



INSTRUCTION

Fuel Pump

DR-50B1SUS (Drum type)

MODEL No.880996

SH-50B1SUS (Siphon type)

MODEL No.880997



WARNING

Prior to operating this pump, be sure to read this operation manual for safety. After reading the manual, please keep it at hand any time for your quick reference.

YAMADA CORPORATION

- Preface

Thank you very much for purchasing Yamada Pump. This pump, driven by the compressed air from an air compressor, is designed to pump out or transfer lubricant from drum cans or other vessels. The material of the liquid contact section of the machine is stainless steel, and that of the seal section is PTFE, FKM. Any solvent which does not agree to these materials is not available.

- For Safe Operation

This manual describes the items that are important for the user to operate this product safely, correctly, and efficiently. Before operating this product, read this manual thoroughly, in particular, "Warnings and Cautions" at the beginning of this manual, with a good understanding of its contents. Keep this manual carefully in an easy-to-access place so that the user may refer to it whenever necessary.

- Warnings and Cautions

For safe use of this product, be sure to note the following: In this document, warnings and cautions are indicated by symbols. These symbols are for those who will operate this product and for those who will be nearby, for safe operation and for prevention of personal injury and property damage. The following warning and caution symbols have the meanings described below. Be sure to remember their meanings.



WARNING : This indicates the existence of potential hazard which, if not avoided, will result in death or serious injury.



CAUTION : This indicates the existence of potential hazard which, if not avoided, may result in bodily injury or in physical damage.

Furthermore, to indicate the type of danger and damage, the following symbols are also used along with those mentioned above:



This symbol indicates an act that is prohibited (prohibition). The concrete contents of prohibition are indicated by the side of the indication.







This symbol indicates the contents that must be observed. The concrete contents of observance are indicated by the side of the indication.

- Precautions on Use






The following warnings and cautions are very important. Be sure to observe them.

WARNING

[Precautions]




-  - For your own safety, please read this instruction manual before use. After reading, please keep this manual on hand for future reference.
-  - When handling toxic or odoriferous liquid, please ventilate enough in order to prevent poisoning. Also, please wear protective equipment (safety mask, safety goggles, safety gloves, etc) always.
-  - Modification of the pump may cause damage or personal injury. Please do not do it for your own safety.
-  - To avoid personal injury, please turn off the air source and release the internal pressure of the pump always before the disassembly and inspection of the pump. In addition, in order to prevent from turning on the air source accidentally by others, please let known by displaying it.

[Cautions about Explosion or Fire]


-  - Gasoline is a highly-volatile fuel. Please do not use it to clean the pump. There is a risk of ignition or explosion.
-  - When transferring flammable liquid at high speed, generation of static electricity can be expected. If the pump is running without prevention measures, it may cause of shock to human body by spark, or may cause of personal injury caused by the explosion and fire. Please implement measures in accordance with the use environment.
-  - When transferring flammable or explosive liquid and if the pump runs with empty, there is a risk of explosion by compress of mixture of gas and air. For prevention of the pump empty run, please implement measures such as liquid level control.
-  - When transferring explosive liquid, please use with safe pressure with a margin.
-  - When handling flammable or explosive liquid, do not bring things that can become a spark around the liquid container and pump. There is a risk of explosion or fire.

CAUTION





[Strict Observance of Pump Spec]

-  - Do not use for the purpose other than prescribed application and the pump specifications. It may cause of personal injury or failure.
-  - Maximum supply air pressure of this unit is 0.7MPa. The use with exceeding pressure may cause of personal injury and property damage accidents by breakage of the pump or secondary piping. Please adjust the air pressure to 0.7MPa or less by air regulator always.
-  - Wetted part of this unit is made of SUS304 and seals are made of fluorine rubber (FKM) mainly. Liquids or chemicals that attack these materials can not be used. If used, there is a risk of human damage or physical damage by leak due to corrosion.





[Cautions in Start of Use]

-  - When installing the pump, please avoid the following locations.
 1. Locations of the atmosphere which corrode the pump. (Locations where generate such as chlorine gas)
 2. Location where ambient temperature is high (more than 60°C) or below zero.


 **CAUTION**

-  - Please use flexible connection such as hose between the pump and piping. If the pump is connected to the piping directly, problems such as noise, piping damage by vibration from the pump, unable of changing drum, unable of maintaining pump, etc will arise.
-  - If air containing water and dust is supplied to the pump, it may cause of pump failure. Please supply the appropriate air using air filter always.
-  - Be aware of discharge port when pump starts. There is a risk of spray of the liquid mixtures with air.
-  - If seals are worn or damaged, it causes of leak from the pump. In case of transferring liquid which may influence the human body, property damage, please adhere to the following matter.
 - 1) In preparation for a liquid leak by damage of the pump, hose and piping, please take the appropriate protective measures.
 - 2) Please check the leakage of the pump before use every day. If there is leak, please investigate and ask for the service.
 - 3) If trouble is found in the operation of the pump, stop the operation and contact our sales office or the dealer whom you purchased.


[Cautions in Operation]

-  - The pump is not equipped with ON-OFF switch. Please start and stop the pump by opening and closing of the valve.
-  - During operation of the pump, please do not touch your hands to the moving parts inside. It may cause of injury.
-  - There is a risk of contamination of lubricants into the exhaust. Please do not bring your hands or face near to the exhaust port.
-  - Do not lay down or hit the pump. It may cause of failure.

[Cautions in End of Use]

-  - After the operation or when the pump will not be operated for a long time, please turn off the air source and open the outlet valve in order to release the internal pressure of the pump, the hose and the piping. The secondary accidents such as damages of the hose and the piping, and pollutions of the facilities by leak from valves, which are caused by not shutting air, will be responsibilities of the users.

[Handling of The Liquid]

-  - Do not discharge the liquid directly on the ground. Please follow the laws and regulations to dispose the toxic substances. For the safety use, please read the MSDS from the liquid manufacturer and handle the liquids very carefully.

[Disposal of The Pump]


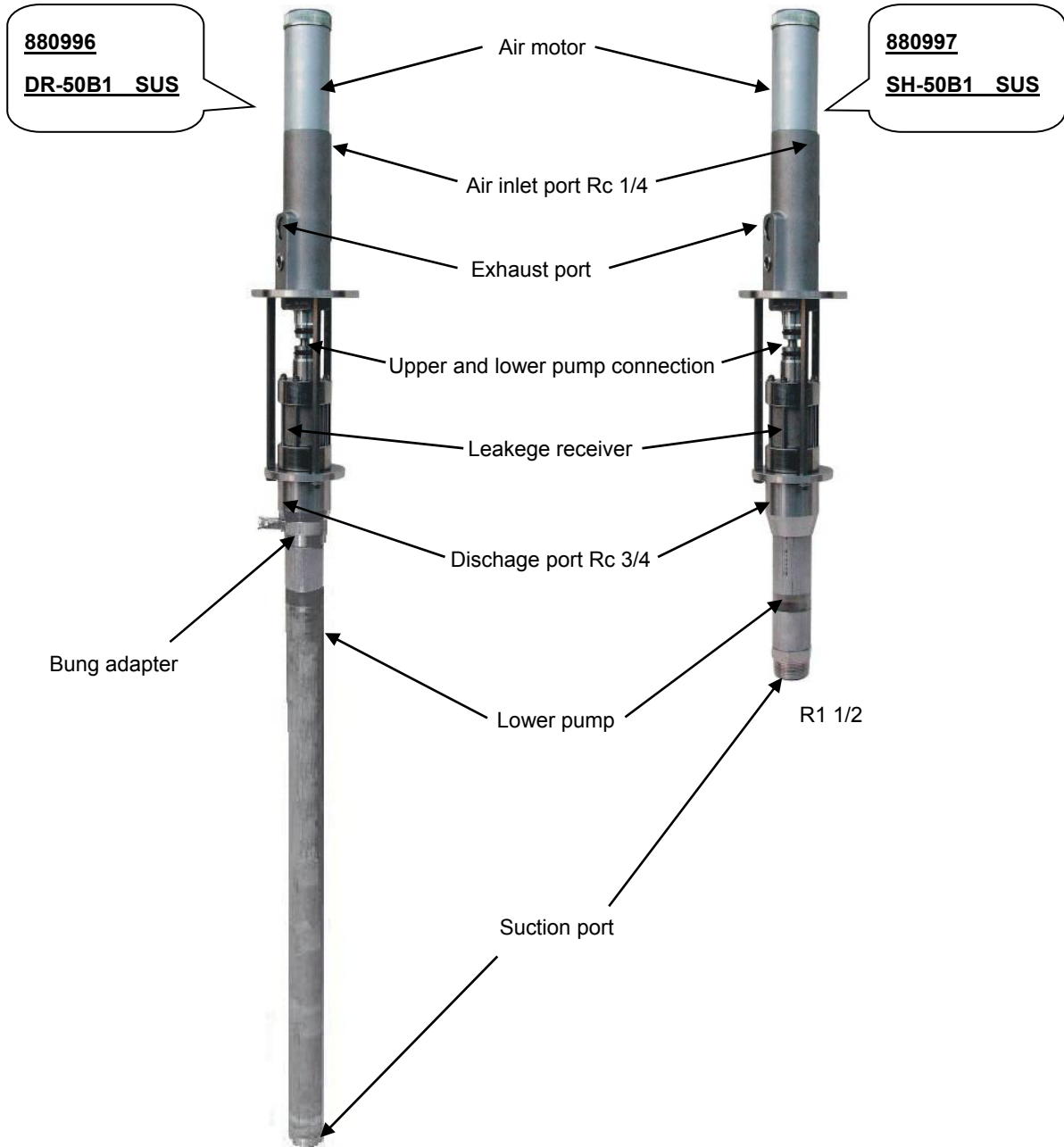
-  - Please follow the laws and regulations when you dispose the pump. (Please contact authorized industrial waste disposer.)

Table of Contents

- Preface
- For Safe Operation
- Warnings and Cautions
- Precautions on Use
- Table of Contents

1. Part Names	1
2. Installation	2
3. Operating Method	4
4. Maintenance and Inspection	7
5. Assembly Drawing and Parts List	
5.1 880996 Pump assembly	9
5.2 853582 Pump assembly	10
5.3 804096 Lower Pump assembly	11
5.4 880997 Pump assembly	12
5.5 853583 Pump assembly	13
5.6 804097 Lower Pump assembly	14
6. Specifications	15
7. Limited Warranty	16

1. Part Names



2. Installation

WARNING

[Confirming adaptability, executing protective treatment]



- When handling flammable, combustible, or explosive liquid, or toxic liquid with corrosive nature or acidity, confirm the adaptability of the pump in advance, and study/execute protective treatments that fit the liquid in use.

[Caution on operation]



- When handling toxic or odiferous liquid, have adequate ventilation to prevent intoxication. Also, do not fail to wear protective equipment (a safety mask, safety goggles, safety gloves, etc.).



- Never modify the pump since modification of the pump may cause injury or death accidents or failures of the pump.

[Caution against explosion/fire accidents]



- When handling flammable or explosive liquid, do not bring anything which may build a fire around the pump and a liquid container. Explosion/fire hazards may occur.

CAUTION

[Caution on beginning of use]



- When the pump is installed, avoid places below.
 - (1) A place with an atmosphere which causes corrosion on the pump (a place with chlorine gas generated)
 - (2) A place with high temperature (60 °C exceeded) or below freezing around the pump



- Do not connect connections of the pump directly to piping but use flexible materials such as a hose between the connections of the pump and the piping. If they are connected directly to the piping, problems will occur such as noise occurrence by pump vibration, pipe damage, drum can replacement unavailability, and pump maintenance unavailability.



- Supplying air which includes dust and water to the pump causes failures of the pump. Never fail to use an air filter or others to supply appropriate air.

Use seal tapes or others to tightly connect the connections of the pump to hoses/piping to prevent liquid leakage/air mixture from the connections.

a) Preparing pump

- (1) Set the pump in a vise, and connect a hose*¹, which is prepared separately, to the liquid outlet.
It is recommended that a hose union is used between the pump and the hose here.
- (2) For SH-50B1 SUS (Siphon pump), additionally install the socket and bush, which are accessories of the suction assembly (Product number: 803410) sold separately, to the liquid inlet of the pump, and connect the liquid inlet to the main body of the suction assembly via a hose*² prepared separately.
If other methods are used for piping, refer to "e) piping."

*1: Use a discharge hose whose material is adaptable to the liquid in use and have 1 MPa of a pressure capacity or higher.

*2: Use a suction hose whose material is adaptable to the liquid in use and have -0.08 MPa of a negative pressure capacity or lower. (Not to be damaged with -0.08 MPa of negative pressure)

b) Installation/storage place

Avoid installing/storing the pump in places below.

- (1) A place with an atmosphere which causes corrosion on the pump (a place with chlorine gas generated)
- (2) A place with high temperature (60 °C exceeded) or below freezing around the pump

c) Air source

(1) Air pressure and air flow volume

Prepare an air source that allows the air pressure and air flow volume which satisfy the pump specification.

(2) Air quality

If watery air is supplied to the pump, freezing will occur in the upper pump, and the original performance will not be maintained. Also, if dusty air is supplied, a packing and other parts may be damaged. Use an air filter or others to remove water and dust.

d) Installation

(1) Installation location

Install the pump so that it is as close as possible to a liquid container and the height of the liquid surface is the same as the height of the liquid outlet of the pump when the liquid is filled to capacity. If the liquid outlet of the pump is lower than the liquid surface, even when the pump is stopped, a valve may be pushed up by liquid pressure within the pump and the liquid may be transferred automatically. Pump failures may cause liquid outflow; therefore, do not use the pump pushing in.

(2) Installation work

For DR-50B1 SUS (Drum pump)

- Install the supplied bang adapter to a larger port (2 inches) of the drum can, insert the pump to the port, and tighten the wing bolt to fix the pump. At this time, to prevent damage of the drum can bottom, fix the pump so that the pump is spaced from the can bottom by 2 to 3 cm.
- Install a drum can on a horizontal floor surface and fix it securely to prevent falling with pump vibration and on disaster.
- Install/fix the pump so that the pump remains vertical.

For SH-50B1 SUS (Siphon pump)

- Install the pump on a wall surface using the mounting bracket (Product No.: 800400) sold separately. At this time, to prevent dropping of the pump by its vibration or outer force, fix the pump firmly.
- When the pump vibration noise is transferred to a building or a structure, insert a rubber vibration insulator between the mounting bracket and the wall surface.
- Install/fix the pump so that the pump remains vertical.

e) Piping

(1) Suction piping

- Use the piping material which is adaptable to the liquid in use and have -0.08 MPa of a negative pressure capacity or lower.
- A long suction distance affects the pump performance.
- Never apply a push piping, but always apply a suction piping.
- If there is a risk of mixture of slurries or other foreign substances, attach a strainer to the head of the suction piping.

(2) Discharge piping

- Use the piping material which is adaptable to the liquid in use and have 1 MPa of a pressure capacity or higher.
- Install a valve to the discharge piping, apply end stop, and control the flow volume.

- A long discharge piping may damage itself because of water hammer phenomenon; therefore, open/close the pump gradually using a manual valve. Avoid opening/closing rapidly using an automatic valve such as a solenoid valve.
- Apply a relief circuit to a long discharge piping. The pressure increase with liquid volume expansion by temperature raise within the piping may cause damage on the piping and the pump.
- If there is a risk of freezing of liquid in use, install a drain to discharge the liquid within the piping.

(3) Air piping







- Install an air valve (ball valve) and air decompression valve to the air piping, which are prepared separately. If the air valve and air decompression valve are directly installed to the pump, to prevent damage on screw parts by pump vibration and valve's own weight, carefully select the piping joint material for connection.
- If clean air is unavailable, attach an air filter.

NOTE: Attaching an air coupler to the air inlet of the pump makes easier operations for drum can replacement and maintenance.

3. Operating Method

1) Before using

Confirm the following warnings and cautions.

 WARNING	
[Confirming adaptability, executing protective treatment]	
	- When handling flammable, combustible, or explosive liquid, or toxic liquid with corrosive nature or acidity, confirm the adaptability of the pump in advance, and study/execute protective treatments that fit the liquid in use.
[Caution on operation]	
	- When handling toxic or odiferous liquid, have adequate ventilation to prevent intoxication. Also, do not fail to wear protective equipment (a safety mask, safety goggles, safety gloves, etc.).
[Caution against explosion/fire accidents]	
	- When the pump is not filled with liquid (when the pump is used for the first time after purchase or after disassembly/repair), do not operate the pump at high speed suddenly. Not only the sealing parts are damaged, but also, if flammable or explosive liquid is handled, vaporizing liquid may be compressed causing explosion. Never fail to start the operation at low speed adjusting the open degree of the air valve and others. Also, to prevent no-liquid running, implement a measure such as liquid surface control.
	- When the pump is used for explosive liquid, use the pump with enough safety pressure.
	- When handling flammable or explosive liquid, do not bring anything which may build a fire around the pump and a liquid container. Explosion/fire hazards may occur.

CAUTION

[Strictly complying with pump specifications]



- Do not use the pump for specifications and purposes other than the ones specified. Injury or death accidents and failures of the pump may occur.



- The maximum supply air pressure for the pump is 0.7 MPa. If higher pressure is applied, the pump and the secondary piping may be damaged causing injury or death accidents/property damage. Never fail to adjust the air pressure to 0.7 MPa or lower with the air decompression valve to use the pump.



- The SUS304 is used for the parts where liquid contacts and fluorine-contained rubber (FKM) is mainly used for the sealing parts of the pump. The pump cannot be used for liquid/chemicals which affect those materials. If it is used, liquid leakage by corrosion may occur causing human body/property damage.

[Caution on beginning of use]



- Abrasion/damage of packings causes liquid leakage from the pump. When the pump is used for liquid which may cause human body/property damage, observe the following items fully.
 - (1) In preparation for unexpected liquid outflow by pump/hose/piping damage, execute a proper protective treatment.
 - (2) Inspect for pump liquid leakage before use every day. If there is a leakage, investigate the pump well and ask repair.
 - (3) If there is an abnormality in the pump operating condition, stop using it, and contact the dealer for your purchase or our sales office.

[Caution on operation/handling]



- The pump has no switch to turn on/off the pump. Open/close the valve or attach/remove the air coupler to start/stop the pump.



- While the pump is running, do not touch movable parts. If you touch them, your hands may be caught in them and get injured.



- Do not drop/slap the pump. Failures of the pump may occur.

[Caution on end of operation]



- When the operation ends or when the pump is not to be used for a long time, never fail to disconnect the air, and open the liquid outlet valve to remove the pressure in the pump, secondary hose, and piping. The secondary disaster shall be user's responsibility such as hose/piping damage without disconnection of air and facility contamination by liquid leakage from a valve.

[Handling transferred liquid]



- Do not discharge the handled liquid directly to the ground. Comply with laws and regulations applied for handling hazardous substances. Also, for safety, read carefully the handling precautions (MSDS) by the manufacturer of the liquid in use to handle the liquid cautiously.

NOTE: Use the pump with the minimum necessary supply air pressure to minimize wear of the pump.

2) Preparing operation

When the pump is operated for the first time after installation or when it is re-operated after long time operation stop, prepare the pump as follows:

- (1) Clean enough inside of the piping and the container.
- (2) Check for piping connection loose and pump connection screw parts loose.
- (3) Wipe off dirt on the part of the pump or the suction assembly, which is inserted to the container, and set it to the container.
- (4) Set 0 MPa for the air decompression valve.

- (5) Fully open the air valve, and gradually increase the pressure of the air decompression valve up to the level where the pump almost starts to operate.
- (6) In this operation status, remove the air in the piping with operation of the discharge piping valve.

3) Operation method

CAUTION



– Never operate rapid opening/closing for both the air valve and discharge piping valve. A water hammer phenomenon may damage the piping and the pump.

- (1) For control with operating discharge piping valve
While the discharge piping valve is closed, fully open the air valve, and set the specified pressure with the air decompression valve. Then, control the pump with the discharge piping valve opening/closing.
- (2) For control with operating air valve/air compression valve
Close the air valve, and set the specified pressure with the air compression valve. Then, control the pump with the air valve opening/closing and opening position adjustment.

4) Running end operation

- (1) Close the discharge piping valve or the air valve to stop the pump. However, if only the discharge piping valve is closed, the internal pressure of the pump will be maintained
- (2) To halt operation, close the air valve.
- (3) To halt operation for a long period, disconnect the air source, and remove liquid from the pump and discharge piping.

4. Maintenance and Inspection

WARNING



- Gasoline is high-volatility fuel. Never use it for cleaning the pump. Flammable explosion may occur.



- When handling toxic or odiferous liquid, have adequate ventilation to prevent intoxication. Also, never fail to wear protective equipment (a safety mask, safety goggles, safety gloves, etc.).



- To prevent injury or death accidents, before the pump disassembly/inspection, never fail to disconnect the air source and remove the pressure in the pump. Also, post a sign to prevent others from turning on the air source wrongly.

CAUTION



- Do not discharge the handled liquid directly to the ground. Comply with laws and regulations applied for handling hazardous substances. Also, for safety, read carefully the handling precautions (MSDS) by the manufacturer of the liquid in use to handle the liquid cautiously.

1) Maintenance and inspection

<Daily check>

- Check for liquid leakage before the pump is operated. If liquid leakage is found, never operate the pump, but repair it. Also, check inside of the leaked liquid receiver. If liquid has been gathered, repair the pump.
- Check for abnormal noise/vibration while the pump is in operation to confirm smooth operation of the pump.
- Check for abnormal appearance (corrosion, etc.). If it is found, never operate the pump, but repair it.
- Check that the supply air pressure does not exceed 0.7 MPa of the maximum operating air pressure of the pump.
- While air is being supplied, close the discharge piping valve, and check the operating condition of the pump. If the pump starts operation within one minute after stop with the end stop, disassemble/repair the pump or replace parts of the pump.

<Every ten days>

- For smooth operation of the pump, pour a few drops (Approx. 5 ml) of a lubricant (Turbine oil: Type 1 ISO VG32) into the air inlet.

<Every one year>

- Check for loose screws. If loose screws are found, tighten them.

<Every three years>

- Execute overhaul.

It is recommended that overhaul is executed earlier than 3 years depending on the operating frequency and consumption condition.

2) Troubleshooting and corrective measures

If an abnormality is noticed, stop operating the pump, and check the following items. Then if the cause is still not found, please consult the dealer for you purchase. In addition, for parts replacement/repair, please contact the dealer.

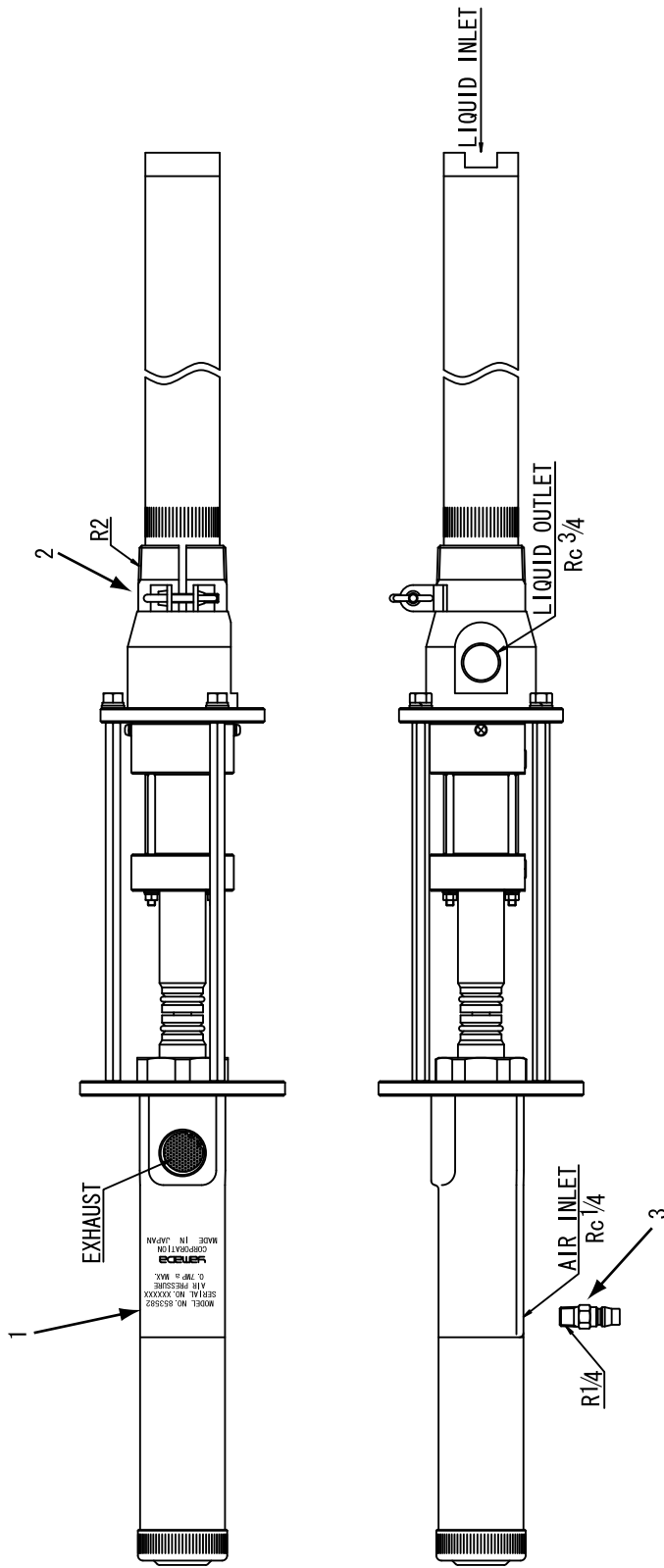
Failure	Symptom	Cause	Corrective measure
No discharge or discharge volume insufficient	The pump cannot be operated.	The compressor is not in operation.	Inspect the compressor.
		Clogging in the air piping	Inspect the air piping. Attach an air filter.
		The supply air pressure is low.	Check the air pressure. 0.3 to 0.7 MPa
		Clogging in the discharge piping	Inspect the discharge piping.
		Freezing in the piping	Stop operation until ice thaws. Attach an air filter. (Removing water)
	Even only air motor cannot be operated.	Failure of the air motor	Repair the air motor.
	Only air motor can be operated.	Failure of the lower pump	Repair the lower pump.
	The pump can be operated.	The drum can/container is empty.	Replace the drum can/Fill up the container.
		Leakage from the suction piping	Repair the suction piping.
		Foreign substance caught in the valve of the pump	Repair the lower pump.
Lower pump packing abrasion		Replace the part.	
The pump operation does not stop with end stop.	Liquid leakage from pump or discharge/suction piping(valves included)	Leakage from discharge/ suction piping	Repair the discharge/ suction piping.
		Leakage from the lower pump	Repair the lower pump.
	No liquid leakage from pump or discharge piping.	The drum can/container is empty.	Replace the drum can/ Fill up the container.
		Air mixed from the suction piping	Repair the suction piping.
		Lower pump packing abrasion	Replace the part.
Abnormal noise during operation	/	Plunger galling	Repair the pump.
		Packing abrasion	Replace the part.
		Part damage	Replace the part of the the pump.

3) Aftermarket parts

Use genuine products for aftermarket parts used for repair.

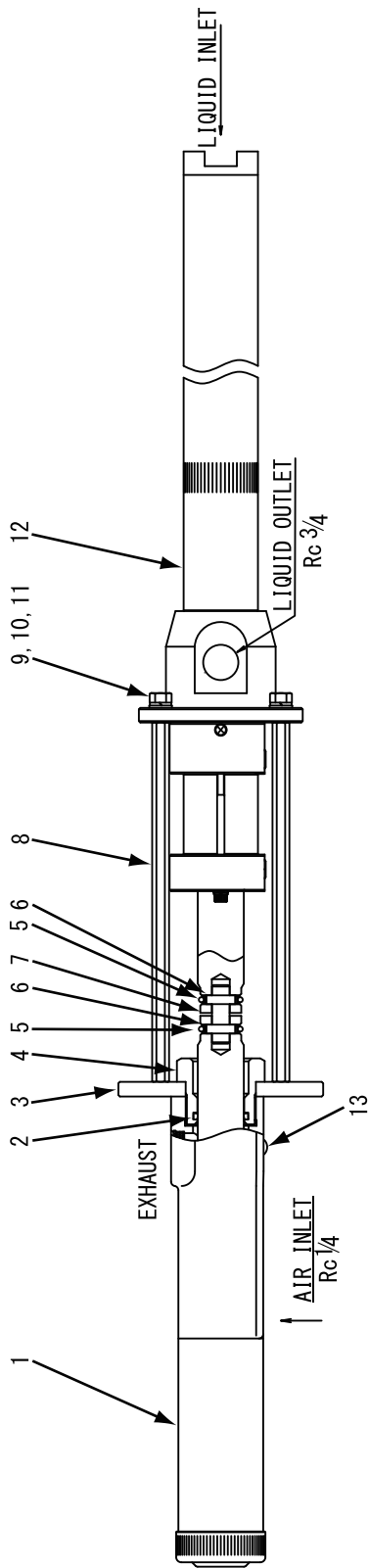
5. Assembly Drawing and Parts List

5.1 880996 Pump assembly



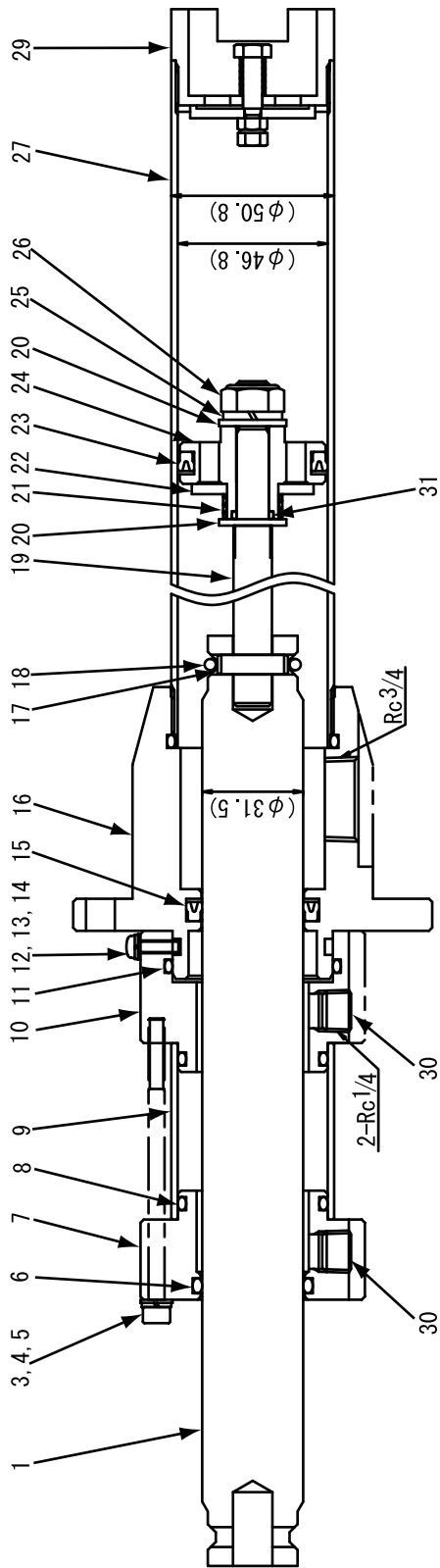
No.	Parts No.	Descriptions	Qty
1	853582	Pump assembly	1
2	804098	Bung adapter	1
3	680743	Air coupler (plug)	1

5.2 853582 Pump assembly



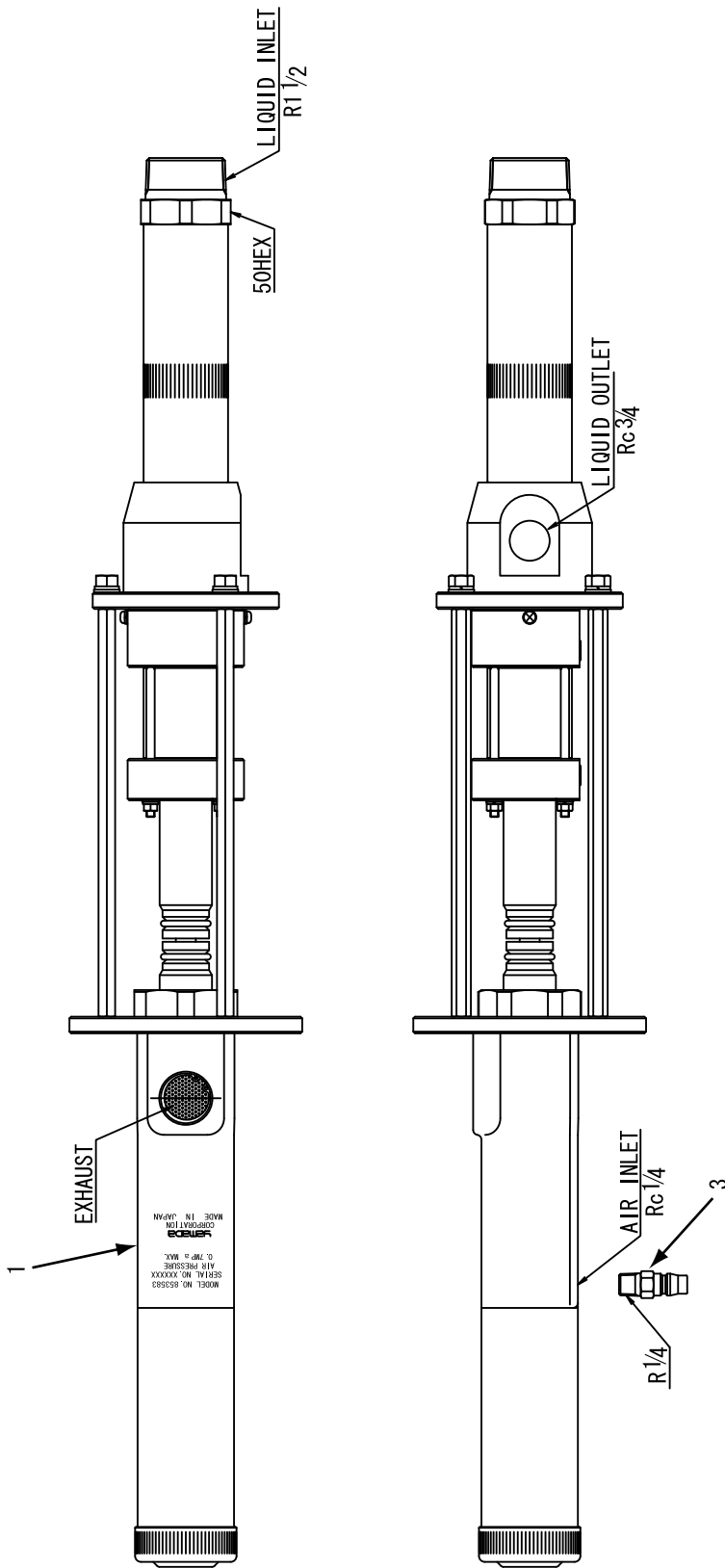
No.	Parts No.	Descriptions	Qty	No.	Parts No.	Descriptions	Qty
1	804095	Air motor assembly	1	8	714478	Stud	3
2	642031	O ring	1	9	631173	Plain washer	3
3	714474	Flange	1	10	681300	Spring lock washer	3
4	716019	Flange holder	1	11	628012	Nut	3
5	642021	O ring	2	12	804096	Lower pump assembly	1
6	685134	Pin	2	13	686337	Tapping screw	1
7	714477	Rod	1				

5.3 804096 Lower Pump assembly



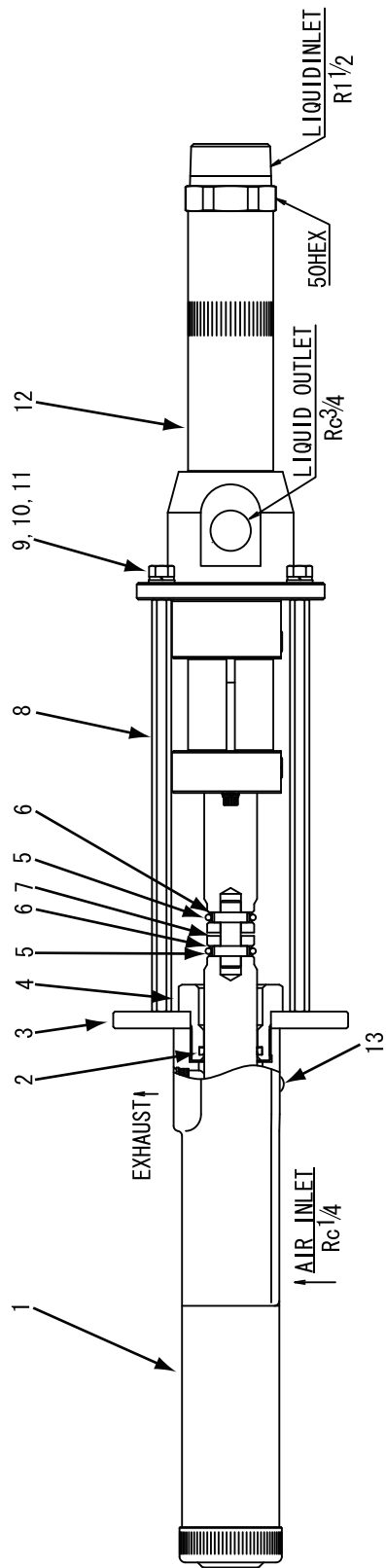
No.	Parts No.	Descriptions	Qty	No.	Parts No.	Descriptions	Qty
1	714479	Plunger	1	17	685134	Pin	1
2				18	642021	O ring	1
3	681493	Spring lock washer	2	19	714485	Rod	1
4	631171	Plain washer	2	20	631330	Plain washer	2
5	686154	Hexagon socket head cap screw	2	21	714486	Spring	1
6	642031	O ring	1	22	714487	Valve seat	1
7	714481	Cap	1	23	685125	Packing	1
8	642133	O ring	2	24	714488	Valve body	1
9	714482	Oil tank	1	25	680257	Spring lock washer	1
10	714483	Socket	1	26	685126	Nut	1
11	642135	O ring	2	27	714489	Suction tube	1
12	608101	Machine Screw	2	28			
13	684306	Spring lock washer	2	29	832487	Foot valve assembly	1
14	631169	Plain washer	2	30	682665	Hexagon socket head set screw	2
15	685124	Packing	1	31	642007	O ring	1
16	714484	Body	1				

5.4 880997 Pump assembly



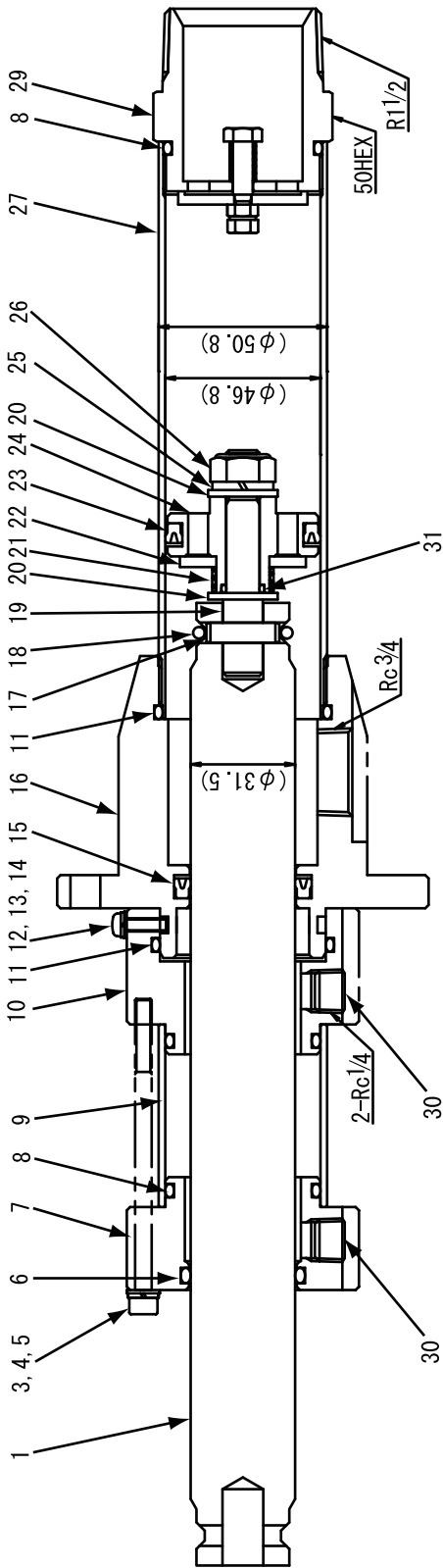
No.	Parts No.	Descriptions	Qty
1	853583	Pump assembly	1
2			
3	680743	Air coupler (plug)	1

5.5 853583 Pump assembly



No.	Parts No.	Descriptions	Q'ty	No.	Parts No.	Descriptions	Q'ty
1	804095	Air motor assembly	1	8	714478	Stud	3
2	642031	O ring	1	9	631173	Plain washer	3
3	714474	Flange	1	10	681300	Spring lock washer	3
4	716019	Flange holder	1	11	628012	Nut	3
5	642021	O ring	2	12	804097	Lower pump assembly	1
6	685134	Pin	2	13	686337	Tapping screw	1
7	714477	Rod	1				

5.6 804097 Lower Pump assembly



No.	Parts No.	Descriptions	Qty	No.	Parts No.	Descriptions	Qty
1	714479	Plunger	1	17	685134	Pin	1
2				18	642021	O ring	1
3	681493	Spring lock washer	2	19	714494	Rod	1
4	631171	Plain washer	2	20	631330	Plain washer	2
5	686154	Hexagon socket head cap screw	2	21	714486	Spring	1
6	642031	O ring	1	22	714487	Valve seat	1
7	714481	Cap	1	23	685125	Packing	1
8	642133	O ring	3	24	714488	Valve body	1
9	714482	Oil tank	1	25	680257	Spring lock washer	1
10	714483	Socket	1	26	685126	Nut	1
11	642135	O ring	2	27	714495	Suction tube	1
12	608101	Machine screw	2	28			
13	684306	Spring lock washer	2	29	832488	Foot valve assembly	1
14	631169	Plain washer	2	30	682665	Hexagon socket head set screw	2
15	685124	Packing	1	31	642007	O ring	1
16	714484	Body	1				

6. Specifications

Model No.		880996	880997
Type		DR-50B1 SUS	SH-50B1 SUS
Pump Ratio (Nominal)		1 × 1	
Material Connection	Suction port	—————	R1 1/2
	Discharge Port	Rc 3/4	
	Leakage receiver connecting port	Rc 1/4 (2 places)	
Air Connection	Supply Port	Rc 1/4 (When the accessory is not used)	
Compatible materials		Kerosene/light oil, other fuel oil, water Other liquid which does not corrode the materials that contact the liquid Unavailable for slurry liquid and food substances	
Operating Air Pressure		0.3 ~ 0.7 MPa	
Noise		Max. 90 dB	
Amb. Temp. Range	Env. Temperature	0 ~ 60 °C	
	Material Temp.	0 ~ 80 °C	
Stroke(Nominal)		69mm	
Discharge Volume per Cycle [※]		174 mL	
Maximum Discharge Pressure [※]	Supply air pressure at 0.7MPa	0.7 MPa	
Limitation of Viscosity		3 Pa · s (in case of submerged suction)	
Suction lift		—————	3 m
Weight (excluding accessories)		12.6 kg	9.9 kg

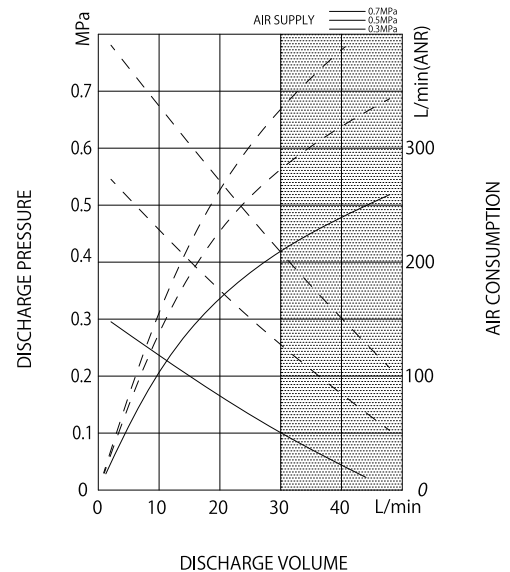
※Discharge volume (per cycle) varies according to use conditions.

a) Transferred liquid

- (1) Do not use the pump for slurry liquid.
- (2) Do not use the pump for food substances.
- (3) Do not use the pump for liquid that affects the SUS304 which is a material used for the pump parts that contact the liquid and fluorine-contained rubber (FKM).
- (4) Note that viscosity, steam pressure, and corrosion resistance change according to liquid temperature change.

b) Indoor/outdoor operation

- (1) The pump can be operated both indoor and outdoor.
- (2) Especially for operation outdoor, pay attention to the air quality (water, dust, etc.) control.
- (3) Take safety measures to prevent the pump and peripheral protective facilities from receiving harmful effects on disasters such as a flood by heavy rains.



Left up: Discharge volume - Discharge pressure Curve line

Right up: Discharge volume - Air consumption volume Curve line

* Do not use the pump under the right side shadowed condition.

7. Limited Warranty

If an abnormality occurs during normal operation in accordance with the operating instructions and other operating cautions within the warranty period (12 months after date of purchase) that can be attributed to a manufacturing defect, the defective parts of this product will be serviced or the product will be replaced free of charge. However, this warranty will not cover compensation for incidental damage or any malfunction listed below.

1. Warranty period

This warranty will be valid for a period of 12 months after the date of purchase.

2. Warranty

If, during the warranty period, any of the material of the genuine parts of this product or the workmanship of this product is found defective, and is so verified by our company, the servicing cost will be fully born by our company.

3. Exclusion

Even during the warranty period, this warranty does not cover the following.

- 1) Malfunction arising from use of parts other than manufacturer-specified genuine parts
- 2) Malfunction arising from misuse or operating errors, or lack of storage or maintenance care
- 3) Malfunction arising from use with a fluid that may cause corrosion, inflation or dissolution of the component parts of the product
- 4) Irregularity arising from repair made by other than by our firm, our regional office, dealer or authorized service personnel
- 5) Malfunction arising from modification of the product by other than authorized service personnel
- 6) Wear and tear of parts that must be regularly replaced in the course of normal operation, such as packings, O-rings and hose.
- 7) Malfunction and/or damage due to use with incorrect voltage.
- 8) Malfunction and/or damage due to transportation, moving or drop page of the product after purchase
- 9) Malfunction and/or damage due to fire, earthquake, flood or other force majeure
- 10) Malfunction arising from use of compressed air that contains impurities or excessive moisture, or use of gases or fluids other than the specified compressed air
- 11) Malfunction arising from use of excessively abrasive material or of inadequate grease.

Furthermore, this warranty does not cover the rubber parts, or other parts used in this product and its accessories, which are subject to wear in normal operation.

- hoses
- packings
- cords

4. Parts

Parts for this product will be kept available for 5 years after discontinuation of production. Once 5 years have elapsed after close of production, availability of parts for this product cannot be guaranteed.

Manufactured by

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