

Quick Start (en)

Date: 05/2022

Revision: v.3.0

MiR 100




Table of contents

1. Version history	4
2. Safety	5
2.1 Safety message types	5
2.2 General safety precautions	6
2.3 Intended use	12
2.4 Users	13
2.5 Foreseeable misuse	14
2.6 Residual risks	15
2.7 Warning label	16
3. Light indicators and speakers	17
3.1 Status lights	17
3.2 Speakers	18
4. Cybersecurity	19
5. Getting started	20
5.1 In the box	20
5.2 Unpacking MiR100	21
5.3 Connecting the battery	23
5.4 Powering up the robot	28
5.5 Connecting to the robot interface	29
5.6 Connecting the robot to a WiFi network	33
5.7 Driving the robot in Manual mode	37
5.8 Checking the hardware status	39

5.9 Mounting the nameplate	40
5.10 Shutting down the robot	42

1. Version history

This table shows current and previous versions of this document.

MiR100			
			
Revision	Release date	Description	HW
3.0	2022-05-05	<p>Updated for HW version 7.0 that changes the router to an Ethernet switch. The robot is now available in two versions: with a 24 V Standard battery or with a 24 V Extended capacity battery.</p> <p>Updated manual to ensure compliance with radio equipment directives.</p> <p>Warning not to use two chargers to charge the robot simultaneously has been added.</p>	7.0
2.3	2022-02-14	General improvements throughout the document.	6.0
2.2	2021-08-27	Updated for HW version 6.0 with new battery.	6.0
2.1	2020-10-30	General improvements throughout the document.	5.0
2.0	2020-10-01	Major update and new structure with new chapters: Warning label, IT security, Mounting the nameplate.	5.0

2. Safety

Read the information in this section before powering up and operating MiR100.

Pay particular attention to the safety instructions and warnings.



NOTICE

Mobile Industrial Robots disclaims any and all liability if MiR100 or its accessories are damaged, changed, or modified in any way. Mobile Industrial Robots cannot be held responsible for any damages caused to MiR100, accessories, or any other equipment due to programming errors or malfunctioning of MiR100.

2.1 Safety message types

This document uses the following safety message types.



WARNING

Indicates a potentially hazardous situation that could result in death or serious injury. Carefully read the message that follows to prevent death or serious injury.



CAUTION

Indicates a potentially hazardous situation that could result in minor or moderate injury. Alerts against unsafe practices. Carefully read the message that follows to prevent minor or moderate injury.



NOTICE

Indicates important information, including situations that can result in damage to equipment or property.

2.2 General safety precautions

This section contains general safety precautions.



WARNING

Harmful electromagnetic interference might be the result of having two radio modules transmitting at the same time.

- Do not attach an access point or additional radio modules to the robot while it is connected to a wireless network.



WARNING

If the robot is not running the correct software and is therefore not functioning properly, the robot may collide with personnel or equipment causing injury or damage.

- Ensure that the robot is always running the correct software.



WARNING

When the robot is in an operating hazard zone, there is a risk of injury to any personnel within the zone.

- Ensure that all personnel are instructed to stay clear of operating hazard zones when the robot is in the zone—see [Using operating hazard zones on page 1](#)



WARNING

The robot may drive over the feet of personnel, causing injury.

- All personnel must be informed of the side Protective fields of the robot and be instructed to wear safety shoes near an operating robot.



WARNING

The robot may drive into a ladder, scaffold, or similar equipment that has a person standing on it. Personnel risk fall injuries, and equipment may be damaged.

- Don't place ladders, scaffolds, or similar equipment in the robot's work environment.



WARNING

The robot may drive down staircases or holes in the floor and cause serious injury to personnel and damage to the robot and to equipment.

- Mark all descending staircases and holes as Forbidden zones on maps.
- Install physical barriers around descending staircases and holes that are in the robot's operating area. If the hazard is not close to the robot's operating area, it may be sufficient to use a Forbidden zone on its own.
- Keep the maps up to date.
- Inform personnel that the robot cannot detect descending staircases and holes in the floor in time to stop.

**WARNING**

Contact with live electrical parts can cause electric shock.

- Do not touch any internal components of the robot while it is powered.

**WARNING**

Using a charging device different from the one supplied by the manufacturer can cause a fire and thereby burn injuries to nearby personnel and damage to the robot and equipment.

- Only use an original MiR charger.



WARNING

Lithium battery packs may get hot, explode, or ignite and cause serious injury if they are misused electrically or mechanically.

Observe the following precautions when handling and using lithium-ion batteries:

- Do not short-circuit, recharge, or connect with false polarity.
- Do not expose to temperatures beyond the specified temperature range or incinerate the battery.
- Do not crush, puncture, or disassemble the battery. The battery contains safety and protection devices, which, if damaged, may cause the battery to generate heat, explode, or ignite.
- Do not allow the battery to get wet.
- In the event the battery leaks and the fluid gets into one's eye, do not rub the eye. Rinse well with water, and immediately seek medical care. If left untreated, the battery fluid could cause damage to the eye.
- In case of fire, use water to put out the fire. There is no need for special extinguishing media. An ambient fire can be fought with class D extinguishing media.
- Do not touch damaged batteries with bare hands. Only personnel using suitable Personal Protection Equipment (PPE) and tools should handle damaged batteries.



- Isolate the battery and keep clear if the following conditions are observed:
 - The battery exhibits abnormally high temperatures.
 - The battery emits abnormal odors.
 - The battery changes color.
 - The battery case is deformed or otherwise differs from the normal electrical or mechanical condition.
- Modifications or manipulations of the battery may lead to considerable safety risks and are therefore prohibited.
- Never smoke or allow an open spark or flame in the vicinity of the robot's battery.
- Do not use the battery for anything other than MiR100.



WARNING

Load falling or robot overturning if the load on the robot is not positioned or fastened correctly can cause fall injuries to nearby personnel or damage to equipment.

- Ensure that the load is positioned according to the specifications and is fastened correctly—see the user guide of your robot for safe payload distribution.



CAUTION

Load placed directly on top of the robot cover may cause damage to the cover of the robot.

- Ensure that the load is not placed directly on top of the robot cover.



CAUTION

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

- Do not use the robot in residential environments.



CAUTION

Robot malfunctions can cause an electrical fire, causing damage and injury to equipment and personnel.

- Personnel operating near the robot must be informed on how to use an ABC fire extinguisher to put out an electrical fire should the robot malfunction and catch on fire.



CAUTION

Risk of trapping or injury to personnel if robots malfunction or if personnel enter operating hazard zones.

- Personnel operating near the robot must be informed on how to engage the robot's Emergency stop function in emergency situations.



NOTICE

Moving the robot by hand forcefully may cause damage to the top cover.

- If the robot is stuck, push or pull gently on the top cover corners to move the robot.

2.3 Intended use

MiR100 is intended to be commissioned and used in indoor industrial environments where access for the public is restricted. For details about the environmental conditions in which MiR100 should operate, see specifications for MiR100 on the MiR website.

MiR100 is intended to be commissioned according to the guidelines in your robot's user guide. This is a prerequisite for safe usage of MiR100.

MiR100 is equipped with safety-related features that are purposely designed for collaborative operation where the robot operates without a safety enclosure or together with people.

MiR100 is intended to be used with top modules supported by Mobile Industrial Robots or custom modules that:

- Do not have any moving parts.
- Do not extend the physical dimensions of the robot.
- Operate within the environmental conditions required for MiR100.
- Are within the weight distribution requirements—see your robot's user guide.

If used with custom modules, all obligations of a manufacturer apply to the individual who performs the modifications. All modifications must be in accordance with the machinery directive.

MiR100 is designed for and all risks are considered when used with one of the following types of top modules:

- MiR Hook 100 to tow carts

MiR100 can be used as a partly complete machine as defined in the EU machinery directive with top modules that do not meet the above limitations. Those who design, manufacture, or commission a system that does not meet the limitations of use of MiR100 carry the obligations of a manufacturer and shall ensure a safe design according to EN ISO 12100. Guidelines outlined in this manual are not sufficient.



NOTICE

A safe machine does not guarantee a safe system. Follow the commissioning guidelines in your robot's user guide to ensure a safe system.

2.4 Users

MiR100 is only intended to be used by personnel that have received training in their required tasks.

There are three types of intended users for MiR100: commissioners, operators, and direct users.

Commissioners

Commissioners have thorough knowledge of all aspects of commissioning, safety, use, and maintenance of MiR100 and have the following main tasks:

- Commissioning of the product. This includes creating maps and restricting the user interface for other users and making brake tests with a full payload.
- Conducting the risk assessment.
- Determining the payload limit, weight distribution, safe fastening methods, safe loading and unloading of loads on MiR100, and ergonomic loading and unloading methods if relevant.
- Ensuring the safety of nearby personnel when the robot is accelerating, braking, and maneuvering.
- Marking operating hazard zones.

Operators

Operators have thorough knowledge of MiR100 and of the safety precautions presented in this user guide. Operators have the following main tasks:

- Servicing and maintaining MiR100.
- Creating and changing missions and map features in the robot interface.

Direct users

Direct users are familiar with the safety precautions in this quick start and have the following main tasks:

- Assigning missions to MiR100.
- Fastening loads to MiR100 securely.
- Loading and unloading from a paused robot.

All other persons in the vicinity of MiR100 are considered indirect users and must know how to act when they are close to the robot. For example, they must be aware that visibly marked operating hazard zones must be respected.

2.5 Foreseeable misuse

Any use of MiR100 deviating from the intended use is deemed as misuse. This includes, but is not limited to:

- Using the robot to transport people
- Using the robot on inclines outside the robot's specifications
- Making changes to the SICK configuration
- Driving the robot on cross slopes
- Exceeding the maximum payload
- Positioning or fastening loads incorrectly according to the specifications
- Using Emergency stop buttons for anything other than emergency stops
- Using the robot in medical and life critical applications
- Operating the robot outside the permissible operating parameters and environmental specifications
- Using the robot in potentially explosive ATEX environments
- Using the robot outdoors

- Using the robot in hygiene zones
- Using the robot together with an external radio module that in any way results in simultaneously active radio transmitters

The following list gives examples of custom modules that are foreseeable misuse of MiR100:

- Top modules (including the payload) that increase the physical dimensions of MiR100
- Conveyers (powered and non-powered)
- Industrial robot arms
- Devices that tow carts
- Customized load transfer stations
- Top modules or modifications that use additional antennas or result in transmitting radio signals simultaneously with the existing radio module.

2.6 Residual risks

Mobile Industrial Robots has identified the following potential hazards that commissioners must inform personnel about and take all precautions to avoid when working with MiR100:

- You risk being run over, drawn in, trapped, or struck if you stand in the path of the robot or walk towards the robot or its intended path while it is in motion.
- You risk being run over, drawn in, trapped, or struck if you stand in the path of the robot or walk towards it while it is driving in reverse. The robot only drives in reverse when undocking from a marker, such as a charging station or load transfer station.
- You risk being crushed or trapped if you touch the robot while it is in motion.
- You risk being crushed or trapped if the robot places a load outside a designated drop-off area due to faulty localization.

- You risk losing control of the robot if it is accessed by unauthorized users. Consider increasing the IT security of your product—see [Cybersecurity on page 19](#).



NOTICE

Other significant hazards may be present in a specific robot installation and must be identified during commissioning.

2.7 Warning label

MiR100 is supplied with a warning label that specifies that it is strictly prohibited to ride on the robot.

The label must be placed on the robot or top module so that it is clearly visible.



Figure 2.1. The warning label must be placed on the robot or top module.

3. Light indicators and speakers

The robot uses its status lights and speaker to let people in the environment know what the robot is currently doing or planning to do.

3.1 Status lights

The LED light bands running all the way around the robot indicate the robot's current operational state. Colors may also be used as part of missions, but as standard, status lights indicate the statuses described in **Table 3.1**.

Table 3.1. Status light colors	
Red	Emergency stop
Green	Ready for job
Cyan	Drives to destination
Purple	Goal/Path blocked
White	Planning/Calculating
Yellow	Mission paused
Yellow wavering	Startup signal before PC is active
Yellow fade	Shutting down robot
Yellow blinking	Relative move, ignoring obstacles
Purple - yellow	General error, for example hardware, localization
Blue	Manual drive
Blue wavering	Mapping
Contracting white	Charging at charging station

White wavering	Prompt user / Waiting for user's response
Cyan wavering (robots connected to MiR Fleet only)	Waiting for MiR Fleet resource or for another MiR robot to move



When the robot's battery reaches a critically low level of power (0-1%), the ends of the status lights flash red.



When the robot is charging in a charging station, the status lights on the side of the robot indicate the robot's battery percentage.

3.2 Speakers

In **Setup > Sounds**, you can upload new sounds to the robot or edit the volume and length of the default sounds.

Sounds are used in missions and can be used as alerts or to attract attention, for example, when the robot has arrived at a position.



CAUTION

Unaware personnel may not see the robot in certain situations and risk colliding with the robot. This may result in injury to personnel or damage to equipment.

- Make sure to adjust the volume of the robot's warning sounds so they are audible in the robot's work environment.
- Implement warning sounds from the robot in missions and areas where it can reduce the risk of hazardous situations.

4. Cybersecurity

Cybersecurity in the context of MiR products means protecting IT (Information Technology) and OT (Operational Technology) assets from unauthorized access, use, disruption, modification, or destruction.

MiR100 communicates all data over the network that it is connected to. It is the responsibility of the commissioner to ensure that it is connected to a secure network. MiR recommends conducting a cybersecurity risk assessment before commissioning MiR100.

To ensure the cybersecurity of your MiR product, see *MiR Cybersecurity Guide* found on the USB drive shipped with MiR100 and on the Support Portal.

5. Getting started

This section describes how to get started with MiR100.



NOTICE

Read [Safety on page 5](#) before powering up MiR100.

5.1 In the box

This section describes the contents of the MiR100 box.



Figure 5.1. The robot and accessories.

The box contains:

- The MiR100 robot
- The robot kit which contains:
 - One Emergency stop box, external antenna, and four pcs. M10x40 bolts
 - One charging cable
 - One external charger, 24 V DC, 10 A
- Adapter cable to connect a cable charger directly to the battery—see the *MiR 24V Battery Technical Guide* for intended use and instructions
- A MiR100 document folder containing a USB flash drive and the following printed documents:
 - *MiR100 Quick Start*
 - *The CE Declaration of Conformity* for your robot
 - *Getting the robot online*
 - *Passwords*
 - *Unpacking note*
 - The unique nameplate for your robot
- The USB flash drive in the document folder has the following content:
 - *MiR100 User Guide*
 - *MiR100 Quick Start*
 - *MiR Network and WiFi Guide*
 - *MiR Cybersecurity Guide*
 - *MiR Robot Reference Guide*
 - *Getting the robot online*
 - *CE Declaration of Conformity*

5.2 Unpacking MiR100

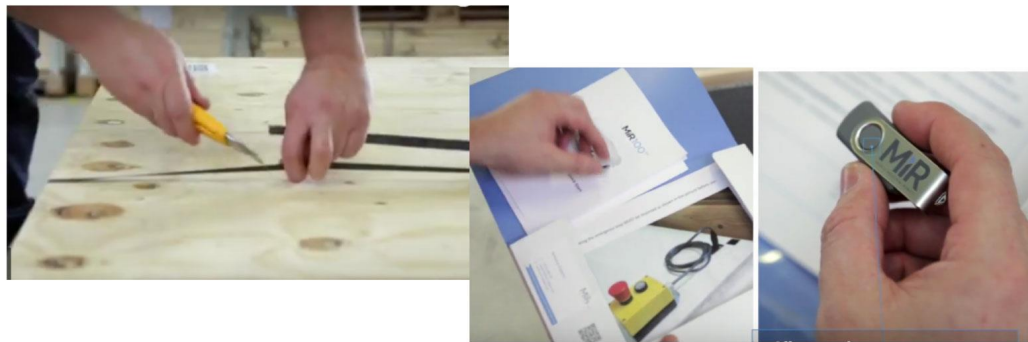
This section describes how to unpack the robot.



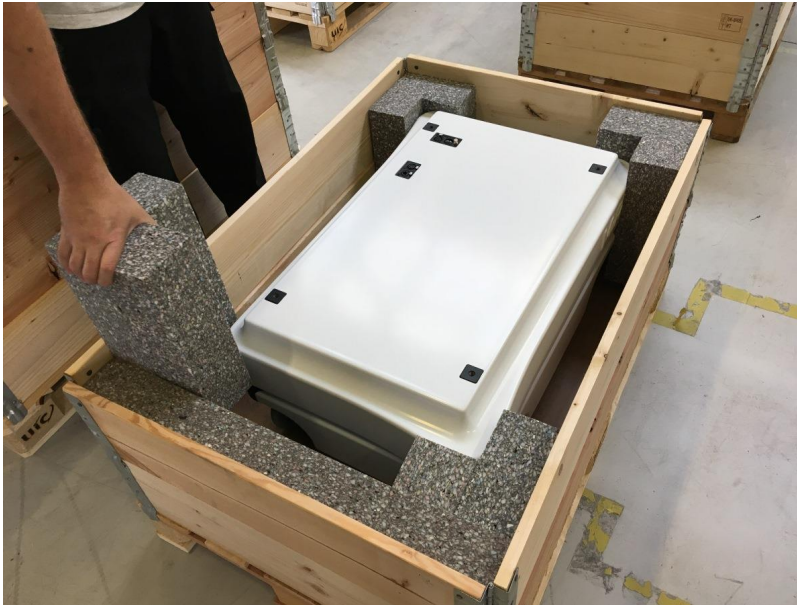
Keep the original packaging for future transportation of MiR100.

To unpack the robot, follow these steps:

1. Place the box with the robot so that there is three meters of free space at the front or the back of the box. This is necessary as the robot drives out of the box on a ramp.
2. Cut the protective straps surrounding the box.
3. Remove the lid from the box.
4. Take the folder with the printed documents and the USB flash drive out of the box.



5. Remove the walls of the box and the protective foam blocks.



6. Place the lid of the box so that you can use it as a ramp at the robot's front or rear end. Align the lid so that it is flush with the base of the box.



5.3 Connecting the battery

To connect the battery to the robot, follow these steps:

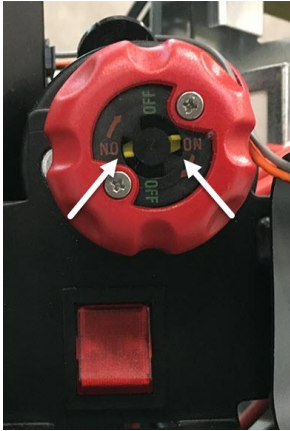
1. Grab the two rounded corners and carefully lift off the cover.



2. Switch on the three relays placed in the corner by the front laser scanner.



3. Ensure that the Battery disconnect switch, placed in the rear right corner, is on (the two yellow indicators pointing to On).



4. Put the cover back on and make sure to fit it correctly over the connector openings.



5. Mount and connect the Emergency stop box on top of the robot cover.



If a top module is going to be mounted on top of the robot, the Emergency stop must be placed in a position where it is easy to reach—see the mounting instructions for your top module.

6. Connect the antenna to the connector on top of the robot cover. Remove the plastic cap from the connector before fixing the antenna.

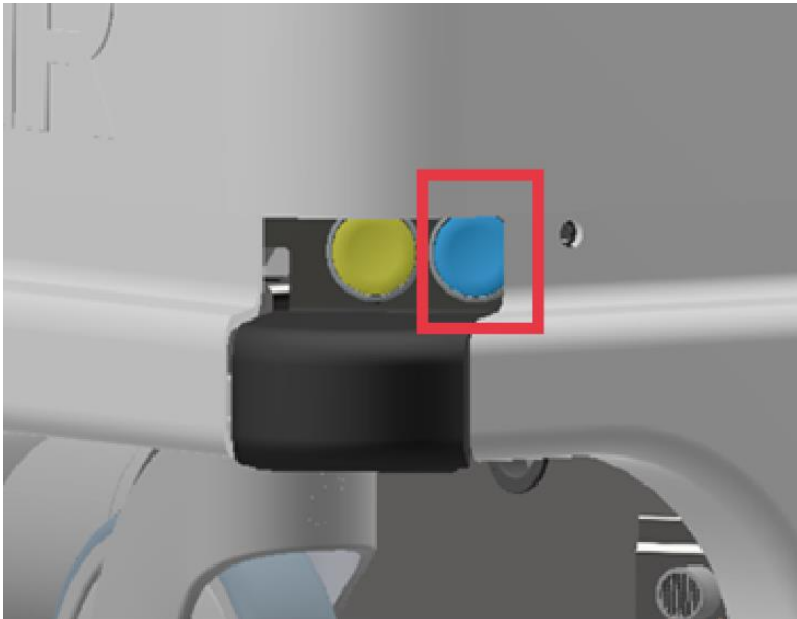


The antenna can be lowered and rotated in all directions to fit under a top module.

5.4 Powering up the robot

To power up the robot, follow these steps:

1. Press the Power button in the corner to turn on the robot. The status lights waver yellow, and the robot starts the software initialization process. When the initialization process ends, the robot goes into Protective stop.



2. Press the reset button on the Emergency stop when the button lights up. The status lights switches to yellow constant light, indicating that the robot is

paused and ready to operate.



5.5 Connecting to the robot interface

When the robot is turned on, you can connect a PC, tablet, or phone to the robot's internal network via the RJ45 Ethernet port under the bumper on the front-right corner shield of the robot. Once connected, you can configure the robot's settings and connect it to a wireless network.

You can connect to the robot using an Ethernet cable or an access point. If you are located in North America, EU, or a part of EAC, you can purchase a WiFi access point dongle from MiR. Outside these areas, you need to use your own access point that is approved for use in your region. If you choose to use an access point, you must ensure that the robot is disconnected from the wireless network before attaching the access point to remain compliant—see [Connecting the robot to a WiFi network on page 33](#).



The robot is certified to have only one radio module active at any given time.



Whether you connect via Ethernet cable or an access point dongle, it is recommended that the client is configured to DHCP. See the documentation of your operating system.



If you require a static IP on the client, assign an address above 192.168.12.150 and set the DNS server and Gateway address to 192.168.12.1. See the documentation of your operating system.



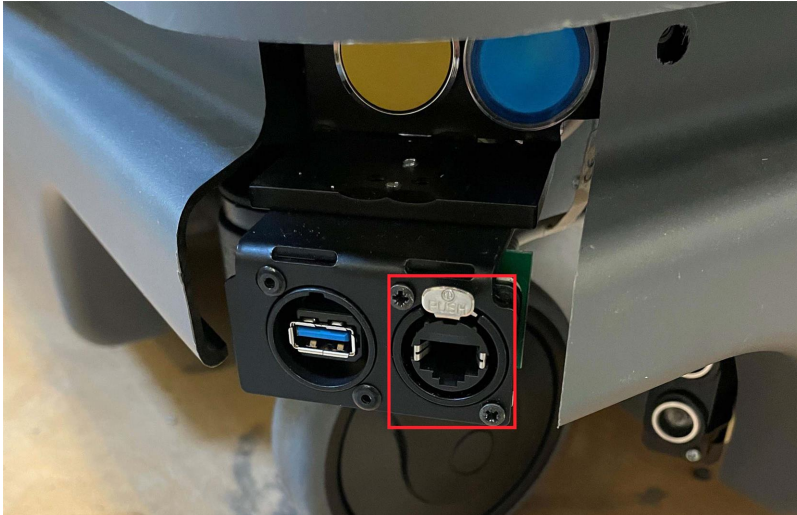
WARNING

Harmful electromagnetic interference might be the result of having two radio modules transmitting at the same time.

- Do not attach an access point or additional radio modules to the robot while it is connected to a wireless network.

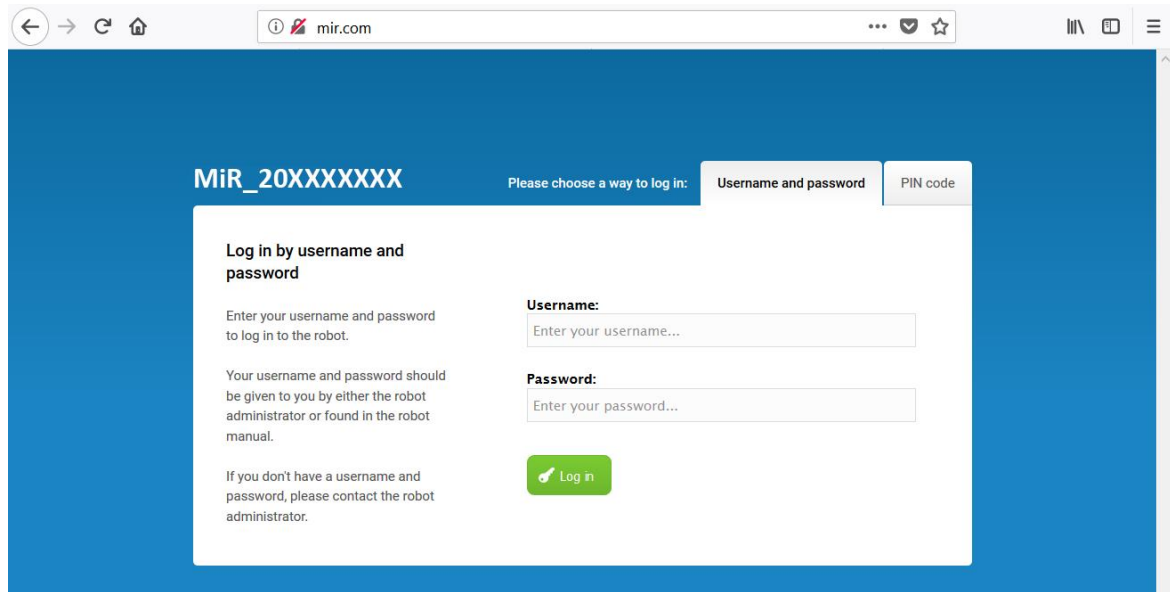
To connect to the robot interface, follow these steps:

1. Locate the RJ45 Ethernet port behind the removable corner cover in the front-right corner of the robot.



2. Connect your device directly to the robot using an Ethernet cable, or connect an access point to the Ethernet port for a wireless connection.
3. If you are using an access point, connect your device to the access point. The MiR WiFi dongle name has the following format: **MiR_3042XXXXX**. Use the password shipped with the access point to connect.

4. In a browser, go to the address **mir.com** and sign in.



You are now signed in to the robot interface and can set up your robot for operation.

If you want to connect the robot to your local WiFi network, connect the robot to the network as described in [Connecting the robot to a WiFi network on the next page](#).

If you want to drive the robot off the pallet immediately, you can do so from the interface as described in [Driving the robot in Manual mode on page 37](#).



If you are going to drive the robot manually and you are using an Ethernet cable to connect to the robot, make sure that the cable you have used is long enough for the robot to move without disconnecting the cable.



Always make sure your robot is running the latest recommended software. This also applies to newly supplied robots, as there may have been important software updates during the storage time and shipment of the robot. Contact your distributor for the latest recommended update file.

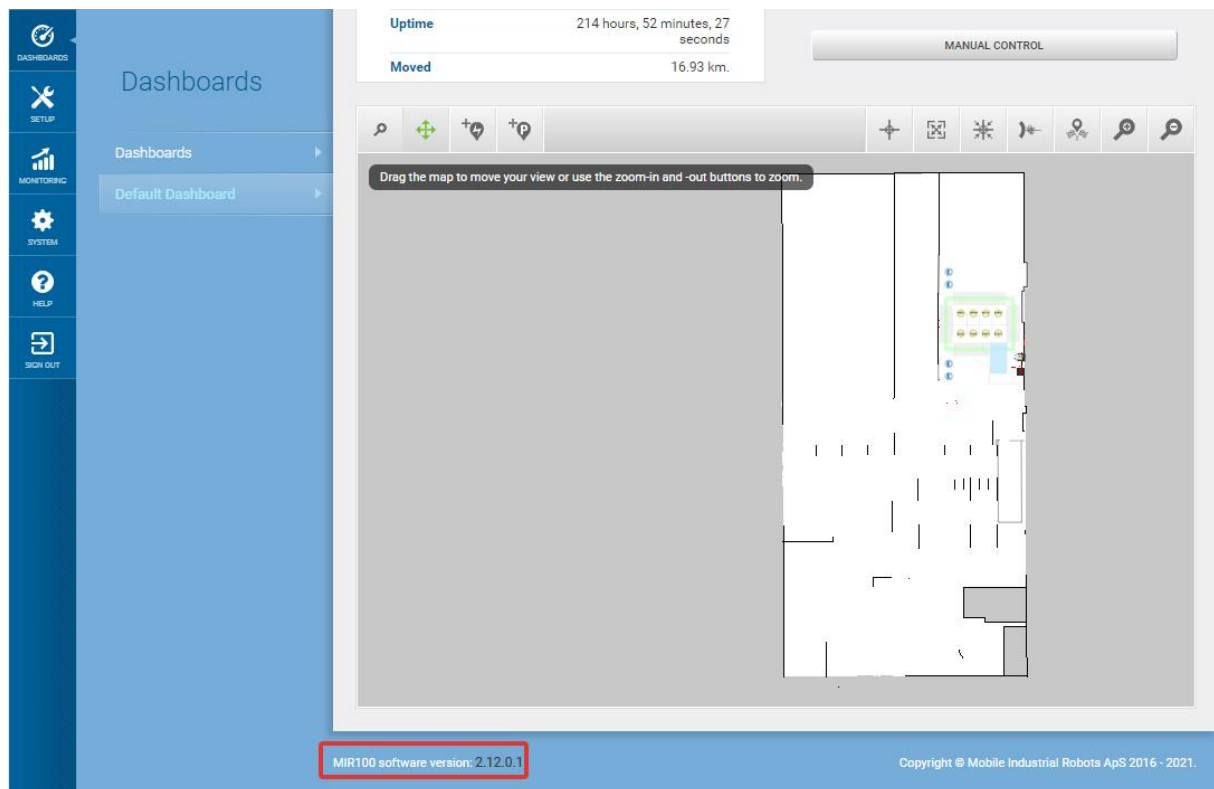


Figure 5.2. You can see the software version your robot is running in the bottom left corner of the robot interface.

5.6 Connecting the robot to a WiFi network

To communicate with the robot wirelessly without using an access point dongle, connect the robot to your local WiFi network. This enables you to access the robot interface via your WiFi network by entering the assigned IP address of your robot in a web browser.

To connect the robot to a WiFi network, follow these steps:

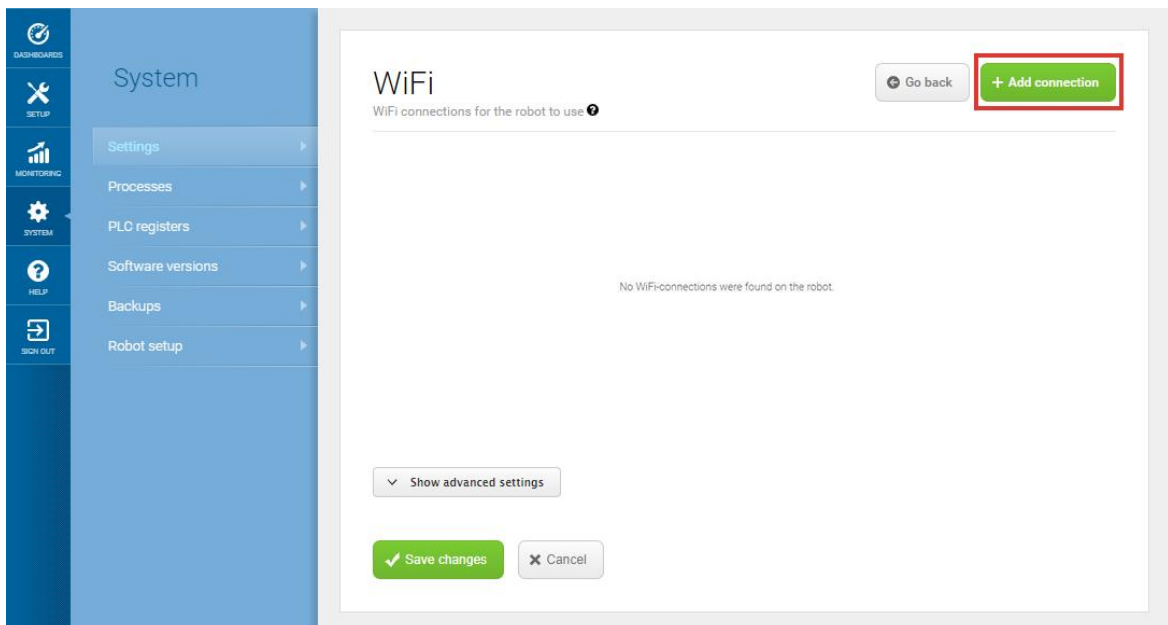
1. Connect to your robot as described in [Connecting to the robot interface on page 29](#).



NOTICE

To comply with the robot's certification, you must use an Ethernet cable to avoid simultaneously active radio transmitters while setting up connection to the local WiFi network.

2. Go to **System > Settings > WiFi**, and select **Add connection**.



3. Select the network you want the robot to be connected to, and fill out the displayed fields—see the guide *How to connect a MiR robot to a WiFi network* for more information about the WiFi settings.

Add connection

You can set up new WiFi connections by selecting from a list of available wireless networks.

Select a network:

MIR

▼

Reload

Security type:

WPA/WPA2 Enterprise TLS

▼

Username:

Password:

DNS servers

Certificate:

Choose File

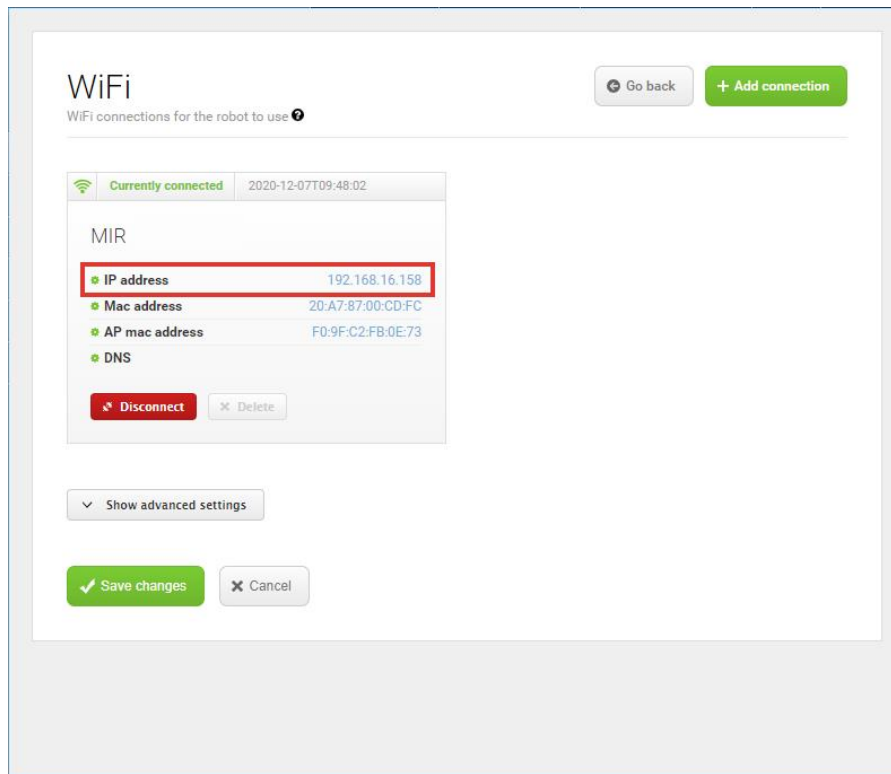
No file chosen

☐ Use static IP

Add connection

Cancel

4. Select **Add connection** when you have finished. The robot is now connected to the network. When you are connected to the same network, you can access the robot's interface by entering the IP address displayed under the connection description into your internet browser.



To disconnect the robot from a WiFi network, select **Disconnect**.

5.7 Driving the robot in Manual mode



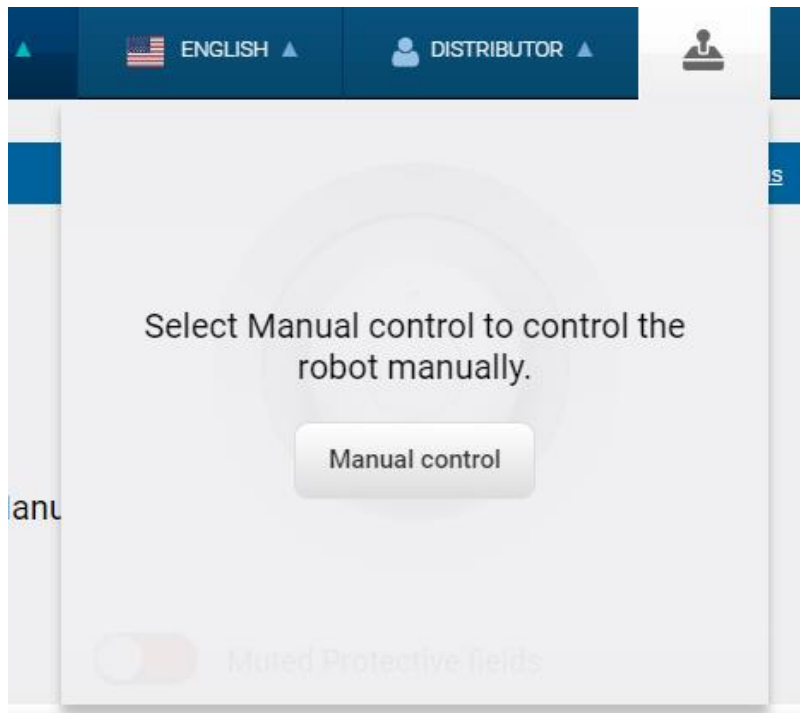
CAUTION

When driving the robot in manual mode, it is possible to drive the robot into Forbidden zones and Unpreferred zones on the map. This can result in injury to personnel or damage to equipment if the robot is not driven carefully.

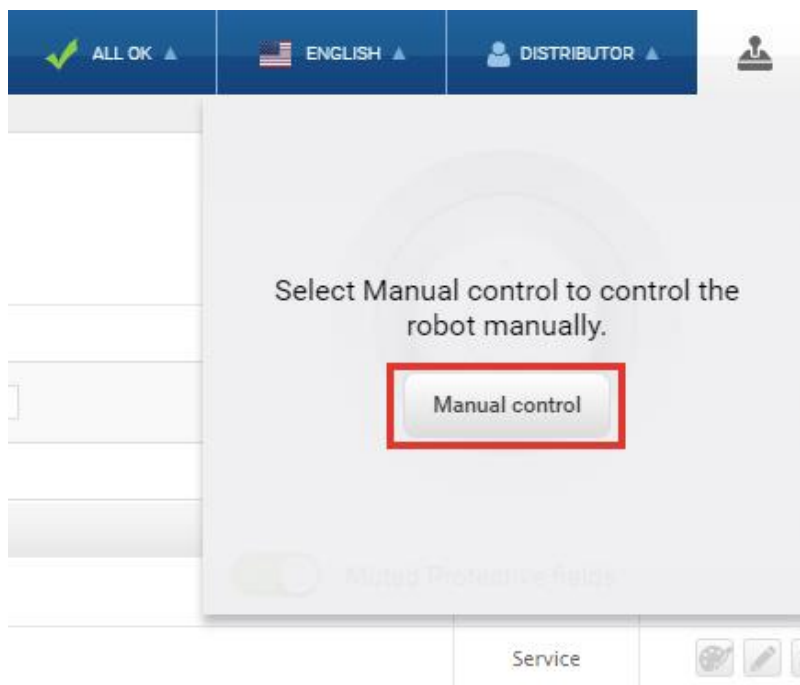
- Drive carefully to avoid collisions with any personnel or objects when driving the robot in Manual mode.
- Avoid driving the robot manually without a clear visual of the robot.

To drive the robot in Manual mode, follow these steps:

1. In the robot interface, select **Manual control**. The joystick control appears.



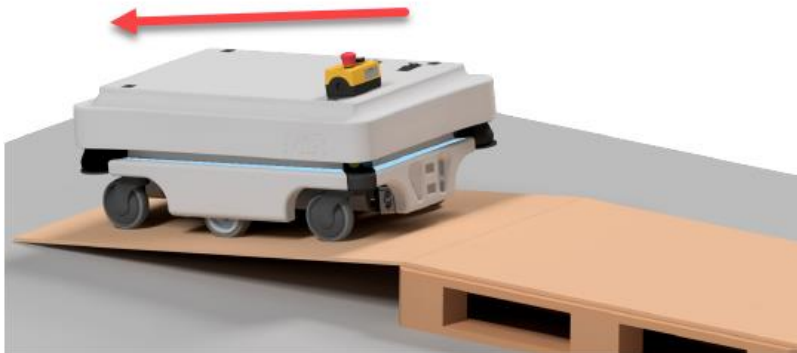
2. Select **Manual control**.



3. Drive the robot onto the ramp using the joystick.



Place your foot in front of the ramp while the robot drives on it to keep the ramp from slipping.

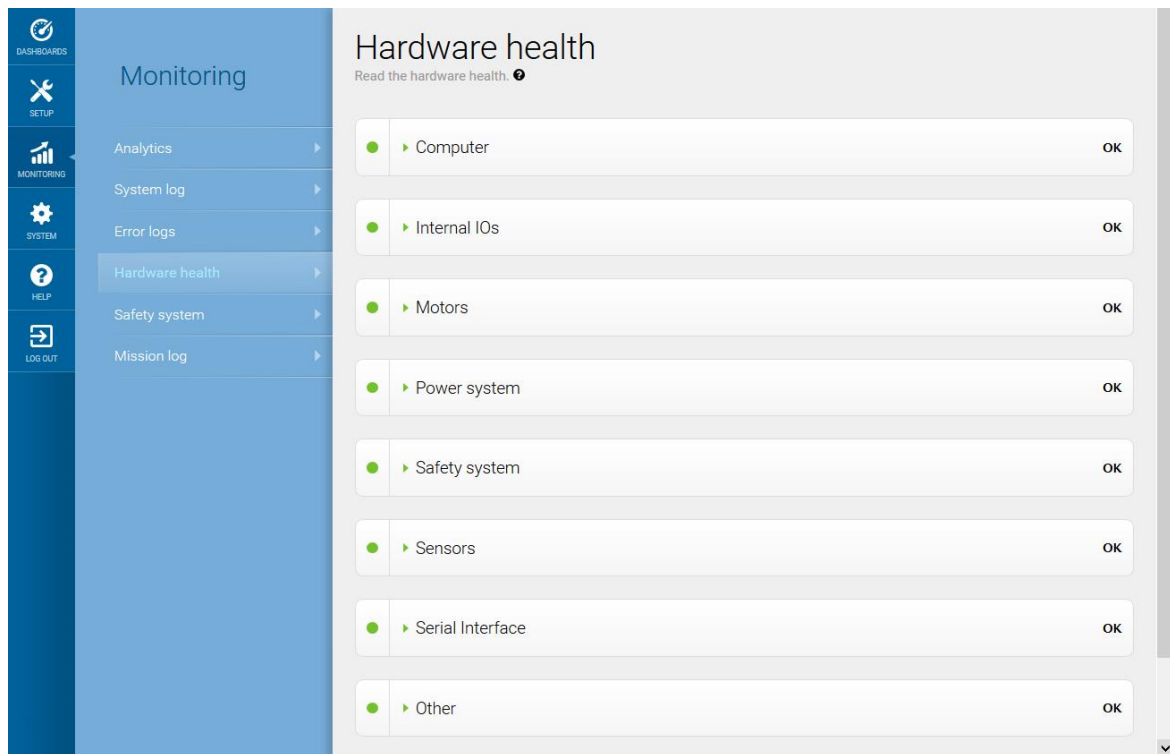


5.8 Checking the hardware status

To check that all hardware components work as intended, follow these steps:

1. Sign in to the robot interface—see [Connecting to the robot interface on page 29](#).
2. Go to **Monitoring > Hardware health**.

3. Check that all elements on the page have the **OK** status and that they have green dots on the left.



For more information, see [Error handling on page 1](#).

5.9 Mounting the nameplate

Before using MiR100, you must mount its unique nameplate to it. The nameplate contains information specific to your MiR application.

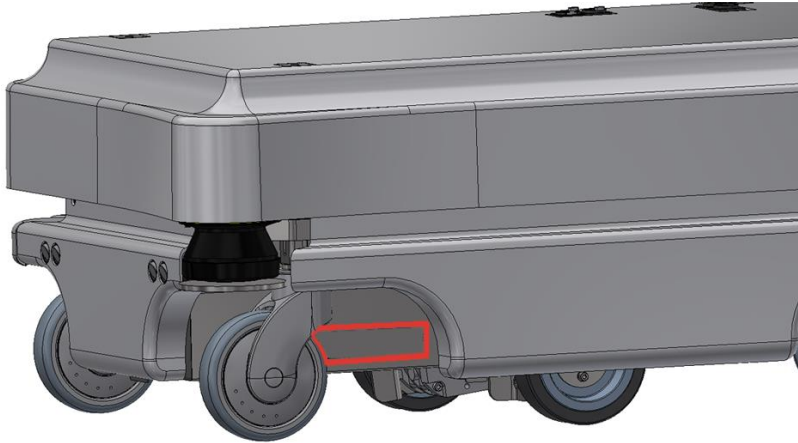


NOTICE

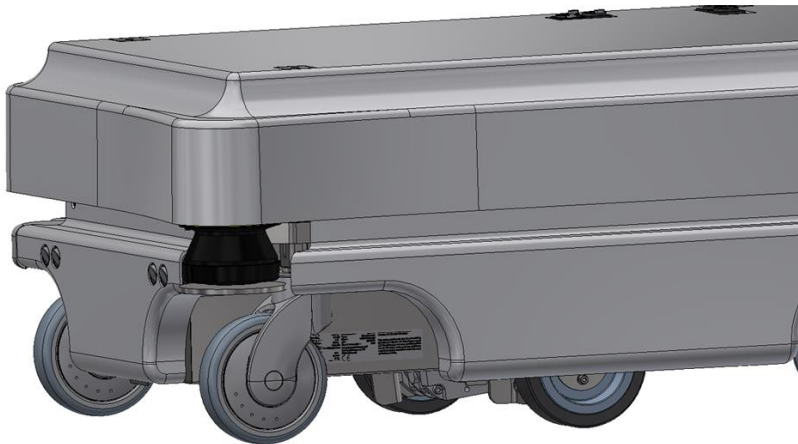
The nameplate must be mounted as described in the following steps. If mounted incorrectly, the CE mark is invalid.

To mount the nameplate correctly, follow these steps:

1. Locate the area below the side cover near the swivel wheel at the rear end of the robot.
2. Clean the area marked in the image below with a degreasing agent. If you cannot access the area, either lift the robot to an appropriate height or remove the top cover to gain access.



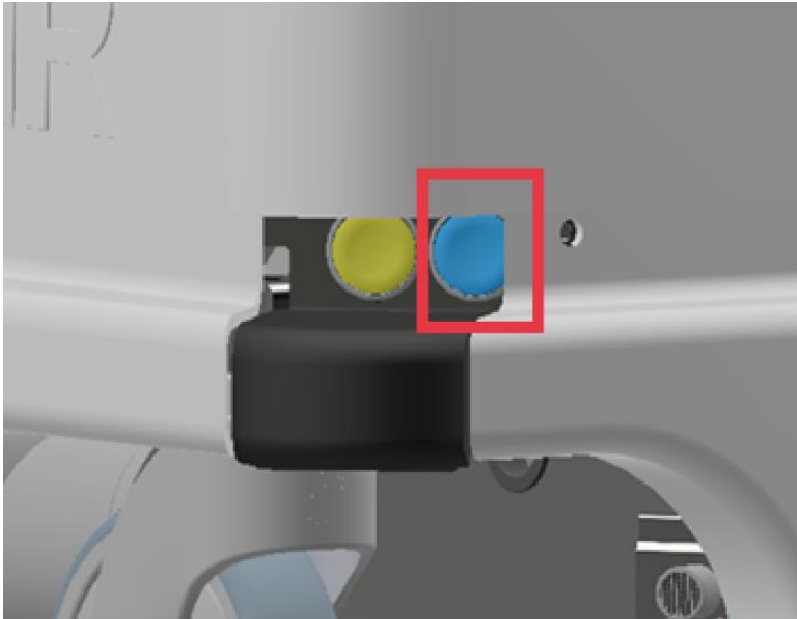
3. Mount the nameplate on the cleaned area.



5.10 Shutting down the robot

To shut down MiR100, follow these steps:

1. Ensure that the robot is not moving or executing an action.
2. Press the Power button for three seconds.



3. The robot starts the shutdown process. The status lights waver yellow.
4. When the robot finishes the shutdown process, the status lights are off.

When you shut down the robot for transportation, service, or repair, the battery must be disconnected—see your robot's user guide for instructions on disconnecting the battery.

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Original instructions (English)

Contact the manufacturer:

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www.mobile-industrial-robots.com

Phone: +45 20 377 577

Email: support@mir-robots.com

CVR: 35251235