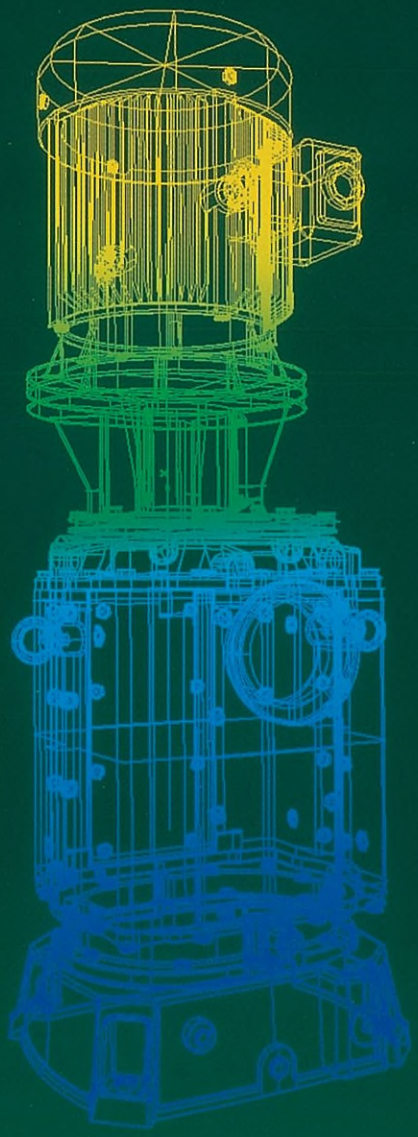
UNOZAWA

DRY VACUUM PUMP



DRY Vacuum Pump

TYPE TRV

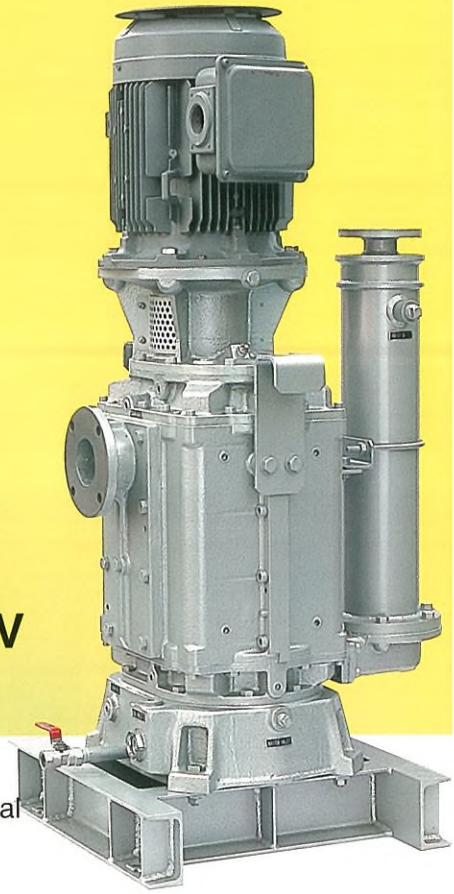
"TRIPAC" series

UNOZAWA-GUMI IRON WORKS, LTD.

Vertical dry vacuum pump developed with new concepts has been evolving 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 in the discharge of the vacuum pump.

Advantages



"TRIPAC" Vertical Dry Vacuum Pump Type TRV

■ **Typical application**

- Vacuum Distillation
- Devices
- Polymer Processing
- Pharmaceutical & Food industryMedical
- Special gases in Chemical industry
- Vacuum Refrigeration

TRIPAC

● **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 in the discharge of the vacuum pump at atmosphere.

● **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.

● **Compact & low maintenance**

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

● **Low level operation**

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

● **Wide operating range**

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

● **Backing pump**

For larger pumping system or high vacuum application, this pump can be used with a mechanical booster. It is easy 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

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 section of the drawing indicates the vacuum (suction pressure), while the dark section indicates the discharge pressure. The left side rotor indicates back-flow cooling system function.

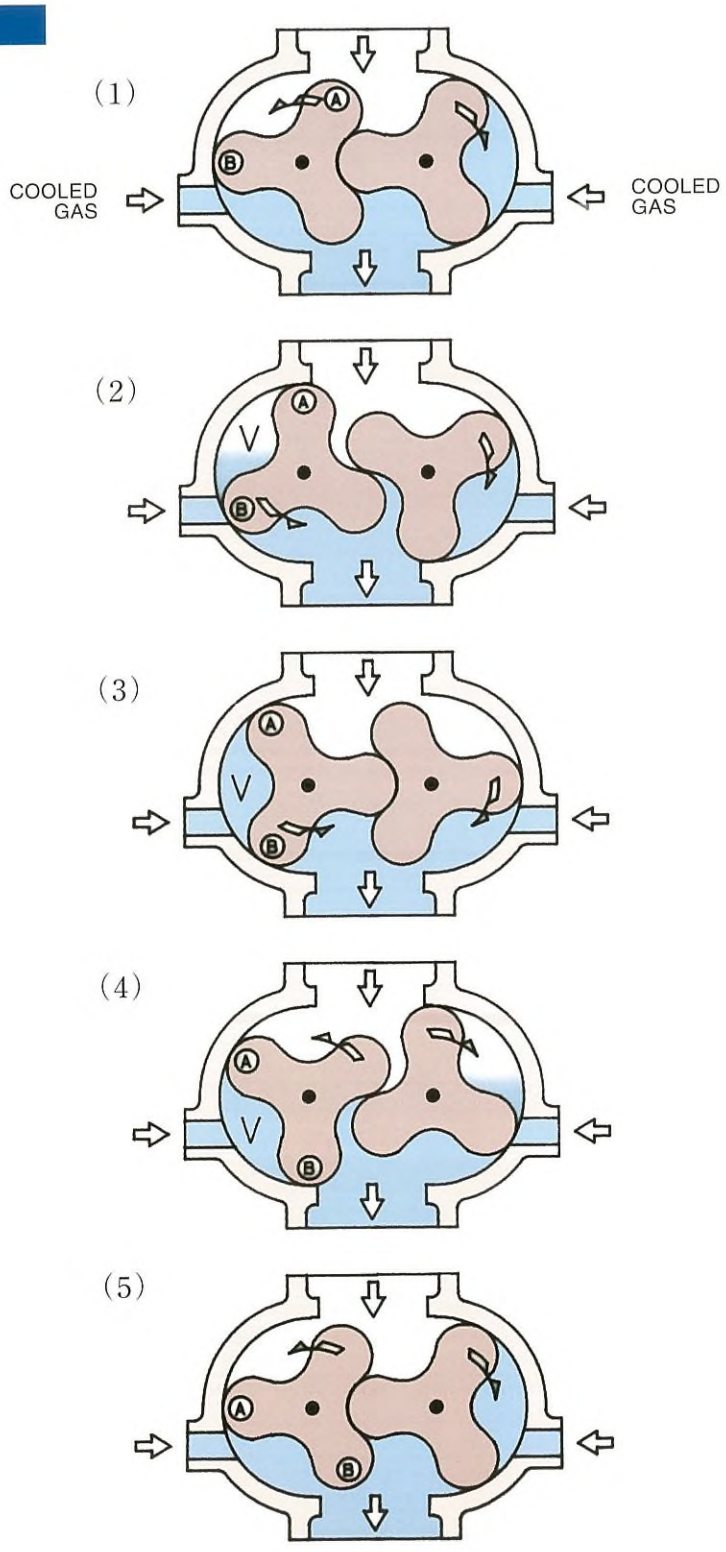
(1) The rotor tips A and B are positioned to catch suction gas in volume "V" (moving volume).

(2) The rotor has completely caught suction gas in volume "V" and cooled gas whose pressure is the same as the discharge pressure has to flow back.

(3) Furthermore, as the rotor turns, the cooled gas continues to flow into volume "V", causing the pressure in volume "V" to approximate that of the discharge pressure.

(4) The pressure in volume "V" nearly equals 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 in the discharge port area.



Dry vacuum pump

1. The suction gas into the inlet of pump is compressed by rotation of rotors and transferred to the peripheral gas passage in just the outside of the housing.

2. Then, gas is divided into 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.

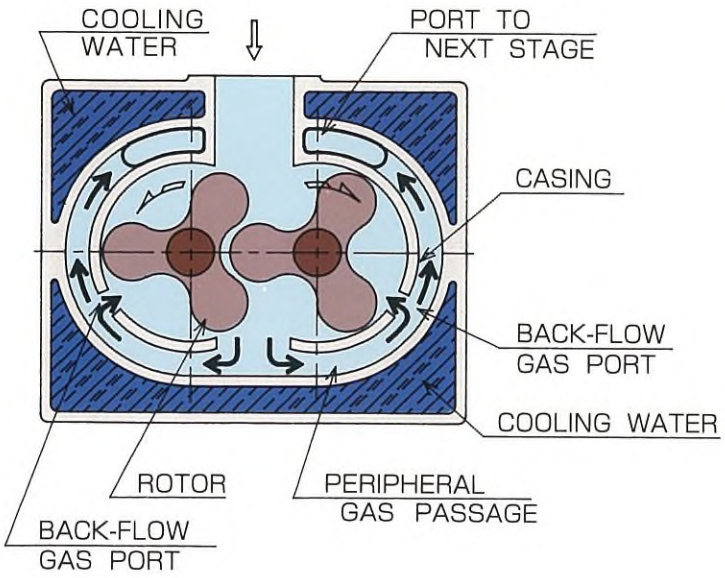
4. The intake gas continuously flows through the peripheral gas passage while radiating heat to outside wall the passage.

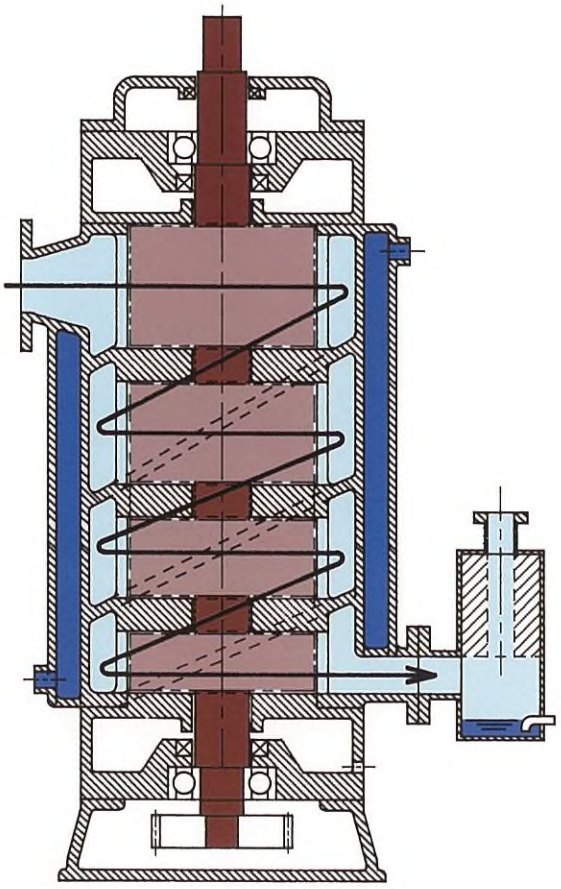
5. The back flow gas successively flows into the housing, heat radiation is carried out in the peripheral gas passage.

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.

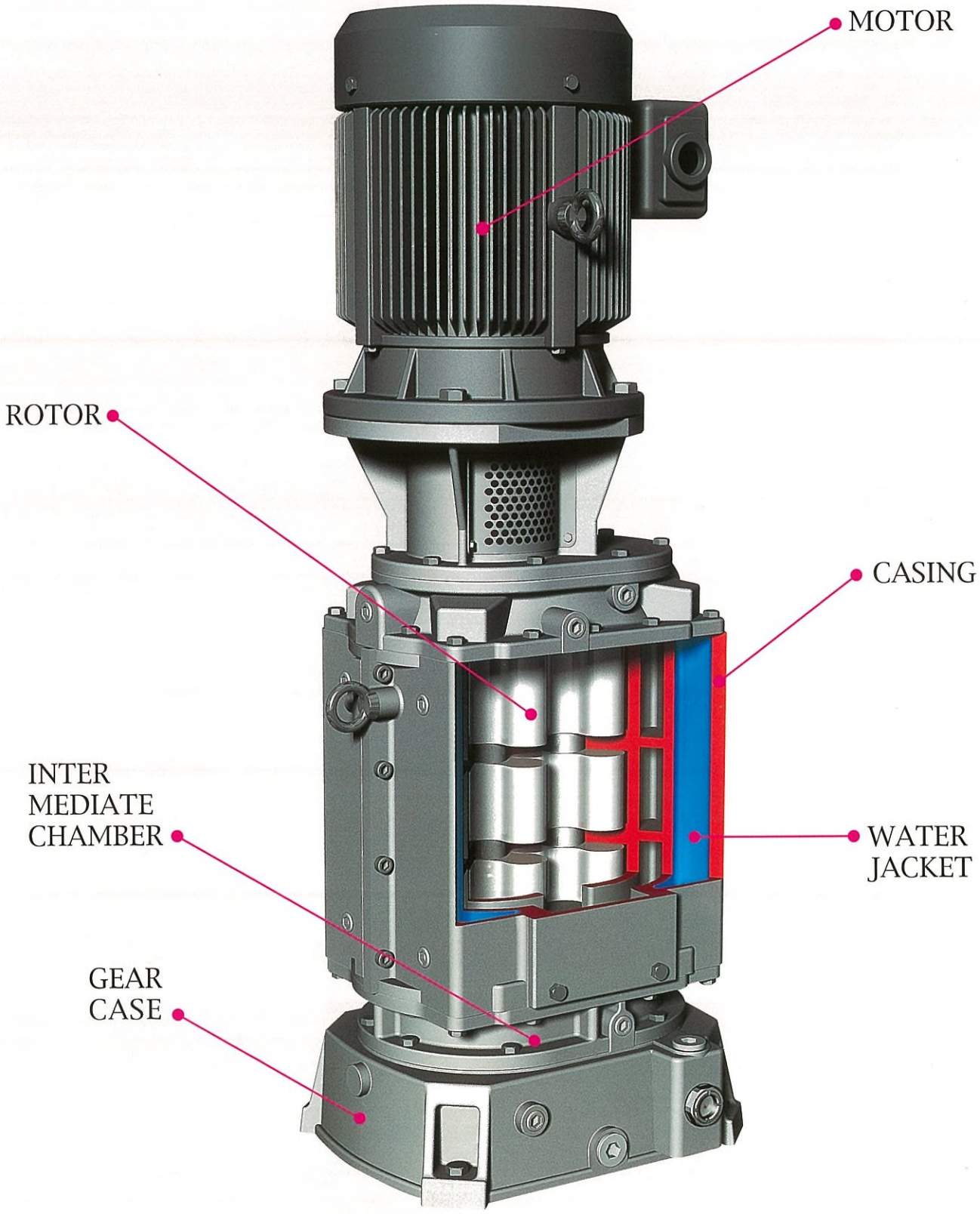
7. The vertical compact dry vacuum pump insures easy draining of liquid without any controls.

■ Pump inner flow





Construction



● Motor

Depending on the installation area the following motor type can be selected.
TEFC, Safety increased explosion proof, Explosion proof, NEMA.

● Rotor

The three lobe rotor made of ductile cast iron has good quality subjected to high precision machining. The inside clearances are precision matched 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 upper suction and the lower horizontal discharge sections, 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 the rotor. Made of chrome molybdenum steel, carbonized, quenched and ground, it is excellent in durability.

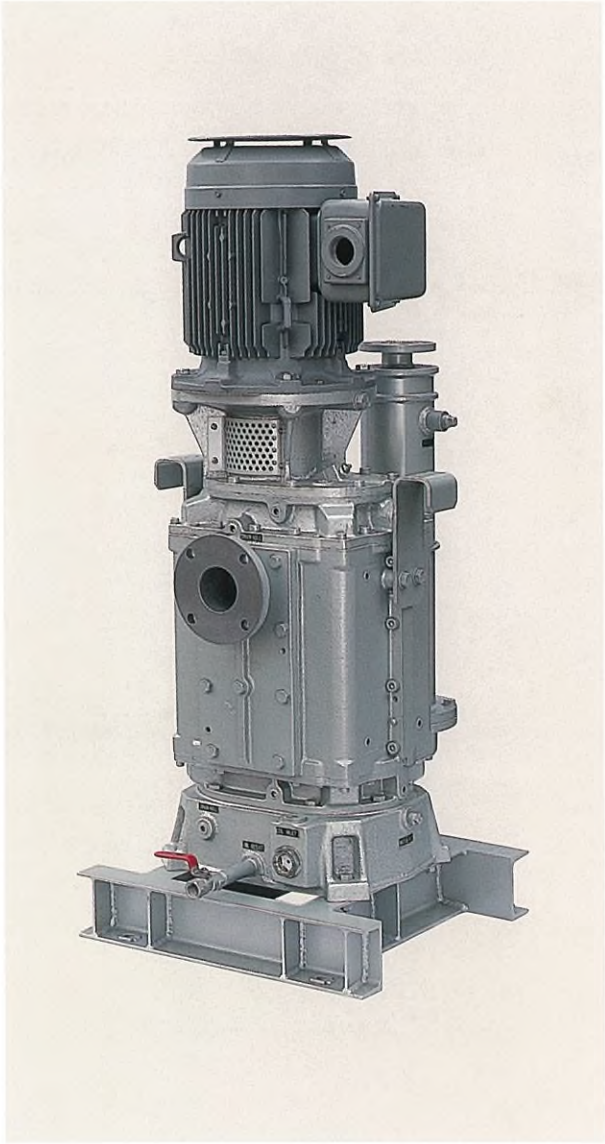
● Inter mediate chamber

The inter mediate chamber is placed between housing and gear case and sealing system are assembled in this cavity 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 : Chromium Molybdenum steel (SCM420H)
"O" ring : FKM
Lip seal : FKM, PTFE

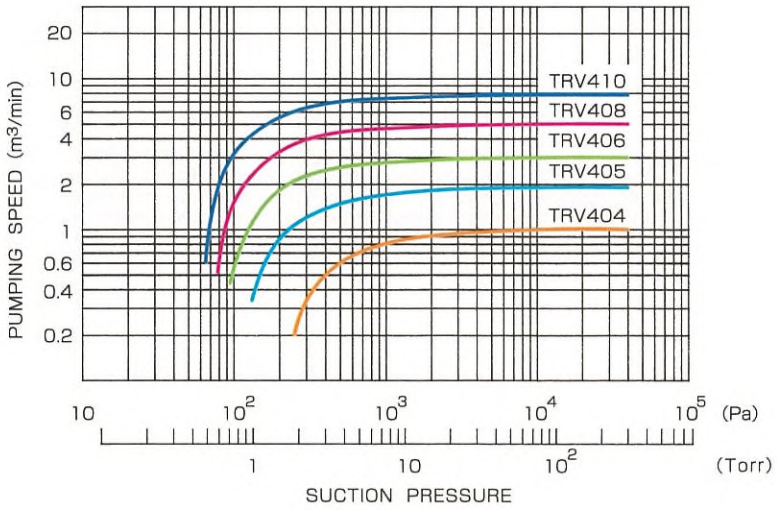
Special material construction
Ductile cast iron(casing). Ni-Resist cast iron.



Performance

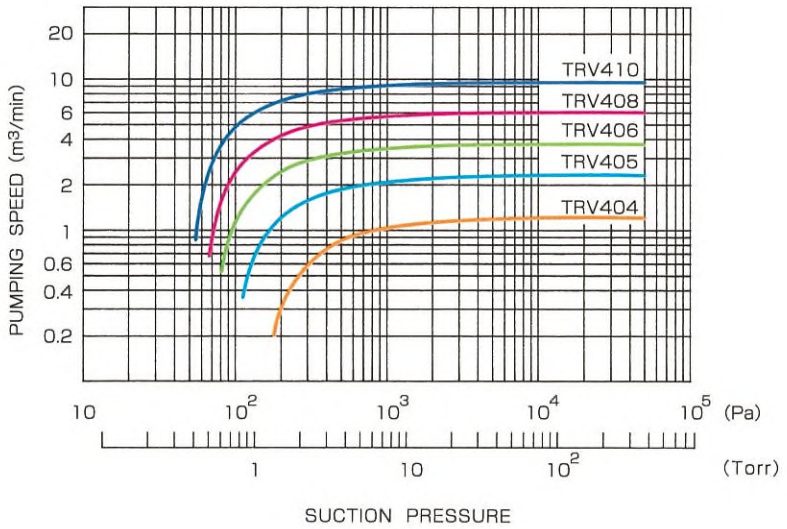
Dry vacuum pump type"TRV"

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

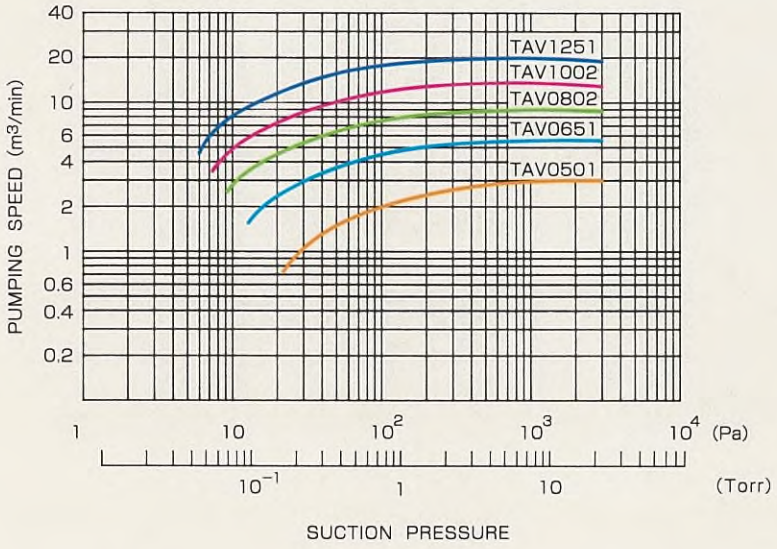
60Hz



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

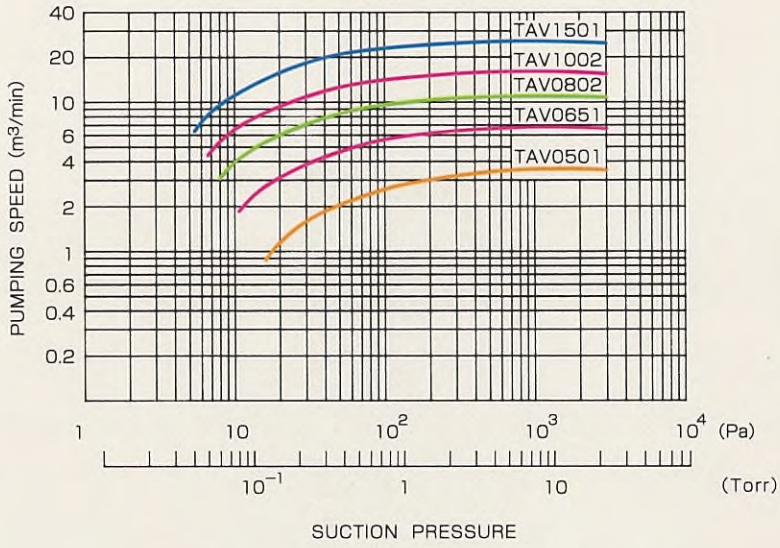
Dry vacuum pump type"TAV"

50Hz



MODEL	SUCTION	DISCHARGE	PUMPING SPEED	ULTIMATE PRESSURE	MECH BOOSTER MODEL	MOTOR	DRY VACUUM PUMP MODEL	MOTOR	COOLING WATER CAPACITY
	D_1 (mm)	D_2 (mm)	(m³/min)	(Pa)		(kW)		(kW)	(Lit/min)
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

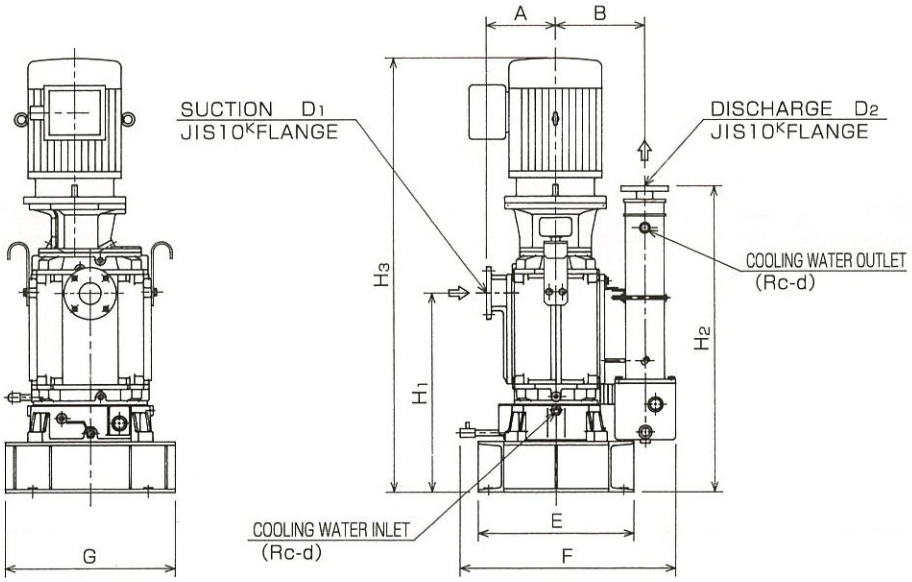
60Hz



MODEL	SUCTION	DISCHARGE	PUMPING SPEED	ULTIMATE PRESSURE	MECH BOOSTER MODEL	MOTOR	DRY VACUUM PUMP MODEL	MOTOR	COOLING WATER CAPACITY
	D_1 (mm)	D_2 (mm)	(m³/min)	(Pa)		(kW)		(kW)	(Lit/min)
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

Dimensions

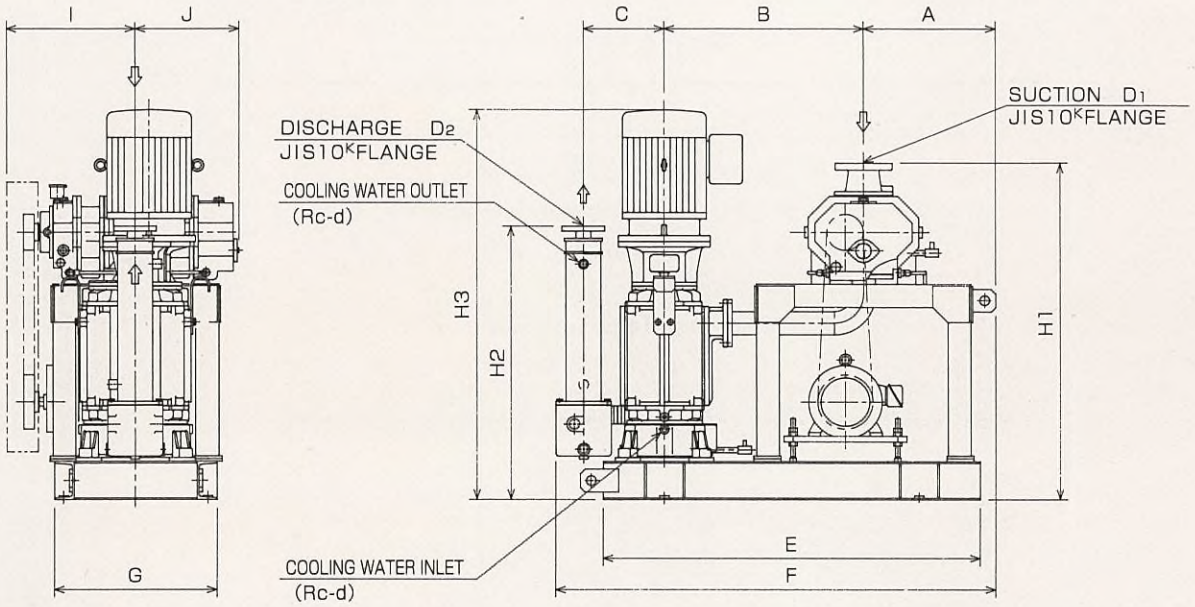
Dry vacuum pump type"TRV"



[mm]

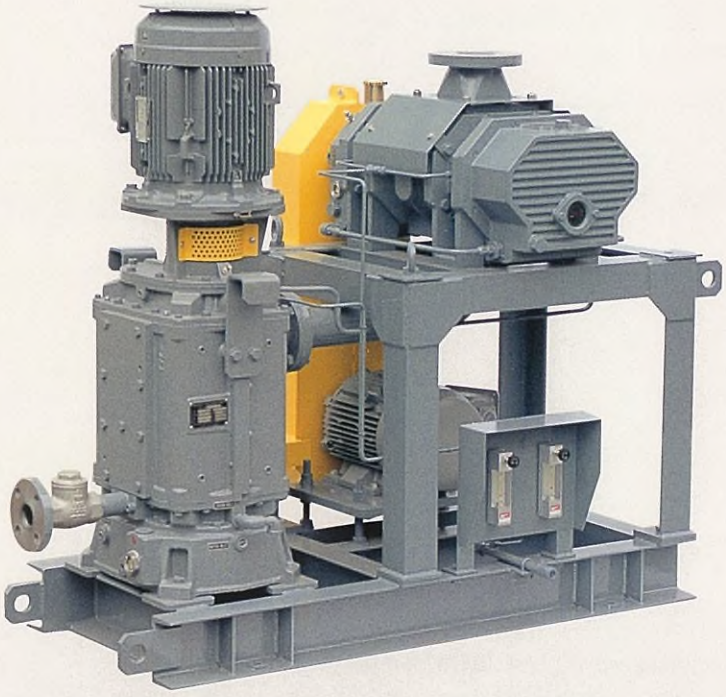
PUMP MODEL	A	B	E	F	G	H1	H2	H3	d
TRV404	200	255	460	650	450	405	750	965	1/2
TRV405	205	265	460	675	500	450	840	1020	1/2
TRV406	205	265	460	675	500	540	860	1170	1/2
TRV408	270	320	600	790	700	750	1190	1685	1/2
TRV410	270	320	600	790	700	755	1190	1765	1/2

Dry vacuum pump type"TAV"



[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:	Solvent recovery, Vacuum Distillation, Vacuum refrigeration, etc. ···
2.Specification:	Pumping capacity, Suction pressure, Suction temperature.
3.Type of gas:	Gas name, Gas constant, Specific heat ratio. Evaporation pressure, Corrosiveness, Contamination of solid.
4.Condition for installation:	Indoor or outdoor, Ambient temperature.
5.Driver and Utility:	Motor type, Source voltage, Frequency, Cooling water temperature, Cooling water pressure.
6. Accessories & Spare parts:	Required or not.
7.Painting color:	

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