

# 1. MiR250 specifications

Date: 2023-06-28

The product specifications in English are the most recently updated on the Support Portal.

See the latest updates [here](#).

## General information

Designated use	For internal transportation of goods and automation of internal logistics
Type	Autonomous Mobile Robot (AMR)
Color	RAL 7011 / Iron Gray
Color - ESD version	RAL 9005 / Jet Black
Cover material	Polycarbonate, Lexan Resin 221R
Product design life	5 years or 20 000 hours, whichever comes first
Disclaimer	Specifications may vary based on local conditions and application setup

## Dimensions

Length	800 mm   31.5 in
Width	580 mm   22.8 in
Height	300 mm   11.8 in
Weight	97 kg   213.8 lbs
Ground clearance	25–28 mm   1.0–1.1 in
Load surface	800 x 580 mm   31.5 x 22.8 in
Wheel diameter (drive wheel)	200 mm   7.9 in

Wheel diameter (caster wheel)	125 mm   4.9 in
Dimensions for mounting top modules	Equal to robot footprint. Contact MiR if a bigger top module is required.
Top plate	Anodized aluminum, 5 mm   0.2 in

## Payload

Maximum payload	250 kg   551 lbs
Footprint of payload	Equal to robot footprint. Contact MiR if a bigger payload footprint is required.
Payload placement	Place center of mass according to directions in the user guide.

## Speed and performance

Maximum speed (with maximum payload on a flat surface)	2.0 m/s (7.2 km/h)   6.6 ft/s (4.4 mph)
Acceleration limits with maximum payload	0.3 m/s <sup>2</sup>   1 ft/s <sup>2</sup>
Minimum distance to achieve maximum speed	9.5 m   31.2 ft
Operational corridor width	<p>With default footprint and SICK safety configuration: 1 450 mm   57 in</p> <p>With dynamic footprint: 1 300 mm   51.2 in</p> <p>With 820 mm × 600 mm   32.3 in × 23.6 in footprint and muted Protective fields: 900 mm   35.4 in</p> <p>With 820 mm × 600 mm   32.3 in × 23.6 in footprint and muted Protective fields and a Critical zone: 850 mm   33.5 in</p>

---

	With default footprint and SICK safety configuration: 1 500 mm   60 in
Operational corridor width for a 90° turn	With dynamic footprint and SICK safety configuration: 1 350 mm   53.1 in
	With minimized footprint and muted Protective fields: 1 000 mm   39.4 in
	1 600 mm   36 in
Operational corridor width for a U-turn	With dynamic footprint: 1 550 mm   61 in
	With minimized footprint and Muted Protective fields: 1 150 mm   45.3 in
	With default setup: 3 000 mm   118 in
Operational corridor width for two robots passing	With minimized footprint and muted Protective fields: 1 700 mm   67 in
	With default dynamic setup: 2 450   96.5 in
	With improved dynamic setup: 2 100 mm   82.7 in
Operational width for pivoting	With default setup: 1 800 mm   70.9 in
	With improved setup and muted Protective fields: 1 200 mm   47.2 in
	With dynamic setup: 1 550 mm   61 in
	With improved dynamic setup and muted Protective fields: 1 200 mm   47.2 in

---

Docking to L-marker:  $\pm 6$  mm | 0.24 in  
on X-axis,  $\pm 3$  mm | 0.12 in on Y-axis,  $\pm 1^\circ$  yaw

Docking to V-marker:  $\pm 9$  mm | 0.35 in  
on X-axis,  $\pm 17$  mm | 0.67 in on Y-axis,  $\pm 3^\circ$  yaw

Docking to VL-marker:  $\pm 3$  mm | 0.12 in  
on X-axis,  $\pm 3$  mm | 0.12 in on Y-axis

Moving to Bar-marker:  $\pm 18$  mm | 0.7 in  
on X-axis,  $\pm 4$  mm | 0.16 in on Y-axis,  $\pm 1.5^\circ$  yaw

Moving to position:  $\pm 60$  mm | 2.36 in  
on X-axis,  $\pm 85$  mm | 3.35 in on Y-axis,  $\pm 4^\circ$  yaw

ⓘ The positioning accuracy is tested under the following conditions:

- Using a single robot without payload
- On a site that is within the environmental requirements for the robot with good localization and no or few dynamic obstacles
- On a flat, clean surface

ⓘ When docking to a V or a VL-marker the positioning accuracy is valid for X-offsets up to 1 200 mm | 47.24 in and Y-offsets up to 350 mm | 13.78 in.

The Bar-marker positioning accuracy is measured with two bar lengths: 400 mm | 15.75 in and 750 mm | 29.53 in, and with distances between the bars ranging from 750 mm | 29.53 in to 1 500 mm | 59.06 in.

Positioning accuracy (in controlled conditions)

<p>Traversable gap and step tolerance</p>	<p>0-20 mm   0.79 in</p> <p>Above 20 mm   0.79 in: Instructions must be followed</p> <p>Above 30 mm   1.18 in: Not recommended, risk of personal injury</p> <p>Above 50 mm   1.97 in: Prohibited</p>
<p>Operational doorway width</p>	<p>With default footprint and SICK safety configuration: 1 500 mm   59.1 in</p> <p>With dynamic footprint and SICK safety configuration: 1 000 mm   39.4 in</p> <p>With minimized footprint and muted Protective fields in any SICK safety configuration: 800 mm   32 in</p>
<p>Minimum distance between chargers</p>	<p>450 mm   17.7 in</p>
<p>Minimum space required in front of chargers</p>	<p>With default footprint and SICK safety configuration: 2 800 mm   110.2 in</p> <p>With dynamic footprint and SICK safety configuration: 2 600 mm   102.4 in</p>
<p>Time used when docking to or undocking from a charging station</p>	<p>Docking time: up to 44 s</p> <p>Undocking time: up to 8 s</p>
<p>Time used when docking to or undocking from a VL-marker</p>	<p>Docking time: up to 14 s</p> <p>Undocking time: up to 11 s</p> <p>(Offsets used: -0.55 m   21.7 in on X-axis, 0.1 m   3.9 in on Y-axis, 0° yaw)</p>

---

Time used when docking to or undocking from a V-marker	Docking time: up to 13 s Undocking time: up to 6 s (Offsets used: -0.45 m   17.7 in on X-axis, 0.2 m   7.9 in on Y-axis, 0° yaw)
Time used when docking to or undocking from an L-marker	Docking time: up to 16 s Undocking time: up to 9 s With default offsets and 1.6 m   63 in undocking distance
Time used when docking to or undocking from a bar-marker	Docking time: up to 13 s Undocking time: up to 11 s (Bar length: 400 mm   15.7 in, bar distance: 750 mm   29.5 in, default offsets)
Minimum space to adjacent wall for a V-marker	For MiR250:  700 mm   27.6 in to the right of marker, 650 mm   25.6 in to the left of marker. (Offsets used: -0.55 m   21.7 in on X-axis, 0.2 m   7.9 in on Y-axis, 0° yaw)  For MiR250 Dynamic:  600 mm   23.6 in to the right of marker, 550 mm   21.7 in to the left of marker. (Offsets used: -0.55 m   21.7 in on X-axis, 0.2 m   7.9 in on Y-axis, 0° yaw)

---

---

Minimum space to adjacent wall for a Bar-marker

For MiR250:

With default setup: 450 mm | 17.7 in to the right of marker, 500 mm | 19.7 in to the left of marker

With minimized footprint and muted Protective fields: 200 mm | 7.9 in to the right of marker, 200 mm | 7.9 in to the left of marker

For MiR250 Dynamic:

With default setup: 250 mm | 9.8 in to the right of marker, 350 mm | 13.8 in to the left of marker

With minimized footprint and muted Protective fields: 200 mm | 7.9 in to the right of marker, 200 mm | 7.9 in to the left of marker

---

Minimum space to adjacent wall for a charging station

For MiR250:

700 mm | 27.6 in to the right of marker, 350 mm | 13.8 in to the left of marker

For MiR250 Dynamic:

600 mm | 23.6 in to the right of marker, 350 mm | 13.8 in to the left of marker

---

<p>Minimum space to adjacent wall for a VL-marker</p>	<p>For MiR250 with docking offsets set to -55 m   21.7 in on X-axis, 0.1 m   3.9 in on Y-axis, and <math>\pm 0^\circ</math> yaw: 450 mm   17.7 in to the right of the marker, 500 mm   19.7 in to the left of the marker</p> <p>For MiR250 Dynamic with docking offsets set to -55 m   21.7 in on X-axis, 0.1 m   3.9 in on Y-axis, and <math>\pm 0^\circ</math> yaw: 300 mm   11.8 in to the right of the marker, 500 mm   19.7 in to the left of the marker</p>
<p>Minimum space required between a wall and a L-marker</p>	<p>For MiR250 Dynamic with default docking offsets: 1.3 m   51.2 in from the long bar</p>
<p>Minimum distance between VL-markers</p>	<p>Without stopping at Entry position before docking: 40 mm   1.57 in</p> <p>With stopping at Entry position before docking: 30 mm   1.18 in</p>
<p>Minimum distance between V-markers</p>	<p>440 mm   17.3 in</p>
<p>Minimum space around Bar-markers</p>	<p>For MiR250:</p> <p>2.1 m   6.9 ft in front of the marker</p> <p>For MiR250 Dynamic:</p> <p>2.0 m   6.6 ft in front of the marker</p>
<p>Minimum space around VI-markers</p>	<p>With docking offsets X = -0.55, Y = 0.1, yaw = 0:</p> <p>150 mm   5.9 in to the sides of the marker, 2 400 mm   94.5 in in front of the marker</p>

<p>Minimum space around L-markers</p>	<p>For MiR250 Dynamic:</p> <p>1 m   3.3 ft from the long bar to the side of the marker</p> <p>1.95 m   6.4 ft in front of the marker</p>
<p>Minimum space around V-markers</p>	<p>For MiR250:</p> <p>500 mm   19.7 in to the sides of the marker, 2 250 mm   88.6 in in front of the marker</p> <p>For MiR250 Dynamic:</p> <p>300 mm   11.8 in to the sides of the marker, 2 200 mm   86.6 in in front of the marker</p>
<p>Minimum space around MiR Charge 48V charging stations</p>	<p>For MiR250:</p> <p>550 mm   21.7 in to the sides of the charger</p> <p>For MiR250 Dynamic:</p> <p>350 mm   13.8 in to the sides of the charger</p>
<p>Minimum distance to achieve maximum speed</p>	<p>9.5 m length × 2 m width   31.2 ft length × 6.7 ft width</p>
<p>Active operation time with maximum payload</p>	<p>13 h at 22°C   72°F, from 100–0% power in the robot interface and with no top module</p>
<p>Active operation time with no payload</p>	<p>17 h 30 min at 22°C   72°F, from 100–0% power in the robot interface and with no top module</p>
<p>Standby time (robot is on and idle)</p>	<p>22 h</p>

Minimum size of detectable object	Scanner: 20 mm   0.79 in at 1 000 mm   39.4 in distance
	70 mm   2.76 in at 2 500 mm   98.4 in distance
Docking types	Forward and reverse to bar, V, and VL markers, and sideways docking to L- markers
Maximum incline/decline	± 5% at 0.5 m/s 1.6   ft/s

## Power

Battery type	Lithium-ion
Charging time with MiR Charge 48V	10%–90%: 52 min at an ambient temperature of 22°C   72°F
Charging time with cable charger	10%–90%: 1 h 10 min
Charging options	MiR Charge 48V, Battery Charger 48V 12A, Cable Charger Lite 48V 3A
Charger communication	The robot communicates with MiR Charge 48V through a CAN interface. Charging starts only when the robot connection is present
Charging current, MiR Charge 48V	Up to 35 A depending on battery temperature and constant voltage ramping down towards end of charge cycle
Battery weight	14 kg   30 lbs
Battery dimensions	546 mm length × 204 mm width × 76 mm height   21.5 in length × 8 in with × 3 in height

	Minimum 3 000 cycles
Number of full charging cycles	ⓘ The minimum number of full charging cycles before the battery capacity drops below 80% .
Battery voltage	47.7 V nominal, minimum 42 V, maximum 54 V
Battery capacity	1.63 kWh (34.2 Ah at 47.7 V)
Charging an empty battery	Only possible with a cable charger. To dock to MiR Charge 48V, the robot requires at least 3% battery (or equal to 10 min of operating time).
Cable charger	Robot cannot drive with cable charger connected and charging
	With maximum payload:
	10 min charging = 2 h and 40 min runtime (1:16 charging to runtime ratio)
	20 min charging = 4 h and 30 min runtime (1:14 charging to runtime ratio)
	30 min charging = 6 h and 5 min runtime (1:12 charging to runtime ratio)
	60 min charging = 10 h and 20 min runtime (1:10 charging to runtime ratio) Fully charged
Charging ratio and runtime for	
<b>Environment</b>	
Environment	For indoor use only
Noise level	42–51 dBA with standard wheels, 44–54 dBA with cleanroom wheels

Ambient temperature range, operation	<p>5–40°C   41–104°F (the maximum ambient temperature only apply up to 1 h)</p> <p>ⓘ The following climatic conditions from ISO3691-4 section 4.1.2 apply to the robot:</p> <ul style="list-style-type: none"> <li>• Maximum average ambient temperature for continuous use is 25°C   77°F</li> <li>• Maximum ambient temperature for short term use (up to 1 h) is 40°C   104°F</li> <li>• Lowest average ambient temperature for continuous use in normal indoor conditions is 5°C   41°F</li> </ul>
Ambient temperature range, storage	<p>1 month: -20–60°C   -4–140°F</p> <p>3 months: -20–+45°C   -4–140°F</p>
IP rating	IP 21
Floor conditions	No water, no oil, no dirt
Maximum altitude	2 000 m   6 561 ft
<b>Compliance</b>	
EMC	EN61000-6-2, EN61000-6-4, (EN12895)
Cleanroom	Class 4 (ISO 14644-1)
Safety standards for industrial vehicles	CE, EN1525, ANSI B56.5, ANSI R15.08
ESD	Certified (ESD version)
<b>Safety</b>	
Personnel detection safety function	Triggered when obstacles or people are detected too close to the robot
Emergency stop	Triggered by pressing the Emergency stop button

---

Overspeed avoidance	Prevents the robot from driving faster than the predefined safety limit
---------------------	---

## Communication

---

Wi-Fi (router)	2.4 GHz 802.11 g/n, 5 GHz 802.11 a/n/ac.
----------------	--

---

Wi-Fi (internal PC)	Wi-Fi adapter: 2.4 GHz and 5 GHz, 2 external antennas
---------------------	---

---

I/O connections	4 digital inputs, 4 digital outputs (GPIO), 1 Ethernet port, 1 Auxiliary emergency stop
-----------------	---

---

Safety I/O connections	6 digital inputs, 6 digital outputs
------------------------	-------------------------------------

---

Ethernet	M12 plug, 4p. 10/100 Mbit Ethernet with Modbus protocol, adapter for external antenna
----------	---

## Top module

---

Power for top modules	48 V (41–54 V, nominal 47.7 V), 10 A combined. 24 V/2 A.
-----------------------	--

## Sensors

---

SICK safety laser scanners	2 pcs, nanoScan3 (front and rear), give 360° visual protection around the robot
----------------------------	---

---

	2 pcs, 3D camera Intel RealSense™ D435
--	--

	FoV height: 1 800 mm   70.9 in
--	--------------------------------

3D cameras	FoV distance in front of robot: 1 200 mm   47.2 in
------------	--

	FoV horizontal angle: 114°
--	----------------------------

	FoV minimum distance in front of robot for ground view: 250 mm   9.8 in
--	---

---

Proximity sensors	8 pcs
-------------------	-------

## Lights and audio

---

Audio	Speaker
Signal and status lights	Indicator lights on four sides, eight signal lights (two on each corner)

## Maintenance

---

Maintenance	Maintenance hatches on four sides of the robot
Service intervals	6 months or according to user guide

# 1. MiR250 specifications

Date: 2023-06-28

The product specifications in English are the most recently updated on the Support Portal.

See the latest updates [here](#).

## Designated use

Designated use	Monitoring MiR robots' operations over time
Performance metrics	Completed missions, distance driven, and uptime
Troubleshooting information	Errors, emergency stops, and battery level over time
Heatmaps	Wi-Fi coverage, high robot occupancy, localization score

## Requirements

Site requirements	MiR Fleet and internet connection
MiR Fleet software version	2.13.0.2 software or higher
Installation file size	300 MB
CPU	Dual core processor with minimum 2.1 GHz clock
RAM	Minimum 8 GB
Permanent storage	Minimum 128 GB SSD
Network	Stable, high-speed internet connection
Supported operating systems	Ubuntu 18.04 LTS, Ubuntu Server 18.04 LTS, Debian 9, CentOS 7, Redhat Enterprise Linux 7.4
Virtualization software	Docker CE/EE version 18.09.01 or higher