

Lineup of Vacuum Components

General Vacuum Products Catalogue
Components Division

Ulvac Россия 8-812-989-01-72 info@ulvac.org ULVAC, Inc.
Vol.01

■ Pressure unit conversion table

Pa (N·m ⁻²)	Torr (mmHg)	Bar	kg·cm ⁻²	Psi (lb·in ⁻²)	atm	Water Column (15°C) m
1	7.500 62x10 ⁻³	10 ⁻⁵	1.019 72x10 ⁻⁵	1.450 38x10 ⁻⁴	9.869 23x10 ⁻⁶	1.020 63x10 ⁻⁴
133.322	1	1.333 22x10 ⁻³	1.359 51x10 ⁻³	1.933 68x10 ⁻²	1.315 79x10 ⁻³	1.360 73x10 ⁻²
10 ⁵	750.062	1	1.019 72	14.503 8	0.986 923	10.206 3
9.806 65x10 ⁴	735.559	0.980 665	1	14.223 4	0.967 841	10.009 0
6.894 75x10 ³	51.714 9	6.894 75x10 ⁻²	7.030 69x10 ⁻²	1	6.804 59x10 ⁻²	0.703 702
1.013 25x10 ⁵	760	1.013 25	1.033 23	14.696 0	1	10.341 6
9.797 82x10 ³	73.489 7	9.797 82x10 ⁻²	9.991 0x10 ⁻²	1.421 06	9.669 70x10 ⁻²	1

1 lb·in⁻² = 144 lb·ft⁻², 1 short ton·ft⁻² = 0.945 08 atm, psi: pound per square inch

■ Flow rate unit conversion table

Pa·m ³ ·s ⁻¹	Torr·L·s ⁻¹	atm·cm ³ ·s ⁻¹	mbar·m ³ ·s ⁻¹	molecule·s ⁻¹	sccm
1	7.500 62	9.869 23	10	2.651 65x10 ²⁰	5.921 540x10 ²
0.133 322	1	1.315 79	1.333 22	3.535 23x10 ¹⁹	78.947 4
0.101 325	0.76	1	1.013 25	2.686 78x10 ¹⁹	60
0.1	0.750 062	0.986 923	1	2.651 65x10 ²¹	59.215 40
3.771 24x10 ⁻²¹	2.828 67x10 ⁻²⁰	3.721 92x10 ⁻²⁰	3.771 24x10 ⁻²⁰	1	2.233 15x10 ⁻¹⁸
1.688 75x10 ⁻³	1.266 67x10 ⁻²	1.666 67x10 ⁻²	1.688 75x10 ⁻²	4.477 97x10 ¹⁷	1

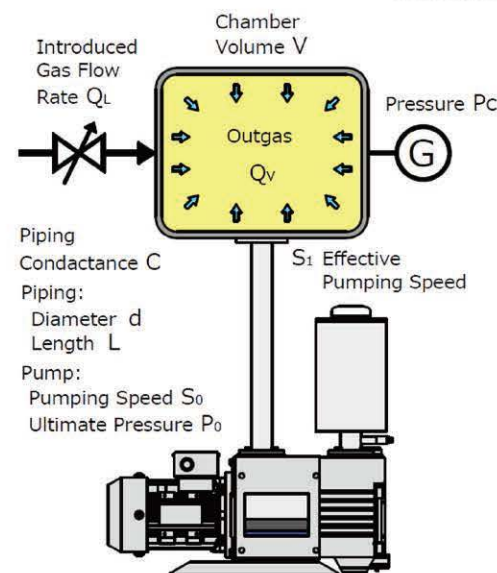
molecule is ideal gas (value of 0°C), sccm: standard cubic centimeter per minute

■ Pumping speed and conductance unit conversion table

m ³ ·s ⁻¹	L·s ⁻¹	L·min ⁻¹	cm ³ ·s ⁻¹	m ³ ·hr ⁻¹	ft ³ ·s ⁻¹
1	10 ³	6x10 ⁴	10 ⁶	3600	35.31
10 ⁻³	1	60	10 ³	3.6	3.531x10 ⁻²
1.667x10 ⁻⁵	1.667x10 ⁻²	1	16.67	0.06	5.885x10 ⁻⁴
10 ⁻⁶	10 ⁻³	0.06	1	3.6x10 ⁻³	3.531x10 ⁻⁵
2.778x10 ⁻⁴	0.277 8	16.67	2.778x10 ²	1	9.808x10 ⁻³
2.832x10 ⁻²	28.32	1.699x10 ³	2.832x10 ⁴	1.019 52x10 ²	1

■ Pumping speed calculation (viscous flow range)

Followings show how to calculate pumping speed in the range of viscous flow when using oil rotation vacuum pumps, dry vacuum pumps, mechanical booster pumps, etc. (Actual result could change from the calculated value depending on vacuum chamber, piping shape, contents in side chamber, leak rate, outgas, etc.)



- (1) Pressure inside vacuum chamber "Pc" being maintained constant while introducing certain amount of gas "Q_L" is calculated by formula "A" below.
- (2) Time "Δt" when pumping down a vacuum chamber with volume "V" from pressure "P₁" to "P₂" is calculated by formula "B" below. To get more precise result, totalize all result after calculation by dividing pressure range in scope in narrow scope.

To get conductance "C" of pipe.

$$C = 1349 \times d^4 / L \times P_{AV}$$

To get effective pumping speed "S₁".

$$S_1 = 1 / (1/S_0 + 1/C)$$

To get pressure "Pc" of vacuum chamber.

$$P_C = (Q_L + Q_v) / S_1 + P_0$$

To get pumping time "Δt".

$$\Delta t = 2.3 \times V / S_1 \times \text{Log}_{10} (P_1/P_2)$$

- V: Vacuum chamber volume (m³)
- L: Piping length (m)
- d: Piping diameter (m)
- Q_L: Introduced gas volume (Pa·m³/sec)
- Q_v: Outgas inside vacuum chamber (Pa·m³/sec)
- S₀: Pumping speed (m³/sec)
- S₁: Effective pumping speed (m³/sec)
- P_{AV}: Average pressure inside piping (Pa)
- P₀: Ultimate pressure of vacuum pump itself (Pa)
- P₁ (Pa) > P₂ (Pa)
- Pc: Pressure inside vacuum chamber (Pa)
- C: Piping conductance (m³/sec)
- Δt: Pumping time (sec)

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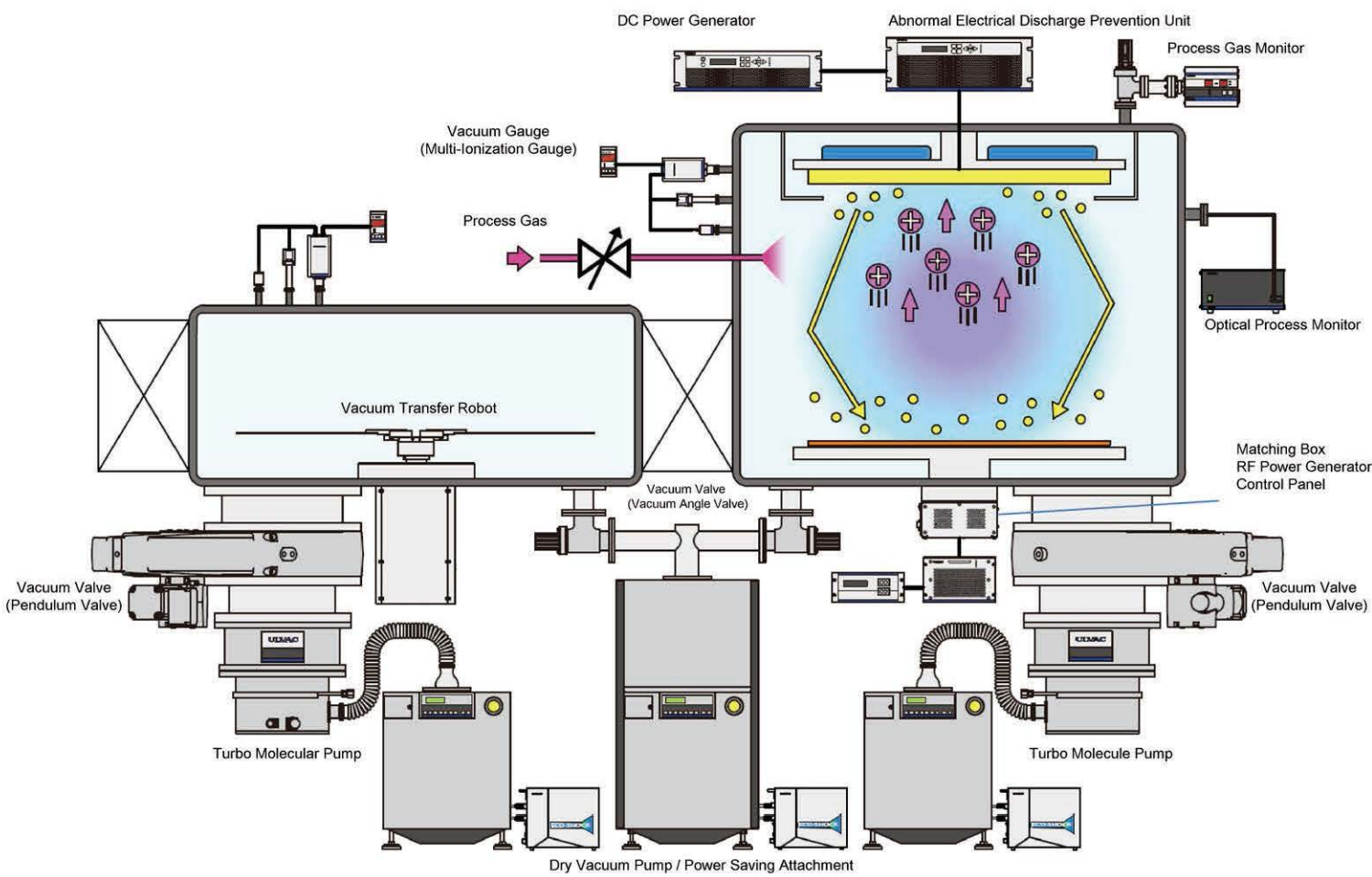
P.52 Accessories

P.56 Molecular Interaction Analyzer

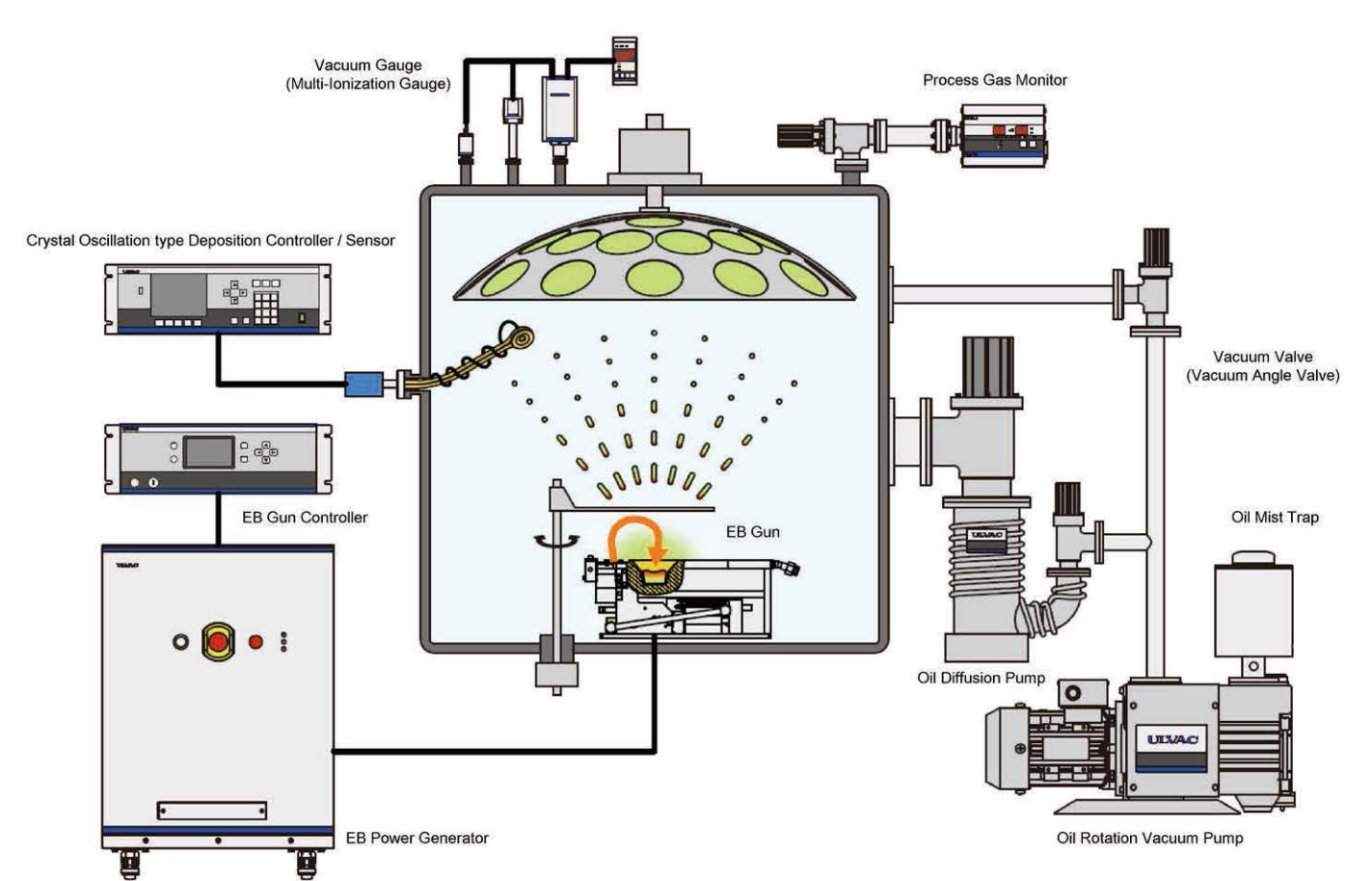
P.57 Precise Microplate Paddle Mixer

Examples of Use in Vacuum Equipments

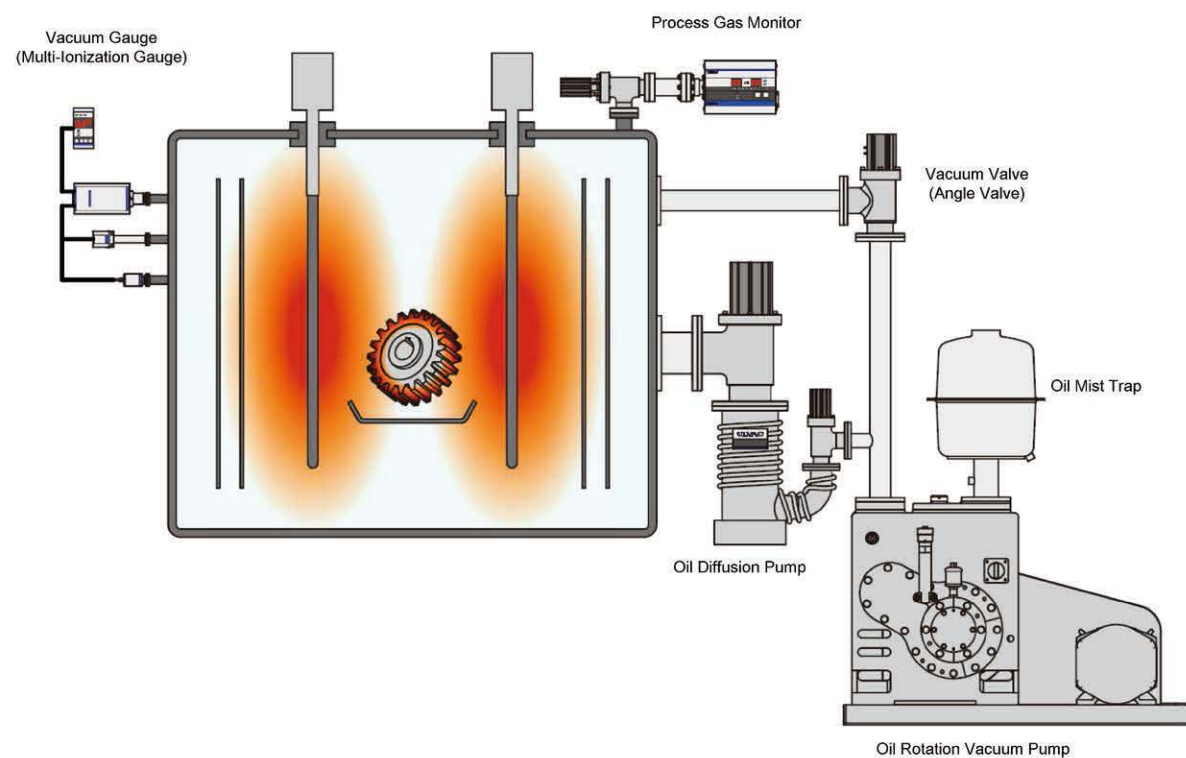
Sputtering Equipment



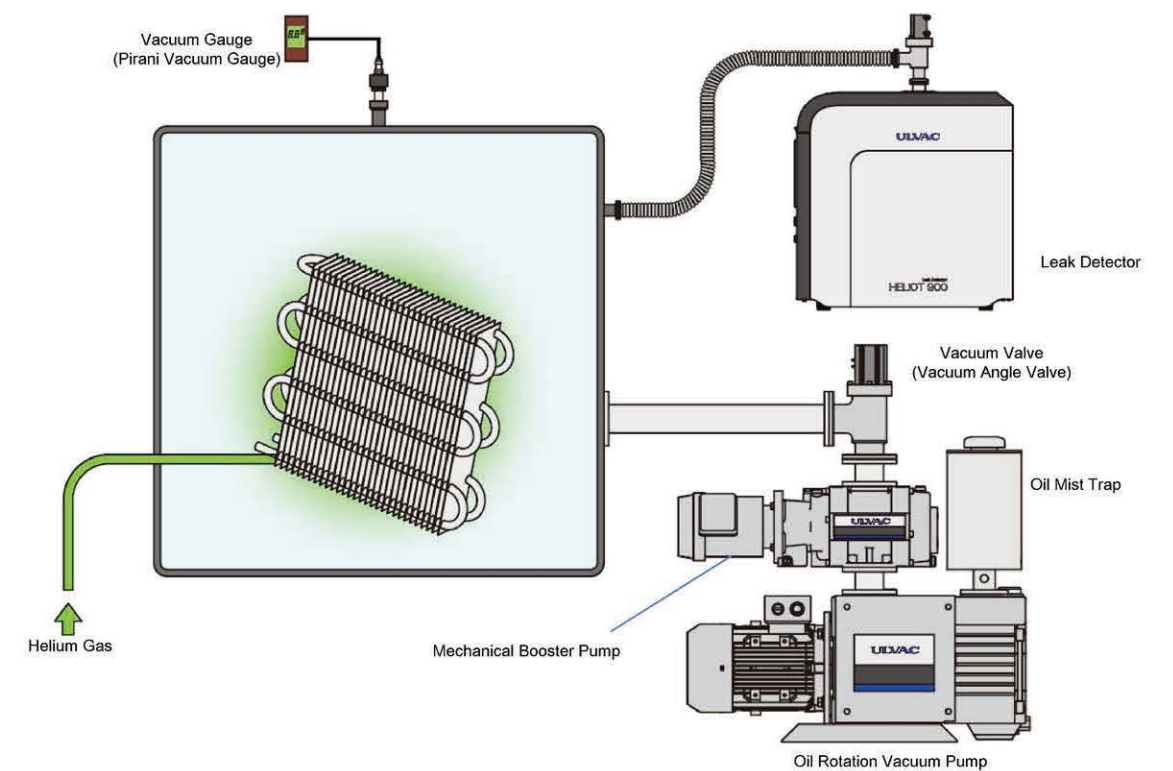
Evaporation Equipment



Vacuum Heat Treatment Furnace



Leak Test System



Selection Guide

Selection Guide (Application Examples)

Product	Pa	1E-10	1E-9	1E-8	1E-7	1E-6	1E-5	1E-4	1E-3	1E-2	1E-1	1E+0	1E+1	1E+2	1E+3	1E+4	1E+5
	mbar	1E-12	1E-11	1E-10	1E-9	1E-8	1E-7	1E-6	1E-5	1E-4	1E-3	1E-2	1E-1	1E+0	1E+1	1E+2	1E+3
	Torr	7.5E-13	7.5E-12	7.5E-11	7.5E-10	7.5E-9	7.5E-8	7.5E-7	7.5E-6	7.5E-5	7.5E-4	7.5E-3	7.5E-2	7.5E-1	7.5E+0	7.5E+1	7.5E+2
Dry Vacuum Pump	LR/HR/UR series																
	CR series																
	GR series																
	VD series																
Oil Rotary Vacuum Pump	VS series																
	PVD series																
	PKS series																
	PMB series Ver.D																
Mechanical Booster Pump	PRC series																
	PMB-C series																
Turbo Molecular Pump	UTM-FW/FH series																
	UTM300B																
	UTM series																
Oil Diffusion Pump	ULK series																
	PFL series																
Oil Diffusion Ejector Pump	PBL series																
Sputter Ion Pump	Acter Pump PST series																
Titanium Getter Pump	PGT series																

Vacuum pumps are also used for the following applications other than for the exhaust of gases such as for clean air.

✓✓✓: Highly recommended. ✓✓: Recommended. ✓: Usable depending on conditions.

Product	Model	Water vapor	Flammable gas	Dust	Sublimation gas
Dry Vacuum Pump	LR series	✓✓	✓	✓✓	✓
	HR / UR series	✓✓	✓	✓✓	✓✓✓
	CR series	✓✓	✓		
	GR series	✓✓	✓	✓✓	✓
Oil Rotary Vacuum Pump	VD series	✓✓	✓	✓✓	✓
	VS series	✓✓	✓	✓✓	✓
	PVD series	✓✓	✓		
	PKS series	✓✓	✓	✓✓✓	✓

Dry vacuum pump Multi-stage roots type

To the Inlet of Next Stage
To the Inlet of Next Stage inlet

Inlet
Cylinder
Rotor

A clean pumping down because oil is not used in the working chamber. It is effective for CVD and etching processes as there are no oil which react to active gases.

Oil rotary vacuum pump Rotary vane type

Inlet
Outlet
Rotor
Vane
Cylinder
Spring

Low vibration and high compression efficiency. It is the pump which mostly used for industrial uses.

Oil rotary vacuum pump Rotary plunger type

Inlet
Outlet Valve
Vane Guide
Rotor
Slide Vane
Cylinder

Robust and comparatively strong for foreign materials. Workable for long term with appropriate regular maintenance.

Power saving attachment for Dry vacuum pump

Inlet
Outlet
Valve Unit
Dry Vacuum Pump
ECO-SHOCK Body

An attachment which could reduce electric power of dry vacuum pumps by connecting to dry vacuum pumps.

Mechanical booster pump Roots type

Inlet
Rotor
Cylinder
Outlet

It is possible to accelerate pumping speed in the pressure range where pumping speed of dry vacuum pump and oil rotary vacuum pump decreases.

Turbo molecular pump

Inlet (high vacuum side)
Rotation Direction
1st rotor blade
1st stator blade
2nd rotor blade
2nd stator blade
Outlet (low vacuum side)

From high to ultra high vacuum generated by high speed rotating turbine blade with tend of thousands rpm. It is not a sorption type and possible to continue evacuation.

Oil diffusion pump

Inlet
Cylinder
Cooling Pipe
Oil Vapor
Boiler
Heater
Outlet
OIL

Air exhaust and high vacuum creation by oil vapor blast.

Sputter ion pump

Power Supply
Anode
Titanium Electrode
Magnet
Titanium
Electron
Gas molecule
Ion
Titanium Atom

A ultra high vacuum pump which uses the getter function by sputtered active titanium. There is not any rotation part.

Titanium getter pump

Titanium Atom
Exhaust Atom
Titanium
Deposited Film
Cooling Pipe
Titanium Vapor
Chamber Customer provided

Gas molecule absorption and evacuation by titanium which is active by evaporation.

Example of water vapor evacuation and problems

< Problems >

- Water condensation
- Oil deterioration

Inlet
Cooling Water Trap
Outlet
Oil-Water Separator

Countermeasures in pumps: Oil rotation vacuum pump → Gas ballast valve, oil exchange, oil water separator.
Dry vacuum pump → Gas ballast.
Countermeasure in the Inlet port: Water cooling trap for the high temperature water vapor.
Countermeasure in the Outlet port: Piping connection not to return water to pump.

Example of combustible gas evacuation and problems

< Problems >

- Oxygen interfusion (leak)
- Spark, heat flammability
- Explosion

Inlet
Outlet
Conductive Piping
N2 Dilution
Oil Mist Trap
N2 Dilution
Explosion-Proof Motor

Countermeasures in pumps: Oil rotation vacuum pump → Helium tight type, explosion-proof motor, electrostatic belt, oil mist trap (helium tight type).
Dry vacuum pump → GR series.
Countermeasure in the Inlet port: Conductive piping, dilution with N2 purge.
Countermeasure in the Outlet port: Conductive piping, dilution with N2 purge.

Example of dusty gas evacuation and problems

< Problems >

- Foreign matter gnawing
- Piping blockage

Dust Filter
Inlet
Conductive Piping
Outlet
Oil Filtration

Countermeasures in pumps: Oil rotation vacuum pump → Oil exchange, oil kind change, oil filtration.
Dry vacuum pump → Purge gas from the Inlet port, gas ballast, Dust trap.
Countermeasure in the outlet port: Prevention of explosion by overpressure due to dust clogging.

Example of sublimation gas evacuation and problems

< Problems >

- Deposition of reactive product (solid substance)

Outlet
Pipe Heating
Inlet
Pipe Heating
N2 Dilution

Countermeasures in pumps: High temperature type dry vacuum pump UR series + gas ballast gas (N2) introduction.
Countermeasure in the Inlet port: Dilution gas introduction (N2 purge), heated piping.
Countermeasure in the Outlet port: Heated piping.

What is gas ballast...?

Gas ballast is a countermeasure when handling condensable gas such as water vapor, etc. Condensable gas is compressed through compression process inside oil vacuum pump, condensed and changed to liquid which mixes with vacuum pump oil. It is left inside in the case of dry vacuum pump. In order to prevent this, it is possible to let condensable gas exhaust without changing from air state to liquid state by opening gas ballast valve and introducing certain amount of air or nitrogen to the working chamber inside pump.

What is helium tight type...?

It is one of optional selections of oil rotation vacuum pump. This type is tested by the helium leak detector and has a leak tightness specification with 1×10^{-6} (Pa·m³/s) or below.

What is sublimation gas...?

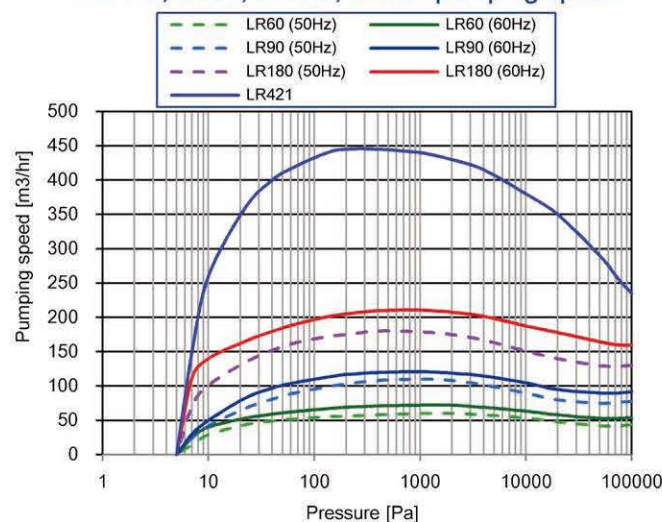
Sublimation gas changes from solid state to gas state without being in liquid state when it is cooled or compressed. There are cases which make difficult to run vacuum pumps because many of sublimation gases generated during CVD and dry etching processes for electronic devices and displays manufacturing will change to solid material.

Roots type LR series

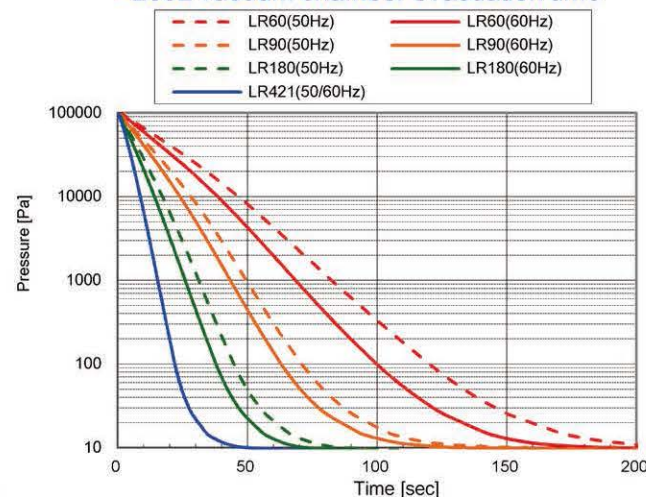
For high speed chamber evacuation.



■ LR60, LR90, LR180, LR421 pumping speed



■ 200L vacuum chamber evacuation time



*The values herein are calculated values. These may vary in actuality depending on the emission of gas, etc.

- Suitable for high speed evacuation for large vacuum chamber because of high pumping speed at high pressure range is high.
- Special surface processing which has high solidity and excellent corrosion resistant is used for their main parts. This reduces corrosion during pumping of corrosive gases.

Model		LR60	LR90	LR180	LR421	LR421-T	LR300	LR600	LR1200	LR1800	LR3601	LR3601-T (TT)	LR3601-R	LR3601-TR (TTR)	
Maximum pumping speed	[m³/h]	50Hz: 62 60Hz: 80	50Hz: 112 60Hz: 126	50Hz: 183 60Hz: 237	440		359 365	653 701	1,012 1,051	1,701 1,784	3,200				
	[L/min]	50Hz: 1,030 60Hz: 1,333	50Hz: 1,860 60Hz: 2,100	50Hz: 3,100 60Hz: 3,950	7,333		5,980 6,080	10,900 11,700	16,900 17,500	28,350 29,700	53,333				
	[CFM]	50Hz: 36 60Hz: 47	50Hz: 66 60Hz: 74	50Hz: 108 60Hz: 139	259		211 215	384 413	596 618	1001 1048	1,883				
	Ultimate pressure [Pa]	5.0					6.7 x 10 ⁻¹					3,200			
	[Torr]	3.7 x 10 ⁻²					5 x 10 ⁻³					53,333			
	[mbar]	5.0 x 10 ⁻²					6.7 x 10 ⁻³					1,883			
Inlet port (optional)		VG50 (KF40)	VG80 (KF50)	VG100	VG80 (KF80)	VG100 (KF100)	VG150								
Outlet port		KF40			VG50	KF40			KF50						
Dry pump surface treatment		with													
Mechanical booster pump surface treatment		n/a	n/a	n/a	n/a	n/a	with			none	T: none TT: with	none	TR: none TTR: with		
Power supply [VAC] (Hz)	3 phase	200 (50/60), 220 (60)		180 to 240, 380 to 440 (50/60)			200 (50/60), 220 (60)			180 to 240, 380 to 440 (50/60)					
Current (at max. load) [A]		7.0	11.8	20.6	48.5		9.6	19	24.2	39.8	58.4	58.4	82	82	
Cooling Water Flow Rate [L/min]		> 5.0			> 4.0		> 5.0			> 4.0					
Nitrogen purge [SLM]	Shaft seal	5													
	Gas ballast	0 to 45			none (*1)	0 to 45	0 to 45			none (*1)	0 to 45	none (*1)	0 to 45		
Weight [kg]		180	245	335	415		251	371	403	553	660	720	660	720	
Dimensions [mm]	W	378	428	528	668		378	470		528	668				
	D	900	967	1,042	1,106		910	987		1,213	1,111				
	H	530	579	645	742		831	951		1,037	1,274				

*) When making a request for an estimate or ordering, notify us about the voltage. *) The LR3601-R/TR/TTR are models which exhaust speed performance in high pressure range had been improved.

*) Surface treatment is selectable for the mechanical booster pumps of the LR300, LR600, LR1200, LR1800.

*1) Specifications with the gas ballast function is available depending on application.

Operation mode	2	3
N ₂ flow rate [SLM]	5	5 to 50

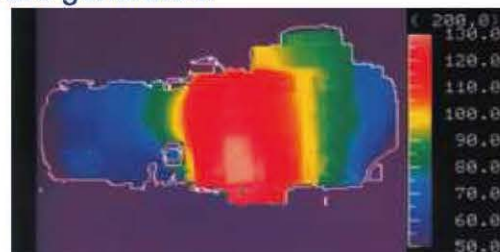
*) Request, if desired, specific mode other than the standard setting when ordering.

*) Standard setting LR: 2 HR and UR: 3

*) N₂ flow rate of the UR421-T, UR1800 and UR3601-TT is from 5 to 200SLM.

Roots type HR / UR series

Whole working chambers inside the pump are uniformly kept at high temperature by utilizing excellent aluminium heat conductivity. Most suitable for processes such as CVD and dry etching processes for semiconductor, electronic devices and displays manufacturing, where sublimation gases are generated.



Whole working chambers inside the pump are uniformly kept at high temperature by utilizing excellent aluminum heat conductivity.

■ Experience in multi layer film process in liquid crystal low temperature polysilicon CVD production line.

UR series is the best for processes where a large volume of sublimation gases occurs.



HR series

Stuck by by-product in 3 months.



UR series

After 12 months running, exceedingly a few by-products are found but the pump could still run.

- High temperature uniformity makes it possible to exhaust reactive gases (sublimation gases) generated in CVD, etching, etc. in gas state, and to restrain from being in solid state.
- Special surface processing which has high solidity and excellent in corrosion resistance is used for their main parts. This reduces corrosion during corrosive gas evacuation.

Model		HR60	HR90	UR421-T	HR300	HR600	UR600	HR1200	UR1200	UR1800	UR3601-TT		
Maximum pumping speed	[m³/h]	50Hz: 62 60Hz: 80	50Hz: 112 60Hz: 126	410	359 365	653 701	653	1,012 1,051	1,012	1,701	2,700		
	[L/min]	50Hz: 1,030 60Hz: 1,333	50Hz: 1,860 60Hz: 2,100	6,833	5,980 6,080	10,900 11,700	10,883	16,900 17,500	16,867	28,350	45,000		
	[CFM]	50Hz: 36 60Hz: 47	50Hz: 66 60Hz: 74	242	211 215	384 413	384	596 618	596	1,001	1,589		
	Ultimate pressure (*1)	[Pa]	5.0		10	6.7 x 10 ⁻¹		1.2	6.7 x 10 ⁻¹		1.2	6.7 x 10 ⁻¹	
	[Torr]	3.7 x 10 ⁻²		0.08	5.0 x 10 ⁻³		0.01	5.0 x 10 ⁻³		0.01	5.0 x 10 ⁻³		
	[mbar]	5.0 x 10 ⁻²		0.1	6.7 x 10 ⁻³		0.01	6.7 x 10 ⁻³		0.01	6.7 x 10 ⁻³		
Inlet port (optional)		VG50 (KF40)	VG80 (KF50)	VG100	VG80 (KF80)		VG100 (KF100)	VG150					
Outlet port		KF40			VG50	KF40			KF50				
Dry pump surface treatment		with											
Mechanical booster pump surface treatment		with											
Power supply [VAC] (Hz)	3 phase	200 (50/60), 220 (60)			200 (50/60), 220 (60)							180 to 240 (50/60), 380 to 440 (50/60)	
Current (at max. load) [A]		7.3	11.8	52.5	8.1	13.8	17.3	18.9	22.4	34.9	68.3		
Cooling Water Flow Rate [L/min]		> 5.0											
Nitrogen purge [SLM]	Shaft seal	5											
	Gas ballast	0 to 45			0 to 195	0 to 45			0 to 195				
Operation mode		3											
Weight [kg]		180	245	415	251	371	403	553	660	720	660	720	
Dimensions [mm]	W	378	428	668	378	470		528	668				
	D	900	967	1,106	910	987		1,213	1,111				
	H	530	579	742	831	951		1,037	1,274				

*) When making a request for estimation/when ordering, please notify us about the voltage used. * The HR and UR series include the exhaust piping heater.

*) Please do not carry out continuous operation for the HR300, HR600, HR1200, UR600, UR1200, UR1800 and UR3601 at a pressure above 200Pa. There may be a case where the pump temperature may become abnormal and the interlock may activate. *) 1 Values only when flowing 5SLM shaft seal gas for HR series. The value when flowing 5SLM gas ballast gas for UR series.

Air-cooled Roots type CR series

Air-cooled dry vacuum pump. 4 models from 16 to 300m³/hr.

- Air-cooled roots-type vacuum pump. Oil is not used inside working chambers. Long-time stable operation is possible because there is no contact between its rotor and cylinder.



CR60A

Model	CR16A		CR30A		CR60A		CR300A	
Maximum Pumping Speed	[m ³ /h]	16	30	55	300			
	[L/min]	280	500	920	5,000			
	[CFM]	9.8	17.6	32.4	176			
Ultimate pressure (*1)	[Pa]	3			0.5			
	[Torr]	2 x 10 ⁻²			4 x 10 ⁻³			
	[mbar]	3 x 10 ⁻²			5 x 10 ⁻³			
Inlet port	KF25				KF40		KF50	
Outlet port	KF25				KF40			
Power supply [V] (*2)	1 phase 100	1 phase 200	1 phase 100	1 phase 200	1 phase 200	3 phase 200	1 phase 200	3 phase 200
	3 phase 200	3 phase 200	3 phase 200	3 phase 200	3 phase 200	3 phase 200	3 phase 200	3 phase 200
Motor rated value [kW]	0.72				1.5		3	
Cooling method	Air cooled							
Gas ballast mechanism	Optional Support							
Maximum water vapor tolerance (*3)	< 300 g/h				< 500 g/h			
Weight [kg]	35				48		100	
Dimensions W x D x H [mm]	180 x 520 x 377				210 x 550 x 439		280 x 594 x 605	

- *1) With OSLM gas ballast gas flow.
- *2) When requesting for an estimate or ordering, specify power supply and voltage.
- *3) Maximum value when gas ballast is used. Make sure to use a gas ballast mechanism when pumping down water vapor.

Roots type with General-purpose Motor GR series

Simplified designed for general industrial applications based on long time experience of the LR series.

- Multi-voltage motor.
- General-purpose induction motor. Special motor such as explosion-proof motor is available (RFQ).



GR90A

Model	GR60A		GR90A		GR180A		
Maximum pumping speed	[m ³ /h]	50Hz/60Hz	62 / 80	112 / 116	183 / 237		
	[L/min]	50Hz/60Hz	1,030 / 1,333	1860 / 2100	3100 / 3950		
	[CFM]	50Hz/60Hz	36.4 / 47.1	65.7 / 74.2	109.5 / 139.5		
Ultimate pressure (*1)	[Pa]	5.0					
	[Torr]	3.7 x 10 ⁻²					
	[mbar]	5.0 x 10 ⁻²					
Inlet port (optional)	VG50 (ISO63F)		VG80 (ISO80F)				
Outlet port	KF40						
Power supply (*2)	200V class motor	AC200V/50Hz, AC200 to 220V/60Hz			Multi voltage motor AC200 to 240V/50Hz, 60Hz		
	400V class motor	AC220 to 240V, AC380 to 415V/50Hz, AC208 to 240V, AC380 to 460V/60Hz			AC380 to 415V/50Hz, AC380 to 460V/60Hz		
Motor rated value [kW]	2.2		3.7		7.5		
Cooling water flow rate [L/min]			> 5.0				
Nitrogen gas [SLM]	Shaft seal	5 (*3)					
	Gas ballast	Optional					
Weight [kg]	128		188		268		
Maximum water vapor tolerance (*4)	< 500 g/h		< 1,000 g/h		< 3,000 g/h		
External dimensions W x D x H [mm]	320 x 1000 x 442		380 x 1100 x 495		470 x 1300 x 582		

- *1) With 5SLM shaft seal gas flow. *2) When requesting for an estimate or ordering, specify power supply and voltage. *3) Nitrogen gas (shaft seal) is constant at 5SLM. *4) Maximum value when gas ballast is used. Make sure to use a gas ballast mechanism when pumping down water vapor.

Silencer for Dry Vacuum Pumps RS series



RS-01 RS-02 RS-03

Model	Applicable pump model	Accessories			
		Clamp	Outer ring	Connection piping	Stay
RS-01 kit A	CR60A, LR60 / 90 / 300	1	1	n/a	n/a
RS-01 kit B	LR600 / 1200	2	2	1	1
RS-01 kit C	CR300A	2	2	1	1
RS-01 kit D	CR16A / 30A	1	1	1	n/a
RS-02 kit A	LR180 (LR60 / 90 / 300)	2	2	1	1
RS-02 kit B	LR1800 (LR600 / 1200)	2	2	1	1
RS-03 kit A	LR421 (-T)	1	1	1	1
RS-03 kit B	LR3601 (-T/TT/TR/TTR)	3	3	1	1
EFS-11-NW25/2/2516 (*1)	CR16A / 30A	1	1	n/a	n/a
EFS-19-NW40/1 (*1) (*2)	CR60A / 300A	1	1	n/a	n/a

- *1) Do not use for harmful gas. *2) Open type which is not connectable to rearward piping.

Power Saving Attachment for Dry Vacuum Pump ECO-SHOCK

An attachment which reduces electrical power consumption by connecting to dry vacuum pumps.

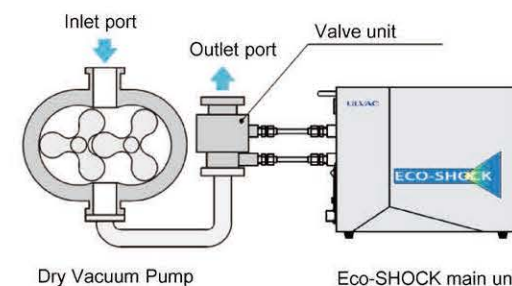
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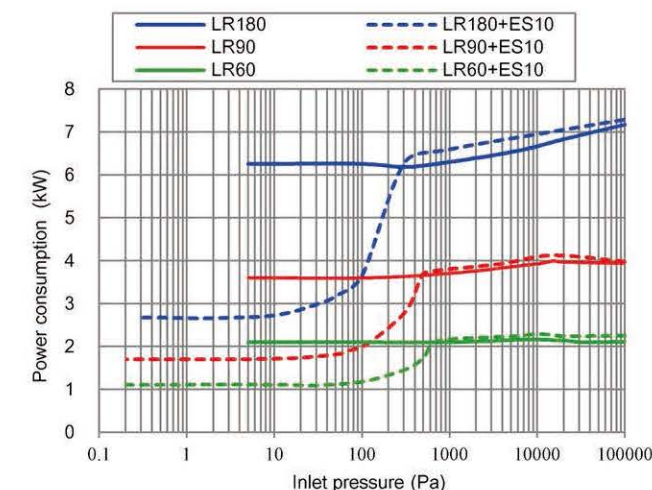
ES4A

- Electrical power consumption can be reduced by connecting to dry vacuum pumps. It is possible to connect to any dry vacuum pump which there is not any problem to reduce pressure at its outlet port.
- Select the ES4A for frequently repetitive pumping down of large vacuum chamber and the pumps with an high pumping speed near atmospheric pressure.
- * Note: Do not use for any application where pump takes combustible, burnable and toxic gases, etc. and solid materials and liquids.

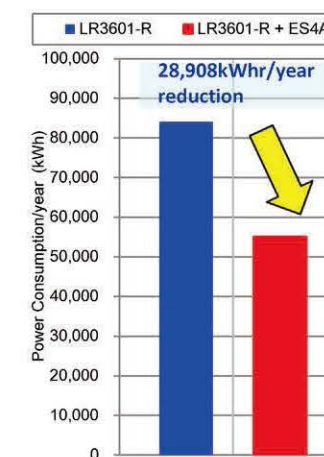
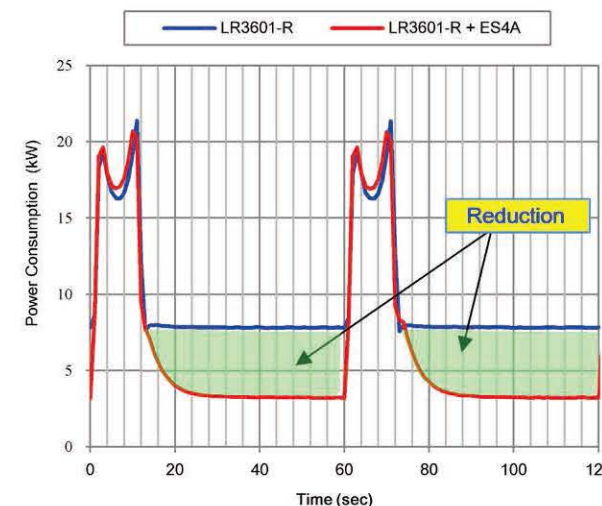
How to connect the ECO-SHOCK



Electric power reduction efficiency of the ECO-SHOCK ES10



Electrical power consumption effect 300L chamber repeat pumping down by 60 sec tact time. Dry vacuum pump LR3601-R + ECO-SHOCK ES4A



Model	ES10	ES4A
Power Supply	Specifications	Single phase AC100 to 220V (±5%) 50/60Hz
	Maximum apparent power [VA]	250
	Consumed electrical power [W]	65
External dimensions W x D x H [mm]	Main unit [mm]	175 x 330 x 240
	Valve unit [mm]	dia. 66 x 110 (KF40)
Connection port	3/8 inch tube connector	16mm tube connector

- * The valve unit is not included in the ES4A and sold separately. Select it in conformity with the pump to be connected.

Vacuum Pump
 Vacuum Valve
 Vacuum Gauge
 Process Gas Monitor
 Leak Detector
 Power Generator (RF/DC)
 EB Power Supply / EB Source
 Deposition Controller
 Thin Film Measurement
 Vacuum Transfer Robot
 Accessories
 Molecular Interaction Analyzer
 Precise Microplate Paddle Mixer

Double Stage Rotary Vane type VD series Ver. C

With high efficiency (IE3) full multi-voltage motor developed by ULVAC. For various kinds of application.



VD90C



Original IE3 Motor

Structure	
Single stage	Double stage
Rotary vane	Rotary plunger
Direct driven	Belt driven
Air cooled	Water Cooling
Forced oil circulation	Differential pressure oil circulation
Oil back flow prevention mechanism	Back flow prevention valve
Option	
Spec. A: Nitrile rubber	
Spec. B: Silicon rubber	
Spec. H: Helium tight	

- Single kind high efficient (IE3) full multi-voltage covers wide range voltage from 200 to 240V / 380 to 460V.
- Forced oil circulation makes pumping performance stable even near atmospheric pressure. Suitable for repetitive and consecutive operation between atmospheric and vacuum.
- Various specification A, B and H are available in addition to standard model.

Model	VD30C	VD40C	VD60C	VD90C
Designed pumping speed [m³/h] (LPM / CFM)	30 (500 / 17.7)	40 (670 / 23.5)	60 (1,000 / 35.3)	90 (1,500 / 53)
	60Hz	48 (800 / 28.3)	72 (1,200 / 42.4)	108 (1,800 / 63.6)
Ultimate pressure [Pa] (Torr / mbar)	0.67 (5 x 10 ⁻³ / 6.7 x 10 ⁻³)			
	Gas ballast port closed			
Motor	Output [kW] (Poles)			
	1.5 (4)	1.5 (4)	2.2 (4)	3.7 (4)
	Voltage [V]			
	50Hz: 200 to 240 / 380 to 415 (Multi-Voltage Motor)			
	60Hz: 200 to 240 / 380 to 460 (Multi-Voltage Motor)			
Standard Oil	ULVOIL R-7			
Oil capacity [L]	1.0 to 2.5		2.5 to 4.0	
Cooling method	Air cooled			
Inlet port (optional)	VG40 (KF40)		VG50 (KF50 or ISO63F)	
Outlet port (optional)	VG40 (KF40)			
Weight [kg]	58	60	90	113
Dimensions W x D x H [mm]	210 x 660 x 324	210 x 680 x 324	280 x 761 x 371	280 x 831 x 371

Specification	Model	Main Seal Material	Oiler Independent Lubrication	He Leak Test
Standard	VD30C, VD40C, VD60C, VD90C	Fluorine Rubber	n/a	n/a
Spec. A	VD30C-A, VD40C-A	Nitrile Rubber	n/a	n/a
Spec. B	VD30C-B, VD40C-B	Silicon Rubber	✓	n/a
Spec. H	VD30C-H, VD40C-H, VD60C-H, VD90C-H	Fluorine Rubber	✓	✓

Small Size Double Stage Oil Rotary Vane type VD series

Double stage oil Rotary vane pump.

- Single kind high efficient (IE3) full multi-voltage covers wide range voltage from 200 to 240V / 380 to 460V.
- Forced oil circulation makes pumping performance stable even near atmospheric pressure. Suitable for repetitive and consecutive operation between atmospheric and vacuum.



VD201

Structure	
Single stage	Double stage
Rotary vane	Rotary plunger
Direct driven	Belt driven
Air cooled	Water cooled
Forced oil circulation	Differential pressure oil circulation
Oil back flow prevention mechanism	Back flow prevention valve

Model	VD151	VD201
Designed Pumping Speed [m³/h] (LPM / CFM)	14.4 (240 / 8.5)	20.2 (336 / 11.9)
	60Hz	24.2 (403 / 14.2)
Ultimate pressure [Pa] (Torr / mbar)	0.67 (5x10 ⁻³ / 6.7x10 ⁻³)	
	Gas ballast port closed	
Motor	Output [kW] (Poles)	
	0.55 (4)	0.75 (4)
	Voltage [V]	
	50Hz: 200 to 240 / 380 to 415 (Multi-Voltage Motor)	
	60Hz: 200 to 240 / 380 to 460 (Multi-Voltage Motor)	
Standard Oil	ULVOIL R-7	
Oil capacity [L]	0.7 to 1.1	
Cooling method	Air cooled	
Inlet port	KF25	
Outlet port	G1	
Weight [kg]	23	34
Dimensions W x D x H [mm]	170 x 314 x 240	170 x 336 x 265

Single Stage Oil Rotary Vane type VS series

Lower ultimate pressure even it is single stage oil rotary vane pump.



VS2401

- Main applications:
- Evaporation, sputtering system
 - Vacuum absorption, transportation, moulding
 - Vacuum impregnation, casting
 - Vacuum drying, freeze drying
 - Leak test system

Structure	
Single stage	Double stage
Rotary vane	Rotary plunger
Direct driven	Belt driven
Air cooled	Water cooled
Forced oil circulation	Differential pressure oil circulation
Oil back flow prevention mechanism	Back flow prevention valve
Option	
Spec. H: Helium tight	
Spec. R: Anti-rust cooling water system	

- Lower vibration structure compared with Rotary plunger model. Suitable when installing at upper floor.
- Forced oil circulation makes pumping performance stable even near atmospheric pressure. Suitable for repetitive and consecutive operation between atmospheric and vacuum.

Model	VS1501	VS2401
Designed pumping speed [m³/h] (LPM / CFM)	150 (2,500 / 88.2)	240 (4,000 / 141.2)
	60Hz	288 (4,800 / 169.4)
Ultimate pressure [Pa] (Torr / mbar)	5.3 (3.9x10 ⁻² / 5.3x10 ⁻²)	
	Gas ballast port closed	
Motor	Output [kW] (Poles)	
	5.5 (4)	7.5 (4)
	Voltage [V]	
	50Hz: 200	
	60Hz: 200 to 220	
Oil	ULVOIL R-7	
Oil capacity [L]	8.0 to 10.5	
Cooling method	Water cooled	
Inlet port (optional)	VG80 (ISO80F)	
Outlet port (optional)	VG50 (KF50 or ISO63F)	
Weight [kg]	240	280
Dimensions W x D x H [mm]	333 x 940 x 460	333 x 1060 x 460

Large Size Single Stage Oil Rotary Vane VS650A / VS750A

Large size and low vibration single stage oil rotary vane pump.



VS650A-A



PMB2400D + VS650A-W

Structure	
Single stage	Double stage
Rotary vane	Rotary plunger
Direct driven	Belt driven
Air cooled	Water cooled
Forced oil circulation	Differential pressure oil circulation
Oil back flow prevention mechanism	Back flow prevention valve

- Selectable from air and water cooled type. Oil cooler is used for oil temperature cooling for a air cooled model.
- Equipped with a cartridge-type oil mist filter inside the oil tank.
- Cleaning of the inside of the oil tank and replacement of the oil mist filter are easy.

- Main applications:
- Evaporation, sputtering system
 - Vacuum furnace
 - Leak test system
 - Large vacuum chamber evacuation.

Model	VS650A-A	VS650A-W	VS750A-A	VS750A-W
Design Exhaust Speed [m³/h] (LPM / CFM)	650 (10,833 / 383)		750 (12,500 / 441)	
	60Hz		n/a	
Ultimate pressure [Pa] (Torr / mbar)	8 (6x10 ⁻² / 8x10 ⁻²)			
	Gas ballast port closed			
Motor	Output [kW] (Poles)			
	22 (4)			
	Voltage [V]			
	50Hz: 200 to 240 / 380 to 415 (Multi-Voltage Motor)			
	60Hz: 200 to 240 / 380 to 460 (Multi-Voltage Motor)			
Oil	ULVOIL R-7			
Oil capacity [L]	23 to 27	25 to 30	23 to 27	25 to 30
Cooling method	Air cooled	Water cooled	Air cooled	Water cooled
Inlet port	DN 100 ISO-K			
Outlet port	DN 100 ISO-K			
Weight [kg]	806	800	802	796
Dimensions W x D x H [mm]	1,490 x 905 x 705	1,490 x 841 x 705	1,490 x 905 x 705	1,490 x 841 x 705

Double Stage Rotary Vane type PVD series

Legacy and small size double stage oil rotary vane pump.



PVD-180

- Quiet and low speed rotation.
- Enclosed belt cover for safety.

Main applications:

- Vacuum drying, freeze drying
- Gas and liquid charging
- Vacuum absorption, transportation, moulding
- Vacuum impregnation, casting

Structure	
Single stage	Double stage
Rotary vane	Rotary plunger
Direct driven	Belt driven
Air cooled	Water cooled
Forced oil circulation	Differential pressure oil circulation
Oil back flow prevention mechanism	Back flow prevention valve
Option	
Spec. B: Oil back flow prevention	
Spec. H: Helium tight	

Model	PVD-180		PVD-360	
Designed pumping speed [m ³ /h] (LPM / CFM)	50Hz	9 (155 / 5.3)	60Hz	19 (310 / 11.2)
Ultimate pressure [Pa] (Torr / mbar)	Gas ballast port closed	0.67 (5x10 ⁻³ / 6.7x10 ⁻³)		
	Output [kW] (Poles)	0.4 (4)		0.75 (4)
Motor	Voltage [V]	200		200 to 220
Oil		ULVOIL R-7		
Oil capacity [L]		0.3		0.5
Cooling method		Air cooled		
Inlet port		dia. 28 x dia. 19		dia. 34 x dia. 27
Outlet port		G3/4		G1
Weight (without Motor) [kg]		33.5		43
Dimensions W x D x H [mm]		265 x 470 x 321		303 x 500 x 321

Oil Mist Trap TM / TMX series

The trap to eliminate oil smoke exhausted from oil rotary vacuum pump.



TM401

- Exhaust sound is reduced especially at the time of repeat operation between ultimate and atmospheric pressure.
- Cartridge type filter makes filter replacement easy.

Model *1	Connecting flange (pump side / outlet side)	Weight [kg]	Material	Dimensions [mm]	For (pump model)	Remarks *2
TMX-1	Special (with adapter) / G1 x 1/2 (with screwed cover)	1.1	Main unit : soft steel (SPCC) Filter : glass wool	dia. 106 x 193	VD151, VD201, PVD-180, PVD-360	
TM201	VF40 / G1 x 1/2 (with screwed cover)	8.5		dia. 165.2 x 280	VD30C / VD301, VD40C / VD401	Low load type
TM401	VF40 / G1 x 1/2 (with screwed cover)	10		dia. 165.2 x 350	VD30C / VD301, VD40C / VD401 VD60C / VD601, VD90C / VD901	High load type Low load type
TM-2	VF40 (with adapter) / G2 (with screwed cover)	9.3		dia. 285 x 520	VD60C / VD601, VD90C / VD901	High load type
TM-2F	VF40 (with adapter) / VG50	9.8		dia. 285 x 525	PKS-016 VD60C / VD601, VD90C / VD901	High load type
TM-3	VF50 / G3 (with screwed cover)	17		dia. 285 x 455	PKS-016	
TM-3F	VF50 / VG80	18		dia. 362 x 635	VS1501	
TM-4	VF50 / G4 (with screwed cover)	35		dia. 362 x 735	PKS-030	
TM-4F	VF50 / VG100	36		dia. 362 x 600	VS1501	
TM-4S	VF50 / VG100	64		dia. 362 x 700	PKS-030	
				dia. 442 x 945	VS2401	
				dia. 442 x 1160	PKS-070	
				dia. 442 x 900	VS2401	
				dia. 442 x 1120	PKS-070	
				dia. 450 x 1487	VS2401	High load type
				dia. 450 x 1387	PKS-070	High load type

*1 F: Flange connection type instead of screwed cover.

*2 Select the high load when the pump repeatedly runs from atmosphere to vacuum in a short period or at the pressure higher than 10,000 Pa (100mbar / 75 Torr) for a long period.

Rotary Plunger type PKS series

Legacy and robust single rotary plunger pump.



PKS-030

- Robust and long life. Low speed rotation with few sliding parts.
- Excellent abrasion resistance material are used.
- Enclosed belt cover for safety.

Main applications:

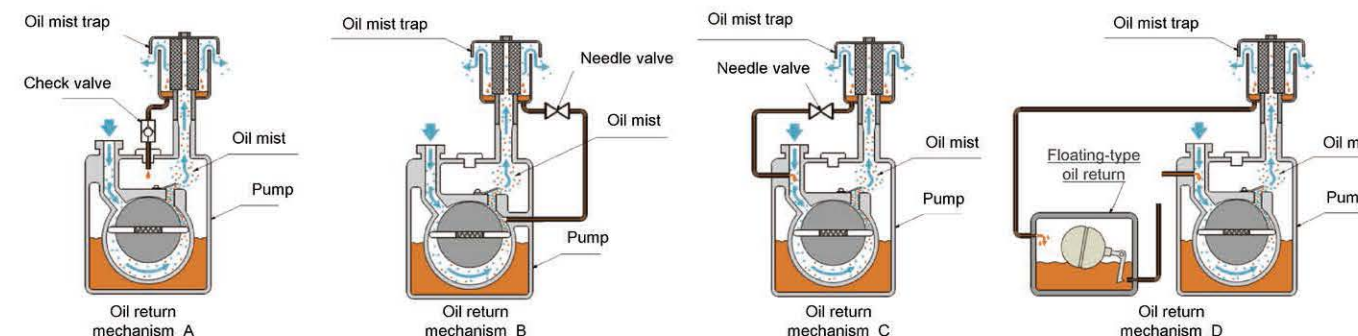
- Vacuum heat treatment, vacuum sintering, vacuum carburization
- Solvent evacuation
- Vacuum impregnation, casting
- Large vacuum chamber evacuation

Structure	
Single stage	Double stage
Rotary vane	Rotary plunger
Direct driven	Belt driven
Air cooled	Water cooled
Forced oil circulation	Differential pressure oil circulation
Oil back flow prevention mechanism	Back flow prevention valve
Option	
Spec. L: Wider clearance	
Spec. H: Helium tight	

Model	PKS-016		PKS-030		PKS-070	
Design Exhaust Speed [m ³ /h] (LPM / CFM)	96 (1,600 / 56.5)		180 (3,000 / 105.9)		420 (7,000 / 247.2)	
Ultimate pressure [Pa] (Torr / mbar)	Gas ballast port closed	2.7 (2x10 ⁻² / 2.7x10 ⁻²)				
	Output [kW] (Poles)	2.2 (4)	3.7 (4)	11 (6)		
Motor	Voltage [V]	200		200 to 220		
Oil		ULVOIL R-7				
Oil capacity [L]		6.5	8	20		
Cooling method		Air cooled		Water cooled		
Inlet port (optional)		VG50 (ASA1.5)	VG80 (ASA2)	VG100 (ASA3)		
Outlet port (optional)		VF50 (ASA1.5)	VF80 (ASA2)	VF100 (ASA3)		
Weight (without motor) [kg]		225	380	900		
Dimensions W x D x H [mm]		590 x 860 x 550	720 x 675 x 930	970 x 942 x 1193		

Oil Mist Trap Oil Return Mechanism

Oil return from the oil mist trap into the pump.



	Details	Recovery method	Effect on ultimate pressure	Recommended pressure range					
Oil return mechanism A	Oil returns into the pump case through the check valve when the pump stops.	Semi-auto	Low						
Oil return mechanism B	Oil returns from the gas ballast port through the needle valve.	Manual	Some						
Oil return mechanism C	Oil returns from the inlet port side through the needle valve.	Manual	High						
Oil return mechanism D	Oil collected in the floating type oil return returns from the inlet port side.	Auto	Low						

* Oil return mechanism is not workable with the oil mist trap TMX-1. The TMX-1 has a check valve inside like the oil return mechanism A.

Continuously-workable pressure range
Repeatable working pressure range

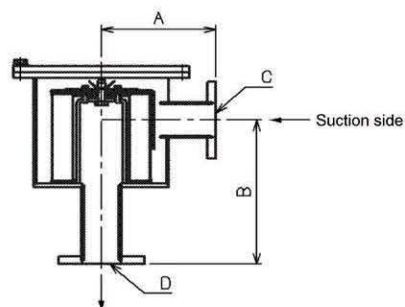
[Pa] 1 10 10² 10³ 10⁴ Atmospheric pressure
[Torr / mbar] 10⁻² 10⁻¹ 1 10 10²

Vacuum Pump, Vacuum Gauge, Process Gas Monitor, Leak Detector, Power Generator (RF/DC), EB Power Supply/EB Source, Deposition Controller, Thin Film Measurement, Vacuum Transfer Robot, Accessories, Molecular Interaction Analyzer, Precise Microplate Paddle Mixer

Dust Filter DS series

Suitable when pumping down gases containing dust, glass particle, etc.

- Stainless steel made enclosure powder trap equipped with a filter element inside.
- Suitable when pumping down gases including dry powder with diameters of 10 µm or more.



Oil rotary vacuum pump

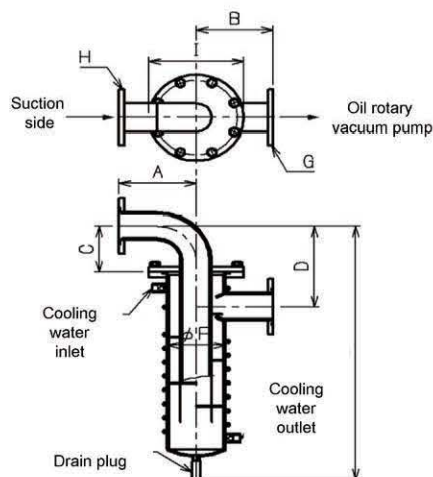
Model	For (pump model)	A	B	C (inlet port)	D (outlet port)
DS-20	VD151, PVD-180	90	90	VG20	VF20
DS-25	VD201, PVD-360			VG25	VF25
DS-40	VD30C / VD301, VD40C / VD401	140	195	VG40	VF40
DS-50	VD60C / VD601, VD90C / VD901			VG50	VF50
DS-2	PKS-016	200	530	VG50	VF50
DS-3	PKS-030			VG80	VF80
DS-4	PKS-070	220	583	VG100	VF100

Unit : mm

Water Cooling Fore Line Trap WT series

Suitable when pumping down gases with high vapour pressure materials such as solvent or high temperature gases.

- A trap to cool down high temperature gases with cooling water.



Model	For (pump model)
WT-25	VD151, VD201, PVD-180, PVD-360
WT-50	VD30C / VD301, VD40C / VD401, VD60C / VD601, VD90C / VD901, PKS-016
WT-80	VS1501, VS2401, PKS-030
WT-100	PKS-070

Model	A	B	C	D	E	F	G (inlet port)	H (outlet port)	I
WT-25	93	100	100	160	550	dia.60.5	VG25	VG25	dia. 120
WT-50	150	150	100	175	550	dia.114	VG50	VG50	dia.185
WT-80	150	150	140	250	705	dia. 165	VG80	VG80	dia. 235
WT-100	200	200	180	290	815	dia.216	VG100	VG100	dia. 300

Unit : mm

Fore Line Trap UFT series

Suitable when preventing oil vapour back flow from oil rotary vacuum pumps.

- Prevents the oil vapour back flow from the oil rotary vacuum pump to the chamber through the molecular sieves.
- Repeated use is possible with built-in heater.



UFT-25M

UFT-65M

Model	UFT-25M	UFT-65M
Pressure range	Atmospheric pressure to 10 ⁻² Pa (10 ⁻⁵ Torr / 10 ⁻⁴ mbar)	
Material	Main unit: Austenitic stainless steel Absorbent: Artificial Zeolite Exhaust side sealing material: FPM	
Inlet port	UFC070-RH	UFC114-FH
Outlet port	VG25	VG65
Cartridge Heater	Single phase AC100V 75W	Single phase AC100V 120W
Heater temperature [°C]	250 to 350	
Absorbent model	Molecular Sieves 13X	
Absorbent weight [kg]	0.15	0.37
Dimensions [mm]	dia. 76.3 x 195	dia. 114.3 x 190
Total weight [kg]	2.2	4.6

Vacuum Pump Oil ULVOIL series

The ULVOIL series is a vacuum pump oil developed for improving performance and extending life of vacuum pumps.



Model	R-4	R-7	R-80	R-7000	
Type	Mineral oil			Synthetic oil	
Ultimate pressure [Pa] (Torr / mbar)	< 4 x 10 ⁻¹ (2.9 x 10 ⁻³ / 4 x 10 ⁻³)		< 7 (5.2 x 10 ⁻² / 7 x 10 ⁻²)	< 7 x 10 ⁻¹ (5.2 x 10 ⁻³ / 7 x 10 ⁻³)	
Characteristics	Color				
	Transparent pale yellow				
	Kinetic viscosity [mm ² /s]	40°C	47	69	57
		100°C	7	9	8
	Viscosity index	112	102	110	110
	Water content [%]	< 0.01			
	Acid number [mgKOH/g]	< 0.05		< 1.9	< 0.1
	Density [g/cm ³]	0.86	0.88		0.91
Flash point [°C]	248	260	230	220	
Pour point [°C]	-12.5		-37.5	-20	
Features	For low temperature start-up	For general purpose	For high temperature and load	For active gas exhaust	
Applicable vacuum pump	Oil rotary vacuum pump				
	Mechanical Booster Pump				

Model	D-11	D-31	B-6		
Type	Hydrocarbon	Silicon	Hydrocarbon		
Ultimate pressure [Pa] (Torr/mbar)	7 x 10 ⁻⁵ (5.2 x 10 ⁻⁷ / 7 x 10 ⁻⁷)	3 x 10 ⁻⁸ (2.2 x 10 ⁻⁹ / 3 x 10 ⁻⁹)	2.7 x 10 ⁻² (2 x 10 ⁻⁴ / 2.7 x 10 ⁻⁴)		
Characteristics	Color		Colorless & Transparent		
	Kinetic viscosity [mm ² /s]	25°C	-	170	-
		40°C	32	-	22
	Steam pressure [Pa] (Torr / mbar)	20°C	7.3 x 10 ⁻⁵ (5.4 x 10 ⁻⁷ / 7.3 x 10 ⁻⁷)	2.1 x 10 ⁻⁸ (1.6 x 10 ⁻¹⁰ / 2.1 x 10 ⁻¹⁰)	1.2 x 10 ⁻⁵ (8.9 x 10 ⁻⁷ / 1.2 x 10 ⁻⁷)
		40°C	1.7 x 10 ⁻³ (1.3 x 10 ⁻⁵ / 1.7 x 10 ⁻⁵)	2.1 x 10 ⁻⁶ (1.6 x 10 ⁻⁸ / 2.1 x 10 ⁻⁸)	1.4 x 10 ⁻⁴ (5 x 10 ⁻⁶ / 1.4 x 10 ⁻⁶)
100°C		1.5 x 10 ⁻¹ (1.1 x 10 ⁻³ / 1.5 x 10 ⁻³)	1.1 x 10 ⁻³ (5.2 x 10 ⁻⁷ / 7 x 10 ⁻⁷)	3.3 x 10 ⁻¹ (2.4 x 10 ⁻³ / 3.3 x 10 ⁻³)	
Flash point [°C]	220	210	Above 200		
Features	For general purpose	For stable heat resistant	For ejector pump		
Applicable vacuum pump	Oil diffusion pump				
	Oil diffusion ejector pump				

Vacuum Pump Oil BARRIERTA J FLUID series

A non-flammable and low vapor pressure fluorine oil.
Excellent heat-resistance and oxidation resistance.



Model	J25F	J60F	J100F	J100F E	
Type	Fluorine Oil				
Characteristics	Color				
	Colorless and transparent.				
	Kinetic viscosity [mm ² /s]	40°C	25	60	95
		100°C	5	9	13
	Viscosity index	85	130		
	Steam pressure [Pa] (Torr / mbar)	20°C	2 x 10 ⁻³ (1.5 x 10 ⁻⁵ / 2 x 10 ⁻⁵)	1 x 10 ⁻⁴ (7.5 x 10 ⁻⁶ / 1 x 10 ⁻⁶)	6 x 10 ⁻⁶ (4.5 x 10 ⁻⁸ / 6 x 10 ⁻⁸)
Operating temperature range [°C]	-55 to 140	-50 to 160	-40 to 180		
Features	Low steam pressure, nonflammable, heat resistance, oxidation resistance, alkali resistance				
Applicable vacuum pump	Oil rotation vacuum pump		-		
	Mechanical booster pump		Mechanical booster pump		
	-		Dry vacuum pump		

With General-purpose Motor PMB series Ver.D

Mechanical booster pump with general-purpose motor for a wide range of applications.



PMB1200D

- It effectively shortens pumping down time by adding this pump to oil rotary vacuum pump or dry vacuum pump. Its maximum pumping speed is in about the range from 1,000Pa (7.5Torr / 10mbar) to 1Pa (7.5 x 10⁻³Torr / 0.01mbar).
- It also helps to achieve further lower ultimate pressure of the oil rotary vacuum pump and dry vacuum pump.
- Atmospheric pressure start operation is possible with the optional inverter.
- Setting for either air-cooled or water-cooled is selectable for the optional inverter.
- Surface treatment (Alumite) is available as an option.

Model		PMB100D	PMB300D	PMB600D	PMB1200D	PMB2400D
Maximum pumping speed [m ³ /h] (LPM / CFM)	50Hz	95 (1,580 / 56)	280 (4,670 / 165)	500 (8,330 / 294)	1,000 (16,667 / 590)	2,000 (33,330 / 1,176)
	60Hz	115 (1,920 / 68)	330 (5,500 / 194)	600 (10,000 / 353)	1,200 (20,000 / 706)	2,400 (40,000 / 1,411)
Ultimate pressure [Pa] (Torr / mbar)		0.4 (3 x 10 ⁻³ / 4 x 10 ⁻³)			0.67 (5 x 10 ⁻³ / 6.7 x 10 ⁻³)	
Motor Capacity [kW] (Poles)		0.4(2)	0.75(2)	2.2(2)	3.7(2)	7.5(2)
	Voltage [V]	200 (200V class motor) or 220 to 240 / 380 to 415 (multi-voltage motor)				
Oil model		ULVOIL R-4				
		ULVOIL R-4 (Water cooled) / R-7 (Air cooled)				
Oil capacity volume [L]		0.35	0.7	1.5	1.9	4 (2.2 ^{*1})
Cooling method		Air cooled / Water cooled (options: to be selected by inverter setting)				
Inlet port (optional)		VG50 (KF50 or ISO63F)	VG80 (ISO80F or 100F)		VG100 (ISO100F)	VG200 (ISO200F)
Outlet port (optional)		VF50 (KF50 or ISO63F)	VF80 (ISO80F or 100F)		VF200 (ISO200F)	
Weight [kg]		26	51	82	115	260
Dimensions W x D x H [mm]		267 x 576 x 180	321 x 685 x 260	362 x 784 x 320	417 x 970 x 340	520 x 1260 x 460
Standard backing pump		VD40C / VD401	VD60C / VD601	VD90C / VD901	VS2401	PKS-070

*1) Values for the horizontal exhaust direction type.

With Canned Motor PRC series

Mechanical booster pump with canned motor for clean environment



PRC-012A

- It effectively shortens pumping down time by adding this pump to oil rotary vacuum pump or dry vacuum pump. Its maximum pumping speed is in about the range from 1,000Pa (7.5Torr / 10mbar) to 1Pa (7.5 x 10⁻³Torr / 0.01mbar).
- It also helps to achieve further lower ultimate pressure of the oil rotary vacuum pump and dry vacuum pump.
- There is no oil leakage to the outside in the case of canned motor. Suitable for clean room environment.
- Surface treatment (Alumite) for corrosion resistance is standard specification.
- Atmospheric pressure start operation is possible with the optional inverter.

Model		PRC-003A	PRC-006A	PRC-012A	PRC-018A
Maximum pumping speed [m ³ /h](LPM / CFM)	50Hz	280 (4,670 / 165)	500 (8,330 / 294)	1,000 (16,667 / 590)	1,500 (25,000 / 882)
	60Hz	330 (5,500 / 194)	600 (10,000 / 353)	1,200 (20,000 / 706)	1,600 (30,000 / 941)
Ultimate pressure [Pa] (Torr / mbar)		0.4 (3 x 10 ⁻³ / 4 x 10 ⁻³)			0.67 (5 x 10 ⁻³ / 6.7 x 10 ⁻³)
Motor Capacity [kW] (Poles)		0.75(2)	2.2(2)	3.7(2)	5.5(2)
	Voltage [V]	200, 380, 400, 415, 440			
Oil model		ULVOIL R-4			
		Water cooled			
Oil capacity [L]		0.7	1.5	1.9	
Cooling method		Water cooled			
Inlet port (optional)		VG80 (ISO80F or 100F)		VG100 (ISO100F)	VG150 (ISO160F)
Outlet port (optional)		VF80 (ISO80F or 100F)			VF100 (ISO100F)
Weight [kg]		51	86	118	150
Dimension W x D x H [mm]		296 x 575 x 260	356 x 619 x 320	406 x 759 x 340	406 x 989 x 340
Standard backing pump		VD60C / VD601	VD90C / VD901	VS2401	VS2401

For Large Capacity. With General-purpose Motor PMB-C series

Mechanical booster pump with low speed rotation. Suitable for large-scale chambers such as vacuum furnaces, etc.



PMB-040C

- Belt driven low speed rotation makes it robust.

		PMB-040C	PMB-060C
Maximum pumping speed [m ³ /h] (LPM / CFM)		3,800 (63,300 / 2,235)	6,200 (103,300 / 3,646)
Ultimate pressure [Pa] (Torr / mbar)		0.67 (5 x 10 ⁻³ / 6.7 x 10 ⁻³)	
Motor Output [kW](Poles)		15(4)	18.5(4)
	Voltage [V]	200	
		200 to 220	
Oil model		ULVOIL R-7	
Oil capacity [L]		8	
Cooling Method		Water cooled	
Inlet port (optional)		VG250 (ISO250F)	VG300 (ISO320F)
Outlet port (optional)		VF150 (ISO160F)	VF250 (ISO250F)
Weight(without motor)[kg]		970	1,100
Dimensions (without motor) W x D x H [mm]		772 x 1182 x 680	772 x 1452 x 680
Standard backing pump		PKS-070	PKS-070 x2

Frame Unit for Mechanical Booster Pump YMV series

Frame unit for combining a mechanical booster pump and oil rotary vacuum pump.

- Removable frame makes it possible to pull out oil rotary vacuum pump from the system.

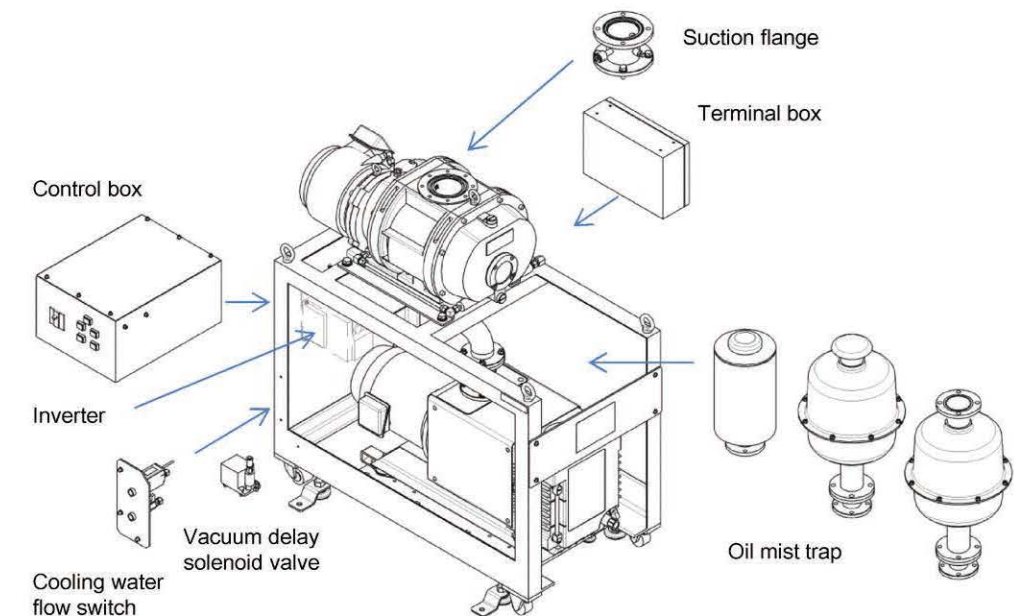


Frame unit YMV series

YMV standard configuration	Frame, connection piping, bellows, caster, adjuster
Option	Atmospheric pressure start operation (inverter is attached to frame), oil mist trap, control box, terminal box, inlet flange (gauge port + leak port), vacuum delay solenoid valve, cooling water flow switch.

Model	Recommended pump	
	Mechanical booster pump	Oil rotation vacuum pump
YMV-01A	PMB100D	VD30C / VD301
YMV-03A	PMB300D	VD40C / VD401
YMV-06A	PMB600D	VD60C / VD601
		VD90C / VD901
YMV-12A	PMB600D	VS1501
		VS2401
		VS1501
	PMB1200D	VS2401

Separate arrangements are made for each kind of pump.



Vacuum Pump
 Vacuum Valve
 Vacuum Gauge
 Process Gas Monitor
 Leak Detector
 Power Generator (RF/DC)
 EB Power Supply / EB Source
 Deposition Controller
 Thin Film Measurement
 Vacuum Transfer Robot
 Accessories
 Molecular Interaction Analyzer
 Precise Microplate Paddle Mixer

Digital Magnetic Levitation type UTM-FH/FW series

FH type: High back pressure and high compression type.
FW type: Wide range and high flow type.



UTM-1400FW

Model		UTM-350FH		UTM-480FH		UTM-800FH		UTM-1001FH		UTM-3303FH		
Pump Body	Inlet flange	VG100	ICF152	VG150	ICF203	VG150	ICF203	VG200	ICF253	VG350		
	Outlet flange	KF25				KF40						
	Exhaust speed (N2) [L/sec]	350	330	480	480	810	740	1,000	1,000	3,300		
	Ultimate pressure (N2) (*1) [Pa] / [Torr] / [mbar]	10 ⁻⁸ / 10 ⁻¹⁰ / 10 ⁻¹⁰										
	Maxi. compression ratio (H2)	1 x 10 ⁴				3 x 10 ⁴				9 x 10 ⁴		
	Max. inlet pressure (N2) (*2) Water cooled / Air cooled	[Pa]	43 / 8				18 / 0.7				9 / none	
		[Torr]	3.2 x 10 ⁻¹ / 6.0 x 10 ⁻²				1.3 x 10 ⁻¹ / 5.2 x 10 ⁻³				6.7 x 10 ⁻² / none	
		[mbar]	4.3 x 10 ⁻¹ / 8.0 x 10 ⁻²				1.8 x 10 ⁻¹ / 7.0 x 10 ⁻³				9.0 x 10 ⁻² / none	
	Max. flow rate of Ar [SCCM]	Water cooled: 370 / Air cooled: 160				Water cooled: 480 / Air cooled: 110				Water cooled: 1,100		
	Rotor blade surface treatment	Nickel Plating										
Cooling method (*3)	Water cooled / Air cooled											
Weight [kg]	Approx. 17				Approx. 28				Approx. 86			
Recommended backing pump [L/min]	290				800				1,500			
Power Supply (D3-Type)	Power supply capacity [kVA]	0.6				0.9				1.6		
	Input voltage, frequency	200 to 240V, 50/60Hz										
	Weight [kg]	Approx. 10										

*1) Value is described by range. *2) Maximum flow rate *3) Please specify cooling method when requesting for a quote or ordering.

Model		UTM-350FW		UTM-480FW		UTM-800FW		UTM-1001FW		UTM-1400FW			UTM-2300FW		UTM-3301FW			
Pump Body	Inlet flange	VG100	ICF152	VG150	ICF203	VG150	ICF203	VG200	ICF253	VG250	VG200	ICF253	VG300	VG250	ICF305	VG350		
	Outlet flange	KF25				KF40												
	Pumping speed(N2) [L/sec]	350	330	480	480	810	740	1,000	1,000	1,490	1,360	1,300	2,730	2,230	2,110	3,300		
	Ultimate pressure(N2) (*1) [Pa] / [Torr] / [mbar]	10 ⁻⁷ / 10 ⁻⁹ / 10 ⁻⁹				10 ⁻⁸ / 10 ⁻¹⁰ / 10 ⁻¹⁰				10 ⁻⁷ / 10 ⁻⁹ / 10 ⁻⁹								
	Max. compression ratio (H2)	3 x 10 ³				4 x 10 ³				6 x 10 ³				9 x 10 ³		8 x 10 ³		
	Max. inlet pressure (N2)(*2) Water cooled / air cooled	[Pa]	76 / 16				38 / 1.2				13 / -				7 / -		8 / -	
		[Torr]	5.7 x 10 ⁻¹ / 1.2 x 10 ⁻¹				2.8 x 10 ⁻¹ / 9.0 x 10 ⁻³				9.7 x 10 ⁻² / -				5.2 x 10 ⁻² / -		6.0 x 10 ⁻² / -	
		[mbar]	7.6 x 10 ⁻¹ / 1.6 x 10 ⁻¹				3.8 x 10 ⁻¹ / 1.2 x 10 ⁻²				1.3 x 10 ⁻¹ / -				7.0 x 10 ⁻² / -		8.0 x 10 ⁻² / -	
	Max. flow rate of Ar [SCCM]	Water cooled: 460 / Air cooled: 210				Water cooled: 700 / Air cooled: 170				Water cooled: 1,000				Water cooled: 1,350		Water cooled: 1,350		
	Rotor blade surface treatment	Nickel Plating																
Cooling method (*3)	Water cooled / Air cooled																	
Weight [kg]	Approx. 17				Approx. 28				Approx. 36				Approx. 60		Approx. 90			
Recommended backing pump [L/min]	290				800				800				1,500					
Power Supply (D3-Type)	Power supply capacity	0.6				0.9				1.2				1.3		2.0		
	Input voltage, frequency	200 to 240V, 50/60Hz																
	Weight [kg]	About 10																

*1) Value is described by range. *2) Maximum flow rate. *3)Please select the cooling method when requesting for an estimate or when ordering.

Ceramic Ball Bearing type UTM 300B series

Compound turbo molecular pump with ceramic ball bearings. An integrated controller saves installation space. Excellent high back pressure performance allows to use smaller backing pump.

• Installation in any orientation makes your system design flexible.



UTM300B

Model		UTM300B		
Pump	Inlet flange (*1)	VG100, ICF152, ISO100-K		
	Outlet flange	KF16		
	Cooling method	Natural air cooled	Forced air cooled	
	Pumping speed(N2) [L/sec]	280		
	Ultimate pressure [Pa] / [Torr] / [mbar](*2) (with double stages backing pump)	After baking	(*3)	
		Before baking	10 ⁻⁶ / 10 ⁻⁸ / 10 ⁻⁸	
	Maximum compression ratio(N2)	> 1 x 10 ⁹		
	Maximum inlet pressure(N2) (*4) [Pa] / [Torr] / [mbar]	6x10 ⁻² / 5 x 10 ⁻⁴ / 6 x 10 ⁻⁴		
	Maximum outlet pressure(N2) (*4) (*5) [Pa] / [Torr] / [mbar]	100 / 0.75 / 1.0		
	Surface treatment	None		
Recommended backing pump (when evacuating 10SCCM)	Approx. 120L/min			
Power Supply	Weight [kg]	VG, ISO / ICF	Approx.6 / Approx. 9	
	Input voltage, power consumption	DC24V, 180W		

*1) Select inlet flange type from tVG100, ICF152 and ISO100-K when ordering. *2) Value is described by range. *3) Baking is available only when forced air cooling method with ICF flange is selected. *4) Max. inlet and outlet pressure are not satisfied at same time. *5) Continuous working pressure when suction gas flow from the inlet port.

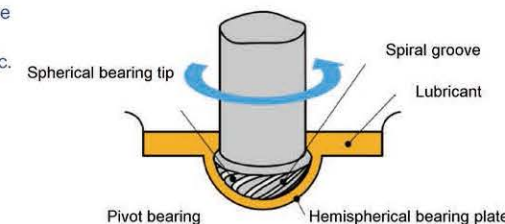
Pivot Bearing Type UTM series

Blades type turbo molecular pump with a pivot bearing and magnetic bearing.



UTM-150

- A magnetic bearing on the top part and a pivot bearing on the bottom part makes operating life long.
- Pumping performance for light gases such as H2 and He, etc. is improved and made compression ratio high by using all blades in the pump.



Model		UTM-50		UTM-150		UTM-300		UTM-500	
Pump	Inlet port	ICF114	VG65	ICF152	VG100	ICF152	VG100	ICF203	VG150
	Outlet port	KF16		KF25		KF25		KF40	
	Pumping speed (N2) [L/sec]	50		190		300		550	
	Ultimate pressure (with double stage backing pump) (N2) [Pa] / [Torr] / [mbar]	10 ⁻⁷ Pa / 10 ⁻⁹ / 10 ⁻⁹		10 ⁻⁸ / 10 ⁻¹⁰ / 10 ⁻¹⁰					
	Maximum compression ratio (N2)	> 1 x 10 ⁸							
	Maximum inlet pressure (N2) [Pa] / [Torr] / [mbar]	0.13 / 9.7 x 10 ⁻⁴ / 1.3 x 10 ⁻³							
	Rotor blade surface treatment	None							
	Cooling Method	Water cooled / Air cooled							
	Recommended backing pump (10SCCM Suction)	50		100		200		300	
	Weight [kg]	Approx. 3		Approx. 6		Approx. 10		Approx. 16	
Power supply	Installation orientation	Vertical only							
	Power consumption [kVA]	0.34		0.59		0.56		0.89	
	Input voltage, frequency	100 to 240V, 50/60Hz							
	Weight [kg]	Approx. 2.2		Approx. 3.9		Approx. 4.5			

Turbo Molecular Pumping System YTP series

YTP series are a pumping system equipped with turbo Molecular pump UTM series and covers from atmospheric pressure to high vacuum.

SA type automatically starts up entire system by pushing start button and M type manually starts up turbo molecular pump by checking its back pressure.



YTP-50M

YTP-150SA-DRY

- The system with oil rotary backing pump is standard and dry backing pump is also available.
- A solenoid fore valve is equipped as standard configuration to prevent back flow and accident in case of black out.
- Pirani vacuum gauge is equipped as a standard configuration to monitor pressure during roughing evacuation.

Model		YTP-50M / SA (-DRY)		YTP-150M / SA (-DRY)		YTP-300M / SA (-DRY)		YTP-500M / SA	
Pump	Inlet flange	ICF114	VG65	ICF152	VG100	ICF152	VG100	ICF203	VG150
	Outlet flange	Oil rotary backing pump: Rc3/4, Dry backing pump: KF16		Oil rotary backing pump: Rc1, Dry backing pump: KF16		Oil rotary backing pump: Rc1, Dry backing pump: KF16		Oil rotary backing pump: Rc1, Dry backing pump: KF16	
	Ultimate pressure(*) [Pa] / [Torr] / [mbar]	10 ⁻⁷ / 10 ⁻⁹ / 10 ⁻⁹		10 ⁻⁸ / 10 ⁻¹⁰ / 10 ⁻¹⁰					
	Pumping speed [L/sec]	N ₂ 50		190		300		550	
	Backing pump speed (50Hz) [L/min]	50 (90)		135 (250)		200 (250)		200 (250)	
	Fore valve	Solenoid valve with rotary pump automatic venting function.							
	Input voltage, frequency	Single phase AC100V, 50/60Hz							
	Power consumption [kVA]	Oil rotary backing pump: 1.3 Dry backing pump: 1.0		Oil rotary backing pump: 1.8 Dry backing pump: 1.7		Oil rotary backing pump: 1.7 Dry backing pump: 1.7		2.1	
	Weight [kg]	Oil rotary backing pump: approx. 55 Dry backing pump: approx. 57		Oil rotary backing pump: approx. 72 Dry backing pump: approx. 71		Oil rotary backing pump: approx. 86 Dry backing pump: approx. 85		Approx. 99	

Vacuum Pump, Vacuum Gauge, Process Gas Monitor, Leak Detector, Power Generator (RF/DC), EB Power Supply/EB Source, Deposition Controller, Thin Film Measurement, Vacuum Transfer Robot, Accessories, Molecular Interaction Analyzer, Precise Micropipette/Pipette Mixer

4 to 14 inch ULK series

4 kinds of models from 4" to 14".

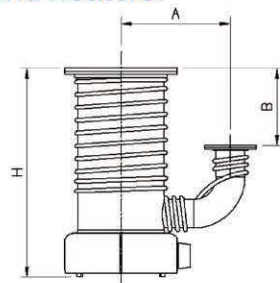
Required pumping speed and ultimate pressure are selectable by 2 types of oils and heaters.



ULK-14A

- A steady high vacuum pump without mechanical moving parts.
- A mechanism preventing oil backflow to the backing pump is included.

- Major applications
- Vacuum deposition system
 - High vacuum laboratory equipments



Model	ULK-04A		ULK-06A		ULK-10A		ULK-14A	
Pumping speed [L/sec]	550	500	1,200	1,100	3,400	3,000	5,400	4,900
Ultimate pressure [Pa] (Torr / mbar)	$< 2.6 \times 10^{-6}$ ($1.9 \times 10^{-7} / 2.6 \times 10^{-7}$)	$< 2.6 \times 10^{-6}$ ($1.9 \times 10^{-6} / 2.6 \times 10^{-6}$)	$< 2.6 \times 10^{-5}$ ($1.9 \times 10^{-7} / 2.6 \times 10^{-7}$)	$< 2.6 \times 10^{-5}$ ($1.9 \times 10^{-8} / 2.6 \times 10^{-8}$)	$< 2.6 \times 10^{-5}$ ($1.9 \times 10^{-7} / 2.6 \times 10^{-7}$)	$< 2.6 \times 10^{-6}$ ($1.9 \times 10^{-8} / 2.6 \times 10^{-8}$)	$< 2.6 \times 10^{-5}$ ($1.9 \times 10^{-7} / 2.6 \times 10^{-7}$)	$< 2.6 \times 10^{-6}$ ($1.9 \times 10^{-8} / 2.6 \times 10^{-8}$)
Critical backing pressure [Pa] (Torr / mbar)	40 (0.3 / 0.4)	60 (0.4 / 0.6)	40 (0.3 / 0.4)	60 (0.4 / 0.6)	35 (0.26 / 0.35)	40 (0.3 / 0.4)	30 (0.22 / 0.3)	30 (0.22 / 0.3)
Oil	ULVOIL D-11	ULVOIL D-31	ULVOIL D-11	ULVOIL D-31	ULVOIL D-11	ULVOIL D-31	ULVOIL D-11	ULVOIL D-31
Oil capacity [L]	0.15		0.35		0.8		1.5	
Cooling water capacity [L/min]	1	1	1	1.5	2.5	3	2.5	3.5
Voltage	Single phase, AC200V							
Required electric power [kW]	0.55	0.73	0.9	1.2	2	2.4	2.25	2.4
Recommended backing pump	VD201		VD40C / VD401		VD90C / VD901		VS2401	
Dimensions A x B x H [mm]	175 x 150 x 341		250 x 180 x 449		340 x 240 x 650		340 x 240 x 670	
Inlet port	VG100		VG150		VG250		VG350	
Outlet port	VG25		VG40		VG80		VG80	
Weight [kg]	7.5		13.5		47		56	
Oil level gauge	None		None		Viewport		Viewport	
Thermostat option	Available		Available		Available		Available	
Thermostat setting temperature [°C]	250		250		180		180	

22 to 52 inch PFL series

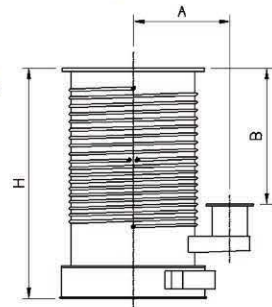
4 kinds of models from 22" to 52" for large size vacuum systems such as vacuum furnaces, etc.



PFL-22

- A steady high vacuum pump without mechanical moving parts.
- An efficient and economical pump because required electric power and oil volume are small.

- Major applications
- Vacuum heat treatment furnace, sintering furnace, carburizing furnace, etc.
 - Large chamber evacuation.



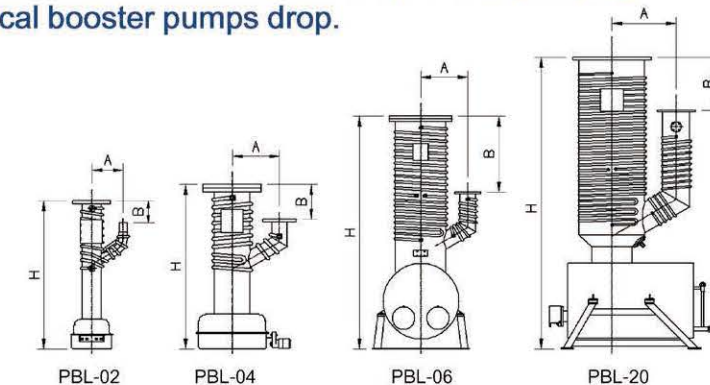
Model	PFL-22	PFL-22TM	PFL-36	PFL-52
Pumping speed [L/sec]	10,000	10,000	34,000	70,000
Ultimate pressure [Pa] (Torr / mbar)	3.0×10^{-4} ($2.2 \times 10^{-6} / 3.0 \times 10^{-6}$)			
Maximum fore pressure [Pa] (Torr / mbar)	16 ($1.2 \times 10^{-1} / 1.6 \times 10^{-1}$)		6.7 ($5 \times 10^{-2} / 6.7 \times 10^{-2}$)	
Oil	ULVOIL D-11			
Oil capacity [L]	5	5	13	27
Cooling water capacity [L/min]	12	15	38	50
Voltage	3 phase, AC200V			
Required electric power [kW]	8	10	Start up: 22, Normal: 11	Start up: 45, Normal: 30
Recommended backing pump	PMB-040C + PKS-070			
Dimensions A x B x H [mm]	480 x 630 x 1,330	480 x 630 x 1,330	725 x 1,022 x 1,732	1,000 x 2,000 x 2,845
Inlet port	VG550	VG550	VG900	VG type equivalent 52 inch
Outlet port	VG150	VG200	VG250	VG350
Weight [kg]	290	290	650	1,400
Oil level gauge	Viewport	Viewport	Viewport	Viewport
Thermostat option	Available	Available	Available	Available
Thermostat setting temperature [°C]	180	180	110	110

Oil Diffusion Ejector Pump PBL series

It has maximum pumping speed at the range of 10^{-1} Pa (10^{-3} mbar and Torr), where pumping speed of oil rotary vacuum pumps and mechanical booster pumps drop.



PBL-02



- A steady high vacuum pump without mechanical moving parts.
- Suitable in intermediate pressure range between oil rotary vacuum pump / mechanical booster pump and oil diffusion pump.
- Body of the pump from the PBL-02 to the PBL-04 is made of stainless steel which is excellent for corrosion resistance.
- Excellent heating efficiency because a pipe heater is placed directly in hydraulic oil for large pumps bigger than the PBL-06.

Model	PBL-02	PBL-04	PBL-06	PBL-10	PBL-14	PBL-20
Pumping speed [L/sec]	80	200	500	1,800	4,000	7,000
Ultimate pressure [Pa] (Torr / mbar)	2.7×10^{-2} ($2 \times 10^{-4} / 2.7 \times 10^{-4}$)					
Maximum fore pressure [Pa] (Torr / mbar)	40 ($3 \times 10^{-1} / 4 \times 10^{-1}$)					
Oil	ULVOIL B-6					
Oil capacity [L]	0.1	0.6	7.5	18	36	90
Cooling water capacity [L/min]	1.5	5	8	12	18	25
Voltage	Single phase, AC200V			3 phase, AC200V		
Required electric power [kW]	0.44	1.8	4 2kW x 2 pcs	8 4kW x 2 pcs	11 5.5kW x 2 pcs	18 6kW x 3 pcs
Recommended backing pump	VD30C / VD301	PKS-016	PKS-030	PKS-070	PMB1200D + PKS-030	PMB-040C + PKS-070
Dimensions A x B x H [mm]	100 x 70 x 463	150 x 112 x 524	200 x 152 x 973	300 x 346 x 1,321	340 x 548 x 1,687	510 x 444 x 2,320
Inlet port	VG50	VG100	VG150	VG250	VG350	VG500
Outlet port	3/4B Hose port	VG40	VG50	VG80	VG100	VG200
Weight [kg]	6	17	86	198	313	495
Oil level gauge	None	None	Level gauge	Level gauge	Level gauge	Level gauge
Thermostat option	None	None	None	None	None	None
Thermostat setting temperature [°C]	-	-	-	-	160	160

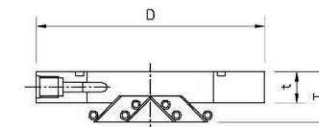
Water-Cooling Baffle BW series

For reducing oil steam backflow from oil diffusion pump into suction side.



BW-04B + Adapter

- For preventing inside of vacuum chamber from the oil steam contamination from the oil diffusion pump.
- It is designed to minimize exhaust resistance.
- By setting the adapter for BW-04B and BW-06B, volume of the oil steam backflow volume can be suppressed additionally.



Model	BW-02	BW-04B	BW-06B	BW-10	BW-14	BW-20	BW-22	BW-36	BW-52
Conductance [L/sec]	100	940	2,200	3,130	5,000	13,000	14,000	54,000	75,000
Outer diameter Dimensions [mm]	D	dia. 120	dia. 149	dia. 199	dia. 350	dia. 450	dia. 625	dia. 680	dia. 1,065
	T	16	28	28	44	50	152	101	113
	t	16	25	25	22	22	24	26	28
Cooling water ports (Size)	Rc 1/8	Rc 1/4	Rc 1/4	Rc 1/4	Rc 3/8	Rc 3/8	Rc 3/8	Rc 3/8	Rc 1/2
Coolant Volume [L/min]	1.5	0.7	1	2	2	3	3	5	5
Weight [kg]	1.7	7.6	11	22	28	66	200		

Vacuum Pump
 Vacuum Valve
 Vacuum Gauge
 Process Gas Monitor
 Leak Detector
 Power Generator (RF/DC)
 EB Power Supply / EB Source
 Deposition Controller
 Thin Film Measurement
 Vacuum Transfer Robot
 Accessories
 Molecular Interaction Analyzer
 Precise Microplate Paddle Mixer

Actor Pump PST series

New type element, which is actor element and optimized magnet filed improves pumping speed in extreme and ultra high vacuum ranges.



Model	PST-030CU	PST-030AU	PST-050CU	PST-050AU	PST-100CX	PST-100AX	PST-110AU	PST-200CXII	PST-200AXII	PST-400CXII	PST-400AXII	
Gas type	Active Gas	Rare Gas	Active Gas	Rare Gas	Active Gas	Rare Gas	Rare Gas	Active Gas	Rare Gas	Active Gas	Rare Gas	
Regenerated pumping speed [m ³ /sec]	N ₂ (*2) 0.03 (0.02)		0.045 (0.03)		0.10 (0.08)		0.11 (0.06)		(0.20)		(0.36)	
	Ar (*2) (0.013)		(0.016)		(0.05)		-		(0.02)		(0.105)	
Ultimate pressure	10 ⁻⁹ Pa range (10 ⁻¹¹ Torr and mbar)		10 ⁻⁹ Pa range (10 ⁻¹¹ Torr and mbar)		10 ⁻⁹ Pa range (10 ⁻¹¹ Torr and mbar)		10 ⁻⁹ Pa range (10 ⁻¹¹ Torr and mbar)		10 ⁻¹⁰ Pa range (10 ⁻¹² Torr and mbar)		10 ⁻¹⁰ Pa range (10 ⁻¹² Torr and mbar)	
Operation pressure (*1)	Recommended value < 8x10 ⁻³ Pa (<6x10 ⁻⁵ Torr, <8x10 ⁻⁵ mbar)		< 8x10 ⁻³ Pa (<6x10 ⁻⁵ Torr, <8x10 ⁻⁵ mbar)		< 5x10 ⁻³ Pa (<4x10 ⁻⁵ Torr, <5x10 ⁻⁵ mbar)		< 5x10 ⁻³ Pa (<4x10 ⁻⁵ Torr, <5x10 ⁻⁵ mbar)		< 4x10 ⁻³ Pa (<3x10 ⁻⁵ Torr, <4x10 ⁻⁵ mbar)		< 8x10 ⁻³ Pa (<6x10 ⁻⁵ Torr, <8x10 ⁻⁵ mbar)	
Connection flange type	UFC070		UFC114		UFC152		UFC152		UFC203		UFC203	
Recommended controller	GST-07L		GST-07L		GST-07L		GST-07L		GST-07L		GST-07L	
Applied voltage [kV]	DC +7.5		DC +7.5		DC +7.5		DC +7.5		DC +7.5		DC +7.5	
Bake-out temperature [°C]	250		250		250		250		250		250	
Weight [kg]	About 9.5		About 12.8		About 37		About 37		About 65		About 124	
Dimensions W x D x H [mm]	108 x 183 x 187		153 x 204 x 241		155 x 340 x 340		180 x 390 x 300		296 x 361 x 376		296 x 544 x 376	
Power for Heater Unit	-		Single phase 200V,300W		Single phase 200V,320W		-		Single phase 200V,600W		Single phase 200V,800W	

*1) During the time of use of the GST-07L-Type controller.
*2) At 1 x 10⁻⁷ Pa (8 x 10⁻¹⁰ Torr, 1 x 10⁻⁹ mbar).

Controller for PST series GST-07L

The GST-07L is a sputter ion pump controller with the high functionality and reliability through the plenty of technology and long time experience in ultra-high vacuum area that ULVAC has engaged.



GST-07L

Model	GST-07L
Display range	7 segments LED display
a) Output current display	2 ranges, mA and μA, automatic switchable (linear scale)
b) Output voltage display	DC 0.0 to 7.5kV
c) Pressure display	10 ⁻² to 10 ⁻⁹ Pa, 10 ⁻⁴ to 10 ⁻¹⁰ mbar)
Output release voltage	DC +7.5kV (2 points, H and L, setting switchable on the front control panel) Volume variable from about 1.0 to 7.5kV for H and L setting voltage
Input voltage / current	AC100 to 115V ±10%, 50/60Hz, 3.0A or lower AC200 to 240V ±10%, 50/60Hz, 1.5A or lower
Monitor terminal output signal	Output of signals being proportionate to 7 segments panel display. DC 0 to 10V full scale for each range, more than 100kΩ
Pressure set point	2 points
Remote / Local	Switchable on the front control panel
External control functions	Various input functions (with remote connector) for remote control and RS-232C communication
Protection functions	Error display / various protection functions High voltage output cutoff when error lighted (ERR 0 to 5) Startup protection timer (adjustable from 1 to 255 minutes)
Weight	Main unit: Approx. 4kg
Dimensions W x D x H	240 x 370 x 99 mm (W : 200mm without the rack mounting bracket.)

Titanium Getter Pump GGT-3/PGT series

A vacuum pump which can create ultra-high vacuum with titanium's sublimation.



GGT-3

PGT-3F

- An extreme high vacuum can be created when it is used with an ion pump.

Titanium getter pump PGT series specifications

Model	PGT-3F	PGT-6F
Maximum pumping speed (*1)	24m ³ /(s · m ²) <20°C> / 64m ³ /(s · m ²) <-196°C>	
Pressure range	10 ⁻¹ to 10 ⁹ Pa (10 ⁻³ to 10 ⁻¹¹ Torr and mbar)	
Applicable gases	H ₂ , H ₂ , O ₂ , H ₂ O, CO, O ₂	
Inapplicable gases	He, Ne, Ar, CH ₄ , C ₂ H ₆ , and other organic gases.	
Leak volume	1.3x10 ⁻¹¹ Pa · m ³ /s (9.8x10 ⁻¹⁴ Torr · m ³ /s, 1.3x10 ⁻¹³ mbar · m ³ /s) or less	
Baking temperature	250°C	
Power consumption	270W	
Filament Material	Titanium Alloy	
Filament lifespan	Rated value for continuous operation (*2): about 75 hours Continuous current: about 25 hours	
Number of filament	3	6
Connection Flange	UFC070-FH	UFC114-FH
Weight	1.0kg	2.5kg

*1) Calculated in ultra high vacuum with nitrogen and temperature of 20°C *2) Turing on for 30 sec and idling for 60 sec.

Specifications For PGT Controller

Model	GGT-3
Output	AC 0 to 6V variable, maximum 60A
Control method	ON/OFF control by timer
Timer setting range	0.05 sec to 300 hours (common to ON and OFF)
Output display	Electric current output display
Output display gradations	Analog / 60A full-scale
Interlock input	1 point
Voltage, frequency	Single phase AC200 to 220V 50/60Hz selectable
Current	Maximum 3.5A
Weight	12kg

Sorption Pump PSM-10B

A pump which uses physical adsorption occurring when the molecular sieves (artificial zeolite) are cooled with liquid nitrogen.

A clean vacuum without oil vapour can be created in the range from atmospheric pressure to 10⁻² Pa (10⁻⁴ mbar and Torr).



PSM-10B

Model	PSM-10B	
Suction port flange	UFC070-RH (*1)	VG40
Ultimate pressure	PSM alone	2.6 Pa (0.02Torr, 0.03mbar)
	PSM in combination with oil rotary vacuum pump	1.3x10 ⁻² Pa (1.0x10 ⁻⁴ Torr, 1.3x10 ⁻⁴ mbar)
Applicable pressure range	Atmospheric pressure to 10 ⁻² Pa order	
Material	Austenitic stainless steel	
Adsorbent type	5A	Molecular sieves
Adsorbent weight	1 kg	
Liquid Nitrogen consumption	Initial stage	5 L/h
	At equilibrium	1.1 L/h
Activating heater	Equipped in the pump	
Heater specification	Single phase AC200V, 300W, 50/60Hz	
Exhaust port flange	¾ Inch packless joint	
Weight	10 kg	

*1)ULVAC standard stainless steel knife-edge metal flange

Wide range line-up to meet various needs, from vacuum angle valve to pendulum valve, from 16A (5/8 inch) to 900A (36 inch) and from atmospheric pressure to extreme high vacuum.



Category chart

Type	Category	Series
Vacuum angle valve	VLP vacuum angle valve (double acting)	VLP-SA vacuum angle valve (double acting / stainless / O-ring shaft feedthrough)
		VLP-SB vacuum angle valve (double acting / stainless / bellows shaft feedthrough)
		VLP-MB vacuum angle valve (double acting / stainless / ultra-high vacuum)
		VLP-U vacuum angle valve (double acting / iron / O-ring shaft feedthrough)
		VLB vacuum angle valve (single acting)
Vacuum gate valve	VAP vacuum gate valve (double acting) VAH vacuum gate valve (manual)	VLB-SA vacuum angle valve (single acting / stainless / O-ring shaft feedthrough)
		VLB-SB vacuum angle valve (single acting / stainless / bellows shaft feedthrough)
Pendulum valve	VFR pendulum valve	VLH-SB vacuum angle valve (manual / stainless / bellows shaft feedthrough)
		VLH-MB vacuum angle valve (manual / stainless / ultra-high vacuum)
Valve for special applications	VUH vacuum angle valve (manual / all metal structure) VLV-3D variable leak valve (manual / flow variable)	10AIV air inlet valve (manual / vent)

Specifications

Series	Vacuum level (*1)	Pressure range abs. [Pa] < mbar > (Torr)	Type	Actuation	Body material	Max. baking temperature [°C] (*2)	Allowable pressure difference [MPa] < bar > (Torr)
VLP-SA	V	Atm. to [1.0E-5] < 1.0E-7 > (7.5E-8)	Angle	Double acting	Stainless steel 304	150	[0.10] < 1 > (750)
VLP-SB	HV	Atm. to [1.0E-6] < 1.0E-8 > (7.5E-9)	Angle	Double acting	Stainless steel 304	150	[0.10] < 1 > (750)
VLP-MB	UHV	Atm. to [1.0E-8] < 1.0E-10 > (7.5E-11)	Angle	Double acting	Stainless steel 304	150 (200)	[0.10] < 1 > (750)
VLP-U	V	Atm. to [1.0E-5] < 1.0E-7 > (7.5E-8)	Angle	Double acting	Steel 400+Ni Plating	60	n/a
VLB-SA	V	Atm. to [1.0E-5] < 1.0E-7 > (7.5E-8)	Angle	Single acting NC(*3)	Stainless steel 304	150	[0.10] < 1 > (750)
VLB-SB	HV	Atm. to 1.0E-6 < 1.0E-8 > (7.5E-9)	Angle	Single acting NC(*3)	Stainless steel 304	150	[0.10] < 1 > (750)
VLH-SB	HV	Atm. to 1.0E-6 < 1.0E-8 > (7.5E-9)	Angle	Manual	Stainless steel 304	150	[0.10] < 1 > (750)
VLH-MB	UHV	Atm. to [1.0E-8] < 1.0E-10 > (7.5E-11)	Angle	Manual	Stainless steel 304	150 (200)	[0.10] < 1 > (750)
VAP	HV	Atm. to 1.0E-6 < 1.0E-8 > (7.5E-9)	Gate	Double acting	Aluminum Alloy	120	[0.10] < 1 > (750)
VAH	HV	Atm. to 1.0E-6 < 1.0E-8 > (7.5E-9)	Gate	Manual	Aluminum Alloy	120	[0.10] < 1 > (750)
VFR	HV	[1.2E5] < 1.2E4 > (900) to [1.0E-6] < 1.0E-8 > (7.5E-9)	Pendulum	Double acting CL retention (*4)	Aluminum Alloy	120	[0.12] < 1.2 > (900)
10AIV	HV	Atm. to [1.0E-6] < 1.0E-8 > (7.5E-9)	Special (vent)	Manual	Stainless steel 304	150	[0.10] < 1 > (750)
VUH	XHV	[1.0E-8] < 1.0E-10 > (7.5E-11)	Special (metal)	Manual	Stainless steel 304	200 (250)	[0.10] < 1 > (750)
VLV-3D	XHV	[1.0E-8] < 1.0E-10 > (7.5E-11)	Special (variable)	Manual	Stainless steel 304	150	[0.10] < 1 > (750)

*1) Refer to "Feedthrough" about relationship between vacuum level and feedthrough.
 *2) Actuator < 60 °C. The value inside the () are when it is opened.
 *3) Single acting NC: Normally closed (Valve automatically closes when compressed air is released).
 *4) Double acting CL retention: Double-acting but the valve is kept closed when compressed air is released.

Portfolio table

Nominal diameter (*1)	◆A (ISO)	[mm]	016	020	025	040	050	063	080	100	160	200	250	320	-	400	-	500	550	900
	◇A (JIS)	[mm]	-	020	025	040	050	065	080	100	150	200	250	300	350	400	450	500	600	900
	●B	[inch]	5/8	3/4	1	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	22	36
VLP-SA□JH	VF		◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇					
VLP-SA□KF	ISO-KF	◆		◆	◆	◆														
VLP-SA□KC	ISO-K						◆	◆	◆	◆	◆	◆	◆							
VLP-SB□JH	VF		◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇							
VLP-SB□KF	ISO-KF	◆		◆	◆	◆														
VLP-SB□KC	ISO-K						◆	◆	◆	◆	◆	◆	◆							
VLP-SB□CH	ISO-CF	◆																		
VLP-MB□CH	ISO-CF	(*2)			(*2)		(*2)		(*2)	(*2)										
VLP-U□	VF																			
VLB-SA□KF	ISO-KF	◆		◆	◆	◆														
VLB-SB□KF	ISO-KF	◆		◆	◆	◆														
VLH-SB□JH	VF		◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇							
VLH-SB□KF	ISO-KF	◆		◆	◆	◆														
VLH-SB□KC	ISO-K						◆	◆	◆	◆	◆	◆	◆							
VLH-SB□CH	ISO-CF	◆			◆															
VLH-MB□CH	ISO-CF	(*2)			(*2)		(*2)		(*2)	(*2)										
VAP-U□	VF									◇	◇									
VAH-U□	VF									◇	◇									
VFR-U□	VF															◇		◇		
10AIV-U□	(*3)																			
VUH-U□	(*3)																			
VLV-3D	(*3)																			

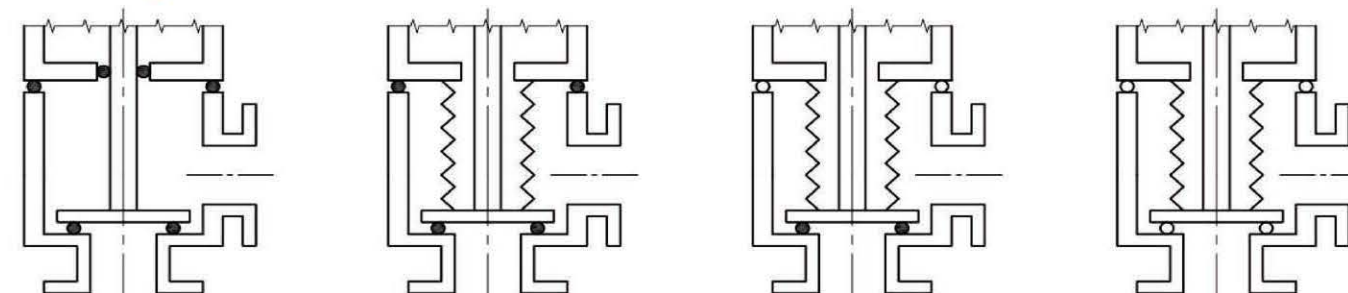
*1) Numerical number used in model is : ◆ "Nominal Diameter: A (ISO) mm", ◇ "Nominal Diameter: A (Former JIS) mm", ● "Nominal Diameter: B inch".
 ◇ "Nominal Diameter: A (JIS) mm" is the standard for the JIS B2290 appendix (maintenance flange).

*2) To be released shortly.

*3) Contact us for details.

ISO-CF nominal diameter	016	025	040	063	100	160	200	250
ULVAC-UFC nominal diameter	034	054	070	114	152	203	253	306

Feedthrough

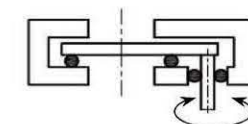
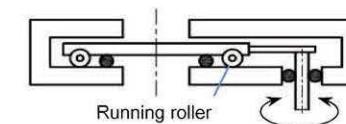


Type	Vacuum level
Angle	V
	HV
	UHV
	XHV

Type	Vacuum level
Angle	V
	HV
	UHV
	XHV

Type	Vacuum level
Angle	V
	HV
	UHV
	XHV

Type	Vacuum level
Angle	V
	HV
	UHV
	XHV



Type	Vacuum level
Gate	V
	HV
	UHV
	XHV

Type	Vacuum level
Pendulum	V
	HV
	UHV
	XHV

- O-ring seal
- Metal seal
- ⌋ Bellows seal

Vacuum level	
V	≤10 ⁵ Pa 10 ⁻² Torr(mbar)
HV	≤10 ⁶ Pa 10 ⁻⁸ Torr(mbar)
UHV	≤10 ⁸ Pa 10 ⁻¹⁰ Torr(mbar)
XHV	≤10 ⁹ Pa 10 ⁻¹¹ Torr(mbar)

Vacuum Pump
 Vacuum Valve
 Vacuum Gauge
 Process Gas Monitor
 Leak Detector
 Power Generator (RF/DC)
 EB Power Supply / EB Source
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 Vacuum Transfer Robot
 Accessories
 Molecular Interaction Analyzer
 Precise Microplate Paddle Mixer

Vacuum Gauge Selection Guide

Selection Guide

Long time experienced and proven know-how from ULVAC who is the leading company of vacuum technology is also utilized in our vacuum measurement product line-up.

Product	Pa	1E-11	1E-10	1E-9	1E-8	1E-7	1E-6	1E-5	1E-4	1E-3	1E-2	1E-1	1E+0	1E+1	1E+2	1E+3	1E+4	1E+5	
	mbar	1E-13	1E-12	1E-11	1E-10	1E-9	1E-8	1E-7	1E-6	1E-5	1E-4	1E-3	1E-2	1E-1	1E+0	1E+1	1E+2	1E+3	
	Torr	7.5E-14	7.5E-13	7.5E-12	7.5E-11	7.5E-10	7.5E-9	7.5E-8	7.5E-7	7.5E-6	7.5E-5	7.5E-4	7.5E-3	7.5E-2	7.5E-1	7.5E+0	7.5E+1	7.5E+2	
Transducer type G-tran series	Atmospheric Pressure Sensor																	SAU	
	Capacitance Manometer																	CCMT-1000D	
																		CCMT-100D	
																		CCMT-10D	
																		CCMT-1D	
	Pirani Gauge																	SW1	
																		SP1	
	Multi Ionization Gauge	Cold Cathode Type Ionization gauge																SC1	
																		ST2	
																		ST2+SPU	
																	ST2+SPU+SAU		
																	SH2		
General purpose type	Pirani Gauge																GP-1G(RY)/1000G		
																	GP-2001G/2002G		
	Hot Cathode Type Ionization gauge																	GI-D7·WIT	
																		GI-D7·WIB	
																		GI-M2	
	Extremely High Vacuum Gauge																AxTRAN		

Vacuum Gauge Calibration Service JCSS

ULVAC is the first company in Japan to receive JCSS accreditation in the vacuum field as a vacuum gauge calibration laboratory.



- At June 3, 2010, accredited as a JCSS-MRA calibration laboratory (JCSS 0258), the first ISO/IEC 17025 compliant calibration laboratory of pressure (vacuum) field in Japan.
- Running JCSS calibration based on ISO/IEC17025.
- JCSS-calibration certificate is available around the countries and region of the ILAC and APLAC MRA.
- Vacuum gauge compliant with calibration possible : Thermal conductivity gauge (pirani vacuum gauge), diaphragm vacuum gauge, ionization vacuum gauge, viscosity vacuum gauge.
(Supports all vacuum gauges from our company as well as those manufactured by other companies.)

Designation for the classification of calibration method	Category	Calibration range	Highest measurement capacity (trust level approx. 95%)
Vacuum gauge	Viscosity vacuum gauge	Above 0.1mPa less than 1mPa	2.0%
		Above 1mPa less than 10mPa	1.0%
		Above 10mPa less than 0.1Pa	0.8%
		Above 0.1Pa less than 1Pa	0.7%
Vacuum gauge	Diaphragm vacuum gauge	Above 1Pa less than 100Pa	1.5%
		Above 10kPa less than 133kPa	0.6%
		Above 0.1mPa less than 1mPa	0.3%
Vacuum gauge	Ionization gauge	Above 0.1mPa less than 1mPa	5.0%
		Above 1mPa less than 1Pa	3.0%
Vacuum gauge	Thermal conductivity gauge	Above 1Pa less than 1kPa	2.0%

Ulvac Россия 8-812-989-01-72 info@ulvac.org

Multi-Ionization Gauge G-TRAN series ST2/SH2

Pirani Vacuum Gauge G-TRAN series SW1/SP1

Transducer type vacuum gauge which is connectable with different measurement range sensor units. It saves running cost greatly.

Constant temperature type Pirani vacuum gauge which utilizes heat conductivity of gases to measure from low vacuum to medium vacuum range.



- ST2-1/ST2-2
 - The world's first metal type triode ionization gauge (Patent 5827532). Long lifetime taking advantage of triode type even in harsh environment for vacuum gauges.
 - Measurement accuracy is improved at ±10% and sensitivity stability is also improved drastically.
 - For measurement of ultimate pressure of vacuum furnaces / organic EL and touch panel manufactured systems, and in atmosphere with lots of hydrocarbon or cleaning fluid, and in equipments where reduction of replacement frequency for sensor heads is required.
- SH2-1/SH2-2
 - For measurement from ultra-high vacuum to high-vacuum.
 - For measurement of ultimate pressure of sputtering and evaporation system such as PV-FPD / SEMI and electronic component manufacturing systems, and pressure monitoring for ultra high vacuum equipments.

- SW1-1/SW1-2
 - Wide range measurement from atmospheric pressure to 5×10^{-2} Pa (3.75×10^{-4} Torr, 5×10^{-4} mbar).
 - Excellent shock-resistance and vibration resistance design.
 - For sputtering system, vacuum laminator, vacuum pump carousel system, manufacturing system where there is vibration from vacuum pumps, etc.
- SP1
 - Long time experienced sensor head WP series is used. Sensor head is fully compatible with other ULVAC Pirani vacuum gauges.
 - For interlock and sequence control for various kind of vacuum manufacturing equipment, other rough pumping systems, etc.

Model	ST2-1	ST2-2	SH2-1	SH2-2
Measurement pressure range	1×10^{-5} to $1 \times 10^{+1}$ Pa 7.5×10^{-8} to 7.5×10^{-2} Torr 1×10^{-7} to 1×10^{-1} mbar		5×10^{-8} to $1 \times 10^{+1}$ Pa 7.5×10^{-11} to 7.5×10^{-2} Torr 1×10^{-10} to 1×10^{-1} mbar	
Accuracy	±10%: 1×10^{-4} to 3Pa, 7.5×10^7 to 2.2×10^{-2} Torr, 1×10^6 to 3×10^2 mbar		±15%	
Filament	1 pc (Ir/Y ₂ O ₃)		2 pcs (Ir/Y ₂ O ₃ and W)	
Degas method	Electron bombardment			
Measurement value output	LOG output (DC 0 to 10V)			
Set point	2 points (open collector output)	None	2 points (open collector output)	None
Serial communication	None	RS232C / RS485	None	RS232C / RS485
Power supply voltage	DC 20 to 28V			
Dimensions	75 x 63 x 184 mm (ST2 / SWT-16)			
Connectable sensor unit	Pirani vacuum gauge SPU (optional), pressure sensor SAU (optional)			
Connectable sensor head	SWT-16 (KF16), SWT-25 (KF25)		M-34 (KF16), M-35 (KF25), M-36 (ICF070)	

Model	SW1-1	SW1-2	SP1
Measurable pressure range	5×10^{-2} to $1 \times 10^{+5}$ Pa 3.75×10^{-4} to 760Torr 5×10^{-4} to 1,013mbar		4×10^{-1} to $3.0 \times 10^{+3}$ Pa 3×10^{-3} to 22Torr 4×10^{-3} mbar
Accuracy	±10% (1×10^{-1} to $1 \times 10^{+4}$ Pa, 7.5×10^4 to 75Torr, 1×10^3 to 100mbar) ±20% (5×10^{-2} to $1 \times 10^{+5}$ Pa, 3.75×10^4 to 760Torr, 5×10^{-4} to $1 \times 1,013$ mbar)		±15% (51 to 760Pa, 3.8×10^{-1} to 5.7Torr, 5.1×10^{-1} to 7.6mbar) ±30% (10 to 1,000Pa, 7.5×10^{-2} to 7.5Torr, 0.1 to 10mbar) ±50% (0.4 to 3,000Pa, 3×10^{-2} to 22Torr, 4×10^{-3} to 30mbar)
Filament	Platinum (Pt)		
Measurement value output	DC 0 to 10V LOG output		DC 0 to 10V non-linear output
Set point	2 points (open collector output)	None	2 points (open collector output)
Serial communication / Digital output	None	RS232C/RS485	None
Power supply voltage	DC 18 to 30V		DC 24V±2 V
Dimensions	46 x 28 x 105 mm		50 x 30 x 146 mm
Sensor head model	SWP-16 (KF16), SWP-R1/8 (R1/8)		WP-01, WP-02, WP-03, WP-16

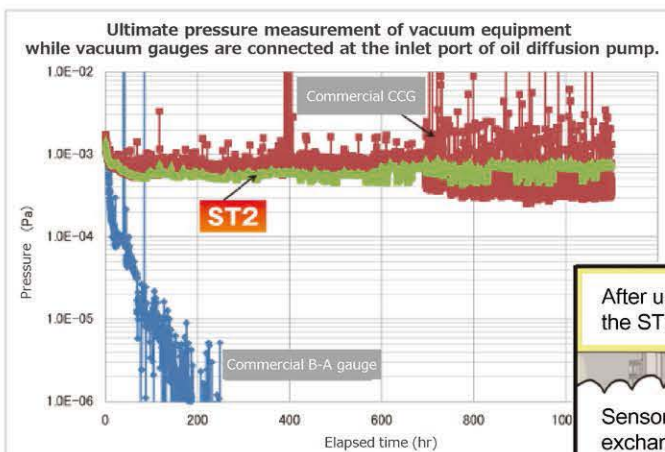
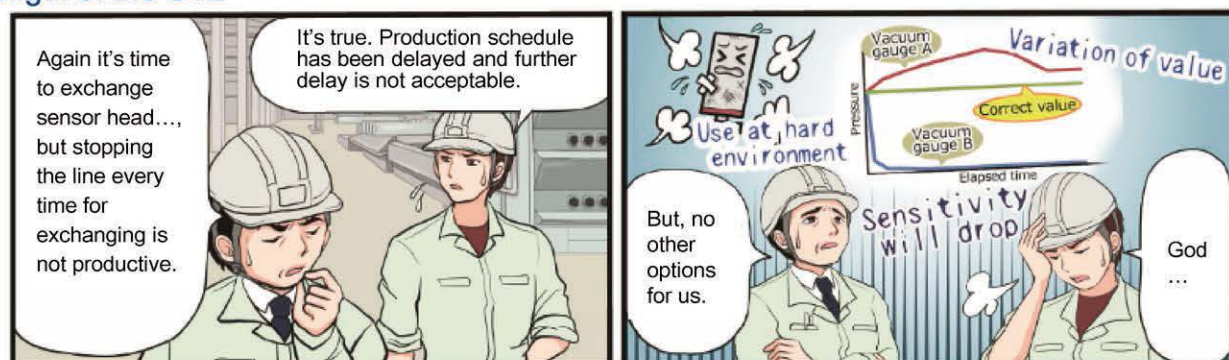
* Connectable with different measurement range sensor units. Measureable from low-vacuum to atmospheric pressure in combination with Pirani vacuum gauge SPU and pressure sensor SAU.

Capacitance Manometer G-TRAN series CCMT

Vacuum gauge which detects change of static electric capacitance occurring from the ceramic diaphragm transforms due to the change of gas pressure.

Secret of strength of the ST2

Do you have any concern like this?



Long life time (more than 30 times when compared internally). Load to vacuum gauge could greatly reduce by keeping down ion current value per unit area of ion collector.
 High stability and high accuracy (±10%)
 ULVAC original design to make electric potential in the space where ionization is occurred even.
 The world's first triode-type metal tube.
 Small metal type. Conductance was maximally considered.
 ULVAC original multi-ionization gauge specifications.
 Operation in combination with Pirani vacuum gauge and atmospheric pressure sensor.



- Excellent corrosion resistance and long-time stable ceramic (alumina) diaphragm.
- Total pressure measurement not depending on gas types.
- Equipped with temperature compensation circuit.
- Sensor protection structure against contamination from flying objects.
- Warming up time after power-on until stabilization is greatly reduced.
- Coating process control for equipments such as sputtering, evaporator, etc. and pressure monitor for various kind of manufacturing equipment such for photovoltaic cell, etc.

Model	CCMT-1000D	CCMT-100D	CCMT-10D	CCMT-1D
Range full scale (F.S.)	133kPa 1,000Torr 1,330mbar	13.3kPa 100Torr 133mbar	1.33kPa 10Torr 13.3mbar	133Pa 1Torr 1.33mbar
Lowest reading	13Pa, 10^{-1} Torr, 1.3×10^{-1} mbar	1.3Pa, 10^{-2} Torr, 1.3×10^{-2} mbar	0.13Pa, 10^{-3} Torr, 1.3×10^{-3} mbar	0.013Pa, 10^{-4} Torr, 1.3×10^{-4} mbar
Practical lowest reading	66.6Pa 5×10^{-1} Torr, 6.7×10^{-1} mbar	6.7Pa 5×10^{-2} Torr, 6.7×10^{-2} mbar	0.67Pa, 5×10^{-3} Torr, 6.7×10^{-3} mbar	6.7 x 10 ⁻² Pa, 5×10^{-4} Torr, 6.7×10^{-4} mbar
Accuracy	±0.2% for the indicated value ± temperature coefficient (2 hours after power-on at 25 °C)			
Display	None (optional display: ISG1/GM-2001G/GM-2002G)			
Measurement value output	Linear output (DC 0 to 10V)			
Set point	None			
Material where gas contacts	Al ₂ O ₃ , Vacon70, SUS316, glass ceramic solder, Ag Ti Cu hard solder			
Power supply voltage	DC 14 to 30V			
Dimensions	Dia. 55 x 117 mm			
Fitting	KF16, 1/2 pipe, 8VCR			

Vacuum Pump, Vacuum Valve, Vacuum Gauge, Process Gas Monitor, Leak Detector, Power Generator (RF/DC), EB Power Supply / EB Source, Deposition Controller, Thin Film Measurement, Vacuum Transfer Robot, Accessories, Molecular Interaction Analyzer, Precise Microplate Paddle Mixer

Pressure Sensor Unit G-TRAN series SAU

Semiconductor type thin-film element makes measurement near atmospheric pressure (gauge pressure : -100 kPa to 10kPa, -1bar to 0.1 bar, -14.5psi to 1.45psi) accurate.



SAU

- Optimum for atmospheric pressure checking because pressure standard is for gauge pressure. It measure atmospheric pressure accuracy.
- Semiconductor type thin film element makes continuous use in high vacuum process possible (SUS316L).
- DC 0-5 linear output as standard.
- Power supply is widely supported from DC 12V to 24V.
- Atmospheric pressure checking or gauge pressure measurement for various kind of coating system such as PV-FPD, SEMI-electronic devices manufacturing system.

Model	SAU
Pressure standard	Gauge pressure
Measurable pressure range (gauge pressure)	-100 to 10kPa -750 to 75Torr -1,000 to 100mbar
Accuracy	±3% F.S.
Measurement value output	DC 0 to 5V linear output
Material	SUS316L
Sensor pressure proof	200kPa, 1,500Torr, 2,000mbar (gauge pressure) *need for the consideration of pressure resistance of the flange and the clamp.
Power supply	DC 12 to 24V±10%
Dimensions	dia. 30 x 68mm
Flange	KF16

Cold Cathode Ionization Gauge G-TRAN series SC1

Reverse magnetron cold cathode gauge.



SC1

- Simple structure makes periodical maintenance easy and inexpensive.
- No filament. Sensor is recyclable by cleaning.
- 2 set points.
- Various kind of vacuum furnace, evaporator, organic EL manufacturing system and other high vacuum system.

Model	SC1
Measurable pressure range	1×10^{-5} to 1×10^0 Pa 7.5×10^{-8} - 7.5×10^{-3} Torr 1×10^{-7} - 1×10^{-2} mbar
Accuracy	-50 to +100% (1×10^{-4} to 1×10^1 Pa, 7.5×10^{-7} - 7.5×10^4 Torr, 1×10^{-6} - 1×10^3 mbar)
Measurement value output	DC 0 to 10V nonlinear output
Set point	2 points (open collector output)
Serial communication / digital output	None
Power supply voltage	DC 24V±2V
Dimensions	dia. 90 x 145 (C-21)
Sensor head model	C-21 (dia. 18/15), C-23 (ICF034), C-24 (KF16), C-25 (KF25)

Display Unit G-TRAN series ISG1 / IM1(2)R1

Display for all G-TRAN series and CCMT series.



ISG1



IM1R1

- 3 set points for ISG1 and 8 points (arbitrary allocation) for IM1R1 and IM2R1
- Measurable in conjunction with ionization (or cold cathode) (ch1) and Pirani gauge (ch2) (IM1R1 and IM2R1 only).
- 4 channels simultaneous measurement and indication (IM1R1 and IM2R1 only).

Model	ISG1	IM1R1	IM2R1
Number of connectable sensor unit	1 unit	1 to 4 units	
Connectable sensor unit	SW1, SP1, ST2, SH2, SC1, CCMT	SW1, SP1, ST2, SH2, SC1	
Indication	Digital display mantissa portion: 2 digit Exponent portion: 2 digit	Digital display mantissa portion: 2 digit Exponent portion: 2 digit	
Measurement value output	DC 0 to 10V		
Set point	3 points	8 points (arbitrary allocation)	
Sampling time	70ms	50ms (70ms only in the case of SW1)	
Power supply	DC 24V±1V	DC 24V±2V	AC 100V±10V
Combination measurement	-	Possible	
Dimensions	DIN 48 x 70 x 96mm	DIN 96 x 70 x 96mm	

Pirani Vacuum Gauge GP-G series

Constant temperature Pirani vacuum gauge which utilizes heat conductivity of gases. Bestseller product, more than 150,000 units.



GP-1000G



GP-2002G



GP-1G with case

- Display is included as standard. Analog or digital display.
- Long time experienced sensor head WP series is used. Sensor head is fully compatible with other ULVAC Pirani vacuum gauges.
- Filament is corrosion resistant platinum (Pt).
- Various interface function according to usage : Digital output, serial communication, control output signal (set point), etc.
- For sputtering system, vacuum laminator, vacuum pump carousel system and interlock and sequence control various kind of vacuum manufacturing system, and other rough pumping systems, etc.

Model	GP-1000G	GP-2001G	GP-2002G	GP-1GRY(A)	GP-1G	GP-1G with case
Measurable pressure range	0.4 to 2,700Pa 3×10^{-3} to 20Torr 4×10^{-3} to 27mbar	0.4 to 3,000Pa 3×10^{-3} to 22.5Torr 4×10^{-3} to 30mbar			0.4 to 2,700Pa 3×10^{-3} to 20Torr 4×10^{-3} to 27mbar	
Pressure unit	Pa or Torr	Pa / kPa		Pa or Pa / Torr		Pa or Torr
Accuracy	±15% (51 to 760Pa, 0.38 to 5.7Torr, 0.5 to 7.6mbar), ±30% (10 to 1,000Pa, 0.075 to 7.5Torr, 0.1 to 10mbar), ±50% (0.4 to 2,700 / 3,000Pa, 3×10^{-3} to 20Torr, 4×10^{-3} to 27/30mbar)			Within ±3% of the 100% straight scale conversion full scale		
Indication	Digital display (LCD) Mantissa portion: 2 columns/exponent Portion: 1 column		Digital display (LED) 4.5 columns		Analog display	
Measurement value output	DC 0 to 10V linear output		DC 0 to 10V linear output		DC 0 to 10mV non-linear output	
Set point	3 point (relay contact output)		3 point (open collector output)		2 points (relay contact output) / None	
Serial communication / digital output	RS232C / BCD output		None			
Power supply voltage	AC100 to 240V		DC24V		AC100 to 240V	
Dimensions (display control unit)	50 x 236 x 99mm	99 x 136 x 48mm		100 x 111 x 100mm	100 x 130 x 100mm	150 x 134 x 191mm
Sensor head	WP-01 (dia. 18), WP-02 (dia. 15), WP-03 (R3/8), WP-16 (KF16), WPB-10-034 (ICF034)					

Ionization gauge/ XHV Gauge GI series / AxTRAN

Hot cathode ionization vacuum gauge for medium to ultra / extreme high vacuum range.



GI-M2



AxTRAN

- GI series
 - Medium to ultra high vacuum range.
 - 3 types of sensor heads are available according to your application, metal tube, glass tube and nude type.
 - GI-D7(WIT) is for vacuum heat treatment furnace, vacuum brazing furnace, evaporator (oil diffusion pump), etc. GI-D7(WIB) and GI-M2 is for sputtering system, evaporator (turbo molecule pump), various kind of high and ultra-high vacuum system, etc.

- AxTRAN
 - Ultra high vacuum to extreme high vacuum range. Lowest range is 10^{-11} Pa (10^{-13} Torr, 10^{-13} mbar). Wide range measurement from 0.5×10^{-10} to 1×10^{-2} Pa (0.4×10^{-12} to 7.5×10^{-5} Torr, 0.5×10^{-12} to 1×10^{-4} mbar).
 - Bessel box energy filter reduces residual current such as soft x-rays and ESD ions, etc.
 - For high-energy accelerators, ultra high and extreme high vacuum equipment, etc.

Product	(Glass type) ionization vacuum gauge	(Metal type) ionization vacuum gauge	Extremely high vacuum gauge
Model	GI-D7	GI-M2	AxTRAN
Pressure range	WIT: 1.3×10^{-5} to 6.7×10^{-1} Pa, 1.0×10^{-7} to 5×10^{-3} Torr, 1.3×10^{-7} to 6.7×10^{-3} mbar WIB: 1.3×10^{-5} to 1.3×10^{-2} Pa, 1.0×10^{-8} to 1.0×10^{-4} Torr, 1.3×10^{-8} to 1.3×10^{-4} mbar	5.0×10^{-8} to 9.9×10^{-0} Pa, 3.7×10^{-10} to 7.5×10^{-2} Torr, 5×10^{-10} to 9.9×10^{-2} mbar	0.5×10^{-10} to 9.99×10^{-3} Pa, 3.7×10^{-12} to 7.5×10^{-5} Torr, 0.5×10^{-12} to 9.99×10^{-5} mbar
Pressure unit	Pa or Torr		
Accuracy	±15%		
Display	Digital display (LED) mantissa portion: 3 columns / exponent portion: 2 columns		
Measurement value output	Mantissa portion linear output, quasi-LOG output (DC 0 to 10V)		
Set point	2 points (relay contact output)		
Serial communication	RS232C / BCD output		RS232C / BCD output (option)
Power supply	AC 100 V±10 V		
Dimensions (display control unit)	240 x 380 x 99 mm		
Sensor head	WIT-G1, WIT-G3, WIB-G5, WIB-N3	M-11, M-12, M-13, M-14, M-15	X-11 (ICF070)

Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interaction Analyzer
Precision Microplate Paddle Mixer

Process Gas Monitor (Residual Gas Analyzer)

Compact Process Gas Monitor Qulee CGM series

For sputtering system for process control, quality control and yield ratio improvement.

- No differential pumping system required for process monitoring up to 1Pa (7.5×10^{-3} Torr, 1×10^{-2} mbar).
- Integrated display does not always require PC for operation. Simple and easy with one touch function.
- Electron stimulated desorption (330V, 5mA) for degas.
- Preventive maintenance function for ion source, secondary electron multiplier and analyzer tube.
- For sputtering system.



Qulee CGM-051

Model	CGM-051	CGM-052
Mass range	1 to 50 amu	
Resolution	M/ΔM=1M (10%P.H.)	
Detector	Faraday cup	EM tube / faraday cup
Sensitivity	1×10^{-7} A/Pa, 1.33×10^{-5} A/Torr, 1×10^{-5} A/mbar	1×10^{-4} A/Pa, 1.33×10^{-2} A/Torr, 1×10^{-2} A/mbar
Minimum detectable partial pressure	1×10^{-7} Pa, 7.5×10^{-10} Torr, 1×10^{-9} mbar	1×10^{-10} Pa, 7.5×10^{-13} Torr, 1×10^{-12} mbar
Maximum operating pressure	2Pa, 1.5×10^{-2} Torr, 2×10^{-2} mbar	1×10^{-2} Pa, 7.5×10^{-5} Torr, 1×10^{-4} mbar (SEM) 2Pa, 1.5×10^{-2} Torr, 2×10^{-2} mbar (FC)
Filament	Ir/Y ₂ O ₃ (1pc)	
Maximum bakeout temperature	120°C, 248F (when analyzer tube is connected) 250°C, 482F (without analyzer tube)	
Software	Qulee QCS Ver.3.1 later (Windows 7/8/10 supported)	

Process Gas Monitor (Residual Gas Analyzer)

Reactive Process Gas Monitor Qulee RGM series

For etching and CVD system for process control, quality control, yield ratio improvement and end point monitoring.

- Stable and long-time measurement in reactive gases or corrosive gases environment.
- Closed ion source with magnet makes ionization soft and gas separation small.
- Compact flow control valve. Short distance between process chamber and ion source realizes high response analysis.
- Preventive maintenance function for ion source, secondary electron multiplier and analyzer tube.
- For process monitoring residual gas analysis and leak test for etching system and CVD system.



Qulee RGM-302

Model	RGM-202	RGM-302
Mass range	1 to 200 amu	1 to 300 amu
Resolution	M/ΔM=1M (10%P.H.)	
Detector	EM tube / faraday cup	
Sensitivity (EM tube)	1×10^{-3} A/Pa 1.33×10^{-1} A/Torr 1×10^{-1} A/mbar	
Minimum detectable partial pressure	1×10^{-10} Pa, 7.5×10^{-13} Torr, 1×10^{-12} mbar	
Maximum sampling pressure	13kPa, 97.5Torr, 130mbar (modification possible through orifice selection.)	
Gas inlet valve	Channel control valve with orifice attached	
Ion source / filament	Closed ion source with magnet / V-shaped filament Ir/Y ₂ O ₃ (1 piece)	
Software	Qulee QCS Ver.3.1 later (Windows 7/8/10 supported)	

Basic Process Gas Monitor Qulee BGM series

For various kind of evaporator and vacuum furnace for quality control and yield ratio improvement.

- Residual gas analysis.
- Integrated display does not always require PC for operation. Simple and easy with one touch function.
- Electron stimulated desorption (330V, 5mA) for degas.
- Preventive maintenance function for ion source, secondary electron multiplier and analyzer tube.
- For evaporator, vacuum furnace, organic EL manufacturing system, PV-FPD semiconductor manufacturing system and other high vacuum systems.



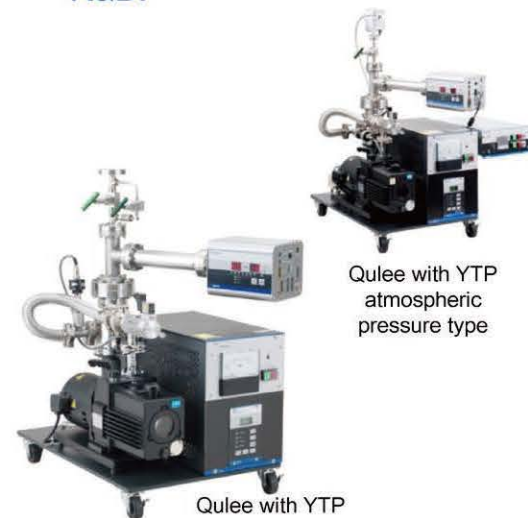
Qulee BGM-102

Model	BGM-101	BGM-201	BGM-102	BGM-202
Mass range	1 to 100 amu	1 to 200 amu	1 to 100 amu	1 to 200 amu
Resolution	M/ΔM=1M (10%P.H.)			
Detector	Faraday cup		EM tube / faraday cup	
Sensitivity	1×10^{-7} A/Pa, 1.33×10^{-5} A/Torr, 1×10^{-5} A/mbar	4 A/Pa, 532 A/Torr, 400 A/mbar		
Minimum detectable partial pressure	1×10^{-8} Pa, 7.5×10^{-11} Torr, 1×10^{-10} mbar	1×10^{-12} Pa, 7.5×10^{-15} Torr, 1×10^{-14} mbar		
Maximum operating pressure	1×10^{-2} Pa, 7.5×10^{-5} Torr, 1×10^{-4} mbar			
Filament	Ir/Y ₂ O ₃ (2 pieces)			
Maximum bakeout temperature	120°C, 248F (when analyzer tube is connected) 250°C, 482F (without analyzer tube)			
Software	Qulee QCS Ver.3.1 later (Windows 7/8/10 supported)			

Process Gas Monitor with Pumping System Qulee with YTP

For wide range of usage from process control, residual gas analysis of various vacuum equipments to R&D.

- From processing monitoring to residual gas analysis by single unit.
- BGM-101 and 102 for 1-100amu, BGM-201 and 202 for 1-200 amu and HGM-302 for 1-300 amu.
- Maximum operation pressure starts from atmospheric pressure and changes depending on selected orifice. 3000, 500, 100, 10, 1Pa (22.5, 3.75, 7.5, 0.75, 0.075Torr, 30, 5, 1, 0.1, 0.01mbar).
- Replacement / refill of oil and bearing replacement is not necessary because the pivot bearing-type turbo pump.
- For process monitoring of sputtering system and evaporator, residual gas analysis of vacuum carburizing furnace, freeze dryer and high vacuum systems.



Qulee with YTP atmospheric pressure type

Qulee with YTP

Process gas monitor	Select from BGM-101, BGM-102, BGM-201, BGM-202, HGM-302
Maximum operation pressure	Select from atmospheric pressure, 3,000,500,100,10,1Pa / 22.5,3.75,7.5,0.75,0.075Torr / 30,5,1,0.1,0.01mbar
Gas introduction system (3000 to 1Pa, 22.5 to 0.075Torr, 30 to 0.01mbar)	Manual bellows valve (2 way), Flange : UFC070
Atmospheric pressure sampling unit (atmospheric pressure)	DAP-6D, ultimate pressure: 6700Pa, 50Torr, 67mbar Control unit Capillary unit Power cable 3m included.
Pumping system YTP-50M	Turbo Molecular Pump Backing pump Pirani Vacuum Gauge
Power supply	Select from oil rotary pump and dry pump GP-1G
Software	50L/s (N ₂) Single phase AC100V, 14A Qulee QCS Ver.3.1 later (Windows 7/8/10 supported)

* Pumping system YTP-50M, Qulee main unit, gas inlet and other parts are packaged separately. Please refer to the assembly manual for set up.

High Performance Process Gas Monitor Qulee HGM series

For research & development equipment.

- Highest sensitivity 2.5×10^{-6} A/Pa (3.3×10^{-4} A/Torr, 2.5×10^{-4} A/mbar).
- Measurable while baking at 250°C (482F) or below. Maximum 300°C (572F) when analyzer tube is disconnected.
- Electron stimulated desorption (330V, 5mA) for degas.
- Preventive maintenance function for ion source, secondary electron multiplier and analyzer tube.
- For thermal desorption gas analysis, residual gas analysis for extreme high and ultra high vacuum equipments, organic compound analysis and environmental analysis, etc.



Qulee HGM-202

Model	HGM-202		HGM-302	
Mass range	1 to 200 amu		1 to 300 amu	
Resolution	M/ΔM=1M (10%P.H.)			
Detector	Faraday cup	EM tube	Faraday cup	EM tube
Sensitivity	2.5×10^{-6} A/Pa 3.3×10^{-4} A/Torr 2.5×10^{-4} A/mbar	4 A/Pa 532 A/Torr 400 A/mbar	2×10^{-6} A/Pa 2.6×10^{-4} A/Torr 2×10^{-4} A/mbar	4 A/Pa 532 A/Torr 400 A/mbar
Minimum detectable partial pressure	1×10^{-9} Pa 7.5×10^{-12} Torr 1×10^{-11} mbar	1×10^{-13} Pa 7.5×10^{-16} Torr 1×10^{-15} mbar	1×10^{-9} Pa 7.5×10^{-12} Torr 1×10^{-11} mbar	1×10^{-13} Pa 7.5×10^{-16} Torr 1×10^{-15} mbar
Maximum operating pressure	1×10^{-2} Pa, 7.5×10^{-5} Torr, 1×10^{-4} mbar			
Filament	Ir/Y ₂ O ₃ (2 pieces)			
Maximum bakeout temperature	250°C, 482F (when analyzer tube is connected) 300°C, 572F (without analyzer tube)			
Software	Qulee QCS Ver.3.1 later (Windows 7/8/10 supported)			

Software for Gas Analysis Qulee QCS

Standard software for Qulee series.



Qulee QCS

- Standard software for all Qulee series. (Windows 7/8/10 supported)
- User-friendly with many shortcut buttons on the screen.
- Various measurement mode such as scan mode, trend mode, analog mode, sensitivity-calibration mode, etc.
- Simultaneous measurements up to 8 units by RS485 communication (any type of Qulee series are connectable).
- For all Qulee series.

Model	Qulee QCS Ver.3.1
OS	Microsoft Windows 7/8/10
Interface	RS-232C/485
Connectable quantity	Maximum 8. Any type of Qulee series are connectable.
Supported model	All models of Qulee (CGM / BGM / HGM / RGM / Qulee with YTP)
Recipes to save	100 (user area 70)
Measurement speed	50, 100, 200, 500, 1,000, 2,000 ms
Analog input	0 to 10V (2 points)
Partial pressure set point	2ch partial pressure set point (error and warning) setting (trend mode only)
PC required specifications	HDD: 2MB (measurement data excluded), RAM: 256MB or more, CPU: Pentium 3 1.2GHz or higher, display area: 1024 x 768 or more, COM Port: RS232C, CD-ROM Drive

* ULVAC standard converter is recommended when using a USB/RS232C converter.

Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interaction Analyzer
Precision Microplate Paddle Mixer

Leak Detector HELIOT900 series

HELIOT 900 series is a leak detector which has high speed pumping capability and user-friendliness. Highest performance is committed in all kinds of leak tests.



HELIOT901W1/D2

HELIOT904W2/D3/D4

HELIOT901+Cart

- High speed pumping capability 5L/sec helium in ULTRA flow mode.
- Tablet wireless remote control as standard.
- Simple and eye-friendly high-definition screen.
- Backing pump is selectable from oil rotary pump and dry scroll pump in different sizes.
- Mobile-friendly with maneuverable cart (904 series) and low height floor cart (901 series).
- Easy maintenance. Tool-free removal panel, easy access to each part and maintenance instruction movies installed.
- Aside from helium, hydrogen detection is possible in vacuum method.



Model	901W1	901D2	904W2	904D3	904D4
Body type	Portable		Mobile		
Detectable gas	⁴ He, ² H ₂				
Minimum detectable leak rate (⁴ He)	<5E-13 Pa·m ³ /sec, <5E-12 mbar·L/sec, <5E-12 Torr·L/sec				
Leak rate display range	⁴ He	ULTRA	0.01E-12 to E-6 Pa·m ³ /sec, 0.01E-11 to E-5 mbar·L/sec, 0.01E-11 to E-5 Torr·L/sec		
		FINE	0.01E-10 to E-5 Pa·m ³ /sec, 0.01E-9 to E-4 mbar·L/sec, 0.01E-9 to E-4 Torr·L/sec		
	² H ₂	GROSS	0.01E-8 to E-3 Pa·m ³ /sec, 0.01E-7 to E-2 mbar·L/sec, 0.01E-7 to E-2 Torr·L/sec		
		FINE	0.01E-8 to E-5 Pa·m ³ /sec, 0.01E-7 to E-4 mbar·L/sec, 0.01E-7 to E-4 Torr·L/sec		
Inlet pumping speed (⁴ He)[L/sec]	ULTRA 5		5		
Maximum connecting pressure	ULTRA		<2 Pa, <0.02 mbar, <0.015 Torr		
	FINE		<100 Pa, <1 mbar, <0.75 Torr		
	GROSS		<1,200 Pa, <12 mbar, <9 Torr		
Main pump : pumping speed [L/sec]	Turbo molecule pump :31				
Backing pump speed (50Hz/60Hz)	Oil rotary pump: 30/36 L/min, 1.8/2.2 m ³ /h, 1.1/1.3 cfm		Dry scroll pump: 90/108 L/min, 5.4/6.5 m ³ /h, 3.2/3.8 cfm		Dry scroll pump: 135/162 L/min, 8.1/9.7 m ³ /h, 4.8/5.7 cfm
	Dry scroll pump: 250/300 L/min, 15/18 m ³ /h, 8.8/10.6 cfm		Dry scroll pump: 500/600 L/min, 30/36 m ³ /h, 17.6/21.2 cfm		
Weight (including floor cart) [kg]	About 33 (about 46)	About 37 (about 50)	About 79	About 74	About 96
Dimensions W x D x H [mm] (floor cart included.)	320 x 480 (652) x 505.5 (917)		444 x 660 x 991		
Power consumption [VA]	600	500	1100	650	1150
Power supply [V]	Single phase 100 to 120 or 200 to 240				
Inlet port flange	KF25				
Start-up time [min]	<2				
External interface	RS232C, RS485, analog DC output, digital input output				
Display language	Japanese, Chinese, Korean, Chinese (simplified character), Chinese (traditional character), German, Spanish				
Controller unit	7inch tablet-type industrial computer (wireless standard :IEEE 802.11 b/g/n) (*1)				
Operation range [m]	Cable	Cable length : 2 (standard attachment), 5 (optional)			
	Wireless	40 (*2)			
Battery lasting time [hr]	3 to 8 (*3)				
Operating temperature range [°C]	10 to 40 (non condensation.)				

*1) Applicable radio law. 1) Tablet: Telec, CE, FCC. 2) Main unit: Telec, CE, FCC, IC, C-TICK. 3) Non-wireless type available but wireless radio communication is still active when cable between tablet controller and main unit is disconnected. *2) May change depending on operating environment. *3) May change depending on communication condition, brightness, volume, etc. *4) Be careful about inrush current. Check if specification is sufficient when using drum reel.

Sniffer

Model	AS9	BS9	BT9
Detectable gas	⁴ He		
Leak rate display range	0.01E-8 to E-5 Pa·m ³ /sec, 0.01E-7 to E-4 mbar·L/sec, 0.01E-7 to E-4 Torr·L/sec		0.01E-7 to E-3 Pa·m ³ /sec, 0.01E-6 to E-2 mbar·L/sec, 0.01E-6 to E-2 Torr·L/sec
Flow rate [SLM]	<0.03		
Sniffing inlet port	Handy probe		dia. 6mm hose joint
Tube [m]	1 to 10		

Optional accessories for HELIOT900 series

Various option lineup for the HELIOT900 Series



a. Sniffer unit	f. Calibrated leak
a-1 AS unit	f-1 Calibrated leak membrane type: E-7, E-8, E-9, E-10 [Pa·m ³ /sec]
a-2 BS unit	f-2 Calibrated leak channel type: E-4, E-5, E-6 [Pa·m ³ /sec]
a-3 BT unit	
b. Cart, case	g. Parts
b-1 Low height cart for the 901 series.	g-1 Manual angle type valve: KF25-KF25
b-2 Controller storage box. *Low height cart is necessary to fix this box in case of the 901 series.	g-2 Helium spray gun
b-3 Carrying case for the 901 series *The 901 series with low height cart is not stored in this case.	g-3 Helium regulator (applicable only for Japanese domestic helium cylinder)
c. Oil mist trap	g-4 Test chamber: dia. 96mm x H30mm inside dimension
c-1 Oil mist trap for the 904W2.	g-5 Bombing tank: dia. 95.5mm x H160mm inside dimension. Pressure range < 0.5MPaG
d. Controller optional accessories	h. Interface
d-1 Controller cable set 5m	I/O connector set : Rec. Out, EXT.I/O
d-2 Charger for the controller (input: 100 to 240V)	h-1 Signal conversion unit for the HELIOT300 series.
d-3 Touch pen for the controller	h-2 Power supply conversion cable: for the HELIOT700 / 710 series and HELIOT300 series.
d-4 Alarm security wire set including mounting bracket to the HELIOT, excluding lock.	i. Consumable parts
d-5 Dial combination lock including master key	i-1 Ion source
e. Printer	i-2 Pirani vacuum gauge sensor head
e-1 Thermal printer	i-3 Micro separator: for the BS and BT
	Thermal printer paper: plain paper/clean room paper

Integration type Leak Detector HELIOT ZERO

Leak detector specially designed for system integration.



Analyzer unit

Display unit

Power supply unit

- Analyzer and control unit can be separated up to 30 meters.
- Analyzer unit can be mounted in any orientation.
- Small footprint.
- Sniffer method (optional).

Model	HELIOT ZERO	
Detectable gas	⁴ He	
Vacuum method detection range	E-12 to E-3 Pa·m ³ /sec E-11 to E-2 Torr·L/sec E-11 to E-2 mbar·L/sec	
Sniffer method detected range	E-8 to E-3 Pa·m ³ /sec E-7 to E-2 Torr·L/sec E-7 to E-2 mbar·L/sec	
Test port / fore line port	KF16	
Language	Japanese, English, Chinese (simplified character)	
Power supply [V] / power consumption [W]	Single phase AC90 to 240 (50/60Hz) / 700	
Weight	Analysis unit + Test port unit [kg]	Approx. 7.4
	Power supply unit + Display unit [kg]	Approx. 10.5
Cable length between analyzer unit and power supply unit [m]	Max. 10	
Cable length between power supply unit and display unit [m]	Max. 20	

Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interaction Analyzer
Precise Microplate Puddle Mixer

RF Power Generator / Matching Box RFS-N series

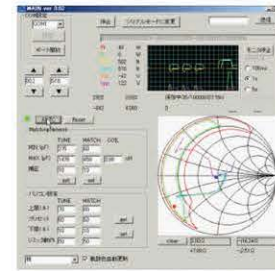
High frequency power generator for plasma generation in LCD and Semiconductor manufacturing systems.



RFS-1305N/1310N



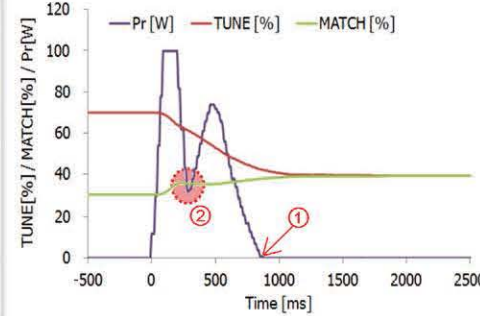
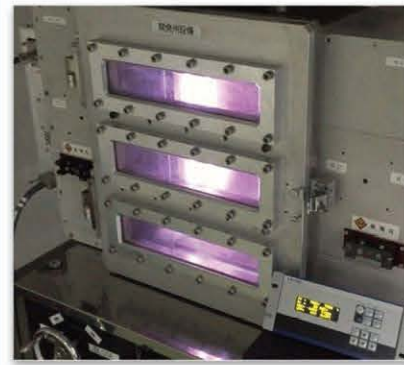
RFS-1330N/RFS-1350N



Matching Assistant Tool

- 0.5kW, 1kW, 3kW, 5kW at 13.56MHz.
- High reliable design based on long time experienced ULVAC know-how.
- Simple configuration with the built-in auto-matching controller.
- Stable process is committed by stable auto-matching function which tracks the plasma unique impedance fluctuation through ULVAC original algorithm.
- Matching conditions can be monitored by the optional matching assistant tools.

Auto matching performance under abnormal conditions during the plasma load



< Auto matching performance during plasma load >
 ① High-speed matching even from distant preset point.
 ② Stable auto matching is performed without straying even with a fake matching point, which is typically generated under plasma load.
 Even in the above bad conditions, stable and high-speed auto matching provides stable reproducible process.

RF Power Generator

Model	RFS-1305N	RFS-1310N	RFS-1330N	RFS-1350N
Input specification	AC180 to 242V, single phase		AC180 to 242V, three phase	
Input capacity	1.2kVA	1.8kVA	5kVA	8kVA
Output specification	13.56MHz			
Oscillating frequency	13.56MHz			
Rate travelling wave power	500W (under 50Ω load)	1kW (under 50Ω load)	3kW (under 50Ω load)	5kW (under 50Ω load)
Maximum reflected wave power	100W		500W	
Harmonic distortion ratio	-35dB or less (Rate output time 50Ω Loading time)			
Control	Rated output ±2% or less			
Control accuracy	10 % to 100 % of rated power value			
Guaranteed control range	10 % to 100 % of rated power value			
Cooling method	Forced air cooled		Water cooled (4L / min)	Water cooled (6L / min)
Dimensions W x D x H	240 x 495 x 150mm (excluding protrusions)		480 x 495 x 150mm (excluding protrusions)	
Weight	11kg		23kg	

Matching box

Model	MBX-1305N	MBX-1310N	MBX-1330N	MBX-1350N
Permissible input power	30 to 500W	30 to 1kW	30 to 3kW	50 to 5kW
Permissible output current	30A		80A	120A
Permissible output voltage	2.5kVpp		5kVpp	10kVpp
Cooling method	Forced air cooled		Water cooled (2L / min)	
Dimensions W x D x H	375 x 250 x 120mm (excluding protrusions)		375 x 250 x 170mm (excluding protrusions)	450 x 500 x 248mm (excluding protrusions)
Weight	8kg		10kg	21kg

RF Power Generator Option MEX-N series

Matching box switching unit for RFS-N series



MEX2N-1k

- Switching for multiple matching boxes.
- Not for simultaneous discharge. Using this unit reduces quantity of power generators and leads to cost down.
- Various cathodes with different impedance are selectable because individual matching box is used to individual cathode.

Capacity	Qty. of matching box which is switchable by the matching box switching unit						
	2 units	3 units	4 units	5 units	6 units	7 units	8 units
500,1kW	MEX2N-1k	MEX3N-1k	MEX4N-1k	MEX5N-1k	MEX6N-1k	MEX7N-1k	MEX8N-1k
3kW	MEX2N-3k	MEX3N-3k	MEX4N-3k	MEX5N-3k	MEX6N-3k	MEX7N-3k	MEX8N-3k
5kW	MEX2N-5k	MEX3N-5k	MEX4N-5k	n/a	n/a	n/a	n/a

RF Power Generator Option EXN series

Switching unit for multiple cathodes



EXN4M-70W

- Switching for matching box output.
- Greatly contributes to cost reduction for the various systems as it is not necessary to install matching box per cathodes.
- Manual and motor driving type are provided as switching method. A water cooled type is also available for higher power.
- Useable as a switching unit for DC power generator and DC pulse power generator.
- Since only single matching box is used with this unit, it is not available to mutual loads exceeding matching range.

Switching points	Air cooled (1kW or less)		Water cooled (3kW)	
	Manual	Motor driven	Manual	Motor driven
2 points	EXN2T-40A	EXN2M-40A	EXN2T-70W	EXN2M-70W
3 points	EXN3T-40A	EXN3M-40A	EXN3T-70W	EXN3M-70W
4 points	EXN4T-40A	EXN4M-40A	EXN4T-70W	EXN4M-70W

RF Power Generator Option PHS-04N

Output phase control of multiple RF power generators.



PHS-04N

- Maximum 4 units of RF power generator output phase.
- It provides stable process with very small variation by adjusting differences occurs between cathodes by phase shift function.

Model	PHS-04N	
Input specifications	Input voltage	Single phase AC90 to 220V
	Input capacity	100VA
Output specifications	Oscillation frequency	13.56MHz ±0.05%
	Phase setting scope	0 to 360°
Dimensions W x D x H	480 x 192 x 49mm (excluding protrusions)	

RF Power Generator Option EXO-13

Output phase synchronization of multiple RF power generators.



EXO-13

- Maximum 4 units of RF power generator.
- No phase shift function.

Model	EXO-13	
Input specifications	Input voltage	Single phase AC90 to 110V
	Input capacity	10VA or less
Output specifications	Oscillation frequency	13.56MHz ±0.05%
Dimensions W x D x H	145 x 110 x 44mm (excluding protrusions)	

Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interaction Analyzer
Precise Microplate Paddle Mixer

High Power DC Power Generator DPG series

10kW / 20kW for sputtering system



DPG-10/20

- High reliability design based on long time experienced ULVAC know-how.
- Stable process is ensured by excellent arc handling by ULVAC who is also vacuum process equipment supplier and has full knowledge about plasma processes.
- Extremely low arc energy by utilizing an optional high-speed arc shutoff circuit. It contributes to high productivity and improves manufacturing yield.
- 800V and 1000V are available. High-impedance load resistance.

Model	DPG-10	DPG-10H	DPG-20	DPG-20H
Input specifications	Input voltage and phase		3 phase AC187 to 229V	
	Input capacity		13.5kVA or less	
	Maximum rated power		10kW	
Output specifications	Rated current	25A	16.7A	33.3A
	Rated voltage	-800V	-1000V	-1000V
	Ignition voltage	-1500V		
	Abnormal discharge control	Stop the inverter or shutoff with high-speed arc shutoff circuit when abnormal discharge is detected.		
Control	Control method	Rated power control (P Control) / Rated current control (I Control) / Rated voltage control (V Control)		
	Control precision	Rated power control (P Control) : Less than ±0.5% of the rated output or ±1% of the set value, whichever is larger. Rated current control (I Control) : Less than ±1% of the rated output or ±2% of the set value, whichever is larger. Rated voltage control (V Control) : Less than ±1% of the rated output or ±2% of the set value, whichever is larger.		
	Control guarantee scope	10 to 100% of rated power value		
Parallel control function	Maximum of up to 12 units. *Mixture of DPG-10(20) and DPG-10H(20H) is not available.			
Cooling method	Forced air cooled			
Dimensions W x D x H	483 x 630 x 133mm (excluding protrusions)			
Weight	28kg		35kg	

Low Power DC Power Generator DCS series

500W / 2kW / 4kW for sputtering system



DCS0052B



DCS0202B/0402B

- It provides a stable process with high reliability performance proved by more than 20 years experience.
- Excellent repetitive and repeatable output ensures higher quality sputtering processes.

Model	DCS0052B	DCS0202B	DCS0402B
Input specifications	Input voltage		3 phase AC190 to 242V
	Input capacity		6kVA
	Maximum rated power		4kW
Output specifications	Rated current	1.25A	10A
	Rated voltage	-800V	
	Abnormal discharge control	Stop the Inverter when abnormal discharge is detected.	
	Control method	Rated Power Control (P Control) / Rated Current Control (I Control) / Rated Voltage Control (V Control)	
Control	Control precision	Rated power control (P Control) : Less than ±2% of the rated power value. Rated current control (I Control) : Less than ±1% of the rated current value. Rated voltage control (V Control) : Less than ±1% of the rated voltage value.	
	Control guarantee scope	10% to 100% of the rated output value	
	Parallel operation function	None	
Cooling method	Forced air cooled		
Dimensions W x D x H	240 x 450 x 99mm (excluding protrusions)		380 x 430 x 125mm (excluding protrusions)
Weight	9kg		22kg

Abnormal Discharge Prevention Unit A2K series

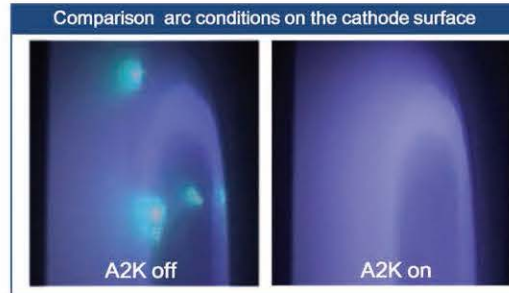
A2K series is the accessory of DC power generator which neutralize the charge built up on the cathode (target) by charging positive voltage pulse to DC power output in the reactive sputtering processes.



A2KH-25

A2KH-50

A2K-20K/40K



- High reliability design based on long time experienced ULVAC know-how.
- Adding A2K series to the existing DC power supply improves productivity and throughput.
- Long time experienced ULVAC arc handling technology minimizes arc energy.

Model	A2KH-25	A2KH-50	A2K-20K	A2K-40K
Control electrical power input specifications	Input voltage		Single phase AC90 to 110V	
	Input capacity		100VA	400VA
	Operating voltage		-100V to -800V	
Input specifications	Operating current	0 to 25A	1 to 50A	2 to 100A
	Input structure	MS3106B 22-2P	MS3106B 28-6P or terminal block	One quick connection connector / Two quick connection connectors
	Oscillation frequency	When pulse range is 5µs: 2, 5, 10, 15, 20kHz When pulse range is 10µs: 1, 2.5, 5, 7.5, 10kHz		1kHz to 50kHz
Output specifications	Reverse pulse range	5µs/10µs (Internal Switch Switching)		3 to 18µs (Setting range limited by oscillation frequency)
	Output structure	MS3106B 22-2S	MS3106B 28-6S	One-touch Connector
Parallel control	None		Maximum up to 6 units (with same model only)	
Cooling method	Forced air cooled			
External dimensions W x D x H	38 x 450 x 149mm (excluding protrusions)	431 x 450 x 149mm (excluding protrusions)	483 x 630 x 177mm (excluding protrusions)	
Weight	16kg	26kg	30kg	45kg

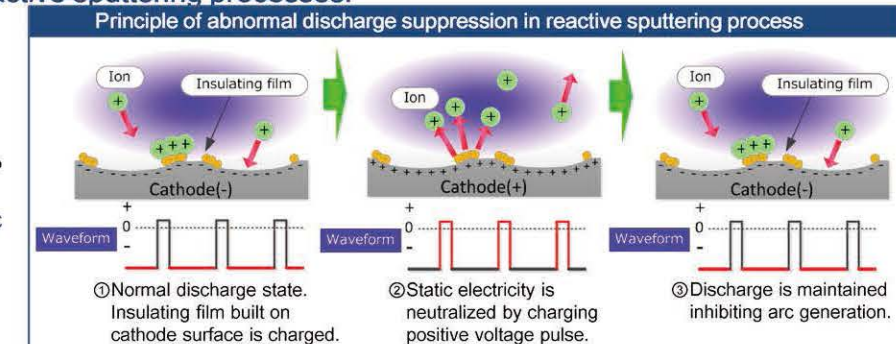
DC Pulse Power Generator DPG-P series

DC pulse power generator which neutralize the charge built up on the cathode (target) by charging positive voltage pulse to DC power output in the reactive sputtering processes.



DPG-5P/10P

- High reliability design based on long time experienced ULVAC know-how.
- High throughput process is available because of high power input by suppressing abnormal discharge.



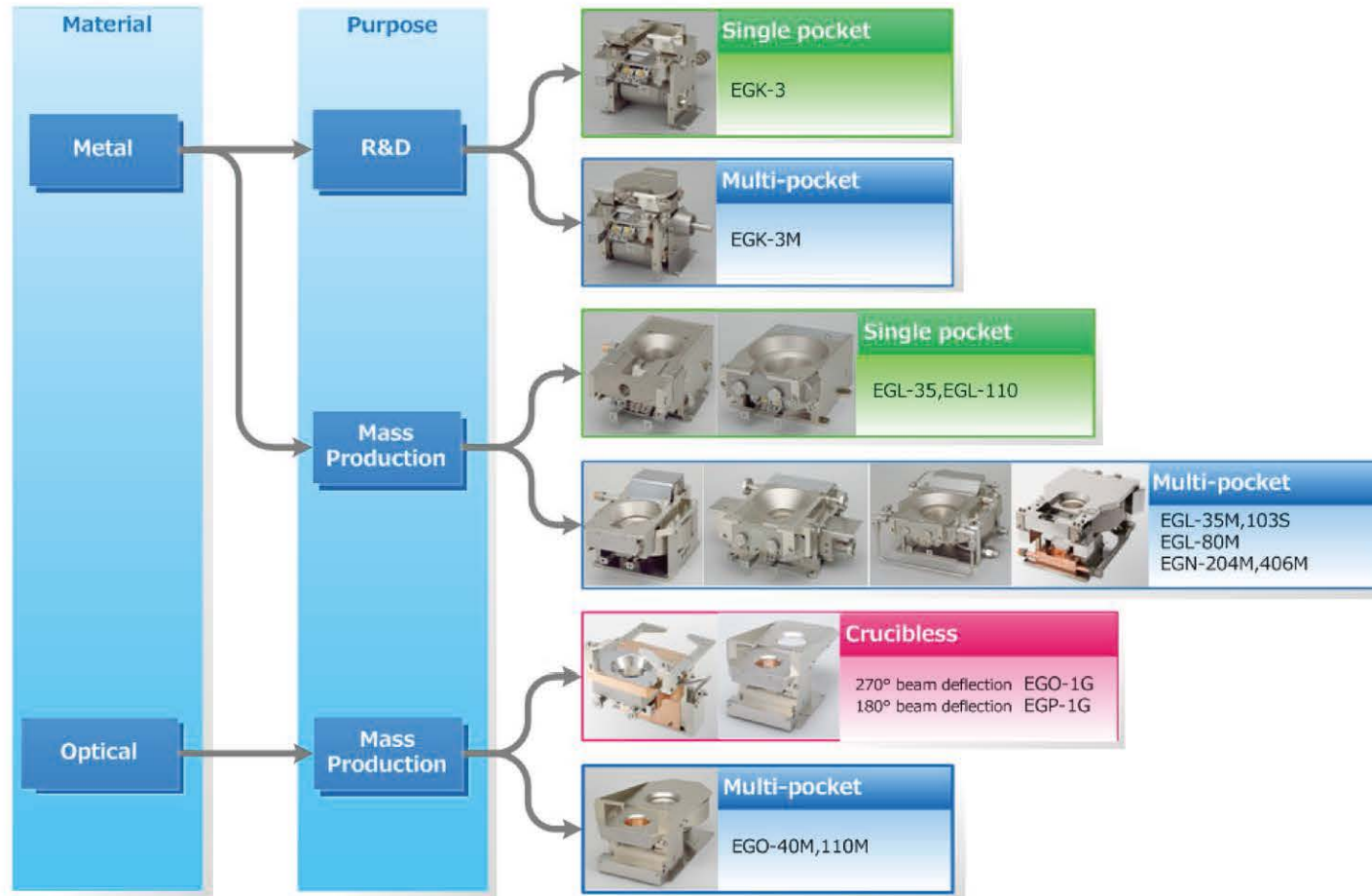
Model	DPG-5P	DPG-10P
Input specifications	Input voltage	
	Input capacity	
	Maximum rated power	
Output specifications	Rated current	12.5A
	Rated voltage	650V (Oscillation frequency more than 155kHz) / 800V (Oscillation frequency less than 150kHz)
	Ignition voltage	1500V
	Oscillation frequency	5k to 250kHz
	Reverse pulse range	0.4µ to 5µs (Setting range limited by oscillation frequency)
	Control method	Rated electric power control (P Control) / Rated current control (I Control) / Rated voltage control (V Control)
	Control precision	Less than ±0.5% of rated output or ±1% of the set value, whichever is larger.
Control guarantee scope	10 to 100% of rated electric power value.	
Parallel control function	Maximum up to 6 units (with same model only)	
Cooling method	Forced air cooled	
Dimensions W x D x H	483 x 630 x 133mm (excluding protrusions)	
Weight	29kg	36kg

Vacuum Pump, Vacuum Valve, Vacuum Gauge, Process Gas Monitor, Leak Detector, Power Generator (RF/DC), EB Power Supply / EB Source, Deposition Controller, Thin Film Measurement, Vacuum Transfer Robot, Accessories, Molecular Interaction Analyzer, Precise Microplate Paddle Mixer

High Function EB Power Supply HPS-N series

Electron beam source with a long-life filament by having the structure to prevent pollution from evaporation materials.

EGK series with small volume pocket for experiment purposes. EGL and EGN series with small medium to large volume pocket are for mass production purposes. EGO and EGP series are for optical applications.



■ EB source selection table based on the qty. of pockets (for metal film)

Qty. of pockets	Pocket volume				
	3cc	10cc	20cc	40cc	110cc
1	EGK-3			EGL-35	EGL-110
3		EGL-103S			
4	EGK-3M	EGL-35M (10cc x2) (40cc x2)		EGL-35M (10cc x2) (40cc x2)	EGL-80M
6			EGN-206M	EGN-406M	
Power Supply	HPS-510S	HPS-1000N			HPS-1600F

■ EB source selection table based on qty. of pockets (for optical film)

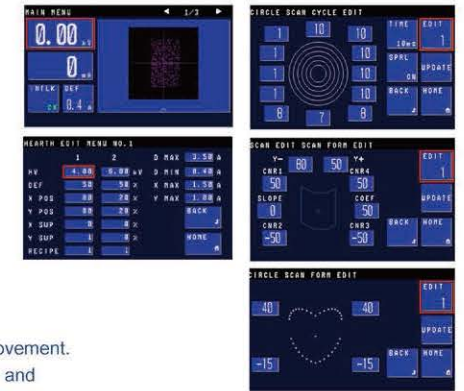
Qty. of pockets	Pocket volume			-
	10cc	40cc	110cc	
0				EGO-1G EGP-1G
4	EGO-40M (10cc x2)	EGO-40M (10cc x2) (40cc x2)	EGO-110M	
Power Supply	HPS-600N / 1000N			

■ EB source selection table based on EB power supply system

EB power supply system		Number of deposition source	Recommended electron beam source	Electron beam source controller
Capacity	Model			
5kW	HPS-510S	1 source	EGK-3/3M, EGL-35/35M	None (The source controller is equipped in the power generator)
6kW	HPS-600N-100	1 source	EGP-1G, EGO-1G, EGO-40M, EGO-110M	EGC-10GS G-TYPE
	HPS-600N-200	2 sources		
10kW	HPS-1000N-100	1 source	EGL-35/35M, EGL-103S, EGN-206M/406M	EGC-10GS S-TYPE
	HPS-1000N-200	2 sources		
	HPS-1000N-G100	1 source	EGP-1G, EGO-1G, EGO-40M, EGO-110M	EGC-10GS G-TYPE
	HPS-1000N-G200	2 sources		
16kW	HPS-1600F-S100	1 source	EGL-110	EGC-16S
	HPS-1600F-S200	2 sources		
	HPS-1600F-S101	1 source with high-power	EGL-80M	EGC-16H

*) EB power supply system model decides depend on which model of the source controller use.

6kW/10 kW EB power supply designed with stabilized circuit and improved performance.



- Usable for both optical and metal film by using highly-functional EB source controller.
- Using graphic user interface assists to multi-functional and complicated operation and it leads to productivity improvement.
- Stable deposition is ensured by excellent arc handling by ULVAC who is also vacuum process equipment supplier and has full knowledge about deposition processes.

■ EB power supply system specifications

Model	HPS-600N-100	HPS-600N-200	HPS-1000N-100	HPS-1000N-200
Input specification	3 phase AC190 to 231V			
Input capacity	9kVA	10kVA	14kVA	15kVA
Rated output power	6kW		10kW	
Voltage range	-2k to -6kV		-4k to -10kV	
Ripple rate	±2% or lower at rated output			
Beam current	0 to 1000mA			
Cooling method	Forced air cooled			
Dimensions W x D x H	494 x 701 x 712mm (excluding protrusions)			
Weight	115kg		120kg	145kg

■ EB source controller specifications

Model	EGC-10GS G-TYPE (for optical film)	EGC-10GS S-TYPE (for metal film)
Input specifications	Supplied from EB power supply	
Variable range	0 to ±1.5A	-0.4 to -3.5A
Voltage range	±24V	
Frequency	10 to 800Hz	0.1 to 5Hz
Y shaft coil output specifications	0 to ±1.5A	0 to ±1.2A
Voltage range	±24V	
Frequency	10 to 800Hz	0.1 to 22Hz
Deflection coil output specifications	-0.4 to -3.5A	
Voltage range	+24V	
Dimensions W x D x H	480 x 499 x 149mm (excluding protrusions)	
Weight	11.5kg	

EB Power Supply HPS series

5kW/16kW for electron beam source.

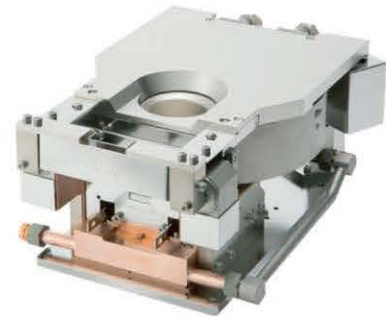


- Stable process is ensured with high quality and high-reliability proven through more than 15 years experience.
- Stable deposition is ensured by excellent arc handling by ULVAC who is also vacuum process equipment supplier and has full knowledge about deposition processes.

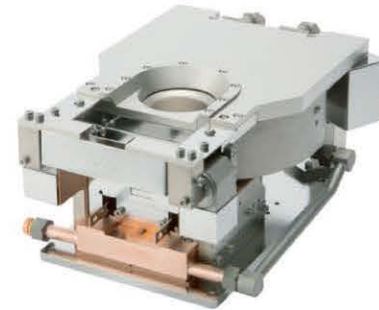
Model	HPS-510S	HPS-1600F-S100	HPS-1600F-S200	HPS-1600F-S101
Input specification	3 phase AC190 to 231V			
Input capacity	7kVA	21kVA	22kVA	21kVA
Rated out power	5kW	16kW		
Voltage range	-4k to -10kV			
Ripple ratio	Less than ±2% at rated output			
Beam current	0 to 500mA	0 to 1600mA		
Cooling method	Forced air cooled			
Dimensions W x D x H	Power generator 480 x 620 x 300mm (excluding protrusions)	500 x 700 x 710mm (excluding protrusions)		
	Source controller	480 x 480 x 149mm (excluding protrusions)		
Weight	Power generator 50kg	113kg	136kg	113kg
	Source controller	20kg		

EB Source for Metal Film EGN-206M/406M

EB deposition source with full flat top configuration without any structural object above the hearth cover.



EGN-206M/406M



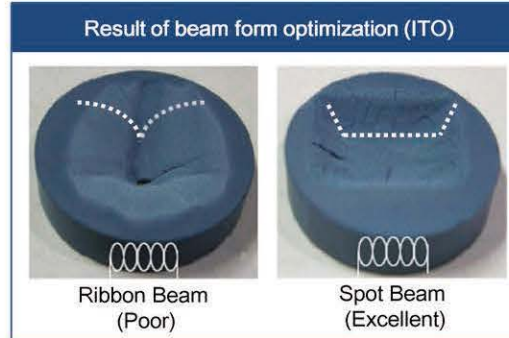
EGN-206M/406M with health cover shield



Hearth cover shield

- By changing a part of EB source, the ribbon-shaped beam suitable for metal deposition or spot-shaped beam suitable for sublime substances/oxides and compounds deposition is selectable.
- Built-in electronic reflection trap mechanism suppresses temperature increase on the substrate which may become critical problem for evaporation process.
- Using the optional hearth cover shield makes maintenance time short and improves productivity.

Model	EGN-206M	EGN-406M
Beam deflection angle	270°	
Qty of pocket	6	
Pocket capacity	20cc	40cc
Pocket dimensions Top x Bottom x Depth	Φ42 x Φ32 x 19mm	Φ50 x Φ41 x 25mm
Cooling water flow rate	Pocket	10 L/min
	Hearth cover	2 L/min
Dimensions W x D x H	214 x 343 x 144mm (excluding protrusions)	
Weight	28kg	
Effective evaporation angle	More than 100°	
Deposition speed	1.6 μm/min (Ribbon beam, Al, 8kW, 40cc pocket, 250mm from health cover)	
Maximum acceleration voltage	-10kV	
Maximum emission current	800mA	1000mA
EB power supply system	HPS-1000N-S100/S200	



Ribbon Beam (Poor)

Spot Beam (Excellent)

Optional accessories

Accessory	Model	Required qty.	Remarks
High voltage feedthrough	BERH311A	2	
Feedthrough for magnet coil	PTS-004	2	For coil wiring, For hearth positioner
Ground terminal	ERZ-003	1	
Vacuum interlock switch	DTA-002	1	
Cooling water feedthrough	DK5203-045	2	Φ10

EB Source for Optical Film EGP-1G

Simple structure 180° deflection EB source

- Extended long life filament even with 180° deflection type realizes improved production productivity.
- Well focused beam spot makes evaporation highly efficient.



EGP-1G



Focused beam spot in 11mm x 7mm.



Excavation mark with SiO2 material.

Model	EGP-1G
Beam deflection angle	180°
Coolant volume	2 L/min
Dimensions W x D x H	185 x 239 x 179mm
Weight	11kg
Maximum acceleration voltage	-10kV
Maximum emission current	1000mA
EB power supply system	HPS-1000N-G100/G200

Optional accessories

Accessory	Model	Required qty.	Remarks
High voltage feedthrough	BERH311A	2	
Feedthrough for magnet coil	PTS-004	1	For coil wiring
Ground terminal	ERZ-003	1	
Vacuum interlock switch	DTA-002	1	
Cooling water feedthrough	DK5203-045	2	Φ10

EB Source for Metal Film EGL/EGK series

High reliable EB source designed based on ULVAC long time experienced technologies.



EKG-3



EKG-3M



EGL-35



EGL-35M



EGL-103S



EGL-110



EGL-80M



High voltage feedthrough BERH311A



Feedthrough for magnet coil PTS-04



Ground terminal ERZ-003



Vacuum Interlock switch DTA-002



Cooling water feedthrough DK5203-045

- Various line-up from R&D to mass production.
- Unique water cooling mechanism reduces contamination from pocket to the evaporation material and so high-grade deposition process is ensured.

Model	EKG-3	EKG-3M	EGL-103S	EGL-35	EGL-35M	EGL-110	EGL-80M
Beam deflection angle	225°		270°				
Qty. of pocket	1	4	3	1	4	1	4
Pocket capacity	2.6cc	2.9cc	10cc	40cc	10cc x 2 / 40cc x 2	110cc	110cc x 4
Cooling water flow rate	Pocket	8 L/min		10 L/min			19 L/min
	Coil	1 L/min		2 L/min	-	2 L/min	4 L/min
Dimensions W x D x H	110 x 207 x 126mm	140 x 207 x 126mm	313 x 250 x 108mm	110 x 206 x 79mm	170 x 240 x 156mm	136 x 220 x 90mm	265 x 318 x 168mm
Weight	4kg	5kg	16kg	10kg	18kg	15kg	30kg
Maximum acceleration voltage	-10kV						
Maximum emission current	500mA		600mA	1,000mA		1600mA	
Power supply system	HPS-510S		HPS-1000N -100 / 200			HPS-1600F -S100 /S200	HPS-1600F -S101

Optional accessories

Accessory	Model	EKG-3	EKG-3M	EGL-103S	EGL-35	EGL-35M	EGL-110	EGL-80M
High voltage feedthrough	BERH311A	2	2	(*1)	2	2	2	2
Current terminal	PTS-004	1	1	(*1)	1	2	2	1(*2)
Ground terminal	ERZ-003	1	1	(*1)	1	1	1	1
Vacuum checker	DTA-002	1	1	(*1)	1	1	1	1
Cooling water terminal	DK5203-045	Φ x2 Φ10 x2	Φ6 x2 Φ10 x2	(*1)	Φ10 x2	Φ6 x2 Φ10 x2	Φ12 x2	Φ6.35 x2 Φ12.7 x2

*1) Ultra-high vacuum specification is necessary. Please contact us separately.
*2) The current terminal for the hearth positioner is PTS-004. However, 3p-16A is used in the case of the current terminal for coil driving.

EB Source for Optical Film EGO series

High reliable EB source designed based on ULVAC long time experienced technologies.

- High performance deflection coil makes sweep performance high and deposition process stable and uniform.



EGO-1G



EGO-40M



EGO-110M

	EGO-1G	EGO-40M	EGO-110M
Beam deflection angle	270°		
Qty. of pocket	0	4	4
Pocket capacity	-	10cc x2 / 40cc x2	110cc
Cooling water flow rate	Pocket	10 L/min	19 L/min
	Coil	2 L/min	2 L/min
Dimensions W x D x H	168 x 285 x 174mm	170 x 309x174mm	232 x 368 x 174mm
Weight	10kg	18kg	30kg
Power supply system	HPS-500N-100/200, HPS-1000N-G100/G200		

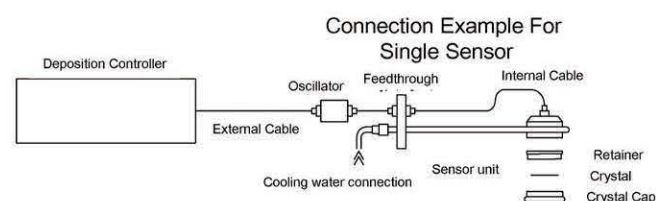
Optional accessories

Accessory	Model	EGO-1G	EGO-40M	EGO-110M
High voltage terminal	BERH311A	2	2	2
Current terminal	PTS-004	1	2	2
Ground Terminal	ERZ-003	1	1	1
Vacuum Checker	DTA-002	1	1	1
Cooling water terminal	DK5203-045	Φ10 x2	Φ10 x2	Φ10 x2 / Φ12.7 x2

Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interaction Analyzer
Precise Microplate Paddle Mixer

Crystal Oscillation type Deposition Controller CRTM series

Deposition control for single layer and multiple layers.



*The OSM connector is not included when feedthrough is not purchased

- Low-rate deposition control and high-precision film thickness control with an outstanding film thickness/rate resolution.
- High-speed sampling rate makes control high responsive.
- Isolated power supply for external interface improved noise tolerance.
- Deposition control for maximum 4 sources simultaneously by adding optional SS cards (CRTM-9200).
- Programs can be saved in USB memory other than internal memory (CRTM-9200).

Model		CRTM-6000G	CRTM-9200
Frequency	Measurement Range	3.0 to 5.01MHz for 5MHz 4.0 to 6.01MHz for 6MHz	
	Measurement resolution	24mHz	1.3mHz
	Display resolution	0.001MHz	
Film Thickness	Measurement range	0 to 999.9 kÅ	
	Measurement resolution	0.041Å for 5MHz, 0.029Å for 6MHz	0.0022Å for 5MHz 0.0015Å for 6MHz
	Display resolution	0.001kÅ:0 to 9.999kÅ, 0.01kÅ:10 to 99.99kÅ, 0.1kÅ:100 to 999.9kÅ	
Qty. of connectable sensors		Single sensor x2 (No simultaneous measurement) Multi-sensor x1	Single sensor x2 (Max. 8) Multi-sensor x1 (Max.4)
Measurement & control simultaneously		1	1 (Max.4)
Sampling rate		125msec	250msec
Layer		99 layers	
Process program		30	1 (saving in and reading from USB memory)
Deposition program		99	128
Dimensions W x D x H		240 x 350 x 99 mm	480 x 300 x 149 mm

Crystal Oscillation type Deposition Sensor CRTS series

Various line-up for various deposition processes.



- Single sensor
- To be selected depends on deposition condition such as with or without baking, temperature range, etc.
 - Compact sensor head makes installation in the chamber easy.
 - Long life time oscillator is available.
 - Specified sensor length and pipe shape are available.
- Multi-sensor
- Multiple crystals, 6 or 12. Crystal is exchangeable by its holder.
 - High reliability with ULVAC original driving system with vacuum motor.
 - Crystal is automatically switched by detecting abnormal crystal oscillation (end of life).

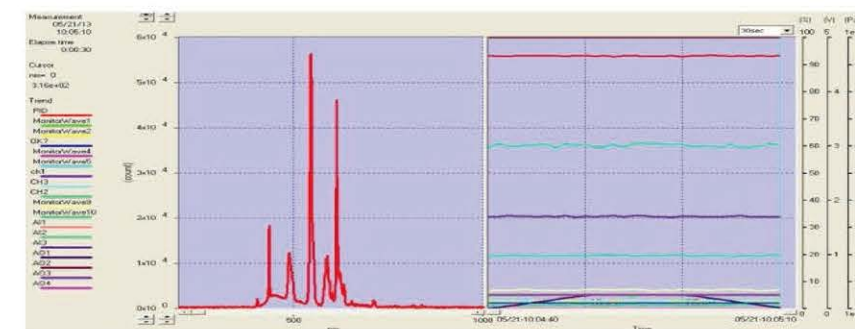
Model	Standard type	Single sensor						Multi-sensor	
		CRTS-0	CRTS-4	CRTS-6	CRTS-4U	CRTS-6U	CRTS-M6	CRTS-12NS	
	Long lifetime type	CRTS-80	+Water Cooling Jacket CRTS-84	CRTS-86	CRTS-84U	CRTS-86U			
Process		Deposition in 80°C or less	Deposition in 300°C or less	Deposition in 100°C or less	Deposition in 200°C or less	Ultra-high vacuum deposition in 100°C or less	Ultra-high vacuum deposition in 200°C or less	Sensor Head 80°C or less	Continuous deposition for thick film 350°C
Qty. of crystals		1						6	12
Crystal frequency		5MHz (6MHz. Contact us or further information)							
Cooling water pipe	Length	-	100 to 800mm						-
	Diameter	-	6mm	4mm	6mm	4mm	6mm	1/4 inch	
	Capacity	-	400 cc/min	200 cc/min	400 cc/min	200 cc/min	400 cc/min	1 L/min	
	Connector	-	3/8 inch	1/4 inch	3/8 inch	1/4 inch	3/8 inch	1/4VCO	

Optical Process Monitor Optius

Real time monitoring of various plasma process conditions by measuring plasma radiation spectrum. Suitable for MFC control in reactive sputtering, etching end point detection and cleaning progress of CVD equipment.



Optius (1ch)



Measurement Screen (Emission spectrum / Trend)

- Measurement wavelength from 200 to 1000nm. Simultaneous multiple wavelength measurement.
- Simultaneous measurement up to 5 channels by addition the optional expansion unit (ESC).
- Feedback control of external components.
- Dedicated software is included for reactive sputtering, etching, etc.
- Atmosphere or vacuum type receiver unit are selectable depending on application.

Measurement channels	1ch (Maximum 5 channel)
Measurable wavelength range	200 to 1000nm
Wavelength resolution ¹	1.7nm (FWHM)
Measurement time	1 to 1000ms
PID control interval setting	100 to 1000ms
Measured wavelength ²	10
PID controllable wavelengths ²	1
Wavelength calculation processing ²	10
Discriminate processing ²	10
Analog input channels	3ch (per 1ch measurement) Maximum 15ch (Measurement 5ch)
Analog output channels	4ch (per 1ch measurement) Maximum 20ch (Measurement 5ch)
Digital input channels	4ch (per 1ch measurement) Maximum 20ch (Measurement 5ch)
Digital output channels	4ch (per 1ch measurement) Maximum 20ch (Measurement 5ch)
Connection to PC for measurement ³	LAN (1000BASE-T/100BASE-TX)
Dimensions W x D x H / Weight	Main unit (1ch): 250 x 300 x 121 / 4.9kg Expansion unit (per 1ch): 50 x 300 x 121 / 1.3kg
Power supply	AC100 to 240V (50/60Hz)
Power consumption	100W (5 channel measurement)

¹ Reference only.
² Number of simultaneous measurement and processing per each channel.
³ PC is not included.



Vacuum light receiving unit, VSM



Atmosphere light receiving unit, ASM



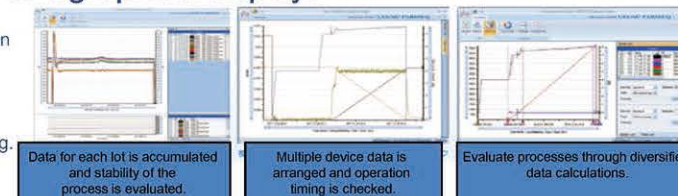
Optius (5channel)

Equipment Diagnosis Software FABISEQ

Software for collecting information of vacuum systems and graphical display.



- High speed system process data collection periodically.
- Graph and statistical analysis.
- Abnormal system data monitoring.
- System information is sent by Web mailing.

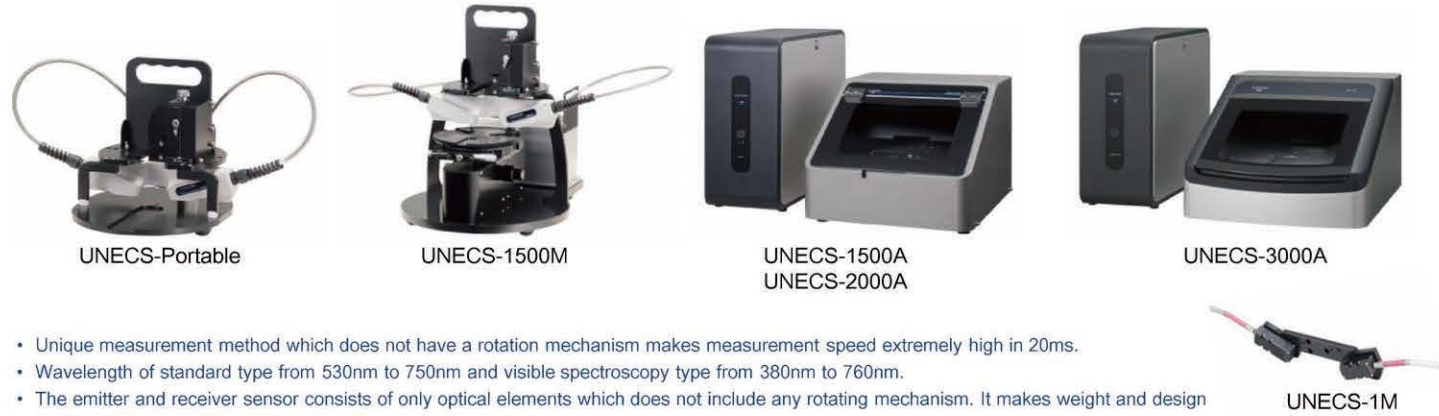


Interface	ULVAC equipment PC-PLC communication system (Optional PC server can be supported by Mitsubishi, Omron and other PLCs.)
Collecting configuration, values	Group: max. 8, Alarm: Max. 256, Event: Max. 256, Trace: Max. 16, IO: Max. 128, Analog: Max. 128
Measurement interval	100ms to 10min
Graph display	Historical graph IO: 8 points/graph, Analog:16 points/graph Real time graph IO: 8 points/graph, Analog:16 points/graph
Functions	Measurement and comparison by data superposition, time measurement, XY graph, calculation, statistics, event search such as lot and alarm. Report, CSV export, automatic mailing, abnormalities monitoring
Operating environment	OS: Windows XP / Windows7, CPU: Pentium4 1GHz or more, memory: 1GB or more, HDD: free space 200MB or more

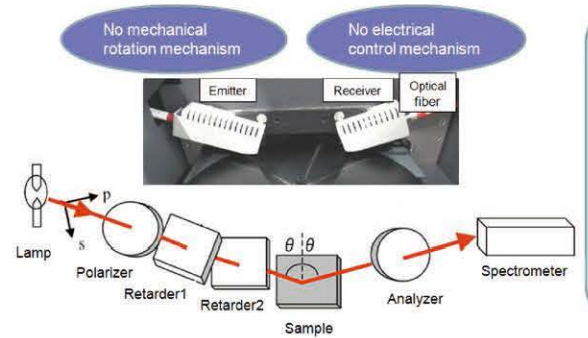
Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interaction Analyzer
Precise Microplate Paddle Mixer

Spectroscopic Ellipsometer UNECS series

UNECS series is Spectroscopic Ellipsometer which measures thin film thickness and refractive index with high speed and high precision. Unique measurement method makes high speed measurement and compact size design.



- Unique measurement method which does not have a rotation mechanism makes measurement speed extremely high in 20ms.
- Wavelength of standard type from 530nm to 750nm and visible spectroscopy type from 380nm to 760nm.
- The emitter and receiver sensor consists of only optical elements which does not include any rotating mechanism. It makes weight and design light and compact, and periodical maintenance cycle very low.
- Various mode available from unique portable, manual stage and auto stage type. A built-in type for vacuum environment is also available.

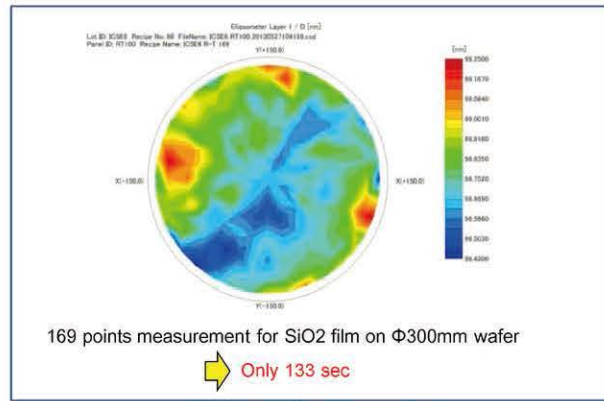


Configuration of emitter and receiver sensor

No mechanical rotation mechanism
No electrical control mechanism

Emitter and receiver unit are composed by fixed optical elements.

- Ultra high-speed measurement (Min.20ms~)
- Compact design
- Maintenance free (Emitter and Receiver)



High-speed auto mapping

Model	UNECS-Portable	UNECS-1500M	UNECS-1500A	UNECS-2000A	UNECS-3000A
Measurement method	Spectroscopic ellipsometry (spectral ellipsometry)				
Measurable film	Transparent film or semitransparent film				
Wavelength range	530 to 750nm or 380 to 760nm				
Light source	Halogen lamp or xenon lamp				
Spot diameter	Φ1mm or Φ0.3mm				
Multilayer film measurement	Maximum 6 layers (film thickness) Simultaneous analysis of film thickness and optical parameter (N,K) is only the top layer				
Incidence angle	70°				
Film thickness repeatability	0.1nm				
Film thickness measurement range	1nm to 2μm				
Scanning time	20ms to 3000ms (configurable)				
Calculation time	300ms				
Sample stage	Approx. Φ150mm (detachable)	Φ150mm		Φ200mm	Φ300mm
Stage moving range	R	-	100mm: manual	0 to 75mm: programmable (resolution 0.1mm)	0 to 100mm: programmable (resolution 0.1mm)
	θ	-	360°: manual	0 to 359.9°: programmable (resolution 0.1°)	
Automatic multiple point measurement	-	200 points (optional 2,000 points)		2,000 points	
Focus (Z-axis) adjustment	Manual	Automatic			
Maximum sample thickness	10mm	30mm			
Maximum sample weight	10kg				
Measurement analysis function	⊙Ψ (λ) and Δ (λ) measurement ⊙film thickness (D), refraction index (N), calculated value of extinction coefficient (K)				
Mapping display	-	2D color map display (Optional: 3D display)			
Control and analyzing PC	Laptop type, OS Windows 7				
Dimensions	Main unit	220 x 268 x 244mm	300 x 400 x 384mm	400 x 525 x 370mm	
	W x D x H	-	-	204 x 500 x 509mm	
Weight	Main unit	2.2kg	10.3kg	24kg	
		Stage: 1.3kg	-	Controller: 19kg	
Utility	Power	AC100 /200V Max 3A 50/60Hz		AC100 /200V Max 6A 50/60Hz	
	Vacuum	-		75kPa or less (necessary when using vacuum type)	

Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interferon Analyzer
Precise Micropipette Paddle Mixer

Vacuum Transfer Robot ELEC / COVOT series

Clean and high reliable vacuum transfer robot.



- Various models are available for different kind of vacuum systems.
- Various kinds of arms are available to meet specification of vacuum systems.
- Highly rigid arm and reliable actuator makes wafer transfer stable.
- Model ELEC-RZ and COVOT are for high vacuum application, up to 1×10^{-6} Pa / 1.0×10^{-8} mbar / 7.5×10^{-9} Torr.

Arm specification table

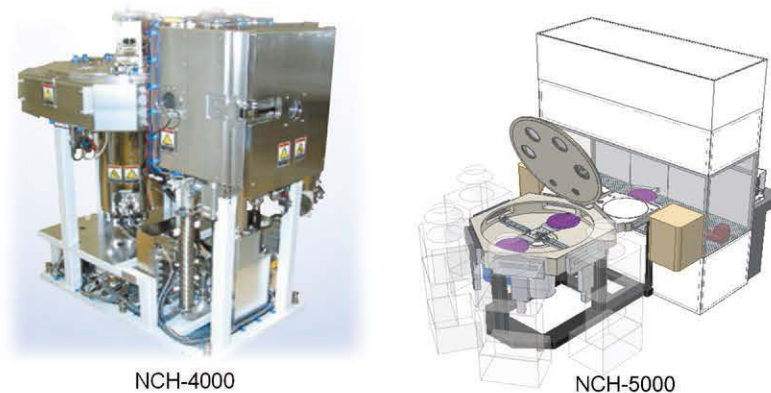
Arm model	Standard arm				Dedicated Arm		
	252	271	325	419	424	FRV	CV6
Maximum reachable distance (mm) *1	700	760	880	1040	1050	740	880
Minimum rotation diameter (mm) *1	606	644	802	940	964	600	-
Number of hands	1 or 2				1 or 2	1	4
Outline *2							Special for COVOT-6
ELEC-RZ	✓	✓	✓	✓	✓	✓	n/a
COVOT	✓	✓	✓	✓	✓	n/a	n/a
COVOT-LC	✓	✓	✓	n/a	n/a	✓	n/a
COVOT-6	n/a	n/a	n/a	n/a	n/a	n/a	✓

*1) *2) When optional ULVAC standard hand(s) for 300mm is used. Contact us for requirement of other hand.

Model	ELEC-RZ	COVOT	COVOT-LC	COVOT-6
Pressure range	1.0×10^{-6} Pa	1.0×10^{-6} Pa	1.0×10^{-6} Pa	1.0×10^{-1} Pa
Atmospheric pressure to:	1.0×10^{-8} mbar	1.0×10^{-8} mbar	1.0×10^{-7} mbar	1.0×10^{-3} mbar
	7.5×10^{-9} Torr	7.5×10^{-9} Torr	7.5×10^{-8} Torr	7.5×10^{-4} Torr
Wafer size	200mm / 300mm	200mm / 300mm	200mm / 300mm	300mm
Number of handling wafer	1 or 2	1 or 2	1 or 2	4
Maximum reachable distance	(See above arm specification table)			
Rotation angle	$\pm 210^\circ$	360° endless	-15° to 375°	360° endless
Z axis stroke	50mm	50mm	None	110mm
Minimum rotation diameter	(See above arm specification table)			
Transportable weight (including pick up)	1kg	1kg	1kg	1kg
Speed	R axis	Max 2.5 sec / full stroke	Max 2.5 sec / full stroke	Max 2.5 sec / full stroke
	θ axis	Max 3.0 sec / 180°	Max 2.5 sec / 180°	Max 2.5 sec / 180°
	Z axis	Max 1.5 sec / 20mm	Max 1.5 sec / 20mm	-
Repetition position precision	R axis	± 0.1 mm	± 0.2 mm	± 0.2 mm
	θ axis	± 0.2 mm	± 0.2 mm	± 0.2 mm
	Z axis	± 0.2 mm	± 0.2 mm	-
Vacuum seal	Magnetic fluid seal	Magnetic fluid seal	Contact seal	Contact seal
Teaching pendant	Included	Included	Option	Included
Controller	Separately shipped	Internally equipped	Internally equipped	Separately shipped

Platform NCH series

A vacuum transport platform for $\Phi 200$ mm / 300mm wafers.



- For 4 to 8 connection ports.
- Equipped with 25 slot cassette lifting type load lock chamber.
- Vacuum pumps and gauges are available as option.

Wafer size	200mm, 300mm
Connection ports	4 to 8 ports
Standard transfer robot	ELEC-RZ (option: COVOT)
Load lock	25 slot cassettes lifting type (in-line type available)
Vacuum pump and gauge	Option

Vacuum parts such as piping, bellows, etc.

Vacuum parts such as piping, bellows, etc.

Various kinds of optional accessories are available.

Unit : mm

Unit : mm

Rotation type suction piping with flange

Material: Stainless Steel, Gasket (FPM)

Model	Applicable pumps	A	B	C
RF-1	PVD-180	dia. 80	72	315
RF-2	PVD-180 with TMX		235	478
RF-3	PVD-360		72	315
RF-5	PVD-360 with TMX	dia. 90	285	528

PF 3/4 (PVD-180)
PF1 (PVD-360)

Rotation type exhaust piping with flange

Material: Stainless Steel, Gasket (FPM)

Model	Applicable pumps	A	B	C
RF-7	PVD-180	dia. 80	PF3/4"	50
RF-8	PVD-360	dia. 90	PF1"	80
RF-9	PVD-180 with TMX	dia. 80	PF1-1/2"	50
RF-10	PVD-360 with TMX	dia. 90		

I Piping

Material: Stainless Steel, Gasket (FPM)

Model	dia. D ₁	dia. D ₂	dia. d	A
I-VF20xVG20	80	90	27.2	100
I-VF20xVG25		90		
I-VF20xVG40		105		
I-VF20xVG50	90	120	34.0	100
I-VF25xVG25		90		
I-VF25xVG40		105		
I-VF25xVG50	105	120	48.6	100
I-VF40xVG40		105		
I-VF40xVG50		120		
I-VF50xVG50	120	120	60.5	100

Short piping with gauge port

Material: Stainless Steel, Gasket (FPM)

Model	Applicable pumps	dia. D	dia. d	dia. p	t
TP-20	PVD-180 (B)	80	27.2	60	8
TP-25	PVD-360 (B)	90	34.0	70	8
TP-40	VD301,VD401	105	48.6	85	10
TP-50	VD601,VD901	120	60.5	100	10

Flange with suction piping

Material: Stainless Steel

Model	P	dia. D	T	dia. D ₁ external diameter	dia. D ₂ Internal diameter	dia. d ₃	Connecting Rubber hose
VF20x15A	60	80	8	21.7	16.1	18	dia. 15 x dia. 36
VF20x20A				27.2	21.6	24	dia. 18 x dia. 42
VF20x25A				34.0	27.6	30	dia. 25 x dia. 55
VF25x15A	70	90	8	21.7	16.1	18	dia. 15 x dia. 36
VF25x20A				27.2	21.6	24	dia. 18 x dia. 42
VF25x25A				34.0	27.6	30	dia. 25 x dia. 55
VF40x15A	80	105	10	21.7	16.1	18	dia. 15 x dia. 36
VF40x20A				27.2	21.6	24	dia. 18 x dia. 42
VF40x25A				34.0	27.6	30	dia. 25 x dia. 55
VF50x15A	100	120	10	21.7	16.1	18	dia. 15 x dia. 36
VF50x20A				27.2	21.6	24	dia. 18 x dia. 42
VF50x25A				34.0	27.6	30	dia. 25 x dia. 55

Flange with gauge port

Material: Stainless Steel, Gasket (FPM)

Model	dia. D	A	T
GF-20	80	60	8
GF-25	90	60	8
GF-40	105	62	10
GF-50	120	62	10
GF-80	160	64	12
GF-100	185	64	12

Bellows joints BJ series

Material: Stainless Steel, Gasket (FPM)

Model	A	B
BJ-25A	65	90
BJ-40A	90	105
BJ-50A	105	120
BJ-80A	110	160
BJ-100A	110	185
BJ-150A	100	235

L piping / T piping

Material: Stainless Steel, Gasket (FPM)

Model	dia. D	dia. d	A	B
T-20	80	27.2	50	100
T-25	90	34.0	55	100
T-40	105	48.6	60	130
T-50	120	60.5	60	150

L-Type Piping

Material: Stainless Steel, Gasket (FPM)

Model	dia. D	dia. d	A	T
L-20	80	27.2	60	8
L-25	90	34.0	65	8
L-40	105	48.6	80	10
L-50	120	60.5	90	10

T-Type Piping

Flexible hose

Material: Stainless Steel

JIS standard vacuum flange model

Model	D	L	T
VFH-20-200	80	200	8
VFH-20-500		500	
VFH-20-1000		1000	
VFH-25-200	90	200	8
VFH-25-500		500	
VFH-25-1000		1000	
VFH-40-500	105	500	10
VFH-40-1000		1000	
VFH-40-2000		2000	
VFH-50-500	120	500	10
VFH-50-1000		1000	
VFH-50-2000		2000	

ISO standard KF flange model

Model	D	L
KFH-20-200	40	200
KFH-20-500		500
KFH-20-1000		1000
KFH-25-200	40	200
KFH-25-500		500
KFH-25-1000		1000
KFH-40-500	55	500
KFH-40-1000		1000
KFH-40-2000		2000
KFH-50-500	75	500
KFH-50-1000		1000
KFH-50-2000		2000

Coupling (Short)

Material: Stainless Steel

Model	Nominal diameter	dia. B	dia. D	H
KSC-10	KF10	15	30	16
KSC-16	KF16	20	30	16
KSC-20	KF20	25	40	20
KSC-25	KF25	30	40	20
KSC-32	KF32	38	55	20
KSC-40	KF40	45	55	20
KSC-50	KF50	56	75	20

Coupling (Long)

Material: Stainless Steel

Model	Nominal diameter	dia. B	dia. D
KLC-10	KF10	15	30
KLC-16	KF16	20	30
KLC-20	KF20	25	40
KLC-25	KF25	30	40
KLC-32	KF32	38	55
KLC-40	KF40	45	55

Clamp

Material: Aluminum Alloy

Model	Nominal diameter
KQC-16	KF10/16
KQC-25	KF20/25
KQC-40	KF32/40
KQC-50	KF50

Vacuum flange

Material: Stainless Steel

Nominal diameter	External diameter of connecting pipe	Q'ty of bolt hole	Bolt size
10	3/8B	4	M8
20	1/2B	4	M8
25	1B	4	M8
40	1-1/2B	4	M8
50	2B	4	M8
65	2-1/2B	4	M10
80	3B	4	M10
100	4B	8	M10
125	5B	8	M10
150	6B	8	M10
200	8B	8	M12
250	10B	12	M12
300	12B	12	M12
350	14B	12	M12
400	16B	12	M16
450	18B	12	M16
500	20B	12	M16
550	22B	12	M16

Flat surface seated

Groove seated

Quick coupling connection adapter

Material: Stainless Steel

Model	D1	D2	D1 Part	D2 Part
KCG-10	30	80	KF10	VG20
KCG-16	30	80	KF16	VG20
KCG-20	40	80	KF20	VG20
KCG-25	40	90	KF25	VG25
KCG-32	55	105	KF32	VG40
KCG-40	55	105	KF40	VG40
KCG-50	75	120	KF50	VG50
KCF-10	30	80	KF10	VF20
KCF-16	30	80	KF16	VF20
KCF-20	40	80	KF20	VF20
KCF-25	40	90	KF25	VF25
KCF-32	55	105	KF32	VF40
KCF-40	55	105	KF40	VF40
KCF-50	75	120	KF50	VF50

UHV parts such as piping, bellows, flange, etc.

The UFC series are our original knife-edge metal-seal bakeable flanges for ultra-high vacuums in conformity with ISO 3669 -1986.



Common specifications

Operating pressure range	Atmospheric Pressure to 10^{-11} Pa
Leak rate	1.0×10^{-11} Pa · m ³ /sec
Operating temperature range	-196 ~ 450°C
Typical bakeout temperature	≤ 300°C
Material	Austenitic stainless steel

FH : Fixed flange type RH : Rotation flange type

Ultra-High Vacuum Zero-Length Viewing Ports TVU series

Viewing ports used UFC flange for an ultra-high vacuum.



- A wide visible diameter because of thin-type window zero length structure of the window part from the flange.
- No gas permeation because of metalizing processing. Optimal for ultra-high vacuum because of the clean structure with little gas emission.
- Leak-tight bakeable sealing structure.

Leak rate	≤ 1.3×10^{-11} Pa · m ³ /sec	Model	Outer dia.	Connecting flange
Bakeout temperature	≤ 420°C (Temperature variation rate ≤ 20°C/min)	TVU16FV	34.1	UFC034
Material	Borosilicate glass (glass for copal sealing)	TVU38FV	69.9	UFC070
		TVU64FV	113.5	UFC114
		TVU100FV	151.5	UFC152
		TVU150FV	202.5	UFC203

Current Introduction Terminal CMS series

The CMS series are electrical feedthrough using a UFC flange for passing current and applying voltage to vacuum chambers with pressure ranging from atmospheric pressure to ultra-high vacuum.



Operating pressure range (*1)	10^{-2} Pa to Ultra-high Vacuum Area	
Leak rate	≤ 1.3×10^{-11} Pa · m ³ /sec	
Bakeout temperature	≤ 300°C (Temperature variation rate 25°C/min max)	
Material	Electrode Pole	Touch Pitch Copper
	Insulator	Ceramic
	Support Fitting	Kobar Metal (*2)
	Seat Plate · Pipe · Flange	Austenitic Stainless Steel

*1) Use at 10^{-4} Pa or below. There may be cases that discharge may occur and the prescribed dielectric withstanding voltage may not be obtained above 10^{-2} Pa.

*2) An alloy with iron, nickel and cobalt as primary ingredients.

Ultra-High Vacuum Rotary Feedthrough TDU series

The TDU series are rotary feedthroughs using a UFC flange enabling objects in vacuum chambers at ultra-high vacuum pressure to be rotated manually from the vacuum system's atmosphere side.

Each complete turn of handle rotates shaft exactly once, allowing angle of rotation to be read.



Model	TDU-04FM	TDU-08F
Shaft / handle Rotation Ratio	1 : 1	
Smallest calibration	45°	10°
Drive shaft diameter	dia. 5mm	dia. 8mm
Maximum torque	0.5N · m	2N · m
Connecting Flange	UFC034	UFC070
Weight	0.4kg	1.1kg
Leak rate	≤ 1.3×10^{-11} Pa · m ³ /sec	
Bakeout temperature	≤ 150°C	≤ 250°C
Bellows life time	10,000 Times	

Ultra-High Vacuum Linear Feedthroughs TSU series

The TDU series are liner feedthroughs using a UFC flange enabling objects in vacuum chambers at ultra-high vacuum pressure to be moved linearly from the vacuum system's atmosphere side.

Each complete turn of handle corresponds to 1mm movement of shaft, enabling fine adjustment.



Model	TSU-15FM	TSU-15F	TSU-40F
Linear movement distance	15mm		
Linear movement distance per complete turn	1mm / rotation		
Smallest calibration	0.05mm	1mm	
Drive shaft diameter	M6	dia. 8mm	
Maximum thrust Load	30kg		20kg
Connecting flange	UFC034	UFC070	UFC070
Weight	0.7kg	1.2kg	1.4kg
Leak rate	≤ 1.3×10^{-11} Pa · m ³ /sec		
Bakeout temperature	≤ 150°C	≤ 250°C	
Bellows life time	10,000 times		

Ultra-high vacuum flanges UFC series

The UFC series are our original knife-edge metal-seal bakeable flanges for ultra-high vacuums in conformity with ISO 3669-1986.

There are various kinds of flanges from an external diameter size of 33.8mm to 306mm.

See individual catalogue for details.

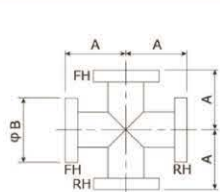
Ultra-high vacuum zero-length reducer flanges UFC series

Ultra-high vacuum zero-length reducer flanges are used to connect UFC flanges of different sizes.

There are various kinds of flanges from an outer diameter size of 69.3mm to 253.2mm.

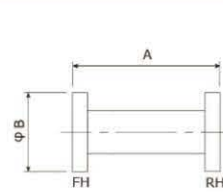
See individual catalogue for details.

Ultra-high vacuum fitting IFX series



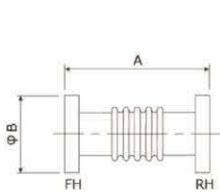
Model	A	dia. B	Connecting flange
IFX034-018	38	33.8	UFC034
IFX070-040	64	69.3	UFC070
IFX114-065	86	113.5	UFC114
IFX152-100	108	151.6	UFC152
IFX203-150	138	202.4	UFC203
IFX253-200	160	253.2	UFC253

Ultra-high vacuum fitting IFS series



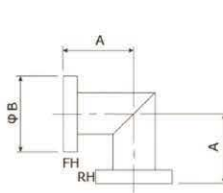
Model	A	dia. B	Connecting flange
IFS034-018	76	33.8	UFC034
IFS070-040	128	69.3	UFC070
IFS114-065	172	113.5	UFC114
IFS152-100	216	151.6	UFC152
IFS203-150	276	202.4	UFC203
IFS253-200	320	253.2	UFC253

Ultra-high vacuum fitting IFB series



Model	A	dia. B	Connecting flange
IFB034-018	76	33.8	UFC034
IFB070-040	80.6	69.3	UFC070
IFB114-065	111	113.5	UFC114
IFB152-100	216	151.6	UFC152
IFB203-150	276	202.4	UFC203
IFB253-200	320	253.2	UFC253

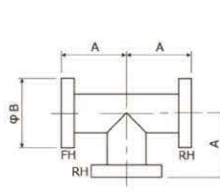
Ultra-high vacuum fitting IFE series



Model	A	dia. B	Connecting flange
IFE034-018	38	33.8	UFC034
IFE070-040	64	69.3	UFC070
IFE114-065	86	113.5	UFC114
IFE152-100	108	151.6	UFC152
IFE203-150	138	202.4	UFC203
IFE253-200	160	253.2	UFC253

Units : mm

Ultra-high vacuum fitting IFT series



Model	A	dia. B	Connecting flange
IFT034-018	38	33.8	UFC034
IFT070-040	64	69.3	UFC070
IFT114-065	86	113.5	UFC114
IFT152-100	108	151.6	UFC152
IFT203-150	138	202.4	UFC203
IFT253-200	160	253.2	UFC253

Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interaction Analyzer
Precise Microplate Paddle Mixer

QCM based Molecular Interaction Analyzers **AFFINIX series**

Precise Microplate Paddle Mixer **MICROPADDLE IMP-096A**

AFFINIX series is the analyzer which measures various molecular responses in real-time without an indicator through the QCM (Crystal Oscillator Micro Balance Method).



AFFINIX Q8
QCM2012

Performance enhanced with 8-channel multi monitoring and low-volume (100µL) sensors.



AFFINIX QNµ
QCM2008-LVKIT

Basic type for aqueous solution measurement.



AFFINIX QN
QCM2008-STKIT

Basic type for material fields measurement.



AFFINIX QN Pro
QCM2008-PRKIT

Evaluation of physical properties such as the analysis of viscoelasticity of adsorbed matter/calculation of Film Thickness

- Material mass increase or decrease through the sensor based on molecule combination/dissociation/polymerization/decomposition can be grasped through frequency changes of the crystal oscillator (Water Oscillator).
- Furthermore, analysis for viscoelasticity of absorption matter and solutions and the evaluation of physical properties has become possible for the AFFINIX QN Pro through the admittance analysis law (QCM-A Method: QCM based on admittance method).

Applications of QCM resonant-oscillation method				Applications using QCM admittance method			
Protein <ul style="list-style-type: none"> Interaction between proteins Antigen-antibody reactions Self-aggregation of proteins (β-amyloid et al.) Protein complex formations Research for cofactors 	DNA <ul style="list-style-type: none"> Hybridization Detection of mismatch base pairs RNA related reactions Research for transcription factors Evaluation of antibiotics and hybridization inhibitors 	Sugar chain <ul style="list-style-type: none"> Sugar chain-lectin interactions Carbohydrate binding proteins Binding of chitin or chitosan 	Lipid <ul style="list-style-type: none"> Reactions of lipid membranes and antimicrobial peptides Liposome bindings to treated surfaces Catechin adsorptions on lipid membranes 	Viscoelastic analysis of adsorption films <ul style="list-style-type: none"> Viscoelastic analysis relating protein-protein interactions Viscosity evaluations of Newtonian fluids Viscoelastic measurements of high concentration proteins 	Structural changes of adsorbed films <ul style="list-style-type: none"> Structural change observations of temperature responsive polymers Adsorption measurements of materials dissolved in glycerol Protein interaction measurements in crude solutions 		
Enzyme Reaction <ul style="list-style-type: none"> Decompositions by DNase Decompositions by trypsin Elongation reactions by DNA polymerase Hydrolysis reactions on sugar chains Sugar chain elongation reactions 	Binding of small molecules <ul style="list-style-type: none"> Inhibitors evaluations Drug binding evaluations Ligand/receptor reactions Binding between small molecules Toxin evaluations 	Other applications (bioscience) <ul style="list-style-type: none"> Selection of highly efficient enzymatic detergents Deterioration test of antibody reagents Maturity test of meats Blood type determination using a small amount of body fluid Selection of sensor blocking reagents 	Special sensors <ul style="list-style-type: none"> Surface coated with metals (Ti, Al etc) Surface coated with oxides (SiO₂ etc) 	Viscoelastic measurement <ul style="list-style-type: none"> Viscoelastic measurements of soft materials (colloid, polymer, etc.) Monitorings of gelation processes Viscoelastic studies of adhesive, resin, and grease 	Measurements with solution temperature changes <ul style="list-style-type: none"> Cloud point observations of surfactants Viscoelastic studies of biocompatible polymers Phases transition monitorings of liquid crystals and gels 		
Evaluation of organic polymers <ul style="list-style-type: none"> Fine particle adsorption on polymers Adsorption on latex beads Solubility evaluations of polymers Molecule adsorption on biocompatible films 	Evaluation of inorganic materials <ul style="list-style-type: none"> Adsorption on carbon nanotubes Adsorption on fullerenes Adsorption on metal nanocolloids Adsorption on hydroxyapatites Evaluation of metal surface solubility 	Measurements in atmosphere <ul style="list-style-type: none"> Effects of light irradiation on coatings Adsorption of smoke Odor sensor 	Other applications (material science) <ul style="list-style-type: none"> Evaluation of stain adsorption on coatings Studies of the optimum consumption of detergents Evaluation of agents for stain prevention Dye adsorptions on cotton Study on optimal condition of surface construction 	Measurement of ultratrace amount samples <ul style="list-style-type: none"> Adsorption measurements of rare samples 	Separate evaluation of mass and viscosity <ul style="list-style-type: none"> Evaluation of drugs dissolved in organic solvents 		

Precise microplate paddle mixer "MICROPADDLE" enables direct mixing for 96 well microplate, features high precision and accuracy, wide rotation speed setting and independent rotation control for each column, promises your laboratory works more comfortable and efficiency.



MICROPADDLE IMP-096A



- Low volume mixing: Reduce sample consumption by mixing with 96 well microplate
- Highly accuracy and precision mixing: Rotation speed from 1 to 3000min⁻¹ (1min⁻¹ increment) with ± 1% precision.
- Low rotation speed mixing: Available highly precise gentle mixing below 300 min⁻¹
- High efficiency mixing: Direct paddle mixing and high rotation speed enable high efficiency mixing.
- Multiple rotation speed setting simultaneously: 12 Independent rotation speed setting in 1 microplate facilitates your optimum rotation setting search.

■ Mixed state Difference For Rotational Speed

Before Mixing → 5-second mixing → After Mixing

Rotational Speed / min⁻¹: 3000 1000 700 600 400 200 100 60

※High-viscosity pigment solution used.

Model	QCM2012	QCM2008-LVKIT	QCM2008-STKIT	QCM2008-PRKIT
Measurement Principle (Measurement Method)	Quartz crystal microbalance (QCM)			Crystal Shared Oscillation Method (Admittance Analysis)
Measurement frequency	27 MHz			27 MHz (81 MHz)
Sensitivity	30 pg/Hz			30 pg/Hz (10 pg/Hz)
Dynamic range	100 pg to 10µg			100 pg to 10µg
Oscillation stability	Distilled water noise ≤ 1 Hz			Liquid Phase Noise Width: below 2 Hz
Average drift	≤ 1 Hz/min			
Sensor type	Sensor with a removable cup	Sensor assembled with a removable cup	Sensor chip	Sensor assembled with a removable cup
Cup volume	80 to 120 µL	400 to 550 µL	5 to 8 mL	400 to 550 µL
Channel Number	8	1	1	1
Stirring Method	Stirrers driven by motors		Magnetic Stirrer	
Temperature at the temp. controlled block	10 to 40 °C (setting step: 0.1 °C)	10 to 50 °C (setting step: 0.1 °C)	0.1 to 50 °C (setting step: 0.1 °C)	10 to 60 °C (setting step: 0.1 °C)
System software	Specialized Measuring software (License limited to the PC included.)			
Body size W × D × H	220×410×170 mm (*)		140×300×220 mm (*)	
Weight	7.0kg (*)	7.1kg (*)	7.0kg (*)	7.1kg (*)
Main option	Optional analysis software AQUA			

Model	MICROPADDLE IMP-096A
Mixing Method	Paddle mixing
Number of paddle	96
Corresponding Plates	96 well micro plate (ANSI / SLAS standard)
Driving Method	Stepping motor
Rotation speed range	0 to 3000 min ⁻¹
Rotational speed setting	Every column (8 paddles). Minimum setting value 1 min ⁻¹
Rotational speed accuracy	± 1 % or ± 1 min ⁻¹ whichever is larger.
Environmental operation temperature	10 to 40 °C
Environmental operation humidity	Below 85% relative humidity
Control method	MICROPADDLE software (CD)
Unit multiply	Maximum 12 units controllable by 1 PC
Power	90 to 264 VAC, 47 to 63 Hz, Attached plug supports max 125VAC system
External Dimensions W × D × H	176×94×97 mm (*)
Weight	1.5 kg (*)

*) Only about the stirring unit.

Vacuum Pump
Vacuum Valve
Vacuum Gauge
Process Gas Monitor
Leak Detector
Power Generator (RF/DC)
EB Power Supply / EB Source
Deposition Controller
Thin Film Measurement
Vacuum Transfer Robot
Accessories
Molecular Interaction Analyzer
Precise Microplate Paddle Mixer

**【 Japan 】**

ULVAC, Inc.
(Worldwide Headquarters)
 2500 Hagisono, Chigasaki, Kanagawa
 253-8543, Japan
 TEL : +81-467-89-2261

【 North America 】

ULVAC Technologies, Inc.
(Headquarters)
 401 Griffin Brook Drive Methuen,
 MA 01844, U.S.A.
 TEL : +1-978-686-7550

【 Germany 】

ULVAC GmbH (Head Office)
 Parkring 11, 85748, Garching, (Munich) ,
 Germany
 TEL : +49-89-960909-0

【 China 】

ULVAC (Shanghai) Trading Co., Ltd.
(Head Office)
 No.1000, Qixin Road, Minhang District,
 Shanghai, 201100, China
 TEL : +86-021-6127-6618

(Beijing Branch)
 Building C-1F, Xingye Road 2, BDA, Beijing,
 100176 China
 TEL : +86-10-5157-0125

(Shenzhen Branch)
 1F,B Zhongkenuo Building, Seventh Rd. No.7,
 Tongguan road, Tianliao Street, Guangming
 District, Shenzhen, 518107 China
 TEL : +86-755-8614-9393

(Dalian Branch)
 A-105, Dalian Economic and Technological
 Development Zone DD Port Business incubator,
 20Liaohe Eastern Road, Dalian, 116620 China
 TEL : +86-411-8740-7180

(Suzhou Branch)
 No.277, Suhong East Road, Suzhou
 Industrial Park, Suzhou, 215026, China
 TEL : +86-512-8917-9891

(Chengdu Branch)
 No.229, Teng Fei Road, Qinyang, Chengdu,
 610091, China
 TEL : +86-28-6551-8700

【 Taiwan 】

ULVAC TAIWAN Inc.
(Head Office)
 4F.-2, No.882, Sec. 2, Guangfu Rd., East
 District,Hsinchu City 300, Taiwan
 TEL : +886-3-579-5688

(Hsinchu Branch)
 8F., No.5,Keji Rd., Hsinchu Science Park
 Hsinchu City 30078, Taiwan
 TEL : +886-3-579-5688

(Taichung Office)
 1F No.37, Keya Rd.,
 Daya Dist Taichung City 428, Taiwan
 TEL : +886-4-2565-3600

(Tainan Office)
 Nanke 2nd Rd., Xinshi District
 Tainan City 749, Taiwan
 TEL : +886-6-505-8080

Ultra Clean Precision Technologies
(Tainan Science Industrial Park Fab)
 No.27, Sec.1, Huandong Rd. Sinshih
 Township, Tainan County 74146, Tainan
 Science Park, Taiwan
 TEL : +886-6-505-8888

(Taoyuan Fab)
 No.20, Ln. 211, Puzhong Rd., Zhongli City
 Taoyuan Country 32083, Taiwan
 TEL : +886-3-286-0998

【 Korea 】

ULVAC KOREA, Ltd.
(Head Office)
 837-4, Hansan-Ri, Cheongbuk-Myeon,
 Pyeongtaek-Si, Gyeonggi-Do, 451-833, Korea
 TEL : +82-31-683-2922

(Seoul Branch)
 5F Clifford Bd., 1338-23 Seocho-dong,
 Seocho-gu, Seoul, 130-070, Korea
 TEL : +82-2-3473-2920

(Busan Branch)
 8F, Donghun B/D, 225, Saebyeok-ro, Sasang-gu,
 Busan, Korea
 TEL:+82-51-317-2920

(Daejeon Branch)
 408, Namjeong B/D, 54, Techno jungang-ro,
 Yuseong-gu, Daejeon, Korea
 TEL:+82-42-936-2920

(Gumi CSC)
 403, Jiwondong, 92-9 Imsu-Dong, Gumi,
 Kyong-Buk, 730-720, Korea
 TEL : +82-54-471-3567

【 Singapore 】

ULVAC SINGAPORE PTE LTD
(Head Office)
 11 Tampines Street 92, Tampines Biz-Hub
 #02-08, Singapore 528872
 TEL : +65-6542-2700

【 Malaysia 】

ULVAC MALAYSIA SDN. BHD.
(Head Office)
 No.8 Jalan Gitar 33/3, Elite Industrial
 Estate Off Jalan, Bukit, Kemuning 40350,
 Shah Alam, Selangor, Malaysia
 TEL : +60-3-5121-4700

(Kulim Branch)
 Plot 10, Kawasan Industry, Lot 120 &
 122 Mukim Sungai Seluang, 09000 Kulim,
 Kendah Darul Aman, Malaysia
 TEL : +60-4-484-8006

【 Thailand 】

ULVAC (THAILAND) LTD.
(Head Office)
 110/6 Moo 13, Soi 25/2, Kingkaew Road,
 Tambol Rachathewa, Amphur Bangplee
 Samutprakarn 10540, Thailand
 TEL : +66-2-738-8883

【 India 】

ULVAC, Inc., India Branch
 301, Tara Tycoon 12-13-97, Tarnaka
 Secunderabad - 500 017, India
 TEL : +91-40-27007006

【 Philippines 】

ULVAC SINGAPORE PTE LTD
(PHILIPPINES Branch)
 Cavite Eco-Zonell, Rosario, Cavite,
 Philippines
 TEL : +63-46-437-7700

【 Vietnam 】

ULVAC SINGAPORE PTE LTD
(Vietnam Representative Branch)
 Room V.I.P 7, 4th Floor, Block B, Indochina
 Park Tower, 04 Nguyen Dinh chieu, Da Kao
 Ward, Dist.1, Ho Chi Minh City, Vietnam
 TEL : +84-8-6299-8262

【 Indonesia 】

ULVAC SINGAPORE PTE LTD
(Indonesia Representative Branch)
 Cikarang Techno Park 3A Floor Unit 4-2,
 Jalan Inti 1 Blok C1 No.7, Lippo Cikarang,
 Bekasi 17550, West Java, Indonesia
 TEL : +62-21-8990-5070



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Ulvac Россия 8-812-989-01-72 info@ulvac.org

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