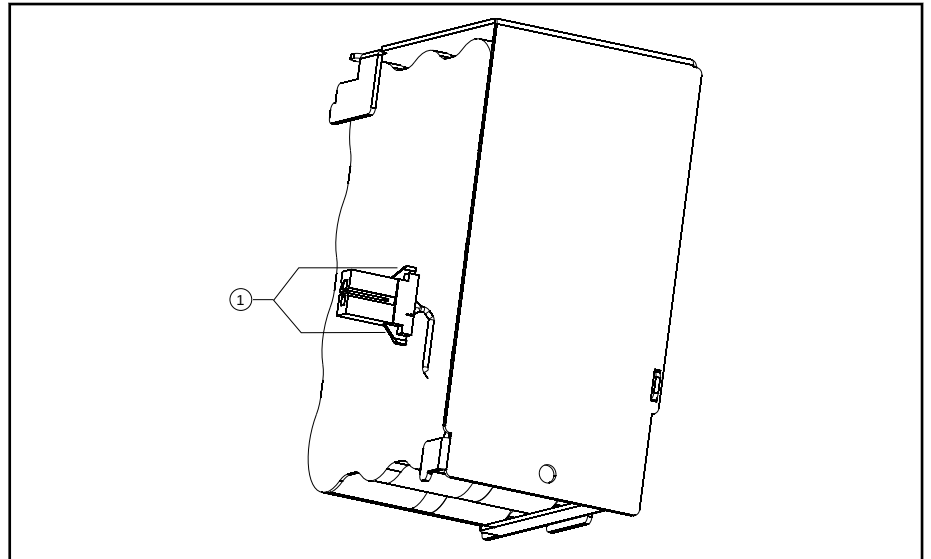
① Screw for opening the VAU 01.1U

Fig. 8-1: Position of the M5 screw for opening the VAU 01.1U

5. • The battery is attached at the cover. Therefore, open the cover carefully.

Maintenance, Storage and Transport

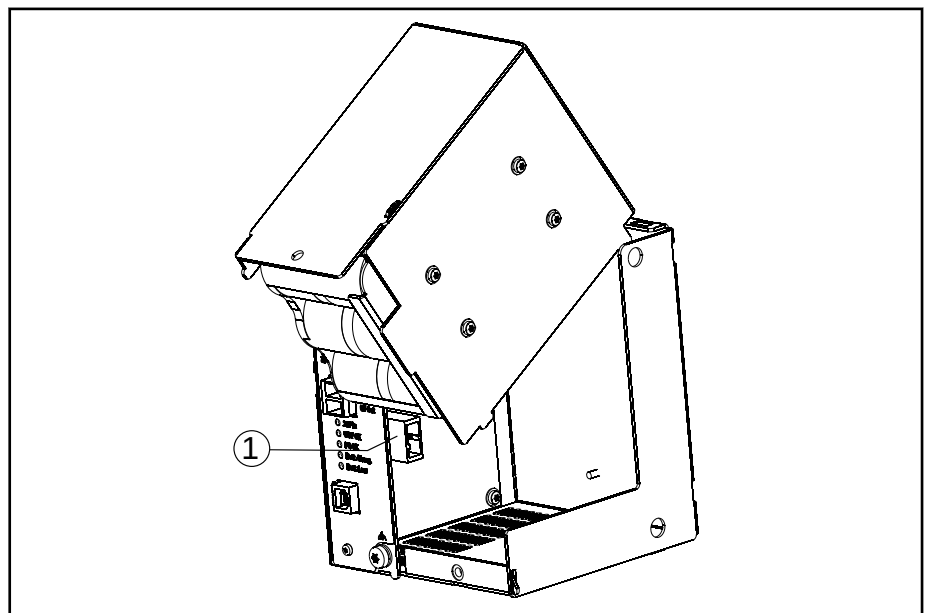
- Loosen the connector, with which the battery is connected. Loosen the connector by pressing the release at the plug housing, see (1) in fig. 8-2 "Plug position at the battery" on page 49.



① Plug interlock

Fig. 8-2: Plug position at the battery

6. • As soon as the cover is opened (see fig. 8-3 "Opened cover of the VAU 01.1U " on page 49), the cover can be separated from the housing.

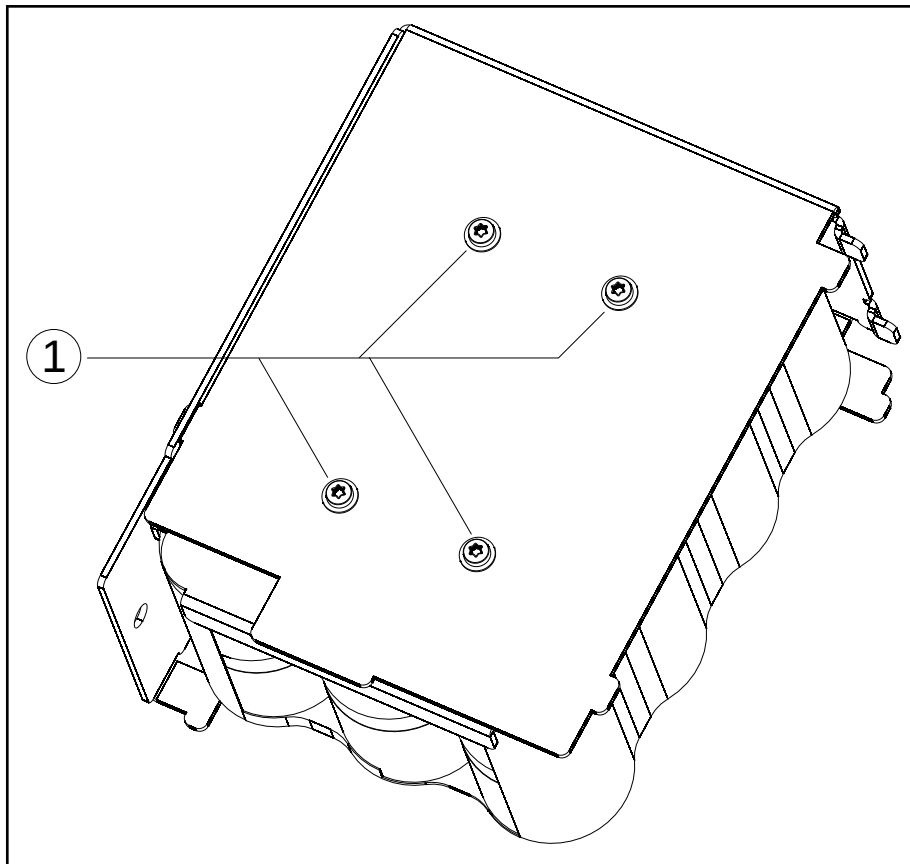


① Connector at the VAU 01.1U

Fig. 8-3: Opened cover of the VAU 01.1U

Maintenance, Storage and Transport

7. • Remove the battery from the cover by loosening the four M3 screws, see [fig. 8-4 "Position of the four M3 screws" on page 50](#).



① Fastening screws of the battery
Fig.8-4: Position of the four M3 screws

Dispose the battery immediately and properly. Observe the notes given in this chapter and in [chapter 10 "Environmental Protection and Disposal" on page 55](#).

8. •

NOTICE

Battery damage due to inadequate screws.

Attach the new battery by using the four original M3 screws. A longer screw might damage the housing of the battery.

- Observe that only a battery which is permitted by Bosch Rexroth is installed, e. g. the battery "AKKU24V/2,5Ah" (Bosch Rexroth parts number: 1070923287).
 - Tighten the four M3 screws (see [fig. 8-4 "Position of the four M3 screws" on page 50](#)) with a torque of 6.2 lbf in (0.7 Nm).
9. Plug the battery connector until it clicks into place.
10. • Close the cover
- Attach the cover with the original M5x10 Z4 screw to the housing by tightening it with a torque of 24.8 lbf in (2.8 Nm).
11. Refit fuse F1.

NOTICE

Battery damage due to inadequate screws.

Use the original screw only. A longer screw might damage the housing of the battery.

NOTICE

Possible data loss due to an uncharged battery.

If the new battery is not yet charged, there is no sufficient UPS protection for a controlled shutdown of the PC during the charging period. Therefore use completely charged batteries, if possible. The charging time of a 2.5 Ah battery is approx. five hours.

Testing the new battery

1. Switch on the supply voltage for the VAU 01.1U again.
2. Observe the "Batt. Charg." display on the front panel:
 - LED "Batt. Charg." lights green: Battery is charged.
 - LED "Batt. Charg." flashes: The battery is nearly completely charged.
 - Unlit LED "Batt. Charg." indicates that the battery is charged. The darker the LED flashes, the higher the charging status of the battery is.

8.4 Storing the VAU 01.1U

Recommended value for the storage time

The storage time is two years at an average ambient temperature of +25 °C.

NOTICE

Battery damage due to deep discharge

If the storage temperature is unclear or if the storage time has exceeded two years, check the open-circuit voltage of the battery regularly – as described in the following section!

Checking the open-circuit voltage

To check the open-circuit voltage of the battery, insert a voltmeter between the fusible wire of fuse F1 (see [fig. 7-1 "Connector panel of the VAU 01.1U with USB interface" on page 39](#)) and the 0 V connection of X1S1.

NOTICE

Damage to the VAU 01.1U due to short-circuit

A short-circuit must not be caused during voltage measuring because a measurement at the fusible wire of the fuse might deactivate its function!

The open-circuit voltage of the battery must not fall below +21 V, as otherwise the battery cells might be damaged.

For this reason, start the charging process of the battery as of an open-circuit voltage of +22 V by connecting the VAU 01.1U to the +24 V supply. Then the charging process automatically starts.

8.5 Transporting the VAU 01.1U

For transporting the VAU 01.1U, the plug connection of the battery has to be removed, see [chapter 8.3 "Replacing Batteries" on page 48](#). This ensures that there is no connection between the battery and the integrated electronics.

9 Ordering Information

9.1 Type Designation Code

The VAU 01.1U is available according to the following type designation code.

Abbrev. Column	1	2	3	4	5	6	7	8	9	1	0	1	2	3	4	5	6	7	8	9	2	0	1	2	3	4	5	6
Example:	V	A	U	0	1	.	1	S	-	0	2	4	-	0	2	4	-	2	4	0	-	N	N					
Product																												
UPS for IndraControl V = VAU																												
Line																												
01..... = 01																												
Design																												
1..... = 1																												
Type of construction ①																												
Standard = S																												
Standard with USB interface . . = U																												
Control for central UPS. = Z																												
Input voltage ①																												
DC 24 V = 024																												
AC 230 V +-10%, 50/60 Hz. = 230																												
DC 24 V + AC 100...240 V, 50/60 Hz = Z24																												
Output voltage ①																												
DC 24 V = 024																												
AC 230 V +-10%, 50/60 Hz. = 230																												
Maximum power ①																												
e.g. 240 W. = 240																												
Other design																												
none = NN																												
Note																												
Available configurations																												
VAU01.1S-024-024-240-NN																												
VAU01.1S-230-230-300-NN																												
VAU01.1U-024-024-240-NN																												
VAU01.1Z-Z24-024-060-NN																												

Fig.9-1: Type designation code for VAU 01.1U



This documentation describes only the uninterruptible power supply (UPS) VAU01.1U-024-024-240-NN.

Ordering Information

9.2 Accessories

Battery

Order code	Parts number	Description
AKKU 24V/2,5Ah	1070923287	Battery
SUP-M01-ENDHAL-TER/PA	R911172352	End clamp (2 pieces)

Fig. 9-2: Order data, battery

USB connecting cables with increased noise immunity

NOTICE

If the UPS is used in noisy environment, malfunctions are possible.

Use only USB cables with high noise immunity for the connection between control cabinet PC and uninterruptible power supply (VAU01.1U) with communication interface.

Order code	Parts number	Description
RKB0023/001,0	R911171627	USB connecting cable with increased noise immunity; Length 1 m
RKB0023/003,0	R911171414	USB connecting cable with increased noise immunity; Length 3 m

Fig. 9-3: Order data, USB connecting cable with increased noise immunity

9.3 Further Documentation

Documentation	Order code of the documentation	Parts number
Rexroth IndraControl VPB 40.3	DOK-SUPPL*-VPB*40.3***-PRxx-EN-P	R911323876
Rexroth IndraControl VPP 16.3/40.3/60.3	DOK-SUPPL*-VPP*XX.3***-PRxx-EN-P	R911323511
Rexroth IndraControl VSB 40.3	DOK-SUPPL*-VSB*40.3***-PRxx-EN-P	R911323880
Rexroth IndraControl VSP 16.3/40.3	DOK-SUPPL*-VSP*XX.3***-PRxx-EN-P	R911323882

Fig. 9-4: Further documentation for devices which are permitted for the VAU 01.1U

10 Environmental Protection and Disposal

10.1 Environmental Protection

Production Processes The products are made with energy- and resource-optimized production processes which allow re-using and recycling the resulting waste. We regularly try to replace pollutant-loaded raw materials and supplies by more environment-friendly alternatives.

No Release of Hazardous Substances Our products do not contain any hazardous substances which may be released in the case of appropriate use. Normally, our products will not have any negative influences on the environment.

Significant Components Basically, our products contain the following components:

Electronic devices

- steel
- aluminum
- copper
- synthetic materials
- electronic components and modules

Motors

- steel
- aluminum
- copper
- brass
- magnetic materials
- electronic components and modules

10.2 Disposal

Return of Products Our products can be returned to our premises free of charge for disposal. It is a precondition, however, that the products are free of oil, grease or other dirt. Furthermore, the products returned for disposal must not contain any undue foreign material or foreign components.

Send the products "free domicile" to the following address:

Bosch Rexroth AG
Electric Drives and Controls
Buergermeister-Dr.-Nebel-Strasse 2
97816 Lohr am Main, Germany

Packaging The packaging materials consist of cardboard, wood and polystyrene. These materials can be recycled anywhere without any problem.

For ecological reasons, please refrain from returning the empty packages to us.

Batteries and Accumulators Batteries and accumulators can be labeled with this symbol.



The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin.

The end user within the EU is legally obligated to return used batteries. Outside the validity of the EU Directive 2006/66/EC keep the stipulated directives.

Used batteries can contain hazardous substances, which can harm the environment or the people's health when they are improperly stored or disposed of.

After use, the batteries or accumulators contained in Rexroth products have to be properly disposed of according to the country-specific collection.

Recycling Most of the products can be recycled due to their high content of metal. In order to recycle the metal in the best possible way, the products must be disassembled into individual modules.

Environmental Protection and Disposal

Metals contained in electric and electronic modules can also be recycled by means of special separation processes.

Products made of plastics can contain flame retardants. These plastic parts are labeled according to EN ISO 1043. They have to be recycled separately or disposed of according to the valid legal requirements.

11 Service and Support

The Bosch Rexroth service helpdesk at our headquarters in Lohr, Germany, and our worldwide service provide 24/7 support and assistance.

	Helpdesk	Worldwide service hot-line
Phone	+49 (0) 9352 40 50 60	Outside Germany, please contact your sales/service office first.
Fax	+49 (0) 9352 40 49 41	
E-mail	service.svc@boschrexroth.de	For hotline numbers, refer to the sales office addresses on the internet.
Internet	For additional information on service, maintenance (e.g. delivery addresses) and training, please go to http://www.boschrexroth.com	

Required information

Please provide the following information:

- Detailed description of malfunction and circumstances leading to the malfunction
- Type plate name of the affected products, in particular type codes and serial numbers
- Phone and fax numbers as well as your e-mail address

Glossary VAU 01.1U

Shutdown Delay Time (= Control time)

The "Shutdown Delay Time" is the time which the shutdown of the connected PC is delayed, which is set in the UPS-NT software. The user can backup the data during this time.

Time delay (= timer, time delay function, time delay circuit, delay time)

This time delay prevents that UPS operation is signaled to the connected PC and initiated during the first 120 seconds after switching on if the input voltage is switched off within these 120 seconds.

UPS (= uninterruptible power supply)

The UPS is used for timely-limited voltage supply of the connected device if the voltage supply (DC 24 V) fails.

UPS-NT Control software

The UPS-NT control software is used to monitor and control the UPS.

UPS operation (= buffer operation, buffer mode)

Signal to the connected PC that the UPS is in the buffer mode and that the supply voltage "24V Out" switches off after a set time.

UPS time (= buffer time)

The UPS time is the time period in which the connected device is provided with output voltage of the VAU – after switching off of the input voltage.

Index

A

Accessories.....	54
Accumulators.....	55
Air pressure.....	22
Ambient conditions.....	22
Ambient temperature.....	22

B

Batteries.....	55
Battery.....	54

C

Cable lengths.....	44
Cable type.....	44
Cable types	
XUSB In	44
CE marking.....	23
charging time.....	51
Compatibility test.....	24
Connecting the USB cable.....	45
Connections.....	40
Connector panel.....	29, 39
Contained substances	
see "Significant components"	55
CSA certified.....	24

D

Declaration of conformity.....	23
Degree of protection.....	21
Delivery status.....	32
Dimensions.....	25
Installation	25
Dismounting.....	27
Disposal.....	55
Documentation.....	6, 54
Drive system.....	9

E

Electric drive system.....	9
Environmental protection.....	55
Error display.....	30

F

F1.....	31
Fuse F1.....	31

G

Glossary VAU 01.1U.....	III
-------------------------	-----

H

Hazardous substances.....	55
---------------------------	----

H

Housing dimensions.....	25
-------------------------	----

I

Input voltage.....	21
Input voltage and output voltage.....	21
Installation	
Mounting notes	25
Intended use	
Introduction	7
Interfaces.....	39
Interface XUSB in.....	44

L

LEDs.....	30
-----------	----

M

Maintenance	
General information	47
Max. shock.....	22
Max. temperature gradient.....	22
Max. vibration.....	22
Minimum distances.....	26
Mounting.....	26
Mounting notes.....	25
Mounting rail.....	25

O

Open-circuit voltage check.....	51
Operating and display components.....	29
Operating and error display.....	30
Order data	
Battery	54
USB connecting cable with increased	
noise immunity	54
Ordering information.....	53
Output voltage.....	21

P

Packaging.....	55
PELV.....	14
Pin assignment of the USB connector.....	45
Production processes.....	55
Protective extra-low voltage.....	14

R

Recycling.....	55
Relative humidity.....	22
Release lever of the mounting rail holder.....	27
Replacing batteries.....	48
Return of products.....	55
Rotary switch S1.....	32

Index

R

...Rotary switch S1	
Timing	32, 33
Rotary Switch S1	
Position	32

S

S1.....	32
Safety instructions for electric drives and controls	9
Significant components.....	55
Software.....	6
Standards.....	22
Storage time.....	51
Storing the UPS.....	51
Support	
see Service-Hotline	57
Switch position 0 to 3.....	33
Switch position 4 to 7.....	33
Switch positions 0 to	
Switching on, switching off and switching	
on again	36
System presentation	
VAU	5

T

Technical data.....	21
Ambient conditions	22
Degree of protection	21
Used standards	22
Voltages	21
Weight	21

T

Testing the battery.....	51
Timing behavior.....	33
Transporting the	51
Type designation code.....	53

U

UL and CSA certified.....	24
Unintended use.....	8
Consequences, exclusion of liability	7
UPS-NT control software.....	33
UPS operation	
Switching on the supply voltage	36
UPS times.....	32
USB interface.....	44
Use.....	7

V

Voltage	
Input voltage	21
Output voltage	21
Voltage connection.....	41

W

Wear parts.....	24
Weight.....	21
Wiring.....	39, 44

X

XUSB In.....	44
--------------	----

Notes

Bosch Rexroth AG
Electric Drives and Controls
P.O. Box 13 57
97803 Lohr, Germany
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr, Germany
Tel. +49 (0)93 52-40-0
Fax +49 (0)93 52-48 85
www.boschrexroth.com/electrics



R911323872