

## Quick start (en)

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# MiR 100



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# 1. Getting started

This section describes how to get started with MiR100.

## 1.1. In the box

This section describes the content of the MiR100 box.



The box contains:

1. The MiR100 robot
2. MiR100 Kit
  - Emergency stop box, external antenna and 4 pcs. M10x40 bolts
  - One charging cable
  - One external charger, 24VDC, 10A
3. MiR100 document folder containing the printed documents and the USB flash drive.

4. Printed documents:
  - MiR100 Quick Start
  - MiR username and passwords
  - CE declaration of conformity
5. USB flash drive with the following content:
  - MiR100 User Guide
  - MiR Robot Interface 2.0 Reference guide
  - MiR robot REST API reference
  - MiR username and passwords
  - CE declaration of conformity

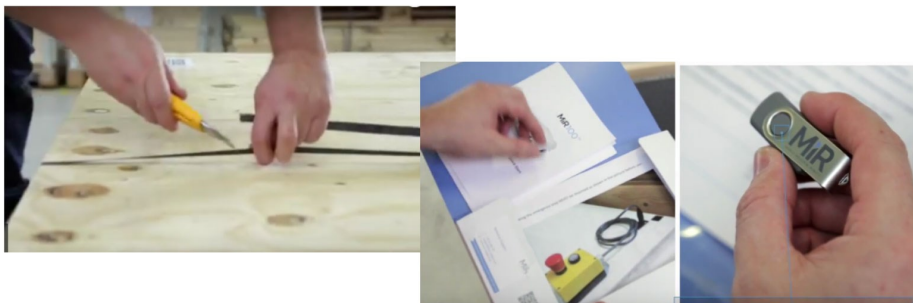
## 1.2. Unpacking MiR100

This section describes how to unpack MiR100.

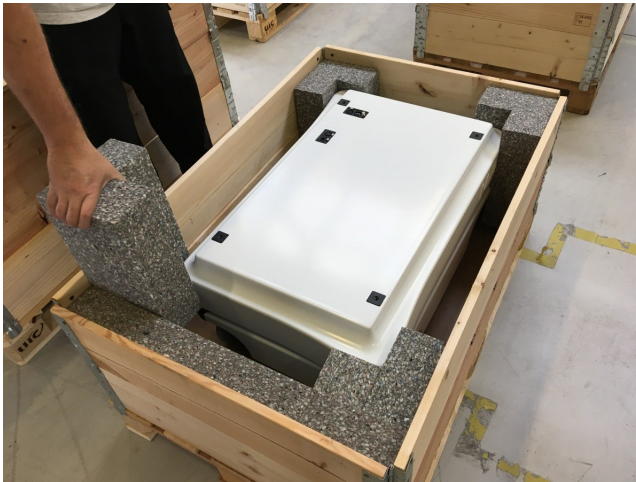


Keep the original packaging for the future transportation of the robot.

1. Remove pallet lid and take out the box with the MiR100 kit. Keep the original packaging for future transportation of the robot.



2. Remove the top foam, foam blocks on the sides and the pallet frames.



3. Place the pallet cover as a ramp at the robot's rear end.



## 2. Commissioning

This section describes how to get started with MiR100.



### NOTICE

Read the Safety chapter before powering up the robot.

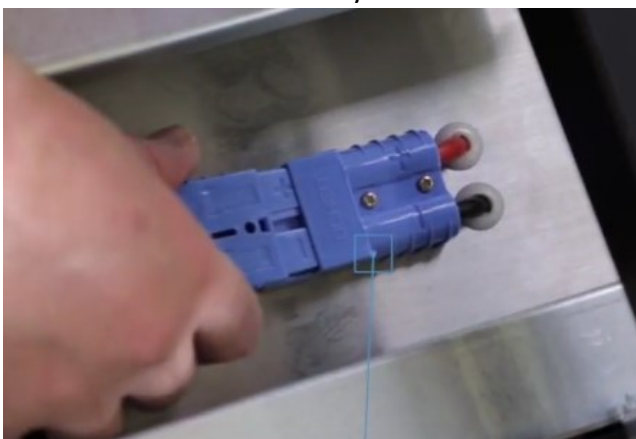
### 2.1. Powering up

Follow these steps to power up MiR100.

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



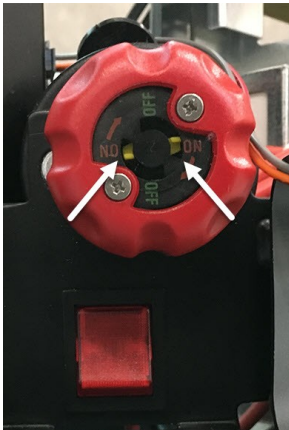
2. Connect one of the two battery cables to the plug on top of the battery box. The second cable is for an extra battery.



3. Switch on the three relays placed in the corner by the front laser scanner. Start with 32A main power, i.e. from the outer frame in.



4. Ensure that the battery disconnect switch is on (the two yellow indicators pointing to On).



5. Put the cover back on making sure to fit it correctly over the connector openings.





6. 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 [Mounting a top module](#) on page 1.

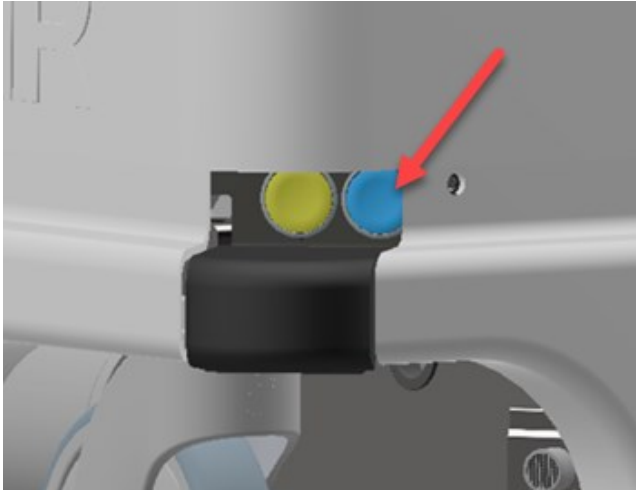
7. Connect the antenna to the connector on top of the robot cover. Remove the plastic cap from the connector before fixing the antenna.



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



8. Push the blue power button in the corner to turn on the robot. The robot lights up with a yellow running light for a short moment, then enters emergency stop mode indicated by a constant red light.



9. Press the reset button on the emergency stop when it has lit up. The robot light now switches to yellow constant light, indicating that the robot is paused and ready to operate.



## 2.2. Connecting to the robot interface

When the robot is 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.

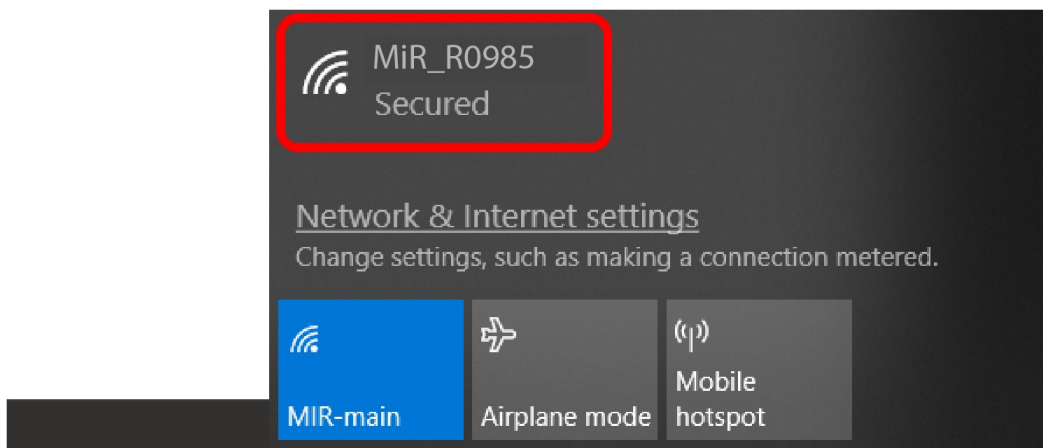


### NOTICE

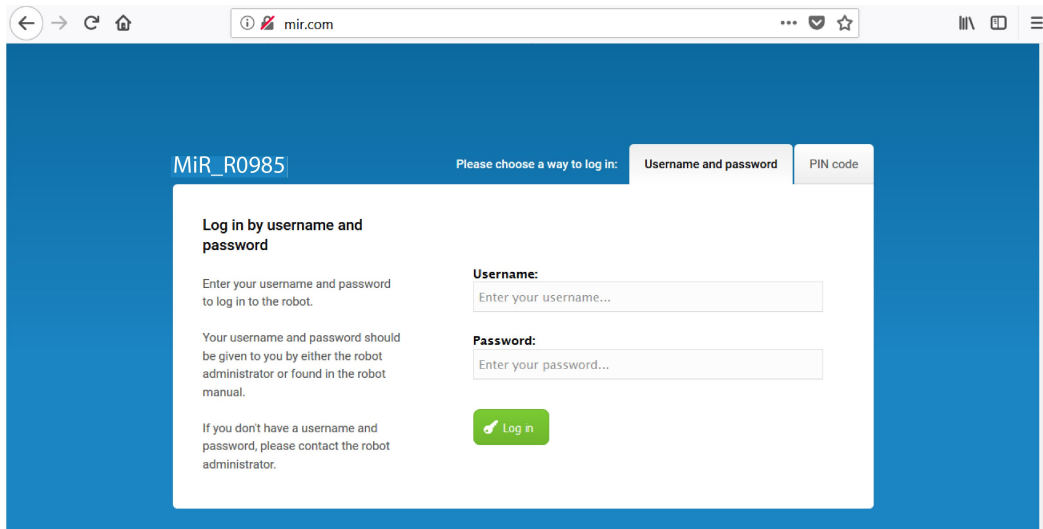
The username and password for the robot's WiFi access point and for accessing the web interface are in the MiR username and passwords document. The document is in the box with the robot.

Follow these steps to connect to the robot interface:

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



2. In a browser, go to the address [mir.com](http://mir.com) and sign in.



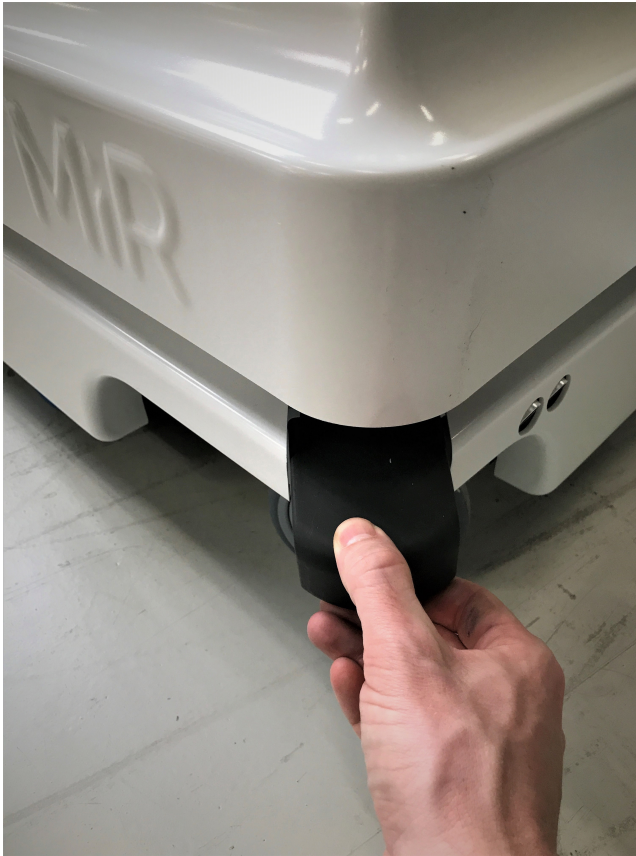
The robot is now ready to move down the ramp. To do this switch to manual mode and use the electronic joystick in the robot interface. See next section **Driving the robot in manual mode** on page 1.



## 2.3. Charging the robot

The robot arrives with a charged battery and can drive for up to three hours before recharging is required. Follow these steps to charge the robot using the enclosed charging cable:

1. Remove the rear corner by pulling it towards you. You may have to apply a bit of force the first couple of times.

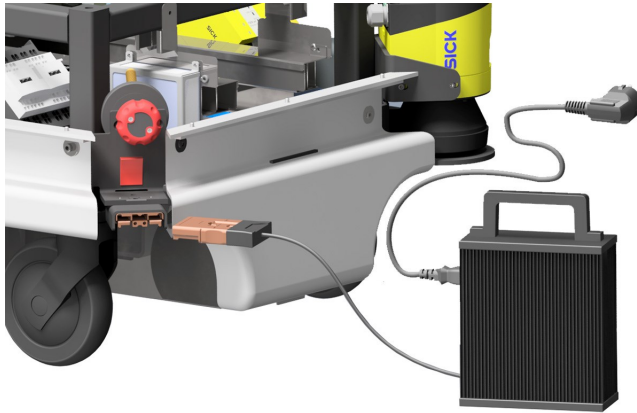


To avoid fast discharging and a depletion of the battery, we recommend that you turn off the robot while charging with a cable.



If charging two robots right after each other with a cable, wait approximately one minute between unplugging the first robot and plugging in the second. This will ensure that the charger registers that a new robot is being charged.

2. Attach the charger to the robot's charging socket and to a power outlet. Turn on the rocker switch on the robot to begin charging.



Use only the original charging cable.

3. After a maximum of four and a half hours, the robot is fully charged.
4. Turn off the rocker switch and disconnect the charging cable from the robot. Slide the corner cover back on.



The robot detects both cable and activated charging-button and will go into emergency stop in both cases.

For information about the charging time, see the robot specifications at [www.mir-robots.com](http://www.mir-robots.com).

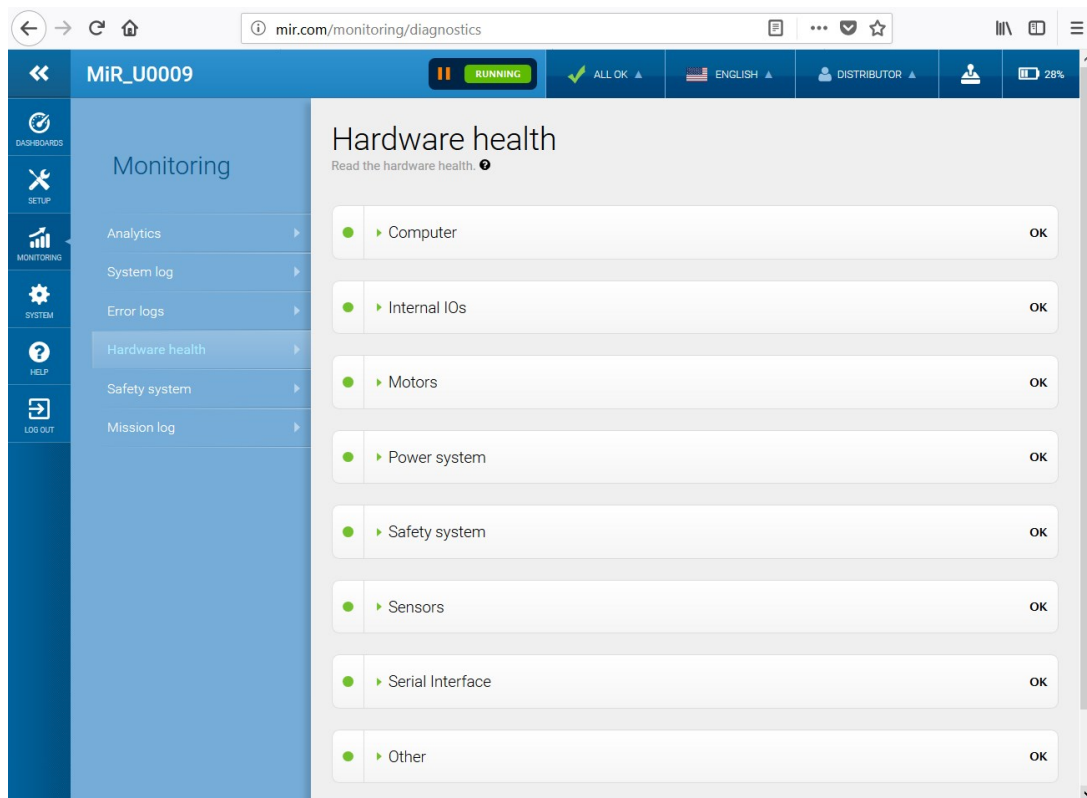
## 2.4. Checking the hardware status

To check that all hardware components work as intended:

Sign in to the robot interface. See the section [Connecting to the robot interface](#) on page 10.

Go to **Monitoring > Hardware health**.

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 Interface 2.0 Reference Guide](#).



## 3. 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.

### 3.1. 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.

- Take proper precautions to avoid damage or injury.



### CAUTION

Indicates a potentially hazardous situation that could result in minor or moderate injury. Alerts against unsafe practices.

- Take proper precautions to avoid damage or injury.



### NOTICE

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

## 3.2. General safety precautions

This section contains general safety precautions.



### WARNING

If the load on the robot is not positioned or fastened correctly, the load may fall or the robot may overturn.

- Ensure that the load is positioned according to the specifications and fastened correctly. Refer to the User guide of your robot for payload specifications.



### WARNING

Using a charger different from the one supplied by the manufacturer can cause a fire.

- Use only the original charger.



### CAUTION

The robot can not see staircases going downwards and holes in the floor.

- Mark staircases or holes on maps with **Forbidden zones**.
- Keep the maps up to date.



### CAUTION

Removing the top cover from the robot exposes parts connected to the power supply.

- Turn off the main power relay to avoid a short circuit. To see the location of the power relay, refer to the User guide of your robot.



### CAUTION

Use Flight Mode with smartphone control of the robot. Risk of personal injury and/or damage to the robot.

- If you use Manual control with a smartphone to drive the robot, make sure that the phone is set to Flight Mode. An incoming call on the smartphone will interrupt control of the robot.



### WARNING

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

Observe the following precautions when handling and using lithium batteries:

- Do not short-circuit, recharge or connect with false polarity.
- Do not expose to temperature 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.

## 3.3. 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 the robot should operate, see Technical specifications on our website.

MiR100 is intended to be commissioned according to [Commissioning on page 6](#) and prepared to the environment according to the guidelines. This is a prerequisite for safe usage of MiR100.

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

- MiRHook 100 to tow trailers.
- A custom designed top application (including payload) designed to fulfill the following requirements:
  - Must not increase the footprint of MiR100 and be within the requirements in [Payload specifications](#)
  - Must not have any moving parts

MiR100 can be used as a partly complete machine as defined in the EU machinery directive, with top applications that do not meet 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. Examples of top applications, which are not intended use of MiR100, but not limited to, are:

- Shelf on supporting legs (with or without wheels)
- Top applications (including payload) which increase the footprint of MiR100
- Conveyers (power and non-powered)
- Industrial robot arm
- Customized load transfer station

### 3.4. Foreseeable misuse

Any use or application deviating from the intended use is deemed to be misuse. This includes, but is not limited to:

- **Use of the robot to transport people.**  
Risk of injury.
- **Steep ramps on the route.**  
Risk of injury. Steep surface grades (ramps etc.) may cause the robot to skid. See Technical specifications on the website.
- **Use outdoor.**  
Risk of injury. MiR100 is designed and intended for indoor use only.
- **Overloading of the robot.**  
Risk of injury. If the maximum payload on top of the robot is exceeded, it may cause over-turning, falling load. See Technical specifications on the website.
- **Failure to follow the guidelines for commissioning**  
See [Commissioning on page 6](#).

- **Failure to make a risk assessment of the full installation**  
See [Risk assessment below](#). This applies to the robot with any extra modules installed.
- **Operation outside the permissible operating rating parameters and environmental specifications**  
Risk of instability, impact or tipping over.
- **Transportation of liquids or food**  
Risk of instability.
- **Use in potentially explosive environments**
- **Use in medical and life critical applications**

### 3.5. Risk assessment

One of the most important steps in achieving a safe installation is to make a risk assessment. The risk assessment is the responsibility of the individuals who are commissioning MiR100 in the environment it will be used in. Most often it will be an integrator who also designs and/or builds work cells or other required infrastructure related to MiR100.

The risk assessment must cover not only MiR100 itself, but also take into account potential potential load transfer stations, work cells and the environment it will be used in. See MiR100 and MiR200 Risk Analysis on the distributor page.

It is recommended that the integrator uses guidelines in ISO 12100, EN 1525, ANSI B56.5 or other relevant standards to conduct the risk assessment.

The risk assessment shall at least consider the following scenarios:

- Detailed description of the robot installation.
- Normal operation of the robot installation.

In EN 1525, clause 4 there is a list of significant hazards, hazardous situations and events which can be used for inspiration.

The risk assessment shall be written and saved as part of the technical file.

### 3.6. Residual risks

Mobile Industrial Robots has identified the potential significant hazards listed below as hazards that must be considered by the integrator.

- Being run over, drawing-in, trapping or impact if a person steps into the route or walks towards MiR100 while driving in reverse. The MiR100 will only drive in reverse when parking or picking up a cart or undocking from a marker such as the MiRCharge 24V.

- Crushing or trapping if user touches MiR100 . Please notice the warnings on MiR100.
- Crushing, drawing-in or trapping at load transfer stations, work cells or charging stations.



#### **NOTICE**

Other significant hazards will be present in a specific robot installation and shall be identified during Commissioning.

### **3.7. Safety-related functions and interfaces**

MiR100 is equipped with a range of built-in safety-related functions as well as safety-related electrical interfaces designed for integration with a top module and/or top manipulator. Each safety function and interface is designed according to the standard ISO 13849-1.

The safety-related functions and interfaces are selected to support compliance with EN 1525.

### **3.8. Limiting safety-related functions**

MiR100 has several built-in safety-related functions that are used to ensure safe operation in the environment it is designed to be used in.

Advanced control software ensures that locomotion and the drive pattern are within safety related limits and thereby avoid triggering a safety function. Violations of limits will hence only occur in exceptional cases. Nevertheless, if a limit is violated, the safety system issues a category 0 stop (stopping by “immediate removal of power to the machine actuators according to IEC 60204-1”) followed by a controlled brake which brings MiR100 to a stop.

See Technical specifications on our website for more details.

#### **Collision avoidance**

The collision avoidance safety function ensures that the robot will come to a stop before it collides with a human or object.

The function measures the speed on the two driving wheels and switches between the predefined protective fields accordingly. The faster the speed, the larger the protective fields will be.

This ensures that the robot will be brought to a stop in case a human or object is detected within the active protective field.



Collision avoidance is automatically deactivated two seconds after the protective field is free.

#### **Overspeed avoidance**

The safety system monitors if the speed of each motor is above limits for maximum rated speed and hence an indication of speed control is lost for any reason.

The overspeed avoidance safety function must be manually deactivated by activation of the restart button.

#### **Emergency stop**

MiR100 has one emergency stop device.

The emergency stop is only intended to be used in case of an emergency and shall not be used for operational stop.

Emergency stop must be manually deactivated by actuation of the restart button.

### 3.9. Lithium battery

This section contains safety precautions related to lithium batteries in MiR robots.



#### **WARNING**

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

Observe the following precautions when handling and using lithium batteries:

- Do not short-circuit, recharge or connect with false polarity.
- Do not expose to temperature 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.











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