

Mechanical Booster Pump PMB / PRC Series

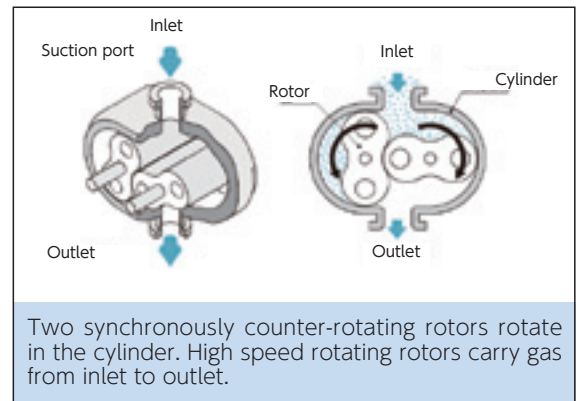
By using mechanical booster pumps together with backing pumps such as dry vacuum pumps and oil rotary pumps, it is possible to increase pumping speed in the range between 10k Pa (75Torr / 100mbar) to 0.1 Pa (7.5 x 10⁻³Torr / 0.001mbar), where pumping speed of backing pumps decreases.



Feature

- ▶ **PMB-D**
For general application. ULVAC original high efficiency (IE3) motor. 5 models are available from 100~2,400 m³/h range. *Motor of the PMB100D is IE2.
- ▶ **PRC-A**
For clean environment. Oil leak-tight canned motor. 4 models are available from 300~1,800 m³/h range.
- ▶ **PMB-C**
For large volume pumping down. Low speed rotation of rotors and motor makes pump lifetime longer. 2 models are available from 4,000~6,000 m³/h range.

Structure



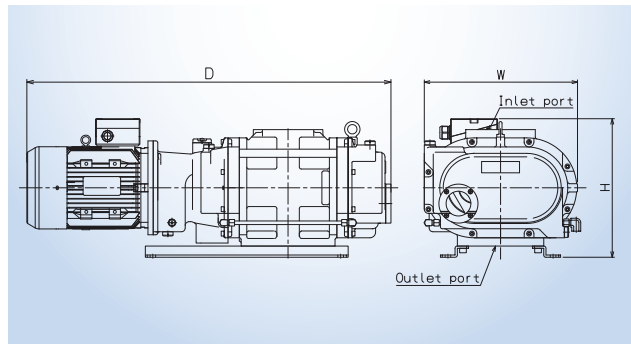
▶ Selection guide

Series	PMB-D	PRC-A	PMB-C
Material (Cylinder, rotor)	Aluminum	Aluminum	Soft steel
Anodic oxidation coatings	Option	Standard	n/a
Motor	Totally enclosed external fan motor	Canned motor	Totally enclosed external fan motor
Motor connection	Direct driven	Direct driven	Belt driven
Atmospheric-vacuum seal	Mechanical seal	O-ring	Mechanical seal
Atmospheric pressure start operation	Option	Option	n/a

Multipurpose motor specification PMB series Ver.D



Dimensions



Specifications

Model ¹		PMB100D	PMB300D	PMB600D	PMB1200D	PMB2400D	
Maximum pumping speed	50Hz	m ³ /hour	95	280	500	1000	
		L/min	1580	4670	8330	16700	41667 / 33330
		cfm	56	165	294	590	1472 / 1178
	60Hz	m ³ /hour	115	330	600	1200	3100 / 2400
		L/min	1920	5500	10000	20000	51667 / 40000
		cfm	68	194	353	706	1825 / 1413
Maximum suction pressure	50Hz	Pa	9.3×10 ³	1.2×10 ³	1.3×10 ³	2.0×10 ³ / 8.0×10 ²	
		Torr	69	9	10	15 / 6	
		mbar	93	12	13	20 / 8	
	60Hz	Pa	6.2×10 ³	9.3×10 ²	1.1×10 ³	1.5×10 ³ / 6.7×10 ²	
		Torr	46	7	8.2	11 / 5	
		mbar	62	9.3	11	15 / 6.7	
Maximum allowable differential pressure	50Hz	Pa	8.0×10 ³	4.0×10 ³	7.3×10 ³	3.5×10 ³ / 5.6×10 ³	
		Torr	60	30	54.7	26.3 / 42.1	
		mbar	80	40	73	35 / 56	
	60Hz	Pa	5.6×10 ³	3.3×10 ³	6.0×10 ³	3.0×10 ³ / 4.7×10 ³	
		Torr	42	25	45	22.6 / 35.3	
		mbar	56	33	60	30 / 47	
Ultimate Pressure ²	Pa		4.0 × 10 ⁻¹		6.7 × 10 ⁻¹		
	Torr		3.0 × 10 ⁻³		5.0 × 10 ⁻³		
	mbar		4.0 × 10 ⁻³		6.7 × 10 ⁻³		
Allowable drive pressure	Pa	from 1.0 × 10 ⁵ (atmospheric pressure start type)					
	Torr	from 760 (atmospheric pressure start type)					
	mbar	from 10000 (atmospheric pressure start type)					
Motor ³	Type	Totally enclosed fan cooled 3 phase induction motor					
	High efficiency class	IE2		IE3			
	Capacity kW (poles)	0.4(2)	0.75(2)	2.2(2)	3.7(2)	7.5(2)	
	Capacity HP (poles)	0.54(2)	1.0(2)	2.95(2)	4.96(2)	10(2)	
	Voltage V	50Hz	200(200V class motor) or 200 to 240 / 380 to 415(multiple voltage motor)				
	60Hz	200 to 220(200V class motor) or 208 to 240 / 380 to 460(multiple voltage motor)					
Oil ⁴		ULVOIL R-4	ULVOIL R-4 (Water cooled) / R-7 (Air cooled)				
Oil capacity	L	0.35	0.7	1.5	1.9	4.0	
Cooling method ⁵		Air cooled		Air cooled / Water cooled			
Cooling water	Primary side pressure	MPa	-				
		psi	-				
	Inlet/outlet differential pressure	MPa	-				
		psi	-				
	Volume	L/min	-		2	3	
Temperature ⁶	°C	-		5 - 30	-		
	F	-		41 - 86	-		
Inlet port (JIS-B-2290)		VG50 / KF50 or ISO63F (optional)	VG80 / ISO80F or 100F (optional)	VG100 / ISO100F (optional)	VG200 / ISO200F, ISO200K (optional)		
Outlet port (JIS-B-2290)		VF50 / KF50 or ISO63F (optional)	VF80 / ISO80F or 100F (optional)	VF200 / ISO200F (optional)			
Weight	kg	26	51	82	115	260	
Dimension W × D × H ⁷	mm	267 × 576 × 180	321 × 685 × 260	362 × 784 × 320	417 × 970 × 340	520 × 1260 × 460	
Standard roughing pump ⁸		VD40	VD60	VD90	VS2401	VS650/PKS-070	
Applicable standard		CE / cTUVus				CE	
Standard accessory		A dose of oil, a set of manual					
Option		Surface treatment, Adapter flange, Explosion proof motor, Atmospheric pressure start type (Inverter) ⁹ , Lubrication oil ⁴ , Lubrication chamber evacuation, Horizontal exhaust direction type (PMB2400D only)					
Atmospheric pressure start type		I2, A2 / 200V to 240V(50Hz / 60Hz)					
Inverter specification / voltage		I4, A4 / 380V to 480V(50Hz / 60Hz)					

*1 Standard model does not have surface treatment. Optional surface treatment (Anodic oxidation coatings) is available.

*2 Measured by Pirani vacuum gauge with standard backing pump and oil.

*3 Either 200V class or multiple voltage motor is selected for the PMB100D. Multiple voltage motor is not available with explosion proof motor.

*4 Mineral Oil: R-7, synthetic oil: R-7000) or fluorine oil: J25F is selectable as an option.

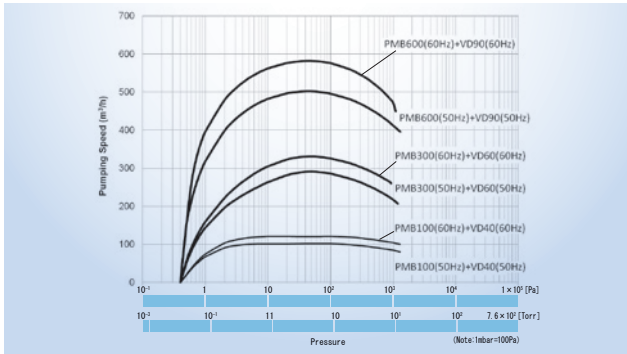
*5 Air-cooled operation is possible in all pressure range in the case of inverter equipped type. Specify when ordering in case the pump is operated with air cooled. Oil: R-7 is used for air cooled operation. It is impossible to operate the pump with air cooled in the case of the inverter for water cooled operation. More than 1 hour operation in 300Pa ~ 4000Pa range could be cause of damage in the case of the PMB600D, 1200D and 2400D. Select water cooled type in that case.

*6 Do not use the pump in the environment where condensation occurs.

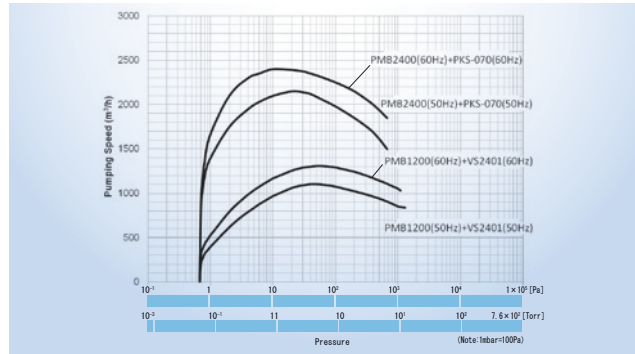
*7 Visit ULVAC website to get CAD data for other dimensions.

► Pumping Speed Curve

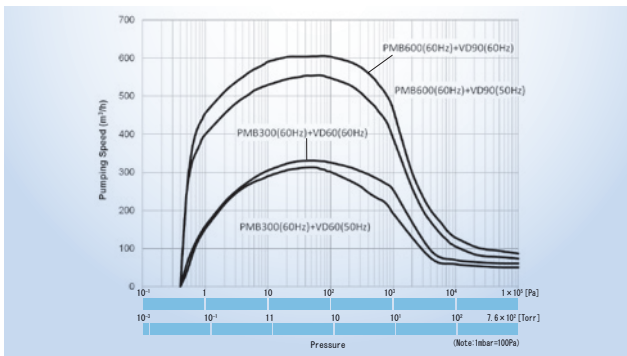
standard



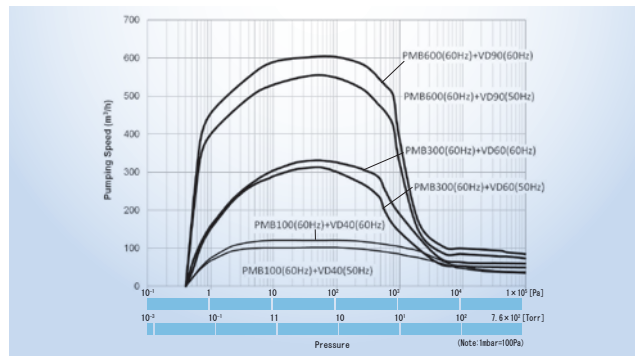
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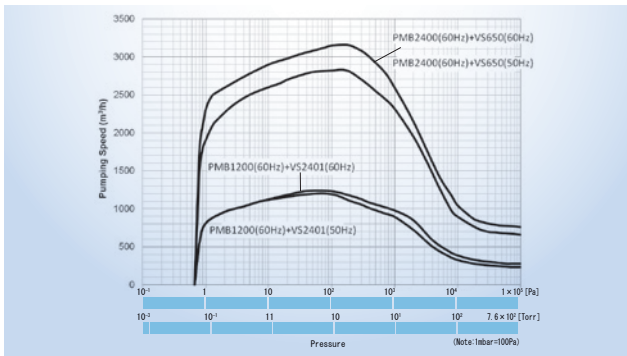
Atmospheric : Water-cooled



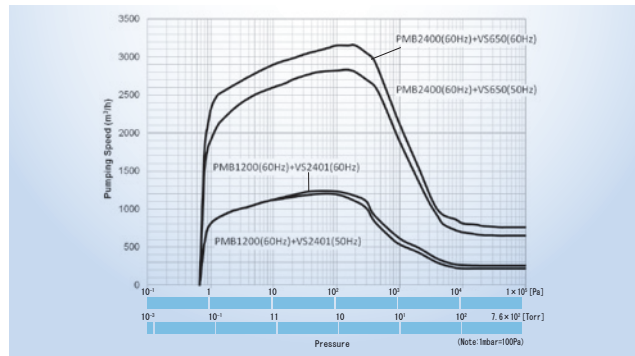
Atmospheric : Air-cooled



Atmospheric : Water-cooled

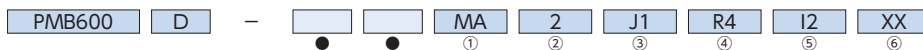


Atmospheric : Air-cooled



Model explanation

E.g.) PMB600D Without surface coating / Totally enclosed external fan motor / 200V class / JIS flange / Oil (R4) / with Inverter (I2)



Pump head option

- Surface treatment
None: Without (std)
T : Surface treatment
- Evacuation direction
None: Vertical (std)
H : Horizontal (PMB2400D only)

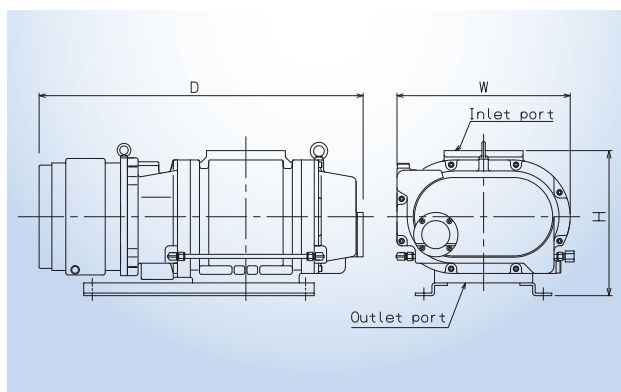
External option

- ① Motor kind
MA: Totally external fan motor (std)
MD: Explosion-protection (indoor)
MF: Flame-proof (indoor)
- ② Motor voltage
2: 200V class
4: Multiple
9: Other (specified voltage)
- ③ Inlet/outlet flange
J1: JIS (std)
A1: Inlet ISO-F (adapter)
A2: Inlet/outlet ISO-F (adapter)
A3: Inlet ISO-K (adapter) (PMB2400D only)
- ④ Oil
R4: Mineral oil (R-4: Water cooled)
R7: Mineral oil (R-7: Air cooled)
S7: Synthetic oil (R-7000)
F1: Fluorinated oil (J25F)
- ⑤ Inverter (Atmosphere start type)
XX: None (std)
I2: 200V class (Water cooled)
I4: 400V class (Water cooled)
A2: 200V class (Air cooled)
A4: 400V class (Air cooled)
- ⑥ Lubrication chamber evacuation
XX: None (std)
B1: Lubrication chamber evacuation

Canned motor specification PRC series Ver.A



► Dimensions



Specifications

Model ¹			PRC-003A	PRC-006A	PRC-012A	PRC-018A
Maximum pumping speed	50Hz	m ³ /hour	280	500	1000	1500
		L/min	4670	8330	16667	25000
		cfm	165	294	589	883
	60Hz	m ³ /hour	330	600	1200	1800
		L/min	5500	10000	20000	30000
		cfm	194	353	706	1060
Maximum suction pressure	50Hz	Pa	1.2×10 ³		1.3×10 ³	1.2×10 ³
		Torr	9		10	9
		mbar	12		13	12
	60Hz	Pa	9.3×10 ²		1.1×10 ³	9.3×10 ²
		Torr	7		8.2	7
		mbar	9.3		11	9.3
Maximum allowable differential pressure	50Hz	Pa	4.0×10 ³		7.3×10 ³	4.3×10 ³
		Torr	30		54.7	32
		mbar	40		73	43
	60Hz	Pa	3.3×10 ³		6.0×10 ³	3.2×10 ³
		Torr	25		45	24
		mbar	33		60	32
Ultimate Pressure ²	Pa		4.0 × 10 ⁻¹		6.7 × 10 ⁻¹	
	Torr		3.0 × 10 ⁻³		5.0 × 10 ⁻³	
	mbar		4.0 × 10 ⁻³		6.7 × 10 ⁻³	
Allowable drive pressure	Pa		from 1.0 × 10 ⁵ (atmospheric pressure start type)			
	Torr		from 760 (atmospheric pressure start type)			
	mbar		from 10000 (atmospheric pressure start type)			
Motor ³	Type		Canned motor, Three-phase induction motor			
	Energy efficiency class		-			
	Capacity	kW (poles)	0.75(2)	2.2(2)	3.7(2)	5.5(2)
	Capacity	HP (poles)	1(2)	3(2)	5(2)	7.5(2)
Voltage	V	50Hz	200, 380, 400, 415, 440			
		60Hz	200 to 220, 480			
Oil ⁴			ULVOIL R-4			
Oil capacity	L		0.7	1.5		1.9
Cooling method			Water cooled			
Cooling water	Primary side pressure	MPa	0.3			
		psi	43.5			
	Inlet/outlet differential pressure	MPa	0.01			
		psi	1.45			
	Volume	L/min	2			3
Temperature ⁵	°C	5 to 30				
	F	41 to 86				
Inlet port(JIS-B-2290)		VG80 / ISO80F or 100F (optional)			VG100 / ISO100F (optional)	VG150 / ISO150F (optional)
Outlet port(JIS-B-2290)		VF80 / ISO80F or 100F (optional)				VF100 / ISO100F (optional)
Weight	kg	51	86	118	150	
Dimension W×D×H ⁶	mm	296×575×260	356×619×320	406×759×340	406×989×340	
Standard roughing pump ⁷		VD60	VD90	VS2401	VS2401	
Applicable standard		-				
Standard accessory		A dose of oil, a set of manual				
Option		No surface treatment, Adapter, flange, Atmospheric pressure start type (Inverter), Oil ⁴ , Lubrication chamber evacuation				

*1 Standard model does not have surface treatment. Optional surface treatment (Anodic oxidation coatings) is available.

*2 Measured by Pirani vacuum gauge with standard backing pump and oil.

*3 Explosion-proof and increased safety type motor are not available.

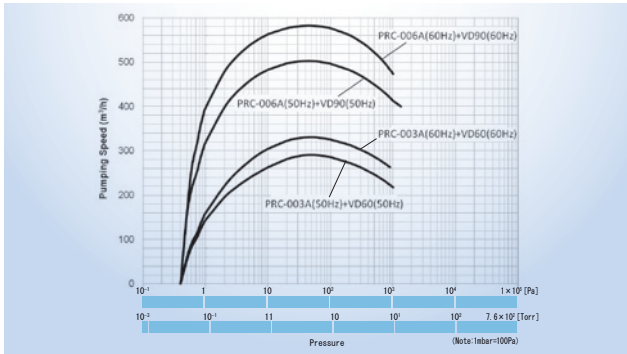
*4 Synthetic oil: R-7000 or fluorine oil: J25F is available as an option.

*5 Do not use the pump in the environment where condensation occurs.

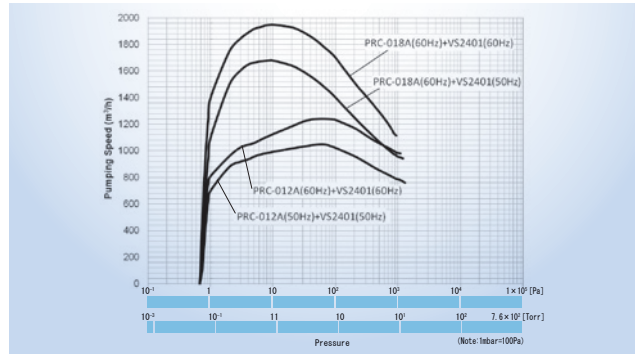
*6 Visit ULVAC website to get CAD data for other dimensions.

► Pumping Speed Curve

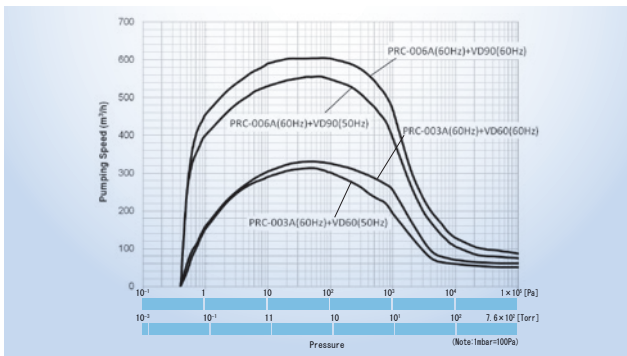
standard



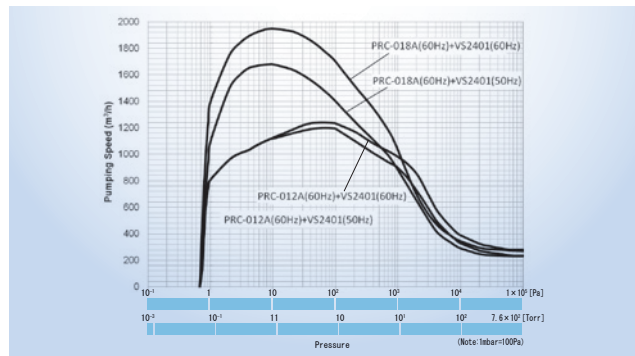
standard



Atmospheric



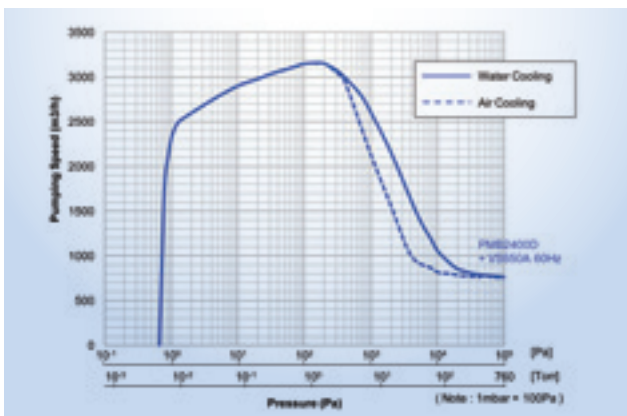
Atmospheric



► Detail of features

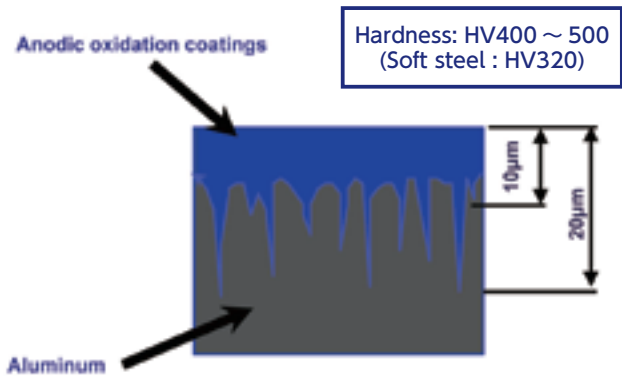
Atmospheric pressure start operation

Pump can start running from the atmospheric pressure when the inverter with the optimized parameter is used.



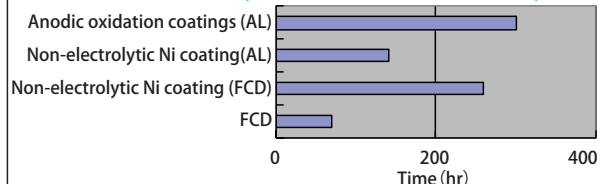
Surface treatment

Anodic oxidation coatings provide excellent corrosion resistant and higher degree of hardness.

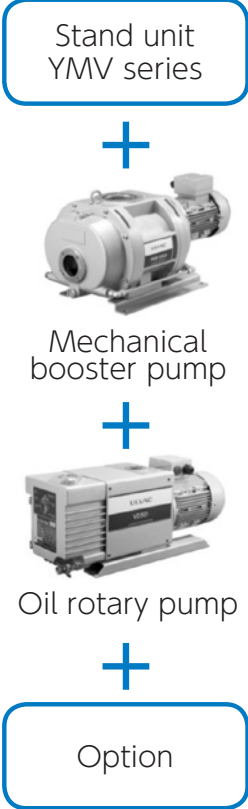
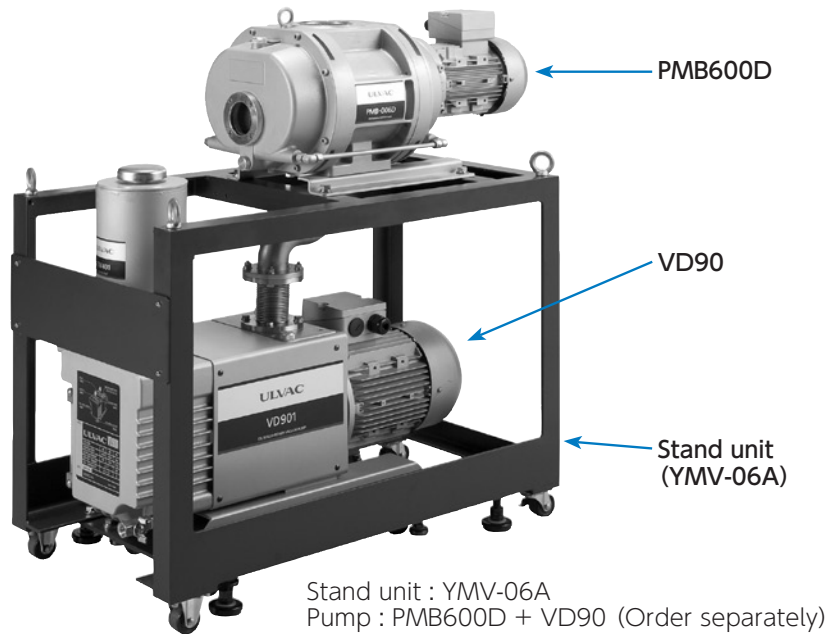


	Inverter type	Applicable voltage
Water-cooled setting	I2	200V~240V
	I4	380V~480V
Air-cooled setting (PMB-D only)	A2	200V~240V
	A4	380V~480V

Anti-corrosion test in hydrochloric acid (HCL) atmosphere.



Frame Unit for Mechanical Booster Pump YMV series



Feature

YMV series is the frame unit for combining a mechanical booster pump and oil rotary vacuum pump. 4 types are available by depending on pumping speed. It is designed for easy maintenance and suitable for production lines.

Specifications

Stands unit ¹		YMV-01A	YMV-03A	YMV-06A		
		Bellows, caster with adjuster				
Recommended pump ²	Mechanical booster pump	PMB100D	PMB300D	PMB600D		
	Oil rotary pump	VD30	VD40	VD60	VD90	
Max. pumping speed. m ³ /hr (L/min)	50Hz	95(1,580)	250(4,100)	450(7,500)	500(8,330)	
	60Hz	115(1,900)	290(4,800)	520(8,670)	600(10,000)	
Max. Suction pressure Pa	50Hz	8.5×10 ³	7.0×10 ²	1.0×10 ³	1.3×10 ³	
	60Hz	4.5×10 ³	7.0×10 ²	1.0×10 ³	1.1×10 ³	
Ultimate pressure Pa ³		4.0×10 ⁻¹				
Cooling water	Cooling water method ⁴	Air cooled		Air cooled / water cooled		
	Primary side pressure MPaG	-		0.3		
	Inlet/outlet differential pressure MPaG	-		0.05		
	Temperature °C	-		5~30		
	Volume L/min	-		2.0≤		
Suction port	JIS B 2290	VG50 / KF50 or ISO63F (optional)	VG80 / ISO80F or 100F (optional)			
Exhaust port	JIS B 2290	VG40 / KF40 (optional)				
Weight (kg)		145	175	260	285	
Dimension W×D×H mm		500×860×848	500×860×920	500×960×1030	500×960×1030	
Option	Atmospheric operation (inverter) ⁵	I2	For PMB100D	For PMB300D	For PMB600D	
		I4	For PMB100D	For PMB300D	For PMB600D	
	Oil mist trap	TM201 / TM401			TM401 / TM-2(F)	
	Control box ⁶	For PMB100D+VD30	For PMB300D+VD40	For PMB600D+VD60	For PMB600D+VD90	
	Terminal box	For PMB100D+VD30	For PMB300D+VD40	For PMB600D+VD60	For PMB600D+VD90	
	Suction flange ⁷	For PMB100D	For PMB300D/PMB600D			
	Vacuum delay solenoid valve ⁸	Common (select from DC24V, AC200V, AC220V, AC380V, AC400V, AC415V or AC440V)				
Cooling water flow switch ⁹	For PMB300D+VD40, PMB600D+VD60, PMB600D+VD90					

Remarks YMV series is the frame unit for mechanical booster pumps. Purchase a mechanical booster pump and a oil rotary pump separately. Refer to the brochure about the specification of mechanical booster pumps and oil rotary pumps. Options for individual pump are available. (Select the inverter for atmospheric pressure start operation from options for YMV series).

- *1 The frame unit contains the frame, connection pipes, bellows and casters with adjusters.
- *2 Combination with recommended pumps.
- *3 Ultimate pressure is measured by Pirani vacuum gauge.
- *4 Water cooled operation is required depending on intake pressure. Refer to the brochure of the mechanical booster pump for details.
- *5 Select the inverter from I2 or I4. I2 is for 200 to 240V and I4 is for 380V to 480V.
- *6 Select the control box from AC200V, AC220V, AC380V, AC400V, AC415V, AC440V, AC460V or AC480V.
- *7 The suction flange includes dia. 18mm gauge port, leak port and 1/4B socket.
- *8 1/4B socket is necessary to connect the delay vacuum solenoid valve. Optional suction flange is recommended.
- *9 DC24V cooling water flow switch.

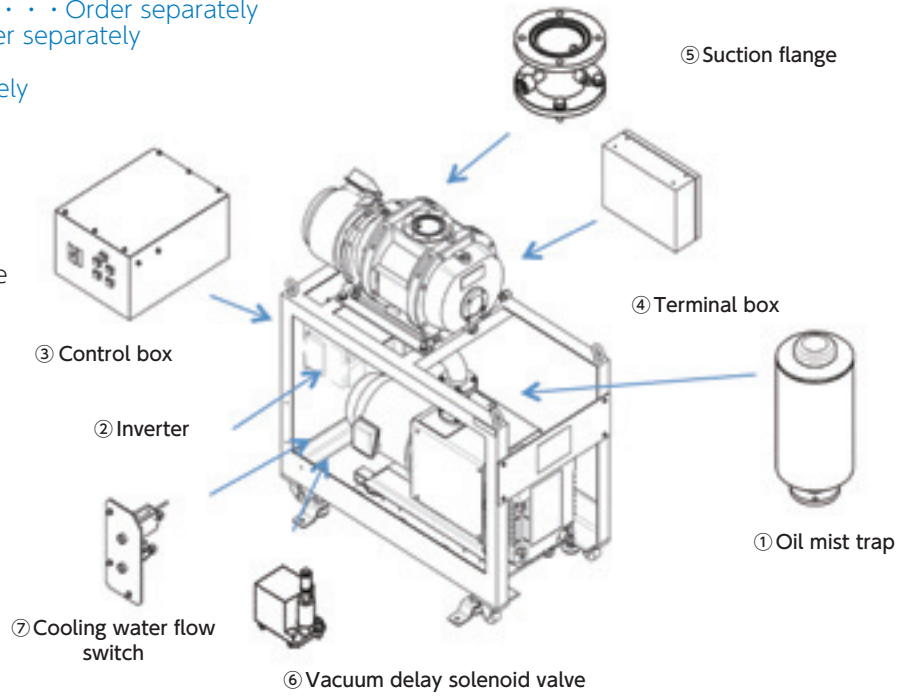
Options

◆ Basic structure

- ① Frame unit (Bellows, caster with adjuster)
- ② Mechanical booster pump . . . Order separately
- ③ Oil rotary pump . . . Order separately

◆ Options . . . Order separately

- ① Oil mist trap
- ② Atmospheric operation (with inverter)
- ③ Control box
- ④ Terminal box
- ⑤ Suction flange
- ⑥ Vacuum delay solenoid valve
- ⑦ Cooling water flow switch

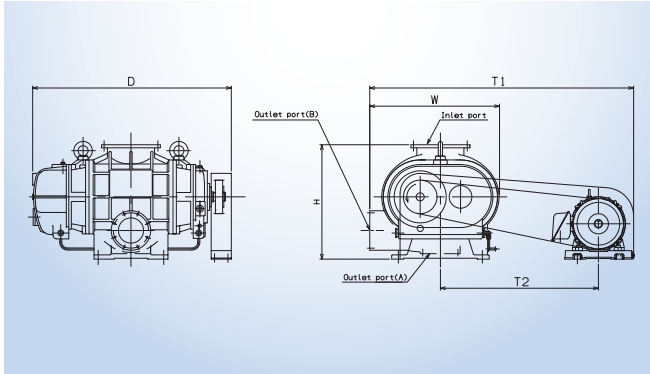


Specifications

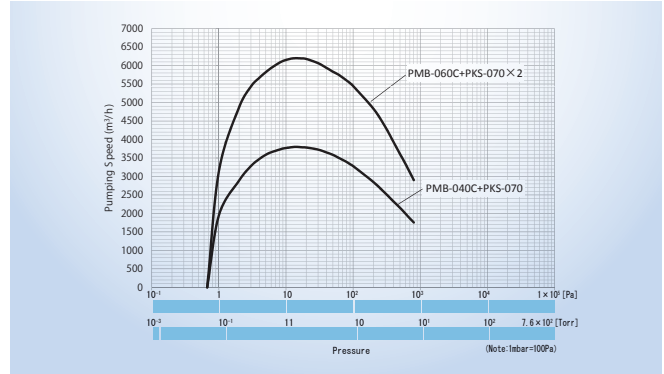
Stands unit ¹⁾		YMV-12A				
		Bellows, caster with adjuster				
Recommended pump ²⁾	Mechanical booster pump	PMB600D		PMB1200D		
	Oil rotary pump	VS1501	VS2401	VS1501	VS2401	
Max. pumping speed. m ³ /hr (L/min)	50Hz	550(9,200)	600(10,000)	850(14,200)	1,000(16,700)	
	60Hz	660(11,000)	720(12,000)	1,000(16,700)	1,200(20,000)	
Max. Suction pressure Pa	50Hz	1.5×10 ³	2.4×10 ³	1.3×10 ³	2.0×10 ³	
	60Hz	1.3×10 ³	2.1×10 ³	1.1×10 ³	1.7×10 ³	
Ultimate pressure Pa ³⁾		6.7×10 ⁻¹				
Cooling water	Cooling water method ⁴⁾	Water cooled				
	Primary side pressure MPaG	0.3				
	Inlet/outlet differential pressure MPaG	0.1				
	Temperature °C	5~30				
	Volume L/min	4.0≤	5.0≤	4.0≤	5.0≤	
Suction port	JIS B 2290	VG80 / ISO80F or 100F (optional)		VG100 / ISO100F (optional)		
Exhaust port	JIS B 2290	VG50 / KF50 or ISO63F (optional)				
Weight (kg)		480	520	530	570	
Dimension W×D×H mm		650×1200×1238	650×1200×1238	650×1200×1258	650×1200×1258	
Option	Atmospheric operation (inverter) ⁵⁾	I2	For PMB600D		For PMB1200D	
		I4	For PMB600D		For PMB1200D	
	Oil mist trap		TM-3(F)	TM-4(F)	TM-3(F)	TM-4(F)
	Control box ⁶⁾		For PMB600D+VS1501	For PMB600D+VS2401	For PMB1200D+VS1501	For PMB1200D+VS2401
	Terminal box		For PMB600D+VS1501/VS2401		For PMB1200D+VS1501/VS2401	
	Suction flange ⁷⁾		For PMB300D/PMB600D		For PMB1200D	
	Vacuum delay solenoid valve ⁸⁾		Common (select from DC24V, AC200V, AC220V, AC380V, AC400V, AC415V or AC440V)			
Cooling water flow switch ⁹⁾		For PMB600D+VS1501	For PMB600D+VS2401	For PMB1200D+VS1501	For PMB1200D+VS2401	

Large capacity pumping multiple purpose motor specification PMB series Ver.C

Dimensions



Pumping Speed Curve



Specifications

Model		PMB-040C	PMB-060C
Max. pumping speed m ³ /h (L/min) <cfm>	50Hz	3800 (63300) <2235>	6200 (103300) <3646>
	60Hz		
Max. suction pressure Pa (Torr) <mbar>	50Hz	8.0×10 ² (6) <8>	
	60Hz		
Max. allowable differential pressure Pa	50Hz	5.9×10 ³ (44.25) <59>	5.1×10 ³ (38.25) <51>
	60Hz		
Ultimate pressure ^{*1} Pa (Torr) <mbar>		6.7×10 ⁻¹ (5×10 ⁻³) <6.7×10 ⁻³ >	
Allowable drive pressure Pa		8.0×10 ²	
Motor	Type	Totally enclosed external fan type 3 phase induction motor	
	High efficiency class	IE3	
	Capacity kW(pole)	15(4)	18.5(4)
	Capacity HP(pole)	20(4)	25(4)
	Voltage V	50Hz	200, 380, 400, 415, 440
60Hz		200 to 220, 480	
Oil		ULVOIL R-7	
Oil capacity L		8	
Cooling method		Water cooled	
Cooling water	Primary side pressure MPa	0.3	
	Inlet /outlet differential pressure MPa	0.05	
	Cooling water volume L/min	10	
	Cooling water temperature ^{*2} °C	5 to 30	
Suction port	JIS-B-2290	VG250 or ISO250F (option)	VG300 or ISO320F (option)
Exhaust port	JIS-B-2290 ^{*3}	VF150 or ISO160F (option)	VF200 or ISO200F (option)
Weight kg		970	1100
		without motor	
Dimension ^{*4}	W×D×H mm	772×1182×680	
	T1/T2 mm	50Hz	1570 / 900
		60Hz	1570 / 940
Standard roughing pump		PKS-070	PKS-070 × 2
Applicable standard		—	
Standard accessories		Pump oil, V-belt, belt cover, foundation bolts, motor pulley, instruction manual	
Option		Other voltage motor	

*1 Measured by Pirani vacuum gauge with standard backing pump and oil.

*2 Do not use the pump in the environment where condensation occurs.

*3 Outlet port direction is selectable.

*4 Visit ULVAC website to get CAD data for other dimensions.

ULVAC, Inc. Components Division

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