WALRUS PUMP

TPR Series

使用說明書

直立多段式泵浦



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

為確保安全和正確使用，請在操作前閱讀本說明。

ISO 9001 Certified　大井泵浦工業股份有限公司

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.

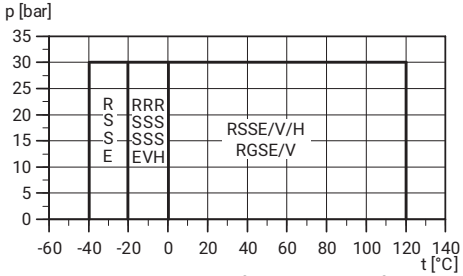


Fig.2 Operating range of standard shaft range

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~+90
RGSV	0.37-18.5	Carbon / SIC VITON	0~+90

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

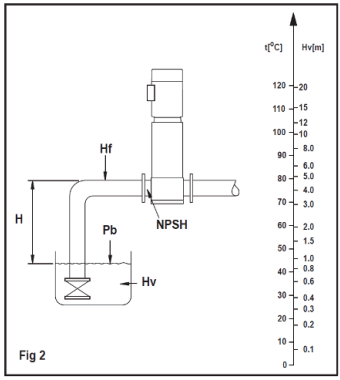


Fig.3 Minimum Inlet Pressure, NPSH

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.

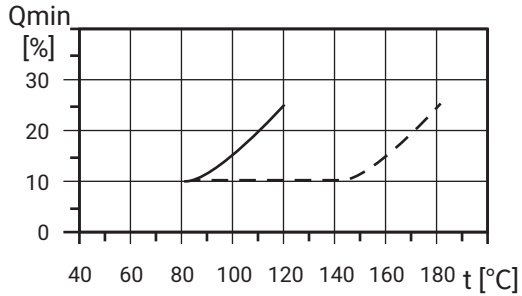


Fig. 4 Minimum flow rate

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

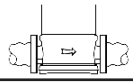
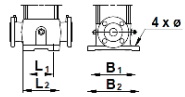
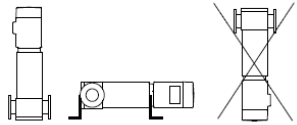
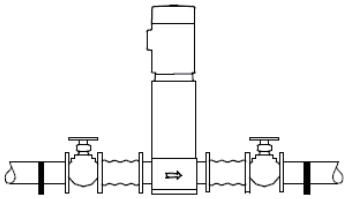
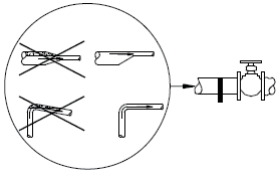
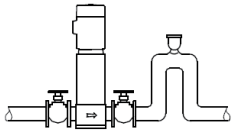
The above drawing shows the noise level while the pump operated with a closed outlet.The tolerance of noise level is ±4dB(A).

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

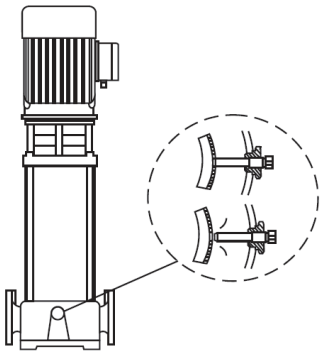
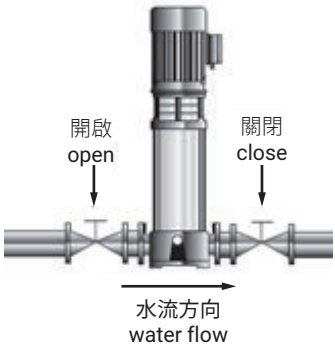


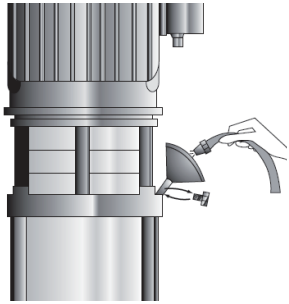
Fig. 5 Location of drain plug and bypass valve

Start-Up

1.



2.



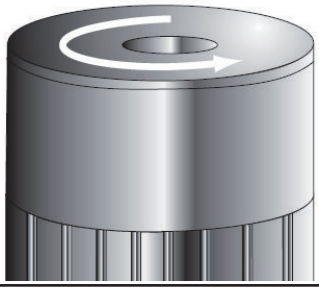
1. Close the isolating valve on the discharge side of the pump and open the isolating valve on the suction side.

1.關閉泵浦出口閥門，打開吸入口的閥門。

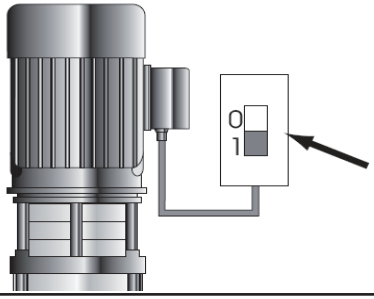
2. Remove the priming plug from the pump head and slowly fill the pump with liquid. Replace the priming plug and tighten securely.

2.從泵頭取下注水塞，將水加滿。鎖緊注水塞。

3.



4.



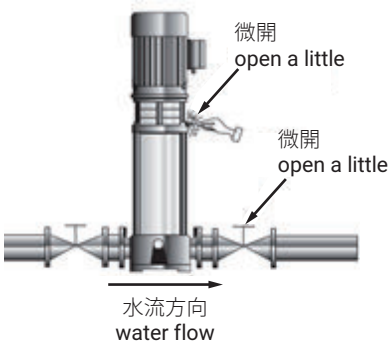
3. See the correct direction of rotation of the pump on the motor fan cover.

3. 查看馬達風罩上的轉向。

4. Start the pump and check the direction of rotation.

4. 啟動泵浦並確認轉向。

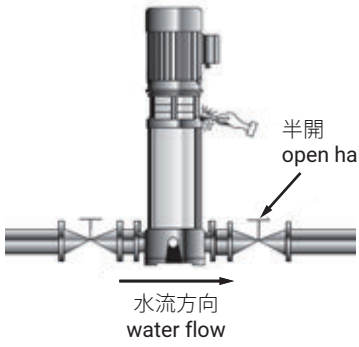
5.



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.

5.微鬆排氣螺栓，(位於泵頭上方)，同時稍微打開泵浦出口側的閥門。

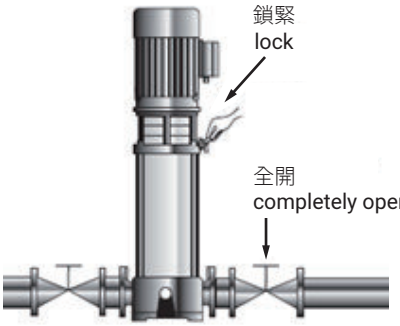
6.



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

6.繼續排氣至水自然流出，同時把出口側的閥門再開的更大一些。

7.



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

7.當排氣螺栓流出的液體流動穩定後，鎖緊排氣螺栓。完全打開泵浦出口側的閥門(水量須在合理範圍)

8. For further information, see page 10.

8.更詳細的情形，請參考第18 頁

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.

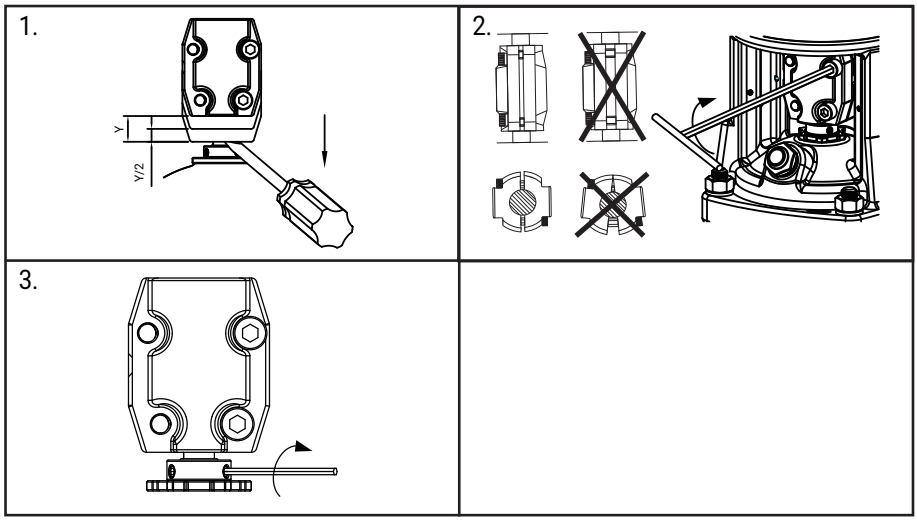
10.2 Scald Protection

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

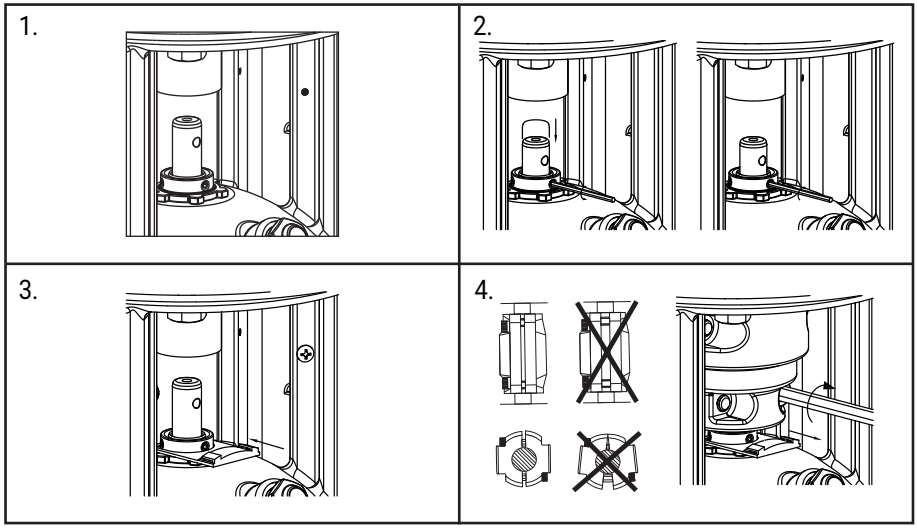
10.3 Do not remove pump and motor parts at will to avoid protection failure, causing personal injury or product damage

11. Coupling Adjustment

TPR1,3,5(S,N)



TPR10,15,20(S,N)



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		

開始安裝之前，請務必詳細閱讀本安裝與使用說明書，遵守當地法規的要求安裝和使用。

1. 儲存與搬運

在搬運水泵時，務必注意，請勿使用馬達的吊環搬運，因為它無法承受整台泵浦的重量，建議採用圖1的吊運方式搬運

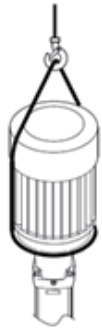


圖1. TPR泵的正確吊運方式

2. 型號說明

泵浦

範例	TPR	1	-4	-S	F	-RSSH
泵系列：						
TPR						
額定流量						
葉輪數目						
泵浦材質代碼						
出入口連接代碼						
軸封代碼						

代碼說明

代碼	描述
材質代碼	
S	SUS 304
N	SUS 316
出入口連接代碼	
F	DIN Flange
P	PJE Coupling

軸封

範例	R	S	S	H
軸封型式				
定部軸封材質				
轉部軸封材質				
軸封橡膠材質				

代碼	描述
軸封形式	
R	TPR軸封形式
軸封材質代碼(定，轉部)	
S	碳化矽 (SIC)
軸封橡膠材質	
E	EPDM
H	HNBR

應用

TPR，TPR_S及TPR_N可用來輸送、循環、加壓冷熱的清潔液體。
TPR_N適用於，和液體接觸的所有零件，都必須是優質不鏽鋼的使用環境。

3. 技術資料

3.1 使用條件

被加壓的液體必須是低黏度、非爆炸性、不含顆粒或是纖維的液體。被輸送之液體決不能對泵的材質具有化學腐蝕性。當被加壓的液體密度和黏度比水大時，必須考慮加大功率。

液體溫度: -20℃ ~ +90℃

環境溫度: Max. +40℃

當環境溫度超過40℃或者海拔高度超過1000m時，會因為空氣密度便小而使得馬達的冷卻效果降低，因而馬達的輸出功率必然也會降低。在此使用條件下，建議更換成輸出功率較大的馬達。

3.2 馬達

馬達為全閉式，風扇冷卻，2極式標準馬達

安裝規格: 0.37~4.0kW,V18 ; 超過5.5kW,V1 符合 to EN 60034-7

絕緣等級: F

外殼防護等級: IP55 及 IP54 (取決於安裝的電機)

啟動和停止的頻率: 0.37~4.0kW 30次/小時

超過4.0kW 20次/小時

3.3 軸封的操作範圍

下圖僅適用於潔淨的水及加防凍劑的水。若超過此操作範圍可能會讓軸封壽命減短。

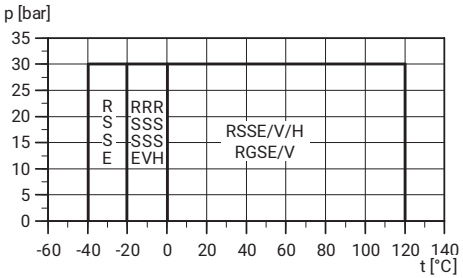


圖2. 最大工作壓力和液體的允許溫度

標準軸封	功率 【kW】	內容	液體溫度 【°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~+90
RGSV	0.37-18.5	Carbon / SIC VITON	0~+90

3.4 最小入口壓力, **NPSH**

檢查下列條件下的最小入口壓力:

- 液體溫度較高
- 需要的流量明顯的大於標示最大值
- 流體需要經過較高的吸取距離
- 入口的管線較長

以[米揚程]計的最大吸入揚程"H"的計算公式如下

H = Pb x 10.2 – NPSH – Hf – Hv – Hs

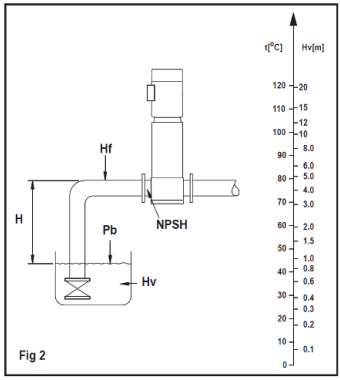


圖3 最小入口壓力, NPSH

Pb – 大氣壓力 [bar]

NPSH – 氣蝕餘量[米揚程]。(在型錄上的NPSH曲線，對應於泵所輸送的最大流量時的數值)。

Hf = 吸入管的摩擦阻力損失[米揚程]。

Hv = 蒸氣壓力，[米揚程]。

Hs = 安全係數=0.5[米揚程]。

如果計算所得的H值為正值，則水泵可在該條件下正常運作，如上圖所示。

如果計算所得的H值為負值，則水泵的工作條件須改善。在運行期間，必須保持正壓力計算所得的"H"值。(計算範例如Page 3)

3.5 最大入口壓力
下表為允許的最大入口壓力。實際上的入口壓力加上關閉閥門時的壓力必須比最大允許壓力低。
如果超過允許的最大入口壓力，可能會損壞馬達內的錐形軸承，軸封的壽命也會縮短。
參考第11頁

3.6 最小流量
由於有過熱的危險，因此泵浦的使用流量不能低於最小流量。
下表為最小流量於各溫度下所佔的額定流量比例。

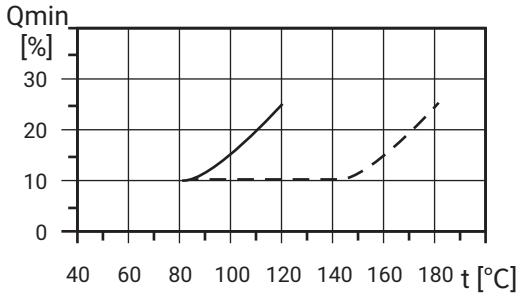


圖4 最小流量

註：泵浦絕不可在出口閥關閉的情況下工作。

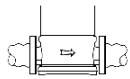
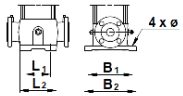
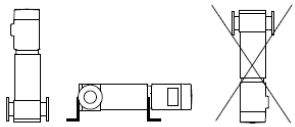
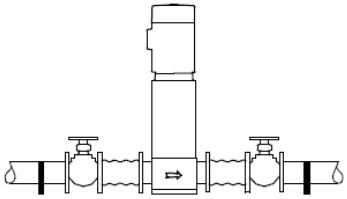
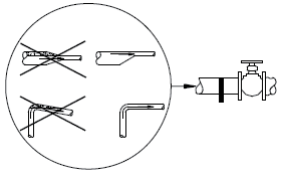
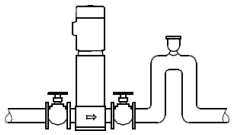
4. 噪音值

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

上表為泵浦出口全閉運轉噪音值，噪音值公差 ±4dB(A)。 噪音超过80 dB(A)的泵浦周围人员需要佩戴听力保护装置

5. 安裝

5.1 安裝時，請按以下步驟進行，以避免損壞。

步驟	說明
1. 	底座上的箭頭，表示水流方向。
2. 	型錄上提供 接頭到接頭之間的長度 底座尺寸 管道連接規格 固定螺栓的直徑和位置
3. 	水泵可以水平或垂直安裝，確保馬達充分冷卻，並嚴禁馬達落地。
4. 	進出口加裝防震軟管，並裝防震座泵浦底部，可有效降低噪音及震動，泵浦兩側加裝閥門或同等品，有助於維修、換裝。
5. 	安裝管路時，應注意避免管路積蓄空氣。
6. 	欲防止虹吸造成逆流異常，請參考圖例並安裝真空排氣閥於泵浦出口附近。

5.2 室外安裝：當泵浦安裝於室外時，必須設置適當防護措施以避免陽光直接曝曬及雨淋，並避免異物進入馬達冷卻風扇入口。

6. 接電



6.1電氣連接必須由合格的電工符合要求的法規執行。
6.2請確保電源電壓和頻率與電動機銘牌匹配。為防止短路的電源線適合一般保護。

6.3在拆除接線盒蓋和泵的任意拆卸/拆解前，請確保電力供應已經被切斷。
6.4電源線必須提供以下設備(除非現行地方性法規另有規定)：

- 短路保護裝置
- 一種高靈敏度的差速裝置中的情況下，提供防觸電附加保護接地系統是低效的。
- 一個電源隔離開關至少3毫米(⅛")一個觸點間隙。

6.5工作電壓和頻率都標電機銘牌上。確保電動機是適合於在其上，將要使用的電力供應，為了您的安全，泵浦須裝漏電流30 mA 以下的漏電斷路器。
6.6 過載保護(三相馬達)
必須提供過載保護(熱繼電器或馬達保護器)
6.7 電氣資料(電壓和頻率)顯示在幫浦銘牌上。 驗證這些數據是否與您的電力供應相符。為了您的安全，應安裝漏電保護器(RCD，30mA)並正確接地。
6.8 三相馬達必須檢查旋轉方向。 風扇罩上標示的旋轉方向，從風扇罩端看，為逆時針方向。 在斷電的情況下互換任兩條導線可以反轉泵浦的旋轉。
6.9 若電源線損壞，必須由製造商、授權服務代理或合格人員更換，以避免造成危險。

7. 啟動



7.1 在水泵未注滿液體以及完全排放空氣以前，請勿啟動水泵。並注意排氣孔的朝向，避免溢出的液體造成部件及人員損傷。

7.2 建議在啟動時，可以將洩水螺絲打開這樣會使注水更為容易，當運轉穩定後，就可以鎖緊洩水螺絲。

請參考第8及9頁

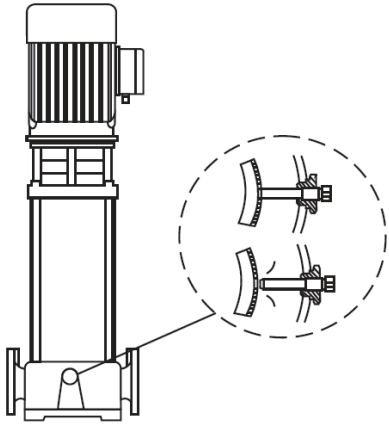


圖5 洩水塞及旁通閥的位置

8. 保養與維護



保養與維護泵浦之前，請先確定電源已經關閉，並且在檢修期間不得啟動，以避免發生意外。

9. 故障排除

9.1 TPR泵浦不需特別的保養，但是預防性的檢查如操作壓力、軸封止洩、過載保護跳脫、噪音值等仍需注意施行。若有問題請參考8.問題與故障排除。

9.2 泵浦長期停置不使用時，應將水泵內的水完全排乾。並打開聯軸器保護蓋，在聯軸器下方注入數滴矽油(Silicone Oil)至軸心上，預防機械軸封面黏住。

狀況	可能原因	排除方法
當啟動時馬達沒有	1. 電源接線不良	確認有電及電線接點牢固
運轉	2. 保險絲燒斷	更換保險絲
	3. 馬達過載跳脫	重設過載保護裝置
	4. 溫度保護跳脫	重設溫度保護
	5. 馬達啟動裝置接觸不良或線圈失能	更換啟動裝置或線圈
	6. 馬達損壞	更換馬達
	7. 控制電路損壞	檢修控制電路
泵浦運轉但無出水	1. 管路或水泵被堵住	排除異物
	2. 止迴閥故障	維修止迴閥
	3. 入水管路油洩漏	維修管路
	4. 入水管路或者水泵有空氣	檢查管線
	5. 馬達轉向錯誤	改變馬達轉向
泵浦運轉但出水量不正常	1. 泵浦入口壓力太低 (注意氣蝕)	檢查吸入條件
	2. 入口管線或水泵有異物堵住	清潔管線及水泵
	3. 水泵內有空氣	排除空氣，檢查吸入條件

10. 安全防護

10.1 霜凍防護

如果在霜凍期內，不需要使用水泵，則必須將水泵內的水排空，以防損壞。

10.2 泵送熱水防護

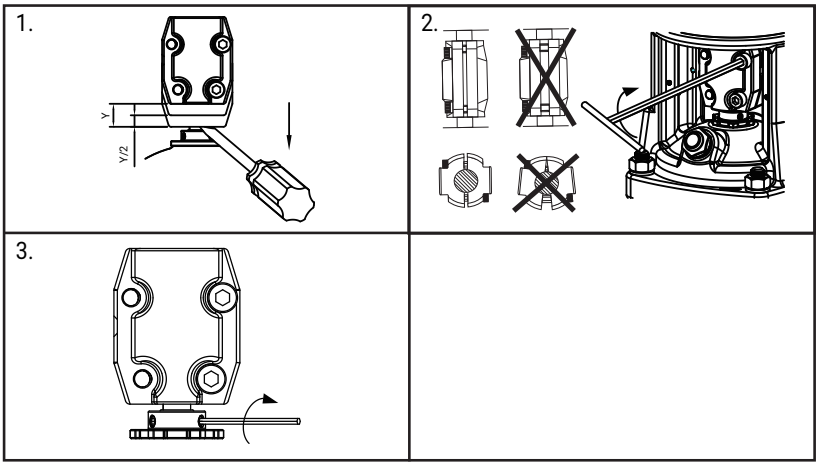
在泵送熱液體場合，請注意避免人員意外接觸熱表面。

10.3 安全防護

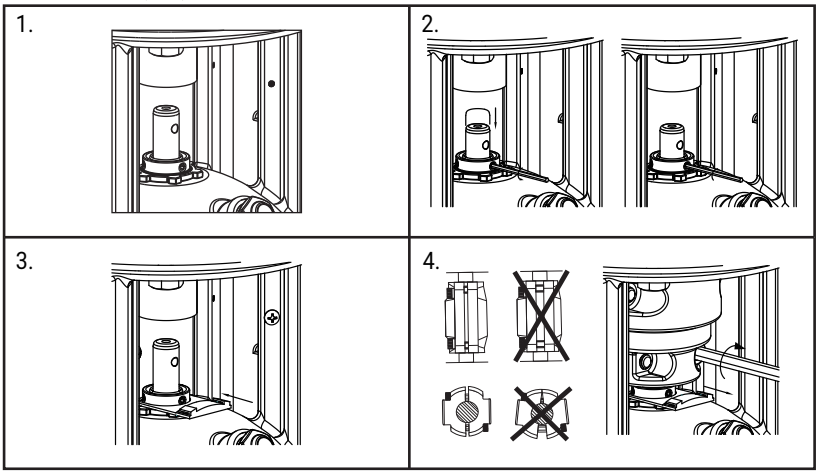
請勿任意移除泵浦及馬達零配件，以避免防護失效造成人員受傷或產品受損。

11.聯軸器調整

TPR1,3,5(S,N)



TPR10,15,20(S,N)



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