Solution

Laboratory automation



Liquid blending / **Fixed capacity** / **Powder weighing**

Packaged system



Bringing precision to experiments.

Bringing accuracy to analysis.

Robots perform simple tasks for researchers.
We want our laboratory robots to go beyond that.

We want to help create efficient environments for research, and for robots to be able to perform experiments.
We want to allow robots to quickly and easily be assigned detailed tasks.
We want to allow researchers to obtain unbiased and consistent experiment data.
Precise experiments would allow researchers to more accurately conduct analysis.
Researchers could raise their heads and look forward.

DENSO WAVE supports laboratories while opening up possibilities for research and results.

Development history

1967
Our first efforts in robot development

1991
Gaining experience internally, and releasing our first systems to market

2006
Using ORiN to control robots using a PC

2007
Our first steps into laboratories

DENSO robots are now being used in laboratories with many devices controlled by PCs using ORiN. They are highly praised for their simple integration with peripheral devices and for how easily they can be combined with equipment and devices already being used. Many research laboratories began contacting us for information on automation, allowing us to take a foothold in the laboratory market.





2010
Compatible with LabVIEW libraries

2014
Releasing the VS-050S2 pharmaceutical/medical robot to market



2018
Releasing COBOTTA collaborative robot to market

COBOTTA, our compact collaborative robot, has made robot automation more accessible. It can be setup in narrow spaces and can handle work with no need to install specialized equipment. Automation can now be introduced even in environments where it would have previously been difficult to install a robot.



2019
Bringing COBOTTA to laboratory systems

We began receiving inquiries on automation from many research laboratories, due to the compact size of COBOTTA and how easy it is to control DENSO robots. COBOTTA continues to be used to automate work, including by chemical product manufacturers and even the DENSO Research & Development Division.



2024
Releasing packaged systems for laboratories to market

Amid growing automation needs in research laboratories, we began developing and selling standardized packaged systems to make setup even easier and faster.

DENSO robots are designed to be easily used by anyone, and help make research more efficient and laboratory automation more accessible.

The progress of development continues...

Our history of taking a leading role and developing groundbreaking laboratory automation systems

We have taken the skills and experience gained through developing industrial robots since the 1960s, and have evolved them in order to meet the needs of research sites. Rather than simply creating highly precise robots, we tackle issues confronting today's researchers and continue to seek out what is truly needed in a system that is easy to use.
We will continue to maintain this spirit of inquiry and work closely with our customers in order to create the future of laboratory automation.

[MERIT]

Advanced lab solutions using precise automation to expand research possibilities



Reproduces the work of experienced researchers, Accelerates experiments with precision

Accurately reproduce work that normally relies on the intuition and skill of experienced researchers.

They emulate human movement.
Repeating work consistently and precisely, improving data reliability.

Automation of repetitive tasks reduces the burden on researchers.

This allows researchers to focus on creative thought and analysis, which should help lead to groundbreaking results.

Surprisingly compact, Minimal hassle and space

The compact design takes up little space while automating multiple processes.

It allows the robot to be placed in a draft chamber or on a clean bench.

It can easily be moved around to facilitate changes in layout.

We open up new possibilities in the lab, while responding quickly to changing research needs.

Supporting laboratory automation with more than a half a century of experience and results

Over 50 years of experience in robot development.

Since the early 2000s when automation had yet to become widely adopted, we have been tackling issues in the research field and have accomplished many things.

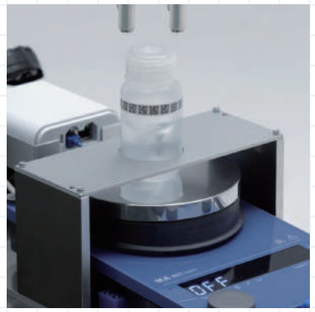
Supports smooth automation from introduction to operation.

We now leverage the insight we have gained to bring automation to everything from setup to operation.

Standard system to accelerate lab automation

[SYSTEM LINEUP]

Preparing processes required for research as standard systems.



Liquid blending system ····· P6



Fixed capacity system ····· P8

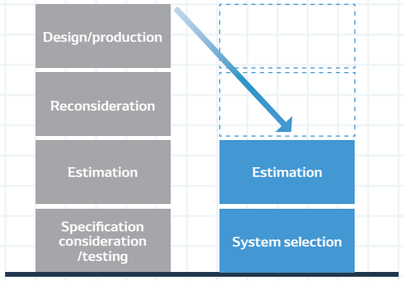


Powder weighing system ···· P10

[FEATURES]

Eight key points in expanding the possibilities of research

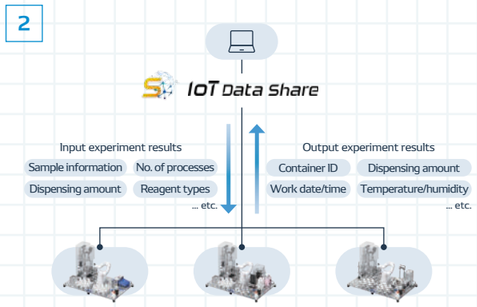
1



Our standardized systems can help make setup quicker

Our standard systems dramatically reduce time spent considering system specifications and other factors, reducing the amount of work required for system setup.

2



Measurement data is automatically saved to make research more efficient

We setup a data management system to bring transparency to experiment processes. It automatically records and saves measurement data. And uses QR codes to provide immediate access to traceability information for each sample.

3



Automatic container cap opening/closing

Container caps are opened/closed only when required, preventing volatilization and contamination. This helps to retain sample quality, which improves experiment precision.

4



Fine changes to dispensing/weighing values

Dispensing/weighing values can be subtly changed for each sample/powder, helping to make research processes more effective and efficient.

5

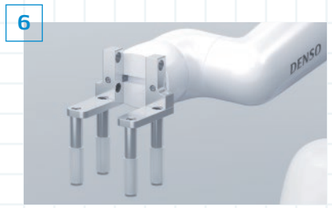


*Screens under development

Intuitive PC operation interface

We have developed a control panel that requires no specialized knowledge to use. Users can issue work commands intuitively, with no programming or robot knowledge required.

6



Multi-hand automates multiple processes

The multi-hand can handle a variety of containers and pipettes. This reduces the amount of time spent on replacing the hand, while the compact design allows for multiple processes to be automated.

7



Easy container exchange

The container storage area can be attached and removed without the use of tools. Containers can be exchanged to suit the experiment, making daily cleaning easy.

8



Rich lineup of compatible containers

Multiple compatible containers are available for each system. This allows for the ideal container to be selected based on the objective or scale of the experiment.



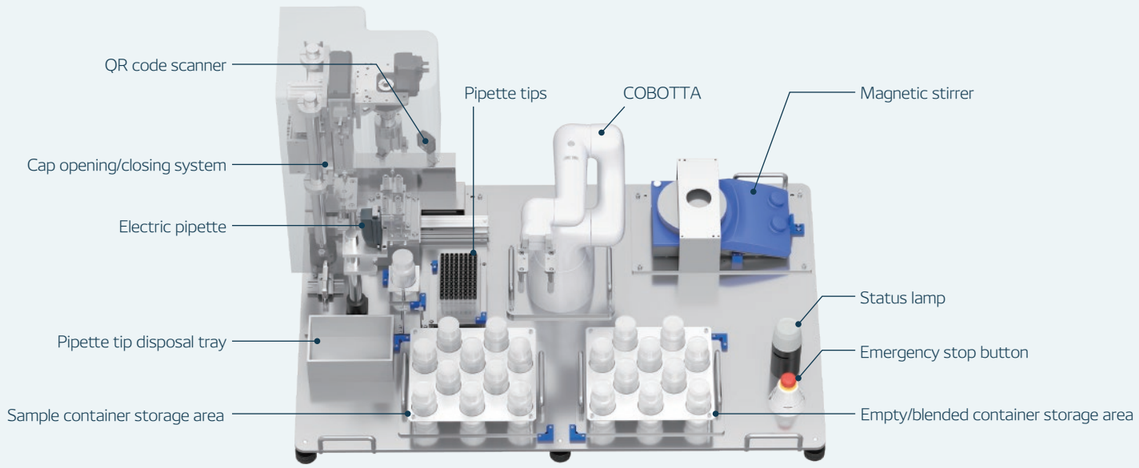
01 Liquid blending system

Capable of dispensing at a precision of 200 µl ±1%

This system automates a series of liquid mixing processes, such as precisely dispensing multiple types of liquids and stirring them using a magnetic stirrer. COBOTTA provides control linked with a variety of analysis devices, allowing for advanced automation even in limited spaces.

System specifications

Dispensing volume	5 to 200 µl, 40 to 1,000 µl, 100 to 5,000 µl
Dispensing precision	200 µl ±1%, 1,000 µl ±0.45%, 5,000 µl ±0.5%
Accuracy	200 µl ±0.3 %, 1,000 µl ±0.15 %, 5,000 µl ±0.15 %
System dimensions	Approx. 1,000 mm (W) × 650 mm (D) × 550 mm (H)
Weight	Approx. 40 kg
Power supply	Single-phase 100 VAC 15 A



Operation overview

1



Container removal and cap opening

Up to 10 containers can be placed on the supply and discharge trays, allowing for up to 10 types of samples to be blended.

2



Sample container removal and cap opening

Container QR codes are scanned to acquire traceability information. Caps are opened only when required, preventing sample volatilization and contamination.

3



Pipette removal and tip attachment

Everything from tip attachment to disposal is performed automatically. Confirmation sensors are used to ensure reliable work.

4



Sample suction/dispensing

The liquid surface is detected, allowing for highly precise suction. It is capable of precise dispensing from 5 µl.

5



Same operation with different samples

The system repeats the same operation with different samples, and blends the set amount.

6



Stirring with stirrer

COBOTTA controls the stirring speed, temperature setting, and when the operation is started/stopped. The magnetic stirrer with heater can be used to heat while stirring.

Available containers

	PP bottles 50 ml, 100 ml
	**Screw-top bottles** 50 ml, 100 ml
	**Beakers** 50 ml, 100 ml

System usage parts

	**Electric pipettes** Sartorius rLine embedded pipette	Volume variations : 5 to 200 µl 40 to 1,000 µl 100 to 5,000 µl
	**Magnetic stirrer** IKA RCT basic	Speed : 50 to 1,500 rpm Speed precision : 10 rpm Temperature setting range : 50 to 360°C Protection grade : IP42
	**QR code scanner** DENSO WAVE QM30 fixed type scanner	–

YouTube ▸



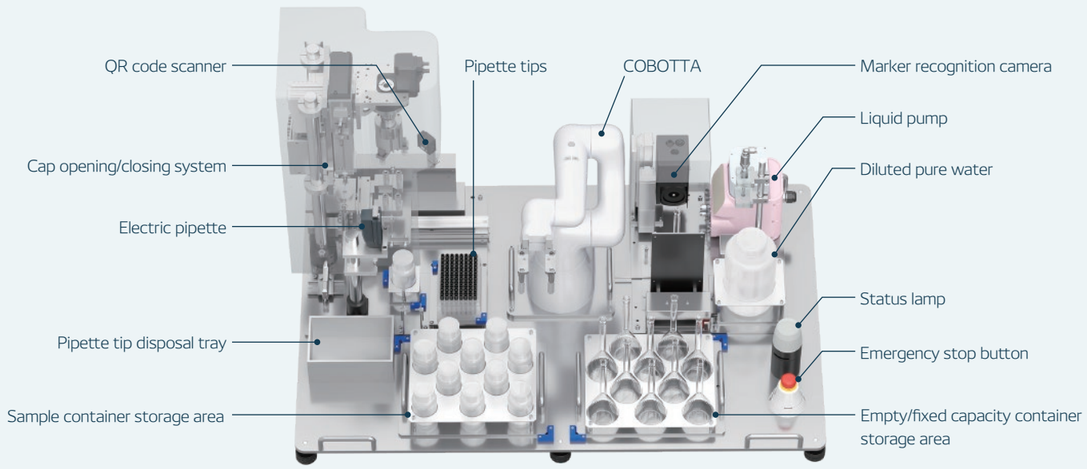
02 Fixed capacity system

Accurately reproduces complicated movements for fixed capacity control

This system automates a series of tasks related to fixed capacity control for liquids, such as dispensing multiple types of liquids, performing precise fixed capacity control through image recognition, and mixing liquids. It automates tasks that are prone to variability, allowing consistent experiment data to be collected.

System specifications

Dispensing volume	5 to 200 µl, 40 to 1,000 µl, 100 to 5,000 µl
Dispensing precision	200 µl ±1%, 1,000 µl ±0.45%, 5,000 µl ±0.5%
Accuracy	200 µl ±0.3 %, 1,000 µl ±0.15 %, 5,000 µl ±0.15 %
System dimensions	Approx. 1,000 mm (W) × 650 mm (D) × 550 mm (H)
Weight	Approx. 50 kg
Power supply	Single-phase 100 VAC 15 A



Operation overview

1



Container removal and cap opening

Up to 10 containers can be placed on the supply and discharge trays, allowing for up to 10 types of samples to be blended.

2



Sample container removal and cap opening

Container QR codes are scanned to acquire traceability information. Caps are opened only when required, preventing sample volatilization and contamination.

3



Pipette removal and tip attachment

Everything from tip attachment to disposal is performed automatically. Confirmation sensors are used to ensure reliable work.

4



Sample suction/dispensing

The liquid surface is detected, allowing for highly precise suction. It is capable of precise dispensing from 5 µl.

5



Nozzle removal and fixed capacity control

COBOTTA starts/stops the liquid pump and controls the amount dispensed by the pump. The advanced camera recognizes the marker and the meniscus line, allowing the system to precisely perform fixed capacity control.

6



Measurement flask closing and tumble mixing

After closing the lid, COBOTTA repeatedly turns the flask up and down to mix the sample. COBOTTA can accurately reproduce tumble mixing movements to ensure consistent frequency and trajectory.

Available containers

PP bottles
50 ml, 100 ml



Measurement flasks
25 ml, 50 ml, 100 ml



Screw-top bottles
50 ml, 100 ml



Beakers
50 ml, 100 ml

System usage parts



Electric pipettes
Sartorius
rLine embedded pipette

Volume variations :
5 to 200 µl
40 to 1,000 µl
100 to 5,000 µl



Liquid pump
TACMINA Q Series

Dispensing amount : 0.1 to 100 ml/min
Reproducibility : ±1 %
Transfer fluid viscosity : 200 mPa/s or less
Protection grade : IP65



QR code scanner
DENSO WAVE
QM30 fixed type scanner

–

YouTube ▸



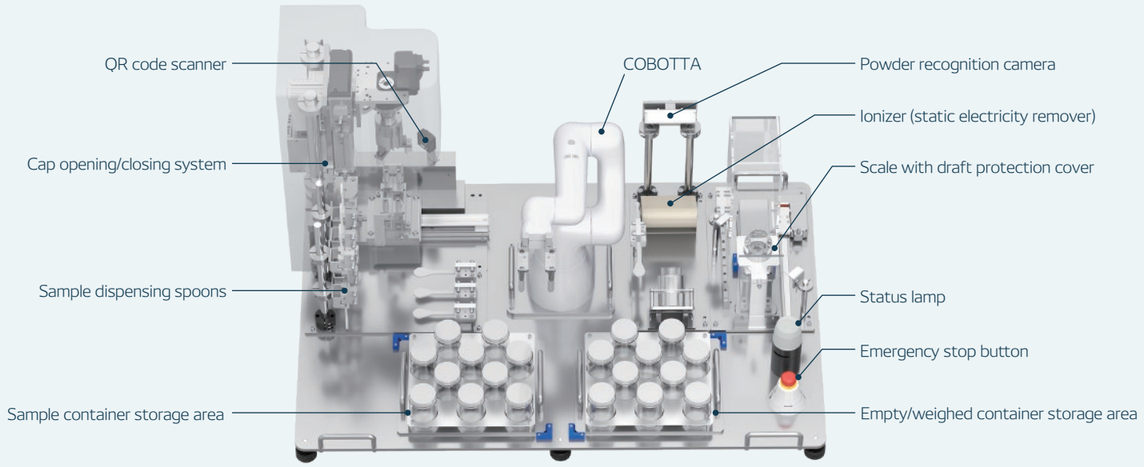
03 Powder weighing system

Precise weighing of even multiple types of powder

This system uses AI technology to weigh multiple powder materials. It recognizes the shapes of powder piles, and can weigh specified amounts and prepare samples. It automates tasks that are difficult to verbalize, ensuring consistent precision and reproducibility.

System specifications

Maximum weighing	320 g
Weighing precision	Roughly 5 g ±10% (*varies by type of powder)
System dimensions	Approx. 1,000 mm (W) × 650 mm (D) × 550 mm (H)
Weight	Approx. 45 kg
Power supply	Single-phase 100 VAC 15 A



Operation overview

1



Container removal and cap opening

Up to 10 containers can be placed on the supply and discharge trays, allowing for up to 10 types of samples to be weighed.

2



Sample container removal and cap opening

Container QR codes are scanned to acquire traceability information. Caps are opened only when required, preventing sample volatilization and contamination.

3



Scooping using AI

AI determines the state of the powder and operates the dispensing spoon at the optimal insertion level. The ionizer removes static electricity while scooping.

4



Weighing out into empty container

The system mirrors the movements of an expert worker when sieving powder, in order to adjust the weighing value. The scale with draft protection cover automatically opens and closes, allowing for highly precise measurement.

Available containers

	PP bottles 50 ml, 100 ml
	**Screw-top bottles** 50 ml, 100 ml
	**Beakers** 50 ml, 100 ml

System usage parts

	**Electronic scale** A&D AD-4212C	Weighing : 320 g Minimum display : 0.001 g Protection grade : IP65
	**Powder weighing skill (AI)**	AI is used to automate tasks consisting of movements difficult to reproduce through programming, such as tasks where the powder shape varies depending on the scooping position and depth.
	**QR code scanner** DENSO WAVE QM30 fixed type scanner	—

YouTube ▸

COBOTTA collaborative robots



Small enough to be easily setup on a table

- The roughly 4-kg body of COBOTTA contains an internal controller.
- COBOTTA runs on standard 100 V power, with no need for additional electrical work.
- It allows for a limited space to be used efficiently, optimizing the use of research environments.



Certified for safety
A robot that works safely with humans

- The unique outer contour has no sharp edges, and consists of curves that prevent hands from getting caught.
- Sensors are built into the six moving parts for constant monitoring of speed and torque.
- Certification from a third-party certification body.

Spec

Total arm length (1st arm + 2nd arm)	342.5 (165 + 177.5) mm
Rated load capacity (Maximum payload)	0.5 kg (0.7 kg within±10 degrees with the wrist angled downward) *1
Position repeatability	±0.05 mm *2
Power supply specifications (AC adaptor)	Input : Single-phase AC100 - 240 V ±10 %／47 - 63 Hz
Safety specifications	Standard Version ISO 10218-1:2011 ISO/TS 15066:2016 ISO 13849-1:2023 PL d, Cat.3

*1 : Without electric gripper
*2 : Precision figures assume use at a constant ambient temperature.

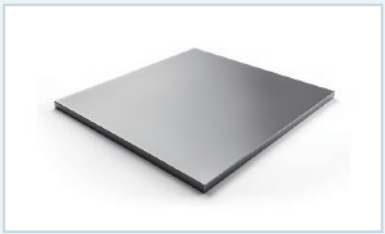
See here for details ▸

Related products



COBOTTA protective cover

We offer protective covers made from materials suitable for research environments. They help ensure safety and comfort over long-term use.



Alternate base material (stainless steel)

The standard base is made from aluminum, and is both lightweight and strong. However, we also offer a stainless steel base suitable for environments requiring.



Compressor

We offer a range of air compressors optimized for use research environment where it is difficult to supply compressed air.

DENSO WAVE INCORPORATED Website https://www.denso-wave.com/en/robot/

DENSO Products and Services Americas, INC.	3900 Via Oro Avenue, Long Beach, California 90810, U.S.A	TEL : +1-888-476-2689
DENSO EUROPE B. V. Robotics Department	Waldeckerstrasse 9 D-64546 Moerfelden-Walldorf, Germany	TEL : +49-6105-27-35-150
J.Y.Systems. Co.,Ltd	6250, Dasanjigeum-ro, Namyangju-si, Gyeonggi-do, Republic of Korea	TEL : 070-8822-8620
DENSO (CHINA) INVESTMENT CO., LTD.	No.35 Yuandian Road, Minhang District, Shanghai, CHINA 201108	TEL : +86-21-2350-0108
DENSO TAIWAN CORP.	No.525, Sec2, Mei Su Rd., Jui Ping Li, Yang Mei Town, Taoyuan Hsien, Taiwan	TEL : +886-3-482-8001
DENSO SALES (THAILAND) CO., LTD.	888 Moo 1 Bangna - Trad Rd., KM. 27. 5, T. Bangbo, A. Bangbo, Samutprakam 10560, Thailand	TEL : +66-2-315-9500
AATEK ROBO PRIVATE LIMITED	27, Dr.D.Jayavardhanvelu Nagar, Masakkalipalayam Road, Peelamedu Post, Coimbatore – 641004, India	TEL : +91-422-2591353
Sales Planning Division	1-1, Showa-cho, Kariya, Aichi 448-8661, Japan	Please contact your nearest location.

Copyright © DENSO WAVE INCORPORATED. All rights reserved. SL-LAB-E 202504