

FLOWBOT® ONE

INTENDED USE

The flowbot® ONE system is an automated liquid handling system consisting of software, hardware and consumables.

The system is intended for use by trained users for the manipulation of fluids for research use only purposes.



FEATURES

- Easy protocol setup. Create and run a program in 30 min.
- API for system integration
- Programming via CSV file
- Sample ID input and output in CSV file format
- Traceability for all executions
- 12 SLAS (SBS) compatible positions
- Many different plates and racks are available
- Liquid level detection
- Patented component recognition system with QR codes

ADD-ON OPTIONS

- Disinfecting UV light
- HEPA cleaned inlet air
- Devices:
 - Barcode scanner
 - Cooling/heating
 - Shaker
 - Magnetic

PIPETTES

2 individual pipette modules with either 1, 4, or 8 fixed channels

Range (tip dependent)

1-20 µL*
2-200 µL
10-1000 µL

Aspiration and dispense speed

20/200 µL pipette: 5-78 µL/sec
1000 µL pipette: 5-313 µL/sec

96 well plate filling time

Dispense move, 10 µL 93 sec.
Using 200 µL 8 channel module with Flow Robotics filter tips 2-200 µL

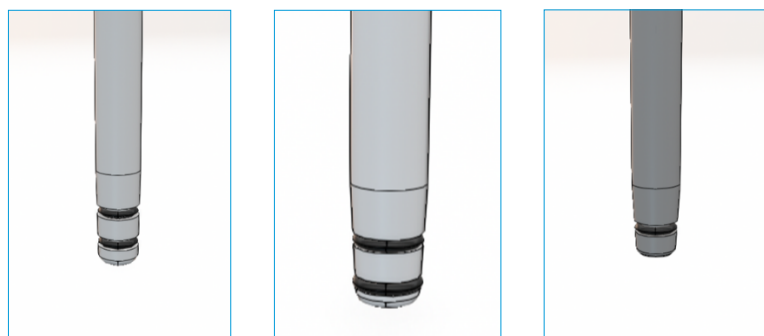
* 200µL pipette with dedicated calibration.

TIPS

Flow Robotics offers 3 different tip interfaces:

Tip cone	Volume range [μL]	Tips
Flowbot	1-50, 2-200, 10-1000	Flow Robotics tips with or without filter
Unitip 200	1-20, 2-200	High quality tip 0.5-20 μL , 0.5-200 μL with or without filter
Unitip 1000	10-1000	High quality tip 10-1000 μL with or without filter

For highest performance we always recommend Flow Robotics tips. Other high quality tips will also fit the tip cones. Be aware that tip boxes and adaptors can also influence performance. Please consult your Flow Robotics contact.



Flowbot

Unitip 1000

Unitip 200

ROBOT DIMENSIONS

Height (closed/open front door):	83/122 cm
Width:	100 cm
Depth (excl. power cord):	66 cm
Weight: 105 kg	
111 kg (UV), 117 kg (HEPA), 119 kg (UV+HEPA)	

WORK AREA AND TABLE DIMENSIONS

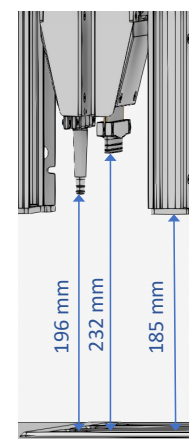
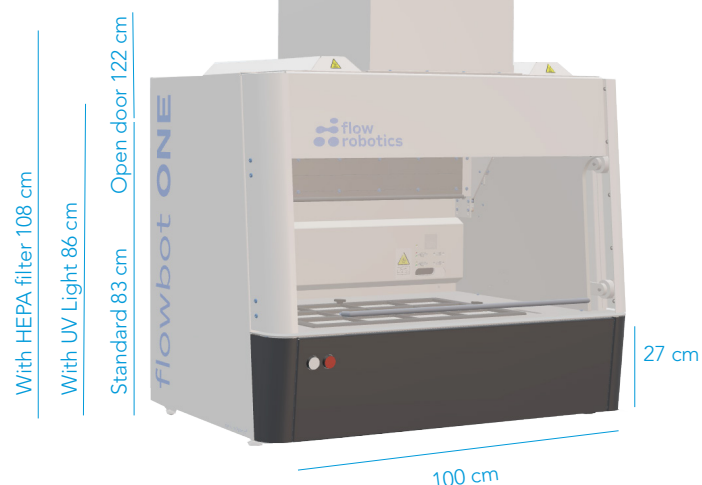
The space inside the robot consists of a stainless-steel plate with a glass plate in the middle. A removable grid is mounted on the glass plate and is called the work area.

Work area height above laboratory table (adjustable):	27-29 cm
Work area dimensions inside door (W x D)	87 x 57 cm
Grid:	
• Positions:	12 (3x4)
• Position size, SLAS (SBS) standard:	127.8 x 85.5 mm
• Column center-to-center distance:	137.8 mm
• Row center-to-center distance:	110.5 mm

Work height from glass plate to tip cones (without tips).

200/1000 μL , flowbot cone:	232 mm
200 μL , Unitip cone:	232 mm
1000 μL , Unitip cone:	196 mm

Work height under pipette module:	185 mm
Integrated waste bin below work area:	25 x 17 x 11 cm



ELECTRICITY

Please note additional power information for optional add-ons in the section below.

Nominal supply voltage:	90-264 V AC	
Nominal supply frequency:	50/60 Hz	
Power connection:	IEC 60320 C14 inlet	
Different regional power cords are available (min. 1.5m) e.g.:	Europe:	Schuko CEE 7/7
	UK:	BS 1363 Plug
	US:	NEMA 5-15 Plug
Power consumption (excl. additional devices used with own power supply):	Power (max):	160 W
	Current @115 VAC:	1.5A
	Current @230 VAC:	0.7A
	Average power turned on:	40 W
	Average power when operated	120 W
	Standby power:	4 W
Power factor:	0.89	
Fused with 2 x standard 20 x ø5 mm:	Rated current (slow blow):	3.15 A

NOISE

Measured airborne sound pressure emitted by the robot incl. HEPA filter option: <60 dB(A)

COMPONENTS

Components like tube racks, well plates, tip boxes, reservoirs, cooling blocks and devices which fit into standard SLAS (SBS) positions can be used. Flow Robotics optional accessories holds a large variety of these components.

Max component height: 120 mm

TARGETING ACCURACY

The robot targeting accuracy is dependent on several factors: tip quality, how they fit the pipette tip cones, maintenance of tip O-rings and settings for tip pickup. It is therefore important to follow Flow Robotics recommendations for tip use and maintenance.

Target accuracy for x, y, and z (syringe) axis: ± 0.3 mm

DISPENSE ACCURACY

The pipette modules are calibrated after production according to ISO-8655 in a certified test laboratory under strict environmental control and with recording of temperature, humidity, and pressure (sea level). Using grade 3 water. Flow Robotics requirements for accuracy and precision meet or exceed the standard requirements.

The pipettes are calibrated in three points: Minimum, middle, and maximum volume. Lesser controlled environments and/or different test conditions will influence accuracy and precision.

Pipette size	Tip size	Volume	Accuracy		Precision	
			±	μL	CV	μL
20	50	1	14%	0.14	5.0%	0.05
		10	2.0%	0.2	1.0%	0.1
		20	1.0%	0.2	0.5%	0.1
200	200	2	12%	0.2	3.0%	0.1
		100	1.2%	1.2	0.3%	0.3
		200	0.6%	1.2	0.3%	0.6
1000	1000	10	6.0%	0.6	3.0%	0.3
		500	0.6%	3.0	0.3%	1.5
		1000	0.3%	3.0	0.3%	3.0

LIQUID PROPERTIES

Liquid properties like viscosity, surface tension, vapor pressure, and affinity can all affect the liquid handling process. Please consult tip specs for the intended use and potential fume contact with inner pipette module materials under "Component chemical compatibility".

EXPECTED LIFETIME

5 years lifetime under normal use (1000hrs/year)
3 years lifetime under full time use (1500hrs/year)

WARRANTY

All products, except consumables, are delivered with 1 year warranty as standard.

SERVICE INTERVAL

Normal service interval is targeted for a yearly usage of 1000 hours. Where usage time is when the robot is moving.

Small robot service: 500 hours or 12 months
Large robot and pipette service
incl. volume calibration: 1000 hours or 12 months

OPERATING LIMITS, ENVIRONMENT

Working temperature: 0 °C to 40 °C
Humidity (non condensing): 20 – 80 %RH

REQUIRED ACCESS

The front of robot must be accessible for the whole width and at least 70 cm deep for safe access. Rear, left side, must be accessible to power switch, power and ethernet connections.

If optional devices are used, rear right side, device port hole can be used for device connection wires.

LIGHT

The robot has three light sources. 2 white LEDs positions below work area to illuminate QR codes. And a top front multi color LED for working light and signaling different states.

EXTERNAL PORTS AND DEVICES

The flowbot® ONE can operate several different devices over 4 communication ports (external power supply) : 2 USB ports and 2 RS232 ports. Supported devices: BioShaker3000, BioShaker3000-T, Coldplate, MagDeck and Barcode scanner (from PC USB port).

COMPONENT CHEMICAL COMPATIBILITY

The flowbot® ONE is designed in a way that only the disposable tips have direct contact with the handled liquids. However, for permanent parts vapor contact is possible. In case of cleaning, accidental, spills, or vapor contamination, the most likely contact materials are listed below.

Robot section	Parts	Materials
Pipette module	Tip cone and O-rings	Aluminium, NBR.
	Cylinder block and pressure sensor seal	Aluminium, NBR
	Pistons and O-rings	Brass, NBR
	O-ring grease	Silicone, PTFE
	Ejector, screws, and rods	PA, stainless steel
	Front and side plates	PVC, polystyrene, aluminium
Work area	Table and seal	Stainless steel, silicone seal
	Glass plate and seal	Glass, silicone seal
	Grid, handles and springs	Aluminium, PA, steel, stainless steel
	Back panel	Aluminium, polyester powder coated
	Side frame	Aluminium, polyester powder coated
Lower compartment	Front door	Polycarbonate (PC) with UV filter. Previous: PETG
	Waste bin	PETG
	Lower cover (white)	PVC

REQUIREMENTS FOR PC/TABLET USER INTERFACE

Browser

We recommend that you use the Google Chrome browser for using the web application with flowbot® ONE.

Other browsers also work.

Display

Recommended minimum screen resolution: 1560 x 840 px

Power scheme and firewall

Disable laptop power schemes with hibernation or sleep functions.

The computer must maintain network connection with the robot to ensure uninterrupted program execution

Network

Robot IP address:	10.0.0.1
Assigned IP address:	10.0.0.2 - 10.0.0.14.
Web application port	80 (HTTP)
Wi-Fi network:	WiFi 2.4 GHz IEEE 802.11b/g/n WPA/WPA2 (personal) encryption

Anti-virus and firewall

We recommend that you check your anti-virus and/or firewall configuration to see if they're compatible with the network settings. Ensure that IP 10.0.0.1 is whitelisted.

API

The robot can be monitored and controlled over an API.

Data handling:	REST API
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Robot control:	WebSocket API
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Detailed API documentation is available.

REGULATORY CONFORMITY

Flowbot® ONE conforms to CE, UKCA and FCC requirements.

OPTIONAL ADD-ON

DISINFECTION UV-C LIGHT

Flowbot® ONE can optional have UV light built in, for routine disinfection of the robot work area. Enabling safe, automatic disinfection.

Two UV-C light bulbs are mounted with reflectors onto the top cover. During operation of the UV-C light the robot arm will make a slow movement, ensuring no shadowing occurs on any part of the work area.

Standard disinfection

Standard disinfection time	30 minutes
Primary UV wavelength	254 nm
UV light intensity	32 W
Min UV light irradiance on deck	3 W/m ²
Min UV light irradiance elsewhere in flowbot	0.3 W/m ²
Culture reduction rate example COVID-19	5LOG (99.999%), 1 minute

Service interval for bulbs (the shortest of the following):

Bulb operating lifetime	10,000 hours
Disinfection cycles (on/off)	3000
Time	2 years

HEPA FILTERED INLET AIR

With a controllable fan and HEPA filter mounted on top of the flowbot® ONE, the air inside can be kept clean for sensitive cultures.

Optional HEPA filter installation consists of a variable speed fan, a coarse pre-inlet filter, and a HEPA H14 filter.

Fan flow volumes (with new filters)	200 – 350 m ³ /h
Downflow min.	0,2 m/s
Downflow max.	0,7 m/s
Maximum air speed at gaps, with door closed:	1 m/s
HEPA filter class	H14 (EN 1822)
HEPA filter efficiency	99.995 % of particles < 0.3µm

Service interval

HEPA filter	1 year
Inlet filter (depending on environment)	1 year

UV light and HEPA filter option can be combined

ELECTRICITY

The UV light and HEPA come with their own separate integrated power inlet. The listed power ratings are to be added to the above listed ratings for the standard robot.

Nominal supply voltage:	90-264 V AC			
Nominal supply frequency:	50/60 Hz			
Power connection:	IEC 60320 C14 inlet			
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	UK:	BS 1363 Plug		
	US:	NEMA 5-15 Plug		
Fused with 2 x standard 20 x ø5 mm:	Rated current (slow blow):	3.15 A		
Power consumption:		UV	HEPA	UV+HEPA
	Power (max):	100	85	185
	Max Current (115/230VAC)	0.9 / 0.45	0.7 / 0.4	1.6 / 0.85
	Standby Power (W)	4	4	4
	Power factor	0.97	0.99	0.97