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# 液壓手動泵浦 操作說明

## SP,SPH,SPHA



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中文 : C1~C14

中文  
English  
Ver.16

## 1. 安全預防措施



不遵守以下的注意事項和警告將引起設備損失及人員傷害。



**重要事項：**未滿18歲人員不得擅自操作。操作 SUN RUN 油壓設備前請先仔細閱讀並了解相關操作手冊、安全事項和警告事項。操作人員負有油壓設備週邊之人員及環境之安全責任。



**警告事項：**為確保避免人員傷害和設備作業損失，請確認所有油壓設備及週邊配件，使用最大壓力為 700 bar(10,000psi)。



**警告事項：**操作人員於使用期間為避免傷害，需全程配戴安全防護措施。



**警告事項：**不得使用油壓設備作為支撐重物使用。當液(油)壓缸作為負載頂昇設備時，僅可頂昇，不可用來支撐重物使用。當完成頂升作用後，需使用機械性工具來固定支撐。



**警告事項：**必須使用硬性物體來支撐重物。慎選能承受重物的鋼鐵或木塊來支撐荷載。不要在頂升或持壓使用中將液(油)壓缸當做墊塊使用。



**危險事項：**為避免人員傷害，請於操作過程中手、腳遠離液(油)油壓缸和液壓設備。



**警告事項：**禁止超載使用。超載使用易造成設備損害及人員損傷。液(油)壓缸設計最大使用壓力為 700 bar (10,000psi)。



**危險事項：**千萬不可將溢流(安全)閥的壓力值設定高於泵浦的額定壓力。超載的壓力值可能引起設備損壞及人員損傷。尤其千萬不可拆除溢流(安全)閥。



**警告事項：**系統操作壓力絕不可超過最低壓力元件之值最低值。系統中應加裝壓力錶藉以監測系統中的壓力並了解使用狀態。



**警告事項：**避免損壞油壓管。捲收油管時，避免油管強烈彎曲或打結。使用彎曲或打結油管易引起背壓。強烈彎曲或打結的油管亦易引起內部損壞或提早油管老化。



**千萬不要重壓油管。**劇烈的撞擊會造成油管內鋼絲網損壞。使用受損的油管可能導致油管破裂。



**重要事項：**千萬不要利用油管來提攜其他油壓設備(例如:小型油壓缸、泵浦..等)。



**危險事項：**液(油)壓設備應遠離火或熱源。高溫會軟化包裝和密封材料，導致液壓油洩漏；高溫同時也會造成油管材質與包裝變質。為確保最好狀態，不要將液(油)壓設備暴露於 65°C(150°F)高溫。在電焊場所時亦應注意防止電焊火花噴到油管。



**危險事項：**不要用手對油管施加壓力(包括拉或舉高) 高壓下洩漏的液壓油會穿透皮膚造成嚴重傷害。當液壓油侵入皮膚請立即就診。

## 1. 安全預防措施

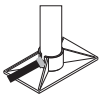


**警告事項:** 液(油)壓缸只能在已連接好的液壓油路中使用；快速接頭尚未確實連接時禁止使用或加壓，否則高壓情況下接頭的油封及鋼珠會高速噴出造成人員傷亡。



使用密封劑提高管件密封度。  
例如，鐵弗龍密封帶。

**注意：**纏繞鐵弗龍帶約1-1/2, 牙最前端保持裸露，預防液壓油流出時阻塞造成危險壓力。  
鎖螺牙管件時，千萬不可鎖過頭，避免崩牙。



**警告事項:** 頂昇荷載前，請確保油壓裝置平穩。油壓缸必須放在平穩可支撐重物的基座上。若情況許可，可使用油壓缸基座來增加穩定性。千萬不可使用焊接或其他方法將油壓缸與所使用的基礎面(支撐座)連接一起。



避免荷載不直接作用在油壓缸的主軸中心上。偏心荷載易導致油壓缸和主軸受損。此外，重物亦可能因傾斜而滑落，引發潛在危險。



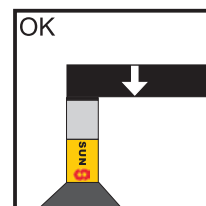
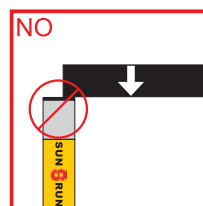
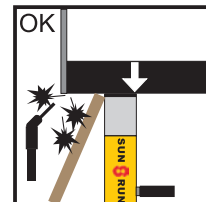
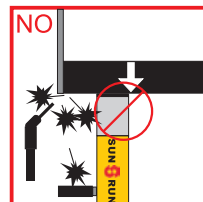
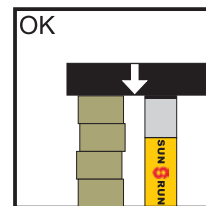
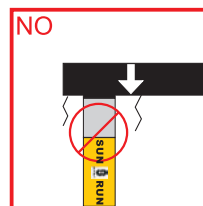
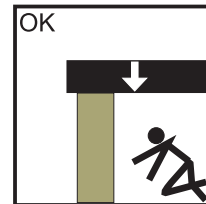
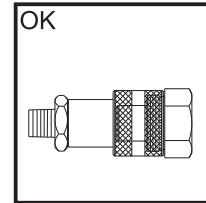
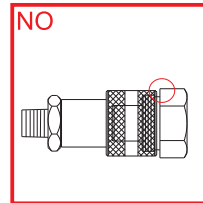
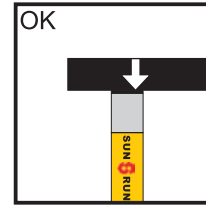
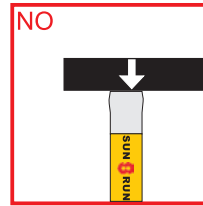
將荷載平均的分布在墊塊表面。  
傾斜墊塊可消除偏荷載。當無使用螺牙連接其他附件時，一定要使用墊塊以保護主軸。



**警告事項:** 當零件出現裂痕或損壞時，應立即以**SUN RUN** 零件更換。正確標準的零件可防止人員或設備損傷。**SUN RUN**零件經特別設計可完全適用並適用產品標稱的額定荷載或壓力。

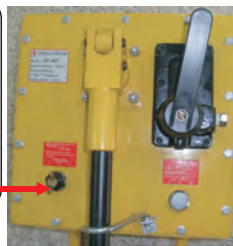


**重要事項:** 液壓設備必需由合格的液壓技工進行維修。需要修理時，請連繫就近的**SUN RUN**服務據點並使用**SUN RUN** 液壓油保固方為有效。

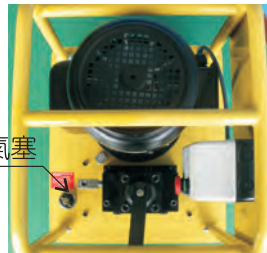


## 1. 安全預防措施

 放鬆  
Release  
加油口 & 通氣口  
使用前, 請先放鬆通氣口螺栓,  
避免真空引起損壞



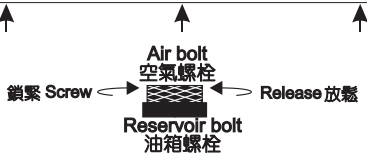
SP-462/  
SP-464



SPE-2/  
SPE-5

1.取下  
9/16-18UNF塞頭  
2.安裝  
加油 / 通氣塞  


SPE-3000

  
Air bolt 空氣螺栓  
Reservoir bolt 油箱螺栓  
鎖緊 Screw 放鬆 Release  
Please release Air bolt as using to  
prevent vacuum situation and screw  
Air bolt after using to prevent leaking.  
使用時請將空氣螺栓放鬆預防吸成  
真空狀態；操作完後請鎖緊空氣螺栓  
預防液壓油自空氣螺栓漏出。

SPH 系列

任何加油/ 通氣裝置, 在使用時通氣口務必打開。  
使用後通氣口關閉, 防止漏油及污染。



通氣

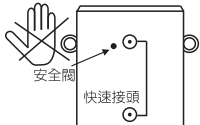


加油

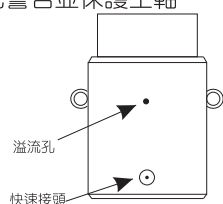


STP-pump

**警告**  
請勿調整安全閥壓力！  
適用於雙動千斤頂  
RSR, RSRH, CSLRG 系列  
大部份的雙動千斤頂安全閥壓力設定值為  
10000psi(700bar)。  
超出原廠設定值時, 安全閥會噴出液壓油保護  
千斤頂。  
當安全閥發生漏油狀況時請先檢查  
快速接頭連接狀況。

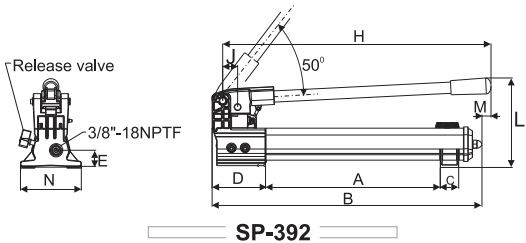


**警告**  
適用於單動,高噸位千斤頂  
CSLP, CSLL, CSLS 系列  
到達揚程極限時, 溢流孔流出  
液壓油。藉此警告並保護主軸  
超揚昇。





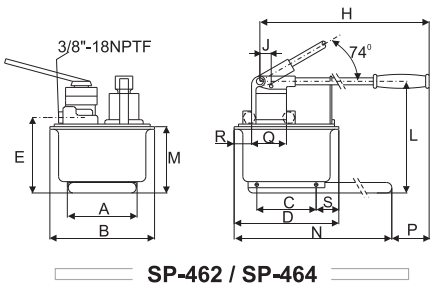
2.規格



SP-392D



SP-392



SP-462

| 型 號<br>Model<br>Number | 泵浦類型<br>Pump<br>Type      | 有效油量<br>Usable Oil<br>Capacity | 輸出壓力<br>Pressure Rating |                       | 輸出油量<br>Oil Displacement<br>per Stroke |                       | 最大施力<br>Max.<br>Handle<br>Effort | 行程<br>Piston<br>Stroke | 外型尺寸<br>Dimensions(mm) |      |     |
|------------------------|---------------------------|--------------------------------|-------------------------|-----------------------|----------------------------------------|-----------------------|----------------------------------|------------------------|------------------------|------|-----|
|                        |                           |                                | 1 <sup>st</sup> stage   | 2 <sup>nd</sup> stage | 1 <sup>st</sup> stage                  | 2 <sup>nd</sup> stage |                                  |                        |                        |      |     |
|                        |                           | (cm³)                          | (bar)                   |                       | (cm³)                                  |                       |                                  |                        | (kg)                   | (mm) | A   |
| SP-392                 | 雙 速<br><br>Two -<br>Speed | 901                            | 13                      | 700                   | 11.26                                  | 2.47                  | 42.2                             | 25.4                   | 344                    | 533  | 36  |
| SP-462                 |                           | 7423                           | 14                      | 700                   | 126.20                                 | 4.75                  | 50.0                             | 38.1                   | 210                    | 308  | 163 |
| SP-464                 |                           | 7423                           | 14                      | 700                   | 126.20                                 | 4.75                  | 50.0                             | 38.1                   | 210                    | 308  | 163 |

| 型 號<br>Model<br>Number | 外型尺寸<br>Dimensions(mm) |     |     |    |     |     |     |    |    |    |    | 重量<br>Weight<br><br>(kg) |
|------------------------|------------------------|-----|-----|----|-----|-----|-----|----|----|----|----|--------------------------|
|                        | D                      | E   | H   | J  | L   | M   | N   | P  | Q  | R  | S  |                          |
| SP-392                 | 99                     | 33  | 522 | 30 | 177 | 16  | 120 | —  | —  | —  | —  | 4.1                      |
| SP-462                 | 320                    | 195 | 671 | 25 | 270 | 175 | 650 | 92 | —  | —  | 80 | 27.7                     |
| SP-464                 | 320                    | 195 | 671 | 25 | 270 | 175 | 650 | 92 | 89 | 68 | 80 | 27.7                     |

## 2.規格



### 其他選配說明

假如您需加裝4口方向閥來操作雙動油壓缸，請依下列規範字尾增加編號。

加裝4口方向閥：型號D

### 案例：

SPH-2000 選配4口方向閥，訂購型號改為 SPH-2000D  
相關技術諮詢請與SUN RUN取得聯繫。

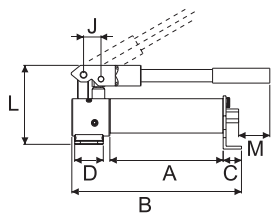
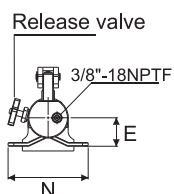
### Optional Features

To add optional features to your pump, add the follow suffixes to the end of the model number.

4 ways control Valve：Model D

### Example：

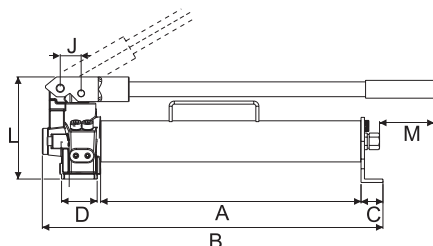
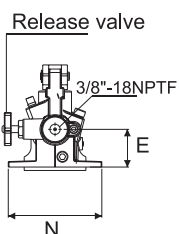
SPH-2000 with 4 ways control valve, order: SPH-2000D. Technical specifications for these features are available from SUN RUN.



SPH -400



SPH-400

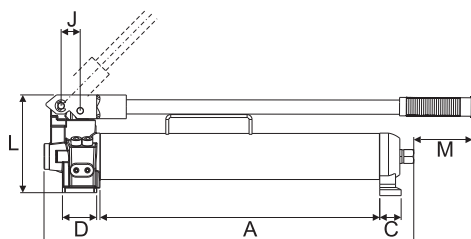
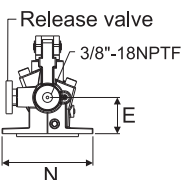


SPH-900

SPH -2000



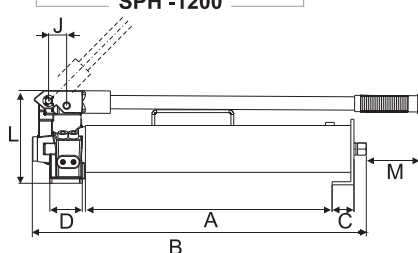
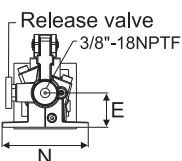
SPH-900



SPH -1200



SPH-1200



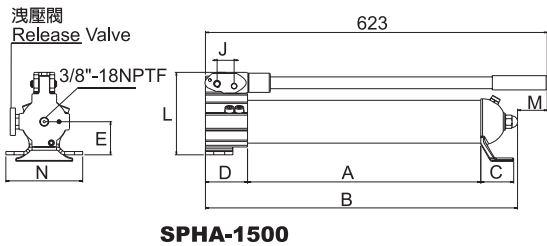
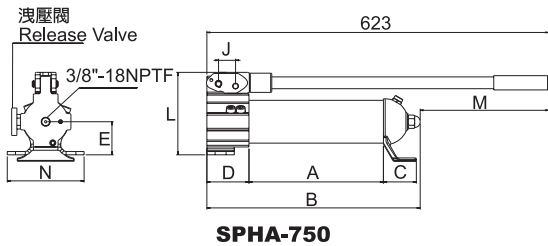
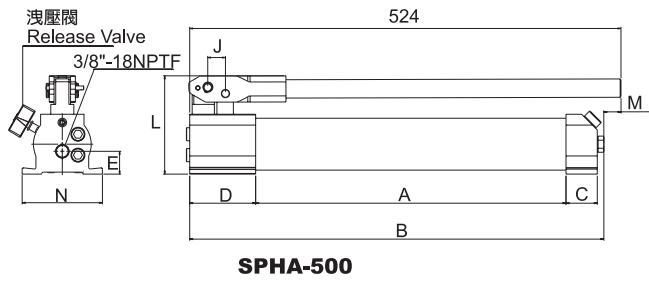
SPH-3000



SPH-3000

| 型 號<br>Model<br>Number | 泵浦類型<br>Pump<br>Type | 有效油量<br>Usable Oil<br>Capacity | 輸出壓力<br>Pressure Rating |                       | 輸出油量<br>Oil Displacement<br>per Stroke |                       | 行程<br>Piston<br>Stroke | 外型尺寸<br>Dimensions(mm) |     |      |    |    |    |     |    |     | 重量<br>(含油)<br>Weight<br>(include oil) |
|------------------------|----------------------|--------------------------------|-------------------------|-----------------------|----------------------------------------|-----------------------|------------------------|------------------------|-----|------|----|----|----|-----|----|-----|---------------------------------------|
|                        |                      |                                | 1 <sup>st</sup> stage   | 2 <sup>nd</sup> stage | 1 <sup>st</sup> stage                  | 2 <sup>nd</sup> stage |                        |                        |     |      |    |    |    |     |    |     |                                       |
|                        |                      | (cm³)                          | (bar)                   |                       | (cm³)                                  |                       |                        | (mm)                   | A   | B    | C  | D  | E  | J   | L  | M   | N                                     |
| SPH-400                | 單速 S/S               | 400                            | —                       | 700                   | —                                      | 1.25                  | 22                     | 200                    | 296 | 32.0 | 50 | 50 | 29 | 142 | 45 | 140 | 5.0                                   |
| SPH-900                | 雙速<br>Two-Speed      | 900                            | 14                      | 700                   | 12.5                                   | 2.8                   | 21                     | 410                    | 510 | 32.5 | 45 | 55 | 29 | 150 | 60 | 136 | 7.5                                   |
| SPH-1200               |                      | 1200                           | 14                      | 700                   | 12.5                                   | 2.8                   | 19                     | 425                    | 536 | 32.5 | 48 | 55 | 29 | 150 | 65 | 137 | 9.0                                   |
| SPH-2000               |                      | 2200                           | 14                      | 700                   | 14.5                                   | 2.8                   | 21                     | 425                    | 536 | 32.5 | 45 | 55 | 29 | 150 | 60 | 136 | 10.5                                  |
| SPH-3000               |                      | 3000                           | 14                      | 700                   | 14.5                                   | 2.8                   | 21                     | 425                    | 562 | 45.0 | 48 | 55 | 29 | 150 | 65 | 137 | 13.6                                  |

2.規格



| 型 號<br>Model<br>Number | 泵浦類型<br>Pump<br>Type | 有效油量<br>Usable Oil<br>Capacity | 輸出壓力<br>Pressure Rating |                       | 輸出油量<br>Oil Displacement<br>per Stroke |                       | 行程<br>Piston<br>Stroke | 外型尺寸<br>Dimensions(mm) |     |    |      |      |    |       |     |      | 重量<br>(含油)<br>Wt.<br>(include oil) |
|------------------------|----------------------|--------------------------------|-------------------------|-----------------------|----------------------------------------|-----------------------|------------------------|------------------------|-----|----|------|------|----|-------|-----|------|------------------------------------|
|                        |                      |                                | 1 <sup>st</sup> stage   | 2 <sup>nd</sup> stage | 1 <sup>st</sup> stage                  | 2 <sup>nd</sup> stage |                        |                        |     |    |      |      |    |       |     |      |                                    |
|                        |                      |                                |                         |                       |                                        |                       |                        |                        |     |    |      |      |    |       |     |      |                                    |
|                        |                      | (cc)                           | (bar)                   | (cm³)                 |                                        | (mm)                  | A                      | B                      | C   | D  | E    | J    | L  | M     | N   | (kg) |                                    |
| SPHA-500               | 雙 速                  | 500                            | 14                      | 700                   | 6.28                                   | 1.57                  | 20                     | 377                    | 503 | 38 | 80.1 | 27.7 | 22 | 119.4 | 21  | 97.5 | 4.5                                |
| SPHA-750               | Two -                | 750                            | 14                      | 700                   | 12.5                                   | 2.8                   | 21                     | 245                    | 389 | 60 | 76.7 | 60.3 | 31 | 150.3 | 234 | 140  | 5.6                                |
| SPHA-1500              | Speed                | 1500                           | 14                      | 700                   | 12.5                                   | 2.8                   | 21                     | 425                    | 568 | 60 | 76.7 | 60.3 | 31 | 150.3 | 54  | 140  | 5.0                                |

### 3.說明及初步安裝

#### 3.1 適用型號 SP-392

圖 3.1 表示出型號 SP-392 液壓手動泵浦的主要部件。

兩用型的通氣/加油蓋可作為油箱受到意外增壓時的洩壓閥使用。

為給較遠的氣閥在油箱尾端提供一個通道，使用一個回油裝置，回油裝置位置略於下圖。

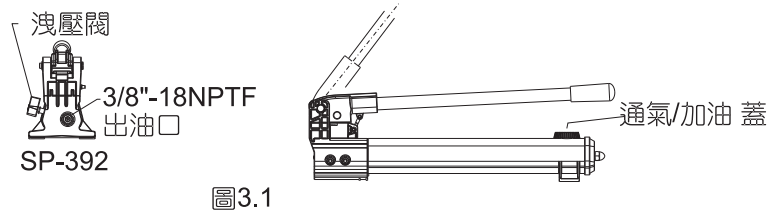


圖3.1

#### 3.2 適用型號 SP-462, SP-464

圖3.2表示型號 SP-462、SP-464液壓手動泵浦主要特性, SP-462 使用於單動液壓缸；

SP-464使用於雙動液壓缸。



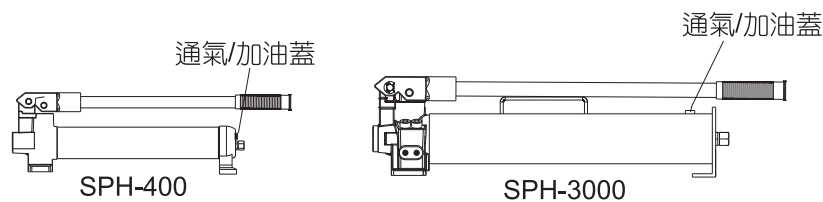
圖3.2

#### 3.3 適用型號 SPH-400,SPH-900,SPH-1200,SPH-2000,SPH-3000

圖3.3表示型號SPH系列液壓手動泵浦主要特性, 可搭配 SW-700(4 □3 位閥)  
可適用於雙動液壓缸。



圖3.3



### 3.說明及初步安裝

#### 3.4 泵浦連接

- 1.先將油管接上泵浦出油口。使用一圈半的鐵弗龍帶(或其他螺紋密封材質)纏在油管接頭上。  
螺紋第一圈不可被密封帶遮住，避免密封帶脫落流入液壓系統引發危害，  
修剪鬆散的密封帶尾端。
- 2.泵浦上安裝壓力錶，可更安全地操作液壓系統。
- 3.將油管安裝至所使用的液壓缸或液壓工具  
注意：以單動液壓缸來說，可以一條油管連接液壓缸和泵浦；而雙動液壓缸則需二條油管  
連接液壓缸和液壓泵浦，其中一條連接泵浦的壓力出口及液壓缸壓力口，  
另一條油管則連接泵浦及液壓缸回油口。

鐵弗龍帶或其他螺紋密封材質



#### 3.5 泵浦工作位置

除了 SP-462 及 SP-464, 使用者可自行選擇垂直或水平方向操作液壓手動泵浦。  
注意: 當手動泵浦採垂直方向安裝時，油管接口必需向下，否則會空吸空氣無法產生壓力。



## 4.操作

### 4.1 手動泵浦操作前準備

- 1.確認系統所有的安裝及連接是否牢固無洩漏。
- 2.確認操作前泵浦油位是否正常。可參考6.1「如何加液壓油」。

注意：

千萬不可加長泵浦手搖桿。加長手搖桿會造成操作運行不穩定。

警告：

某些情況下手搖桿會產回彈。請始終站在泵浦一側，以防止並遠離手搖桿回彈範圍。

### 3.重要事項

 放鬆  
Release  
加油口 & 通氣口  
使用前, 請先放鬆通氣口螺栓,  
避免真空引起損壞



SP-462/  
SP-464

 鎖緊 Screw → Air bolt 空氣螺栓 → Release 放鬆  
Reservoir bolt 油箱螺栓  
Please release Air bolt as using to  
prevent vacuum situation and screw  
Air bolt after using to prevent leaking.  
使用時請將空氣螺栓放鬆預防吸成  
真空狀態；操作完後請鎖緊空氣螺栓  
預防液壓油自空氣螺栓漏出。



通氣

加油

SPH 系列

操作手動泵浦前，務必先放鬆加油/ 通氣口約1/4~1圈,避免真空引起損壞。

SUN RUN油壓手動泵浦之加油/ 通氣口具上述二種型式，並於各系列手動泵浦上均以貼紙告示。

### 4.2 如何使用雙速手動泵浦

以下說明泵浦可提供二階段流量。在無負載時，泵浦在大流量的第一階段流量運作，快速前進。當連接負載時，泵浦自動轉換至第二階段流量並產生壓力。以SP-462或SP-464為例，當泵浦壓力接近200psi (14bar)時，操作者必需先暫停泵浦動作並稍微抬高手搖桿直到感到緊迫壓力消失，即表示已轉換至高流量，才可再進行泵浦動作。

注意：

最好的操作狀態，即在第一階段大流量時使用中速來操作手搖桿；快速操作手搖桿將使泵浦吸油不足。

### 4.3 單動操作與洩壓閥

- 1.如圖4.3順時針方向關閉洩壓閥。

注意: 僅能以手動方式輕轉洩壓閥，切勿使用其他工具硬轉洩壓閥，如此會造成洩壓閥損壞。

- 2.操作泵浦手搖桿將壓力傳送至液壓系統，壓力將維持至鬆開洩壓閥。

- 3.打開洩壓閥 (逆時針旋轉) 洩除壓力, 液壓油回油至油箱。

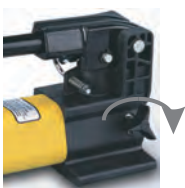


圖4.3

## 4.操作

### 4.4 單動操作與3口2位手控閥

- 1.如圖4.4將手控閥扳至1位置。
- 2.操作泵浦手搖桿將壓力傳送至液壓系統，壓力將維持至手控閥方位變換。
- 3.將手控閥位置扳至2，則泵浦回油。

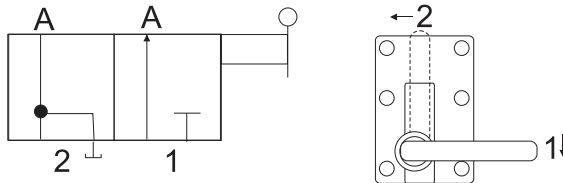


圖 4.4

### 4.5 雙動操作與4口3位手控閥

四口手控閥用來設計操作雙動液壓缸(請參考圖4.5 閥門位置)。

- 1.下列為四口手控閥的各位置功能：
  - (A) 流向孔 "A"; 則孔 "B" 為回油流向油箱。
  - (N) 中立; 孔 "A" 和孔 "B" 均為封閉狀態。
  - (B) 流向孔 "B" 則孔 "A" 為回油流向油箱。
- 2.操作泵浦至完成工作。
- 3.視需要改變閥門位置。

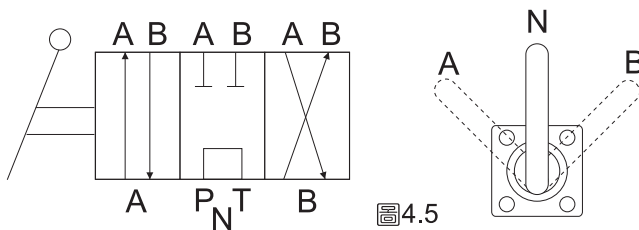


圖4.5

警告：需二條油管均連接上液壓泵浦，雙動液壓缸才可被操作。假若其中一條油管未妥善連接，油路中產生的高壓會引起設備損壞及人員傷亡。

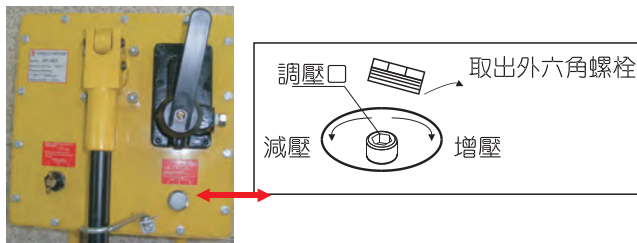
## 4.操作

### 4.6 調整洩壓閥

所有液壓泵浦於出廠時其洩壓閥均已調設成預設的壓力值，以預防超壓情況。  
若需設定較低壓狀況請與SUN RUN連絡。

### 4.7 壓力調整(SP-462 & SP-464 適用)

非專業技術人員請勿擅自調壓。  
本產品預設壓力 $700\text{kgf/cm}^2$ (10,000psi)



### 4.8 壓力調整(SPH系列適用)

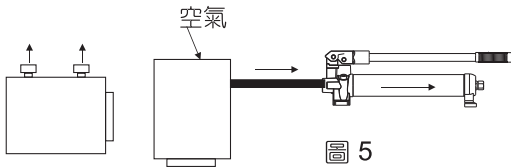


高壓閥

- 1.先利用 8mm 六角扳手鬆開螺栓.
- 2.再用一字起子旋轉高壓鋼珠銷調壓:  
順時針: 增壓  
逆時針: 減壓

## 5. 空氣排除

將液壓系統中的空氣排出，有助液壓缸平順地前進或回縮。(如圖5)



放鬆  
Release  
加油口 & 通氣口  
使用前，請先放鬆通氣口螺栓，  
避免真空引起損壞



SP-462/  
SP-464

↑ ↑ ↑  
鎖緊 Screw ← Air bolt 空氣螺栓 → Release 放鬆  
Reservoir bolt 油箱螺栓  
Please release Air bolt as using to  
prevent vacuum situation and screw  
Air bolt after using to prevent leaking.  
使用時請將空氣螺栓放鬆預防吸成  
真空狀態；操作完後請鎖緊空氣螺栓  
預防液壓油自空氣螺栓漏出。



通氣

加油

SPH 系列

### 5.1 泵浦與單動液壓缸(A)

1. 打開液壓泵浦的通氣口(僅限於有通氣口的液壓泵浦)；關閉洩壓閥。
2. 泵浦位置需高於液壓缸。
3. 將液壓缸主軸向下(倘若使用拉力液壓缸則主軸向上)。見圖5
4. 操作泵浦使液壓缸完全揚程(如為拉力液壓缸則完全回縮)。見圖5
5. 操作洩壓閥使液壓缸回縮(若為拉力液壓缸則揚昇).如此將空氣引入泵浦油箱內。
6. 重覆上述動作。
7. 視需要添加液壓油,見下頁。
8. 將通氣/加油口轉換至操作狀態。

### 5.2. 泵浦與雙動液壓缸(B)

1. 打開液壓泵浦的通氣口(僅限於有通氣口的液壓泵浦)
2. 泵浦位置需高於液壓缸。
3. 將液壓缸水平放置，接頭朝上。如圖5
4. 將液壓缸完全上昇及回縮2~3次。
5. 重覆上述動作。
6. 視需要添加液壓油,見下頁。
7. 將通氣/加油口轉換至操作狀態。

## 6.維修/保養

請使用 **SUN RUN**液壓油以延長泵浦使用壽命及保障您的品質安全。對於使用 **Viton** 和**EPR** 油封配件是可使用在部份泵浦 之中。如需提供此類維修技術資訊，請和**SUN RUN** 技術部門連絡。

### 6.1如何在泵浦內添加液壓油

- 1.請先檢查液面是否合於標準。

警告：務必於液壓缸完全回縮狀態下才可加油(假若為拉力液壓缸則需完全揚昇)  
否則系統內所含的液壓油將超過泵浦油箱所能容納的油量。

- 2.打開通氣/加油蓋。

- 3.將油加至泵浦上所標識的液壓油位置或目視加油孔內油位尚有一指空間。  
切勿將油加至全滿。

- 4.視需要將空氣自系統內排出， 見圖5。 . 移除空氣後再確認液面。

- 5.再將通氣/加油口調至原先位置。

注意：無通氣口的液壓泵浦需設法在油箱中有一定的空氣量使能發揮正常功能。  
若油箱內完全充滿油，造成真空壓力將無法使液壓油流出泵浦。

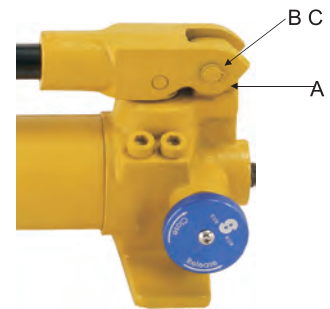
### 6.2 保持油路暢通

當快速接頭無連接時， 務必將防塵蓋鎖上。

應使用所有的保護措施來防止髒污或異物進入液壓設備  
，使液壓泵浦、液壓缸或液壓閥失效。

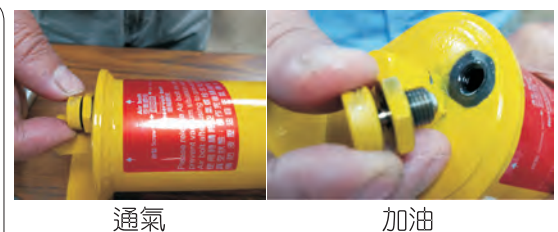
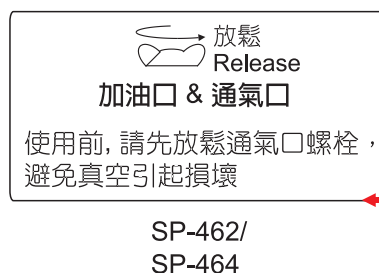
### 6.3 泵浦潤滑

為增加泵浦使用壽命及發揮最佳效用請定期潤滑 油泵(A),  
插銷 (B), 及主軸頭 (C) 見圖8



### 6.4 如何換油

- 1.請於每12個月排放光舊的液壓油，再注入新的**SUN RUN** 液壓油。若使用  
環境屬高污染環請常更換液壓油
- 2.打開通氣/加油口。
- 3.將舊油排光。
- 4.注入新液壓油至泵浦標識液面位置。
- 5.重新蓋好通氣/加油蓋。
- 6.妥善處理舊油。



SPH 系列

## 7.故障排除

下列資訊可有助於解決使用疑問

| 問題                  | 原因                                                                                                                                                                         | 解決                                                                                                                                                                                         |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 液壓缸無法前進, 前進緩慢或是突然前進 | <ol style="list-style-type: none"> <li>1. 泵浦液壓油太低</li> <li>2. 洩壓閥呈打開狀態</li> <li>3. 快速接頭未妥善連接</li> <li>4. 荷重過重</li> <li>5. 系統內空氣阻塞</li> <li>6. 液壓缸主軸遭阻礙</li> </ol>          | <ol style="list-style-type: none"> <li>1. 如項6說明方式添加液壓油</li> <li>2. 關閉洩壓閥</li> <li>3. 確認所有接頭是否已鎖緊</li> <li>4. 請勿超載使用</li> <li>5. 請依項6說明排出空氣</li> <li>6. 確認液壓缸損害情況。<br/>請連絡液壓技術人員</li> </ol> |
| 液壓缸前進但無法持壓          | <ol style="list-style-type: none"> <li>1. 漏油或是連接不完全</li> <li>2. 油封漏油</li> <li>3. 泵浦內部洩漏</li> </ol>                                                                         | <ol style="list-style-type: none"> <li>1. 確認所有連接接頭是否鎖緊<br/>無洩漏</li> <li>2. 確認洩漏位置，連絡液壓技術人員</li> <li>3. 連絡液壓技術人員</li> </ol>                                                                 |
| 液壓缸無法回縮、部份回縮或是回縮緩慢  | <ol style="list-style-type: none"> <li>1. 洩壓閥呈關閉狀態</li> <li>2. 泵浦液壓油過滿</li> <li>3. 快速接頭鬆動</li> <li>4. 系統內有空氣阻塞</li> <li>5. 油管內徑太小</li> <li>6. 液壓缸回縮彈簧毀損或是其他零件損壞</li> </ol> | <ol style="list-style-type: none"> <li>1. 打開洩壓閥</li> <li>2. 將多餘的油倒出至泵浦標記位置即可</li> <li>3. 請確認所有接頭都已完全鎖緊</li> <li>4. 如圖5所示將空氣排出</li> <li>5. 改換內徑較大的油管</li> <li>6. 請連絡液壓技術人員</li> </ol>       |





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# OPERATING INSTRUCTIONS HYDRAULIC HAND PUMP

## SP,SPH,SPHA



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English : E1~E14

中文  
English  
Ver.16

## 1.SAFETY ISSUES



Fail to comply with the following cautions and warnings could cause equipment damage and personal injury.



**IMPORTANT :** Minimum age of the operator must be 18 years The operator must have read and understood all instructions, safety issues, cautions and warnings before starting to operate the SUN RUN equipment. The operator is responsible for this activity towards other persons.



**WARNING :** To avoid personal injury and possible equipment damage, make sure all hydraulic components withstand the maximum pressure of 700 bar(10,000psi).



**WARNING:** Always wear safety glasses. The operator must take precaution against injury due to failure the tool or workpiece.



**WARNING:** Stay clear of loads supported by hydraulics. A cylinder, when used as a load lifting device, should never be used as a load holding device. After the load has been raised or lowered, it must always be blocked mechanically.



**WARNING:** USE ONLY RIGID PIECES TO HOLD LOAD. Carefully select steel or wood blocks that are capable of supporting the load. Never use a hydraulic cylinder as a shim or spacer in any lifting or pressing application.



**DANGER:** To avoid personal injury keep hands and feet away from cylinder and workpiece during operation.



**WARNING :** Do not overload equipment. Overloading cause equipment failure and possible personal injury. The cylinders are designed for a max. Pressure of 700 bar (10,000psi).



**DANGER: NEVER** set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/ or personal injury. Do not remove relief valve.



**WARNING :** The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.



**CAUTION:** Avoid sharp bends and kinks that will cause severe back-up pressure in hoses. Bends and kinks lead to premature hose failure.



**DO NOT** drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.



**IMPORTANT:** Do not lift hydraulic equipment by the hoses or couplers. Use the carrying handle or other means of safe transport.



**CAUTION :** KEEP HYDRAULIC EQUIPMENT AWAY FROM FLAMES AND HEAT. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance do not expose equipment to temperatures of 65°C(150°F) or higher. Protect hoses and cylinders from weld spatter.



**DANGER:** Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin causing serious injury. If oil is injected under the skin, see a doctor immediately.

## 1.SAFETY ISSUES

 **WARNING:** Never pressurize uncoupled couplers. Only use hydraulic equipment in a coupled system.

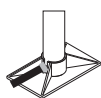
Teflon tape or high-grade pipe thread sealer.



Seal connection with a high-grade pipe thread sealer, such as teflon tape.

**NOTE :** Use 1-1/2 wraps of teflon tape, leaving the first thread bare to prevent tape from shedding into the hydraulic system and causing damage.

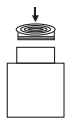
Tighten pipe connections securely, but DO NOT over-tighten.



**WARNING: BE SURE SETUP IS STABLE BEFORE LIFTING LOAD.** Cylinders should be placed on a flat surface that can support the load. Where applicable, use a cylinder base for added stability. Do not weld or otherwise modify the cylinder to attach a base or other support.



**Avoid** situations where loads are not directly centered on the cylinder plunger. Off-center loads produce considerable strain on cylinder and plungers. In addition, the load may slip or fall, causing potentially dangerous results.



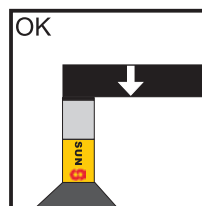
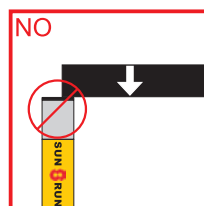
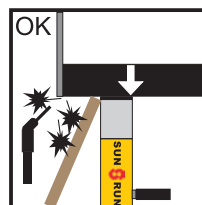
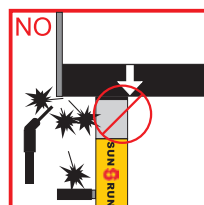
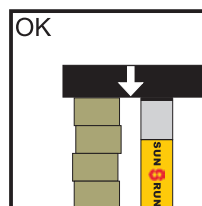
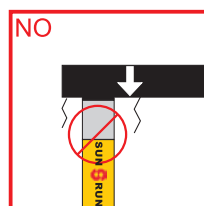
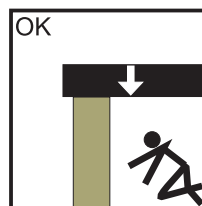
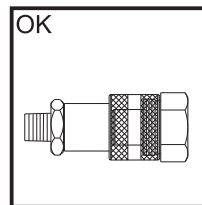
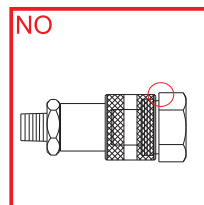
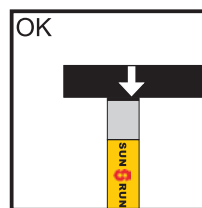
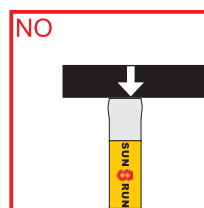
Distribute the load evenly across the entire saddle surface. Always use a saddle to protect the plunger.



**WARNING:** Immediately replace worn or damaged parts with genuine SUN RUN parts. SUN RUN parts are designed to fit properly and withstand rated loads.



**IMPORTANT:** Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the SUN RUN Service Center in your area. To protect your warranty, use only SUN RUN oil.



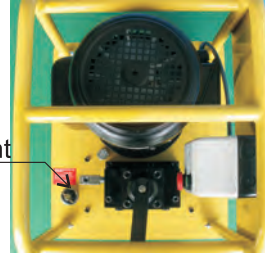
## 1.SAFETY ISSUES

 Release  
OIL & Vent  
Before using, please release  
air vent screw to prevent  
vacuum damage.



SP-462/  
SP-464

oil / vent

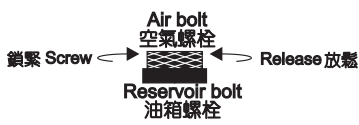


SPE-2/  
SPE-5

- 1.Remove  
9/16-18UNF  
plug.
- 2.Install the  
oil / vent plug



SPE-3000

  
Air bolt  
空氣螺栓  
Reservoir bolt  
油箱螺栓  
Please release Air bolt as using to  
prevent vacuum situation and screw  
Air bolt after using to prevent leaking.  
使用時請將空氣螺栓放鬆預防吸成  
真空狀態；操作完後請鎖緊空氣螺栓  
預防液壓油自空氣螺栓漏出。

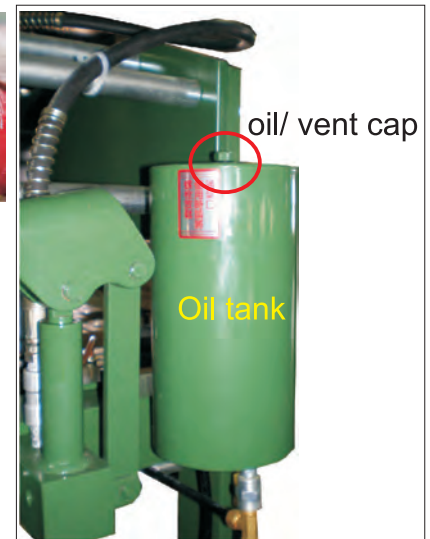
SPH series



vent



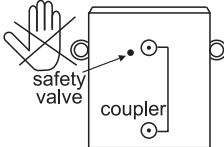
oil



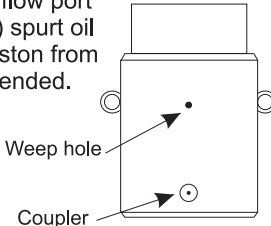
STP-pump

For any oil / vent system, the vent port must open as pump working.  
The vent port should be closed after pump finish prevent leaking  
and contamination.

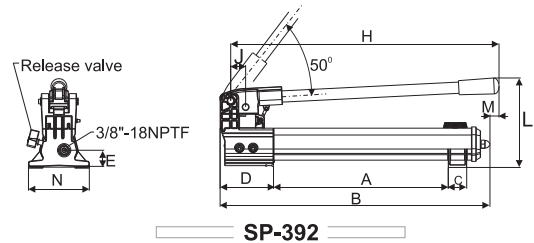
**⚠ WARNING**  
**Don't adjust safety valve pressure!**  
Apply to double-acting cylinder  
RSR, RSRH, CSLRG series  
Most double-acting cylinder safety valve pressure  
setting 10000psi(700bar).  
As surpasses the original factory hypothesis  
pressure safety valve will spurt oil to protect  
cylinder.  
Leaking from safety valve, inspect  
connection of coupler at first.



**⚠ WARNING**  
**Apply to**  
**Single-acting, High tonnage cylinder**  
**CSLP, CSLL and CSLS series**  
When stroke limit is  
reached; overflow port  
("weep hole") spurt oil  
to prevents piston from  
being overextended.



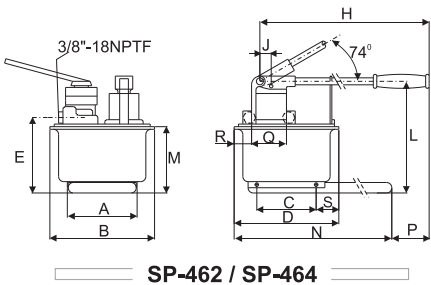
2.SPECIFICATIONS



SP-392D



SP-392



SP-462

| 型 號<br>Model<br>Number | 泵浦類型<br>Pump<br>Type      | 有效油量<br>Usable Oil<br>Capacity | 輸出壓力<br>Pressure Rating |                       | 輸出油量<br>Oil Displacement<br>per Stroke |                       | 最大施力<br>Max.<br>Handle<br>Effort | 行程<br>Piston<br>Stroke | 外型尺寸<br>Dimensions(mm) |      |     |
|------------------------|---------------------------|--------------------------------|-------------------------|-----------------------|----------------------------------------|-----------------------|----------------------------------|------------------------|------------------------|------|-----|
|                        |                           |                                | 1 <sup>st</sup> stage   | 2 <sup>nd</sup> stage | 1 <sup>st</sup> stage                  | 2 <sup>nd</sup> stage |                                  |                        |                        |      |     |
|                        |                           | (cm³)                          | (bar)                   |                       | (cm³)                                  |                       |                                  |                        | (kg)                   | (mm) | A   |
| SP-392                 | 雙 速<br><br>Two -<br>Speed | 901                            | 13                      | 700                   | 11.26                                  | 2.47                  | 42.2                             | 25.4                   | 344                    | 533  | 36  |
| SP-462                 |                           | 7423                           | 14                      | 700                   | 126.20                                 | 4.75                  | 50.0                             | 38.1                   | 210                    | 308  | 163 |
| SP-464                 |                           | 7423                           | 14                      | 700                   | 126.20                                 | 4.75                  | 50.0                             | 38.1                   | 210                    | 308  | 163 |

| 型 號<br>Model<br>Number | 外型尺寸<br>Dimensions(mm) |     |     |    |     |     |     |    |    |    |    | 重量<br>Weight<br><br>(kg) |
|------------------------|------------------------|-----|-----|----|-----|-----|-----|----|----|----|----|--------------------------|
|                        | D                      | E   | H   | J  | L   | M   | N   | P  | Q  | R  | S  |                          |
| SP-392                 | 99                     | 33  | 522 | 30 | 177 | 16  | 120 | —  | —  | —  | —  | 4.1                      |
| SP-462                 | 320                    | 195 | 671 | 25 | 270 | 175 | 650 | 92 | —  | —  | 80 | 27.7                     |
| SP-464                 | 320                    | 195 | 671 | 25 | 270 | 175 | 650 | 92 | 89 | 68 | 80 | 27.7                     |



## 2.SPECIFICATIONS



### 其他選配說明

假如您需加裝4口方向閥來操作雙動油壓缸，請依下列規範字尾增加編號。

加裝4口方向閥：型號D

### 案例：

SPH-2000 選配4口方向閥，訂購型號改為 SPH-2000D  
相關技術諮詢請與SUN RUN取得聯繫。

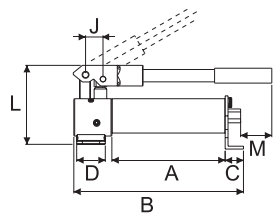
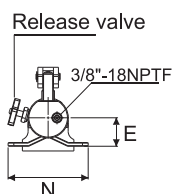
### Optional Features

To add optional features to your pump, add the follow suffixes to the end of the model number.

4 ways control Valve：Model D

### Example：

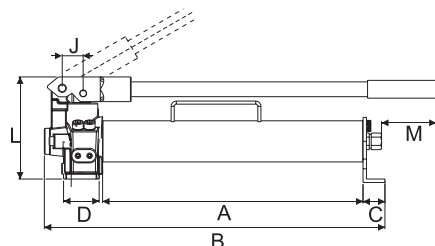
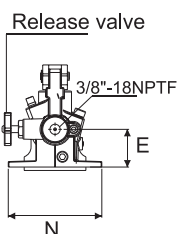
SPH-2000 with 4 ways control valve, order: SPH-2000D. Technical specifications for these features are available from SUN RUN.



SPH -400



SPH-400

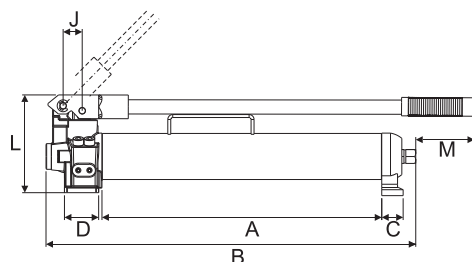
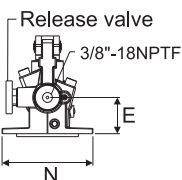


SPH-900

SPH -2000



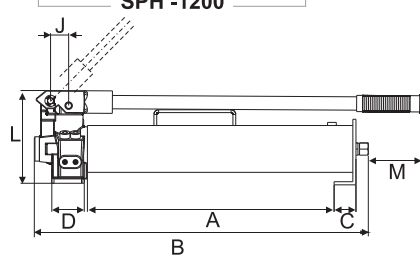
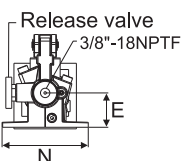
SPH-900



SPH -1200



SPH-1200



SPH-3000

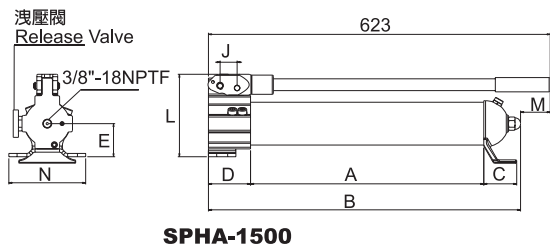
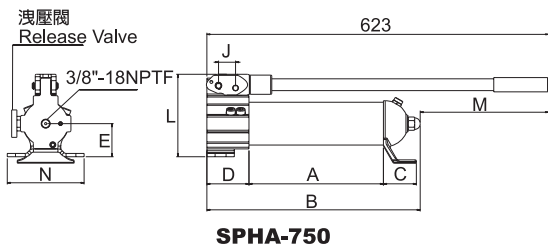
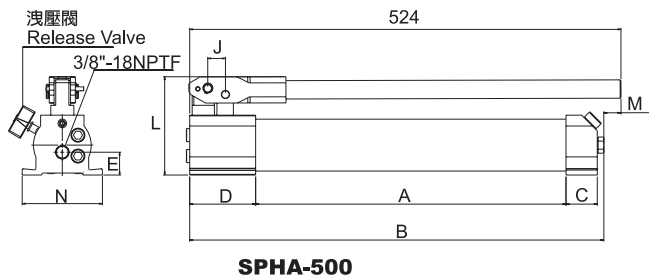


SPH-3000

| 型 號<br>Model<br>Number | 泵浦類型<br>Pump<br>Type | 有效油量<br>Usable Oil<br>Capacity | 輸出壓力<br>Pressure Rating |                       | 輸出油量<br>Oil Displacement<br>per Stroke |                       | 行程<br>Piston<br>Stroke | 外型尺寸<br>Dimensions(mm) |     |      |    |    |    |     |    |     | 重量<br>(含油)<br>Weight<br>(include oil) |
|------------------------|----------------------|--------------------------------|-------------------------|-----------------------|----------------------------------------|-----------------------|------------------------|------------------------|-----|------|----|----|----|-----|----|-----|---------------------------------------|
|                        |                      |                                | 1 <sup>st</sup> stage   | 2 <sup>nd</sup> stage | 1 <sup>st</sup> stage                  | 2 <sup>nd</sup> stage |                        |                        |     |      |    |    |    |     |    |     |                                       |
|                        |                      |                                | (bar)                   |                       | (cm³)                                  |                       |                        | (mm)                   | A   | B    | C  | D  | E  | J   | L  | M   | N                                     |
| SPH-400                | 單速 S/S               | 400                            | —                       | 700                   | —                                      | 1.25                  | 22                     | 200                    | 296 | 32.0 | 50 | 50 | 29 | 142 | 45 | 140 | 5.0                                   |
| SPH-900                | 雙速<br>Two-Speed      | 900                            | 14                      | 700                   | 12.5                                   | 2.8                   | 21                     | 410                    | 510 | 32.5 | 45 | 55 | 29 | 150 | 60 | 136 | 7.5                                   |
| SPH-1200               |                      | 1200                           | 14                      | 700                   | 12.5                                   | 2.8                   | 19                     | 425                    | 536 | 32.5 | 48 | 55 | 29 | 150 | 65 | 137 | 9.0                                   |
| SPH-2000               |                      | 2200                           | 14                      | 700                   | 14.5                                   | 2.8                   | 21                     | 425                    | 536 | 32.5 | 45 | 55 | 29 | 150 | 60 | 136 | 10.5                                  |
| SPH-3000               |                      | 3000                           | 14                      | 700                   | 14.5                                   | 2.8                   | 21                     | 425                    | 562 | 45.0 | 48 | 55 | 29 | 150 | 65 | 137 | 13.6                                  |



2.SPECIFICATIONS



| 型 號<br>Model<br>Number | 泵浦類型<br>Pump<br>Type      | 有效油量<br>Usable Oil<br>Capacity | 輸出壓力<br>Pressure Rating |                       | 輸出油量<br>Oil Displacement<br>per Stroke |                       | 行程<br>Piston<br>Stroke | 外型尺寸<br>Dimensions(mm) |     |    |      |      |    |       |     |      | 重量<br>(含油)<br>Wt.<br>(include oil) |
|------------------------|---------------------------|--------------------------------|-------------------------|-----------------------|----------------------------------------|-----------------------|------------------------|------------------------|-----|----|------|------|----|-------|-----|------|------------------------------------|
|                        |                           |                                | 1 <sup>st</sup> stage   | 2 <sup>nd</sup> stage | 1 <sup>st</sup> stage                  | 2 <sup>nd</sup> stage |                        |                        |     |    |      |      |    |       |     |      |                                    |
|                        |                           |                                |                         |                       |                                        |                       |                        |                        |     |    |      |      |    |       |     |      |                                    |
|                        |                           | (cc)                           | (bar)                   | (cm³)                 |                                        | (mm)                  | A                      | B                      | C   | D  | E    | J    | L  | M     | N   | (kg) |                                    |
| SPHA-500               | 雙 速<br><br>Two -<br>Speed | 500                            | 14                      | 700                   | 6.28                                   | 1.57                  | 20                     | 377                    | 503 | 38 | 80.1 | 27.7 | 22 | 119.4 | 21  | 97.5 | 4.5                                |
| SPHA-750               |                           | 750                            | 14                      | 700                   | 12.5                                   | 2.8                   | 21                     | 245                    | 389 | 60 | 76.7 | 60.3 | 31 | 150.3 | 234 | 140  | 5.6                                |
| SPHA-1500              |                           | 1500                           | 14                      | 700                   | 12.5                                   | 2.8                   | 21                     | 425                    | 568 | 60 | 76.7 | 60.3 | 31 | 150.3 | 54  | 140  | 5.0                                |

### 3.DETAIL & INSTALL

#### 3.1 Models SP-392

Figure 3.1 show the main components of hand pump models SP-392.

The dual-purpose vent/fill cap acts as a pressure relief valve in case of accidental reservoir pressurization. To provide an access port at the rear of the reservoir for remote valves, use a return-to-tank kit. See the Figure 3.1 for kit position.

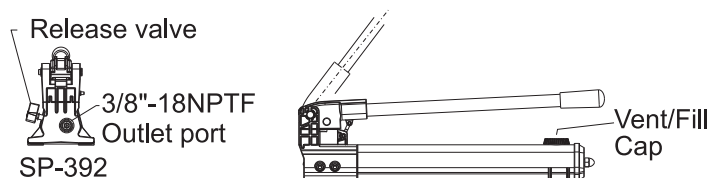


Figure 3.1

#### 3.2 Models SP-462 , SP-464

Figure 3.2 show the main features of hand pump models SP-462, for use with single-acting cylinders, and SP-464, for use with double-acting cylinders.

SP-462: 3way 2position valve  
SP-464: 4way 3position valve

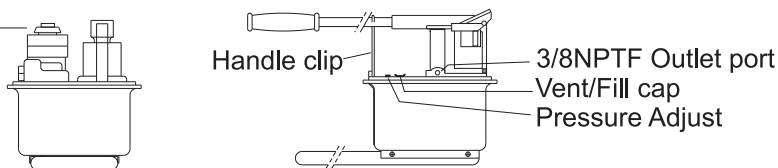


Figure 3.2

#### 3.3 Models SPH-400,SPH-900,SPH-1200,SPH-2000,SPH-3000

Figure 3.3 show the features of hand pump models SPH series, can fit SW-700 (4 way, 3 position valve) for use with double-acting cylinder.

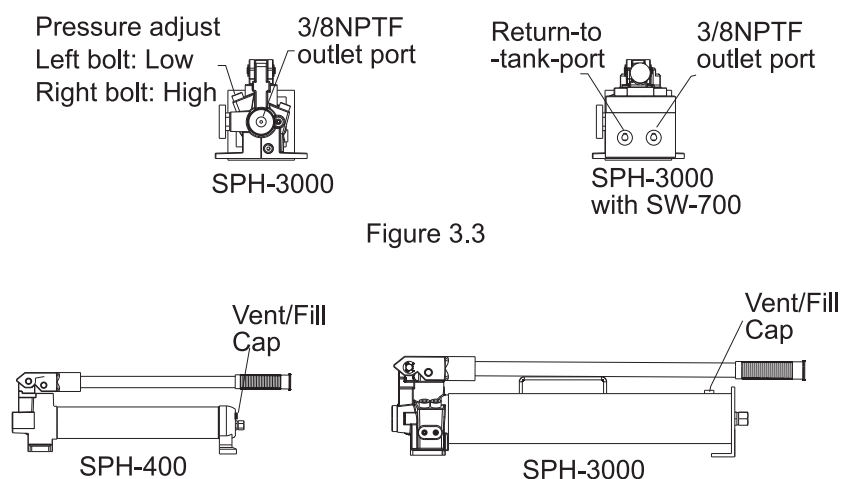


Figure 3.3

### 3.DETAIL & INSTALL

#### 3.4 Connecting the Pump

- 1.Thread hose into pump outlet. Use 1-1/2 wraps of Teflon tape (or suitable thread sealant) on hose fitting, leaving the first complete thread free of tape to ensure that tape does not shed into hydraulic system, causing damage. Trim loose ends.
- 2.Install a pressure gauge in-line from the pump for added safety and better control.
- 3.Connect the hose(s) to your cylinder or tool.

**Note :** For single-acting cylinders, connect one hoses from the pump to the cylinder.

For double-acting cylinders, connect two hoses. Connect one hose from the pressure port of the pump to the pressure port of the cylinder. Connect another hose from the retract port of the pump to the retract port of the cylinder.

Teflon tape or high-grade pipe thread sealer.



#### 3.5 Pump Position

Beside SP-80,SP-801,SP-804,SP-462 and SP-464, you can operate your handle pump , horizontal or vertical.

**NOTE:** When operating the pump in the vertical position, the hose end must be pointed down, or the pump will pick up air and will not build pressure properly.

## 4.OPERATION

### 4.1 Before Using the Pump

- 1.Check all system fitting and connections to be sure they are tight and leak free.
- 2.Check oil level in reservoir before operating pump. See "Adding Oil to the Pump" on item 6.1.

#### **CAUTION:**

**NEVER** add extensions to pump handle. Extensions cause unstable pump operation,

#### **WARNING:**

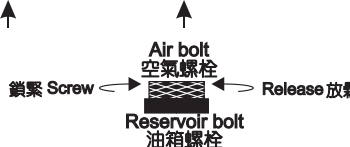
**IN** certain situations the pump handle can "kick back". Always keep your body to the side of the pump, away from the line of force of the handle.

#### 3.IMPORTANT:

 Release  
**OIL & VENT**  
Before using, please release  
air vent screw to prevent  
vacuum damage.



SP-462/  
SP-464

  
Please release Air bolt as using to  
prevent vacuum situation and screw  
Air bolt after using to prevent leaking.  
使用時請將空氣螺栓放鬆預防吸成  
真空狀態；操作完後請鎖緊空氣螺栓  
預防液壓油自空氣螺栓漏出。



Vent

Oil

SPH series

Before operating the manual pump, be sure to loosen the oil /venting port about 1/4~1 turn to avoid damage caused by vacuum. The oil /venting ports of SUN RUN hydraulic manual pumps have the above two types, and are marked with stickers on each series of pumps.

### 4.2 Using Two-Speed Pumps

These pumps provide 2-stage flow. Under no-load, the pump operates in the high flow first stage for rapid advance.

When the load is contacted, the pump automatically shifts to the second stage for building pressure. For **SP-462** or **SP-464** models, when pump pressure reaches approximately 200psi (14bar), you must momentarily stop pumping and raise the handle to shift to the high pressure stage.

#### **NOTE:**

For best performance, operate pump handle at moderate speed during the high flow first stage. Rapid handle speed in the first stage will prevent the pump from delivering full volume of oil.

## 4.OPERATION

### 4.3 Single-Acting Applications with Release Valve

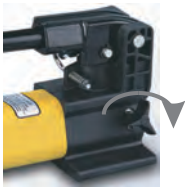


Figure 4.3

1.Close release valve by turning clockwise ,as shown in Figure 4.3.

**CAUTION:** Close release valve finger tight **ONLY**. Using tools on release valve can damage it and cause the pump to malfunction.

2. Operate pump handle to deliver hydraulic power to system. Pressure will be maintained until release valve is opened.

3.Open release valve (turn counter-clockwise) to release pressure, allowing oil to flow back to the reservoir.

### 4.4 Single-acting Applications with 3 way, 2Position Manual Valve

1.Shift valve handle to position 1 as shown Figure 4.4.

2.Operate pump handle to deliver hydraulic power to the system. Pressure will be maintained until the valve is shifted.

3.To allow oil to return to the reservoir, shift valve handle to position 2.

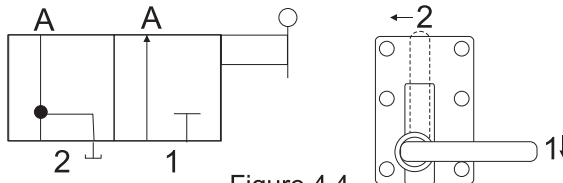


Figure 4.4

### 4.5 Double-acting Applications with 4 way, 3Position Manual Valve

Pumps with 4-way control valves are designed to operate double-acting cylinders. See Figure 4.5 for valve positions.

1.Position lever on 4 way valve to select function as follows:

(A) Flow to port "A"; port "B" returns flow to the reservoir

(N) Neutral ; port "A" and "B" are blocked

(B) Flow to port "B" port "A" returns flow to the reservoir

2.Operate pump to perform work.

3.change valve positions as needed.

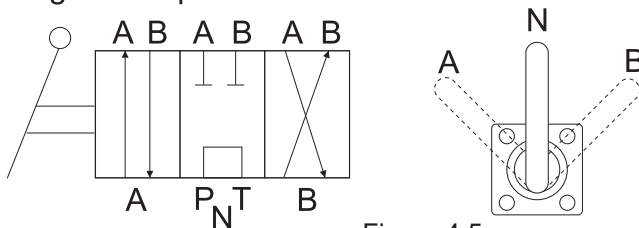


Figure 4.5

**WARNING:** Operate double-acting cylinder only when both hoses are connected to the pump. If one coupler is left unconnected, high pressure will build the coupler which could cause personal injury and/or equipment damage.

## 4.OPERATION

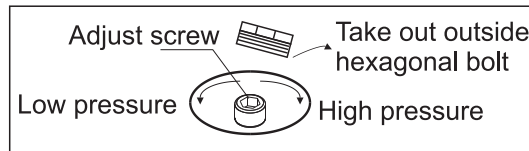
### 4.6 Relief valve Adjustment

All pumps contain a factory set relief valve to prevent over-pressurization of the system.  
Lower pressure settings can be obtained.

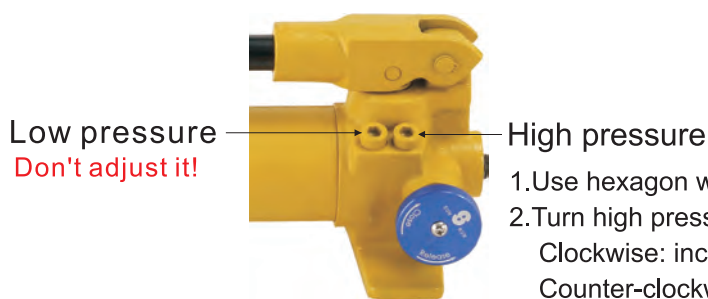
### 4.7 Pressure Adjust (Use only SP-462 &SP-464)

DON'T Adjust pressure, beside hydraulic professional.

Factory set pressure 700kgf/cm<sup>2</sup> (10,000psi)



### 4.8 Pressure Adjust (Use only SPH series)



- 1.Use hexagon wrench 8mm to take out bolt.
- 2.Turn high pressure steel ball sheath by flat screwdriver.  
Clockwise: increase pressure  
Counter-clockwise: remove pressure



## 5. AIR REMOVE

Removing air from the hydraulic system will help the cylinder to advance and retract smoothly .  
(Figure 5)

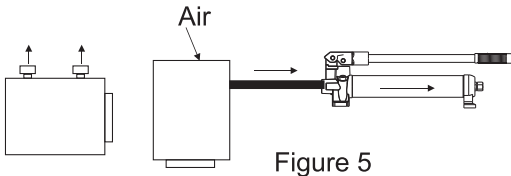
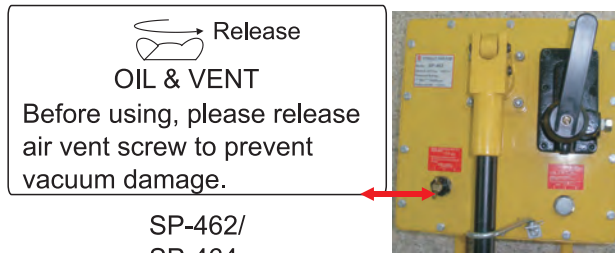
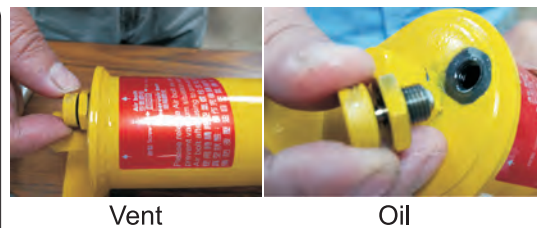


Figure 5



SPH series



### 5.1 Pump with single-acting cylinder (A)

- 1.Vent pump reservoir (for vented pumps only) and close release valve.
- 2.Position pump at higher elevation than cylinder.
- 3.Position cylinder with the plunger end down (up if using pull cylinder). See Figure 5.
- 4.Operate pump to fully extend the cylinder (retract if using pull cylinder). See Figure 5.
- 5.Open release valve to retract cylinder (extend if a pull cylinder).This will force the trapped air to move up to the pump reservoir.
- 6.Repeat the above steps as necessary.
- 7.Add oil of necessary. See page 6
- 8.Return vent/fill cap to operating position.

### 5.2. Pump with Double-acting cylinder (B)

- 1.Vent pump reservoir(for vented pump only).
- 2.Position pump at higher elevation than cylinder.
- 3.Put cylinder in horizontal position with ports up. See Figure5.
- 4.Fully advance and retract the cylinder 2 to 3 times.
- 5.Repeat the above steps as necessary.
- 6.Add oil if necessary. See next page.
- 7.Return vent/fill cap to operating position.

## 6.MAINTENANCE

Use only SUN RUN hydraulic oil with these pumps to promote long pump life and to protect your warranty. Viton and EPR seal kits are available for some hand pump. Contact your SUN RUN representative for more information on these products and their applications.

### 6.1 Adding oil to the pump

#### 1.Check oil level regularly.

**WARNING:** Always add oil with cylinders fully retracted (extended if pull cylinders) or the system will contain more oil than reservoir can hold.

#### 2.Remove vent/fill cap from reservoir.

#### 3.Add oil to the hydraulic oil position marked on the pump or visually check that there is still a finger's space for the oil level in the oil filling hole.

#### 4.Remove air from system if necessary. See Figure 5. Recheck oil level after removing air.

#### 5.Return vent/fill cap to proper position.

**NOTE:** Non-vented hand pumps require air in the reservoir to function properly. If the reservoir is completely filled, a vacuum will form preventing oil from flowing out of the pump.

### 6.2 Keeping oil lines clean

When coupler halves are disconnected, always screw on dust caps. Use every precaution to guard unit against entrance of dirt because foreign matter may cause pump, cylinder, or valve failure.

### 6.3 Lubricating the pump

To extend pump life and improve performance, lubricate the beam pin (A), cross pin (B), and piston head (C) regularly, using bearing grease. See Figure 6.3.

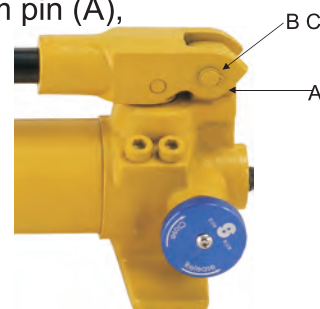


Figure 6.3.

### 6.4 Changing the oil

#### 1.Drain all oil and refill with clean SUN RUN oil every 12 months. If pump is used in dirty environments, change the oil more often.

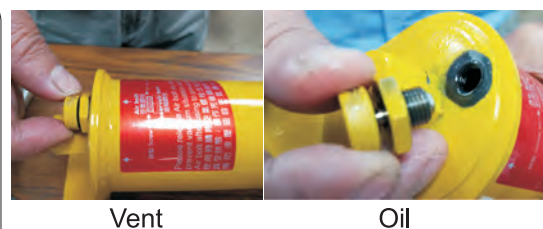
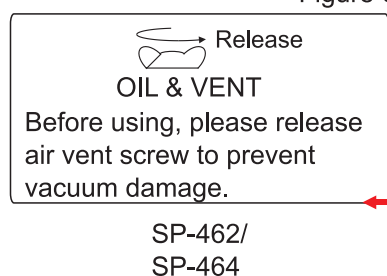
#### 2.Remove vent/fill cap or plug from reservoir.

#### 3.Tilt pump to drain out old oil.

#### 4.Fill reservoir only to level mark shown on pump.

#### 5.Replace the vent/fill cap or plug.

#### 6.Dispose of used oil properly.



## 7.TROUBLESHOOTING GUIDE

The following information is intended as an aid in determining if a problem exists.

| PROBLEM                                                                            | CAUSE                                                                                                                                                                                                                                                                                            | SOLUTION                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cylinder does not advance, advances slowly, or advances in spurts.                 | <ol style="list-style-type: none"> <li>1.Oil level in pump reservoir is low.</li> <li>2.Release valve open.</li> <li>3.Loose hydraulic coupler.</li> <li>4.Load is too heavy.</li> <li>5.Air trapped in system.</li> <li>6.Cylinder plunger binding.</li> </ol>                                  | <ol style="list-style-type: none"> <li>1.Add oil according to the Maintenance instructions on item6.</li> <li>2.Close the release valve.</li> <li>3.Check that all couplers are fully tightened.</li> <li>4.Do not attempt to lift more than rated tonnage.</li> <li>5.Remove air according to the instructions on item 6.</li> <li>6.Check for damage to cylinder. Have cylinder serviced by a qualified hydraulic technician.</li> </ol> |
| Cylinder advances, but does not hold pressure.                                     | <ol style="list-style-type: none"> <li>1.Leaking connection.</li> <li>2.Leaking seals.</li> <li>3.Internal leakage in pump.</li> </ol>                                                                                                                                                           | <ol style="list-style-type: none"> <li>1.Check that all connects are tight and leak free.</li> <li>2.Locate leak(s) and have equipment serviced by a qualified hydraulic technician.</li> <li>3.Have pump serviced by a qualified hydraulic technician.</li> </ol>                                                                                                                                                                         |
| Cylinder does not retract, retracts part way, or retracts more slowly than normal. | <ol style="list-style-type: none"> <li>1.Release valve closed.</li> <li>2.Pump reservoir is over-filled.</li> <li>3.Loose hydraulic coupler.</li> <li>4.Air trapped in system.</li> <li>5.Hose I.D too narrow.</li> <li>6.Cylinder retraction spring broken or other cylinder damage.</li> </ol> | <ol style="list-style-type: none"> <li>1.Open release valve.</li> <li>2.Drain oil level to full mark. See 7.1 instructions for adding oil.</li> <li>3.Check that all couplers are fully tightened.</li> <li>4.Remove air according to the instructions on Figure 5.</li> <li>5.Use larger diameter hydraulic hose.</li> <li>6.Have cylinder serviced by a qualified hydraulic technician.</li> </ol>                                       |