ULVAC

No. VP-1202

SMALL VACUUM PUMPS

CATALOG

Creating the possibilities of vacuum pump technology

ISO-9001 Certified ISO-14001

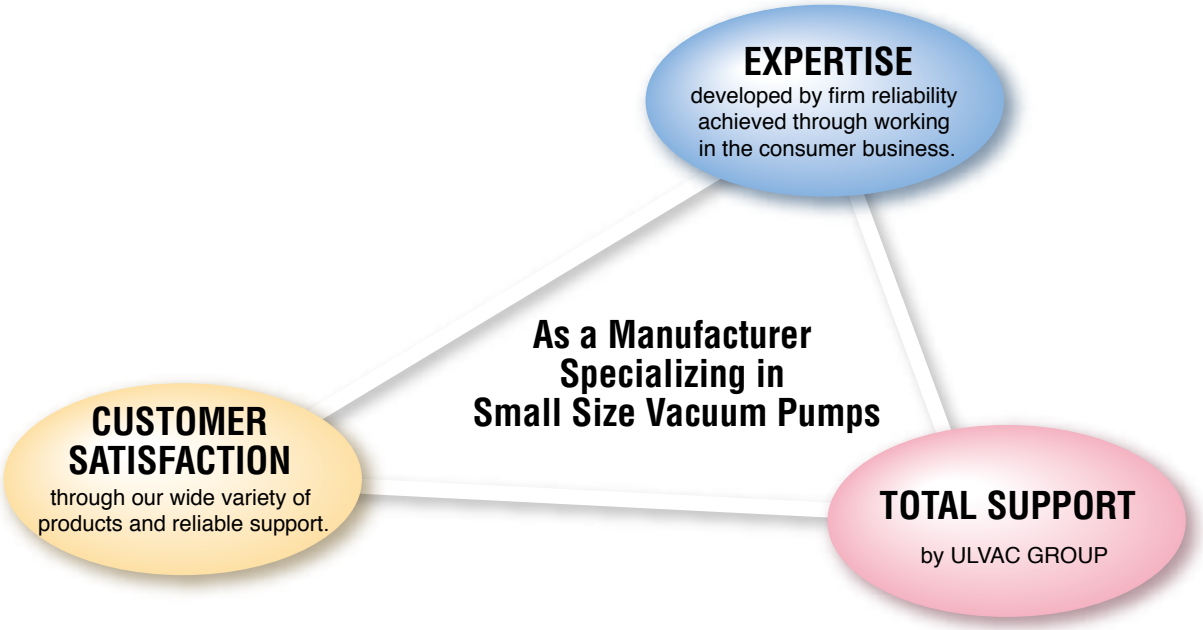
ULVAC KIKO, Inc.

www.ulvac-kiko.com/en

ULVAC KIKO
Serves a Wide Variety of Industries

We ULVAC KIKO provide vacuum pumping solutions for various industries and applications. We manufacture, sell and provide customer support of small vacuum pumps with high-performance, high-reliability and high-quality. We are one of the member of world' leading vacuum technology group, "ULVAC GROUP"

Head Office & Factory (Miyazaki Japan)



◆Units conversion table

Temperature

°C	°F
0	32
10	50
20	68
30	86
40	104
50	122
60	140
70	158
80	176
90	194
100	212

Pressure units

Pa	mbar	Torr
1	10^{-2}	7.5×10^{-3}
100	1	0.75
133	1.33	1
1.33×10^{4}	133	100
4.0×10^{4}	400	300
1.013×10^{5}	1.013×10^{3}	760

Dimensions

mm	Inches	Inches
3.1750	1/8	0.1250
6.3500	1/4	0.2500
9.5250	3/8	0.3750
12.70000	1/2	0.50000
19.0500	3/4	0.7500
25.4000	1/1	1.0000

Pumping speed units

	L/min	m^3/h	cfm
$L/min = L \times min^{-1}$	1.0	0.06	0.035
$m^3/h = m^3 \times h^{-1}$	16.67	1.0	0.589
cfm = cubic feet/min	28.32	1.699	1.0

C O N T E N T S

Dry Vacuum Pumps

Oil-Sealed Rotary Vacuum Pumps

Systems

Optional Parts

Outline Drawings

Pump Selecting Process

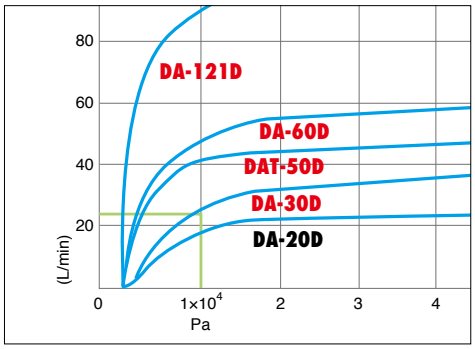
Below calculation and Pumping speed curves are available for selecting suitable pump

1. Calculation of Pumping time and Pumping speed.

$$t\ (\text{Pumping time, min}) = \frac{V\ (\text{Tank Volume, L})}{S\ (\text{Pumping speed, L/min})} \times 2.303 \log \frac{P_1\ (\text{First pressure, Pa})}{P_2\ (\text{Ultimate pressure, Pa})}$$

$$t_0 = t_1 + t_2 + t_3 + \cdots\cdots$$

example 1 We want to decrease pressure from atmospheric pressure (100kPa) to 10kPa in 50 liter of tank within 5 minutes.
Which pump is suitable?

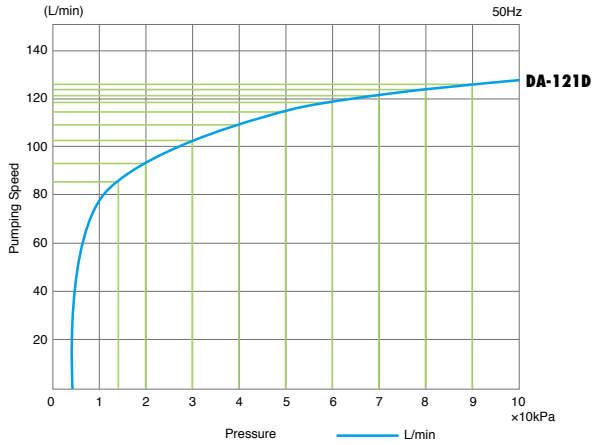


From calculation, more than 23 L/min pumping speed is required, select faster pumping speed more than DA-30D pump.
Please allow safe rate with considering pipe conductance and leak.

$$S = \frac{V\ 50}{t\ 5} \times 2.303 \log \frac{P_1\ 100{,}000}{P_2\ 10{,}000}$$

$$S \fallingdotseq 23\ \text{L/min (at 10,000Pa)}$$

example 2 How long does it take to decrease pressure from atmospheric pressure (100kPa) to 13kPa in 80 liter of tank?
DA-121D is used at this case.



$$S = \frac{V}{t} \times 2.303 \text{Log} \frac{P_1\ \text{First pressure}}{P_2\ \text{Ultimate pressure}}$$

Atmospheric pressure 90kPa S_1=124L/min $t_1 = \frac{80}{124}$ 2.303 log $\frac{101325}{90000}$ =0.08

90kPa×80kPa S_2=123L/min $t_2 = \frac{80}{123}$ 2.303 log $\frac{90000}{80000}$ =0.08

80kPa×70kPa S_3=122L/min $t_3 = \frac{80}{122}$ 2.303 log $\frac{80000}{70000}$ =0.09

70kPa×60kPa S_4=120L/min $t_4 = \frac{80}{120}$ 2.303 log $\frac{70000}{60000}$ =0.10

60kPa×50kPa S_5=116L/min $t_5 = \frac{80}{116}$ 2.303 log $\frac{60000}{50000}$ =0.13

50kPa×40kPa S_6=111L/min $t_6 = \frac{80}{111}$ 2.303 log $\frac{50000}{40000}$ =0.16

40kPa×30kPa S_7=108L/min $t_7 = \frac{80}{108}$ 2.303 log $\frac{40000}{30000}$ =0.21

30kPa×20kPa S_8=96L/min $t_8 = \frac{80}{96}$ 2.303 log $\frac{30000}{20000}$ =0.34

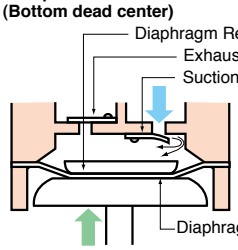
20kPa×13kPa S_9=86L/min $t_9 = \frac{80}{86}$ 2.303 log $\frac{20000}{13000}$ =0.40

$t_0 = t_1 + t_2 \sim + t_9 = 1.59\text{min}$

Movement Principles for Each Type of Vacuum Pumps

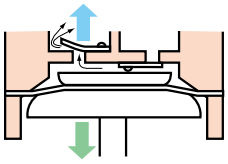
• Diaphragm Type Dry Vacuum Pumps

Last process of suction (Bottom dead center)



Suction Valve completely opens. Exhaust valve keep closed.

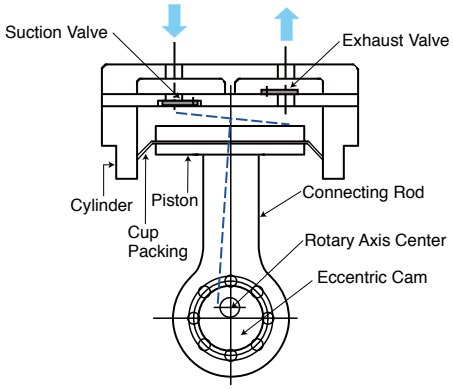
Last process of exhaust (Top dead center)



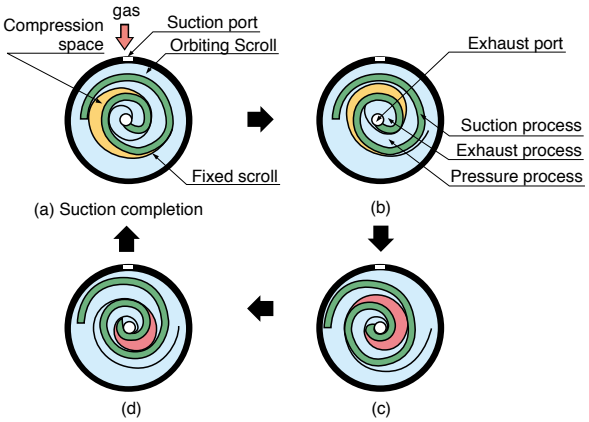
Suction Valve keeps closed as pressed.

Exhaust valve completely open as pressed.

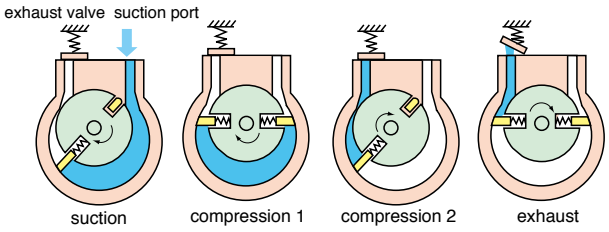
• Rocking Piston Type Dry Vacuum Pumps



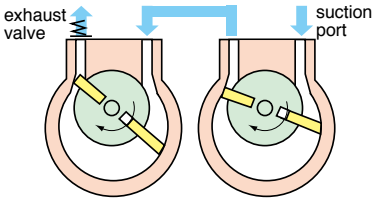
• Scroll Type Dry Vacuum Pumps



• Oil-Sealed Rotary Pumps



Exhaust process of 2 stage Oil-Sealed Rotary Pumps



A Guide to Our Catalog

CE **CE marked**

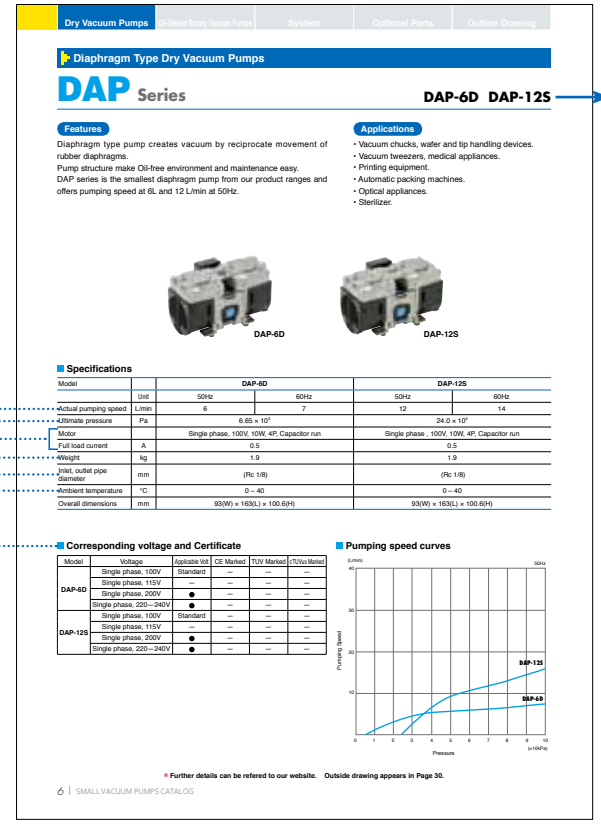
TUV marked

CSA marked

cTUVus marked

(compliance to U.S. and Canadian National Standards)

※ cTUVus is equivalent to UL/CSA standard.



Dry Vacuum Pumps | Oil-Sealed Rotary Vacuum Pumps | System | Optional Parts | Outline Drawing

Diaphragm Type Dry Vacuum Pumps

DAP Series DAP-6D DAP-12S

Features

Diaphragm type pump creates vacuum by reciprocate movement of rubber diaphragms.
Pump structure make Oil-free environment and maintenance easy.
DAP series is the smallest diaphragm pump from our product ranges and offers pumping speed at 6L and 12 L/min at 50Hz.

Applications

- Vacuum chucks, wafer and tip handling devices.
- Vacuum tweezers, medical appliances.
- Printing equipment.
- Automatic packing machines.
- Optical appliances.
- Sterilizer.

DAP-6D DAP-12S

Specifications

Model		DAP-6D		DAP-12S	
	Unit	50Hz	60Hz	50Hz	60Hz
•Actual pumping speed	L/min	6	7	12	14
•Ultimate pressure	Pa	6.65×10^2		24.0×10^2	
Motor		Single phase, 100V, 10W, 4P, Capacitor run		Single phase , 100V, 10W, 4P, Capacitor run	
Full load current	A	0.5		0.5	
•Weight	kg	1.9		1.9	
•Inlet, outlet pipe diameter	mm	(Rc 1/8)		(Rc 1/8)	
•Ambient temperature	°C	0 – 40		0 – 40	
Overall dimensions	mm	93(W) × 163(L) × 100.6(H)		93(W) × 163(L) × 100.6(H)	

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DAP-6D	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	—	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220—240V	●	—	—	—
DAP-12S	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	—	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220—240V	●	—	—	—

Pumping speed curves

※ Further details can be refered to our website. Outside drawing appears in Page 30.

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Type of Pump

DAP-12S

Actual pumping speed

The numbers show the actual pumping speed at 50 Hz. The number will increase 20% with 60 Hz.

Indicates the actual pumping speed in atmospheric pressure. Some other companies show the number of nominal pumping speed. In that case you can compare the speed by increasing our rate 20 %.

When the pump achieves this ultimate pressure the pumping speed becomes 0.

Indicates the motor rating.

Basic machine weight including the power cord.

Indicates the standard inlet, outlet diameter. For request on different sizes, please contact us.

Use the pump within this atmospheric temperature range.

Corresponding voltage and Certificate

Diaphragm Type Dry Vacuum Pumps

DAP Series

DAP-6D DAP-12S

Features

Diaphragm type pump creates vacuum by reciprocate movement of rubber diaphragms.
Pump structure makes Oil-free environment and maintenance easy.
DAP series is the smallest diaphragm pump from our product ranges and offers pumping speed at 6L and 12 L/min at 50Hz.

Applications

- Vacuum chucks, wafer and tip handling devices.
- Vacuum tweezers, medical appliances.
- Printing equipment.
- Automatic packing machines.
- Optical appliances.
- Sterilizer.

DAP-6D

DAP-12S

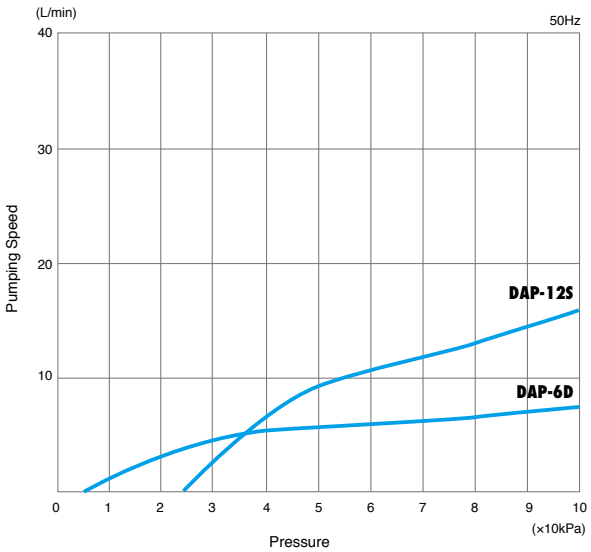
Specifications

Model		DAP-6D		DAP-12S	
	Unit	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	6	7	12	14
Ultimate pressure	Pa	6.65×10^3		24.0×10^3	
Motor		Single phase, 100V, 10W, 4P, Capacitor run		Single phase , 100V, 10W, 4P, Capacitor run	
Full load current	A	0.5		0.5	
Weight	kg	1.9		1.9	
Inlet, outlet pipe diameter	mm	(Rc 1/8)		(Rc 1/8)	
Ambient temperature	°C	0 – 40		0 – 40	
Overall dimensions	mm	93(W) × 163(L) × 100.6(H)		93(W) × 163(L) × 100.6(H)	

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DAP-6D	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	—	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220—230V	●	—	—	—
DAP-12S	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	—	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220—230V	●	—	—	—

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 30.

Diaphragm Type Dry Vacuum Pumps

DA/DAT Series

DA-30D DA-60S DAT-50D DAT-100S

Features

Diaphragm type pump creates vacuum by reciprocate movement of rubber diaphragms.
Pump structure makes Oil-free environment and maintenance easy.
Various pumping speed and two/single stages are selectable depends on your required pressure and pumping volume.

Applications

- Vacuum chucks, wafer and tip handling devices.
- Vacuum tweezers, medical appliances.
- Printing equipment.
- Automatic packing machines.
- Optical appliances.
- Semiconductor industry.
- Injection molding machine


DA-30D


DA-60S


DAT-50D


DAT-100S

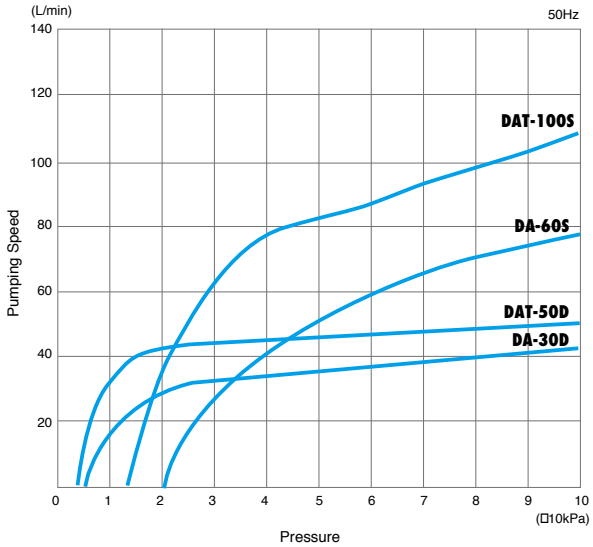
Specifications

Model		DA-30D		DA-60S		DAT-50D		DAT-100S	
	Unit	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	30	36	60	72	50	55	100	110
Ultimate pressure	Pa	6.7×10^3		21.3×10^3		3.3×10^3		13.3×10^3	
Motor		Single phase, 100V, 200W, 4P, Split phase starting		Single phase, 100V, 200W, 4P, Split phase starting		Single phase, 100V, 200W, 4P, Split phase starting		Single phase, 100V, 200W, 4P, Split phase starting	
Full load current	A	5.6	5.0	5.6	5.0	5.6	5.0	5.6	5.0
Weight	kg	11.0		11.0		11.0		11.0	
Inlet, outlet pipe diameter	mm	O.D. dia.9 × I.D. dia.5 (Rc 1/4)		O.D. dia.9 × I.D. dia.5 (Rc 1/4)		O.D. dia.12 × I.D. dia.8.5 (Rc 1/4)		O.D. dia.12 × I.D. dia.8.5 (Rc 1/4)	
Ambient temperature	°C	7 – 40		7 – 40		7 – 40		7 – 40	
Overall dimensions	mm	212(W) × 278(L) × 224.5(H)		212(W) × 278(L) × 224.5(H)		150(W) × 232(L) × 305(H)		150(W) × 232(L) × 305(H)	

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DA-30D	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
DA-60S	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
DAT-50D	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
	Three phase, 200—220V	●	●	●	●
DAT-100S	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
	Three phase, 200—220V	●	●	●	●

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 30.

Diaphragm Type Dry Vacuum Pumps

DA Series

DA-20D DA-40S DA-41D DA-81S

Features

Diaphragm type pump creates vacuum by reciprocate movement of rubber diaphragms.
Pump structure makes Oil-free environment and maintenance easy. Various pumping speed and two/single stages are selectable depends on your required pressure and pumping volume.

Applications

- Vacuum chucks, wafer and tip handling devices.
- Vacuum tweezers, medical appliances.
- Printing equipment.
- Automatic packing machines.
- Optical appliances.


DA-20D


DA-40S


DA-41D


DA-81S

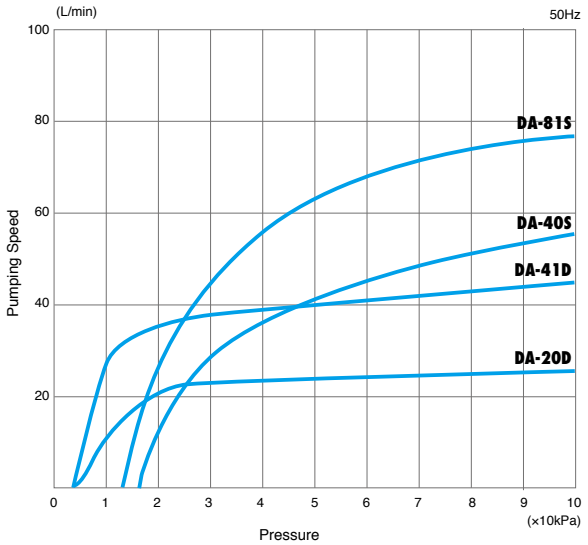
Specifications

Model		DA-20D		DA-40S		DA-41D		DA-81S	
	Unit	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	20	24	40	46	40	46	75	85
Ultimate pressure	Pa	5.33×10^3		19.9×10^3		3.3×10^3		13.3×10^3	
Motor		Single phase,100V, 60W, 4P, Capacitor run		Single phase, 100V, 60W, 4P, Capacitor run		Single phase, 100V, 100W, 4P, Capacitor run		Single phase, 100V, 100W, 4P, Capacitor run	
Full load current	A	1.6		1.6		2.5	2.7	2.5	2.7
Weight	kg	7.2		7.2		10.3		10.3	
Inlet, outlet pipe diameter	mm	O.D. dia.9 × I.D. dia.5 (Rc 1/4)		O.D. dia.9 × I.D. dia.5 (Rc 1/4)		O.D. dia.12 × I.D. dia.8 (G1/4)		O.D. dia.12 × I.D. dia.8 (G1/4)	
Ambient temperature	°C	7 – 40		7 – 40		0 – 40		0 – 40	
Overall dimensions	mm	118(W) × 242(L) × 178(H)		128(W) × 242(L) × 178(H)		157(W) × 336.5(L) × 217(H)		181(W) × 336.5(L) × 217(H)	

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DA-20D	Single phase, 100V	Standard	●	●	—
	Single phase, 115V	●	●	●	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	●	●	—
DA-40S	Single phase, 100V	Standard	●	●	—
	Single phase, 115V	●	●	●	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	●	●	—
DA-41D	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
DA-81S	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 30—31.

Diaphragm Type Dry Vacuum Pumps

DA Series

DA-60D DA-120S DA-121D DA-241S

Features

Diaphragm type pump creates vacuum by reciprocate movement of rubber diaphragms.
Pump structure makes Oil-free environment and maintenance easy.
Various pumping speed and two/single stages are selectable depends on your required pressure and pumping volume.

Applications

- Vacuum chucks, wafer and tip handling devices.
- Vacuum tweezers, medical appliances.
- Printing equipment.
- Automatic packing machines.
- Optical appliances.
- Semiconductor industry.


DA-60D


DA-120S


DA-121D


DA-241S

Specifications

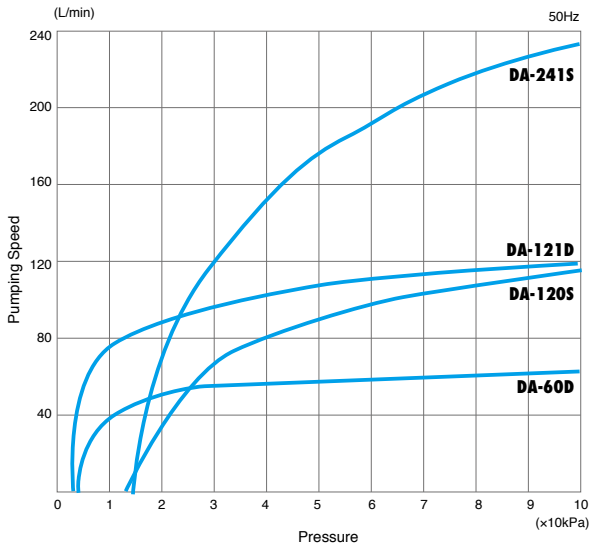
Model		DA-60D		DA-120S		DA-121D		DA-241S	
	Unit	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	60	72	120	144	120	145	240	260
Ultimate pressure	Pa	3.32×10^{3}※		13.3×10^{3}※		3.3×10^{3}		16.0×10^{3}	
Motor		Single phase, 100V, 200W, 4P, Capacitor run		Single phase, 100V, 200W, 4P, Capacitor run		Single phase, 100V, 400W, 4P, Capacitor run		Single phase, 100V, 400W, 4P, Capacitor run	
Full load current	A	5.0		5.0		4.8	5.8	5.2	6.0
Weight	kg	19.0		19.0		26.0		26.0	
Inlet, outlet pipe diameter	mm	O.D. dia.14 × I.D. dia.9 (G3/8)		O.D. dia.14 × I.D. dia.9 (G3/8)		O.D. dia.16 × I.D. dia.12 (G1/2)		O.D. dia.16 × I.D. dia.12 (G1/2)	
Ambient temperature	°C	7 – 40		7 – 40		0 – 40		0 – 40	
Overall dimensions	mm	156(W) × 358(L) × 238(H)		162(W) × 358(L) × 238(H)		193.5(W) × 411(L) × 285(H)		207(W) × 411(L) × 285(H)	

※ With built-in Unloader valve.

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DA-60D	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
DA-120S	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
DA-121D	Single phase, 100V	Standard	●	●	●
	Single phase, 115V	●	●	●	●
	Single phase, 200V	●	●	●	●
	Single phase, 220—230V	●	●	●	●
DA-241S	Single phase, 100V	Standard	●	●	●
	Single phase, 115V	●	●	●	●
	Single phase, 200V	●	●	●	●
	Single phase, 220—230V	●	●	●	●

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 31.

Diaphragm Type Dry Vacuum Pumps

DAU/DTU Series

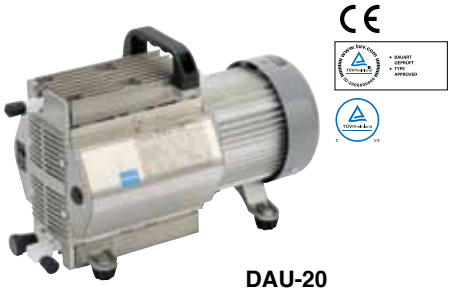
DAU-20 DTU-20

Features

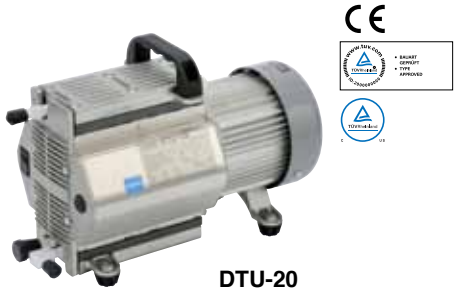
- High vacuum type diaphragm pump.
- Low vibration.
- High corrosion resistant. (DTU-20)

Applications

- Backing pump for TMP.
- Analytical equipment.
- Biochemical analysis.
- Gas charging.
- Vacuum drying systems.
- Evaporators etc.



DAU-20



DTU-20

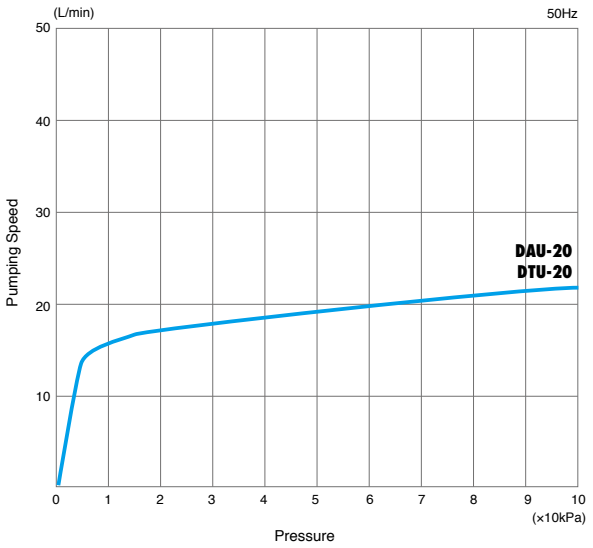
Specifications

Model		DAU-20		DTU-20	
	Unit	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	20	23	20	23
Ultimate pressure	Pa	200		200	
Motor		Single phase, 100V, 80W, 4P, Capacitor run		Single phase, 100V, 80W, 4P, Capacitor run	
Full load current	A	1.46		1.46	
Weight	kg	7.5		7.5	
Inlet, outlet pipe diameter	mm	O.D. dia.10 × I.D. dia.6 (Rc 1/8)		O.D. dia.10 × I.D. dia.6 (Rc 1/8)	
Ambient temperature	°C	5 – 40		5 – 40	
Overall dimensions	mm	161(W) × 327(L) × 217(H)		161(W) × 327(L) × 217(H)	

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DAU-20	Single phase, 100V	Standard	●	●	●
	Single phase, 115V	●	●	●	●
	Single phase, 200V	●	●	●	●
	Single phase, 220V	●	●	●	●
	Single phase, 230V	●	●	●	●
DTU-20	Single phase, 100V	Standard	●	●	●
	Single phase, 115V	●	●	●	●
	Single phase, 200V	●	●	●	●
	Single phase, 220V	●	●	●	●
	Single phase, 230V	●	●	●	●

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 31.

Diaphragm Type Dry Vacuum Pumps

DTC Series

DTC-22 DTC-41 DTC-60

Features

- All contacted parts of the gas are made of PTFE and FPM.
- Suitable for pumping out corrosive gas or organic solvent.
- High vacuum down to 1000Pa.
- Compact.

Applications

- Rotary evaporator.
- Evaporating system.
- Vacuum Concentrator.
- Vacuum filtration.
- Exhaust of gas-transfer tube.
- Vacuum drying systems.
- Laser-gas circulation.
- Centrifuge.
- Medical/Pharmaceutical equipments.
- Analysis/scientific equipments.

DTC-22

DTC-41


DTC-60

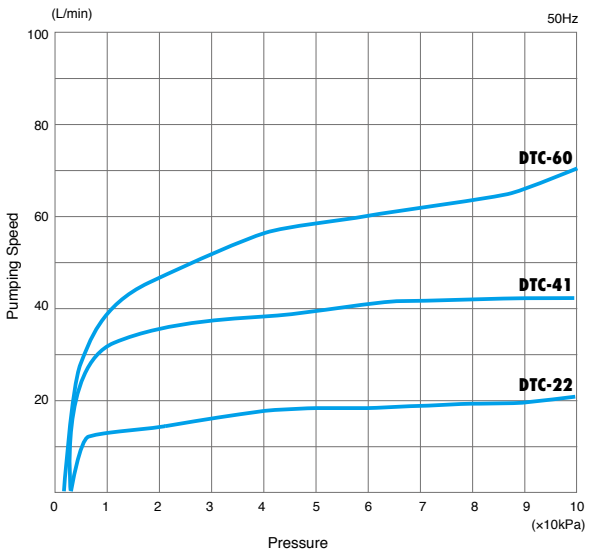
Specifications

Model		DTC-22		DTC-41		DTC-60	
	Unit	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	20	24	40	46	60	70
Ultimate pressure	Pa	1.0×10^3		1.0×10^3		1.0×10^3	
Motor		Single phase, 100V, 50W, 4P, Capacitor run		Single phase, 100V, 100W, 4P, Capacitor run		Single phase, 100V, 200W, 4P, Capacitor run	
Full load current	A	1.3		2.2	2.3	3.6	3.7
Weight	kg	7.1		10.3		18.0	
Inlet, outlet pipe diameter	mm	O.D. dia.10 × I.D. dia.6 (G1/4)		O.D. dia.10 × I.D. dia.6 (G1/4)		O.D. dia.14 × I.D. dia.9 (G3/8)	
Ambient temperature	°C	0 – 40		0 – 40		0 – 40	
Overall dimensions	mm	142(W) × 288.5(L) × 202(H)		155(W) × 336.5(L) × 217(H)		158(W) × 340(L) × 242(H)	

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DTC-22	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	●	●	●
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	●	●	●
	Single phase, 230V	●	●	●	●
DTC-41	Single phase, 100V	Standard	●	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
	Single phase, 230V (50Hz)	●	●	—	—
DTC-60	Single phase, 100V	Standard	—	—	—
	Single phase, 115V (50Hz)	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 32.

Rocking Piston Type Dry Vacuum Pumps

DOP Series

DOP-40D DOP-80S DOP-80SP

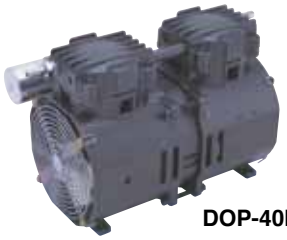
Features

Rocking type piston vacuum pump creates vacuum by reciprocal motion of cup packing inside the cylinder. Pressurized type is available for DOP-80S which can be used as a small compressor. (DOP-80SP)

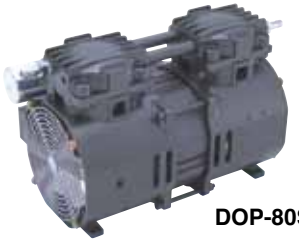
Applications

(Vacuum)
- Vacuum chuck, vacuum tweezers.
- Absorption and transfer of automatic machines.
- Vacuum packing printing machines.
- Tip mounter.
- Medical equipments.
- Oxygen generator.

(Pressure)
- Pressure source for automatic machines.
- Air pressure unit.
- Printing machine.
- Otorhinolaryngology, dental unit.
- Air pressure meter.



DOP-40D



DOP-80S

DOP-80SP

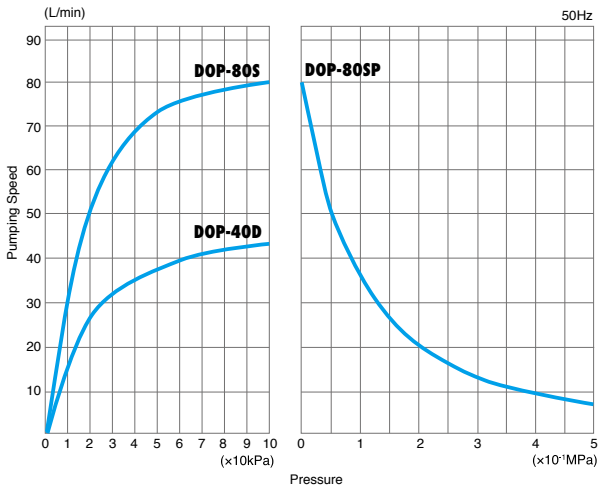
Specifications

Model		DOP-40D		DOP-80S		DOP-80SP	
	Unit	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	40	44	80	88	80	84
Ultimate pressure	Pa	1.2×10^3		5.33×10^3		Only for pressure	
Maximum pressure	MPa	–		–		0.5	
Motor		Single phase, 100V, 210W, 4P, Capacitor run		Single phase, 100V, 210W, 4P, Capacitor run		Single phase, 100V, 300W, 4P, Capacitor run	
Full load current	A	3.2	3.9	3.2	3.9	5.0	5.5
Weight	kg	7.0		7.0		9.0	
Inlet, outlet pipe diameter	mm	O.D. dia.9 × I.D. dia.5 (Rc 1/4)		O.D. dia.9 × I.D. dia.5 (Rc 1/4)		O.D. dia.9 × I.D. dia.5 (Rc 1/4)	
Ambient temperature	°C	7 – 40		7 – 40		7 – 40	
Overall dimensions	mm	160(W) × 270(L) × 179(H)		160(W) × 270(L) × 179(H)		167.5(W) × 288(L) × 181(H)	

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DOP-40D	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
DOP-80S	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	●	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
DOP-80SP	Single phase, 100V	Standard	—	—	—
	Single phase, 115V	—	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 32.

Rocking Piston Type Dry Vacuum Pumps

DOP Series

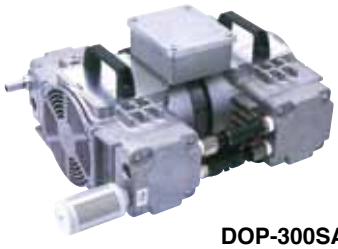
DOP-300SA DOP-420SA

Features

Rocking type piston vacuum pump creates vacuum by reciprocal motion of cup packing inside the cylinder. Bigger volume of pumping speed with increased number of pump heads.

Applications

- Vacuum chuck, vacuum tweezers.
- Semiconductor industry. (Handler, Mounter)
- FPD industry. (Bonder)
- Printing machine.
- Injection molding.
- Adsorption and transfer.



DOP-300SA

DOP-420SA

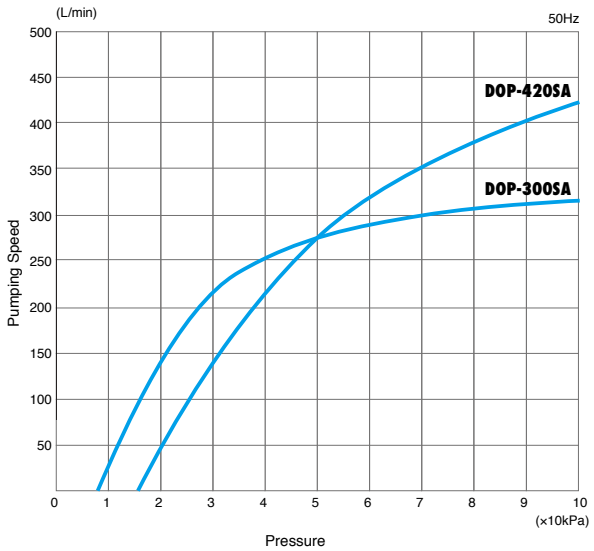
Specifications

Model		DOP-300SA		DOP-420SA	
	Unit	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	300	330	420	460
Ultimate pressure	Pa	8.0×10^3		17.3×10^3	
Motor		Three phase, 200V, 400W, 4P		Three phase, 200V, 550W, 4P	
Full load current	A	2.5	2.3	3.5	3.1
Weight	kg	20.0		33.0	
Inlet, outlet pipe diameter	mm	O.D. dia.16 × I.D. dia.12 (Rc 1/2)		O.D. dia.26 × I.D. dia.20 (Rc 3/4)	
Ambient temperature	°C	0 – 40		0 – 40	
Overall dimensions	mm	315(W) × 443(L) × 231(H)		310(W) × 523(L) × 253(H)	

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
DOP-300SA	Three phase, 200V	Standard	●	—	—
DOP-300SB	Three phase, 200–220V	●	●	●	●
DOP-420SA	Three phase, 200V	Standard	●	●	—

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 32.

Scroll Type Dry Vacuum Pumps

DIS Series Double wrap

DIS-90 DIS-251 DIS-501

Features

- Double wrap type scroll pump which consists of 1 orbiting and 2 fixed scrolls.
- Operation from atmospheric pressure is possible.
- High ultimate pressure level is attainable
- Low vibration and low noise.
- Maintenance cycle can be controlled by hour meter.

Applications

- Analytical equipment.
- Gas recovery system.
- Coating equipment.
- Back pump for TMP.
- Helium leak detector.
- Manufacturing process for semiconductor.

DIS-90

DIS-251

DIS-501

Specifications

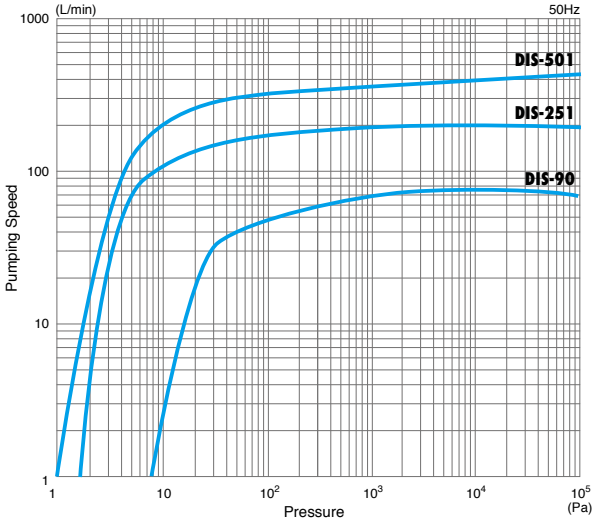
Model			DIS-90		DIS-251		DIS-501	
		Unit	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Nominal pumping speed		L/min	90	108	250	300	500	600
Ultimate pressure		Pa	5.0		1.6		1.0	
Motor	Single phase		Single phase, 100/115/200/230V, 150W, 4P, Capacitor start & run		Single phase, 100/115/200/230V, 400W, 4P, Capacitor start & run		Single phase, 100/115/200/230V, 600W, 4P, Capacitor start & run	
	Three phase		–		Three phase, 200/208/230/380/400/415/460V, 400W, 4P		Three phase, 200/208/230/380/400/415/460V, 600W, 4P	
Full load current	Single phase	A	2.6/1.3/1.6 (100/200/230V)	2.1/2.2/1.1/1.1 (100/115/200/230V)	4.8/2.6/2.4 (100/200/230V)	4.8/4.3/2.8/2.4 (100/115/200/230V)	8.5/4.3/3.9 (100/200/230V)	10.0/8.6/4.8/4.0 (100/115/200/230V)
	Three phase		–	–	1.6/0.9/0.9/1.0 (200/380/400/415V)	1.9/1.9/1.8/1.0 (200/208/230/460V)	2.7/1.57/1.57/1.63 (200/380/400/415V)	2.8/2.6/2.5/1.47 (200/208/230/460V)
Weight	Single phase	kg	14.0		25.0		44.0	
	Three phase		–		23.0		38.0	
Inlet, outlet pipe diameter			Inlet pipe KF-25 Outlet pipe KF-16		Inlet pipe KF-25 Outlet pipe KF-16		Inlet pipe KF-40 Outlet pipe KF-25	
Ambient temperature		°C	5 – 40		5 – 40		5 – 40	
Water vapor handling		g/day	≤ 5 (AF open)		≤ 25 (AF open)		≤ 25 (AF open)	
Overall dimensions	Single phase	mm	214(W) × 308(L) × 225(H)		252(W) × 400(L) × 336(H)		290(W) × 443(L) × 397(H)	
	Three phase		–		252(W) × 370(L) × 336(H)		292(W) × 372(L) × 397(H)	

AF = Air flush

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	CSA Marked
DIS-90	Single phase, 100V	Standard	●	●
	Single phase, 115V (60Hz)	Standard	●	●
	Single phase, 200—230V	Standard	●	●
DIS-251	Single phase, 100V	Standard	●	●
	Single phase, 115V (60Hz)	Standard	●	●
	Single phase, 200—230V	Standard	●	●
	Three phase, 200V	Standard	●	●
	Three phase, 208V (60Hz)	Standard	●	●
	Three phase, 230V (60Hz)	Standard	●	●
	Three phase, 380V (50Hz)	Standard	●	●
	Three phase, 400V (50Hz)	Standard	●	●
	Three phase, 415V (50Hz)	Standard	●	●
	Three phase, 460V (60Hz)	Standard	●	●
DIS-501	Single phase, 100V	Standard	●	●
	Single phase, 115V (60Hz)	Standard	●	●
	Single phase, 200—230V	Standard	●	●
	Three phase, 200V	Standard	●	●
	Three phase, 208V (60Hz)	Standard	●	●
	Three phase, 230V (60Hz)	Standard	●	●
	Three phase, 380V (50Hz)	Standard	●	●
	Three phase, 400V (50Hz)	Standard	●	●
	Three phase, 415V (50Hz)	Standard	●	●
	Three phase, 460V (60Hz)	Standard	●	●

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 33.

Scroll Type Dry Vacuum Pumps

DISL Series Single wrap

DISL-101 DISL-502

Features

Single wrap type scroll which consists of each 1 orbiting and fixed scroll.
Tough type scroll pump than DIS series against incoming particles and suitable for industrial use.

Applications

- Pick and transfer system.
- Cleaning and drying.
- Degassing / deforming.
- Packaging.

DISL-101

DISL-502

Specifications

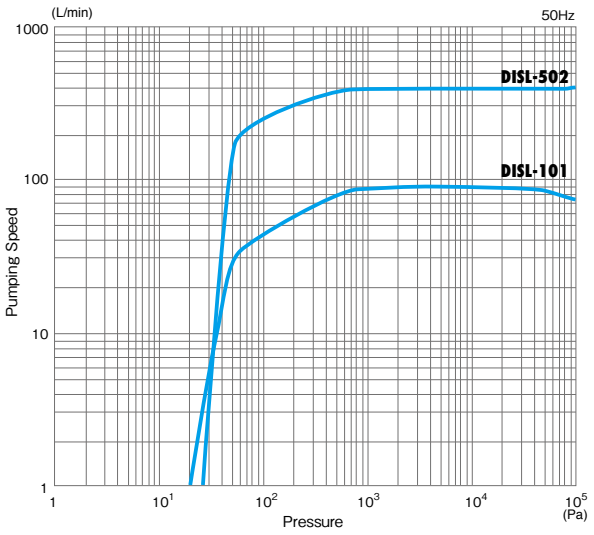
Model		DISL-101		DISL-502	
	Unit	50Hz	60Hz	50Hz	60Hz
Nominal pumping speed	L/min	100	120	430	520
Ultimate pressure	Pa	20.0		30.0	
Motor		Single phase, 100/115/200/230V, 300W, 2P, Capacitor start & run		Three phase, 200/380/400/415V, 900W, 2P	Three phase, 200/208/230/460V, 1100W, 2P
Full load current	A	3.2/1.6/2.0 (100/200/230V)	3.7/3.4/1.8/1.7 (100/115/200/230V)	3.6/1.9/1.9/1.8 (200/380/400/415V)	4.2/4.1/3.9/1.95 (200/208/230/460V)
Weight	kg	15.0		36.0	
Inlet, outlet pipe diameter		Inlet pipe KF-25 Outlet pipe KF-16		KF-25	
Ambient temperature	°C	5 – 40		5 – 40	
Water vapor handling	g/day	≤ 100 (AF open)		≤ 250 (AF open)	
Overall dimensions	mm	210(W) × 358(L) × 215(H)		317(W) × 491(L) × 280(H)	

AF = Air flush

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	CSA Marked
DISL-101	Single phase, 100V	Standard	●	●
	Single phase, 115V (60Hz)	Standard	●	●
	Single phase, 200—230V	Standard	●	●
DISL-502	Three phase, 200V	Standard	●	●
	Three phase, 208V (60Hz)	Standard	●	●
	Three phase, 230V (60Hz)	Standard	●	●
	Three phase, 380V (50Hz)	Standard	●	●
	Three phase, 400V (50Hz)	Standard	●	●
	Three phase, 415V (50Hz)	Standard	●	●
	Three phase, 460V (60Hz)	Standard	●	●

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 33.

Oil-Sealed Rotary Vacuum Pumps

GLD Series

GLD-040 GLD-136A GLD-136C

Features

GLD series features high performance, low vibration and noise and several functions such as gas ballast valve, oil-back-flow prevention mechanism, and large sized oil level gauge. This series equips multi-voltage motor and correspondent to international standard.

Applications

- Chemical, science experiment, Analyzer and Laser system.
- Vacuum pumping system.
- Backing pumps for the electronic microscope.
- Semiconductor equipment, sputtering equipment, vacuum evaporation equipment.
- Vacuum dryer, freeze dryer.

GLD-040

GLD-136A

GLD-136C

Specifications

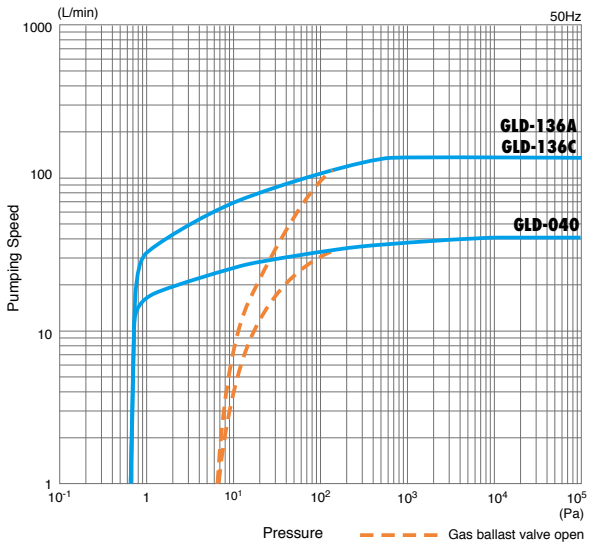
Model		GLD-040		GLD-136A		GLD-136C	
	Unit	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	40	48	135	162	135	162
Ultimate pressure※	Pa	G.V. Closed : 0.67 G.V. Open : 6.7		G.V. Closed : 0.67 G.V. Open : 6.7		G.V. Closed : 0.67 G.V. Open : 6.7	
Motor		Single phase, 200W, 4P, Multiple-range motor Capacitor start & run, 100 – 120V/200 – 240V		Three phase, 400W, 4P, Multiple-range motor 200 – 240V/380 – 460V		Single phase, 400W, 4P, Multiple-range motor Capacitor start & run, 100 – 120V/200 – 240V	
Full load current	A	4.20 (100V), 4.40 (110V) 4.60 (115V), 5.05 (120V) 2.10 (200V), 2.20 (220V) 2.30 (230V), 2.60 (240V)	3.60 (100V), 3.40 (110V) 3.40 (115V), 3.60 (120V) 1.80 (200V), 1.70 (220V) 1.70 (230V), 1.80 (240V)	2.10 (200V), 2.20 (220V) 2.30 (230V), 2.50 (240V) 1.30 (380V), 1.30 (400V) 1.40 (415V)	2.00 (200V), 1.90 (220V) 1.90 (230V), 2.00 (240V) 1.10 (380V), 1.10 (400V) 1.15 (440V), 1.20 (460V)	6.8 (100 – 120V) 3.5 (200 – 240V)	5.8 (100 – 120V) 2.9 (200 – 240V)
Oil capacity	mL	550 – 800		1,000		1,000	
Recommended oil		R-2		SMR-100		SMR-100	
Weight	kg	16.0		23.0		27.0	
Inlet port diameter	mm	KF-25		KF-25		KF-25	
Ambient temperature	°C	7 – 40		7 – 40		7 – 40	
Overall dimensions	mm	150(W) × 427(L) × 228.5(H)		170(W) × 485.5(L) × 240(H)		170(W) × 487.5(L) × 249.5(H)	

※ : Ultimate pressure is measured by Pirani gauge. (In case of macleod gauge, the rate is one digit smaller than this rate.)

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
GLD-040	Single phase, 100—120V	Standard	●	●	●
	Single phase, 200—240V	Standard	●	●	●
GLD-136A	Three phase, 200—240V	Standard	●	●	—
	Three phase, 380—460V	Standard	●	●	—
GLD-136C	Single phase, 100—120V	Standard	●	●	●
	Single phase, 200—240V	Standard	●	●	●

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 33.

Oil-Sealed Rotary Vacuum Pumps

GLD Series

GLD-201A GLD-201B

Features

GLD series features high performance, low vibration and noise and several functions such as gas ballast valve, oil-back-flow prevention mechanism, and large sized oil level gauge. This series equips multi-voltage motor and correspondent to international standard.

Applications

- Chemical science experiment, Analyzer and Laser system.
- Vacuum pumping system.
- Back pump for the electronic microscope.
- Semiconductor equipment, sputtering equipment, vacuum evaporation equipment.
- Vacuum dryer, freeze dryer.

GLD-201A

GLD-201B

Specifications

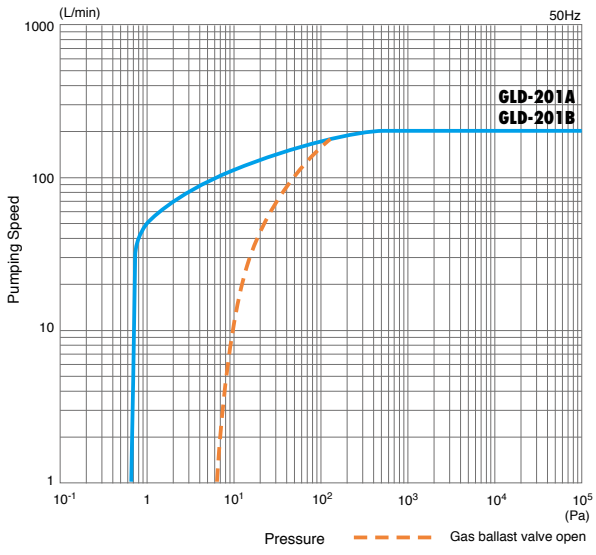
Model		GLD-201A		GLD-201B	
	Unit	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	200	240	200	240
Ultimate pressure※	Pa	G.V. Closed : 0.67 G.V. Open : 6.7		G.V. Closed : 0.67 G.V. Open : 6.7	
Motor		Three phase, 550W, 4P, Multiple-range motor 200 – 240V/380 – 460V		Single phase, 550W, 4P, Multiple-range motor Capacitor start & run, 100 – 120V/200 – 240V	
Full load current	A	3.00 (200V), 3.10 (220V) 3.30 (230V), 3.60 (240V) 1.80 (380V), 1.90 (400V) 2.00 (415V)	2.70 (200V), 2.70 (220V) 2.70 (230V), 2.80 (240V) 1.50 (380V), 1.60 (400V) 1.70 (440V), 1.70 (460V)	8.2 (100-120V) 4.1 (200-240V)	7.9 (100-120V) 3.9 (200-240V)
Oil capacity	mL	1,100		1,100	
Recommended oil		SMR-100		SMR-100	
Weight	kg	26.0		29.0	
Inlet port diameter	mm	KF-25		KF-25	
Ambient temperature	°C	7 – 40		7 – 40	
Overall dimensions	mm	170(W) × 513.5(L) × 240(H)		170(W) × 515.5(L) × 249.5(H)	

※ : Ultimate pressure is measured by Pirani gauge. (In case of macleod gauge, the rate is one digit smaller than this rate.)

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
GLD-201A	Three phase, 200—240V	Standard	●	●	—
	Three phase, 380—460V	Standard	●	●	—
GLD-201B	Single phase, 100—120V	Standard	●	●	●
	Single phase, 200—240V	Standard	●	●	●

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 34.

Oil-Sealed Rotary Vacuum Pumps

GHD Series GHD-031

Features

- Wide range voltage motor and correspond to CE, cTUVus.
- Magnet coupling for no oil leakage from shaft seal and realized longer lifetime.
- Integrated check valve below the inlet port for backflow prevention.

Applications

- Helium leak detector.
- Analytical equipment. (GC/MS, ICP/MS, LC/MS)
- Laboratory experiment.

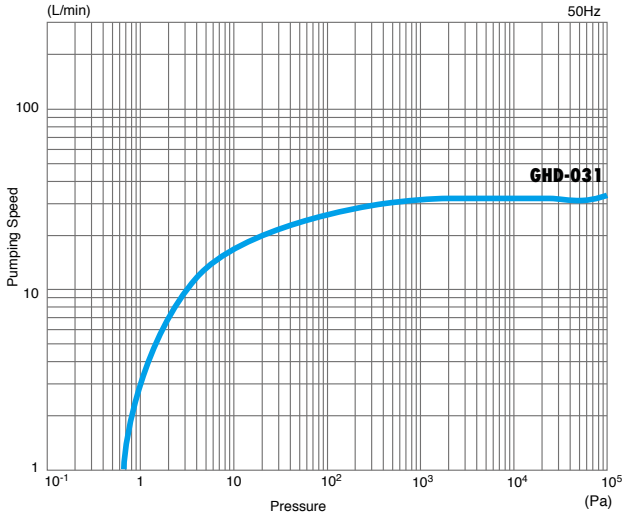
GHD-031

Specifications

Model		GHD-031	
	Unit	50Hz	60Hz
Actual pumping speed	L/min	30	36
Ultimate pressure※	Pa	0.67	
Motor		Single phase, 100 – 120V, 100W, 2P, Capacitor run	
Full load current	A	2.0 (100 – 120V)	1.8 (100 – 120V)
Oil capacity	mL	370	
Recommended oil		R-2	
Weight	kg	9.3	
Inlet port diameter	mm	KF-16	
Ambient temperature	°C	7 – 40	
Overall dimensions	mm	120(W) × 288.5(L) × 163(H)	

※ : Ultimate pressure is measured by Pirani gauge.
(In case of macleod gauge, the rate is one digit smaller than this rate.)

Pumping speed curve



Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
GHD-031	Single phase, 100—120V	Standard	●	●	●
	Single phase, 200—240V	●	●	●	●

Mechanical Booster Pump

MBS Series MBS-052

Features

- Lower power consumption.
- No oil leakage by adoption of magnet coupling.
- Compact size and light weight.
- Pumping can be started from atmospheric pressure.
- Setting of a driver circuit is necessary in 100V system and 200V system.

Applications

- Ideal main pump to support pumping speed of backing pump.

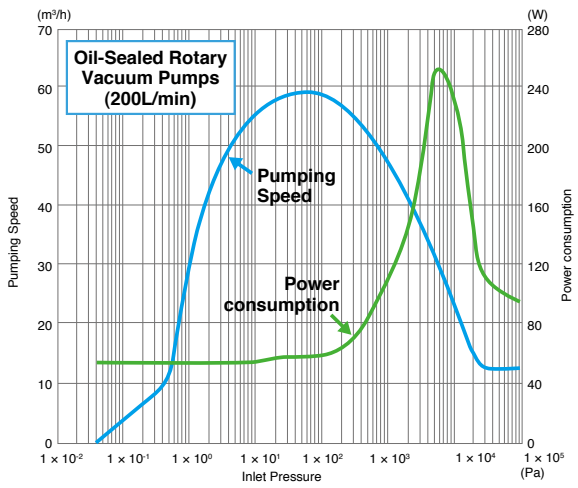
MBS-052

Specifications

Model	Unit	MBS-052
Actual pumping speed※1	m^3/h	50
Ultimate pressure※2	Pa	4.0×10^{-2}
Motor		DC Brushless motor, 200W
Power supply		Single phase, 100 – 120V / 200 – 240V (50/60Hz)
Motor speed	r/min	3500
Current	A	1.2 (100V)/0.8 (200V) (At ultimate pressure) 4.33 (100V)/2.54 (200V) (At maximum load)
Power consumption	W	50 (At ultimate pressure) 250 (At maximum load)
Oil capacity	mL	50
Recommended oil		SMR-200
Weight	kg	11.0
Inlet pipe diameter		JIS VG-40
Outlet pipe diameter		JIS VF-40
Backing pump		Oil rotary vacuum pump 130 – 200L/min
Ambient temperature	°C	0 – 40
Overall dimensions	mm	167(W) × 410(L) × 130(H)

※1 : Pumping speed varies depends on pumping speed of backing pump.
※2 : Measured by ionization vacuum gauge.
Ultimate pressure varies depends on ultimate pressure of backing pump.

Pumping speed curve



※ : Significantly increases pumping speed in a pressure range where pumping speed of backing pump often drops.

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
MBS-052	Single phase, 100—120V	Standard	●	●	—
	Single phase, 200—240V	Standard	●	●	—

※ Further details can be refered to our website. Outside drawing appears in Page 34.

Oil-Sealed Rotary Vacuum Pumps

GCD Series

GCD-051X GCD-136X GCD-201X

Features

GCD Series, direct drive, oil rotary vacuum pump is corrosion resistant for toxic and corrosive gases which is ideal for chemical, pharmaceutical applications.
Surface of gas contacted parts are coated with hard plating. Three different sizes are available from 50L to 200L/min

Applications

- Semiconductor industry.
- Chemical industry.
- Post chemical-treatment drying.
- Pharmaceutical industry.


GCD-051X


GCD-136X


GCD-201X

Specifications

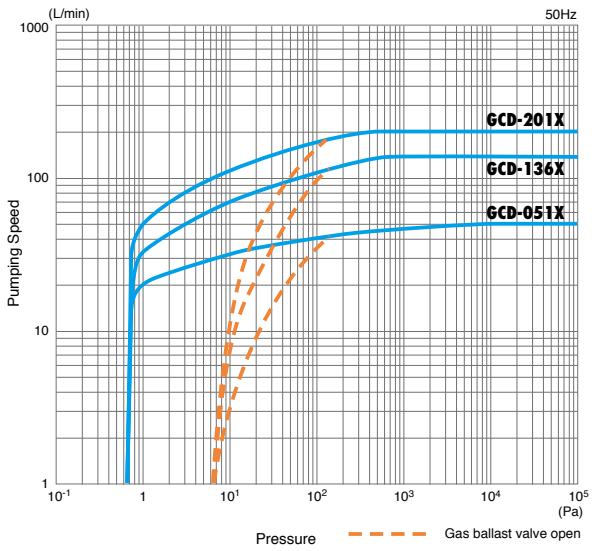
Model		GCD-051X		GCD-136X		GCD-201X	
	Unit	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Actual pumping speed	L/min	50	60	135	162	200	240
Ultimate pressure※	Pa	G.V. Closed : 0.67 G.V. Open : 6.7		G.V. Closed : 0.67 G.V. Open : 6.7		G.V. Closed : 0.67 G.V. Open : 6.7	
Motor		Single phase, 100V, 200W, 4P Split phase starting		Single phase, 100V, 400W, 4P Capacitor start & run		Shingle phase, 100V, 550W, 4P Capacitor start & run	
Full load current	A	5.6	4.8	7.7	6.1	8.0	7.2
Oil capacity	mL	500 – 800		1,000		1,100	
Recommended oil		SO-M		SO-M		SO-M	
Weight	kg	14.1		25.4		29.4	
Inlet port diameter	mm	KF-25		KF-25		KF-25	
Ambient temperature	°C	7 – 40		7 – 40		7 – 40	
Overall dimensions	mm	165.5(W) × 419(L) × 222.7(H)		170(W) × 493(L) × 241.1(H)		170(W) × 541.5(L) × 241.1(H)	

※ : Ultimate pressure is measured by Pirani gauge. (In case of macleod gauge, the rate is one digit smaller than this rate.)

Corresponding voltage and Certificate

Model	Voltage	Applicable Volt	CE Marked	TUV Marked	cTUVus Marked
GCD-051X	Single phase, 100V	Standard	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
	Single phase, 230V	●	—	—	—
GCD-136X	Single phase, 100V	Standard	—	—	—
	Single phase, 200V	●	—	—	—
	Single phase, 220V	●	—	—	—
	Three phase, 200V	●	—	—	—
GCD-201X	Single phase, 100V	Standard	—	—	—
	Single phase, 220V	●	—	—	—

Pumping speed curves



※ Further details can be refered to our website. Outside drawing appears in Page 34.

High Speed Vacuum Coater

VPC Series

VPC-1100

Features

1. Effective system with high pumping down performance.
   - 10^{-4}Pa from atmospheric pressure in 10 minutes.
   - Cooling water can be stopped after 15 minutes from the system is shut down.
2. Scalable functions with various options.
   - Multi-layer deposition and co-deposition are available with additional evaporation power supply.
3. Compact and easy mobilibity.
4. EB Deposition is available as optional.

Applications

- Basic R&D for Electronic material, Semiconductor, solar cell.
- R&D of thin film for layer and organic EL.

VPC-1100

Standard Specifications

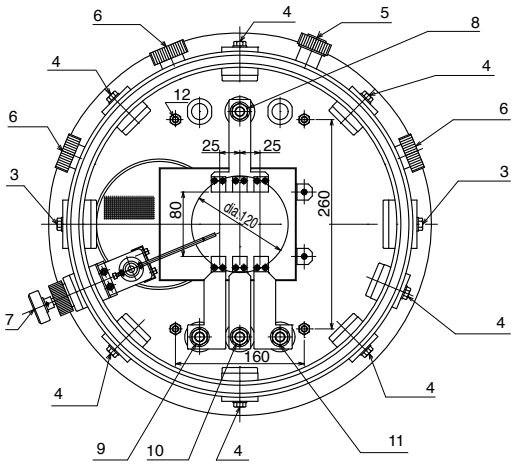
Model	VPC-1100
Ultimate pressure	1.3 × 10^{-4} Pa (with LN_2)
Evacuation time	10^{-4}Pa / 10min LN_2
Belljar size	dia.390mm × 350mm(H)
Evaporation electrode structure	3 points switch (source length : 100mm)
Evaporation power supply	0 – 10V 150A (Max)
Vacuum system	Oil diffusion pump (Water cooling) 1100L/sec Oil rotary vacuum pump 200L/min × 2 Liquid Nitrogen trap
Control system	Manual control
Vacuum gauge	Pirani vacuum gauge “GP-1G”
Power required	Three phase 200V 5.0 kVA Single phase 100V 1.0 kVA
Water requirement	1.5L/min (Water temperature : 20 – 25 degrees C, Water pressure : 200 kPa)
Weight	313kg
Overall dimensions (W) × (D) × (H)	1235mm × 836mm × 2155mm
Accessories	Three phase 200V Cable 4m Single phase 100V Cable 4m

※ Optional parts in the picture are not equipped.

Optional Parts

Special components	● Evaporation Electrode SEREM “PSE-150C” ● Deposition Controller ● Film thickness sensor ● Ionization vacuum gauge ● Electron beam evaporation source
Special parts	● Deposition shield plate ● Electrode partition ● Water cooling metal bell-jar ● UFC070 flange ● Oil mist trap (“OMI-200” “OMT-200A”) ● Sample holder ● Side/back panel ● Additional shutter ● Evaporation source/power supply for EB ● Flow switch, Substrate heating device ● Gas introduction port for service port ● System rack, Carbon electrode
Electrode structure options	● Evaporation electrode 1 point + 2 points switch ● 2 points + 2 points switch ● 2 points + 3 points switch

Feedthrough collar



1	Plate	7	Shutter
2	Filter	8	Electrode COM
3	Service port (L)	9	Electrode 1
4	Service port (S)	10	Electrode 2
5	Gauge port.1	11	Electrode 3
6	Hermetic seal port.3 pcs.	12	Prop

※ Further details can be refered to our website. Outside drawing appears in Page 34.

Vacuum Coater

DEPOX Series

VFR-200M/ERH VWR-400M/ERH VTR-350M/ERH VTS-350M/ERH

Features

1. Deposition system for metal and organic material.
2. Variable combination is available for pumping unit.
3. High scalable functions.
4. Enhanced safeness and reliability.
5. Multi-layer deposition and co-deposition(Max: 4 layers) are available with additional evaporation power supply and electrode.
6. Easy viewable through glass bell jar and easy maintenance.

Applications

- Basic R&D for Electronic material, Semiconductor, solar cell.
- R&D of thin film for layer and organic EL.

VFR-200M / ERH

VWR-400M / ERH

VTR-350M / ERH

VTS-350M / ERH

Specifications

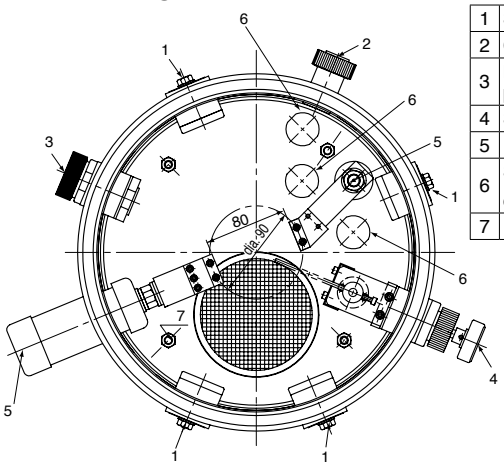
Model		VFR-200M / ERH	VWR-400M / ERH	VTR-350M / ERH	VTS-350M / ERH
Ultimate pressure		8.0×10^{-4}Pa (6.0×10^{-4}Pa LN_2)	4.0×10^{-4}Pa (3.0×10^{-4}Pa LN_2)	4.0×10^{-4}Pa (2.0×10^{-4}Pa LN_2)※1	4.0×10^{-4}Pa (2.0×10^{-4}Pa LN_2)※1
Evacuation time		4.0×10^{-3}Pa/15min (3.0×10^{-3}Pa/15min LN_2)	4.0×10^{-3}Pa/10min (3.0×10^{-3}Pa/10min LN_2)	4.0×10^{-3}Pa/10min (3.0×10^{-3}Pa/10min LN_2)※1	4.0×10^{-3}Pa/10min (3.0×10^{-3}Pa/10min LN_2)※1
Belljar size		dia.300mm × 300mm(H)	dia.300mm × 300mm(H)	dia.300mm × 300mm(H)	dia.300mm × 300mm(H)
Evaporation electrode structure (source length)		1 point (100mm)	1 point (100mm)	1 point (100mm)	1 point (100mm)
Evaporation power supply		0 – 10V 150A (Max)	0 – 10V 150A (Max)	0 – 10V 150A (Max)	0 – 10V 150A (Max)
Main pump		Oil diffusion pump (Air cooling) 200L/sec	Oil diffusion pump (Water cooling) 400L/sec	Turbo molecular pump 345L/sec	Turbo molecular pump 345L/sec
Backing pump		Oil rotary pump 100L/min	Oil rotary pump 200L/min	Oil rotary pump 200L/min	Scroll pump 250L/min
In-line trap		OMI-100	OMI-200	OMI-200	–
Pirani vacuum gauge		GP-1G	GP-1G	GP-1G	GP-1G
Ionization vacuum gauge		GI-M2	GI-M2	GI-M2	GI-M2
Weight		145kg	148kg	165kg	160kg
Overall dimensions (W) × (D) × (H)	(Body)	730mm × 603mm × 1161mm	730mm × 709mm × 1161mm	730mm × 584mm × 1161mm	730mm × 584mm × 1161mm
	(Power supply)	480mm × 435.3mm × 149mm	480mm × 435.3mm × 149mm	480mm × 435.3mm × 149mm	480mm × 435.3mm × 149mm
Power required	(Body)	Single phase 100V 1.4kVA	Single phase 100V 1.6kVA	Single phase 100V 1.4kVA	Single phase 100V 0.9kVA
	(Power supply)	Single phase 200V 1.5kVA	Single phase 200V 1.5kVA	Single phase 200V 1.5kVA	Single phase 200V 1.5kVA

※1 : LN_2trap is optional.

Optional Parts

Electrode structure options	● 2 points switch ● 2 points simultaneously ● 3 points switch ● 3 points simultaneously	● 1 point + 2 points switch ● 2 points switch + 2 points switch ● 2 points switch + 1 point + 1 point
Feed through collar	● 20 ports (Side 16, Bottom 4) (300 x 100H)	
Vacuum chamber	● Bell jar holder ● Bell jar cover	● Metal Bell jar
Accessories for inner vacuum chamber	● Sample holder ● Adhesion shield plate ● Electrode partition ● Gauge port set ● Hermetic port set ● Sealing flange set	● UFC070 Adapter ● KF-25 Adapter ● Gas introduction port ● Carbon electrode set ● Substrate heating device 350 degrees C
System exterior	● Elevating device ● Side panel, Back panel ● Deposition controller	● Control panel ● Side panel for control panel ● Back panel for control panel
Pumping system	● Automatic leak valve for Oir rotary vacuum pump (VFR-200M/ERH, VWR-400M/ERH)	

Feedthrough collar



1	Service port
2	Gauge port
3	Hermetic seal port
4	Shutter
5	Electrode
6	Spare port for electrode
7	Prop

※ Further details can be refered to our website. Outside drawing appears in Page 35.

High frequency Sputtering System

RFS Series

RFS-200

Features

1. Compact and easy mobilibity.
2. High speed pumping is attainable with TMP.
3. Introduction gas can be controlled continuously with flow control valve.
4. Suitable for pre-sputtering.
5. Automatic matching control is available.
6. High accurate thin film.

Applications

- Basic R&D for basic material, high melting material, insulating material and semiconductor material.

RFS-200

Specifications

Model		RFS-200
Vacuum performance	Ultimate Pressure	6.6×10^{-4}Pa
	Evacuation time	6.6×10^{-3}Pa/5min
Vacuum chamber	Vacuum chamber	Metal chamber (200mm (W) X 250mm (D) X150mm (H))
	Cathode	dia.80mm, 1way
	Standard target	dia.80mm×t1mm
	Effective area of sputtering	dia.50mm
	Sputtering speed	SiO_2, More than 20nm/min at deposition
	Film thickness distribution	SiO_2, within ±8% at dia.50mm
	Substrate heating temperature	Max 350 degrees C
	Substrate electrode distance	30mm - 60mm (Variable)
Exhaust system	Main pump	Oil diffusion pump (Water cooling) 150L/sec
	Liquid Nitrogen trap	Option
	Backing pump	Oil rotary pump 100L/min
	Oil-mist trap	OMT-100A
Operation system	Main valve	Clapper valve
	Sub valve	Three ways valve
	Automatic leak valve	Option
	Control	Manual control
Control system	RF power supply	Max 200W (Variable:0 - 200W)
	Pirani vacuum gauge	G-TRAN
	Ionization vacuum gauge	Option
Setup	Overall dimensions, Weight	800mm(W)×725mm(D)×1635mm(H) 200kg

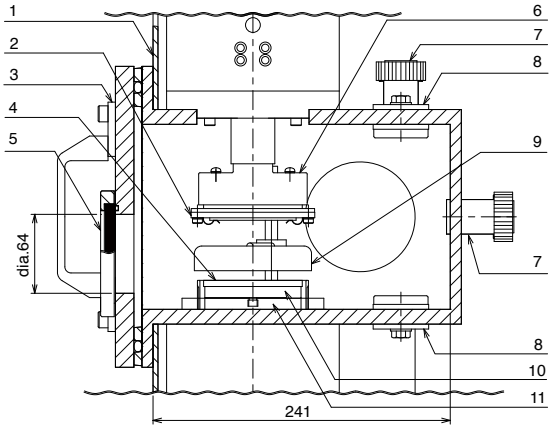
Utility

Power required	Single phase, 50/60Hz, 100V, 1.3kVA
Ground terminal	A grade (ground resistance/10Ω or less)
Water requirement	5.0L/min [Water temperature : Less than 25 degrees C, Water pressure : 200 – 300kPa(gauge pressure)]

Optional Parts

- Liquid Nitrogen trap
- Ionization vacuum gauge
- Magnetron
- In line trap (OMI-100)
- Turbo molecular pump
- DC power supply
- Introduction gas (2,3 lines)
- Automatic leak valve for oil rotary pump

Feedthrough collar



1	System rack	5	Viewport	9	Shutter
2	Sample holder	6	Substrate electrode	10	Backing plate
3	Front door	7	Gauge port	11	Target electrode
4	Target	8	Service port		

※ **Further details can be refered to our website.** **Outside drawing appears in Page 35.**

High frequency magnetron Sputtering System

SCOTT Series

VTR-150M/SRF

Features

1. Parallel-plate type RF magnetron discharge method.
2. Turbo molecular pump is used for main pumping.
3. Multiple deposition is available by dia.2 inch , 3 cathodes.
4. All gauges are installed in the rack.
5. Sputtering speed 30nm/min (SiO_2) is available by magnetron sputtering.
6. Easy handling for substrate exchange and maintenance from top cover open style.
7. Reactive sputtering is available as optional.

Applications

- Basic R&D for basic material, high melting material, insulating material and semiconductor material.

SCOTT-C3

Specifications

Model	VTR-150M/SRF (SCOTT-C3)	
Vacuum performance	Ultimate Pressure	6.6×10^{-4}Pa
	Evacuation time	6.6×10^{-3}Pa/5min
Vacuum chamber	Vacuum chamber	Metal chamber (dia.310.5mmX160mm (H))
	Cathode	dia.2inch, 3ways
	Standard target	dia.2inch(dia.50.8mm)×t1mm
	Effective area of sputtering	dia.25mm
	Sputtering speed	SiO_2, More than 30nm/min at deposition
	Film thickness distribution	SiO_2, within ±10% at dia.25mm
	Substrate heating temperature	Max 350 degrees C
	Substrate electrode distance	50mm - 90mm (Variable : Half fixed)
Exhaust system	Main pump	Turbo molecular pump (230L/sec)
	Liquid Nitrogen trap	–
	Backing pump	Oil rotary pump 200L/min
	Oil-mist trap	OMT-200A
Operation system	Main valve	L (angle) model valve
	Sub valve	Three ways valve
	Automatic leak valve	Option
	Control	Manual control
Control system	RF power supply	Max 300W (Variable:40 - 300W)
	Pirani vacuum gauge	GP-1G
	Ionization vacuum gauge	GI-M2
Setup	Overall dimensions, Weight	1150mm(W)×751mm(D)×1067mm(H) 400kg

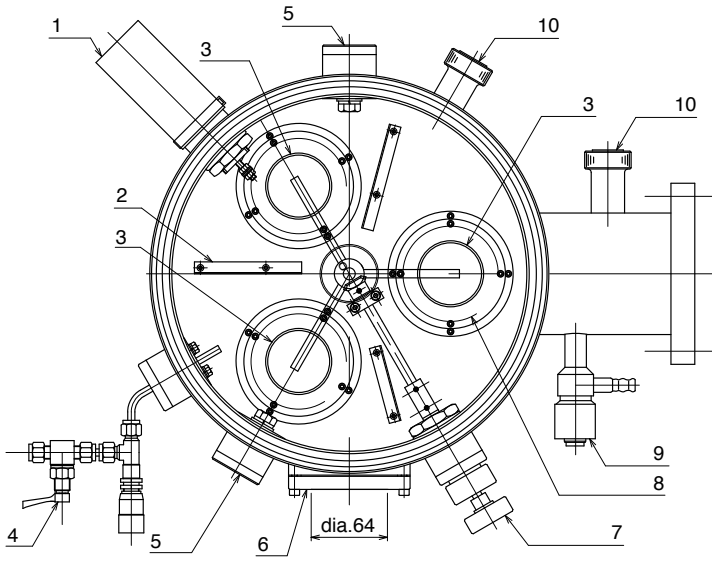
Utility

Power required	Single phase, 50/60Hz, 100V, 3.0kVA
Ground terminal	A grade (ground resistance/10Ω or less)
Water requirement	2.0L/min [Water temperature : Less than 25 degrees C, Water pressure : 200kPa(gauge pressure))

Optional Parts

- Substrate heating 600 degrees C (Water cooling chamber)
- Mass flow controller
- In line trap (OMI-200)
- 4 inch, 1 way
- DC power supply
- Introduction gas (2,3 lines)
- Automatic leak valve for oil rotary pump

Feedthrough collar



1	Trigger electrode	5	Sealing flange	9	Vent valve
2	Electrode partition	6	Viewport	10	Gauge port
3	Cathode	7	Shutter handle		
4	Gas introduction	8	Shutter		

※ Further details can be refered to our website. Outside drawing appears in Page 35.

Attachment of Oil Rotary Vacuum Pump Optional parts

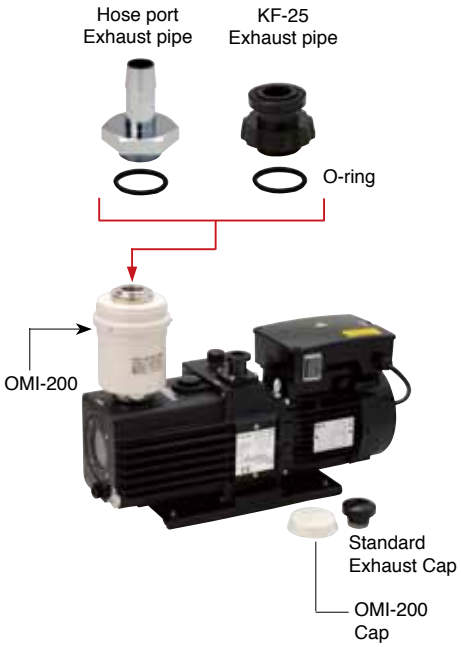
Suction and Exhaust Trap

GLD-136C+OMT-200A

GLD-136C+OMT-200A+OFI-200V

GCD-136X+OMC-200

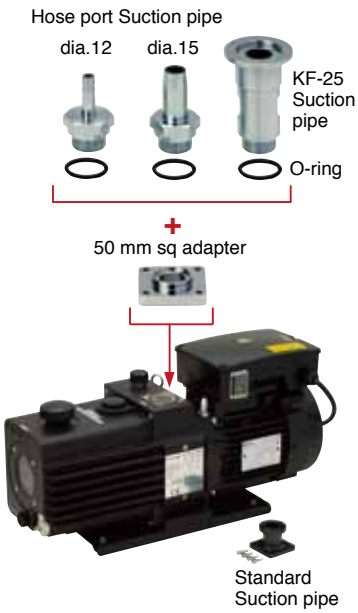
GLD-136C+OMI-200+KF-25 Exhaust pipe



Suction and Exhaust Pipe

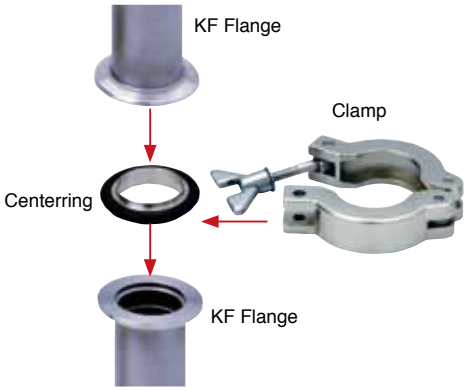
GLD-136C+Selectable Suction pipe

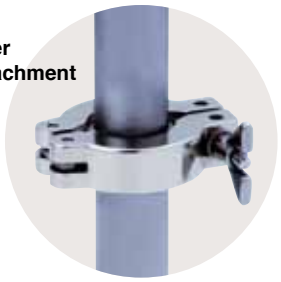
GLD-136C+Selectable Suction pipe



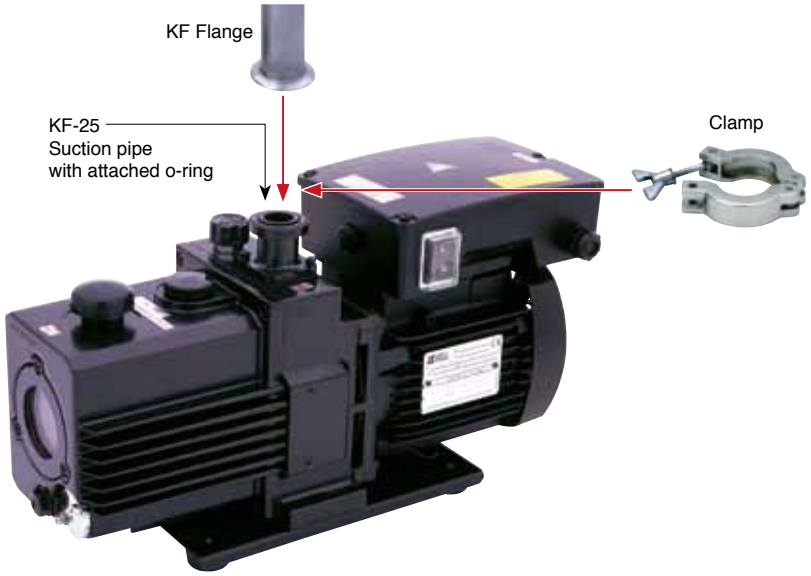
KF Flange Attachment Process

Standard Composition





Unnecessary case of Centering



Optional Parts

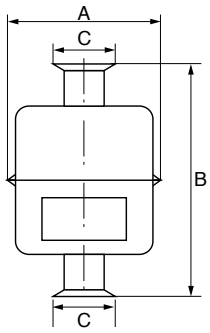
Accessories for Oil Rotary Vacuum Pumps

Fore-line Trap (Inlet filter)

Units: mm.

Models	Applications	Applicable models *	A	B	C
※OFI-050C	Prevent counter flow of oil diffusion	50L/min or less	dia. 74	114	KF-25
※OFI-200C	Prevent counter flow of oil diffusion	200L/min or less	dia. 99	150	KF-25
※OFI-050V	Prevent particles into vacuum pumps	50L/min or less	dia. 74	114	KF-25
※OFI-200V	Prevent particles into vacuum pumps	200L/min or less	dia. 99	150	KF-25

KF-25 clamp needed for installation.
※: Filters are non-replaceable due to closed type.
★: Pumping speed of applicable models is at 50Hz.

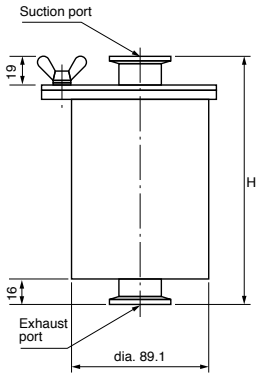


OFI-050 OFI-200

Vacuum Pump Suction and Exhaust Filter

This filter can trap acidic gas, oil mist effectively by using ion-exchanged resin fiber. Filter can be placed both vacuum and exhaust side and filter can be replaceable.

Models	Filter system	Applicable models	Pressure range	Ambient temperature	Ambient humidity	Suction port	Exhaust port	Height
SGT-100	Out · In · Pass	500L/min or less	0.1MPa	7 – 40°C	85% (non condensing)	KF-25	KF-25	154mm
SGT-200						KF-40	KF-40	234mm



SGT-200 SGT-100

Optional Parts

Vacuum Pump Oil

• SMR-100

Models	Can size
SMR-100 Mineral oil	1 L (2 × 500ml cans)
	4L can
	18L can

• SO-M

Models	Can size
SO-M Synthetic oil	1L can
	4L can
	18L can

• R-2 / R-7

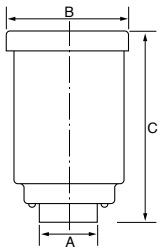
Models	Can size
ULVOIL R-2 Synthetic oil	1L can
	4L can
	20L can
ULVOIL R-7 Synthetic oil	2.2L can
	8L can
	20L can

Oil-mist Trap

Units: mm.

Models	Applicable models	A	B	C
OMT-050A △	GLD-040, GHD-031	G3/4	dia.65	93
OMT-100A △	–	G1	dia.113	135
OMT-200A △	GLD-136A, GLD-136C GLD-201A, GLD-201B	G1	dia.113	135

△ : Filter replaceable

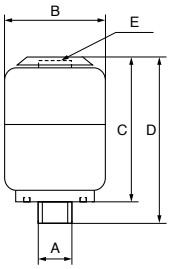


In-line Trap (Piping connection type oil-mist trap)

Units: mm.

Models	Applicable models	A	B	C	D	E
OMI-100 ※ △ ◎	GLD-040, GHD-031	G1	dia.94	166	177	G1
OMI-200 ※ △	GLD-136A, GLD-136C GLD-201A, GLD-201B	G1	dia.116	166	178	G1

△ : Filter replaceable ※ : In-line type ◎ : Adapter for Oil-mist Trap is necessary.



Adapter for Oil-mist Trap

This Adapter is required to adjust screw diameter from G3/4 to G1.

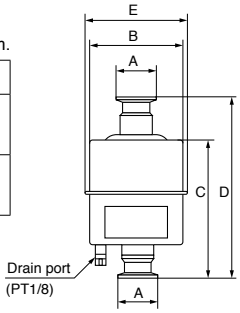
Type of Adapter	Applicable models	Adaptive oil-mist traps
G $^{3}/_{4}$ male × G1 female	GLD-040, GHD-031	**OMI-100** **OMT-100A**

Oil-mist Separator (Anti-corrosive type)

Units: mm.

Models	Applicable models	A	B	C	D	E
OMC-050 ◇	GCD-051X (Anti-corrosive)	KF-25	dia.66	116	148	dia.74
OMC-200 ◇	GCD-136X, GCD-201X (Anti-corrosive)	KF-25	dia.90	140.5	173	dia.99

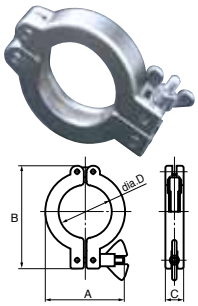
◇ : Chemical type (KF-25 clamp needed for installation)



Optional Parts

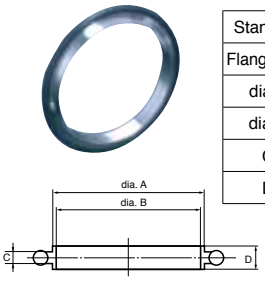
units : mm.

Clamp (Material : Aluminium)



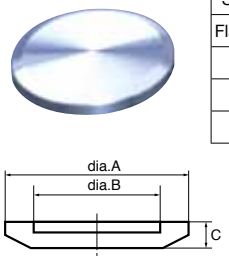
Standard	SCK-1016	SCK-1025	SCK-1040
Flange size	KF-16	KF-25	KF-40
A	45	55	70
B	61	72	90
C	16	16	16
dia.D	22	32	47

Centerring (Material : SUS304)



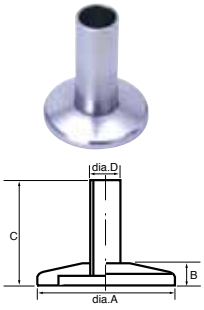
Standard	SCK-2016	SCK-2025	SCK-2040
Flange size	KF-16	KF-25	KF-40
dia.A	17	26	41
dia.B	16	24	39
C	3.9	3.9	3.9
D	8	8	8

Blank Flange (Material : SUS304)



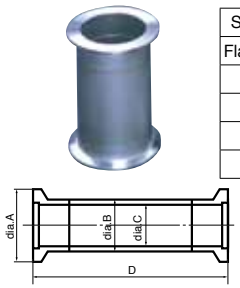
Standard	SCK-4016	SCK-4025	SCK-4040
Flange size	KF-16	KF-25	KF-40
dia.A	30	40	55
dia.B	17.2	26.2	41.2
C	6	6	6

Nozzle (Material : SUS304)



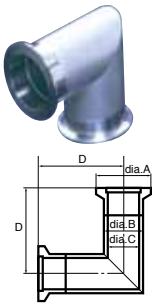
Standard	SCK-2512	SCK-2518
Flange size	KF-25	KF-25
dia.A	40	40
B	6	6
C	35	35
dia.D	12	18

Nipple (Material : SUS304)



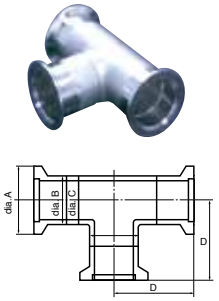
Standard	SCK-5016	SCK-5025	SCK-5040
Flange size	KF-16	KF-25	KF-40
dia.A	30	40	55
dia.B	20.0	27.2	42.7
dia.C	16	24	39
D	60	100	100

Elbow (Material : SUS304)



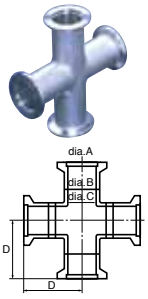
Standard	SCK-6016	SCK-6025	SCK-6040
Flange size	KF-16	KF-25	KF-40
dia.A	30	40	55
dia.B	20.0	27.2	42.7
dia.C	16	24	39
D	40	50	65

Tee (Material : SUS304)



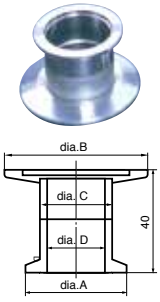
Standard	SCK-7016	SCK-7025	SCK-7040
Flange size	KF-16	KF-25	KF-40
dia.A	30	40	55
dia.B	20.0	27.2	42.7
dia.C	16	24	39
D	40	50	65

Cross (Material : SUS304)



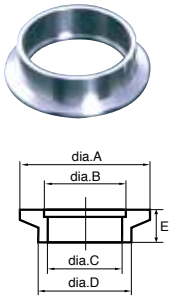
Standard	SCK-8016	SCK-8025
Flange size	KF-16	KF-25
dia.A	30	40
dia.B	20.0	27.2
dia.C	16	24
D	40	50

Reducer (Material : SUS304)



Standard	SCK-9025	SCK-9040
Flange size	KF-16/25	KF-25/40
dia.A	30	40
dia.B	40	55
dia.C	20.0	27.2
dia.D	16	24

KF Flange (Material : SUS304)



Standard	SCK-3016	SCK-3025	SCK-3040
Flange size	KF-16	KF-25	KF-40
dia.A	30	40	55
dia.B	17.2	26.2	41.2
Connected pipe	dia.20 t = 2	20A 10S	32A 10S
dia.C	16	24	39
dia.D	20.0	27.2	42.7
E	10	20	20

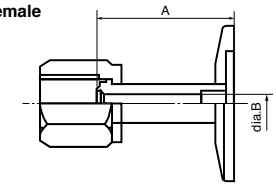
Optional Parts

Accessories for Oil Rotary Vacuum Pumps

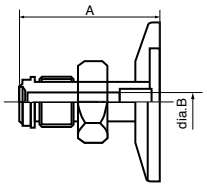
units : mm.

VCR Adapters (Material : Joint = SUS316, Flange = SUS304)

Female



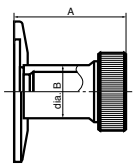
Male



	Standard	SCA-1614-F	SCA-1638-F	SCA-1612-F	SCA-2514-F	SCA-2538-F	SCA-2512-F
Female	Flange size	KF-16	KF-16	KF-16	KF-25	KF-25	KF-25
	Tube diameter	1/4 inch	3/8 inch	1/2 inch	1/4 inch	3/8 inch	1/2 inch
	A	35.8	42.1	40.6	35.8	40.6	40.6
	dia.B	3.0	7.1	10.2	4.6	7.1	10.2

	Standard	SCA-1614-M	SCA-1638-M	SCA-1612-M	SCA-2514-M	SCA-2538-M	SCA-2512-M
Male	Flange size	KF-16	KF-16	KF-16	KF-25	KF-25	KF-25
	Tube diameter	1/4 inch	3/8 inch	1/2 inch	1/4 inch	3/8 inch	1/2 inch
	A	35.8	42.1	40.6	35.8	40.6	40.6
	dia.B	3.0	7.1	10.2	4.6	7.1	10.2

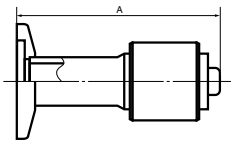
Gauge port (Material : SUS304)



Standard	SCO-1025	SCO-1040
Flange size	KF-25	KF-40
Pipe diameter	dia.15	dia.15
A	74	58
dia.B	25	25

Standard	SCO-2025	SCO-2040
Flange size	KF-25	KF-40
Pipe diameter	dia.18	dia.18
A	74	58
dia.B	28	28

Leak port (Material : SUS304)



Standard	SCO-3016	SCO-3025
Flange size	KF-16	KF-25
A	65	66.5

Flexible tube (Material : SUS316)

Standard	Flange size (mm)
STK-016-250	KF-16/250
STK-016-500	KF-16/500
STK-016-1000	KF-16/1000
STK-025-250	KF-25/250
STK-025-500	KF-25/500
STK-025-1000	KF-25/1000
STK-040-250	KF-40/250
STK-040-500	KF-40/500
STK-040-1000	KF-40/1000

Rubber Vacuum Hose

• It covers each meter up to 10 meters. (at the most)

Size (I.D. × O.D.)	Adaptable hose port
6 × 18	dia.8
7.5 × 20	dia.9※
9 × 24	dia.11, dia.12
12 × 30	dia.15
15 × 36	dia.16※, dia.18
18 × 42	dia.20, dia.22
25 × 50	dia.27

※ Some of the Dry Vacuum Pumps may not be suited in this size. Please kinaly contact us in this case.

Optional Parts

Suction and Exhaust Pipes for Oil Rotary Vacuum Pumps

Suction Pipes

Type	Product	Material	GHD-031	GLD-040 GCD-051X	GLD-136A GLD-136C GLD-201A GLD-201B GCD-136X GCD-201X	Photo number
Hose port type	Hose port suction pipe (dia.8 × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	①
	Hose port suction pipe (dia.12 × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	②
	Hose port suction pipe (dia.15 × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	③
	Hose port suction pipe (dia.18 × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	④
	Hose port suction pipe (dia.22 × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	⑤
	Hose port suction pipe (dia.27 × 40 mm sq)	ZDC + plate		▲		⑥
	Hose port suction pipe (dia.27 × 50 mm sq)	ZDC + plate			▲	⑦
For GHD-031 only	Hose port suction pipe for GHD-031 (dia.12)	BS + plate	▲			⑧
	Hose port suction pipe for GHD-031 (dia.18)	BS + plate	▲			⑨
	Suction pipe for GHD-031 (KF-16)	BS + plate	●			
KF-25 type	KF-25 suction pipe (KF-25 × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	⑩
	KF-25 suction pipe (KF-25 × 40 mm sq)	PPS		●		⑪
	KF-25 suction pipe (KF-25 × 50 mm sq)	PPS			●	⑫
1/4 screw type	A-type suction pipe (R1/4-L20 Male × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	⑬
	B-type suction pipe (R1/4 Female × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	⑭
	C-type suction pipe (R1/4-L10 Male × M20)	BS + plate		▲ + 40 mm sq	▲ + 50 mm sq	⑮
Adapter	40 mm sq Adapter (M20 Female)	ZDC + plate		▲		⑯
	50 mm sq Adapter (M20 Female)	ZDC + plate			▲	⑰

● : Standard type
▲ : Replaceable (no Adapters necessary) ▲ + 40 mm sq : Replaceable (40 mm sq Adapter required) ▲ + 50 mm sq : Replaceable (50 mm sq Adapter required)

Suction Pipe

Exhaust Pipe

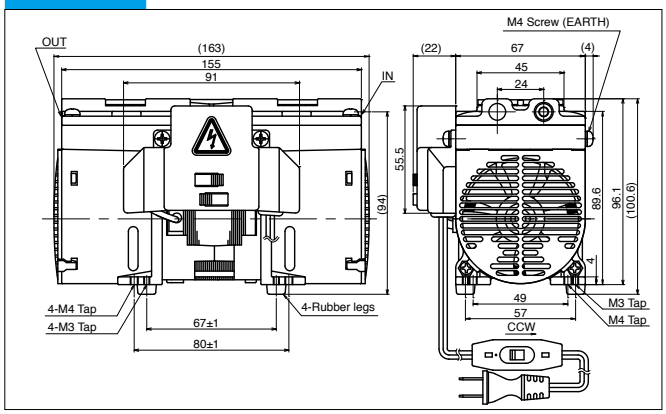
Exhaust Pipes

Type	Product	Material	GLD-040	GHD-031	GLD-136A GLD-136C GLD-201A GLD-201B	GCD-051X	GCD-136X GCD-201X	Photo number
Hose port type	Hose port exhaust pipe (dia.15 × G3/4)	BS + plate	▲	▲		▲		⑱
	Hose port exhaust pipe (dia.18 × G3/4)	BS + plate	▲	▲		▲		⑲
	Hose port exhaust pipe (dia.27 × G1)	BS + plate			▲		▲※	⑳
KF flange type	KF-25 exhaust pipe (KF-25 × G3/4)	PPS	▲	▲		●		㉑
	KF-25 exhaust pipe (KF-25 × G1)	PPS			▲		●	㉒
	KF-16 exhaust pipe (G3/4)	BS + plate		▲				
Exhaust pipe	Exhaust pipes Assy (G3/4)	PA	●	●		▲		
	Exhaust pipes Assy (G1)	PA			●		▲※	

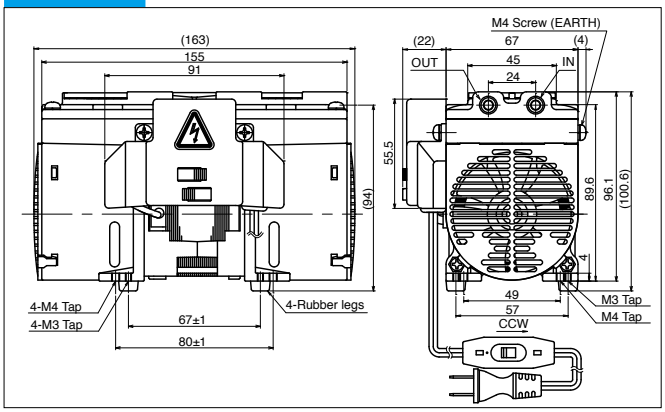
※ Remarks: Different anti-corrosive quality as standard exhaust pipes.
● : Equipped with vacuum pump ▲ : Replaceable (no Adapters necessary)

Outline Drawings

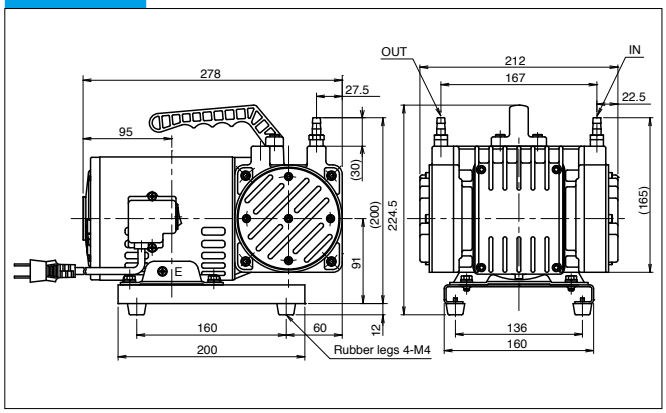
Dry pump DAP-6D (see p.6)



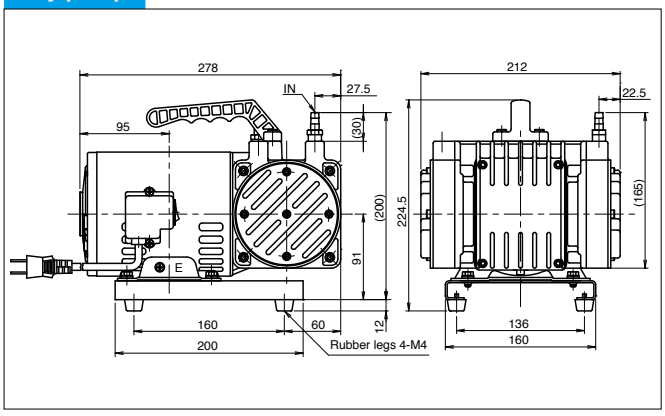
Dry pump DAP-12S (see p.6)



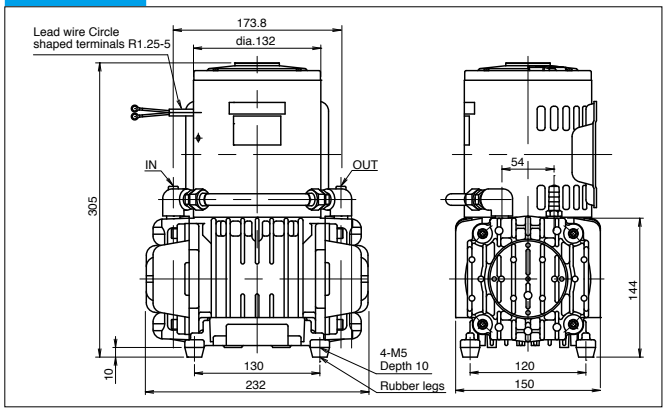
Dry pump DA-30D (see p.7)



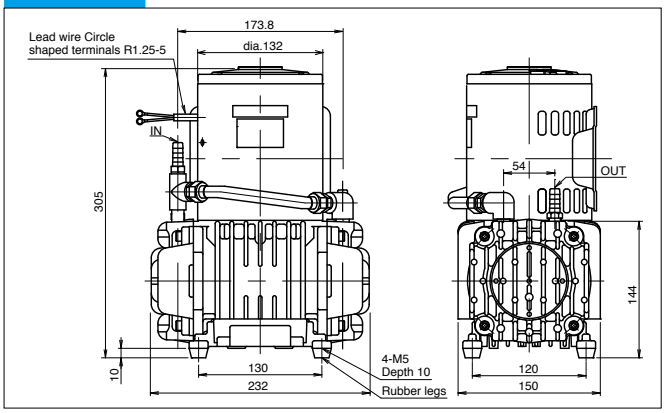
Dry pump DA-60S (see p.7)



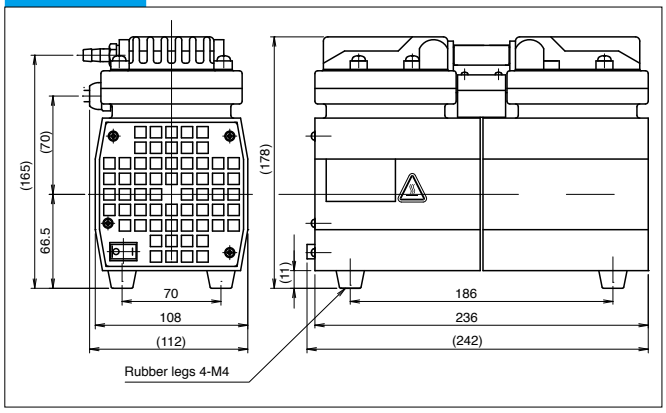
Dry pump DAT-50D (see p.7)



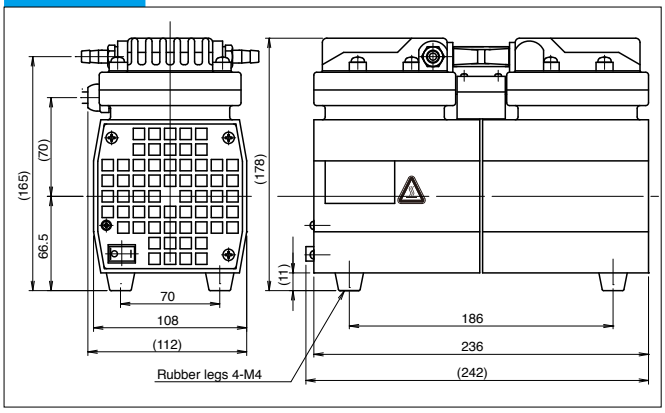
Dry pump DAT-100S (see p.7)



Dry pump DA-20D (see p.8)

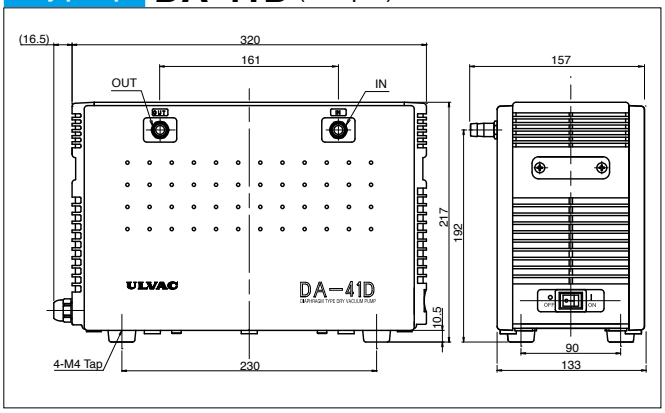


Dry pump DA-40S (see p.8)

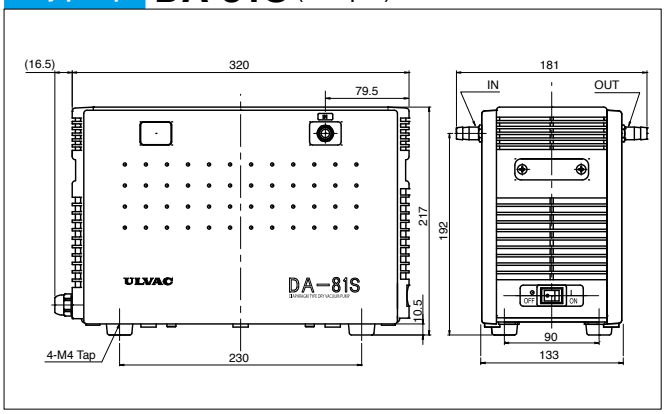


All size unit is mm

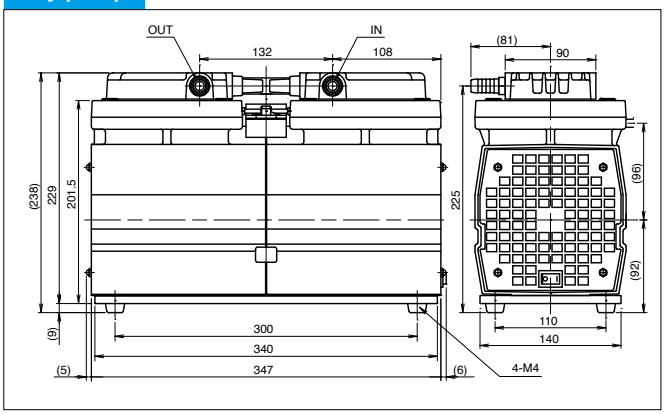
Dry pump DA-41D (see p.8)



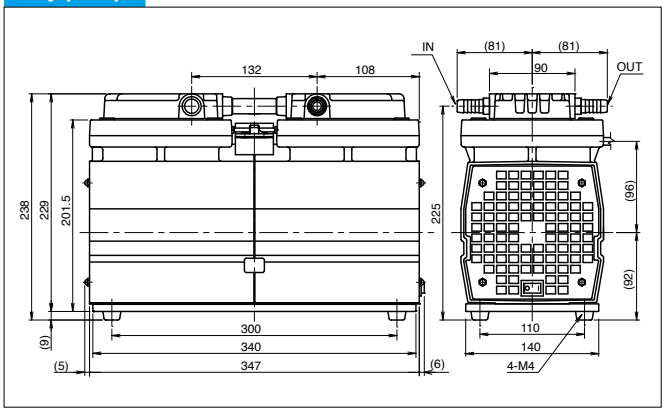
Dry pump DA-81S (see p.8)



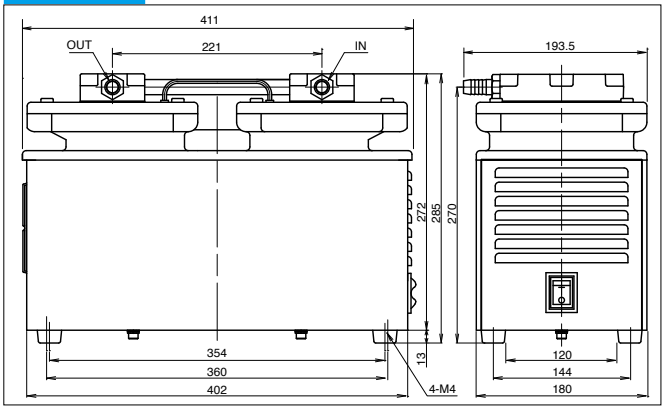
Dry pump DA-60D (see p.9)



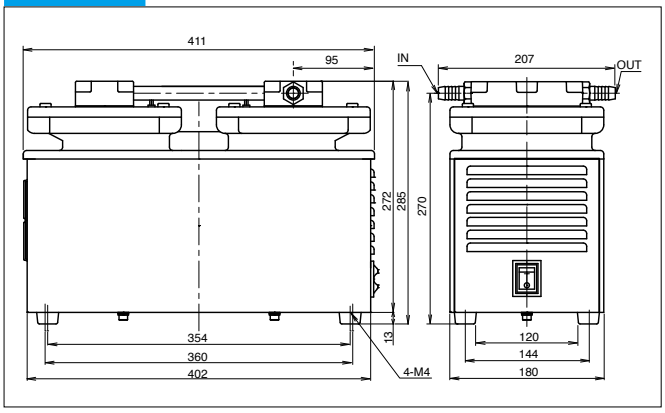
Dry pump DA-120S (see p.9)



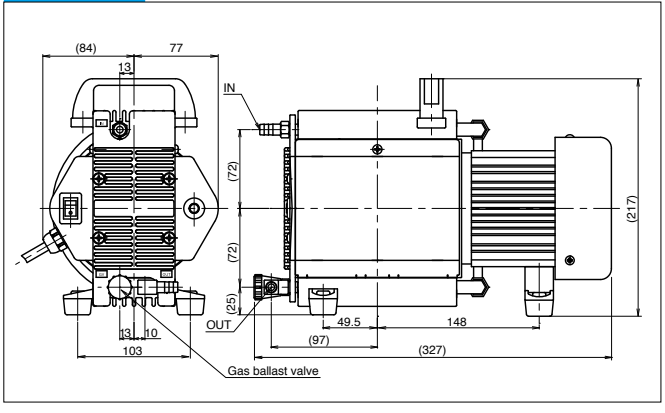
Dry pump DA-121D (see p.9)



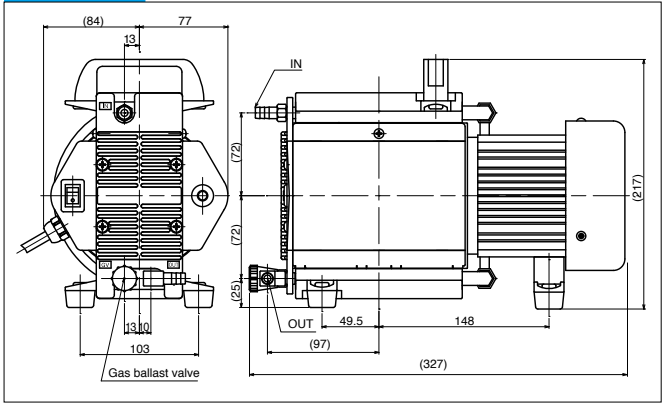
Dry pump DA-241S (see p.9)



Dry pump DAU-20 (see p.10)

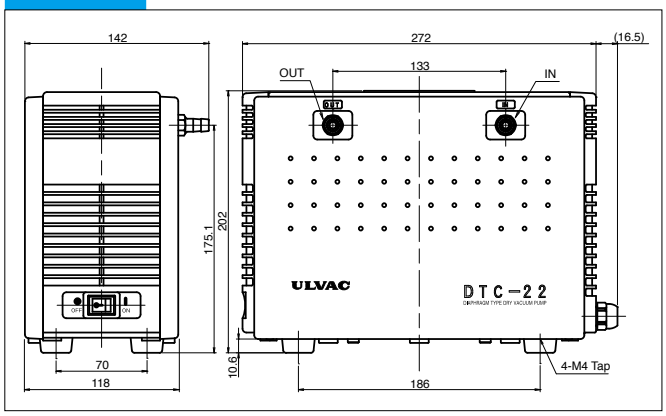


Dry pump DTU-20 (see p.10)

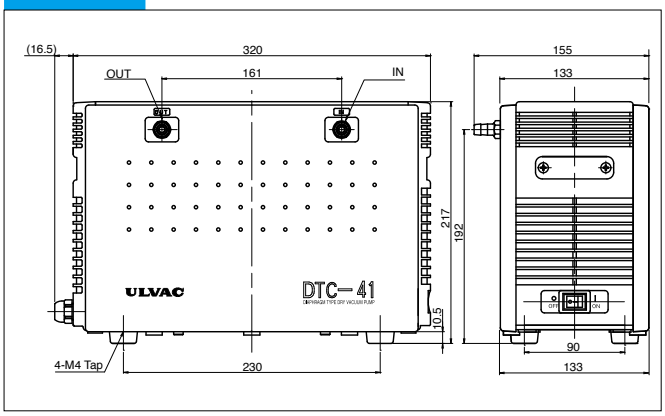


Outline Drawings

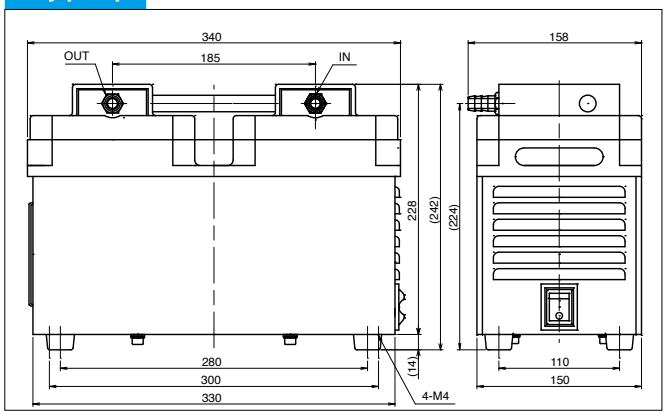
Dry pump DTC-22 (see p.11)



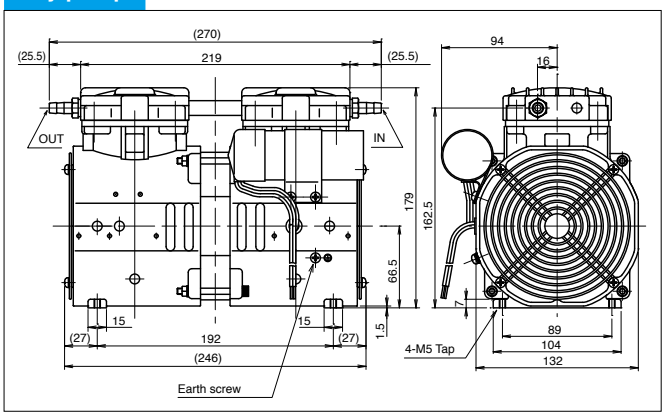
Dry pump DTC-41 (see p.11)



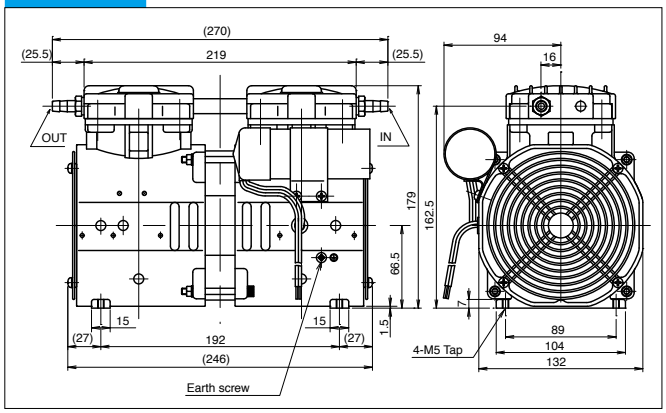
Dry pump DTC-60 (see p.11)



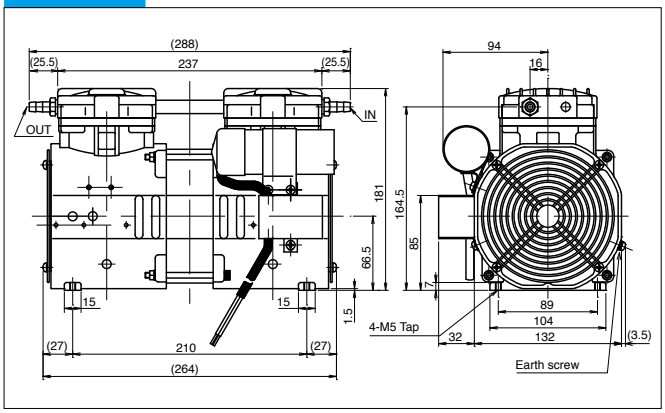
Dry pump DOP-40D (see p.12)



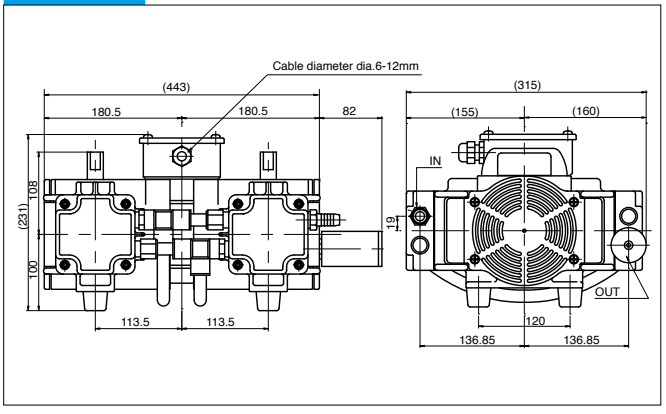
Dry pump DOP-80S (see p.12)



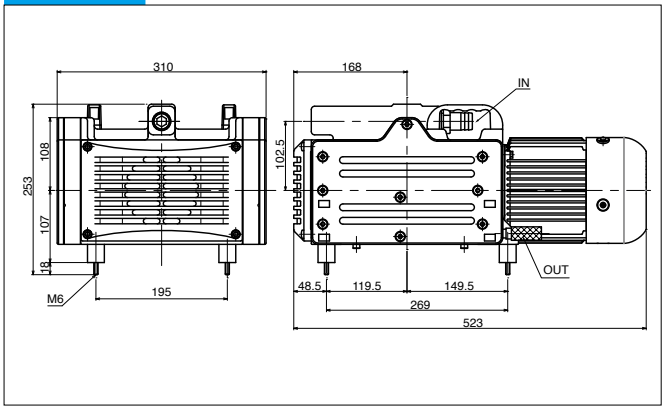
Dry pump DOP-80SP (see p.12)



Dry pump DOP-300SA (see p.13)

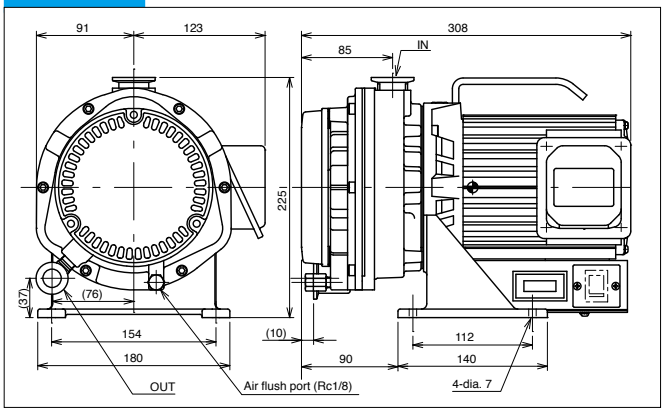


Dry pump DOP-420SA (see p.13)

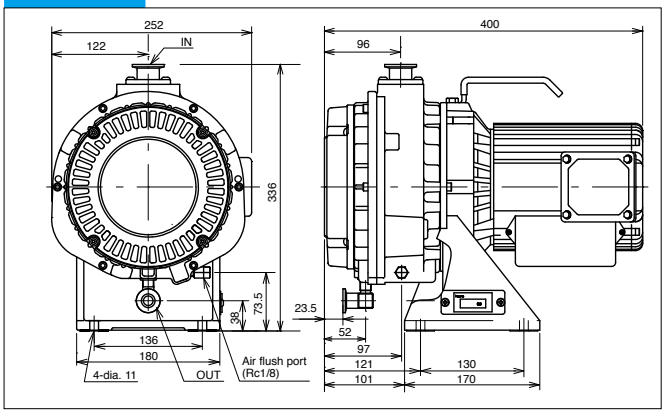


All size unit is mm

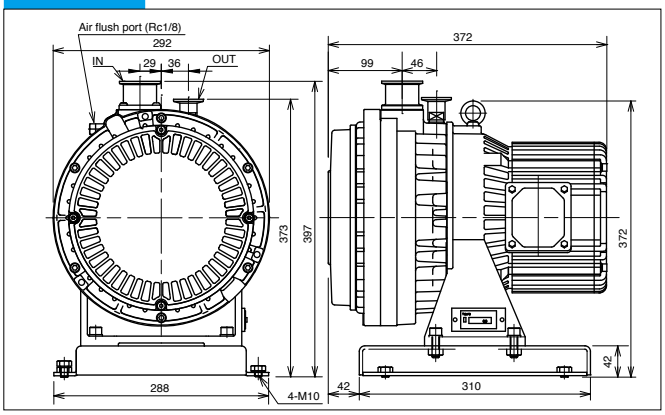
Dry pump DIS-90 (see p.14)



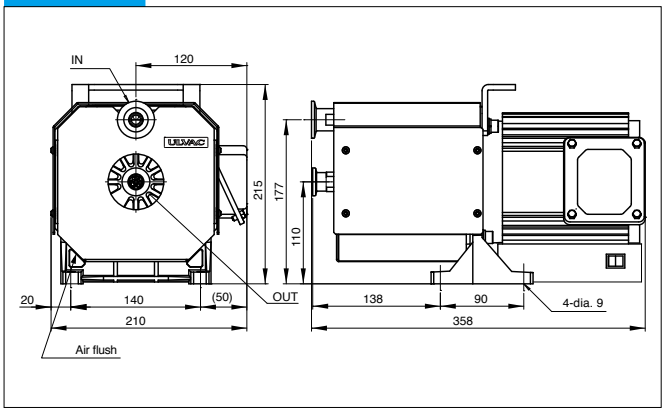
Dry pump DIS-251 [Single phase] (see p.14)



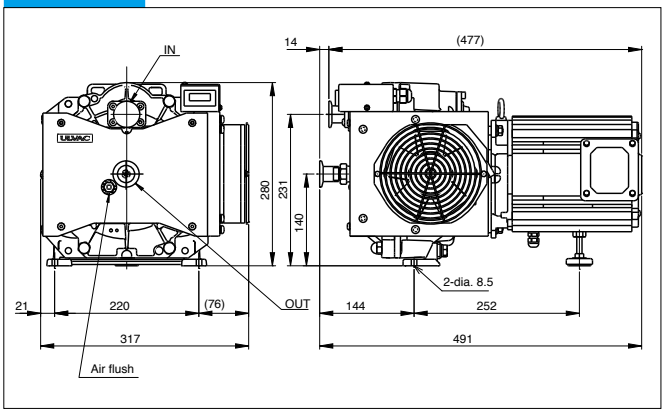
Dry pump DIS-501 [Three phase] (see p.14)



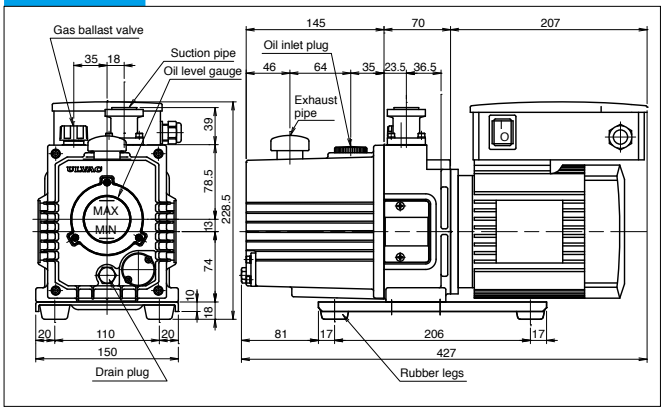
Dry pump DISL-101 (see p.15)



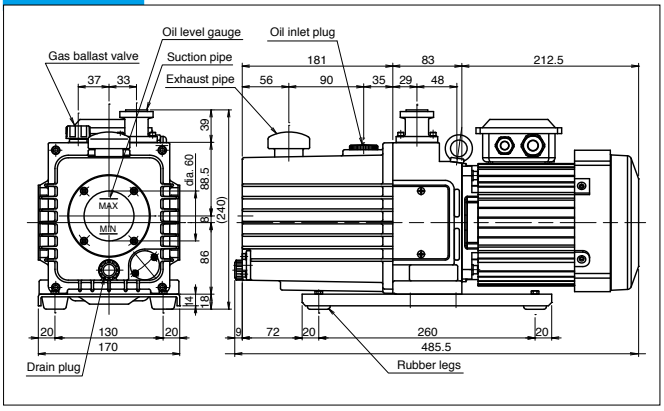
Dry pump DISL-502 (see p.15)



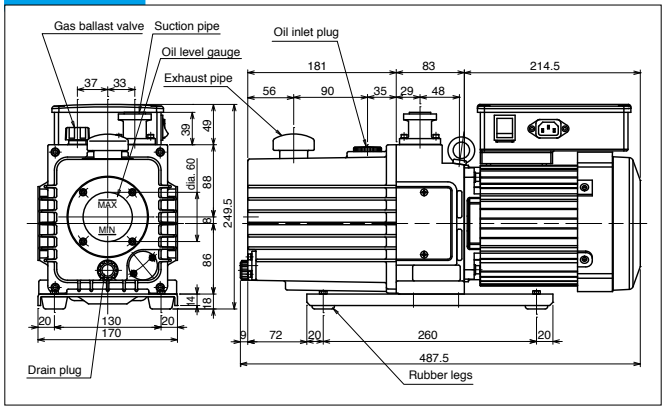
Oil pump GLD-040 (see p.16)



Oil pump GLD-136A (see p.16)

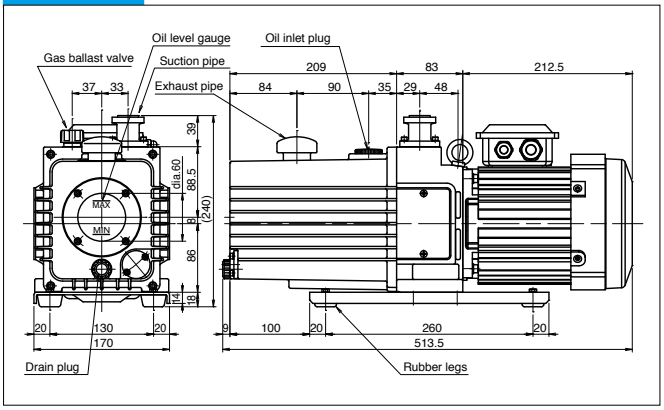


Oil pump GLD-136C (see p.16)

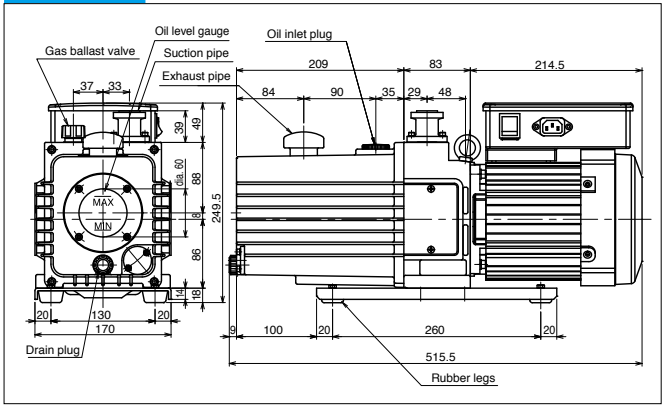


Outline Drawings

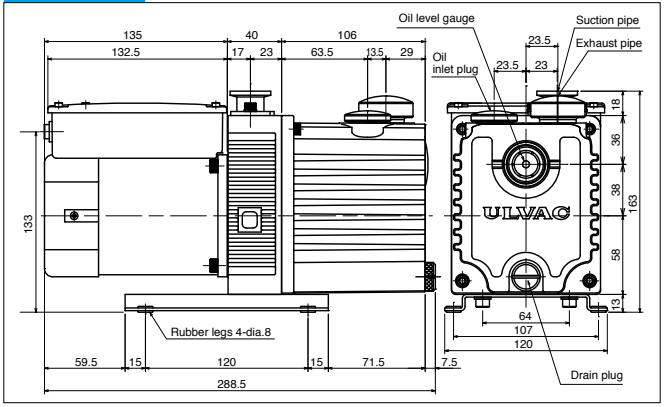
Oil pump GLD-201A (see p.17)



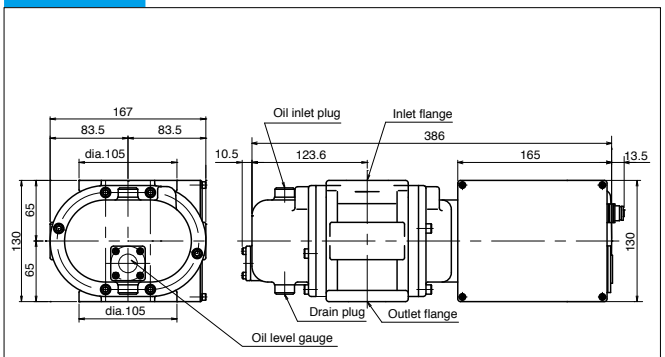
Oil pump GLD-201B (see p.17)



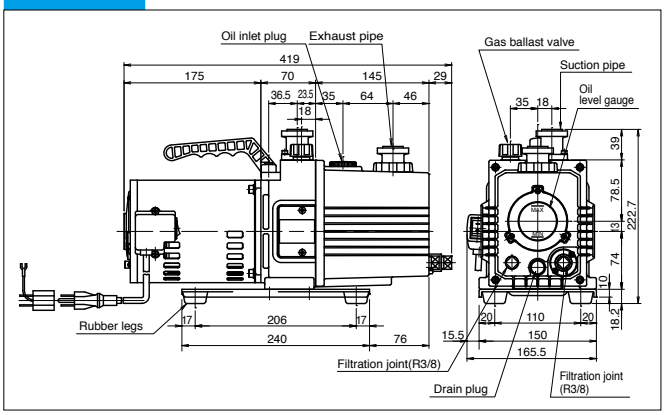
Oil pump GHD-031 (see p.18)



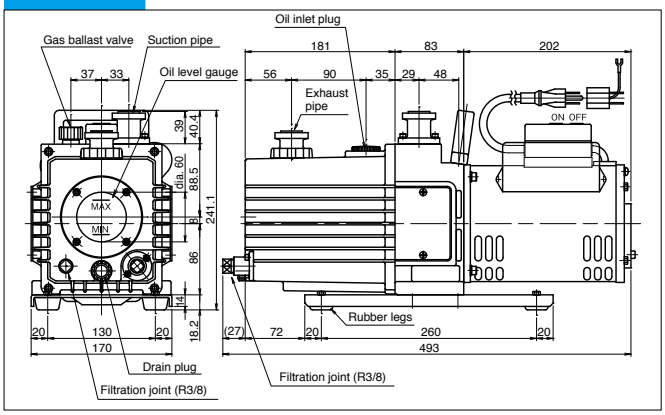
Oil pump MBS-052 (see p.18)



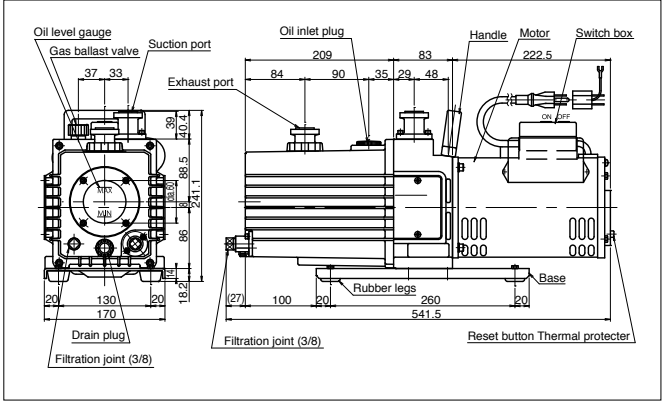
Oil pump GCD-051X (see p.19)



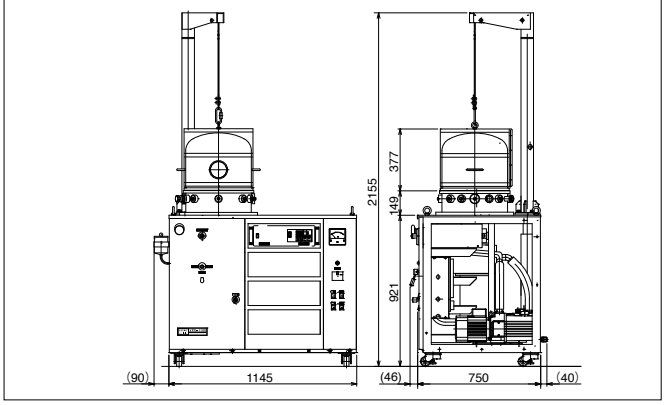
Oil pump GCD-136X (see p.19)



Oil pump GCD-201X (see p.19)

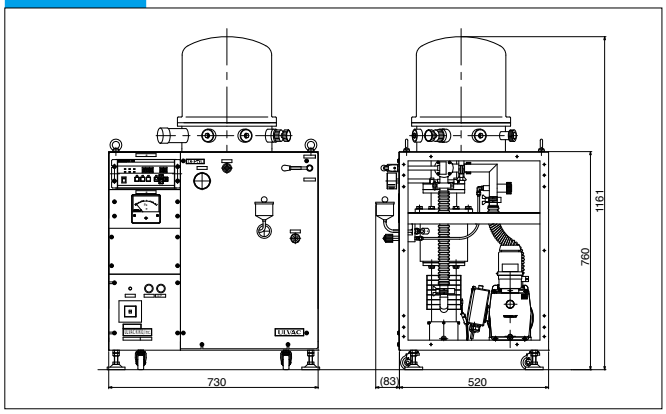


System VPC-1100 (see p.20)

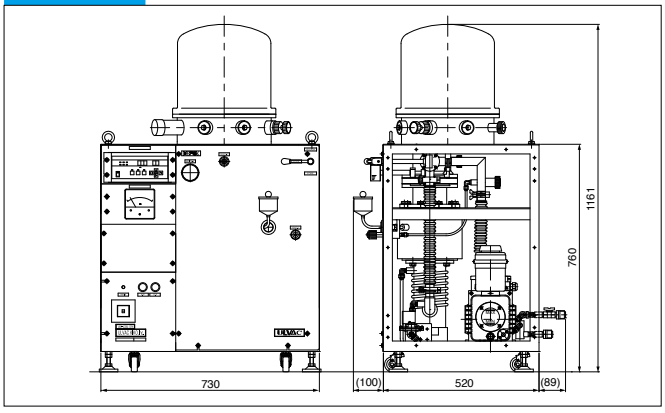


All size unit is mm

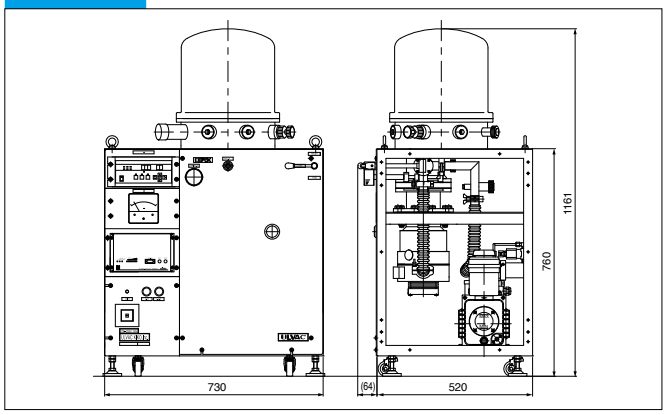
System VFR-200M/ERH (see p.21)



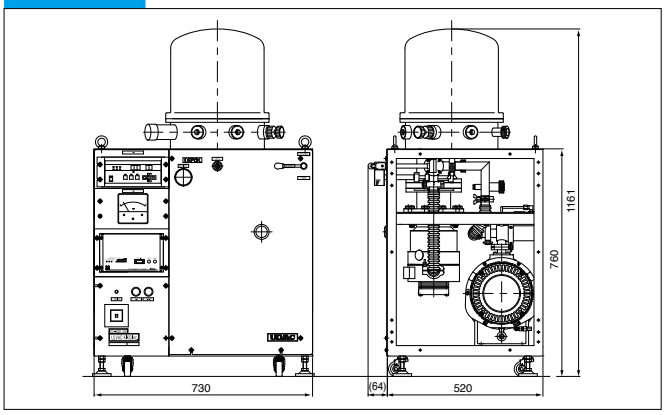
System VWR-400M/ERH (see p.21)



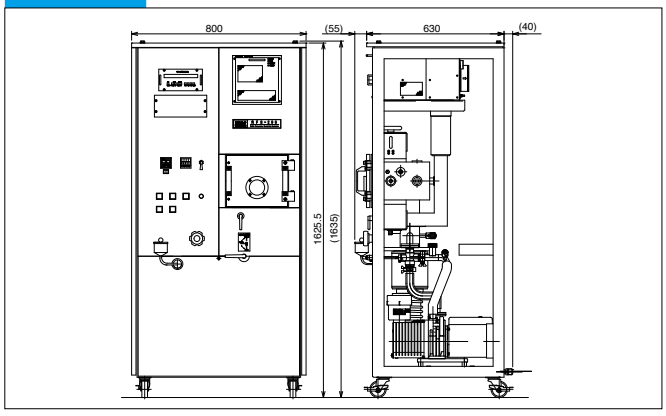
System VTR-350M/ERH (see p.21)



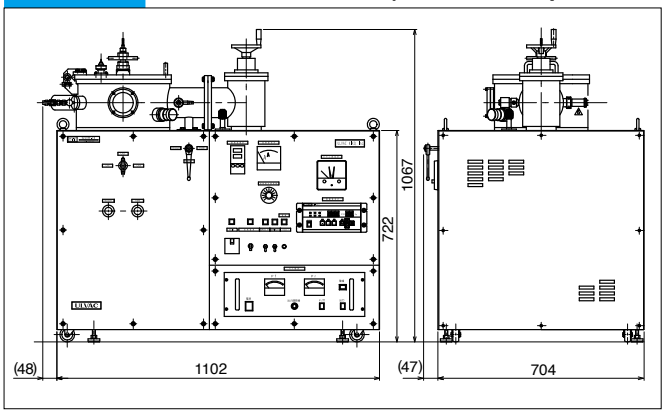
System VTS-350M/ERH (see p.21)



System RFS-200 (see p.22)



System VTR-150M/SRF (SCOTT-C3) (see p.23)



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