ez-Way®

THE SMART NAVIGATION

Instruction manual

Version 1.3.x-a – Original version

ez-Wheel®
A brand of **the IDEC Corporation Group**

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⚠ **Please read this document carefully before using the product for the first time.**

1. Introduction

1.1 Who is this manual intended for?

This manual is intended for machine integrators, robotics engineers and advanced ***ez-Way***® users. Knowledge and understanding of **mobile robotics, autonomous navigation, and industrial communication systems** are recommended to integrate ***ez-Way***® navigation software.

1.2 Terms of use

The terms used in this manual relate to the technical field of industrial robots and, more specifically, to mobile robots equipped with autonomous navigation software.

For an accurate reading of the manual, a good knowledge of the following reference systems and standards is recommended:

- Machinery Directive (2006/42/CE)
- Safety requirements for mobile robots (ISO 3691-4)
- Standard navigation interfaces for mobile robots (VDA5050)
- Network and Wi-Fi administration (IETF, IEEE 802.11)

1.3 Additional resources

The following documents relating to mobile robots are available:

- Datasheets and technical specifications of IDEC devices for mobile robotics
- General brochure on ***ez-Way®*** navigation solution for mobile robots
- APIs and error description documentation
- Integration guides (with supported sensors, controllers, and fieldbus systems)

	https://github.com/IDEC-ezWheel
	https://ez-wheel.com/en

1.4 Important information about the manual

⚠	Important information – **Read carefully**
💡	Tip
🛈	Additional information

1.5 Terminology

This manual, dedicated to the use of ***ez-Way®*** software, uses technical terms related to the industrial field and, more specifically, to autonomous mobile robots.

The ***ez-Way®*** software provides the control and navigation of a mobile robot, hereinafter "**robot", "machine"** or "**AGV" "AMR",** equipped with an industrial PC running the software.

For clarity of reading, a good knowledge of the following standards is recommended:

- Machinery Directive (2006/42/EC)
- Safety requirements for autonomous industrial robots and their systems (ISO 3691-4)
- VDA 5050 interface for communication between automated guided vehicles (AGVs) and central master control systems.

Dictionary of acronyms:

AGV	Automatic Guided Vehicle
AMR	Autonomous Mobile Robot
IPC	Industrial PC (hardware embedding ***ez-Way®***).
ISO	International Standardization Organization
JSON	JavaScript Object Notation – *Standard text format for representing structured data*
LED	Light Emitting Diode
LiDAR	Light Detection And Ranging
MLS	Magnetic Line Sensor
NAV	Navigation
OLS	Optical Line Sensor
PLd	Performance Level "d" – *Reliability Measurement of Safety Functions (ISO 13849-1)*
PLe	Performance level "e" – *Highest level of reliability (ISO 13849-1)*
POI	Point Of Interest
PU	Polyurethane – *Polymer material*
SBC	Safe Brake Control
SBS	Safe Brake System
SDI	Safe Direction Indication
SIL	Safety Integrity Level
SLS	Safety Limited Speed
SMS	Safe Maximum Speed
SSID	Service Set IDentifier – *Unique identifier to differentiate wireless networks*
SSLS	Safety Stop Laser System
STO	Safe Torque Off – *Safe deactivation of motor torque*
SWD	Safety Wheel Drive
UTC	Universal Time Coordinate
VDA	Verband Der Automobilindustrie – *Standard of the Automobile Industry Association*
Wi-Fi AP	Wi-Fi Access Point – *Wireless connection at the access point*
Wi-Fi UP	Active Wi-Fi – *Wireless connection to an external network*
WPA2	Wi-Fi Protected Access 2 – Wi-Fi *Network Protection Protocol*
FMS	Fleet Management System

1.6 Disclaimer

The technical information included in this manual is subject to change. We decline all responsibility for the completeness, timeliness, or accuracy of the data and illustrations provided.

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« INSTRUCTION MANUAL »
Original version

FIRST EDITION, AUGUST 2025

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2. Description

ez-Way® software enables the operation of any mobile platform, ensuring smooth, safe and efficient operations. It enables mobile robot management, robot localization, navigation, and mission execution.
ez-Way® is a solution that speeds up the development of autonomous mobile platforms, simplifies their operations and improves the overall performance of your facility.

Figure 1: ez-Way® solution

2.1 Benefits

- Turns ***SWD®*** mobile platforms into autonomous machines
- VDA 5050 compliant: making connections to the Fleet Management System (FMS) easier
- Intuitive and user-friendly graphical interface
- Operation in Standalone or Fleet mode
- Several modes of control: autonomous, manual or service mode (maintenance)
- Several modes of navigation: virtual line following or optical/magnetic line following

2.2 Product compatibility

- ***SWD® Starter Kit***
- Mobile platforms equipped with SWD® and operating with differential kinematics

Figure 2: ez-Way® powered solutions

2.3 Key features

The ***ez-Way®*** software suite can be used to automate mobile operations:

INSTALLATION	**PLATFORM / DEVICES** Configure robot's name, description, dimensions and kinematics Configure robot's devices (laser, line sensor, RFID reader)
DEPLOYMENT	**MAP / RELATIVE GUARD ZONES** Import / Export / Delete and rename maps Configure robot's relative guard zones
FLEET	**FLEET** Set mode of operation: Standalone or Fleet Management Configure missions: maps, nodes and actions, absolute guard zones
CONNECTIVITY	**Connectivity** Edit broker address, port and MQTT version Connect robot to Wi-Fi's facility (Wi-Fi UP), Edit robot's hotspot (Wi-Fi AP)
USERS	**User management** Create, remove and edit rights for users Choose language for each user in the interface
MODE	**Robot management** Choose navigation mode (Auto, manual, …) Get robot's feedback
STATE	**Managers** Get robot's state, devices information, battery levels, …
DIAG	**Diagnostic manager** Diagnose robot's state, devices, battery, …
MAP	**Map** Show current map and mission Rename, import/export and remove maps Manage different zones of operations
ABOUT	**About** Get information about ***ez-Way®***, Version, commit and NiceGui version, build date

2.4 Technical specifications

Multi-lingual interface	English, French and Japanese
OS operating system	Linux and Docker
IPC Specifications	- HDMI display outputs - x86 64-bit architecture (Intel® Core) - Fanless industrial (passive cooling, no vents) - 2.4 GHz Wireless connectivity (hotspot and wireless access) - 4xUSB-A ports - 2x Gigabit Ethernet ports on RJ45 - CAN bus port - 24V DC power input (*12-56V*) - Dimensions (LxWxH): 200 mm x 200 mm x 35.3 mm - Weight 420 g

2.5 HMIs (Human Machine Interfaces)

ez-Way® provides web pages HMIs, enabling easy access for users. They can be accessed from any web browser, enabling users to operate the robot and configure missions (*Firefox or Chrome are recommended*).

- In ***ez-Way®* Config**, it is possible to configure the machine and the missions.

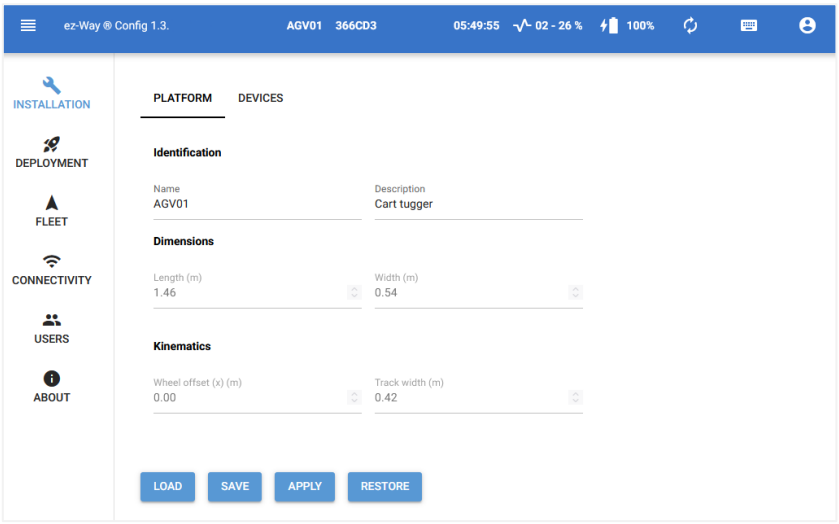


Figure 3: ez-Way® Config

- In ***ez-Way®* Control** it is possible to control and diagnose the machine.

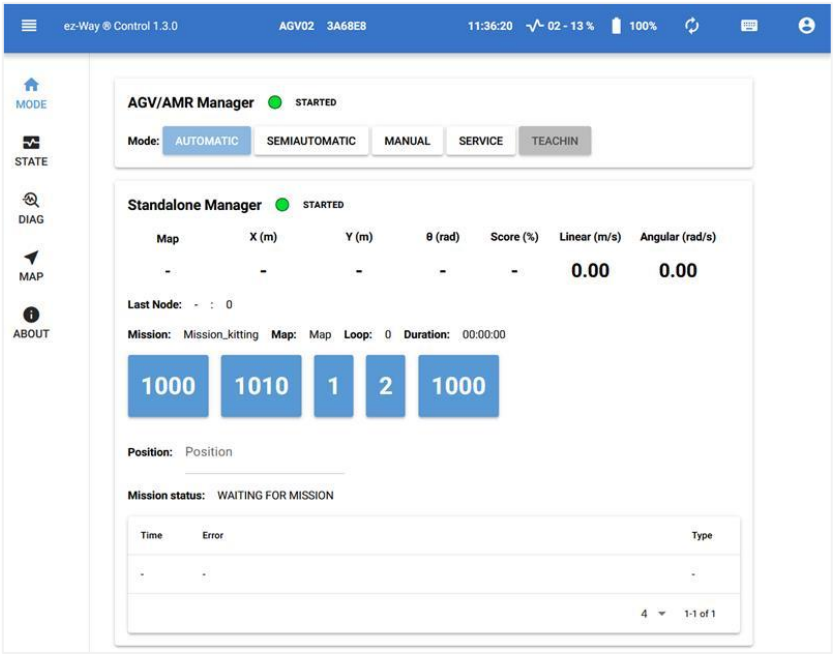


Figure 4: ez-Way® Control

These interfaces were specifically designed to provide users with an intuitive and easy-to-use interface for interacting with the machine's functionalities.

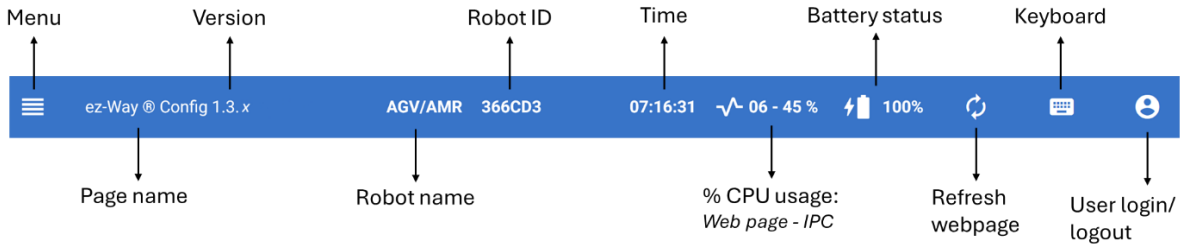


Figure 5: ez-Way® header

Menu	Drop-down menu to access the different tabs (differs from user profile)
Page name	***ez-Way® Config*** or ***ez-Way® control*** page
Version	Version of ***ez-Way®***
Robot name	Name used for the machine (e.g. R2-D2)
Robot "ID"	Defined by the manufacturer, based on MAC address (cannot be changed) It is a unique robot identifier
Time	Network UTC/GMT time.
% CPU usage	Computational resource used to run ***ez-Way®***
Battery status	Consolidated state of the battery
Numeric Keypad	Shows a virtual keyboard
"Refresh" button	Refresh the page
User profile access	Get login user details and log out

ez-Way® Drop-down menus		***Description***
ez-Way® Config	INSTALLATION DEPLOYMENT FLEET CONNECTIVITY USERS ABOUT	- Configure the platform - Configure devices - Manage maps - Configure guard zones - Configure missions - Manage connectivity - Manage users and access rights - Get information about the application
ez-Way® Control	MODE STATE DIAG MAP ABOUT	- Switch mode of control - Start missions - Monitor machine's state - Diagnose the machine and its peripherals - Monitor the mission in the map - Get information about the application

Table 1: ez-Way® drop-down menus

3. Access rights

The access rights to ***ez-Way®*** interfaces depend on the profile of the user connected.

Drop-down menus		Operator	Maintenance	Deployment	Integrator	Administrator
ez-Way® Config	 INSTALLATION	☐	☐	☐	☑	☑
	 DEPLOYMENT			☑		
	 FLEET					
	 CONNECTIVITY					
	 USERS					
	 ABOUT	☑				
ez-Way® Control	 MODE	☑ All users have access to these sections				
	 STATE					
	 DIAG					
	 MAP					
	 ABOUT					

Table 2: Tabs access available depending on the user profile

In ***ez-Way® Control***, only the control “MODE” has restricting access depending on the user profile.

Profile / **Mode**	**Operator**	**Maintenance**	**Deployment**	**Integrator**	**Administrator**
SERVICE	☑	☑	☑	☑	☑
TEACHIN			☑	☑	☑
AUTOMATIC	☑				☑
SEMIAUTOMATIC		☑	☑	☑	☑
MANUAL	☑	☑	☑	☑	☑

Table 3: Control modes available depending on the user profile

4. Connections to the interfaces

The full start-up of ***ez-Way®*** after powering on, can take several minutes.

4.1 Accessibility

To access ***ez-Way® Control*** and ***ez-Way® Config*** the device must be connected to the same network as the IPC.

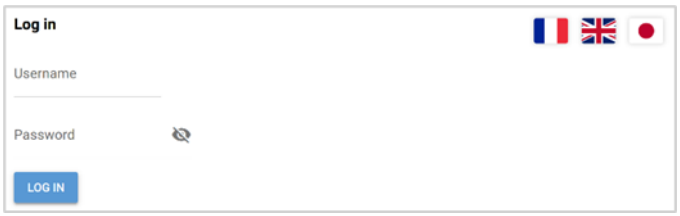


Figure 6: Log in

Default Profiles and Logins	Operator	Integrator	Administrator
Username	user1	integrator	administrator
Password	pass1	868707	992617

Table 4: Default profiles and logins

💡 To access ***ez-Way® Control*** it is also possible to directly connect an HDMI (touch)screen to the IPC.

4.2 Ethernet Connection to *ez-Way®*

If a ethernet port is available on the IPC, it is possible to connect through ethernet to ***ez-Way®***, with a manual IPv4 assignment. For instance, on 10.0.0.2 or 10.1.0.2 (mask 255.255.255.0).

Check with your IT for any restrictions.

4.3 Wi-Fi Connection to *ez-Way®*

To connect a device to the same network as ***ez-Way®***, there are two possibilities:

1. Connect the device to ***ez-Way®*** Access Point (Wi-Fi AP),
2. Connect ***ez-Way®*** (IPC) to your network facility (Wi-Fi UP)

💡 You can use a touchscreen to set it up for the 1st time

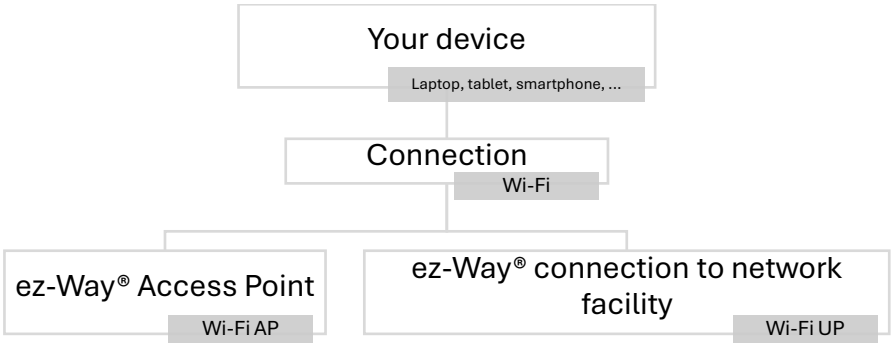


Figure 7: Wi-Fi connection

Wi-Fi AP (Access Point)

On your device, connect to the Wi-Fi with SSID "AGV-*XXX*". This SSID is based on the IPC MAC address.

SSID	AGV-<*XXXXXX*> (<*depending on each machine*>)
Security Type	WPA2 Personal
Passkey (*default*)	!ez-Way!

The web pages can now be opened in the web browser, with the following URLs:

- ***ez-Way®* Config:** http://10.42.0.1:8081/
- ***ez-Way®* Control:** http://10.42.0.1:8082/

⚠ This solution is only possible near the machine, since the connection is established locally in between the machine and your device.

Wi-Fi UP (Wi-Fi of the facility)

While connected to ***ez-Way®*** access point, open the ***ez-Way®* Config.** In the "CONNECTIVITY" section, enable and configure 'WIFI UP' connection with your Wi-Fi SSID, Security type and passkey (PSK).

💡 If the connection was set up correctly, you can check in ***ez-Way®* Control**, "DIAG" section, 'Connectivity Manager' box, your assigned IPv4 address.

ℹ The web pages can now be opened in the web browser, with the assigned URLs:

- ***ez-Way®* Config:** http://<XXX.XXX.*X.X*>:8081, (<*depending on each network*>), for instance http://192.168.1.97:8081/
- ***ez-Way®* Control:** http://<XXX.XXX.*X.X*>:8082, (<*depending on each network*>), for instance http://192.168.1.97:8082/

This solution allows the user to log in even when the machine is distant. Check with your IT department or network administrator on site.

5. *ez-Way®* Control

This interface allows the user to change control modes, start or stop missions, and manage mission states. The ***ez-Way®* Control page** enables real-time monitoring of the device's status and supports diagnostic operations, ensuring the system is efficiently controlled and maintained.

5.1 MODE

AGV/AMR Manager

The AGV/AMR Manager allows the user to select the mode of control of the machine.

Figure 8: AGV/AMR Manager

AUTOMATIC	Executes mission autonomously. Missions configured in ***ez-Way®*** Config or missions sent from a VDA5050 Fleet manager.
SEMIAUTOMATIC	Performs mission step by step using the manual controller. User pushes the joystick forward to process the mission and release it to stop.
MANUAL	Controls the machine manually with a controller.
SERVICE	Default mode when powering on the machine. Accessible from any user profile
TEACHIN	Starts mapping the environment. Instructions for creating a map are available in a dedicated chapter.

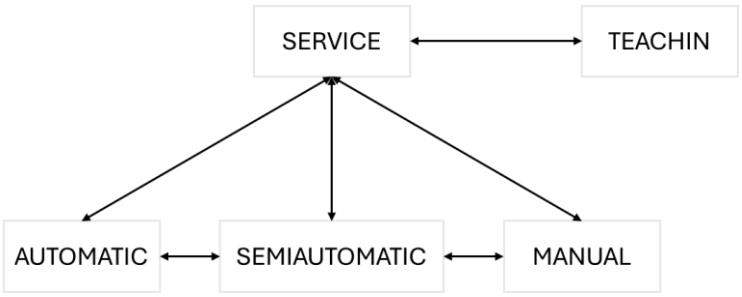


Figure 9: Control mode switch condition

User access rights to the modes of control:

Mode / Profile	AUTOMATIC	SEMIAUTOMATIC	MANUAL	SERVICE	TEACHIN
Operator	☑		☑	☑	
Maintenance		☑	☑	☑	
Deployment		☑	☑	☑	☑
Integrator		☑	☑	☑	☑
Administrator	☑	☑	☑	☑	☑

Table 5: User access to control modes

💡 For manual control, a virtual joystick is available in the “MAP” section of ***ez-Way®* Control**.

If a manual controller is available, you can now use it to control the machine. If a remote control was provided, press and hold its top-right button ('LR' or 'RB') with your index while manipulating the joysticks.
Maintaining joy pressed for 3 seconds is required to move the machine.

Standalone Manager *(only in Standalone mode)*

The Standalone Manager allows the user to carry out a mission. It displays information about the mission and the robot. You can use it to start, pause/resume or stop a mission.

- Display the map used for the ongoing mission.
- Display the robot's coordinates on the map.
  - Position X and Y in meters.
  - Orientation θ in radians.
- Display the accuracy with which the robot self-localized within the map.
- Display the speed of the robot:
  - Linear speed in meters per second.
  - Angular speed in radians per second.
- Display the last node ID that the robot has passed through.
- Display the name of the ongoing mission, the number of loop iterations (if applicable) and the time that elapsed since the mission started.
- Display the status of the mission.

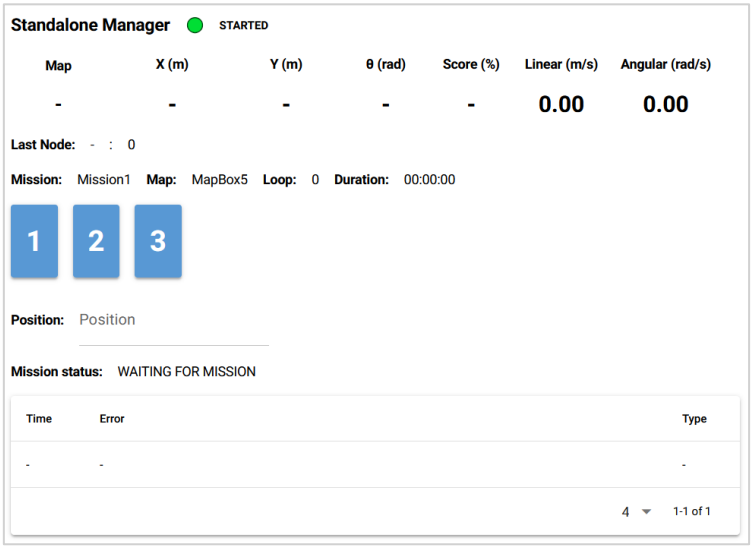


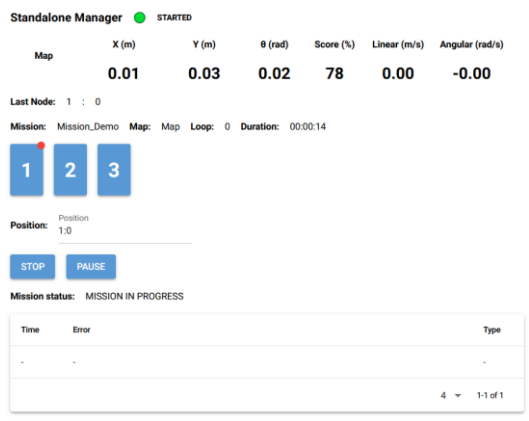
Figure 10: Standalone Manager

⚠ Only accessible when the selected mode of control is “AUTOMATIC” or “SEMIAUTOMATIC”.

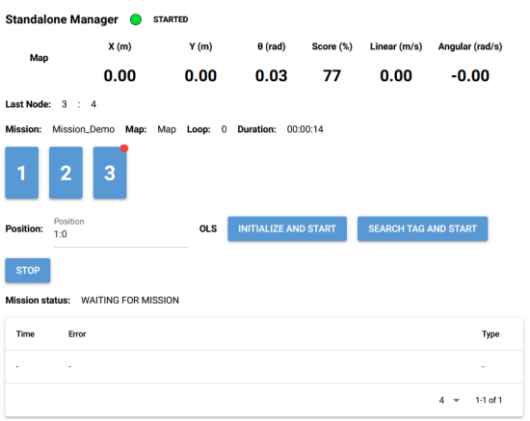
To start a mission, the robot must be placed on a virtual or physical node, or on a physical line. Depending on the navigation mode, different buttons will be available.

	Virtual node - **NAV2**	**Physical Line / Node** - ***OLS (Optical)*** - ***MLS (Magnetic)***	**Coordinates used to initialize (x, y, θ)**
INITIALIZE AND START Set the position of the robot on the map and start the mission.	☑	☑	Coordinates of the node.
SEARCH TAG AND START Follow the line until the selected tag ID (at low speed) and start the mission.	☐	☑	Coordinates of the physical tag.

Mission status	**Description**
WAINTING FOR MISSION	The robot is ready to carry out its mission.
MISSION IN PROGRESS	Once the mission has started, the robot will move automatically after a warning delay (3s). The last node crossed is marked with a red dot in the top-right corner of the node ID button. You can stop or pause the mission at any time.
MISSION COMPLETED	Once the mission is complete, the robot stops at its final node and awaits the launch of the next mission.
ERROR	If an error occurs, the list of errors is displayed as shown below: **Mission status:** ERROR Time ↑ | Error | Type 17:58:51 | Action failed | navigationError 17:58:51 | Goal was canceled | actionError All 1-2 of 2



Mission in progress



Mission completed

Mission Checklist:

⚠ Periodic checks must be performed before starting a mission to avoid errors, as well as after any changes have been made. This helps to ensure the safety and efficiency of operations.

Check	Actions
Map	Ensure that the applied map matches the actual environment. This check should be performed in all three modes: manual, semi-automatic and automatic.
Mission	Confirm that the selected mission can be carried out on the chosen map and according to the original plan.
Node configurations	Check the configuration of each node, including maximum speed, guard zones and actions.
Battery level	Ensure that the robot has sufficient battery power to complete the entire mission.
Sensors	Check the condition of the sensors.
Environment	Make sure that the work area is clean and free from any obstacles.
Navigation Mode	Confirm that the selected navigation mode (NAV2, MLS or OLS) meets the mission requirements.
Connectivity	Ensure the robot is properly connected.

5.2 STATE/DIAG

The following managers provide feedback on the state of the machines and their devices:

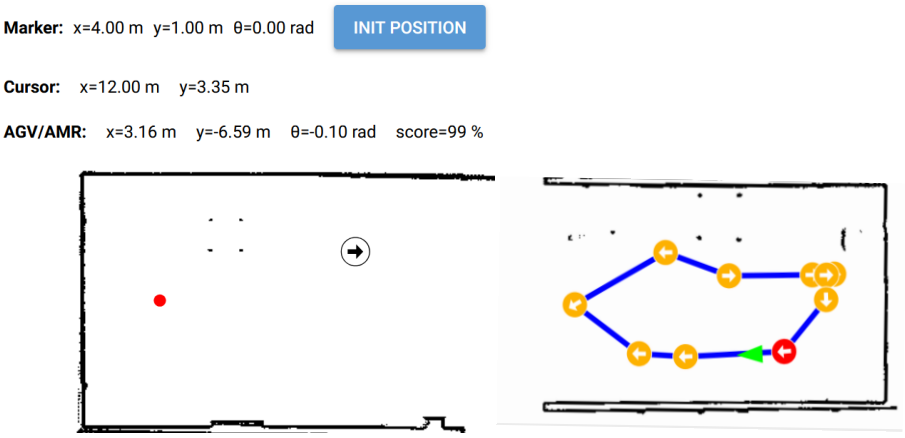
AGV/AMR Manager	This manager shows the most recent error reported by the AGV/AMR.
Standalone Manager	This manager shows whether the standalone manager is enabled. If it is enabled, it provides feedback on the last error raised by the standalone manager.
Power Manager	This manager shows information on the batteries state.
Connectivity Manager	This manager shows the information related to the machine's connectivity. This includes the global broker, the Wi-Fi UP, and the Wi-Fi AP.
Error Manager	This manager shows any errors identified by ***ez-Way®***. The detailed documentation is described on "Errors Reference".
Traction Pin Manager *(if any)*	This manager shows information about the traction pin.
Indicator Manager *(if any)*	This manager shows information on the status of the LED and buzzer.
Charger Manager *(if any)*	This manager shows information on the charging status of the machine.
OCU Manager *(if any)*	This manager shows information on the OCU sensor, which triggers a presence.
Guard Zones Manager	This manager shows information about the guard zones.
Lift Table Manager *(if any)*	This manager shows information about the lift table of the machine.
Modbus Tcp Gateway Manager *(if any)*	This manager shows information about the Modbus TCP gateway.
MQTT Gateway Manager *(if any)*	This manager shows information about the MQTT gateway.

5.3 MAP

This section allows the user to:

- Reset the machine's position as indicated by the marker on the map using the 'INIT POSITION' button.
- Obtain the coordinates of a location by moving the mouse cursor or placing a marker.
- Retrieving the current coordinates of the AGV/AMR.

	Marker set in the map (by double-clicking)
	Origin of the map [X=0; Y=0; θ=0] (starting position of the robot when set to TEACHIN mode)
	Current position of the robot in the map
	Last node reached by the robot
	Node in the current mission



5.4 ABOUT

This section provides information about the ***ez-Way® Control*** version, the commit build identifier and the build time. The NiceGui version is used for the graphical interface.

6. *ez-Way® Config*

This interface allows the user to configure the robot, its maps and missions, and manage user rights.

6.1 INSTALLATION

PLATFORM

This tab allows the user to:

- Edit the name of the robot that will be displayed in the HMIs' header. Add a description of the vehicle.
- Get the dimensions of the vehicle as a simplified rectangular shape.
- Get the wheel offset on the X-axis if the wheels are not centered on the robot. Get the vehicle's track width, i.e. the distance between the drive wheels.

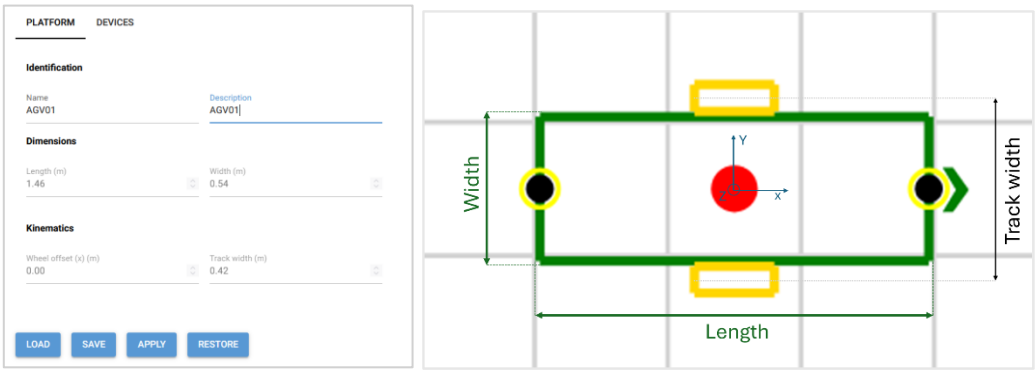


Figure 11: Platform configuration

DEVICES

This tab allows us to get the location of the devices on the robot. As shown below with the front laser scanner. The distance from the origin of the X- and Y-axes, as well as the angular orientation.

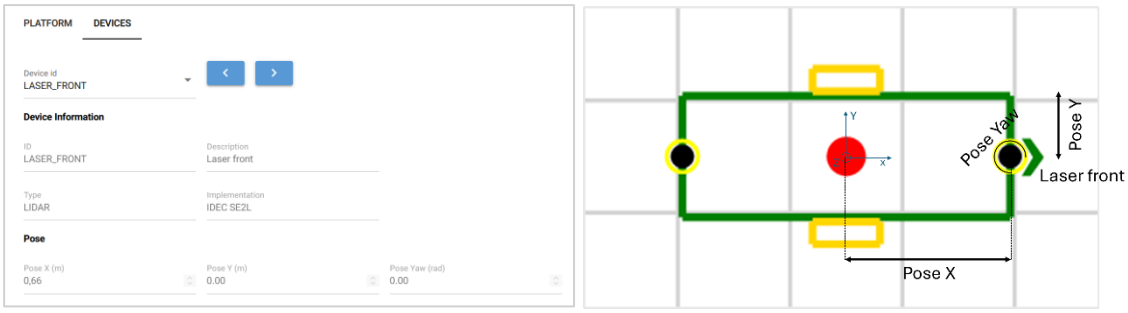


Figure 12: Device configurations

6.2 DEPLOYMENT

MAP MANAGEMENT

This tab determines which map is used by default when the robot is controlled by a VDA5050 master controller. It also provides import, export, rename and delete map features.

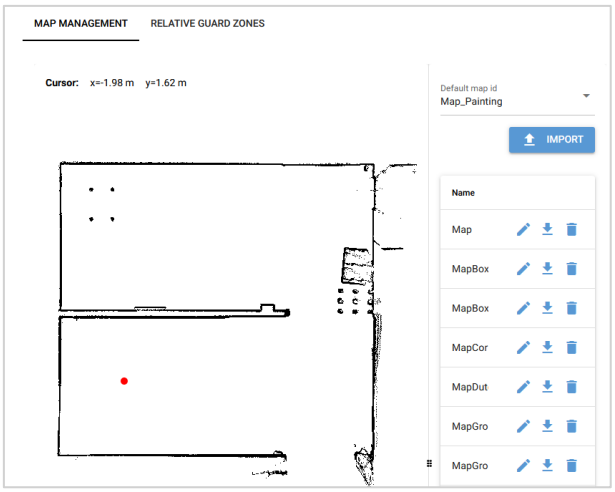


Figure 13: Map management

⚠ The mode of control must be set to 'SERVICE' when changing the map used by the robot.

RELATIVE GUARD ZONES

This tab allows the user to manage relative guard zones. It provides an intuitive canvas for designing these zones. It also offers import, export, duplication and deletion features.

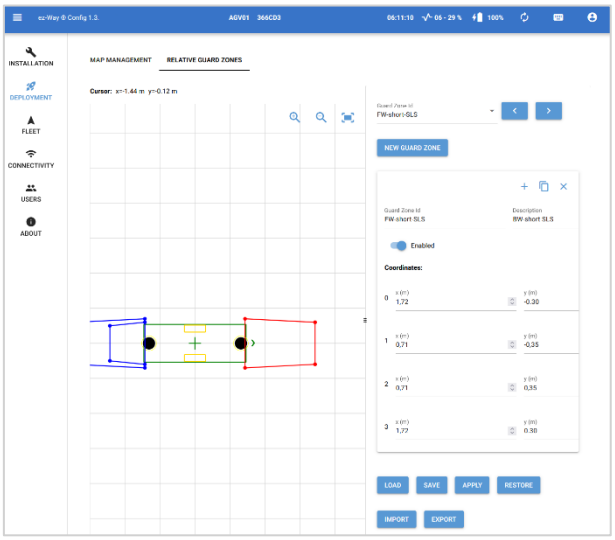


Figure 14: Relative guard zones configuration

ℹ The red polygon shows the current selection.

6.3 FLEET

MISSION

This tab allows the user to manage missions in standalone mode. It provides an intuitive map-based overview of the current mission. You can select the mission to perform, add a description and specify the map on which the mission is to be carried out. It also offers the possibility to import, export, create, clone and delete missions.

Figure 15: Fleet, Standalone mode configuration

⚠ When creating a mission, the user must name it and select the associated map. Providing a description of the assignment is optional.

💡 We recommend saving regularly throughout the construction process.

NODES

This tab allows the user to configure the nodes and actions to carry out during a mission. The machine moves along a defined path, defined by nodes and edges. The edges define the trajectory to follow between the nodes. Below are described the characteristics

Input		Type	Description
Node settings	Node Id	String	Usually a decimal value. 💡 For physical node, use [1;999] 💡 For virtual node, use [1000; +∞] and increment by 10 in between nodes (to be able to add some in between later) ⚠ If a physical node (e.g. a barcode) is defined by a number, the value must be equal in ***ez-Way®*** *OLS: [0; 255]; MLS: [256; 499]; RFID: [500: 755]* *NONE [1000; 1499]; WAYPOINT [2000; +∞]*
	Node Type	- NONE - TAG - WAYPOINT - OLS (Optical) - MLS (Magnetic) - RFID	ℹ NONE = LiDAR POINT, by default ℹ TAG is deprecated ℹ WAYPOINT = LiDAR WAYPOINT, for smooth trajectories
	Edge Navigation	- NONE - LiDAR - OLS - MLS	ℹ NONE = LiDAR POINT, by default the LiDAR is used
	Edge Mode	- STRAIGHT	Trajectory to follow on the edge
	Edge Max Speed [m/s]	Float	Maximum speed the robot can reach on this edge
	X [m]	Float	Coordinates of the node on X-axis in the map
	Y [m]	Float	Coordinates of the node on Y-axis in the map
	θ [radians]	Float	Orientation of the node in the map
	Allowed Deviation X, Y [m]	Float	Tolerance in X, Y on the accuracy of the machine to reach a node

Input		Type	Description
	Allowed Deviation Theta [radians]	Float	Tolerance of the angular orientation of the machine to reach a node
	Edge Length (*Optional*)	Float	Distance between two nodes
	Edge Orientation	- Forward - Backward	Direction in which the robot must proceed on the edge
	Node Description (*Optional*)	String	Add a description to the node

ℹ Edge Navigation:
- LiDAR performs Virtual Line following, defined trajectory is virtual and exclusively implemented in the map.
- OLS and MLS perform physical line following, with optical/magnetic tape on the ground.
- Mixed navigation combines these two modes.

On each node, it is possible to define actions. Several actions can be carried out at the same node and are performed one after the other.
The "Blocking Type" field sets up how the action is performed, as explained below:
- **NONE**: The action executes without impacting the movement of the machine.
- **HARD**: Executing the action at the checkpoint stops the movement and blocks the execution of subsequent actions. This pause is maintained until the action is completed.
- **SOFT** (*Not Implemented):* Executing the action at the waypoint stops the movement but does not block the execution of subsequent actions. The pause is maintained until the action is completed.

	Type	Action	Parameters
Action settings	**BUILTIN**	Generic Action	Name: e.g. “custom_action_xxx” Parameters: Description: Blocking Type: NONE, SOFT, HARD
		Wait For Delay	Delay [s]: Description: Blocking Type: NONE, SOFT, HARD
		Wait For No Obstacle	X1 [m], y1 [m], x2 [m], y2 [m] Description: Blocking Type: NONE, SOFT, HARD
		Guard Zone	Guard Zone Id: Description: Blocking Type: NONE, SOFT, HARD
	DEVICES (*upon configuration*)	Pick	Station type: Load type: Description: Blocking Type: NONE, SOFT, HARD
		Drop	Description: Blocking Type: NONE, SOFT, HARD
		Start Charging	Description: Blocking Type: NONE, SOFT, HARD
		Stop Charging	Description: Blocking Type: NONE, SOFT, HARD
		Battery Switch	Mode: MANUAL SWITCH, AUTO ON, AUTO OFF Description: Blocking Type: NONE, SOFT, HARD

	Type	Action	Parameters
		<*Color*> Led: - Front - Back *Color = White, Green, Orange, Red*	State: ON, OFF, BLINK Description: Blocking Type: NONE, SOFT, HARD
		Spot Led: - Front - Back	State: ON, OFF, BLINK Description: Blocking Type: NONE, SOFT, HARD
		Buzzer: - Front - Back	State: ON, OFF Description: Blocking Type: NONE, SOFT, HARD
		Wait For Trigger (OCU)	Parameters: e.g. {"id": "front", "value": [true, true, false, false]} Description: Blocking Type: NONE, SOFT, HARD
		Move To End (Lift)	End: UP, DOWN Description: Blocking Type: NONE, SOFT, HARD
		Move To Location (Lift)	Location Id: upper_support, under_support Speed [m/s]: Description: Blocking Type: NONE, SOFT, HARD
		Move To Position (Lift)	Position [m]: Speed [m/s]: Description: Blocking Type: NONE, SOFT, HARD
		Move By (Lift)	Distance [m]: Speed [m/s]: Description: Blocking Type: NONE, SOFT, HARD
		Auto Diag (Not available)	Description: Blocking Type: NONE, SOFT, HARD
		Traction Pin (Automatic Pin)	State: DOWN, UP Description: Blocking Type: NONE, SOFT, HARD
	GENERAL	Move	Velocity [m/s]: Distance [m]: Orientation: Description: Blocking Type: NONE, SOFT, HARD
		Rotate	Description: Blocking Type: NONE, SOFT, HARD
	NAVIGATION	Init Position	X [m]: Y [m]: θ [radians]: Map Id: Last node Id: Last node sequence Id: Description: Blocking Type: NONE, SOFT, HARD
		Select Navigation (*upon machine configuration*)	Mode: NONE, LiDAR, MLS, OLS Description: Blocking Type: NONE, SOFT, HARD

	Type	Action	Parameters
		Select Controller	Controller: NONE, FollowPath Description: Blocking Type: NONE, SOFT, HARD
		Select Planner	Planner: NONE, StraightLine Description: Blocking Type: NONE, SOFT, HARD

ABSOLUTE GUARD ZONES

This tab allows the user to manage absolute guard zones. It provides an intuitive canvas to design these zones. It also offers insert and deletion features.

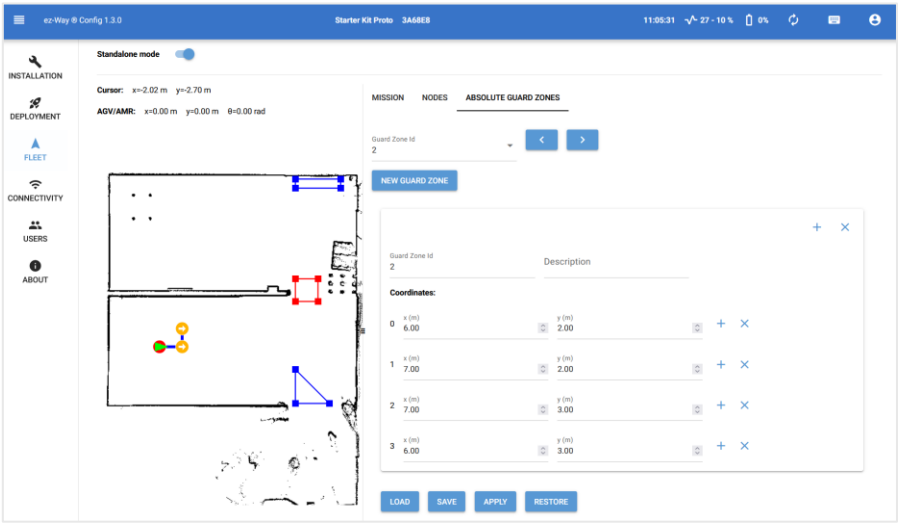


Figure 16: Absolut Guard Zone configuration

ⓘ The red polygon shows the current selection.

6.4 CONNECTIVITY

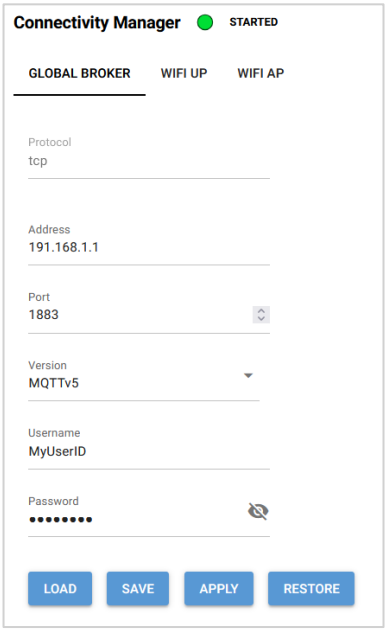
GLOBAL BROKER

WIFI UP

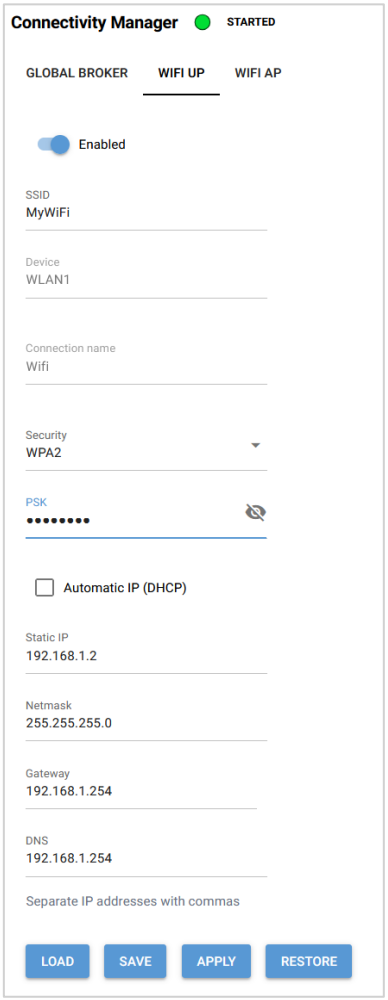
WIFI AP

These tabs allow us to configure the global broker connection, the Wi-Fi connection with the facility, and the Wi-Fi Access-Point of the robot.

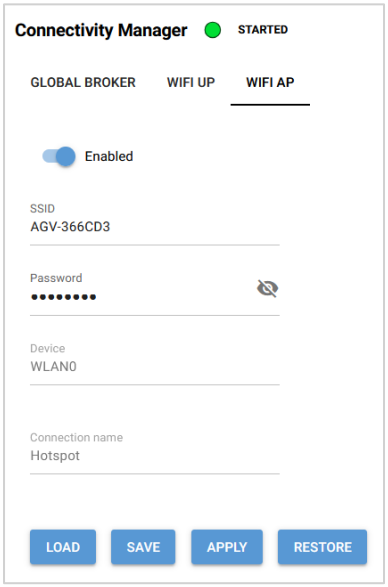
GLOBAL BROKER



WIFI UP



WIFI AP



6.5 USERS

This tab allows the user to manage and create access to users. Users are identified with a name, password, profile and language used with the HMIs. English is the default language.

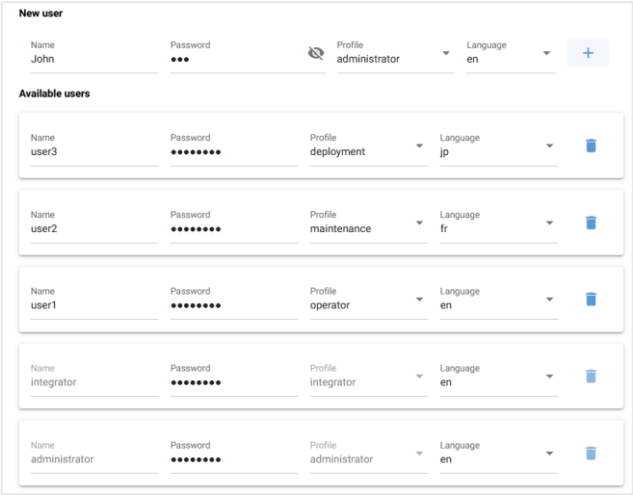


Figure 17: User management

There are different profiles, which define the access level within ***ez-Way®***, which are detailed below:

Profile	Duties
Operator	He will be responsible for launching the missions, ensuring the smooth running of each mission, stopping the robot if necessary and even making emergency stops if necessary. He will also be the privileged interlocutor of the maintenance manager dedicated to the equipment in the event of damage to the robot and/or failures, regardless of its origin.
Maintenance	He manages the maintenance of the AMR. Its role is to ensure the proper functioning of the equipment by carrying out regular maintenance operations.
Deployment	Its role is to deploy AMR on the production line. He is called upon to define the missions. He will have to train the operator(s) in the operation of the robot and will train the operator(s) in changes of missions.
Integrator	He manages the configuration of the AMR and its implementation after receipt. He intervenes during the installation on site and, in the event of a change in the robot's environment, to adapt the configuration. He works in collaboration with the site's safety manager to guarantee the safety of people as well as the facilities and equipment in which the robot is required. It is also a guarantor of machine compliance by guaranteeing the operation of the operating rules established by the manufacturer.
Administrator	Its role is to manage profiles and the various permissions. He has access to all classes of shares.

ℹ User management is available from the administrator, integrator and deployment profiles
ℹ The creation and use of all profile types is not mandatory.
ℹ Passwords will no longer be visible after registration (but can be edited or removed)

⚠ If the user does not log out, the session remains connected.

6.6 ABOUT

This section provides information about the ***ez-Way® Config*** version, the commit build identifier and the build time. The NiceGui version is used for the graphical interface.

7. Appendices

7.1 Map creation

One of the first steps in the commissioning process is to map the environment in which the machine will operate. This map will then be used to:

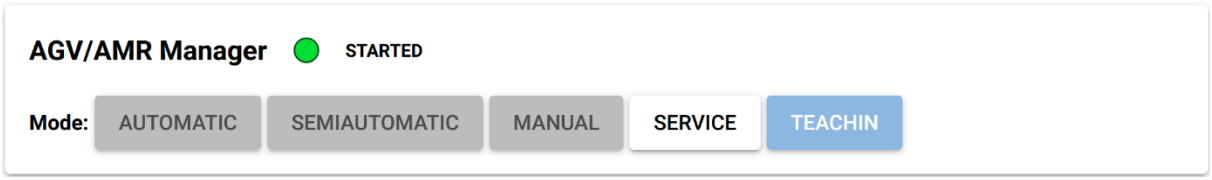
- locate the machine on the map.
- locate the nodes of the mission
- allow the machine to self-localize.
- set up absolute guard zones on the map.

The map is built from the data captured by the LiDAR and computed by ***ez-Way®***, to come up with a 2D representation of the environment. The map thus obtained is a laser-height plane.

💡 It is possible to use the same map for several machines (if the location of the LiDAR is the same).

TEACHIN Mode

Switching to 'TEACHIN' mode starts the mapping process.



💡 Access to "TEACHIN" mode is only possible from "SERVICE" mode.

Visualization

It is possible to see the ongoing mapping process on the "MAP" tab of ***ez-Way® Control***.

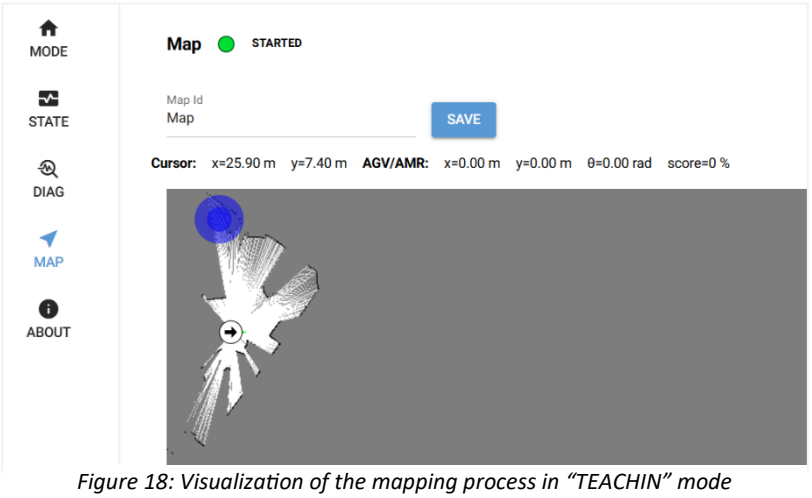


Figure 18: Visualization of the mapping process in "TEACHIN" mode

ℹ It is recommended to start creating a map with the robot oriented along the longest length of its operating area.
ℹ It is advisable to monitor the construction of the map and avoid unscanned areas.
ℹ It is also possible to view the map from an external *device*.

Mapping process

Mapping requires navigating the entire environment in which the machine will operate. During this process, all areas that will be within the AMR's field of view during operation must be covered.

ℹ During this operation, the machine is manually moved.
ℹ During this operation we advise:

- Avoid passing through the same place several times.
- Avoid bumps or potholes in the ground.
- Move slowly and close to the walls and permanent obstacles.
- Check that there are no black areas when creating the map.

When the entire area has been covered, it is necessary to return to the exact starting point and same orientation to complete it.
If the map accurately represents the environment, it can be renamed using the "Map ID" field, then saved using the "SAVE" button. Finally, return to "SERVICE" mode to complete the procedure.

⚠ If you save a map with a name that has already been used, the previously registered map will be lost.

7.2 Map orientation

The origin and orientation of the map are defined when you start the 'TEACHIN' process. The x-axis runs along the length of the robot, and the y-axis runs along its width, with the orientation defined accordingly. The z-axis is oriented vertically defining theta orientation.

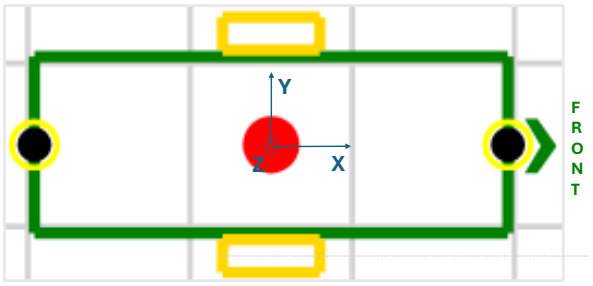
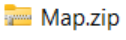
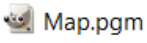
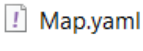
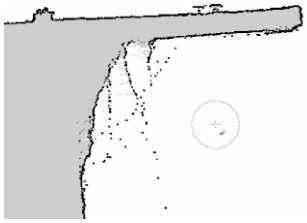
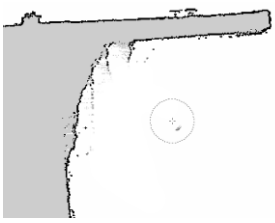
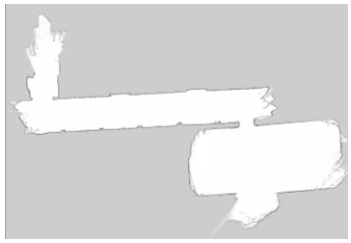
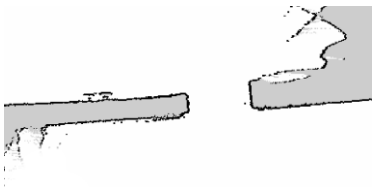
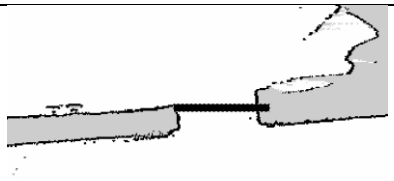


Figure 19: Coordinates (X, Y, Z)

Cleaning an *ez-Way*® Map (removing elements)

On the “DEPLOYMENT” tab from ***ez-Way® Control***, export the map you want to modify by clicking the export button.

 Right-click on the compressed folder you downloaded and select “Extract All”.	
In the extracted folder, you will find two files: • A ".pgm" file containing the data related to the map. • A ".yaml" file, containing the configuration such as name, resolution and origin of the map . With GIMP software, open the .pgm file and eras the desired elements. ⚠ Do not change the file dimensions or crop the map. ⚠ To “clean” areas, add pure white color . ⚠ Do **not** add black or remove drawing zones.	 

		**OK** To “clean” areas, add white.
		**Not OK** Do **not** change the file dimensions or crop the map.
		**Not OK** Do **not** add black or remove drawing zones.

Saving and re-importing the map

- Save the file with the same name and extension (.pgm).
- Select both files (.pgm and .yaml), right-click on them → Compress to → ZIP file.
- A .zip folder will be created.
- Return to ***ez-Way®*** and import this .zip folder.
- The imported folder will be added to the list
- Restart the AGV to apply the modification.

ℹ It is advisable to rename the old version of the map (example: map → map_old) before re-importing the new version, otherwise the old version will be lost.

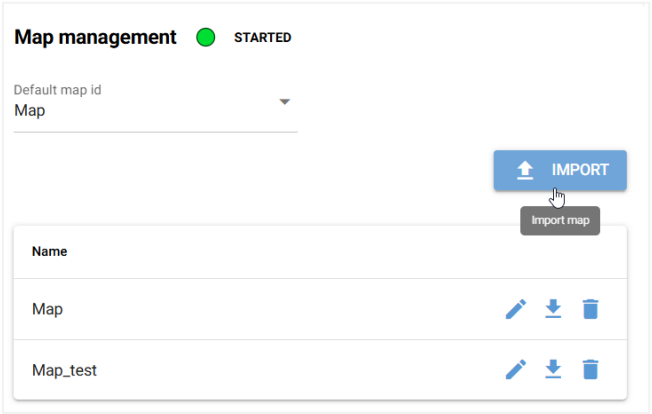


Figure 20: Importing a map

7.3 Editing a mission (nodes, actions …)

Node name

The "Node Id" in the drop-down menu has the format "**a**:**b**" corresponding to:

- **a**: "Node Id" is the unique identification of the node. It is created via a digital suite.
- **b**: "Sequence Id" is a numerary identifier calculated on the sequence of nodes and edges (paths between two nodes). Its objective is to distinguish the nodes that are crossed several times within the same mission.

Figure 21: Node identification; Node-Id and Sequence-Id

Node Selection and Orientation

The position and orientation of the nodes can be set in two different ways:

- Manually on the graph by positioning the coordinates on the plan
- By entering the coordinates [x,y,θ] for more precision (narrow passages, obstacles...)

Nodes that have already been created appear in orange on the map while selected nodes appear in red.
The arrows on each node indicate the orientation of the AMR when going to the next node. It is up to the user, when configuring the mission, to define this orientation.

⚠ Uncontrolled orientation can lead to the risk of collisions or falls on the same level for people nearby.

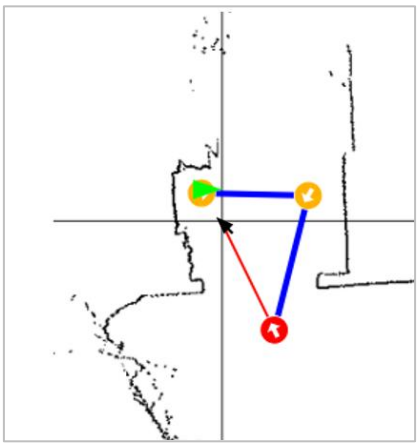


Figure 22: Node orientation theta (ϑ)

Loop mission

When creating a continuous loop mission, it is possible to configure it to run continuously. This means that the mission will start again when it is completed, without any intervention, until it is stopped.

Prerequisites:

- The first and last nodes must be in the same location and orientation.
- The last Node-ID must be identical to the first.

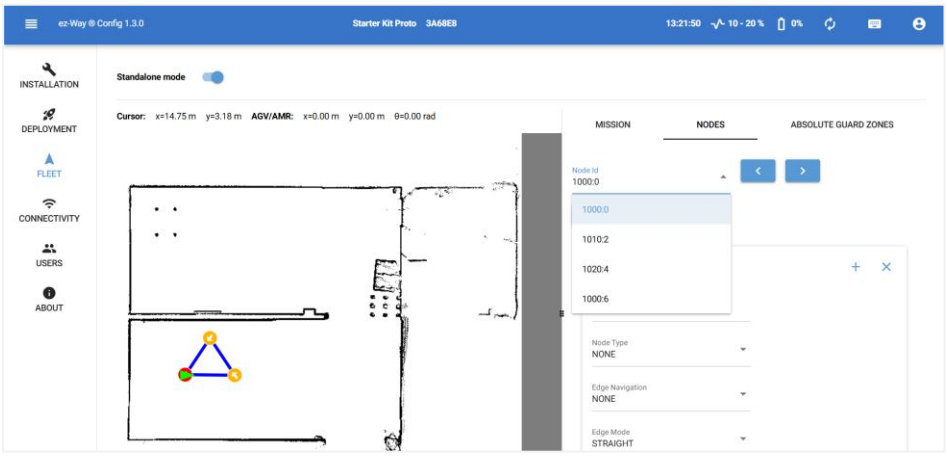


Figure 23: Create a loop mission

💡 In this example, both the first and last nodes have a Node-ID of 1000 and are positioned at (X=0, Y=0, θ=0).

Load, Save, Apply and Restore a mission

It is important to back up regularly when creating a mission. Indeed, any menu change will not keep the unsaved changes. An alert message always appears when there is a menu change.

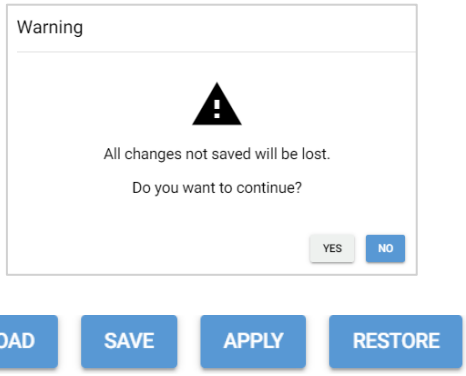


Figure 24: Load, Save, Apply and Restore a mission

To send a mission to the robot, select the desired mission from the drop-down menu and press “SAVE” button. For the robot to execute the mission, click “APPLY”.

The “LOAD” button allows the user to load manually a mission configuration file in JSON format, that he could have exported before. It is also possible to edit the file manually. The “RESTORE” button allows to recover the last backup in progress, overwriting the unsaved changes.

7.4 MQTT API Documentation

The MQTT API reference for ***ez-Way®*** is available here. It provides details on how to interact with ***ez-Way®*** robots via the MQTT interface, listing the MQTT topics and payload formats (JSON structure, commands and

fields) that clients can publish to or subscribe to. The reference is the definitive source of information for developers building apps, PLC interfaces, fleet management systems or third-party integrations using MQTT.

7.5 Errors Reference

The ***ez-Way®*** error reference is available here. This lists all the error codes and messages that the ***ez-Way®*** can generate. It helps users interpret errors reported by robots. Each error code corresponds to a specific issue relating to hardware, software, communication or safety. It also provides diagnostic details and sometimes recommended actions.

8. Troubleshooting

Additional web pages are accessible to start and stop services, get system logs, and documentation:

- Supervisor: http://10.42.0.1:8083/, or http://<*XXX.XXX.X.X*>:8083, (<*depending on each network*>)
- Dashboard: http://10.42.0.1:8088/, or http://<*XXX.XXX.X.X*>:8083, (<*depending on each network*>)

⚠ URLs only accessible when connected to the machine.

9. Modification history

Revision	Release date	Changes
V1.3.x-a	December 2025	First release
V1.2.x	October 2025	Preliminary versions
V1-a	August 2025	