

ROC documentation

Version rhea-5

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User manual for the ROC web application

Introduction

This ROC-E / ROC-M application manual describes all functions and how they work.

It covers use of the application on a ROC-E robot and on a ROC-M manager.

Home page

On a ROC-E robot



The home page displays the list of destinations stored in the robot's map in the form of a large button.

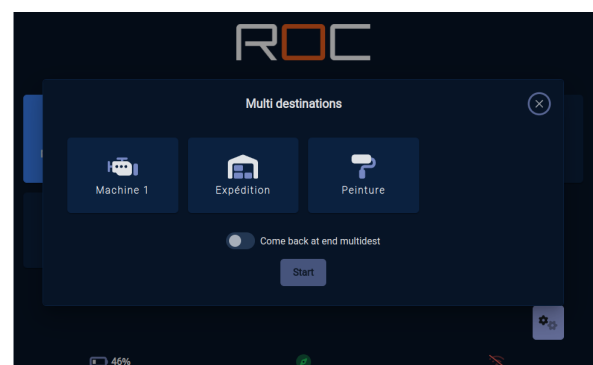
Pressing one of these buttons sends a command to the robot to move to the associated destination.

The button at bottom right gives access to the application configuration.

Multi destinations

By clicking on the **Multi destinations** button, you can ask the robot to move to several positions in the same mission by selecting the desired destinations. The robot will move from destination to destination, from closest to closest.

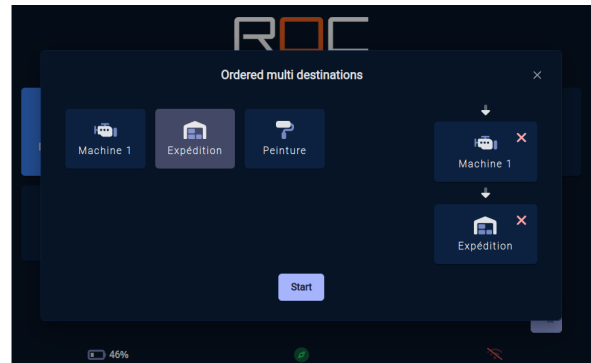
Once the robot has reached a destination, the operator can only release the robot to move on to its next destination (he cannot ask the robot to go to another destination).



Ordered multi destinations

By clicking on the **Ordered multi destinations** button, you can instruct the robot to move to several positions in the same mission in a fixed order by selecting the desired destinations. The robot will move from destination to destination in the desired order.

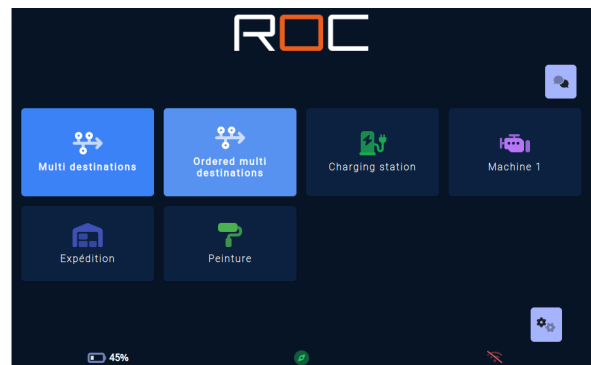
Once the robot has reached a destination, the operator can only release the robot to move on to its next destination (he cannot ask the robot to go to another destination).



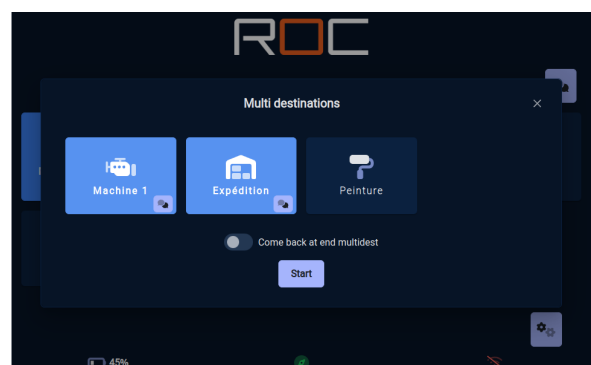
Predefined messages

If predefined messages have been configured, a button with 2 bubbles appears at the top right.

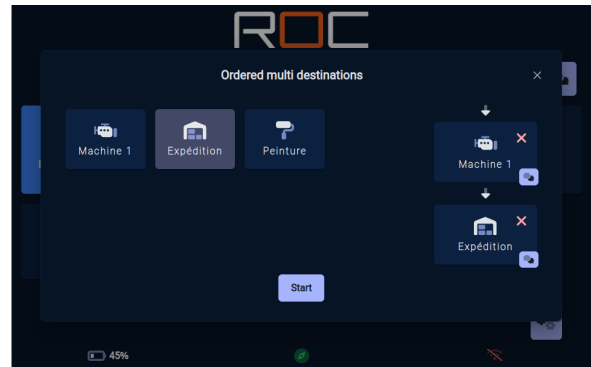
This button is used to select a predefined message to be displayed once the robot has reached its destination for the current mission.



In the case of multi destinations, the message can be customised for each destination by clicking on the button associated with the destination.



In the case of ordered multi destinations, the message can be customised for each destination by clicking on the button associated with the destination.



On a manager



3 buttons at the bottom of the screen give access to different sections:

- The button on the left gives access to the list of current missions.
- The button on the right gives access to the application configuration.
- The central button gives access to usage statistics.

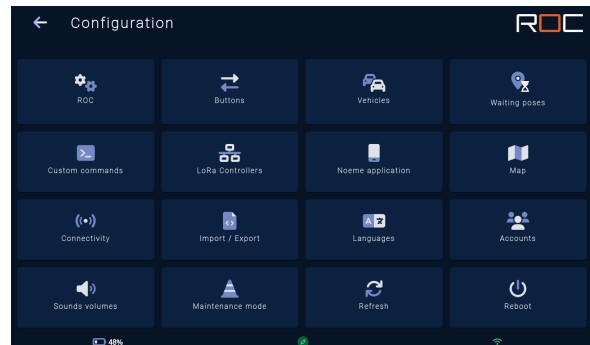
Configuration

The configuration page allows you to configure the tool.

Depending on your configuration (e.g. manager or not), some options may not be available.

This page takes you to the following sections:

- **ROC** : for general module configuration.
- **Buttons** : add / modify / delete call buttons.
- **Vehicles** : manage the list of fleet vehicles.
- **Waiting poses** : add / modify / delete waiting points.
- **Custom commands** : add / modify / delete custom commands.
- **LoRa Controllers** : add / modify / delete LoRa controllers.
- **Predefined messages** : add / modify / delete predefined messages.
- **Noeme application** : access the Noeme application.
- **Map** : manage destinations.
- **Connectivity** : manage the different WiFi connections of ROC and Noeme.
- **Select map** : manage the active map.
- **Import / Export** : export / import configurations.
- **Languages** : select the interface language.
- **Accounts** : add / modify / delete a user account.
- **Sounds volumes** : configure different sound volumes.
- **Maintenance mode** : activate or deactivate maintenance mode (manager only).
- **Refresh** : update the page (perhaps useful when updating the application).
- **Reboot** : restart the ROC application.



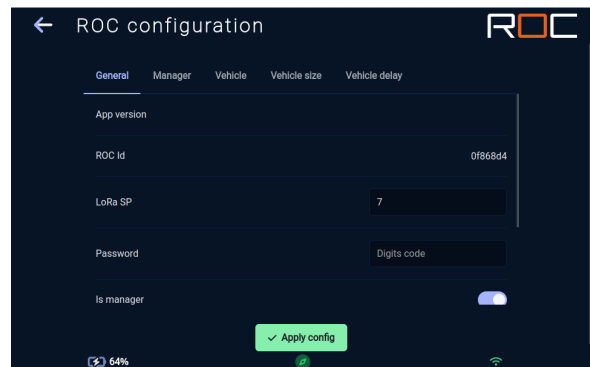
ROC

This configuration page lets you access certain information (application version, ROC Id...) and configure various application parameters.

General

This page allows you to view/modify the following parameters:

- **App version** : installed application version.
- **ROC Id** : unique module identifier.
- **LoRa SP** : configuration of LoRa communication spread factor; must be the same as call buttons, manager and other robots. Possible values from 7 to 12.
The higher the value, the slower the communication but the longer the range.
- **Password** : password to access the configuration section.
- **Is manager** : indicate whether the active equipment is the manager or not.
- **Is vehicle** : indicate whether the active equipment is connected to a Noeme vehicle.
- **Virtual keyboard** : Whether or not to use the virtual keyboard.



Manager

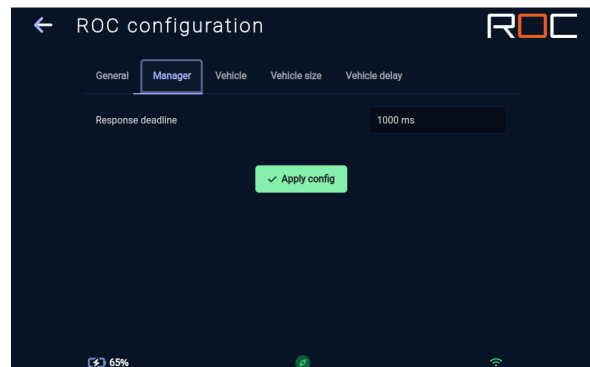
This page allows you to view/modify the following parameters:

If the manager is also a vehicle:

- **Response deadline** : waiting times for call equipments responses.

If the manager is not also a vehicle :

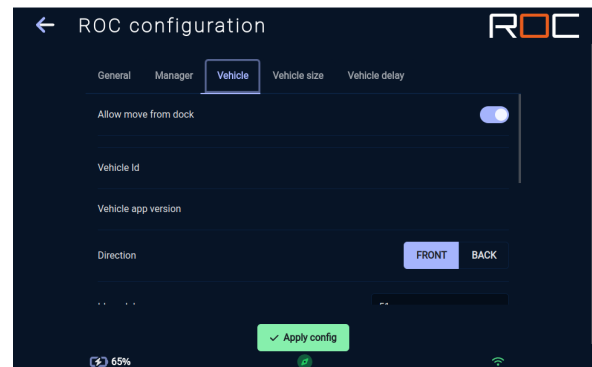
- **Default response deadline** : default waiting times for call button and LoRa controller responses.
- **Vehicle response deadline** : waiting times for vehicle responses.



Vehicle

This page allows you to view/modify the following parameters:

- **Allow move from dock** : allow a user to start a new mission when the robot is waiting at its charging station.
- **Vehicle Id** : unique vehicle identifier.
- **Direction** : indicate the vehicle's direction of arrival.
- **LoRa module ID** : LoRa module identifier for communication. Must be unique and reported on the manager.
- **Put the screen to sleep** : Put the screen to sleep when robot enter in sleep mode.
- **Nb retry on move failed on first step** : number of move attempts if move fails at first stage.
- **Nb retry on move failed on other step** : number of move attempts if move fails at other stages.
- **Nb retry on move failed on multidest** : number of retry attempts in the event of a failed multidestination trip.
- **Veh to destination, distance goal tolerance** : distance in cm around the destination where the robot is considered to have arrived.
- **Veh to destination, yaw goal tolerance** : angle in degrees with respect to the destination where the robot is considered to have arrived.



Vehicle - Size

This page allows you to view/modify the following parameters:

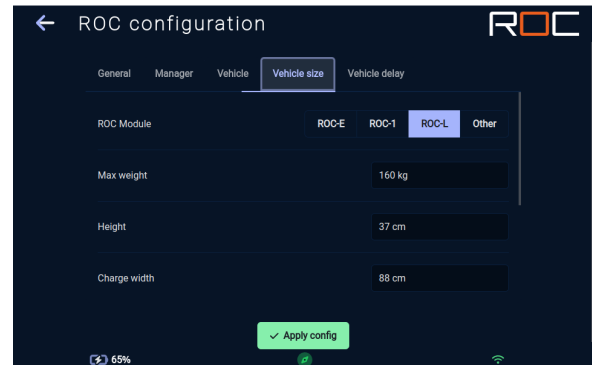
- **ROC Module** : type of active ROC module.
- **Max weight** : maximum weight of the robot with its load.
- **Height** : total height of the robot.

If the module is of type **ROC-L**

- **Charge width** : width of the load being transported.
- **Charge depth** : depth of the load being transported.
- **Height with charge** : total height of the robot with its load.
- **Charge max speed** : maximum speed of the robot authorised when carrying the load.

If the module is of type **Other**

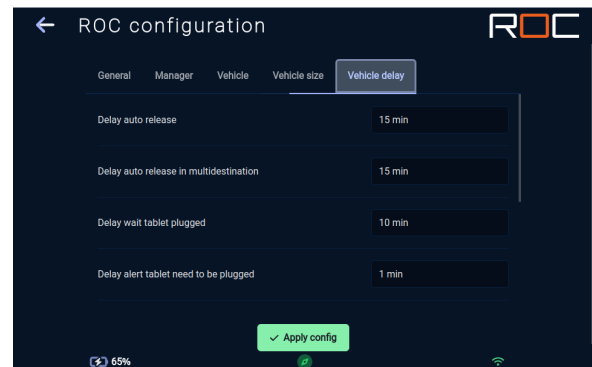
- **Max width** : maximum width of the robot.
- **Max depth** : maximum depth of the robot.



Vehicle - Delays

This page allows you to view/modify the following parameters:

- **Delay auto release** : automatic release delay on arrival at first stage (robot without load).
- **Delay auto release in multideestination** : automatic release delay on arrival at other stages (robot potentially loaded).
- **Delay wait tablet plugged** : for versions with removable tablet, wait time before the robot leaves if the tablet is not connected.
- **Delay alert tablet need to be plugged** : for versions with removable tablet, waiting time between 2 alerts when the tablet is not connected.
- **Delay between sound on wait release** : delay between 2 tones to indicate waiting for release.
- **Delay between retry on move failed** : waiting time between 2 attempts if the move fails.
- **Delay before retry on waiting pose** : waiting time before retry when the robot is in a waiting position.
- **Delay before standby** : waiting times once the robot is charging and before it goes into standby.



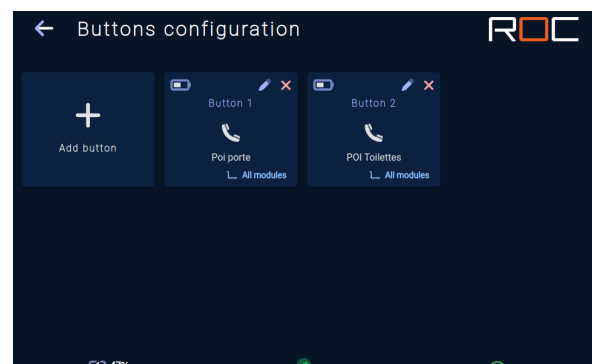
Buttons

This page lists the configured buttons.

To add a new button, click on the "Add button" button.

To modify a new button, click on the pencil associated with the button.

To delete a button, click on the red cross associated with it.



Add a button

To add a new button configuration, click on the "Add button" button.

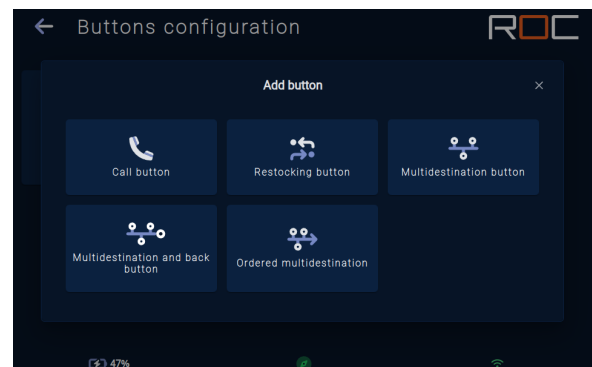
If the application is configured as manager and vehicle, an automatic mode will be proposed; otherwise, the manual mode will be displayed.

Follow the steps to create a new button.

Button type

The application currently supports 5 button types:

- **Call button** : Once there, the user can choose the next step or release the robot..
- **Restocking button** : When the associated button is pressed, the robot will move to the first associated destination. Once there, the user can only release the robot, and it will move to the second associated destination. This type of configuration may be useful in the case of workstation replenishment, where the call is launched from the workstation, and the robot moves first to the warehouse where it will be loaded, and then to the user's workstation.
- **Multidestination button** : When the associated button is pressed, the robot will move to all associated destinations, from nearer to nearer.
- **Multidestination and back button** : When the associated button is pressed, the robot will move to all the associated destinations, from nearest to nearest, ending at a specific, configured last position.
- **Ordered multidestination** : When the associated button is pressed, the robot will move to all associated destinations in the defined order.



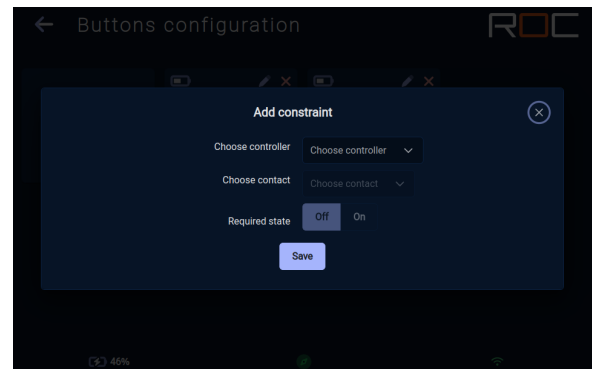
Constraints

For each step, you can set constraints by clicking on the padlock associated with the step.

These constraints are linked to the LoRa controllers connected to the solution (see section on LoRa controllers);

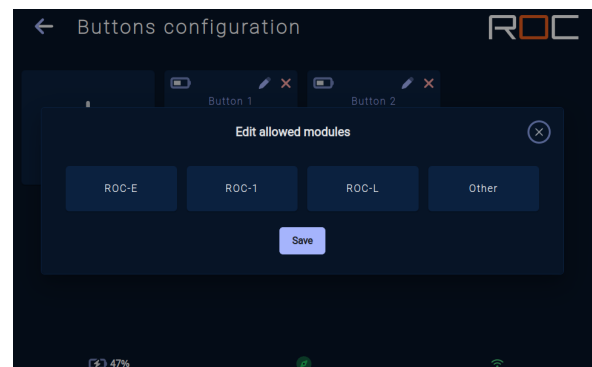
To define a constraint, you must indicate:

- the LoRa controller where the sensor that will define the constraint is connected
- the LoRa controller contact
- the state of the contact expected to validate the step



Module type

Once a button has been created, you can restrict the calling of these buttons to certain types of ROC module; to do this, click on the "All modules" link at the button level, then select the module(s) authorized to respond to a call from this button.

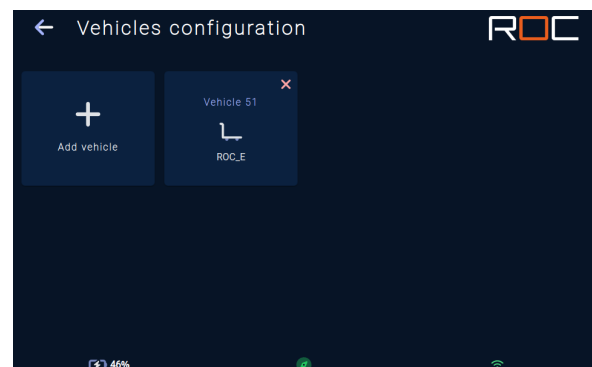


Vehicles

This page lists configured vehicles.

To delete a vehicle, click on the red cross associated with the vehicle.

To add a new vehicle, click on the "Add a vehicle" button and complete the required information.



Waiting points

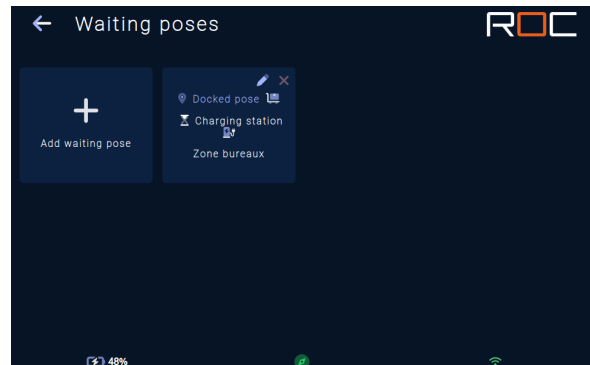
In some cases, several robots will need to go to the same saved position at the same time.

To prevent robots from self-blocking, it is possible to set up waiting points so that one of the robots waits on the position until the other robot has left the saved position.

Prerequisites

To add a new waiting point, you must first create:

- The **saved position** where there may be a conflict.
- The saved position corresponds to the **waiting point**.
- A **configurable zone** must contain the saved position where there may be a conflict. The robot will send a message to the other robots to indicate that the space is free when it leaves this zone.

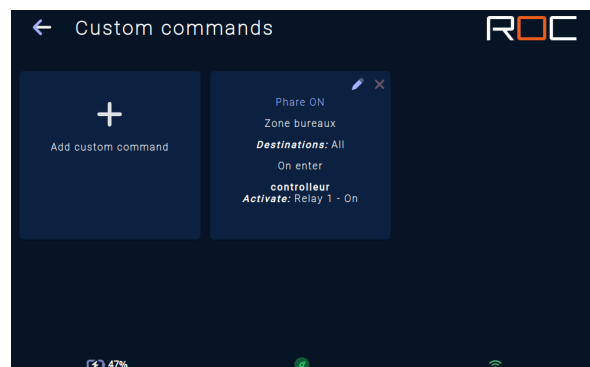


Custom commands

Custom commands can be created to instruct a LoRa controller to activate one of its relays at a particular time, or to pause robot movement depending on the state of a LoRa controller contact.

To add a custom order, you must indicate:

- a **title**
- the **trigger zone** (create a customizable zone on the map as a first step)
- the **list of saved positions** for which the order is to be sent (select nothing to apply to all destinations, activate "All except" to select only those positions where the behavior should not be triggered)
- the **triggering moment** (on entering the zone, on leaving the zone, on a movement error, as long as the robot is in the zone)
- the **LoRa controller relay** to activate or the contact to wait for



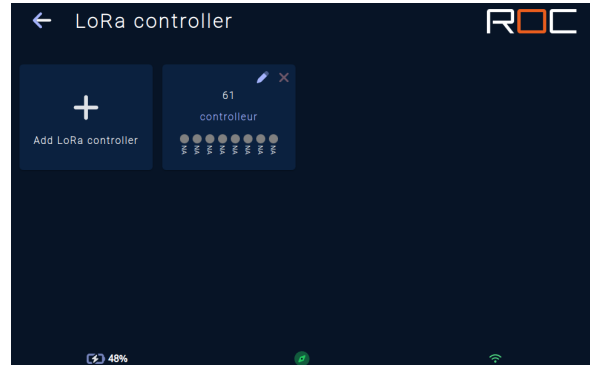
Examples of use : open an automatic door, switch off a zone alarm system, wait for a door to open before continuing...

LoRa controllers

This section lets you add, modify and delete LoRa controllers for use in other configurations.

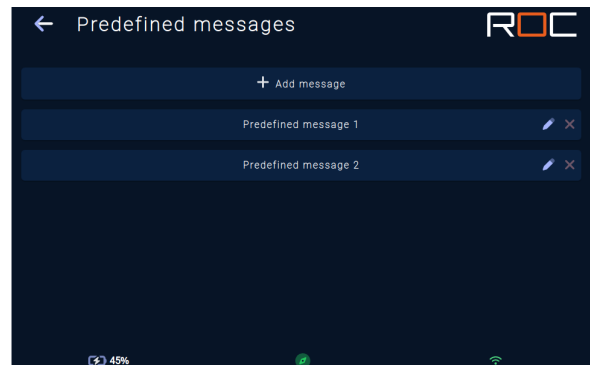
When a controller contact is active, the dot will be green.

When modifying a LoRa controller, it is possible to remotely retrieve the configuration of the controller's contacts. Once this configuration has been retrieved, you can modify the configuration of a contact remotely.



Predefined messages

This section allows you to add, modify and delete predefined messages for use when the robot moves.



Noeme application

This menu gives you direct access to the vehicle's application.

Please refer to the Noeme application documentation for further details.

Map

This section allows you to:

- add, move and delete saved positions.
- modify names, icons and colors of saved positions, charging stations and docked positions.
- configure control of a LoRa controller relay when the robot is in position.

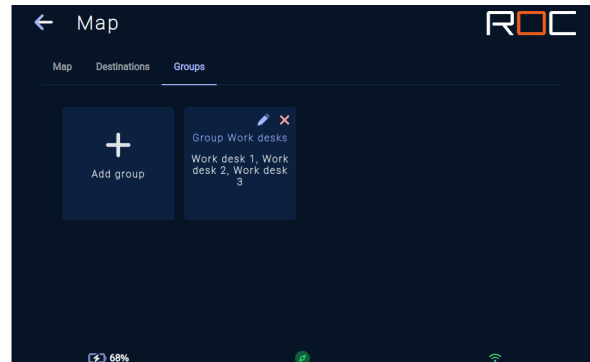
- restrict access to positions to certain module types.
- manage groups.

Groups

Groups allow several positions to be grouped together with a main position. For example, a user can send a robot to the main position, and once the robot has reached the main position, the screen will allow the user to choose a more precise destination position (one of the positions configured in the group).

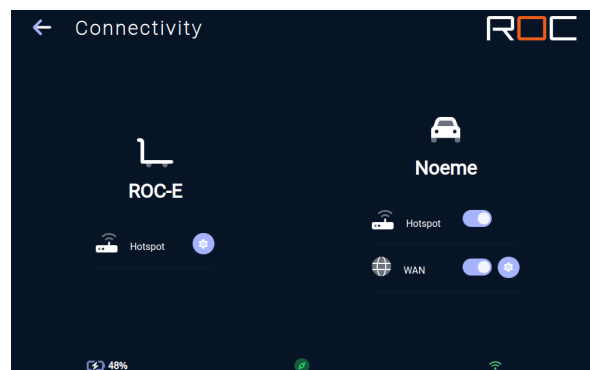
To create a group, you must specify :

- a main position
- a list of the group's other positions.



Connectivity

This page lets you activate, deactivate and configure the various WiFi functions for the module and Noeme.

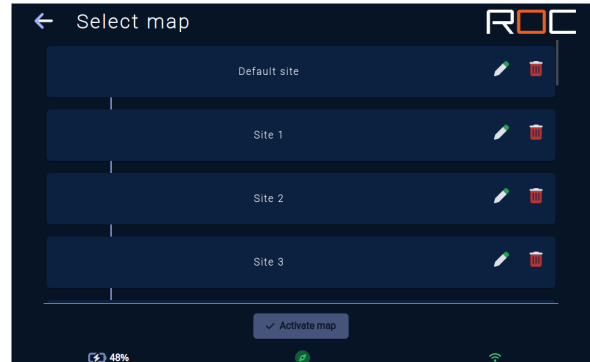




Select map

This page allows you to change the vehicle's **active map** among the maps **created** or **imported** on the vehicle.

It also allows renaming and deleting sites, as well as deleting maps.

In this "tree" view, the **sites** (containing the maps) are visible on the left side of the tree, and the **maps**, their names, and their **previews** are located under the parent site.



The pencil button  allows you to modify the **name** and **description** of a site. The trash button  allows you to delete, with **confirmation** required.

It is not possible to delete the active site or the active map.

Once the selection is complete, the button at the bottom of the page allows you to initiate the **map change**.

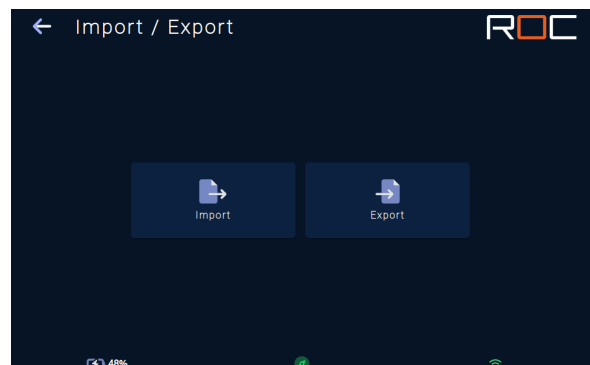
The vehicle will start by replacing its **active map**, then it will perform a **relocation** to start **autonomous navigation** on its new map.

Import / Export

This page lets you import/export configurations.

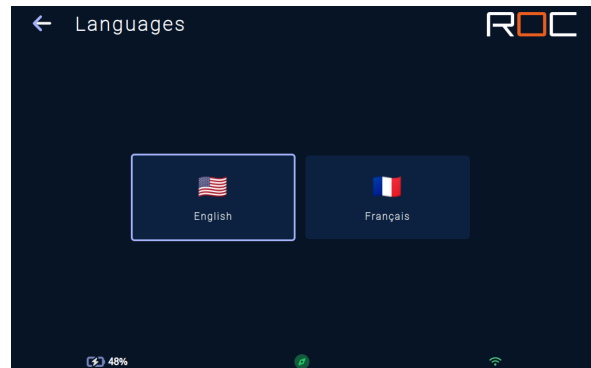
Export: click on the "Export" button to download configurations (to save them or to import them on another robot or manager).

Import: click on the "Import" button, then select the file to be imported.



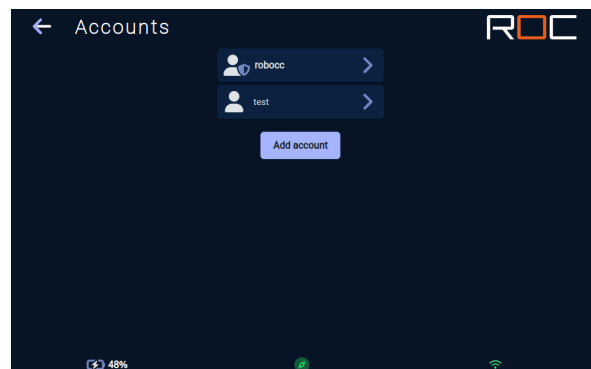
Languages

This page lets you choose the application language.



User accounts

This page allows you to add, modify or delete a user account.



Sound volumes

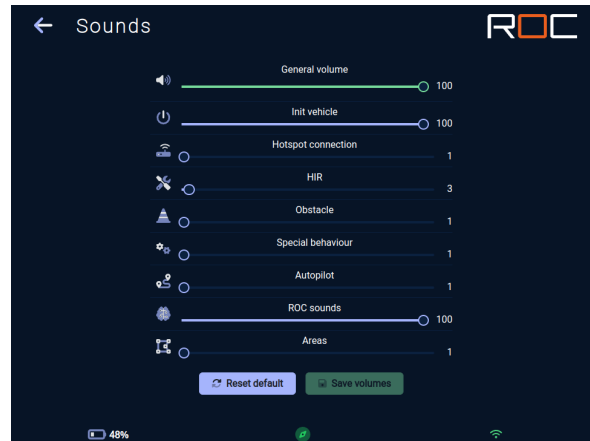
This page lets you set a **maximum volume** for each **scenario** of **sounds emitted** by the vehicle.

The general volume acts as an upper limit for all other values.

*If set to 30, other volumes cannot exceed 30.

The following scenarios can be configured:

- **Initialization** : Sounds when the vehicle is **started** .
- **Hotspot connection** : Sounds emitted when a device is **connected** to the vehicle's **WiFi hotspot** .
- **IHR** : Sounds emitted when the vehicle is **expecting human intervention** (Intervention Humaine Requite).
- **Obstacle** : Sounds emitted when the vehicle detects an **obstacle** while traveling.
- **Special behaviors** : Sounds emitted when the vehicle is in a particular state.
- **Autopilot** : Sounds emitted during the **steps** of sounds in a sequence of the vehicle's **autopilot** mode.
- **ROC sounds** : Sounds emitted during missions.
- **Settable areas** : Sounds emitted when the vehicle enters, exits or is in a **settable area** in which **sound behaviors** have been configured.



Maintenance mode

Click this button to activate or deactivate maintenance mode.

This button is only visible on a manager, and is used to pause the system.

If maintenance mode is enabled, the button icon will be orange.

Refresh

Click this button to force a complete page refresh.

This action may be useful after an application update.

Restart

Click on this button to completely restart the application and return it to its start-up state.

Statistics

The statistics page gives you access to a set of graphs and heatmaps showing how the solution is working.

The Export button lets you export the application's raw data to generate your own usage statistics.

Home

Provides an overview of solution usage.

A filter system lets you select the date and period of data analyzed.

Calls

Allows you to view a set of graphs on calls made to the solution.

Calls by button

View the number of calls per button.

Destinations

Provides statistics on the most popular destinations, as well as a heatmap.

Delays

Allows you to consult statistics on intervention times on the solution:

- Travel time
- Assistance in the event of a problem
- Release time

Movement error

View statistics on displacement errors and a heatmap to see where problems occur.

HIR

View statistics on HIR (Human Intervention Required) errors and a heatmap to see where problems occur.

Missions

The "missions" page is only available to managers.

It allows you to consult the list of current missions and to create new missions.



Creating a new mission

Create new mission

By clicking on the "Create new mission" button, you can create a new customized mission to send to the robots.

- Step 1: choose between a multidestination mission or an ordered multidestination mission.
- Step 2: choose destinations.
- Step 3: choose the type(s) of module(s) authorized for this mission (if you don't select a module, they will all be authorized).
- Step 4: choose one or more robots authorized for this mission (if you don't select any robot, they will all be authorized, if you select only one robot, the mission will be directly assigned to it).

Start button mission

By clicking on the "Start button mission" button, you can create a new mission to be sent to the robots from the pre-configured buttons. This works in the same way as pressing a LoRa button.

- Step 1: choose the pre-configured button.
- Step 2: select one or more robots authorized for this mission (if you don't select any robot, they'll all be authorized, if you select just one robot, the mission will be directly assigned to it).

Mission lists

The first list shows priority missions.

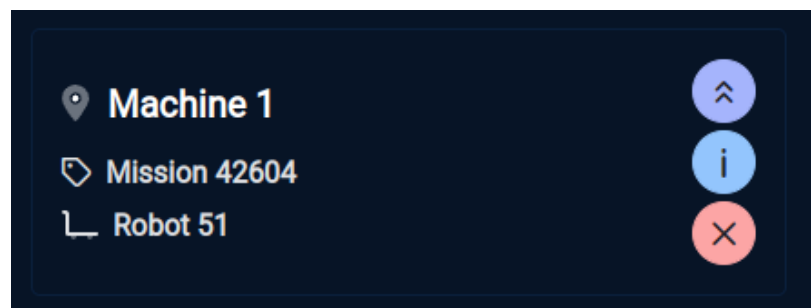
The second, non-priority missions (by default).

A non-priority mission will be given priority if the first robot is unable to carry out the mission (as soon as another robot is available, it will give priority to this mission).

Mission

Basic information is displayed:

- Active mission stage and destination.
- Mission number or associated button.
- The robot assigned to the mission.

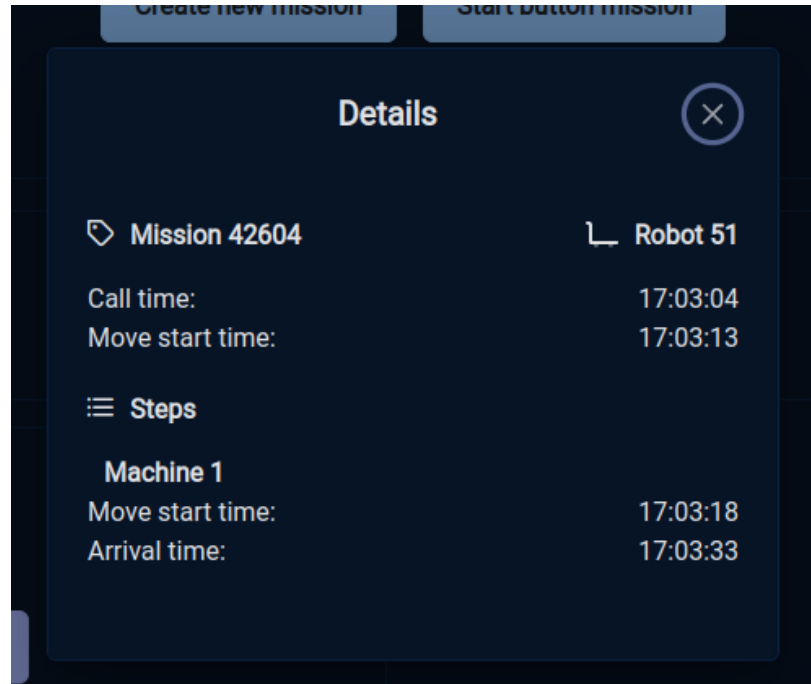


3 interaction buttons are available:

- Skip priority mission.
- View mission details.
- Cancel mission.

Mission details

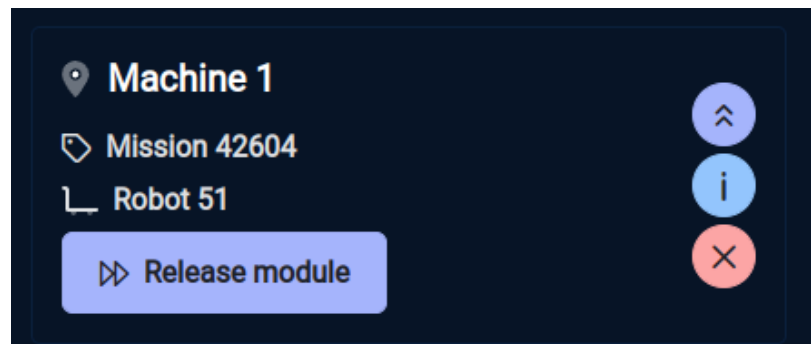
This popup allows you to view the mission details with all its steps.



Release a robot

When a robot is waiting to be released, the "Release robot" button appears.

This button lets you release the robot so that it can move on to its next step, or return to charge if its mission has been completed.

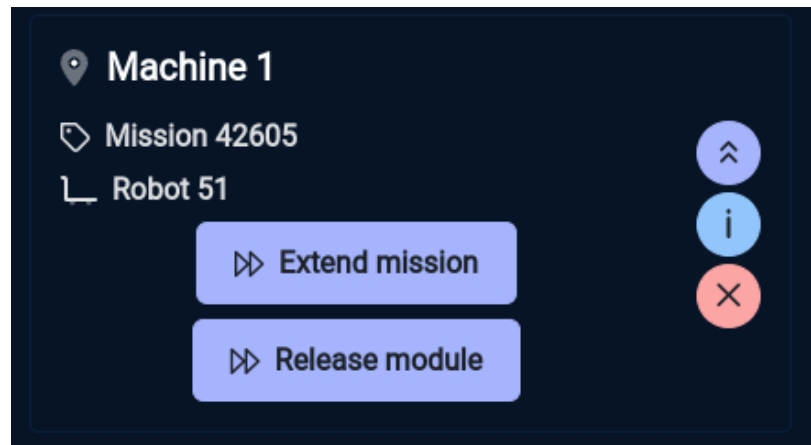


Extend a mission

When a robot is waiting to be released and has completed its mission, the "Extend mission" button is displayed.

This button lets you specify the next steps in the robot's mission.

The robot will be automatically released when it receives these new steps.



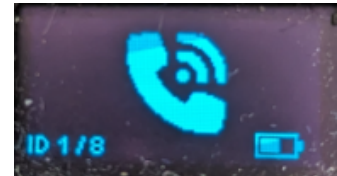
Call buttons user manual

How it works

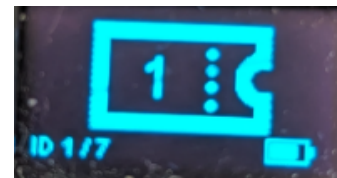
Start a call

Short press the physical button to launch a call.

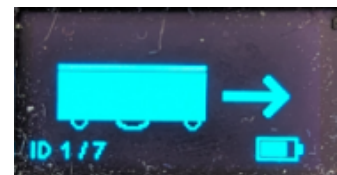
The display will show a phone.



Once the call has been received by the manager, the screen will display a ticket with the position number in the queue.



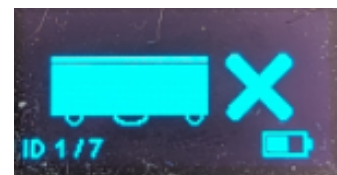
As soon as a robot is assigned to the mission, the screen displays the robot icon with an arrow.



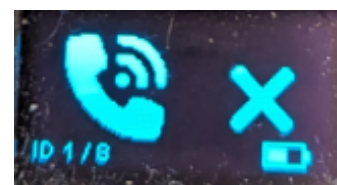
Once the robot has arrived, the screen will display the robot icon with a tick, then switch off.



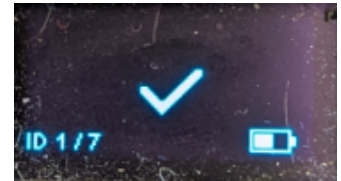
If the robot fails to come to the requested position, the screen will display the robot icon with a cross. This display will remain active until another robot is assigned to the mission.



If no equipment answers the call after 10 seconds (SP configuration problem or no manager on), the display will show a phone with a cross and then switch off.



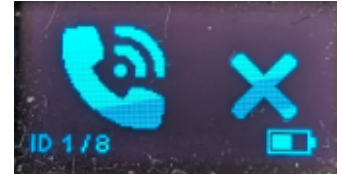
If the manager is in the process of being configured, the display will show a tick and then switch off.



Cancel a call

During a call, press and hold to cancel the call.

The display will show a phone with a cross.



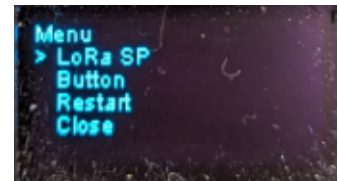
Configuration

Press and hold the button for 3 seconds to access the menu.

Menu

Quickly press the physical button to change menu, long press to enter menu.

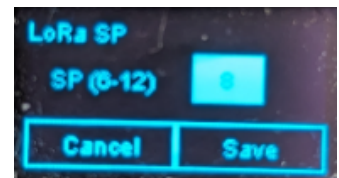
- **LoRa SP**
- **Button**
- **Restart** : restart the controller, to be done after a modification.
- **Close** : close the menu.



LoRa SP

This page is used to configure the controller's SP.
The SP must be set to the same SP as the manager and robots.

Quickly press the physical button to change a value or validate a button, long press to change fields or buttons.

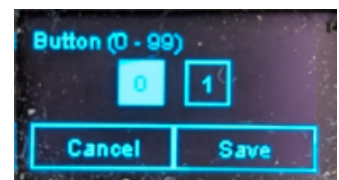


Button

Unique button identifier from 1 to 99.

It must be unique and will be configured on the manager and robots.

Quickly press the physical button to change a value or validate a button, long press to change fields or buttons.



LoRa controllers user manual

Principle

LoRa controllers are equipped with 2 relays and 8 dry contacts. They can be used to control equipment or be controlled by equipment/sensors.

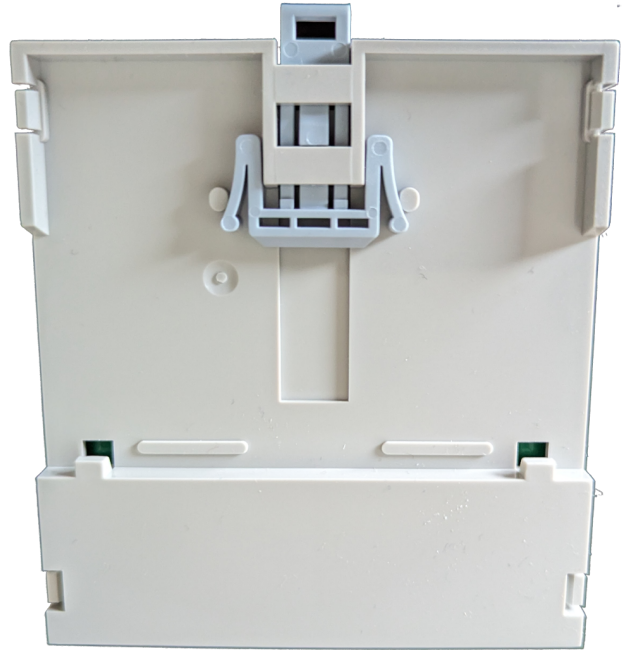
LoRa controllers must be connected to a power supply between 12V and 24V DC.

LoRa controllers should be installed on a DIN rail.

Views



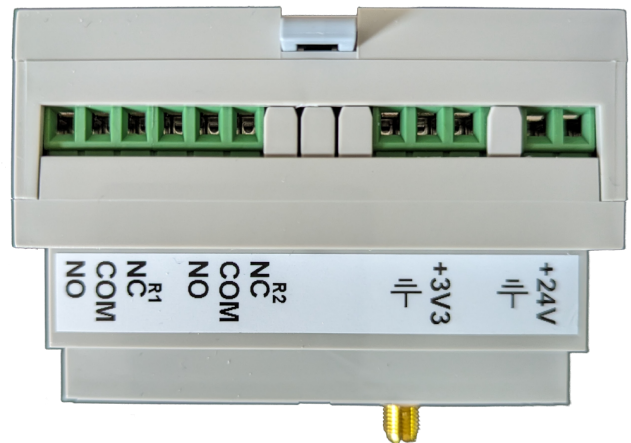
Front view



Rear view



Top view



Bottom view

Configuration

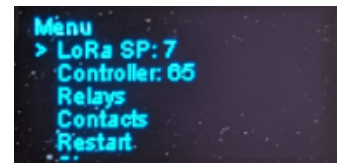
Press and hold the button for 2 seconds to access the menu.

Menu

Quickly press the physical button to change menu, long press to enter menu.

Menu

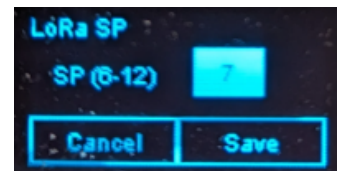
- LoRa
- Controller
- Relays
- Contacts
- Restart : restart the controller, to be done after a modification.
- Close : o close the menu.



LoRa

This page is used to configure the controller's SP.
The SP must be set to the same SP as the manager and robots.

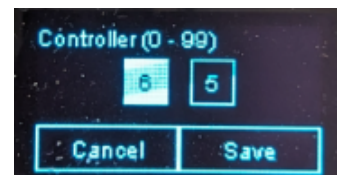
Quickly press the physical button to change a value or validate a button, long press to change fields or buttons.



Controller

Unique controller identifier between 1 and 99.
It must be unique and will be configured on the manager and robots.

Quickly press the physical button to change a value or validate a button, long press to change fields or buttons.



Relays

Allows you to modify the relay activation time on a pulse command in tens of milliseconds and test relays.

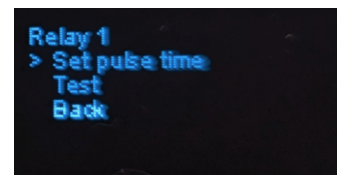
Quickly press the physical button to change menu, long press to enter menu.



Relay

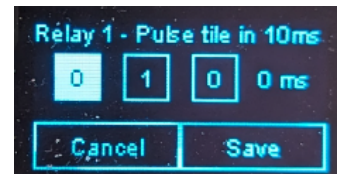
Once on a relay page :

- **Pulse** : set the pulse duration,
- **Test** : test the relay,
- **Back** : return to the previous page.



Relay - Set pulse time

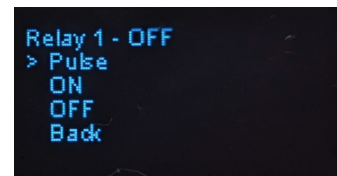
Once on the page, press the physical button quickly to change a value or validate a button, and press and hold to change fields or buttons.



Relay - Test

This page allows you to :

- **Set pulse time** : send a pulse to the relay
- **ON** : activate the relay
- **OFF** : deactivate the relay

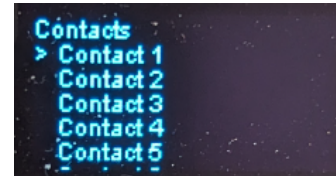


The active state of the relay is shown at the top of the page.

Contacts

Allows you to modify contact configuration.

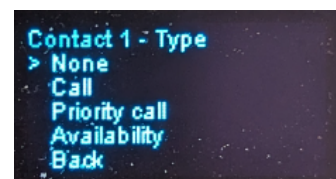
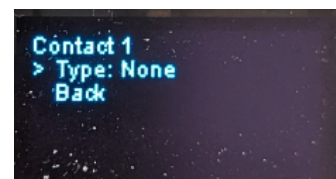
Quickly press the physical button to change menu, long press to enter menu.



Contact

Once on a contact's page, you can choose its type:

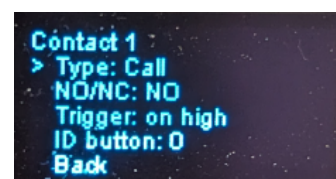
- **None** : no configuration
- **Call**
- **Priority call**
- **Availability**



Contact *Call* / *Priority call*

If the contact type is *Call* or *Priority call* , new configurations are available:

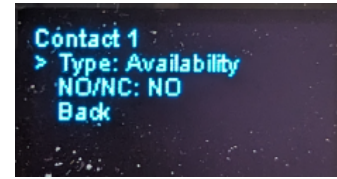
- **NO/NC** : indicate whether the contact is normally open or closed.
- **Trigger** : indicate whether the call should be triggered on an impulse or when the contact is "high".
In the case of "high" contact configuration, if the status changes to "low", the call will be cancelled.
The "high" configuration is generally used for presence contacts.
 - on high
 - on pulse
- **ID button** : Identifier of the button used to generate the call.



Contact *Availability*

If the contact type is *Availability* , a new configuration is available:

- **NO/NC** : indicate whether the contact is normally open or closed.



Contact *Release robot*

If the contact type is *Release robot* , new configurations are available:

- **NO/NC** : indicate whether the contact is normally open or closed.
- **UUID** : Unique identifier of the map element where the robot is to be released (UUID in hexadecimal).

