OMRON

Autonomous Mobile Robots
MD Series

Self-navigating mobile robots that transport payloads up to 900 kg

- Natural feature navigation:
  Automatically plans efficient routes and prevents collisions; capable of full reverse navigation
- Fleet management:
  Operates in coordination with a fleet of up to 100 AMRs
- Easy deployment:
  Installs quickly, without facility modifications



Ordering Information

Model	Payload Capacity	Pendant	Charging Station	Ordering Code
MD-650	650 kg	No	No	37350-10000
		No	Yes	37350-10002
		Yes	Yes	37350-10004
MD-900	900 kg	No	No	37370-10000
		No	Yes	37370-10002
		Yes	Yes	37370-10004

Note: 1. All AMRs in a fleet must have the same version of the FLOW Core software installed. Other considerations must be made when adding AMRs to a fleet. Contact your local OMRON representative for more information.
2. The battery for the AMR must be ordered separately (73330-100). Before ordering lithium-ion batteries, please verify local shipping regulations to ensure compliance with applicable laws and restrictions.

Items Included with the AMR

Item	Description
Labels	Lifting, warning, and product labels
Top Plate Seal Kit	Kit includes eight M16 screws, PTFE thread sealing tape, and tape application instructions
Lift Kit	Includes straps and hardware for lifting the AMR
USB Drive	Contains digital product documentation and software for operating the AMR
Printed Documentation	Printed documents and guides for safety and unpacking the AMR

Accessories and Optional Items

Item		Details	Ordering Code
Pendant		Handheld, external input device for manually driving an AMR, typically used for map creation	68940-000L
Charging Station	**Power Supply Box**	Supplies power to the Docking Target or battery for charging purposes	73990-000
	Docking Target	A fixed object connected to the Power Supply Box that the AMR docks to for autonomous charging	68910-000
Battery ✻1		Removable and rechargeable power source for the AMR	73330-100
Supplementary Laser Scanner Kit		Includes 2 Supplementary Laser Scanners, mounting kit, cables and hardware	73945-010
High Accuracy Positioning System (HAPS), single sensor		AMR Alignment using magnetic floor tape. Includes single HAPS sensor kit, cabling, hardware, and magnetic tape (25 mm wide, 49 m long)	73925-010
High Accuracy Positioning System (HAPS), double sensor		AMR Alignment using magnetic floor tape. Includes double HAPS sensor kit, front and rear cabling, hardware, and magnetic tape (25 mm wide, 49 m long)	73925-020
High Accuracy Positioning System (HAPS) magnetic tape		25 mm wide magnetic tape (South top side, 49 m roll)	14925-000
Mobile I/O Box		Used with a Fleet Manager to summon an AMR to a goal or control connected devices with I/O	23419-802
Mobile I/O Box Power Supply		Recommended for purchase with the Mobile I/O Box	23419-812
Maintenance Port Extension Kit		Includes cable and hardware for relocating the maintenance port	73955-000
Wireless Antenna Extension Kit		Includes two dipole antennas, two 2 m coaxial cables, and two 0.6 m coaxial cables	68955-000
Operator Panel Relocation Kit		Includes extension cable and blanking plate.	73953-000

✻1. Before ordering lithium-ion batteries, please verify local shipping regulations to ensure compliance with applicable laws and restrictions.

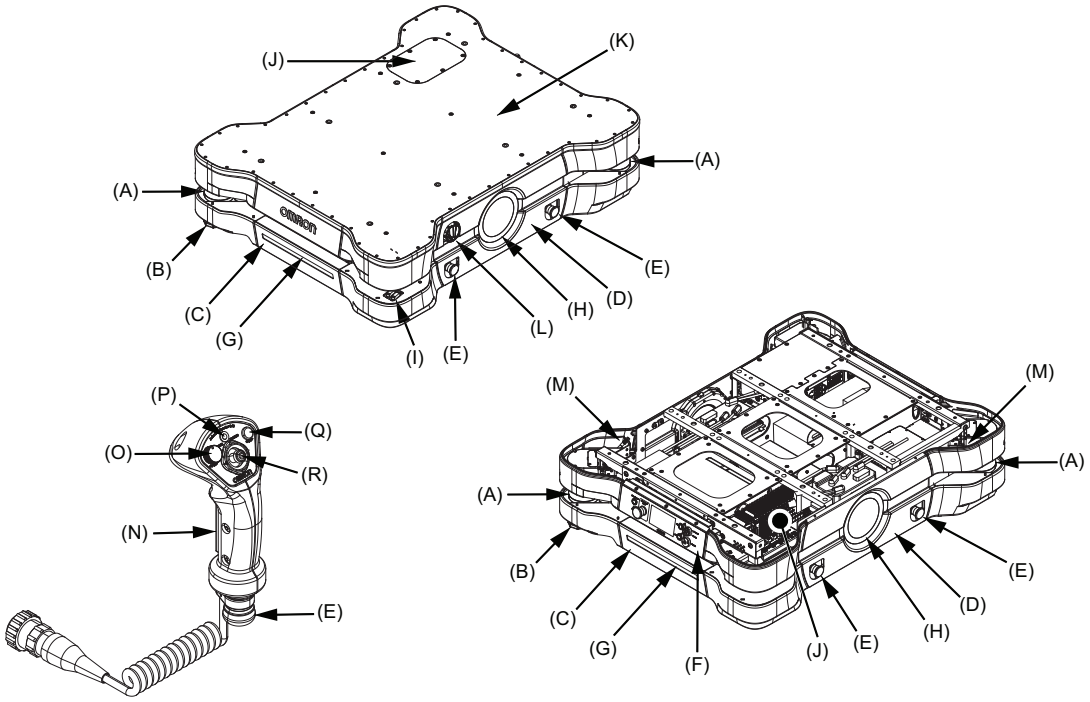
Software Licenses

Product Name	Applicable For	Configuration	Ordering Code
Fleet Operations Workspace Core Fleet Manager License	Virtual Fleet Manager	Initial entitlement for a 3 year renewable FLOW Core license. Replace □□ with 05, 10, 15, 20, 25, 30 to indicate the number of AMRs licensed to connect. Replace □□ with 50 for 31 or more AMRs.	30271-1□□ ✻1
Fleet Operations Workspace Core Fleet Upgrade		Entitlement for a fleet connection limit increase by one additional AMR (used for existing installations).	30271-001
Fleet Operations Workspace Core Renewal		Entitlement for a 1 year renewal of the FLOW Core license. Replace □□ with 05, 10, 15, 20, 25, 30 to indicate the number of AMRs licensed to connect. Replace □□ with 50 for 31 or more AMRs.	30271-2□□
Unified Fleet License		Provides access to the Unified Fleet Object feature for tracking the position of external moving equipment (such as carts, forklifts, and third party AGVs) and integrating them into OMRON Fleet Manager logic. Also provides access to advanced TrafficLight sector functions.	30271-601
Fleet Operations Workspace iQ (FLOW iQ) License		Entitlement for a 1 year renewable FLOW iQ license.	30271-701
		Entitlement for a 3 year renewable FLOW iQ license.	30271-703
Cell Alignment Positioning System (CAPS) License	AMR	AMR Alignment using software-defined target. Entitlement for a perpetual CAPS license.	20271-805
Cycle Time Optimization License		Enables reduced cycle times with fewer stops and path caching. Entitlement for a perpetual Cycle Time Optimization license.	20271-905

✻1. After expiration of a FLOW Core Fleet Manager license, all Virtual Fleet Manager functionality will continue to operate without requiring subscription renewals. An active subscription is required for software upgrades and to access subsequent software releases, including bug fixes, feature upgrades, and performance improvements.

Note: To upgrade to the latest version of the FLOW Core software, contact your local OMRON representative. Please note that an active subscription is required for access to software upgrades.

Features and Components



Item	Description	Item	Description
A	Safety Laser Scanner	J	User Connection Area / Cover
B	Low Laser	K	Payload Mounting Surface / Top Plate
C	Front / Rear Skin	L	Main Disconnect Switch
D	Side Skin	M	Wireless Antenna
E	E-STOP Button ∗1	N	Three-position Enabling Switch
F	Operator Panel	O	Speed Control
G	Light Strip	P	Power Indicator LED
H	Light Disc	Q	Goal Button
I	Charging Contacts	R	Directional Control Stick

∗1. An additional E-STOP button is provided on the Operator Panel.

MD Series

Specifications

Item		Details	
Model		**MD-650**	**MD-900**
Weight (no battery or accessories)		220 kg	
Environment	**Ambient Temperature**	5 to 40°C	
	Storage Temperature	-20 to 60°C	
	Ambient Humidity	5% to 95% (non-condensing)	
	Operating Environment	Indoor usage only, no corrosive or explosive gas or liquid	
	Dust / Smoke	Accumulated dust smaller than 37 µm cannot exceed 1.5 mL / m^2 in the operating environment. Avoid operating in areas with smoke.	
	Altitude	2000 m maximum	
	Pollution Degree	2	
	Ingress Protection Class ✻1	IP22 (IP10 for charging pads)	
	Enclosure Rating	Type 2	
	Atmospheric	Non-hazardous environments (no explosive gas and oil mist).	
	Cleanroom Rating ✻2	ISO 4 / Class 10	
Floor Conditions	**Floor Requirements**	No water, oil, or dirt	
	Minimum Floor Flatness	F_F25 (ACI 117 standard)	
	Minimum Floor Levelness	F_L25 (ACI 117 standard)	
	Maximum Step Traversal (speed limited ✻3)	10 mm / 15 mm	
	Maximum Gap Traversal ✻4	20 mm / 30 mm	
	Maximum Slope	Max. 5° / 8.75% incline	
	Minimum Floor Compressive Strength	7.2 MPa	9.4 MPa
	Minimum Coefficient of Friction	Flat surfaces: 0,6; Inclined surfaces: 0.8	
Navigation	**Routing**	Autonomous routing by localizing with Safety Laser Scanners, based on environment mapping.	
	Environmental Map-Making Method	Scan by driving the AMR through the environment and uploading the scan data to the MobilePlanner.	
	Low Lasers	Two Low Lasers are provided to detect obstacles below the scanning plane of the Safety Laser Scanners.	
	Supplementary Laser Scanners (Optional)	Two optional, Supplementary Laser Scanners can be added for object detection in the vertical plane	
Visual Indicators		Light discs are located on the sides of the AMR. Light strips are located on the front and back of the AMR. Additional indicators can be added.	
Maximum Payload Capacity		650 kg	900 kg
Mobility	**Run Time ✻5**	10 h (no payload); 8 h (full payload)	
	Swing Radius	729 mm	
	Turn Radius	0 mm	
	Maximum Translational Speed (forward and reverse)	2200 mm/s	1800 mm/s
	Maximum Translational Acceleration	900 mm/s^2	
	Maximum Translational Deceleration	1300 mm/s^2	
	Maximum Rotational Speed ✻6	60 °/s	
	Maximum Rotational Acceleration	100 $°/s^2$	
	Maximum Rotational Deceleration	150 $°/s^2$	
	Maximum Moment of Inertia	250 $kg\text{-}m^2$	300 $kg\text{-}m^2$
	Stop Position Repeatability (Single AMR) ✻7	To a position: ±55 mm, ±2° To standard target: ±25 mm, ±2° With HAPS: ±8 mm, ±0.5° With CAPS: ±4 mm, ±0.4°	
	Stop Position Repeatability (Fleet) ✻7	To a position: ±75 mm, ±2° To standard target: ±35 mm, ±2° With HAPS: ±10 mm, ±0.5° With CAPS: ±16 mm, ±0.5°	
Drive Wheels	**Materials**	Steel wheels with ESD tread	
Passive Casters	**Materials**	Cast iron wheels with polyurethane tread	
Auxiliary Power	**Unregulated**	40 to 57 VDC (51.2 VDC nominal); 40 A fused	
	Regulated	23 to 25 VDC; 0.7 A fused	

Item		Details	
Model		**MD-650**	**MD-900**
Standards	**AMR**	EN ISO 12100, EN ISO 13849-1, EN 60204-1, EN ISO 10218-1, EN 61326-3-1, EN 61326-1, EN 12895, EN ISO 3691-4, CAN/UL 3100, CAN/CSA-Z434, KS C 9610-6-2, KS C 9610-6-4, ANSI RIA 15.08	
	Battery	ANSI/CAN/UL/ULC 2271, UN 38.3	
	Charging Station	EN 61204-7, EN 62477-1, UL1012, CAN/CSA C22.2.107.2	
	Wireless	IEEE 802.11 a/b/g	
Certification Markings	**AMR**	cTUVus, KC	
	Battery	cTUVus, CE	
	Power Supply Box and Docking Target	cTUVus	
Signal Interfaces	**Wireless**	Fleet communication and other maintenance functions	
	RJ-45 Ports	Four ports for connections to internal devices	
	Digital I/O	Eight PNP / sourcing inputs; Eight PNP / sourcing outputs	
	Safety	Emergency stop and protective signals, alternate safety zone switching, and no-motion output	
	Lights	Connects user-supplied visual signal devices	
	Buzzer	Connects user-supplied audible signal devices	
Safety Features	**Safety Laser Scanners**	Two Safety Laser Scanners are included to provide a 360° detection area around the AMR. The scanning plane is positioned 175 mm above the floor. Lasers are rated as Class 1M, eye-safe, per IEC 60825-1 and 21 CFR 1040.10 and 1040.11.	
	Safety Laser Scanner Zone Sets	A pair of safety-rated alternate safety zone inputs can toggle the Safety Laser Scanner zones between a default configuration or an alternate configuration.	
	E-STOP Buttons	Five E-STOP buttons are located on the AMR (sides and Operator Panel). Additional E-STOP buttons can be added to the payload structure.	
	Audible Indicators	Two speakers are included. Additional buzzers can be added.	
	Emergency Stop	Stops the AMR and requires user intervention to resume operation.	
	Protective Stop	Stops the AMR temporarily and automatically resumes operation when safety conditions are met.	
Operator Panel	**Display**	127 mm diagonal LCD	
	Controls	• E-STOP button • ON/OFF buttons • Brake release button • Pendant port • Keyed Mode Selection Switch	

✻1. The supplied Top Plate Plugs must be inserted to achieve an IP22 rating.
✻2. Cleanroom ratings are associated with the AMR and charging components when used together as a complete system.
✻3. Traversing a 10 mm step must occur at speeds below 500 mm/s in the forward direction and 400 mm/s in the reverse direction. Traversing a 15 mm step must occur at speeds below 300 mm/s in the forward and reverse directions. Frequent driving over steps will shorten the lifespan of the drivetrain components. Steps should have smooth, rounded profiles.
✻4. 20 mm gaps may be traversed at any speed. Traversing a 30 mm gap must occur at speeds below 2000 mm/s for MD-650 and speeds below 1500 mm/s for MD-900. Frequent driving over gaps will shorten the lifespan of the drivetrain components.
✻5. Auxiliary power draw will impact these times.
✻6. The maximum rotational speed is reduced to 45 degrees/s when the AMR is traveling at speeds over 100 mm/s.
✻7. Stop position repeatability values were obtained using default AMR parameters and a map created by the MD-series AMR.

MobilePlanner Software Requirements

MobilePlanner, PC	**Operating System**	Windows 10 (64-bit version), Windows 11
	CPU	1.5 GHz dual-core CPU recommended
	Main Memory	1.5 GB min. (4 GB min. recommended)
	Hard Disk	At least 200 MB of available space
	Video Memory	256 MB min.
	Display	XGA 1280 x 720, 16 million colors minimum
MobilePlanner, Tablet Edition	**Operating System**	Android® OS, Version 9 or newer, minimum 2 GB of RAM
		iOS®, Version 10 or newer
Supported Languages		English, German, Japanese, French, Italian, Korean, Spanish, Polish, Simplified Chinese and Traditional Chinese.

Virtual Fleet Manager Software Minimum Hardware Requirements

Fleet Size / AMR Count	Small ≤ 5	Medium ≤ 15	Large ≤ 30	X-Large > 30 ∗1
Virtual CPU	2 Cores		4 Cores	
Clock Speed (per core)	2 GHz	4 GHz	3 GHz	4 GHz
Virtual RAM	8 GB	16 GB	24 GB	32 GB
Virtual Disk	512 GB			1 TB
FLOW Software Version	Minimum FLOW Core 4.0			

∗1. Contact your local OMRON representative for fleets larger than 100.

Note: The PC/IPC/Server is supplied by the user.

Charging Station

Maximum Current	Input current: 25 A Output current: 120 A (nominal) ∗1
Input Voltage	3-phase 200 to 240 VAC, 50/60 Hz (Delta/Wye) 380 to 415 VAC, 50/60 Hz (Wye only)
Output voltage	40 to 57 VDC
Power Consumption	7.75 kW
Maximum Power Output	6.84 kW
Humidity	5% to 95%, non-condensing
Ambient Operating Temperature	5 to 40°C
Storage Temperature	-20 to 60°C
Ingress Protection	IP20 (IP10 for charging pads)
Cleanroom Rating ∗2	ISO 4 / Class 10
Altitude	2000 m maximum
Pollution degree	2
Equipment Class	1
Weight	Power Supply Box: 111 kg Docking Target: 28 kg
Docking Target Mounting	To floor and/or wall

∗1. Fused at 150 A

∗2. Cleanroom ratings are associated with the AMR and charging components when used together as a complete system.

High Accuracy Positioning System

Ingress Protection		IP64
Environment		-40 to 85°C
Magnetic Tape	**Width**	25 mm
	Orientation	South up
Markers (Magnetic Tape)	**Width**	25 mm
	Length	250 mm min. for 500 mm/s drive speed
	Orientation	North up
	Separation from Tape	20 to 30 mm
Protective Covering Tape (recommended)		Mighty Line Safety Floor Tape, Solid (102 mm width)

Pendant

Ambient Operating Temperature	0 to 40°C
Storage Temperature	-20 to 65°C
Humidity	5% to 95%, non-condensing
Altitude	2000 m
Ingress Protection Class	IP30

Battery

Type	Lithium-Ion (LiFePO4)
Voltage	40 to 57 VDC (51.2 VDC nominal)
Capacity	38 Ah nominal
Energy	2048 Wh nominal
Recharge Time	19.6 minutes (from 20% to 80%) ∗1
Charge Cycles	Approximately 3000 cycles ∗2 ∗3
Charging Method	Automatic or manual
Ambient Operating Temperature	5 to 40°C
Storage Temperature	< 1 month: -20 to 45°C < 3 months: -20 to 35°C > 3 months: 20 to 25°C
Humidity (Storage)	65% or less
Humidity (Operation)	5% to 95%, non-condensing
Altitude	4500 m, operating 15240 m, transporting
Ingress Protection Class	IP33
Weight	29 kg

∗1. Charging time can vary based on battery cell temperature and state of charge.

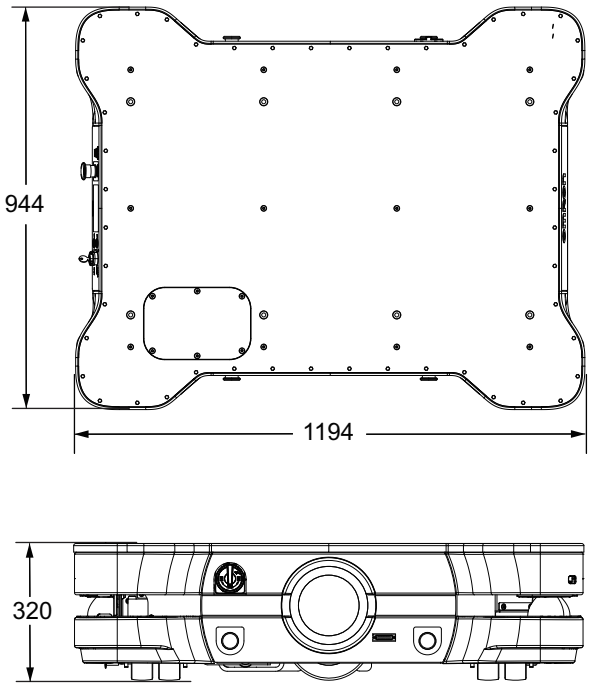
∗2. Approximately 80% of nominal battery capacity will be available after using the battery at 100% depth of discharge.

∗3. Under manufacturer's test conditions of 25°C ±3°, 25% to 85% relative humidity, 40 A charge/discharge, 57 and 40 VDC charge/discharge, with 60 minutes of inactivity after charging/discharging. Actual cycles may vary according to the application.

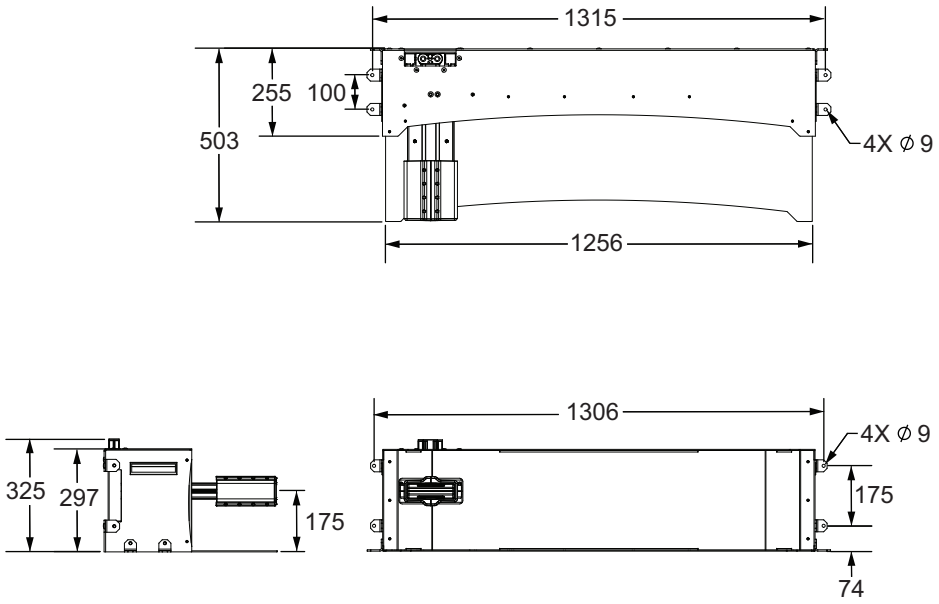
Dimensions

(Unit: mm)

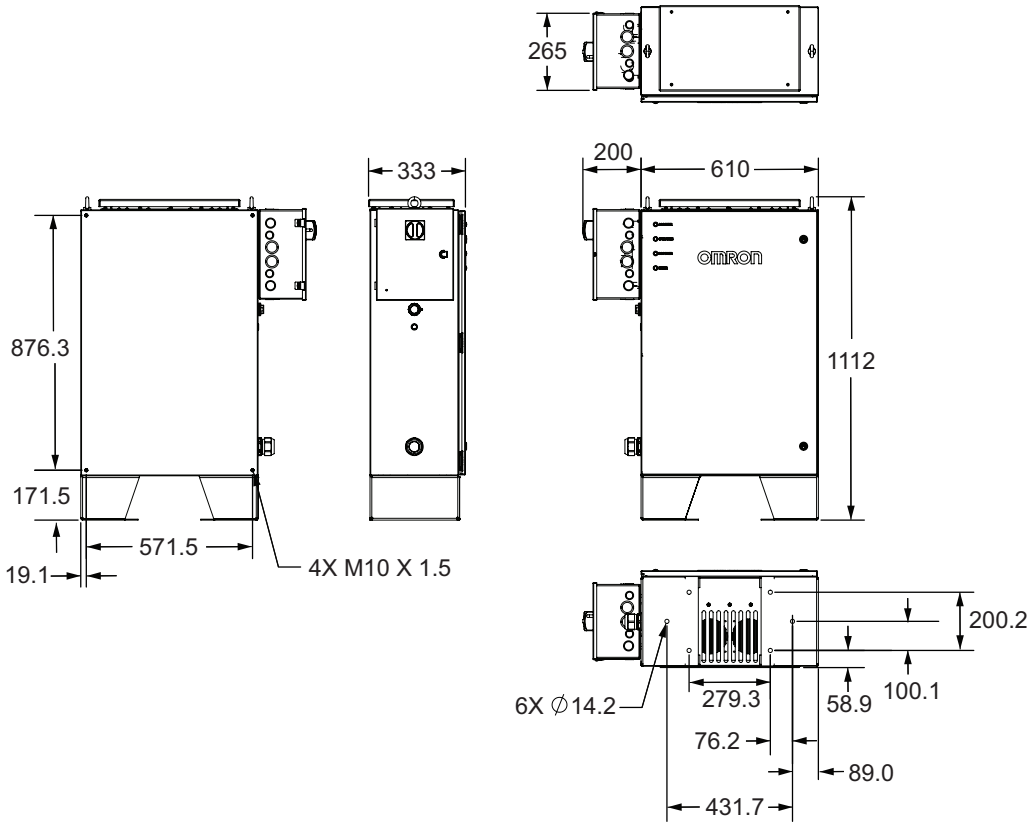
MD AMR



Docking Target



Power Supply Box



Related Manuals

Manual No.	Title
I681	AMR (Autonomous Mobile Robot) MD-series Platform User's Manual
I617	Advanced Robotics Command Language Reference Manual
I618	Advanced Robotics Command Language Enterprise Manager Integration Manual
I635	Fleet Operations Workspace Core User’s Manual
I636	Fleet Operations Workspace Core Migration Guide
I637	Fleet Operation Workspace Core Integration Toolkit User Manual
M107	Fleet Operation Workspace Core Integration Toolkit - MQTT API User's Manual
I665	Fleet Operations Workspace iQ User's Manual
I649	Fleet Simulator User’s Manual
I677	Mobile I/O Box User's Manual
I695	Virtual Fleet Manager Installation Guide

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