

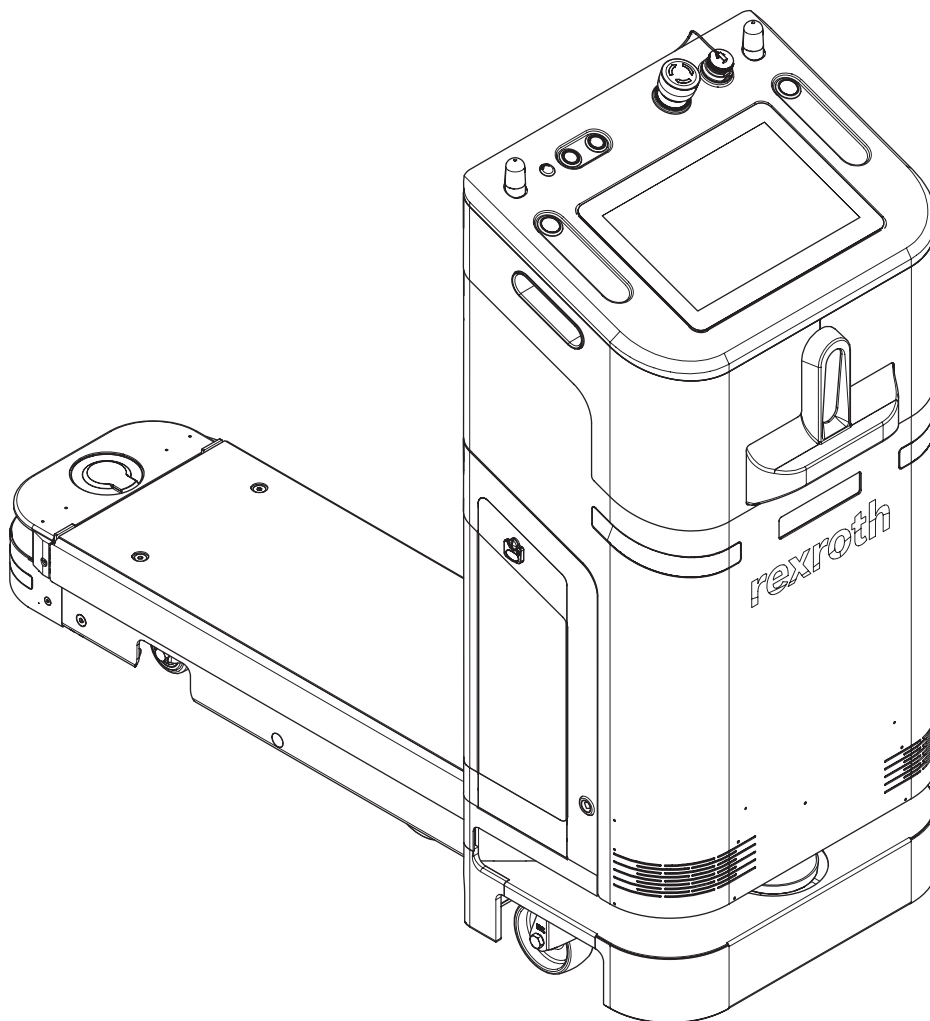
ACTIVE Shuttle

Transport vehicle

3 842 560 099
3 842 560 570
3 842 560 899
3 842 560 206
3 842 560 151

Operating manual
3 842 560 081/2024-04

Replaces: 2023-07
ENGLISH



The information in these instructions is for product description purposes only. Any information in these instructions on how to use the product only constitutes examples and recommendations. Catalog information is not binding. The information given does not release the user from the obligation of own judgment and verification. Our products are subject to natural wear and aging. © All rights reserved by Bosch Rexroth AG, also for the registration of industrial property rights. This document may not be reproduced or distributed to third parties without our consent.

An example configuration is shown on the title page. The delivered product may thus vary from the illustration. The original operating manual is in German.

DE	3 842 560 080	print	media	ACTIVE Shuttle	Transportfahrzeug	Deutsch
EN	3 842 560 081	print	media	ACTIVE Shuttle	Transport vehicle	English
FR	3 842 560 082	print	media	ACTIVE Shuttle	Véhicule de transport	Français
IT	3 842 560 083	print	media	ACTIVE Shuttle	Veicolo di trasporto	Italiano
ES	3 842 560 084	print	media	ACTIVE Shuttle	Vehículo de transporte	Español
PT	3 842 560 086	print	media	ACTIVE Shuttle	Veículo de transporte	Português
ZH	3 842 560 087	print	media	ACTIVE Shuttle	导引车	中文
CS	MTCS 560 080		media	ACTIVE Shuttle	Transportní vozidlo	Česky
PL	MTPL 560 080		media	ACTIVE Shuttle	Pojazd transportowy	Polski
HU	MTHU 560 080		media	ACTIVE Shuttle	Szállítójármű	Magyar
RO	MTRO 560 080		media	ACTIVE Shuttle	Vehicul de transport	Română
TR	MTTR 560 080		media	ACTIVE Shuttle	Taşıma arabası	Türkçe
FI	MTFI 560 080		media	ACTIVE Shuttle	Kuljetusajoneuvo	Suomi
SV	MTSV 560 080		media	ACTIVE Shuttle	Transportfordon	Svenska
BG	MTBG 560 080		media	ACTIVE Shuttle	Транспортен автомобил	Български
HR	MTHR 560 080		media	ACTIVE Shuttle	Transportno vozilo	Hrvatski
NO	MTNO 560 080		media	ACTIVE Shuttle	Transportkjøretøy	Norsk
SL	MTSL 560 080		media	ACTIVE Shuttle	Transportno vozilo	Slovenščina
SK	MTSK 560 080		media	ACTIVE Shuttle	Prepravné vozidlo	Slovenčina
DA	MTDA 560 080		media	ACTIVE Shuttle	Køretøj til transport	Dansk
ET	MTET 560 080		media	ACTIVE Shuttle	Transpordivahend	Eesti
EL	MTEL 560 080		media	ACTIVE Shuttle	Όχημα μεταφοράς	ελληνική
GA	MTGA 560 080		media	ACTIVE Shuttle	Feithicil iompair	Gaeilge
IS	MTIS 560 080		media	ACTIVE Shuttle	Flutningabifreið	Íslenska
LV	MTLV 560 080		media	ACTIVE Shuttle	Transporta līdzeklis	Latviešu
LT	MTLT 560 080		media	ACTIVE Shuttle	Transporto priemonė	Lietuvių
MT	MTMT 560 080		media	ACTIVE Shuttle	Vettura tat-trasport	Malti
NL	MTNL 560 080		media	ACTIVE Shuttle	Transportvoertuig	Nederlands

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1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following products:

- **3 842 560 099**, ACTIVE Shuttle 2.1 Transport vehicle
- **3 842 560 151**, ACTIVE Shuttle AMR transport vehicle
- **3 842 560 570**, lithium ion battery
- **3 842 560 206**, handheld controller
- **3 842 560 899**, docking station (incl. assembly frame)
- Wall box according to customer order

This documentation is intended for fitters, operators, service engineers and system owners.

This documentation contains important information relating to the safe and proper assembly, transportation, commissioning, operation, use, maintenance and disassembly of the product, and on how to rectify simple faults yourself.

- Read this documentation in full prior to working with the product, particularly chapter 2 "Safety instructions" and chapter 3 "General notes on property and product damage."

1.2 Required and supplementary documentation

- Only commission the product if the documentation marked with the book symbol  is available and you have understood and followed the instructions in it.

Table 1: Required and supplementary documentation

Title	Document number	Document type
 General safety instructions for the electrical installation of MPS components ¹⁾	3 842 358 820	
 Declaration of conformity ACTIVE Shuttle 2.1 ¹⁾	3 842 560 085	
 Wall box Material number 3 842 560 897 ¹⁾	3 842 560 581	Operating manual
 Wall box Material number 3 842 560 097 ¹⁾	3 842 560 958	Operating manual
 Handheld controller ²⁾	Manufacturer documentation	Manual
 Battery operating instructions ¹⁾	RB05156761	Operating manual
 Assembly instructions adapter cable wall box – battery ¹⁾	3 842 560 088	Assembly instructions
AMR manual ³⁾	RB02831888	Manual
AMS manual ³⁾	RB02831885	Manual
VDA 5050 manual ³⁾	RB02831992	Manual

¹⁾ If not included in the scope of delivery, download from the website:
www.boschrexroth.com

²⁾ If not included in the scope of delivery, download from the manufacturer's website:
www.keba.com

³⁾ Download from the website: www.boschrexroth.com.
Log in there under "MyRexroth."
Select ➤ **Collaboration** ➤ **Collaboration Rooms**.
To download, enter the RB number.

AMR RB02831888 manual

This manual explains the AMR (autonomous mobile robot) and its functionalities. This manual provides information on configuration and operation of the ACTIVE Shuttle.

AMS RB02831885 manual

In this manual you will find the hardware and software requirements of the Rexroth ACTIVE Shuttle Management System AMS, how to install the software and which features are included. It explains how to integrate the ACTIVE Shuttle and set up a complete use case.

VDA 5050 RB02831992 manual

This manual is intended for the integration and control of the AMR via the VDA 5050 interface. It is aimed at people who want to connect ACTIVE Shuttle to an external fleet management system, for example.

1.3 Presentation of information

Standardized safety instructions, symbols, terms and abbreviations are used so that you can use this documentation to work quickly and safely with your product. These are explained in the following sections to help you understand them better.

1.3.1 Safety instructions

This document contains safety instructions in section 2.6 "Product-specific safety instructions" and section 3 "General notes on property and product damage", as well as before any sequence of actions or any required action which involves a risk of personal injury or property damage. Be sure to observe all safety precautions.

Safety instructions are set out as follows:

 SIGNAL WORD
Type and source of danger! Consequences of non-compliance ► Measures to prevent danger ► ...

- **Warning sign:** Points out the danger
- **Signal word:** Indicates the severity of the danger
- **Type and source of danger:** Indicates the type and source of the danger
- **Consequences:** Describes the consequences of non-compliance
- **Prevention:** States how the danger can be avoided

Table 2: Risk classes according to ANSI Z535.6-2006

Warning sign, signal word	Meaning
 DANGER	Indicates a hazardous situation that will result in serious injury or death if not avoided.
 WARNING	Indicates a hazardous situation that may result in serious injury or death if not avoided.
 CAUTION	Indicates a hazardous situation that may result in minor to moderate injury if not avoided.
NOTICE	Property damage: The product or the surrounding area could get damaged.

1.3.2 Symbols

The following symbols indicate important information that is not safety-relevant but increases the comprehensibility of the documentation.

Table 3: Meaning of the symbols

Symbol	Meaning
	If this information is not observed, the product cannot be used and/or operated as designed.
	Single, independent action
1. 2. 3.	Numbered steps: The numbers indicate that the action steps are sequential.

1.3.3 Designations

This document uses the following designations:

Table 4: Designations

Designation	Meaning
AMR	Autonomous Mobile Robots
AMS	Rexroth ACTIVE Shuttle Management System
FTS	Automated Guided Vehicle system
KLT	Small load carrier according to VDA 4500
Source	Loading point
Dip	Unloading point
VDA	German Association of the Automotive Industry

2 Safety instructions

2.1 About this chapter

The product has been manufactured in accordance with the generally accepted rules of current technology. Nevertheless, there is a risk of personal injury and property damage if you do not read this chapter and follow the safety instructions in this document.

- ▶ Read this documentation carefully and completely before you start working with the product.
- ▶ Keep the documentation accessible to all users at all times.
- ▶ Always include it when giving the product to a third party.

2.2 Intended use

ACTIVE Shuttle

The product is a complete machine.

You may use the product as follows:

- For automated material transport in production with operator-defined
 - Driving ranges
 - Loading (sources) and unloading points (dips)
 - Speedsin areas used jointly with passenger traffic.
- For transporting KLTs stacked on approved dollies (see chapter 8.5.1 Permissible dollies) with
 - a total weight incl. dolly of up to 260 kg and
 - max. stacking height of 1,200 mm.
- For permissible load dimensions, load positioning and load distribution, see page 92.
- Technical data see page 87.
- For ambient conditions, see page 90.

Handheld controller

The handheld controller is used in the "Manual" operating mode exclusively for controlling the ACTIVE Shuttle.

Lift aid

The lift aid may only be used to transport the ACTIVE Shuttle.

Charging station ACTIVE Shuttle

The charging station is used exclusively for charging the ACTIVE Shuttle. The product is strictly intended for professional use and not for private use. The intended use also includes having read and understood these instructions, especially chapter 2 "Safety instructions".

2.3 Improper use

Any use other than that described in the section "Intended use" is considered improper and is not permitted.

Bosch Rexroth AG is not liable for any damage resulting from improper use.

The user alone bears any risks associated with improper use.

The following foreseeable misuses also constitute improper use:

- Installation and operation in potentially explosive atmospheres/Ex zones.
- Transporting goods other than those specified.
- Transporting people on the product or transported material.
- Driving near edges/steps (e.g. platforms, stairs, shafts, loading ramps, doors, etc.) with insufficient clearance and without barriers recognizable from the protective field to prevent the ACTIVE Shuttle or load from falling/crashing.
- Private use.
- The charging station must not be used as a stepladder or climbing aid.

2.4 Personnel qualifications

The activities described in this documentation require basic knowledge of mechanical, electrical systems, as well as knowledge of the appropriate technical terms. Additional knowledge regarding the use of lifting gear and corresponding slings is required for transporting and handling the product. To ensure safe use, these activities should therefore only be performed by qualified personnel or by an instructed person acting under the direction of such qualified personnel. "Qualified personnel" refers to those who can recognize potential hazards and take appropriate safety measures based on their technical training, knowledge, experience, and understanding of the relevant regulations pertaining to the work being performed. Qualified personnel must comply with the relevant technical regulations and have the necessary expertise.



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<https://www.boschrexroth.com/de/de/academy>

2.5 General safety instructions

- As owner, please note the following: Before the initial commissioning of the product, carry out a risk assessment in accordance with the national regulations in your country (in Germany: according to the Occupational Health and Safety Act).
- Observe the applicable accident prevention, fire protection and environmental protection regulations.
- Observe the safety rules and regulations of the country in which the product is being used.
- Only use Rexroth products that are in proper working order.
- Observe all the notices on the product.

- Persons who assemble, operate, disassemble or maintain Rexroth products should not be under the influence of alcohol, drugs or medication that may affect their ability to respond.
- Use only original accessories and spare parts from Rexroth in order to prevent hazards to people due to unsuitable spare parts.
- Observe the technical data and ambient conditions specified in the product documentation.
- Only start up the product if it has been determined that the end product (for example, a machine or system) into which the Rexroth products have been installed complies with national provisions, safety regulations and application standards.

2.6 Product-specific safety instructions

General	• Do not attempt to modify the product (software or hardware). • Do not expose the product to any inadmissible mechanical loads under any circumstances. Never use the product as a handheld or step. Do not place any objects on the product.
During transport	• Always ensure that the product cannot topple over. • Observe the transport instructions on the packaging. • De-energize the vehicle during transport (switch off the battery main switch).
During assembly	• Inspect the product for obvious transport damage. • Route the cables and lines adequately protected to prevent mechanical damage and ensure that no one can trip over them. • Make sure the system component you are working on is depressurized and de-energized before assembling the product or inserting or removing plugs.
During commissioning	• Ensure that the system component cannot be switched back on. • Allow the product to acclimatize for a few hours prior to commissioning in order to prevent water condensation from forming in the housing. • Check the safety requirements according to DIN EN 60204-1. • Only start up a product that has been completely installed. • Make sure that all the safety equipment which forms part of the product is present, has been properly installed, and is fully functional. Do not move, bypass or disable any safety equipment.
During operation	• Check the product for malfunctions. • Make sure that only authorized personnel perform the following tasks within the scope of the product's intended use: – Starting or operating the system or interfering with its normal operation. – Operating component or part adjusters. • Only allow people to be in the immediate vicinity of the product when it is operating if they are authorized by the owner to be there. This also applies when the product is idle. • Do not use EMERGENCY STOP controls for routine stopping. • Regularly check the EMERGENCY STOP controls to ensure that they are functioning properly. • Following an EMERGENCY STOP or in the event of a fault or other irregularity, turn the product off and secure it against being switched back on. • Do not reach into moving parts. • An idle system is not necessarily a safe system, as stored energy can be released unintentionally or through improper maintenance procedures.
EMERGENCY STOP, malfunction	• After an EMERGENCY STOP or a malfunction, only switch the system back on once you have established and rectified the cause of the fault.
During servicing and repair	• Make sure that access to maintenance and inspection points is kept unobstructed. • Perform the prescribed maintenance work at the intervals prescribed in chapter 10.6 Maintenance.

During disposal

- Make sure that no line connectors, connections or components are disconnected as long as the system is supplied with pressure and voltage. Secure the system against being switched back on.
- Dispose of the product in accordance with the regulations in your country.

2.6.1 ACTIVE Shuttle

**WARNING****Hazards based on the nature of the load!**

Hazardous load (e.g. hazardous substances, hot materials, etc.) can lead to serious injury or even death.

- ▶ The operator is solely responsible for any hazards arising from the nature of the load.
- ▶ The load must not pose any risk to persons (e.g. catching items of clothing, scalding, burning, etching, cutting, stabbing).

Danger of the ACTIVE Shuttle or load falling/crashing!

Sloping edges are not recognized by the ACTIVE Shuttle and can lead to a dangerous crash or fall of the load.

- ▶ Edges/steps (e.g. on platforms, stairs, shafts, loading ramps, doors, etc.) must be at sufficient distance from the driveway and must be secured by means of barriers visible for the protective field of the ACTIVE Shuttle.

**CAUTION****Danger of injury due to safety checks not carried out!**

Risk of serious injury from non-functioning safety and warning devices.

- ▶ Carry out a test of the visual and acoustic warning devices **every quarter**.
- ▶ Carry out a test of the safety equipment **in accordance with** the test cycles specified in chapter 10.3.
- ▶ Take vehicles with non-functional safety and warning devices out of service and contact the Bosch Rexroth Service.

Risk of burns from hot components inside the ACTIVE Shuttle!

During operation, individual components inside the housing may heat up.

- Wait a reasonable amount of time before opening the housing.

Risk of serious injury from collision with the ACTIVE Shuttle.

Personal injury when staying in the driving range, especially in curve areas!



- If possible, do not stand within the driving range of the ACTIVE Shuttle.
- Restrict pedestrian traffic within the ACTIVE Shuttle's driving range as much as possible.
- Always wear safety shoes.

Insufficient stopping distance, e.g. by entering the protective area from the side!

Risk of serious injury from collision with the ACTIVE Shuttle.



- Do not step into the protective area of the vehicle from the side.
- Do not move against the direction of travel towards the ACTIVE Shuttle.
- Always wear safety shoes.

! CAUTION

Risk of crushing at the rear wheels of the load

When a loaded vehicle starts up/restarts, there is a danger of crushing at the rear wheels of the load.



- Do not put your feet between the wheels.
- Observe start-up warning.
- Always wear safety shoes.

Danger due to unadapted speed!

Risk of serious injury due to a speed not adapted to the situation.

- ▶ The speed of the ACTIVE Shuttle must be reduced in narrow corridors, curves, intersections and areas with pedestrian traffic.

Danger of the ACTIVE Shuttle tipping over if loaded incorrectly!

Risk of serious injury due to the ACTIVE Shuttle tipping over.

- ▶ Observe the permissible load and the maximum stacking height.
- ▶ Ensure that the load is evenly distributed (see chapter 16.7).
- ▶ Only use the ACTIVE Shuttle in accordance with its intended use.

Danger due to falling load in case of incorrect loading!

Risk of serious injury from falling load.

- ▶ Ensure that the load is evenly distributed.
- ▶ Only use the ACTIVE Shuttle in accordance with its intended use.

Danger from entrained load!

Risk of serious injury due to entrained, insufficiently secured load.

- ▶ Independent movements of the dolly in the supermarket, e.g. due to dirt, unevenness or gradients on the floor, must be prevented by the operator.
- ▶ Ensure that the load is completely and correctly positioned on the loading area.

Danger from unpredictable movements of the ACTIVE Shuttle due to inadequate floor surfaces!

Risk of serious injuries due to unpredictable movements of the ACTIVE Shuttle, e.g. slipping, especially during emergency braking.

- ▶ The driving range of the ACTIVE Shuttle must have sufficient traction.
- ▶ The driving range of the ACTIVE Shuttle must be level, dry, clean and free of objects lying around.

Danger from dirty driveways!

Risk of serious injury from unpredictable movements of the ACTIVE Shuttle due to dirty driveways.

- ▶ The driving range of the ACTIVE Shuttle must be clean.

Danger due to incorrect loading condition!

Risk of serious injury due to incorrect loading condition when changing to the "Automatic" operating mode.

- ▶ After manual loading, no change to the "Automatic" operating mode is permitted.



CAUTION

Danger due to limited safety functions in the "Manual" operating mode!

Risk of serious injury from incorrect operation.

- ▶ In the "Manual" operating mode, the ACTIVE Shuttle may only be operated by specially trained staff using the handheld controller.
- ▶ The responsibility for vehicle control in "Manual" operating mode lies entirely with the operator.

Risk of personal injury when intervening with automated processes!

Risk of serious injury due to unauthorized intervention in automated processes by operating personnel.

- ▶ Under no circumstances may operating personnel intervene with the automated processes such as loading and unloading positions and when moving in and out at the charging stations.

Danger of collision with obstacles outside the protective area!

The ACTIVE Shuttle can be damaged by obstacles outside the protective area.

- ▶ Keep the driving range free of obstacles, especially flat objects or objects protruding into the driving range.

Risk of overheating of the ACTIVE Shuttle!

If the ventilation slots of the ACTIVE Shuttle are covered or if the filter mats of the fans are not maintained, there is a risk of overheating and thus damage to the ACTIVE Shuttle.

- ▶ The ventilation slots of the ACTIVE Shuttle must always be free and uncovered to ensure sufficient cooling.
- ▶ The filter mats of the fans must be maintained regularly depending on the ambient/operating conditions (see chapter 10.6).

NOTICE

Risk of damage through unauthorized use!

Unauthorized opening of the ACTIVE Shuttle housing can damage the vehicle.

- ▶ Always keep the square key secured against unauthorized use.

2.6.2 Lithium-ion batteries

 CAUTION
Possible hazard due to incorrect handling of lithium-ion batteries!

The ACTIVE Shuttle is powered by a replaceable lithium-ion battery. Lithium-ion batteries can be damaged by mechanical, thermal or electrical stress (e.g. shock, heat, cold, incorrect charging, short circuit).

This may result in the following hazards:

- Leakage of toxic substances and toxic combustion products in case of fire.
- Leakage of corrosive liquid and thus possible skin irritations, burns and chemical burns.
- Increased fire hazard due to electrolyte leakage (flammable solvent).

- ▶ Never use dropped or damaged batteries.
- ▶ Do not use defective or damaged lithium-ion batteries.
- ▶ Do not use lithium-ion batteries with a defective connection cable or defective contacts.
- ▶ Charge the lithium-ion battery in the ACTIVE Shuttle only using the charging station supplied by Bosch Rexroth or the charger supplied by Bosch Rexroth.
- ▶ Only operate lithium-ion batteries and accessories when they are in a perfect technical condition.
- ▶ Protect the battery terminals from short circuiting.
- ▶ Protect the lithium-ion batteries from mechanical stress (shocks, falls, vibrations).
- ▶ Do not expose the lithium-ion batteries to high temperatures and/or large temperature variations.
- ▶ Store the lithium-ion batteries in a cool, dry and well ventilated place.
- ▶ Protect the lithium-ion batteries from direct sunlight.
- ▶ Do not immerse the lithium-ion batteries in liquids.
- ▶ Please observe the country-specific regulations regarding storage of the lithium-ion battery.
- ▶ Check the lithium-ion batteries regularly for damage.
- ▶ Lithium-ion batteries must not be opened, repaired or serviced.

NOTICE**Handling damaged lithium-ion batteries**

- Only touch and transport damaged lithium-ion batteries with personal protective equipment that is resistant to alkalis and solvents.
- If there are any signs of heat, smoke, odor, noise, or deformation of the batteries, disconnect the lithium-ion battery from the vehicle.
- Store the lithium-ion battery in a fire-resistant container or at a safe distance from combustible materials.
- Do not inhale any vapors that may be generated.

NOTICE

Disposal of lithium-ion batteries

- ▶ Dispose of lithium-ion batteries properly.
- ▶ Tape off the connection contacts for disposal.
- ▶ Store damaged lithium-ion batteries in fire-resistant containers.
- ▶ During transport, observe the relevant hazardous goods requirements for lithium-ion batteries.
- ▶ Observe the operating manual of the manufacturer:
VARTA AG
VARTA-Platz 1
73479 Ellwangen/Germany
info@varta-ag.com

Recommendations for best possible battery service life

- ▶ Store lithium-ion batteries with a charge level of about 50 %.
- ▶ After three months, check the charge level and recharge to approx. 50% if necessary.

2.6.3 Handheld controller

**CAUTION****Possible hazard through unauthorized use!**

Unauthorized activation of the "Manual" operating mode can cause damage to property and danger to life and limb.

- ▶ Always keep the handheld controller secured against unauthorized use.

Danger due to limited safety functions in the "Manual" operating mode!

Risk of serious injury from incorrect operation.

- ▶ In the "Manual" operating mode, the ACTIVE Shuttle may only be operated by specially trained staff using the handheld controller.
- ▶ The responsibility for vehicle control in "Manual" operating mode lies entirely with the operator.
- ▶ Also observe the operating manual of the manufacturer:

KEBA AG
Gewerbepark Urfahr
Reindlstraße 51
4041 Linz
Austria
www.keba.com

NOTICE**Loss of operational readiness due to non-use**

If the handheld controller is not used and charged regularly, this may lead to loss of the operational readiness (battery discharge).

- ▶ Use the handheld controller regularly to charge it.

Handling the handheld controller

- ▶ Handheld controllers must not be opened.
- ▶ Repair and maintenance only by the manufacturer.
- ▶ When using the handheld controller, make sure that no one can trip over the cable or the ACTIVE Shuttle can run over the cable, causing the handheld controller to fall to the ground or be damaged.
- ▶ Do not expose the handheld controller to high temperatures, large temperature variations or direct sunlight.
- ▶ Do not expose the handheld controller to mechanical shocks, excessive dust, moisture or strong magnetic fields.

2.6.4 Charging station

**WARNING****Risk of injury due to incorrect pre-fuse!**

Operation of the charging station with an incorrect pre-fuse can lead to serious injuries or even death and equipment damage.

- ▶ Only operate the charging station with a 16 A circuit breaker, triggering characteristic C.

Risk of injury by bridging the charging contacts of the charging station!

By bridging the charging contacts, there is a risk of damage, sparks, overheating and fire.

- ▶ Do not place any objects, especially electrically conductive or flammable objects, in the area in front of the charging contacts of the charging station.

**CAUTION****Risk of injury due to incorrect positioning of the charging station!**

If the charging station is positioned in walkways and corridors, there is a risk of tripping.

- ▶ Do not position the charging station in walkways and corridors.

Risk of injury due to improper installation of the charging station!

- ▶ Observe the operating manual of the manufacturer:

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- ▶ Anchor the charging station in the hall floor to avoid malfunctioning and associated risks.
- ▶ Route the connection cable according to the country-specific specifications for avoiding risks.
- ▶ Protect the connecting cables from mechanical damage.

Risk of injury and possible damage due to incorrect use!

When climbing or stepping onto the charging station, there is a risk of injury from falling and of damage to the housing of the charging station.

- ▶ Do not use the charging station as a stepladder or climbing aid.

- The emergency stop function is carried out on the charging station by pulling out the mains plug.

2.7 Personal protective equipment

- Appropriate protective equipment should be worn when handling/using the product (e.g. safety shoes, close-fitting clothing, a hair net for long, loose hair). As the system owner or operator, you are personally responsible for ensuring the use of appropriate protective equipment when the product is being used. All component parts of the personal protective equipment must be free of damage.

2.8 Owner responsibilities/obligations

The user is responsible for hazards arising from the nature of the load. The load must not pose any risk to persons (e.g. catching items of clothing, scalding, burning, etching, cutting, stabbing).

The user of the ACTIVE Shuttle is obliged to comply with all requirements of

- DIN EN ISO 3691-4 "Industrial trucks – Safety requirements and verification – Part 4: Driverless industrial trucks and their systems"; Annex A "Requirements for preparation of the operating zones"
 - Guideline VDI 2510 Part 1 "Infrastructure and peripheral installations for Automated Guides Vehicle Systems (AGVS)"
 - Guideline VDI 2510 Part 2 "Automated Guided Vehicle Systems (AGVS) – Safety of AGVS"
- and to keep it under constant review.

This also includes, among other things:

- Training of the logistics staff (see chapter 2.9 Training of the operating personnel).
- Reducing the pedestrian traffic in hazardous areas.
- Attaching warning notices in hazardous areas.
- Ensuring sufficient distance when driving past junctions, if necessary reduced speed.
- Further measures after evaluation of the user to prevent stepping into the protective field from the side, e.g.
 - installing mirrors at narrow junctions,
 - providing doors at junctions,
 - information on the function of the Bluespot of ACTIVE Shuttle,
 - information on the function of the warning tones for narrow junctions, etc.
- Driving routes must be planned in such a way that gradients are only used in the direction of travel (forwards or backwards).
- Driveways must not be inclined sideways.
- Do not plan curves/turns on slopes/gradients.
- If necessary, define slow speed zones for slopes/gradients depending on the actual load.
- Plan escape routes between driving routes and obstacles in accordance with national standards and regulations.
- Driveways must be planned in such a way that vehicle encounters are avoided as far as possible and collisions and loss of load are avoided to the greatest possible extent.
- A collision of ACTIVE Shuttles must not lead to consequential hazards (e.g. due to falling load).
- Passageways must be designed in such a way that there is sufficient distance to avoid shearing (risk assessment according to the situation). There must be a distance of at least 50 mm between automatically and manually used supermarket tracks.
- Turns of the ACTIVE Shuttle must be planned at a sufficient distance from solid obstacles.
- Driveways must be level, dry, clean and free of objects lying around. For exact requirements regarding the floor conditions of the driveways, see chapter 16.6 Floor requirements.

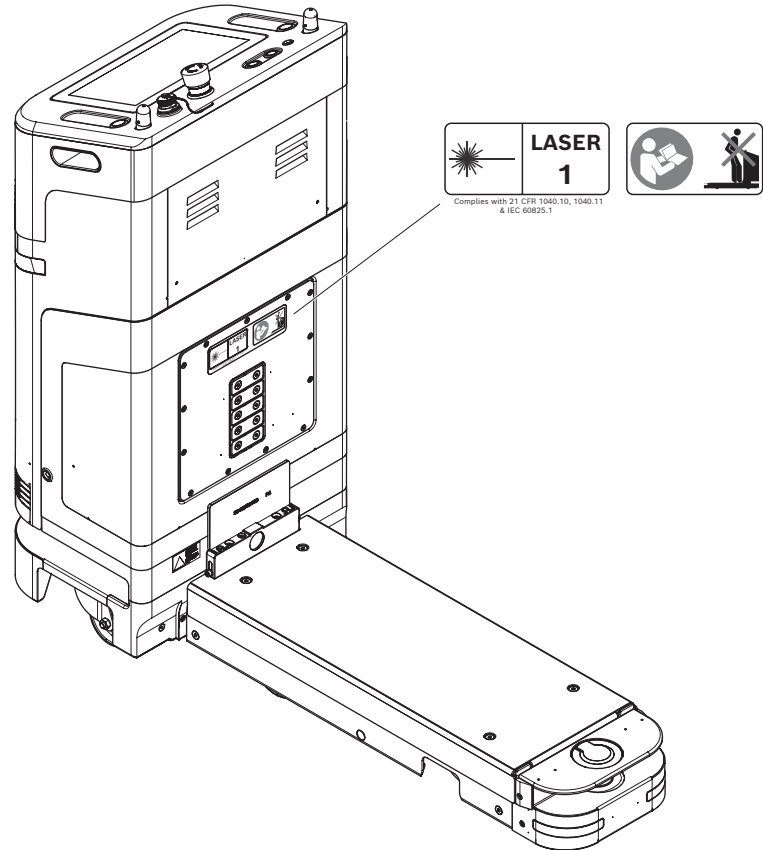
- Cleaning the hall floor must not result in a change to the surface finish of the driveways (e.g. due to cleaning agent residues).
 - The driveways must be kept clear of objects that cannot be detected by the protective field (see chapter 16.8 Scanning levels of the personal protection systems (laser scanner)).
 - Driveways must be free of projecting obstacles.
 - In the event of a malfunction, collisions with obstacles next to and on driveways must not lead to consequential hazards.
 - After a malfunction, restarting next to or on driveways must not lead to hazards.
 - Faulty or defective ACTIVE Shuttle must be detected by the operator and put out of operation.
 - Do not plan stopping, loading and unloading positions in escape routes or driveways.
 - Do not plan stopping, loading and unloading positions on, next to or near inclinations/slopes/gradients.
 - To avoid shearing, stopping, loading and unloading positions must have a sufficient distance from solid obstacles.
 - Operating personnel must not intervene in the automated processes at stopping, loading and unloading positions.
 - Stairwells must be separated from the normal driving range by closed doors. Keeping doors open, e.g. by blocking with wedges, is regarded as misuse.
 - Edges/steps (e.g. on platforms, stairs, shafts, loading ramps, doors, etc.) that could cause the ACTIVE Shuttle or the load to fall or crash must be at sufficient distance from the driveway and must be secured by means of barriers visible for the protective field.
 - Automatic doors and gates (e.g. roller shutters) must not be used jointly by the ACTIVE Shuttle and persons.
 - Work in the driving ranges, especially with ladders, must be avoided or secured sufficiently (e.g. by a second person).
 - Escape routes must not be constricted or even blocked by ACTIVE Shuttle.
 - Due to the danger of tripping, do not plan any waiting positions in walkways.
 - When employees are in hazardous areas, or in sources or dips, e.g. between crate stacks in a supermarket, e.g. in the case of maintenance work in supermarkets, the affected areas must be secured. To do this, a barrier must be used that can be recognized by the ACTIVE Shuttle, in combination with a definition of the work location as a restricted area in the higher-level control system. Alternatively by setting the operation of the AMS / external fleet management system.
 - Setting of the operation of the AMS / external fleet management system must be checked on the affected ACTIVE Shuttle since the transmission of the stop command to the ACTIVE Shuttle does not take place as a safety function.
 - Protect the WIFI network from unauthorized access.
 - If operating on your own server, protect the server from unauthorized access, keep the operating system up to date.
 - Upon new commissioning of additional ACTIVE Shuttle, they are not yet entered in the AMS / external fleet management system and therefore not known to the already autonomous ACTIVE Shuttle (e.g. if the additional ACTIVE Shuttle have been pushed manually into a charging station). The owner must take appropriate measures to prevent dangerous states and damage to the ACTIVE Shuttle.
- After setting up ACTIVE Shuttle, the owner is obliged to check all driveways again for possible hazards!
- Provide safety-related instructions/training to the operating personnel (see chapter 2.9 Training of the operating personnel) before the first commissioning or recommissioning and afterwards regularly.

2.8.1 Minimum marking

CAUTION

Risk of injury due to incorrect behavior due to missing safety signs!

The ACTIVE Shuttle is marked with the following safety labels:



► Make sure that these safety labels are present and legible.

2.9 Training of the operating personnel

2.9.1 Manual operation

- The responsibility for vehicle control in the "Manual" mode lies with the operator.
- The personal protection systems are deactivated in manual operation.
- The vehicle must always be operated in such a way that non-execution of the driving commands (stopping or halting) is safe.
- The remote control must be protected against unauthorized use.

2.9.2 Logistics employees

- The driver of a manned vehicle must ensure that their vehicle does not drive into the braking path of the ACTIVE Shuttle. The driver must be given the opportunity to become familiar with this area.
- The personnel driving the manned vehicles must be trained in the behavior of the ACTIVE Shuttle. In particular, the braking path and the behavior of the ACTIVE Shuttle must be known.
- Keep sufficient distance from the future track of the ACTIVE Shuttle, slow down or stop if necessary to avoid collisions with the ACTIVE Shuttle or crushing persons between your own vehicle and the ACTIVE Shuttle.

2.9.3 Logistics planner

Restricted areas and intersection areas must be defined during installation.

Tests after set-up

A newly created order must first be tested in the presence of a qualified person.

Route planning

Distance of the route from permanent or expected obstacles

The installer must plan a sufficient distance to permanent or expected obstacles on the driveway (also bypassing zones with regard to free cornering, also taking into account vehicle rotation and vehicle parts moving out). Expected obstacles are, for example, pallets at a designated unloading position.

This serves for the

- Avoidance of shearing points (sufficient distance: 50 cm plus the accuracy of the navigation in normal operation; less only if the operator can exclude certain scenarios on a case-by-case basis) and
- Prevention of stepping into the protective field from the side. Sufficient distance: to be determined by the operator depending on the concrete situation (clarity, constriction, additional measures of the operator) and
- Avoidance of turning into an obstacle (sufficient distance: the same as "Avoidance of shearing points")

Distance and speed at intersections/junctions

- The speed when passing junctions and crossings shall be reduced during set-up where it is necessary to ensure sufficient responsiveness of the intersecting traffic and to shorten the braking path.
- The distance to the intersecting paths must be large enough that a person will not enter the track of the ACTIVE Shuttle in the area of the protective field (protective field length max. 970 mm).

Unloading positions

- Do not plan supermarkets in the immediate vicinity of gradients or ramps. (Incorrectly extended dollies should not roll away uncontrolled, and an incorrectly detected unloading position should not lead to unloading on gradients).

Gradients

- Driving routes must be planned in such a way that gradients are only used in the direction of travel (forwards or backwards).
- Driveways must not be inclined sideways.
- Do not plan curves/turns on slopes/gradients.
- If necessary, define slow speed zones for slopes/gradients depending on the actual load.

Uneven floors(e.g. joints and sills)

- It is recommended to set up slow speed zones in case of uneven floors that lead to stronger impacts.
- The ACTIVE Shuttle is not designed for moving on uneven floors (e.g. attached drive gear at sill). Situations (e.g. in the supermarket) in which the shuttle has to move on uneven floors are to be prevented by the user.

3 General notes on property and product damage

The warranty only applies to the delivered configuration.

During cleaning

- The warranty is void in the event of incorrect assembly, commissioning and operation, as well as improper use and/or improper handling.
- The cleaning personnel must be informed of the possible hazards to the system before starting the cleaning work.
- Prevent cleaning agents from getting into the system.
- Never use solvents or corrosive cleaning agents.
- Do not use a pressure washer for cleaning.

4 Scope of delivery

The scope of delivery includes the following, according to the customer order:

- **3 842 560 099**, ACTIVE Shuttle 2.1 transport vehicle incl. lithium-ion battery, square key, mounted lift aid, operating manual "ACTIVE Shuttle Transport Vehicle" or
- **3 842 560 151**, ACTIVE Shuttle AMR transport vehicle incl. lithium-ion battery, square key, mounted lift aid, operating manual "ACTIVE Shuttle Transport Vehicle"
- **3 842 560 570**, lithium ion battery
- **3 842 560 206**, handheld controller
- **3 842 560 899**, docking station (incl. assembly frame) incl. operating manual "ACTIVE Shuttle Transport Vehicle"
- Wall box according to customer order

4.1 Condition on delivery

- Transport vehicle ACTIVE Shuttle ready for use incl. lithium-ion battery and installed lift aid
- Handheld controller ready for connection
- Charging station ACTIVE Shuttle incl. connection cable, 5 m
- Lithium-ion battery ready for connection

5 About this product

5.1 Specifications

5.1.1 Use

ACTIVE Shuttle

- Automated material transport in production with owner-defined:
 - Driving ranges
 - Loading and unloading points and
 - Speeds in areas used jointly with pedestrian traffic.
- Transportation of KLTs stacked on dollies with
 - a total weight incl. dolly of up to 260 kg and
 - max. stacking height of 1,200 mm.

Handheld controller

To control the ACTIVE Shuttle in the "Manual" operating mode.

Charging station ACTIVE Shuttle

To charge the lithium-ion battery in the ACTIVE Shuttle.

5.2 Product description

- A:** Control panel
- B:** Lithium-ion battery 51 V DC/1502 Wh (built-in)
- B1:** Battery toggle latches
- B2:** Battery main switch
- C:** Battery compartment (flap with lock)
- D:** Loading area
- E1:** Personal protection system (laser scanner)
- E2:** Personal protection system (laser scanner) and laser localization
- F:** Signal lamps
- G:** Bluespot
- H:** Drive rollers
- I:** Cam rollers
- J:** Ventilation slots
- K:** Battery charging contacts
- L:** Detection of dolly/charging station
- M:** Lift aid with lashing strap (incl. edge protector), mounted on the ACTIVE Shuttle when delivered
- N1:** Square lock
- N2:** Square key

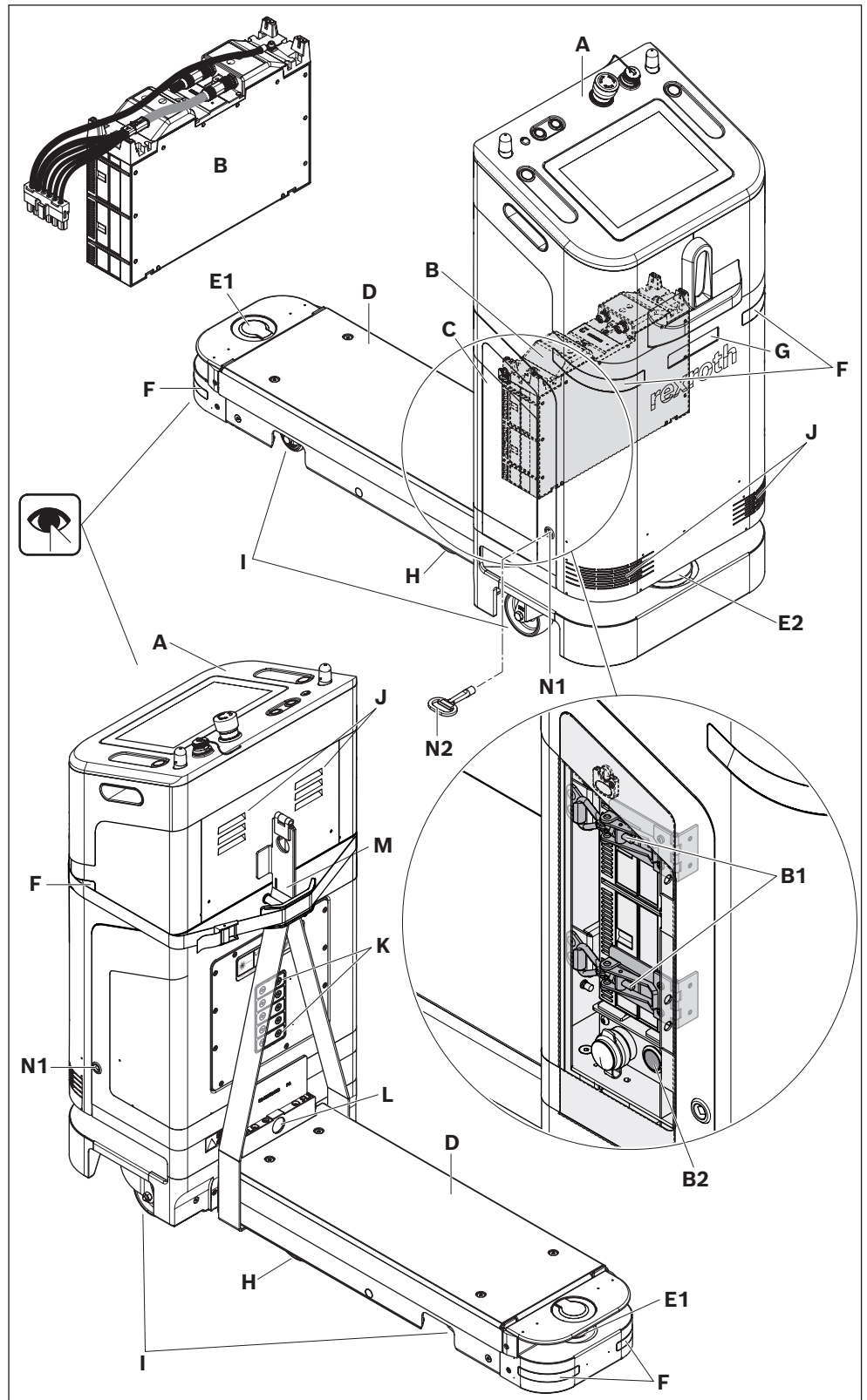


Fig. 1: ACTIVE Shuttle, overall view

560 080-02

- O:** Safety flag mounting hole
- P:** ON/OFF button
- Q:** Acknowledgment button (confirmation button)
- R:** Emergency stop device, rotary release
- S:** Handheld controller connection with closing cap
- T:** Touchscreen display (see chapter 5.4)
- U:** Stereo cameras for 3D obstacle detection ¹⁾
- V:** "Release brake" buttons
- W:** WiFi antennas

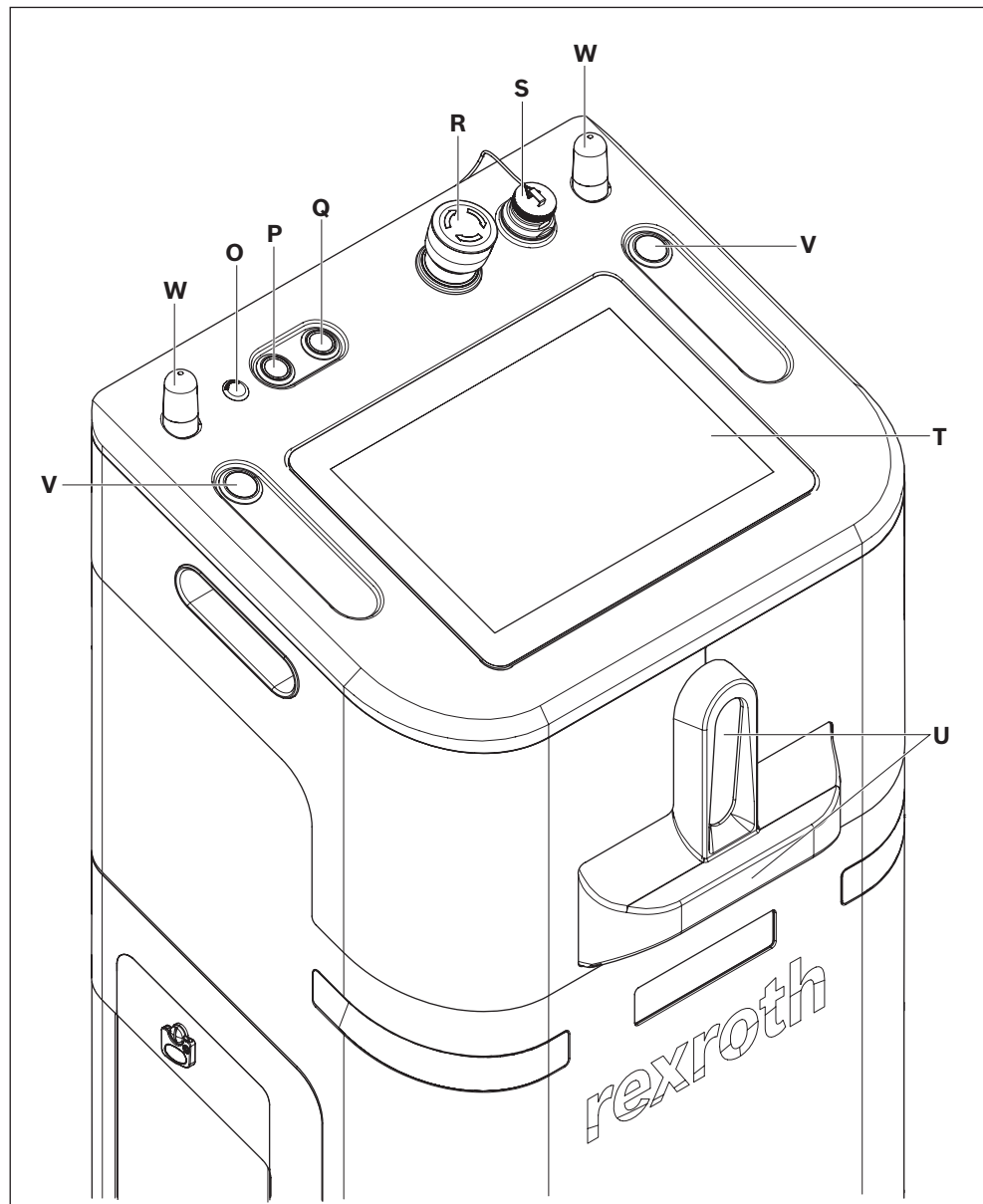


Fig. 2: ACTIVE Shuttle, detailed view of control panel

560 080-03

1) No recordings or personal data are stored with the stereo cameras for 3D obstacle detection.

**Please note:**

- The connector plug of the handheld controller and the connection socket on the control panel are coded (see detail X).
- Removing the handheld controller:
 1. Retract the release mechanism
 2. Remove the plug

A: Emergency stop device, rotary release

B: Color display

C: Joystick for controlling the ACTIVE Shuttle in the "Manual" operating mode

D: Membrane keypad:

E: Enabling switch, 3-stage

- Stage 1: not actuated, OFF
- Stage 2: approval, ON
- Stage 3: Panic function, OFF (travel function is shut down)

+/- Speed $\pm$

▲ Lifting the loading area

▼ Lowering the loading area

↶ Source position

↷ Dip position

⚡ Charging station position

P Parking position

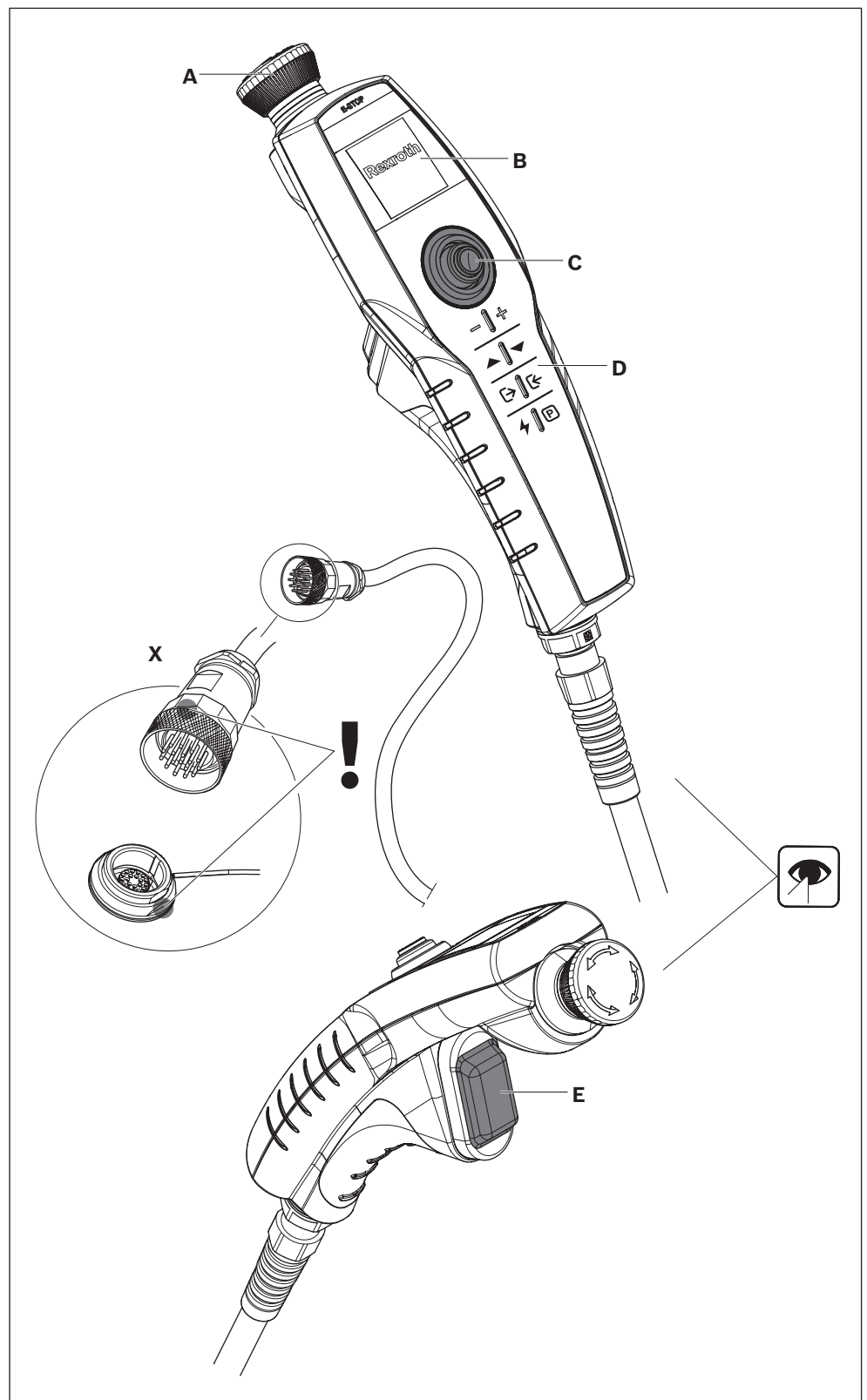


Fig. 3: Handheld controller

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Table 5: List of display symbols of the handheld controller and their meaning

Symbol	Meaning
	Handheld controller not connected to ACTIVE Shuttle (usually for a short time immediately after plugging in the handheld controller) or upon loss of connection.
	Handheld controller not connected to ACTIVE Shuttle, no further information available (usually for a short time immediately after plugging in the handheld controller; may not be visible).
	ACTIVE Shuttle is stopped because an emergency stop device (on the ACTIVE Shuttle or the handheld controller) has been pressed.
	ACTIVE Shuttle is stopped because ACTIVE Shuttle is not activated.
	ACTIVE Shuttle is activated, the software has not yet switched to "Manual" operating mode.
	The software has switched to "Manual" operating mode but localization information is not yet available.
	ACTIVE Shuttle is unlocalized.
	ACTIVE Shuttle is unlocalized but is only in odometry mode.
	ACTIVE Shuttle can be moved and is localized, but is not in the travel corridor.
	ACTIVE Shuttle is localized.
	The forward speed is set to 0.1 m/s.
	The forward speed is set to 0.3 m/s (default setting).
	The forward speed is set to 0.5 m/s.
	The forward speed is set to 1.0 m/s.
	Connection to ACTIVE Shuttle lost.
	Loading area moving downwards.
	Loading area moving upwards.
	The maximum forward speed in "Manual" operating mode is set (1.0 m/s).

**Please note:**

- The charging station may only be used in connection with the assembly frame.
- Further information can be found in the operating manual for the wall box used (see Table 1 on Page 6).

- A:** Wall box
B: Control panel
C: Wall box / docking station connection cable, 3 m

- D:** Docking station incl. assembly frame and accessories
E: Docking station
F: Assembly frame
G: Wall box connection cable, 5 m ¹⁾
H: Charging contacts
I: Charging compartment
J: Detection flag for ACTIVE Shuttle
K: Cover sheet
L: Docking station assembly kit
M: Assembly frame and wall box assembly kit
N: Spare heavy-duty anchor

¹⁾ Only in connection with wall box 3 842 560 097

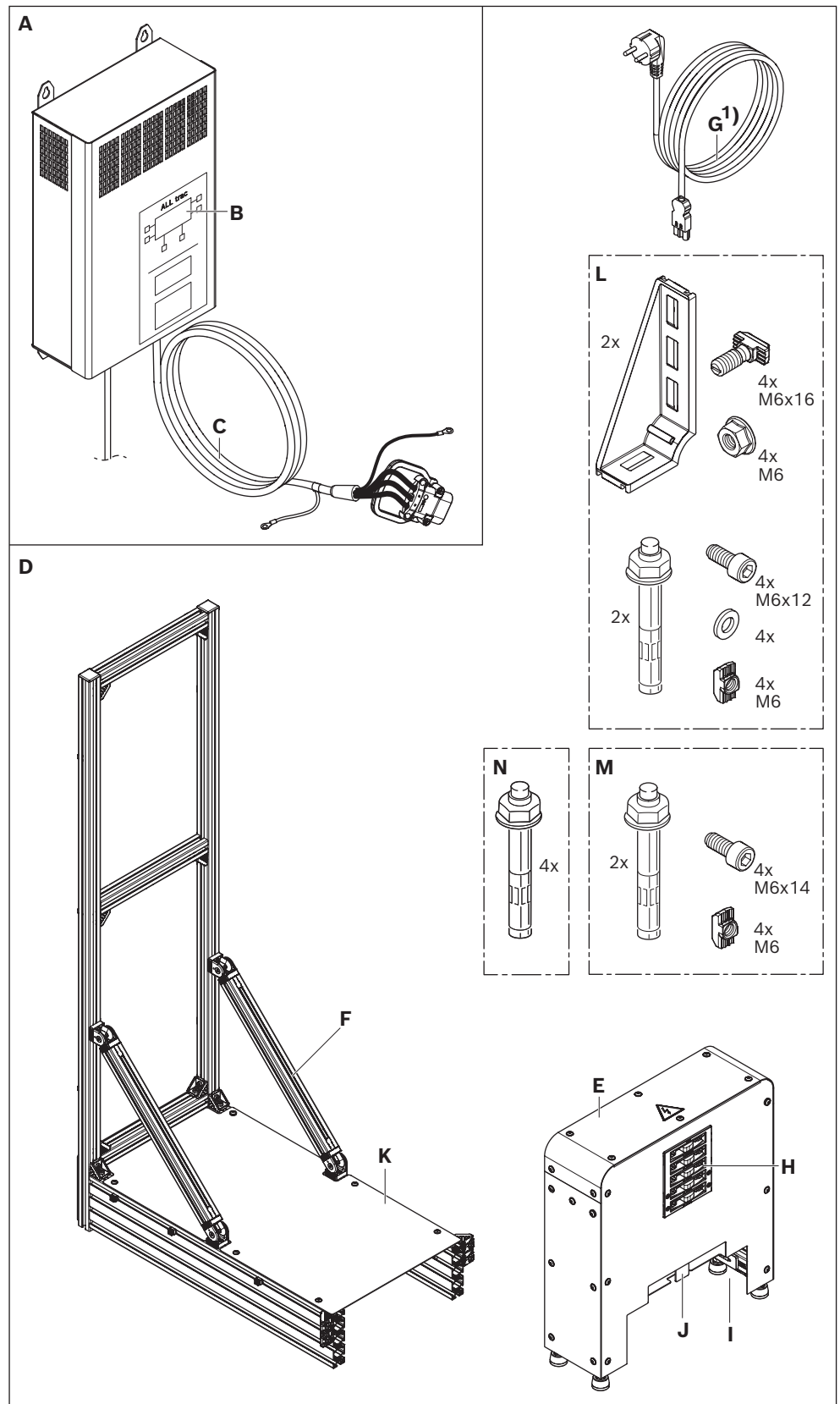


Fig. 4: Charging station ACTIVE Shuttle

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5.3 Safety and warning devices



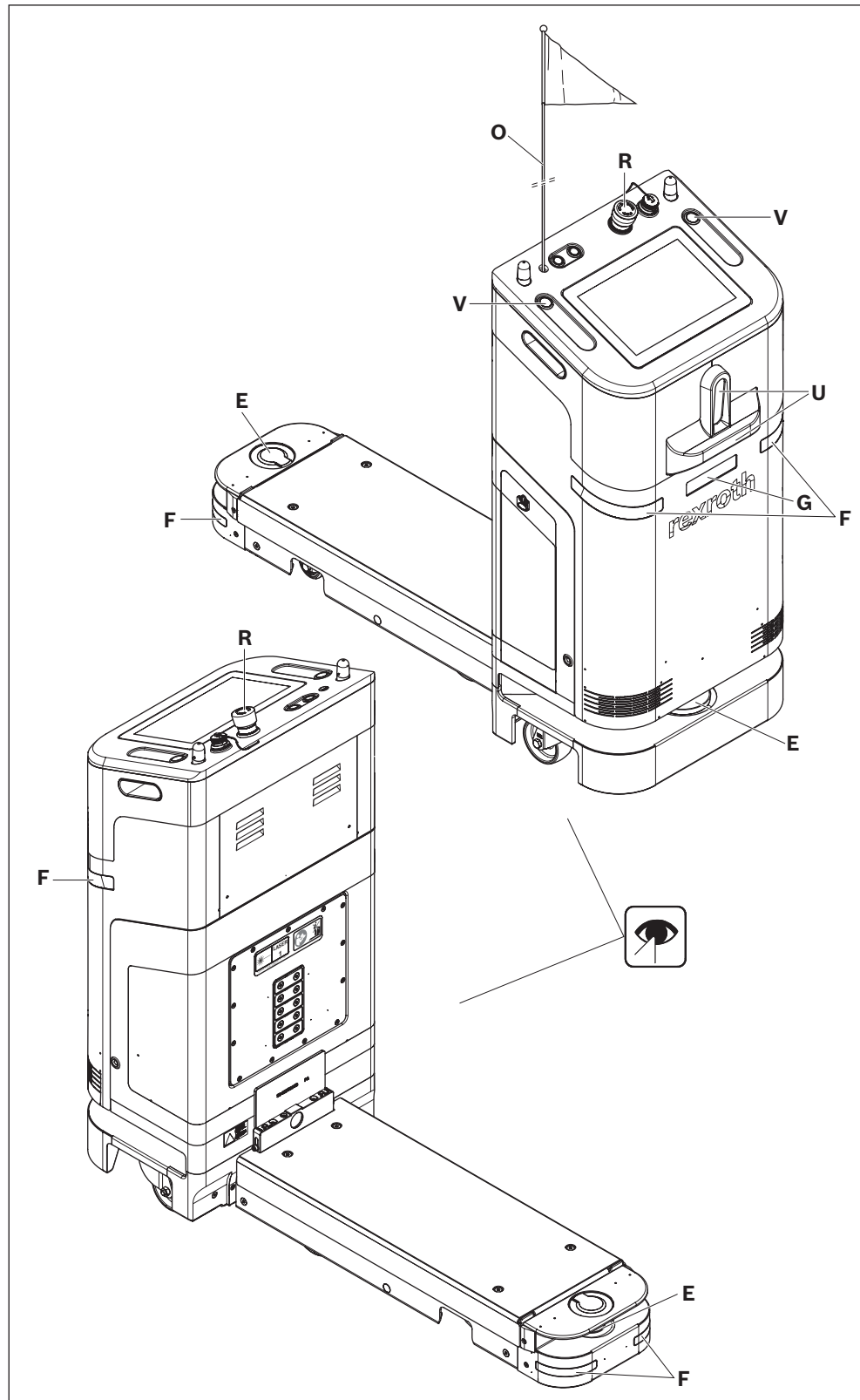
Please note:

Compatible safety flags can be found in the list of compatible accessories in the AMR manual **RB02831888**.

- E:** Personal protection system (laser scanner)
- F:** Signal lamps
- G:** Bluespot
- O:** Safety flags (accessories, not included in the scope of delivery)
- R:** Emergency stop device, rotary release
- U:** Stereo cameras for 3D obstacle detection
- V:** "Release brake" buttons

Not visible:

- Acoustic signal transmitter



560 080-04

Fig. 5: Safety equipment and warning signs

5.3.1 Signaling

Table 6: Signaling

Warning device	Signal/Color	Condition/description	Remedy	
Bluespot (G)	Blue	ACTIVE Shuttle is in the "Automatic" operating mode. Active only while driving.	-	
Signal lamps (F)	Warning signals	Yellow	The handheld controller is plugged in and the enabling switch of the handheld controller is pressed (level 2).	-
		Yellow flashing (2 Hz)	ACTIVE Shuttle approaching, entering a danger zone or avoiding an obstacle (additional acoustic signal).	-
		Yellow flashing (side corresponds to the change of direction)	ACTIVE Shuttle changing direction.	-
	Indication signals	Blue	User intervention is required.	Press the acknowledgment button (Q).
		Dark green	ACTIVE Shuttle is ready.	-
		Dark green flashing (1 Hz)	ACTIVE Shuttle is shutting down (duration 30 ... 60 s).	-
		Light green	Battery charging active: Battery is fully charged.	-
		Light green ↔ Dark green flashing (1 Hz)	Battery charging active: Battery is charging.	-
		Light green ↔ Light red flashing (1 Hz)	Battery charging active: Charging voltage interrupted.	Reconnect charging voltage.
		Light red flashing (1 Hz)	Hardware error	Follow the instructions on the touchscreen display.
		Light red	Emergency stop	Unlock the emergency stop device at the ACTIVE Shuttle or at the handheld controller.
		Dark red	The personal protection system has triggered a safe stop (SS1).	If the handheld controller is connected, press the acknowledgment button (Q).
	White	ACTIVE Shuttle has recognized an obstacle and is braking.	Remove the obstacle from the protective field.	
ON/OFF button (P)	Green flashing (1 Hz)	ACTIVE Shuttle is in the charging station and "Charging" mode is active	-	
	Green flashing (5 Hz)	ACTIVE Shuttle is in the charging station and "Offline charging" mode is active	-	
Acoustic signal transmitter	Audible warning 1x	- ACTIVE Shuttle is switched on	-	
		- ACTIVE Shuttle starts in 2 s.	-	
	Audible warning every 10 s	- ACTIVE Shuttle is lifting or lowering the loading area.	-	
- ACTIVE Shuttle during maneuvering (backwards/ forwards/when turning on the blue line)		-		
	- Further movement of the ACTIVE Shuttle is blocked by an obstacle.	Remove the obstacle from the protective field.		
Battery charge indicator	Visual indicator on the touchscreen display (see chapter 5.4)	Bar chart		

5.3.2 Protective fields

The protective fields depend on speed and situation. They serve to identify persons and obstacles and thus prevent accidents.

The dimensions of the protective fields can be found in chapter 16.9.

5.3.3 Note regarding the limits of the personal protection system



Please note:

The 3D obstacle detection via stereo cameras has a mere assistance function and is not part of the personal protection system. For more information on the 3D obstacle detection, refer to chapter 16.10 and the ACTIVE Shuttle system manual (see Table 1 on Page 6).

The personal protection system is designed for the detection of standing and lying adult persons.

Persons or obstacles that are not recognizable with the thickness of a human calf at the level of the scanning planes (see chapter 16.8) may not be recognized.

Examples could be:

Ladders

- Wheelchair users
- Cyclists
- Small children
- Pushed means of transport (shopping carts, etc.).

- The routes of the ACTIVE Shuttle must be planned away from areas where it is possible to encounter these groups of persons or obstacles.

- ▶ Equipment used in or near the area of the ACTIVE Shuttle travel path must be identifiable at the level of the scanning planes.
- ▶ Areas with a hazard potential when the ACTIVE Shuttle is moving must be secured in a way that the personal protection system (laser scanner) of the ACTIVE Shuttle can recognize them.
- ▶ Areas with driveways of the ACTIVE Shuttle must be free from reflective surfaces, especially the area of the supermarkets. This does not apply to the reflectors for localization approved by Bosch Rexroth.

5.4 Touchscreen display



Information on using the display can be found in the AMR manual **RB02831888** (see Table 1 on Page 6).

- A:** Material number
(order number)
- B:** Designation
- C:** Serial number
- D:** Information on version
and dimensions

5.5 Identification of the product

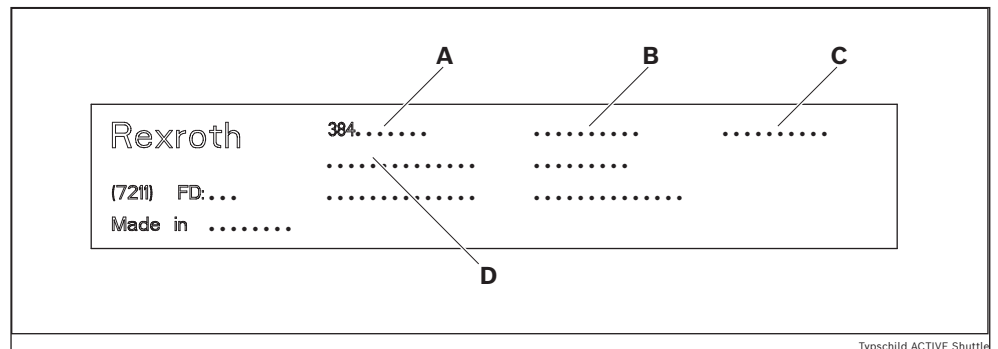


Fig. 6: Nameplate

6 Transport and storage

- Observe the transport instructions on the packaging.
- Transport weight: see delivery documents.
- Secure the product to prevent toppling over!
- Always maintain ambient conditions during loading and transport, see page 90.

6.1 Transporting the product

! WARNING

Suspended loads may fall!

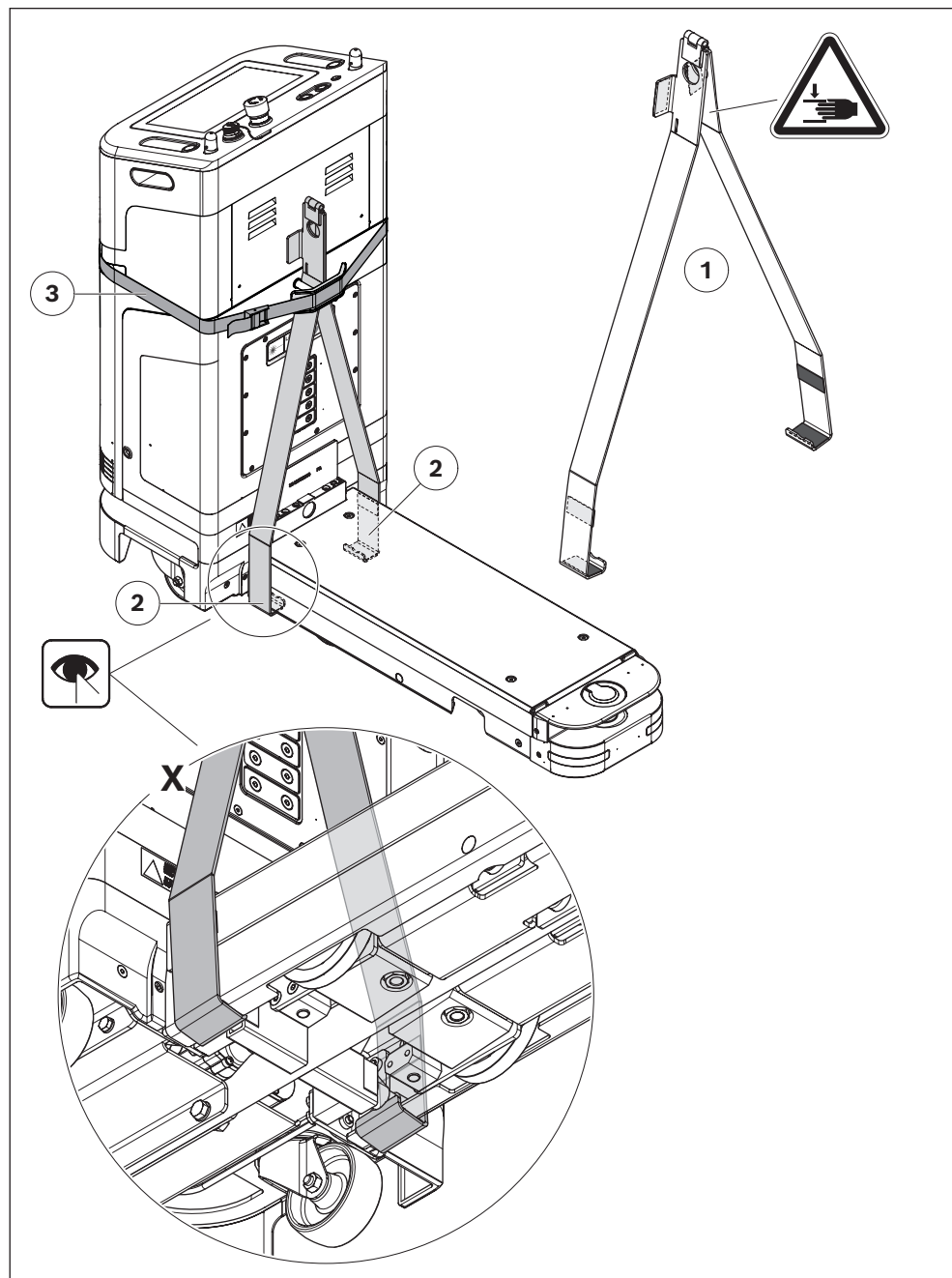
Falling objects can result in severe injury (or even death).

- ▶ Do not lift above head height and do not step under suspended loads.
- ▶ Only use the lift aid included in the scope of delivery to lift the ACTIVE Shuttle.
- ▶ Always make sure that the lashing strap of the lift aid is in a safe operating condition before each use.
- ▶ Before lifting, check the correct seat of the lift aid (see chapter 6.1.1 Mounting/removing the lift aid).
- ▶ Use only slings with sufficiently high bearing loads (for product weight, see delivery documents).
- ▶ Make sure the lifting gear is correctly fastened before lifting the product!
- ▶ Secure the product against tipping over when lifting!
- ▶ Make sure that no one but the operator is in the danger zone during lifting and lowering!

6.1.1 Mounting/removing the lift aid

**Please note:**

- Remove the packaging before lifting the ACTIVE Shuttle.
 - Only use the lift aid included in the scope of delivery to lift the ACTIVE Shuttle.
 - Keep the lift aid for further use.
 - Make sure that the parts of the lift aid touching metal are protected by foam material stickers.
1. Unfold the lift aid.
 2. Hook the lift aid on both sides positively into the provided recesses of the lower edge of the loading area (see detail X).
 3. Secure the lift aid with the lashing strap (incl. edge protector) at the ACTIVE Shuttle.
- Removal is done in the reverse order.



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Fig. 7: Mounting/removing the lift aid**6.2 Storing the product**

- Only set the product down on a flat surface.
- Protect the product from mechanical stress.
- Protect the product from environmental influences, such as dirt and moisture.
- Observe the ambient conditions, see page 90.
- When storing lithium-ion batteries, observe the safety instructions on Page 15 and the national specifications.

7 Installation

7.1 Ambient conditions

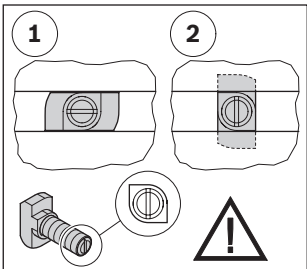
- ▶ Always comply with the ambient conditions specified in the technical data (see page 90).

7.2 Required tools

- Hex wrench (open-end) SW13.
- Hex socket wrench SW2.5 / SW4.
- Hammer
- Level

7.3 Symbols used

Table 7: Symbols used



Connection with T-bolt and flange nut.
Make sure the T-bolt is in the correct position when inserting it into the slot and tightening it. The notch at the head of the screw indicates the orientation of the T-bolt.
1 = T-bolt insertion position in the slot.
2 = T-bolt clamping position in the slot.
Tightening torque: 25 Nm



M_D = 20Nm

Hex wrench
SW = wrench size ... mm
M_D = required tightening torque ... Nm



M_D = 8Nm

Hex socket wrench
SW = wrench size ... mm
M_D = required tightening torque ... Nm



Loctite 243

Secure the screws with:
• Loctite 243: Medium strength (detachable), www.loctite.de



The marked parts are not required for the described assembly. Dispose of the parts or use them for other purposes.



Graphical depiction of the installation steps.
The numbers correspond to the sequence of installation steps, in accordance with the instructions in the accompanying text.



Graphical depiction of the designation of components.
The letters denote the components mentioned in the accompanying text.



Detailed view from a different direction, for example, the back or the bottom side of the product.

7.4 Unpacking the charging station

- ▶ Keep the transport packaging for further use (e.g. return shipment to the manufacturer).
- ▶ Dispose of the packaging material (film, cardboard boxes, etc.) in accordance with the applicable regulations in your country.

7.5 Positioning/mounting the charging station

CAUTION

Risk of injury due to incorrect positioning of the charging station!

If the charging station is positioned in walkways and corridors, there is a risk of tripping.

- ▶ Do not position the charging station in walkways and corridors.

Risk of injury due to improper installation of the charging station!

- ▶ Observe the operating manual of the manufacturer:

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CZ - 619 00

Brno

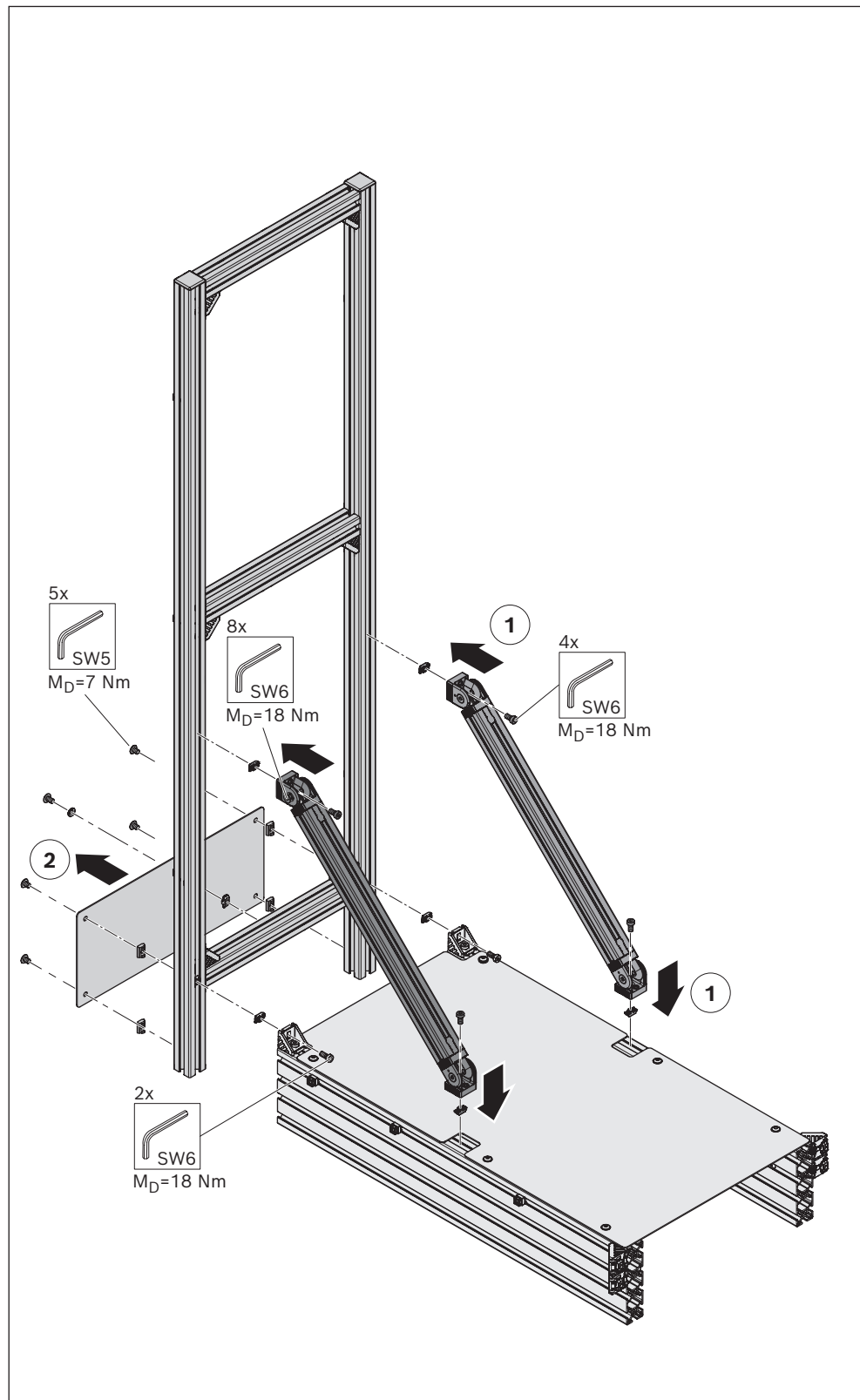
- ▶ Anchor the charging station in the hall floor to avoid malfunctioning and associated risks.
- ▶ Route the connection cable according to the country-specific specifications for avoiding risks.
- ▶ Protect the connecting cables from mechanical damage.

Risk of injury and possible damage due to incorrect use!

When climbing or stepping onto the charging station, there is a risk of injury from falling and of damage to the housing of the charging station.

- ▶ Do not use the charging station as a stepladder or climbing aid.

1. Mount the assembly frame.
2. Disassemble the rear-side guard plate.



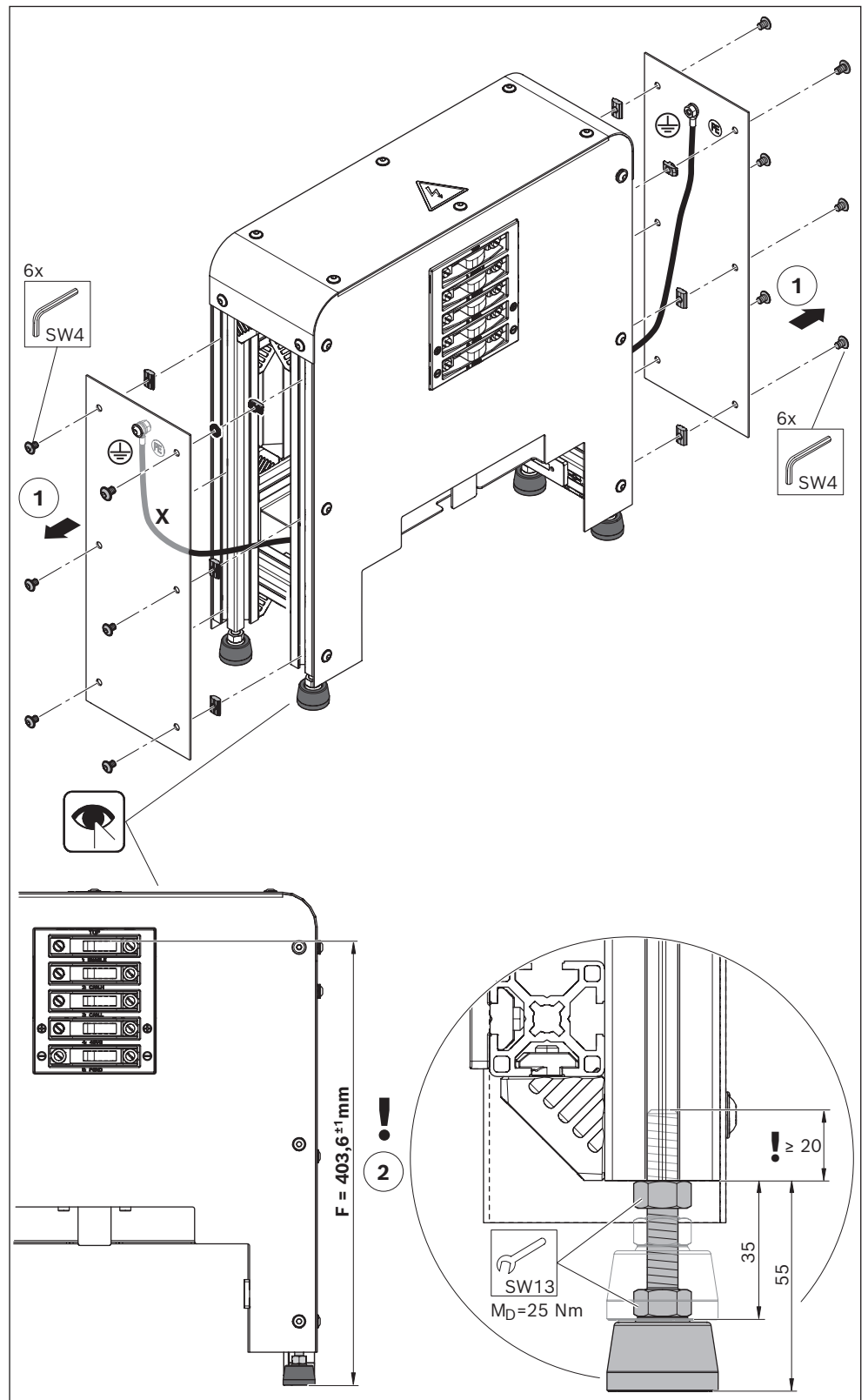
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Fig. 9: Mounting the assembly frame

**Please note:**

- The charging station may only be used in connection with the assembly frame.
- Mount the docking station on a level surface.
- The docking station must be mounted at right angles to the vehicle axis.
- The protective conductor (X) must not be disassembled. Otherwise, a new test in accordance with DIN EN 60204-1 Section 18 is required.

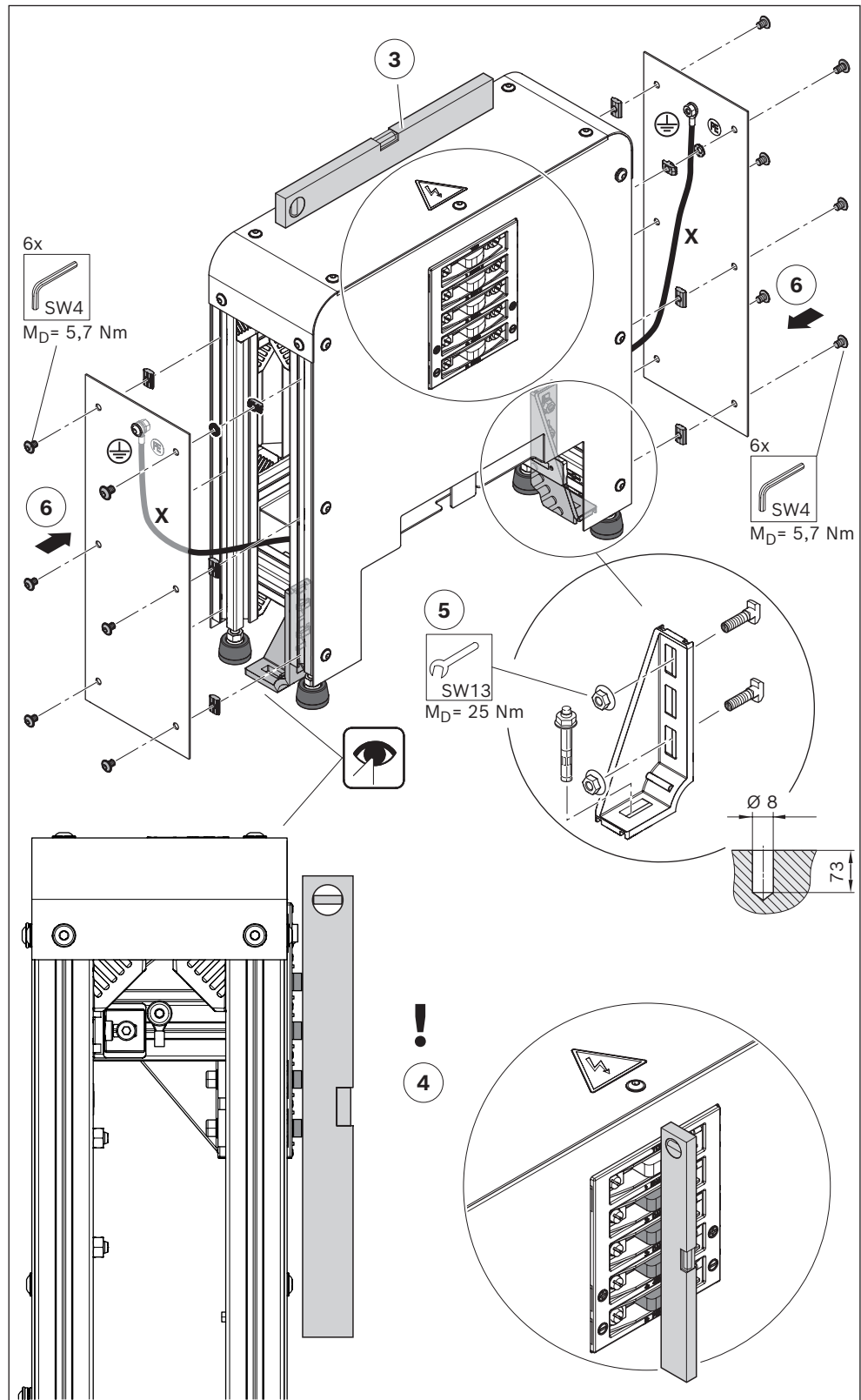
1. Remove both lateral housing parts of the docking station.
2. Set the dimension F with the leveling feet.

**Fig. 10: Docking station assembly (1/2)**

**Please note:**

Vertical alignment of the charging contacts with a spirit level may only be carried out when the system is de-energized.

3. Horizontally align the docking station.
4. Align the docking station in such a way that the 4 lower charging contacts are vertically aligned.
5. Install the two foundation brackets and screw the docking station to the floor.
6. Mount the lateral housing parts.
7. After installing the docking station, verify that it is perpendicular to the vehicle axis.



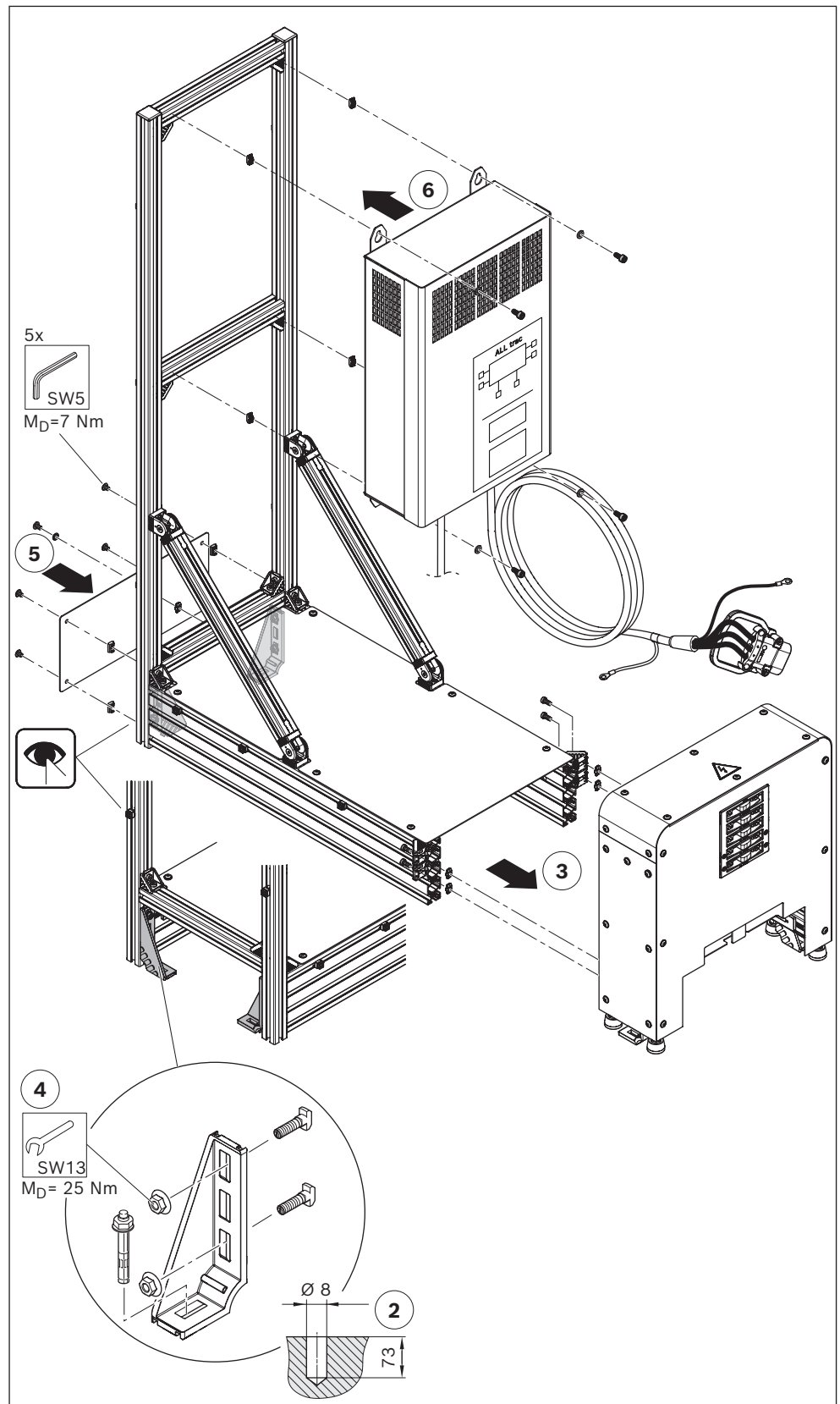
560 080-30

Fig. 11: Docking station assembly (2/2)

**Please note:**

- The charging station may only be used in connection with the assembly frame and the docking station.
- The connecting cable from the wall box to the docking station (length 3 m)
 - must not be shortened or extended.
 - must be laid in a protected manner so that there is no risk of tripping or mechanical damage.
- We recommend laying the connection cable in a cable duct.
- After the installation of the docking station and wall box on the assembly frame, a new test in accordance with DIN EN 60204-1, section 18 is imperatively required.

1. Lean the assembly frame against the docking station and mark the holes for the foundation brackets.
2. Drill the holes for the foundation brackets.
3. Mount the assembly frame at the docking station.
4. Screw the assembly frame to the floor.
5. Mount the rear-side guard plate at the assembly frame.
6. Mount the wall box at the assembly frame.
7. Carry out a test in accordance with DIN EN 60204-1 section 18.

**Fig. 12: Assembly of the charging station on the assembly frame**

560 080-25

7.5.1 Connecting the charging station electrically

**WARNING****High electrical voltage!**

Risk of severe injury or death from electric shock.

- ▶ Disconnect the relevant system component before performing any maintenance or repair work.
- ▶ Secure the system against being unintentionally switched on again.
- ▶ Only operate the charging station with a 16 A circuit breaker, triggering characteristic C.
- ▶ The charging station may only be operated with the housing panels mounted.

Risk of injury by bridging the charging contacts of the charging station!

By bridging the charging contacts, there is a risk of damage, sparks, overheating and fire.

- ▶ Do not place any objects, especially electrically conductive or flammable objects, in the area in front of the charging contacts of the charging station.

**CAUTION****Risk of injury due to improper installation of the charging station!**

- ▶ Observe the operating manual of the manufacturer:
AXIMA, spol. s r.o.
Videňská 204/125
CZ - 619 00
Brno
- ▶ Route the connection cable according to the country-specific specifications for avoiding risks.
- ▶ Protect the connecting cables from mechanical damage.

- Electrical work may only be carried out by qualified personnel!
- Comply with the standard DIN EN 60204 (previously: VDE regulation VDE 0100) for Germany, or the corresponding regulations in the country of use.

The charging station has a GST plug-in system.

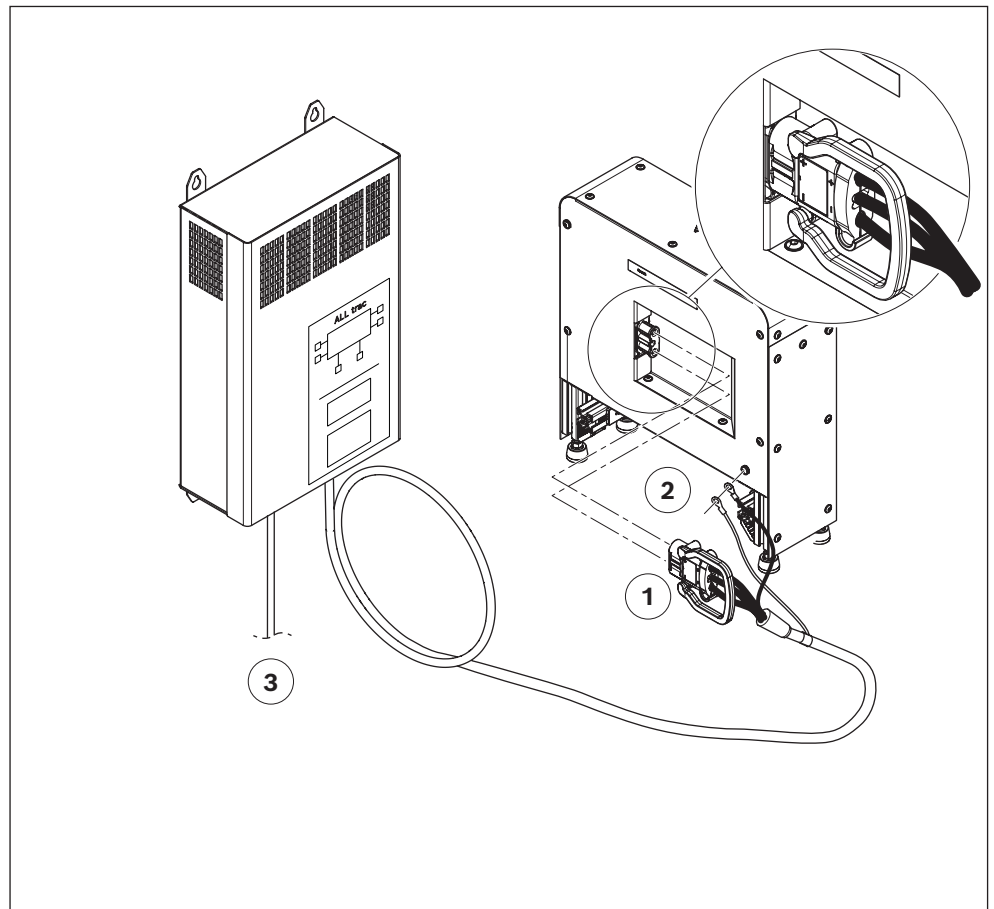
Further details on the connection can be found in the enclosed document

"General safety instructions for electro-technical installation of MPS components" (see Table 1 on Page 6).

**Please note:**

- The charging station may only be used in connection with the assembly frame.
- The connecting cable from the wall box to the docking station (length 3 m)
 - must not be shortened or extended.
 - must be laid in a protected manner so that there is no risk of tripping or mechanical damage.
- We recommend laying the connection cable in a cable duct.
- After the installation of the docking station and wall box on the assembly frame, a new test in accordance with DIN EN 60204-1, section 18 is imperatively required.

1. Plug the wall box connection cable into the docking station.
2. Connect the grounding cable to the cable shield at the docking station.
3. Connect the wall box according to the specifications in the operating manual for the wall box used (see Table 1 on Page 6).

**Fig. 13: Wall box and docking station connection (principle representation)**

560 080-26

7.6 Unpacking the ACTIVE Shuttle

NOTICE

Potential damage to the drive rollers by moving without the brake being released

If the ACTIVE Shuttle is moved by hand after unpacking without commissioning (see chapter 8), the drive rollers may be damaged.

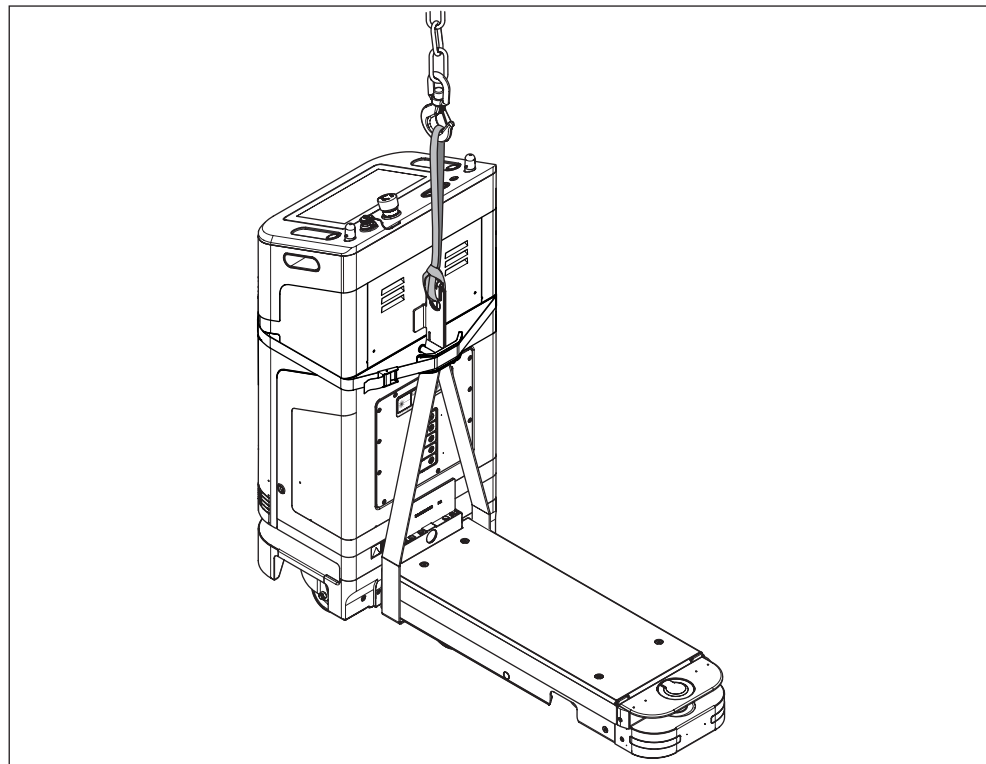
- ▶ Only move the ACTIVE Shuttle after switching it on (see chapter 8.3.1) and releasing the brake (see chapter 8.3.6).
- ▶ Observe the emergency measures and safety instructions for commissioning in chapter 8.

Possible damage caused by pushing/pulling on the WiFi antennas

Moving the ACTIVE Shuttle using the WiFi antennas may damage the antennas.

- ▶ Move the ACTIVE Shuttle only by the lateral handle shells.

- ▶ Observe the transport weight of the ACTIVE Shuttle (see chapter 16 Technical data).
- ▶ Remove the packaging before lifting the ACTIVE Shuttle
- ▶ Before lifting, check the correct seat of the lift aid (see chapter 6.1.1 Mounting/removing the lift aid).
- ▶ Lift the product by the lift aid (see Fig. 14).



560 080-06

Fig. 14: Lifting the ACTIVE Shuttle

- ▶ Remove the lift aid (see chapter 6.1.1 Mounting/removing the lift aid).
- ▶ Keep the lift aid and the transport packaging for further use (e.g. return shipment to the manufacturer).
- ▶ Dispose of the packaging material (film, cardboard boxes, etc.) in accordance with the applicable regulations in your country.
- ▶ Before moving the ACTIVE Shuttle, commission it properly (see chapter 8).

8 Commissioning

8.1 Emergency measure pressing the emergency stop device

- ▶ In emergency situations and in the event of unpredictable movements of the ACTIVE Shuttle, press the
 - emergency stop device (R) on the ACTIVE Shuttle
 - emergency stop device (A) on the handheld controller
- ➔ The ACTIVE Shuttle is shut down.
- ➔ The signal lamps light up permanently in red.
- ▶ Unlock the emergency stop device by turning the mushroom knob.

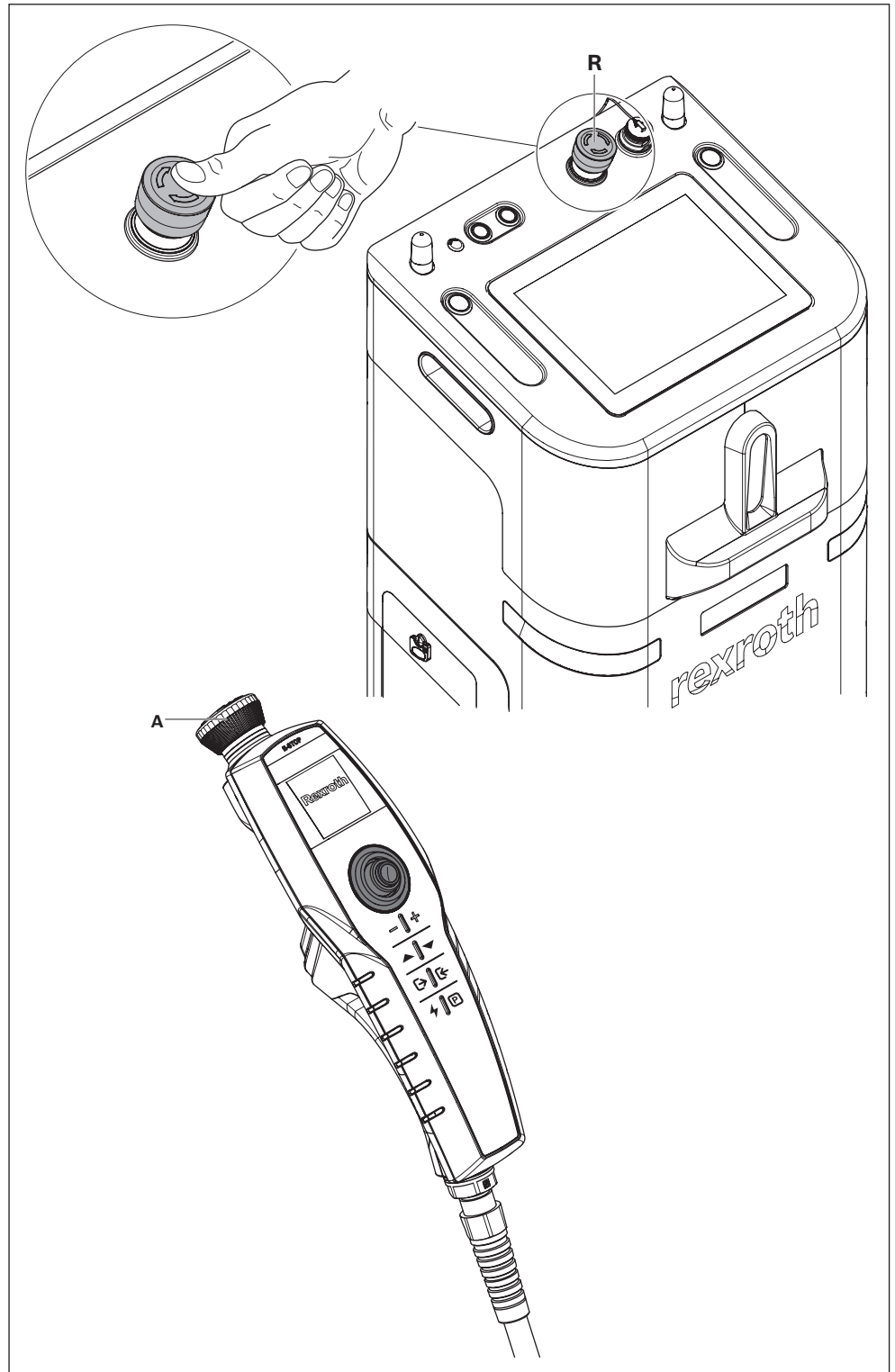


Fig. 15: Emergency measure pressing the emergency stop device

560 080-07

8.2 Emergency measure removing the lithium-ion battery

CAUTION

Possible hazard due to incorrect handling of lithium-ion batteries!



The ACTIVE Shuttle is powered by a replaceable lithium-ion battery. Lithium-ion batteries can be damaged by mechanical, thermal or electrical stress (e.g. shock, heat, cold, incorrect charging, short circuit). This may result in the following hazards:

- Leakage of toxic substances and toxic combustion products in case of fire.
- Leakage of corrosive liquid and thus possible skin irritations, burns and chemical burns.
- Increased fire hazard due to electrolyte leakage (flammable solvent).

- ▶ Never use dropped or damaged batteries.
- ▶ Do not use defective or damaged lithium-ion batteries.
- ▶ Do not use lithium-ion batteries with a defective connection cable or defective contacts.
- ▶ Charge the lithium-ion battery in the ACTIVE Shuttle only using the charging station supplied by Bosch Rexroth or the charger supplied by Bosch Rexroth.
- ▶ Only operate lithium-ion batteries and accessories when they are in a perfect technical condition.
- ▶ Protect the battery terminals from short circuiting.
- ▶ Protect the lithium-ion batteries from mechanical stress (shocks, falls, vibrations).
- ▶ Do not expose the lithium-ion batteries to high temperatures and/or large temperature variations.
- ▶ Store the lithium-ion batteries in a cool, dry and well ventilated place.
- ▶ Protect the lithium-ion batteries from direct sunlight.
- ▶ Do not immerse the lithium-ion batteries in liquids.
- ▶ Please observe the country-specific regulations regarding storage of the lithium-ion battery.
- ▶ Check the lithium-ion batteries regularly for damage.
- ▶ Lithium-ion batteries must not be opened, repaired or serviced.

NOTICE

Handling damaged lithium-ion batteries



- Only touch and transport damaged lithium-ion batteries with personal protective equipment that is resistant to alkalis and solvents.
- If there are any signs of heat, smoke, odor, noise, or deformation of the batteries, disconnect the lithium-ion battery from the vehicle.
- Store the lithium-ion battery in a fire-resistant container or at a safe distance from combustible materials.
- Do not inhale any vapors that may be generated.

NOTICE

Disposal of lithium-ion batteries

- ▶ Dispose of lithium-ion batteries properly.
- ▶ Tape off the connection contacts for disposal.
- ▶ Store damaged lithium-ion batteries in fire-resistant containers.
- ▶ During transport, observe the relevant hazardous goods requirements for lithium-ion batteries.
- ▶ Observe the operating manual of the manufacturer:
VARTA AG
VARTA-Platz 1
73479 Ellwangen/Germany
info@varta-ag.com

Damage to the lithium-ion battery due to a low state of charge!

The state of charge of the lithium-ion battery should not fall below 6%.

- ▶ Reduce the discharge of the lithium-ion battery during extended downtimes by switching the lithium-ion battery off using the OFF/ON switch.

**Please note:**

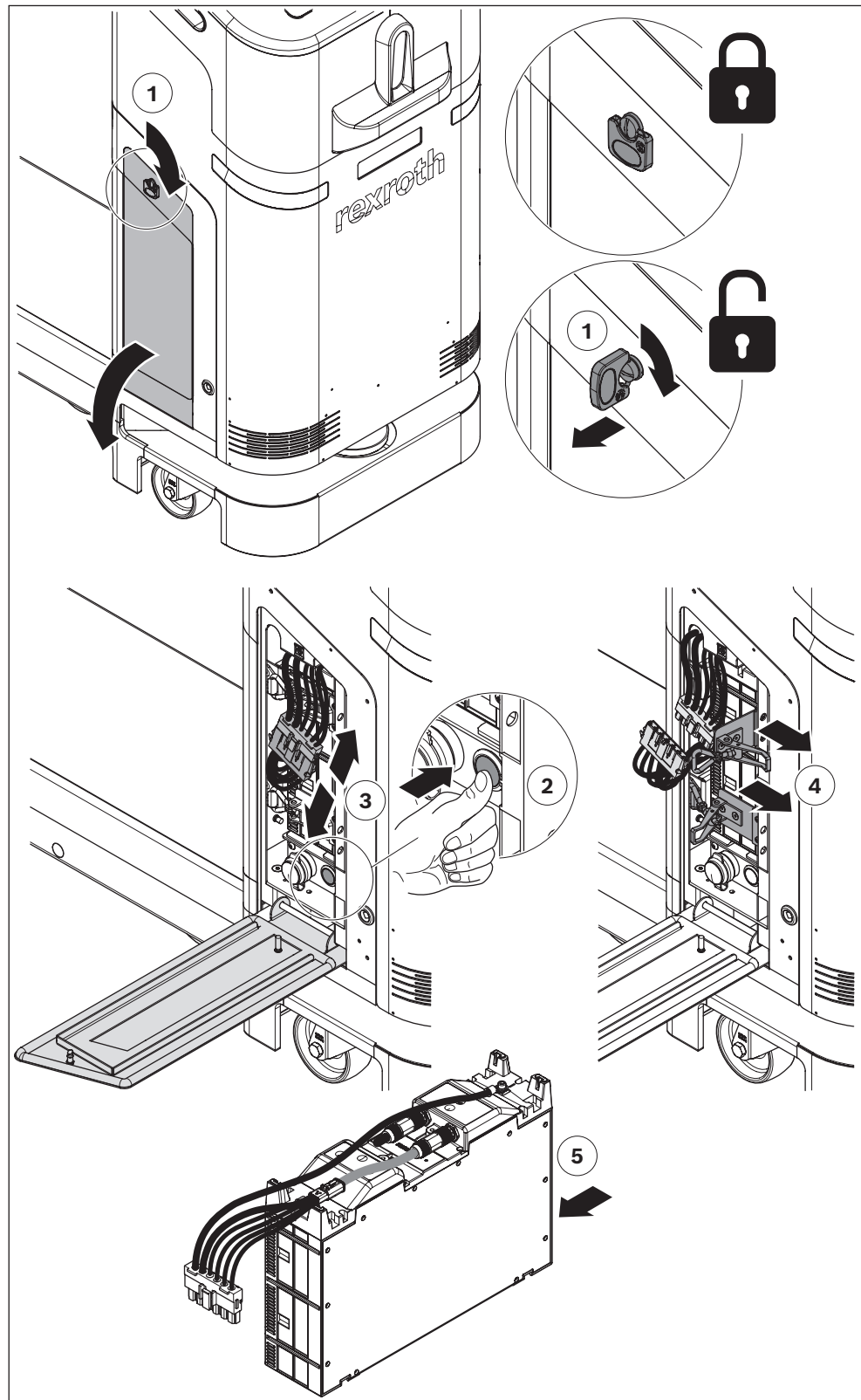
- Only perform this action in an emergency situation that cannot be resolved otherwise.
- When removing the battery, be careful not to shear any connecting cables between the battery and the housing.

Function**Battery main switch (B2)**

	Battery on
	Battery off

1. Open the cover of the battery compartment.
2. Switch off the battery using the battery main switch.
3. Disconnect the battery connecting plug.
4. Open the toggle latches.
5. Remove the battery.

- ▶ Inserting the battery is done in the reverse order.
- ▶ Stow the vehicle-side battery connector between battery and rear wall.
- ▶ After inserting the battery, check that the toggle latches are engaged and that the battery is firmly seated in the battery compartment.
- ▶ Adjust the tensile force of the toggle latches if it is loose.



560 592-08

Fig. 16: Emergency measure removing the lithium-ion battery

8.3 Initial commissioning

CAUTION

Risk of injury and damage to the ACTIVE Shuttle

Upon new commissioning of additional ACTIVE Shuttle, they are not yet entered in the AMS / external fleet management system and therefore not known to the already autonomous ACTIVE Shuttle (e.g. if the additional ACTIVE Shuttle have been pushed manually into a charging station).

- The owner must take appropriate measures to prevent dangerous states and damage to the ACTIVE Shuttle.

Danger of injury due to safety checks not carried out!

Risk of serious injury from non-functioning safety and warning devices.

- Carry out a test of the visual and acoustic warning devices **every quarter**.
- Carry out a test of the safety equipment **in accordance with** the test cycles specified in chapter 10.3.
- Take vehicles with non-functional safety and warning devices out of service and contact the Bosch Rexroth Service.

Risk of burns from hot components inside the ACTIVE Shuttle!



During operation, individual components inside the housing may heat up.

- Wait a reasonable amount of time before opening the housing.

Risk of serious injury from collision with the ACTIVE Shuttle.

Personal injury when staying in the driving range, especially in curve areas!



- If possible, do not stand within the driving range of the ACTIVE Shuttle.
- Restrict pedestrian traffic within the ACTIVE Shuttle's driving range as much as possible.
- Always wear safety shoes.

Insufficient stopping distance, e.g. by entering the protective area from the side!

Risk of serious injury from collision with the ACTIVE Shuttle.



- Do not step into the protective area of the vehicle from the side.
- Do not move against the direction of travel towards the ACTIVE Shuttle.
- Always wear safety shoes.

Risk of crushing at the rear wheels of the load!

When a loaded vehicle starts up/restarts, there is a danger of crushing at the rear wheels of the load.



- Do not put your feet between the wheels.
- Observe start-up warning.
- Always wear safety shoes.

Danger due to unadapted speed!

Risk of serious injury due to a speed not adapted to the situation.

- The speed of the ACTIVE Shuttle must be reduced in narrow corridors, curves, intersections and areas with pedestrian traffic.

CAUTION

Danger of the ACTIVE Shuttle tipping over if loaded incorrectly!

Risk of serious injury due to the ACTIVE Shuttle tipping over.

- ▶ Observe the permissible load and the maximum stacking height.
- ▶ Ensure that the load is evenly distributed (see chapter 16.7).
- ▶ Only use the ACTIVE Shuttle in accordance with its intended use.

Danger due to falling load in case of incorrect loading!

Risk of serious injury from falling load.

- ▶ Ensure that the load is evenly distributed.
- ▶ Only use the ACTIVE Shuttle in accordance with its intended use.

Danger from entrained load!

Risk of serious injury due to entrained, insufficiently secured load.

- ▶ Independent movements of the dolly in the supermarket, e.g. due to dirt, unevenness or gradients on the floor, must be prevented by the operator.
- ▶ Ensure that the load is completely and correctly positioned on the loading area.

Danger from unpredictable movements of the ACTIVE Shuttle due to inadequate floor surfaces!

Risk of serious injuries due to unpredictable movements of the ACTIVE Shuttle, e.g. slipping, especially during emergency braking.

- ▶ The driving range of the ACTIVE Shuttle must have sufficient traction.
- ▶ The driving range of the ACTIVE Shuttle must be level, dry, clean and free of objects lying around.

Danger from dirty driveways!

Risk of serious injury from unpredictable movements of the ACTIVE Shuttle due to dirty driveways.

- ▶ The driving range of the ACTIVE Shuttle must be clean.

Danger due to incorrect loading condition!

Risk of serious injury due to incorrect loading condition when changing to the "Automatic" operating mode.

- ▶ The change to the "Automatic" operating mode may only take place in an unloaded condition.

Danger due to limited safety functions in the "Manual" operating mode!

Risk of serious injury from incorrect operation.

- ▶ In the "Manual" operating mode, the ACTIVE Shuttle may only be operated by specially trained staff using the handheld controller.
- ▶ The responsibility for vehicle control in "Manual" operating mode lies entirely with the operator.

Risk of personal injury when intervening with automated processes!

Risk of serious injury due to unauthorized intervention in automated processes by operating personnel.

- ▶ Under no circumstances may operating personnel intervene with the automated processes such as loading and unloading positions and when moving in and out at the charging stations.

NOTICE

Danger of collision with obstacles outside the protective area!

The ACTIVE Shuttle can be damaged by obstacles outside the protective area.

- ▶ Keep the driving range free of obstacles, especially flat objects or objects protruding into the driving range.

Risk of overheating of the ACTIVE Shuttle!

If the ventilation slots of the ACTIVE Shuttle are covered or if the filter mats of the fans are not maintained, there is a risk of overheating and thus damage to the ACTIVE Shuttle.

- ▶ The ventilation slots of the ACTIVE Shuttle must always be free and uncovered to ensure sufficient cooling.
- ▶ The filter mats of the fans must be maintained regularly depending on the ambient/operating conditions (see chapter 10.6).

- Make sure that all electrical connections are either used or covered. Make sure that all screw connections and plug-in connections are properly seated. All relevant protective covers must be fitted.
- Observe DIN EN ISO 13857 when you remove or replace protective equipment and/or bypass safety equipment.
- Only start up the product if all safety equipment has been installed in the system and is functional.
- Only start up a product that has been completely installed.



Please note:

- During initial commissioning, observe EN 60204-1 or the national regulations and carry out the necessary tests.
- Check that all safety and warning devices function in accordance with the following descriptions when switching on and off.

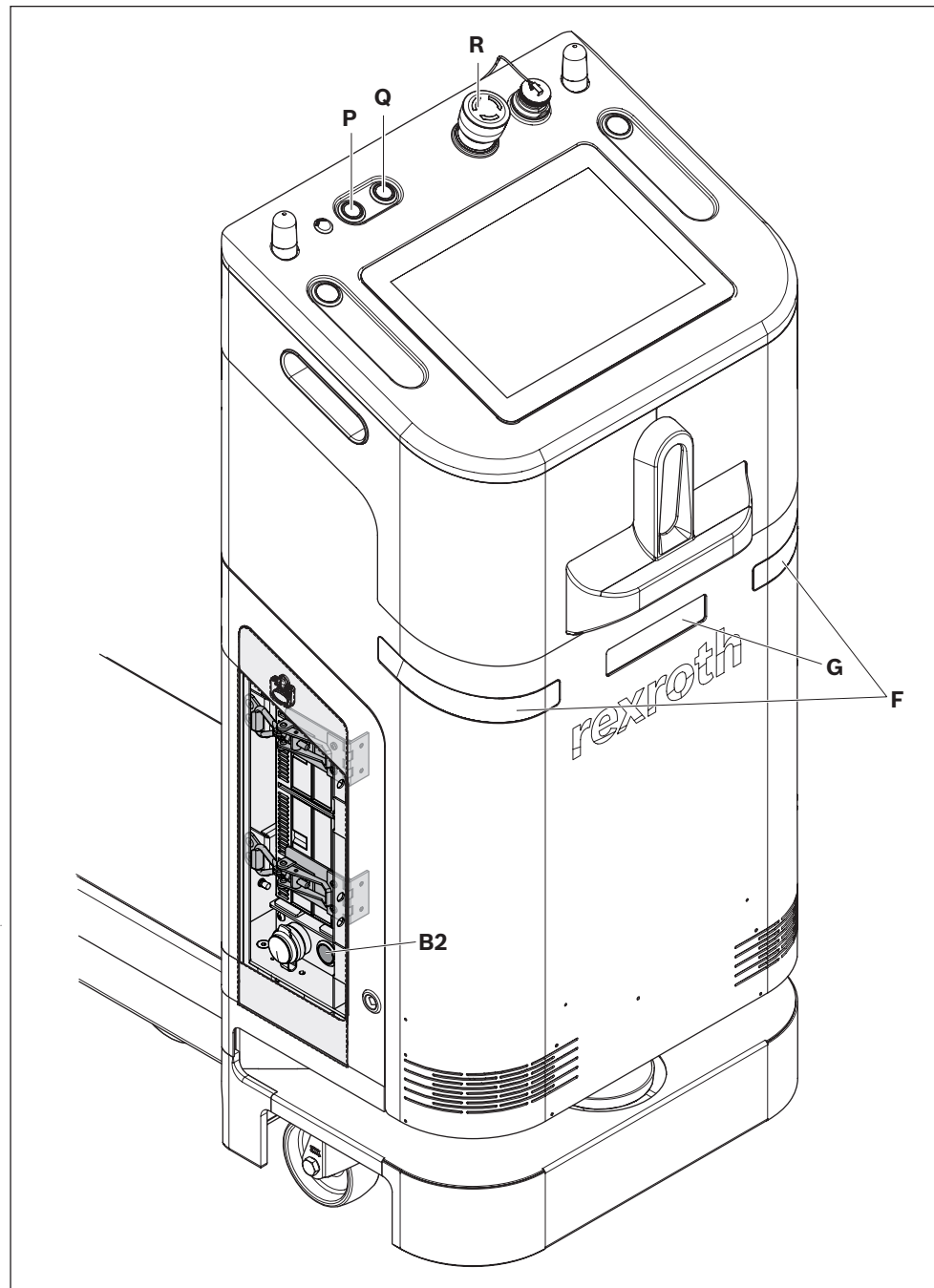
For initial commissioning, proceed chronologically as described in the chapters 8.3.1 to 8.3.5:

8.3.1 Switching on the ACTIVE Shuttle

Function**Battery main switch (B2)**
 Battery on

 Battery off

1. Switch on the battery using the battery main switch (B2, see Fig. 1 on Page 25).
2. Briefly press the ON/OFF button (P).
 - ➔ The ON/OFF button (P) flashes (5 Hz).
 - ➔ The signal lamps (F) flash yellow.
 - ➔ A warning signal sounds.
 - ➔ The bootscreen is displayed (see chapter 5.4 Touchscreen display).
 - ➔ The ON/OFF button (P) lights up permanently in green.
 - ➔ The acknowledgment button (Q) flashes green.
3. Press the acknowledgment button (Q).
 - ➔ The acknowledgment button (Q) lights up permanently in green.
 - ➔ The Bluespot (G) lights up.
 - ➔ The ACTIVE Shuttle is in "Automatic" operating mode.
- When the emergency stop device (R) is actuated, the ACTIVE Shuttle is stopped.
 - ➔ The signal lamps (F) light up permanently in red.



560 080-09

Fig. 17: Switching on the ACTIVE Shuttle**Please note:**

If it is not possible to switch the ACTIVE Shuttle on, check the seating of the battery connecting plug and press the battery main switch again (B2, see Fig. 1 on Page 25).

**Please note:**

- The connector plug of the handheld controller and the connection socket on the control panel are coded (see detail X).
- Removing the handheld controller:
 1. Retract the release mechanism
 2. Remove the plug

1. Plug in the handheld controller (observe coding).

➔ The acknowledgment button (Q) flashes green.

2. Press the acknowledgment button (Q).

➔ The acknowledgment button (Q) lights up permanently in green.

➔ The ACTIVE Shuttle is in "Manual" operating mode.

3. Press the 3-stage enabling switch (E) to the middle position (stage 2).

Stage 1 Not actuated, OFF

Stage 2 Approval, ON

Stage 3 Panic function, OFF (travel function is shut down)

➔ The signal lamps (F) light up permanently in yellow.

8.3.2 Switching to "Manual" operating mode

**CAUTION****Possible hazard through unauthorized use!**

Unauthorized activation of the "Manual" operating mode can cause damage to property and danger to life and limb.

- ▶ Always keep the handheld controller secured against unauthorized use.

Danger due to limited safety functions in the "Manual" operating mode!

Risk of serious injury from incorrect operation.

- ▶ In the "Manual" operating mode, the ACTIVE Shuttle may only be operated by specially trained staff using the handheld controller.
- ▶ The responsibility for vehicle control in "Manual" operating mode lies entirely with the operator.

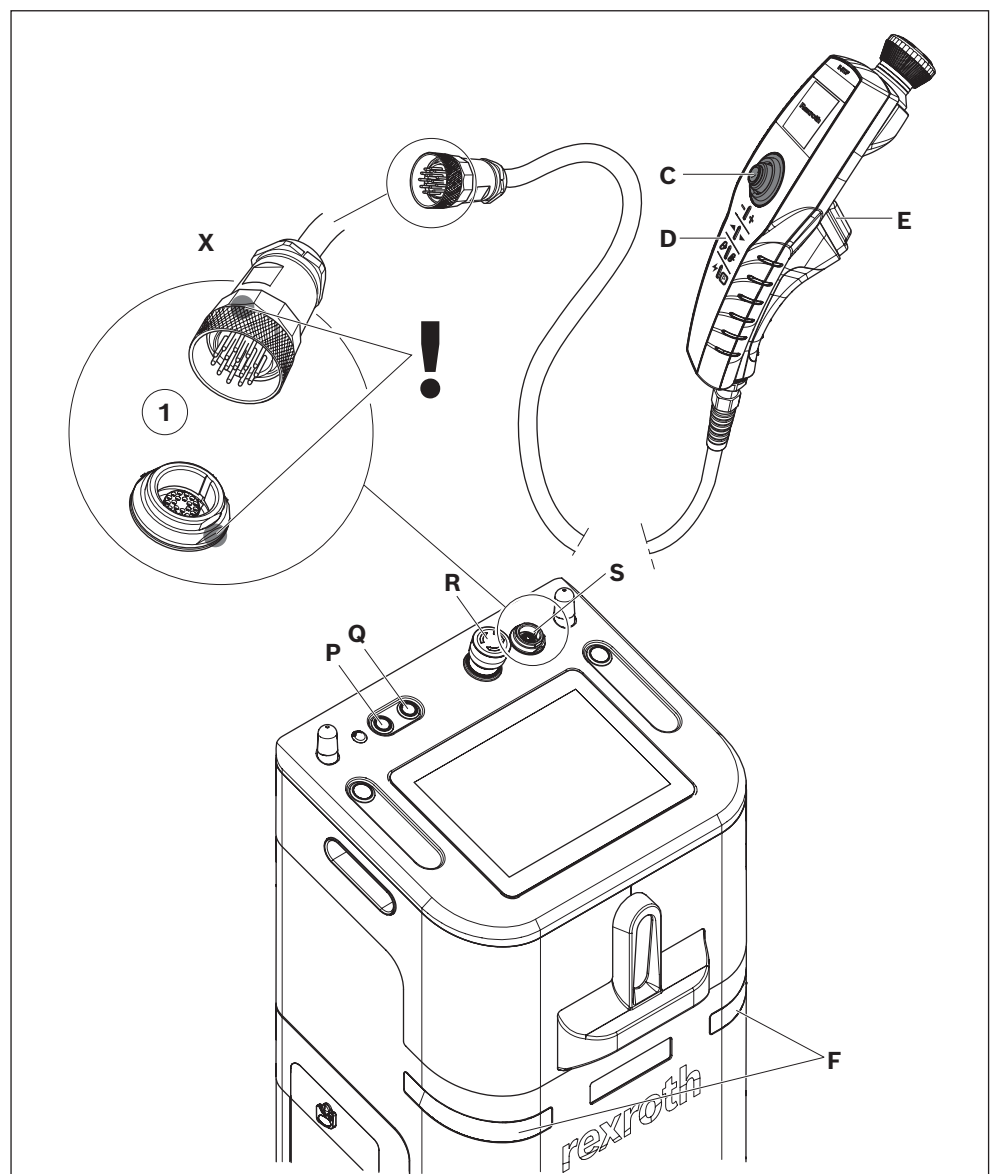


Fig. 18: Switching to "Manual" operating mode

560 080-10

**Please note:**

- When checking or adjusting the loading area height, the ACTIVE Shuttle must be on a flat, dry, clean surface where there are no objects lying around.
- For exact requirements regarding the floor of the driveways, see chapter 16.6.

1. Checking the height h_{LOW} :
 - ▶ Lower the load surface completely (handheld controller button ▼).
 - ▶ Measure the height h_{LOW} on **both sides** on the **front** and on the **rear** (**4 measuring points**).
 - ▶ If it is not set correctly, loosen the adjustment screws (A), and adjust h_{LOW} using the LOW setting screw. Re-tighten the adjustment screws.
 - ▶ Check h_{LOW} again by raising and lowering.
2. Checking the height h_{TOP} :
 - ▶ Raise the loading surface completely (handheld controller button ▲).
 - ▶ Measure the height h_{TOP} on **both sides** on the **front** and on the **rear** (**4 measuring points**).
 - ▶ If it is not set correctly, loosen the adjustment screws (A), and adjust h_{TOP} using the TOP setting screw. Re-tighten the adjustment screws.
 - ▶ Check h_{TOP} again by raising and lowering.

8.3.3 Checking the lower and upper loading area height and adjusting it, if necessary

**CAUTION**

Do not plan stopping, loading and unloading positions on, next to, or near inclinations/slopes/gradients!

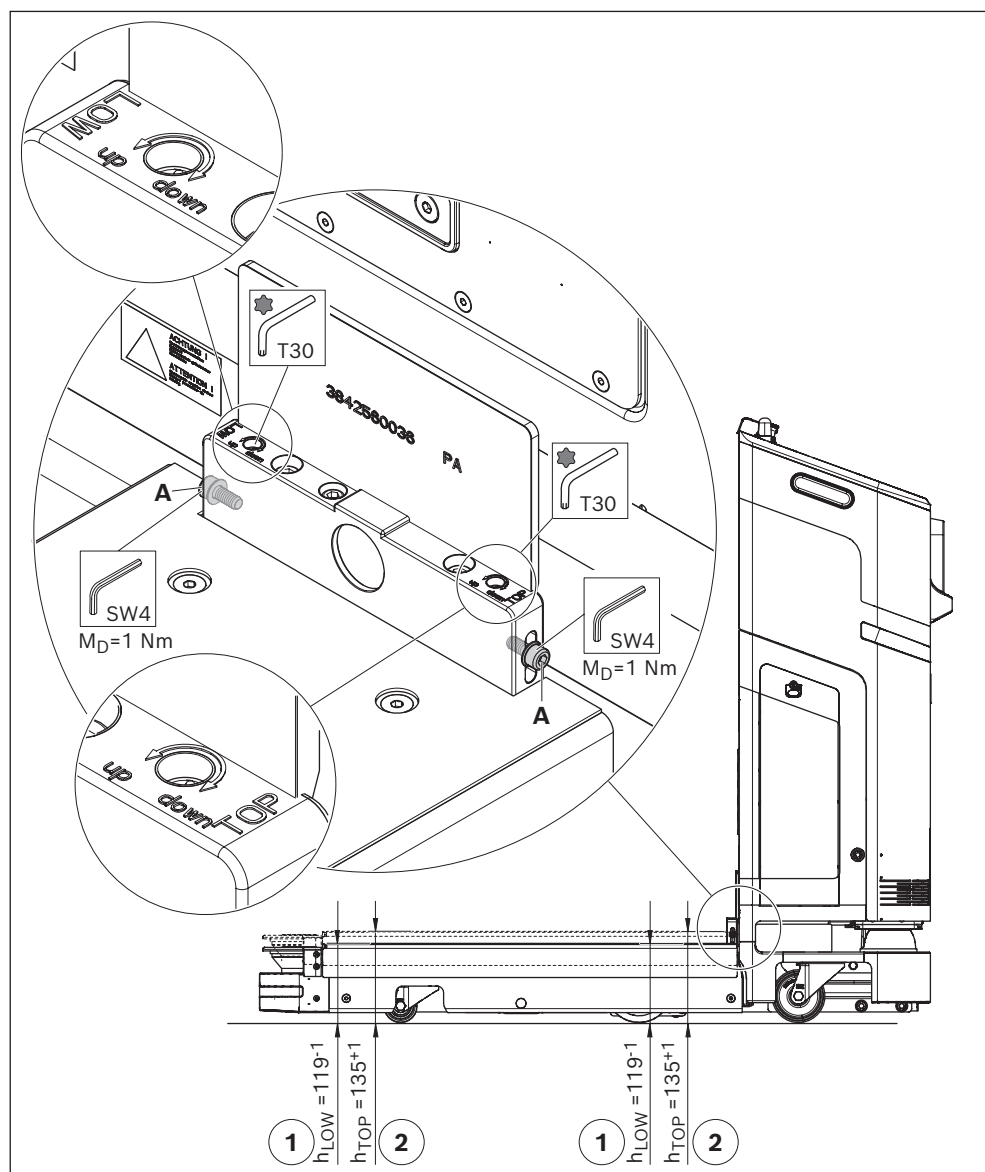
The load might tilt or start rolling when stopping, loading and unloading positions on, next to, or near inclinations/slopes/gradients.

- ▶ Do not raise or lower the loading platform in these areas.

Risk of crushing limbs when manually raising or lowering the loading area!

Limbs may be caught and crushed between the **loading area and the dolly** or between the **floor and casters of the dolly** during manual raising or lowering of the loading area.

- ▶ Make sure that no limbs are in the hazard zone when raising or lowering the loading platform.



560 080-22

Fig. 19: Checking the lower and upper loading area height and adjusting it, if necessary

**Please note:**

- To move ACTIVE Shuttle manually, the drive mode must be unlocked by pressing the enabling switch (E, level 2, consent on).
- The loading area must be fully lowered before entering the charging station.

8.3.4 Moving the ACTIVE Shuttle to the charging station with the handheld controller

- ▶ The ACTIVE Shuttle can now be controlled with the joystick (C) and the membrane keypad (D).
- ▶ Lower the loading area completely before entering the charging station.

+/- Speed ±

▲ Lifting the loading area

▼ Lowering the loading area

- ▶ Check the height of the charging contact.

If the heights of the charging contacts of the ACTIVE Shuttle and the charging station are not aligned, readjust the height of the charging station (see chapter 7.5 Fig. 10).

- ▶ When the emergency stop device (A/R) is actuated, the ACTIVE Shuttle is stopped.

➔ The signal lamps (F) light up permanently in red.

- ▶ You can return to the "Automatic" operating mode by unplugging the handheld controller and pressing the acknowledgment button (O) again.

8.3.5 Fully charging the ACTIVE Shuttle

NOTICE

Damage to the lithium-ion battery due to a low state of charge!

The state of charge of the lithium-ion battery should not fall below 6%.

- ▶ Reduce the discharge of the lithium-ion battery during extended downtimes by switching the lithium-ion battery off using the OFF/ON switch.

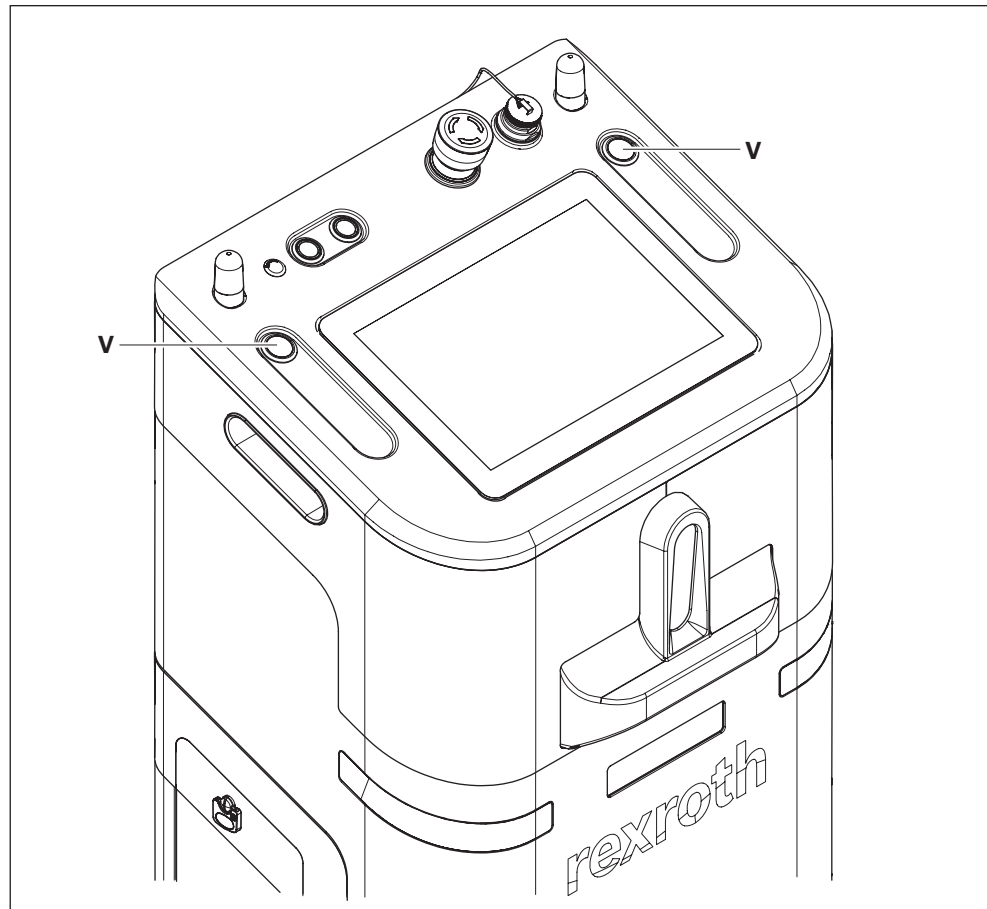
- ▶ Fully charge the ACTIVE Shuttle before further use (for battery charge indicator, see chapter 5.4 Touchscreen display).

**Please note:**

The ACTIVE Shuttle can also be moved freely by hand without a handheld controller:

- ▶ Press both buttons "Release brake" (V) simultaneously.
 - ➔ The ACTIVE Shuttle can be moved freely by hand when the buttons are pressed.
- ▶ Lower the loading area completely before insertion into the charging station.
- ▶ Insert the ACTIVE Shuttle into the charging station.
- ▶ Check the height of the charging contact: The contacts of the ACTIVE Shuttle and the charging station must be at the same height.
- ▶ If the heights of the charging contacts of the ACTIVE Shuttle and the charging station are not aligned, readjust the height of the charging station (see chapter 7.5 Fig. 10).

8.3.6 Moving the ACTIVE Shuttle manually



560 080-11

Fig. 20: Drive unlocking

8.3.7 Raising/lowering the loading area without handheld controller

**CAUTION****Do not plan stopping, loading and unloading positions on, next to, or near inclinations/slopes/gradients!**

The load might tilt or start rolling when stopping, loading and unloading positions on, next to, or near inclinations/slopes/gradients.

- ▶ Do not raise or lower the loading platform in these areas.

Risk of crushing limbs when manually raising or lowering the loading area!

Limbs may be caught and crushed between the **loading area and the dolly** or between **the floor and casters of the dolly** during manual raising or lowering of the loading area.

- ▶ Make sure that no limbs are in the hazard zone when raising or lowering the loading platform.

- ▶ Press the acknowledgment button (Q) for more than 3 s.

Loading area in lower position ➡ Loading area rises

Loading area in upper position ➡ Loading area is lowered

8.3.8 Switching off the ACTIVE Shuttle

- ▶ Press the ON/OFF button (P) for 1 second.

➡ The ON/OFF button (P) flashes (1 Hz).

➡ The control system shuts down. Duration approx. 30 ... 40 seconds.

➡ The ACTIVE Shuttle shuts down.

8.3.9 Switching off the ACTIVE Shuttle if the control system is faulty

- ▶ Press the ON/OFF button (P) for more than 15 seconds.

➡ The ACTIVE Shuttle shuts down.

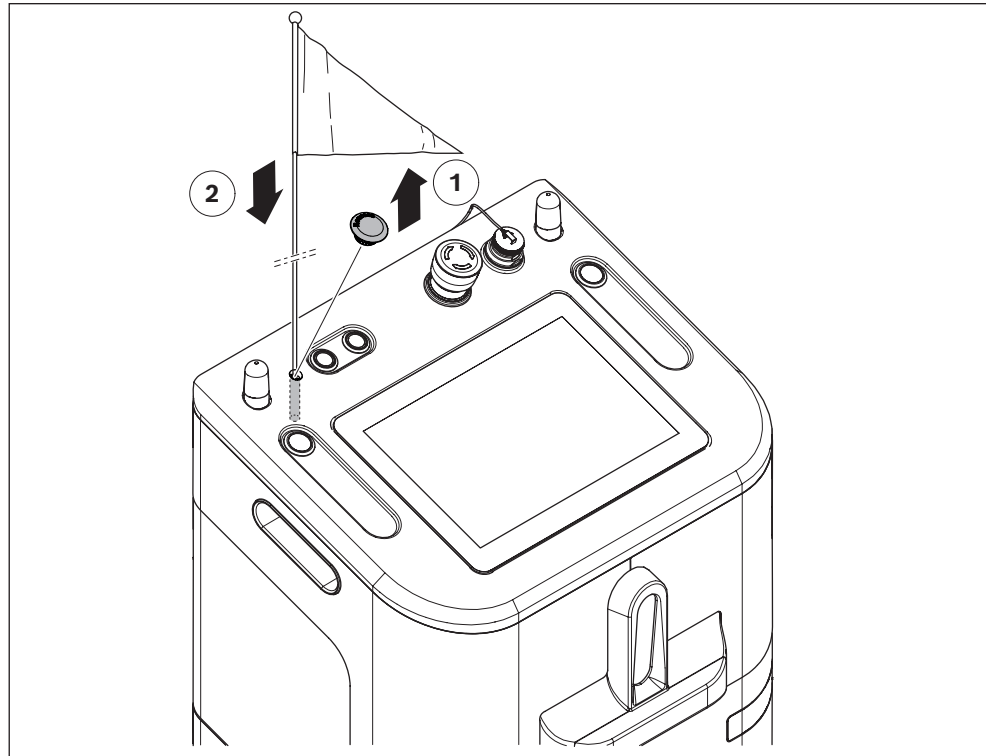
**Please note:**

Compatible safety flags can be found in the list of compatible accessories in the AMR manual **RB02831888**.

For better visibility, the ACTIVE Shuttle can be equipped with safety flags (accessories, not included in the scope of delivery).

1. Remove the cover caps.
2. Insert the safety flags.

8.3.10 Putting up safety flags (accessories, not included in the scope of delivery)



560 080-12

Fig. 21: Putting up safety flags

8.3.11 IT setup

For information on the IT setup of the vehicle, refer to the AMS manual **RB02831885** (see Table 1 on Page 6) and/or the documentation of the external fleet management system.

8.4 Re-commissioning after a standstill

Follow the steps for initial commissioning and the instructions displayed on the touchscreen display and in the AMS / external fleet management system.

8.5 Preparing the supermarket

CAUTION

Hazard from restricted personal protection system (laser scanner)!

When driving on supermarket tracks, the personal protection system (laser scanner) is restricted on its side.

- ▶ The logistics employees must be trained accordingly (see chapter 2.9).
- ▶ Restrict pedestrian traffic in this danger area.
- ▶ Attach warning signs in this danger area.

Hazard due to non-compliance with the minimum distance to manual supermarket tracks!

A sufficient distance must be maintained between a supermarket track (also) used by dollies and a supermarket track (also) used manually to avoid crushing/shearing during manual transport of dollies.

- ▶ Maintain a minimum distance of 50 mm to protect hands.
- ▶ If, due to their weight, it is foreseeable that dollies will be enclosed by more than just the hands, the distances must be increased accordingly.

**Please note:**

- Only straight lines (no radii) may be attached.
- Do not attach the blue guide line to the blue surface. It must have a clear contrast to the background. Guide lines in other colors are available on request.
- The blue guide line and the surrounding areas must be kept clean.
- The distances shown in the drawing must be observed in order for the ACTIVE Shuttle to function correctly.
- The supermarket tracks must be fixed to the floor (e.g. glued, screwed or similar).
- The danger zone of the ACTIVE Shuttle begins from the teaching point where the vehicle turns into the track and is in reverse mode.
- Plan the danger zone outside of workstations or footpaths.
- For further options for implementing a guide line, please refer to the instructions in the AMR manual **RB02831888** (see Table 1 on Page 6).

Required accessories:

A list of compatible guide lines can be found in the AMR manual **RB02831888** (see Table 1 on Page 6).

A: Dollies

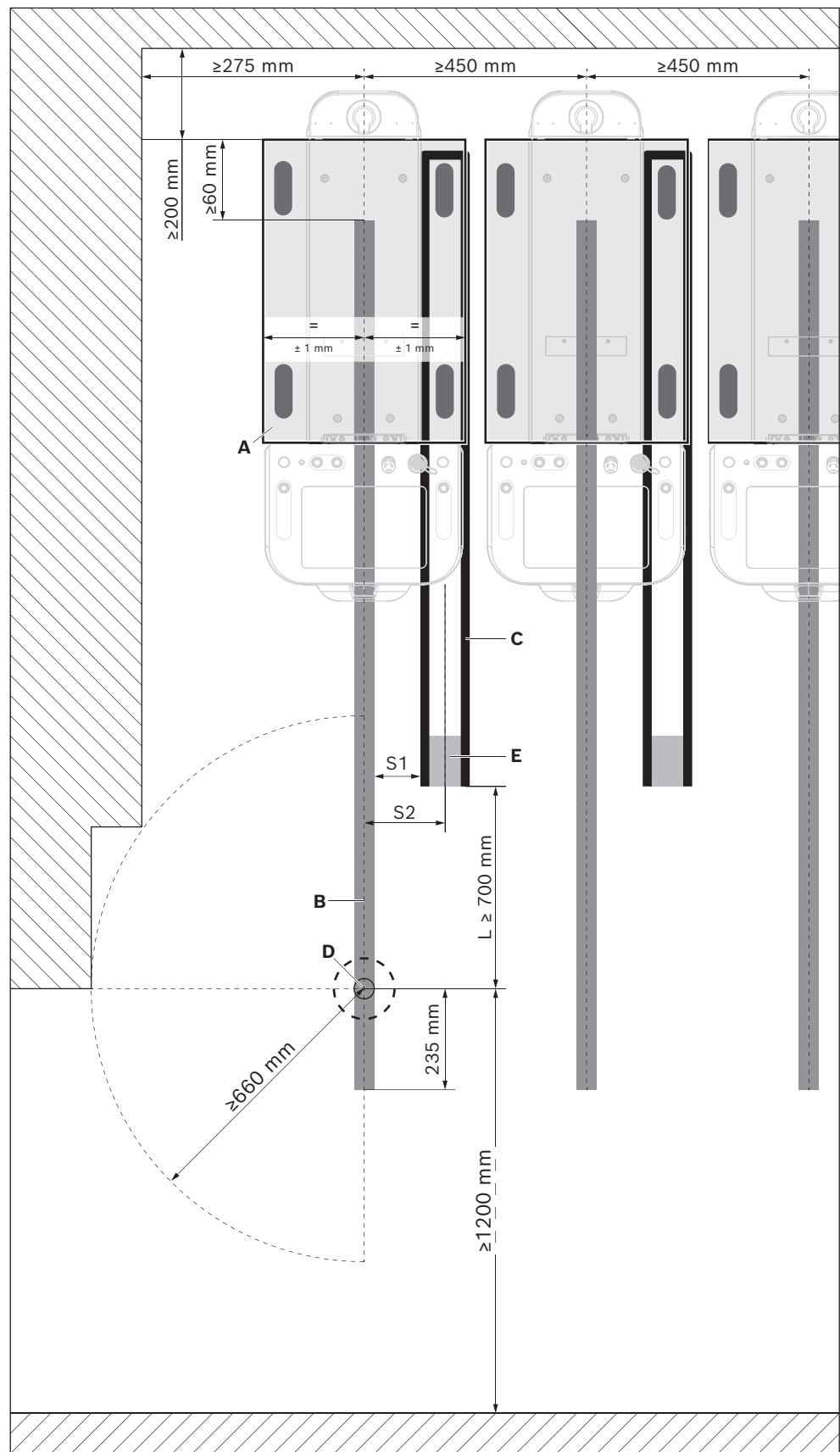
B: Guide line

C: Supermarket

D: Teaching point

E: Access ramp

- Attach the guide lines.



560 592-10

Fig. 22: Supermarket (dimensions not to scale)

Table 8: Supported supermarket tracks

Supported supermarket tracks	Type number	Distance S1*	Distance S2
G3 SW 41 (Blokma)	138318-XXXXX	86 mm	159 mm
FiFo Monorail 40 mm 5S (Orgatex)	MONO-BP	86 mm	

* The distance between the line and the supermarket rail is the minimum distance between the two objects. Therefore, measure from the edge of the rail to the first edge of the glued line.



For more compatible supermarket tracks, refer to the list of compatible accessories in the AMR manual **RB02831888** (see Table 1 on Page 6).

8.5.1 Permissible dollies

NOTICE

Damage of the ACTIVE Shuttle due to modified, damaged or dirty dollies!

Protruding or sharp-edged parts at the dolly can damage the ACTIVE Shuttle.

- ▶ Do not modify the dollies.
- ▶ Ensure that the ground clearance height and ground clearance width of the dollies are not reduced (e.g. by protruding loads, lashing straps, etc.).
- ▶ Make sure that no damaged dollies are used.
- ▶ Make sure that the dollies are not dirty (oily).
- ▶ Clean the dollies before use.

Only the following dollies are permitted for use with the ACTIVE Shuttle:

Table 9: Permissible dollies of Hartwall

Type	Version	Type	Version
Lean Dolly Type I DOS-1325D.1		Lean Dolly Type VII A DOS-1406 C.4	
Lean Dolly Type II DOS-1472 B.2		Lean Dolly Type VII B DOS-1489 C.4	
Lean Dolly Type IV DOS-1340 D.2 Use only without additional brake.		HDLL 10009 Type 1 All configurations apart from "Wheel position 1 + brake" possible.	
Lean Dolly Type V DOS-1334 D.2		HDLL 10011 + version ESD 4 castor wheels All configurations apart from "Wheel position 1 + brake" possible.	



For more compatible dollies, refer to the list of compatible accessories in the AMR manual **RB02831888** (see Table 1 on Page 6).

9 Operation

9.1 Information on operation

9.1.1 ACTIVE Shuttle

WARNING

Hazards based on the nature of the load!

Hazardous load (e.g. hazardous substances, hot materials, etc.) can lead to serious injury or even death.

- ▶ The operator is solely responsible for any hazards arising from the nature of the load.
- ▶ The load must not pose any risk to persons (e.g. catching items of clothing, scalding, burning, etching, cutting, stabbing).

Danger of the ACTIVE Shuttle or load falling/crashing!

Sloping edges are not recognized by the ACTIVE Shuttle and can lead to a dangerous crash or fall of the load.

- ▶ Edges/steps (e.g. on platforms, stairs, shafts, loading ramps, doors, etc.) must be at sufficient distance from the driveway and must be secured by means of barriers visible for the protective field of the ACTIVE Shuttle.

CAUTION

Danger of injury due to safety checks not carried out!

Risk of serious injury from non-functioning safety and warning devices.

- ▶ **Carry out a test of the visual and acoustic warning devices every quarter.**
- ▶ Carry out a test of the safety equipment **in accordance with** the test cycles specified in chapter 10.3.
- ▶ Take vehicles with non-functional safety and warning devices out of service and contact the Bosch Rexroth Service.

Risk of burns from hot components inside the ACTIVE Shuttle!

-  During operation, individual components inside the housing may heat up.
- Wait a reasonable amount of time before opening the housing.

Risk of serious injury from collision with the ACTIVE Shuttle.

Personal injury when staying in the driving range, especially in curve areas!

- 
- If possible, do not stand within the driving range of the ACTIVE Shuttle.
 - Restrict pedestrian traffic within the ACTIVE Shuttle's driving range as much as possible.
 - Always wear safety shoes.

Insufficient stopping distance, e.g. by entering the protective area from the side!

Risk of serious injury from collision with the ACTIVE Shuttle.

- 
- Do not step into the protective area of the vehicle from the side.
 - Do not move against the direction of travel towards the ACTIVE Shuttle.
 - Always wear safety shoes.

! CAUTION

Risk of crushing at the rear wheels of the load!

When a loaded vehicle starts up/restarts, there is a danger of crushing at the rear wheels of the load.



- Do not put your feet between the wheels.
- Observe start-up warning.
- Always wear safety shoes.

Danger due to unadapted speed!

Risk of serious injury due to a speed not adapted to the situation.

- ▶ The speed of the ACTIVE Shuttle must be reduced in narrow corridors, curves, intersections and areas with pedestrian traffic.

Danger of the ACTIVE Shuttle tipping over if loaded incorrectly!

Risk of serious injury due to the ACTIVE Shuttle tipping over.

- ▶ Observe the permissible load and the maximum stacking height.
- ▶ Ensure that the load is evenly distributed (see chapter 16.7).
- ▶ Only use the ACTIVE Shuttle in accordance with its intended use.

Danger due to falling load in case of incorrect loading!

Risk of serious injury from falling load.

- ▶ Ensure that the load is evenly distributed.
- ▶ Only use the ACTIVE Shuttle in accordance with its intended use.

Danger from entrained load!

Risk of serious injury due to entrained, insufficiently secured load.

- ▶ Independent movements of the dolly in the supermarket, e.g. due to dirt, unevenness or gradients on the floor, must be prevented by the operator.
- ▶ Ensure that the load is completely and correctly positioned on the loading area.

Danger from unpredictable movements of the ACTIVE Shuttle due to inadequate floor surfaces!

Risk of serious injuries due to unpredictable movements of the ACTIVE Shuttle, e.g. slipping, especially during emergency braking.

- ▶ The driving range of the ACTIVE Shuttle must have sufficient traction.
- ▶ The driving range of the ACTIVE Shuttle must be level, dry, clean and free of objects lying around.

Danger from dirty driveways!

Risk of serious injury from unpredictable movements of the ACTIVE Shuttle due to dirty driveways.

- ▶ The driving range of the ACTIVE Shuttle must be clean.

Danger due to incorrect loading condition!

Risk of serious injury due to incorrect loading condition when changing to the "Automatic" operating mode.

- ▶ The change to the "Automatic" operating mode may only take place in an unloaded condition.

CAUTION

Danger due to limited safety functions in the "Manual" operating mode!

Risk of serious injury from incorrect operation.

- ▶ In the "Manual" operating mode, the ACTIVE Shuttle may only be operated by specially trained staff using the handheld controller.
- ▶ The responsibility for vehicle control in "Manual" operating mode lies entirely with the operator.

Risk of personal injury when intervening with automated processes!

Risk of serious injury due to unauthorized intervention in automated processes by operating personnel.

- ▶ Under no circumstances may operating personnel intervene with the automated processes such as loading and unloading positions and when moving in and out at the charging stations.

NOTICE

Danger of collision with obstacles outside the protective area!

The ACTIVE Shuttle can be damaged by obstacles outside the protective area.

- ▶ Keep the driving range free of obstacles, especially flat objects or objects protruding into the driving range.

Risk of overheating of the ACTIVE Shuttle!

If the ventilation slots of the ACTIVE Shuttle are covered or if the filter mats of the fans are not maintained, there is a risk of overheating and thus damage to the ACTIVE Shuttle.

- ▶ The ventilation slots of the ACTIVE Shuttle must always be free and uncovered to ensure sufficient cooling.
- ▶ The filter mats of the fans must be maintained regularly depending on the ambient/operating conditions (see chapter 10.6).

Risk of damage through unauthorized use!

Unauthorized opening of the ACTIVE Shuttle housing can damage the vehicle.

- ▶ Always keep the square key secured against unauthorized use.



Please note:

To prevent the battery from discharging, switch off the ACTIVE Shuttle completely during longer standstill by pressing the battery main switch (B2, see Fig. 1 on Page 25).

9.1.2 Lithium-ion batteries

 CAUTION
Possible hazard due to incorrect handling of lithium-ion batteries!

The ACTIVE Shuttle is powered by a replaceable lithium-ion battery. Lithium-ion batteries can be damaged by mechanical, thermal or electrical stress (e.g. shock, heat, cold, incorrect charging, short circuit). This may result in the following hazards:

- Leakage of toxic substances and toxic combustion products in case of fire.
- Leakage of corrosive liquid and thus possible skin irritations, burns and chemical burns.
- Increased fire hazard due to electrolyte leakage (flammable solvent).

- ▶ Never use dropped or damaged batteries.
- ▶ Do not use defective or damaged lithium-ion batteries.
- ▶ Do not use lithium-ion batteries with a defective connection cable or defective contacts.
- ▶ Charge the lithium-ion battery in the ACTIVE Shuttle only using the charging station supplied by Bosch Rexroth or the charger supplied by Bosch Rexroth.
- ▶ Only operate lithium-ion batteries and accessories when they are in a perfect technical condition.
- ▶ Protect the battery terminals from short circuiting.
- ▶ Protect the lithium-ion batteries from mechanical stress (shocks, falls, vibrations).
- ▶ Do not expose the lithium-ion batteries to high temperatures and/or large temperature variations.
- ▶ Store the lithium-ion batteries in a cool, dry and well ventilated place.
- ▶ Protect the lithium-ion batteries from direct sunlight.
- ▶ Do not immerse the lithium-ion batteries in liquids.
- ▶ Please observe the country-specific regulations regarding storage of the lithium-ion battery.
- ▶ Check the lithium-ion batteries regularly for damage.
- ▶ Lithium-ion batteries must not be opened, repaired or serviced.

NOTICE**Handling damaged lithium-ion batteries**

- Only touch and transport damaged lithium-ion batteries with personal protective equipment that is resistant to alkalis and solvents.
- If there are any signs of heat, smoke, odor, noise, or deformation of the batteries, disconnect the lithium-ion battery from the vehicle.
- Store the lithium-ion battery in a fire-resistant container or at a safe distance from combustible materials.
- Do not inhale any vapors that may be generated.

NOTICE

Disposal of lithium-ion batteries

- ▶ Dispose of lithium-ion batteries properly.
- ▶ Tape off the connection contacts for disposal.
- ▶ Store damaged lithium-ion batteries in fire-resistant containers.
- ▶ During transport, observe the relevant hazardous goods requirements for lithium-ion batteries.
- ▶ Observe the operating manual of the manufacturer:
VARTA AG
VARTA-Platz 1
73479 Ellwangen/Germany
info@varta-ag.com

Recommendations for best possible battery service life

- ▶ Store lithium-ion batteries with a charge level of about 50 %.
- ▶ After three months, check the charge level and recharge to approx. 50% if necessary.

9.1.3 Handheld controller

**CAUTION****Possible hazard through unauthorized use!**

Unauthorized activation of the "Manual" operating mode can cause damage to property and danger to life and limb.

- ▶ Always keep the handheld controller secured against unauthorized use.

Danger due to limited safety functions in the "Manual" operating mode!

Risk of serious injury from incorrect operation.

- ▶ In the "Manual" operating mode, the ACTIVE Shuttle may only be operated by specially trained staff using the handheld controller.
- ▶ The responsibility for vehicle control in "Manual" operating mode lies entirely with the operator.
- ▶ Also observe the operating manual of the manufacturer:

KEBA AG
Gewerbepark Urfahr
Reindlstraße 51
4041 Linz
Austria
www.keba.com

NOTICE**Loss of operational readiness due to non-use**

If the handheld controller is not used and charged regularly, this may lead to loss of the operational readiness (battery discharge).

- ▶ Use the handheld controller regularly to charge it.

9.1.4 Charging station

**WARNING****Risk of injury due to incorrect pre-fuse!**

Operation of the charging station with an incorrect pre-fuse can lead to serious injuries or even death and equipment damage.

- ▶ Only operate the charging station with a 16 A circuit breaker, triggering characteristic C.

Risk of injury by bridging the charging contacts of the charging station!

By bridging the charging contacts, there is a risk of damage, sparks, overheating and fire.

- ▶ Do not place any objects, especially electrically conductive or flammable objects, in the area in front of the charging contacts of the charging station.

Risk of injury due to incomplete assembly of the charging station!

The charging station may only be operated if all housing parts and cover sheets are fully assembled.

- ▶ Install the charging station according to Fig. 10 on Page 39.

 CAUTION**Risk of injury and possible damage due to incorrect use!**

When climbing or stepping onto the charging station, there is a risk of injury from falling and of damage to the housing of the charging station.

- ▶ Do not use the charging station as a stepladder or climbing aid.

9.1.5 Wear

Individual components are subject to unavoidable wear by their very nature. Constructive measures and the selection of materials help ensure functional safety over the full service life. However, wear is also dependent on the operating, maintenance and ambient conditions at the place of use (resistance, contamination).

9.1.6 Measures to reduce wear

The following measures will reduce wear:

- Avoid contamination caused by abrasive media, reduce contamination by cleaning on a regular basis.

9.1.7 Environmental factors

- Avoid any contact with highly reactive acidic or alkaline materials.
- Wear can increase significantly in the case of contamination with abrasive media in the environment in particular; these include sands and silicates from construction work, for example, as well as from processes (e.g. welding beads, pumice dust, glass shards, or loose and easily lost items). Maintenance intervals should be significantly reduced under these circumstances.
- Resistance to media and contamination does not mean that functional safety is guaranteed in every case.
 - Liquids that thicken as they evaporate and become highly viscous or adhesive (sticky) can lead to malfunctions.
 - In such instances, special care must be taken when planning the system, and the maintenance intervals must be correspondingly shortened.

10 Maintenance and repair



CAUTION

Risk of injury or damage to property due to improper maintenance and repair work!

- ▶ The ACTIVE Shuttle must be de-energized during maintenance and repair works. This is done by pressing the battery main switch (B2, see Fig. 1 on Page 25).
 - ▶ Only qualified personnel may perform maintenance work, particularly in case of safety-relevant work.
 - ▶ Bosch Rexroth recommends contacting the Bosch Rexroth service, see chapter 15 Service.
 - ▶ Servicing only by Bosch Rexroth.
- Return shipment only in original transport packaging with mounted lift aid.
 - Observe DIN EN ISO 13857 when you remove or replace protective equipment and/or bypass safety equipment.

10.1 Cleaning and care

NOTICE

Bearing failure

Applying grease-dissolving substances to the bearing points, e.g. during cleaning, leads to bearing failure. There is a risk of damage to property, and service life may be reduced.

- ▶ Keep degreasers or aggressive cleaning agents away from the bearings!
- ▶ Only clean the product with a dry or slightly damp cloth.

Loss of ESD safety

Dirty cam rollers impair the discharge value of the loading area and may therefore lead to loss of ESD safety.

- ▶ Remove dirt from the cam rollers regularly.

Damage to personal protection systems (laser scanner)

Incorrect cleaning may cause damage to the glass components of the personal protection systems.

- ▶ Cleaning according to chapter 10.2 Cleaning of personal protection systems, stereo cameras and touchscreen displays.

Damage to the stereo cameras for the 3D obstacle detection

Incorrect cleaning may cause damage to the glass lenses of the stereo cameras.

- ▶ Cleaning according to chapter 10.2 Cleaning of personal protection systems, stereo cameras and touchscreen displays.

Damage to the touchscreen display

Incorrect cleaning may cause damage to the touchscreen display.

- ▶ Cleaning according to chapter 10.2 Cleaning of personal protection systems, stereo cameras and touchscreen displays.

Damage to the lithium-ion batteries by liquids

Lithium-ion batteries may be damaged by liquids during cleaning.

- Only clean removed lithium-ion batteries with a dry cloth.

Risk of overheating of the ACTIVE Shuttle!

If the filter mats of the fans are not maintained, there is a risk of overheating and thus damage to the ACTIVE Shuttle.

- ▶ Maintain the filter mats at regular intervals (see chapter 10.6) and replace them if necessary (see chapter 10.7.1).
- ▶ The filter mats of the fans must be maintained regularly depending on the ambient/operating conditions (see chapter 10.6).

Reduced drive/braking power due to dirty drive rollers

Dirty drive rollers may impair the drive/braking power.

- ▶ Remove dirt from the drive rollers regularly.

10.2 Cleaning of personal protection systems, stereo cameras and touchscreen displays



Please note:

- Do not use any aggressive or abrasive cleaning agents.
- Recommendation: Use antistatic cleaning agents, e.g. antistatic plastic cleaners and antistatic lens cloths.

Cleaning procedure

1. Make sure that:
 - No dangerous conditions can occur during cleaning,
 - The ACTIVE Shuttle is shut down,
 - Unintentional restarting is not possible.
2. Dust off the components with a clean and soft brush.
3. Moisten a clean, soft cloth with antistatic plastic cleaner and wipe the components with it.
4. Carry out the regular safety checks (see chapter 10.3 Regular safety checks).

10.3 Regular safety checks



CAUTION

Danger of injury due to safety checks not carried out!

Risk of serious injury from non-functioning safety and warning devices.

- ▶ Carry out a test of the visual and acoustic warning devices **every quarter**.
- ▶ Carry out a test of the safety equipment **in accordance with** the test cycles specified in chapter 10.3.
- ▶ Take vehicles with non-functional safety and warning devices out of service and contact the Bosch Rexroth Service.

NOTICE

- ▶ Regularly check the personal protection systems (laser scanner) for contamination. The cleaning intervals depend on the degree of ambient contamination. Adapt these iteratively to your circumstances.
- ▶ The safety equipment of the ACTIVE Shuttle must be checked at regular intervals for its functionality.
- ▶ Carry out the following tests **at least according to** the specified test cycles.
- ▶ Depending on the actual operating conditions of the vehicle, it may be necessary to reduce the test cycle.
- ▶ In addition, it may be necessary to carry out a reduced daily inspection of the safety equipment.

10.3.1 Periodic inspection - minimum requirements
The tests must be carried out by competent persons or by specially authorized and commissioned persons and documented in a comprehensible manner.

Table 10: Periodic inspections - minimum requirements

Safety equipment	Inspection	Notes on the execution	Test cycle
Emergency stop devices	Checking the basic function of the safety equipment	Actuate the emergency stop command device - on the vehicle - on a connected handheld controller and check the correct response of the vehicle.	3 months
Minimum marking	Visual inspection	Ensure that the minimum marking is present and legible according to chapter 2.8.1.	3 months
Personal protection system (laser scanner) front and rear	Visual inspection	Check the safety equipment for visible damage and check the front laser scanner for correct fastening (check sealing wax for damage).	6 months
Personal protection system (laser scanner) front and rear	Checking the basic function of the safety equipment	See chapter 10.4.1. Checking the basic function of the personal protection systems (laser scanner)).	6 months
Personal protection system (laser scanner) front and rear	Checking the areas to be protected and the detection capability	This check is performed by the Bosch Rexroth service.	12 months

If an inspection reveals an error, the ACTIVE Shuttle must be shut down immediately.
In this case, have the vehicle and its safety equipment checked by the Bosch Rexroth Service.

10.4 Procedure for testing the personal protection systems (laser scanner)

The regular inspections serve to check the effectiveness of the protective equipment and to detect defects due to changes or external influences (e.g. damage or manipulation).



A special test object is required for the tests. This is defined in the respective valid standard for autonomous transport vehicles.

10.4.1 Checking the basic function of the personal protection systems (laser scanner)

Performance of the test

- ▶ Check the function of the personal protection system (laser scanner) by triggering the protective function once and observing the reaction of the safety outputs, e.g. based on the response of the ACTIVE Shuttle.
- ▶ Perform these tests in "Automatic" operating mode.
 - **Front laser scanner:**
Stop the ACTIVE Shuttle. Check zone 1 in Table 11 on Page 95 statically with the intended test object.
 - **Rear laser scanner:**
To do this, move the designated test object dynamically into the driving path of the ACTIVE Shuttle and observe whether the ACTIVE Shuttle stops. Check the zones in Table 15 to Table 17 on pages 97 to 98.
- ▶ If the zone is violated, the personal protection system must stop the movement.
- ▶ Remove the test object from the zones and check whether the ACTIVE Shuttle starts moving again.

10.4.2 Checking the areas to be protected

- ▶ This check is performed by the Bosch Rexroth service.

10.5 Checking the optical and acoustic safety equipment

- ▶ Press the ON/OFF button (P) until the acoustic signal sounds.
 - ➔ The acoustic signal must be clearly audible.
- ▶ Release the ON/OFF button (P) immediately when the signal sounds.

The acoustic signal sounds within a second after pressing the ON/OFF button and the signal lamps (F) briefly light up orange.

10.6 Maintenance

Bearings

The bearings have lifelong lubrication and are maintenance-free under normal conditions of use.

Gear

The gears are maintenance-free.

Filter mats

Depending on the degree of pollution of the ambient air, the filter mats must be maintained at regular intervals to ensure a constant air volume flow of the fan. Adjust the maintenance intervals step-by-step. Maintenance should be done at least every 12 months (for positioning of the filter mats, opening of the ACTIVE Shuttle and replacement of the filter mats, see chapter 10.7.1).

Checking the lower and upper loading area height

Check:

- Once after 3 months
- Yearly
- When replacing the rollers,
adjust the lower and upper loading area height as necessary according to chapter 8.3.3.

Cam rollers

Check the cam rollers at regular intervals.

- Measure the diameter of the cam rollers at two positions offset by 90°:
 - Front cam roller diameter >78.5 mm
 - Rear cam roller diameter >49.3 mm
 - Cam roller play approx. 0.2 mm
 - The cam rollers must be free of chips, holes and damage.

If these values are not met, replace the cam rollers (for replacing the rollers, see chapter 10.7.2).



Replacement of the entire cam rollers incl. slewing ring only by Bosch Rexroth. Contact the Bosch Rexroth service in case of a noticeable play in the slewing ring of the cam rollers (see chapter 15).

Drive rollers

Check the drive rollers at regular intervals.

- Measure the diameter of the drive rollers at two positions offset by 90°:
 - Drive rollers diameter >99 mm
 - Axial run-out of the drive rollers <0.3 mm
 - The drive rollers must not have brake or base plates.
 - The drive rollers must be free of chips, holes and damage.



Replacement of drive rollers only by Bosch Rexroth. If these values are not met, please contact the Bosch Rexroth service (see chapter 15).

Anti-slip mat

To ensure safe transport and the ESD properties of the ACTIVE Shuttle, visually check the anti-slip mat for damage and wear at regular intervals. Replace the anti-slip mat if necessary (for replacing the anti-slip mat, see chapter 10.7.3).

After fitting a new anti-slip mat, the upper and lower end position of the loading area must be checked and, if necessary, readjusted (see chapter 8.3.3).

Lithium-ion battery

Check the battery status at regular intervals (state of health).

The test is carried out in the AMS (see AMS manual RB02831885).

In a state of health of $\leq 60\%$, the battery is worn and should be replaced. It may be necessary to replace the battery earlier, e.g. if the transport performance/throughput of the ACTIVE Shuttle is no longer sufficient for your application.

For replacing the lithium-ion battery, see chapter 10.7.5.

10.7 Replacement of wear parts

10.7.1 Replacing filter mats of the fan

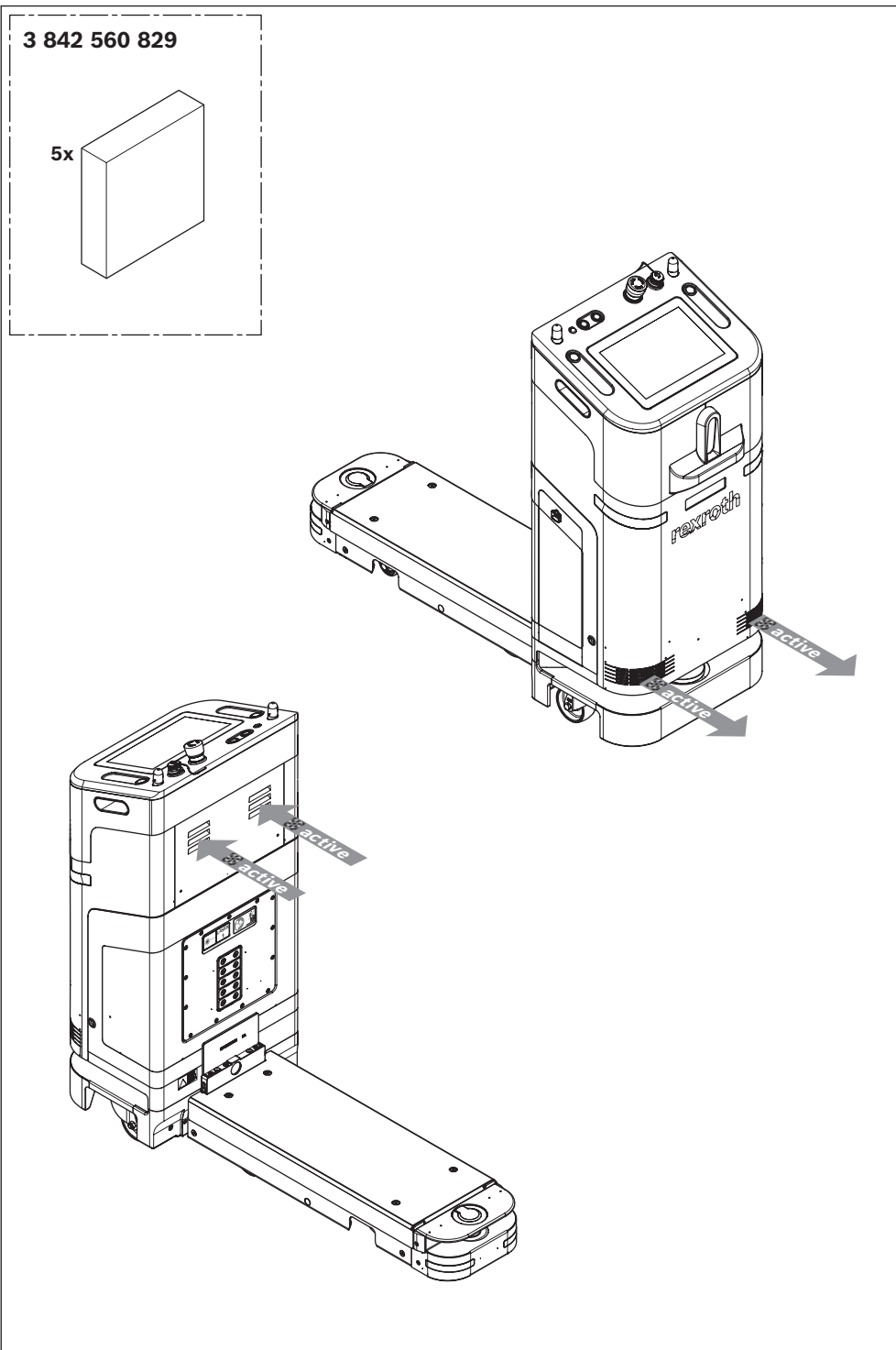


Please note:

- 4 identical filter mats are installed in the ACTIVE Shuttle.
- The replacement of the filter mats is identical for all 4 fan positions.

Required accessories:

- Filter mat set (5 pieces),
3 842 560 829



560 080-13

Fig. 23: Set of filter mats and fan positions

1. Unlock the cover of the ACTIVE Shuttle.
2. Open the cover of the ACTIVE Shuttle.
3. Remove the filter cover.
4. Replace the filter mat (A) if necessary.

► Assembly is done in the reverse order.

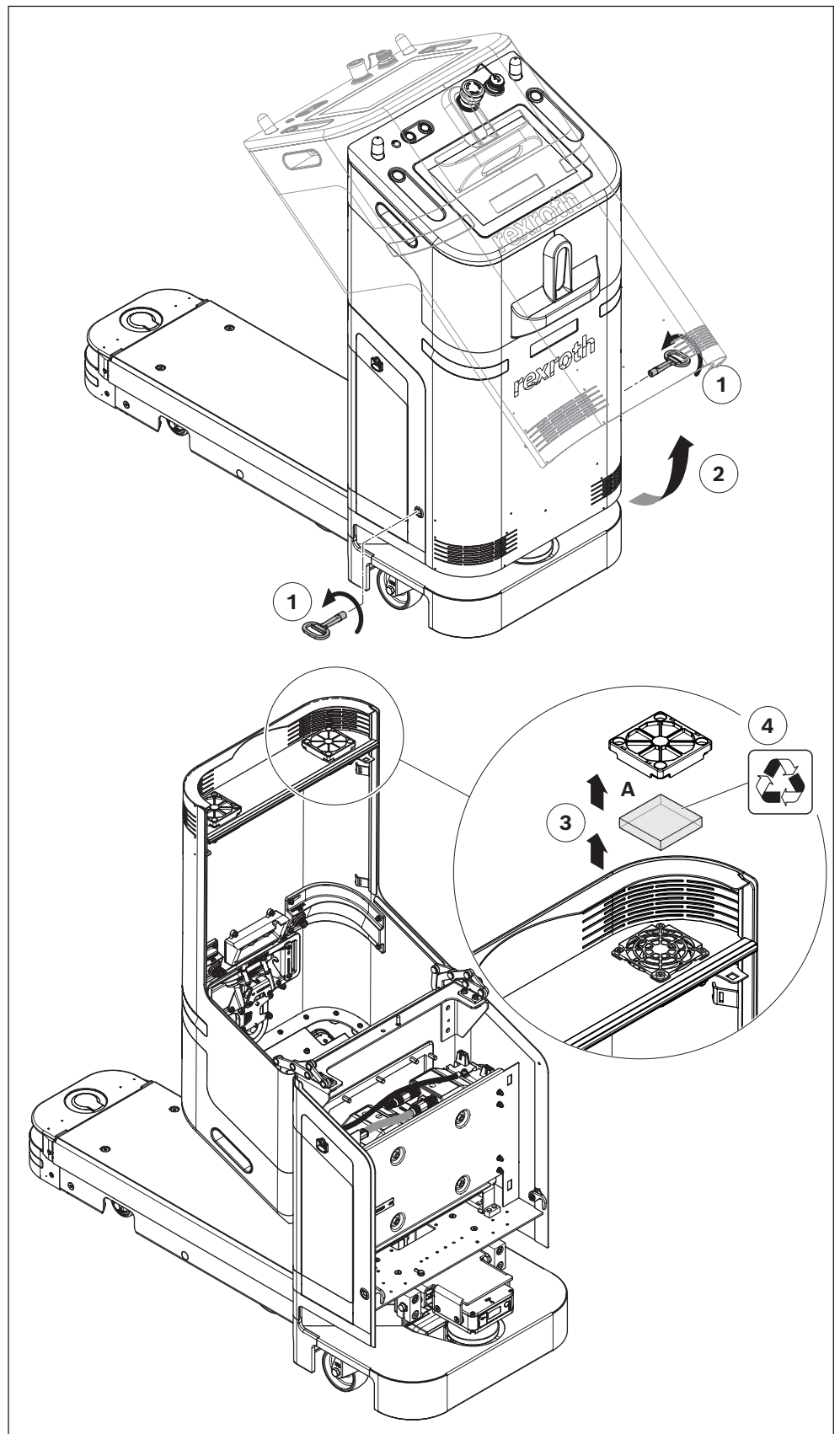


Fig. 24: Replacing the filter mats (example illustration)

10.7.2 Replacing the cam rollers

**Please note:**

- Observe the transport weight of the ACTIVE Shuttle (see chapter 16).
- Lift the ACTIVE Shuttle only using the lift aid included in the scope of delivery (see 6.1.1).
- Make sure that the ACTIVE Shuttle cannot tip over from the support.

Required accessories:

- Roller set front,
2x PO 80/8KA-ELS
(80 x 80 x 32 mm)
3 842 560 832
- Roller set rear,
2x GSPO 50/15K
(50 x 50 x 32 mm)
3 842 560 833

1. Install the lift aid (see chapter 6.1.1).
 2. Lift the ACTIVE Shuttle using the lift aid. The cam rollers must be free to the extent that removal is possible.
 3. Support the ACTIVE Shuttle over the entire width of positions X and lower the ACTIVE Shuttle.
 4. Turn the cam rollers outward.
 5. Remove the cam rollers.
- For installation of new cam rollers, proceed in reverse order.
- Check the loading area height after replacement (see chapter 8.3.3).

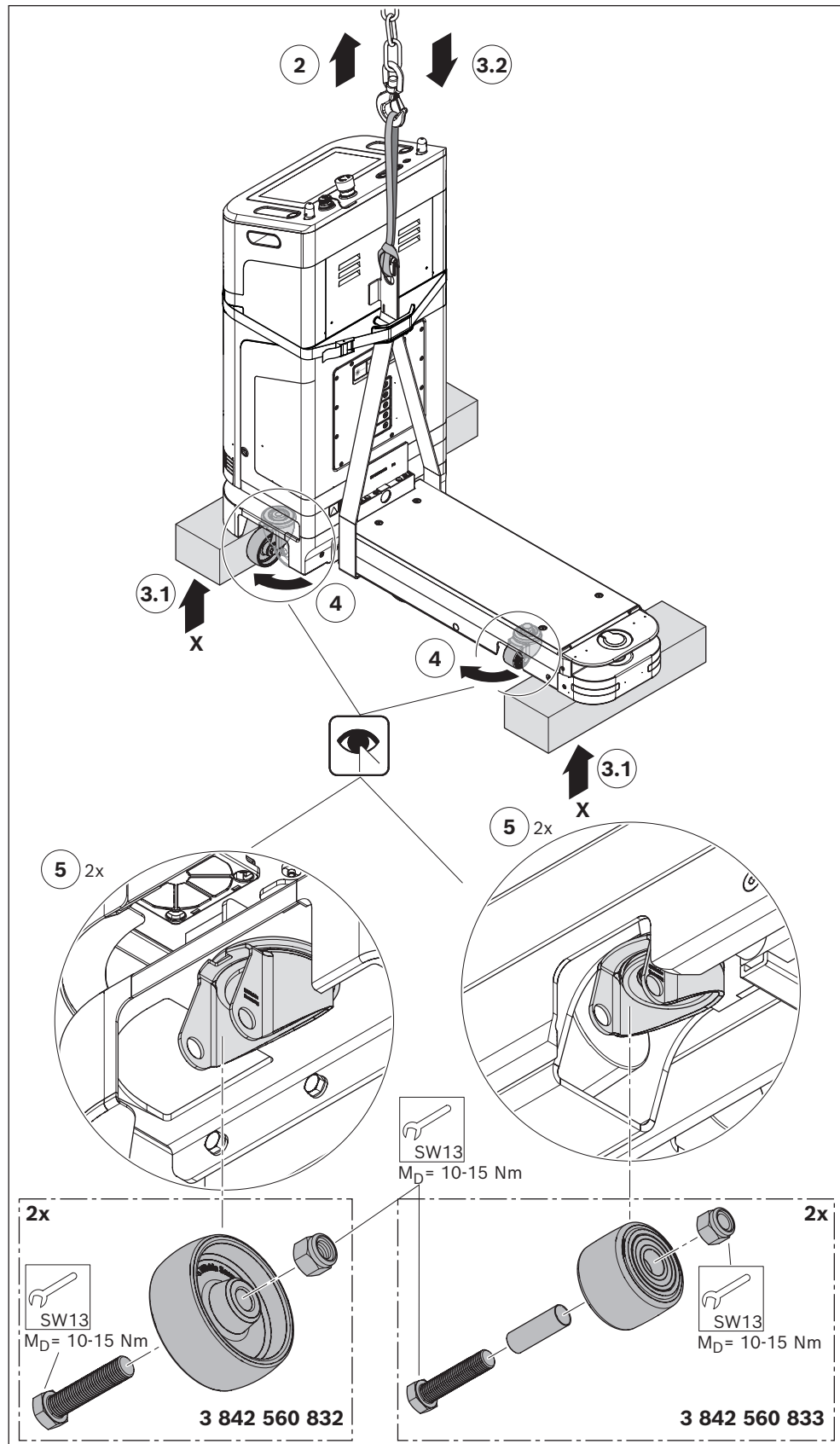


Fig. 25: Replacing the cam rollers

560 080-15

10.7.3 Replacing the anti-slip mat of the loading area

**Please note:**

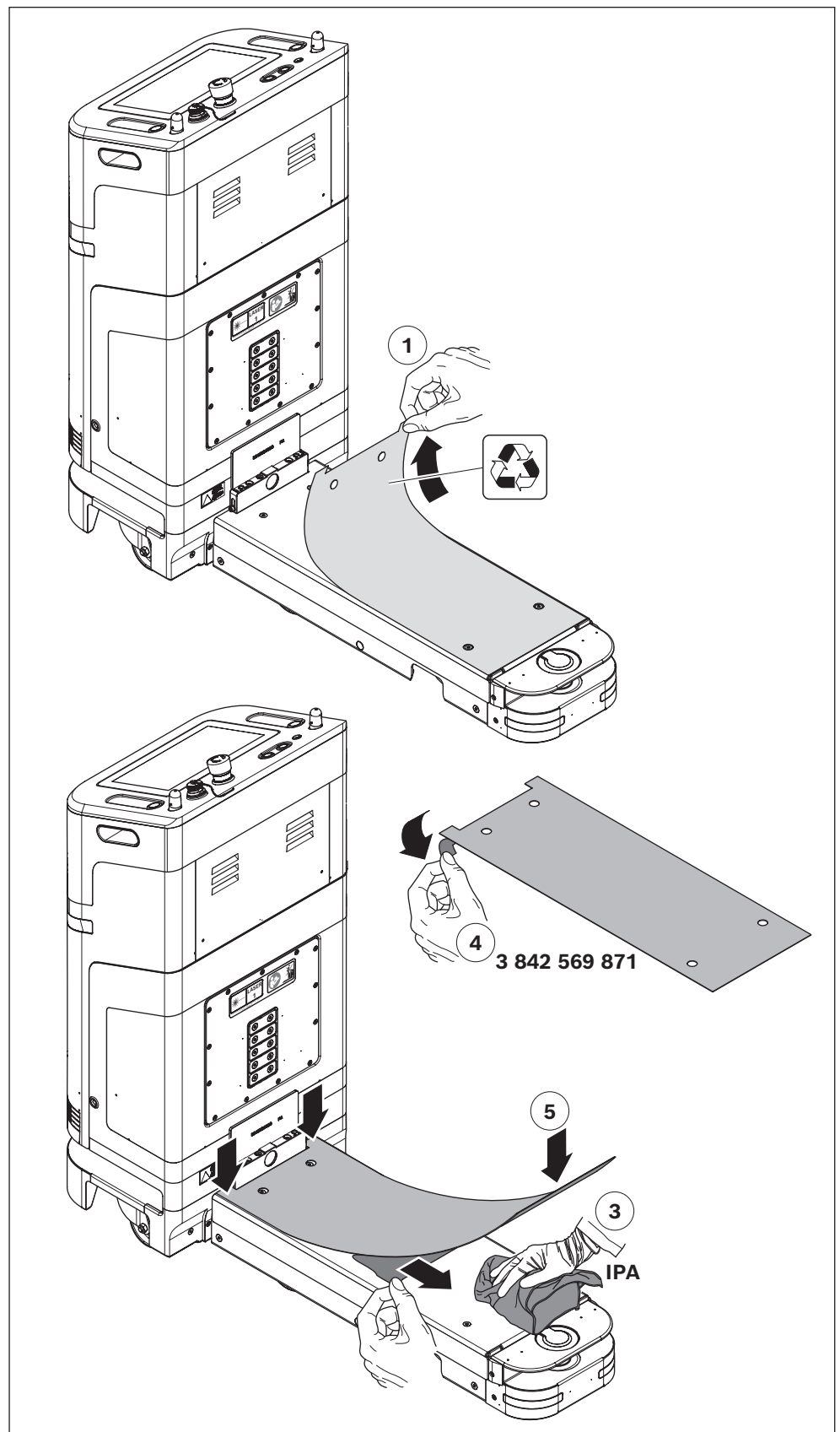
- The new anti-slip mat must be bonded bubble-free.
- After fitting a new anti-slip mat, the upper and lower end position of the loading area must be checked and, if necessary, readjusted (see chapter 8.3.3).

Required accessories:

Anti-slip mat

3 842 569 871

1. Remove the anti-slip mat from the loading area.
2. Carefully remove remaining adhesive residues without damaging the loading area.
3. Thoroughly clean the entire loading area with isopropanol.
4. Remove the protective film of the new anti-slip mat slightly from the adhesive side.
5. Bond the anti-slip mat starting from the control panel. Remove the protective film piece by piece.

**Fig. 26: Replacing the anti-slip mat of the loading area**

560 080-16

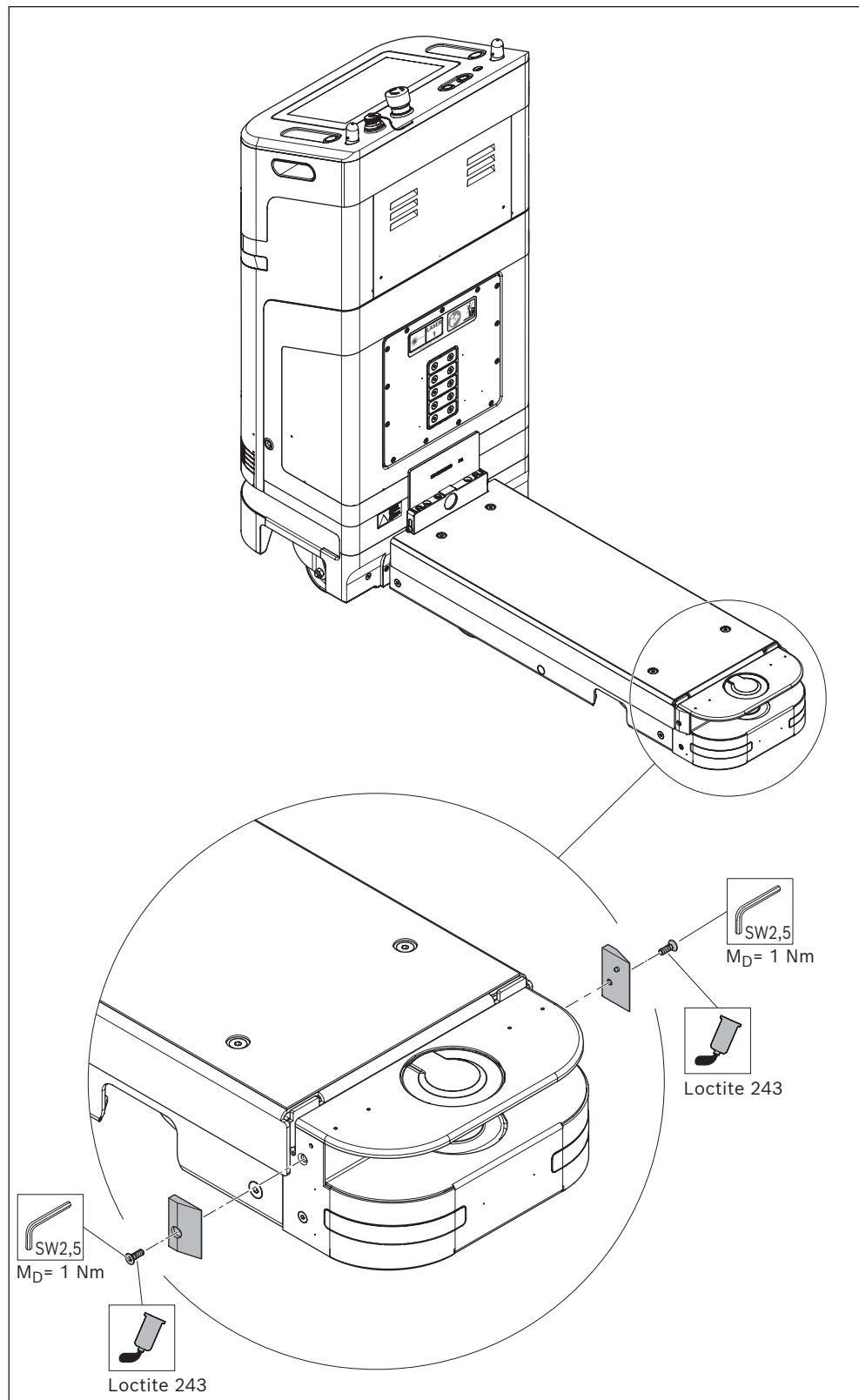
10.7.4 Replacing the deflector on the loading area

Required accessories:

Deflector kit

3 842 560 923

- Replace the worn deflectors.



560 080-31

Fig. 27: Replacing the deflector on the loading area

10.7.5 Replacing the lithium-ion battery

**Please note:**

- For safety instructions on handling and disposal of lithium-ion batteries, see chapter 2.6.2.
- When removing the battery, be careful not to shear any connecting cables between the battery and the housing.

Required accessories:

Lithium-ion battery,
3 842 560 570

Function**Battery main switch (B2)**

 Battery on

 Battery off

1. Open the cover of the battery compartment.
2. Switch off the battery using the battery main switch.
3. Disconnect the battery connecting plug.
4. Open the toggle latches.
5. Remove the battery.

- ▶ Inserting the battery is done in the reverse order.
- ▶ Stow the vehicle-side battery connector between battery and rear wall.
- ▶ After inserting the battery, check that the toggle latches are engaged and that the battery is firmly seated in the battery compartment.
- ▶ Adjust the tensile force of the toggle latches if it is loose.

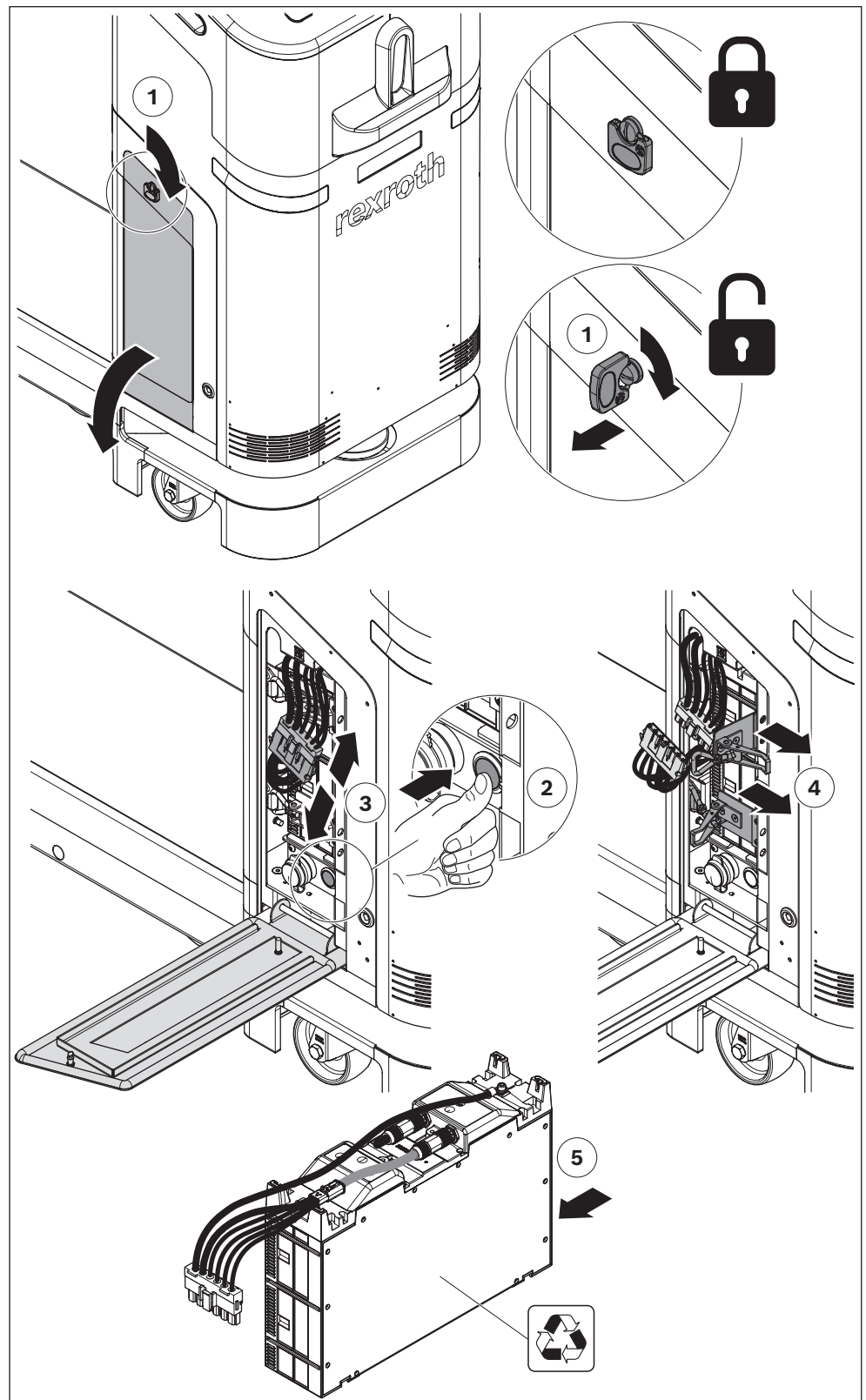


Fig. 28: Replacing the lithium-ion battery

560 080-17

11 Decommissioning

The ACTIVE Shuttle must be de-energized for decommissioning. This is done by pressing the battery main switch (B2, see Fig. 1 on Page 25).

11.1 Preparing the product for storage/later use

- Only set the product down on a flat surface.
- Protect the product from mechanical stress.
- Protect the product from environmental influences, such as dirt and moisture.
- Observe the ambient conditions, see page 90.

12 Disposal

NOTICE

Handling damaged lithium-ion batteries



- Only touch and transport damaged lithium-ion batteries with personal protective equipment that is resistant to alkalis and solvents.
- If there are any signs of heat, smoke, odor, noise, or deformation of the batteries, disconnect the lithium-ion battery from the vehicle.
- Store the lithium-ion battery in a fire-resistant container or at a safe distance from combustible materials.
- Do not inhale any vapors that may be generated.

Disposal of lithium-ion batteries

- ▶ Dispose of lithium-ion batteries properly.
- ▶ Tape off the connection contacts for disposal.
- ▶ Store damaged lithium-ion batteries in fire-resistant containers.
- ▶ During transport, observe the relevant hazardous goods requirements for lithium-ion batteries.
- ▶ Observe the operating manual of the manufacturer:
VARTA AG
VARTA-Platz 1
73479 Ellwangen/Germany
info@varta-ag.com

Instructions for disposing of batteries or accumulators according to the battery law



- ▶ Batteries or accumulators must not be disposed of in household waste at the end of their service life.
- ▶ You are legally obligated to return old batteries and accumulators.
- ▶ You can do this free of charge at Bosch Rexroth or another collection point in your vicinity.
- ▶ You can obtain addresses of suitable collection points from your city or municipal administration.
- ▶ To return to Bosch Rexroth, contact the service department.

**Please note:**

- The materials used are environmentally friendly.
- They can be recycled or reused (components may have to be processed and replaced). Recyclability is ensured by the selection of materials and the ability to take the components apart.
- Careless disposal may lead to environmental pollution.
- **Disposal of electrical components:**
 - Electrical components, tools, batteries, and packaging must be recycled in accordance with environmental protection regulations.
 - Never dispose of electrical components, tools, and accumulators/batteries in household waste or commercial waste!
- **Only in EU countries:**
 - According to the currently valid EU Directive on Waste Electrical and Electronic Equipment (WEEE) and its implementation into national law, electrical components and devices that are no longer used must be collected, separated, and recycled in accordance with environmental protection regulations.
 - According to the currently valid WEEE EU Directive, exhausted or defective accumulators/batteries must be recycled.
 - According to the Directive, the product may **not** contain any foreign substances or foreign components when it is recycled.
- Dispose of the product in accordance with the regulations in your country.

13 Upgrading and modification

- Do not modify the product.
- The Bosch Rexroth warranty only applies to the configuration as delivered, and to approved upgrades. The manufacturer will not accept any warranty claims for systems with unapproved modifications or upgrades.

14 Troubleshooting

- If you cannot correct a fault, please contact one of the addresses you can find at www.boschrexroth.com.

15 Service

Our global service network is available in over 40 countries at any time.
For detailed information on our service locations in Germany and worldwide, go to:
<http://www.boschrexroth.com/service>

Provide the following information for quick and efficient support:

- Date and time of the malfunction
- Detailed description of the malfunction and circumstances
- Information on the name plate of the relevant products, in particular material and serial numbers
- Telephone and email address under which we can contact you if we have any questions.

Bosch Rexroth offers product and service training in in-person and digital formats for different target groups.

- For end customers at:
<https://academy.boschrexroth.com/>
- For DC-internal and partner training see:
MyRexroth ➔ Academy ➔ Sales Campus

Additional information on service, repair and training as well as the current addresses of our sales offices can be found at:

<http://www.boschrexroth.com>

Outside of Germany, please contact our nearest contact person.

Service Germany

Tel.: +49 711 40049810

Email: **Support.robotics@boschrexroth.de**

15.1 Shipping packaging

Only use the original packaging material and the original lift aid when returning the ACTIVE Shuttle.

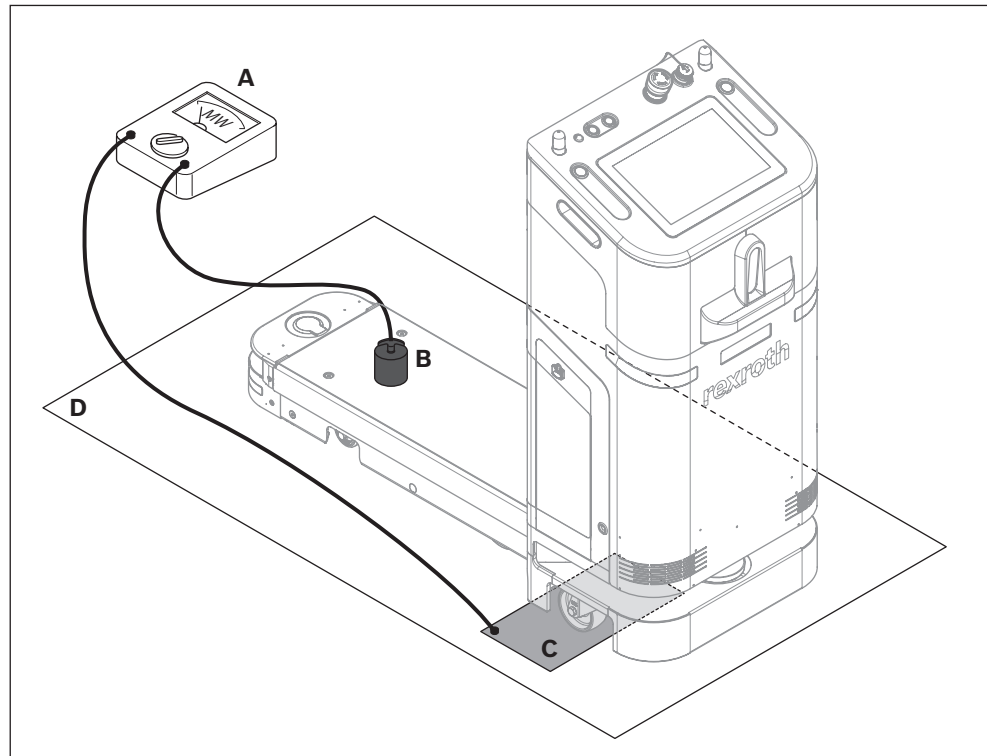
If this is no longer available, you can obtain compatible packaging material from Bosch Rexroth. This can be found in the list of compatible accessories in the AMR manual **RB02831888** (see Table 1 on Page 6).

16 Technical data

16.1 ACTIVE Shuttle

- Dimensions (LxWxH): 1,013 x 405 x 913 mm
- Empty weight: 88 kg
- Max. additional load incl. dolly: 260 kg
- Max. stacking height: 1,200 mm
- Max. load dimensions (LxWxH): 600 x 400 x 1,200 mm
- Protection class: IP54
- Drive: electrical servo drive
- Min. driveway width: 900 mm
- Speed at
Driveway width >900 mm: approx. 1 m/s
- Max. Speed: 1 m/s
Please note: The maximum speed depends on the prevailing ambient conditions. If you have any questions, please contact your Bosch Rexroth contact person.
- Noise emission: < 70 dB(A)
- Localization and navigation: via laser scanner
- Safety laser scanner front and rear: type 3, PL d, SIL2
 - Laser class: 1 according to DIN EN 60825-1:2015
 - Wavelength: 905 nm
- Stereo cameras for 3D obstacle detection:
 - Laser class: 1 according to EN IEC 60825-1:2014 (edition 3) international and IEC 60824-1:2007 (edition 2) USA
 - Complies with the US FDA performance standards according to 21 CFR 1040.10 for laser products except for deviations outlined in the document "Laser Notice No. 50" from June 24, 2007.
- Communication interface: WiFi IEEE 802.11
Please note: For network requirements, please refer to the AMS manual **RB02831885** or contact your Bosch Rexroth contact person.
- ESD-safe: yes
 - Derivative value of the loading area: $1 \times 10^4 \Omega \leq R_v \leq 1 \times 10^9 \Omega$
(see Fig. 29 Schematic diagram of the derivative value measurement)

- A:** Measuring instrument
B: Electrode
C: Conductive base plate
D: Insulating base



560 080-18

Fig. 29: Schematic diagram of the derivative value measurement

16.2 Lithium-ion battery

- Battery voltage: 51 V DC
- Battery capacity: 1502 Wh / 29 Ah

16.3 Charging station

Wall box

For technical data, please refer to the operating manual for the wall box used (see Table 1 on Page 6).

Docking station incl. assembly frame

- Total weight: 23 kg
- Docking station weight: 11 kg
- Assembly frame weight: 12 kg

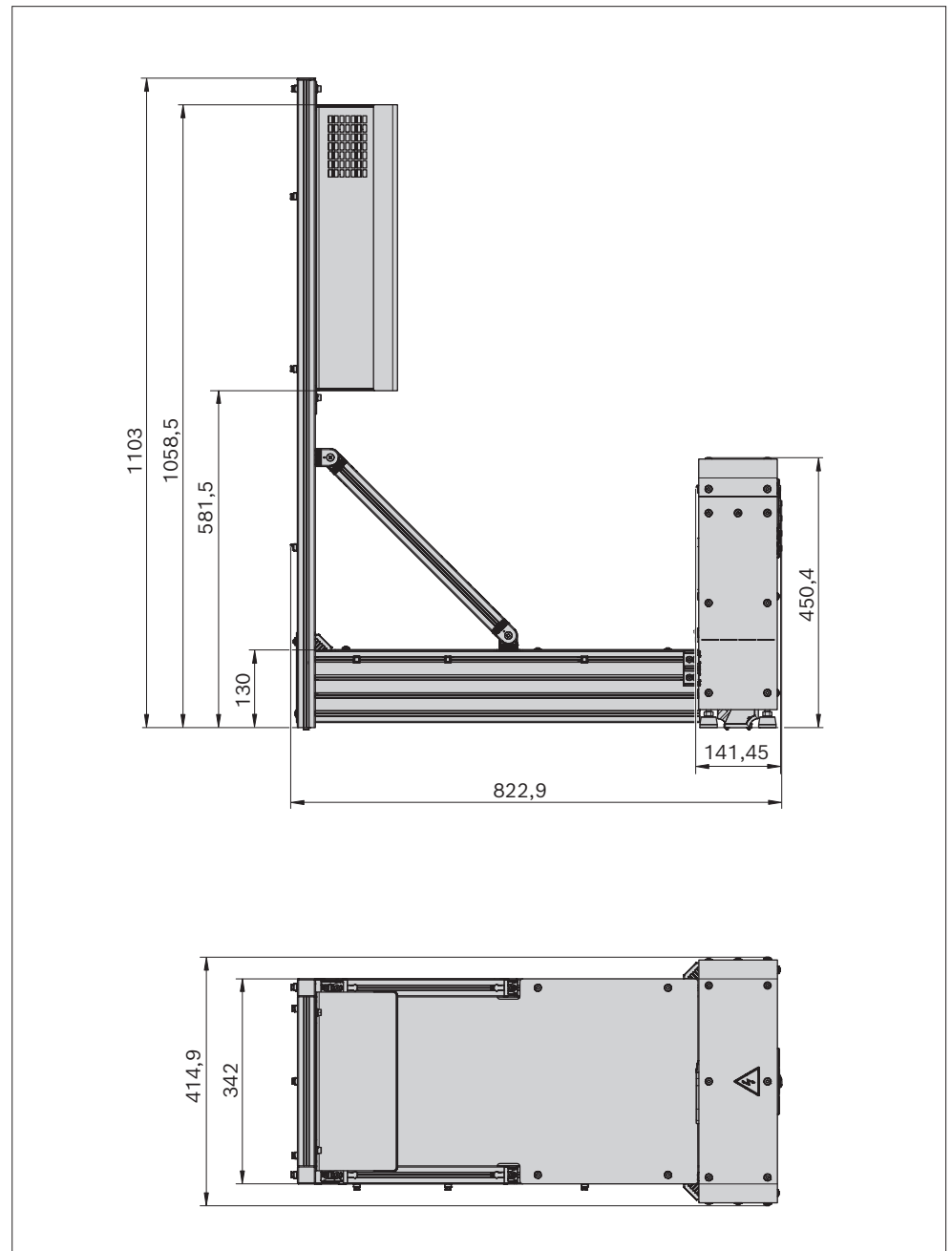


Fig. 30: Charging station dimensions

560 080-32

16.4 Ambient conditions

- No installation and operation in potentially explosive atmospheres/Ex zones.
- The ACTIVE Shuttle is designed for mobile use in indoor areas.
- Operating temperature
 - in continuous operation +5 °C to +25 °C
 - in short-term operation +5 °C to +40 °C
(up to a maximum of 1 hour)
- Storage temperature –20 °C to +45 °C
- Optimum charging temperature +20 °C to +25 °C
- Relative humidity 5 % to 85 %, non-condensing
- Degree of contamination 3 according to IEC 61010:
- Air pressure > 84 kPa, corresponds to an installation altitude
 < 1,400 m above sea level
- At installation altitudes > 1,400 m, the load values of the electric drives are reduced by 15%.
- Field strength 18 V/m at 27 to 1,000 MHz
- The area should be kept free of mold, fungus, rodents and other vermin.
- Do not install or operate in the immediate vicinity of industrial equipment producing chemical emissions.
- Do not install or operate near sources of sand or dust.
- Do not install or operate in areas that are regularly subjected to high-energy forces caused, for example, by presses or heavy machinery.
- Contact with highly reactive acidic or alkaline substances must be avoided.

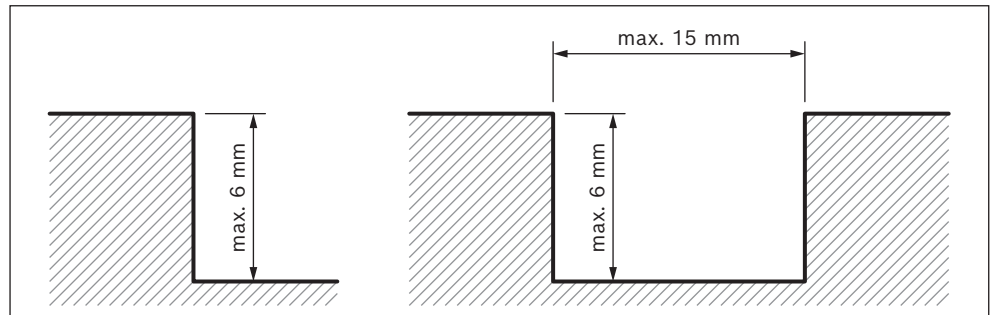
16.5 IT infrastructure

For IT infrastructure requirements, refer to the AMS manual **RB02831885** or the AMR manual **RB2831888**.

If you have any questions, please contact your Bosch Rexroth contact person.

16.6 Floor requirements

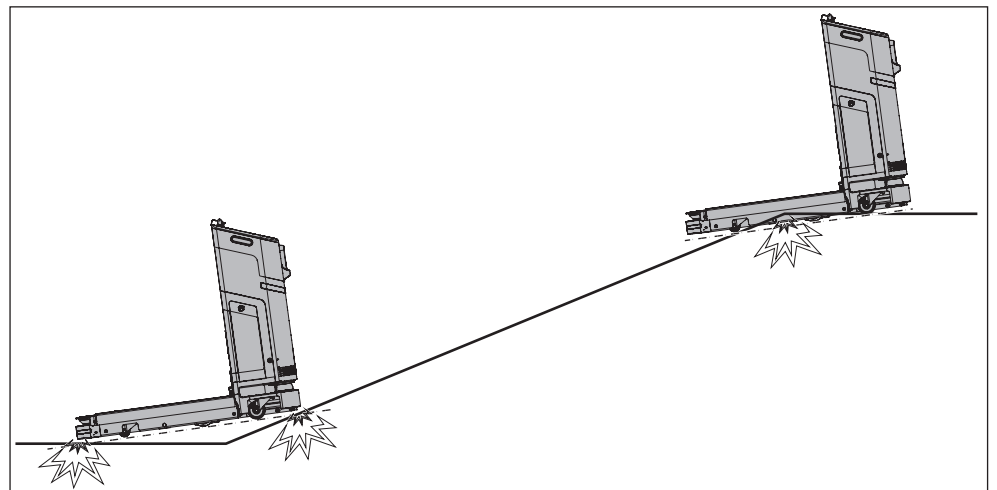
- Slope/gradient: max. 2.5%
 - Slope/gradient only permitted for forward travel
- Lateral inclination: not permitted
- Flatness: according to DIN 18202, table 3 line 3
- Strength: static 6 ... 8 N/mm²; dynamic 12 ... 16 N/mm
- Surface finish: $0.8 \geq \mu \geq 0.6$ (wheel material: Vulkollan)
- Electrical conductivity: $R_g < 1 \times 10^9 \Omega$ (ESD applications)
- Thresholds (max. height 6 mm) and joints (max height 6 mm, max. width 15 mm)
 - Thresholds/joints only permitted at right angles to the direction of travel
 - Thresholds/joints only admissible in driving range
 - Thresholds/joints not on slopes/gradients
 - Thresholds/joints not in sources, dips or in the area of charging stations
 - Do not start at thresholds or over joints
 - Repeating joints (e.g. gutters, drains) not admissible



560 080-22

Fig. 31: Admissible thresholds and joints

- Transitions from flat areas to slopes and gradients
 - The ACTIVE Shuttle must not run aground at transitions from flat areas to slopes and gradients.



560 080-33

Fig. 32: Transitions from flat areas to slopes and gradients

16.7 Load distribution on the loading area



CAUTION

Danger due to incorrect load dimensions, load positioning and/or incorrect load distribution!

Risk of serious injury due to a load protruding beyond the vehicle and/or incorrect load distribution.

- ▶ The load dimensions must not exceed 1,200 x 600 x 400 mm (H x L x W) (see Fig. 33).
- ▶ The load must **not** protrude beyond the lateral contour of the vehicle (maximum vehicle width).
- ▶ The load must **not** protrude beyond the rear edge of the loading area.

Danger due to inaccessible controls!

Risk of serious injury from load building up over the control panel.

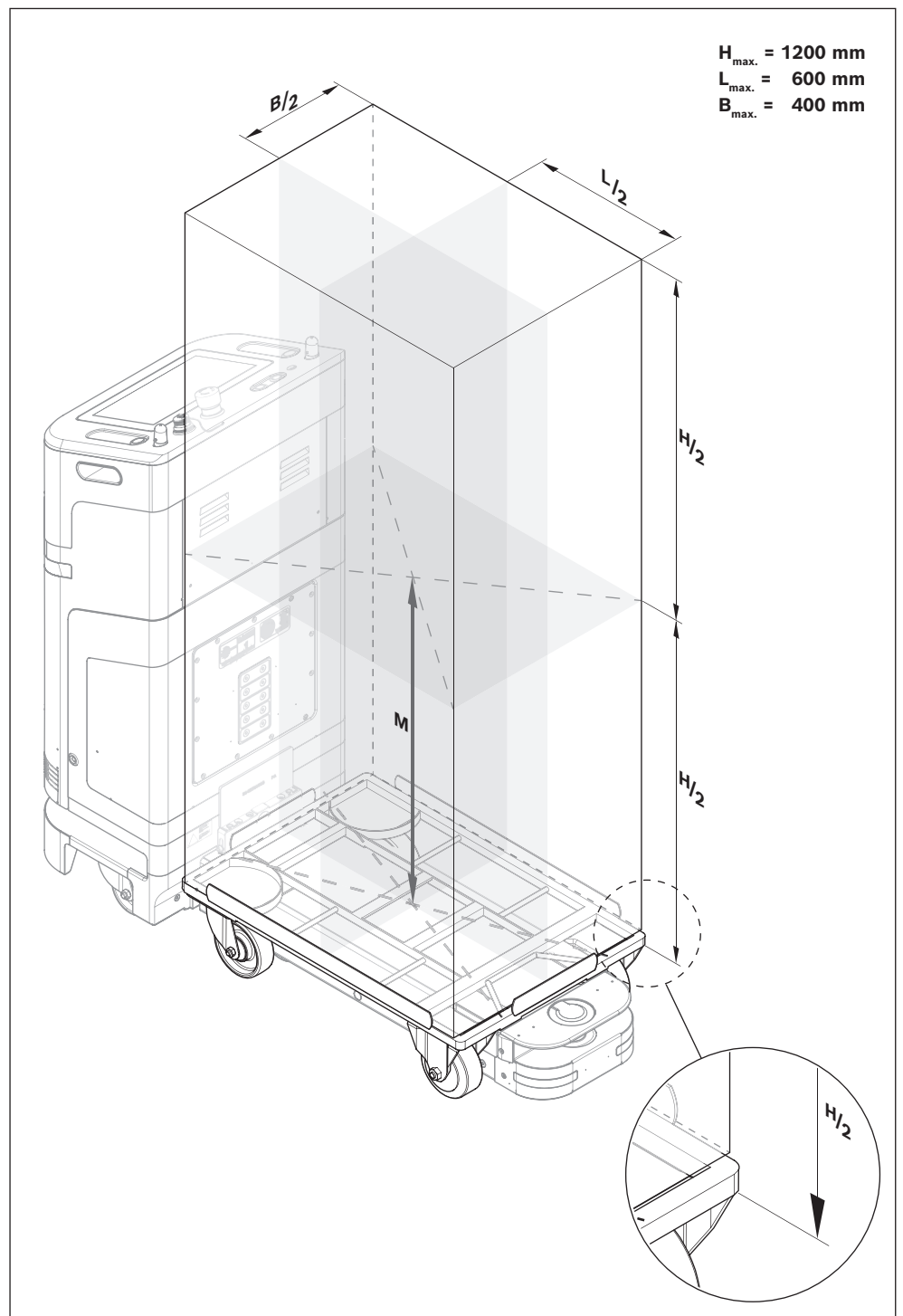
- ▶ The load must **not** build up over the control panel.
- ▶ All operating elements, in particular the emergency stop device, must be freely accessible at all times.

Danger due to incorrectly secured load!

Risk of serious injury due to the load's center of gravity changing during travel.

- ▶ The load's center of gravity must **not** move during travel.
- ▶ Transported goods must be secured against slipping inside the KLTs.

- The mass point of the load to be transported must be as low as possible on line M below the intersection of levels H/2, L/2 and B/2 in the middle of/above the loading area of the ACTIVE Shuttle (see Fig. 33).
- The dimensions H/2, L/2 and B/2 arise from the actual dimensions of the load incl. dolly.
- The distance between the mass point and the loading area must always be $\leq H/2$.



560 080-19

Fig. 33: Position of the mass point of the load

16.8 Scanning levels of the personal protection systems (laser scanner)



CAUTION

Danger due to external light sources and reflections!

Risk of serious injury due to malfunctions caused by external light sources and reflections around the vehicle.

- ▶ Avoid interfering external light sources within $\pm 5^\circ$ of the laser scanner plane.
- ▶ Avoid stroboscopes, infrared sources, fluorescent sources that may influence the laser scanner.
- ▶ Avoid reflective surfaces on the laser scanner plane. This does not apply to the reflectors for localization approved by Bosch Rexroth.

Scan levels, each measured above the floor:

- Front: scan level 130 mm
- Rear: scan level 87 mm

16.9 Protective fields

16.9.1 Front protective fields

Table 11: When driving forward

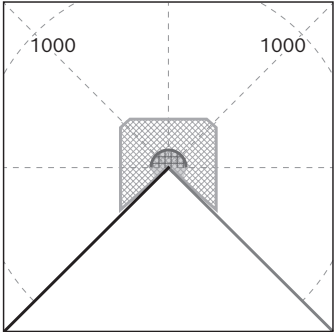
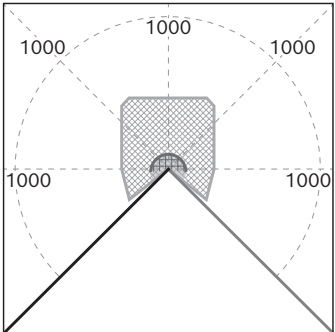
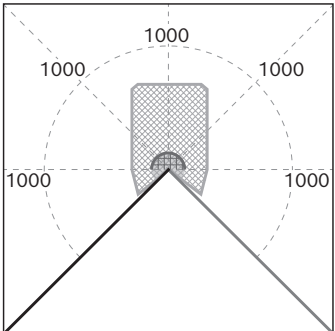
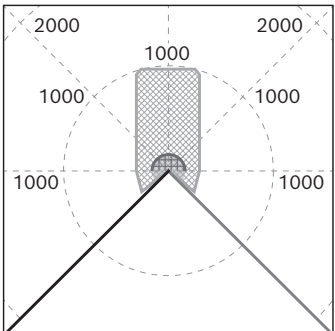
Zone	Vreg [mm/s]	Vmax [mm/s]	Protective field Width [mm]	Protective field Length [mm]	Protective field
1	0	50	500	270	
2	300	350	535	460	
3	650	700	535	690	
4	1,000	1,050	535	970	

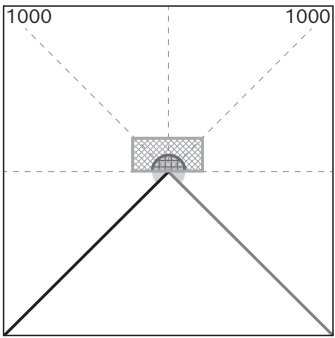
Table 12: In curves

Zone	Vreg [mm/s]	Vmax [mm/s]	Protective field		Protective field
			Width [mm]	Length [mm]	
5	0	50	500	170	
6	300	350	920	460	
7	650	700	1,080	690	

Table 13: In the danger area

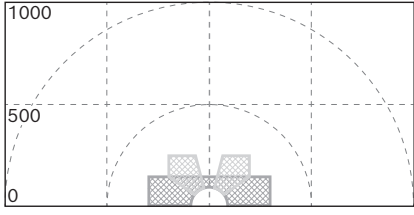
Zone	Vreg [mm/s]	Vmax [mm/s]	Protective field		Protective field
			Width [mm]	Length [mm]	
8	100	110	400	200	

Table 14: When reversing

Zone	Vreg [mm/s]	Vmax [mm/s]	Protective field		Protective field
			Width [mm]	Length [mm]	
9	0	10	300	140	

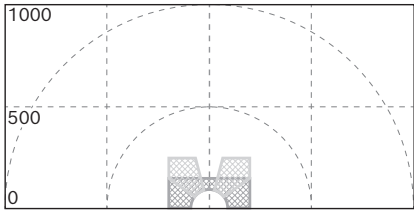
16.9.2 Rear protective fields

Table 15: When reversing

Zone	Vreg [mm/s]	Vmin [mm/s]	Protective field		Warning field	Protective field
			Width [mm]	Length [mm]		
1	-100	-110	600	150	250	

 Warning field
  Protective field

Table 16: In the danger area

Zone	Vreg [mm/s]	Vmin [mm/s]	Protective field		Warning field	Protective field
			Width [mm]	Length [mm]		
2	-100	-110	400	150	250	

 Warning field
  Protective field

Table 17: Muted/slow

Zone	Vreg [mm/s]	Vmin [mm/s]	Protective field		Warning field	Protective field
			Width [mm]	Length [mm]	Width [mm]	
3 Muted	-100	-110	130	150	400	
3 Slow	-50	-55				

 Warning field  Protective field

Table 18: Forward

Zone	Vreg [mm/s]	Vmin [mm/s]	Protective field		Warning field	Protective field
			Width [mm]	Length [mm]	Width [mm]	
4	0	-10	200	125	400	

 Warning field  Protective field

16.10 Stereo camera fields for 3D obstacle detection ¹⁾

Further information about obstacle detection can be found in the AMR manual **RB02831888** (see Table 1 on Page 6).

1) No recordings or personal data are saved by the stereo cameras for 3D obstacle detection.

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