

Maintenance

Cleaning of filter element



Warning

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 maintenance. Failure to do so may result in electric shock or personal injury.
 ※Consult with a specialized company for maintenance and inspection.



Check
 Before cleaning, maintenance and inspection, be sure to shut off the main power supply.



Warning

Do not wash filter element with organic solvents.

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

Check
 Do not use organic solvents such as thinner, alcohol, benzene, gasoline and kerosene.



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.

Cleaning of Filter Element

When the filter element is covered with dusts, remove the filter case and pull out the filter element toward you and then blow off dusts from the filter element with compressed air. When dusts and dirt on the filter element cannot be removed by blowing air, replace the filter element with new one.

1. Cleaning of Filter Element

Inspection period	What is Inspected
Once a week	Remove dust or dirt

2. Inspection of O-ring (O-ringS56)

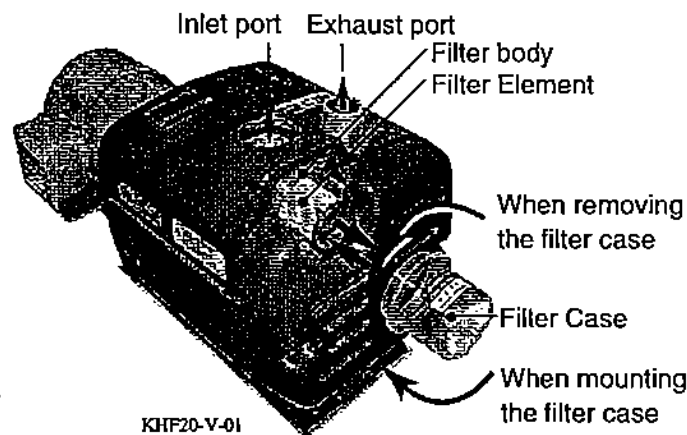
Inspection period	What is Inspected
Once a week	Damage or crush

3. Inspection of O-ring (O-ringS20)

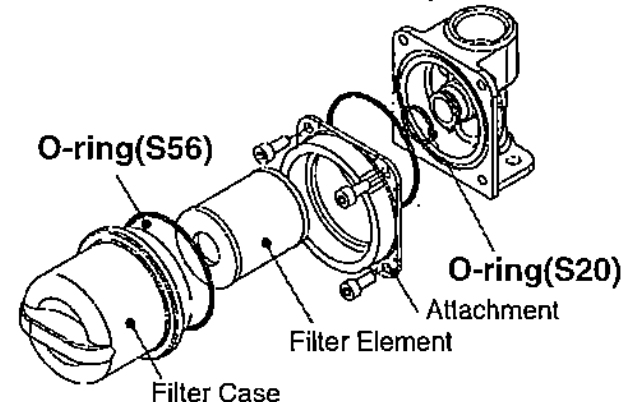
Inspection period	What is Inspected
Replacing the filter element	Damage or crush

4. Inspection of Piping

Inspection period	What is Inspected
Once a month	Air leak, clogging, looseness of tightened parts



■ Sectional drawing of filter body



Check whether there are air leak, clogging, and looseness of tightening in the piping system. Be sure to tighten the filter case firmly.

Troubleshooting



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Condition	Cause	Corrective action
Vacuum level does not increase.	Filter element is clogged with dust, and air cannot be taken in.	<ul style="list-style-type: none"> ● 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.	Replace the meter.
	Damage to meter	
	Tightening of cap, piping and air tank are not tightened well, and air leaks.	Consult with our dealer or service personnel.
	The coupling fixing bolt is loose.	Re-tighten the fixed bolt of coupling.
	Decreased pump rotating speed due to motor malfunction.	Consult with our dealer or service personnel.
	Damaged vane	
	Worn vane	

Troubleshooting



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



Check
Check abnormal factors.

Condition	Cause	Corrective action
When an abnormal noise is heard or when the meter shows pulsations.	Excessive exhaust pressure causes an abnormal noise.	Adjust the exhaust resistance to return the exhaust pressure to normal.
	The abnormal noise occurs due to burning of the motor.	Consult with our dealer or service personnel.
	The abnormal noise occurs because mounting bolts became loose.	Re-tighten mounting bolts additionally.
	Damage to meter.	Replace the meter.
	Filter element is clogged with dust, and air cannot be taken in.	<ul style="list-style-type: none"> ● Remove the element and blow off dust from the element with compressed air. ● If the element becomes dirty, replace it with new one.
	Oil entered into the pump, and the vane cannot come out.	Consult with our dealer or service personnel.
	Due to condensation inside of the pump, the vane cannot come out.	
The blade was broken because foreign object(s) entered into the pump.		
When pump is stopped.	The blade was broken because foreign object(s) entered into the pump.	Consult with our dealer or service personnel.
	Defective electromechanical system	

Operation Procedure

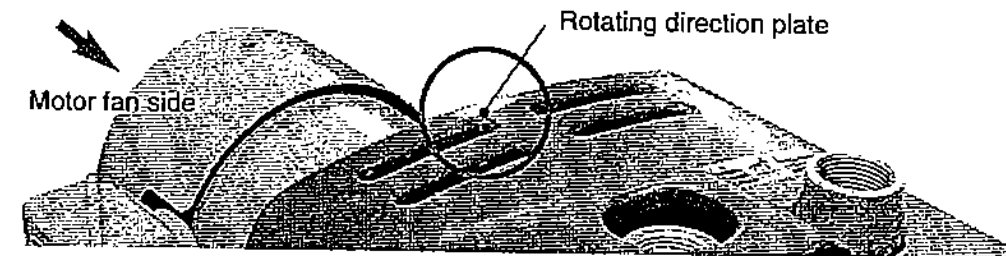
Check before Operation / Operation / Stop

Check before Operation

- Before using the machine that had not been used for a long period of time, be sure to check that the power is off, and then rotate the cooling fan shaft gently with a driver or a similar tool to confirm that it can be rotated smoothly.
- The compound gauge is weak against shock. So, handle the gauge carefully not to hit against any part and not to drop it. (In case of attaching the gauge.)
- Install the earth leakage breaker according to the internal regulations.
 - ※ Consult with a specialized company for installation.
- Install the overload protection device (e.g. thermal relay). Use the rated current value written on the motor name plate for the set value.
- When storage temperature and operation temperature are different over 10 degrees in Celsius, leave the pump at the operation site for more than 2 hours in order to eliminate the temperature difference. When dew condensation occurred, and the condensation entered into the pump, it may result in rust, lock and not coming out of the vane.

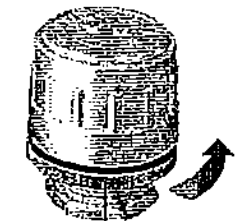
Operation

1. Be sure to check by inching that the rotating direction is the same as the one shown on the "rotating direction plate" when it is viewed from the motor fan side.



Check
Be sure to check the rotating direction.

2. Turn on the power switch.
3. When the rotation comes to normal after the vacuum controller and the vacuum gauge were mounted, adjust the vacuum level to normal.
4. After adjusting the pressure of the vacuum controller, tighten the locknut firmly.
 - ※ Pressure regulation range of vacuum controller is 20 to 80 kPa (abs).
5. Do not operate the product beyond the permissible pulse range (13.3kPa or less per sec.) and the permissible exhaust resistance (10kPa or less).



locknut

Stop

Shut off the power switch.

Preparation and Confirmation

Electrical Wiring

- (3) Install the overload protection device (e.g. thermal relay). Use 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) Select a power cord referring to the current value shown on the motor name plate.

Use the power supply cable that is approved by Europe standard certification body like TVV or VDE for CE Marking approved model of KHF□□-V-04.

(6) Motor name plate (sample)

- Matsushita-made flange motor is mounted as standard.
- For details other than following models, refer to the actual motor name plate on the product.

■KHF14-V-01

National				
Model No. EMFLH4PH009				
THREE PHASE INDUCTION MOTOR				
RATING	S1	THERMAL		E
JIS C 4210		FRAME NO.		FLH-71M
IP44 IC411		BEARING		6203, 6202
SER. NO.				
IME	Hz	V	A	r/min
0.4 kW 4 POLE	50	200	2.5	1420
	80	200	2.5	1700
	60	220	2.5	1720
Matsushita Electric Industrial Co., Ltd. Made in Japan				

■KHF20-V-01

National				
Model No. EMFLS14PK001				
THREE PHASE INDUCTION MOTOR				
RATING	S1	THERMAL		E
JIS C 4210		FRAME NO.		FLH-71M
IP44 IC411		BEARING		6204, 6202
SER. NO.				
IME	Hz	V	A	r/min
0.75 kW 4 POLE	50	200	3.8	1415
	60	200	3.4	1695
	60	220	3.4	1715
Matsushita Electric Industrial Co., Ltd. Made in Japan				

■KHF14-V-04

(CE Marking approved)

Panasonic THREE PHASE INDUCTION MOTOR				
Model No. EMFLH4PH010				
IME	0.4kW	4POLE		
RATING	S1			
THERMAL	E			
Hz	50	60	60	
V	200	200	220	
A	2.5	2.5	2.5	
r/min	1420	1700	1720	
IP44 IC411	EN50034-1			
SER. NO.				
connect the neutral point of power supply to protective earth				
Matsushita Electric Industrial Co., Ltd. Made in Japan				

■KHF20-V-04

(CE Marking approved)

Panasonic THREE PHASE INDUCTION MOTOR				
Model No. EMFLH4PK003				
IME	0.75kW	4POLE		
RATING	S1			
THERMAL	E			
Hz	50	60	60	
V	200	200	220	
A	3.8	3.4	3.4	
r/min	1415	1695	1715	
IP44 IC411	EN50034-1			
SER. NO.				
connect the neutral point of power supply to protective earth				
Matsushita Electric Industrial Co., Ltd. Made in Japan				

Consumable parts

List of Consumable Parts

※ For consumable parts, refer to ● mark in the page 5 of "Name of Components."

List of Consumable Parts

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

Name of Parts	Model	KHF14	KHF20
Filter Element	Parts Number	04A30159010	
	Quantity /unit	1	
	Inspection period	Every week (daily check)	
	Replacement criterion	When it was damaged, or when dirt cannot be removed by blowing air.	
O-ring (S56) ※1	Parts Number	35154541040	
	Quantity /unit	1	
	Replacement criterion	When it was damaged or crushed.	
O-ring (S56) ※2	Parts Number	35154541040	
	Quantity /unit	1	
	Replacement criterion	When the attachment is removed.	
O-ring (S20) ※3	Parts Number	35154515040	
	Quantity /unit	1	
	Replacement criterion	When the filter element is replaced (daily check).	
Gasket ※4	Parts Number	04044224010	
	Quantity /unit	1	
	Replacement criterion	When the filter unit is removed.	
Liner ※5	Parts Number	040000380□0	
	Quantity /unit	To be decided by actual positioning.	
	Replacement criterion	When the vane is replaced.	
Spider:	Parts Number	04044059010	04044087010
	Quantity /unit	1	
	Replacement criterion	Six months	
		When it was cracked or damaged.	

※1 Where filter case and attachment are sealed.

※2 Where attachment and filter body are sealed.

※3 Where filter and filter body are sealed.

※4 Where filter body and cylinder are sealed.

※5 Parts number of second digits from the right side differs depending on thickness.

0.2t→**1** 0.1t→**2** 0.05t→**3** 0.03t→**4**

※6 For other consumable parts, consult with our dealer or service personnel.

Consumable parts

List of replacement parts

※ For replacement parts, refer to ▲ mark in the page 5 of "Name of Components."

List of replacement parts

(Parts to be replaced periodically at specified period.)

Name of Parts	Model	KHF14	KHF20
Vane	Parts Number	04043569010	04043570010
	Quantity /unit	6	6
	Replacement time	10,000	10,000
Bearing	Parts Number	0A000284000	0A000228000
	Quantity /unit	2	2
	Replacement time	20,000	20,000

※ When replacing the vane for the second time, replace the bearing as well.

※ The replacement time shows our recommended value in ultimate operation.

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

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 the receipt or if the regularly used pump has not been used for a long time.

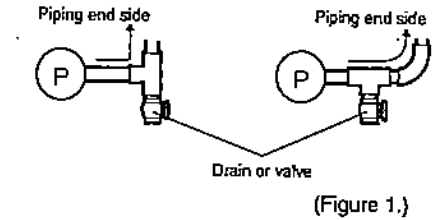
Storage location

- (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 being rusted.

- (4) In view of the exhaust piping system, provide drain hose properly in the system in order to prevent condensation of water occurred inside the system from entering the pump, and from discharging from the piping end.

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

- (1) Arrange 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 not to enter condensation of water into the pump.

- In case of a long piping system, provide valve or drain hose in the halfway of the system.

- When condensation of water discharges from the piping end, provide valve or drain hose at the piping end.

- (2) If the pump is not frequently used, idle the pump for 10 to 15 minutes after finished the operation.

- Do not operate the product beyond the permissible pulse range (13.3kPa or less per sec.), and the permissible exhaust resistance (10kPa or less).

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 according to the internal regulations.

Set the breaking capacity regarding 1.5 times the current value shown on the motor name plate as a rough idea. Select a sensed current of 30mA. ※Consult with a specialized company for installation.

- (2) Be sure to install the grounding.

- Location of grounding screws.

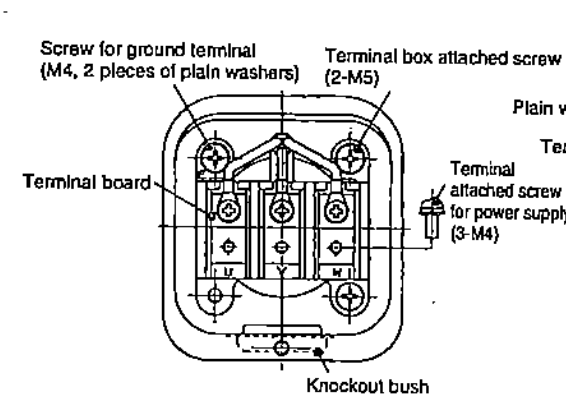
In case of the three-phase specification, grounding screw is fitted inside the motor terminal box.

(You can find the mark "E" or mark "⊕" near the screw.)

- Select the grounding wire of 2mm² or more in nominal cross section.
- 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.
- Recommended tightening torque for terminal board as Matsushita-made three-phase flange motor model (KHF□□-V-01, etc) is 1.6 to 2.5Nm.
- Recommended tightening torque of lead wire fixing screw to the terminal board of KHF□□-V-04 CE Marking approved is 0.4 to 0.5Nm.

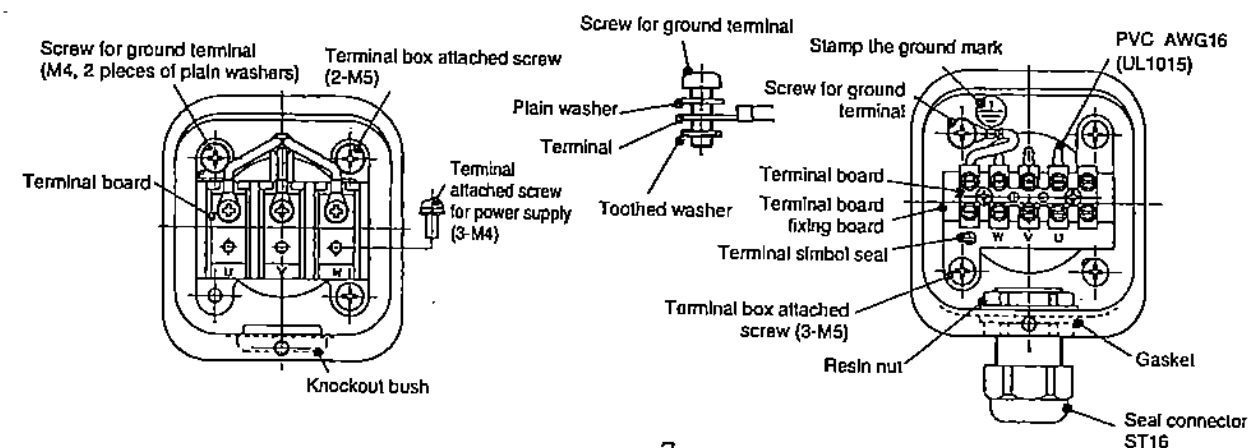
■ KHF□□-V-01

(Standard terminal board detail drawing)



■ KHF□□-V-04

(CE Marking terminal board detail drawing)



Preparation and Confirmation

Before Installation/ Installation/ Installation Site/ Piping/ Electrical Wiring

Before Installation



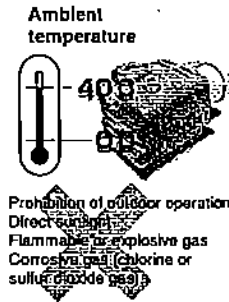
Danger

- Do not use the product where flammable or explosive gas is generated.



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 the product is 15kg or over, hold the product with two persons for transfer.



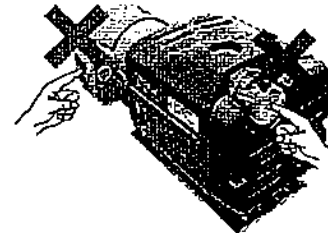
- Be sure to check the name plate whether purchased product is right model as you ordered.
- Upon receiving the product, check it carefully for signs of shipping-related damage like scratches, deformation, etc. If you notice a problem, contact with your dealer.
- When the product is with accessories,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

Installation



- The product is heavy. Be careful enough when moving the product.
- When the product is 15kg or over, hold the product with two persons. Also, do not hold the terminal box and filter case of motor when holding with two persons. Holding the terminal box and filter case of motor may result in injury, damage or malfunction by the product fall.

Do not hold these parts.



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 such 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 over 40 deg. C.
- Be sure to install the product horizontally on the flat surface.

Piping

- 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 (150 deg. C or over) and pressure resistant (100kPa or over) hose.
 - Completely remove dirt and dust inside the hose before piping.
- When intake air contains a great amount of dust or dust grain is very fine (10 μm or less), use an appropriate filter in addition to the accessory filter.
- In case of exhaust piping, exhaust cannot be used. Set the exhaust resistance to 10kPa or less when the inlet side is open-air (0kPa).

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.

Optional Parts

List of optional parts

List of optional parts

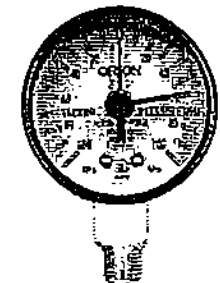
Name of Parts	Model	KHF14	KHF20
Vacuum Controller VC63	Parts Number	03049718010	
	Diameter of piping connection	R 3/4	
D type (φ60) compound gauge ※1	Parts Number	04040737010	
	Diameter of piping connection	R 1/4	
A type (φ60) compound gauge ※2	Parts Number	04040738010	
	Diameter of piping connection	R 1/4	

- ※1 Arrange piping vertically against the gauge body.
- ※2 Arrange piping in parallel with the gauge body.
- ※ The above parts are optional and are available separately.
- ※ To purchase the above parts, contact with our dealer in your district.

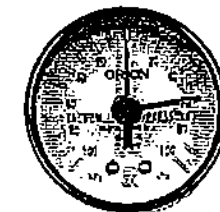
Vacuum controller VC63



A type (φ60) compound gauge ※2



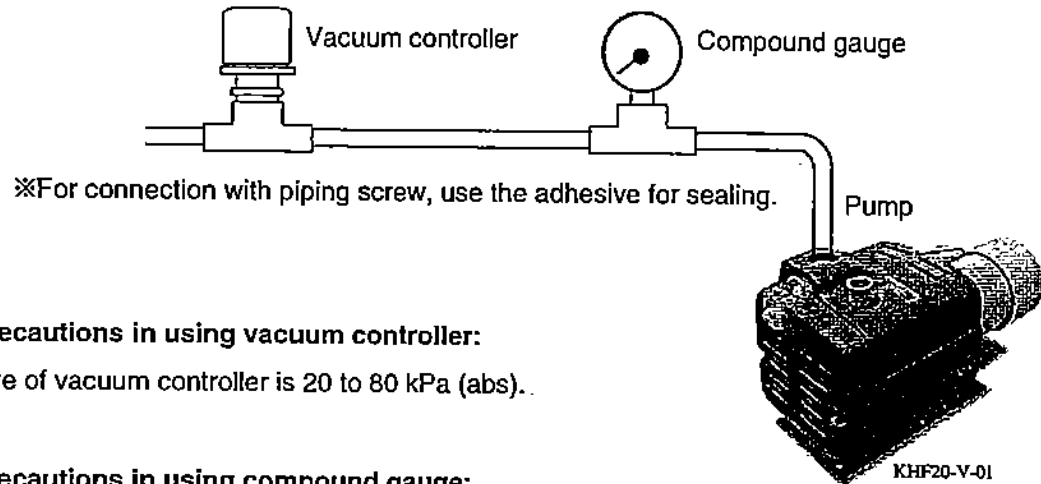
D type (φ60) compound gauge ※1



Optional Parts

How to install optional parts / Vacuum (gauge pressure) correction

How to install optional parts



■ Precautions in using vacuum controller:

Range of vacuum controller is 20 to 80 kPa (abs).

■ Precautions in using compound gauge:

The ultimate pressure, 8kPa (abs), of the high vacuum dry pump is displayed in absolute pressure. When a compound gauge (Bourdon tube type) based on atmospheric pressure is used to measure the pressure, the measured value should be converted into gauge pressure. In addition, the vacuum level should be corrected depending on the atmospheric pressure conditions.

For the conversion, the following formula is used:

A : Absolute pressure (kPa [abs])	B : Gauge pressure (kPa)
$A = 101.3 - B$	$B = 101.3 - A$

How to Correct Vacuum Level (Gauge Pressure)

Correction formula: $B' = A + (101.3 - C)$

A : Reading on compound gauge (vacuum based on atmospheric pressure) kpa

B' : Vacuum level at 1 atmosphere kpa

C : Atmospheric pressure at vacuum level measuring position kpa

(Example) When the reading on the compound gauge is 89kPa and the atmospheric pressure is 970hPa (97kPa), the vacuum level at 1 atmosphere is calculated as follow: $89 + (101.3 - 97) = 93.3\text{kPa}$

Atmospheric pressure conversion formula (hPa → kPa)

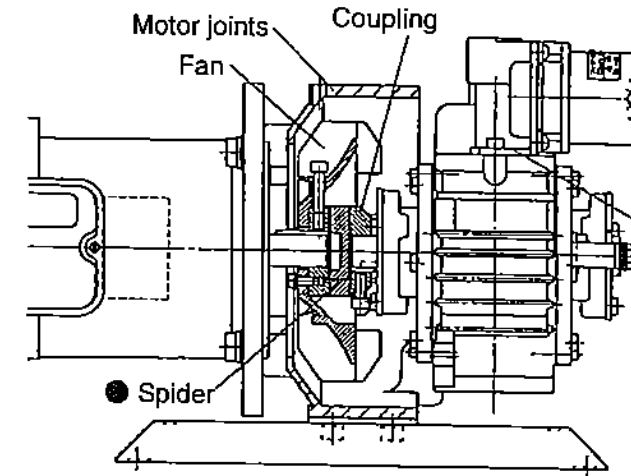
$$C \text{ (kPa)} = C' \text{ (hPa)} \div 10$$

To read the accurate vacuum level, use a mercury manometer or an equivalent meter based on absolute pressure.

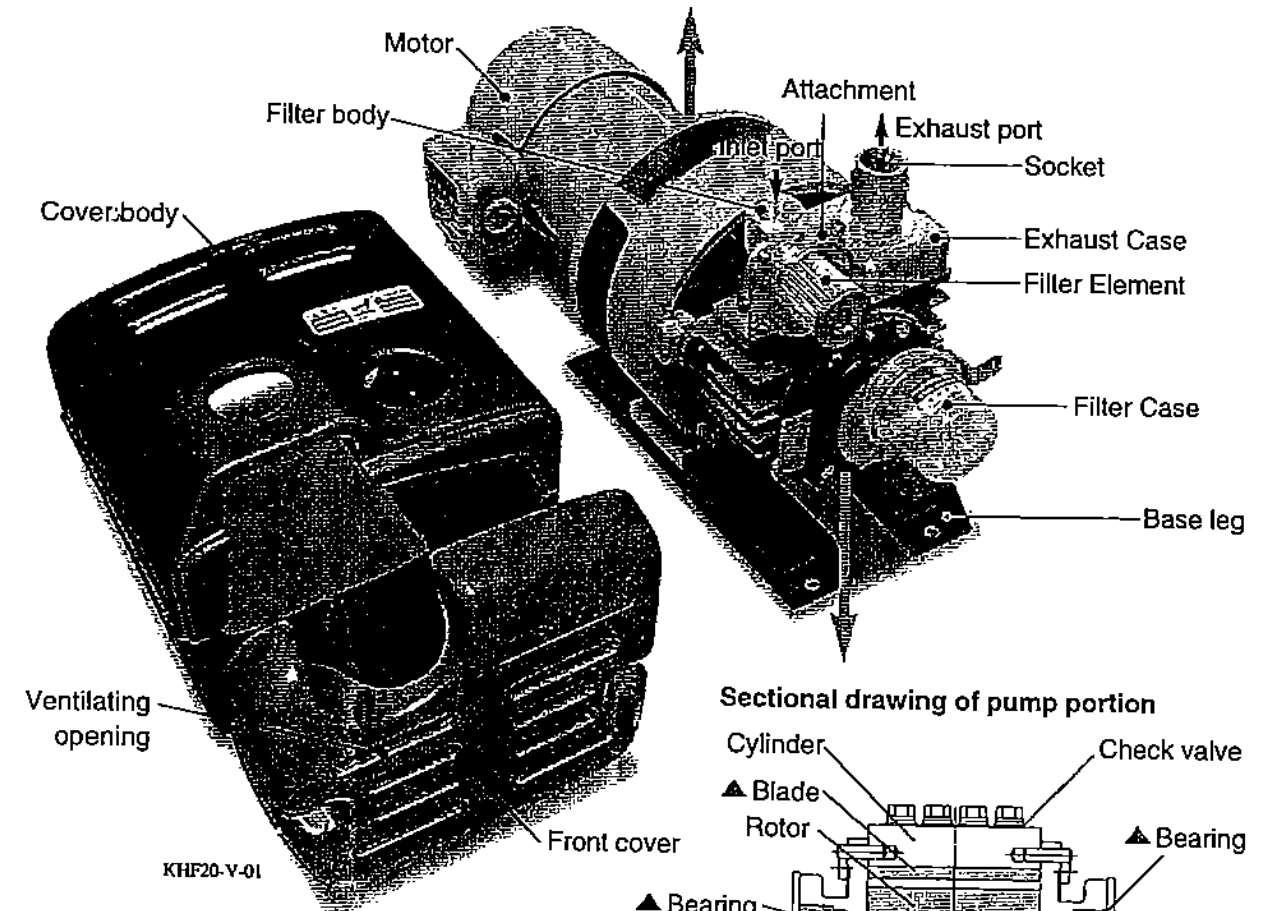
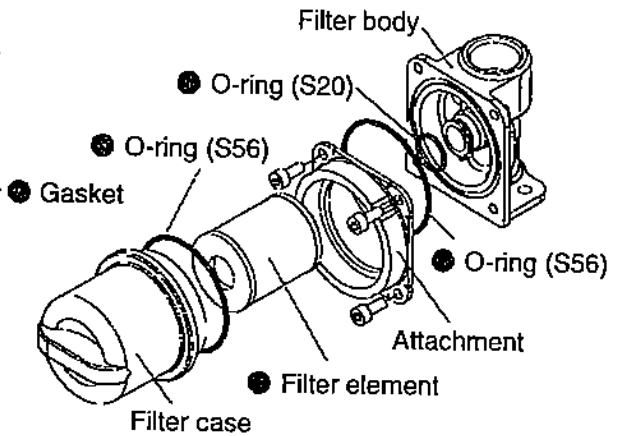
Name of Components

※ mark indicates consumable parts that is replaced depending on wear condition when checking. (Refer to page13.)
 ※ mark indicates replacement parts that is replaced periodically at the specified period. (Refer to page14.)

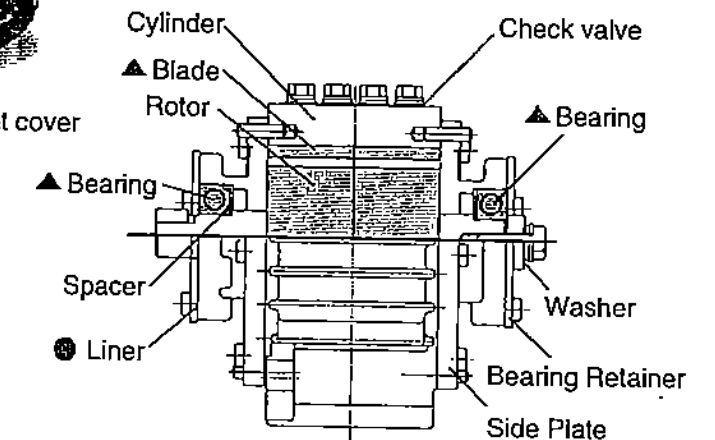
Sectional drawing of coupling portion



Exploded view of filter body



Sectional drawing of pump portion



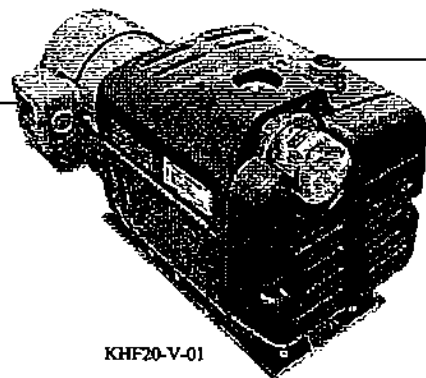
Precautions For Safety

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 one for replacement.

Motor



KHF20-V-01

Burn

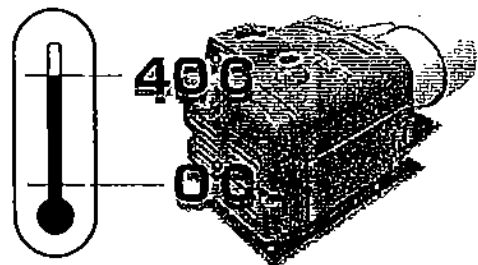


※ Be alert to burn since the piping part becomes 60 deg. C or higher depending on use condition at ambient temperature 20 deg. C.

To Maintain Efficient and Trouble-Free Performance

- In case the operation time is within 5 minutes and if it is 40kPa (abs), make the inlet side to open-air after finished the operation, and then **perform the idling operation for 10 to 15 minutes.**
- If operating for a short time with no load at the inlet side, **dew condensation occurs inside the pump, and it may result in pump block by rust.**

- 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.
- 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.**
- Periodically replace consumable parts (see pages 13) and replacement parts (see page 14).
- Use heat-resisting hose (150 deg. C or over) for exhaust pipe.
- Keep the pump away from oil, water, dust, rain, etc. **Also, never lubricate the product.**
- Install the product on a flat surface.
- Be sure to remove the package wood. **Failure to do so may cause abnormal sound or abnormal vibration.**
- Do not operate the product beyond the permissible pulse range (13.3kPa or less per second) and the permissible exhaust resistance (10kPa or less.).

Specifications

Specification list

Specification list

Item	Model	KHF14-V-01/04	KHF20-V-01/04
Designed capacity	L/min	230/280	340/400
Speed	rpm	1,450/1,730	
Ultimate pressure		8kPa [abs] or less	
Applicable pressure range		0kPa to ultimate pressure	
Permissible pulse range		Within 13.3kPa/sec.	
Permissible exhaust resistance		10kPa or less	
Operation noise ※ 1	dB	66/68	67/69
Supply of power		Overcurrent classification ※2: Classification 3 (supply from fixed wiring facility)	
Applicable environment		Degree of contamination ※2: Degree of contamination 3 (Worse environment than normal environment)	
Diameter of piping connection		Rc3/4 (KHF body)	
		R3/4 (Vacuum Controller/ VC63) (Optional parts)	
		Rc1/4 D type compound gauge (Optional parts)	
		Rc1/4 A type compound gauge (Optional parts)	
Power supply		Three-phase 200V 50/60 Hz 220V 60Hz	
Required power	W	400	750
Mass	kg	25	31

※1 Operation noise is actual measured value at ultimate pressure operation with new Orion standard motor (three-phase) loading.

※2 Refer to IEC664-1.

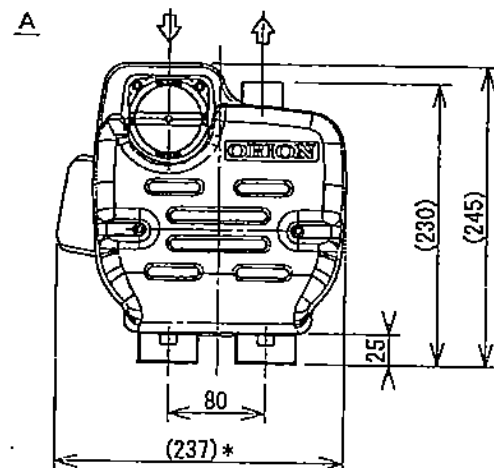
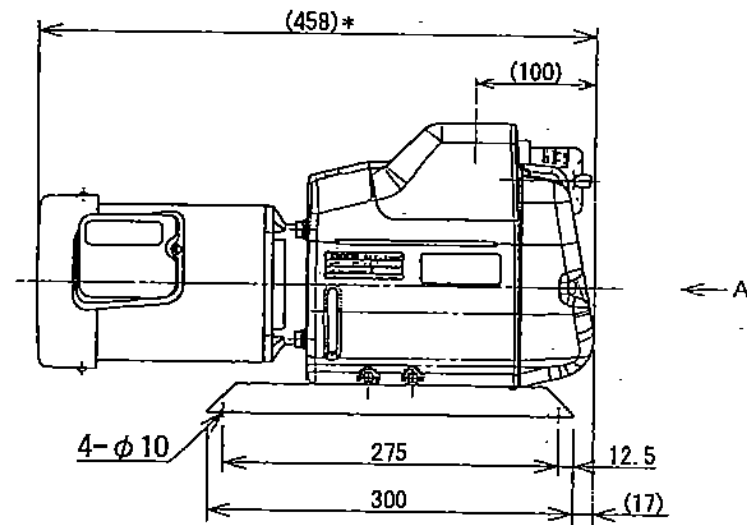
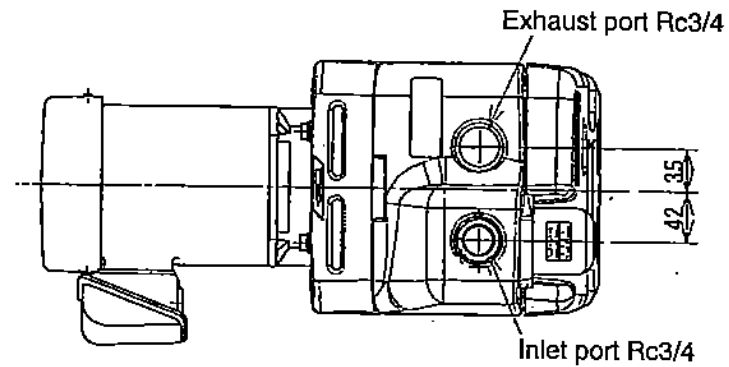
Specifications

Outside dimension

Outside dimension

KHF14-V-01

※mark is the dimensions with standard motor loading.
(unit: mm)



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 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.

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 fire.



Be alert to burn.

Do not touch areas around the exhaust port and the cover ventilating opening because they are heated to high temperature. Touching these areas may cause 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.

Shut off the main power supply in case of not using 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 fire 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.



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

Precautions for Use (Warning / Caution)



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



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.



Installation must be done by specialized personnel.

The product may fall down or drop when 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 maintenance. 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.

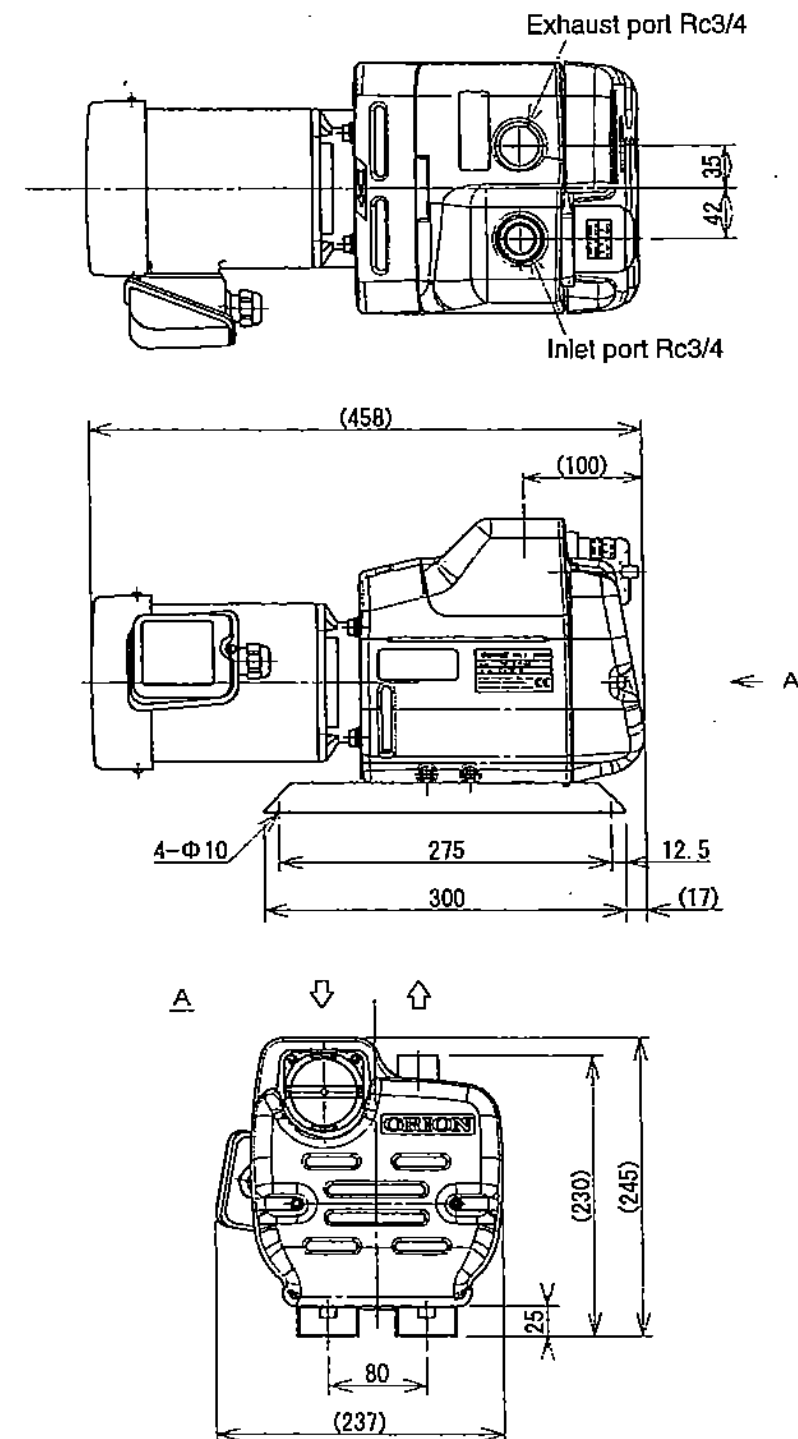
Do not use this product outdoors.

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.

Outside dimension

KHF14-V-04

(unit: mm)



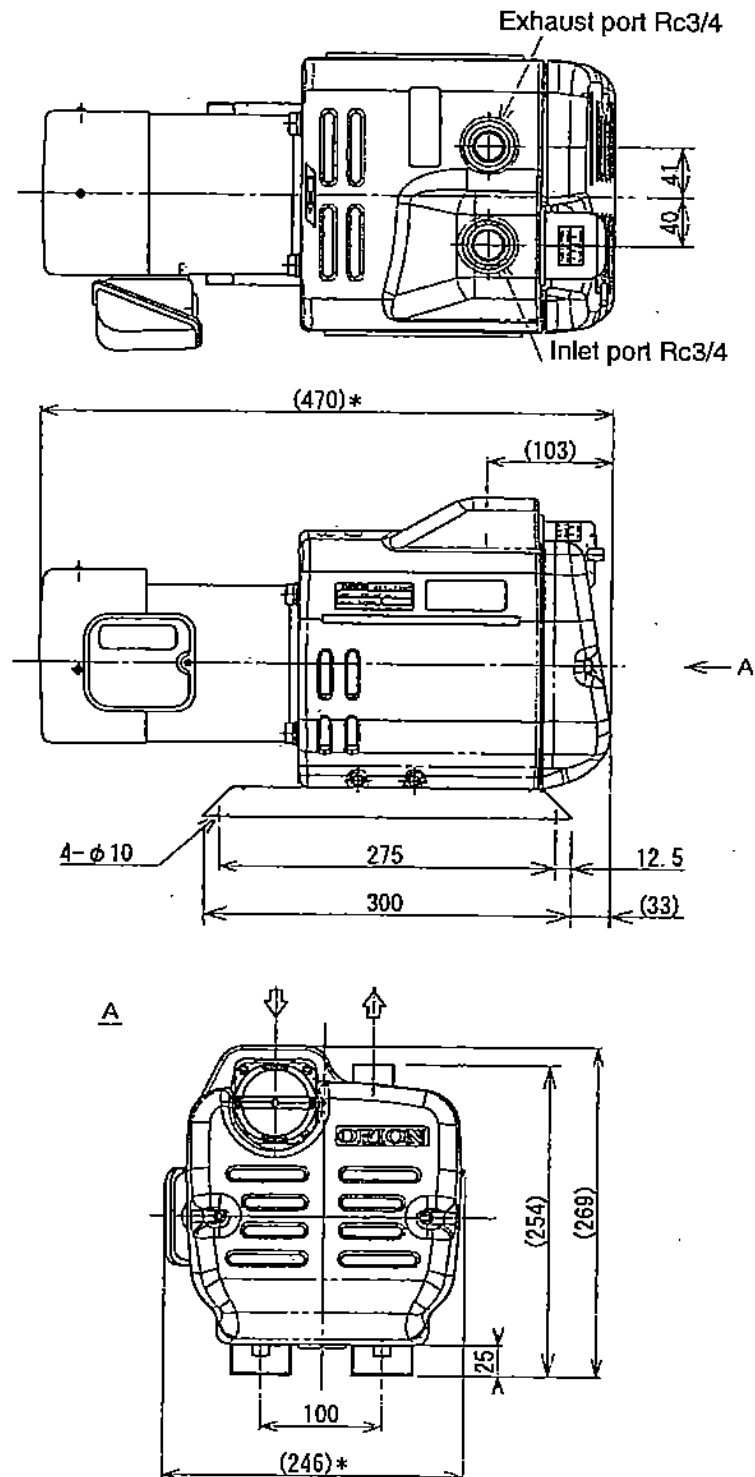
Specifications

Outside dimension

Outside dimension

KHF20-V-01

※mark is the dimensions with standard motor loading.
(unit: mm)



Precautions For Safety

Precautions for Use (Danger / Warning)

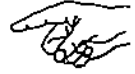
Danger

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 out. Do not use the unit in the place where flammable or explosive gas exists. It may cause explosion or fire.



Check
The pump never inhales flammable or explosive gas.

Warning

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



No operation with exhaust pipe closed.

Do not operate this product while the exhaust pipe is closed. Operating the product while the exhaust pipe is closed may increase the pressure and temperature in the pipe, and may cause serious injury or malfunction of the product due to damage or burst of the pipe 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, benzene, gasoline, and kerosene. It may result in explosion or fire.

Do not remove the cover during operation.

The cooling fan and the coupling rotate at high speed. Do not operate this product while the plastic cover is removed. Such operation may result in serious injury including mutilation of a hand.

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 pined. 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 hand. Also, do not operate switch with wet hand. It may cause electric shock.



Do not modify the product.

Do not modify the product. It may cause the abnormal operation and may result in injury, electric shock or fire.

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.

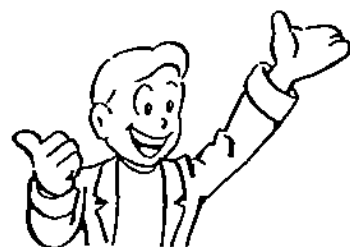
Additionally, the situation that is explained in ⚠ Caution column may cause serious accident. All safety information must be followed for safe operation.

- After reading this manual, keep 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.

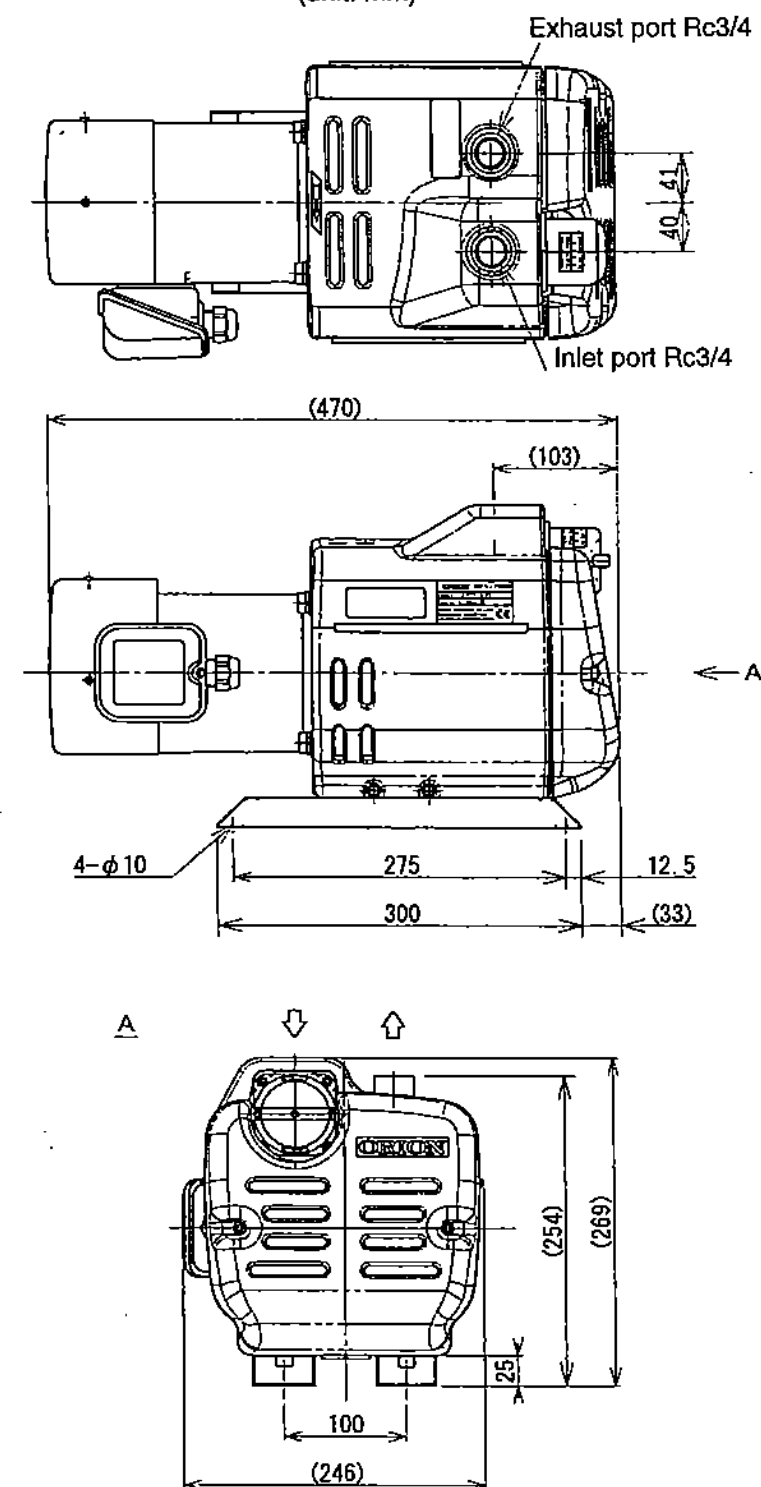
Be sure to read through the safety information.



Outside dimension

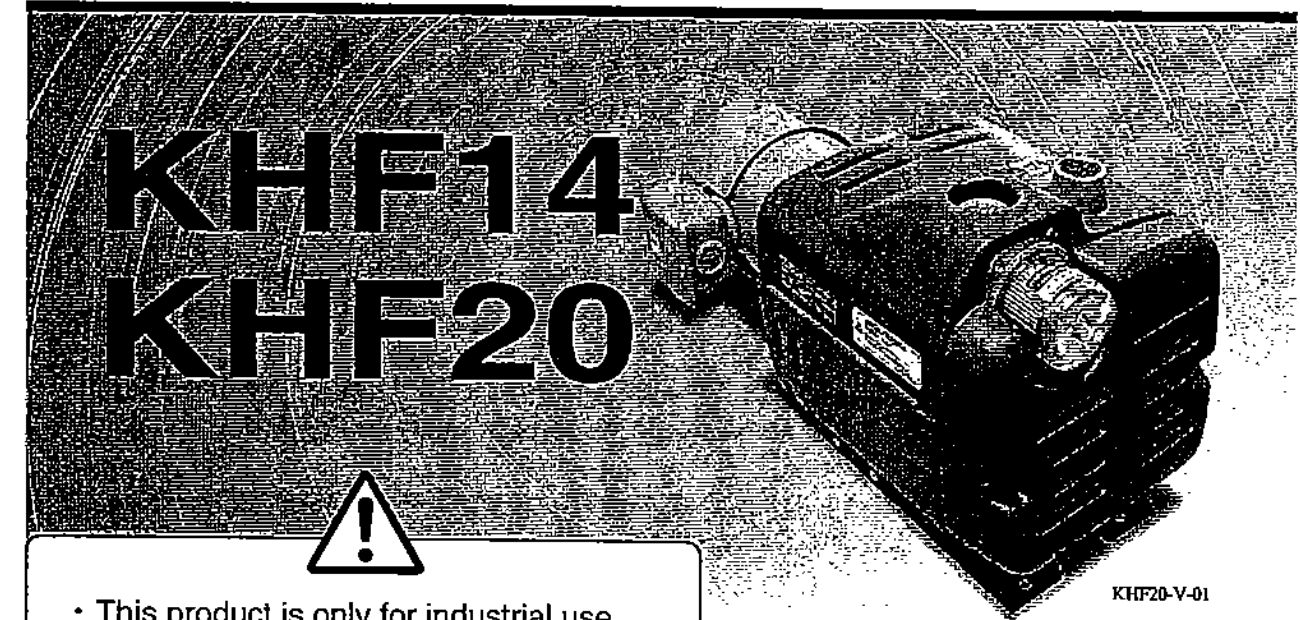
KHF20-V-04

(unit: mm)



INSTRUCTION MANUAL
OIL FREE ROTARY VANE VACUUM PUMP

ORION DRY PUMP



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

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No lubrication!