ORION

INSTRUCTION MANUAL

OILLESS ROTARY VACUUM PUMP & BLOWER

ORION DRY PUMP

KRF70
KRF110

KRF70

CAUTION

- This product is intended only for industrial use. Use with caution.
- Read this Instruction Manual and follow the instructions described herein.
- Please keep this Instruction Manual for future reference.

No lubrication!

Thank you very much for your purchase of the Orion pump. Read this instruction manual in advance to use this pump safely and to ensure continuing good performance. The product mechanism and specifications are subject to change without notice. If mechanism or specifications are changed, contents of this manual may not match the actual product.

Safety Information

Read "Precautions for Safety" before operation to ensure safe operation. Safety instructions in this manual are intended to ensure safe and correct pump operation and to prevent damage or personal injury. Safety instructions in this manual are classified into ⚠Danger, ⚠Warning, and ⚠ Caution.

⚠ **Danger**	Indicates an imminently hazardous situation that, if the product is misused, may bring about death or serious injury to the operator.
⚠ **Warning**	Indicates a potentially hazardous situation that, if the product is misused, may bring about death or serious injury to the operator.
⚠ **Caution**	Indicates a critical situation that, if the product is misused, may bring about injury to the operator or damage to the product.

Additionally, the situation that is explained in ⚠Caution column may cause serious accident. All safety information must be followed for safe operation.

- After reading this manual, keep it where an operator can refer to it anytime.
- When transferring or renting this product, attach this manual to the product where a new owner can easily refer to it for proper operation.

■Symbols

	The symbol ⚠ represents warning or caution. What is shown inside or described near informs of an actual hazard. The example on the left means caution for electric shock.
	The symbol ⃠ represents prohibition. What is shown inside or described near informs of an actual action which is prohibited. The example on the left means prohibition of disassembly.
	The symbol ● represents essential action or instruction. What is shown inside or described near informs of an actual instruction about operation. The example on the left means disconnect the power plug from the outlet.
	The symbol ▬ represents important information other than warning or caution.

Although model KRF70 is used as description pictures and figures in the manual, the other models in the KRF-series are operated the same way as KRF70 if there is no note.

Be sure to read through the safety information.

Contents

Precautions For Safety

Precautions for Use (Danger / Warning)

⚠ Danger

Indicates an imminently hazardous situation that, if the product is misused, may bring about death or serious injury to the operator.

Keep flammable or explosive gas out.

Keep the pump from inhaling flammable or explosive gases. Do not use the unit in the place where flammable or explosive gas exists. **It may cause explosion or fire.**

⚠ Warning

Indicates a potentially hazardous situation that, if the product is misused, may bring about death or serious injury to the operator.

Do not block the exhaust piping. (B type and V・B type)

Do not operate the pump while the pressure controller is totally closed or the exhaust piping is blocked. Blocking the exhaust air may increase the pressure and temperature in exhaust piping, **and result in injury and malfunction due to burst of the piping and pump parts.**

Do not wash filter element with organic solvents.

When cleaning the filter element, do not use organic solvents such as thinner, alcohol, benzine, gasoline, and kerosene. **It may result in explosion or fire.**

Do not remove the cover during operation.

Do not operate this product while the main cover is removed. Otherwise, your hand(s) may be cut off or be seriously hurt because the cooling fan and the coupling rotate at high speeds.

Prevent the power cord from any damage.

Do not damage, bend, pull, or bind the power cord. Do not place heavy object on it or let it get caught or pinched. **It may damage the cord, and may cause electric shock or fire.**

Keep this product away from water.

Do not pour water over the pump and the motor, and do not use water for cleaning this product. Also, do not use this product where it may touch water or other liquid. **It may cause electric shock or fire.**

Be alert to electric shock.

Do not touch electrical parts such as power plug with wet hands. Also, do not operate switch with wet hands.

It may cause electric shock.

Never fail to put the terminal box cover on.

In the case of a motor with the terminal box, do not operate it with the terminal box cover removed. It may cause electric shock.

Do not modify the product.

Do not modify the product.

It may cause abnormal operation and may result in injury, electric shock or fire.

Be sure to ground this product.

Be sure to ground the product with the screw for grounding inside the terminal box or at the lower part of the frame of the motor.

Failure to do so may cause electric shock.

Precautions For Safety

Precautions for Use (Warning / Caution)

⚠ Warning

Indicates a potentially hazardous situation that, if the product is misused, may bring about death or serious injury to the operator.

Installation must be done by specialized personnel.
The product may fall down or drop if it is improperly installed. **It may result in personal injury, electric shock or fire.**

Do not operate this product under abnormal conditions.
Stop the operation when it is abnormal. Then, pull out the power plug or shut off the main power supply, and consult with our dealer or a specialized company. If the operation is continued under such conditions, **it may cause electric shock or fire.**

Shut off the main power supply before cleaning, maintenance and inspection.
Shut off the main power supply before cleaning, maintenance, and inspection, and clearly post a sign on the power supply switch to indicate it is under cleaning, maintenance, and inspection. **Failure to do so may result in electric shock or personal injury.**
※Consult with a specialized company for maintenance and inspection.

Inspect the power plug periodically.
If the product is operated with the power plug, periodically inspect the power plug and confirm it is not covered with dust. The power plug must be fully inserted to the root of pins. If the power plug is covered with dust or not fully inserted, **it may cause electric shock or fire**.

Be sure to install the protective device.
Consult with a specialized company to install an earth leakage breaker. **Failure to do so may cause electric shock or fire.** Also, install an overload protection device (thermal relay). **Operation without such a device may cause malfunction due to overload or fire.**

Contact with a specialized company when the earth leakage breaker is activated.
When the earth leakage breaker is activated, contact with a specialized company. If you force to turn on the power supply, **it may cause electric shock or fire.**

Do not use this product outdoors.
This product is intended for indoor use. If the product is used outside and is exposed to wind or rain, the motor may suffer from incomplete insulation and may cause **electric shock or fire.**

⚠ Caution

Indicates a critical situation that, if the product is misused, may bring about injury to the operator or damage to the product.

Do not use the machine over the specified pressure.
If using the machine over the specified pressure, it may shorten the life of product and may cause failure, abnormal generation of heat or trouble.

Prohibition of operation with the vacuum pipe closed (V type and V・B type)
Do not operate the pump with the vacuum controller closed completely to close the vacuum pipe. Negligence may cause an abnormal pump temperature rise resulting in a product failure, protective cover deformation or burn injury.

Do not sit on, lean on, or place objects on this product.
Do not place heavy objects or object containing water on the product, and do not get on it. If you get on the product, you may fall and be injured. If water spills, it may cause rust inside or poor insulation and **may cause leakage or electric shock.**

Precautions For Safety

Precautions for Use (Caution)

⚠ Caution

Indicates a critical situation that, if the product is misused, may bring about injury to the operator or damage to the product.

Do not operate this product with any voltage other than the rated one specified for the motor.

Operation with any voltage other than the rated voltage specified for the motor **may result in failure or accident.**

Prevention of melting of distribution cable covering due to contact.

Install the motor so that wiring cables do not touch the motor frame. **Contacting with cables may result in melting covering or ignition.**

Be alert to burn.

Do not touch areas around the dry pump, and the exhaust port and the piping surface of exhaust side. **They are heated to high temperature, and it may result in burn.**

Inspect the earth leakage breaker periodically.

Periodically check performance of the earth leakage breaker. If using the product with failure of the earth leakage breaker, **it may cause electric shock in case of short circuit.**

Installation of check valve

Residual pressure may reverse the rotation when the pump is stopped. Be sure to install the check valve horizontally within 50cm from the inlet port (or the exhaust port) of pump. **No installation of check valve may cause malfunction.**

Turn off the main power supply in case of not using the pump for a long time.

When you do not use the product for a long time, shut off the main power supply. Otherwise, **it may cause electric shock or short circuit ignition due to degenerated insulation.**

Be sure to wear personal protective equipment for cleaning and maintenance.

When you carry out cleaning or maintenance, be sure to wear gloves. **Failure to do so may result in injury or burn.**

When you transfer the product, be sure to wear nonslip gloves and safety shoes. **Failure to do so may result in injury.**

Continuous operation is recommended.

If the start and stop frequency is high, start and stop cycle in 5 minutes or less, **it may cause significant lifetime deterioration or malfunction of the product.**

Product Use Limitations

(1) If the unit is to be used as part of critical installations, safety devices and backup systems which can be switched to should be put into place to insure that serious accidents or losses do not occur in the event that the unit should break down or malfunction.

(2) This product was designed and produced as a general purpose device for use in ordinary manufacturing. Accordingly, this warranty does not apply to nor cover the following applications. However, in cases where the customer/user takes full responsibility and confirms the performance of the equipment in advance, and takes necessary safety precautions, please consult with ORION and we will consider if use of the unit in the desired application is appropriate.

①Atomic energy, aviation, aerospace, railway works, shipping, vehicles (cars and trucks), medical applications, transportation applications, and/or any applications where it might have a great effect on human life or property.

②Electricity, gas, or water supply systems, etc. where high levels of reliability and safety are demanded.

Precautions For Safety

Precautions for Use (Caution)

Pull out the power plug to disconnect it.

When the product is used with power plug, pull the power plug to disconnect it. Pulling the power cord may result in disconnection of part of the core wire, **and may cause generation of heat or deterioration.**

Precautions For Safety

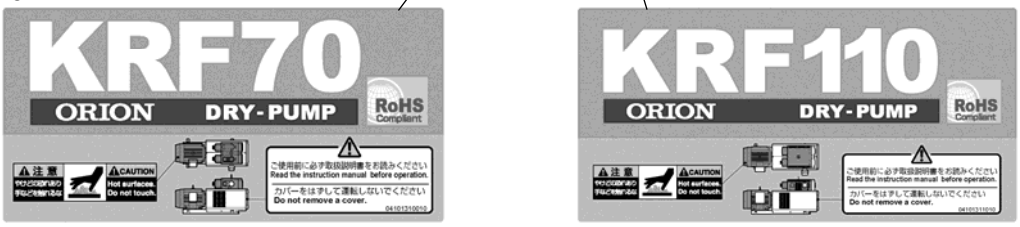
Warning Label Position on the Product

⚠ Warning Label Position on the Product

The following warning labels are selected as most important ones out of Safety Information and are placed on the product. Read the labels before operating the product. When the labels become unreadable due to scratch or dirt, contact with your dealer to get new ones for replacement.

■Electric shock

■Burn



Precautions for Proper Operation

■For inlet air, aim at normal temperature and normal humidity clean air with little dust but free from corrosive and explosive gases.
※Normal temperature: 0 to 40 deg. C
※Normal humidity: 65% +/- 20% (JIS Z 8703)

■**Prohibition of operation in reverse rotation.**
■Set the ambient temperature of the dry pump to the range of 0 to 40 degrees C.
Try not to cause condensation inside the pump.
■Keep the pump away from oil, water, dust, rain, etc. **Also, never lubricate the product.**
■Be sure to use under specified pressure or less.
■Do not remove the main cover, and top and bottom partition plates. Removing these cover and plates may result in shortening the life of product severely due to the temperature rise.
■Install the product on a flat surface..
■Periodically replace consumable parts (see pages 20) and replacement parts (see page 21).
■Be sure to Install the product on the level while whole base is touching on the level surface like in figure A.
※do not Install the product like in figure B.

Fig.A

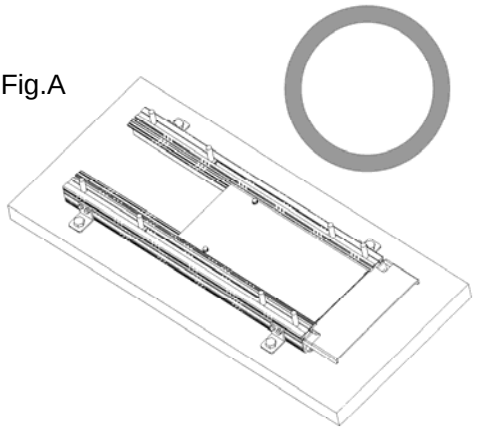
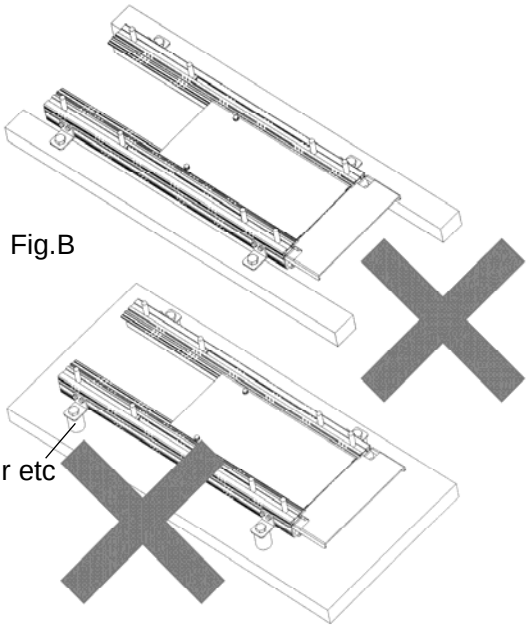


Fig.B



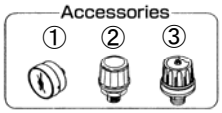
Name of Components

KRF70

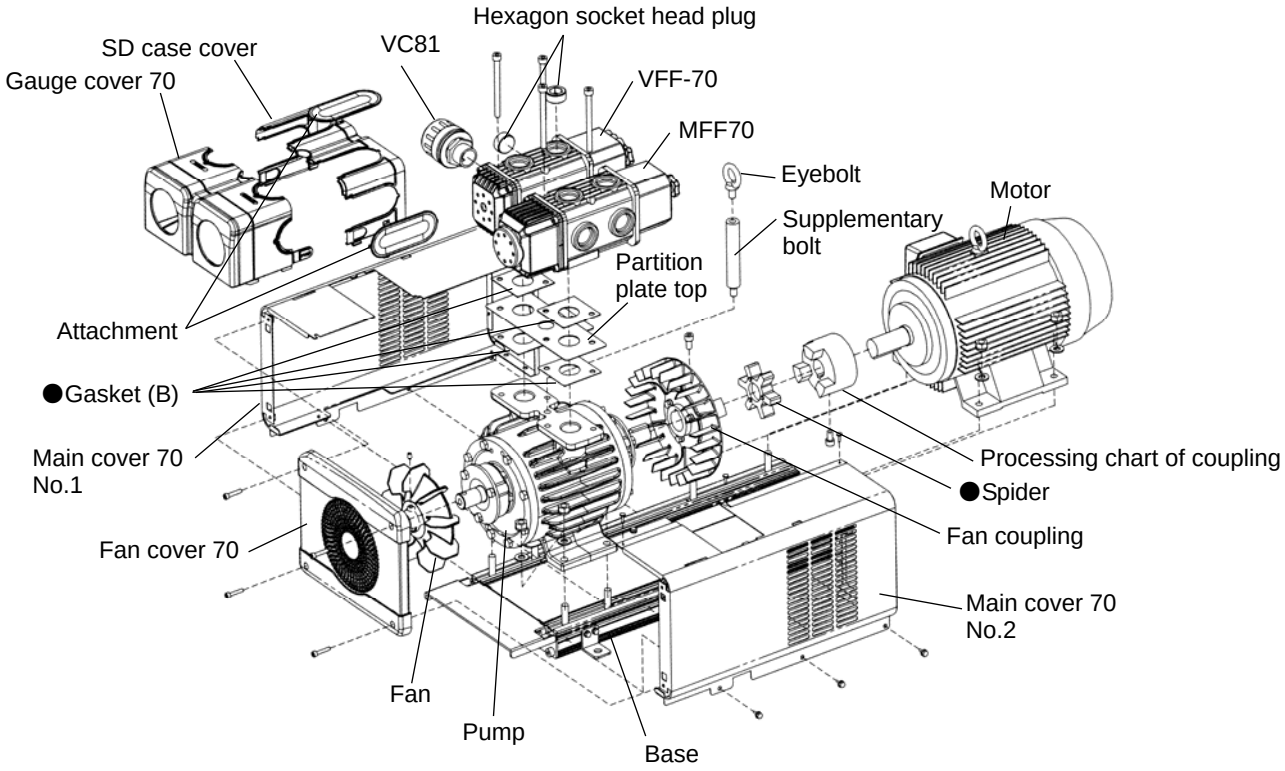
※●mark indicates consumable parts that is replaced depending on wear condition when checking.
(Refer to page 20.)

※△mark indicates replacement parts that is replaced periodically at the specified period.
(Refer to page 21.)

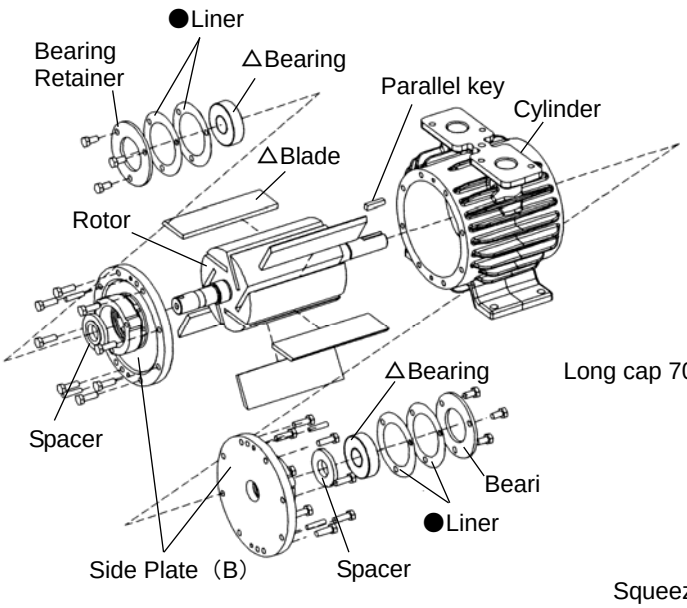
① Compound gauge
●② Vacuum controller VC81
③ Pressure controller PCA8



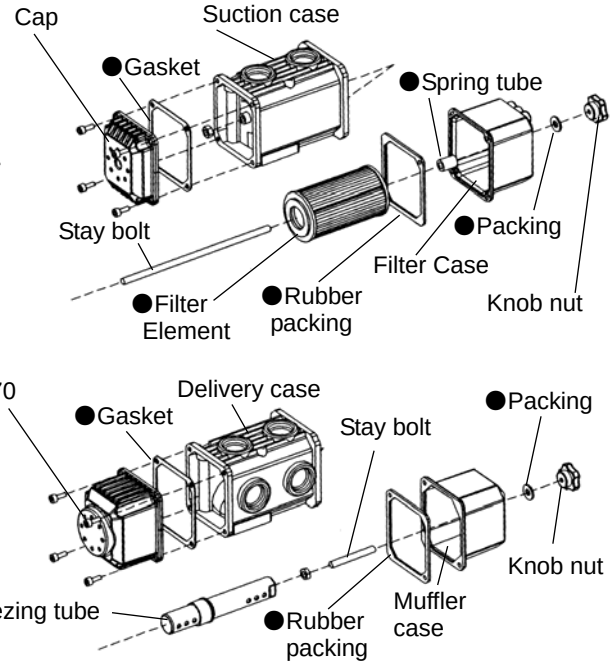
Dry pump deal drawing



Pump deal drawing



Exploded view of filter body



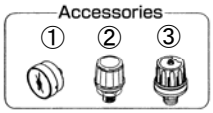
Name of Components

KRF110

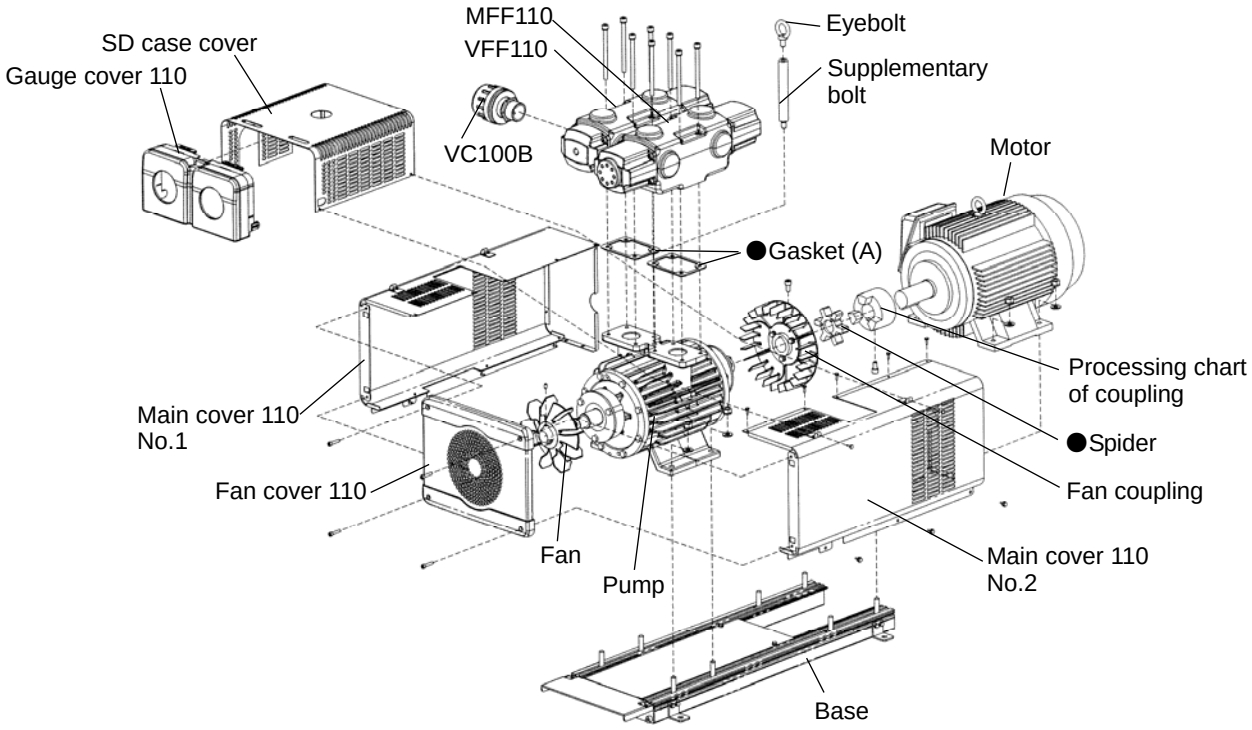
※●mark indicates consumable parts that is replaced depending on wear condition when checking.
(Refer to page 20.)

※△mark indicates replacement parts that is replaced periodically at the specified period.
(Refer to page 21.)

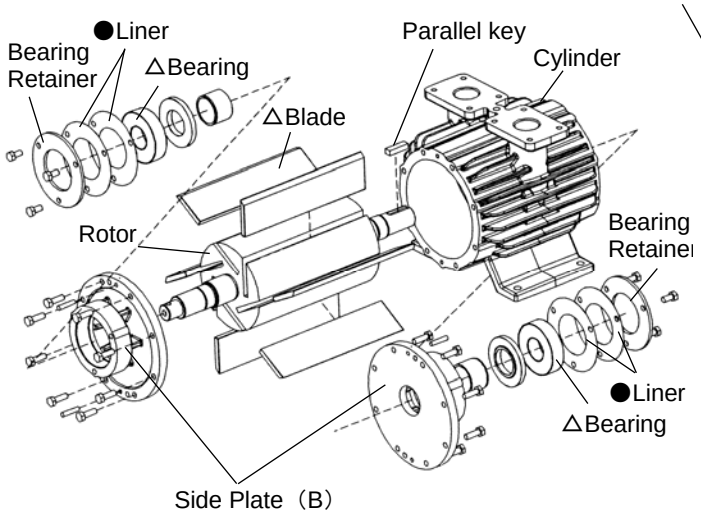
① Compound gauge
●② Vacuum controller VC100B
③ Pressure controller PCA10



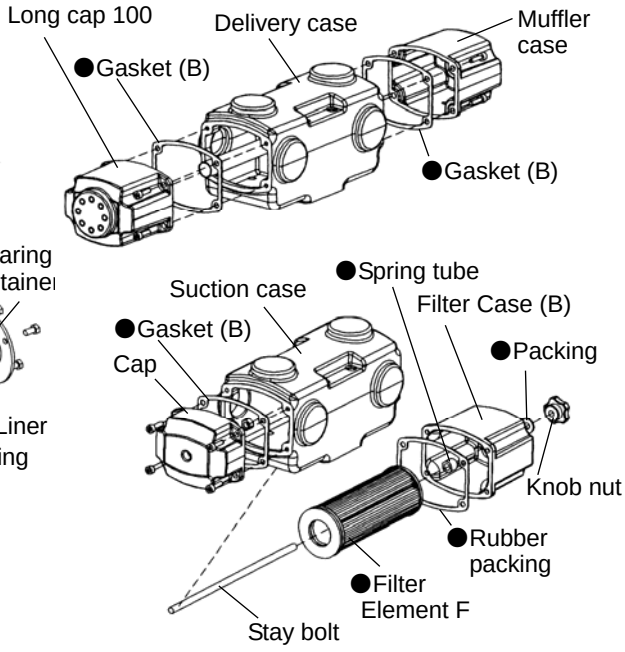
Dry pump deal drawing



Pump deal drawing



Exploded view of filter body



Preparation and Confirmation

Before Installation/ Installation

Danger

●**Do not use the product where flammable gas or explosive gas may exist.**

Warning

●Set up the product where it is protected from water, oil and dust.
●Please use the product indoors.
●Do not set up the product where corrosive gas (chlorine or sulfur dioxide gas) exists.
●Do not set up the product under direct sunlight.
●Use the product where the ambient temperature ranges 0 to 40 degrees in Celsius.
●When you transport the product, lift up with slings.

Before Installation

IMPORTANT

●The product is heavy. Be careful enough when moving the product.
●Upon receiving the product, check it carefully for signs of shipping-related damage like scratches, deformation, etc. If you notice a problem, contact with your dealer.
●Be sure to check the name plate whether purchased product is
right model as you ordered.
●When the product is delivered with accessories, be sure to check the accessories whether there are all the parts or not.

Name plate

Installation

IMPORTANT

●When the product is 25kg or over, **hold the product with two persons.** Also, **do not hold the terminal box of motor, filter case, and controller** when holding with two persons. **Holding the terminal box and filter case of the motor may result in injury, damage or malfunction if product or parts of it are dropped.**
●In case of using a hanging belt, be sure to belt as shown in the photo.

Do not hang a sling for these parts.

Photo

Preparation and Confirmation

Installation Site/ Gauge & Controller

Installation Site

⚠ Warning

- Installation should be carried out by your dealer or special service company. Improper installation may result in vibration, electric shock, or fire.
- Set up the product in a wide space where you can easily maintain, inspect and overhaul the product.
- Ambient temperature of the pump is 40 deg. C or less. If there is any heat source near the pump, be sure to check the ambient temperature does not exceed 40 deg. C.
- Using the product in the enclosed space may result in malfunction due to the generation of heat of the pump. Ventilate adequately around the pump, and be careful not to exceed the permissible ambient temperature.
- **Be sure to install the product horizontally while the whole base plate is touching the level surface.**

❗ Warning

- Installation of check valve

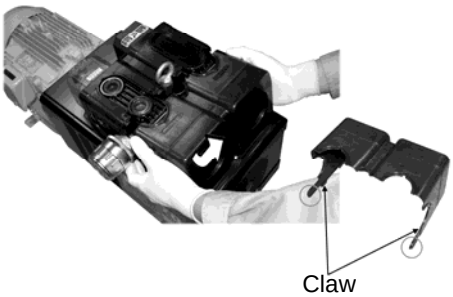
Residual pressure may reverse rotation when the pump is stopped. Be sure to install the check valve within 50cm from the inlet or outlet port of the pump. No installation of check valve may cause malfunction.

Gauge & controller

KRF70

Be sure to install the gauge according to following procedure.

1 Remove the cover.



Push the check point, remove the claw and pull the case foward.

2 Install the gauge.

3 Press it back in place until the cover claw is locked.

※For the controller installation position, refer to the outer dimension drawing provided on P26-28.
※Do not apply a sealing tape when installing the pressure gauge. (Do not overtighten.)
※Do not apply a sealing tape on the threads. After tightening the controller hand-tight, give an additional quarter to half turn using a tool. Smooth surface due to application of a sealing tape may result in excessively tightening the controller. This may damage or deform the thread part and cause malfunction. (There is no need of securing high airtightness using a sealing tape or adhesive agent because the pump is designed for low pressure/vacuum.)
※Compound gauge is a part that is weak against impacts. Do not hit or drop the product with compound gauge.

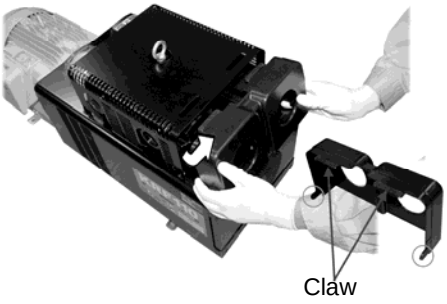
Preparation and Confirmation

Gauge & Controller / Piping

KRF110

Be sure to install the gauge according to following procedure.

1 Remove the cover.



Push the check point, remove the claw and pull the case foward.

2 Install the gauge.

3 Press it back in place until the cover claw is locked.

※For the controller installation position, refer to the outer dimension drawing provided on P29-31.
※Do not apply a sealing tape when installing the pressure gauge. (Do not overtighten.)
※Do not apply a sealing tape on the threads. After tightening the controller hand-tight, give an additional quarter to half turn using a tool. Smooth surface due to application of a sealing tape may result in excessively tightening the controller. This may damage or deform the thread part and cause malfunction. (There is no need of securing high airtightness using a sealing tape or adhesive agent because the pump is designed for low pressure/vacuum.)
※Compound gauge is a part that is weak against impacts. Do not hit or drop the product with compound gauge.

Piping

1.Avoid direct connection with steel pipe.

- Use hose for inlet and exhaust piping. In case of direct connection with steel pipe, resonance with the piping system **may cause noise or vibration.** For exhaust piping, use heat resistant and pressure resistant (100kPa or over) hose.
- Completely remove dirt and dust inside the hose before piping.

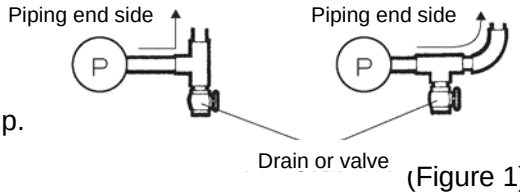
2.When intake air contains a big amount of dust, or if dust grains are very fine (10μm or less), use an appropriate filter in addition to the accessory filter.

3.Install the hose of the exhaust piping system properly in order to prevent condensed water inside the system from entering the pump, and from discharging from the piping end.

If condensed water in the piping system enters the pump, the pump inside may be locked by rust or the blades may not come out. To avoid this situation, take the following measures:

①Install the valve or drain in the exhaust piping system so that the condensation of water occurred inside the system can drain out. Also, drain out the collected condensation of water periodically. (See Figure 1.)

- Provide valve or drain hose on the pump side in order to prevent condensed water from entering into the pump.
- In case of a long piping system, provide valve or drain hose in the halfway of the system.
- When condensed water discharges from the piping end, install a valve or drain hose at the piping end.



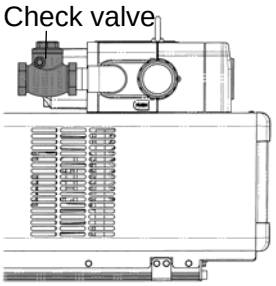
(Figure 1)

②If the pump is not frequently used, idle the pump for 10 to 15 minutes after finishing operation.

Preparation and Confirmation

Piping / Electrical Wiring

4.If reverse rotation is caused by residual pressure upon stopping the pump, blade damage is likely to be incurred. Please install a check valve within 50 cm from the pump's inlet port (or exhaust port) to prevent this from happening. In installing a check valve, install it levelly to the floor. Negligence may cause pulsation or abnormal noises. (Figure 2)
(Recommended check valve: manufacturer's product name: JIS compliant KITZ bronze swing check valve)
5.Do not apply a sealing tape when connecting pipes. Pieces of torn sealing tape may cause controller malfunction or abnormal operation sound.
6.Do not overtighten pipes. Overtightening pipes may damage the SD case.



(Figure 2) Example of check valve installation

Electrical Wiring

Warning

●Contact with a specialized company to install an earth leakage breaker. **Failure to do so may cause electric shock or fire.** Also, install an overload protection device (thermal relay). **Failure to do so may cause failure to the product due to overload or fire.**

1.Install the earth leakage breaker.
Set the breaking capacity to 1.5 times the current value shown on the motor name plate as a rough guiding value. Select a sensed current of 30mA.
※Consult with a specialized company for electrical installation.

2.Be sure to install the grounding.
・Location of grounding screws:
The grounding is attached on the terminal box.
(You can find the mark "E" or mark "⏚" near the screw.)
・Select a copper wire, with a nominal cross section bigger than the cross section shown in the example, as grounding wire.

Motor rated output (kW)	Nominal cross section（mm^2）
2.2	2
3.7	3.5

・When the grounding screw becomes loose due to vibration during operation, sparks will occur at the grounding section. Wire the grounding cable so that the grounding screw does not loose due to vibration during operation, and tighten the screw with locking.

3.Install the overload protection device (e.g. thermal relay). Make the V specification 100%, and B and VB specifications 110% against the rated current value written on the motor name plate for the set value.
4.Operate the pump with the rated power supply written on the motor name plate.
5. A special characteristic of the dry pump is that during initial operation, the rated current value may be exceeded at the start, but will drop over time.(Note that depending on the specifications and/or operating conditions, there are cases it may not drop to the rated current value or below.) Consult with your dealer if the overload protector (thermal relay) activates during initial operation or during normal operation.
6.Select a power cord referring to the current value shown on the pump name plate.
7.Be sure to keep the power supply cable with holding assembly in order not to get stressed to the internal power supply connection terminal at the time of pulling the cable.
(Recommended holding assembly: Maker; UI Lapp GMBH/ Product name: Skintop/ Model: ST-M, STR-M)

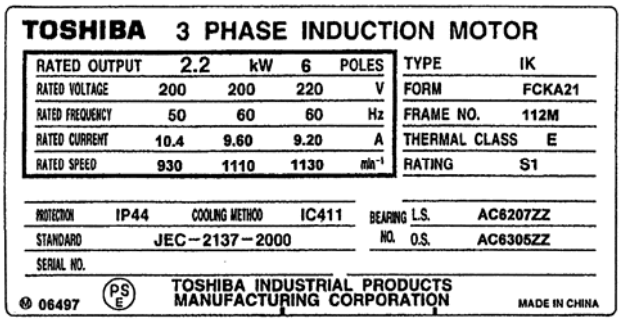
Preparation and Confirmation

Electrical Wiring

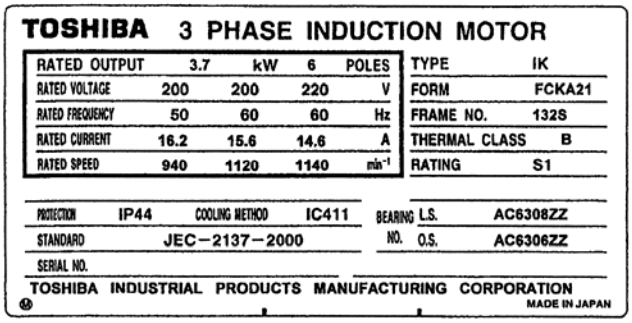
7.Motor name plate (V, B, or VB enters into the ☐.)

・Matsushita-made motor is mounted for three-phase specification.　Mitsubishi-made motor is mounted as standard for single-phase specification.

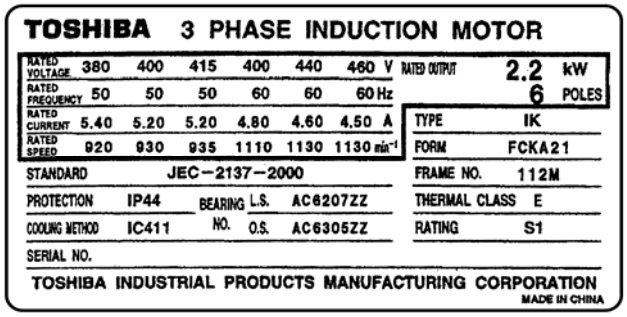
■KRF70-☐-01, KRF70-☐H-01



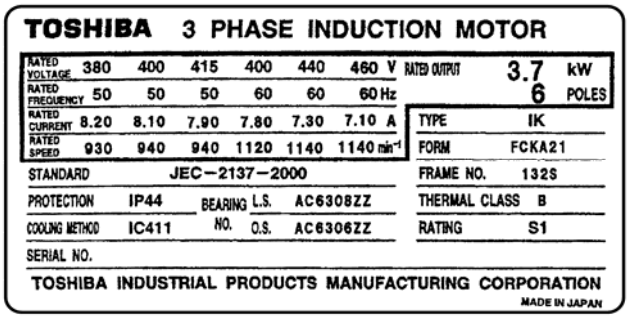
■KRF110-☐-01



■KRF70-☐-04, KRF70-☐H-04



■KRF110-☐-04



Operation Procedure

Check before Operation/ Operation

Check before Operation

■Install the earth leakage breaker.
※Consult with a specialized company for electrical installation.

■Install the overload protection device (e.g. thermal relay).　Make the V specification 100%, and B and VB specifications 110% against the rated current value written on the motor name plate for the set value.

■Before using a machine that has not been used for a long period of time, be sure to check that the power is off, and then rotate the rotor (fan, motor fan etc.) gently to confirm that it can be rotated smoothly.

■Compound gauge is a part that is weak against impacts.　Do not hit or drop a product with compound gauge.

■When storage temperature and operation temperature are differing more than 10 degrees in Celsius, leave the pump at the operation site for more than 2 hours in order to eliminate the temperature difference before using.
If condensation water occurred, and the condensation water enters into the pump, it may result in rust, lock, and vanes might block.

Operation Procedure

Operation

Operation

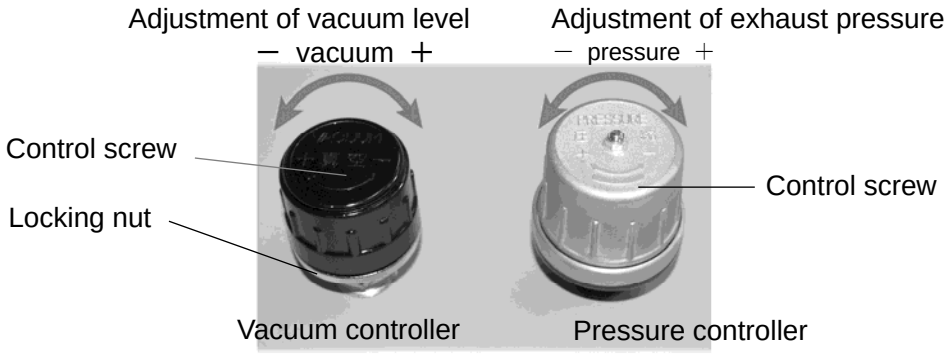
1.Turn the control screw in the direction of (－) .
2.Be sure to check by inching that the rotating direction is the same as the one shown on the "rotating direction arrow" when it is viewed from the motor fan side.
3. Turn on the power switch.
4. Use the controller to adjust vacuum level and exhaust pressure.

「Rotating direction arrow」

IMPORTANT

Check: Be sure to check the rotating direction.

Adjustment of vacuum level and exhaust pressure



■Adjustment of vacuum level（Vacuum controller）

1. Turn the locking nut clockwise to unlock the control screw.
2. Turn the control screw until the desired vacuum level is obtained on the gauge.
3. Turn the locking nut counterclockwise to lock the control screw.

■Adjustment of exhaust pressure（Pressure controller）

1. Turn the control screw until the desired exhaust pressure is obtained on the gauge.

Operation Procedure

Pressure range during operation / How to Correct Vacuum Level（Gauge Pressure）/Stop

Pressure range during operation

	kPa	KRF70・110(Standard)	KRF70(High-pressure)
■Use as vacuum pump (V type)	Continuous operative vacuum	60 or lower	80 or lower
■ Use as blower pump(B type)	Continuous exhaust pressure	60 or lower	70 or lower
■Use as vacuum pump and blower pump (V, B type)	Continuous operative pressure	Total of continuous operative vacuum and continuous exhaust pressure 60 or lower	Total of continuous operative vacuum and continuous exhaust pressure 80 or lower

※1 Recommended range: The pump operating under 1 atmospheric pressure can exert its optimal performance (life, operation noise, etc.) at a vacuum/pressure within this range.
Use the pump within the recommended range unless the higher vacuum/pressure is required.
※Contact with Orion or Orion dealer for other usage.

How to Correct Vacuum Level (Gauge Pressure)

Correction formula: A = C ＋(101.3－ B)

A : Vacuum level at 1 atmosphere kpa

B : Atmospheric pressure at vacuum level measuring position kpa

C: Reading on compound gauge kpa

Ex) When the reading on the compound gauge is 76kPa and the atmospheric pressure is 973hPa (97.3kPa), the vacuum level at 1 atmosphere is calculated as follow:76 + (101.3 – 97.3) = 80kPa
To read the accurate vacuum level, use a mercury manometer or an equivalent meter based on absolute pressure.

Atmospheric pressure conversion formula (hPa → kPa)

B(kPa)=B(hPa)÷10

Stop

Shut off the power switch.

Maintenance and Inspection

Cleaning of filter element

Warning

Turn off the main power supply before cleaning, maintenance and inspection.

Turn off the main power supply before cleaning, maintenance and inspection, and clearly post a sign on the power supply switch to indicate it is under maintenance. **Failure to do so may result in electric shock or personal injury.**

※Consult with a specialized company for maintenance and inspection.

Do not wash filter element with organic solvents.

When cleaning the filter element, **do not use organic solvents such as thinner, alcohol, benzine, gasoline, and kerosene. It may result in explosion or fire.**

Caution

Be sure to wear protective wear.

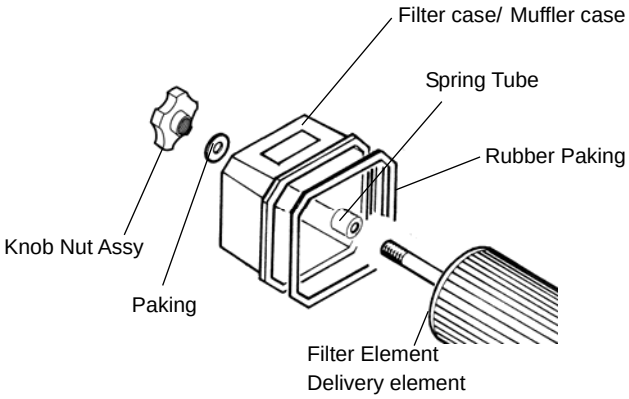
When you carry out cleaning or maintenance, be sure to wear gloves. **Failure to do so may result in injury or burn.**

When you transfer the product, be sure to wear nonslip gloves and safety shoes. **Failure to do so may result in injury.**

1. Cleaning of Filter Element and Delivery element

When debris deposits on the filter element, remove the filter case and muffler case, and then remove the filter element and the delivery element to get rid of the debris with an air blow. If a fouled filter element cannot be cleaned with air blows, replace it with a new one.

Inspection period	Contents
Once a week	Remove dust or dirt



Maintenance and Inspection

Cleaning of Filter Element

2. Cleaning of Controller

(Vacuum controller, pressure controller)

If the sheet surface of the controller is very dirty, the function may deteriorate. Disassemble the controller periodically, and remove the dirt of each part.

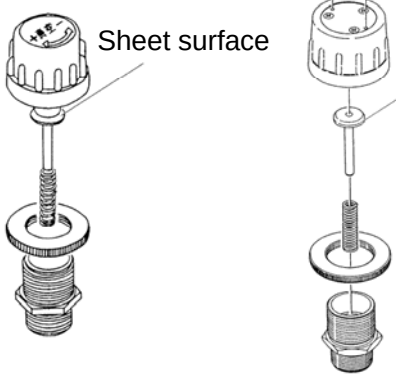
Inspection period	Contents
Once a month	**Disassembly cleaning**

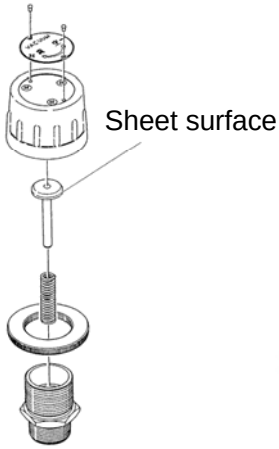
3. Inspection of Piping

Be sure to tighten the knob nut of filter case surely and ckeck that there is no air leakage, clogging, or loosening in the piping.

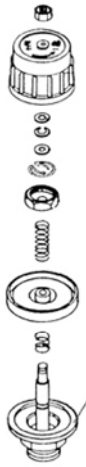
Inspection period	Contents
Once a month	**Air leak, clogging, looseness of tightened parts**

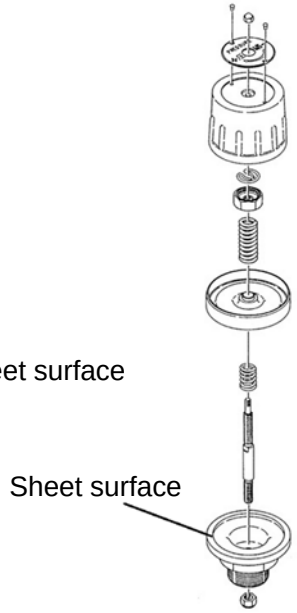
(Vacuum controller)
VC81(KRF70) VC100B(KRF110)





(Pressure controller)
PCA8(KRF70) PCA10(KRF110)





Troubleshooting

Warning

Turn off the main power supply before cleaning, maintenance and inspection.
Turn off the main power supply before cleaning, maintenance and inspection, and clearly post a sign on the power supply switch to indicate it is under maintenance. **Failure to do so may result in electric shock or personal injury.**
※Consult with a specialized company for maintenance and inspection.

Caution

Be sure to wear protective wear.
When you carry out cleaning or maintenance, be sure to wear gloves. **Failure to do so may result in injury or burn.**
When you transfer the product, be sure to wear non-slip gloves and safety shoes. **Failure to do so may result in injury.**

IMPORTANT

Check abnormal factors.

Troubleshooting

Condition	Cause	Corrective action
Vacuum level does not increase.	Filter element is clogged with dust, and air cannot be taken in.	Remove the element and blow off dust from the element with compressed air. If the element becomes dirty, replace it with a new one.
	Oil entered into the pump, and the vane cannot come out.	Consult with our dealer or service personnel.
	Foreign object entered into the pump and the vane cannot come out.	
	Due to rust inside of the pump by intaking water, the vane cannot come out.	
	Due to condensation inside of the pump, the vane cannot come out.	
	Damage to meter	Replace the meter.
	Tightening of filter case, piping, air tank are not tightened well, and air leaks.	Consult with our dealer or service personnel.
	The coupling fixing bolt is loose.	
	Decreased pump rotating speed due to motor malfunction.	
	Damaged vane.	
	Worn vane.	
When an abnormal noise is heard or when the meter shows pulsations.	An abnormal noise is occurred because the pressure is out of allowable range.	Return the pressure to the applicable pressure range.
	Excessive exhaust pressure causes an abnormal noise.	Adjust the exhaust resistance to return the exhaust pressure to normal.
	The abnormal noise occurs due to misfitting of the coupling.	Consult with our dealer or service personnel.
	The abnormal noise occurs due to burning of the motor.	
	The abnormal noise occurs because mounting bolts became loose.	
	Damage to meter.	Replace the meter.
	Filter element is clogged with dust, and air cannot be taken in.	Remove the element and blow off dust from the element with compressed air. If the element becomes dirty, replace it with a new one.
	Oil entered into the pump, and the vanes cannot come out.	Consult with our dealer or service personnel.
	Due to condensation inside of the pump, the vanes cannot come out.	
	The vanes were broken because foreign object(s) entered into the pump.	
When pump is stopped.	The vanes were broken because foreign object(s) entered into the pump.	
	The rotor was touched because the pressure was out of applicable pressure range.	
	Defective electromechanical system	

Consumable parts

List of Consumable Parts

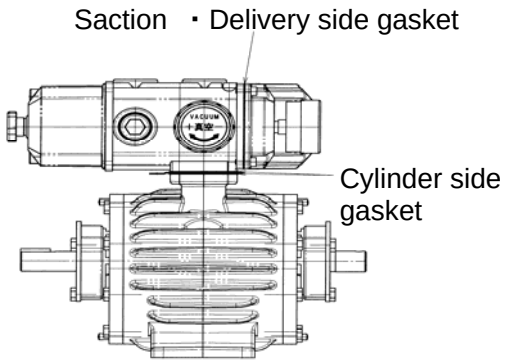
List of Consumable Parts (Parts to be replaced depending on wear condition when checking.)

Name of Parts	Model	KRF70	KRF110
Filter element (Inlet side)	Parts Number	04000451010	04041878010
	Quantity /unit	1	
	Inspection period	Every week	
	Replacement criterion	When it was damaged, or when dirt cannot be removed by blowing air.	
Delivery element (exhaust side) ※3	Parts Number	04044336010	04101351010
	Quantity /unit	1	
	Inspection period	Every week	
	Replacement criterion	When it was damaged, or when dirt cannot be removed by blowing air.	
Gasket (Cylinder side)	Parts Number	04010287010	04002846010
	Quantity /unit	4	2
	Inspection period	At the time of removal of Suction case to Delivery case	
	Replacement criterion	When it was damaged or crushed.	
Packing	Parts Number	04001458010	
	Quantity /unit	2	1
	Inspection period	At the time of removal of Suction case to Delivery case	
	Replacement criterion	When it was damaged or crushed.	
Rubber packing	Parts Number	03042560010	04006914010
	Quantity /unit	2	1
	Inspection period	At the time of check and replacement of element	
	Replacement criterion	When it was damaged or crushed.	
Gasket (Suction side) (Delivery side)	Parts Number	03042561010	04000020010
	Quantity /unit	2	
	Inspection period	At the time of removal of Suction case to Delivery case	
	Replacement criterion	When it was damaged or crushed.	
Liner ※1	Parts Number	040000410□0	040028390□0
	Quantity /unit	To be decided by actual positioning.	
	Inspection period	At the time of replacement of vane.	
	Replacement criterion	When it was damaged.	
Spring tube	Parts Number	04042925010	04042925020
	Quantity /unit	※2	
	Inspection period	At the time of check and replacement of element	
	Replacement criterion	When it was damaged or crushed.	
Spider	Parts Number	04101313010	
	Quantity /unit	1	
	Inspection period	Six months	
	Replacement criterion	When it was damaged or crushed.	
VC81	Parts Number	03000205020	—
	Quantity /unit	1	—
	Inspection period	Once a month	—
	Replacement criterion	When surface of control screw and valve were abrade away.	—
VC100B	Parts Number	—	03044148020
	Quantity /unit	—	1
	Inspection period	—	Once a month
	Replacement criterion	—	When surface of control screw and valve were abrade away.

※1 Parts number of second digits from the right side differs depending on thickness.
0.2t (white) becomes 1, 0.1t (black) becomes 2, 0.05t (yellow) becomes 3, 0.03t (red) becomes 4.

※2 (1) 1 pc for vacuum models.
（KRF70−V−01・04）（KRF70−VH−01・04）
（KRF110−V−01・04）
(2) 2 pcs for blower, and vacuum & blower models.
（KRF70−B−01・04）（KRF70−VB−01・04）
（KRF70−BH−01・04）（KRF70−VBH−01・04）
（KRF110−B−01・04）（KRF110−VB−01・04）

※3 (1) B lower, and vacuum & blower models only.
（KRF70−B−01・04）（KRF70−VB−01・04）
（KRF70−BH−01・04）（KRF70−VBH−01・04）
（KRF110−B−01・04）（KRF110−VB−01・04）



Consumable parts

List of Motor Maintenance Cycle / List of Replacement Parts

List of Motor Maintenance Cycle

Name of parts	Model	KRF70	KRF110
Motor Three-phase 200V spec.	Parts no.	0A001675000	0A001676000
	Model	Toshiba IK-FCKA21 2.2kW 6P	Toshiba IK-FCKA21 3.7kW 6P
	Qty.	1	
	※Maintenance cycle	20,000Hr	
Motor Three-phase 400V spec.	Parts no.	0A001677000	0A001678000
	Model	Toshiba IK-FCKA21 2.2kW 6P	Toshiba IK-FCKA21 3.7kW 6P
	Qty.	1	
	※Maintenance cycle	20,000Hr	

※Time on the list is the time that possibility to reaching the friction damage range becomes high. It is not necessary to replace the motor on time because it differs depending on the installation site. However, be sure to replace and repair the motor whenever troubles happen.

List of Replacement Parts (Parts to be replaced periodically at specified period.)

(V,B, or VB enters into the □)

Name of parts	Model	KRF70-□	KRF-□H	KRF110-□
Vane	Parts Number	04101504010	04101504010	04100653010
	Quantity /unit	6	6	6
	Replace-ment time	10,000	6,000	5,500
Bearing	Parts Number	0A000332000	0A000332000	0A000333000
	Quantity /unit	2	2	2
	Replace-ment time	10,000	6,000	5,500

※Consider the replacement time as a guide, and carry out the periodic replacement.

※Advanced technologies are required to replace vanes and bearings, so contact with our dealer or service personnel.

※Exchange bearings at the same time when you exchange vanes.

※The indicated blade replacement period is recommended in order to help prevent breakdown due to blade wear, and assumes average blade wear at 60Hz operation; specific performance is not guaranteed. The blade might not last as long as the above specified replacement time due to higher than normal wear from operating environments with low humidity or high temperatures, etc. The blade should be replaced soon if performance decreases or noise levels increase.

※If the blade is not replaced periodically, progressive wearing down of the the blade height and thickness can result in the blade being damaged which could lead to the pump becoming inoperable.

Consumable parts

List of Replacement Parts / Maintenance of plastic parts affecting operation safety

Use the maintenance kit for replacement parts.

Name of Parts		Unit	Maintenance kit Assembly 70	Maintenance kit Assembly 110
Model			KRF70	KRF110
Parts no.			04101347010	04101348010
Items	Vane	Pcs/Unit	6	
	Bearing		2	
	Liner (white)		2	
	Liner (black)		2	
	Liner (yellow)		4	
	Liner (red)		6	

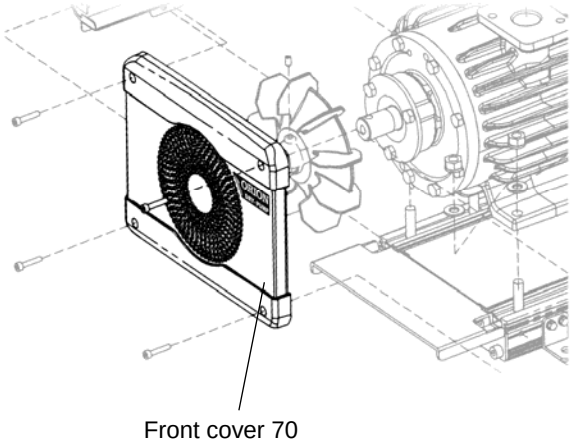
Maintenance of plastic parts affecting operation safety

⚠ Caution

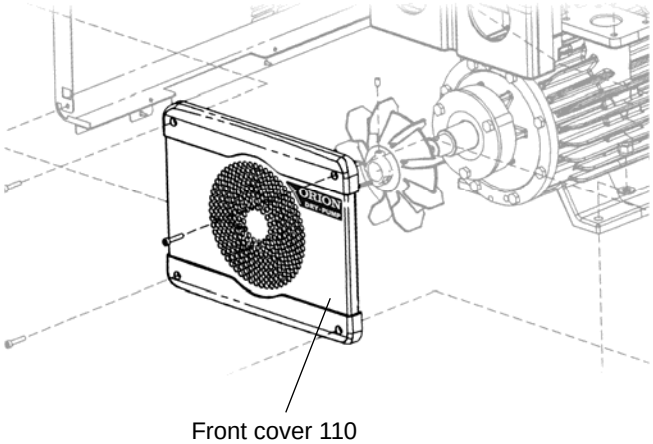
Replace the following plastic parts affecting operation safety promptly upon detection of breakage or deformation. Failure to do so may cause personal injury.

Name of Parts	Model	KRF70	KRF110
Front cover 70	Parts Number	03101467010	—
	Quantity /unit	1	—
Fan cover	Parts Number	—	03101469010
	Quantity /unit	—	1

KRF70



KRF110



Storage（Not in Use for a Long Time)

Storing method / Storage location

Storing method

Pay attention to formation of rust if the pump is not used immediately after received or if the regularly used pump has not been used for a long time.

Storage location

1.Store the product indoors and place the cover on the pump to protect it from water and dust.
2.Store the product where it is protected from water, oil and dust.
3.Store the product in a dry and clean place.
4.Store the product in an airy place where the ambient temperature is 40 degrees in Celsius or less.
5.Do not store the product where toxic gas such as chlorine gas or sulfur dioxide gas, which corrodes the pump, is generated.
6.Store the product in a low humidity place to prevent the pump from rusting.

Disposal

Be sure to entrust the disposal of the Product to the specialists in the trade of disposal of industrial wastes, observing Law about Disposal of Wastes and the Cleaning.

Specifications

Specification list

Specification list

(V,B, or VB enters into the ☐)

Model ※1			KRF70-☐	KRF70-☐H	KRF110-☐
Designed capacity		L/min	1130 / 1350		1850 / 2200
Speed ※2		rpm	930 / 1110		940 / 1120
Ultimate vacuum		kPa	90 or more		
Continuous operative (V)		kPa	60 or less	80 or less	60 or less
Continuous exhaust (B)		kPa	60 or less	70 or less	60 or less
Continuous operative (VB)		kPa	Total of vacuum level and exhaust pressure: 60kPa or lower	Total of vacuum level and exhaust pressure: 80kPa or lower	Total of vacuum level and exhaust pressure: 60kPa or lower
Diameter of piping connection			Rc1		Rc1-1/4
Power supply ※2, ※3, ※4	Three-phase 200V spec	Hz	200V-50/60, 220V-60		
	Three-phase 400V spec		380V-50, 400V-50/60, 415V-50, 440V-60, 460V-60		
Motor	Three-phase 200V spec	kW	2.2（6P）		3.7（6P）
	Three-phase 400V spec				
Rated current ※2	Three-phase 200V spec	A	10.4/9.6 (200V-50/60Hz) 9.2 (220V-60Hz)		16.2/15.6 (200V-50/60Hz) 14.6 (220V- 60Hz)
	Three-phase 400V spec		5.4 (380V-50Hz) 5.2/4.8 (400V-50/60Hz) 5.2 (415V-50Hz) 4.6 (440V-60Hz) 4.5 (460V-50Hz)		8.2 (380V-50Hz) 8.1/7.8 (400V-50/60Hz) 7.9 (415V-50Hz) 7.3 (440V-60Hz) 7.1 (460V-50Hz)
Mass ※2	Three-phase 200V spec	kg	75		120
	Three-phase 400V spec				
Operation noise Three-phase ※2	（V）	dB	67/68	73/74	74/75
	（B）		74/76		76/77
Applicable environment	Installation site		Indoor		
	Permissible ambient temperature		0 to 40 deg.C		
	Suction air ※5		"Normal temperature：0 to 40 deg.C , Normal humidity：65±20% (JIS Z 8703) Conditions where there is no corrosive and explosive gas exist. Clean air without vapor and dew condensation, and less dirt and dust."		
	Altitude of installation		1000m or less		
	Pollution Degree		Pollution Degree 3 (Worse environment than normal environment)		
Overvoltage classification ※6			Classification 3 (supply from the fixed wiring facility)		

※1 Only three-phase specification is complied with CE marking.
※2 Values shown are with our standard motor.
※3 Allowable intermittent power supply voltage fluctuation range is ±10% of the specified voltage; allowable sustained supply voltage fluctuation range is ±5% of the specified voltage.
※4 Voltage specifications for motors other than our standard ones are according to power supply specifications specifications shown on the motor name plates.
※5 Consult with your dealer if the product is used in extremely low humidity for adjustment. It may cause the malfunction of pump.
※6 Refer to IEC664-1.

EC Declaration of Conformity

■This EC declaration of conformity applies only to models that are equipped with ORION specified 3 phase motors. Models with single phase motors, models without motors, and those models where the CE marking is not printed on the machine name plate are not CE approved.

CE

ORION

ORION MACHINERY CO., LTD.
246 Oaza Kotaka, Suzaka-shi, Nagano-ken,
382-8502 JAPAN
TEL +81-26-245-1230 FAX +81-26-246-0564

EC DECLARATION OF CONFORMITY

We hereby declare that the following our product conform with the essential health and safety requirements of EC Directives.

Product	: DRY PUMP
Model	: KRF Series (KRF15,KRF25,KRF40,KRF15A,KRF25A,KRF40A KRF04A,KRF08A,KRF70,KRF110)
Manufacturer	: ORION MACHINERY CO., LTD. 246 Oaza Kotaka, Suzaka-shi, Nagano-ken, 382-8502 JAPAN
Authorized person to compile the technical file	: Lorenz Beck Ehrler & Beck GmbH Industriestrasse 16D-71272 Renningen, Germany
Directives	: Machinery Directive 2006/42/EC Low Voltage Directive 2006/95/EC

The above product has been evaluated for conformity with above directives using the following European standards. The technical construction file (TCF) for this product is retained at the above manufacturer's location.

Machinery Directive/ Low Voltage Directive
EN ISO 12100:2010, EN ISO 14121-1:2007, EN 1012-2:1996+A1:2009,
EN 60204-1:2006+A1:2009, EN ISO 13732-1:2008, EN 983:1996+A1:2008,
others

Signature : Y. Kuroiwa

Date : 2011. 09. 12

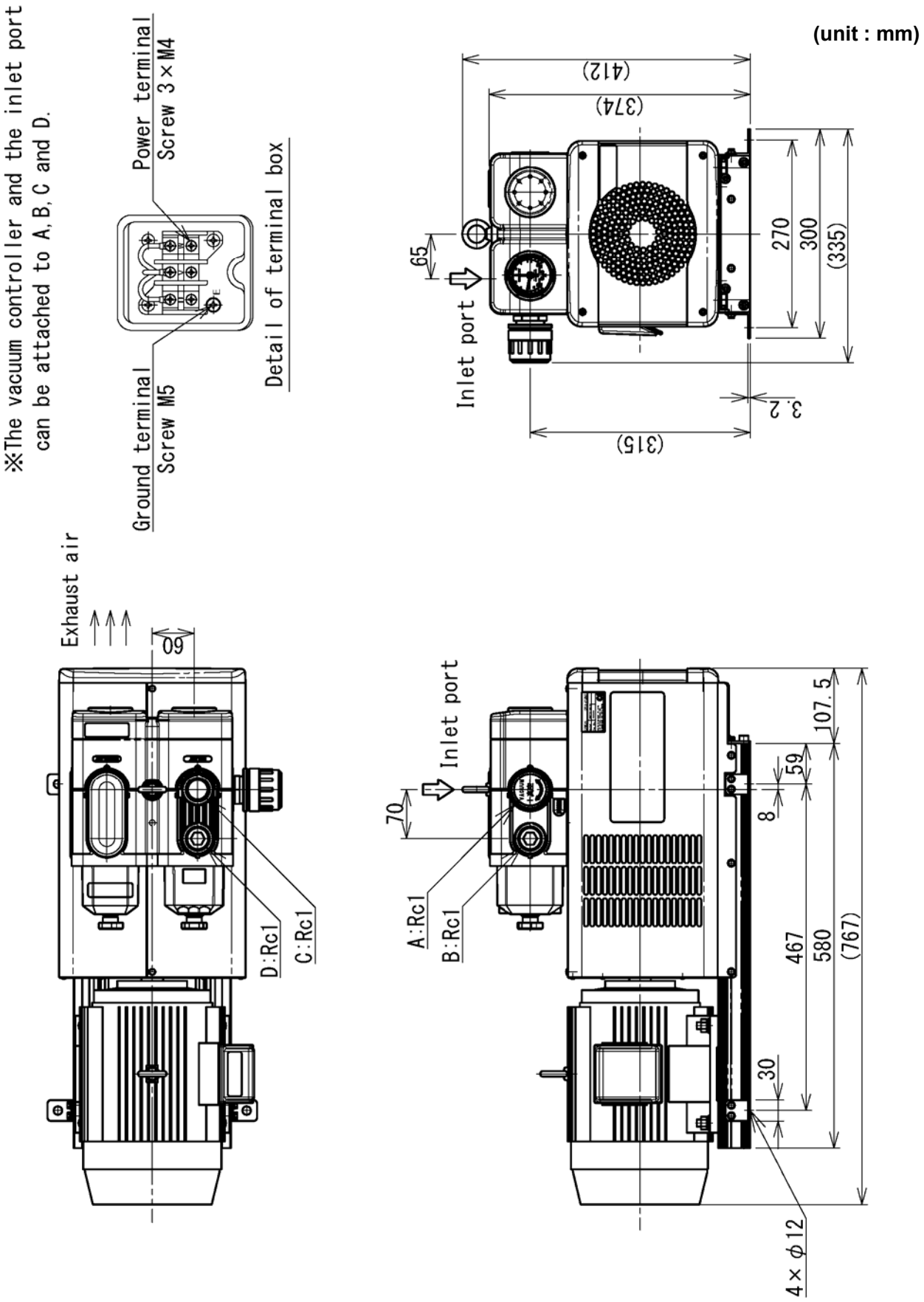
Name/Title : Yoshirou Kuroiwa / General Manager
Industrial Machinery Engineering Department
Technology Administration Division

Being the responsible person appointed and employed by the manufacturer.

Dimensional Outline Drawing

KRF70-V-01,04 / KRF70-VH-01,04

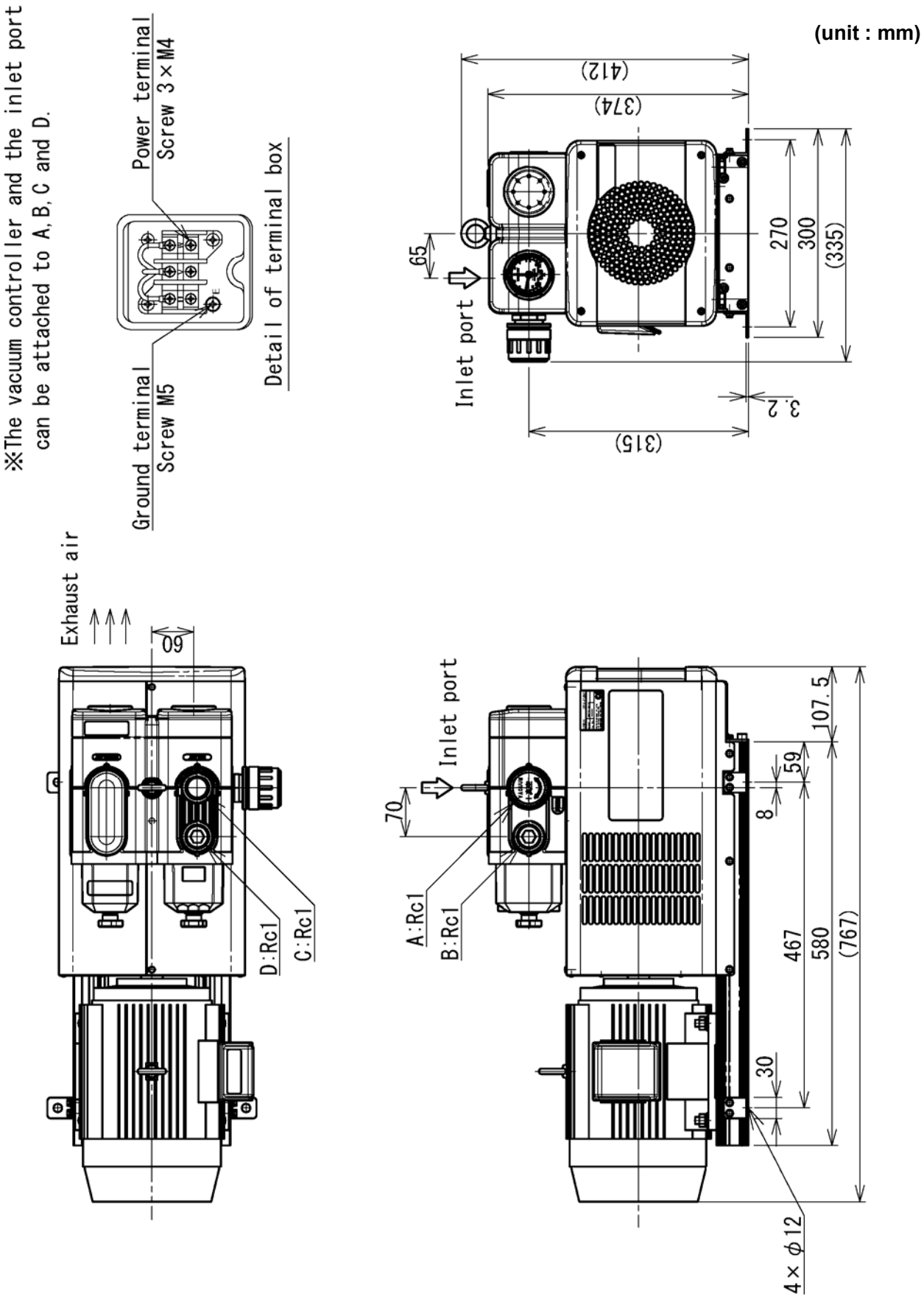
(unit : mm)



Dimensional Outline Drawing

KRF70-B-01,04 / KRF70-BH-01,04

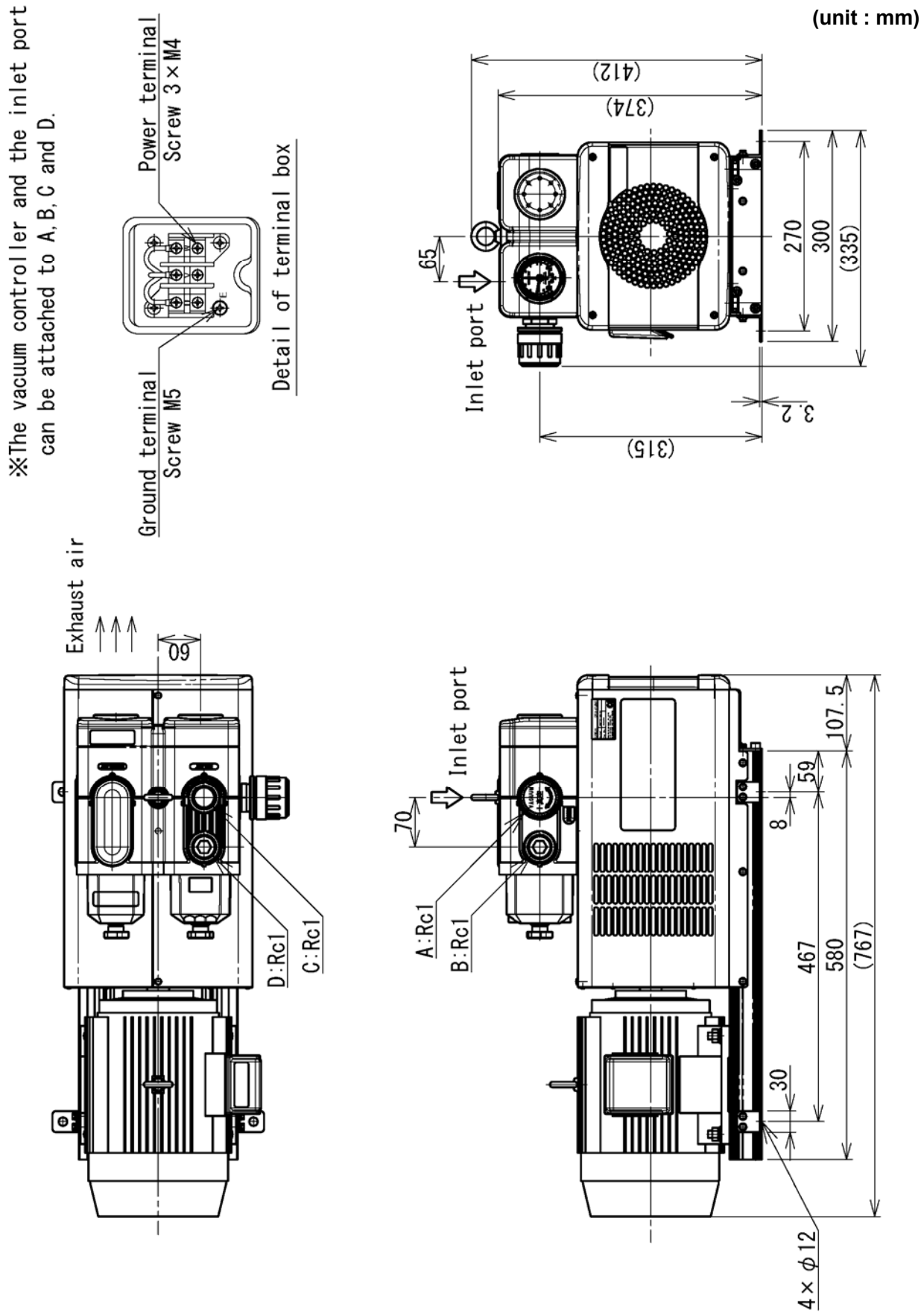
(unit : mm)



Dimensional Outline Drawing

KRF70-VB-01,04 / KRF70-VBH-01,04

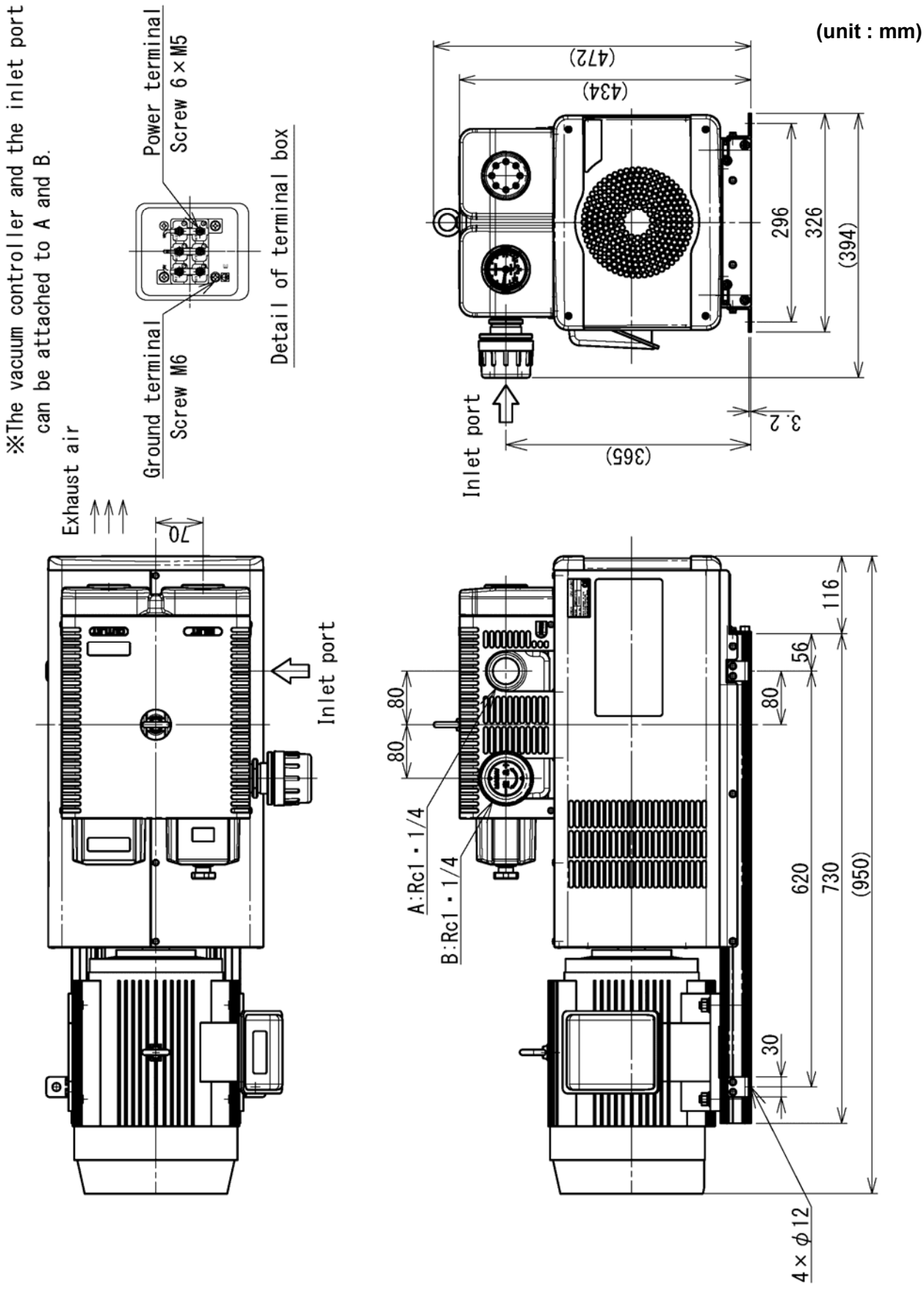
(unit : mm)



Dimensional Outline Drawing

KRF110-V-01,04

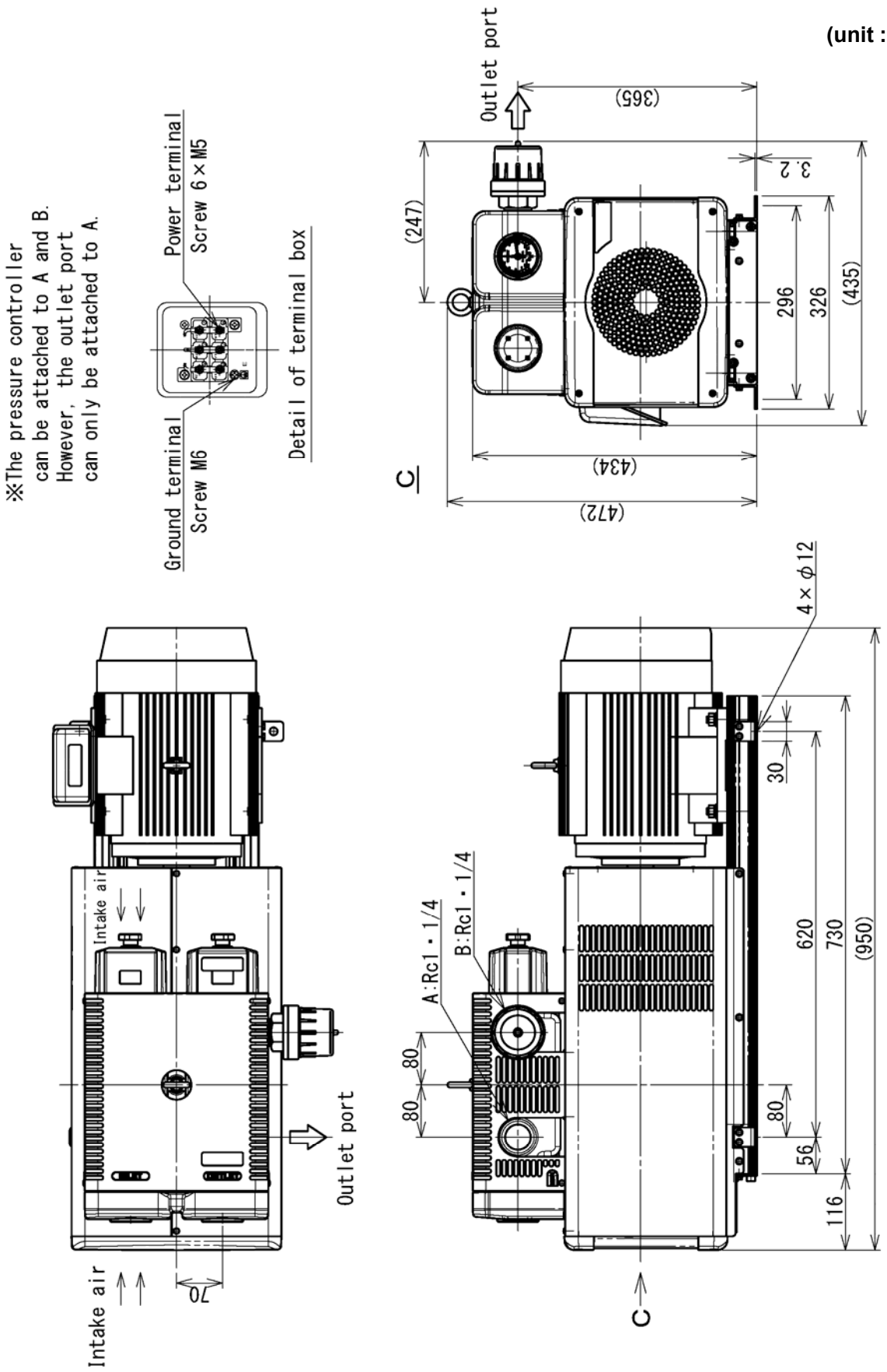
(unit : mm)



Dimensional Outline Drawing

KRF110-B-01,04

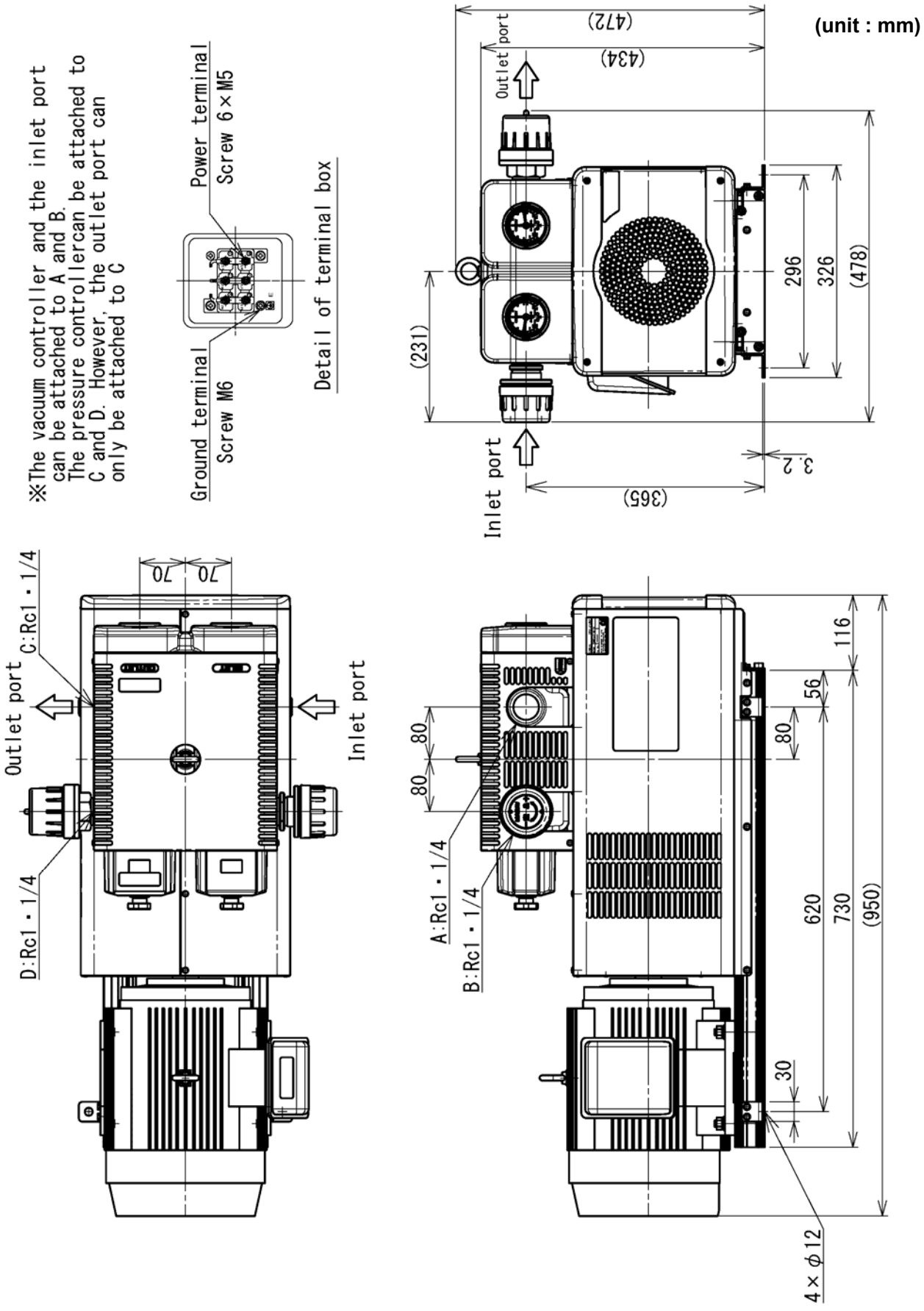
(unit : mm)



Dimensional Outline Drawing

KRF110-VB-01,04

(unit : mm)



memo

memo

オリオン機械株式会社

http : // www.orionkikai.co.jp

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E-mail : sijo@orionkikai.co.jp

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●東北地区統括	東北オリオン株式会社	TEL 022-284-0691
●関東地区統括	東日本オリオン株式会社	TEL 03-3523-8881
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●東海・北陸地区統括	中部オリオン株式会社	TEL 0586-76-1217
●近畿・中四国地区統括	関西オリオン株式会社	TEL 06-6305-1414
●九州地区統括	西日本オリオン株式会社	TEL 092-477-8480

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千歳工場 〒066-0077 北海道千歳市上長都1051-16

便利メモ（おぼえのため、記入されると便利です。）

お買いあげ日		製造番号	
販売店名		店名 電話（ ） －	

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