RBY Series

Dual-Arm Mobile Manipulator

RAINBOW ROBOTICS

RBY Series

A next-generation mobile dual-arm robot platform combining dual-arm interaction and mobility.

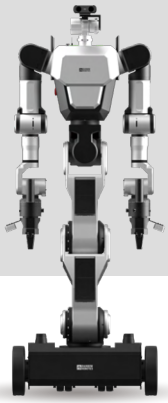
The RBY Series is a mobile dual-arm robot platform that integrates Rainbow Robotics' core robot technologies into a single system. Designed with a balanced structure that considers mobility, controllability, scalability, and stability, it has been tested and verified in research environments to allow for step-by-step expansion into industrial and service sectors. Rather than being a conventional industrial robot that performs a single function, the RBY Series is a technology-intensive platform that presents a robot utilization framework where manipulation, movement, and learning are organically connected.

RBY Series line up

The RBY Series consists of a mobile dual-arm robot platform lineup that can be selected based on research objectives and operational environments.

Y1

The standard mobile dual-arm robot platform for research, experimentation, and data collection.



Y2 *Coming Soon

A next-generation industrial mobile dual-arm robot platform expanded for on-site operation beyond research.

Research & Expansion Focused Mobile Dual-Arm Robot Platform

RBY is a humanoid-style mobile dual-arm platform designed to test and verify manipulation, mobility, and perception in real-world environments. It serves as a foundational base for next-generation technologies like teleoperation and whole-body control, offering high scalability through a proprietary pipeline that connects to external AI sources.

RBY Series Technical Highlights

Integrated Platform: Manipulation & Mobility

Designed as a single workflow rather than separate functions, RBY goes beyond fixed-position tasks to perform complex mobile-based operations

Software Optimized for AI Learning & Data

Provides a standard pipeline for robot control and data learning through advanced software architecture and SDKs for teleoperation and simulation.

Stable Dual-Arm Control via Whole-Body Coordination

Utilizing redundant degrees of freedom, the system coordinates upper body posture and center of gravity for stable and efficient dual-arm performance.

Reliability-First Design: From Lab to Industry

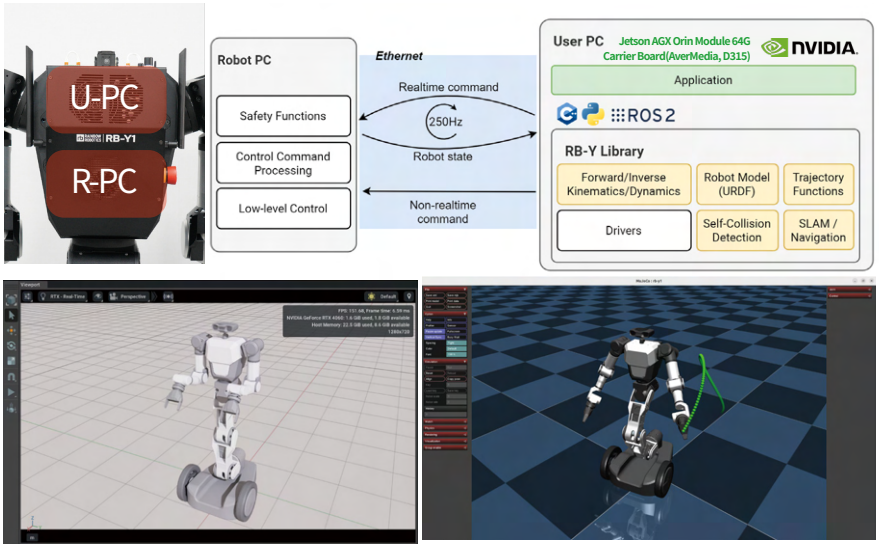
Features a brake system that maintains joint posture even during power loss, ensuring long-term operational stability for field applications.

RB-Y1

RB-Y1 SDK is available on GitHub.
https://github.com/RainbowRobotics/rby1-sdk

RB-Y1 Software

Based on the robot's high performance and safety, RBY provides an open-source-based software structure that allows for easy integration of AI in research environments.



Simulation I Supports various simulation environments such as Isaac Gym and MuJoCo; provides URDF and MJCF files.

- **Control Box**
  An independent internal controller ensures stable performance and safety. Systems can be configured by communicating with customizable Application/Control PCs to meet diverse customer needs.
- **Non-Real-Time Communication Channel**
  Transmits abstract high-level control commands (e.g., JointPositionController, CartesianController) that do not require real-time execution, and handles various system configurations.
- **Real-Time Communication Channel**
  Transmits low-level control commands requiring short cycles and real-time precision while receiving robot status data.
- **Robot Model Library**
  Provides kinematic and dynamic information necessary for building simulation environments.
- **Kinematics & Motion Library**
  Offers various libraries and example codes related to kinematics and motion control.

Y1

Modular Configurations

V1.2 vs V1.3

*Basic Options

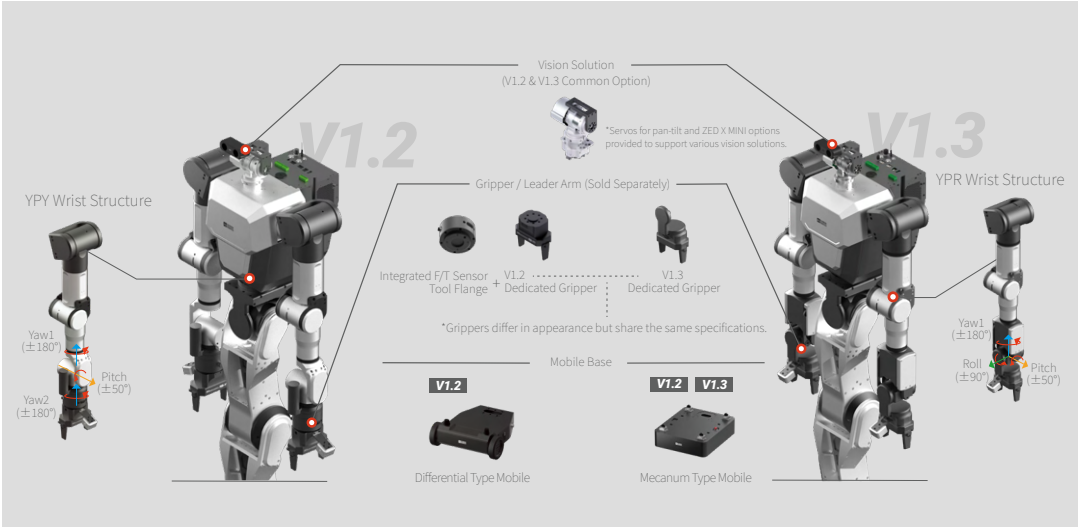
Neck Joint (Pan/Tilt) (V1.2, V1.3)

Differential Mobile Base (V1.2)

Mecanum Mobile Base (V1.2, V1.3)

*Vision sensor bracket included.

*Vision camera is not included.



Category	V1.2	V1.3
Focus	Precision-oriented manipulation	Control & Flexibility (VR-linked)
Recommended Use	Precision tasks, repetitive operations	Teleoperation, research, AI learning
Wrist Structure	YPY (YAW-Pitch-Yaw) Inline type – Linear motion or single-axis rotation	YPR (Yaw–Pitch–Roll) Ball-joint type – Multi-directional rotation from a single point
Manipulation Characteristics	High position/posture precision; advantageous for consistent repetitive tasks	High freedom of posture; human-like wrist feel; easy for VR-based teleoperation
Features	Standard axis configuration used in collaborative and industrial robots	Standard axis configuration used in human-like humanoid robots
Workability	May result in unnecessary movements during specific tasks	Enables human-like movement with 3 distinct axis configurations
Teachability	Axis configuration differs from humans; ideal for Leader Arm use	Axis configuration identical to humans; ideal for Teleoperation
Controllability	Singularities near home pose; complex control due to Y-axis singularity in Y-P-Y wrist	Singularities near home pose; relatively simple control as each axis is independent in Y-P-R wrist
Components	RB-Y1 Body, Integrated dual-arm FT sensors, Neck Joint Module (Optional), Gripper (Optional)	RB-Y1 Body, Neck Joint Module (Optional), Gripper (Optional

*Basic options may vary depending on the modular configuration version.

EXPANSION OPTIONS

RB-Y1 Expanded by Option Combinations

RB-Y1 Expansion Options are not merely accessory additions; they are structural components that expand the robot's operational scenarios themselves.
From mobility and manipulation to interfaces, all expansion options are designed based on the RB-Y1 dedicated SDK, ensuring organic integration.

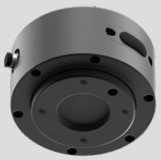
Neck Joint Module

Sold Separately

Standard Gripper

Sold Separately

F/T Tool Flange



*Included in V1.2 standard specifications

Item	Specifications
Size	122.5 x 70.5 x 194 mm
Weight	1.5 kg
Material	AL6061(Aluminum Alloy)
Rated Torque	5.4 Nm
Max. Intermittent Torque	30 Nm
Starting Torque	<= 2.8 Ncm
Transmission Accuracy	<= 1.5 arcmin
Hysteresis Loss	<= 2 arcmin
Rated Speed	20 rpm
Max. Speed	30 rpm
Max. Permissible Moment (Based on Cross Roller Bearing)	46.4 Nm
Degrees of Freedom & Range of Motion (Counter-clockwise +)	YAW(-90°~+90°), Pitch(-90°~+90°)
Encoder Resolution	14bit

Category		Unit	Min	Typ	Max
Electrical Specifications	Operating Voltage	V	10	12	14.8
	Current	A	0.07 (무부하)	-	2.3 (stall)
	Standby Current	A		0.04	
Mechanical Specifications	Total Stroke	mm		100	
	Gripping Force	N	-	30	150(stall)
	Gripping Speed	mm/s		80.63	
	Gripping Time	s		0.62	
	Weight	g		770g	
	Dimensions	mm		126 x 65 x 152.7	

Item	Specifications
Size	D88 x H46.5 mm
Operating Voltage	5 V
Rated Force Range (F_XYZN)	200N
Rated Torque Range (M_XYZN)	15Nm
Max. Force (F_XYZL)	300 N
Max. Torque (M_XYZL)	20 Nm
Operating Temperature	10~50°C
Sampling Rate	1000 Hz
Interface & Communication Speed	CAN (1,000 Kbps)
Accuracy	< 2.5 %R.C.
Non-linearity	< 2.0 %R.C.
Hysteresis	< 3.0 %R.C.
Repeatability	< 1.0 %R.C.
Crosstalk	< 3.0 %R.C.
Resolution (Force)	0.4
Resolution (Torque)	0.025

Item	Specifications
Tool Flange Interface Standard	ISO 9409-1-50-4-M6
Max. Payload (End-Effector)	3 kg

Mobility Expansion

By selecting various mobility options, users can achieve the specific movement performance and driving characteristics required for their research environments and experimental scenarios.

MECANUM WHEEL TYPE

Item	Specifications
Model Name	RBM-Y1 MECA
Size	600 x 695 x 205 mm(W x D x H)
Compatible Product	Y1
AMR Net Weight	85 kg (Including Battery)
Max. Payload	150 kg
Navigation Method	2D Lidar SLAM / 3D Lidar SLAM
Drive Type	Mecanum Wheel
Travel Speed	Max 1.0m/s
Driving Precision	30m 직진 시 ±30 mm 이내
Battery	50V 50AH-VXCOM (2,500Wh)

Omnidirectional Mobility for Free Movement in Confined Spaces

Supports forward, backward, lateral, and diagonal movement.
Ideal for experimental environments requiring precise position control,
making it suitable for indoor research spaces and service scenario verification.

DIFFERENTIAL TYPE

Item	Specifications
Model Name	RBM-Y1 DD
Product Dimensions	578 x 655 x 250 mm(W x D x H)
Compatible Product	Y1
AMR Net Weight	50 kg (Including Battery)
Max. Payload	150 kg
Navigation Method	2D Lidar SLAM
Drive Type	Differential Drive Type
Travel Speed	Max 1.0m/s
Driving Precision	Within ±30 mm during 30m straight drive
Battery Capactity / Space	50V 25AH-DH415COM (1,250Wh)

Stable Driving Performance and Flexible Zero-Radius Turning

Supports forward/backward movement and differential steering (pivot turn).
Optimized for environments requiring long-distance stable driving,
such as logistics transport and autonomous delivery scenarios.

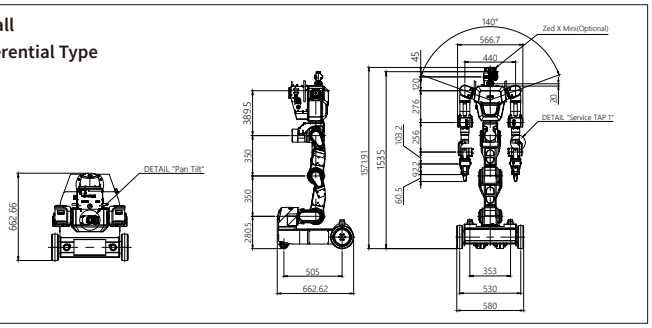
Technical Specifications / RB-Y1(V1.2) DD Type

Size	580 x 662.66 x 1,571.91mm (W x D x H)	Battery Capacity	50V, 25Ah (1,250Wh)
Degrees of Freedom	Total: 24 DOF / *Gripper: 1 DOF x 2 Arm: 7 DOF x 2 Leg: 6 DOF Wheel: 1 DOF x 2 Neck: 2 DOF	Weight	Total: 130kg Upper body: 38kg (Arm 11kg x 2, Torso 16kg) Lower body: 42kg Mobile: 50kg
Arm Payload	3kg (per arm)	Arm Reach	640 (to wrist) + hand [mm]
Joint Maximum Speed, Angle Range	Ankle roll 120°/s, -20° ~ 20° Ankle pitch 120°/s, -60° ~ 70° Knee 180°/s, -140° ~ 45° Hip pitch 180°/s, -45° ~ 90° Hip roll 180°/s, -30° ~ 30° Hip yaw 180°/s, -90° ~ 90° Shoulder pitch 180°/s, -135° ~ 135° Shoulder roll 180°/s, 0° ~ 180° Shoulder yaw 180°/s, -120° ~ 120° Elbow pitch 180°/s, -150° ~ 0° Wrist yaw1 360°/s, -360° ~ 360° Wrist pitch 360°/s, -100° ~ 115° Wrist yaw2 360°/s, -170° ~ 170°	Safety Functions	Low Level Controller (Motor Controller) - Position Reference Continuity Error - Position Tracking Error - Temperature Error - Overcurrent Error - Communication Error High Level Controller - Current Limit
		Arm Repeatability	< ±0.05mm (협동로봇 기준)
Power Supply Voltage and Frequency	48 V / DC	Ambient Operating Temperature	40°C
Exterior Materials	Aluminum	Mobile Operation Velocity	1.0m/s

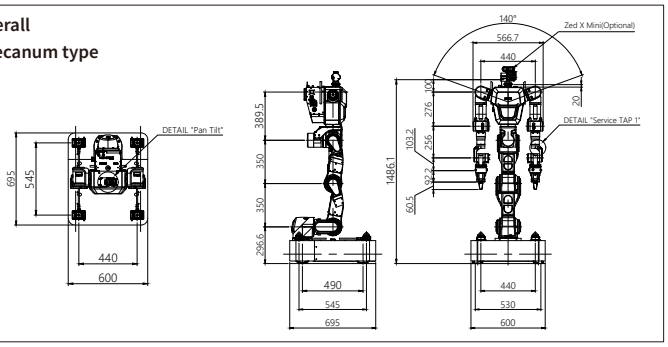
Dimensions

*All dimensions are in millimeters (mm). / Based on collaborative robots.

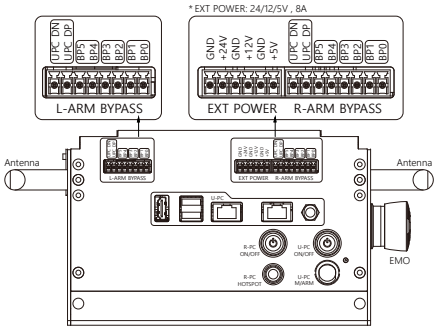
Overall
Differential Type



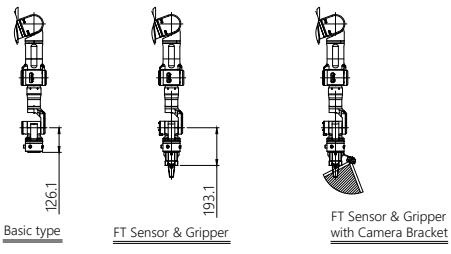
Overall
Mecanum type



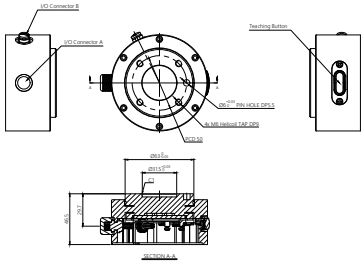
Backpack



Wrist options



Tool flange



Pin Map

I/O Connector A		I/O Connector A RB Gripper + Bypass		I/O Connector B F/T Sensor + CAN
	1	BYPASS 0	1	Din B
	2	BYPASS 1	2	Din A
	3	BYPASS 2	3	5V
	4	BYPASS 3	4	Dout B
I/O Connector B	5	12 / 24V	5	Dout A
	6	BYPASS 4	6	CAN L
	7	BYPASS 5	7	CAN H
	8	GND	8	GND

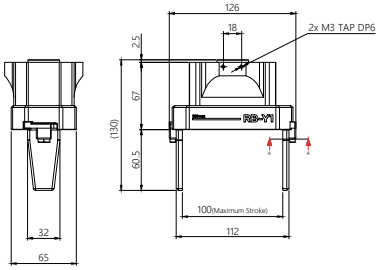
1= White 2= Brown 3= Green 4= Yellow
5= Grey 6= Pink 7= Blue 8= Red

F/T Sensor

1) Operating Voltage	5 VDC	8) Accuracy	<2.5%R.C
2) Nominal force range(F_XY2N)	200N	9) Non-linearity	<2.0%R.C
3) Nominal torque range(M_XY2N)	15Nm	10) Hysteresis	<3.0%R.C
4) Limit force(F_XYZL)	300N	11) Repeatability	<1.5%R.C
5) Limit torque(M_XYZL)	20Nm	12) Crosstalk	<3.0%R.C
6) Temperature	10-50 °C	13) Resolution(Force)	0.4N
7) Sample rate	1000Hz	14) Resolution(Torque)	0.025Nm

Gripper

SPECIFICATIONS	
General Properties	**Value**
Total Stoke	100 mm
Gripping Force	65 N
Gripping Speed	80.6 mm/s
Power Supply	12 VDC
Current Consumption	0.04 ~ 2.3 A



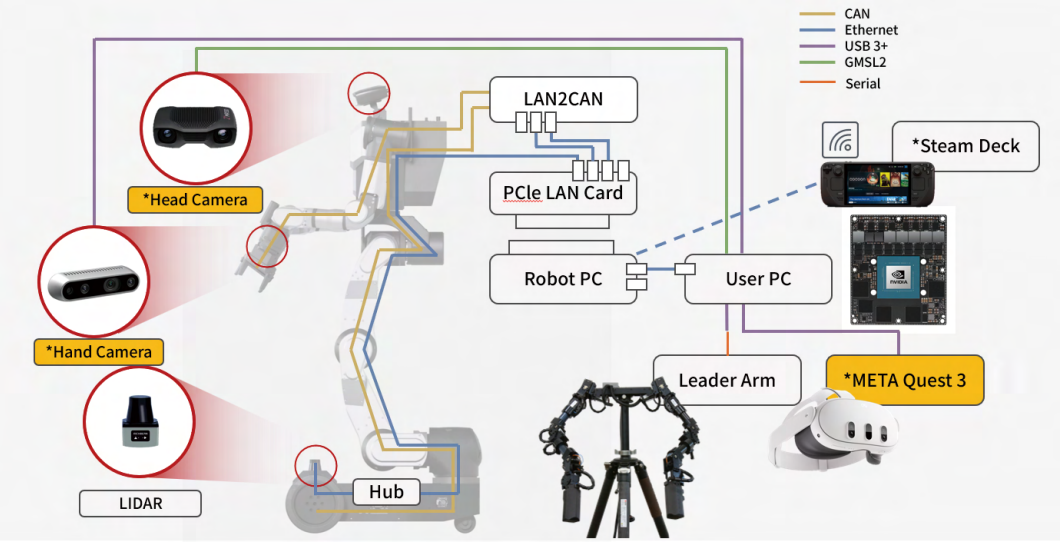
*Specifications are subject to change without notice for performance improvement.

LEADER ARM

Data Collection via Teaching Devices

This is a teleoperation and manipulation interface designed to directly transmit human manipulation movements to robots, enabling the efficient collection of motion data required for machine learning research, such as Learning from Demonstration (LfD). By integrating with the RBY series, it allows for the configuration of data collection environments for manipulation research, remote control, and AI training.

RB-Y1 System overview
Main System



Cameras, Steam Deck, and Meta Quest 3 are not included.

Leader Arm #Reverse Direction

Providing a clear view of the opposite
side to monitor the entire work process at a glance.

As a standard manipulation and learning device for the RBY series,
it enables intuitive operation for easy behavioral data collection and teleoperation-based research.

Size	350 x 100 x 600mm (W x D x H)
Degrees of Freedom	Total: 14 DOF Shoulder: 3 DOF x 2 Elbow: 1 DOF x 2 Wrist: 3 DOF x 2
Weight	3.86kg
Operating Range	Shoulder Pitch -360° ~ 360° Shoulder Roll -146° ~ 8° Shoulder Yaw -155° ~ 155° Elbow -180° ~ 6° Wrist Yaw1 -155° ~ 155° Wrist Pitch -137° ~ 123° Wrist Yaw2 -155° ~ 155°
Actuators	Shoulder & Elbow : XM540-W150-R Others: XM430-W120-R
Input Voltage	12 VDC
Interface	RS-485

Stand Leader Arm #Forward Direction

An intuitive Leader Arm that aligns
with the operator's line of sight.

The stand-mounted structure provides a stable operating environment designed for long-term experiments and repetitive manipulations. Its ability to maintain a consistent posture and reference coordinates makes it ideal for research requiring precise control settings, as well as the comparison and validation of repetitive experimental data.

Stand		
Size	W	850 mm
	D	610 mm
	H	1420 ~ 2070 mm (stroke : 650 mm)
Weight	Stand Weight	14.9 kg
	Total Weight (including Master Arm Modules)	18.5 kg
Key Features	Guide Rail Stroke	0 ~ 150 mm
	Guide Rail Precision	1 mm/rev
	Mobile Wheel	1.5 inch wheel (brake type)