

The GoPal® P35 Operators Manual



Robotize

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1 General Information

This manual provides a detailed overview of the GoPal® P35 Autonomous Mobile AMR.

GoPal P35: Type No. ATR2101 An AMR designed to transport up to a maximum weight of 250 kg.

1.1 Purpose of the Manual

This manual, produced by Robotize, serves as a comprehensive guide for operators of the GoPal Solution. It offers necessary instructions for the efficient operation of the GoPal P35 throughout its lifespan.

Before commissioning the AMR, please read the operating instructions carefully and follow the instructions. Always follow all the safety information contained in the operating instructions.

For future reference or for any new operators, keep this manual within reach.

Instructions must be stored carefully and must always be available to the operator.

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Please be aware that the actual product may slightly differ from the descriptions and illustrations in this manual. However, these variations will not impact the product's functionality.

1.2 Safety Notices

The following icons highlight safety instructions and crucial information:

DANGER!

This signifies a highly dangerous situation. Failure to comply may result in serious, potentially fatal injuries.

WARNING!

This underlines a potential risk. Ignoring these instructions could result in significant, possibly irreversible injuries.

CAUTION!

This symbolizes a potentially hazardous situation. Neglecting these instructions could lead to minor or moderate injuries.

NOTICE

This indicates potential property damage. Not adhering to these instructions may result in material damage.

1.3 Technical Assistance

For any issues not addressed by this manual, please seek technical assistance exclusively from your Robotize partner.

1.4 Important Safety Instructions

To ensure the safety of all personnel operating the GoPal AMR, adhere to the following additional safety instructions:

DANGER!

Serious injury or property damage can result from:

- Misuse or incorrect operation,
- Unauthorized access or tampering with the devices,
- Inadequate installation, maintenance, or repair.

DANGER!

All instructions concerning the correct usage, potential risks, installation, operation, and maintenance detailed in this manual must be understood and adhered to.

DANGER!

It is prohibited to ride on the AMR.

The AMR is designed exclusively for moving goods and not for transporting people. Any such misuse poses a high risk of serious or fatal injury.

WARNING!

Electrical hazard!

The AMR's battery can generate dangerous currents and voltages. To minimize risk, only individuals with specific training should handle the AMR, adhering to these guidelines:

- Always deactivate the AMR before performing any maintenance or work on it.
- Repairs should only be carried out by Robotize partners, who are authorized for such tasks.
- Under no circumstances should the AMR be modified.

WARNING!

Damage or defects can cause accidents.

Upon discovery of any safety-related modifications, damage, or operational defects in the GoPal AMR:

- Label the faulty device and remove it from operation.
- Report defects to your Robotize partner immediately.
- Only return the device to operation after your Robotize partner has identified and corrected the fault.
- After repairing or servicing the AMR's safety system, a safety function inspection is mandatory before returning the AMR to operation. This inspection must be conducted by a certified Robotize safety inspector.

2 The GoPal Solution

2.1 General Description

The GoPal Solution is a fully automated system designed to transport various types of goods using one or more Autonomous Mobile AMRs.

These GoPal AMRs navigate using integrated sensors, which enable autonomous movement within different environments, such as factory buildings or warehouses.

The GoControl Fleet Management System, which can either be a virtual solution or a physical server installed on-site, centrally monitors, controls, and configures all aspects of the GoPal Solution, including the AMRs, stations, and potential accessories.

Key responsibilities of GoControl include:

- Assigning and prioritizing tasks for GoPal AMRs.
- Sending AMRs to the Charging Station for automatic charging when required.
- Collecting and displaying system data, including distances driven.
- Interfacing with your ERP/WMS system for seamless operations.

The GoPal Solution may also include one or more Buttons, which allow users to instruct the system to transport an AMR from one destination to another. The system might feature an IO Box as well, which provides a generic interface for sensors or equipment such as automatic doors or fire alarm systems.

The GoPal AMR communicates via Wi-Fi. To ensure successful operation of the GoPal Solution, it is crucial that the company's Wi-Fi network provides complete coverage of the operational area and maintains sufficient quality. Additional devices such as Buttons and IO Boxes can communicate through either wired Ethernet or Wi-Fi.

NOTICE

Designed for indoor use on level floors, the system can operate in temperatures ranging from -10 to +45 degrees Celsius in a non-condensing environment.

2.2 Operating Environment

Each GoPal AMR is equipped with two forward-facing 3D cameras: one camera detects objects on the path, and the other is used for detecting free height e.g. through doors. Additionally, a single 3D camera is located at the rear of the GoPal AMR, which detects objects when reversing.

NOTICE

The GoPal operator is responsible for ensuring that the entire operating floor surface meets the required coefficient of friction (see Table 4 GoPal P35 Spec Sheet). For instance, if oil or water is spilled in the transport area, it must be closed off to GoPal AMRs until the surface regains the necessary friction.

NOTICE

Before installing the GoPal Solution, ensure that the transport area's floor has sufficient strength and is level, or nearly so (see Chapter 8, Technical Information).

⚠ CAUTION!

Note that 3D detection is not 100% reliable. Therefore, the GoPal operator should perform a daily walkthrough of the GoPal operating area to check for potential obstructions. Any found objects should either be removed or safely indicated for GoPal by marking areas at LIDAR detection height (128 mm off the floor), for example, using warning cones. Ensure the distance between cones does not exceed 80 cm to guarantee that GoPal will not venture beyond the markings.

2.3 Transportation

1. GoPal maintains enough load on the driving wheels for safe manoeuvring, also during emergency braking.

⚠ DANGER!

Please note that it's essential not to exceed the maximum load of the GoPal AMR and any accessories.

Always ensure that the top modules can withstand the load and usage conditions imposed by the GoPal Solution.

In addition to these load condition requirements, it's crucial that the load on the top modules does not extend beyond the GoPal bumper or the GoPal emergency stops. Any protrusions could compromise the GoPal safety functions.

2.4 GoPal Solution Installation

⚠ DANGER!

Installation of the GoPal Solution must only be conducted by a Robotize partner.

2.5 Servicing and Parts Replacement

⚠ DANGER!

All replacements of GoPal Solution parts must be carried out by an individual authorized by Robotize. This ensures the maintenance of the system's high safety level. In case of a breakdown, contact your Robotize partner.

After repairing or servicing the AMR's safety system, a safety function inspection is mandatory before returning the AMR to operation. This inspection must be conducted by a certified Robotize safety inspector.

3 Safety information

3.1 General Safety Directions

During the design and construction of the GoPal Solution, Robotize prioritized safety and health risks to those working with the system. In addition to complying with relevant legislation, Robotize adhered to all requirements of good construction techniques.

This manual aims to ensure that GoPal operators understand the need for caution in all operations to mitigate risks. Prior to initial use of the GoPal Solution, operators should read this entire manual and ensure they comprehend all the contents, particularly safety-related information.

⚠ DANGER!

The GoPal Solution and its accessories should only be used for purposes prescribed by Robotize. Using the system for unsuitable purposes could pose a health and safety risk to individuals and risk damaging the equipment. The intended and approved uses for the GoPal Solution are detailed in this manual.

Altering, removing, or bypassing the installed safety devices is strictly prohibited. Timely execution of the prescribed service inspections is also mandatory. Failure to comply with these requirements could result in serious health and safety risks as well as potential equipment damage.

⚠ DANGER!

All repairs to the GoPal Solution should generally be performed by an approved partner or individuals authorized by Robotize. Not adhering to this could result in personal health and safety risks.

A limited number of repairs may be performed by GoPal operators or other unauthorized individuals, but only if explicitly stated in this manual.

After repairing or servicing the AMR's safety system, a safety function inspection is mandatory before returning the AMR to operation. This inspection must be conducted by a certified Robotize safety inspector.

⚠ DANGER!

It is expressly forbidden to use any element of the GoPal Solution in areas with explosive or flammable atmospheres.

NOTICE

Maintaining the GoPal Solution and its accessories in good and functional condition is essential. Follow the maintenance instructions provided by Robotize to ensure operational reliability and extend the product's lifespan.

NOTICE

Take note of the symbols on all labels and understand their meanings. These symbols, their shapes, and colours, specifically relate to safety. Ensure that these labels remain legible and comply with the information they provide. If any labels become illegible, you can order new ones from your Robotize partner.

3.2 Warning Labels

The GoPal Solution features warning labels placed in high-risk areas for the safe operation of the system. These are explained as follows:



Figure 1 Do Not Step

The safety label in Figure 1 Do Not Step marks areas where stepping or sitting on the equipment is strictly prohibited.



Figure 2 Do Not Enter

The safety label in Figure 2 denotes areas where entry into the equipment is strictly prohibited.



Figure 3 Max Load 300 kg

The maximum load sticker in Figure 3 showing the maximum permissible load, e.g. 300 kg.

3.3 Safety System Overview

AMR LIDAR Safety

The primary safety system of GoPal AMR is comprised of two safety-approved LIDAR laser scanners. These scanners emit laser beams encircling the AMR at approximately 13 cm above the floor. This system actively monitors the AMR's surroundings, assessing collision risk with objects or people. If a potential collision is detected, the AMR's safety functions initiate a safety stop. The slower the AMR's speed, the closer an object or person can approach without triggering a safety stop.

If the LIDAR protection is activated by an object or person, the AMR initiates a safety stop. After verifying that the path is clear, the AMR resumes operation automatically. At low speeds, the LIDAR safety function is disabled to facilitate tight manoeuvring, such as through doorways.

AMR Bumper Safety

In addition to the primary LIDAR safety system, GoPal AMRs possess a secondary safety mechanism—a mechanical bumper encircling the AMR. This system remains active even when the LIDAR safety is disabled. If the bumper makes contact, the AMR performs an emergency stop and must be manually restarted using the Safety Reset button located at the AMR's rear.

AMR Bumper Safety Automatic Reset Function

GoPal P35 AMR has an automatic reset function for the bumper safety stop. If the bumper safety switches are not activated within 3 seconds, the automatic reset function allows the robot to resume movement automatically after a bumper stop. As a warning, the AMR will flash its LEDs and beep 2 seconds before resuming movement.

⚠ CAUTION!

The 3-second bumper safety automatic reset function will automatically allow the AMR to move, so operators should exercise caution.

AMR Emergency Stops

Beyond these two safety systems, GoPal AMRs feature two mechanical emergency stop buttons. A firm push on any of these red buttons halts the AMR. To resume movement, the emergency stop must be released by turning the knob back to its original position and pressing the Safety Reset button at the AMR's rear.

In an emergency or safety stop situation, the AMR employs aural alerts and visual signals, such as flashing front and rear lights, to warn its surroundings. These signals also serve to draw attention when the AMR performs actions associated with potential safety risks.

Additionally, GoPal AMRs are equipped with a green warning light at the front, illuminating the path ahead to alert other traffic of the AMR's approach—particularly useful around corners and doorways.

Through these integrated safety systems, Robotize aims to minimize the risk of accidents and personal injuries associated with system use.

3.4 Role and Safety Responsibilities: GoPal Operator

Every GoPal Solution must designate at least one qualified GoPal operator responsible for the system's operation and safety. The operator's duties include:

- Ensuring the physical safety of individuals interacting with the GoPal Solution.
- Maintaining the system's safety features in proper working conditions.
- Complying with the specified service intervals for the GoPal Solution.

The operator must be familiar with all safety guidelines outlined in this manual.

3.5 Safety Instructions: Transportation Area

⚠ DANGER!

Breaking and Friction:

GoPal's braking system depends on the friction between the AMR's wheels and the floor. The surface's friction coefficient should meet or exceed the value specified in Table 4 GoPal P35 Spec Sheet. If the area becomes slippery due to spills or debris, the friction can decrease drastically, endangering safe GoPal operation. This can present health and safety risks to personnel and potential damage to the equipment. GoPal operators are obligated to keep the GoPal's driving area clear and maintain the required friction coefficient.

⚠ DANGER!

Load-Bearing Capacity:

The floor's load-bearing capacity must support the combined weight of the load and the GoPal AMR comfortably. Therefore, floors should have a minimum compressive strength of 25 MPa.

⚠ DANGER!

Stairs and Ramps:

The operational boundaries for the GoPal AMR must be configured to prevent it from approaching stairs, ramps, or inclines steeper than those specified in Table 4 GoPal P35 Spec Sheet. Additionally, it is crucial to physically close off areas like stairs and ramps to the AMR, for instance, by using cones or similar barriers. This physical demarcation is necessary as a safety measure, even when such areas are marked in the AMR's operational configuration. Failure to adequately secure these areas can lead to significant safety hazards and equipment damage.

⚠ DANGER!

Operation on Inclines:

GoPal AMRs are certified for operation on near-level floors (see Chapter 8 for more technical information). Using the AMR on inclines steeper than recommended could destabilize the AMR or its load, posing risks to people's health and safety and potential equipment damage.

You must verify the maximum floor inclination during the installation process.

⚠ WARNING!

High and Low Obstacles:

Objects that protrude into the GoPal AMR's path but are above or below the LIDAR detection range (see Chapter 8 Table 4 GoPal P35 Spec Sheet more technical information) can be hit by the AMR or its load. Such collisions can cause severe damage to the AMR, the load, or the object.

The GoPal operator is responsible for keeping the AMR's driving area free from both protruding and small objects.

3.6 Safety Instructions: Personnel and Vehicles

⚠ DANGER!

Avoiding Contact:

Do not place hands or feet under the GoPal AMR or its load.

Doing so poses a health and safety risk and could cause equipment damage.

⚠ DANGER!

Prohibited Use:

GoPal AMRs must not be used to transport people, and the stations of the GoPal Solution should not be stepped or sat upon. These actions could result in personal injury.

⚠ DANGER!

Interactions with Traffic:

The GoPal AMRs are designed to avoid stationary objects and people. However, sudden movements from individuals on foot or vehicles, such as trucks, may trigger emergency braking. During this process, the AMR continues its path, and a collision may not always be avoidable due to the required braking distance. The AMR will emit aural and visual warnings during emergency braking. It's particularly sensitive to cross-traffic, so extra care is necessary when crossing the AMR's path. This situation poses a health and safety risk and could additionally cause equipment damage.

3.7 Safety Instructions: Handling Loads

⚠ DANGER!

Exceeding Maximum Load:

Overloading the GoPal AMR could cause the AMR to become damaged or malfunction, and it could also compromise the AMR's driving stability. Overloading may pose health and safety risks and risk equipment damage.

The GoPal operator must ensure that the weight transported by the GoPal AMR does not exceed the maximum limit through appropriate staff training.

⚠ DANGER!

Loads Protruding Beyond the AMR's Dimensions:

As mentioned in section 3.3 *Safety System Overview*, the main safety components of GoPal AMRs are the LIDAR and bumper detectors, which detect nearby objects or individuals. Thus, it's crucial that the load transported by GoPal AMRs do not extend beyond the AMR's dimensions on any side. If a load is longer or wider than the GoPal AMR, it won't be adequately protected by the AMR's safety function and may collide with surrounding objects or individuals. This could pose serious health and safety risks and damage equipment.

The GoPal operator is responsible for ensuring, through appropriate staff training, that the loads do not extend beyond the GoPal bumper or cover the GoPal emergency stops.

⚠ DANGER!

Load Stability:

The GoPal AMR's movements are designed based on guidelines for the load's centre of gravity and stability. Non-compliance with these guidelines may cause the load to fall off the AMR during transportation and strike people or equipment. An incorrect centre of gravity can also significantly impact the AMR's braking capacity. This could pose health and safety risks and risk equipment damage.

It is the GoPal operator's responsibility to comply with the GoPal AMR's loading guidelines (refer to TBD).

3.8 Safety Instructions: Charging Station

DANGER!

While Parked:

When a GoPal AMR is parked in the charging station, its LIDAR safety function is deactivated to facilitate parking in the limited space available. The mechanical bumper remains active, but certain areas of the AMR unprotected by automatic safety functions present a potential risk to personal health and safety, as well as equipment damage. The AMR will emit continuous audio and light signals to alert personnel to potential dangers. In situations with a potential trapping risk, activate the AMR's manual emergency stop to halt its operation. Risk areas for trapping are marked with a warning label (see *Section 3.2*).

4 The GoPal P35

Autonomous Mobile Robot (AMR) for automatically picking up, transporting and delivering payloads up to 250 kg // 550 lbs using either custom top modules/equipment or top modules/equipment from leading suppliers.

The GoPal P35 AMR is CE-approved and adheres to safety standards for operation among people as stipulated by the Machine Directive.



Figure 4 GoPal P35



Figure 5 GoPal P35 front view

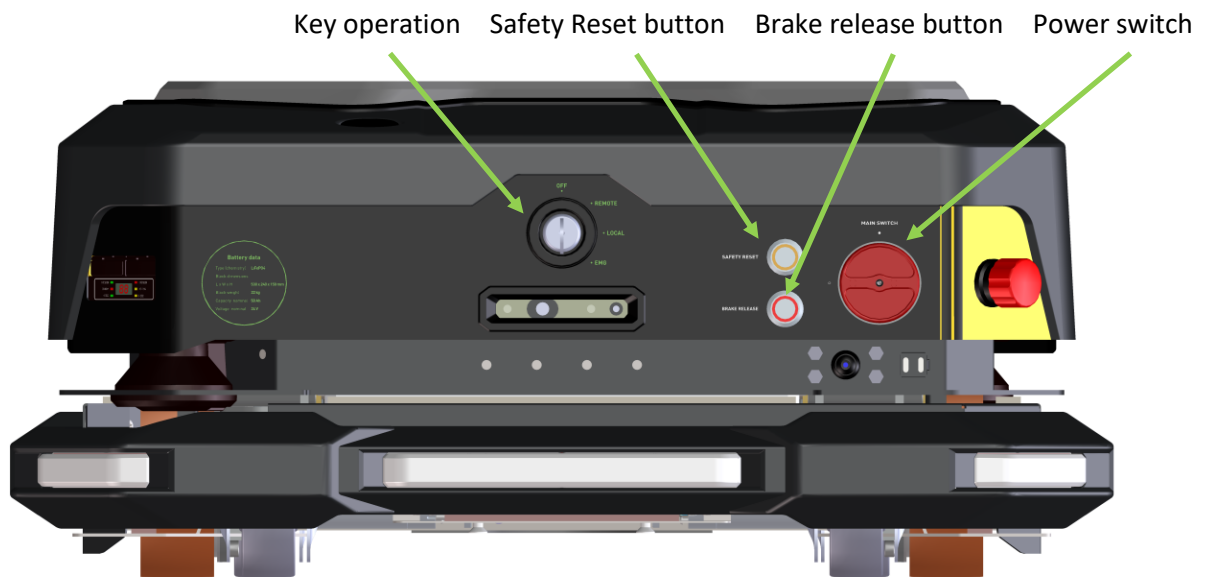
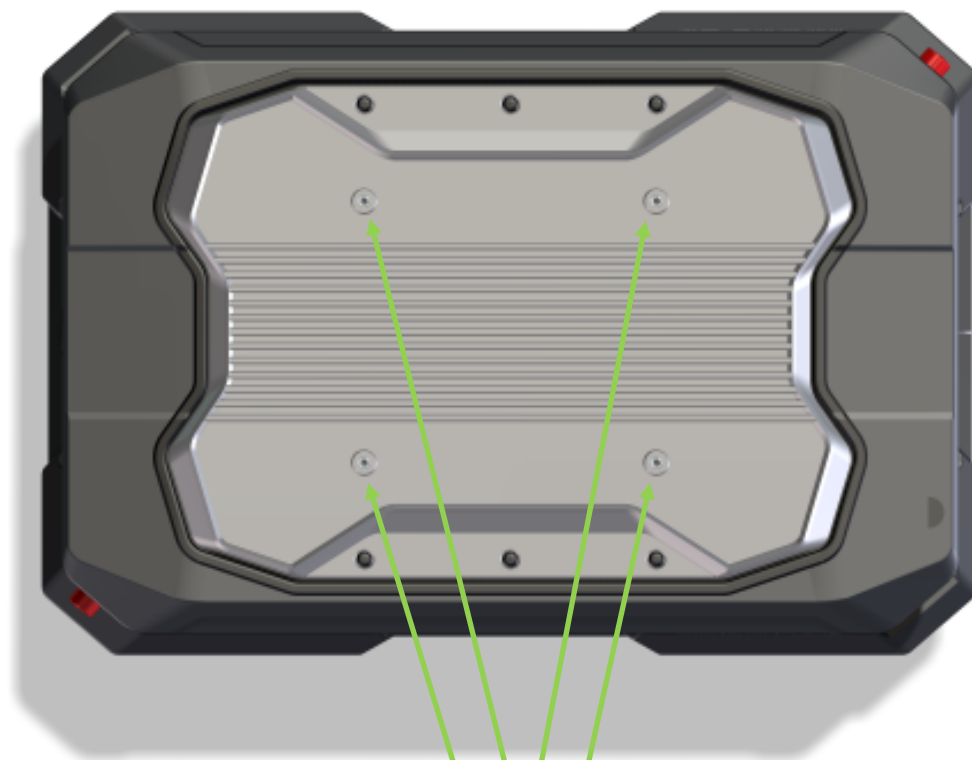


Figure 6 GoPal P35 rear view



Product label

Figure 7 GoPal P35 side view



Mounting holes for top module (M8)

Figure 8 GoPal P35 top view

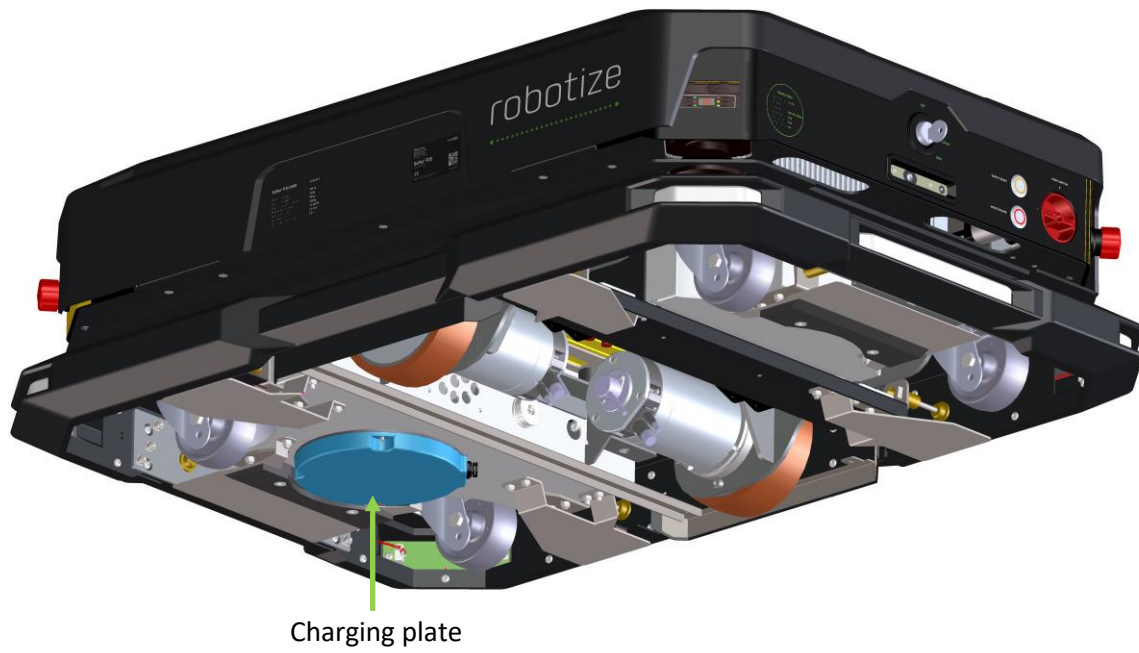


Figure 9 GoPal P35 bottom view

4.1 Type Label

The type label, located at the left side of the AMR, displays information about the serial number, model, production date, and approval certification.



Figure 10 Type Label GoPal P35

4.2 Foil Label

The GoPal P35 has a foil sticker on its back, which provide information regarding load capacity, weight, battery specifications and speed ect. For a list of technical information, refer to Section 8.



Figure 11 P35 foil sticker at rear side

4.3 Function and Use

NOTICE

Before using GoPal for the first time, it is required to read this entire manual and ensure its contents are fully understood, particularly the sections related to safety. GoPal should only be used for the purposes described in this manual. Any manipulation of the GoPal Solution to achieve performance deviating from the normal operating parameters may compromise safety.

4.3.1 Stopping GoPal in Safety Mode

The GoPal AMR can be safely brought to a halt by pressing one of the two red emergency stop buttons, each located at a corner of the AMR. Activating an emergency stop will safely halt the AMR, and it will remain non-operational until the emergency stop button is released by turning it. Following this, the Safety Reset button must be activated to resume operation.

4.3.2 Emergency Stop

Two of the corners of the GoPal AMR is equipped with an emergency stop button (see Figure 4 GoPal P35 **Error! Reference source not found.**). These buttons are activated by firmly pushing the top of the button. Once pressed, the button will stay in a depressed state until it is twisted slightly, which allows it to return to its normal position.

If an emergency stop button is pressed while GoPal is moving, the AMR will perform a controlled braking manoeuvre to prevent loss of control and potential loss of load.

Following an emergency stop, the Safety Reset button must be pressed after releasing the emergency stop button, to reactivate the AMR.

4.3.3 Mechanical Bumper

The mechanical bumper (see Figure 6 GoPal P35 rear view **Error! Reference source not found.**) spans all sides of the GoPal AMR. Should GoPal touch an object via the bumper, it will execute a controlled braking manoeuvre. To reactivate the AMR after the bumper has been triggered, the object and the AMR must be separated. Then, the restart button must be activated for GoPal to resume operation.

4.3.4 Safety Reset Button

The Safety Reset button (see Figure 6 GoPal P35 rear view) is located at the rear of GoPal. If the mechanical bumper or any of the emergency stop buttons have been triggered, this button must be pressed to reset the safety system of the AMR. After holding the Safety Reset button for a minimum of 1 second, GoPal will emit an audible warning signal and flash a light to indicate its active state.

4.3.5 Brake Release Button

The Brake Release button (see Figure 6 GoPal P35 rear view) is located at the rear of GoPal. To release the AMR's brakes, press this button while the key switch is in the "Emg" position. The brakes will remain released as long as the button is pressed, allowing the AMR to be moved away from an object if its bumper has been engaged.

DANGER!

Exercise caution when activating the brake release system. If the AMR is on an inclined surface, it may roll when the brakes are released.

4.3.6 Key Switch for Operating GoPal

The key switch, located at the rear of the AMR (see *Figure 6 GoPal P35 rear view*) is used to control GoPal. The key switch has several positions:

- **“Off”**: Power to GoPal is turned off, and all lights are switched off. The AMR stops and ceases movement. Although GoPal is turned off, the batteries will slowly drain and should be fully charged at least every other month. Note that it's typically not necessary to manually turn off the AMR, except during prolonged periods of non-use, such as holidays.
- **“Remote”**: Powers on GoPal and sets it to a normal operating state.

NOTICE

After turning the key to “Remote”, the Safety Reset button must be pressed for GoPal to become operational and manageable by GoControl.

- **“Local”**: Powers on GoPal and sets it to a local manual control state. In this mode, GoPal can be controlled manually by logging into the AMR's own Wi-Fi access point and accessing the GoPal user interface via a mobile device's browser. Through this interface, GoPal can be moved manually.

NOTICE

Even when controlled manually, GoPal's safety features remain active. Thus, the Safety Reset button must be pressed after the AMR has been started in Local mode before GoPal can move.

- **“Emg” (Emergency)**: Partially powers on GoPal. While the key is in this position, the AMR will not move, but the brakes can be released, allowing the AMR to be moved manually. The AMR's brakes can be released by pressing the brake release button.

4.3.7 Main Power Switch

The Main Power Switch disconnects the batteries from the AMR's electronics. The switch is set to OFF when the AMR leaves the factory. Turn it to ON when you start using the AMR.

⚠ WARNING!

Do not use the Main Power Switch to turn OFF the AMR during normal operation. Always use the key-switch to power the AMR OFF and ON. This ensures that the AMR is safely shut down and started up.

The Main Power Switch should only be in the OFF position when the AMR is being shipped or when you are servicing the AMR.

4.3.8 Top module

The GoPal P35 offers the ability to mount a top module as desired. There are four M8 mounting holes at the top of P35.

NOTICE

The maximum length of the mounting screws are 40 mm incl. a 13 mm spacer, cover and a washer.

4.4 Deployment

To deploy your GoPal P35, you should follow these steps:

- Set up GoControl in coordination with your Robotize partner or directly with Robotize.
- Configure the settings in GoControl as per your specific needs.
- Charge the GoPal P35 for the first time using the Charging Station or the emergency charging connector (refer to Chapter 9.1 Emergency charging).
- Your Robotize partner or Robotize will use the GoPal P35 to map the desired operational area.
- Your Robotize partner or Robotize will provide training to GoPal Operators for the safe and effective operation of the GoPal Solution.

Always remember to follow each step closely to ensure a smooth and successful deployment process.

4.5 GoPal Light and Sound Indications

The GoPal AMR is equipped with operating lights (see *Figure 4 GoPal P35*) that function in the same way as those on a car. GoPal has white lights at the front, red braking lights at the rear, and orange corner lights that function as indicators when turning.

Additionally, GoPal has a powerful green light installed at the front (See *Figure 4 GoPal P35*) illuminating the floor several meters in front of the AMR. The purpose of this light is to alert other traffic to an approaching GoPal AMR.

The GoPal is also equipped with a warning horn (buzzer) that is activated when the AMR performs operations requiring extra caution for safety.

Table 1 provides an overview of GoPal's light and sound indications. It is designed to assist users in understanding and responding to the AMR's status and needs.

Colour/Sound	Indication
Green, pulsing light	The AMR is idle and ready
Green, blinking light	The AMR is charging and cannot take orders
Blue/yellow, blinking light	The AMR is under user control in either local or emergency mode, the AMR is in remote mode but not in service, the AMR is configured not to take orders, or AMR operation is suspended by GoControl
Blue, blinking light accompanied by a buzzer sound	The AMR requires assistance due to: safety stop, task failure, alarm, AMR blocked while charge docking, or while driving towards its goal
Red, blinking light accompanied by a buzzer sound	The AMR is issuing a warning signal due to increased risk; laser safety zones may be inactive due to slow driving, there is a risk for pinch and crush hazards while charge docking.
Yellow, blinking light	Communication with GoControl has timed out

Table 1 GoPal Light and Sound Indications

4.6 Routine Maintenance

⚠ CAUTION!

Before beginning any maintenance or service tasks, ensure that GoPal is in safety mode (refer to *Section 4.3.1*).

4.6.1 Safety Inspections

The GoPal operator is responsible for ensuring the safety functions of the GoPal AMR are always operating correctly:

- Ensure warning lights and buzzer function as expected. Test by observing the GoPal when provoking an emergency stop situation.
- Confirm the forward green light is working correctly and emitting a clear, green light onto the floor.
- Check that warning labels are intact and easily readable.
- Each of the two manual emergency stops must be tested individually. Verify that activation causes the AMR to enter safety mode.
- Test the bumper function by activating it sideways and longitudinally. Confirm that activation causes the AMR to enter safety mode.
- Confirm automatic emergency stop functionality by suddenly introducing an object (e.g., a broom) in front of the moving AMR. The AMR should execute emergency braking, halt for a couple of seconds, then restart and attempt to navigate around the obstacle. Perform this test from both sides of the GoPal AMR. If the GoPal AMR does not respond by braking for the sudden obstacle, it must be immediately taken out of operation and your Robotize partner must be contacted.

4.6.2 Battery Care and Management

During normal operation, the system automatically maintains the battery power at a healthy level.

NOTICE

If a system error prevents the AMR from charging, it will automatically shut off when the remaining power reaches a lower limit. The AMR will maintain vital functions, so it's important not to leave the AMR in this condition for more than a few days. Longer periods without charging could damage the batteries, necessitating replacement.

NOTICE

If the AMR will be powered off for an extended period, make sure the batteries are fully charged before turning off the power using the key switch (refer to *Section 4.3.6*). Even when the AMR is turned off, the batteries will continue to drain some power. Therefore, every second month, turn the AMR on and fully charge it again. Failure to do so could cause the batteries to reach a critical power level, damaging them and requiring replacement. This will not be covered by the warranty.

4.6.3 Exterior Maintenance and Cleaning

Set GoPal to safety mode before cleaning. Clean all exterior surfaces with a cloth dampened (not wet) with lukewarm water or a mild, neutral soap.

⚠ CAUTION!

Avoid using solvents or similar substances as these could damage painted surfaces and plastic components. Never wash the internal parts of GoPal, and never use any type of running water, to avoid damaging electrical and electronic components. These components are not waterproof.

Regularly check the safety lasers for any dust or dirt. To clean them, use a soft, clean cloth and be careful not to leave fingerprints or scratch the surfaces. Since the lasers have a 270-degree field of view, make sure to clean all sides thoroughly. After cleaning, use a bright torch to double check that no dust or dirt remains on the lasers. See more details in Robotize Document No. 11582 GoPal Service Note – Laser Cleaning.

⚠ CAUTION!

Inspect the GoPal AMR's underside (the area around the wheels) and remove any accumulated materials that could impair GoPal's efficient functioning.

4.7 Disposal

NOTICE

Proper disposal of the GoPal P35 is essential. When the product reaches the end of its service life, responsible disposal is crucial to prevent environmental harm and to comply with local waste disposal laws.

Follow these steps for proper disposal:

Disconnect the Equipment: Ensure that the GoPal P35 is disconnected from all power sources, network connections, and any attached peripherals.

Contact a Professional: Consult your Robotize partner or local waste management authority for guidance on the proper disposal methods.

Recycling: This equipment contains electronic components that can often be recycled. Verify if local recycling facilities accept such materials.

Follow Regulations: Comply with all local, national, and international laws related to the disposal of electronic waste.

Under the WEEE Directive (Waste of Electric and Electronic Equipment), you are required to separate electrical and electronic components for disposal. Deliver them to an approved collection centre or your Robotize partner. Failure to comply can lead to penalties as outlined in the relevant legislation of your jurisdiction. Improper disposal can result in the release of harmful substances that pose a threat to both the environment and human health. Always dispose of electronic components responsibly.

5 GoControl Fleet Management System

The GoControl Fleet Management System, referred to as GoControl, is the central control unit for the GoPal Solution. GoControl is a localized solution, meaning it operates autonomously within your facility's network environment. This design allows GoControl to independently manage the operation of the GoPal AMRs and other components within the GoPal Solution at your company, without relying on external networks.

GoControl is tasked with determining the activities of GoPal AMRs, including task prioritization and sequence. It manages the power needs of the GoPal AMRs, sending them to a Charging Station for recharging as necessary. In its role, GoControl also collects and displays comprehensive system data, such as the position of the AMRs on the map and distance driven.

Additionally, GoControl is designed to integrate with your existing ERP/WMS system, facilitating seamless operation and data flow within your logistics infrastructure. It can be configured either as a virtual solution or as a physical server installed on-site, providing operational adaptability to meet specific needs.

6 GoPal Solution Service Inspections

To maintain the high safety standards of the GoPal AMR, Robotize mandates service inspections every six months. These services must be carried out by an authorized Robotize safety inspector. It is the responsibility of the GoPal operator to ensure ongoing system maintenance and adherence to inspection requirements.

6.1 Semi-annual GoPal Safety Inspection

The semi-annual safety inspection assesses the general condition of the GoPal AMR and conducts an enhanced inspection of the components listed in Table 2.

Component	Service Inspection Type
LIDAR	Enhanced safety function inspection
Emergency brake	Inspection of function and brake lining
Warning labels	Legibility and presence
Rubber Areas	Examination for wear on rubber elements on the GoPal AMR
Bumper	Bumper function test
Wheels	Examination for wear
Emergency Stop	Verification of functionality of the two emergency stops
Protecting Shield	Inspected for damage
Warning Lights	Functionality check for warning lights
Horn	Verification of horn functionality
Charging Station(s)	Inspected for damage

Table 2 Semi-annual GoPal inspection

7 Troubleshooting

This section provides guidance for identifying and resolving issues that might arise during the operation of the GoPal AMR. While most errors can be addressed by the GoPal operator, some may require specialized technical skills or extensive experience. In such instances, contact your Robotize partner. Most error types will trigger a GoControl alert that clearly describes the error encountered by the system. GoControl will also provide instructions on how to rectify the error. *Table 3* lists some common errors, their causes, and potential solutions:

Issue	Cause	Solutions
GoPal AMR does not enter at the destination	The Wi-Fi connection is poor and GoPal cannot communicate with GoControl	Check GoControl and Wi-Fi connection
	Debris at the LIDAR	Clean LIDAR as described
GoPal AMR has struck an object with its bumper and is stationary	The GoPal AMR will remain in safety mode for as long as the bumper is impacted, and the reactivation button is not activated	Remove the object impacting the bumper and reactivate the AMR with the Safety Reset button
GoPal AMRs stop performing tasks - Call Buttons stop working	The Wi-Fi Network unavailable or unstable	Re-establish or enhance Wi-Fi network coverage
	GoControl offline or inactive	Check GoControl status and restart GoControl Server if required
Charging is not performed	Misalignment between the AMR and the charging plate	Check the alignment of the AMR in the charging station
AMR is not docking in Charging Station	Foreign obstacles is affecting the LIDAR	Remove foreign obstacles
	Debris at the LIDAR	Clean the LIDAR as described

Table 3 GoPal P35 Troubleshooting Chart

8 Technical Information GoPal P35

This section provides detailed technical specifications for the GoPal P35. These specifications are critical for ensuring proper installation, operation, and maintenance of the equipment.

8.1 Technical Specifications

Group	Parameter		Condition/remark		Unit	Value
Weights	Load carrying capacity	total	CoG within spec. limits	max	kg	250
	AMR weight	no load	Operational	max	kg	110
	Total weight	incl. load	Operational	max	kg	333
Dimensions	Length	over all		nom	mm	960
	Width	over all		nom	mm	660
	Height	excl. Load		nom	mm	295
	Circumscribed circle radius	physical	AMR center to corner	max	mm	560
	Turning radius	min required	Autonomous navigation	typ	mm	660
	Narrow passage	min required	Autonomous navigation	typ	mm	760
Load dimen.	Length		Without overhang	max	mm	800
	Width		No overhang allowed	max	mm	600
	Height		Standard	max	mm	1200
Floor	Flatness (over 1000 mm)	peak-peak	Max local slope 5 %	max	mm	10
	Edges	step height	Local slope above 5 %	max	mm	2.0
	Slope	average	Over any 1000 mm	max	%	2.0
	Friction coefficient	all conditions	Wheels: SH A 65-75	min	-	0.70
Safety system	Bumper system	effective speed		max	m/s	0.16
		depression for activation		max	mm	5
		max depression		min	mm	30
	Hand operated emergency stops	number	At two corners	-	-	2
	Brake acceleration in case of emergency stop		Both directions	nom	m/s^2	1.25
Environmental	Operating temperature	AMR opr. range	NB! Batt. charge at >0 °C	min / max	°C	-10 / +45
	Operating humidity		Non condensing	max	%	95
	IP rating			-	-	00
	Battery temperature	range	Discharge	min / max	°C	-10 / +45
			Charge	min / max	°C	0 / +45
Electrical	Battery capacity			nom	Ah	40
	Battery voltage	total	2 blocks	nom	V	24.0
	Battery charge time	30 - 95 % SOC	Max charge current	typ	mn.	50
		30 - 100 % SOC	Max charge current	typ	mn.	55
		10 - 100 % SOC	Max charge current	typ	mn.	65
	AMR run time, high activity	-65 % SOC		typ	h	6
	AMR run time, medium activity	-65 % SOC		typ	h	9
	AMR run time, idle	-90 % SOC	no activity	min	h	48

Abbreviations;

CoG: Center of Gravity

SOC: State Of Charge

SH: Shore Hardness

Table 4 GoPal P35 Spec Sheet

8.2 Outline

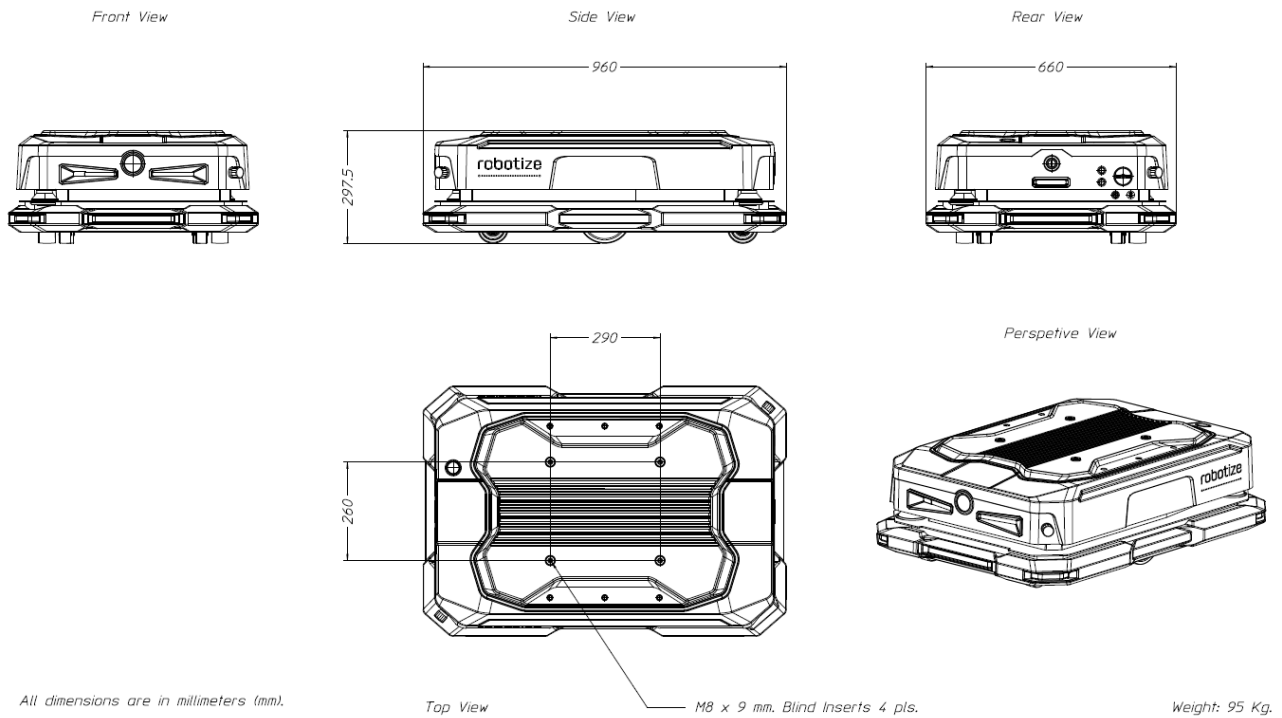


Figure 12 GoPal P35 outline (all measurements in mm)

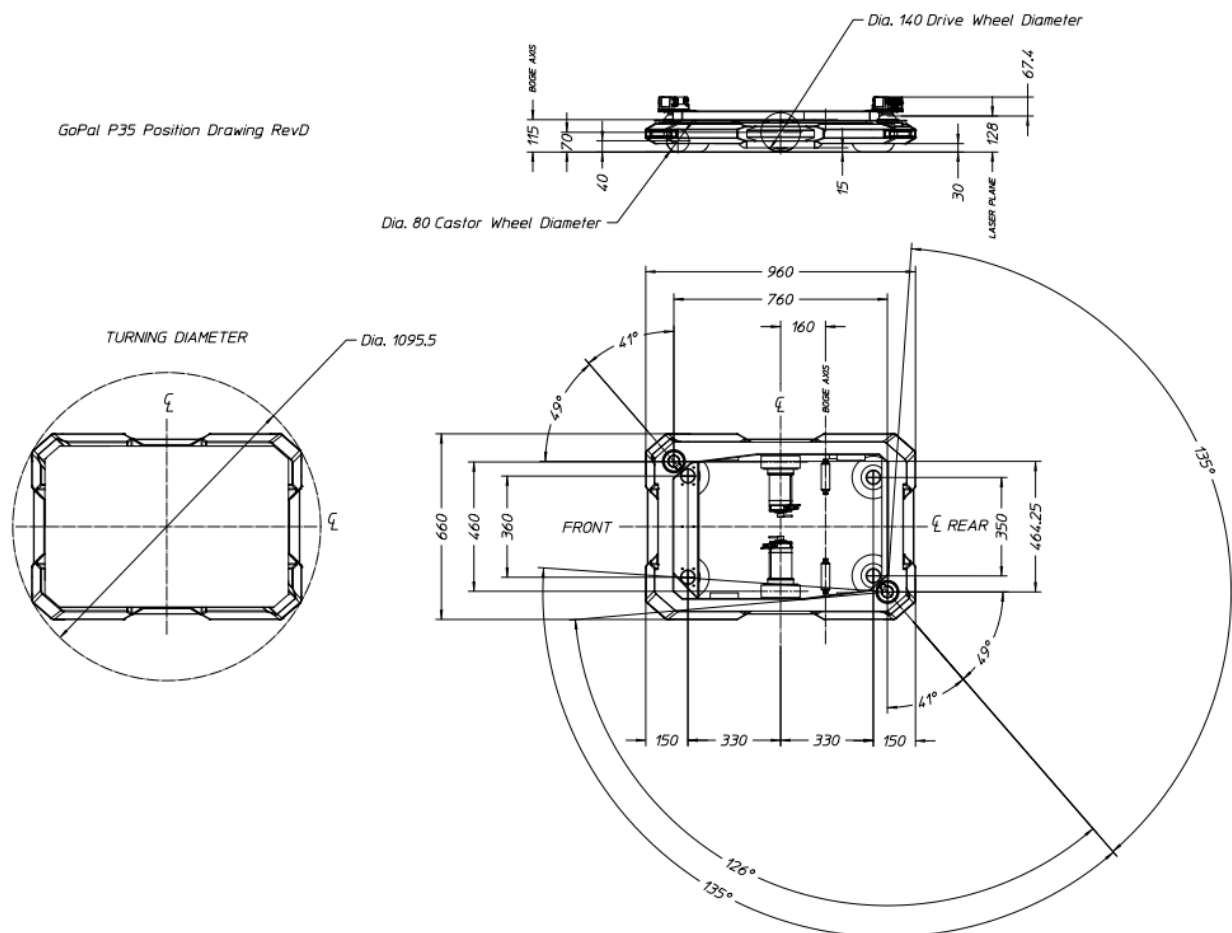


Figure 13 GoPal P35 Position drawing (all measurements in mm).

9 Appendix A

9.1 Emergency charging

In case of deep discharge of the batteries the BMS (Battery Management System) can be unable to control the charging of the batteries.

In such cases, the GoPal Robot can be connected to an external charger using the emergency charge connector (USB-C) at the rear. Earlier versions of the P35's have the USB ports located vertically, while recent models have the USB ports located in a horizontal layout (See Figure 14 GoPal rear view and Figure 15 GoPal P35 rear view – early version).

The emergency charge connector has to be supplied from a USB-C PD charger rated at minimum 20 V / 40 W. A USB-C Power Delivery cable has to be used to connect between charger and the AMR.

Emergency Charging Procedure:

- The main power switch must be in the 'on' position
- Turn the key switch to the 'off' position and wait ~30 seconds for the AMR to turn off.
- Connect the USB-C PD charger and charging cable to the emergency charging connector on the rear of the AMR.
- The blue indicator in the emergency charge button will flash during emergency charging.
 - In the case that the battery level is so low that the BMS is unpowered, or this is the first time powering on the battery, press the emergency charge button to initiate charging.

NOTICE

The AMR remains stationary during emergency charging.

9.2 Data connector

An USB-C connector is placed at the rear of the AMR layout (See Figure 14 GoPal rear view and Figure 15 GoPal P35 rear view – early version) intended for downloading new software.

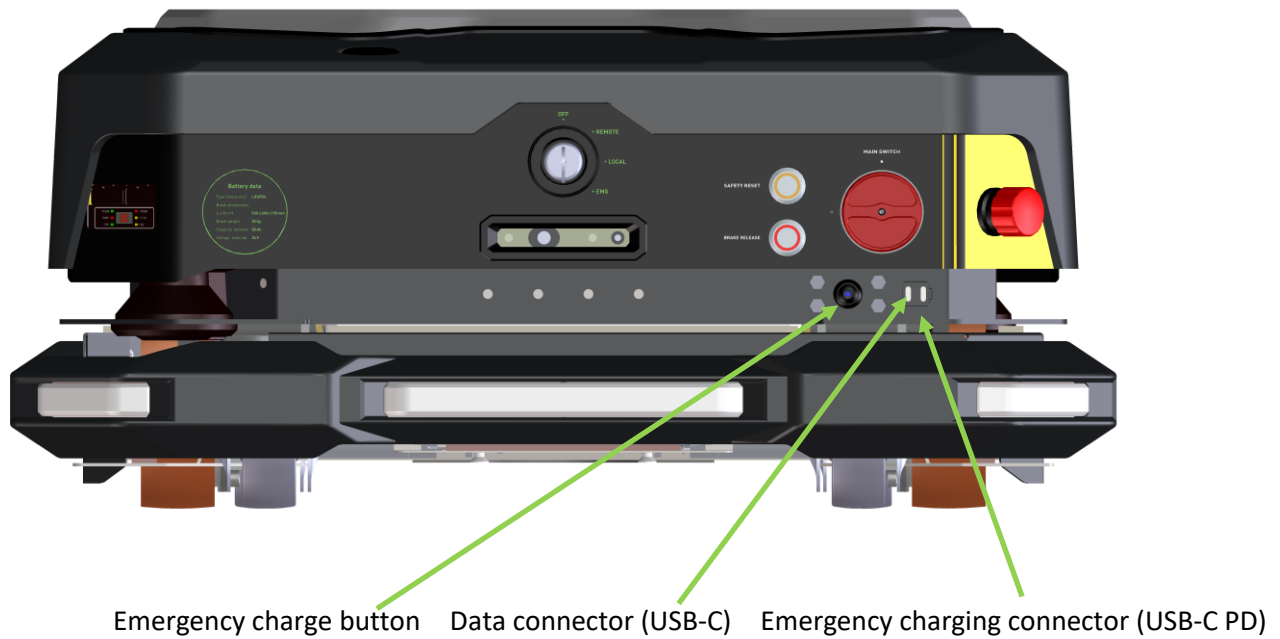


Figure 14 GoPal rear view

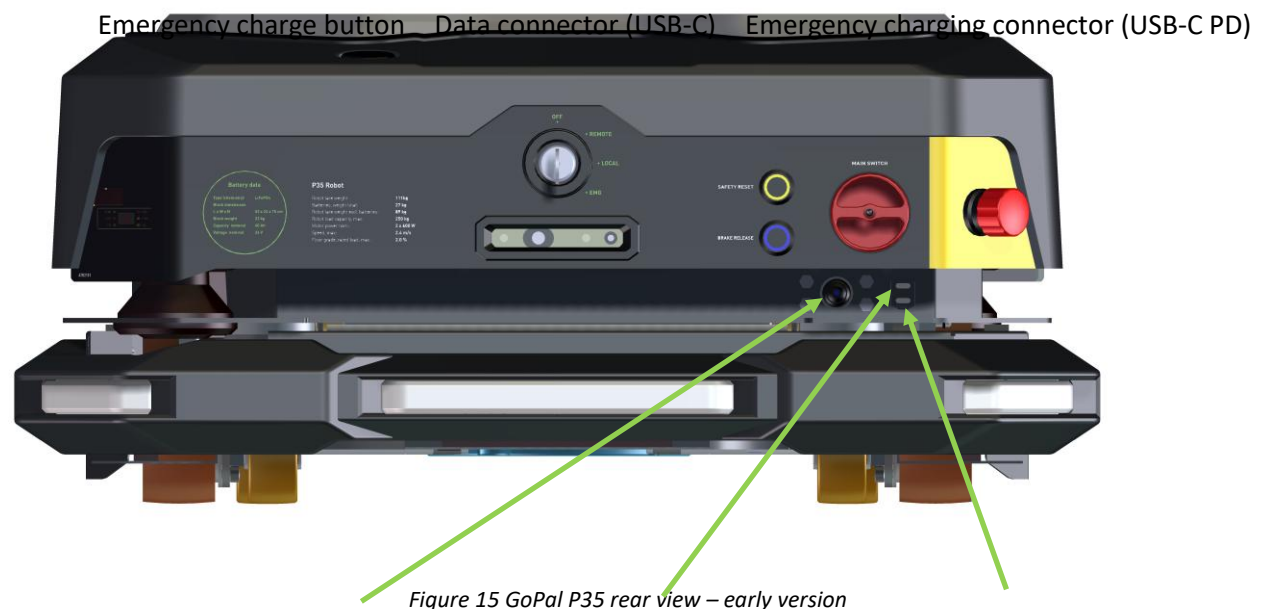



Figure 15 GoPal P35 rear view – early version

Appendix B - Declaration of Conformity

robotize



EU Declaration of Conformity

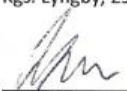
The manufacturer: Robotize ApS
 Maglebjergvej 5B
 DK-2800 Kgs. Lyngby
 Denmark
 CVR: 37222941

Declare that the products: Robot, GoPal® P35, Type ATR2101

Are conformal to the following directives and standards - when used alone, or in conjunction with other products in the Robotize GoPal® series:

Directives	Applied harmonized standards
2006/42/EC Machinery (MD)	EN ISO 3691-4:2020 (Safety, Driverless industrial trucks and their systems)
2014/30/EU Electromagnetic compatibility (EMC)	EN 12895 (EMC, Industrial Trucks) EN 61000-6-2:2019 (Immunity, industrial) EN 61000-6-3:2019 (Emission, residential, commercial and light-industrial)
2014/53/EU Radio equipment (RED)	EN 301 489-3 V2.3.2:2023 (Radio equipment, Short-Range Devices)
2011/65/EU (RoHS)	EN IEC 63000:2018 (Restriction of hazardous substances)

Kgs. Lyngby, 29. may 2024



Anders Pjetursson
CEO Robotize ApS

Robotize doc. no. 012794

Figure 16 Declaration of Conformity GoPal P35