rexroth
A Bosch Company

ACTIVE Shuttle

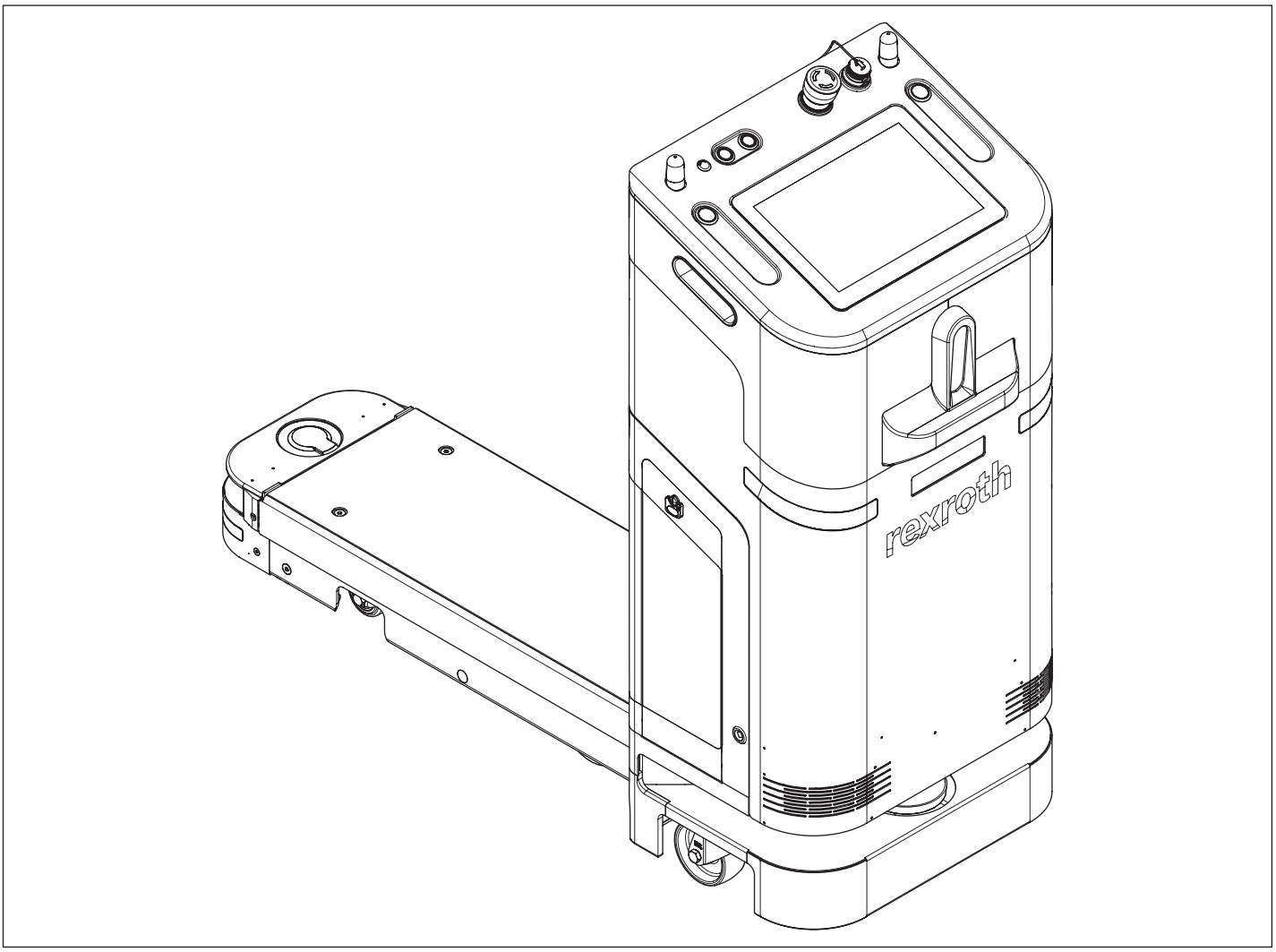
Transport vehicle

ENGLISH

3 842 560 099
3 842 560 570
3 842 560 107
3 842 560 108
3 842 560 206
3 842 560 151

Operating manual
3 842 560 081/2023-07

Replaces: –
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 exempt the user from the obligation of own judgment and verification. Our products are subject to natural wear and aging.

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.

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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
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Contents

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
- **3 842 560 107**, charging station ACTIVE Shuttle 2.1
- **3 842 560 108**, assembly frame for charging station ACTIVE Shuttle 2.1

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 section 2 "Safety instructions" and section 3 "General notes on property and product damage".

1.2 Required and supplementary documentation

- ▶ Only commission the product if he 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 [2)]	Manufacturer documentation	
🕮	Handheld controller [3)]	Manufacturer documentation	Manual
🕮	Battery safety instructions [4)]	Manufacturer documentation	
🕮	Assembly instructions adapter cable wall box – battery [1)]	3 842 560 088	Assembly instructions
	Manual AMR	RB02831888	Manual
	Manual AMS	RB02831885	Manual
	Manual VDA 5050	RB02831992	Manual

1) If not included in the scope of delivery, download from the website: **www.boschrexroth.com**
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3) If not included in the scope of delivery, download from the manufacturer's website: **www.keba.com**
4) If not included in the scope of delivery, download from the manufacturer's website: **info@varta-ag.com**

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 Warnings and safety instructions

This document contains safety instructions in chapter 2.6 "Product-specific safety instructions" and chapter 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.

Warnings are structured 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 subsequent.

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 them 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)
  - speeds

  in areas used jointly with passenger traffic.
  For the transport of KLTs stacked on approved dollies (see chapter 8.5.1 Permissible dollies) with a
- total weight incl. dolly of up to 260 kg and a
  - max. stacking height of 1,200 mm.
- For permissible load dimensions, load positioning and load distribution, see page 89.
- Technical data see page 85.
- For ambient conditions, see page 87.

Handheld controller

The handheld controller is used in the "Manual" operating mode exclusively for controlling 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.
- 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 a person.
"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.

Bosch Rexroth offers training support for specialized fields. You can find an overview of the training content online at:
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 mechanical loads under any circumstances. Never use the product as a handhold or step. Do not place any objects on the product.
- Always secure the product against tipping over.

During transport
- 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.
- Ensure that the system component cannot be switched back on.

During commissioning
- 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 commission 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.
- Check the product for malfunctions.

During operation
- 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 use at the intervals specified in chapter 10.3 "Maintenance".
- 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.

During disposal
- 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).

⚠ 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 audible warning devices **every quarter**.
- ▶ Carry out a test of the safety equipment **in accordance with** the test cycles specified in chapter 10.2.
- ▶ 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 time before opening the housing.
Personal injury when staying in the driving range, especially in curve areas!

Risk of serious injury from collision with the ACTIVE Shuttle.

• If possible, do not stay within the driving range of the ACTIVE Shuttle.
• Restrict passenger 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 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 passenger 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 unpredictable movements of the ACTIVE Shuttle due to insufficient ground conditions!
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 free from contamination.

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.

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 into automated processes!
Risk of serious injury due to unauthorized intervention in automated processes by operating personnel.
- ▶ Under no circumstances may operating personnel intervene in 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.

⚠ CAUTION

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 10.5).

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.
- ▶ To charge the lithium-ion battery in the ACTIVE Shuttle, use only the charging station supplied by Bosch Rexroth or the charger supplied by Bosch Rexroth.
- ▶ Only operate lithium-ion batteries and accessories in perfect 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:
  AXIMA, spol. s r.o.
  Vídeňská 204/125
  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.

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

2.7 Personal protective equipment

- Appropriate protective clothing 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 passenger 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 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). Between automatically and manually used supermarket tracks must be a distance of at least 50 mm.
- 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 ground conditions of the driveways, see chapter 16.6 Floor requirements.

- After cleaning the hall floor, the surface finish of the driveways must not be altered (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 abuse.
- Stairs, doors, loading ramps, etc. must be at a sufficient distance from the driveway and must be protected against traffic by 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 use 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.
- When operating on your own server, protect the server from unauthorized access, keep the operating system up to date.
- Upon new commissioning of additional ACTIVE Shuttles, they are not yet entered in the AMS / external fleet management system and therefore not known to the already autonomous ACTIVE Shuttles (e.g. if the additional ACTIVE Shuttles have been pushed manually into a charging station). The operator must take appropriate measures to prevent dangerous states and damage to the ACTIVE Shuttle.

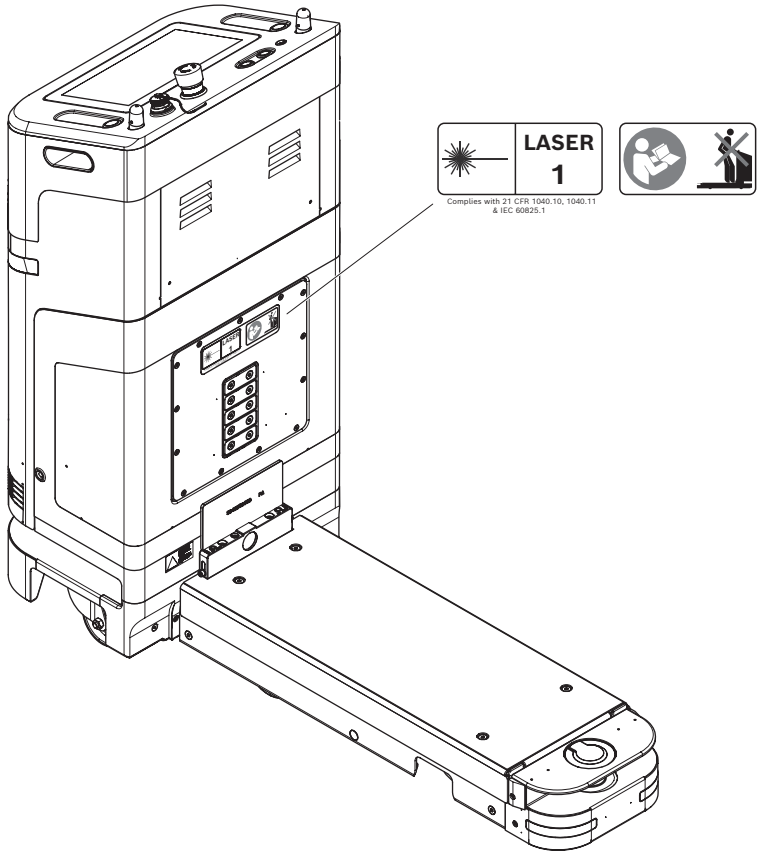
After setting up ACTIVE Shuttle, the operator is obliged to check all driveways again for possible hazards!

- 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 his 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 or in 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 can be ruled out by the user.

3 General notes on property and product damage

The warranty only applies to the delivered configuration.
- The warranty is void in the event of incorrect assembly, commissioning and operation, as well as improper use and/or improper handling.

During cleaning
- 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 customer order:
- **3 842 560 099**, ACTIVE Shuttle 2.1 transport vehicle for intended use with AMS incl. lithium-ion battery, square key, mounted lift aid, operating manual "ACTIVE Shuttle Transport Vehicle"
- **3 842 560 151**, ACTIVE Shuttle AMR transport vehicle for intended use with external fleet manager incl. lithium-ion battery, square key, mounted lift aid, operating manual "ACTIVE Shuttle transport vehicle"
- **3 842 560 570**, lithium-ion battery incl. operating manual "ACTIVE Shuttle Transport vehicle"
- **3 842 560 206**, handheld controller
- **3 842 560 107**, charging station ACTIVE Shuttle 2.1 incl. operating manual "ACTIVE Shuttle Transport vehicle"
- **3 842 560 108**, assembly frame for charging station ACTIVE Shuttle 2.1

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 ready for connection incl. connecting 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 operator-defined
  - driving ranges
  - loading and unloading points and
  - speeds

  in areas used jointly with passenger traffic.
  Transport of KLTs stacked on dollies with a
- total weight incl. dolly of up to 260 kg and a
  - 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 navigation
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 Velcro strap, mounted to ACTIVE Shuttle in condition on delivery
N1: Square lock
N2: Square key

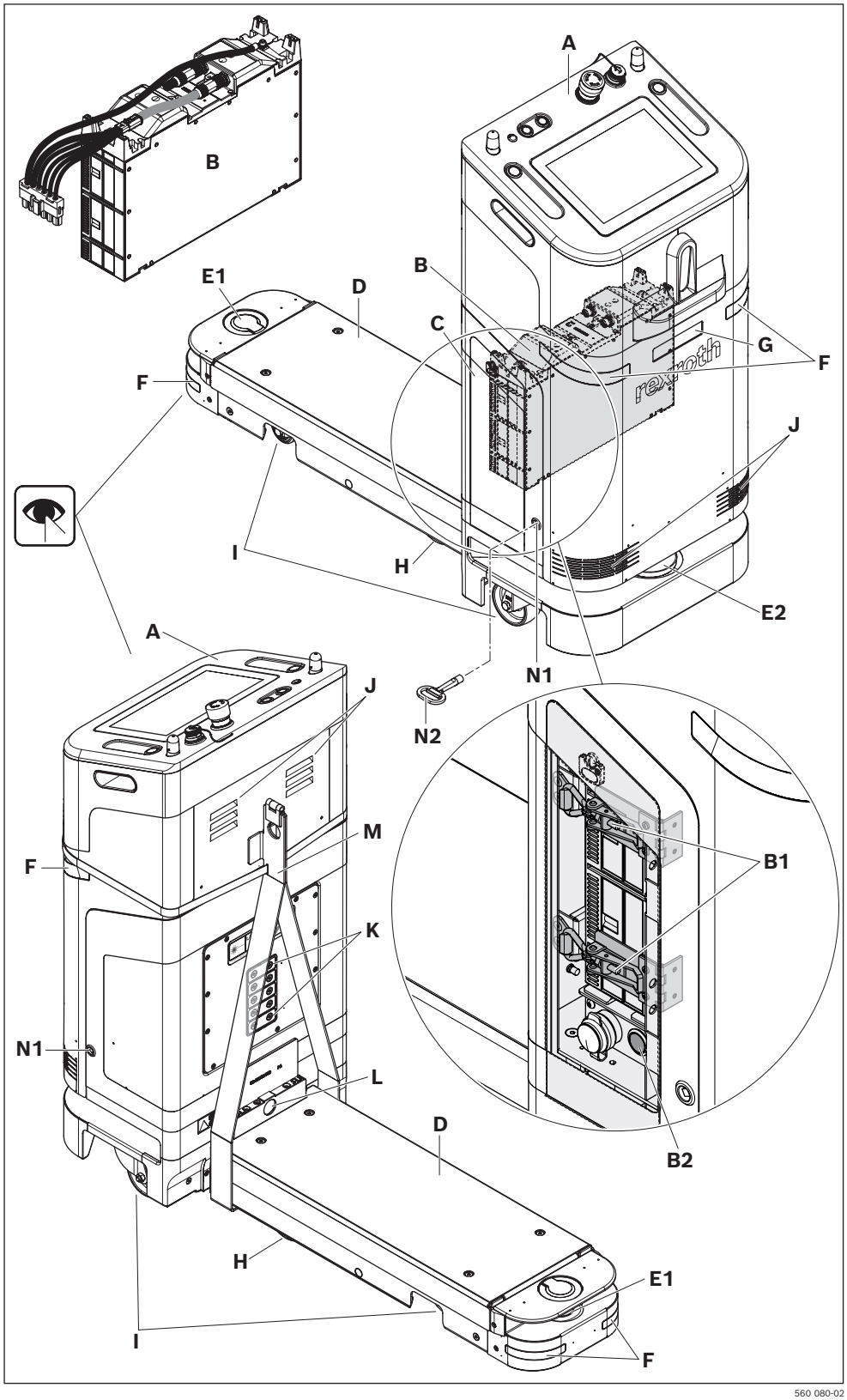


Fig. 1: ACTIVE Shuttle, overall view

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

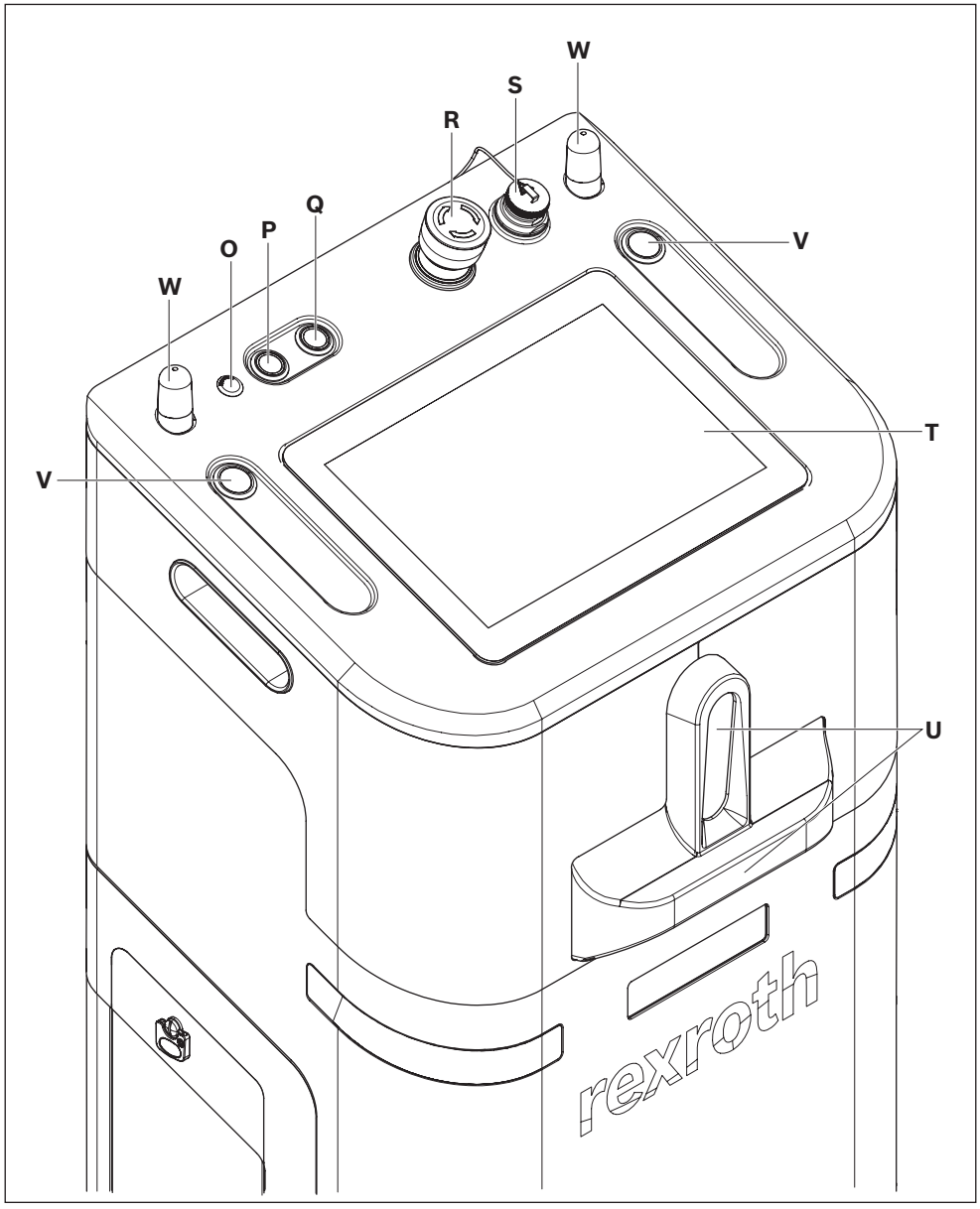


Fig. 2: ACTIVE Shuttle, detailed view of control panel

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 ±

Lifting the loading area

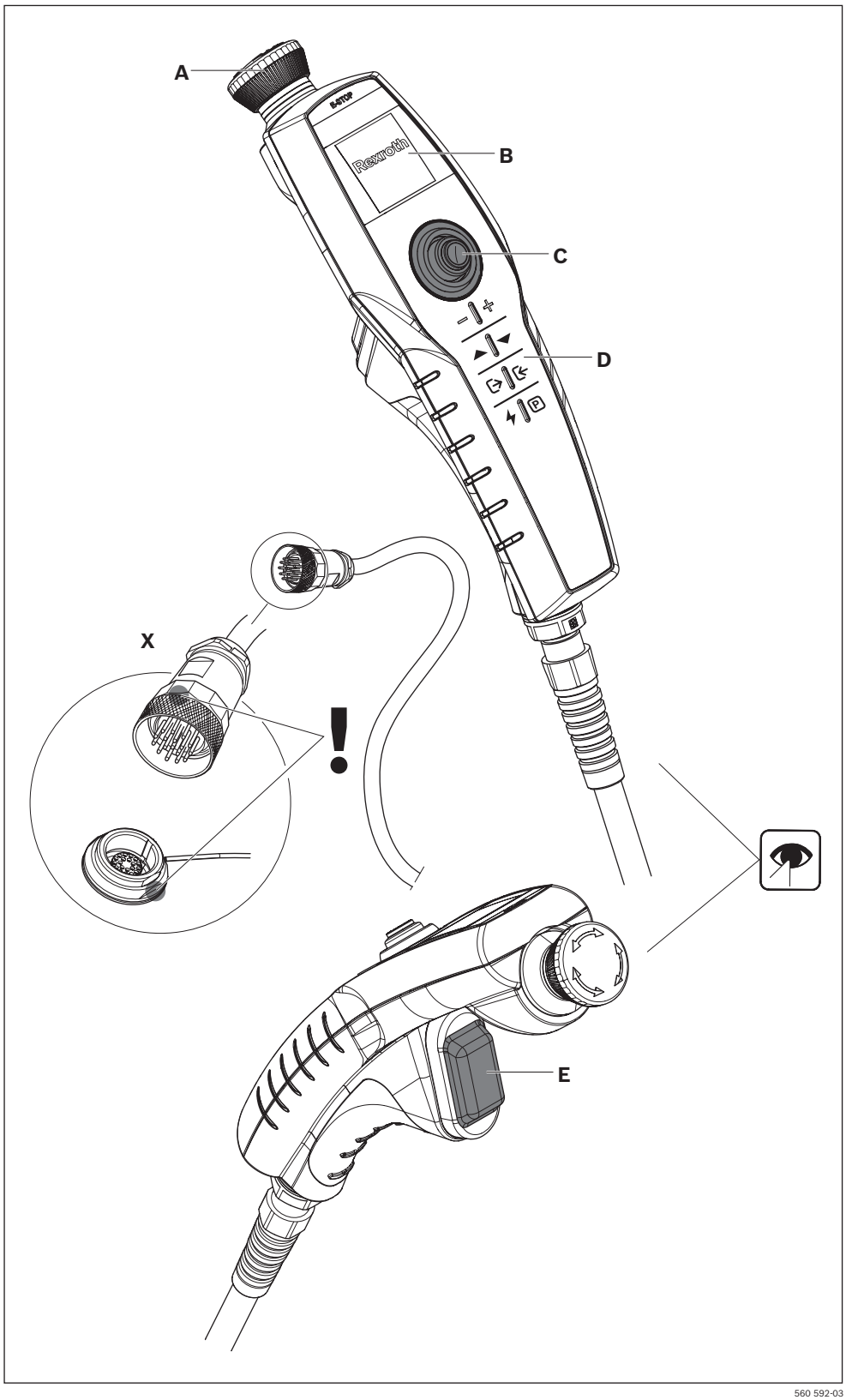
Lowering the loading area

Source position

Dip position

Charging station position

Parking position



560 592-03

Fig. 3: Handheld controller

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 moves downwards.
	Loading area moves 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.

- **A:** Charging station
- **B:** Wall box
- **C:** Docking station
- **D:** Wall box / docking station connecting cable, 3 m
- **E:** Wall box connecting cable, 5 m
- **F:** Control panel
- **G:** Charging contacts
- **H:** Charging compartment
- **I:** Detection flag for ACTIVE Shuttle
- **J:** Charging station assembly kit
- **K:** Assembly frame for charging station
- **L:** Cable duct
- **M:** Cover sheet
- **N:** Assembly frame assembly kit

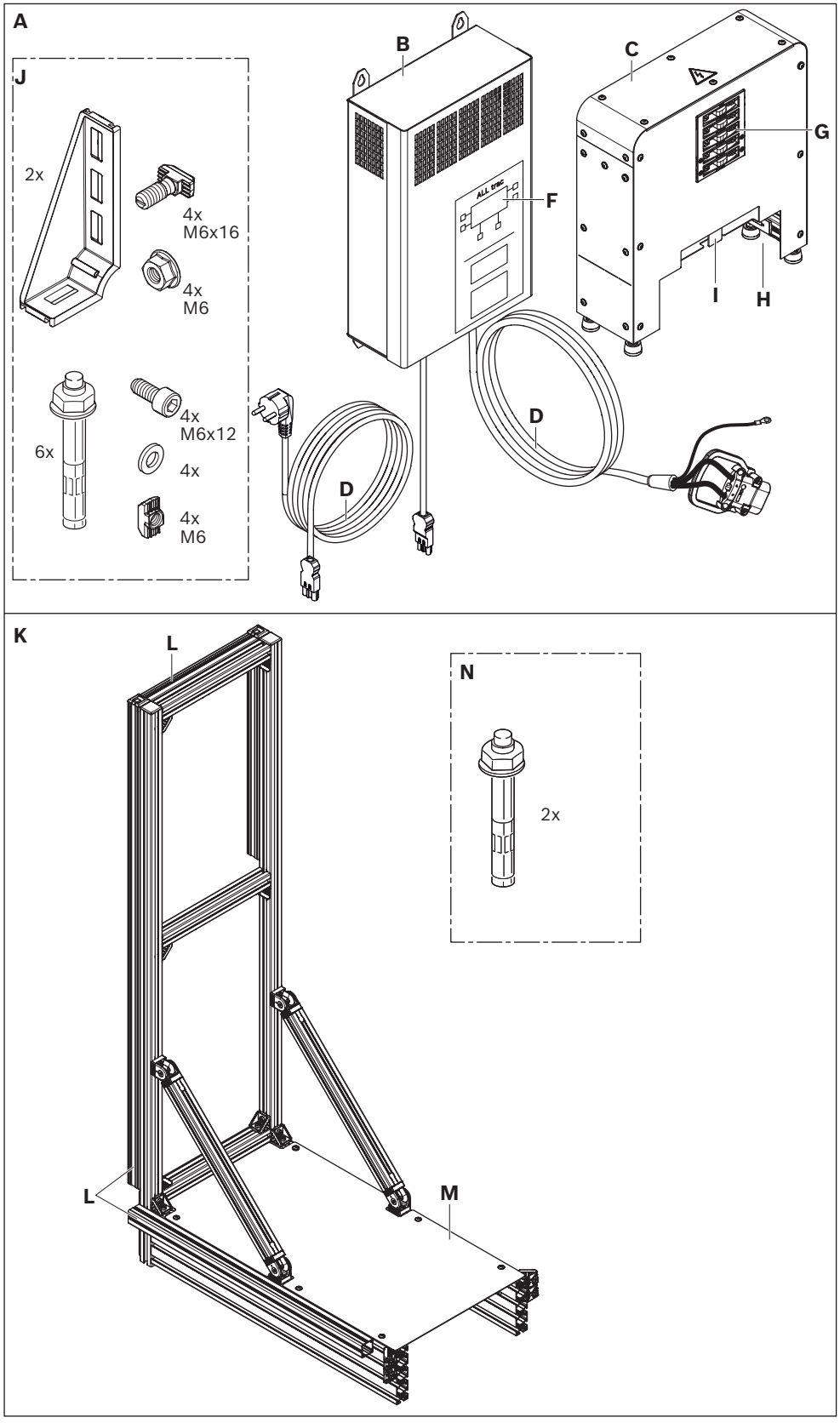


Fig. 4: Charging station ACTIVE Shuttle

5.3 Safety and warning devices

Please note:
Compatible safety flags can be found in the list of compatible accessories in the manual AMR **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

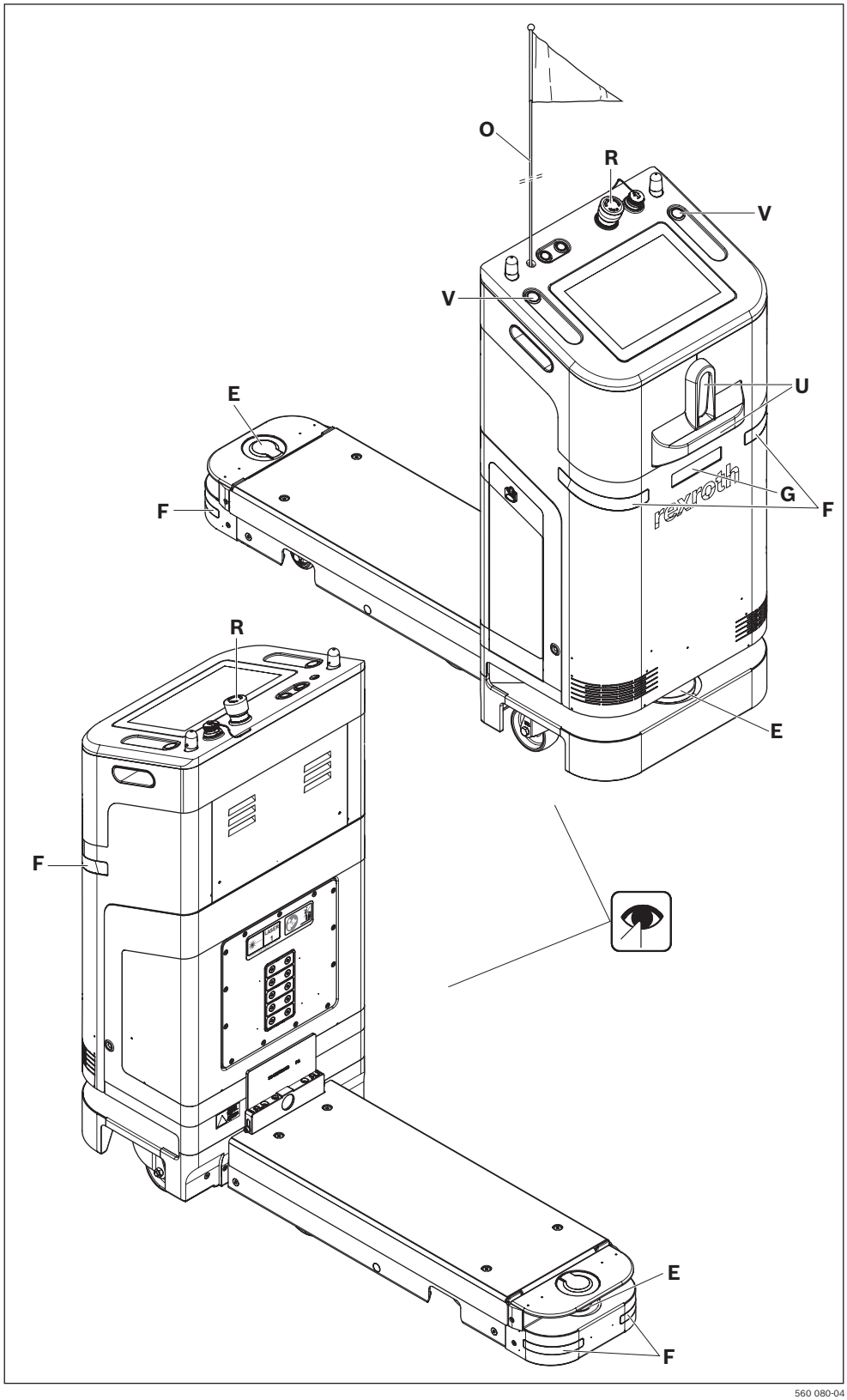


Fig. 5: Safety equipment and warning signs

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	Personal protection system (laser scanner) is active.	-
		Yellow flashing (2 Hz)	ACTIVE Shuttle approaches, enters danger zone or avoids an obstacle (additional acoustic signal).	-
		Yellow flashing (side corresponds to the change of direction)	ACTIVE Shuttle changes 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 recognized an obstacle and brakes.	Remove the obstacle from the protective field.
ON/OFF button (P)		Green flashing (1 Hz)	ACTIVE Shuttle is started or shut down.	-
Acoustic signal transmitter		Audible warning 1x	- ACTIVE Shuttle is switched on. - ACTIVE Shuttle starts in 2 s. - ACTIVE Shuttle lifts or lowers the loading area.	-
		Audible warning every 10 s	- ACTIVE Shuttle during maneuvering (backwards/forwards/when rotating 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 Reference to 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.
- ▶ In areas with driveways of the ACTIVE Shuttle, no reflective surfaces may be present. Especially in the area of the supermarkets.

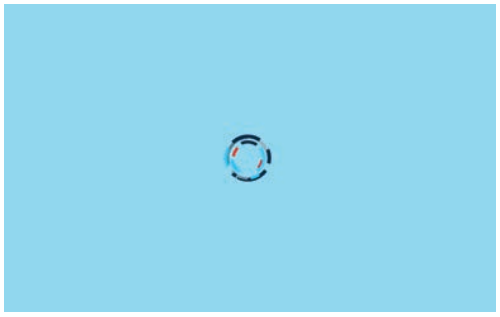
5.4 Touchscreen display

The ACTIVE Shuttle has a touchscreen display that can be used for inspection, control and troubleshooting purposes.
Different screens are displayed according to the current status of the ACTIVE Shuttle (see Table 7).

Boot screens and tab screens

The tab screens are used as screen savers during operation and can be unlocked by simply tapping on the touchscreen display.

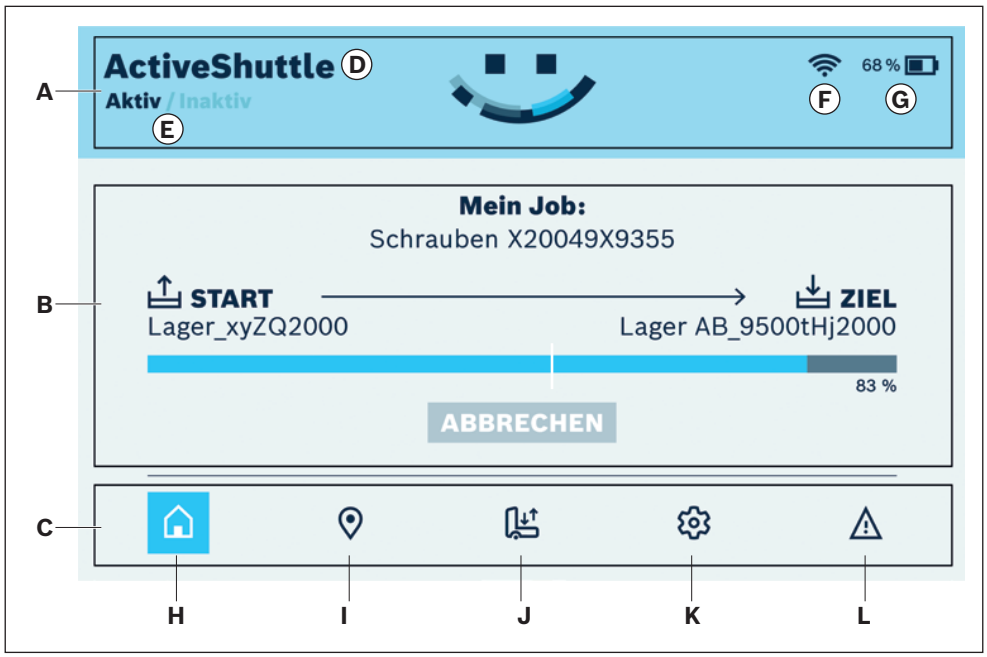
Table 7: Boot screens and tab screens

Designation/status	Screen
Boot screen: The ACTIVE Shuttle is started.	
Tab screens	
Blue tab screen: There are no errors.	
Gray tab screen: An error has occurred that has not been caused by the ACTIVE Shuttle system.	
Red tab screen: An error has occurred in the ACTIVE Shuttle system.	

The screens consist of the following areas:

- **A:** Header area
- **B:** Content area
- **C:** Navigation bar
- **D:** Name of the ACTIVE Shuttle
- **E:** Current state
- **F:** WIFI connection quality
- **G:** Lithium-ion battery charge indicator
- **H:** Job overview
- **I:** Localization
- **J:** Move platform
- **K:** Settings
- **L:** Error messages

Screens
After unlocking, the user is shown an overview of the current job (Fig. 6) and the user can switch between different menu items.



560 592-100

Fig. 6: Screen display ACTIVE Shuttle (shown here: job overview view)

If there is an error, it will be displayed in a pop-up window with information on troubleshooting.
The display of the content area (B) depends on which menu item is selected in the navigation bar (C). The view for the job overview is shown in Fig. 6.

Header area
As in the tab screen, the user also receives information on the status of the ACTIVE Shuttle on the unlocked screen. The header area (A) indicates the status of the ACTIVE Shuttle by means of the color and the smiley. If the header area is blue, there are no errors. A gray header area indicates that there are errors in the environment that were not caused by the system. A red header area indicates that there is an error in the ACTIVE Shuttle system.
The header area also contains information on the name of the ACTIVE Shuttle (D), its current status (E), the quality of the WIFI connection (F) and the state of charge of the lithium-ion battery (G).

Navigation bar
You can switch between the various functions of the screen in the navigation bar (C). The menu items "Job overview" (H), "Localization" (I), "Move platform" (J), "Settings" (K) and "Error messages" (L).

5.5 Identification of the product

A: Material number (order number)

B: Designation

C: Serial number

D: Information on version and dimensions

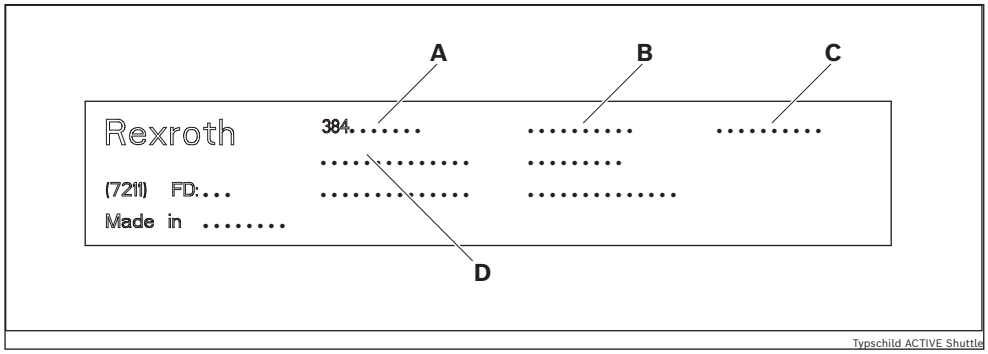


Fig. 7: Nameplate

6 Transport and storage

- Observe the transport instructions on the packaging.
- Transport weight: See delivery documents.
- Secure the product to prevent toppling!
- Always maintain ambient conditions during loading and transport, see page 87.

6.1 Transporting the product

⚠ WARNING

Suspended loads may fall!
Falling objects can result in severe injury (or even death).

- ▶ Only use the lift aid included in the scope of delivery to lift the ACTIVE Shuttle.
- ▶ 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:

- 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 Velcro strap at the ACTIVE Shuttle.

▶ Removal is correspondingly done in the reverse order.

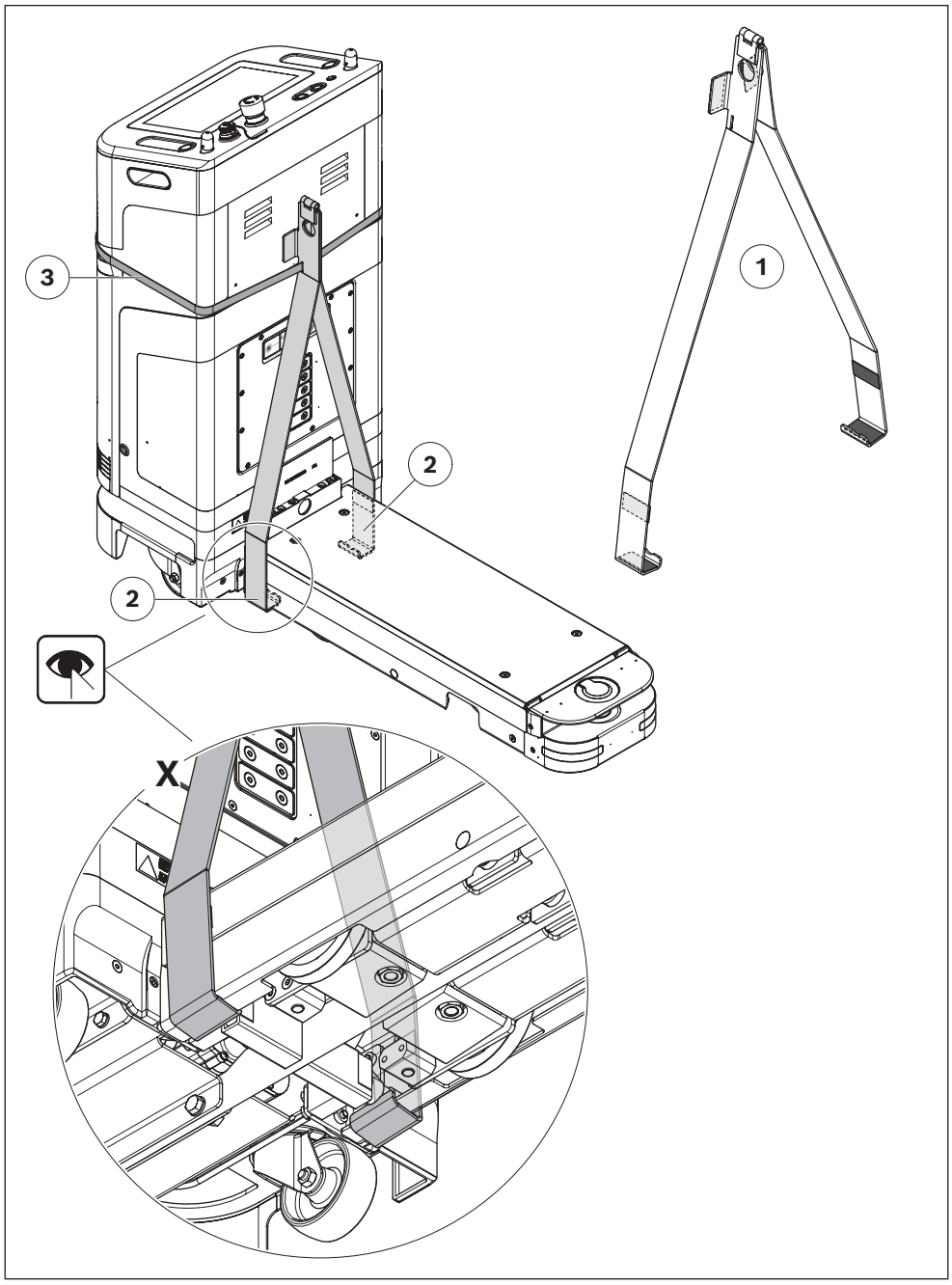


Fig. 8: Mounting/removing the lift aid

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 87.
- When storing lithium-ion batteries, observe the safety instructions on Page 15 and the national specifications.

7 Installation

7.1 Ambient conditions

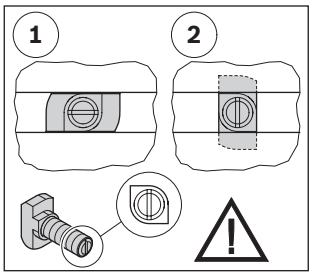
- Always comply with the ambient conditions specified in the technical data (see page 87) are specified.

7.2 Required tools

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

7.3 Symbols used

Table 8: 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
 $M_D = 8Nm$	Wrench for hex socket screw SW = wrench size ... mm M_D = required tightening torque ... Nm
1 2 3	Graphical depiction of the installation steps. The numbers correspond to the sequence of installation steps, in accordance with the instructions in the accompanying text.
A B C X	Graphical depiction of the designation of components. The letters denote the components mentioned in the accompanying text.
	Detail 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/preassembling 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:
  AXIMA, spol. s r.o.
  Vídeňská 204/125
  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.

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 free of contamination.
- The distances shown in the drawing must be observed in order for the ACTIVE Shuttle to function correctly.
- Observe national and international regulations regarding the installation of battery charging systems.

Required accessories:
Blue guide line, roll 25 m,
3 842 560 612

A: Charging station on assembly frame
B: Blue guide line
C: Wall/obstacle
D: Teaching point

▶ Mount the charging station and attach the guide lines.

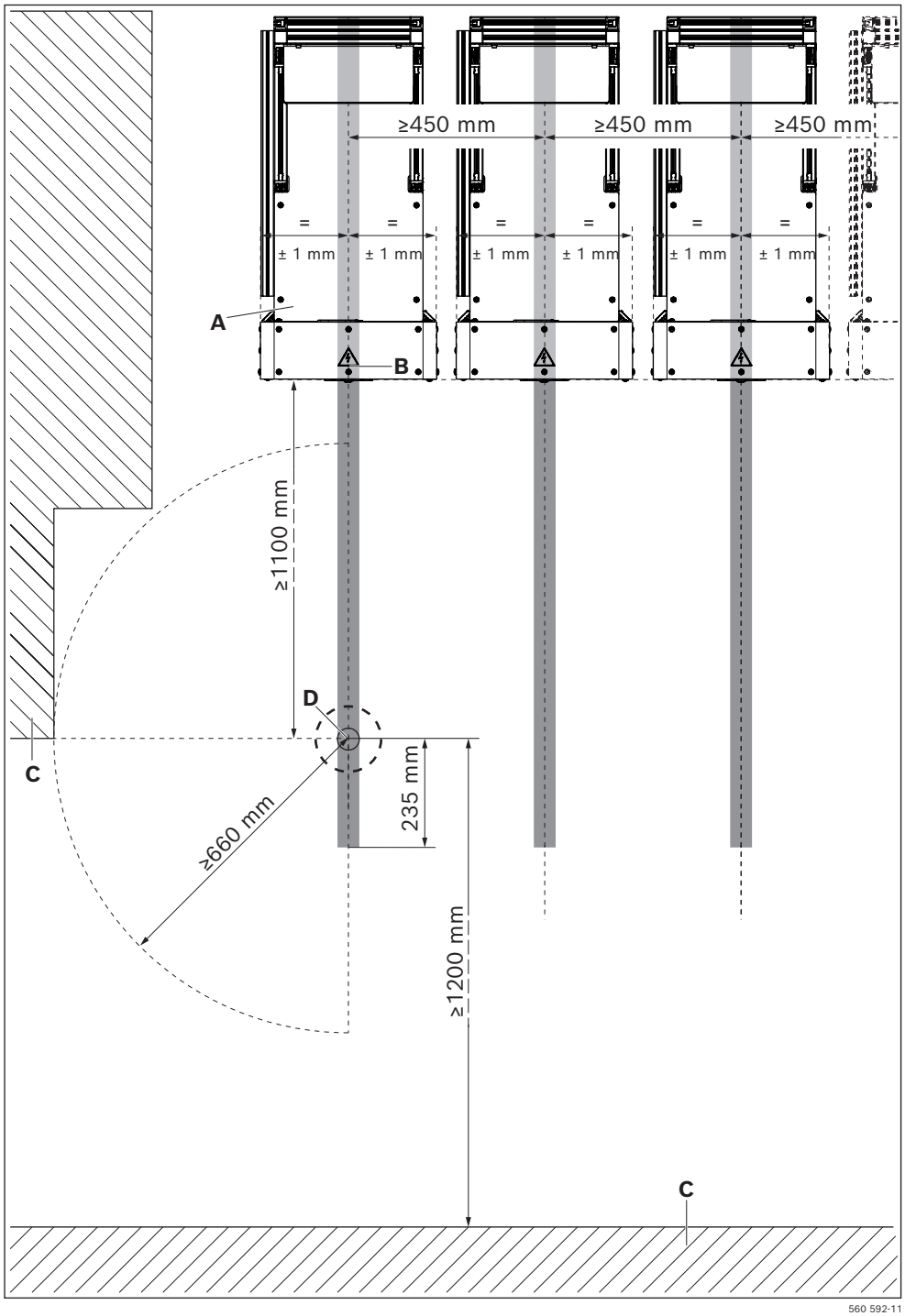


Fig. 9: Positioning the charging station

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

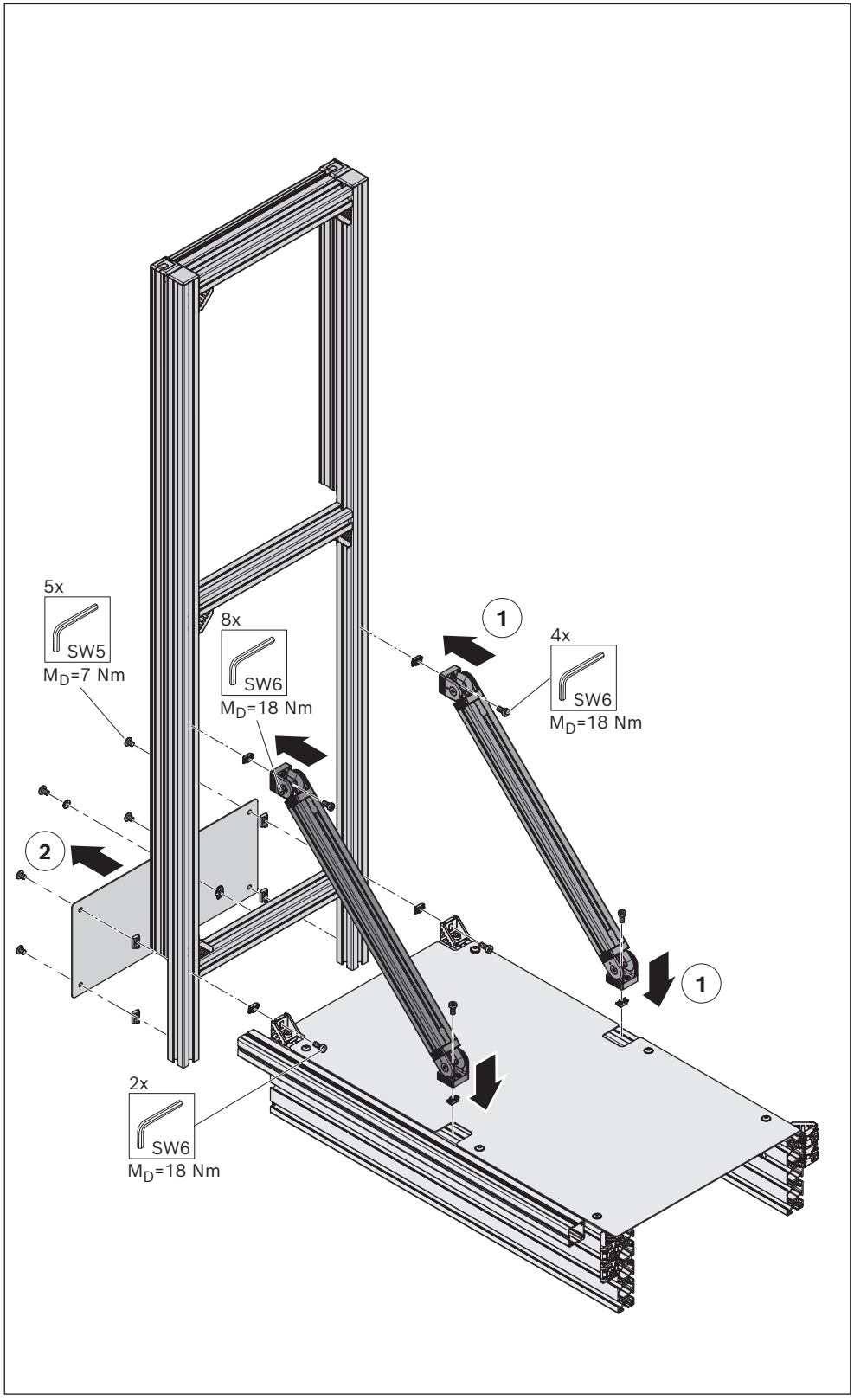


Fig. 10: Mounting the assembly frame

Please note:

- The charging station may only be used in connection with the assembly frame.
- 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 and align the charging station horizontally.
3. Screw the charging station to the base.
4. Mount the lateral housing parts.
5. After assembly the docking station, verify that it is perpendicular to the vehicle axis.

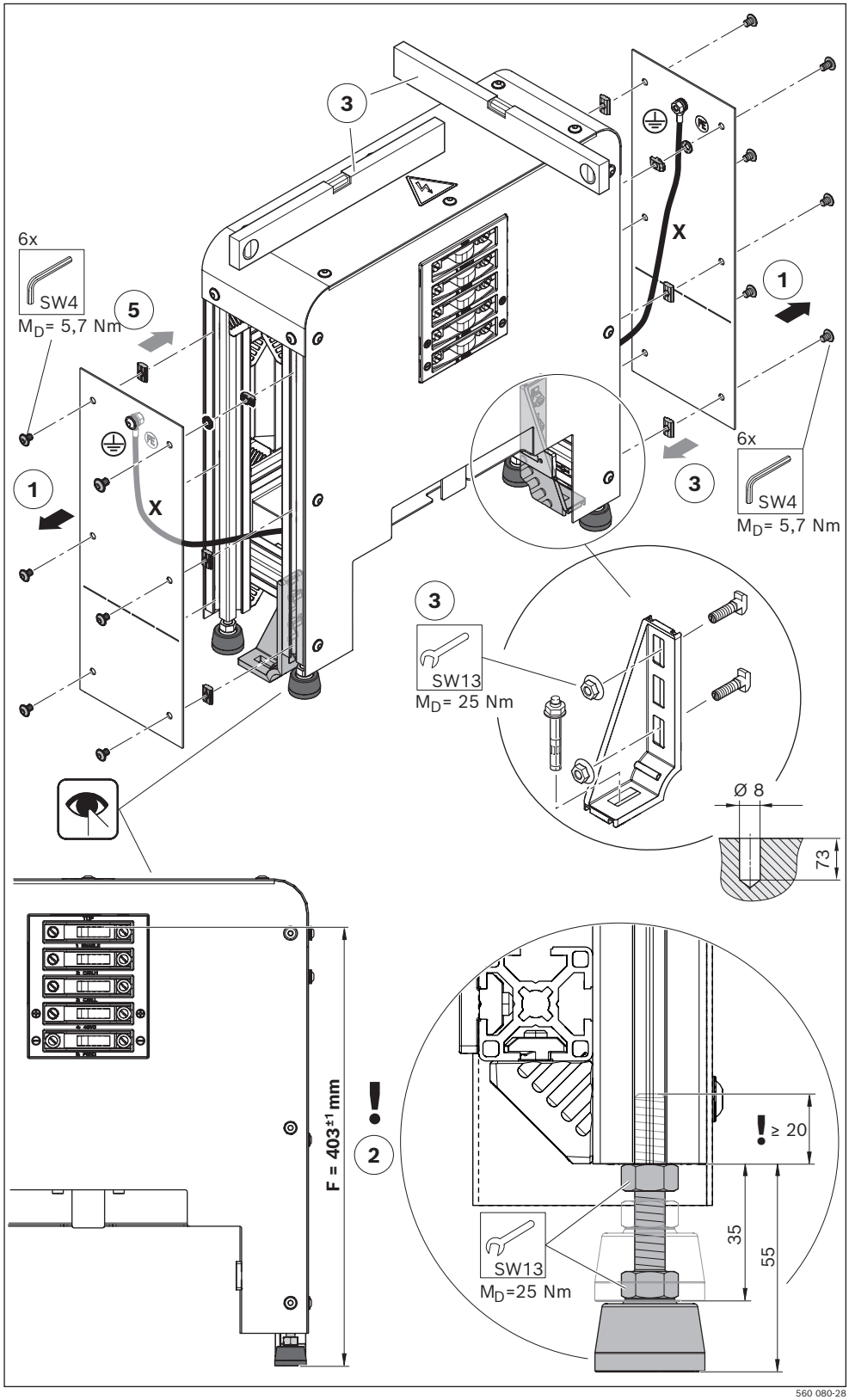


Fig. 11: Docking station assembly

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.
  - must be routed in the cable duct of the assembly frame.
- After the assembly of 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. Remove the pre-perforated sheet metal sections and deburr the breaking edge.
4. Mount the assembly frame at the docking station.
5. Screw the assembly frame to the floor.
6. Mount the rear-side guard plate at the assembly frame.
7. Mount the wall box at the assembly frame.
8. Carry out a test in accordance with DIN EN 60204-1 section 18.

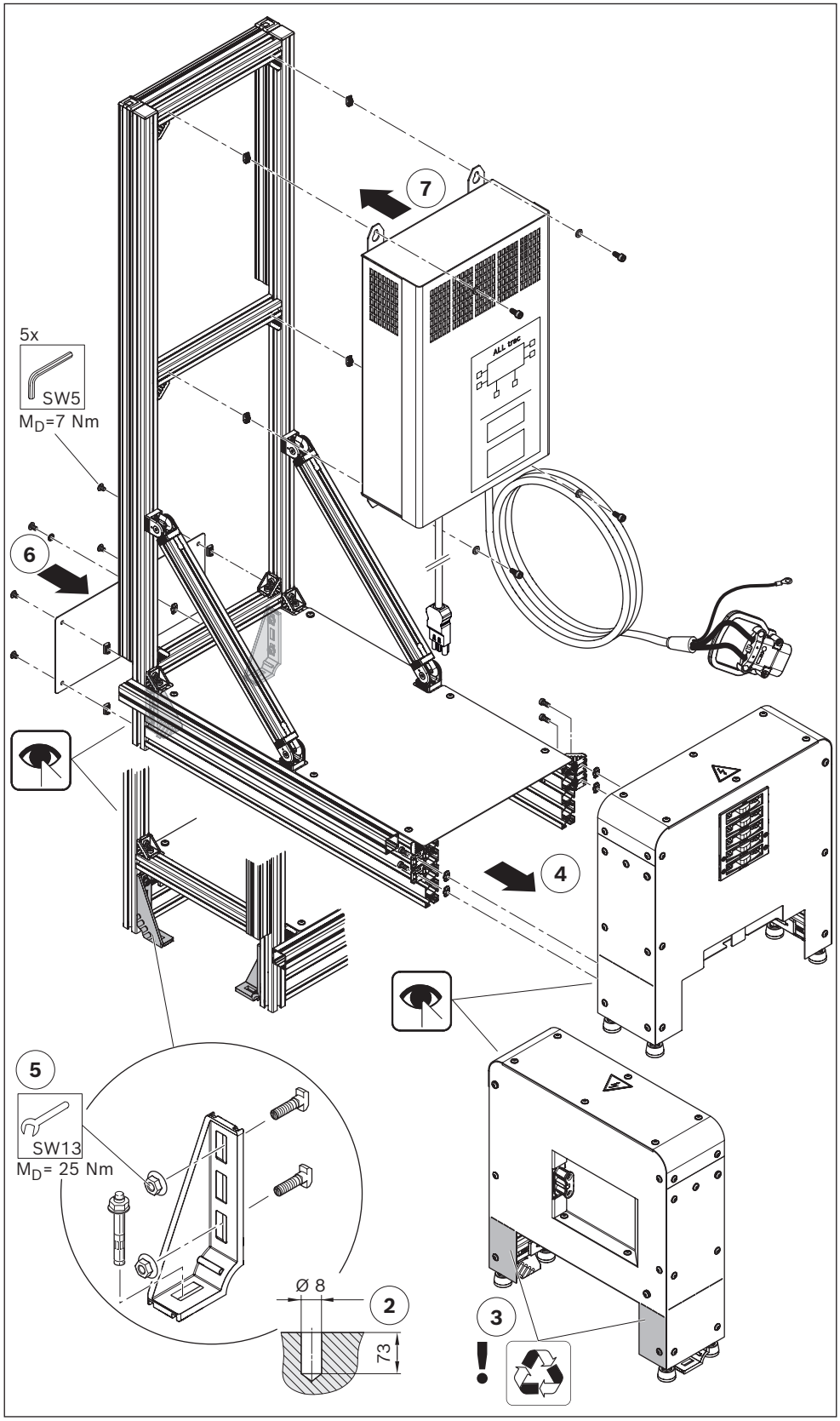


Fig. 12: Assembly of the charging station on the assembly frame

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.
  Vídeňská 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" 3 842 358 820.

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.
  - must be routed in the cable duct of the assembly frame.
- After the assembly of 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 docking station.
3. Connect the wall box to the power supply.

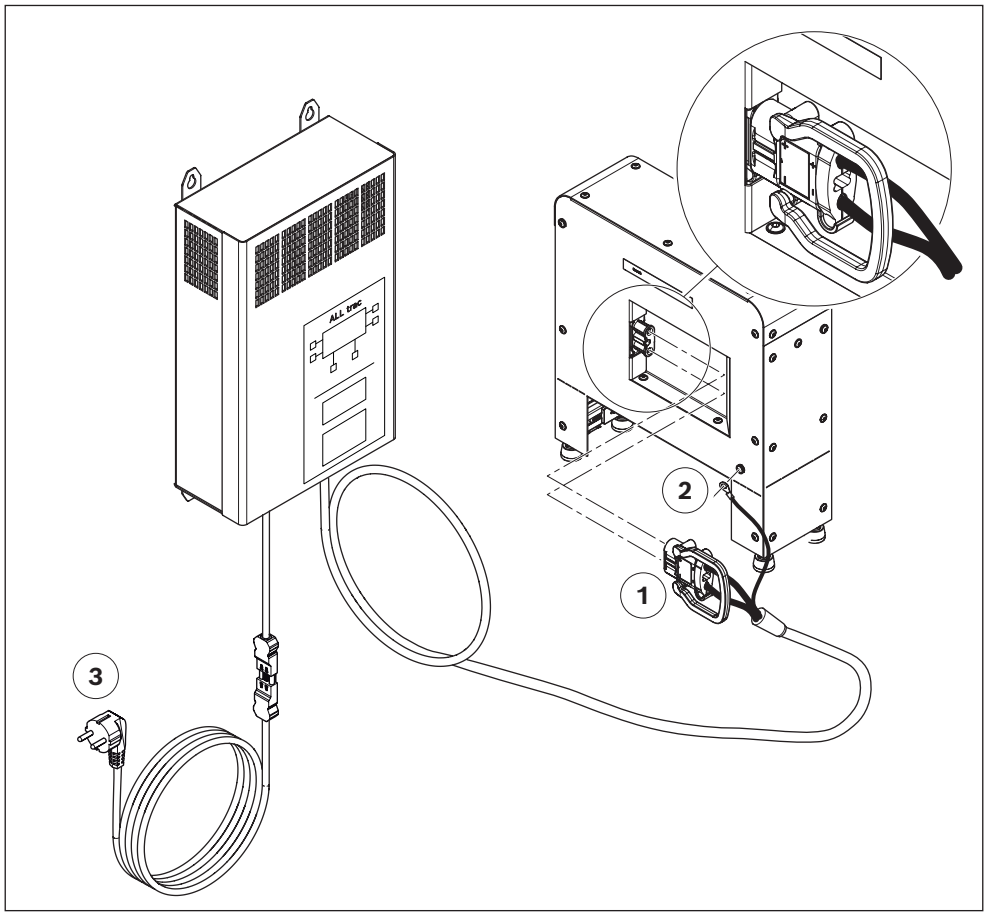


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Fig. 13: Wall box and docking station connection (principle representation)

7.6 Unpacking the ACTIVE Shuttle

NOTICE

Potential damage to the drive rollers by shifting without the brake 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 on the lateral handle shells.

- Before lifting, check the correct seat of the lift aid (see chapter 6.1.1 Mounting/removing the lift aid).
- Lift the product out of its packaging at the lift aid (see Fig. 14).

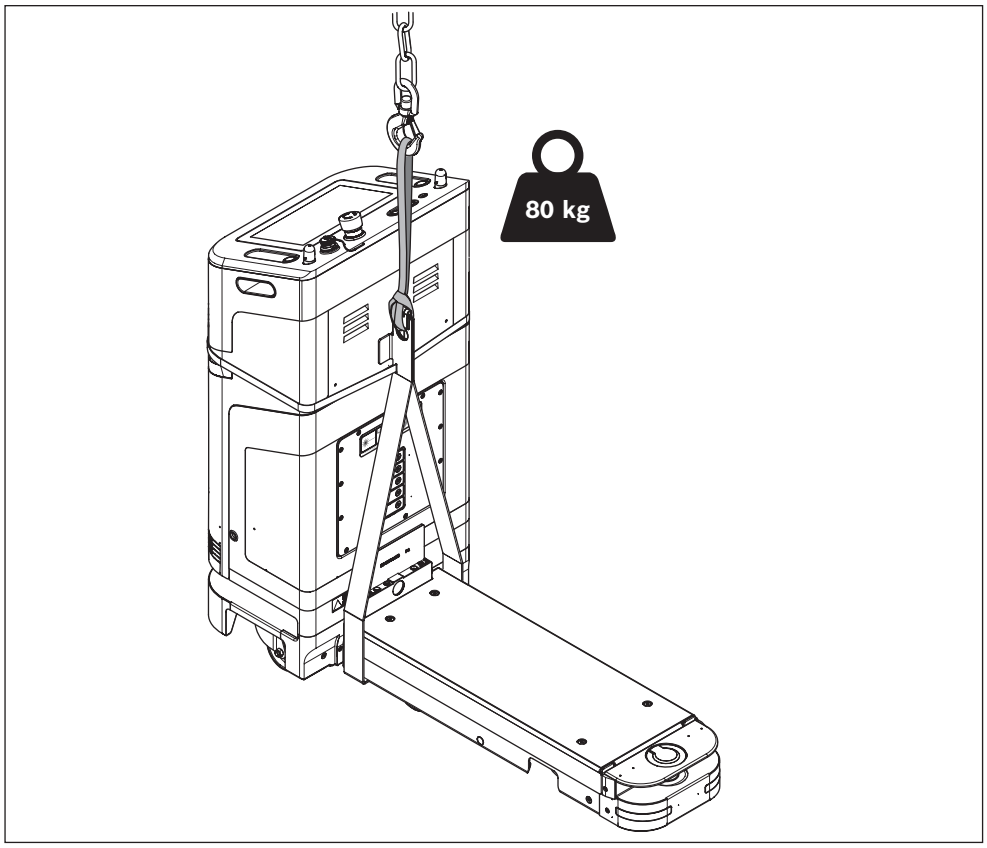

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Fig. 14: Lift the ACTIVE Shuttle

- 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, put it into proper operation (see chapter 8).

8 Commissioning

8.1 Emergency measure pressing 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.

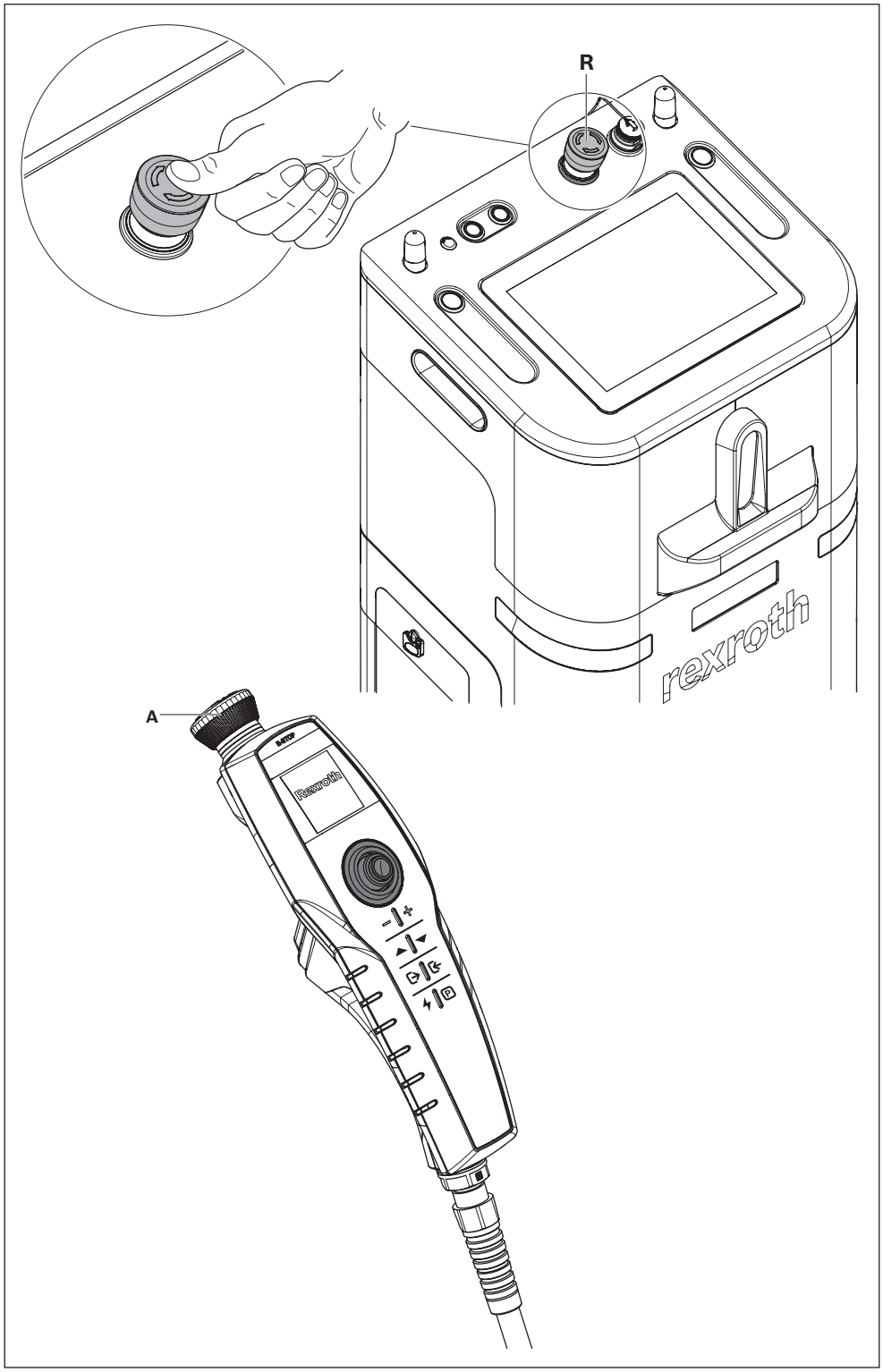

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Fig. 15: Emergency measure pressing emergency stop device

8.2 Emergency measure removing 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.
- To charge the lithium-ion battery in the ACTIVE Shuttle, use only the charging station supplied by Bosch Rexroth or the charger supplied by Bosch Rexroth.
- Only operate lithium-ion batteries and accessories in perfect 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.

1. Open the cover of the battery compartment.
2. Press 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 in case of loose seat.

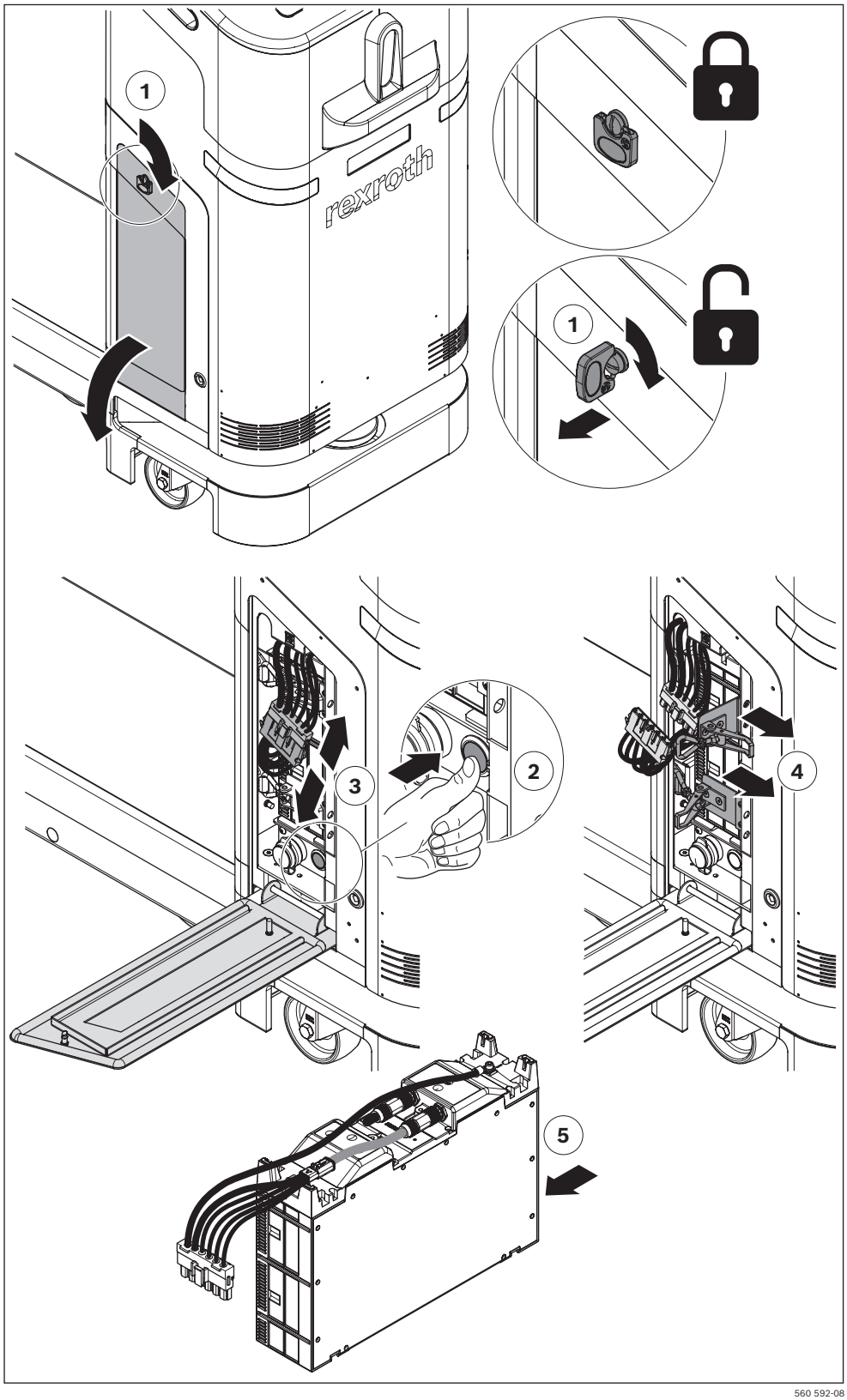

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Fig. 16: Emergency measure removing lithium-ion battery

8.3 Initial commissioning

⚠ CAUTION

Risk of injury and damage to the ACTIVE Shuttle
Upon new commissioning of additional ACTIVE Shuttles, they are not yet entered in the AMS / external fleet management system and therefore not known to the already autonomous ACTIVE Shuttles (e.g. if the additional ACTIVE Shuttles have been pushed manually into a charging station).
- ▶ The operator 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 audible warning devices **every quarter**.
- ▶ Carry out a test of the safety equipment **in accordance with** the test cycles specified in chapter 10.2.
- ▶ 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 time before opening the housing.
Personal injury when staying in the driving range, especially in curve areas!

Risk of serious injury from collision with the ACTIVE Shuttle.

• If possible, do not stay within the driving range of the ACTIVE Shuttle.
• Restrict passenger 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 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 passenger 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.

⚠ CAUTION

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 unpredictable movements of the ACTIVE Shuttle due to insufficient ground conditions!
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 free from contamination.

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 into automated processes!
Risk of serious injury due to unauthorized intervention in automated processes by operating personnel.
- Under no circumstances may operating personnel intervene in 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 10.5).

- Make sure that all electrical connections are either used or covered. Make sure that all bolted 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 commission a product that has been completely installed.

Please note:
- During initial commissioning, observe EN 60204-1 or 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

1. Press the battery main switch (B2, see Fig. 1 on Page 25).
2. Press the ON/OFF button (P) and hold it briefly (max. 3 seconds) until:

   ➡ The ON/OFF button (P) flashes green.

   ➡ The signal lamps (F) flash yellow.

   ➡ The signal lamps (F) light up permanently in 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.

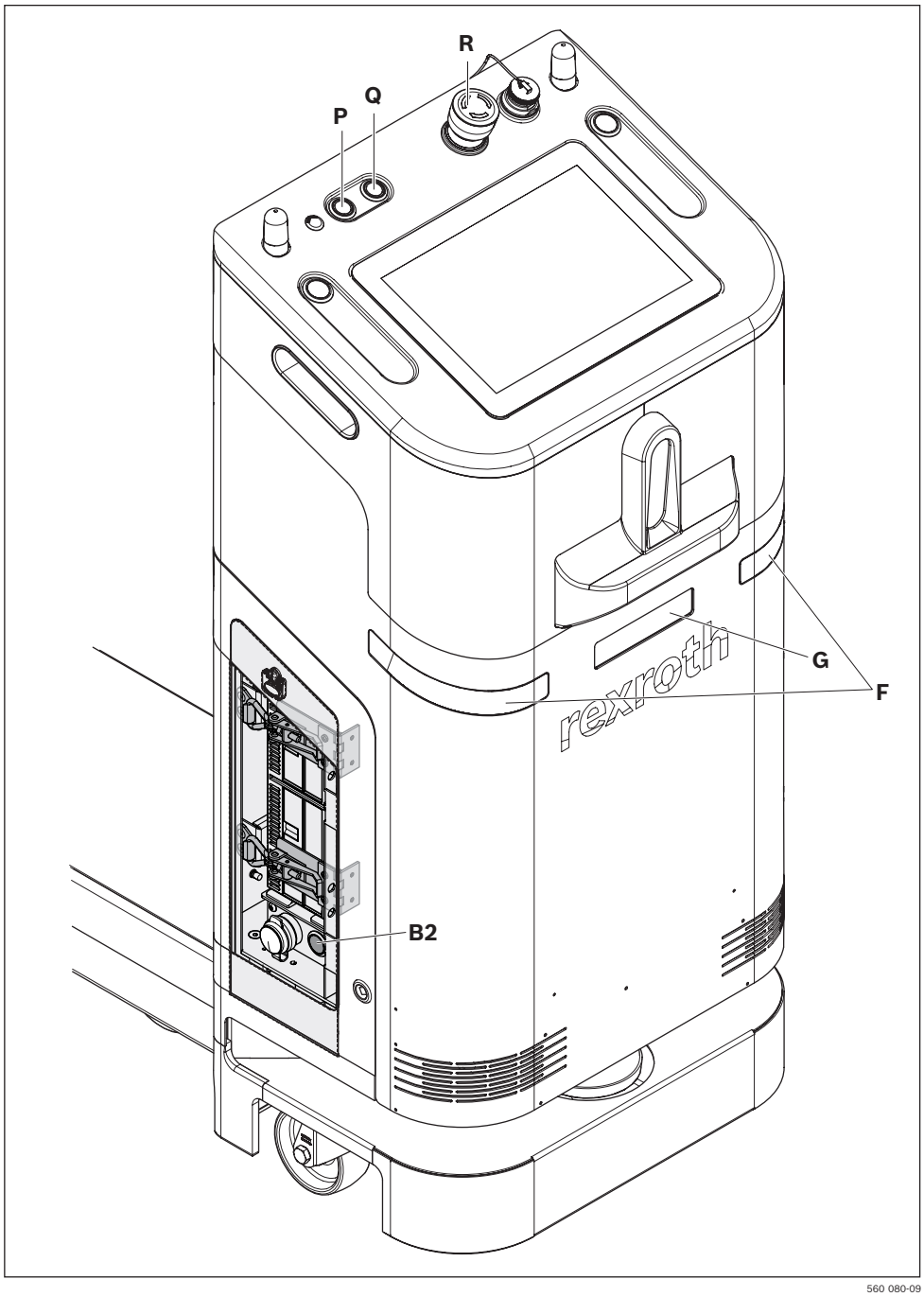

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Fig. 17: Switching on the ACTIVE Shuttle

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).

8.3.2 Switching to "Manual" operating mode

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.

⚠ 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.

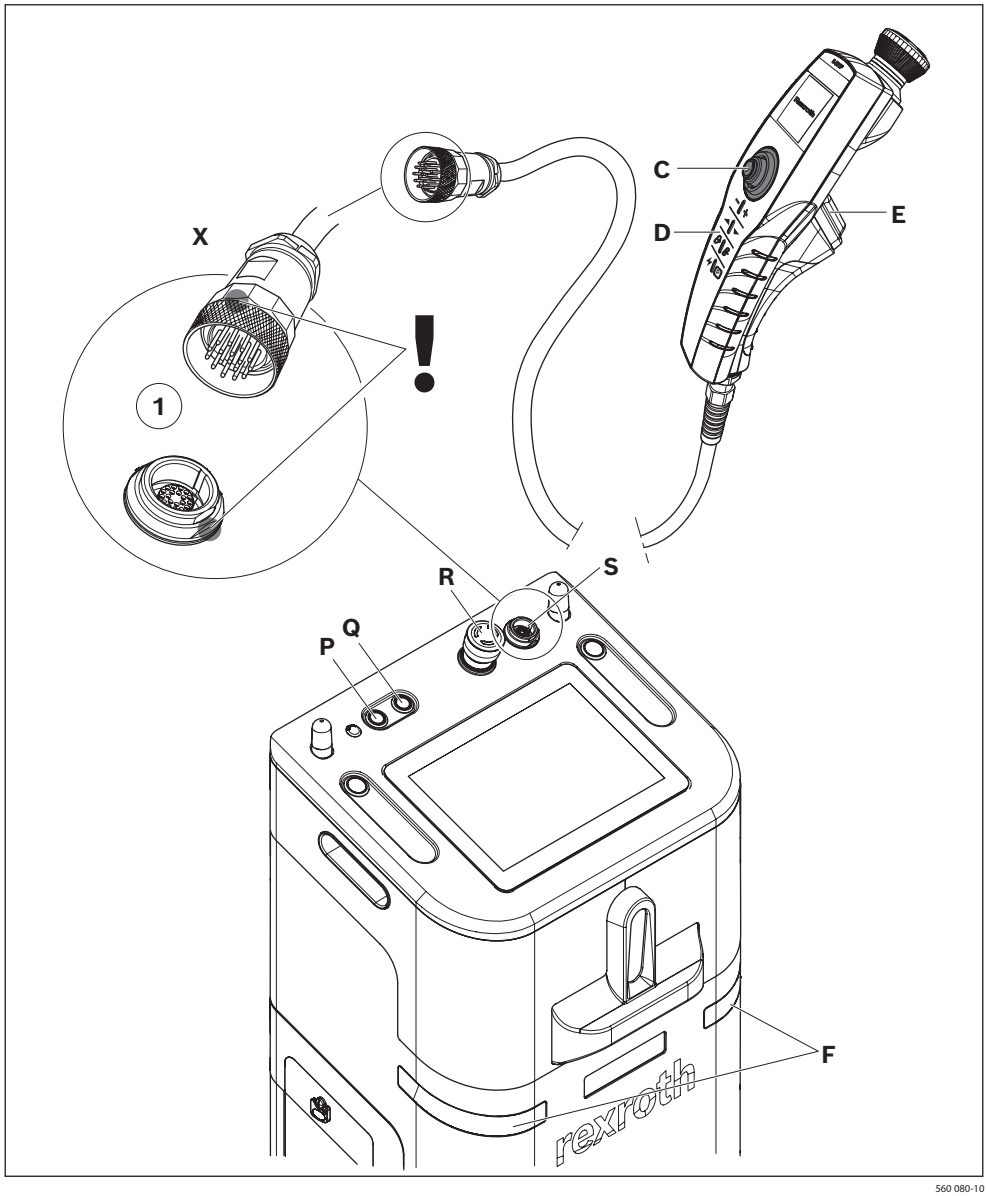

Fig. 18: Switching to "Manual" operating mode

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

Please note:

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

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.

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} by raising and lowering again.

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} by raising and lowering again.

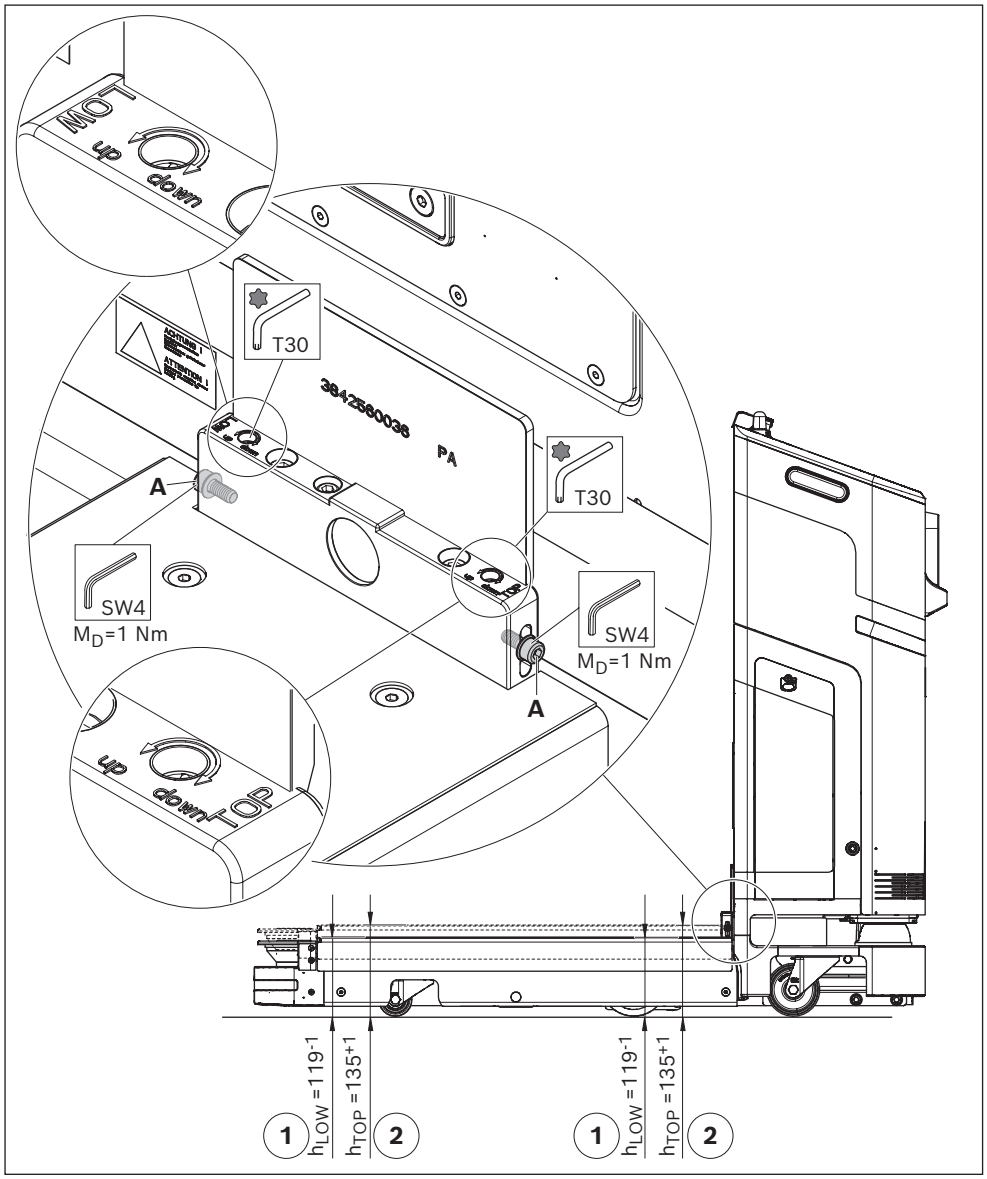

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Fig. 19: Checking the lower and upper loading area height and adjusting it, if necessary

Please note:
To move ACTIVE Shuttle manually, the drive mode must be unlocked by pressing the enabling switch (E, level 2, consent on).

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).

+/– 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 do not match, readjust the height of the charging station (see chapter 7.5 Fig. 11).

- 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 charge 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).

8.3.6 Moving the ACTIVE Shuttle manually

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.
- 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 on the same height.
- If the heights of the charging contacts of the ACTIVE Shuttle and the charging station do not match, readjust the height of the charging station (see chapter 7.5 Fig. 11).

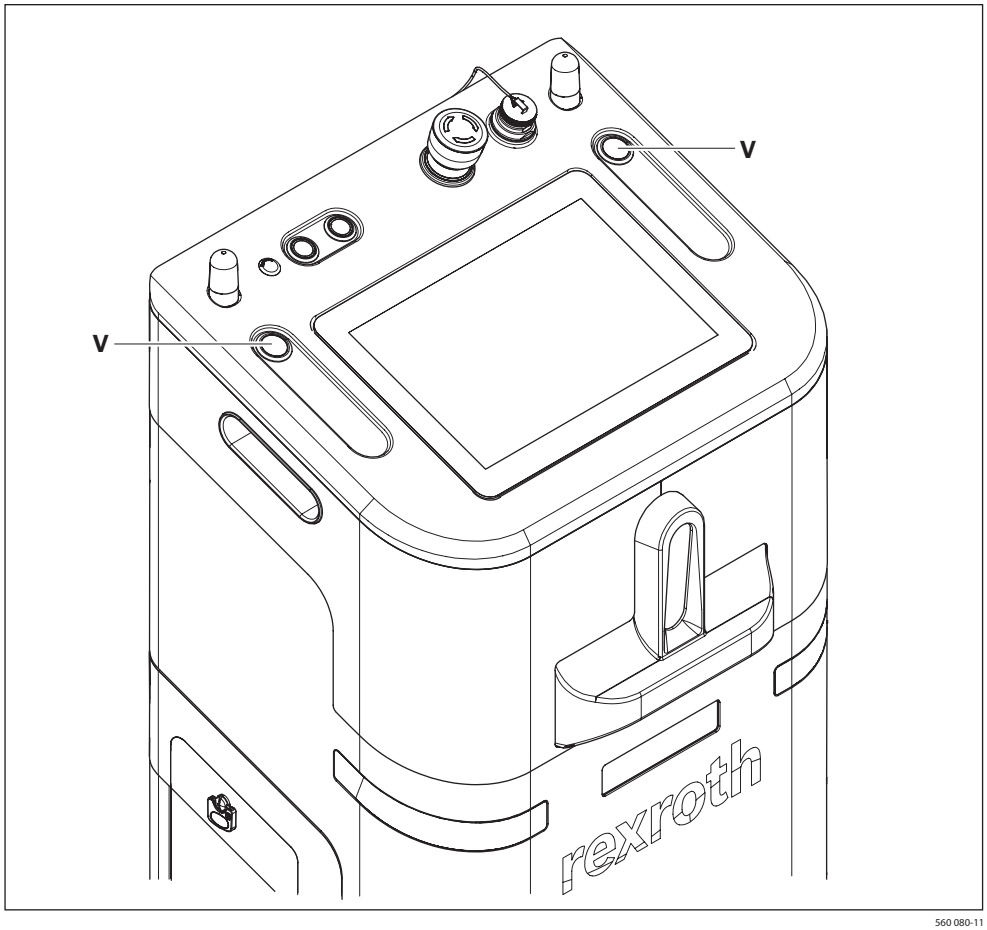


Fig. 20: Drive unlocking

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 lifts

Loading area in upper position ➡ Loading area lowers

8.3.8 Switching off the ACTIVE Shuttle

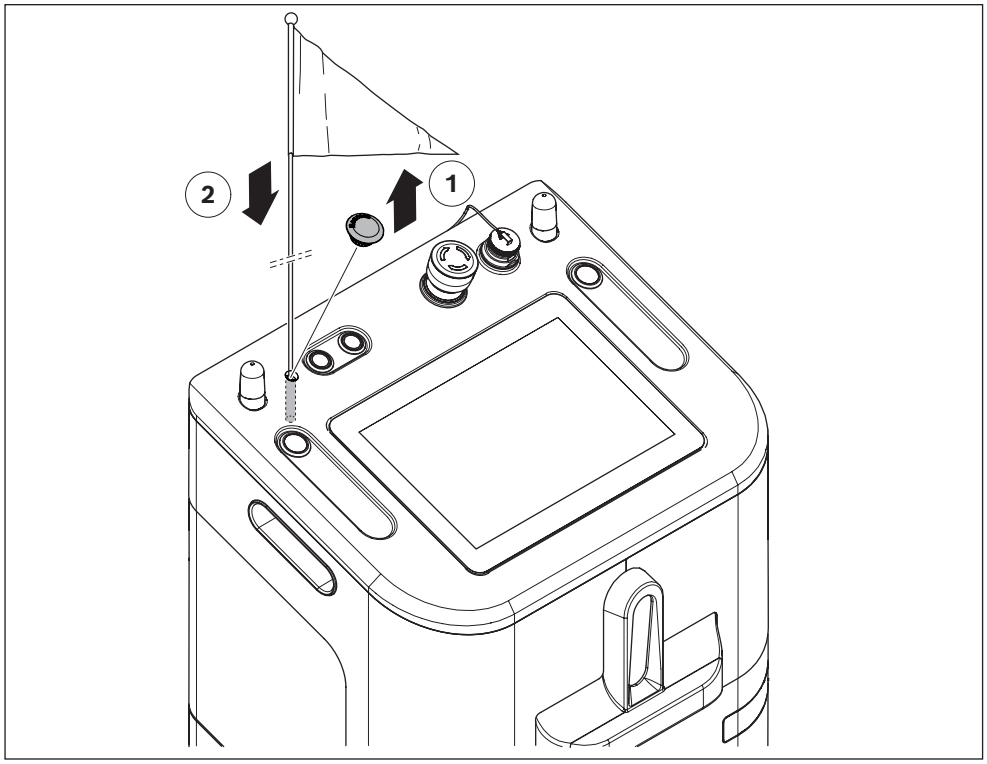
1. Press the ON/OFF button (P) for at least 5 seconds.
   ➡ The ON/OFF button (P) flashes green.
   ➡ The acknowledgment button (Q) flashes green.
   ➡ The ACTIVE Shuttle switches off.

8.3.9 Mounting safety flags (accessories, not included in the scope of delivery)

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



560 080-12

Fig. 21: Mounting safety flags

8.3.10 IT setup

For information on the IT setup of the vehicle, refer to the manual AMS **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 to the side.
- The logistics employees must be trained accordingly (see chapter 2.9).
- Restrict passenger 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 free of contamination.
- 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.

Required accessories:
Blue guide line, roll 25 m,
3 842 560 612

A: Dollies
B: Blue guide line
C: Supermarket
D: Teaching point
E: Access ramp

▶ Attach the guide lines.

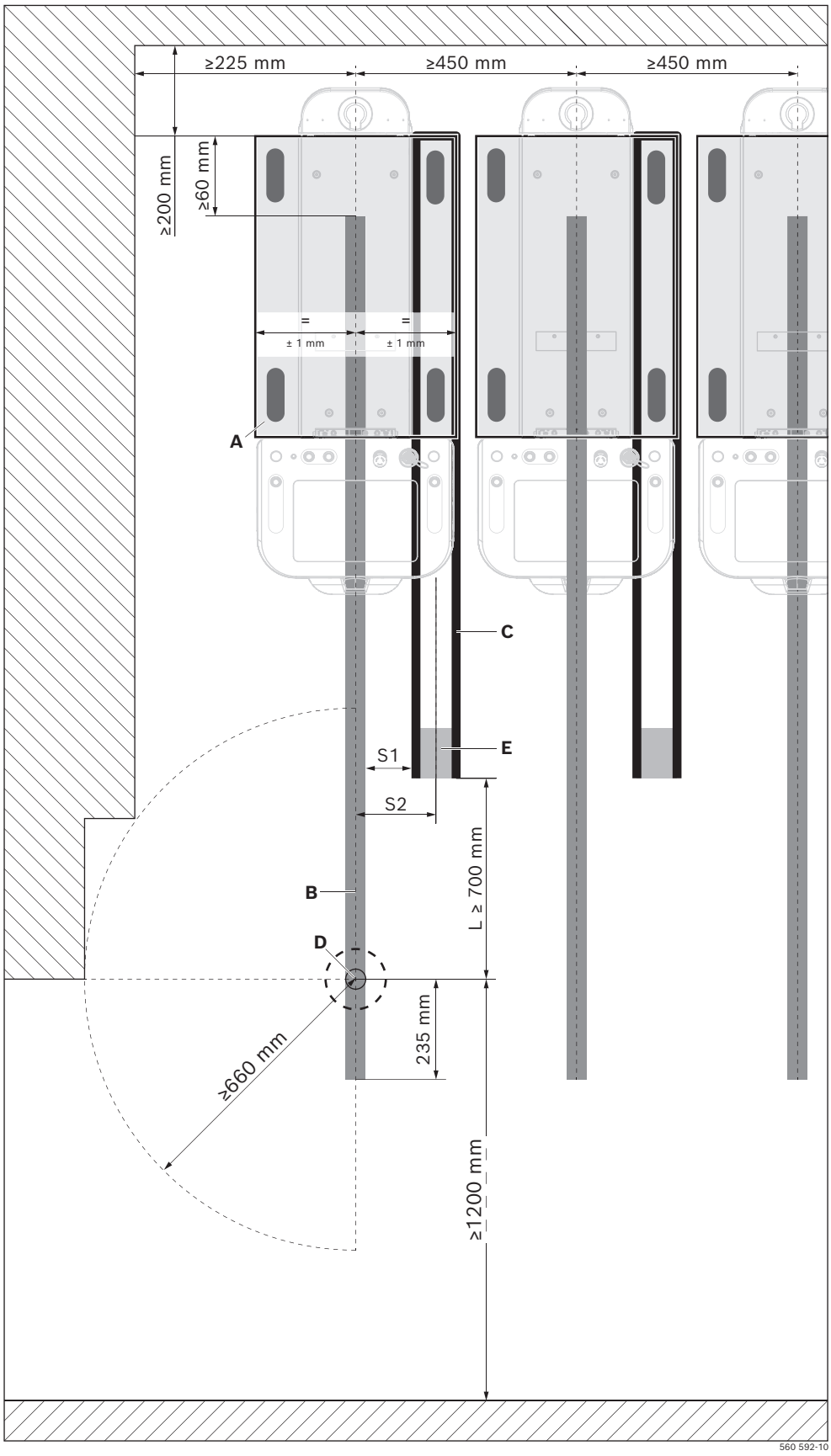


Fig. 22: Supermarket (dimensions not to scale)

Table 9: Supported supermarket tracks

Supported supermarket tracks	Distance S1*	Distance S2
G3 SW 41 (Bloksma)	86 mm	
FiFo Monorail 40 mm 5S (Orgatex)	86 mm	
FiFo station (Bosch Rexroth, Orgatex)	164 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.

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.
- Make sure that no damaged dollies are used.
- Make sure that the dollies are not dirty (oily).
- Clean the dollies before use.

For use with ACTIVE Shuttle only the following dollies are permitted:

Table 10: 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 without additional brake only.		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 manual AMR **RB02831888**.

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).

⚠ 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 audible warning devices **every quarter.**
- ▶ Carry out a test of the safety equipment **in accordance with** the test cycles specified in chapter 10.2.
- ▶ 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 time before opening the housing.
Personal injury when staying in the driving range, especially in curve areas!

Risk of serious injury from collision with the ACTIVE Shuttle.

• If possible, do not stay within the driving range of the ACTIVE Shuttle.
• Restrict passenger 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 the rear wheels of the load.

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

⚠ CAUTION

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 passenger 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 unpredictable movements of the ACTIVE Shuttle due to insufficient ground conditions!
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 free from contamination.

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 into automated processes!
Risk of serious injury due to unauthorized intervention in automated processes by operating personnel.
- Under no circumstances may operating personnel intervene in 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 10.5).

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.
- ▶ To charge the lithium-ion battery in the ACTIVE Shuttle, use only the charging station supplied by Bosch Rexroth or the charger supplied by Bosch Rexroth.
- ▶ Only operate lithium-ion batteries and accessories in perfect 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. 11 on Page 41.

⚠ 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 obvious 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 glasses of the personal protection systems.
- ▶ Particle contamination: Carefully clean the glasses of the personal protection systems with a dry soft cloth.
- ▶ Liquids contamination: Carefully clean the glasses of the personal protection systems with a damp soft cloth (water or mild detergent).

Damage to the stereo cameras for the 3D obstacle detection
Incorrect cleaning may cause damage to the glasses of the stereo cameras.
- ▶ Particle contamination: Carefully clean the glasses of the stereo cameras with a dry soft cloth.
- ▶ Liquids contamination: Carefully clean the glasses of the stereo cameras with a damp soft cloth (water or mild detergent).

Damage to the touchscreen display
Incorrect cleaning may cause damage to the touchscreen display.
- ▶ Particle contamination: Carefully clean the touchscreen display with a dry soft cloth.
- ▶ Liquids contamination: Carefully clean the touchscreen display with a damp soft cloth (water or mild detergent).

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 10.5) and replace them if necessary (see chapter 10.6.1).
- ▶ The filter mats of the fans must be maintained regularly depending on the ambient/operating conditions (see chapter 10.5).

Reduced drive/braking power due to contaminated drive rollers
Dirty drive rollers may impair the drive/braking power.
- ▶ Remove dirt from the drive rollers regularly.

10.2 Regular safety inspections

⚠ 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 audible warning devices **every quarter**.
- Carry out a test of the safety equipment **in accordance with** the test cycles specified in chapter 10.2.
- 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.

10.2.1 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 11: 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 correct fastening.	6 months
Personal protection system (laser scanner) front and rear	Checking the basic function of the safety equipment	See chapter 10.3.1. 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.

10.3 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.

10.3.1 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. using 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 12 on Page 92 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 16 to Table 18 on pages 94 to 95.
- If the zone is violated, travel through the personal protection system must be prevented.
- Remove the test object from the zones and check whether the ACTIVE Shuttle starts again.

10.3.2 Checking the areas to be protected

- This check is performed by the Bosch Rexroth service.

10.4 Checking the optical and acoustic safety equipment

- Press the ON/OFF button (P) until the acoustic signal transmitter sounds.
- Release the ON/OFF button (P) immediately when the signal transmitter sounds.

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

10.5 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 10.6.1).

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 10.6.2).

Replacement of the entire cam rollers incl. slewing ring only by Bosch Rexroth. Contact the Bosch Rexroth service for 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 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 10.6.3).
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 manual AMS RB02831885).
In a state of health of ≤ 60%, the battery is worn and should be replaced. It may be necessary to replace the battery earlier, e.g. if the transport performance/flow of the ACTIVE Shuttle is no longer sufficient for your application.
For replacing the lithium-ion battery, see chapter 10.6.4.

10.6 Replacement of wear parts

10.6.1 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), **3 842 560 623**

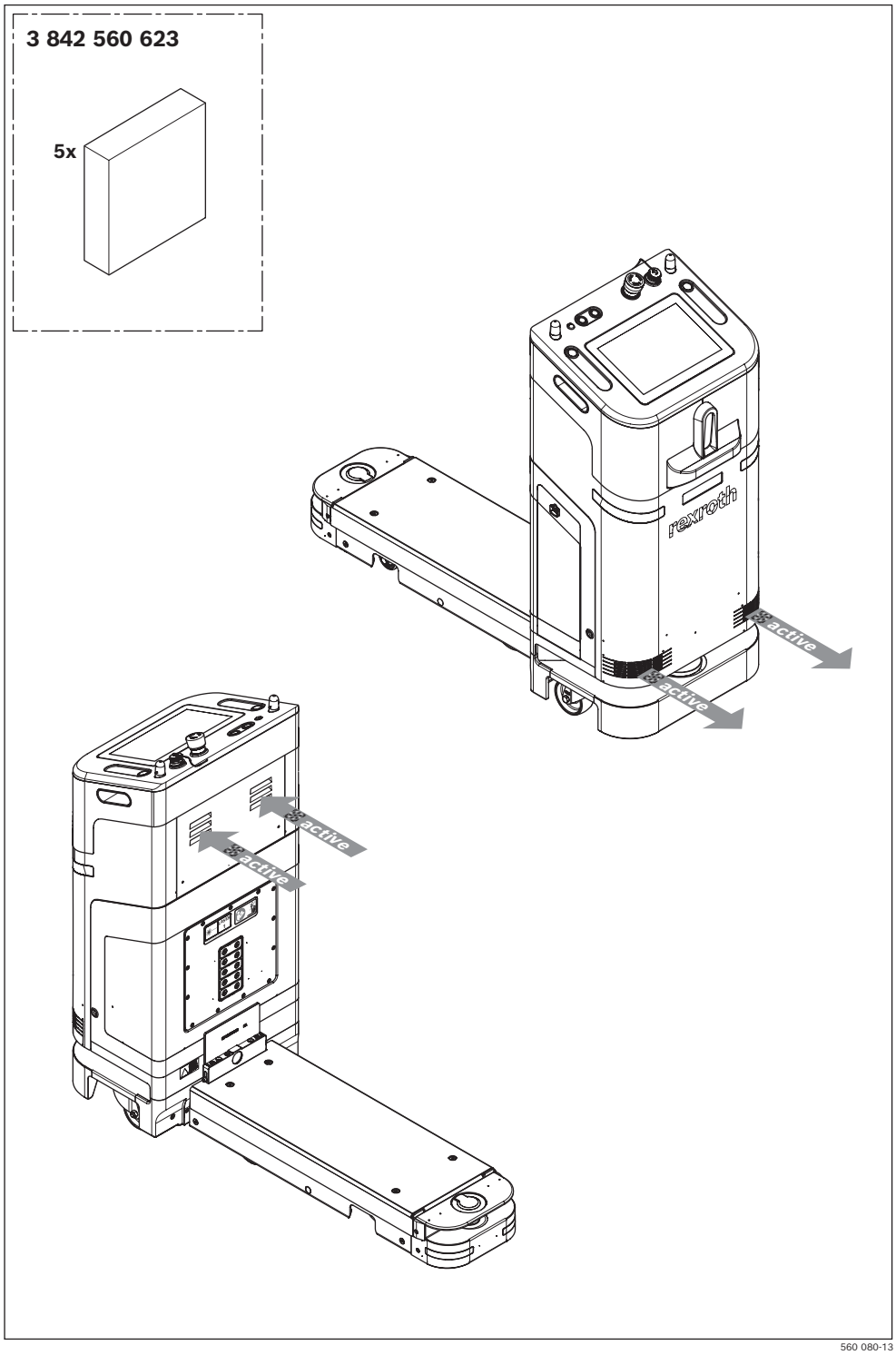


Fig. 23: Set of filter mats and fan positions

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 correspondingly done in the reverse order.

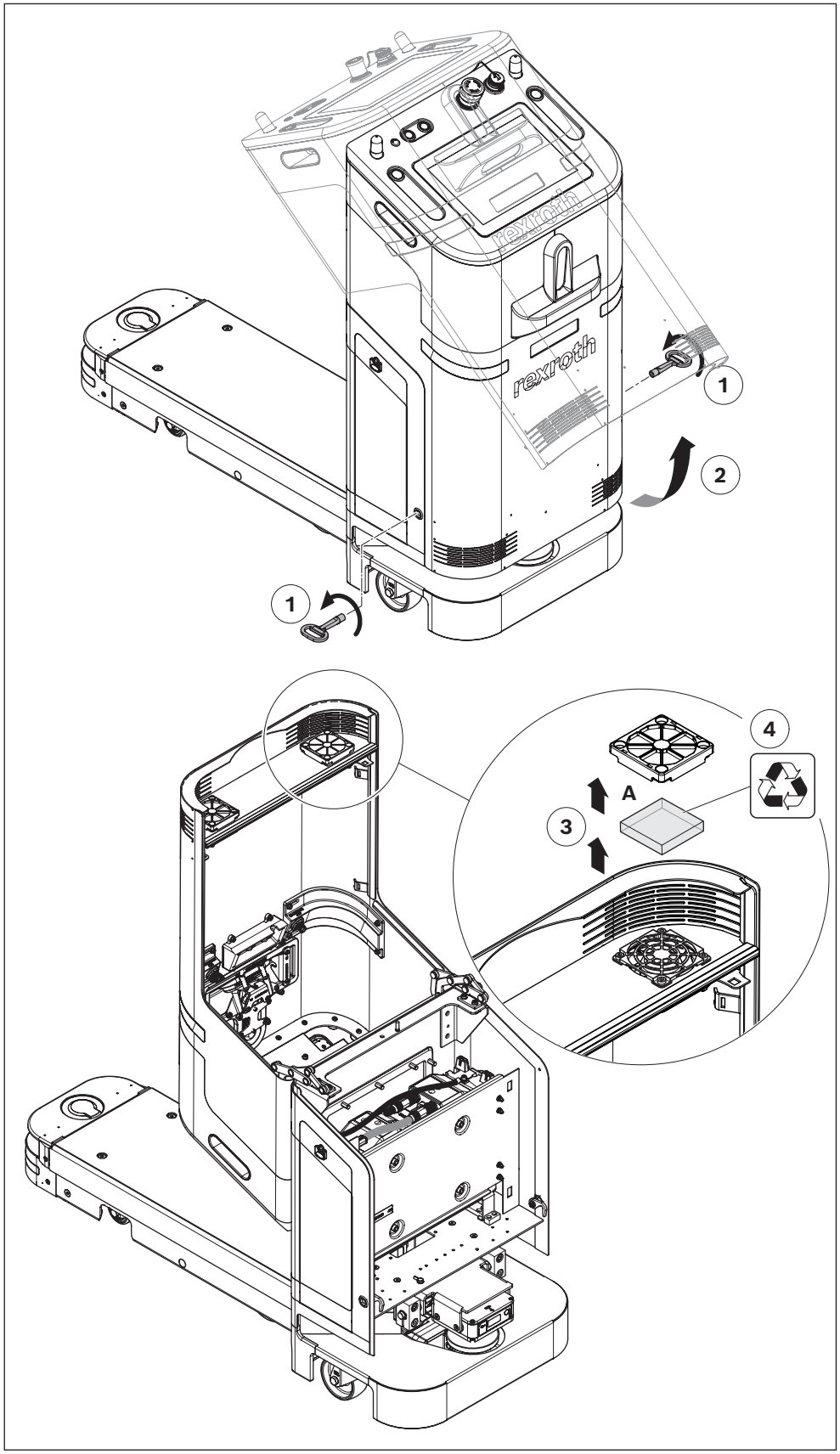


Fig. 24: Replacing the filter mats (example illustration)

10.6.2 Replacing the cam rollers

Please note:

- Only use the lift aid included in the scope of delivery to lift the ACTIVE Shuttle (see chapter 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 disassembly is possible.
3. Support the ACTIVE Shuttle at 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.

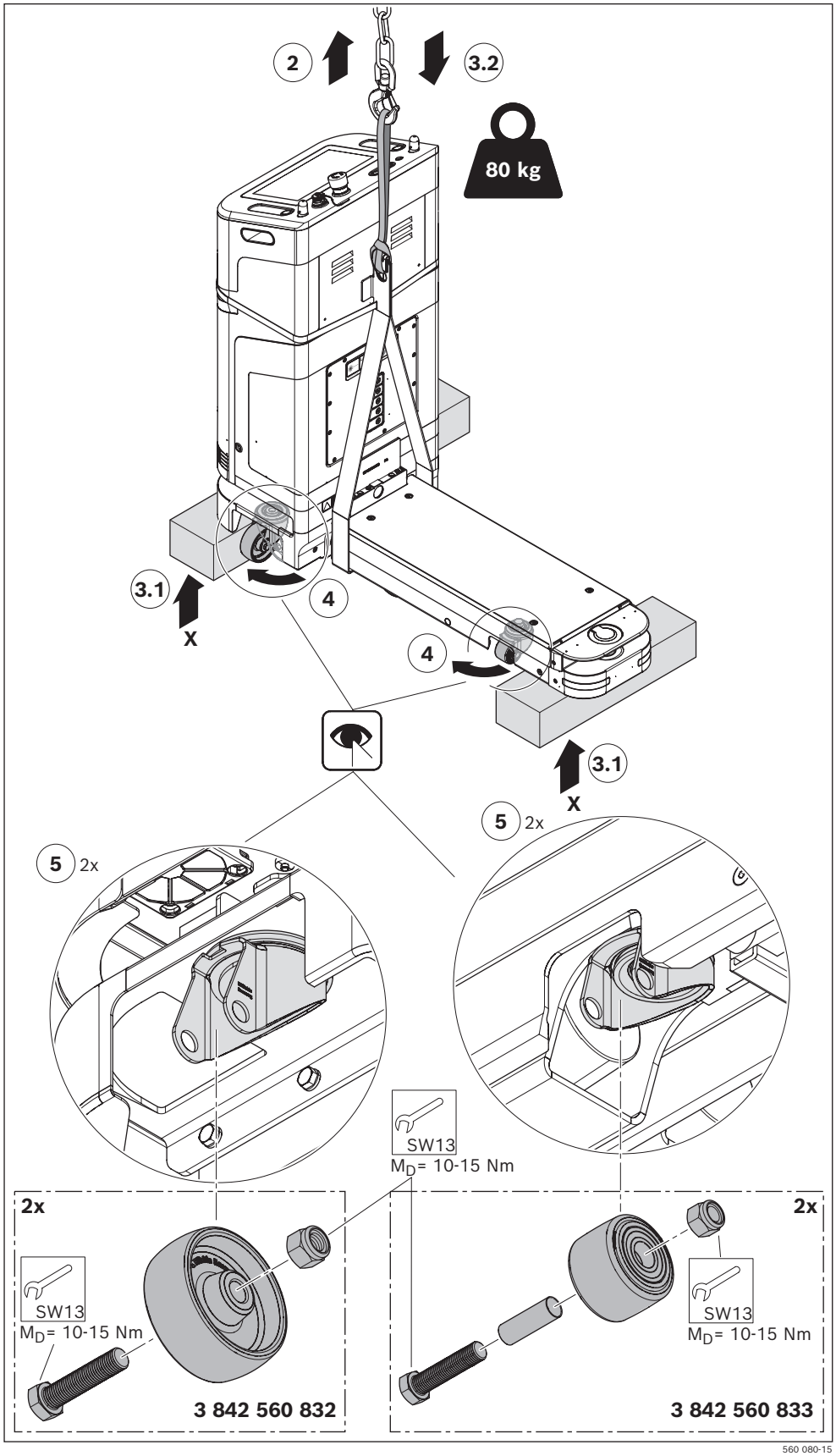


Fig. 25: Replacing the cam rollers

10.6.3 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
3 842 560 130

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.

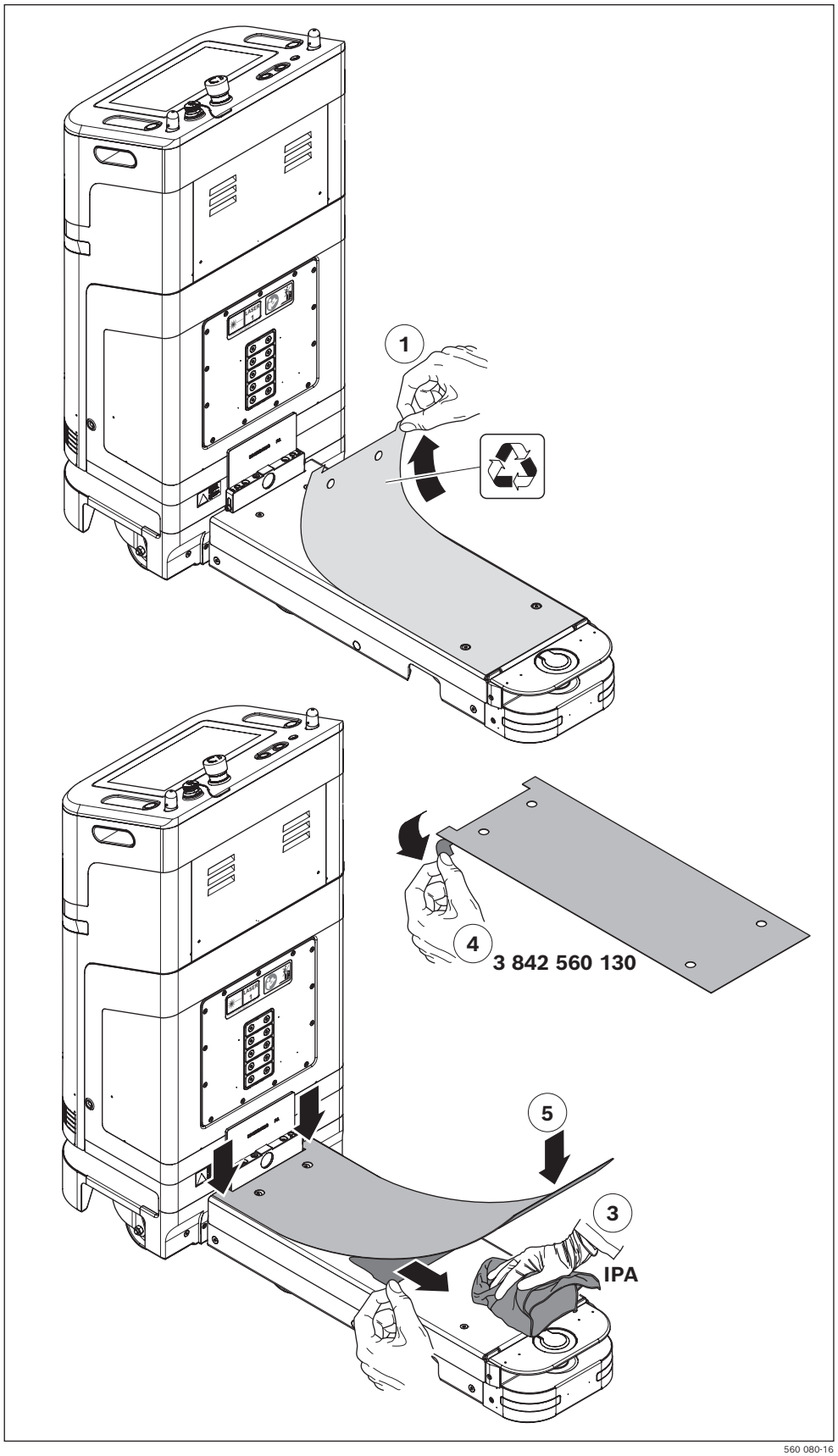


Fig. 26: Replacing the anti-slip mat of the loading area

10.6.4 Replacing the lithium-ion battery

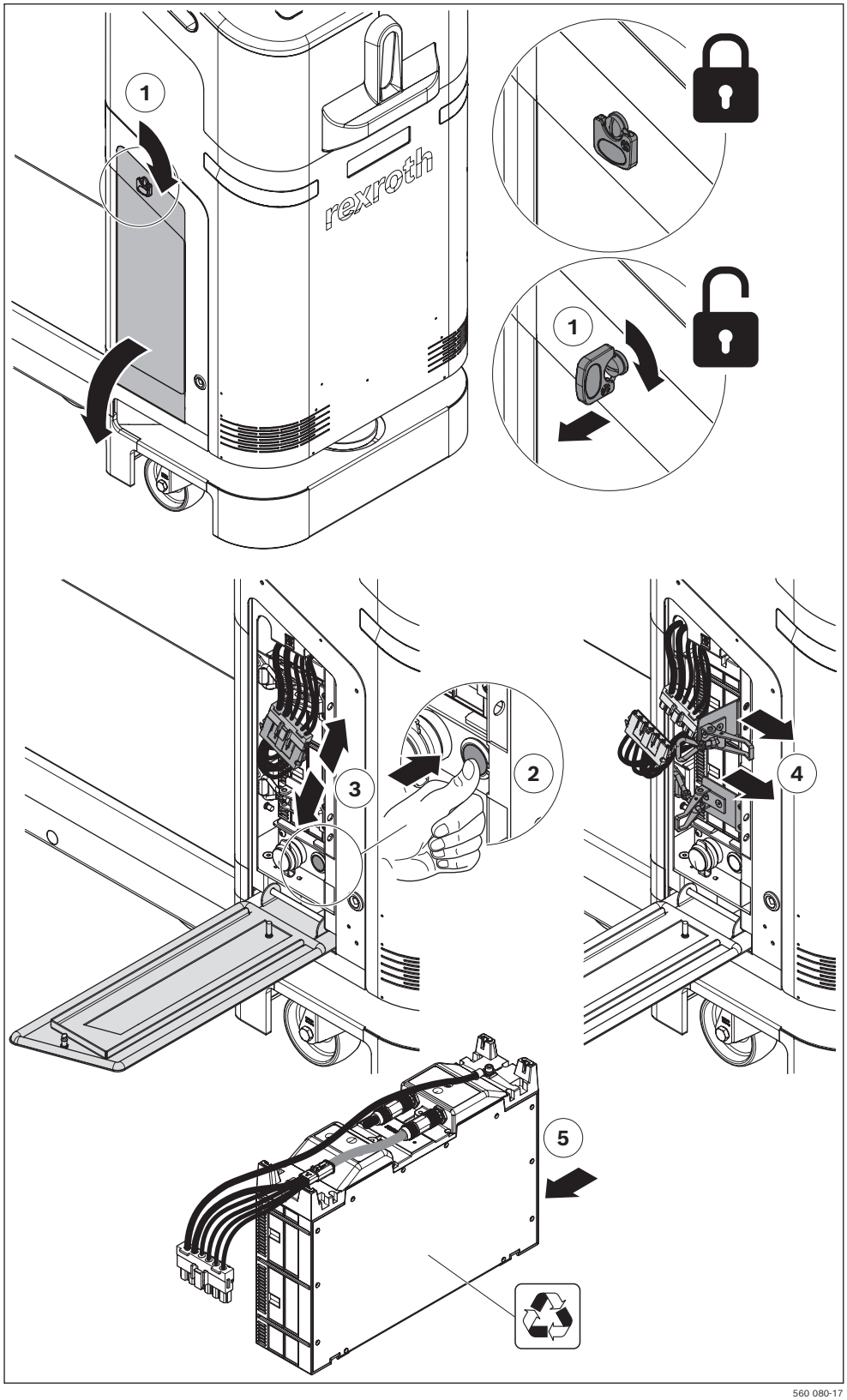
Please note:

- 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

1. Open the cover of the battery compartment.
2. Press 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 in case of loose seat.



560 080-17

Fig. 27: Replacing the lithium-ion battery

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 87.

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 batteries.
- ▶ 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 contamination.
- **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 fax numbers and email address under which we can contact you if we have any questions.

We are also happy to offer training courses on the topic of ACTIVE Shuttle troubleshooting and repair.

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**

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)
- Positioning 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 manual AMS **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. 28 Schematic diagram of the derivative value measurement)

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

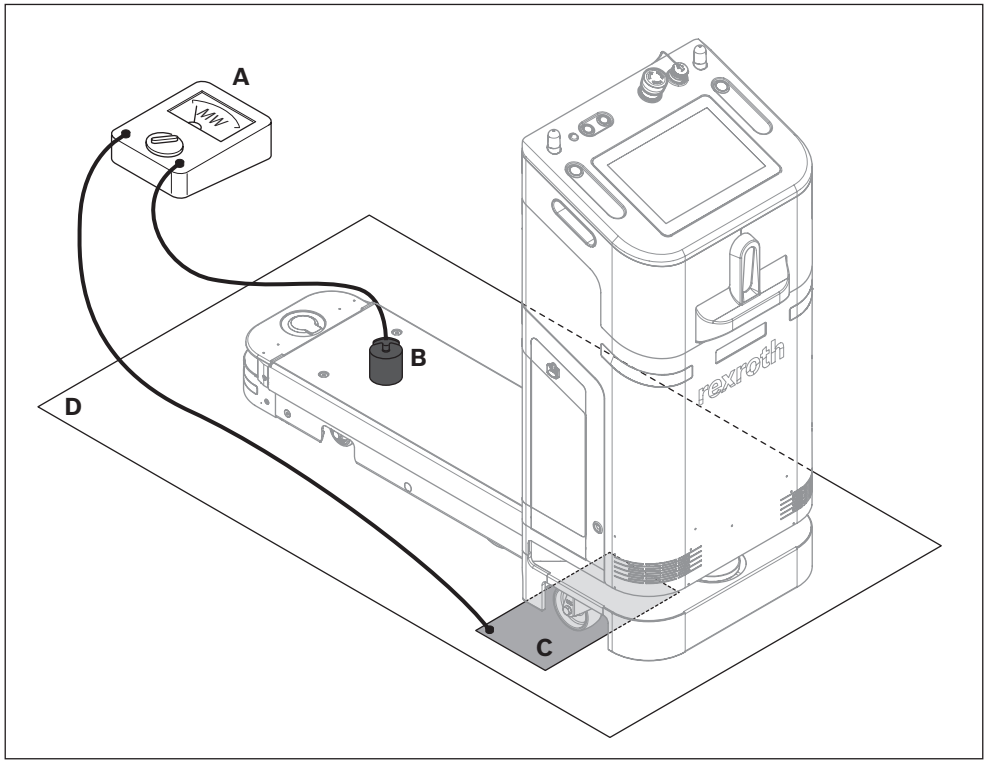


Fig. 28: Schematic diagram of the derivative value measurement

16.2 Lithium-ion battery

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

16.3 Charging station

Wall box

- Dimensions (HxWxD): 477 x 302 x 135 mm
- Weight: 13 kg
- Input voltage: 230 VAC ±15% 50/60Hz (1N PE) or
  400 VAC +15%/-10% 50/60Hz (3N PE)
- Rated output voltage: 60 VDC
- Charging current: max. 20 A
- Internal fuse: 16 A circuit breaker, triggering characteristic C

Docking station

- Dimensions (HxWxD): 417 x 402 x 131 mm
- Weight: 11 kg

Assembly frame

- Dimensions (HxWxD): 1,253 x 342 x 671 mm
- Weight: 12 kg

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 (up to a maximum of 1 hour) +5 °C to +40 °C
- 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 < 1400 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 manual AMS **RB02831885** or the manual AMR **RB2831888**.
If you have any questions, please contact your Bosch Rexroth contact person.

16.6 Floor requirements

- Slope/gradient: max. 2.5% only in driving direction (forwards or backwards)
- 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 ≥ μ ≥ 0.6 (wheel material: Vulkollan)
- Electrical conductivity: $R_g < 1 \times 10^9\ \Omega$ (ESD applications)
- Uneven floors: max. 6 mm high
  - Uneven floors only admissible in the driving range
  - Uneven floors not in sources, sinks or in the area of charging stations
  - Do not start at uneven points
- Joints: max. 6 mm high, max. 15 mm wide
  - Joints only admissible in driving range
  - Joints not in sources, sinks or in the area of charging stations
  - Repeating joints (e.g. gutters, drains) not admissible
  - No starting over joints

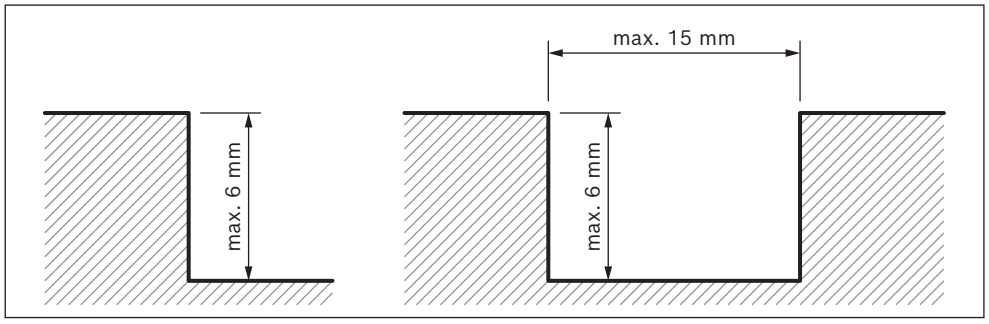


Fig. 29: Admissible uneven floors and joints

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. 30).
- ▶ The load must **not** exceed 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.

- 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. 30).
- 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 ≤ H/2.

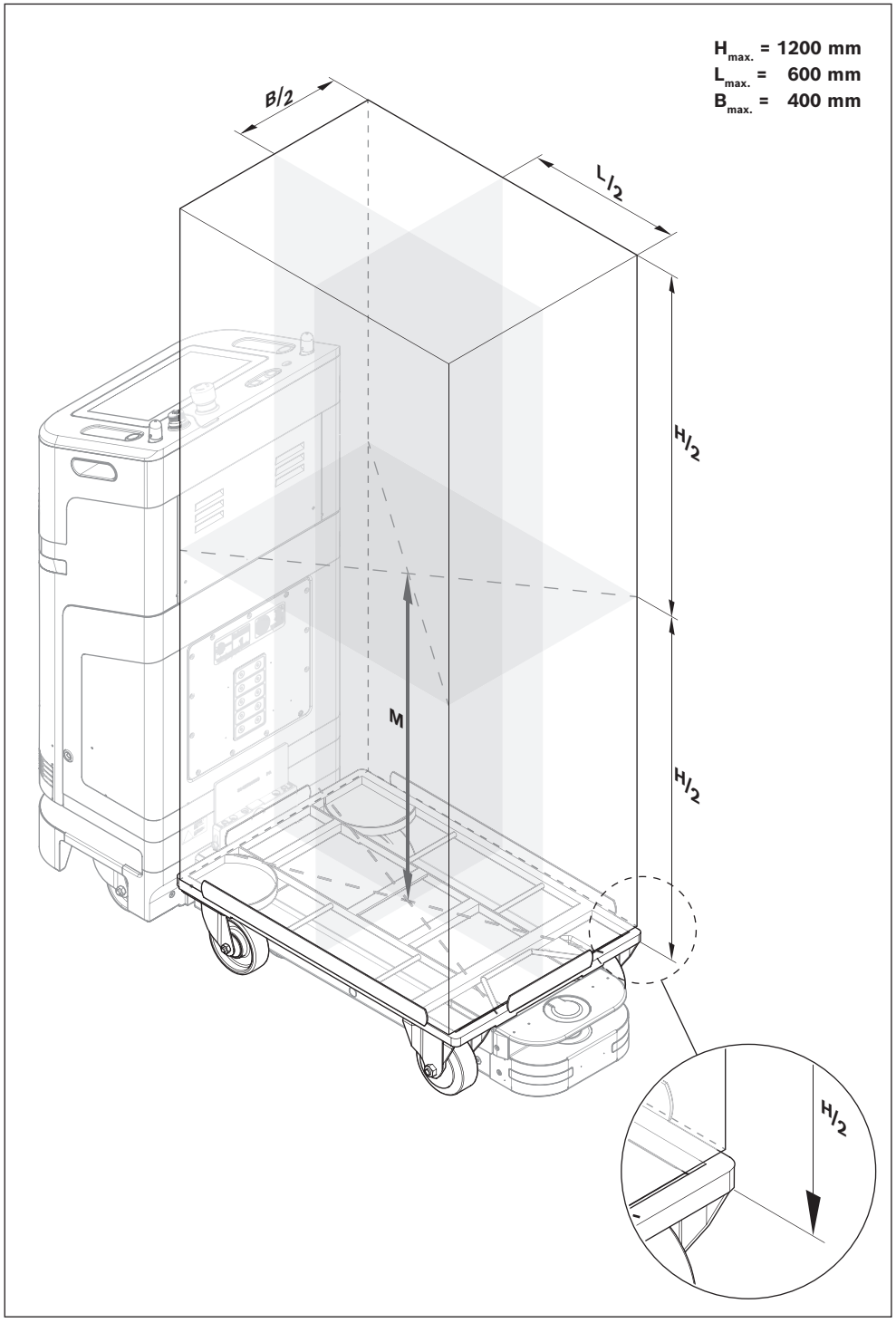


Fig. 30: Position of the mass point of the load

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 ±5° 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.

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 12: When driving forward

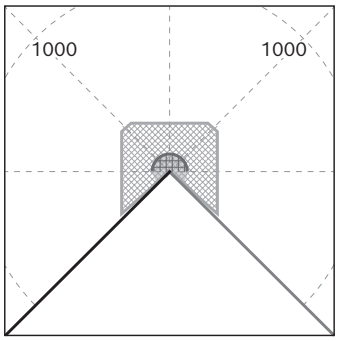
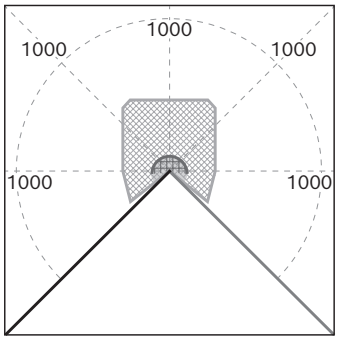
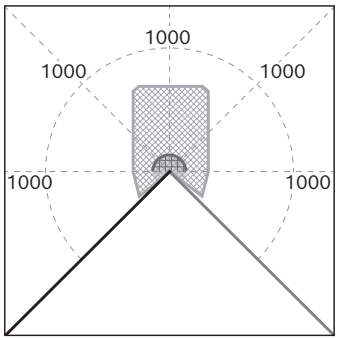
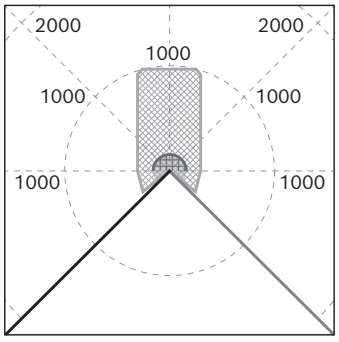
Zone	Vreg [mm/s]	Vmax [mm/s]	Protective field Width [mm]	Protective field Length [mm]	Protective field
1	0	50	500	270	
2	300	350	535	460	
3	650	700	535	690	
4	1,000	1,050	535	970	

Table 13: In curves

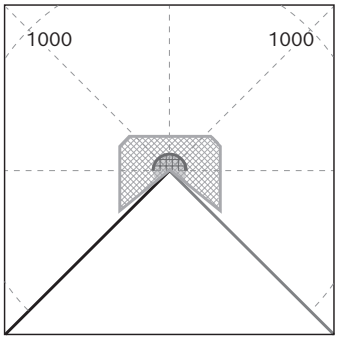
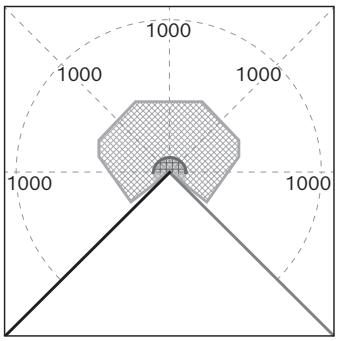
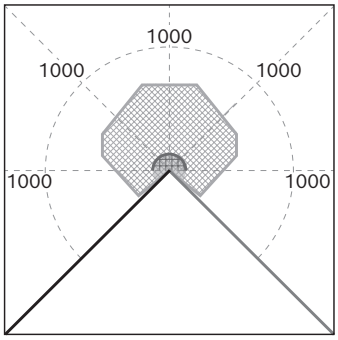
Zone	Vreg [mm/s]	Vmax [mm/s]	Protective field Width [mm]	Protective field Length [mm]	Protective field
5	0	50	500	170	
6	300	350	920	460	
7	650	700	1,080	690	

Table 14: In the danger area

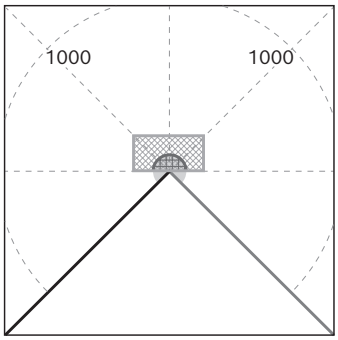
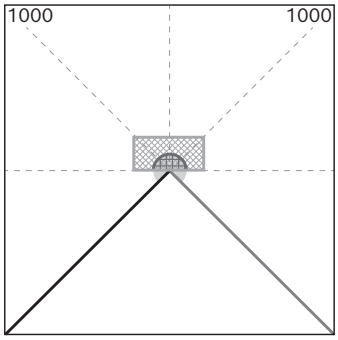
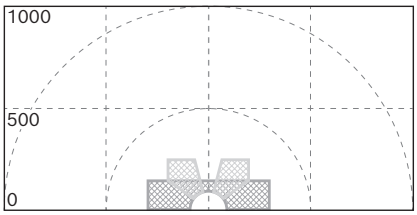
Zone	Vreg [mm/s]	Vmax [mm/s]	Protective field Width [mm]	Protective field Length [mm]	Protective field
8	100	110	400	200	

Table 15: When reversing

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

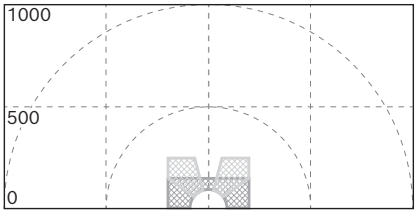
16.9.2 Rear protective fields

Table 16: When reversing

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

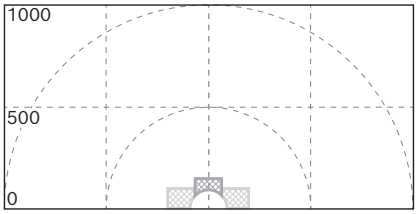
Warning field Protective field

Table 17: In the danger area

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

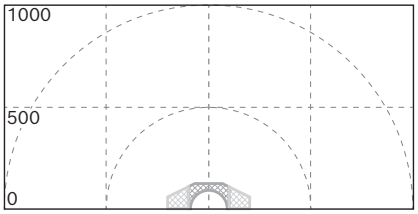
Warning field Protective field

Table 18: 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 19: 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)]

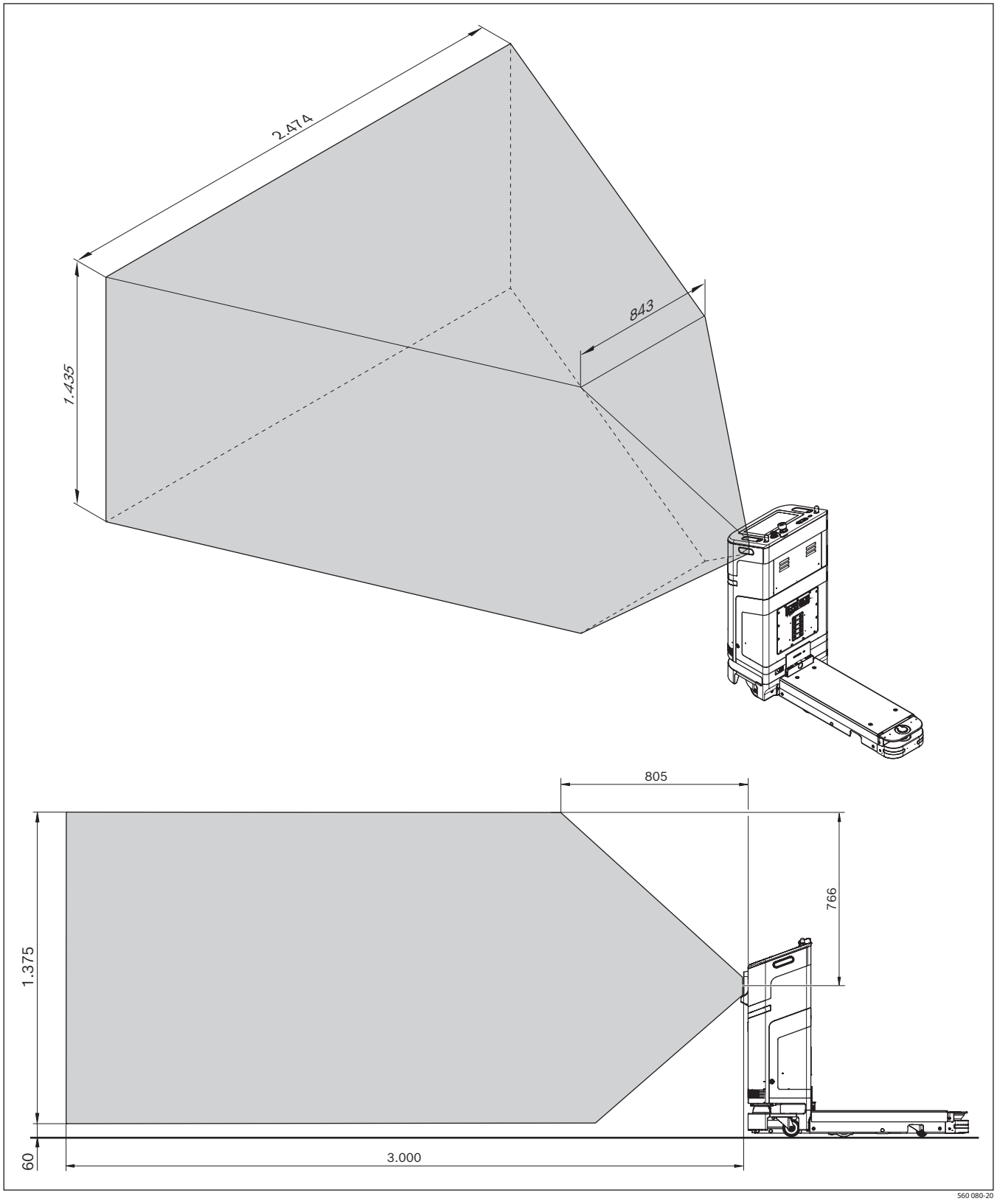


Fig. 31: Field distance range obstacle detection (all dimensions in mm)

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

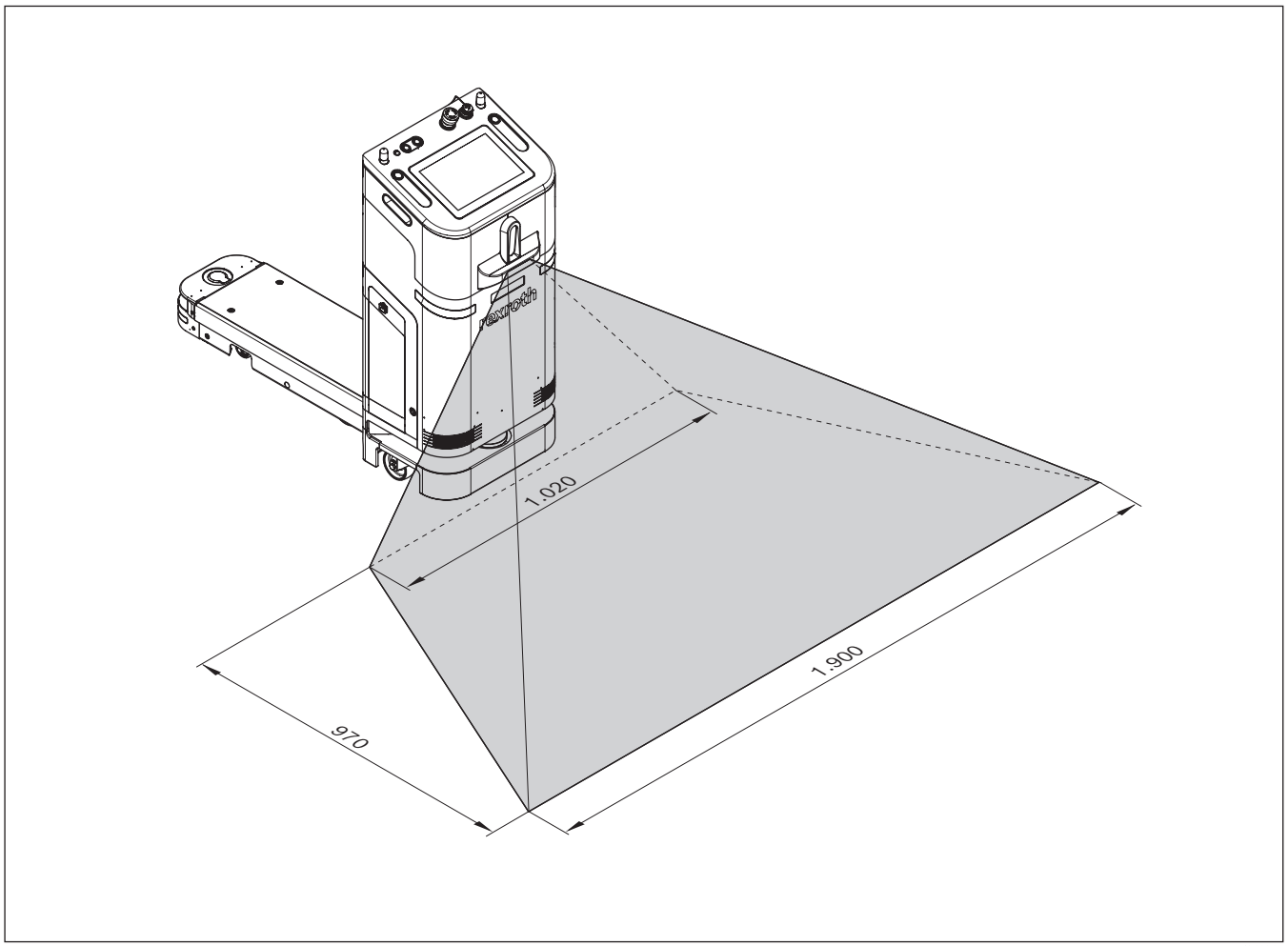


Fig. 32: Field close range obstacle detection (all dimensions in mm)

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Subject to modifications
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