OMRON

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)	Ordering Code
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-90 ESD ∗2		No			37042-20000
		Yes	No		37042-20002
		Yes			37042-20004
LD-90x ∗3		No			37062-00000
		Yes	No		37062-00002
		Yes			37062-10004
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. 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 (ordering code 20452-700). 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
Operator Panel Jumper Plug	HDB15 male plug, required when the Operator Panel is removed
Wireless Antennas	Two rubber duck antennas with SMA plugs
Labels	Warning and product labels
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

Appearance	Item	Details	Ordering Code
	Mobile I/O Box	Used with a Fleet Manager to summon an AMR to a goal or control connected devices with I/O Box.	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 (25 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 (25 mm wide, 49 m long). Requires 24010-000F.	LD-60/90: 13660-000 LD-250: 21374-000
	Magnetic tape	25 mm wide magnetic tape (South top side, 49 m roll)	14925-000
	RS232 Splitter Cable	Provides two serial communication connectors (RS232-1 and RS232-2) in an arrangement similar to the legacy AMR Core configuration. Cable length is 200 mm.	24010-000F
	Acuity Localization	Camera, mounting kit, cables, leveling kit	13700-000
		Camera, mounting kit, cables, no leveling kit	13700-100
	Supplementary Laser Scanner Bundle	Includes two laser scanners and cabling	13456-000
	Supplementary Laser Scanner Kit	Includes two laser scanners, two mounting kits, two metal sensor covers and cabling.	13456-100
	Battery ⁎1	Removable and rechargeable power source for the AMR	20452-700
	Docking Station	Used to autonomously charge the battery inside an AMR or to charge an AMR battery outside of the AMR with a battery power cable (sold separately).	12477-000
	Wireless Antenna Extension Kit	Includes two dipole antennas, two 2.0 m coaxial cables, and two 0.6 m coaxial cables.	68955-000

Appearance	Item	Details	Ordering Code
	Battery Power Cable	Battery to Docking Station Charging cable, 1.1 m cable length	12676-000L
	Pendant (Joystick)	Handheld device for manually driving an AMR and map creation, 3.0 m cable length.	13558-000
	Digital I/O Terminal Block Kit	Provides a terminal block for the Digital I/O connector on the Core. Includes a 0.76 m male to female cable, terminal block, and a mounting bracket.	14165-000
	Top Plate - LD-60, LD-90, LD-90x	Provides additional protection for the AMR. Includes mounting hardware.	12944-000
	Top Plate - LD-250	Provides additional protection for the AMR. Includes mounting hardware.	20458-002
	Top Plate - LD-250 ESD	Provides additional protection for the AMR in ESD environments. Includes mounting hardware.	20458-202
	Rear Facing Laser Bundle	Provides CAPS functionality while the AMR is traveling in the reverse direction. Includes TiM laser and required cables.	21446-000

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

Software Licenses

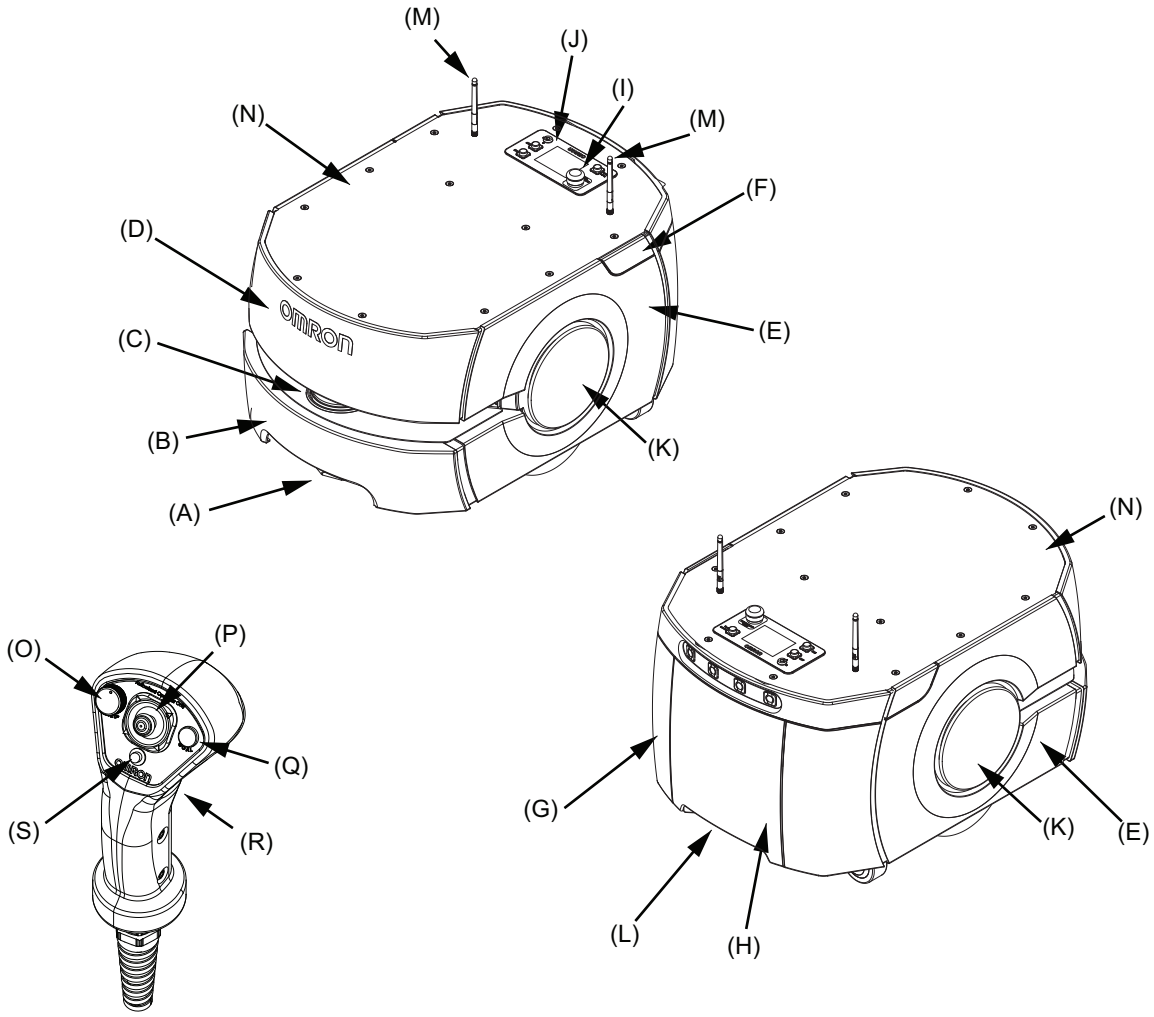
Product Name	Applicable For	Configuration	Ordering Code
Fleet Operations Workspace Core Fleet Manager License, 3 Year	Virtual Fleet Manager	Initial entitlement for a 3 year renewable FLOW Core license. Replace ☐☐ with 05, 10, 15, 20, 25, 30 to indicate the number of AMRs licensed to connect. Replace ☐☐ with 50 for 31 or more AMRs.	30271-1☐☐ ∗1
Fleet Operations Workspace Core Fleet Upgrade		Entitlement for fleet connection, 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 a value of 05 to 30, to indicate the number of AMRs licensed to connect. Replace ☐☐ with 50 for 31 or more AMRs.	30271-2☐☐
Fleet Operations Workspace 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 is 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 will still be required 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

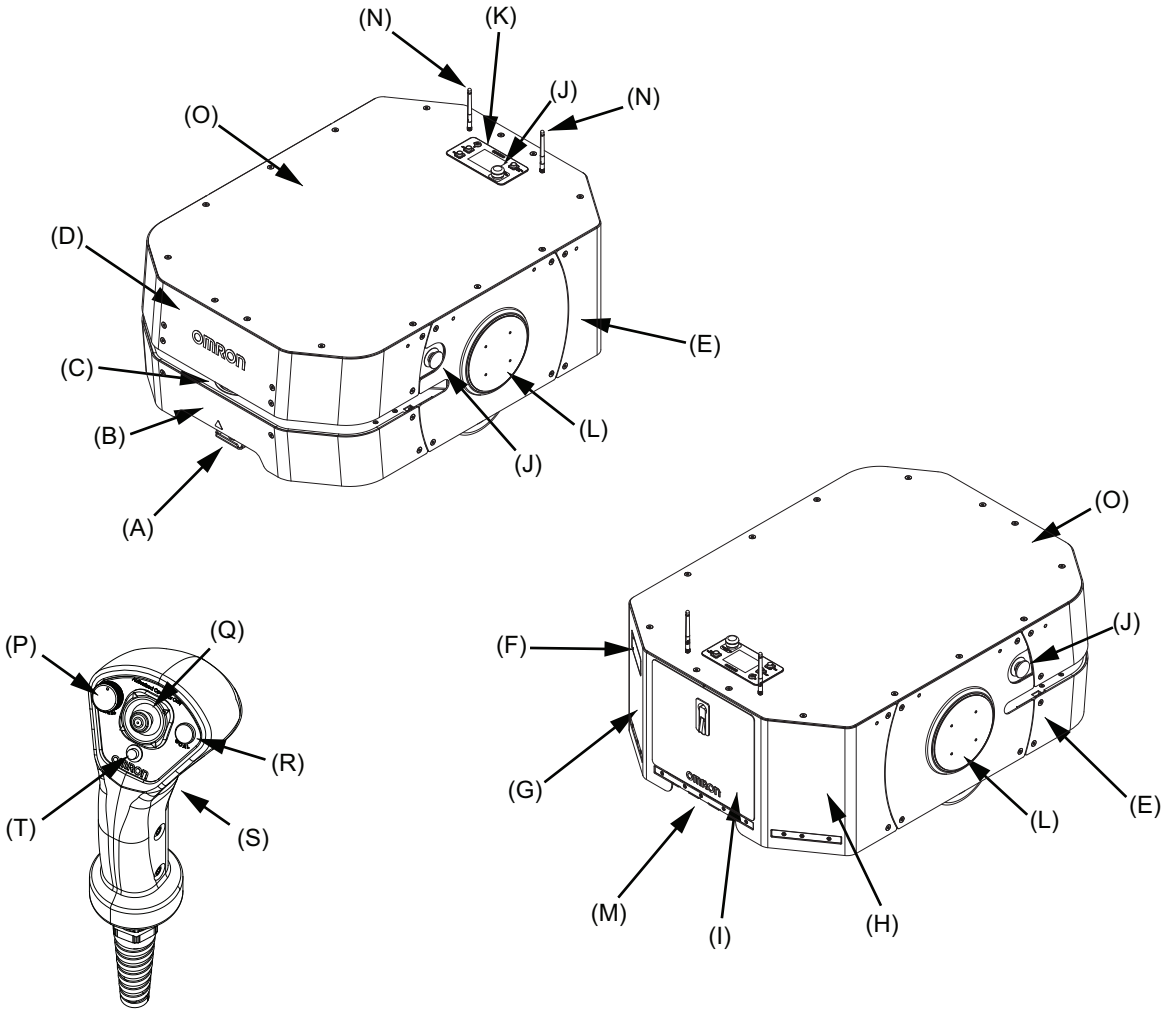
LD-60, LD-90, LD-90x, LD-60 ESD, LD-90 ESD, and LD-90x ESD



Item	Description	Item	Description
A	Low Laser	K	Light Disk
B	Bumper Skin	L	Charging Contacts
C	Safety Laser Scanner	M	Wireless Antennas
D	Upper Front 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		

Features and Components

LD-250, LD-250 ESD



Item	Description	Item	Description
A	Low Laser	K	Operator Panel
B	Bumper Skin	L	Light Disk
C	Safety Laser Scanner	M	Charging Contacts
D	Upper Front 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 corrosive gas or liquid. Direct sunlight may cause safety laser false positives.		
	Dust / Smoke	Accumulated dust smaller than 37 µm cannot exceed 10 mL/ m^2 in the operating environment. Avoid operating in areas with smoke.		
	Ingress Protection Class	IP20		
	Altitude	1000 m above mean sea level maximum		
Floor Conditions	**Floor Requirements**	No water, oil or dirt		
	Minimum Floor Flatness	F_F25 (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	2.6 Mpa	3.27 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		
	Supplementary Laser Scanners (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	
Mobility	**Run Time (no payload)**	15 h approx.		20 h approx.
	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) ∗3	· 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) ∗3	· 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 (25.6 VDC nominal), 4 A switched 22 to 30 VDC (25.6 VDC nominal), 10 A switched 22 to 30 VDC (25.6 VDC nominal), 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.		
Standards	**AMR**	EN IS0 12100, EN ISO 13849-1, EN 60204-1, ANSI B56.5, EN 61000-6-2, EN 61000-6-4, EN ISO 3691-4 (except: clauses 4.1.15b, 4.8.2.6 for items 6 and 7, 4.12, 4.14), KN 61000-6-2, KN 61000-6-4		
	Battery	UN 38.3, ANSI/CAN/UL/ULC 2271		
	Docking Station	UL1012, CSA C22.2.107.2		
	Wireless	IEEE 802.11 a/b/g		
	Cleanroom Rating	ISO 5 / Class 100 (AMR, Battery and Docking Station)		
Certification Marking	**Battery**	cRUus		

Item		LD-60	LD-90	LD-90x
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, 2.0 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		
User Interface	Wireless	802.11 a/b/g		
	Ethernet	One general purpose, shielded, Auto-MDIX Ethernet port.		
	Serial	Two serial communication interfaces		
	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.
∗3. Stop position repeatability values were obtained using default AMR parameters and a map created by the LD-series AMR.

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. Direct sunlight may cause safety laser false positives.
	Dust / Smoke	Accumulated dust smaller than 37 µm cannot exceed 10 mL / m^2 in the operating environment. Avoid operating in areas with smoke.
	Ingress Protection Class	IP20
	Altitude	1000 m above mean sea level maximum
Floor Conditions	Floor Requirements	No water, oil or dirt
	Minimum Floor Flatness	F_F25 (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
	Supplementary Laser Scanners (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) ∗3	· 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) ∗3	· To a position: ±100 mm · To standard target: ±35 mm, ±2° · With CAPS: ±14 mm, ±0.6° · With HAPS: ±10 mm, ±0.6°

Item		LD-250
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 (25.6 VDC nominal), 4 A switched 22 to 30 VDC (25.6 VDC nominal), 10 A switched 22 to 30 VDC (25.6 VDC nominal), 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	**AMR**	EN IS0 12100, EN ISO 13849-1, EN 60204-1, ANSI B56.5, EN 61000-6-2, EN 61000-6-4, EN ISO 3691-4 (except: clauses 4.1.15b, 4.8.2.6 for items 6 and 7, 4.12, 4.14), KN 61000-6-2, KN 61000-6-4
	Battery	UN 38.3, ANSI/CAN/UL/ULC 2271
	Docking Station	UL1012, CSA C22.2.107.2
	Wireless	IEEE 802.11 a/b/g
	Cleanroom Rating	ISO 5 / Class 100 (AMR, Battery and Docking Station)
Certification Marking	**Battery**	cRUus
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 x 240 pixels, color screen
	Button	ON button, OFF button, Brake-release button, and keyed mode selection
User Interface	**Wireless**	802.11 a/b/g
	Ethernet	One general purpose, shielded, Auto-MDIX Ethernet port.
	Serial	Two serial communication interfaces
	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.

∗3. Stop position repeatability values were obtained using default AMR parameters and a map created by the LD-series AMR.

MobilePlanner Software

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 400 MB of available space
	Video Memory	256 MB min.
	Display	XGA 1280 x 720, 16 million colors
MobilePlanner, Tablet Edition	**Operating System**	Android® OS, Version 9 or newer, minimum 2 GB of RAM
		iOS®, Version 10 or newer
Supported Languages		English, Japanese, German, French, Italian, Korean, Spanish, Polish, Simplified Chinese, 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	
Clockspeed	4 GHz	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			

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

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

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

Battery

Type	Lithium-Ion (LiFePO4)
Weight	19 kg
Voltage	22 to 30 VDC (25.6 VDC nominal)
Capacity	72 Ah (battery cell nominal)
Recharge Time	2 hrs. 10 min. for 20% to 80% charge
Ingress Protection Class	IP20
Recharge Cycles	Approximately 2000 cycles ∗1
Charging Method	Automatic or manual

∗1. Approximately 80% of nominal battery capacity will be available after using the battery at 100% depth of discharge at temperatures between 15°C to 35°C.

Docking Station

Current	8 A ∗1
Power	100 to 240 VAC, 50 to 60 Hz
Power Consumption	800 W
Humidity	5% to 95%, non-condensing
Temperature	5 to 40° C
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

∗1. Circuit breaker built into AC power switch

Joystick (Pendant)

Weight	0.55 kg
IP Rating	IP56

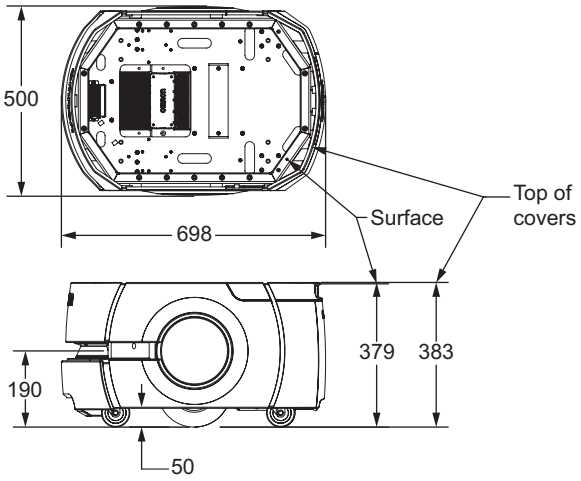
Acuity Camera Specifications

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

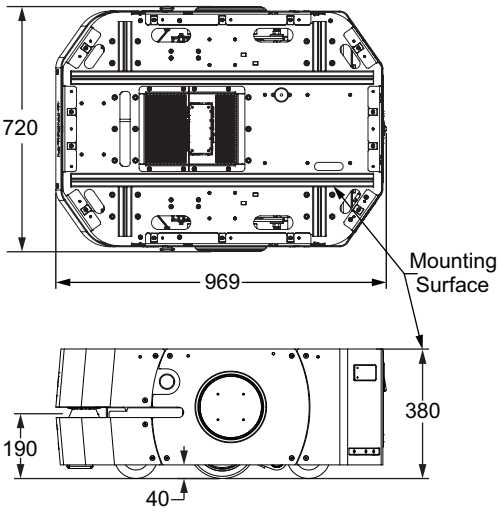
Dimensions

(Unit: mm)

LD-60, LD-90, LD-90x, LD-60 ESD, LD-90 ESD and LD-90x ESD, LD-250, LD-250 ESD

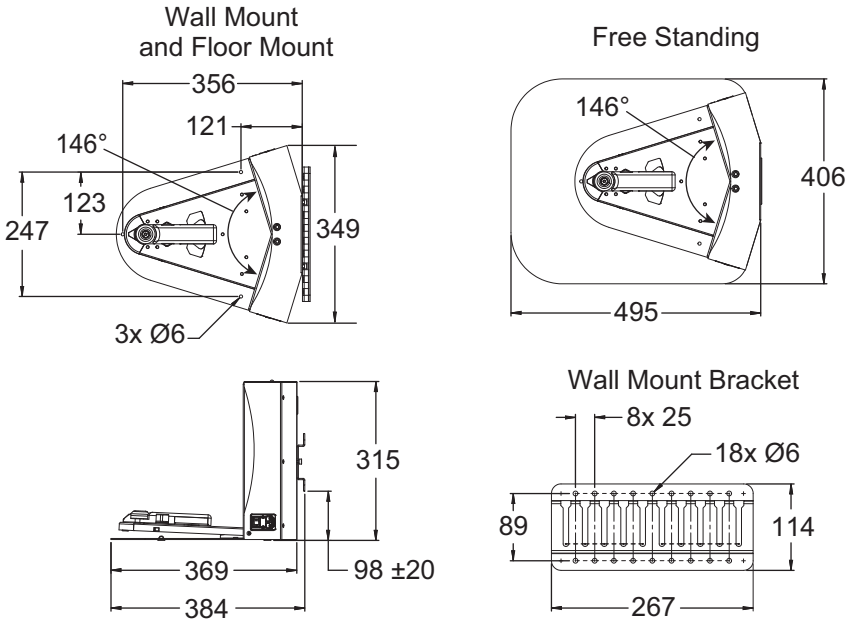


LD-60, LD-90, LD-90x, LD-60 ESD, LD-90 ESD and LD-90x ESD



LD-250, LD-250 ESD

Docking Station



Related Manuals

Catalog Number	Manual Title
I611	LD-60/90 Platform User's Manual
I616	Mobile Robot LD Safety Guide
I617	Advanced Robotics Command Language Reference Guide
I618	Advanced Robotics Command Language Fleet Manager - Mobile Robots Integration 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
M107	Fleet Operation Workspace Core Integration Toolkit - MQTT API User's Manual
I642	LD-250 Platform User's Manual
I649	Fleet Simulator User's Manual
I665	Fleet Operations Workspace iQ User's Manual
I677	Mobile I/O Box User's Manual
I680	LD-Series Integration Guide
I695	Virtual Fleet Manager Installation Guide

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MEMO

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NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Programmable Products.

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.

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Change in Specifications.

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Note: Do not use this document to operate the Unit. This document describes AMR functionality supported with FLOW v4.1.11.

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