

AMR (Autonomous Mobile Robot) 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	Part Number
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. To ensure proper fleet management, please contact an OMRON representative before ordering AMRs to add to an existing fleet.
 2. The battery for the AMR must be ordered separately (part number 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 manuals and guides for unpacking and operating the AMR

Accessories and Optional Items

Item	Details	Part Number
EM2100 Appliance	Appliance that runs any Fleet Operations Workspace Solutions software. 120 day factory trial license included. Refer to Fleet Operations Workspace (FLOW) Licenses below for more information.	20271-900 (Primary Fleet Manager) 20271-901 (Secondary Fleet Manager) 20271-903 (Bundle with Fleet Simulator License)
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
	Docking Target	A fixed object connected to the Power Supply Box that the AMR docks to for autonomous charging
Battery *	Removable and rechargeable power source for the AMR	73330-100
Side Laser Kit	Two additional laser scanners for overhanging obstacle avoidance. Includes side lasers, 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 and HAPS magnetic tape.	73925-010

MD Series

Item	Details	Part Number
High Accuracy Positioning System (HAPS), double sensor	AMR Alignment using magnetic floor tape. Includes double HAPS sensor kit and HAPS magnetic tape.	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

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

Software Licenses

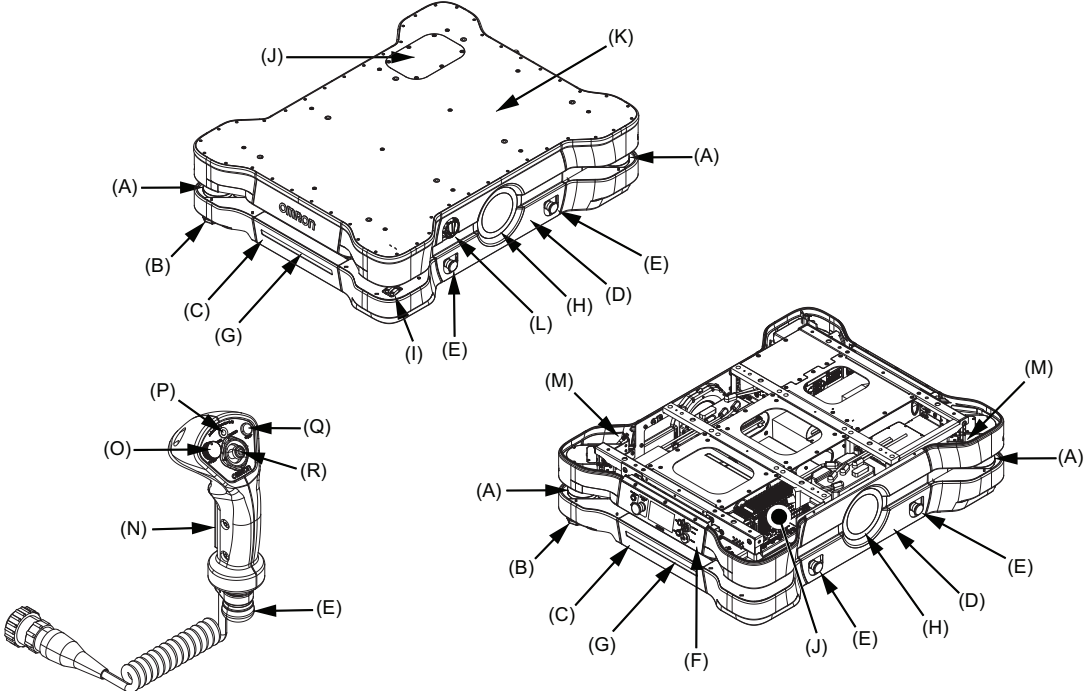
Product Name	Applicable For	Configuration	Part Number
Fleet Operations Workspace (FLOW) Core Fleet Manager License, 3 Year	Virtual Fleet Manager	Initial entitlement for a 3 year renewable FLOW Core license. Replace □□ with 05, 10, 15, 20, 25, 30, 50 to indicate the number of AMRs licensed to connect, where 50 represents an unlimited number of AMRs.	30271-1□□ *1
Fleet Operations Workspace (FLOW) Core Fleet Upgrade		Entitlement for fleet connection limit increase by one additional AMR (used for existing installations).	30271-001
Fleet Operations Workspace (FLOW) Core Renewal		Entitlement for a 1 year (verify) renewal of the FLOW Core license. Replace □□ with a value of 05 to 30, or 50 to indicate the number of AMRs licensed to connect, where 50 represents an unlimited number of AMRs.	30271-2□□
Fleet Operations Workspace (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
Primary Fleet Operations Workspace (FLOW) Core License, 1 Year	EM2100	Entitlement for a 1 year renewable Primary FLOW Core license, runtime and development, per AMR connection	20271-800 *2
Primary Fleet Operations Workspace (FLOW) Core License, 5 Year		Entitlement for a 5 year renewable Primary FLOW Core license, runtime and development, per AMR connection	20271-806 *2
Secondary Fleet Operations Workspace (FLOW) Core License, 1 Year		Entitlement for a 1 year renewable Secondary FLOW Core license per fleet, redundant runtime	20271-802 *2
Secondary Fleet Operations Workspace (FLOW) Core License, 5 Year		Entitlement for a 5 year renewable Secondary FLOW Core license per fleet, redundant runtime	20271-807 *2
License, Fleet Operations Workspace iQ		Entitlement for a 1 year renewable FLOW iQ license	20271-701
		Entitlement for a 5 year renewable FLOW iQ license	20271-705
Cell Alignment Positioning System (CAPS) License	AMR	AMR Alignment using software-defined target. Entitlement for a perpetual CAPS license	20271-805

*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 will still be required to access subsequent software releases, including bug fixes, feature upgrades, and performance improvements.

*2. Expiration of a 1 year subscription license without renewal will result in cessation of the EM2100 fleet management functions of the OMRON AMR solution until the license is renewed. This does not apply to Virtual Fleet Manager. After five consecutively licensed years (either one 5 year license or five 1 year licenses), all EM2100 fleet management functions will continue to operate without requiring subsequent subscription renewals. An active subscription will still be required to access new 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 *	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

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

MD Series

Specifications

Item		Details	
		MD-650	MD-900
Model			
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 excessive dust, no corrosive gas or liquid	
	Altitude	2000 m maximum	
	Pollution degree	2	
	Ingress Protection Class	IP22 *1 (IP10 for charging pads)	
	Enclosure Rating	Type 2	
	Atmospheric	Non-hazardous environments (no explosive gas and oil mist).	
Floor Conditions	Floor requirements	No water, oil, or dirt	
	Minimum floor flatness	F _F 25 (ACI 117 standard)	
	Minimum floor levelness	F _L 25 (ACI 117 standard)	
	Maximum step traversal (speed limited *2)	10 mm / 15 mm	
	Maximum gap traversal *3	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.	
	Side Lasers (optional)	Two optional Side Lasers 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 *4	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 *5	60 °/s	
	Maximum rotational acceleration	100 °/s ²	
	Maximum rotational deceleration	150 °/s ²	
	Maximum moment of inertia	250 kg·m ²	300 kg·m ²
		Stop position repeatability (single AMR) *6	To a position: ±70 mm, ±2° To standard target: ±25 mm, ±2° With HAPS: ±8 mm, ±0.5° With CAPS: ±4 mm, ±0.4°
	Stop position repeatability (Fleet) *6	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; 1 A fused	
Standards	AMR	EN ISO 12100, EN ISO 13849-1, EN 60204-1, ISO 10218-1/CSA Z434, EN ISO 3691-4, EN 12895, EN 12895, EN 61000-6-4, EN 61000-6-2	
	Battery	UL2271, UN 38.3	
	Charging Station	UL1012/CSA C22.2.107.2, EN 61204-7 used in conjunction with EN 62477-1	
	Wireless	IEEE 802.11 a/b/g	

Item		Details	
		MD-650	MD-900
Model			
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	7-inch diagonal LCD	
	Controls	<ul style="list-style-type: none"> • 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. 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.

*3. 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 below 1500 mm/s for MD-900. Frequent driving over gaps will shorten the lifespan of the drivetrain components.

*4. Auxiliary power draw will impact these times.

*5. The maximum rotational speed is reduced to 45 °/s when the AMR is traveling at speeds over 100 mm/s.

*6. Stop position repeatability values were obtained using default AMR parameters and a map created by the MD-series AMR.

MD Series

MobilePlanner Software Requirements

MobilePlanner, PC	Operating System	Windows 10 (32-bit/64-bit version)
	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 1024 × 768, 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 / ≤ 100
Virtual CPU	2 cores		4 cores	
ClocksPEED	4GHz	8 GHz	12 GHz	16 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			

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

EM2100 Appliance

Weight	9.1 kg
Mounting method	1U rack mount in a standard 19-inch equipment rack
Power Supply	100 to 240 VAC (typical 100 W)
Power Consumption	200 W max.
Operating Temperature	10 to 35°C
Storage Temperature	-25 to 60°C
Operating Humidity	8 to 90%, non-condensing
Storage Humidity	5 to 95%, non-condensing
Ingress Protection Class	IP20
Main Memory	32 GB DDR3
Storage	60 GB SSD
Archive Storage	4 TB HDD
Communication port	10/100/1000 Ethernet × 4, USB × 4, VGA
Status Display	Multi-segment LCD

Charging Station

Maximum Current	Input current: 25 A Output current: 120 A (nominal) *
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)
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

* Fused at 150 A

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)	
Stop Position Repeatability *	Single AMR	±8 mm position, ±0.5° rotation
	Fleet	±10 mm position, ±0.5° rotation

* Stop position repeatability values were obtained using default AMR parameters and a map created by the MD-series AMR.

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°C to 45°C < 3 months: -20°C to 35°C > 3 months: 20°C 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.

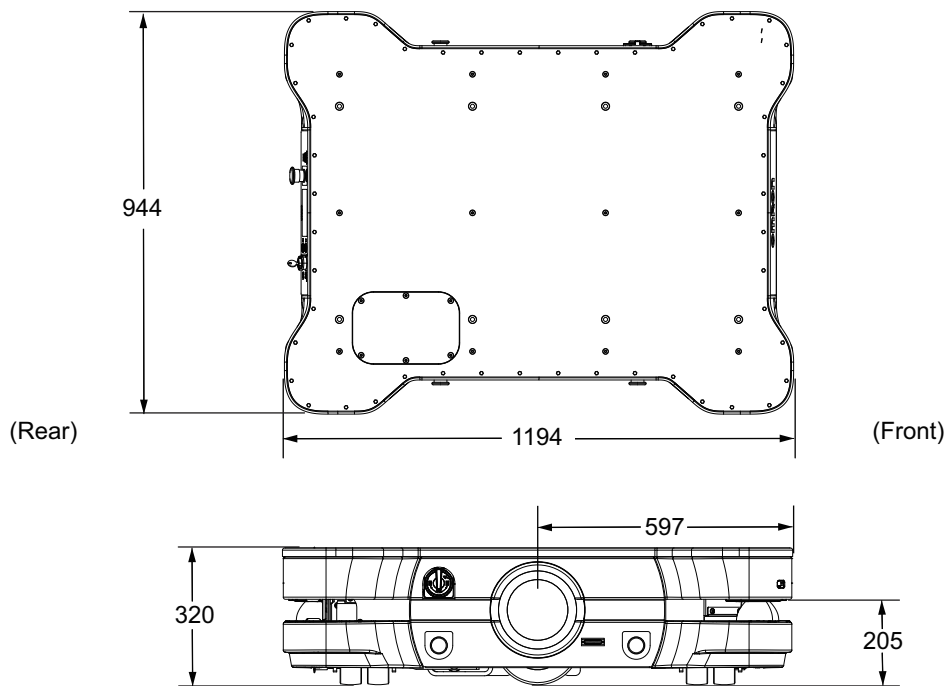
*2. Approximately 80% of nominal battery capacity will be available after using the battery at 100% depth of discharge.

*3. Under manufacturer's test conditions of 25°C ±3°, 25%-85% R.H., 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.

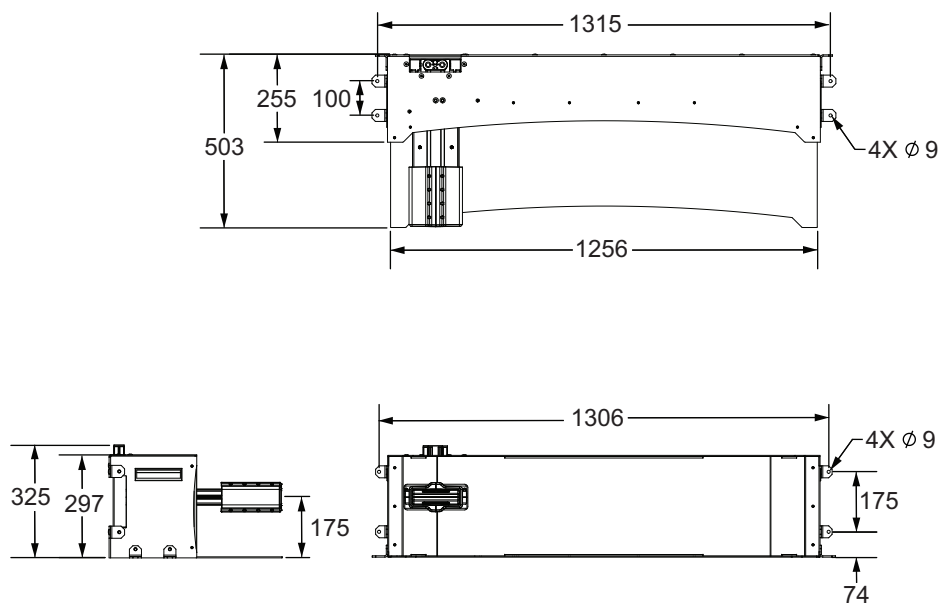
MD Series Dimensions

(Unit: mm)

MD AMR

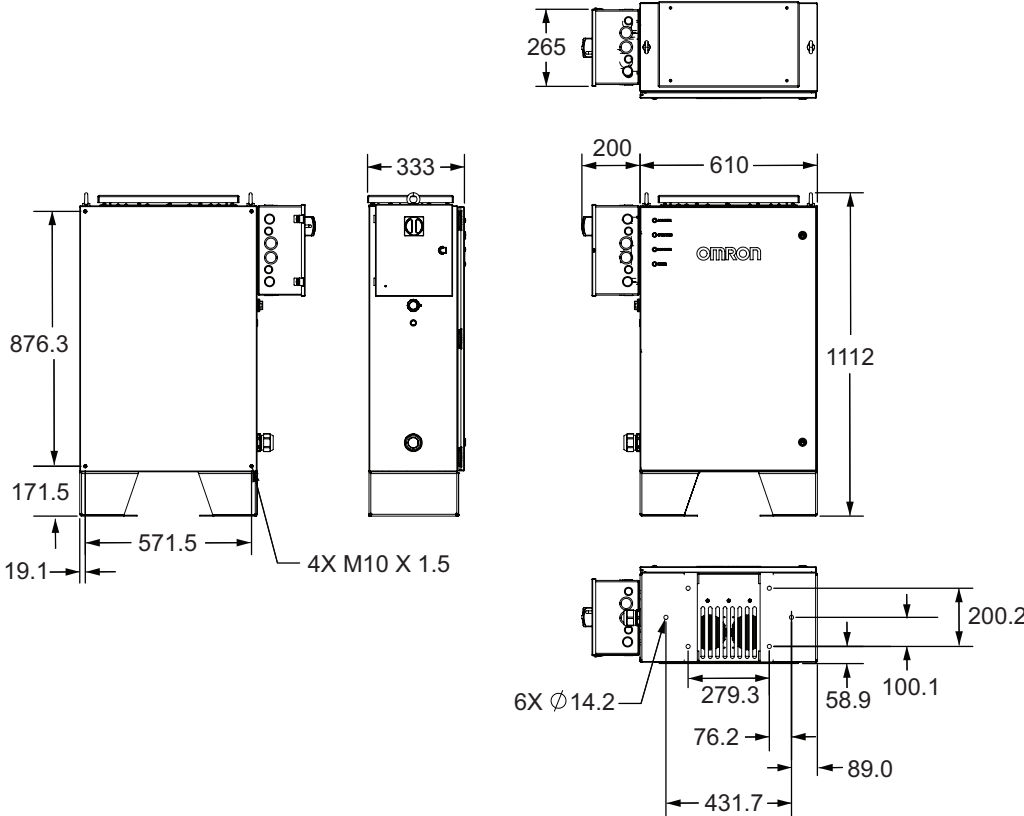


Docking Target

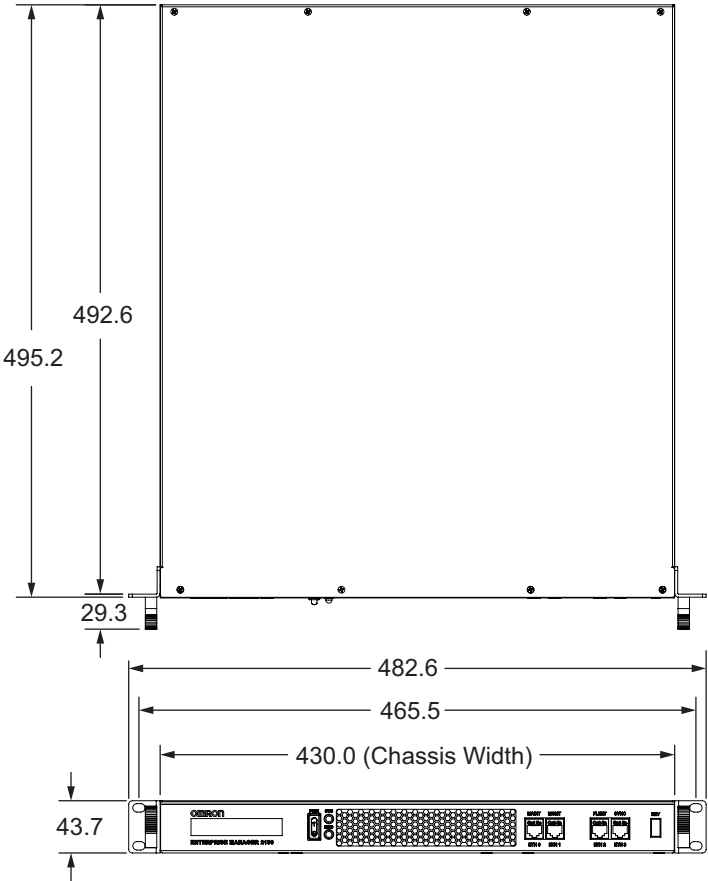


Dimensions

Power Supply Box



Fleet Manager EM2100 Appliance



MD Series

Related Manuals

Manual No.	Title
I617	Advanced Robotics Command Language Reference Manual
I618	Advanced Robotics Command Language Enterprise Manager Integration Manual
I634	EM2100 Installation Manual
I635	Fleet Operations Workspace Core User's Manual
I637	Fleet Operation Workspace Core Integration Toolkit User Manual
I665	Fleet Operations Workspace iQ User's Manual
I649	Fleet Simulator User's Manual
I695	Virtual Fleet Manager Installation Guide
I681	AMR (Autonomous Mobile Robot) MD-series Platform User's Manual
I682	AMR (Autonomous Mobile Robot) MD-series Platform Safety and Unpacking Guide
I677	Mobile I/O Box User's Manual

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Errors and Omissions.

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

Note: Do not use this document to operate the Unit. This document describes AMR functionality supported with FLOW v3.3.

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