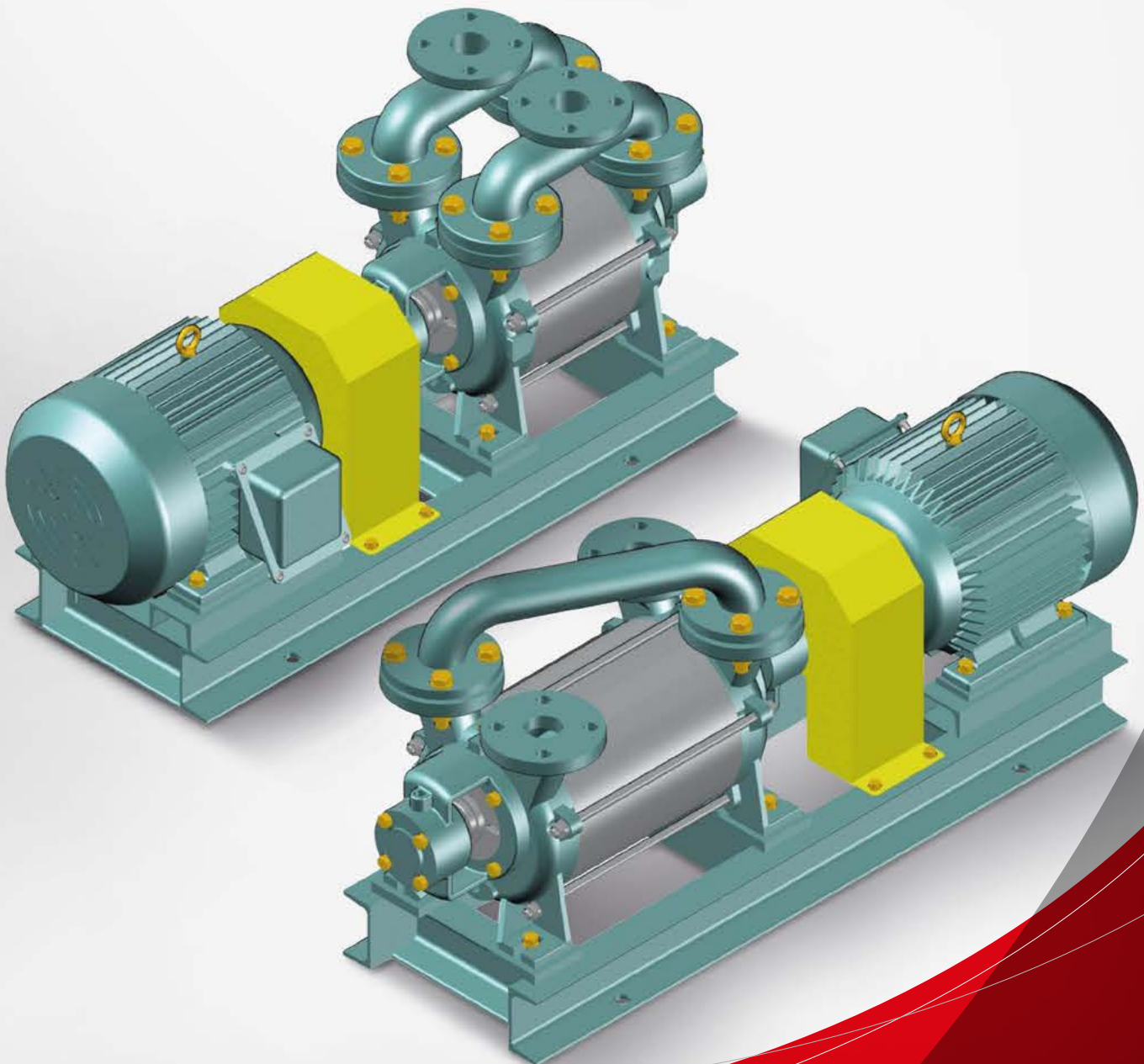


Liquid Ring VACUUM PUMP

A professional manufacturer of
pumps and mechanical seals.



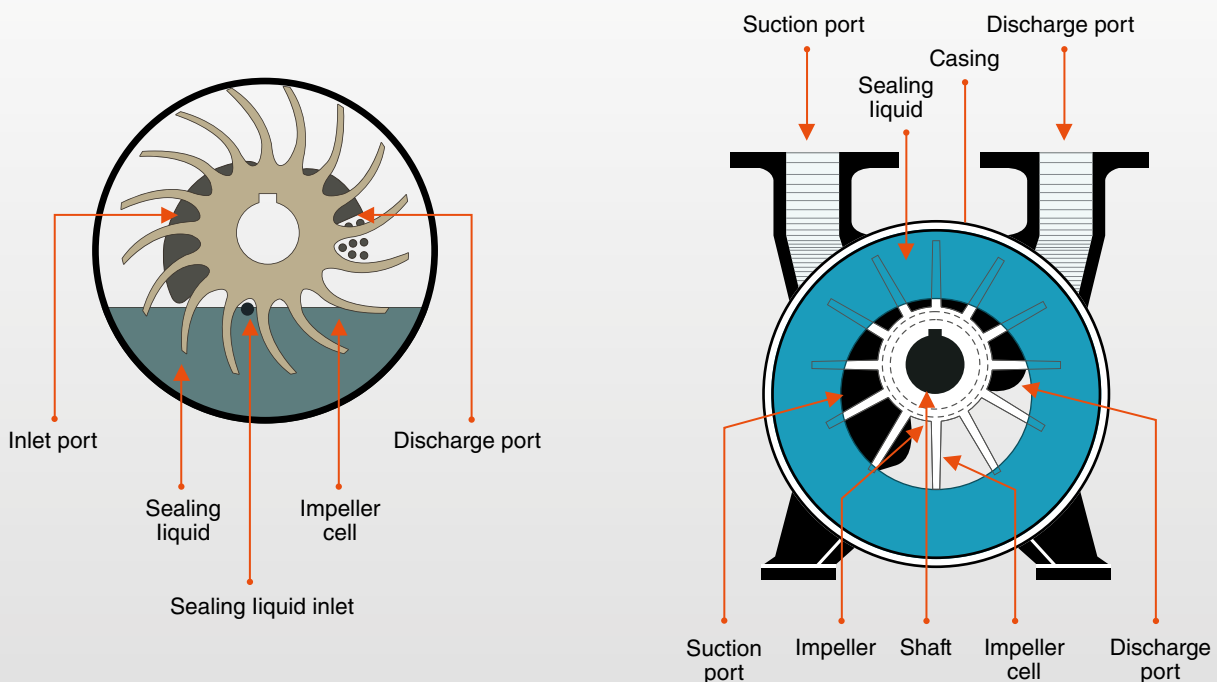
SEPA KOREA

SEPA KOREA has pursued “Fluid-Total-System” in the pump & mechanical seal field by R&D. On the basis of such technology, we launched a Liquid ring vacuum pump. Because of this development, we can get closer to our customer in the field. Through accumulated technology of SEPA KOREA, the Liquid ring vacuum pump is developed and it meets our customer needs.

What is a Liquid ring vacuum pump?

진공펌프를 운전할 때 케이싱에 적당한 양의 물을 넣고 편심되게 장착된 임펠러를 회전시키면, 아래 오른쪽 그림과 같이 물은 원심력에 의하여 케이싱의 내벽에 동심원 모양(파란부분)으로 봉수링을 형성한다. 이 봉수링의 내벽과 임펠러 날개로 생기는 공간이 펌프가 회전함에 따라 변화하는 것을 이용하여 그 공간으로 흡입구에서 기체를 흡입하며, 배기구에 가까워지면서 기체는 압축되어 물과 함께 배출된다.

The internals of the liquid ring vacuum pump are partially filled with liquid in operation. Casing and port plates form the internals, where the eccentrically mounted rotating impeller forms a liquid ring. The liquid ring forms a cell between the impeller blades, that expands during rotation and thus draws the gas through the suction port. As the impeller rotates further, these cells are getting smaller and consequently compressing the gas through the discharge port. Together with the gas, a part of the liquid will be expelled through the discharge port that is separated from the gas in the separator.



Features



케이스

진공과 기체 배출에 최적화 된 구조로써 잔류물 없이 흡입, 압축 및 배기작업을 할 수 있다.

Casing

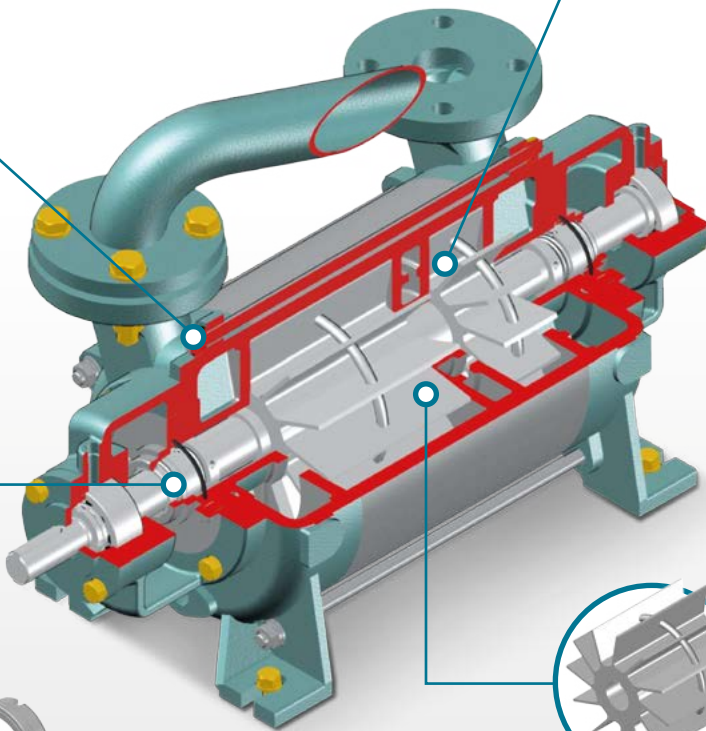
As the state-of-the-art design for the vacuum & exhaust, inhale / compression / discharge are realized without processing residuum.

재질과 간극

용도에 따라 펌프의 재질이 결정되고, 주요부품 사이의 정밀한 간극은 펌프가 문제점 없이 운전되도록 설계되어 있다.

Material & Clearance

Optional material composition is possible as per processing. It is designed to be repeated without working error when maintaining the slight-clearance in the parts of stationary and rotation.

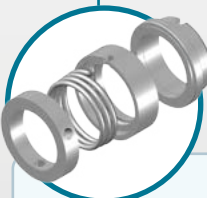


임펠러

한차원 높은 설계와 정밀한 구조에 의하여 유체저항 및 케이테이션 현상을 극소화시켰다.

Impeller

By designing an ideal mechanical design and precision-mold, Flow resistance and cavitation are minimized.



메카니칼씰

재질 : SIC / TC / CARBON

형식 : 멀티씰/모노씰, 벨로우즈씰, 싱글씰/더블씰

Mechanical Seal

Material (SIC / TC/ Carbon etc.)

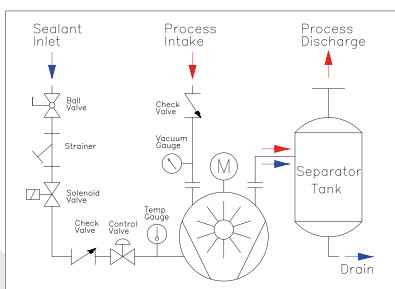
Type (Multi / Mono, Bellows, Single / Double)

Any types are possible; we manufacture all pumps at our plant.

Typical Service Liquid Supply

ONCE-THROUGH RECOVERY

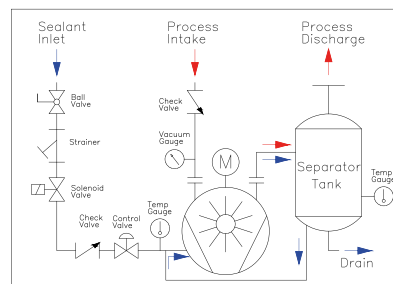
The once-through recovery system takes water directly from the water supply through the pump and discharges it directly through a gas/liquid separator tank to an approved drain. This arrangement is most common on small pumps, in installations where water conservation is not a factor, or where contamination of sealant is not a factor. Optional valving arrangement is designed to conserve sealant flow and power, and when the pump is operating at high pressure (low vacuum).



PARTIAL SEALANT RECOVERY

In the partial recovery arrangement, the pump discharges water and gas into a gas/liquid separator tank, releasing the gas to the atmosphere and retaining the water. Some water is disposed of through an overflow and the remainder is retained in the separator tank for recirculation.

Makeup water is added in a quantity necessary to maintain proper sealing water temperature. This is the most commonly used arrangement where sealing liquid conservation is required.



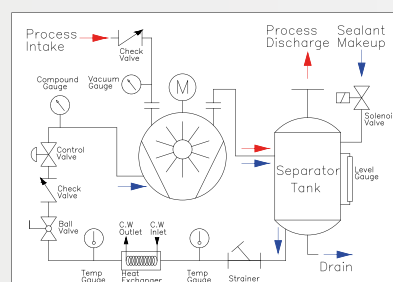
FULL SEALANT RECOVERY

A full sealant recovery system is a closed-loop sealing configuration that employs a heat exchanger (water- or air-cooled) to maintain proper sealing fluid temperature. For piping arrangement. This arrangement is not suitable for prolonged operation at pressure above 400 Torr (533.28 mbar) unless a circulating pump is installed.

Full liquid recovery systems often operate under conditions where condensation would cause the liquid level to rise, making it necessary to drain liquid from the unit in order to maintain the liquid level. The opposite condition can exist whereby liquid evaporation makes it necessary to add makeup liquid to maintain the liquid level. If there are extensive piping fittings and valves and other restrictive devices in the sealant line on a full recovery system that does not use a circulation pump, the sealant liquid is induced into the pump under pump suction entirely. For sustained operation above 400 Torr (533.28 mbar), on rapid cycling of pump-down from the atmosphere, a circulation pump may be required.

A circulation pump, when added to a full recovery system, maintains proper sealant flow at all inlet pressure conditions.

The pressure on the sealant gauge will vary depending upon the inlet pressure, from several inches of vacuum to a slightly positive pressure. Normally, a common supply line is used for both seal liquid and mechanical seal cooling.

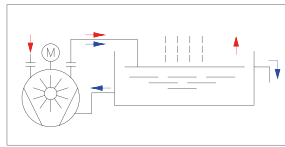


Cycled Use of the Sealing Liquid

1 Large Storage Tank | 대형 저액조

The sealing liquid coming from the gas and liquid separation tank is put in this large storage tank for natural air cooling. Tanks separated for gas and liquid are available along with the other one for combined use. Since the liquid surface is open to the air, the tank is not adequate for the work generating toxic gas or steam. It is quite useful for small-pump for water saving purposes, especially for its intermittent operation.

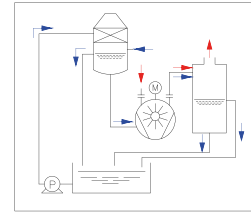
기액 분리조로부터 유출된 봉액(Sealing Liquid)을 대형조에 넣어 자연공냉하는 것이다. 기액 분리조 및 겸용형도 가능하다. 액면이 대기에 개방되므로 유해가스, 증기가 발생 하는 작업에 부적당하며 절수를 목적으로 한 소형 펌프 특히 단속 운전이 유효하다.



2 Cooling Tower | 냉각탑

Sealing liquid coming from the separation tank is frozen here in this cooling tank used in parallel with the large storage tank. So it needs a pump to transport sealing liquid. As for the exhaustion of toxic gases, careful attention needs to be paid as described in 1 above. Adequate for a relatively large pump whose sealing liquid is water.

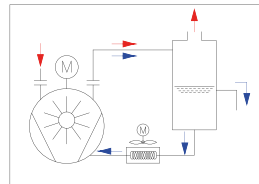
기액 분리조로부터 유출된 봉액을 대형의 저액조와 병용하여 강제 냉각되므로 봉액이송 펌프가 필요하다. 유해한 가스의 배기에 관해서는 1 과 같은 주의가 필요하다. 봉액이물이며 비교적 대용량의 펌프에 적당하다.



3 Cooler | 쿨러

Air-cooling is done while passing a cooler. As the circulation circuit can be used closed, it is not proper to use it for high quantity circulation taking into account its structure, which is adequate for toxic gas exhaust.

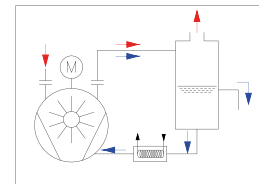
쿨러를 통과하는 동안 외부로부터 강제 공냉하는 방식으로 순환회로는 밀폐형이 가능하므로 유해물질의 배기에 적당한 쿨러의 구조상 순환량이 많은 것은 부적당하다.



4 Water Heat Exchanger | 수냉형 열교환기

As a multi-vessel or plate heat exchanger, this water heat exchanger cools the sealing water using water. As it is a closed type, it is adequate to use it to exhaust toxic materials like in 3. In general it is used for multi-purpose.

다관식 또는 plate형의 열교환기로서 봉액을 수냉하는 것으로서 회로는 밀폐형이 되므로 3 과 같은 유해물질의 배기에 적당하여 다용도의 일반적인 방식이다.



Vacuum System



▲ Single System



▲ Dual System



▲ Multi System



▲ Booster System

Vacuum Unit Conversion Table

	Pa N/m ²	bar	mbar	μbar dyn/cm ²	Torr mmHg	mTorr	atm
Pa	1	1×10 ⁻⁵	1×10 ⁻²	10	7.5×10 ⁻³	7.5	9.87×10 ⁻⁶
bar	1×10 ⁵	1	1×10 ³	1×10 ⁶	750	7.5×10 ⁵	0.987
mbar	100	1×10 ⁻³	1	1×10 ³	0.75	750	9.87×10 ⁻⁴
μbar	0.1	1×10 ⁻⁶	1×10 ⁻³	1	7.5×10 ⁻⁴	0.75	9.87×10 ⁻⁷
Torr	133	1.33×10 ⁻³	1.33	1.33×10 ³	1	1000	1.32×10 ⁻³
mTorr	0.133	1.33×10 ⁻⁶	1.33×10 ⁻³	1.33	1×10 ⁻³	1	1.32×10 ⁻⁶
atm	1.01×10 ⁵	1.013	1013	1.01×10 ⁶	760	7.6×10 ⁵	1



Water Vapor Pressure

Temp. (°C)	Vapor Pre. (mmHg)	Temp. (°C)	Vapor Pre. (mmHg)	Temp. (°C)	Vapor Pre. (mmHg)	Temp. (°C)	Vapor Pre. (mmHg)
0	4.579	25	23.756	50	92.51	75	289.10
1	4.926	26	25.209	51	97.20	76	310.40
2	5.294	27	26.739	52	102.09	77	314.10
3	5.685	28	28.349	53	107.20	78	327.30
4	6.101	29	30.043	54	112.51	79	341.00
5	6.545	30	31.824	55	118.04	80	355.10
6	7.013	31	33.695	56	123.80	81	369.70
7	7.513	32	35.663	57	129.82	82	384.90
8	8.045	33	37.729	58	136.03	83	400.60
9	8.609	34	39.898	59	142.60	84	416.80
10	9.209	35	42.175	60	149.38	85	433.60
11	9.844	36	44.563	61	156.43	86	450.90
12	10.518	37	47.067	62	163.77	87	468.70
13	11.231	38	49.692	63	171.38	88	487.10
14	11.987	39	52.442	64	179.31	89	506.10
15	12.788	40	55.324	65	187.54	90	525.76
16	13.634	41	58.340	66	196.09	91	546.05
17	14.530	42	61.500	67	204.96	92	566.99
18	15.477	43	64.800	68	214.17	93	588.60
19	16.477	44	68.260	69	223.73	94	610.90
20	17.535	45	71.880	70	233.70	95	633.90
21	18.650	46	75.650	71	243.90	96	657.62
22	19.827	47	79.600	72	254.60	97	682.07
23	21.068	48	83.710	73	265.70	98	707.27
24	22.377	49	88.020	74	277.20	99	733.24

Vacuum Pump Capacity Calculation

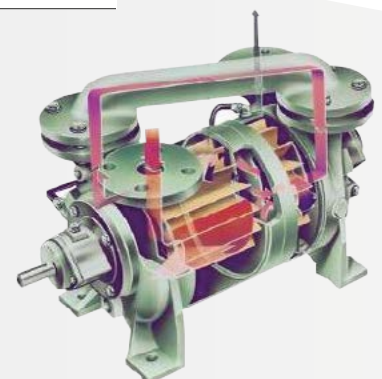
$$S = 2.303 * (V/T) * \log(P1/P2)$$

S= Vacuum pump capacity (ℓ/min, V= Chamber capacity(ℓ),
T= Required pumping time (min)

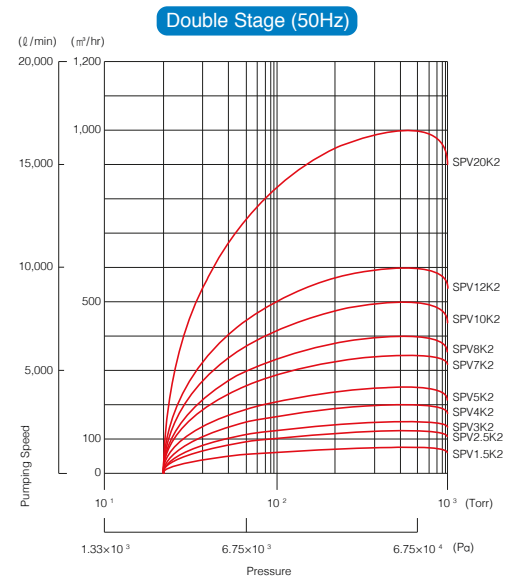
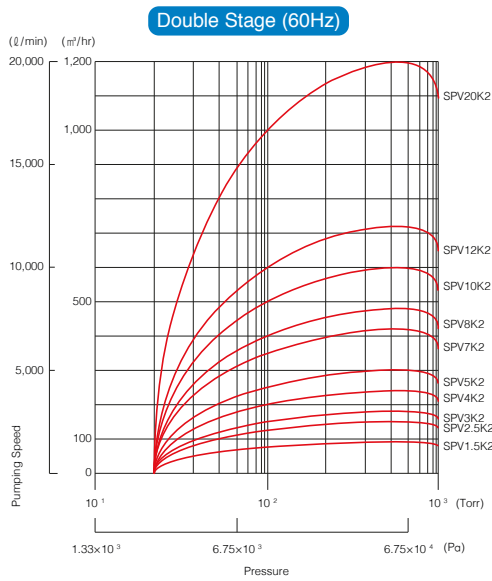
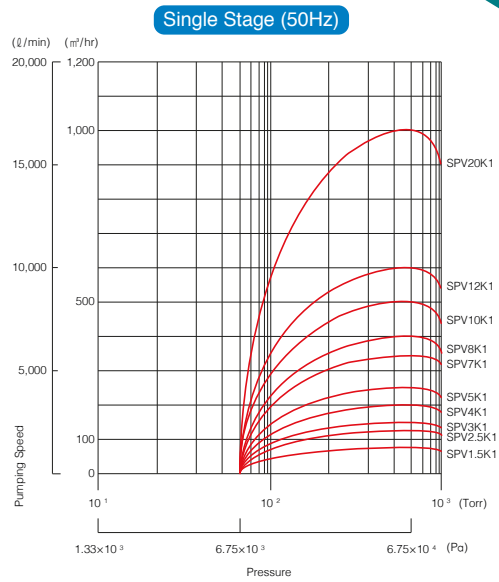
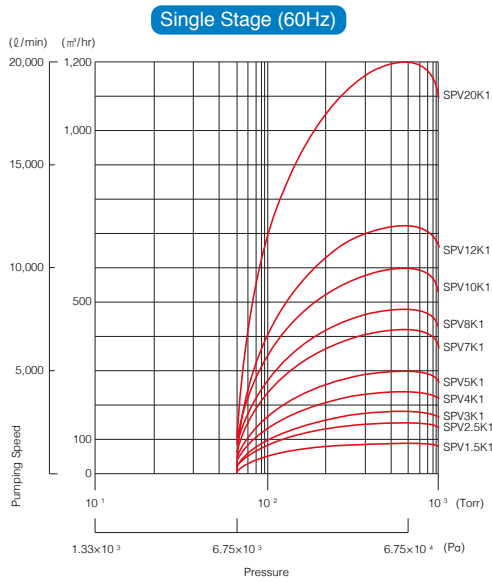
P1= Atmospheric pressure, 760 Torr
P2= Required vacuum (Torr)

Because the above calculation is a theoretical one,
Please consider the safety factor as the list

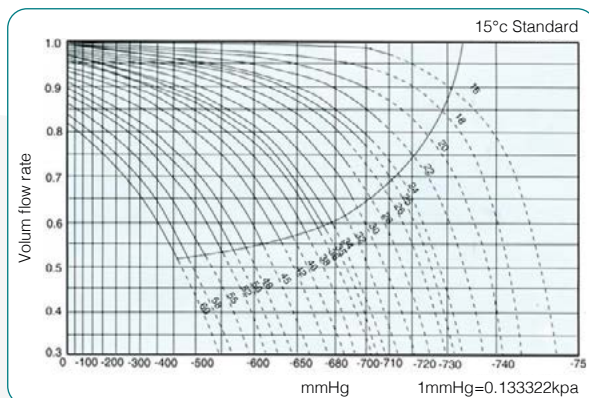
Vacuum (Torr)	Safety Factor
760 ~ 100	1.0
100 ~ 10	1.25
10 ~ 0.5	1.5
0.5 ~ 0.05	2.0
0.05 ~ 0.01	4.0



Performance curve



The above data is tested with 15°C(±10%) water, and under conditions of 20°C(±10%) process temperature for intake & exhaust.



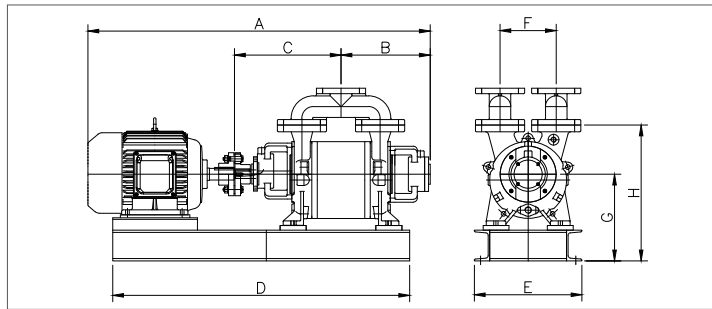
As per water temperature, Volume flow rate

Technical Data

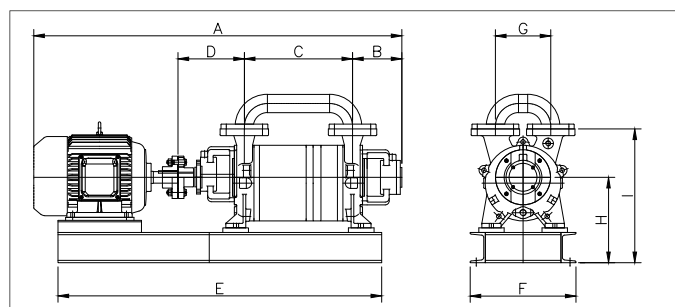
Specification	Displacement Speed		Ultimate Pressure	Motor	Seal Water Flow	Suction port	Exhaust port	Dimension	Weight (with Motor)
	60Hz	50Hz							
	ℓ/min								
SPV1.5K1	1,500	1,250	6.7×10 ³ (50)	2.2(4)	8	40A	40A	945×240×420	80
SPV2.5K1	2,500	2,000	6.7×10 ³ (50)	3.7(4)	10	50A	50A	1,080×270×440	120
SPV3K1	3,000	2,500	6.7×10 ³ (50)	5.5(4)	15	50A	50A	1,140×270×440	130
SPV4K1	4,000	3,300	6.7×10 ³ (50)	7.5(4)	20	80A	80A	1,325×330×520	160
SPV5K1	5,000	4,100	6.7×10 ³ (50)	11(4)	30	80A	80A	1,365×330×520	175
SPV7K1	7,000	5,800	6.7×10 ³ (50)	15(4)	35	80A	80A	1,485×330×520	210
SPV8K1	8,000	6,650	6.7×10 ³ (50)	18.5(4)	40	80A	80A	1,470×400×600	360
SPV10K1	10,000	8,300	6.7×10 ³ (50)	22(4)	45	80A	80A	1,570×400×600	480
SPV12K1	12,000	10,000	6.7×10 ³ (50)	30(4)	60	80A	80A	1,670×400×600	510
SPV20K1	20,000	16,500	6.7×10 ³ (50)	55(6)	85	125A	125A	2,115×500×725	750

Specification	Displacement Speed		Ultimate Pressure	Motor	Seal Water Flow	Suction port	Exhaust port	Dimension	Weight (with Motor)
	60Hz	50Hz							
	ℓ/min								
SPV1.5K2	1,500	1,250	2.7×10 ³ (20)	3.7(4)	8	40A	40A	995×240×420	95
SPV2.5K2	2,500	2,000	2.7×10 ³ (20)	5.5(4)	10	50A	50A	1,140×270×440	135
SPV3K2	3,000	2,500	2.7×10 ³ (20)	7.5(4)	15	50A	50A	1,210×270×440	145
SPV4K2	4,000	3,300	2.7×10 ³ (20)	11(4)	20	80A	80A	1,390×330×520	205
SPV5K2	5,000	4,100	2.7×10 ³ (20)	15(4)	30	80A	80A	1,430×330×520	215
SPV7K2	7,000	5,800	2.7×10 ³ (20)	18.5(4)	35	80A	80A	1,550×330×520	260
SPV8K2	8,000	6,650	2.7×10 ³ (20)	22(4)	40	80A	80A	1,560×400×600	410
SPV10K2	10,000	8,300	2.7×10 ³ (20)	30(4)	45	80A	80A	1,660×400×600	560
SPV12K2	12,000	10,000	2.7×10 ³ (20)	37(4)	60	80A	80A	1,760×400×600	680
SPV20K2	20,000	16,500	2.7×10 ³ (20)	75(6)	85	125A	125A	2,450×500×725	1,190

Dimension(mm)

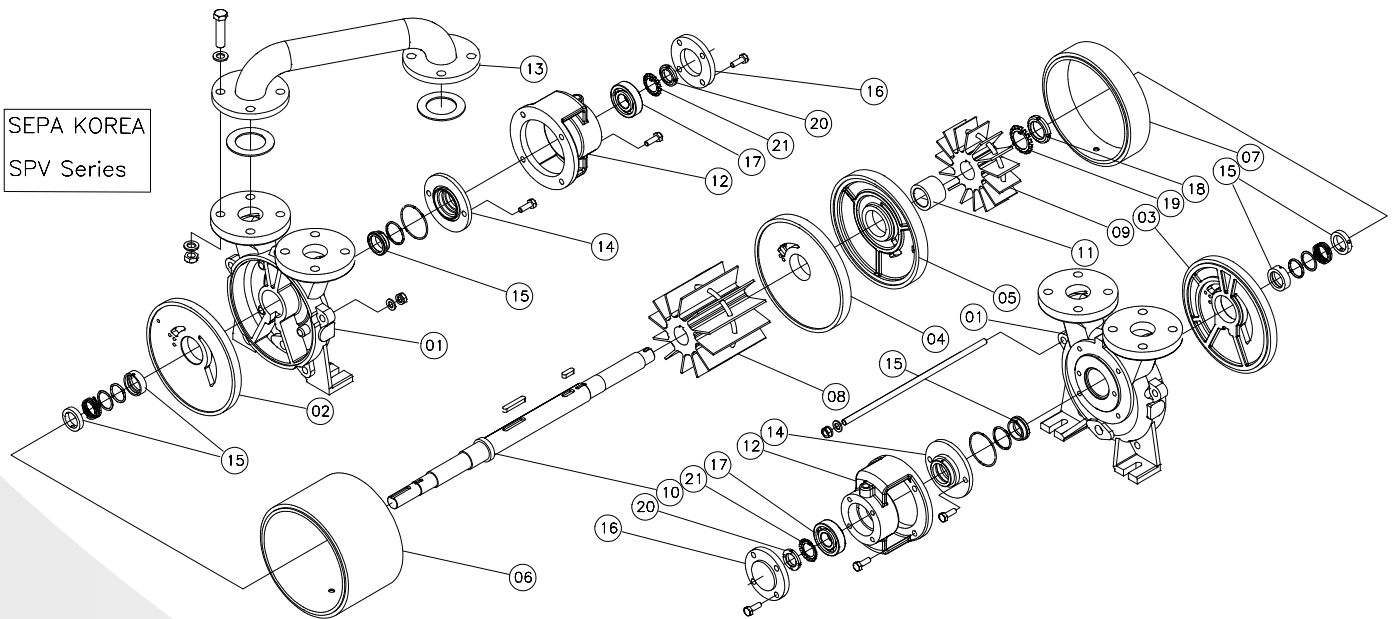


MODEL	A	B	C	D	E	F	G	H
SPV1.5K1	950	155	230	750	240	-	250	420
SPV2.5K1	965	235	290	770	270	180	250	420
SPV3K1	1,075	270	325	880	270	180	250	420
SPV4K1	1,265	310	375	1,015	320	235	330	525
SPV5K1	1,370	312	397	1,085	320	235	330	525
SPV7K1	1,450	348	433	1,135	320	235	330	525
SPV8K1	1,410	330	420	1,140	400	235	390	600
SPV10K1	1,510	355	445	1,230	400	235	390	600
SPV12K1	1,610	430	620	1,550	400	235	390	600
SPV20K1	2,125	550	630	1,655	500	310	460	725



MODEL	A	B	C	D	E	F	G	H	I
SPV1.5K2	1,030	155	260	230	830	240	-	250	420
SPV2.5K2	1,065	155	260	210	870	270	180	250	420
SPV3K2	1,185	155	340	210	990	270	180	250	420
SPV4K2	1,390	200	345	265	1,140	320	235	330	525
SPV5K2	1,495	200	380	285	1,210	320	235	330	525
SPV7K2	1,575	200	420	285	1,260	320	235	330	525
SPV8K2	1,560	180	450	270	1,290	400	235	390	600
SPV10K2	1,660	180	500	270	1,380	400	235	390	600
SPV12K2	1,760	180	650	370	1,700	400	235	390	600
SPV20K2	2,450	360	440	550	1,850	500	310	460	725

Exploded view



NO	Part Name	Material	NO	Part Name	Material	NO	Part Name	Material
1	Casing	STS304/GC250	8	2ne Impeller	STS304	15	Mechanical Seal	
2	Stator Cover1	STS304/GC250	9	2ne Impeller	STS304	16	Bearing Cover	SM45C
3	Stator Cover2	STS304/GC250	10	Shaft	STS304	17	Bearing	
4	Stator Cover3	STS304/GC250	11	Retainer	STS304	18	Lock Nut	STS304
5	Stator Cover4	STS304/GC250	12	Bearing Housing	GC250	19	Lock Washer	STS304
6	1st Housing	STS304/GC250	13	Manifold Pipe	STS304/GC250	20	Lock Nut	STS304
7	2nd Housing	STS304/GC250	14	Seal Cover	STS304	21	Lock Washer	STS304

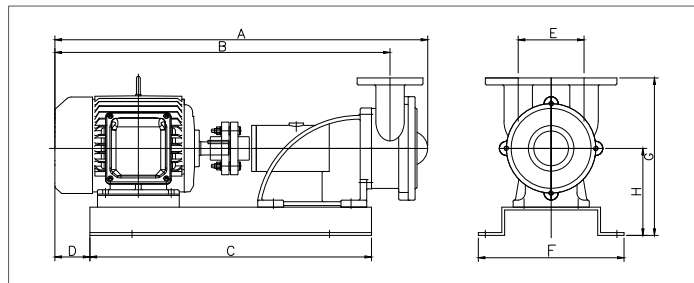
Vacuum Self Priming Pump

Technical Data

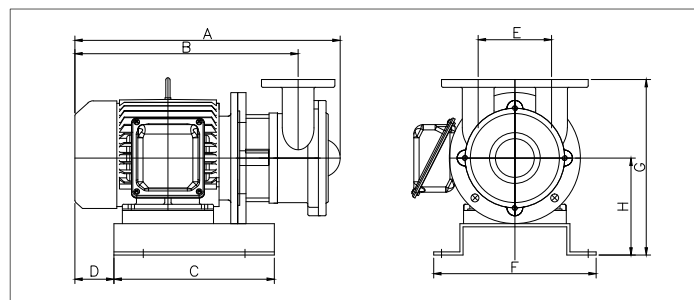


Specification	Capacity	Head	Motor	Suction port	Exhaust port
	m ³ /min	m	kW(Pole)	mm	mm
SPVP40	0.12	15	2.2(4)	40A	40A
SPVP50	0.20	20	3.7(4)	50A	50A

Dimension(mm)



MODEL	A	B	C	D	E	F	G	H
SPVP40H	755	675	500	75	140	310	330	190
SPVP50H	815	715	600	95	170	310	360	175



MODEL	A	B	C	D	E	F	G	H
SPVP40V	500	420	300	75	140	310	330	190
SPVP50V	560	460	400	95	170	310	360	175



Maximize Efficiency, Minimize Trouble!

 **SEPA KOREA CORP.**

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