WALRUS PUMP

TPR Series

Instruction Manual

Vertical Multistage Centrifugal Pump



Model : 1 / 3 / 5 / 10 / 15 / 20 / 32 / 45 / 64 / 90

To ensure safe and proper use, please read this instruction before operation.

ISO 9001 Certified **WALRUS PUMP CO., LTD.** CE

EC Declaration of Conformity

Manufacturer:

Walrus Pump Co., Ltd.

Address:

No.83-14, Dapiantou, Sanzhi Dist., New Taipei City 252, Taiwan

Declare that the machinery described:

Name: Water Pump

Model: TPR Series

Conform to the following directive:

2006/42/EC—Machinery directive

2014/35/EU—Low voltage directive

2014/30/EU—EMC (Electromagnetic compatibility) directive

2009/125/EC— Ecodesign Directive

Refer to the following standards:

EN ISO 12100:2010	EN ISO 13857:2008
EN 809:1998+A1:2009	EN 60204-1:2006
EN 60335-1:2012	EN 60335-2-41:2003+A2:2012
EN 61000-6-2:2005	EN 61000-6-3:2007

R&D Department: Kao Tien-Chuan

Director: Kao Tien chuan

Please read this instruction manual carefully before installing your new system as failures caused by incorrect installation and operation are not covered by the warranty.

1. Handling The Pump

When lifting the entire pump with motor, follow these instructions:
Lift the pump in the motor flange by means of straps or the like.



Fig. 1 Correct lifting of a TPR pump

2. Model Explanation

Pump

Example	TPR	1	-4	-S	F	-RSSH
Type range: TPR						
Flow rate						
Number of impellers						
Code for materials						
Code for pipe connection						
Code for shaft seal						

Dey to codes

Code	Description
Code for materials	
S	SUS 304
N	SUS 316
Code for pipe connection	
F	DIN Flange
P	PJE Coupling

Shaft seal

Example	R	S	S	H
Shaft seal type designation				
Material of stationaryr seal face				
Material of rotating seal face				
Material of secondary seal (rubber part)				

Code	Description
Shaft seal type designation	
R	Shaft seal type designation
Seal face material (stationary and rotating)	
S	Silicon Carbide (SIC)
Secondary seal material (rubber parts)	
E	EPDM
H	HNBR

Application

TPR, TPR_S and TPR_N pumps are suitable for liquid transfer, circulation and pressure boosting of cold or hot clean liquids.
Use TPR_N pumps in systems where all parts in contact with the liquid are made of high-grade stainless steel.

3. Technical Data

3.1 Operation condition

Delivery liquids : non-viscous, non-flammable/explosive, not containing solid or fiber particles, and should not cause physical nor chemical damage to the pump. For viscosity larger than water, use pumps with a higher output if necessary. Whether a pump is suitable for a certain liquid depends on factors such as the liquid's chlorine content, PH value, temperature and composition, among other factors.

Liquid Temperature: -20°C ~ +90°C

Ambient Temperature: Max. +40°C

At ambient temperatures over 40°C or altitudes over 1000m above sea level, motor heat dissipation will be reduced due to reduced air density. The power output will also be reduced accordingly. In those situations, a higher rated pump is necessary.

3.2 Motor

The motor is a totally enclosed, fan cooled, 2-pole standard motor.

Installation specifications: 0.37-4.0kW, V18; over 5.5kW, V1 acc to EN 60034-7

Insulation class: F

Enclosure class: IP 55 and IP 54 (Depending on the installed motor)

Stops and Restarts: 0.37 up to 4kw, 30 times / hour

Over 4.0kw, 20 times / hour

3.3 Operating range of the shaft seal

The operating range of the shaft seal depend on operating pressure, pump type, type of shaft seal and liquid temperature. The range show in fig.2 applies to clean water with anti-freeze liquids. If the operating range is exceeded, the life of the shaft seal may be reduced.

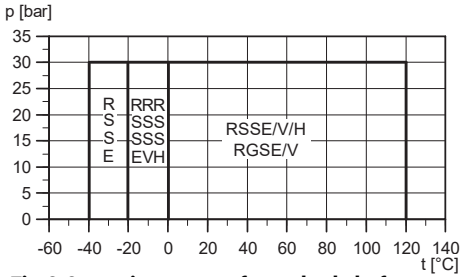


Fig.2 Operating range of standard shaft range

Standard Shaft seal	Motor Size (kW)	Description	Liquid Temperature (°C)
RSSH	0.37-18.5	SiC / SIC, HNBR	-20~+120
RSSE	0.37-18.5	SiC / SIC, EPDM	-40~+120
RSSV	0.37-18.5	SiC / SIC, VITON	-20~+120
RGSE	0.37-18.5	Carbon / SIC, EPDM	0~+120
RGSV	0.37-18.5	Carbon / SIC VITON	0~+120

3.4 Minimum Inlet Pressure, NPSH

Check the minimum inlet pressure under the following conditions:

-The liquid temperature is high
-Flow rate significantly larger than quoted maximum
-The fluid requires a long sucking distance
-Long pipes lead to the fluid inlet point

Use the formula below to calculate the maximum suction distance of the pump:

H = Pb x 10.2 – NPSH – Hf – Hv – Hs

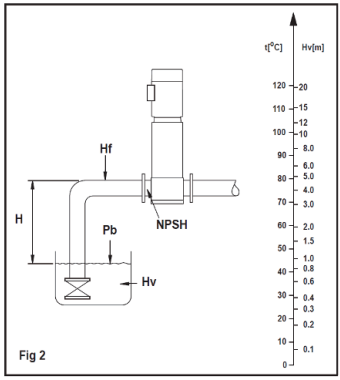


Fig.3 Minimum Inlet Pressure, NPSH

Pb – Atmospheric pressure [bar]. In an enclosed system, Pb is the system pressure.
NPSH – Net Positive Suction Head [m]. Read from the NPSH curve, for the maximum value of the particular pump system.
Hf = Loss from suction pipes [m], calculate from pump's maximum flow values.
Hv = Vapor pressure [m], read from the vapor pressure chart.
Hs = Safety margin [m], use the minimum 0.5m if necessary.
If H is positive then the pump can safely operate at a maximum suction distance H. If H is negative then an inlet pressure H must be guaranteed.

Example:
Pb =1bar
Pump type: TPR 3 , 60Hz
Flow rate: 3 m^3/hr
NPSH: 1.7m
Hf = 3.0m
Liquid temperature: +40°C (From Fig.3)
Hv = 3.1m
H = 1 X 10.2 - 1.7 - 3.0 – 0.75 - 0.5 = 4.65m
This means that the pump can operate at a suction lift of maximum 4.25 meters head.

3.5 Maximum inlet pressure

The following table shows the maximum permissible inlet pressure. However, the actual inlet pressure plus the pressure against a closed valve must always be lower than the maximum permissible operating pressure.

If the maximum permissible operating pressure is exceeded, the conical bearing in the motor may be damaged and the life of the shaft seal reduced. (see page 11)

3.6 Minimum flow rate

Due to the risk of overheating, do not use the pump at flows below the minimum flow rate. The curves below show the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature.

- - - - = air-cooled top.

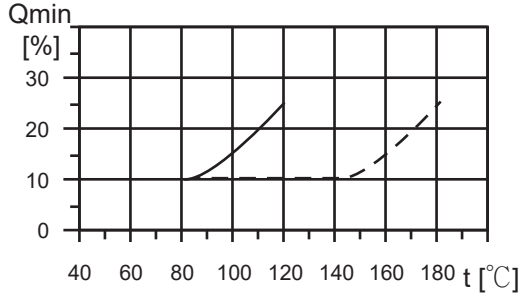


Fig. 4 Minimum flow rate

Caution: The pump must not run against a closed discharge valve.

4. Noise Level

Motor (kW)	$\overline{LA}$ dB(A) 50Hz	Motor (kW)	$\overline{LA}$ dB(A) 50Hz
0.37	<70	5.5	80
0.55	<70	7.5	80
0.75	<70	11	86
1.1	<70	15	86
1.5	<70	18.5	86
2.2	<70	22	86
3.0	72	30	88
4.0	72	37	88

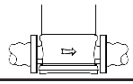
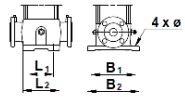
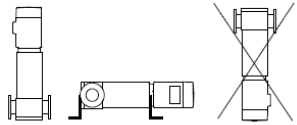
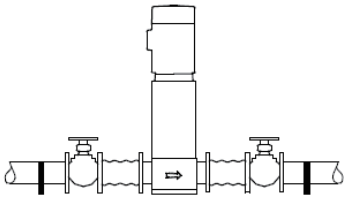
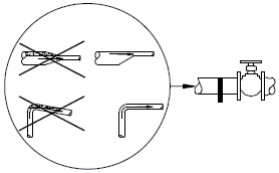
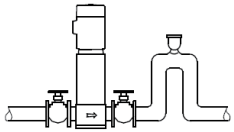
The above drawing shows the noise level while the pump operated with a closed outlet.The tolerance of noise level is ±4dB(A).

A Hearing protection device is needed by the personnel around the pump where is noise over 80 dB(A)

5. Installation

5.1 The pump must be secured to a horizontal, plane and solid foundation by bolts through the holes in the base plate.

When installing the pump, follow the procedure below in order to avoid damaging the pump.

Step	Action
1. 	Arrows on the pump base show the direction of flow of liquid through the pump.
2. 	This information is in: • port-to-port lengths • dimensions of the base • pipework connections • diameter and position of foundation bolts.
3. 	The pump can be installed vertically or horizontally (TPR, TPRN 120 and 150, 75 kW, only vertically). However, the motor must neither fall below the horizontal plane nor be installed upside down. Ensure that an adequate supply of cool air reaches the motor cooling fan. Motors above 4 kW must be supported.
4. 	To minimize possible noise from the pump, we advise you to fit expansion joints on either side of the pump. Fit isolating valves on either side of the pump to avoid draining the system if the pump needs to be removed for cleaning, repair or replacement. Always protect the pump against backflow by means of a non-return valve (foot valve).
5. 	Install the pipes so that air locks do not occur, especially on the suction side of the pump.
6. 	Fit a vacuum valve close to the pump if the installation has one of these characteristics: • The discharge pipe slopes downwards away from the pump. • There is a risk of siphon effect. • Protection against backflow of unclean liquids is needed.

5.2 Outdoor installation: When the pump is installed outside, please provide a suitable cover to protect it from weather and forst. Please do not allow any foreign objects fall into the motor fan cover.

6. Electrical Connection

6.1 The electrical connections must be performed by a qualified electrician in compliance with the required regulations.

6.2 Make sure that the supply voltages and frequencies matched with the electric motor rating plate.
Provide suitable general protection against short circuits on the power line.

6.3 Before removing the terminal box cover and before any removal/dismantling of the pump, make sure that the electricity supply has been switched off.

6.4 The power supply line must be provided with the following devices (unless otherwise specified by the local regulations in force:
- A short-circuit protection device
- A high-sensitivity differential device providing additional protection against electric shock in case the grounding system is inefficient.
- A mains isolator switch with a contact gap of at least 3 millimeters (⅛").

6.5 The operating voltage and frequency are marked on the motor nameplate. Make sure that the motor is suitable for the electricity supply on which it will be used.

6.6 Overload protection (three-phase motors)
You must provide the overload protection (thermal relay or motor protector)

6.7 Electrical data (voltage and frequency) are shown on the pump nameplate. Verify if these data match your electricity supply. A Residual current device (RCD, 30mA) should be installed and the grounding be properly connected for your safety.

6.8 Three phase motor must check rotating direction. The rotating direction indicated on the fan cover, is counter clockwise viewing from fan cover end. Interchanging any two leads with power off can reverse the pump rotation.

6.9 If the supply cord is damaged, it must be replaced by the manufacturer, authorized service agent, or qualified persons in order to avoid causing a hazard.

7. Start-Up

7.1 **Note:** Do not start the pump until it has been filled with liquid and vented.

For priming, the pump and suction piping must be filled with liquid before startup. If the pump runs dry, the pump bearings and the shaft seal may be damaged.

7.2 Liquid level higher than the pump

Remove the fill/bleed plug and open the suction valve until the water flows out of the plug, then re-tighten it (fig. 5).

Follow the instructions on page 7 and 8

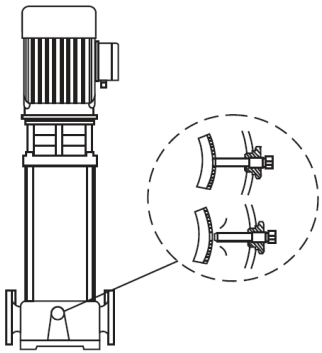
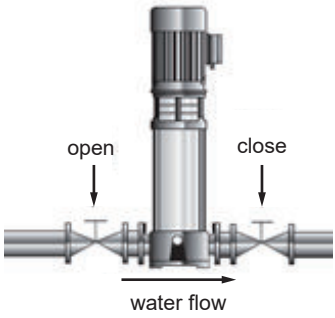
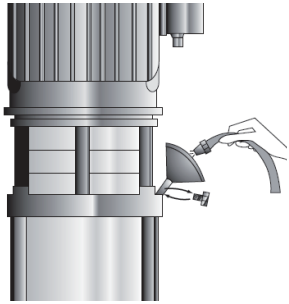
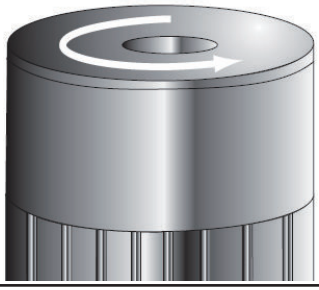
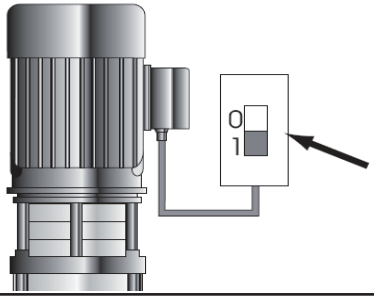
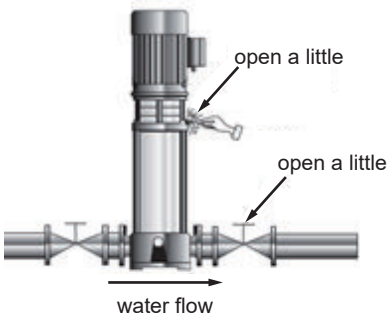


Fig. 5 Location of drain plug and bypass valve

Start-Up

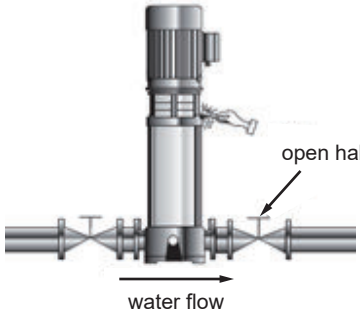
1. 	2. 
1. Close the isolating valve on the discharge side of the pump and open the isolating valve on the suction side.	2. Remove the priming plug from the pump head and slowly fill the pump with liquid. Replace the priming plug and tighten securely.
3. 	4. 
3. See the correct direction of rotation of the pump on the motor fan cover.	4. Start the pump and check the direction of rotation.

5.



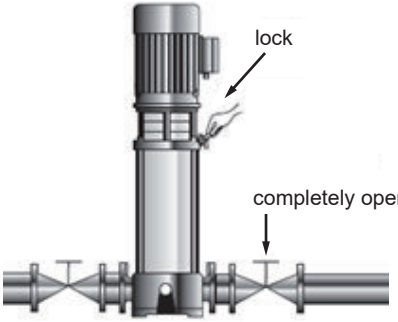
5. Vent the pump by means of the vent valve in the pump head. At the same time, open the discharge isolating valve a little.

6.



6. Continue to vent the pump. At the same time, open the discharge isolating valve a little more.

7.



7. Close the vent valve when a steady stream of liquid runs out of it. Completely open the discharge isolating valve.

8. For further information, see page 9.

8. Maintenance



Before starting work on the pump, make sure that all power supplies to the pump have been switched off and that they cannot be accidentally switched on.
Pump bearings and shaft seal are maintenance-free.

Motor bearings

Motors not fitted with grease nipples are maintenance-free.
Motors fitted with grease nipples should be lubricated with a high temperature, lithium-based grease. See the instructions on the fan cover.
In the case of seasonal operation (motor is idle for more than 6 months of the year), we recommend you to grease the motor when the pump is taken out of operation.

Operation and Maintenance

It is dangerous to operate the pump against a closed discharge outlet because it will cause extremely high.
liquid flow temperature and damage the pump in 1 minute.

8.1. Lubrication

The mechanical seal and shaft sleeves are lubricated by the pumped liquid.

8.2. Suction Filter

Always keep suction filter clean and make sure it is not blocked by impurities.

8.3. Periodic Checks

The following checks should be carried out periodically to ensure the normal operation.

8.3.1 The liquid level and operating pressure.
8.3.2 There are no leaks on piping and joints.
8.3.3 Check the tripping of the motor starter.
8.3.4 Check that all controls are functional.

8.4 When pump is not in use for a period, it should be drained. For start up after long time inactivity please check if the impeller and mechanical seal are free. If they are locked up by sand, rust or something else please clean them up.

8.5 The pump must not be used to transfer explosive liquids. In systems with hot liquids (over 60°C), extra caution should be exercised to prevent from personal injury.

8.6 The pump should not be used to transfer toxic or contaminated liquids. Please carefully follow all instructions in the manual as Walrus may refuse to accept the contaminated pump for servicing.

8.7 If the supply cord is damaged, it must be replaced by a special cord or assembly available from the manufacturer or its service agent.

9. Fault Finding



Warning

Before removing the terminal box cover and before removing/dismantling the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Fault	Cause	Remedy
Motor does not run when started.	1. Supply failure.	Connect the power supply.
	2. Fuses are blown.	Replace fuses.
	3. Motor-protective circuit breaker has tripped out.	Reactivate the motor-protective circuit breaker.
	4. Thermal protection has tripped out.	Reactivate the thermal protection.
	5. Main contacts in motor-protective circuit breaker are not making contact or the coil is faulty.	Replace contacts or magnetic coil.
	6. Control circuit is defective.	Replace the control circuit.
	7. Motor is defective.	Replace the motor.
Pump runs but gives no water.	1. Suction pipe/pump blocked by impurities.	Clean the suction pipe/pump.
	2. Foot or non-return valve blocked in closed position.	Repair the foot or non-return valve.
	3. Leakage in suction pipe.	Repair the suction pipe.
	4. Air in suction pipe or pump.	Check the suction conditions.
	5. Motor runs in the wrong direction of rotation.	Chang the direction of rotation of the motor.
Pump performance not constant.	1. Pump inlet pressure is too low (cavitation).	Check the suction conditions.
	2. Suction pipe/pump partly blocked by impurities.	Clean the suction pipe/pump.
	3. Pump draws in air.	Check the suction conditions.

10. Safety Protection

10.1 Frost Protection

Pumps that are not being used during periods of frost should be drained to avoid damage.

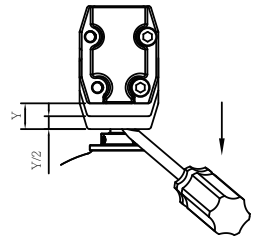
10.2 Scald Protection

Do not touch the outer surface, when the pump is used for hot liquid transmission.

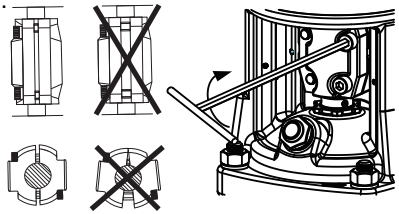
11. Coupling Adjustment

TPR1,3,5(S,N)

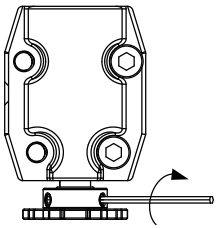
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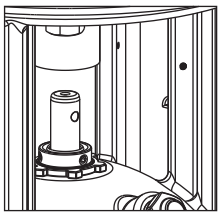


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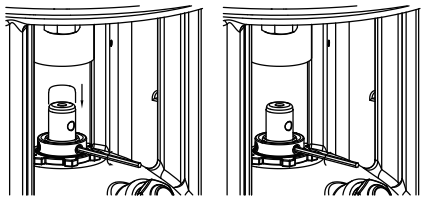


TPR10,15,20(S,N)

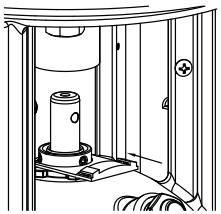
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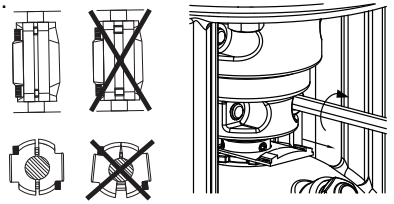
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4.



Maximum inlet pressure for TPR, TPR_S and TPR_N

50Hz		60Hz	
1-2 → 1-36	10bar	1-2 → 1-25	10bar
		1-27	15bar
3-2 → 3-29	10bar	3-2 → 3-15	10bar
3-31 → 3-36	15bar	3-17 → 3-25	15bar
5-2 → 5-16	10bar	5-2 → 5-9	10bar
5-18 → 5-36	15bar	5-10 → 5-24	15bar
10-1 → 10-6	8bar	10-1 → 10-5	8bar
10-7 → 10-22	10bar	10-6 → 10-17	10bar
15-1 → 15-3	8bar	15-1 → 15-2	8bar
15-4 → 15-17	10bar	15-3 → 15-12	10bar
20-1 → 20-3	8bar	20-1	8bar
20-4 → 20-17	10bar	20-2 → 20-10	10bar
32-1-1 → 32-4	4bar	32-1-1 → 32-3	4bar
32-5-2 → 32-10	10bar	32-3-2 → 32-6	10bar
32-11-2 → 32-14	15bar	32-7-2 → 32-10-2	15bar
45-1-1 → 45-2	4bar	45-1-1 → 45-1	4bar
45-3-2 → 45-5	10bar	45-2-2 → 45-3	10bar
45-6-2 → 45-13-2	15bar	45-4-2 → 45-7	15bar
64-1-1 → 64-2-2	4bar	64-1-1	4bar
64-2-1 → 64-4-2	10bar	64-4 → 64-2-1	10bar
64-4-1 → 64-8-1	15bar	64-2 → 64-5-2	15bar
90-1-1 → 90-1	4bar	90-1-1 → 90-2-2	10bar
90-2-2 → 90-3-2	10bar	90-2-1 → 90-4-2	15bar
90-3 → 90-6	15bar		

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PUMP

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