MiR250 specifications

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

See the latest updates here.

Specifications may vary based on local conditions and application setup.

General information

Designated use	Autonomous mobile robot (AMR) for internal transportation of small- and medium-sized loads
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

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 plus a traction kit weighing 20.86 kg | 46 lbs on MiR250 Hook and MiR250 Shelf Carrier
Ground clearance	25–28 mm | 1.0–1.1 in
Load surface	800 × 580 mm | 31.5 × 22.8 in
Wheel diameter (drive wheel)	200 mm | 7.9 in
Wheel diameter (caster wheel)	125 mm | 4.9 in

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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 and speed

Maximum payload	250 kg | 551 lbs
Maximum speed (with maximum payload on a flat surface)	2.0 m/s (7.2 km/h) | 6.6 ft/s (4.4 mph)
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.

Performance

For an in-depth explanation of the performance specifications, see the guide *MiR250 Space Requirements*. You can find this guide on MiR Support Portal.

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^2 | 1 ft/s^2
Minimum distance to achieve maximum speed	9.5 m | 31.2 ft
Operational corridor width	With default footprint and protective fields: 1 450 mm | 57 in With dynamic footprint: 1 300 mm | 51.2 in With 820 mm × 600 mm | 32.3 in × 23.6 in footprint and muted Protective fields: 900 mm | 35.4 in 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

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

Positioning accuracy (in controlled conditions)	Docking to L-marker: ± 6 mm | 0.24 in on X-axis, ± 3 mm | 0.12 in on Y-axis, ± 1° yaw Docking to V-marker: ± 9 mm | 0.35 in on X-axis, ± 17 mm | 0.67 in on Y-axis, ± 3° yaw Docking to VL-marker: ± 3 mm | 0.12 in on X-axis, ± 3 mm | 0.12 in on Y-axis, ± 0.5° yaw Moving to Bar-marker: ± 18 mm | 0.7 in on X-axis, ± 4 mm | 0.16 in on Y-axis, ± 1.5° yaw Moving to position: ± 60 mm | 2.36 in on X-axis, ± 85 mm | 3.35 in on Y-axis, ± 4 ° yaw[1] [2]
Operational doorway width	With default footprint and protective fields: 1 500 mm | 59.1 in With dynamic footprint and protective fields: 1 000 mm | 39.4 in With minimized footprint and muted Protective fields in any protective fields: 800 mm | 32 in
Minimum distance between charging stations	800 mm | 31.5 in

[1]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.

[2]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

Minimum space required in front of charging stations	With default footprint and protective fields: 2 800 mm | 110.2 in With dynamic footprint and protective fields: 2 600 mm | 102.4 in
Time used when docking to or undocking from a charging station	Docking time: up to 44 s Undocking time: up to 8 s
Time used when docking to or undocking from a VL-marker	Docking time: up to 14 s Undocking time: up to 11 s (Offsets used: -0.55 m | 21.7 in on X-axis, 0.1 m | 3.9 in on Y-axis, 0° yaw)
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: 650 mm | 25.6 in to the right of marker, 700 mm | 27.6 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, 450 mm | 17.7 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

Minimum space to adjacent wall for a VL-marker	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 ± 0° yaw: 450 mm | 17.7 in to the right of the marker, 500 mm | 19.7 in to the left of the marker 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 ± 0° yaw: 300 mm | 11.8 in to the right of the marker, 500 mm | 19.7 in to the left of the marker
Minimum space required between a wall and a L-marker	For MiR250 Dynamic with default docking offsets: 1.3 m | 51.2 in from the long bar
Minimum distance between VL-markers	Without stopping at Entry position before docking: 40 mm | 1.57 in With stopping at Entry position before docking: 30 mm | 1.18 in
Minimum distance between V-markers	440 mm | 17.3 in
Minimum space around Bar-markers	For MiR250: 2.15 m | 7.05 ft in front of the marker For MiR250 Dynamic: 2.0 m | 6.6 ft in front of the marker
Minimum space around Vl-markers	With docking offsets X = -0.55, Y = 0.1, yaw = 0: 150 mm | 5.9 in to the sides of the marker, 2 400 mm | 94.5 in in front of the marker
Minimum space around L-markers	For MiR250 Dynamic: 1 m | 3.3 ft from the long bar to the side of the marker 1.95 m | 6.4 ft in front of the marker

Minimum space around V-markers	For MiR250: 450 mm | 17.7 in to the sides of the marker, 2 250 mm | 88.6 in in front of the marker For MiR250 Dynamic: 300 mm | 11.8 in to the sides of the marker, 2 200 mm | 86.6 in in front of the marker
Minimum space around MiR Charge 48V charging stations	For MiR250: 550 mm | 21.7 in to the sides of the charger, 2 800 mm | 110.2 in in front of the charger For MiR250 Dynamic: 350 mm | 13.8 in to the sides of the charger
Minimum distance to achieve maximum speed	9.5 m length × 2 m width | 31.2 ft length × 6.7 ft width
Minimum size of detectable object	90 x 90 x 90 mm| 3.54 x 3.54 x 3.54 in (Object on floor in front of robot, default speed and default camera configurations)
Docking types	Forward and reverse to bar, V, and VL markers, and sideways docking to L-markers

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
Number of full charging cycles	Minimum 3 000 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

Charging ratio and runtime for	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
Active operation time with no payload	17 h 30 min at 22°C | 72°F, from 100–0% power in the robot interface and with no top module
Active operation time with maximum payload	13 h at 22°C | 72°F, from 100–0% power in the robot interface and with no top module
Standby time (robot is on and idle)	22 h

Environment

Environment	For indoor use only
Noise level	42–51 dBA with standard wheels, 44–54 dBA with cleanroom wheels
Ambient temperature range, operation	0–40ºC | 32–104°F for continuous use (maximum recommended use in 26–40ºC | 79–104°F is 1 h)
Ambient temperature range, storage	1 month: -20–60°C | -4–140°F 3 months: -20–45°C | -4–113°F
Humidity	20–95% non-condensing
IP rating	IP 21
Floor conditions	No water, no oil, no dirt

Maximum incline/decline	± 5% at 0.5 m/s | 1.6 ft/s
Traversable gap and step tolerance	0-20 mm | 0.79 in Above 20 mm | 0.79 in: at maximum 40° angle with reduced speed Above 30 mm | 1.18 in: Not recommended, risk of personal injury Above 50 mm | 1.97 in: Prohibited
Floor to wheel frictional coefficient	0.60–0.80 (recommended)
Drive wheel material	Thermoplastic Polyurethane
Material the robots cannot detect reliably	Transparent, translucent, glossy, reflective, and light emitting [1]
Optimal light conditions	Even and steady lighting (strong directional light can cause the robot to detect non-existent obstacles)
Maximum altitude	2 000 m | 6 561 ft

Compliance

EMC	EN 61000-6-4, EN 61000-6-2, EN 12895
Cleanroom	Optional Class 4 (ISO 14644-1)—see the cleanroom certificate on MiR Support Portal
Designed to meet safety standards for industrial vehicles	ISO 3691-4 (Except Clause 4.4, 4.9.4, 5.1, 6, and Annex A), ISO 13849-1, ISO 13850, ISO 12100, ITSDF B56-5, RIA R15.08-1
ESD	Certified (ESD version)—you can find the certificate on MiR Support Portal

[1]We recommend either avoiding these materials, covering them with opaque and matte material the robot can detect, or ensuring the robot does not operate in areas with these materials.

Safety

Safety functions	12 safety functions according to ISO 13849-1. The robot stops if a safety function is triggered.
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

3D cameras	2 pcs, 3D camera Intel RealSense™ D435 FoV height: 1 800 mm | 70.9 in 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
Minimum lidar radius range for each safety laser scanner	10 m | 10.9 yd
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)