

Quick Start (en)

Date: 07/2020

Revision: v.1.2



MiR 250

Table of contents

1. About this document	4
1.1 Where to find more information	4
1.2 Version history	4
2. Safety	6
2.1 Safety message types	6
2.2 General safety precautions	7
2.3 Intended use	10
2.4 Users	11
2.5 Foreseeable misuse	12
2.6 Residual risks	13
2.7 Warning label	13
3. Light indicators and speakers	15
3.1 Status lights	16
3.2 Signal lights	16
3.3 Speakers	17
4. Control panel	18
4.1 The Operating mode key	18
4.2 The control panel buttons	19
5. Accessing the internal parts	22
5.1 Front compartment	22
5.2 Rear compartment	23
5.3 Side compartments	25
5.4 Top compartments	25

6. IT security	27
6.1 Managing users and passwords	27
6.2 Software security patches	27
7. Getting started	29
7.1 In the box	29
7.2 Unpacking MiR250	30
7.3 Connecting the battery and powering up	33
7.4 Connecting to the robot interface	36
7.5 Driving the robot in Manual mode	38
7.6 Moving the robot by hand	40
7.7 Checking the hardware status	42
7.8 Mounting the nameplate	42
7.9 Shutting down the robot	44

1. About this document

This guide explains how to set up and start operating your MiR250. You will also find information regarding safety precautions that must be considered when operating MiR250.



NOTICE

Save this manual. It contains important safety and operating instructions.

1.1 Where to find more information

At [the MiR website](#), you can find the following resources under the **Manuals** tab on each product page:

- **Quick starts** describe how you start operating MiR robots quickly. This document is in print in the box with the robots. Quick starts are available in multiple languages.
- **User guides** provide all the information you need to operate and maintain MiR robots. User guides are available in multiple languages.
- **Risk Analysis Guides** include guidelines on how to create a risk assessment of your robot solution.
- **Commissioning guides** describe how to commission your robot safely and prepare it to operate in the workplace.
- **Operating guides** describe how to set up and use top modules and accessories, such as charging stations, hooks, shelf lifts, and pallet lifts.
- **Getting started guides** describe how to set up products that are mainly software-based, such as MiR Fleet.
- **Reference guides** contain descriptions of all the elements of the robot interface and MiR Fleet interface. Reference guides are available in multiple languages.
- **REST API references** for MiR robots, MiR hooks, and MiR Fleet.
- The **MiR network and WiFi guide** specifies the performance requirements of your network and how you must configure it for MiR robots and MiR Fleet to operate successfully.

1.2 Version history

This table shows current and previous versions of this document.

Revision	Release date	Description	HW
1.0	2020-06-26	First edition	1.0
1.1	2020-07-01	Minor corrections throughout manual.	1.0
1.2	2020-07-08	Minor correction throughout manual.	1.0

2. Safety

Read the information in this section before powering up and operating MiR250.

Pay particular attention to the safety instructions and warnings.



NOTICE

Mobile Industrial Robots disclaims any and all liability if MiR250 or its accessories are damaged, changed, or modified in any way. Mobile Industrial Robots cannot be held responsible for any damages caused to MiR250, accessories, or any other equipment due to programming errors or malfunctioning of MiR250.

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

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 the original charger.



WARNING

MiR250 may drive over the feet of personnel, causing injury.

- All personnel must be informed of the side protective fields of MiR250 and be instructed to wear safety shoes near an operating robot.



WARNING

Contact with live electrical parts can cause electric shock.

- Do not touch any internal components of MiR250 while it is powered.



WARNING

MiR250 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 descending staircases and holes as forbidden zones on maps.
- 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

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.
- Use only the original charger (cable charger or charging station) and always follow the instructions from the battery manufacturer.
- 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 colors.
 - 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.
- Do not use the battery on anything other than MiR250.



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.

2.3 Intended use

MiR250 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 MiR250 should operate, see specifications for MiR250 on the MiR website.

MiR250 is intended to be commissioned according to the guidelines in your robot's user guide. This is a prerequisite for safe usage of MiR250.

MiR250 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.

MiR250 is intended to be used with top modules supported by MiR or custom modules that:

- Do not have any moving parts.
- Do not extend the footprint of the robot.
- Operate within the environmental conditions required for MiR250.

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

MiR250 is designed for and all risks are considered when used with one of the following types of top modules:

- MiR Shelf Carrier 250 to transport wheeled carts.

MiR250 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 MiR250 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. The following list gives examples of applications which are not intended use of MiR250:

The following list gives examples of modules that are not intended use of MiR250:

- Top modules (including total payload) that increase the footprint of MiR250
- Conveyers (powered and non-powered)
- Industrial robot arm
- Devices that tow carts
- Customized load transfer station



NOTICE

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

2.4 Users

MiR250 is only intended to be used by personnel that have received training in their required tasks.

There are three types of intended users for MiR250: commissioners, operators, and direct users.

Commissioners

Commissioners have thorough knowledge of all aspects of commissioning, safety, use, and maintenance of MiR250 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 MiR250, 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 MiR250 and of the safety precautions presented in this User guide. Operators have the following main tasks:

- Servicing and maintaining MiR250.
- 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 MiR250.
- Fastening loads to MiR250 securely.
- Loading and unloading from a paused robot.

All other persons in the vicinity of MiR250 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 MiR250 deviating from the intended use is deemed as misuse. This includes, but is not limited to:

- Using MiR250 to transport people
- Using MiR250 on steep surface grades, such as ramps
- Using the wrong SICK configuration
- Driving MiR250 on cross slopes
- Exceeding the total payload
- Using the Emergency stop button for anything other than emergency stops

- Positioning or fastening loads incorrectly according to the specifications
- Using MiR250 in medical and life critical applications
- Operating MiR250 outside the permissible operating parameters and environmental specifications
- Using MiR250 in potentially explosive environments
- Using MiR250 outdoors
- Using MiR250 in hygiene zones

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:

- You risk being run over, drawn in, trapped, or struck if you stand in the path of MiR250 or walk towards MiR250 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. It will only drive 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 MiR250 while it is in motion.
- You risk being crushed, run over, drawn in, or trapped if the robot places a load outside a designated drop-off area due to faulty localization.
- You risk losing control of MiR250 if it is accessed by unauthorized users. Consider increasing the IT security of your product.



NOTICE

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

2.7 Warning label

MiR250 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.



3. Light indicators and speakers

The robot uses two types of light indicators to let people in the environment know what the robot is currently doing or planning to do.

- **Status lights**
An LED light band on all four sides of the robot uses colors and light motion patterns to signal the current status of the robot.
- **Signal lights**
The signal lights at the front and back of the robot show if the robot is about to turn a corner or go backwards. Front lights are white and rear lights are red. Right and left turns are indicated by blinking.



Pos.	Description	Pos.	Description
1	Status lights	2	Signal lights

3.1 Status lights

The LED light band running all the way around the robot indicates the robot's current operational state. Colors may also be used as part of missions, but as standard, the robot is delivered with the following setup.

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 e.g. hardware, localization
Blue	Manual drive joystick
Blue wavering	Mapping
Contracting white	Charging: Charging station
White wavering	Prompt user / Waiting for user's response



NOTICE

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

3.2 Signal lights

Signal lights are used to indicate the robot's immediate motion plans by signaling forwards-backwards-braking and left-right turns.

The signal lights work similarly to lights used on cars; white at the front, red at the back, and indicating a left or right turn by blinking.

When the robot drives with muted personnel detection means, for example when docking to a marker, all signal lights blink yellow.

3.3 Speakers

When the robot drives with muted personnel detection means it emits a warning sound. In **System > Settings > Safety system**, you can choose which sound the robot makes and the volume of the sound.



CAUTION

Changing the safety system can cause the robot to not comply with safety standards.



NOTICE

It is the responsibility of the commissioner to ensure that the warning sounds are audible in the robot's work environment.

4. Control panel

MiR250 has a control panel in the rear-left corner of the robot.

4.1 The Operating mode key

The Operating mode key lets you switch between operating modes.

- **Left position: Autonomous mode**
Puts the robot in Autonomous mode.



- **Middle position: Locked**
Locks the robot. The robot blocks the wheels; you cannot start a mission or drive the robot manually.



- **Right position: Manual mode**
Puts the robot in Manual mode.



4.2 The control panel buttons

The following table identifies the three buttons on the control panel.



Pos.	Description	Pos.	Description
1	Manual stop	2	Resume
3	Power		

Manual stop

Pressing this button stops the robot. After pressing this button, you must press the Resume button to let the robot continue operating.

Color indication:

- Red: It is possible to engage the Manual stop.

Resume

Pressing this button:

- Clears the Emergency stop state.
- Lets the robot continue operating after the Manual stop button was pressed or after the operating mode changes.
- Lets the robot start operating after powering up.

Color indication:

- Blinking blue: The robot is waiting for a user action (clear the Emergency stop state, acknowledge the change of operating mode).

Power

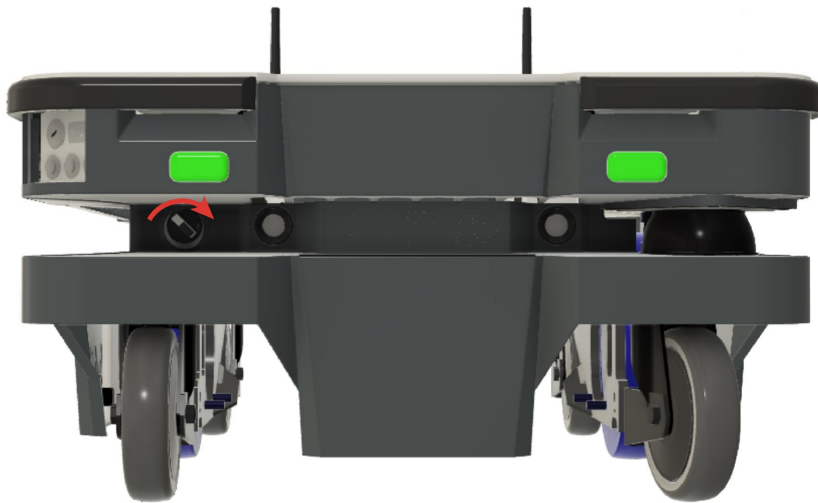
Pressing this button for three seconds turns the robot on or shuts it off.

Color indication:

- Blue: The robot is off.
- Blinking green: The robot is starting up.
- Green: Normal operation.
- Blinking red: The battery level is too low to start without additional charging or, the robot is shutting down.

Manual brake release switch

The manual brake release switch is located below the control panel and releases the mechanical brakes on MiR250. You release the brakes by turning the Manual brake release switch clockwise.



The mechanical brakes require electrical power to be released, so if the robot is without power, the mechanical brakes cannot be released.

When driving in Autonomous mode, the robot engages and releases the mechanical brakes automatically.



The robot cannot operate while the mechanical brakes are released.

5. Accessing the internal parts

Most internal parts of MiR250 are accessed through covers that open to different compartments:

- Front compartment
- Rear compartment
- Side compartments
- Top compartments



CAUTION

Removing covers from the robot exposes parts connected to the power supply, risking damage to the robot from a short circuit and electrical shock to personnel.

- Disconnect the battery by unlocking the Battery lever and pressing the lever down.

5.1 Front compartment

Follow these steps to open the front compartment:

1. Unscrew the two screws holding the front cover with a T30 Torx screwdriver.



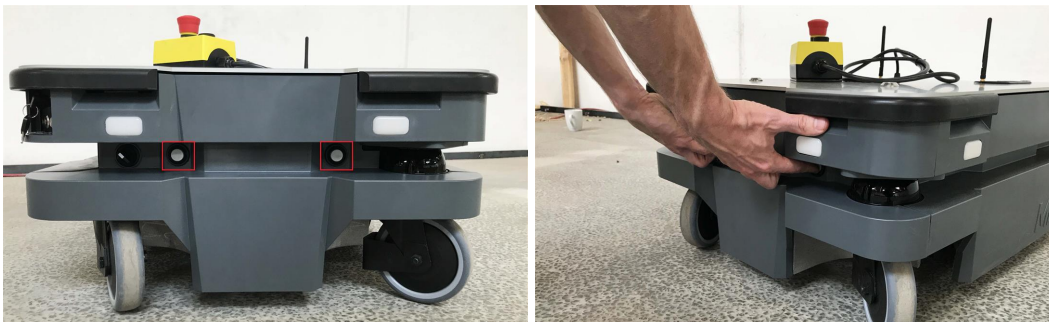
2. Pull the front cover off of the robot.



5.2 Rear compartment

Follow these steps to open the rear compartment:

1. Push the two white buttons at the same time.



2. Loosen the cover by wiggling both sides.



3. Pull off the cover.



5.3 Side compartments

Follow these steps to open a side cover:

1. Turn the two screws counterclockwise with a T30 Torx screwdriver.



2. Pull the cover off.



5.4 Top compartments

To open a top compartment, unscrew the four screws with a T8 Torx screwdriver, and lift off the black plastic top cover.



NOTICE

With the antenna cables mounted, the plastic top covers can be lifted 50 mm. If you need to remove a cover completely, the antenna cable needs to be detached from the cover first. When reattaching the covers, make sure that the antenna cables are not damaged.



Figure 5.1. The top compartments of MiR250.

6. IT security

IT security is a set of precautions you can take to prevent unauthorized personnel from accessing MiR250. This section describes the main IT-security related risks and how to minimize them when commissioning MiR250.

MiR250 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 creating an IT-security risk assessment before commissioning the robot.

6.1 Managing users and passwords

Managing your users and passwords is the main way you can control access to MiR250.

There are three default users with predefined passwords for you to start using. These are described in the *MiR Robot Reference guide* along with instructions to create new users, user groups, and passwords. MiR advises you to:

- Change the default password for all predefined users if you choose to continue to use them. Make sure to choose a strong password since MiR250 does not enforce any password rules nor expire the password.
- Create new user groups if more levels of access are necessary.
- Create dedicated user accounts under the relevant user group for each person accessing MiR250, and ensure that the users change the password on their first sign-in. It is not recommended to have several users share the same account.
- Only enable users with a minimum level of access to use a pin code to sign in. Users with a higher level of access are recommended to use a strong password to sign in instead.

6.2 Software security patches

To improve the security of MiR250, MiR supplies security patches to the operating system in new MiR software update files. When you install a security patch, it takes approximately 10-15 minutes longer to update a MiR product.

Understanding MiR software versions

MiR uses the **Major.Minor.Patch.Hot fix** format to version software. For example, 2.8.1.1 means that the software is based on the second major release, the eighth minor release of the major version, the first patch release of the minor version, and in this example a single

hot fix is included too.

- **Major releases** include the most significant changes that affect the entire robot software.
- **Minor releases** often include new features and smaller changes that only affect parts of the software.
- **Patch releases** focus on fixing small issues in the software and introducing quality improvements.
- **Hot fix releases** are only created when a patch release has introduced a critical issue that needs to be fixed immediately.

Security patch policy

MiR applies the following policy when supplying security patches:

- New security patches are distributed per every minor release.
- All patch releases under a minor release include the security patches also. In other words, if you chose not to install the first software version in a minor release, such as version 2.9.0, the security patches will still be installed when you update to 2.9.1 or higher.
- Whenever there is a new minor release with new security patches, the security patches are also made available in a separate file. In this way, you are not required to update to the latest software to apply the security patches. You can use any lower software version and just install the security patches to that software instead.

7. Getting started

This section describes how to get started with MiR250. To be able to use MiR250, your robot must be running software version 2.9.0 or higher.



NOTICE

Read [Safety on page 6](#) before powering up MiR250.

7.1 In the box

This section describes the contents of the MiR250 box.



The box contains:

- The MiR250 robot
- A MiR250 document folder containing a USB flash drive and the following printed documents:
 - *MiR250 Quick Start*
 - *CE declaration of Conformity*
 - *Getting the robot online*
 - *Passwords*
 - The unique nameplate for your application
- The USB flash drive in the document folder has the following content:
 - *MiR250 Quick Start*
 - *MiR Network and WiFi guide*
 - *MiR Robot Reference guide*
 - *MiR Robot REST API Reference*
 - *Getting the robot online*
 - *CE declaration of Conformity*

7.2 Unpacking MiR250

This section describes how to unpack MiR250.



Keep the original packaging for future transportation of the robot.



The robot is shown with a MiR Shelf Carrier 250 top module.

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. Align the lid so that it is flush with the base of the box.



7.3 Connecting the battery and powering up

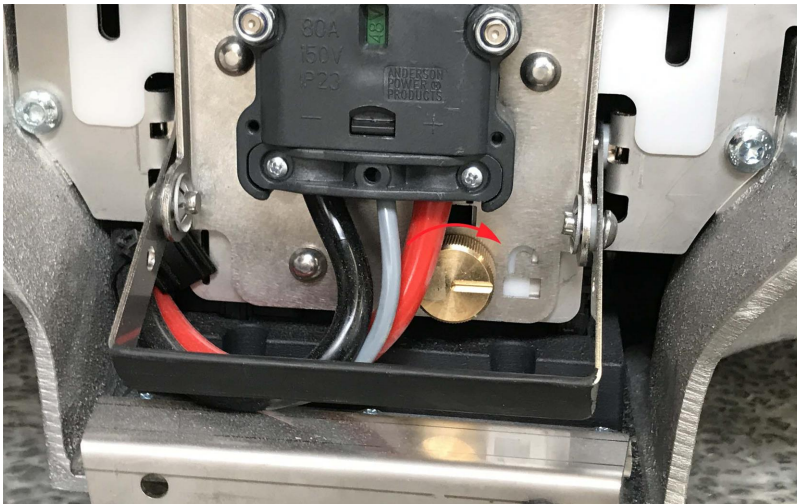
You must connect the battery before powering up the robot.

Connecting the battery

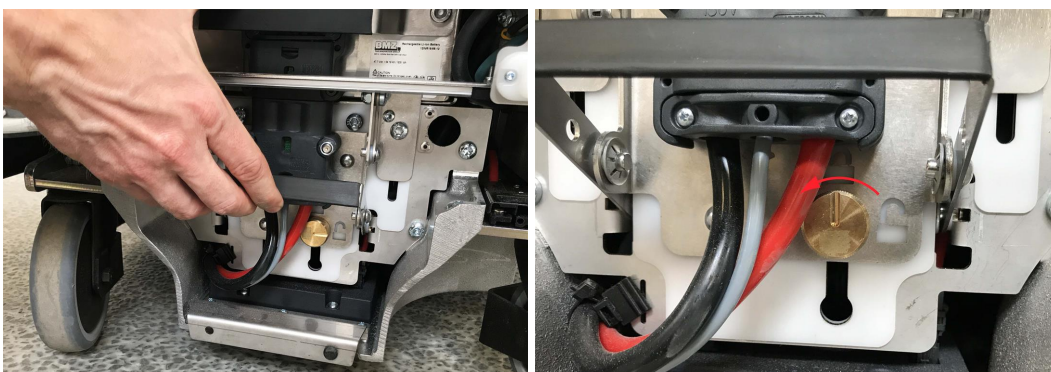
To connect the battery to the robot, you need to open the rear compartment—see [Accessing the internal parts on page 22](#).

Follow these steps to connect the battery to the robot:

1. Turn the battery lever lock clockwise to unlock the battery lever.



2. Pull up the lever to connect the battery connector to the battery. Then turn the battery lever lock counterclockwise to secure the battery lever.



3. Reattach the rear cover by inserting it into the two attachment sockets. When attaching the cover to the robot, press the two white buttons, and don't tilt the cover.



4. Click the cover in place.



Powering up

Follow these steps to power up the robot:

1. Press the Power button for three seconds 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 Resume button to clear the Protective stop. The robot is now ready for operation.



7.4 Connecting to the robot interface

When the robot is turned on, it enables the connection to its WiFi access point. The name of the access point appears in the list of available connections on your PC, tablet, or phone.



NOTICE

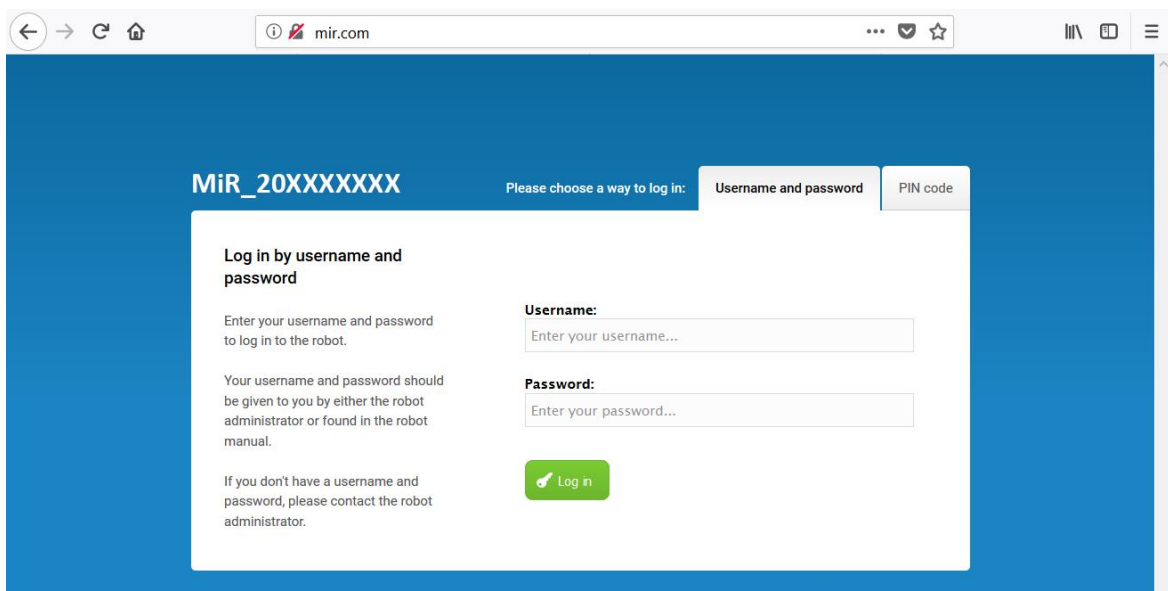
The username and password for the robot's WiFi access point and for accessing the web interface are in the Passwords document. The document is in the box with the robot.

Follow these steps to connect to the robot interface:

1. Using your pc, tablet, or phone, connect to the WiFi access point of the robot. The access point name has the following format: MiR20XXXXXXX



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



3. Switch to Manual mode, and drive the robot down the ramp—see [Driving the robot in Manual mode on the next page](#).

7.5 Driving the robot in Manual mode



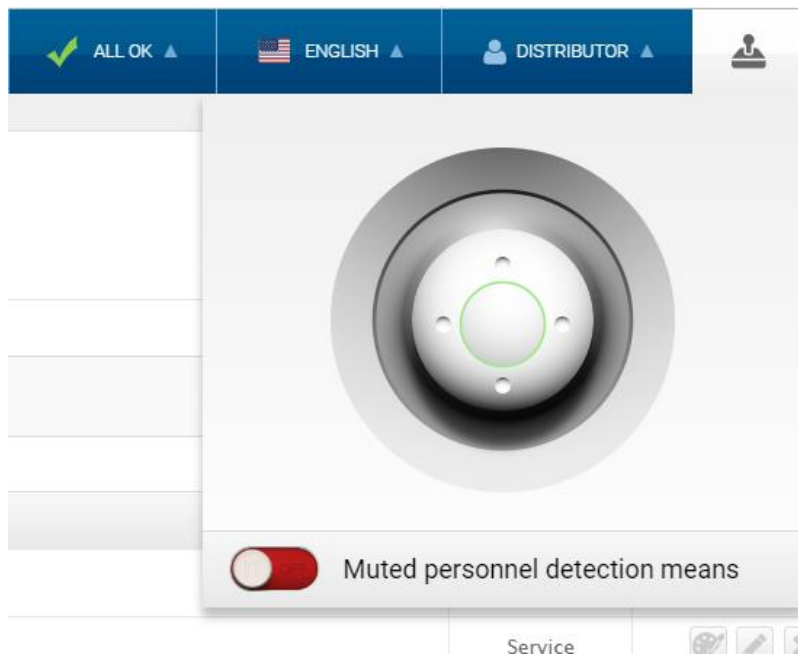
CAUTION

When driving the robot in manual mode, it is possible to mute the personnel detection means and drive the robot into Forbidden zones and Unpreferred zones in the map. This means that the robot will only stop when very close to an obstacle and will not respond to 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. On the robot, turn the Operating mode key into Manual mode (turn it to the right).
2. In the robot interface, select **Manual control**. The Resume button on the robot starts blinking.
3. In the robot interface, select the joystick icon. The joystick control appears.



4. On the robot, press the Resume button. The status lights turn blue, indicating that the robot is in Manual mode.



5. Drive the robot off 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.



S



7.6 Moving the robot by hand

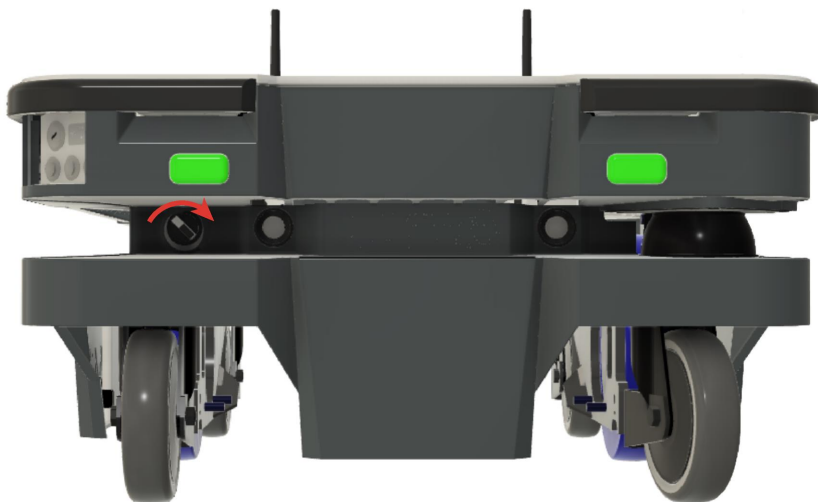
You should generally avoid moving the robot by hand, but if for example the robot gets stuck near an obstacle and cannot be moved by manual control, it is possible to do so.

Before moving the robot by hand, make sure the mechanical brakes are released.



To release the brakes, the robot must be turned on—see [Connecting the battery and powering up on page 33](#).

Release the brakes by turning the Manual brake release switch located below the control panel clockwise.



To move the robot by hand, either push or pull it.

When pushing the robot, only push on the top plate.



When pulling the robot, use either the front pull handle or the rear pull handle.



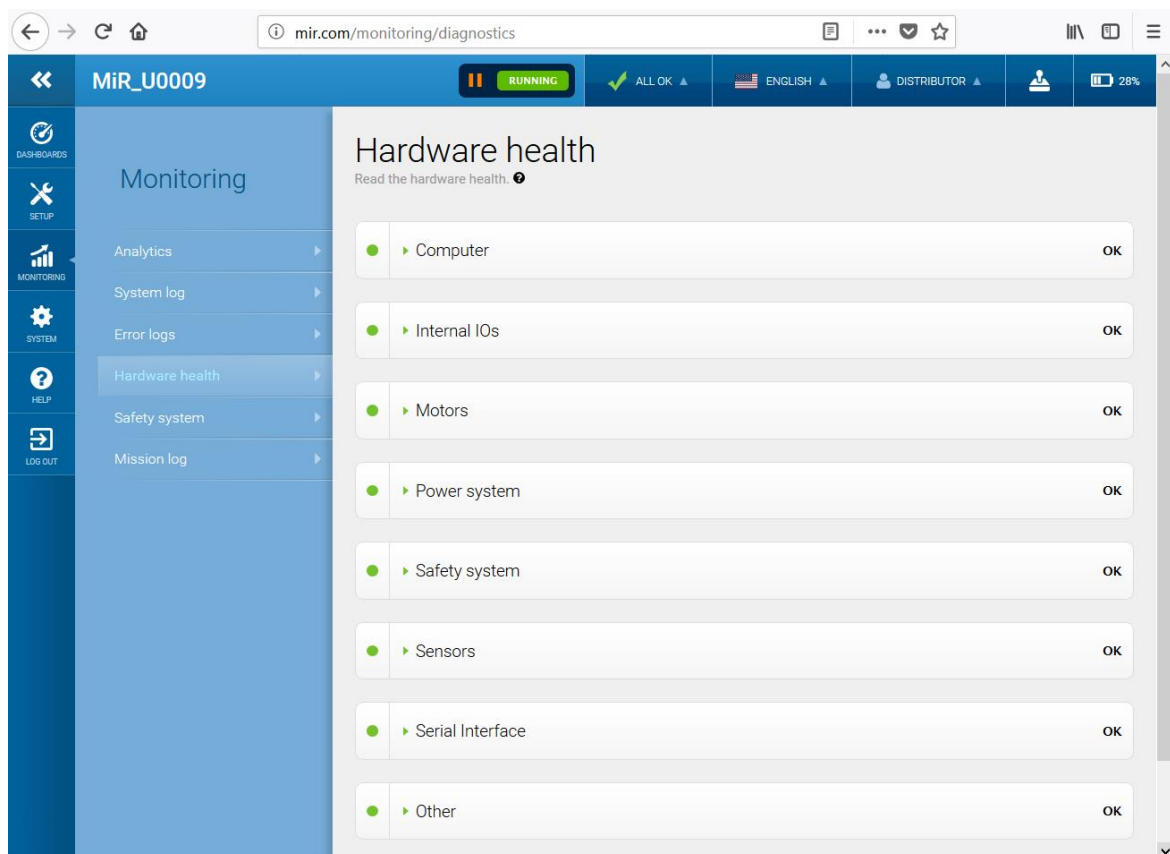
NOTICE

When handling the robot, do not push or pull the robot sideways, and do not use the covers for pushing or pulling. Only use the designated pull handles or the top plate.

7.7 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 36](#).
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 **Hardware health** in *MiR Robot Reference Guide* on the MiR website.

7.8 Mounting the nameplate

Before using MiR250, 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.

The following steps describe how to mount the nameplate correctly:

1. Locate the rear cover.
2. Clean the area marked in the image below with a degreasing agent.



3. Mount the nameplate on the cleaned area.



7.9 Shutting down the robot

To shut down MiR250:

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, and the Power button blinks red.



4. When the robot finishes the shutdown process, the status and the signal lights go off, and the Power button turns blue.



When you shut down the robot for transportation, service, or repair, the battery must be disconnected.

Copyright and disclaimer

All rights reserved. No parts of this manual may be reproduced in any form without the express written permission of Mobile Industrial Robots A/S (MiR). MiR makes no warranties, expressed or implied, in respect of this document or its contents. In addition, the contents of the document are subject to change without prior notice. Every precaution has been taken in the preparation of this manual. Nevertheless, MiR assumes no responsibility for errors or omissions or any damages resulting from the use of the information contained.

Copyright © 2020 by Mobile Industrial Robots A/S.

Contact the manufacturer:

Mobile Industrial Robots A/S
Emil Neckelmanns Vej 15F
DK-5220 Odense SØ

[the MiR website](#)

Phone: +45 20 377 577

Email: support@mir-robots.com

CVR: 35251235