

Autonomous Mobile Robots

LD Series

Designed to automate material transport tasks in factories and indoor facilities.

- Natural-feature navigation:
Automatically plans efficient routes and prevents collisions
- Fleet management:
Supervises and coordinates the entire fleet of up to 100 vehicles
- Easy deployment:
Short installation time, no facility modifications



Ordering Information

Product Name	Maximum Load	Docking Station Kit *1	Top Plate	Pendant (Joystick)	Part Number
LD-60	60 kg		No		37032-00000
		Yes		No	37032-00002
			Yes		37032-10004
LD-60 ESD *2			No		37032-20000
		Yes		No	37032-20002
			Yes		37032-20004
LD-90	90 kg		No		37042-00000
		Yes		No	37042-00002
			Yes		37042-10004
LD-90x *3			No		37062-00000
		Yes		No	37062-00002
			Yes		37062-10004
LD-90 ESD *2			No		37042-20000
		Yes		No	37042-20002
			Yes		37042-20004
LD-90x ESD *2*3			No		37062-20000
		Yes		No	37062-20002
			Yes		37062-20004
LD-250	250 kg		No		37222-00000
		Yes		No	37222-00002
			Yes		37222-10004
LD-250 ESD *2			No		37222-20000
		Yes		No	37222-20002
			Yes		37222-20004

*1. Includes Battery Power Cable.











*2. For use in electrostatic-sensitive environments, compliant to the IEC 61340-5-1 standard.




*3. For use in cart transporter applications.

Note: 1. To ensure proper fleet management, please contact an OMRON representative before ordering AMRs to add to an existing fleet.
2. Batteries are sold separately. Refer to *Accessories and Optional Items* on page 2 for more information.

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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)
	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
	High Accuracy Positioning System (HAPS) Single sensor	AMR Alignment using magnetic floor tape. Includes single HAPS sensor kit, one mounting bracket, cabling, hardware, and magnetic tape (254 mm wide, 49 m long)	LD-60/90: 13660-100 LD-250: 21374-100
	High Accuracy Positioning System (HAPS) Double sensor	AMR Alignment using magnetic floor tape. Includes double HAPS sensor kit, two mounting brackets, cabling, hardware, and magnetic tape (254 mm wide, 49 m long)	LD-60/90: 13660-000 LD-250: 21374-000
	RS232 Splitter Cable	Connects both sensors to the single AMR Core RS232 port	24010-000F
	Magnetic tape	25 mm wide magnetic tape (South top side, 49 m roll)	14925-000
	Acuity Localization	Camera, mounting kit, cables, leveling kit	13700-000
	Side Laser Bundle	Includes two Lasers and cable	13456-000
	Side Laser Kit	Includes two lasers, two mounting kits, two metal covers, and cable	13456-100
	Battery	Removable and rechargeable power source for the AMR.	20452-000
	Docking Station	Used to autonomously charge the battery inside an AMR or to charge an AMR battery outside of the AMR with a supplied cable	12477-000
	Pendant (Joystick)	Handheld device for manually driving an AMR and map creation, 3 m cable length	13558-000
	Breakout Cable	D-Sub44 pin cable for digital I/O interface	14165-000

	Item	Details	Part Number
	Top Plate - LD-60, LD-90, LD-90x	Provides additional protection for the AMR.	12944-000
	Top Plate - LD-250	Provides additional protection for the AMR.	20458-002
	Top Plate - LD-250 ESD		20458-202
	Battery Power Cable	Cable length: 0.45 m	12676-000L

Fleet Operations Workspace (FLOW) Licenses

Product Name	Configuration	Part Number
Primary Fleet Operations Workspace (FLOW) Core License, 1 Year *1	Entitlement for a 1 year renewable Primary FLOW Core license, runtime and development, per AMR connection	20271-800
Primary Fleet Operations Workspace (FLOW) Core License, 5 Year *2	Entitlement for a 5 year renewable Primary FLOW Core license, runtime and development, per AMR connection	20271-806
Secondary Fleet Operations Workspace (FLOW) Core License, 1 Year *1	Entitlement for a 1 year renewable Secondary FLOW Core license per fleet, redundant runtime	20271-802
Secondary Fleet Operations Workspace (FLOW) Core License, 5 Year *2	Entitlement for a 5 year renewable Secondary FLOW Core license per fleet, redundant runtime	20271-807
License, Fleet Simulator	Entitlement for perpetual Fleet Simulator license for use with existing Fleet Manager appliance, simulation runtime and development	20271-804
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 Alignment using software-defined target. Entitlement for a perpetual CAPS license	20271-805

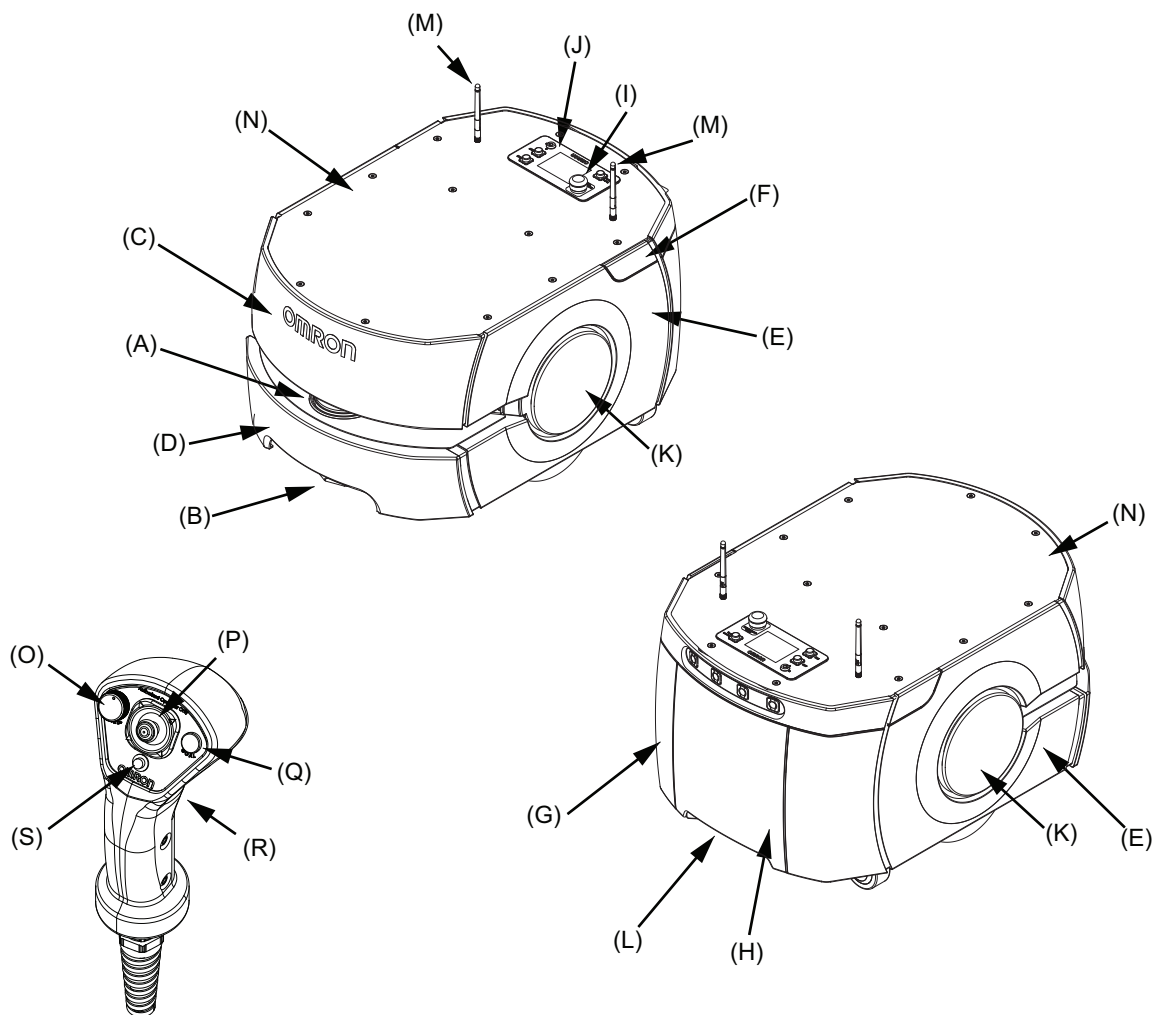
Note: To obtain the latest version of the Fleet Operations Workspace (FLOW) Core software, contact your local OMRON representative. Please note that an active subscription is required for access to software upgrades.

- *1. Expiration of a 1 year subscription license without renewal will result in cessation of the fleet management functions of the OMRON AMR solution until the license is renewed.
- *2. After five consecutively licensed years (either one 5 year license or five 1 year licenses), all fleet management functions will continue to operate without requiring subsequent subscription renewals. An active subscription will still be required to access subsequent software releases, including bug fixes, feature upgrades, and performance improvements.

LD Series

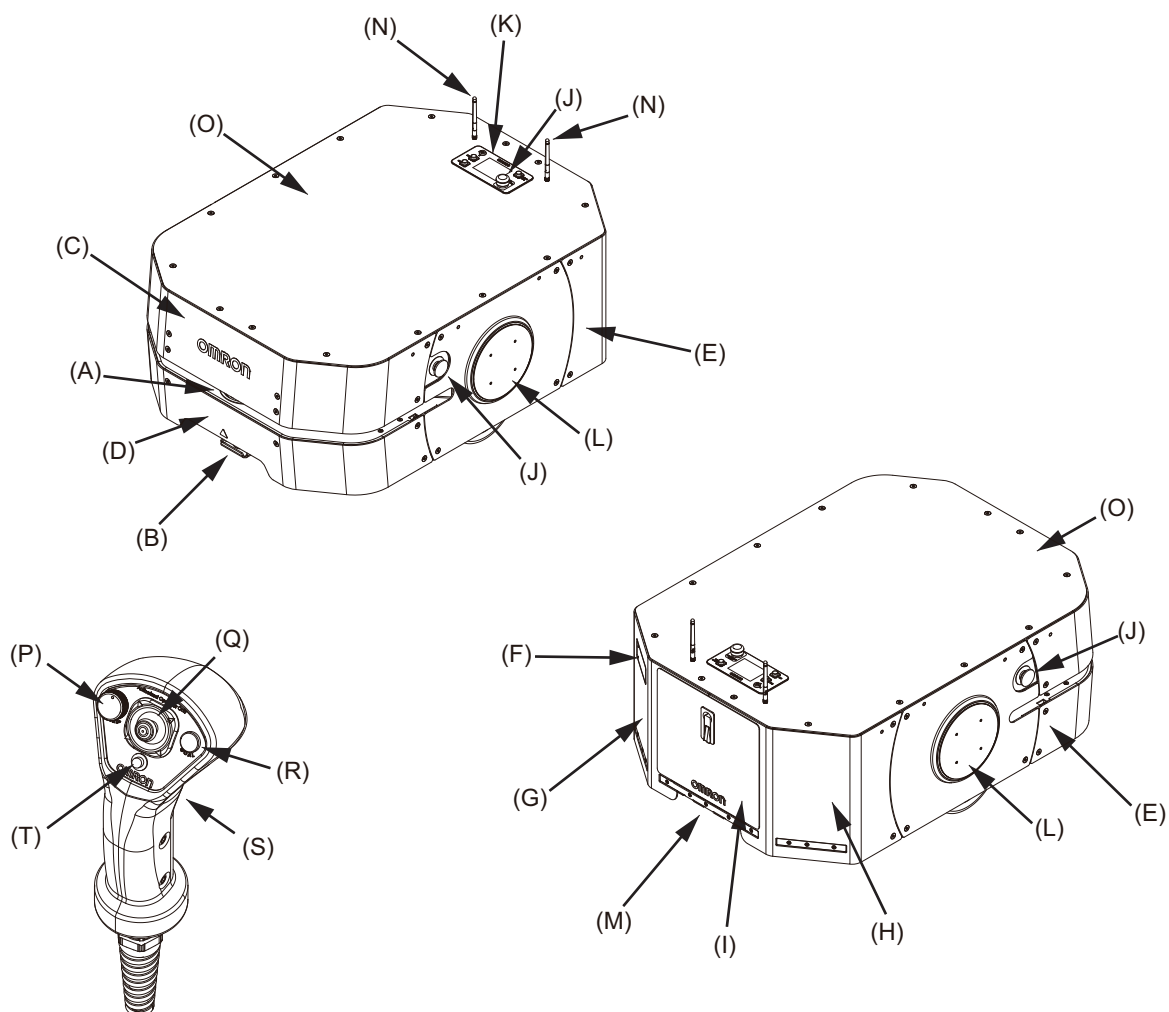
Features and Components

LD-60, LD-90, LD-90x, LD-60 ESD, LD-90 ESD, and LD-90x ESD



Item	Description	Item	Description
A	Safety Laser Scanner	K	Light Disk
B	Low Laser	L	Charging Contacts
C	Upper Front Skin	M	Wireless Antennas
D	Bumper Skin	N	Payload Mounting Surface (Top Plate shown)
E	Side Skin	O	Speed Control
F	Access Panel	P	Directional Control Stick
G	Rear Skin	Q	Goal Button
H	Battery Door Skin	R	Trigger
I	E-STOP button	S	Indicator Light
J	Operator Panel		

LD-250, LD-250 ESD



Item	Description	Item	Description
A	Safety Laser Scanner	K	Operator Panel
B	Low Laser	L	Light Disk
C	Upper Front Skin	M	Charging Contacts
D	Bumper Skin	N	Wireless Antennas
E	Side Skin	O	Payload Mounting Surface (Top Plate shown)
F	Access Panel	P	Speed Control
G	Left Rear Skin	Q	Directional Control Stick
H	Right Rear Skin	R	Goal Button
I	Battery Door Skin	S	Trigger
J	E-STOP button	T	Indicator Light

LD Series

Specifications

LD-60, LD-90, LD-90x, LD-60 ESD, LD-90 ESD, and LD-90x ESD

Item		LD-60	LD-90	LD-90x
Weight (with Battery)		62 kg		
Environment	Ambient temperature	5 to 40°C		
	Ambient humidity	5 to 95% (non-condensing)		
	Operating Environment	Indoor usage only, no excessive dust, no corrosive gas or liquid. Floor must be free of water, oil, dirt, and debris. Direct sunlight may cause safety laser false positives.		
	Ingress Protection Class	IP20		
	Cleanroom rating	ISO 5 / Class 100		
Floor Conditions	Minimum floor flatness	F _F 25 (ACI 117 standard)		
	Traversable step	15 mm max. ^{*1}	10 mm max. ^{*1}	
	Traversable gap	15 mm max. ^{*2}		
	Maximum Slope	Up to 60 kg: 4.8° / 8.3% incline Over 60 kg: Level floor only		
	Minimum floor compressive strength	5 Mpa		
Navigation	Routing	Autonomous routing by localizing with safety scanning laser based on environment mapping		
	Environmental map making method	Scan by walking the AMR through the environment, and upload the scan data to the MobilePlanner software		
	Low Front Laser	One Class 1 laser at front of AMR with a 126° field of view		
	Side Laser (optional)	Two Class 1 lasers with a 270° field of view on the sides of payload structure, user-mounted		
Visual Indicators		Light discs are located on the sides of the AMR. Additional indicators can be added.		
Payload	Maximum Weight	60 kg	90 kg	
	Run time (no payload)	15 h approx.		20 h approx.
Mobility	Run Time (full payload)	12 h approx.		15 h approx.
	Maximum Speed	1800 mm/s	1350 mm/s	900 mm/s
	Maximum Rotation Speed	180 °/s		
	Stop Position Repeatability (single AMR)	<ul style="list-style-type: none"> To a position: ±65 mm To standard target: ±25 mm, ±2° With CAPS: ±8 mm, ±0.5° With HAPS: ±8 mm, ±0.4° 		
	Stop Position Repeatability (Fleet)	<ul style="list-style-type: none"> To a position: ±85 mm To standard target: ±35 mm, ±2° With CAPS: ±12 mm, ±0.5° With HAPS: ±10 mm, ±0.5° 		
	Drive wheels	Materials	Solid aluminum with non-marking, non-conductive, foam-filled rubber tread	
Passive casters	Materials	Conductive thermoplastic rubber on polyolefin		
Auxiliary Power		5 VDC±5%, 1 A switched Aux power 12 VDC±5%, 1 A switched Aux power 20 VDC±5%, 1 A switched Aux power 22 to 30 VDC, 4 A switched 22 to 30 VDC, 10 A switched 22 to 30 VDC, 10 A safe, switched 10 A switched and 10 A safe switched are from the same source and pass through the same 10 A fuse, so the sum of their current must be less than 10 A.		
Standard	Harmonized Standard	EN ISO 12100 / EN ISO 13849-1 / EN 60204-1		
	Relevant Standard	EN 1525 / ANSI B56.5		
	Wireless	IEEE 802.11 a/b/g/n/ac		
Safety Features	Safety Scanning Laser	One at front of AMR Class 1 PLd safety per ISO13849-1 240° field of view		
	E-STOP Buttons	One on Operator Panel, additional E-STOP buttons can be added to the payload structure		
	Rear Sonar	Two at rear of AMR, 2 m range. Each pair includes one emitter and one receiver working together.		
	Front Bumper	Two pairs of sensors at the front of the AMR		
	Audible Indicators	Two speakers are included. Additional buzzers can be added.		
Operator Interface	Display	8.89 cm diagonal TFT, 320 x 240 pixels, color screen		
	Button	ON button, OFF button, Brake-release button, and keyed mode selection		

Item		LD-60	LD-90	LD-90x
User Interface	Wireless	802.11 a/b/g/n/ac		
	Ethernet Port	Two user LAN, One maintenance LAN, Auto-MDIX		
	Serial	One RS-232		
	Digital I/O	16 inputs, 16 outputs		
	Audio	Digital audio in / out		

*1. A speed of 250 mm/s is recommended for traversing steps, and routine driving over steps should be avoided. Lower speeds may not traverse the step. Faster or frequent driving over steps will shorten the lifespan of the drivetrain components. All steps should have smooth, rounded profiles.

*2. AMR maximum speed is recommended for traversing gaps, and routine driving over gaps should be avoided. Lower speeds may not traverse the gap. Faster or frequent driving over gaps will shorten the lifespan of the drivetrain components.

LD-250, LD-250 ESD Specifications

Item		LD-250
Weight (with battery)		148 kg
Environment	Ambient temperature	5 to 40°C
	Ambient humidity	5 to 95% (non-condensing)
	Operating Environment	Indoor usage only, no excessive dust, no corrosive gas or liquid. Floor must be free of water, oil, dirt, and debris. Direct sunlight may cause safety laser false positives.
	Ingress Protection Class	IP20
	Cleanroom rating	ISO 5 / Class 100
Floor Conditions	Minimum floor flatness	F _r 25 (ACI 117 standard)
	Traversable step	10 mm max. *1
	Traversable gap	15 mm max. *2
	Maximum Slope	Max. 1.7° / 3% incline
	Minimum floor compressive strength	5 Mpa
Navigation	Routing	Autonomous routing by localizing with safety scanning laser based on environment mapping
	Environmental map making method	Scan by manually driving the AMR through the environment, and upload the scan data to the MobilePlanner for map creation.
	Low Front Laser	One Class 1 laser at front of AMR with a 126° field of view
	Side Laser (optional)	Two Class 1 lasers with a 270° field of view on the sides of payload structure, user-mounted
Visual Indicators		Light discs are located on the sides of the AMR. Additional indicators can be added.
Payload	Maximum Weight	250 kg
Mobility	Run time (no payload)	13 h approx.
	Run Time (full payload)	10 h approx.
	Maximum Speed	1200 mm/s
	Maximum Rotation Speed	120 °/s
	Stop Position Repeatability (single AMR)	<ul style="list-style-type: none"> To a position: ±75 mm To standard target: ±25 mm, ±2° With CAPS: ±8 mm, ±0.5° With HAPS: ±8 mm, ±0.4°
	Stop Position Repeatability (Fleet)	<ul style="list-style-type: none"> To a position: ±100 mm To standard target: ±35 mm, ±2° With CAPS: ±14 mm, ±0.6° With HAPS: ±10 mm, ±0.6°
Drive wheel	Materials	Aluminum with polyurethane tread
Passive caster	Materials	Elastomer (Polyurethane)
Auxiliary Power		5 VDC±5%, 1 A switched Aux power 12 VDC±5%, 1 A switched Aux power 20 VDC±5%, 1 A switched Aux power 22 to 30 VDC, 4 A switched × 2 22 to 30 VDC, 10 A switched 22 to 30 VDC, 10 A safe, switched 10 A switched and 10 A safe switched are drawn from the same source, and pass through the same 10 A fuse, so the sum of their current must be less than 10 A.
Standards	Harmonized Standard	EN ISO 12100 / EN ISO 13849-1 / EN 60204-1/
	Relevant Standard	EN 1525 / ANSI B56.5
	Wireless	802.11 a/b/g/n/ac

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Item		LD-250
Safety Features	Safety Scanning Laser	One at front of AMR Class 1 PLd safety per ISO13849-1 240° field of view
	E-STOP Buttons	One at Operator Panel, one on each side. Additional E-STOP buttons can be added to the payload structure
	Rear Sensing	Time of flight (TOF) sensors
	Audible Indicators	Two speakers are included. Additional buzzers can be added
Operator Interface	Display	3.5 inch TFT, 320 × 240 pixels, color screen
	Button	ON button, OFF button, Brake-release button, and keyed mode selection
User Interface	Wireless	802.11 a/b/g/n/ac
	Ethernet Port	Two user LAN, One maintenance LAN, Auto-MDIX
	Serial	One RS-232
	Digital I/O	16 inputs, 16 outputs
	Audio	Digital audio in / out

*1. A speed of 600 mm/s is recommended for traversing steps, and routine driving over steps should be avoided. Lower speeds may not traverse the step. Faster or frequent driving over steps and gaps will shorten the lifespan of the drivetrain components. All steps should have smooth, rounded profiles.

*2. AMR maximum speed is recommended for traversing gaps, and routine driving over gaps should be avoided. Lower speeds may not traverse the gap. Faster or frequent driving over gaps will shorten the lifespan of the drivetrain components.

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
Chassis Ingress Protection Class	IP20
CPU	Intel® Xeon® CPU
Main Memory	32 GB DDR3
Storage	60 GB SSD
Archive Storage	4 TB HDD
Communication ports	Four 10/100/1000 Ethernet Four USB One VGA
Status Display	Multi-segment LCD

High Accuracy Positioning System (HAPS)

Sensor	Depth	30 mm
	Width	160 mm
	Ingress Protection Class	IP64
	Environment	-40 to 85°C
	LEDs	Power, tape present, left marker, right marker
Magnetic Tape	Width	25 mm
	Orientation	South up
Markers (Magnetic Tape)	Width	25 mm
	Length	300 mm min. for 500 mm/s drive speed
	Orientation	North up
	Separation From Tape	15 to 30 mm
Connections	Front Sensor	RS232-1 (/dev/ttyUSB9) on the core
	Rear Sensor	RS232-2 (/dev/ttyUSB10) on the core
	Power, Both Sensors	Aux power using the included splitter cable
Stop Position Repeatability, LD-60, LD-90	Single AMR	±8 mm position, 0.4° rotation
	Fleet	±10 mm position, 0.5° rotation
Stop Position Repeatability, LD-250	Single AMR	±8 mm position, 0.4° rotation
	Fleet	±10 mm position, 0.6° rotation

Cell Alignment Positioning System (CAPS)

Stop Position Repeatability, LD-60, LD-90, LD-90x	Single AMR	±8 mm position, 0.5° rotation
	Fleet	±12 mm position, 0.5° rotation
Stop Position Repeatability, LD-250	Single AMR	±8 mm position, 0.5° rotation
	Fleet	±14 mm position, 0.6° rotation
Type	Software license	

Battery

Type	Lithium Ion
Weight	19 kg
Voltage	22 to 30 VDC
Capacity	72 Ah (battery cell nominal)
Recharge Time	2 hrs. 10 min. for 20% to 80% charge
Ingress Protection Class	IP20
Life Expectancy	2,000 times 80% DOD (battery cell nominal), 7 years, approx., 16 h/day, 5 days/week 4 years, approx., 19/7 (full-time)
Charging Method	Automatic or manual

Docking Station

Current	8 A *
Power	100 to 240 VAC, 50 to 60 Hz
Power Consumption	800 W
Humidity	5 to 95%, non-condensing
Temperature	5 to 40° C
Dimensions (W × D × H)	349 × 369 × 315 mm
	495 × 495.5 × 317 mm (with floor plate)
Weight	8.2 kg
Mounting	Wall bracket, directly to floor, or on floor with floor plate
Indicators	Power on: blue Charging: yellow
Connector	For out-of-AMR battery charging

* Circuit breaker built into AC power switch

Joystick (Pendant)

Weight	0.55 kg
IP Rating	IP56

Acuity Localization

Field of View	140°
Power Input	12 VDC (±10%) supplied from AMR through power connector
Power Consumption	3.3 W maximum

MobilePlanner Software

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
Supported Languages	English, Japanese, German, French, Italian, Korean, Spanish, Polish, Simplified Chinese, Traditional Chinese

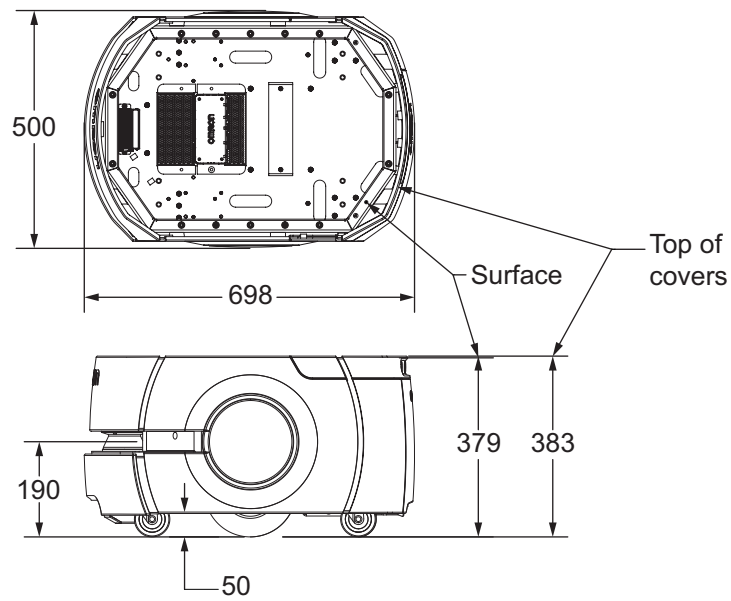
LD Series

Dimensions

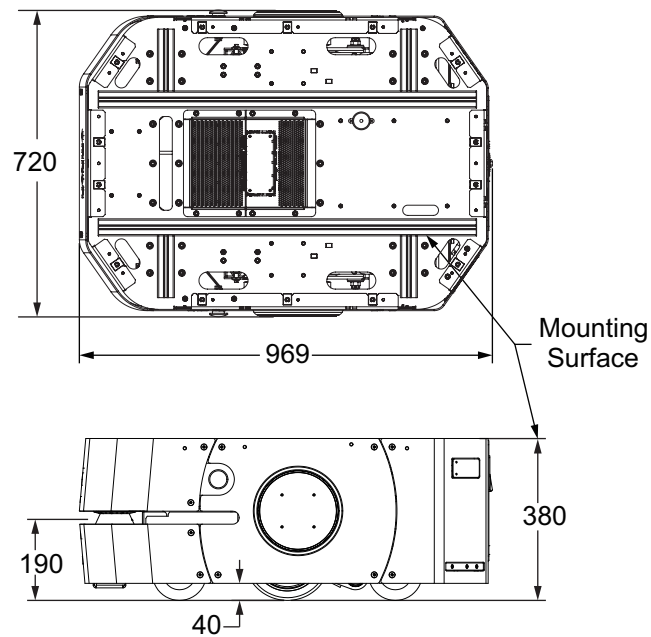
CAD data can be downloaded from https://robotics.omron.com/browse-documents/dir_id=10:
<http://www.adept.com/Robots-CAD-File>

(Unit: mm)

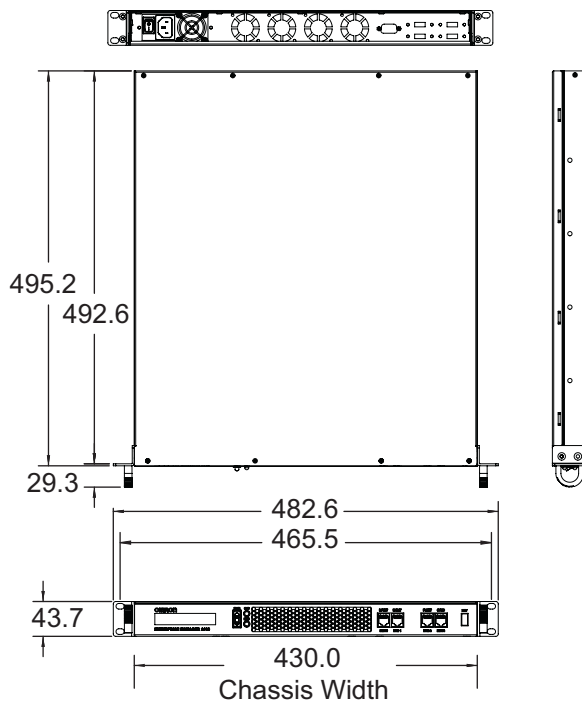
LD-60, LD-90, LD-90x, LD-60 ESD, LD-90 ESD and LD-90x ESD



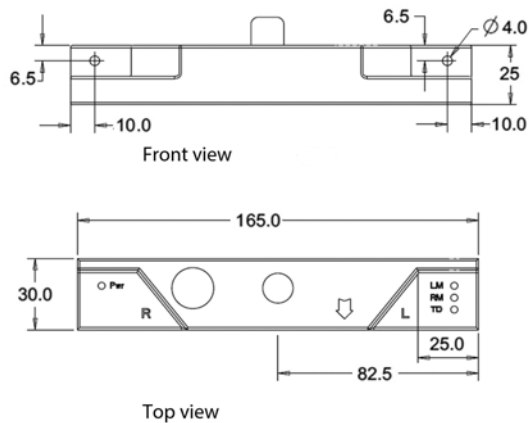
LD-250, LD-250 ESD



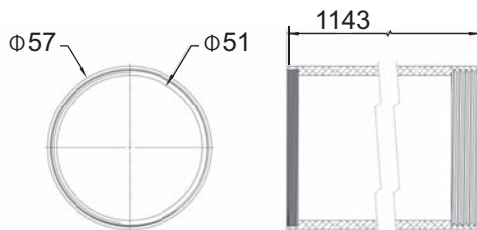
EM2100 Appliance



High Accuracy Positioning System (HAPS)

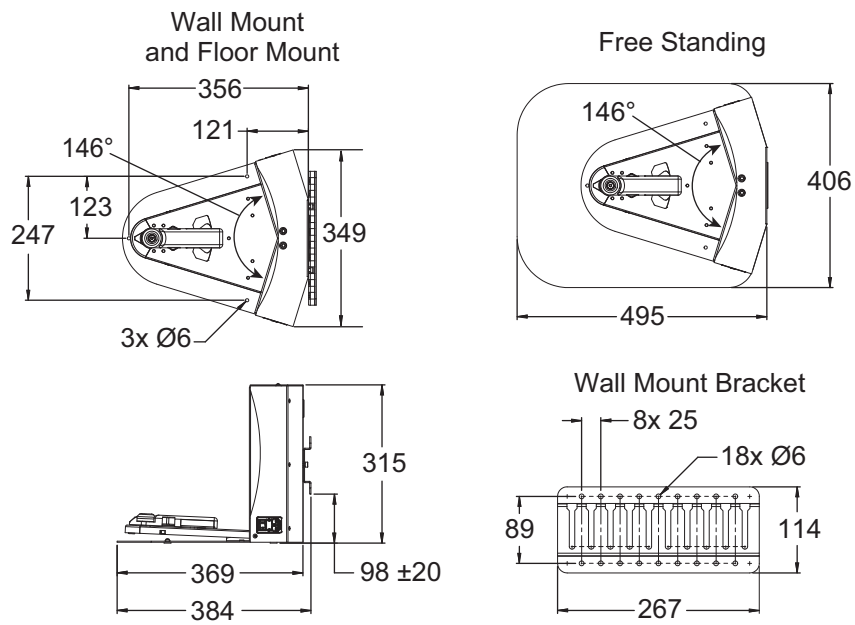


Acuity Localization

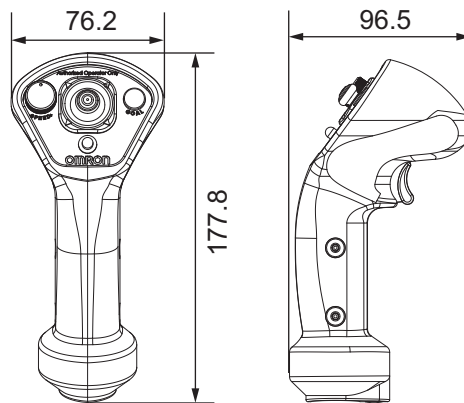


LD Series

Docking Station



Joystick (Pendant)



Related Manuals

Catalog Number	Manual Title
I611	LD-60/90 Platform User's Manual
I613	LD Platform Peripherals User's Guide
I614	Mobile Robot Software Suite User's Guide
I615	Enterprise Manager User Guide (this covers the EM1100, not the EM2100)
I616	Mobile Robot LD Safety Guide
I617	Advanced Robotics Command Language Reference Guide
I618	Advanced Robotics Command Language Fleet Manager - Mobile Robots Integration Guide
I634	EM2100 Installation Guide
I635	Fleet Operations Workspace Core User's Manual
I636	Fleet Operations Workspace Core Migration Guide
I637	Fleet Operations Workspace Core Integration Toolkit User Guide
I665	Fleet Operations Workspace iQ User's Manual
I649	Fleet Simulator User's Manual
I642	LD-250 Platform User's Manual
I677	Mobile I/O Box User's Manual
I680	LD-Series Integration Guide

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MEMO

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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.

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