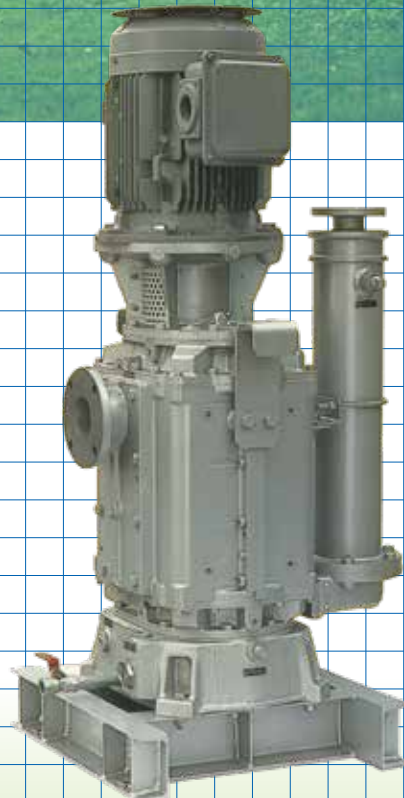


DRY VACUUM PUMP

TYPE TRV
"TRIPAC" Series



Vertical dry vacuum pump developed with new concepts has been evolving to new vacuum technology.

The new dry vacuum pump type TRV is completely oil free type developed with a new concept, which is different from conventional dry vacuum pumps. The cooling effect of a high efficiency jacketed pump housing eliminates inter cooler and drain tanks. The top down transport of gas ensures rapid and complete draining. The pump insures easy solvent recovery at the discharge of the vacuum pump.

TRIPAC



"TRIPAC "Vertical Dry Vacuum Pump Type TRV

■ Typical application

- Vacuum Distillation · Pharmaceutical ,Medical Equip.,&Food industry
- Solvent Recovery · Special gases Chemical industry
- Polymer Processing · Vacuum Drying

Advantages

● Top down configuration

The top down transport of gas ensures rapid and complete draining. The pump is strong to handle liquid carry over and condensed liquid of gas and insures easy solvent recovery at the discharge of the vacuum pump at atmosphere.

● Compact & low maintenance

As the vertical configuration eliminates drain tanks and high frame, the pump footprint is very small.

● Wide operating range

The pump can be operated at any suction pressure. The three lobe rotor design permits stable performance at any suction pressure from atmospheric to suction shut-off.

● Reduced power consumption

In all compression steps, the back-flow cooling system (refer Page 3) are applied. Also in gas flow passage to the next stage, gas would be cooled down by water jacket. This low temperature compression and cooling system are repeated in all stages. This ensures low temperature compression. As a result, the pump has good efficiency and reduced power consumption.

● Low noise operation

The special designed compact vacuum pump is very low noise type. The pump can be operated in any surrounding condition.

● Backing pump

For larger pumping system or high vacuum application, this pump can be used with a mechanical booster. It leads to make a compact vacuum system using the vertical dry vacuum pump.

Low power consumption and high efficiency.

The vertical dry vacuum pump has the best configuration to handle liquid carry over and condensed liquid.

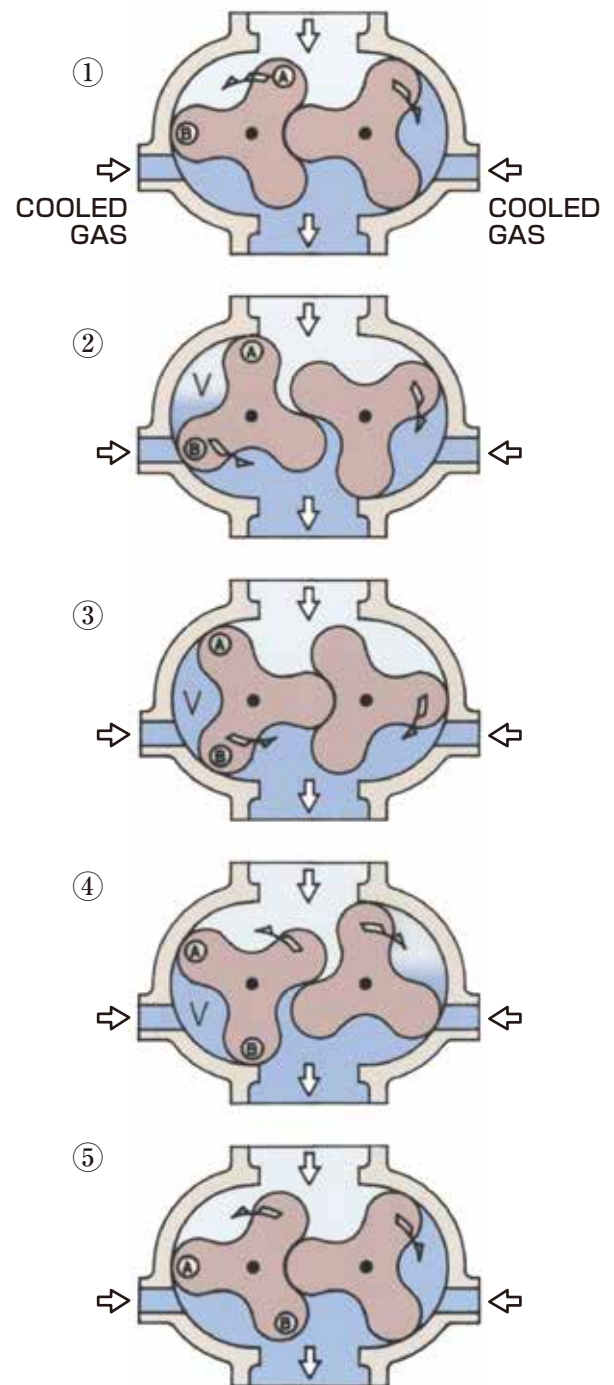
Back-flow cooling system enable to make the gas temperature low and keep the efficiency high.

Back-Flow cooling system

What are operating principles of a vacuum pump with back-flow cooling system?

The rotor turns in the sequence of (1)to(5). The light color section of the drawing indicates the vacuum (suction pressure), while the dark color section indicates the discharge pressure. The left side rotor indicates back-flow cooling system function.

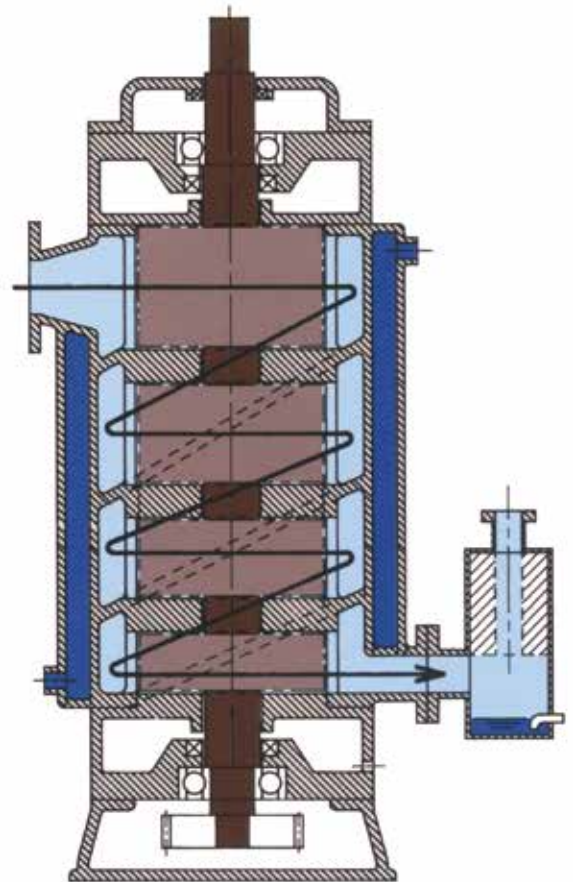
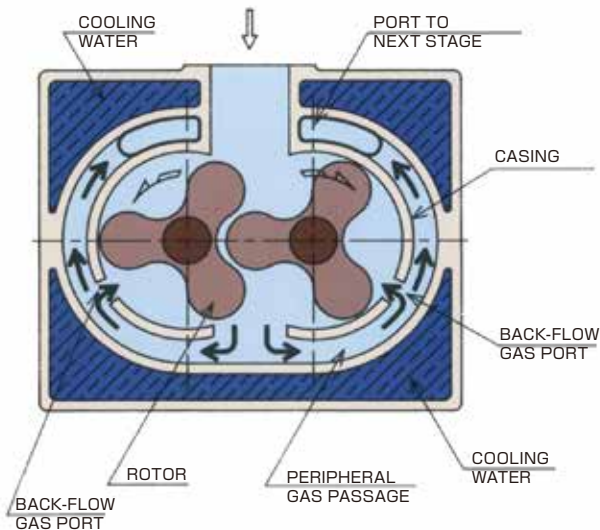
- (1) The rotor tips A and B are positioned to catch suction gas in volume "V"(moving volume).
- (2) The rotor has completely caught suction gas in volume "V"and cooled gas whose pressure is the same as the discharge pressure starts to flow back.
- (3) Furthermore, as the rotor turns, the cooled gas continues to flow into volume "V", increasing the pressure in volume "V"to approximate same with the discharge pressure.
- (4) The pressure in volume "V"nearly equals to the discharge pressure in the discharge port.
- (5) The volume "V" comes in direct contact to discharge pressure part and the gas shall be pushed into the discharge port area.



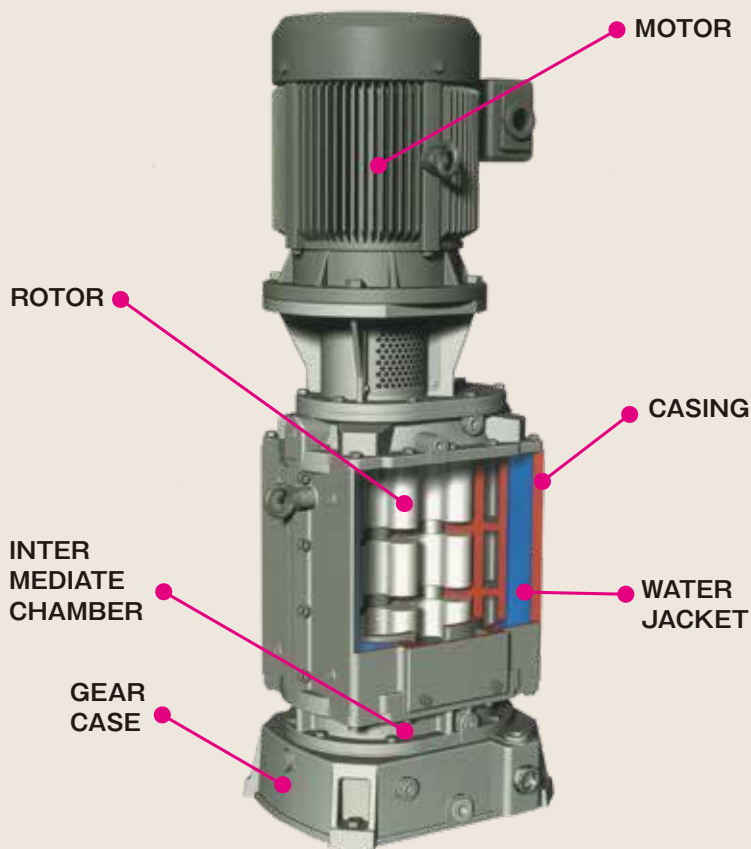
Dry vacuum pump operation principles

1. The suction gas into the inlet of pump is compressed by rotation of rotors and transferred to the peripheral gas passage at just the outside of the housing.
2. Then, gas is divided to two portions, one portion is flowing into the back flow gas port of the first stage through the peripheral gas passage and another portion flows into the inlet of the second stage.
3. The outer wall of the peripheral gas passage is cooled by water cooled jacket located outside of the peripheral passage.
4. The intake gas continuously flows through the peripheral gas passage while radiating heat to outside wall of the passage.
5. That working of flow and compression to next stage is repeated till final stage and consequently the gas is compressed to atmospheric pressure and discharged.
6. Condensable gas would be condensed according to its pressure. Some cases suction gas has carry over liquid. In both cases, liquid would be flown down with handling gas and discharged to the atmosphere.
7. The vertical compact dry vacuum pump insures easy draining of liquid without any controls.

■ Pump inner flow



Construction



●Motor

Depending on the installation area the following motor type can be selected. TEFC, Increased safety explosion proof, Flameproof enclosure, NEMA.

●Rotor

The three lobe rotor made of ductile cast iron has good quality subjected to high precision machining. The inside clearances are precisely secured and optimum efficiency is guaranteed. In addition, as it is perfectly balanced by means dynamic balancing machine, noise and vibration are minimized.

●Casing

The casing made of cast iron, consisting of the suction-side half and the discharge-side half, ensures sufficient strength and durability.

●Bearing

The bearing are high precision bearings with a load capacity suited for working conditions. Stable performance and long service life are guaranteed.

●Timing gear

Special considerations have been given to the timing gear, since it is as important part of vacuum pump as well as the rotor. Made of chrome molybdenum steel, carbonized, quenched and ground, it is excellent in durability.

●Intermediate chamber

The intermediate chamber is placed between housing and gear case, and sealing system are assembled in this chamber to avoid dropping drain from casing into gear case.

Material Construction

The Standard material construction

- Casing & Covers: Cast iron(FC250)
- Rotor & Shaft: Ductile cast iron(FCD450)
- Timing gear: Chrome Molybdenum steel (SCM420H)
- "O"ring: FKM(Option: Perfluor)
- Lip seal: FKM, PTFE
- Gasket: Non-asbestos(Option: PTFE)

Special material option

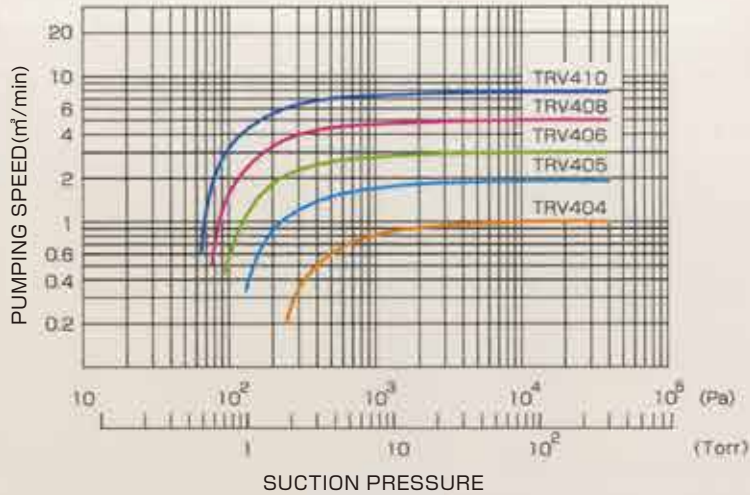
- Ductile cast iron (casing)
- Nickel coating (casing & rotor)
- PTFE coating(casing & rotor)



Performance

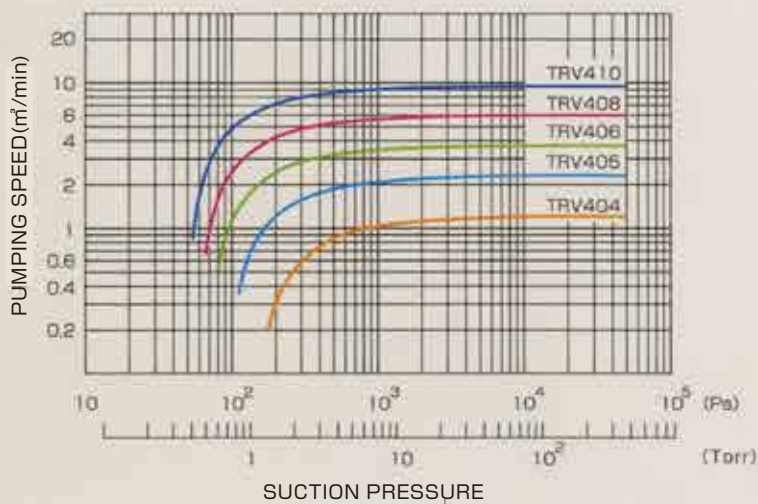
Dry vacuum pump type "TRV"

50Hz



PUMP MODEL	SUCTION	DISCHARGE	PUMPING SPEED	ULTIMATE PRESSURE	MOTOR	COOLING WATER CAPACITY
	D ₁ (mm)	D ₂ (mm)	(m ³ /min)	(Pa)	(kW)	(Lit/min)
TRV404	40	25	1.0	200	2.2	5
TRV405	50	32	1.9	110	3.7	7
TRV406	65	40	3.0	80	5.5	10
TRV408	80	50	5.0	70	7.5	14
TRV410	100	65	7.8	60	11	20

60Hz

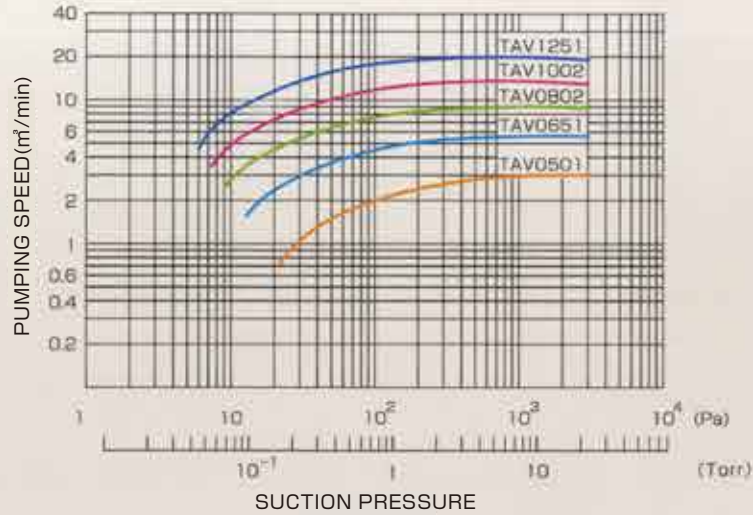


PUMP MODEL	SUCTION	DISCHARGE	PUMPING SPEED	ULTIMATE PRESSURE	MOTOR	COOLING WATER CAPACITY
	D ₁ (mm)	D ₂ (mm)	(m ³ /min)	(Pa)	(kW)	(Lit/min)
TRV404	40	25	1.2	150	2.2	5
TRV405	50	32	2.3	95	3.7	7
TRV406	65	40	3.7	70	5.5	10
TRV408	80	50	6.0	60	11	20
TRV410	100	65	9.5	50	15	28

Performance

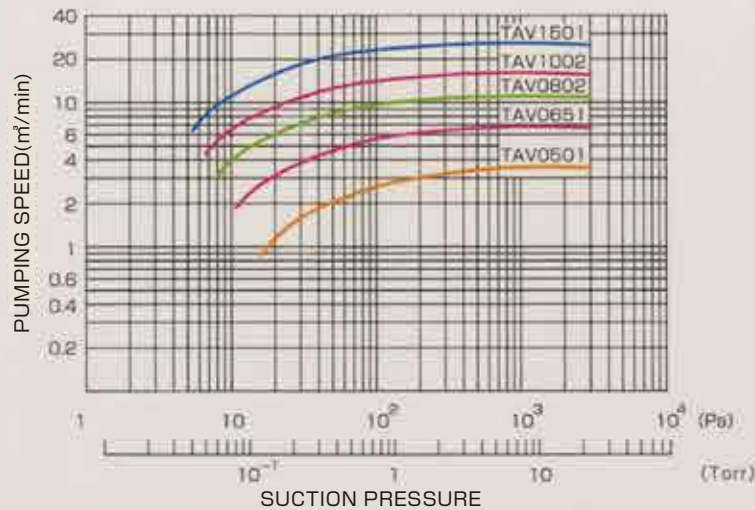
Dry vacuum pump type "TAV" ("TRV" + Mechanical Booster)

50Hz



MODEL	SUCTION	DISCHARGE	PUMPING SPEED (m³/min)	ULTIMATE PRESSURE (Pa)	MECH BOOSTER MODEL	MOTOR (kW)	DRY VACUUM PUMP MODEL	MOTOR (kW)	COOLING WATER CAPACITY (Lit/min)
	D ₁ (mm)	D ₂ (mm)							
TAV0501	50	25	3.0	15	TRA0501	1.5	TRV404	2.2	5
TAV0651	65	32	5.7	9	TRA0651	2.2	TRV405	3.7	7
TAV0802	80	40	9.0	7	TRA0802	3.7	TRV406	5.5	10
TAV1002	100	50	13.5	6	TRA1002	3.7	TRV408	7.5	14
TAV1251	125	65	20	5	TRJ1251	5.5	TRV410	11	20

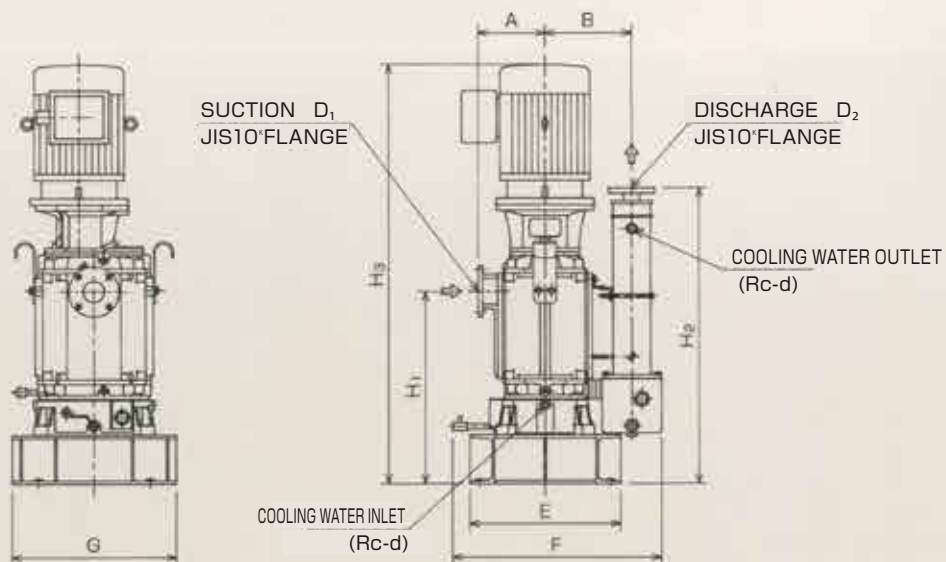
60Hz用



MODEL	SUCTION	DISCHARGE	PUMPING SPEED (m³/min)	ULTIMATE PRESSURE (Pa)	MECH BOOSTER MODEL	MOTOR (kW)	DRY VACUUM PUMP MODEL	MOTOR (kW)	COOLING WATER CAPACITY (Lit/min)
	D ₁ (mm)	D ₂ (mm)							
TAV0501	50	25	3.6	12	TRA0501	1.5	TRV404	2.2	5
TAV0651	65	32	6.7	8	TRA0651	2.2	TRV405	3.7	7
TAV0802	80	40	11	6	TRA0802	3.7	TRV406	5.5	10
TAV1002	100	50	16	5	TRA1002	5.5	TRV408	11	20
TAV1501	150	65	25.5	4	TRJ1501	5.5	TRV410	15	28

Dimension

Dry vacuum pump type "TRV"



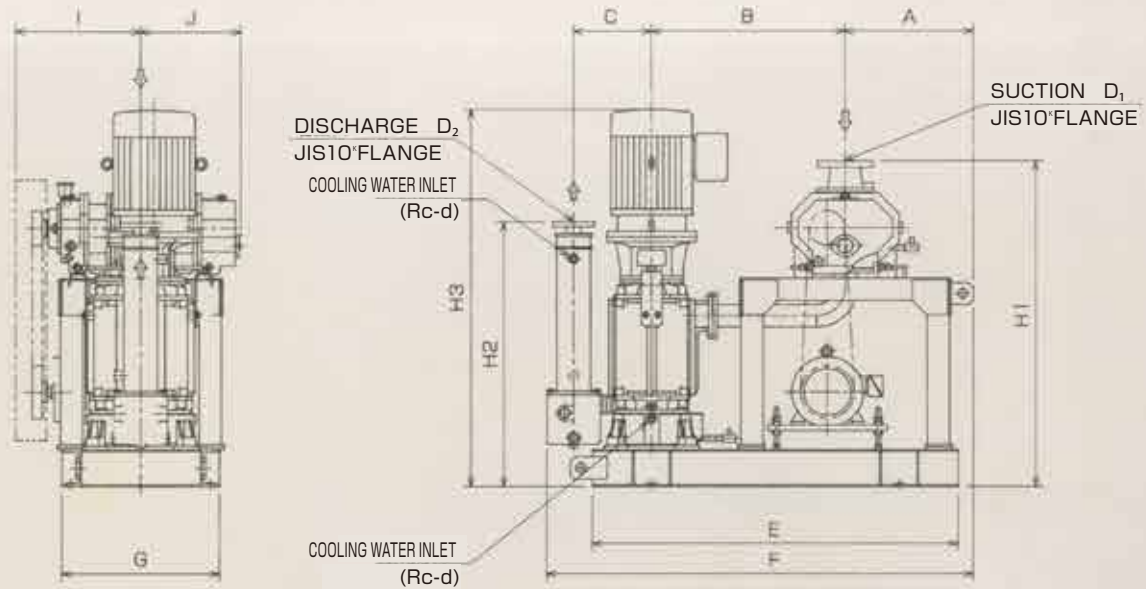
[mm]

PUMP MODEL	A	B	E	F	G	H ₁	H ₂	H ₃	d
TRV404	200	255	460	650	450	405	750	965	1/2
TRV405	205	265	460	675	500	450	840	1020	1/2
TRV406	205	265	460	675	500	540	860	1170	1/2
TRV408	270	320	600	790	700	750	1190	1685	1/2
TRV410	270	320	600	790	700	755	1190	1765	1/2



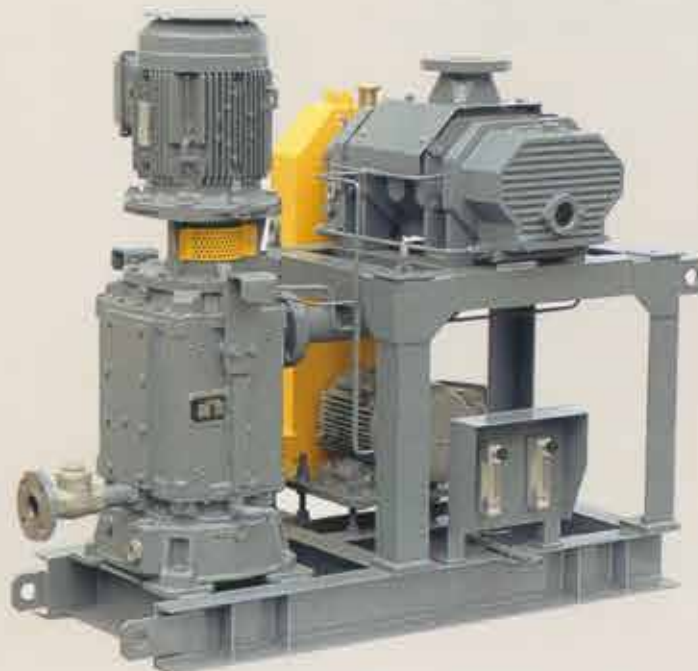
Dimension

Dry vacuum pump type "TAV"("TRV"+ Mechanical Booster)



[mm]

MODEL	A	B	C	E	F	G	H ₁	H ₂	H ₃	I	J	d
TAV0501	345	600	255	1000	1300	450	915	740	1020	385	265	1/2
TAV0651	385	610	265	1120	1350	530	945	895	1060	395	300	1/2
TAV0802	430	650	265	1230	1435	530	1100	895	1280	420	340	1/2
TAV1002	430	720	345	1300	1600	660	1200	1120	1580	470	390	1/2
TAV1251	550	930	345	1600	1950	700	1200	1150	1730	480	430	1/2
TAV1501	550	930	345	1600	1950	700	1200	1150	1820	530	480	1/2



Dimensions may be subject to change without prior notice.

UnoZawa Products

1. Rotary blower(Roots type)
2. Rotary vacuum pump(Roots type)
3. Dry Vacuum pump
4. Mechanical booster
5. Water ring Vacuum pump

Inquiries

When inquiring about UnoZawa Dry vacuum pump,
please furnish the following information:

1. Application: Vacuum distillation, Solvent recovery, Vacuum drying etc.
2. Specification: Pumping speed, Suction pressure, Suction gas temperature,
Ultimate vacuum pressure
3. Handling gas: Gas name, Corrosiveness
4. Condition of installation: Indoor or Outdoor
5. Driver and Utility: Motor type, Voltage, Frequency, Cooling water temperature,
Cooling water pressure
6. Accessories & Spare parts: Required or not
7. Painting color: (UnoZawa standard color is munsell 5B-4/1.5)

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<http://www.unozawa.co.jp>

While every care has been taken in the preparation of data and dimensional drawings,
we reserve the right to change specifications without notice.

