

MAGNETIC DRIVE PUMP

無軸封磁力驅動泵浦

OPERATION INSTRUCTION

操作說明書

2014 年版

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一、到貨時的確認事項

泵浦到貨時，請馬上確認下記事項。如發現有問題時，請快向弊社連絡。

- (1) 貼在泵浦的銘板是否與訂購規格相同。
- (2) 附屬品是否齊全。
- (3) 螺絲是否鬆動。
- (4) 外觀有沒有運送時之破損。
- (5) 把馬達之外扇蓋卸下，能否用手輕輕轉動，感覺重或不動時，即運送時有破損的可能性。

二、禁止泵浦空運轉

無軸封泵浦的最大致命傷-空轉

- (1) 無軸封泵浦的摺動零件是藉由輸送液內部循環來潤滑及冷卻，若泵浦空轉即會產生大量摩擦熱而損壞泵浦，因此，絕對要避免。
- (2) 萬一稍微空轉時，請立刻關閉電源，但不可馬上將凡而打開讓水進入或灌水，應先放置一小時以上，然後再注水操作。避免急速冷卻所造成的熱衝擊(thermal shock)損壞泵浦零件。
- (3) 避免空轉損壞，建議加裝空轉保護器，請洽詢各地代理商。

三、安全使用之注意事項

- (1) 磁場的危害：無軸封磁力泵浦內部的被動磁鐵與馬達上面的驅動磁鐵，均含有很強烈的磁性，小心不要讓你的手指被磁鐵夾住。無軸封磁力泵浦強大的磁場會對配戴電子裝置的人造成明顯傷害。
- (2) 確認：泵浦安裝，或維修後要試運轉時，一定要確認法蘭螺絲、外蓋螺絲等是否已上緊後再進行。
- (3) 僅允許在指定電壓下使用泵浦：不要在銘牌上沒有指名的電壓下使用泵浦，以防止泵浦損壞或火災。
- (4) 禁止泵浦空運轉：不要使泵浦空運轉(即泵浦內沒有液體)。泵浦空運轉會使內部另件摩擦生熱，將使泵浦損壞。在入口閥完全關閉或入口管路殘存空氣的情況下，使泵浦工作也視為空運轉。
- (5) 異物吸入的應變措施：如有異物進入泵浦，要立即切斷供電，並清除堵塞。在泵浦本身有異物的情況下使用泵浦會引起泵浦的損壞或功能失常。
- (6) 適用：這泵浦是依合約之用途而設計，製造的。改變用途使用時,務必請向訂購處或弊社查詢。

四、 儲存

泵浦到貨至運轉開始時之間，請依下記要領作儲存中的保養，檢查。

1. 短期儲存 (3 個月以內) 時

- (1) 不要剝掉配管接續上的口徑貼紙。
- (2) 保管場所為室內，避免高溫，且是通風良好的場所，避免雨水，漏水及積水。
- (3) 馬達的電線入線部用膠布把接線盒孔封住，以防塵埃進入。
- (4) 避免放置在其它機材的下方以免其它機器移動時損傷到泵浦，否則請作充分保護。
- (5) 泵浦上面不要放置重物。
- (6) 冬季因結冰等可能發生液體冷凍的關係，由排水部 (孔) 排空液體。
- (7) 用過的泵浦將儲存時，請作如下的作業。
 - 用清水洗淨泵浦內部。
 - 防止泵浦吸入口及吐出口異物侵入措施。

2. 長期儲存(三個月以上)時

- (1) 同前項『短期儲存』之(1)-(7)項。
- (2) 馬達之絕緣部因受潮，絕緣抵抗有可能下降。所以進貨時把絕緣抵抗測定做紀錄，定期的確認。如下降時以正規的方式乾燥後，充分注意防潮。

五、 安裝與配管

1. 安裝

- (1) 以安裝於混凝土基礎上面為原則。如不可能時安裝鐵架上也可以，但運轉中，請不要振動。
- (2) 基礎螺絲插入腳座上的螺絲孔，螺帽鎖到螺絲頭盡頭，基礎孔正中垂下。
- (3) 如為混凝土基礎時，混凝土面與腳座下面之間春插入四個襯墊，確使泵浦水平。
- (4) 為確認水平方向，在泵浦吐出法蘭上面用水準器，作全方向的確認。
- (5) 水平確認後，腳座與混凝土基礎之間的基礎螺絲孔塞入較細的水泥，再植入基礎螺絲，使其密合。
- (6) 放置數天後水泥完全硬化，鎖上基礎螺絲的螺帽。
- (7) 鋼架的場合，用螺絲螺帽鎖也可以，但如前述同樣要充分鎖上。

2. 配管注意事項一覽表

一.【吸入配管】

- (1) 泵浦拆卸維修時必需要裝的凡而與短管 (0.3 M 程度) 的長度外，吸入管越短越好。
- (2) 吸入配管法蘭接頭部份，儘量要少。
- (3) 吸入配管，對 NPSHA_v 有很大的影響，請充分檢討配管口徑、長度。

- (4) 為避免積留空氣在配管內，吸入端斜度向上至泵浦 (1/50 程度)但如為押入式配管時，作向下配管至泵浦側。
- (5) 吸入水槽請裝設防塵設備 (濾器)。
- (6) 吸入管的進水端，為使泵浦運轉時，不要進入空氣，要配至槽內深一點。
- (7) 裝吸入側的凡而，灌入水母時可能積留空氣，請將把手裝設成水平方向。
- (8) 彎頭要少，且不要裝設於近泵浦吸入口。
- (9) 要用異徑配管時，因不要有積留空氣，請用偏心形。如要用同心形時，大口徑側請裝設排氣閥。
- (10) 同一槽要設置數台泵浦時，各泵浦的吸入配管請單獨配管。
- (11) 一般要求：
 1. 儘可能降低入口揚程。
 2. 設計支架時，考慮支架上溫度改變的影響以避免熱應力。
 3. 入口配管及連結器應安裝適當，以防止吸入空氣。
 4. 配管系統不應有可能貯存空氣的向上腫塊。
- (12) 入口配管：
 1. 管入口與桶槽邊緣之間最少有管直徑 1.5 倍距離，以防止漩渦產生。
 2. 入口管之入水深度應於水面下最少 0.5M 或最少為管直徑的 2 倍。
 3. 桶槽底與入口管之間應有最少 1.5 倍管徑的距離。
 4. 如果同一桶槽中配有二支以上的入口管，應被隔開最少三倍管徑以防止互相擾亂彼此的水流。
- (13) 底閥：當泵浦必須安裝於液面上時(即入口高於液面)，必須在入口處加裝底閥。
- (14) 自吸筒：當泵浦必須安裝於液面上時(即入口高於液面)，請安裝自吸筒，以防止因底閥洩漏引起空轉。
- (15) 控制閥：
 1. 泵浦入口應安裝控制閥以便於拆卸泵浦，只有在保養維修時方可關閉閥門。
 2. 建議採用全開時最少壓損的閥。
- (16) 濾網：
 1. 不建議加裝濾網，會意外增加吸入系統阻抗。
 2. 如必須加裝濾網，務必定期清理，以確保水流順暢。
- (17) 真空計：
 1. 應使用耐腐蝕材料，否則應使用壓力計膜片。
 2. 操作期間，如果真空計讀數會變動，不是系統中有空氣，就是產生氣蝕現象。

二.【吐出配管】

- (1) 吐出配管，務請裝置凡而。
- (2) 如果吐出側積留空氣，有時會起有害作用，故請裝排氣閥。
- (3) 吐出配管時，避免產生虹吸現象。

- (4) 為防止泵浦停止時逆流，或防止實揚程高時的水擊作用，有裝逆止閥的必要。但起動時逆止閥的下面可能積有空氣，所以請裝設排氣閥。
- (5) 一般要求：
1. 出口配管流動速率不應超過 3M/Sec。
 2. 配管系統中每一另件應計算其承受壓力之能力，以決定最大允許操作壓力。
- (6) 注水配管：如果泵浦入口高於液面，且沒有安裝自吸筒，應有注水配管系統。
- (7) 壓力計：
1. 在出口管路上必須正確安裝一個壓力計。
 2. 使用壓力計應能指示比最大操作壓力更大的數值。
 3. 壓力計應為耐腐蝕材料所製。
 4. 配管系統中可於壓力計前加裝閥，以便保養及延長壓力計使用壽命。
 5. 操作過程中，如果壓力計讀數會變動，不是系統中有空氣，就是產生氣蝕現象
- (8) 逆止閥：
- 以下任何一種情況時，必須於泵浦出口加裝逆止閥。在選擇逆止閥時，要考慮泵浦的壓力極限。
1. 吐出管過長。
 2. 吐出壓力超過 2Kg/cm² 且流動速率超過 3M/Sec。
 3. 總揚程超過 15M。
 4. 貯罐液面和吐出管口之間高度差超過 9M。
 5. 二部以上泵浦共用出口配管系統。
 6. 在不預期斷電時，防止回流損壞泵浦。
- (9) 控制閥：
1. 可用控制閥來控制液體的流動，不要將閥門關掉而長期運轉泵浦。
 2. 啟動泵浦時，一定要於關閥時啟動，然後緩慢開閥以得到想要的操作壓力及流量，一定要逐漸的開啓或關閉閥門。
- (10) 排氣閥：如果出口配管水平距離太長，則管路上要安裝有排氣孔。

六、 運轉時之注意事項

1. 起動注意事項

- (1) 要配管之前，口徑貼紙要確認剝掉。
- (2) 把馬達外扇卸下，用手動作確認外扇是否會輕輕轉動。
- (3) 配管工作中在吸入管內殘留的雜物標尺等流入泵浦內會引起致命的故障，所以吸入槽或吸入管請清掃乾淨。
- (4) 請確認馬達的回轉方向。(外殼與馬達上有指示方向)
- (5) 在吸入配管的閥，請一定全開。
- (6) 泵浦要完全滿水的關係，請灌滿水，灌水是利用吐出側配管等，迫出空氣，空氣不易溢出時，馬達的外扇葉片用手逆向重複轉動 3~4 回。
- (7) 開始動作時，吐出閥請保持全閉狀態。
- (8) 泵浦完全灌水時，吐出壓力瞬時上升。之後，吐出閥慢慢打開，設定吐出壓力或設定吐油量。

2. 運轉中的注意事項

- (1) 聲音的檢查：從吸入管吸入空氣或固形物時，就會發出異常的聲音，振動也隨之增加的情形。吸入側壓力計的指針有變動時，大多是有空氣混入之情形。
- (2) 振動的檢查：請事前注意是否會造成空蝕現象或按裝不良的振動，請用吐出側的閥進行吐出量的調整，吸入側的閥請不要關小。
- (3) 其他：注意吐出壓力、吸入壓力、流量、電流值，這些如異常變動或下降時可能是吸入側有固形物阻塞或吸入空氣等。

3. 停止時的注意

- (1) 平常是要泵浦吐出閥全閉後，再停止的。吸入側先關閉就成空蝕現象，會有發生燒壞的事故。
- (2) 押入狀態運轉時，停止後請關閉吸入閥。
- (3) 運轉中因停電而停止時，先切電源開關，同時用手關閉吐出閥。

4. 長期停止運轉注意事項

長時間停止時，泵浦內的液體放乾淨。冬季泵浦的液體如凍結，因體積膨脹會起龜裂、破壞等，請特別注意。

5. 其他注意事項

- (1) 裝於配管的備用泵浦，請時常加予運轉，確認能隨時使用。
- (2) 泵浦空轉時，泵浦的軸承可能會燒壞造成致命的事故，所以絕對不要空運轉。
- (3) 請在規定吐出量、揚程使用，不要使用在極少或過大的吐出量。

6. 輸送內含雜質（細小顆粒）之液體

- (1) 原則上不建議泵浦輸送內含微粒之液體，因為泵浦之使用壽命將依雜質顆粒之多寡、大小、硬度而減損。
- (2) 可用於有雜質液體，只要不產生覆著
 - 粒徑在 500micron 下可用於 4%含量
 - 粒徑在 100micon 下可用於 8%含量

7. 泵浦的最小安全流量

無軸封泵浦若操作流量過低會因潤滑不足而使泵浦溫度持續上昇，此外，振動與徑向力，軸向力均較高，因此，操作流量必須有一最小限制，以確保泵浦使用壽命。

最小安全流量如下表。

單位：l/min

型號	最小流量
60、10	3
11、22	5
220、221、222、251、252、201	10
420、421、4220LF、5225LF	25
541、542、4220	40
8415、8420	60
8515	100

(★上表係以清水為標準，若輸送液為揮發性液體或高黏度液體，請洽代理商)

七、 保養與維修

1. 日常保養

- (1) 檢查泵浦運轉是否平穩，是否產生任何異常噪音或振動。
- (2) 檢查貯罐中的液面高低及吸入壓力。
- (3) 在泵浦運轉中，將吐出壓力、電流大小與馬達銘牌上的數值作比較，驗證馬達負荷是否正常。
- (4) 如果有備用的泵浦，要經常啟動，以備隨時可使用。
- (5) 在泵浦工作前，檢查並確認泵浦有無洩漏，如發現洩漏，禁止泵浦工作。
- (6) 在泵浦運行時，檢查並確認泵浦的吐出壓力、吐出流量、馬達的供電電壓有無波動，如果各數值出現相當大的波動，請參考『故障檢 修與排除』採取措施。

2. 定期檢查

為了泵浦的高效和穩定工作，請按下列說明的步驟進行定期檢查，當泵浦拆卸時，小心不要損壞轉動部份和塑料部分，並小心不要被磁力強大的驅動磁鐵和被動磁鐵夾傷手指。

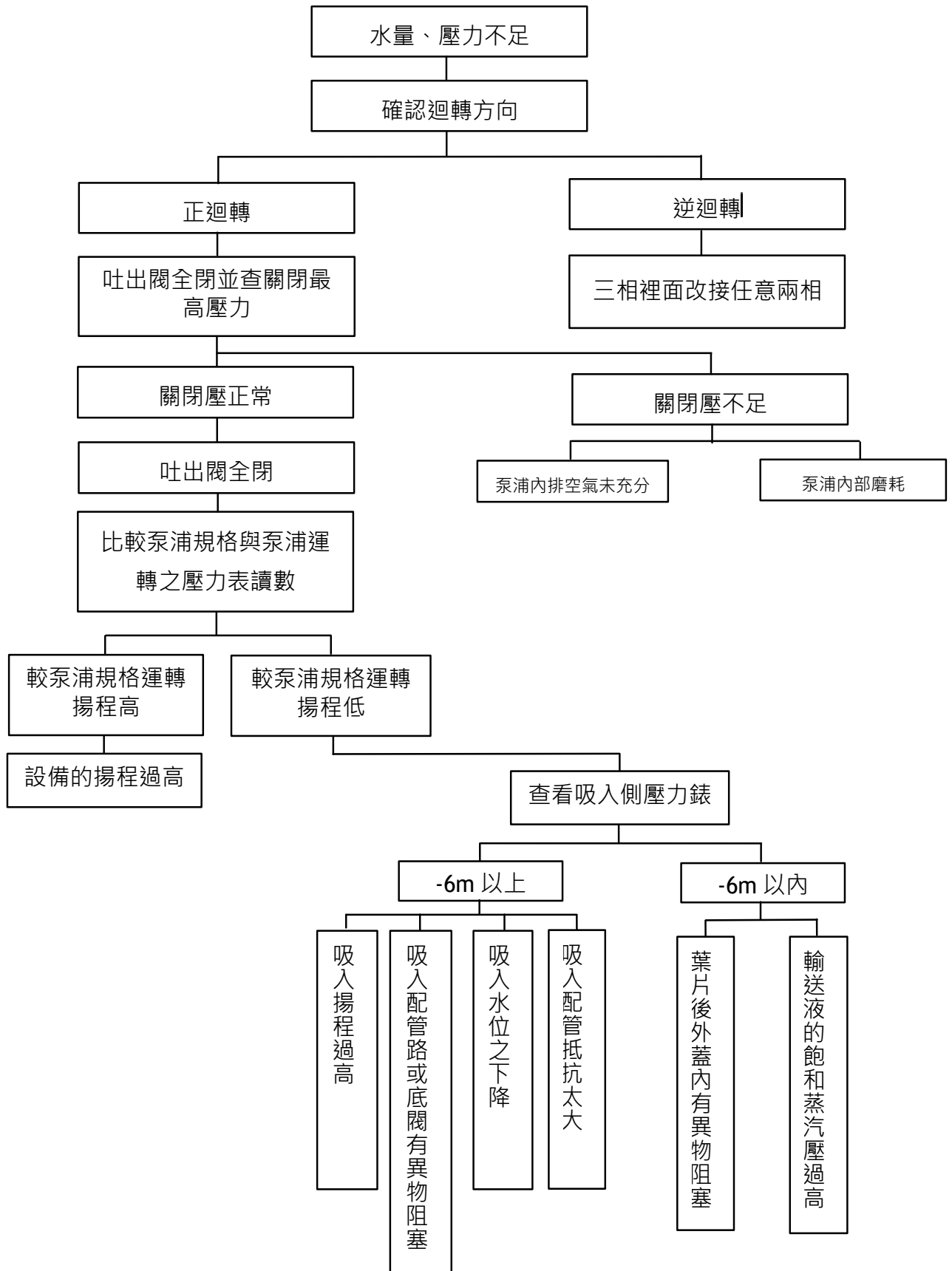
泵浦的維修工作必須由經過培訓的合格人員實施，如用戶不遵守本操作說明書，進行錯誤操作所引起的人身傷害或設備損壞，本公司不負任何責任。

★建議每六個月檢查一次，並保留檢查記錄

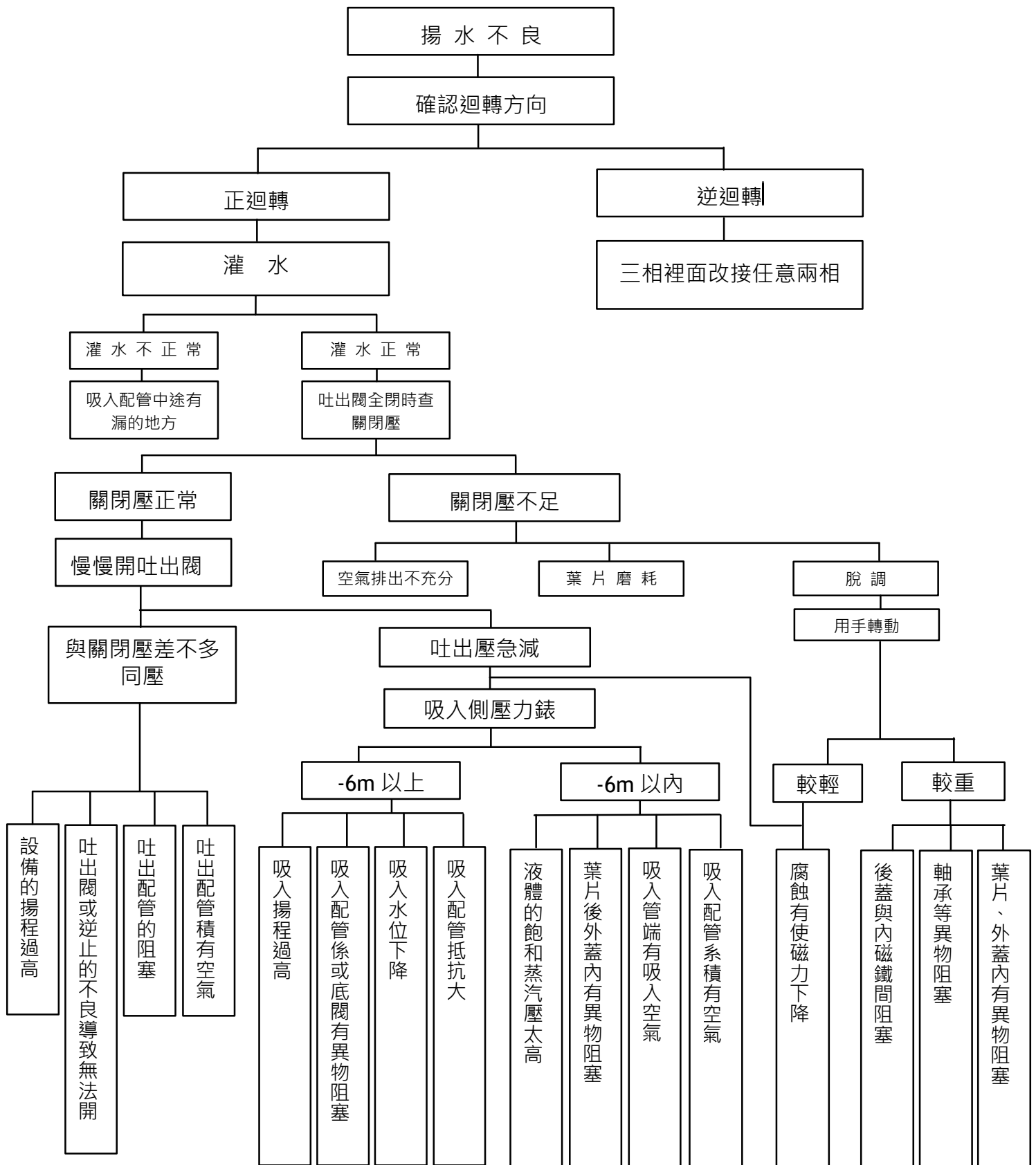
另件名稱	檢查要點	解決方法
被動磁鐵	後部或圓筒內是否有摩擦痕跡	如有異常情況請與經銷商聯繫。
	以測量直徑判定軸承的磨損	達到磨損極限請更換。
	與葉輪的固定狀況	如與葉輪固定鬆脫，請更換。
軸承	內徑是否嚴重磨損	達到磨損極限請立即更換。
	軸承內部有污垢、堵塞或結晶	清潔。
	是否有裂痕	如有異常情況請更換。
	葉輪內有污垢或堵塞	清潔。
	葉輪直徑的變化	如有異常情況請更換。
前蓋	接液端的污垢	清潔。
	是否有裂痕	如有異常情況請更換。
	止推環上是否有磨損、摩擦痕跡、裂痕	如有異常情況請與經銷商聯繫。
	墊片是否有膨脹、破裂	如有膨脹或破裂請更換。
	是否有摩擦痕跡	如有異常情況請與經銷商聯繫。
內磁鐵	有打FRONT字母面需向葉輪面	如有異常情況請做調整

八、 事故現象與原因

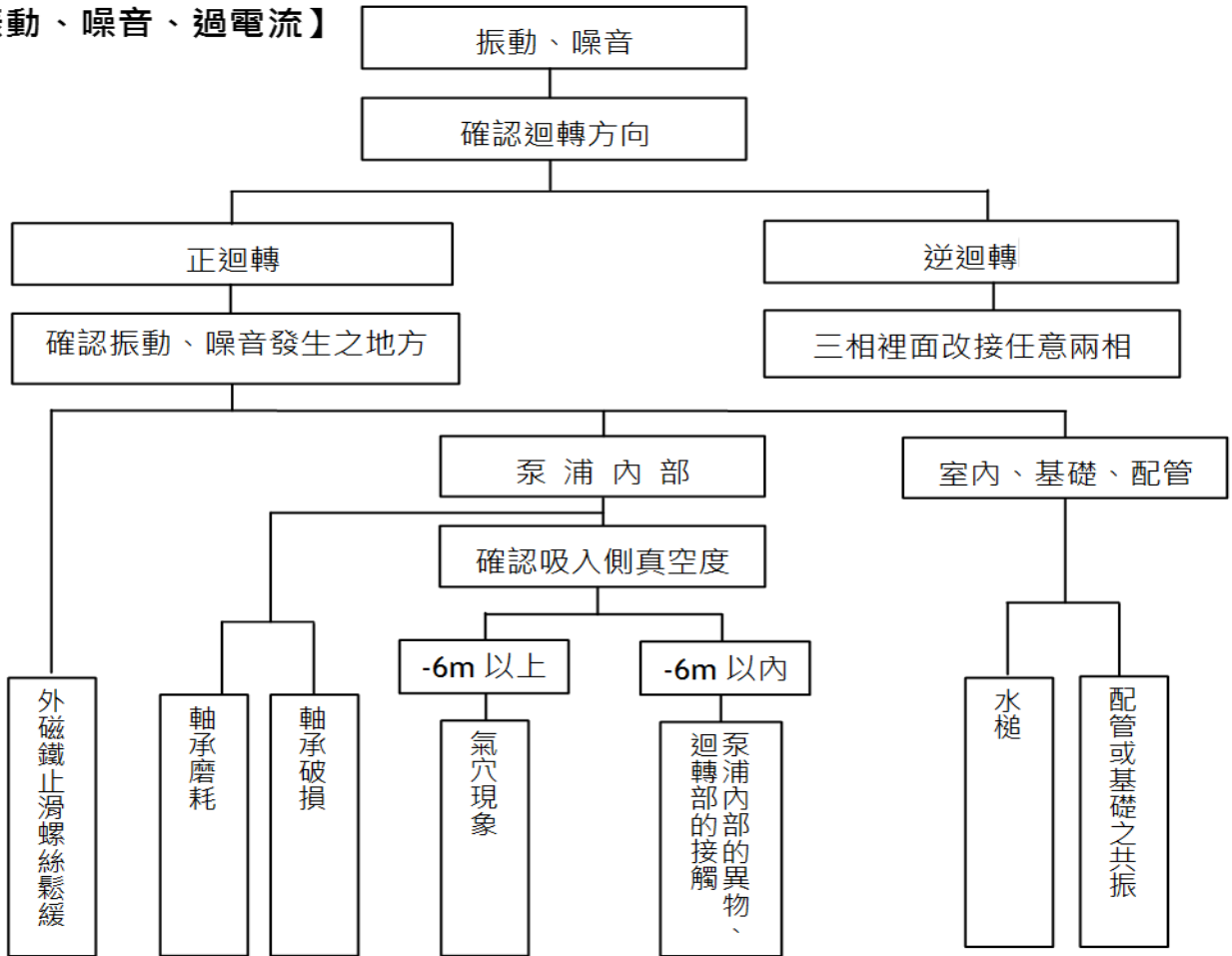
1.【水量、壓力不足】



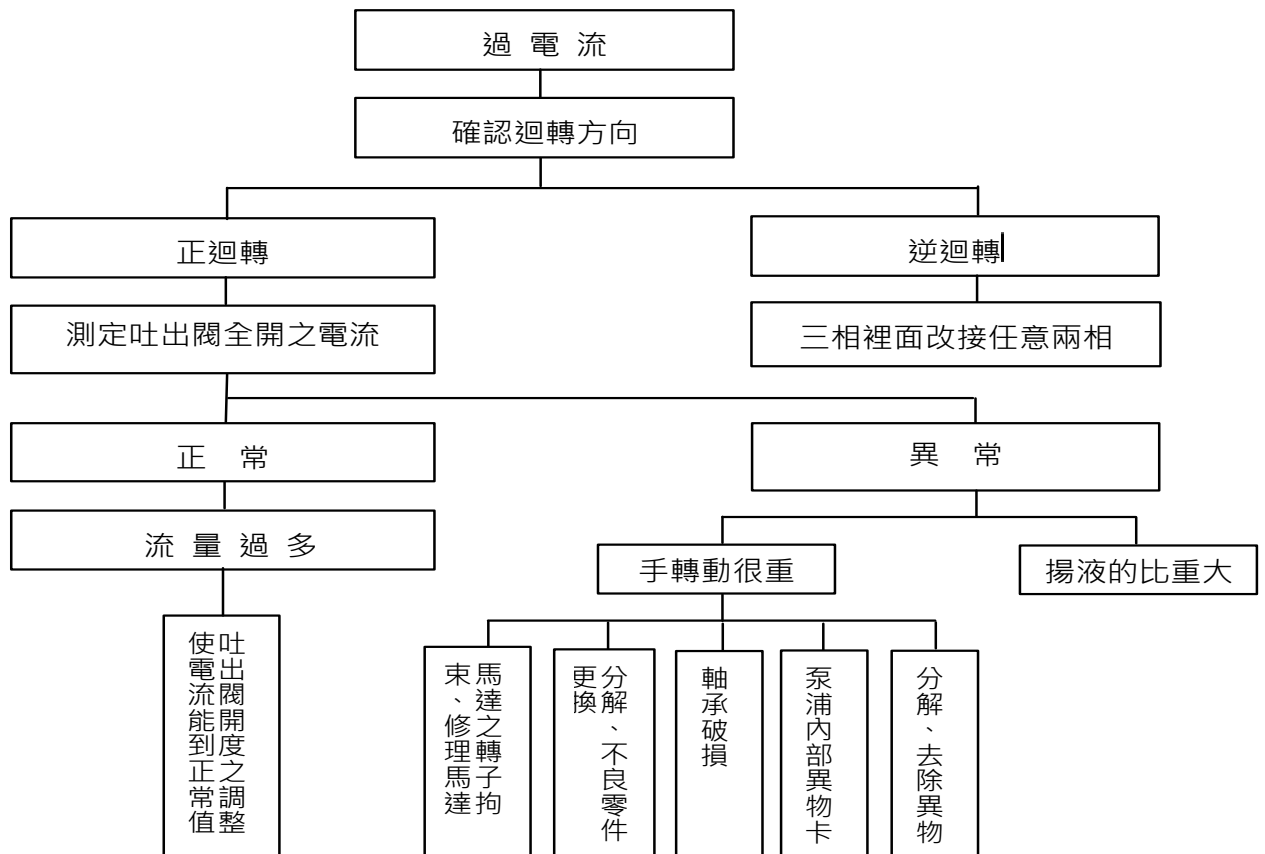
2. 【揚水不良】



3.【振動、噪音、過電流】

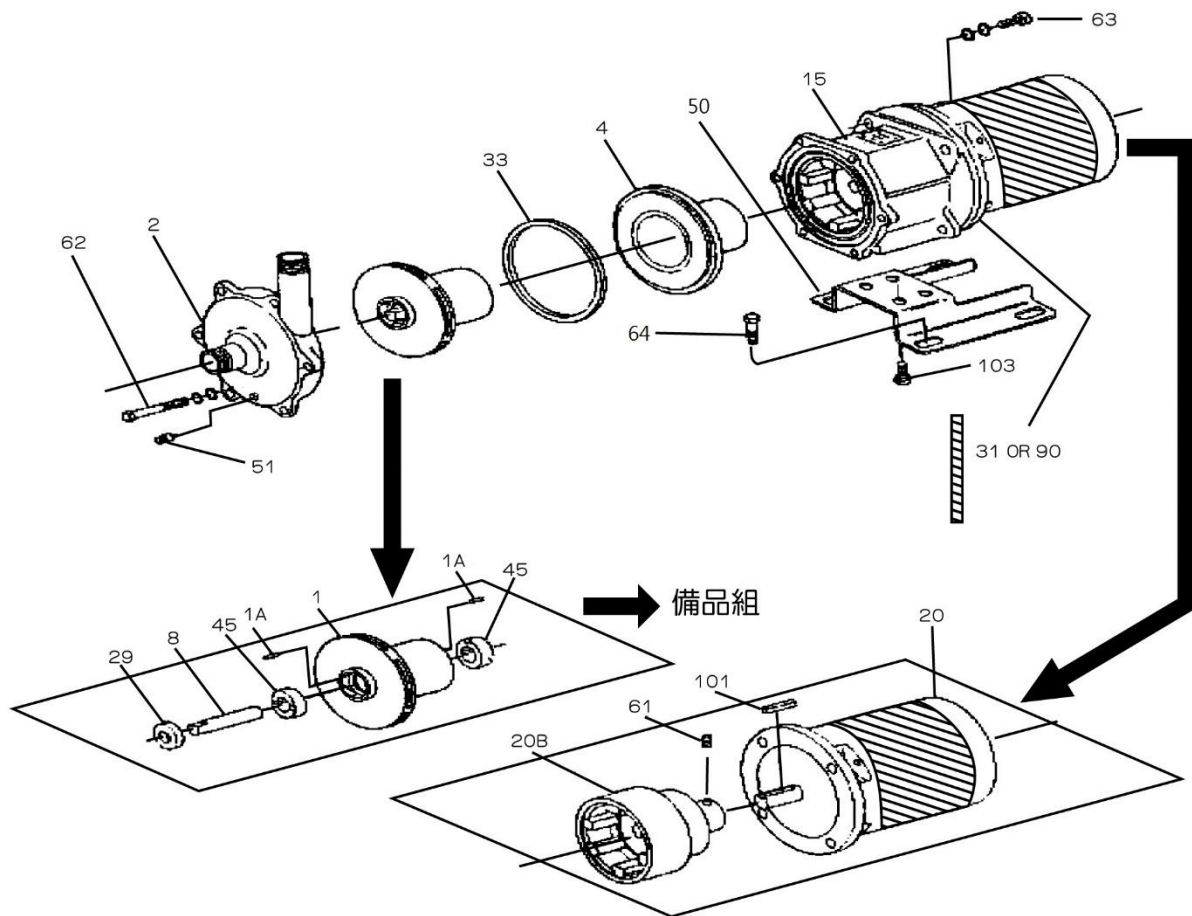


【過電流】



九、 零件圖

【 GMMP / GMMH / GMML 系列 】



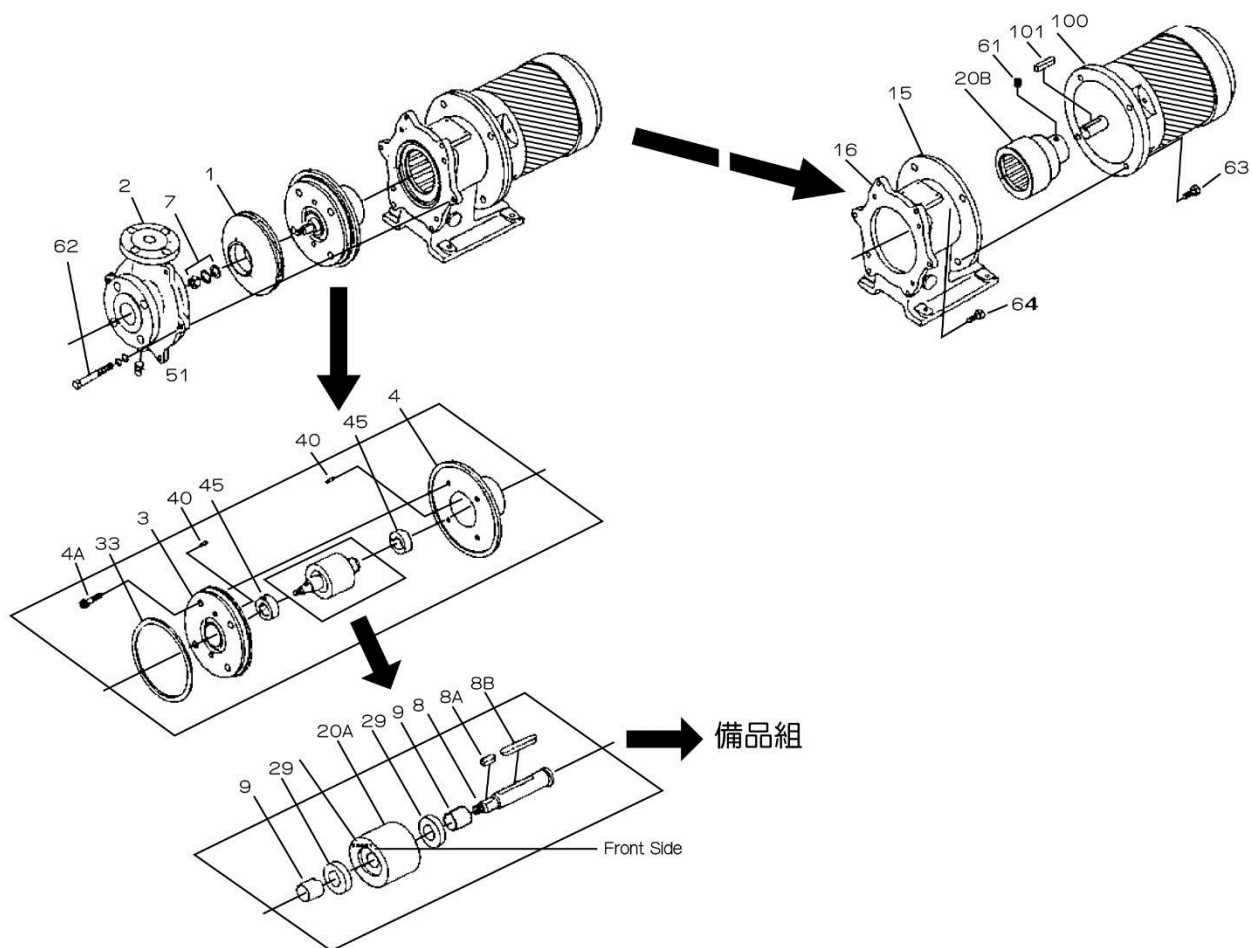
編號 MARK	零件名稱 NAME OF PART	中文名稱	材質 MATERIALS	數量 No.REQ'D	編號 MARK	零件名稱 NAME OF PART	中文名稱	材質 MATERIALS	數量 No.REQ'D
1	IMPELLER	葉輪內磁組	SUS316	1	33	O RING	墊片	PTFE	1
1A	PIN	定位銷	SUS316	2	45	BUSHING	軸受	SSiC	2
2	CASING	前蓋	SCS14	1	50	BASE	底座	SUS304	1
4	REAR CASING	後蓋	SUS316	1	51	PLUG	洩水螺絲	SUS316	1
8	SHAFT	軸心	SSiC	1	61	SET SCREW	固定螺絲	SCM435	1
15	FRAME ADAPTER (*1) (*3)	馬達座	FC200	1	62	CASING BOLTS	前蓋螺絲	SUS304	6
20	MOTOR	馬達	—	1	63	MOTOR BOLTS	馬達螺絲	SUS304	4
20B	MAGNET COUPLING (M)	外磁	FCD	1	64	BASE BOLTS	底座螺絲	SUS304	4
29	THRUST RING	止推環	SSiC	1	101	COUPLING KEY(M)	馬達鍵	SCM435	1
31(90)	SPACER (*2)	中隔板	SS400(SUS304)	1	103	BOLT	螺絲	SUS304	4

*1.GMMP10 編號為 31,GMML/GMMH 編號為 90.(Spacer 31 is attached to GMMP10 only, Spacer 31 is attached to GMMH and GMML)

*2.GMMH11,21 / GMML11,21 馬達座為 304.(Frame adapter 15 for GMMH11,21 comes is SCS13)

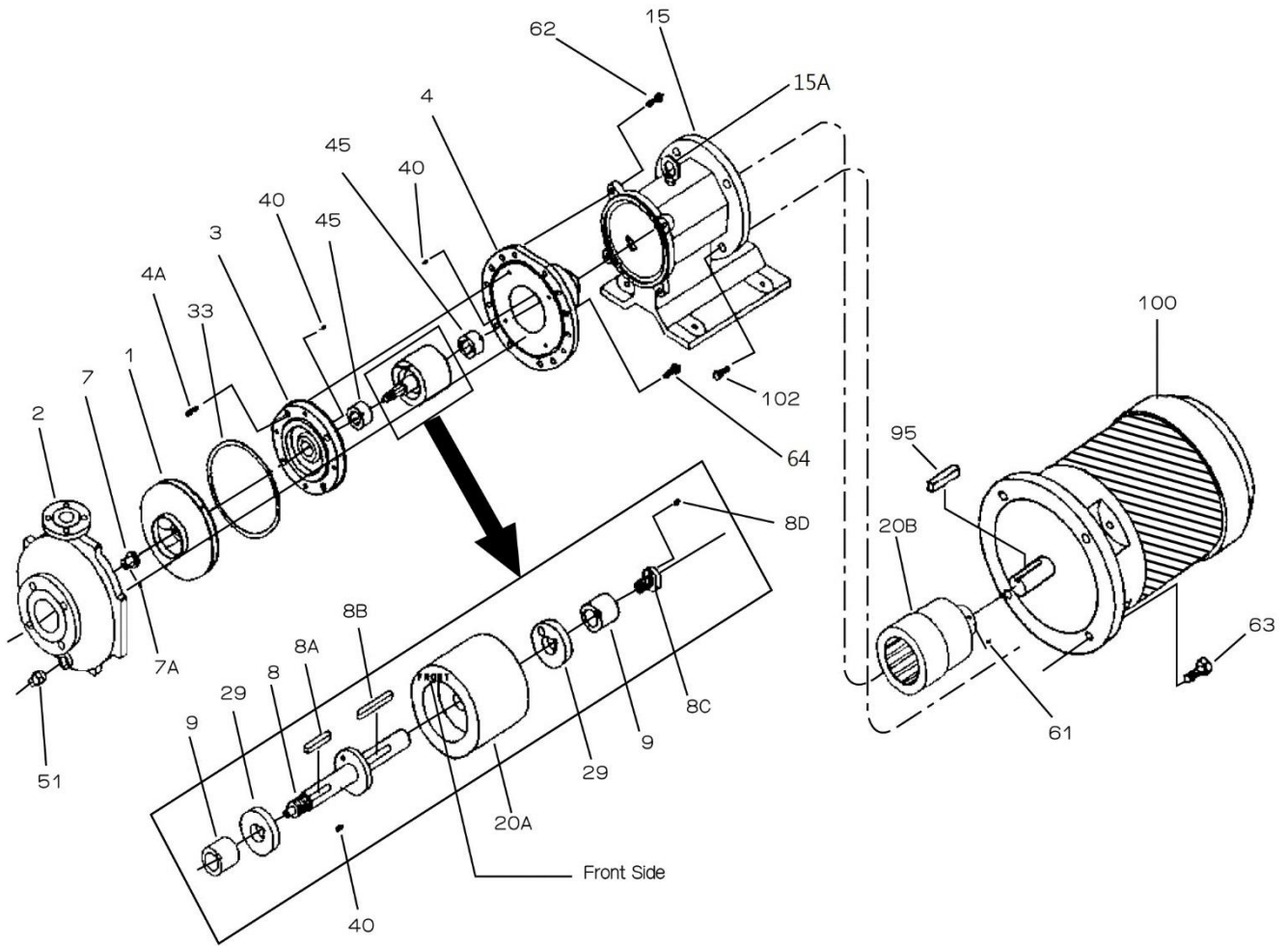
*3.GMMH/GMML 33 號墊片材質為石墨.(O Ring 33 for GMMH and GMML comes in GASKET)

【 GMP / GMH / GML 系列 】



編號 MARK	零件名稱 NAME OF PART	中文名稱	材質 MATERIALS	數量 No.REQ'D	編號 MARK	零件名稱 NAME OF PART	中文名稱	材質 MATERIALS	數量 No.REQ'D
1	IMPELLER	葉輪	SCS14	1	20B	MAGNET COUPLING (M)	外磁	FCD	1
2	CASING	前蓋	SCS14	1	29	THRUST RING	止推環	SSiC	2
3	CASING COVER	後蓋板	SUS316	1	33	SHEET GASKET	前蓋墊片	33	1
4	REAR CASING	後蓋	SUS316	1				MH/ML: 石墨	
4A	HEXAGON SOCKET HEAD CAP SCREW	後蓋板螺絲	SUS316	4	40	PIN	襯套止動螺絲	SUS316	2
7	IMPELLER NUT	葉輪螺帽	SUS316	1	45	BUSHING	軸受	SSiC	2
8	SHAFT	軸心	SUS316	1	51	PLUG	洩水螺絲	SUS316	1
8A	IMPELLER KEY	葉輪固定鍵	SUS316	1	61	SET SCREW	外磁固定螺絲	SCM435	1
8B	COUPLING KEY (P)	內磁固定鍵	SUS316	1	62	HEXAGON SOCKET HEAD CAP SCREW (CASING)	前蓋鎖附螺絲	SUS304	6
9	SLEEVE	軸心襯套	SSiC	2	63	HEXAGON HEAD BOLT (MOTOR)	馬達鎖附螺絲	SS400	4
15	FRAME ADAPTER	馬達座	FC200	1	64	HEXAGON HEAD BOLT (FLANGE)	泵頭固定螺絲	SUS304	4
16	FLANGE (CASING)	泵頭固定框架	SUS304	1	100	MOTOR	馬達	—	1
20A	MAGNET COUPLING (P)	內磁	SUS316	1	101	COUPLING KEY (M)	馬達鍵	S45C	1

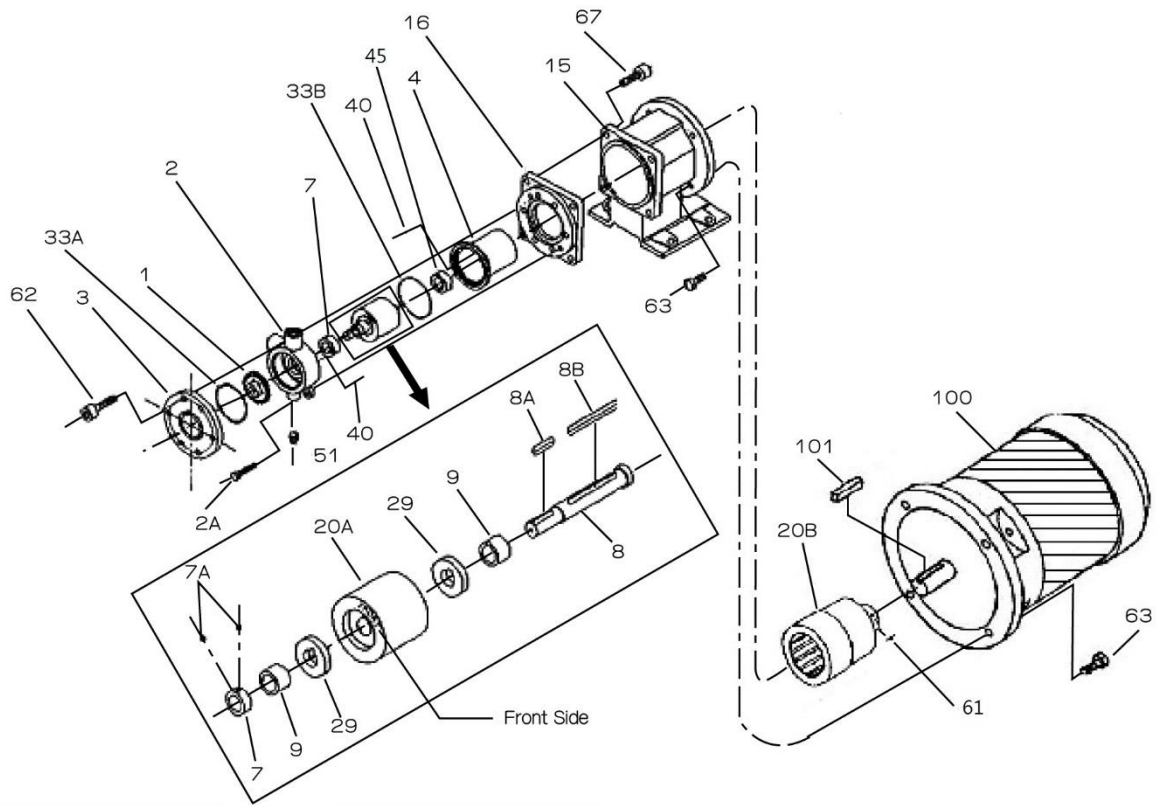
【 GMPL / GMHL / GMLL 系列】



編號 MARK	零件名稱 NAME OF PART	中文名稱	材質 MATERIALS	數量 No.REQ'D
1	IMPELLER	葉輪	SUS316	1
2	CASING	前蓋	SCS14	1
3	CASING COVER	後蓋板	SCS14	1
4	REAR CASING	後蓋	SUS316	1
4A	HEXAGON SOCKET HEAD CAP SCREW	後蓋板螺絲	SUS316	4
7	IMPELLER NUT	葉輪螺帽	SCS14	1
7A	IMPELLER NUT SET SCREW	葉輪固定螺絲	SUS316	1
8	SHAFT	軸心	SUS316	1
8A	IMPELLER KEY	葉輪固定鍵	SUS316	1
8B	COUPLING KEY (P)	內磁固定鍵	SUS316	1
8C	SLEEVE BOLT	軸心後螺絲	SUS316	1
8D	SLEEVE SET SCREW	軸心固定螺絲	SUS316	1
9	SLEEVE	軸心襯套	SSiC	2
15	FRAME ADAPTER	馬達座	FC200	1
15A	EYE BOLT	單眼螺絲	SF440	1

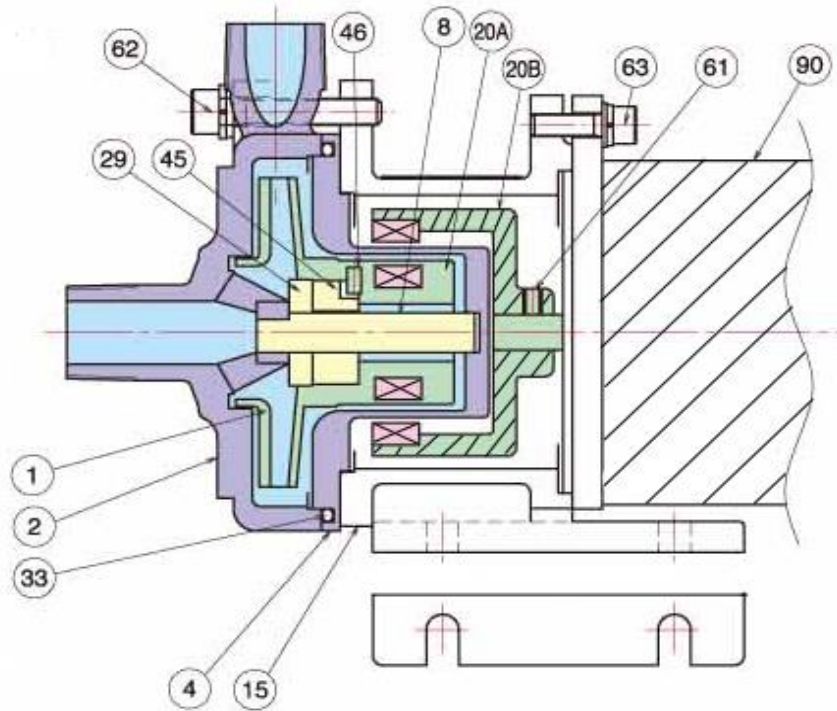
編號 MARK	零件名稱 NAME OF PART	中文名稱	材質 MATERIALS	數量 No.REQ'D
20A	MAGENT COUPLING (P)	內磁	SUS316	1
20B	MAGENT COUPLING (M)	外磁	FCD	1
29	THRUST RING	止推環	SSiC	2
33	SHEET GASKET	前蓋墊片	MP:PTFE MH/ML: 石墨	1
40	SET SCREW	襯套止動螺絲	SUS316	3
45	BUSHING	軸受	SSiC	2
51	PLUG	洩水螺絲	SUS316	1
61	SET SCREW	外磁固定螺絲	SCM435	1
62	HEXAGON SOCKET HEAD BOLT (CASING)	前蓋鎖附螺絲	SUS304	8
63	HEXAGON SOCKET HEAD BOLT (MOTOR)	馬達鎖附螺絲	SS400	4
64	HEXAGON HEAD BOLT (FLANGE)	泵頭固定螺絲	SS400	4
95	COUPLING KEY (M)	馬達鍵	S45C	1
100	MOTOR	馬達	—	1
102	BOLT	螺絲	SUS304	4

【 GMSW / GMHW / GMLW 系列】



編號 MARK	名稱 NAME OF PART	中文名稱	材質 MAT'L	數量 USE		編號 MARK	名稱 NAME OF PART	中文名稱	材質 MAT'L	數量 USE	
					No REOD						No REOD
1	IMPELLER	葉輪	SUS316	1		16	FLANGE (CASING)	泵頭固定框架	SUS304	1	
2	CASING	前蓋	SCS14	1		22	BUSHING	軸受	SSiC	2	
2A	HEXAGON SOCKET BOLT	前蓋螺絲	SUS304	4		29	THRUST RING	止推環	SSiC	2	
3	CASING COVER	前蓋板	SCS14	1		33A	O RING	墊片	PTFE	1	
4	REAR CASING	後蓋	SUS316	1		40	PIN	襯套止動螺絲	SUS316	2	
7	SET RING	固定環	SUS316	1		51	PLUG	洩水螺絲	SUS315	1	
8	SHAFT	軸心	SUS316	1		61	SET SCREW	外磁固定螺絲	SCM435	1	
8A	IMPELLER KEY	葉輪固定鍵	SUS316	1		62	HEXAGON SOCKET BOLT	前蓋螺絲	SUS304	6	
8B	COUPLING KEP(P)	內磁固定鍵	SUS316	1		63	HEX HEAD BOLTS (MOTOR)	馬達鎖附螺絲	SUS304	4	
9	SLEEVE	軸心襯套	SSiC2	2		67	HEXAGON SOCKET HEAD CAP SCREW	泵頭固定螺絲	SUS304	4	
15	FRAME ADAPTER	馬達座	FC200	1		33B	O RING	墊片	PTFE	1	
20A	MAGENT	內磁	RARE EARTH	1s		A	SET SCREW	外磁固定螺絲	SUS316	2	
	MAGNET COUPLING(P)		SUS316	1		7A	SET SCREW	外磁固定螺絲	SUS316	2	
20B	MAGENT	外磁	RARE EARTH	1s		100	MOTOR	馬達	-	1	
	MAGNET COUPLING(M)		SS400	1		101	MOTOR SHAFT KEY	馬達鍵	S45C	1	

【 GMB 系列】



編號 MARK	零件名稱 NAME OF PART	中文名稱	材質 MATERIALS	數量 No.REQ'D
1 / 20A	IMPELLER	葉輪內磁組	SUS316	1
2	CASING	前蓋	SCS14	1
4	REAR CASING	後蓋	SUS316	1
8	SHAFT	軸心	SSiC	1
15	FRAME ADAPTER	馬達座	FC200	1
20B	MAGNET COUPLING (M)	外磁	FCD	1
29	THRUST RING	止推環	SSiC	1
33	O RING	墊片	PTFE	1
45	BUSHING	軸受	SSiC	1
46	PIN	定位銷	SUS316	1
61	SIT SCREW	固定螺絲	SCM435	1
62	CASING BOLTS	前蓋螺絲	SUS304	4 or 6
63	MOTOR BOLTS	馬達螺絲	SUS304	4
90	MOTOR	馬達	—	1

一、 Checking Points on Arrival

Make sure of the following points right away when pump arrived.

1. Does the nameplate correspond to what you ordered?
2. Are all the accessories supplied?
3. Have any of the components been damaged in transit?
4. Are any of the bolts loose?
5. Can the motor be turned easily by hand? If heavy resistance is felt, or the motor does not turn at all, this means it has been damaged in shipping.

二、 Do not dry running

Our pump use the transfer fluid as its internal cooling system, therefore, dry-running, the pump can cause the temperature to rise to a dangerous level that may seriously damage the pump.

If dry-running occurs, switch off the pump immediately, let it cool for at least an hour before priming the pump to prepare it for normal operation. NOTE: Do not subject the pump to rapid cooling, which may damage the internal parts.

We recommend using a dry-run protector to detect dry-run occurrences to avoid causing unnecessary damage to the pump.

三、 Safety Introduction

1. Handling of magnet coupling :

The magnet used in the pump has a very high magnetic power. Be careful not to allow your fingers to be seized by the magnet or to allow the magnet near any electronic device which may be affected by the magnet's power.

2. Verification :

When conducting the operational tests after installation or maintenance, make sure that all flange bolts and casing bolts are tightly secured.

3. Run the pump at the specified power :

Don't supply voltage which is not shown on nameplate to the pump. Otherwise, pump damage or fire may occur.

4. Do not dry running :

Do not run the pump dry (without liquid inside the pump). Heat generated as a result of abrasion between Elements inside the pump during operation without liquid may damage the inside of the pump. Operating the pump with the suction valve fully closed will result in dry operation.

5. Foreign matter :

Should foreign matter enter the pump, turn off the power at once and remove the obstruction. Using the pump with foreign matter inside may cause damage to the pump or a malfunction.

6. Application :

This pump has been designed and constructed in accordance with the operating conditions and specifications stated in the contract. If the pump is not used for the above mentioned purpose, consult the supplier or SEIKOW Chemical Engineering & Machinery, Ltd. before installation or operation of the pump.

四、 Storage

While in storage, perform maintenance and inspections by following the instructions shown below until pump startup.

1. Storage for up to Three Months:

- (1) Do not remove the seals from the suction and discharge flanges until the pump is installed to the piping.
- (2) Store the pump in a dry, adequately-vented room. The atmosphere must be free of rain, water and other sources of excess moisture.
- (3) Cover the opening through which wires enter the motor terminal box with gummed cloth tape or similar material to prevent entry of foreign matter, such as dust and dirt particles.
- (4) Avoid storing the pump in locations where an object may fall onto the pump or damage to the pump. If the pump cannot be moved, it must be fully protected.
- (5) Do not place heavy material on the pump.
- (6) Drain the liquid through the drain hole to prevent it from freezing.
- (7) When storing the pump after operating it, follow the steps below :
 - Clean internals of the pump with fresh water.
 - Seal the suction and discharge flanges to keep out foreign matter.

2. Storage for more than Three Months:

- (1) Follow steps 1 through 7 in paragraph 1.
- (2) The motor insulation resistance may degrade over time due to moisture absorption. Therefore, measure and record the insulation resistance on delivery of the pump/motor and check resistance periodically.

If resistance is reduced, dry the motor according to the manufacturer's recommended procedure and take action to avoid subsequent exposure to moisture. (Refer to the motor instruction manual.)
- (3) Remove the fan cover from the motor and rotate the fan by hand once per month.

五、 Installation and Piping

1. Installation

- (1) Basically, the pump base should be mounted in concrete foundation. When this is not possible, install it on a steel or wooden frame, make sure that it is stable enough not to cause vibrations during operation.
- (2) Insert the foundation bolts into bracket bolt holes, set the nuts to foundation bolt holes as shown in Fig.l.
- (3) In case of a concrete foundation, adjust parallel alignment for bracket by placing four sets of metal shims between concrete and base plate.
- (4) Check this parallel alignment from all directions by placing a level gauge on the pump discharge flange.

- (5) After checking parallel alignment for the bracket, a high grade of non-shrinking grout should be poured between the bracket and concrete foundation. °

2. Piping

—. Suction piping

- (1) The length of suction pipe from suction reservoir to pump inlet should be as short and straight as possible. Note that valve and short piping (0.3m/1 feet) are required for disassembling.
- (2) Avoid all unnecessary elbows, bends and fittings as they increase friction losses in the piping. A valve and a short length pipe should be provided for disassembling the pump.
- (3) Consider sufficient available NPSH A_v when considering or designing the diameter and length of the suction pipe, and provide elbows/bends/fittings on the suction piping.
- (4) To avoid air pocket, incline the piping upward about (1/50) from the suction side toward the pump. However, when using pressurized piping, incline the piping down toward the pump.
- (5) Install a dust-proof screen on the suction tank. Clean out the tank before filling liquid.
- (6) Position the end of the suction pipe deep enough to be immersed even when the liquid level is low.
- (7) To prevent cavitation, the gate valve installed on the suction side should be positioned horizontally or facing downward. Be sure to keep the valve fully open except during inspection or when switching over.
- (8) Make bends as gentle as possible, keep the number to a minimum, and do not install bends close to the pump suction port.
- (9) When using special or different sized pipes, an eccentric or special types of valves are recommended to prevent cavitation.
- (10) The suction piping of parallel operated pumps may cause an unbalance in suction pressure when connected to common main piping. Separate piping is recommended in this case.
- (11) Generally :
 1. Reduce the head of inlet as low as possible.
 2. While design holder, please consider the changeable temperature from holder to avoid heat stress.
 3. The inlet piping and connecting should be installed well to prevent air sucking.
 4. The piping system can not be upward the bump · or it will result in air stay.
- (12) Inlet :
 1. To prevent an eddy forming, the distance between the inlet of pipe and the edge of tank is at least 1.5 times of pipe's diameter.
 2. The enter water depth of inlet pipe is at least 2 times of pipe's diameter or 0.5 meter below the water.
 3. The distance between the inlet of pipe and the bottom of tank is at least 1.5 times of pipe's diameter.
 4. If over two inlet pipes are installed in a same tank, the distance between each is at least 3 times of pipe's diameter to prevent flow disturbed each other.

- (13) Foot valve :
When the pump is installed above liquid level (same as the inlet is above liquid level), the inlet of pump should be equipped with foot valve.
- (14) Self-priming barrel :
When the pump is installed above liquid level (same as the inlet is above liquid level), please install the self-priming barrel to prevent dry running because of leakage of foot valve
- (15) Controlled valve :
 - 1. The controlled valve should be installed on the inlet of pump for easy disassembling. And only at maintenance, the controlled valve can be closed.
 - 2. The valve is suggested to choose the best quality of resistance when pump fully opens.
- (16) Strainer :
 - 1. Strainer is not suggested to be installed. That will increase sucking resistance.
 - 2. If strainer has to be installed, please clean it periodically to ensure flowing smoothly.
- (17) Vacuum gauge :
 - 1. Please use the material of corrode- resisting, otherwise the diaphragm should be used.
 - 2. During operating, if the reading of vacuum gauge is changing, the situation is either the air enter system or cavitation happened.

二. Discharge piping

- (1) A valve should be provided for adjusting flow rate and/or disassembling the pump on the discharge piping.
- (2) To avoid the air pocket to prevent non-pumping, an air vent valve should be provided as required.
- (3) Even in case of the siphon piping, top height of discharge piping must be lower than the pump TDH(total dynamic head) at shutoff point.
- (4) To prevent reverse flow and/or water hammer at higher actual head when stopping the pump, a check valve should be provided as required.
An air vent piping with valve should be equipped above a discharge valve to avoid air pocket at starting pump
- (5) Generally :
 - 1. The flow rate of outlet pipe should be lower than 3M/Sec.
 - 2. Please count the enduring pressure ability of each part of piping system to determine the max operating pressure.
- (6) Priming pipe : When the inlet of pump is above liquid level and there is no self priming barrel, the priming pipe should be installed
- (7) Pressure gauge :
 - 1. The pressure gauge must be correctly installed on outlet pipe.
 - 2. The used pressure gauge must show the reading larger than operating pressure.
 - 3. The material of pressure gauge should be made of corrode- resisting.
 - 4. The valve is installed in piping system and in front of pressure gauge. That can maintain and extend the used life of pressure gauge.
 - 5. During operating, if the reading of vacuum gauge is changing, this situation is either the air enter system or cavitation happened.

(8) Check valve :

1. Any situation is shown as below should be equipped with check valve on the outlet. Please consider the pressure limit of pump, when you choose the check valve.
2. Discharge pipe is too long.
3. Discharge pressure is over 2Kg/cm² and the flow rate is over 3 M/Sec.
4. Total head is over 15M.
5. The height between liquid level and discharge pipe is over 9M.
6. Two or over two pumps use the same discharge pipe system.
7. Once the power disconnect unexpectedly. (For preventing the pump from backflow)

(9) Controlled valve :

1. The controlled valve is used for controlling flow. Please do not close the valve and run the pump for a long time.
2. Close the controlled valve while starting pump, then open valve slowly to get the ideal pressure and flow. The controlled valve must open or close slowly.

(10) Exhausting valve :

If the horizontal distance of outlet piping is too far, the discharge pipe must install exhausting valve.

六、Precaution for Operation

1. Starting-Up

- (1) Seal stickers on both inlet and outlet of the pump must be taken off before connecting pipes on to the pump.
- (2) Turn the motor manually to confirm that it rotates smoothly.
- (3) Clean inside the suction piping. If dirt and scales, which entered the suction piping during installation, they may flow into the pump, causing critical malfunction.
- (4) Check the rotational direction of the motor.
(Direction indicated by arrow on the casing cover)
- (5) Open the valve at the suction side pipe completely.
- (6) In order to fill the pump completely, priming is required. To prime the pump, use the discharge side piping to discharge air. If difficulty is experienced in discharging air, rotate the motor fan in the reverse direction by hand three or four times and utilize the reaction.
- (7) Start operation with the discharge valve fully closed.
- (8) After confirming the rated speed and pressure and that the pressure has risen, gradually open the discharge valve to gain the specified discharge pressure.

2. During Operation

- (1) Noise checking : Sucking of air or solid from the suction pipe line often causes abnormal noise and vibrations.
- (2) Vibration check :
Take special care to avoid vibrations caused by cavitation. Adjustment of the discharge volume must be carried out by using the valve at the discharge side. Do not close the valve on the suction side.
- (3) Other: Special care should be taken to observe the discharge and suction pressure,

discharge volume and electric current. When the discharge pressure fluctuates or falls abnormally, the cause can often be found in clogging of solids or in sucking air at the suction side

3. Suspension of Operation

- (1) Normally, operation of the pump should be stopped only after fully closing the discharge valve. If the suction valve is closed first, cavitation and seizure may occur
- (2) In case of flooded suction, close the suction valve after stopping operation.

4. Shut-Down Operation

In case of a long term shut-down, remove the liquids from the pump. If liquid is left inside the pump during the winter season, cubical expansion of the liquid develop due to freezing and may cause cracks and other damages.

5. Other

- (1) Do not leave a reserve or stand by pump unused for a long time. Operate it occasionally to confirm that it can be employed when necessary. °
- (2) Avoid dry operation of the pump even for a short time. Dry operation may cause the sliding parts damaged and leads to accidents.
- (3) Use the pump with in the specified flow rate and head. Do not use with an excessive flow.

6. Particle Size (Sludge)

- (1) The service life of a pump can be greatly shortened by pumping fluids that carry small particles or sludge. Its service life is dependent on the concentration of the particles, its size, and hardness.
- (2) For particle concentration less than 5%, particle size smaller than 50pm, and hardness within 80Hs, which has SiC bushings, can be used. However, a shorter-than-normal service life can be expected.

7. Minimum Flow

The pump' s maximum operating pressure is dependent on the operating temperature and the structure of the pump. Please refer the figure for the recommended maximum operating pressure for our pumps.

Unit : l/min

Model	Minimum Flow
60.10.	3
11.22.	5
220.221.222.251.252.201	10
420.421. 4220LF.5225LF	25
541.542. 4220	40
8415.8420	60
8515	100

(★ The above data is based on water. For volatile or viscous fluids, consult your local distributor.)

七、 MAINTENANCE

1. Daily Maintenance

- (1) Check whether the pump operates smoothly, without generating any abnormal noise or vibration.
- (2) Check the level of the liquid in the suction tank and the suction pressure.
- (3) Compare the discharge pressure and electric current measured during operation with the values indicated on the motor nameplate for the verification of normal pump load.
- (4) If a spare pump is available, activate it from time to time to keep it ready for use anytime.
- (5) Check and ensure there is no leakage in the pump before operating it. If leakage is detected, never try to operate the pump.
- (6) Check and ensure the discharge pressure, discharge flow rate, and motor power supply voltage do not fluctuate during pump operating. If considerable fluctuation of the respective values occurs, refer to "Causes of Trouble and Troubleshooting" for taking measures

2. Periodic Inspection

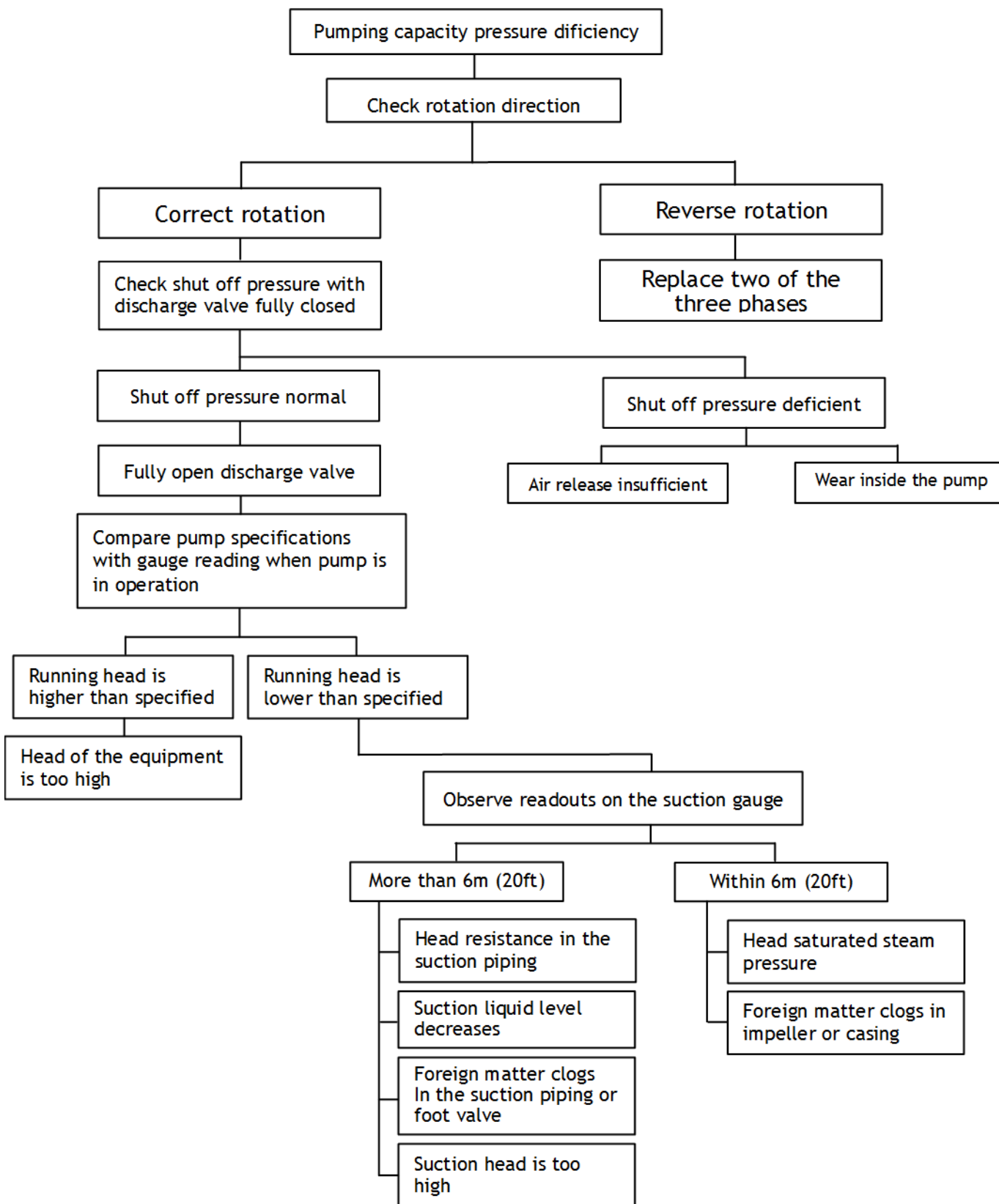
To ensure efficient and stable operation of the pump, carry out periodic inspections by following the procedures described below. During the disassembly and assembly processes, be careful not to damage rotational and plastic elements, and avoid your fingers get hurt because of caught between the magnet elements. The overhauling and repair for the pump must be performed by qualified machinist who have been trained. Personal injury or broken facility that is made due to incorrect operation, our company will not take any responsibility ◦

★Inspection Timing : Every 6 months, and the inspection record should be kept.

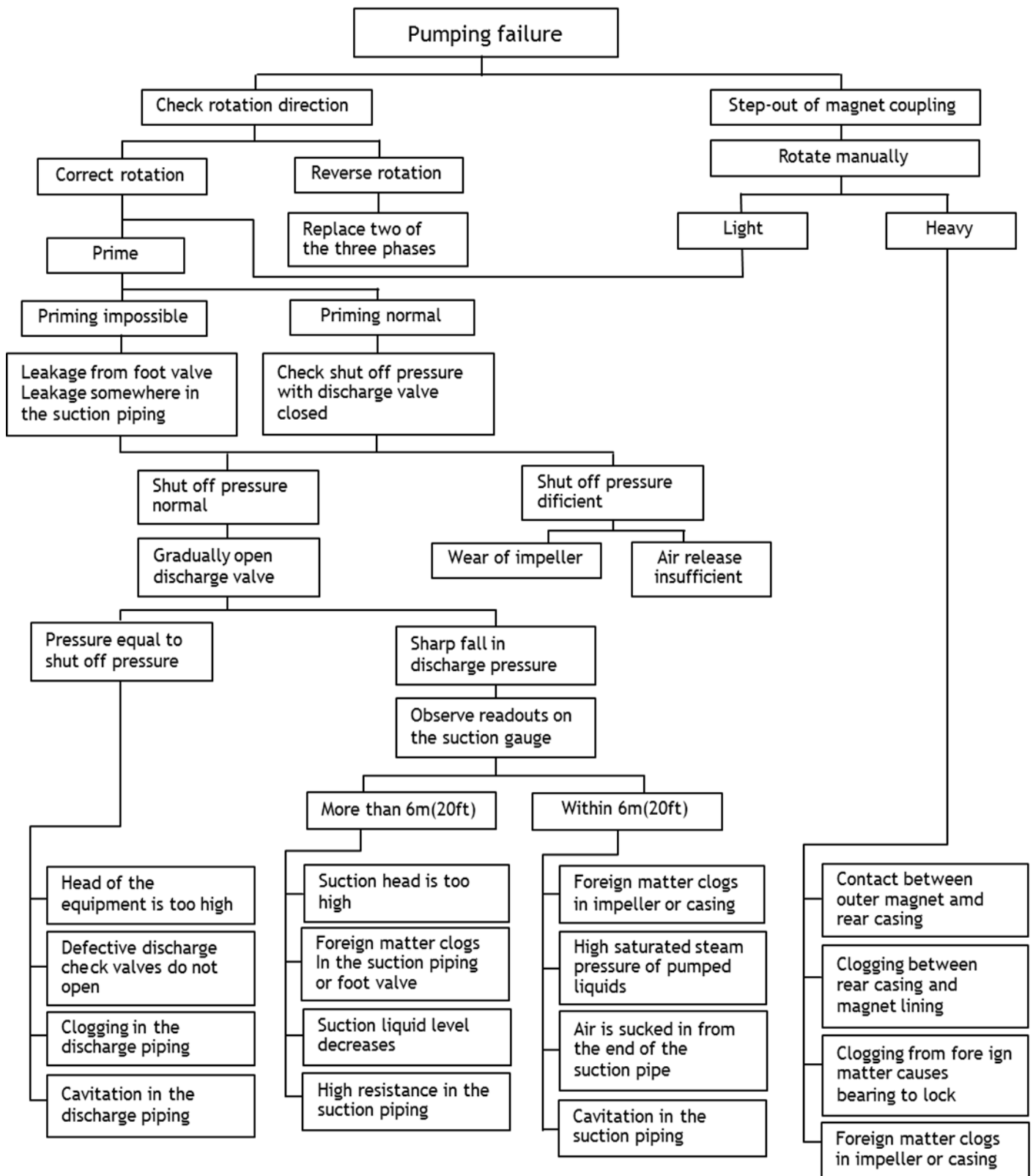
Part name	Check points	Solution
Magnet capsule	Are there slide-scratches in the rear section or in the cylindrical body?	If abnormal condition happened, please contact your dealer.
	Measure dimensions to determine the wear of bearing.	Please replace, if it is limit of wear.
	Condition of fixed with impeller.	Please replace, if it is disconnected with impeller.
Bearing	The inner perimeter is wore out or has cracks.	Please replace, if it is limit of wear. (Please refer to the table of wear limit of bearing and spindle.)
	Stains, crystallization or clogging inside the bearing.	Clean.
	Wear of impeller thrust.	If abnormal condition happened, please replace it.
	Stains or clogging inside impeller.	Clean.
	Dimensional change in impeller.	If abnormal condition happened, please replace it.
Front casing	Stains in liquid contacting part.	Clean.
	Are there cracks?	If abnormal condition happened, please replace it.
	Are there wear, slide-scratches, or cracks in thrust ring.	If abnormal condition happened, please contact your dealer.
	Are the expansion or cracks on O-ring.	Please replace, if it is expanded or cracked.
	Slide-scratches in unlikely position.	If abnormal condition happened, please contact your dealer.
On inner magnet	End stamped "Front" on inner magnet must be toward the threaded end (impeller side) of the shaft.	If abnormal condition happened, please check and adjustment.

八、 Accident and Cause

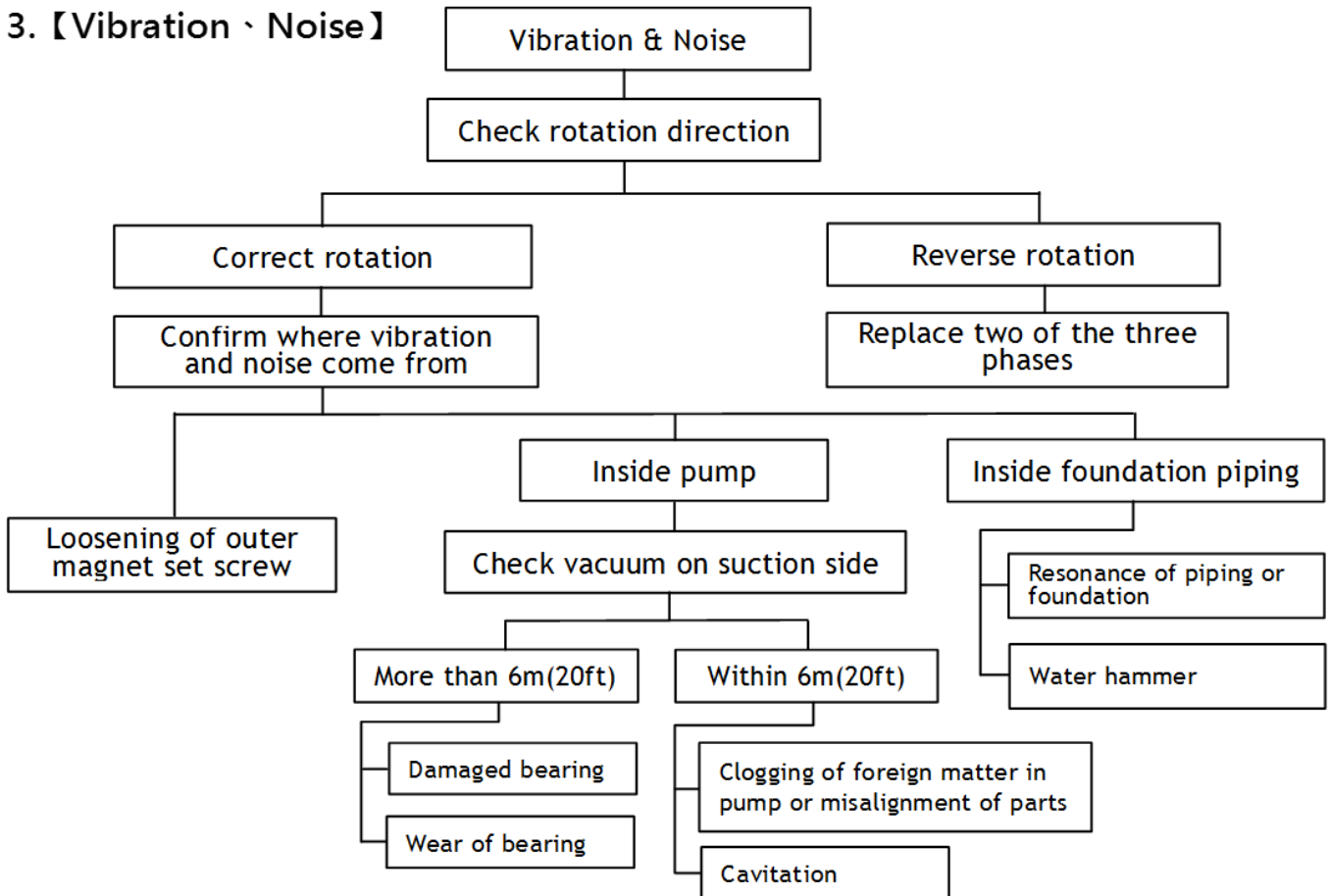
1. 【Pumping capacity pressure deficiency】



2. 【 Pumping failure 】



3. 【Vibration · Noise】



【Over Current】

