

# M / ML Type

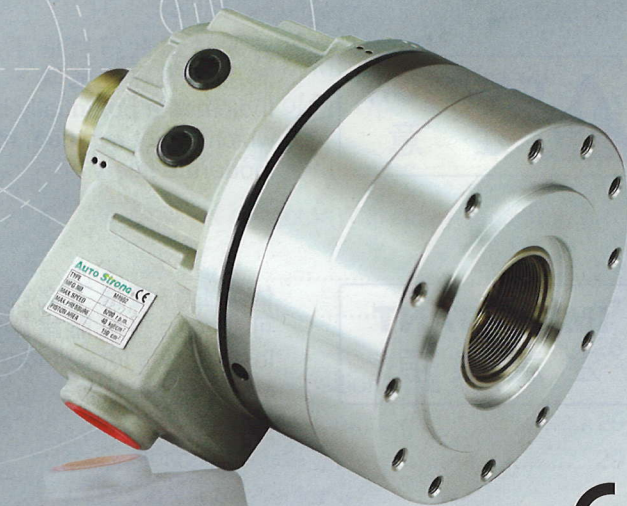
## HIGH SPEED THROUGH-HOLE ROTARY HYDRAULIC CYLINDER 高速中空迴轉油壓缸

### 使用說明書 INSTRUCTION MANUAL

通過ISO 9001品保系統認證合格與CE Mark認證合格廠商

Approved by ISO 9001 and CE certification

*A Stronghold  
by precision and power*



#### 重要 IMPORTANT

當您使用產品前，請詳閱並完全瞭解此說明書內之重要警告事項及使用前之注意事項。

Please ensure this instructions manual has been read and fully understand before operation.



請妥善保存本說明書  
READ AND SAVE THIS BOOK

**Strong**<sup>AUTO</sup> 億川鐵工所 好的品質 · 源自堅持

**序言**

為了確保您的安全，在使用油壓缸之前，請務必閱讀本說明書內所記載之警告事項，並請特別注意文中此 ⚠ 符號底下之說明。

**Introduction:**

To ensure safe operation of your cylinder, please read this instruction manual and pay particular attention to instructions marked with ⚠, including IMPORTANT instructions concerning cylinder performance.

**警告事項 Important**



若未依照此符號底下之說明來操作機械，將引起立即性危險，導致重大傷害或死亡。  
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



若未依照此符號底下之說明來操作機械，將引起潛在性危險，導致重大傷害或死亡。  
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



若未依照此符號底下之說明來操作機械，將引起潛在性危險，導致輕中度的傷害。  
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



依照此符號底下之說明事先了解製品的性能，可避免因誤解而錯誤的操作油壓缸。  
Instructions for cylinder performance and avoiding errors or mistakes.

## 目錄

## TABLE OF CONTENTS

1. 安全措施.....3	1. Safety precautions .....3
2. 規 格.....9	2. Specifications.....9
3. 安 裝.....10	3. Mounting.....10
3-1 安裝概要.....10	3-1 Outline of mounting.....10
3-2 油壓缸連接板的製作及安裝.....11	3-2 Preparation and mounting of cylinder adapter.....11
3-3 連接管的製作及安裝.....12	3-3 Preparation and mounting of draw pipe.....12
3-4 安裝油壓缸.....13	3-4 Mounting of cylinder.....13
3-5 油壓缸安裝螺絲的鎖緊力矩.....15	3-5 Tightening torque for cylinder mounting bolts.....15
3-6 適合油壓夾頭規格.....15	3-6 Matching power chucks specification.....15
4. 油壓迴路設計說明.....16	4. Hydraulic circuit diagram.....16
5. 安裝控制閥、油壓系統及管路.....17	5. Attachment of control valve, hydraulic unit and piping.....17
6. 油壓油.....18	6. Hydraulic oil.....18
7. 運轉測試.....18	7. Test run.....18
8. 油壓油的溫度上升.....20	8. Temperature rise of hydraulic oil.....20
9. 維護及檢查.....20	9. Maintenance and inspection.....20
10. 故障排除.....21	10. Troubleshooting.....21
11. 迴轉油壓缸零件分解圖.....23	11. Parts list of cylinder.....23
11-1 M型零件分解圖.....23	11-1 Parts list of M type .....23
11-2 ML型零件分解圖.....25	11-2 Parts list of ML type .....25
12. 集水盒.....27	12. Coolant collector.....27
13. 集水盒(含行程檢知).....27	13. Coolant collector(With stroke control).....27
1. 概 要.....27	1. General.....27
2. 規 格.....27	2. Specification.....27
3. 安 裝.....28	3. Mounting.....28
4. 近接開關的位置調整.....29	4. Adjusting the position of a proximity switch.....29
5. 使用上的注意.....29	5. Notices on use.....29
6. 集水盒(含行程檢知)零件分解圖.....29	6. Coolant collector (With stroke control)parts list.....29

# 1. 安全措施

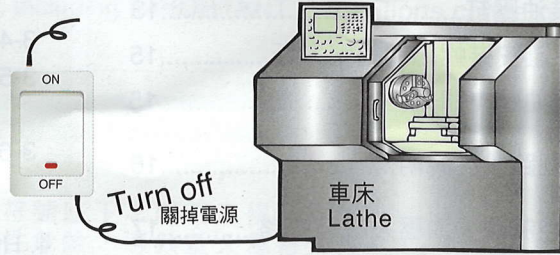
## Safety precautions



使用前請詳閱本說明書，並遵循本說明書所給予的指示。  
Please read this manual and following instructions carefully.

在安裝、檢查或潤滑迴轉油壓缸時需關掉所有電源，確保操作人員之安全  
TURN OFF all power before setting, inspecting, lubricating or changing the cylinder.

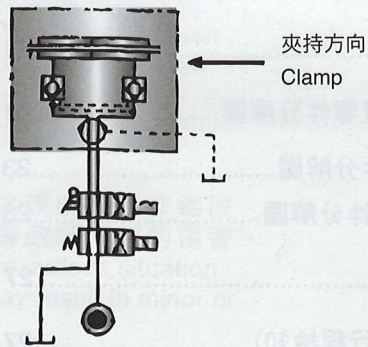
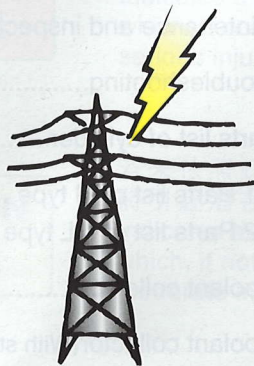
易發生身體或衣服捲入等意外事故  
Danger caused by catching operator in a machine.



迴轉油壓缸內之"止回閥機構"當電力喪失時能防止油壓缸內部壓力的驟降，可保持夾頭在夾持狀態。(參考P.16)  
Use built-in check valves and route solenoid valve so as to clamp even if power is interrupted. (see page P.16)

停電時夾持力降低，工件飛散產生危險  
Danger by discharge of clamping workpiece.

停電  
INTERRUPTION



夾持狀態固定位置  
Set work to correct gripping position.

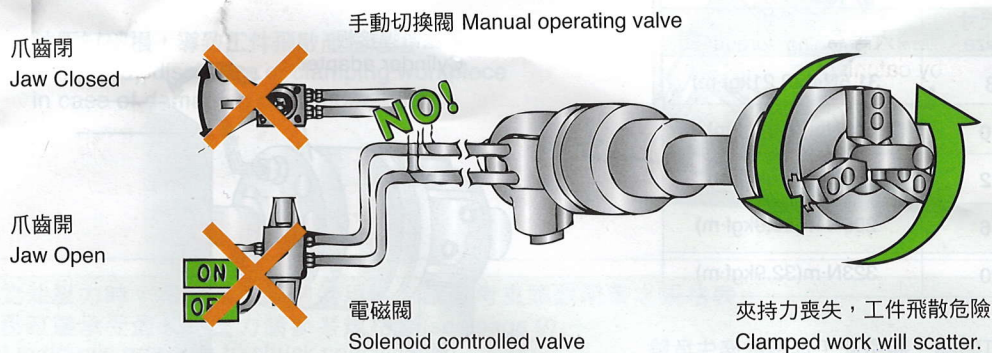
每星期檢查止回閥之斷電裝置是否正常。  
檢查方法：先讓夾頭夾持一圓棒後，關掉電源查看工件是否會鬆脫，不會鬆脫表功能正常，如鬆動表功能失效，須立刻送廠檢修。  
The safety device for power failure should be checked once a week.  
The checking procedure is to grip a workpiece first, then turn off the power.  
Inspect the gripping condition of the workpiece. If the workpiece is clamped tightly, it indicates the safety device works effectively. Otherwise, the safety function fails.  
Please call your local distributor for repair service.



若未依照指示，錯誤的使用油壓缸而引起的損傷及意外事故，本公司概不負責。

We cannot assume responsibility for damage or accidents caused by misuse of the cylinder, through noncompliance with the safety instructions.

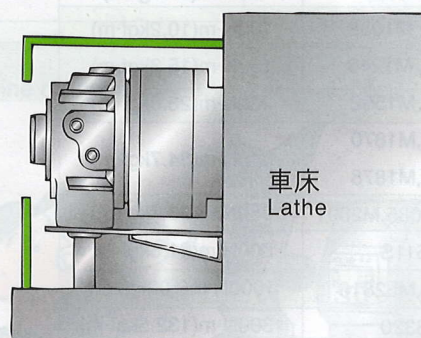
當主軸旋轉時，不可關掉油壓幫浦的電源，更不可操作切換閥  
Never turn off the power of hydraulic pump and operate selector valve and solenoid valve during spindle rotation.



工件飛散產生危險。  
Danger by discharge of workpiece.

使用迴轉缸必須安裝防護罩，將外圍蓋住  
Cover the periphery of cylinder .

易發生身體及衣物捲入等意外事故  
Danger caused by catching operator in a machine.



## 1. 安全措施

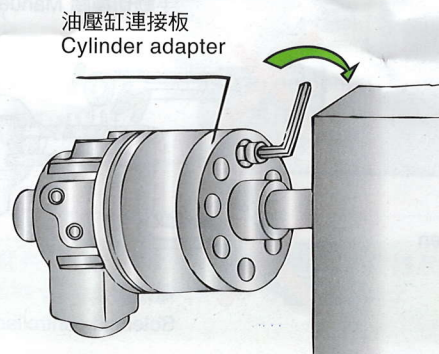
### Safety precautions



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連接螺絲須依照規定的力矩鎖緊(參考P.15)  
Secure clamp bolts with specified torque.(see page 15)

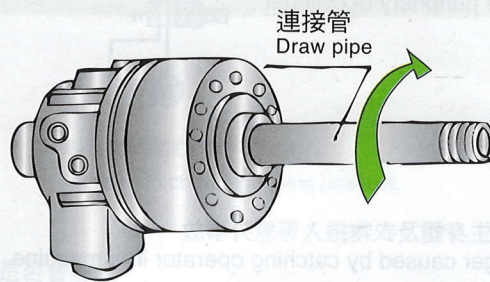
螺絲尺寸 Bolt size	鎖緊力矩 Tightening torque
M 8	31.5N·m(3.21kgf·m)
M 10	60N·m(6.1kgf·m)
M 12	87N·m(8.9kgf·m)
M 16	205N·m(20.9kgf·m)
M 20	323N·m(32.9kgf·m)



如果油壓缸破損，將引起工件飛散產生危險  
Danger by discharge of workpiece  
in case of damaging of cylinder.

連接管須依照規定的力矩確實鎖緊  
Secure the draw pipe with specified torque.

油壓缸型式 Cylinder Type	鎖緊力矩 Tightening torque
M0926A/M0928A	50N·m(5.1kgf·m)
M1036, M1038	100N·m(10.2kgf·m)
M1236, M1246	150N·m(15.3kgf·m)
M1546, M1552	280N·m(28.6kgf·m)
M1768, M1870 M1875, M1878	340N·m(34.7kgf·m)
M2078, M2085, M2091	380N·m(38.7kgf·m)
M2511S	800N·m(81.6kgf·m)
ML2814, ML2816	1000N·m(102kgf·m)
ML3320	1300N·m(132.5kgf·m)



否則工件飛散產生危險  
Danger by discharge of  
clamping workpiece.

將活塞設定於行程終點，並完全伸出  
油壓缸外部時，再旋入連接管  
Set the piston at stroke end on  
pushing side.

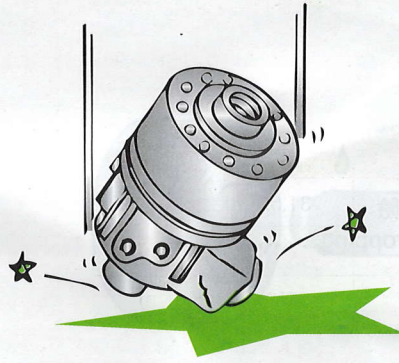


若未依照指示，錯誤的使用油壓缸而引起的損傷及意外事故，本公司概不負責。

We cannot assume responsibility for damage or accidents caused by misuse of the cylinder, through noncompliance with the safety instructions.

勿使油壓缸受到衝擊或碰撞  
Never shock!

油壓缸破損，導致工件飛散產生危險  
Danger by discharge of clamping workpiece  
in case of damaging of cylinder.



設定油壓力時，須考量夾頭的適用性，請參考夾頭說明書之規格表。

油壓缸能承受最大油壓力請參考規格表(see page 9)

Set hydraulic pressure to chuck specification.

The maximum hydraulic pressure of cylinder refer specifications (see page 9)

造成油壓缸破裂，導致工件飛散產生危險。  
Danger by discharge of clamping workpiece  
in case of damaging of cylinder.



操作機器前，請勿喝酒或服用麻醉性藥物  
Never attempt to operate a machine while taking medicine or alcohol.

判斷力差時，容易操作錯誤十分危險  
Danger by operational fault and  
lowering judgment.



## 1. 安全措施

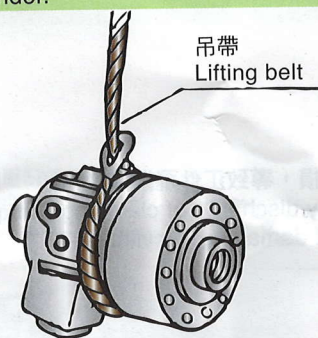
### Safety precautions



使用前請詳閱本說明書，並遵循本說明書所給予的指示。  
Please read this manual and following instructions carefully.

欲拆卸或安裝油壓缸時，請使用吊環或吊帶。  
Use eyebolt or lifting belt when mounting or removing the cylinder.

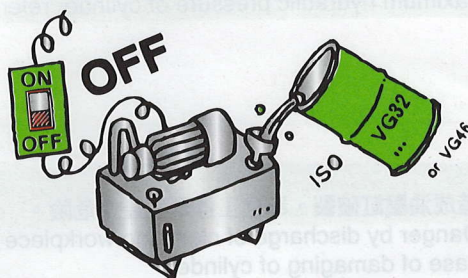
掉落時十分危險  
Danger by dropping.



供給足夠的油壓油前，務必先關掉電源。  
Turn off power source and supply specified oil.

油料不足將使得油壓缸作動速度慢、  
推力不足，因而導致夾持力減弱，  
工件飛散十分危險。

Danger by discharge of workpiece  
incompletely gripped because of  
slow operation speed or insufficient thrust.

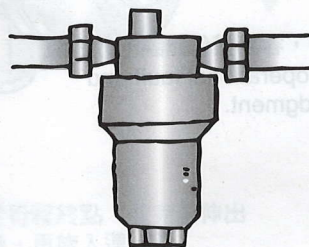


供給壓力的油管須裝置過濾器  
Incorporate a filter in pressure supply line.

如果雜質進入，將使油壓缸阻塞而  
失去功能，工件容易飛散產生危險

Danger by discharge of workpiece because  
cylinder may seize if foreign matter is  
entered into cylinder.

過濾網須在精度 $20\mu\text{m}$ 以下  
Filter accuracy  $20\mu\text{m}$  or less



## 3. 安裝 Mounting

## 3-1 安裝概要 Outline of mounting



若未依照指示，錯誤的使用油壓缸而引起的損傷及意外事故，本公司概不負責。

We cannot assume responsibility for damage or accidents caused by misuse of the cylinder, through noncompliance with the safety instructions.

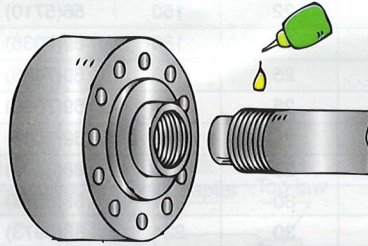
連接管的螺牙部分須塗上接合膠，並且依照規定的力矩鎖緊

Coat the threaded part of the draw pipe with adhesive and screw it with the specified torque.

萬一螺牙鬆開，將使得夾頭爪行程變短，  
工件夾持不良而飛散十分危險

Danger by discharge of workpiece.

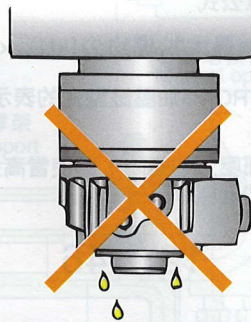
Because screw becomes loosened, the  
jaw stroke of the chuck becomes short.



請勿直立裝置油壓缸

Vertical mounting is impossible.

會發生漏油現象  
Oil leakage



## 2. 規格 Specifications

規格 Specs 型式 Model	通孔直徑 Through -Hole (mm)	活塞行程 Piston Stroke (mm)	活塞面積 Piston Area (cm <sup>2</sup> )	最大 拉桿出力 Max. Draw Bar Force kN(kgf)	最大 使用油壓力 Max. Operating Pressure MPa(kgf/cm <sup>2</sup> )	總流量 Total Leakage (L/min)	最高轉速 Max. Speed (r.p.m.)	重量 Weight (kg)	慣性矩 I Moment of Inertia I (kg·m <sup>2</sup> )	適合夾頭 Matching Chuck
M0926A	26	10	48.3	18(1835)	4.0(40.8)	3	8000	5.7	0.006	N-204
M0928A	28	10	48.3	18(1835)	4.0(40.8)	3	8000	5.5	0.006	N-204
M1036	36	15	68.5	25(2549)	4.0(40.8)	3	8000	8.6	0.011	N-205
M1038	38	15	66	24.5(2498)	4.0(40.8)	3	8000	8.5	0.011	N-205
M1236	36	15	89	33(3365)	4.0(40.8)	3	7000	13	0.019	N-206
M1246	46	15	89	33(3365)	4.0(40.8)	3	7000	12	0.019	N-206
M1546	46	22	154	57.8(5894)	4.0(40.8)	3.9	6200	18	0.056	N-208
M1552	52	22	150	56(5710)	4.0(40.8)	3.9	6200	16.8	0.052	N-208
M1768	68	25	183	69(7036)	4.0(40.8)	4.2	4700	27.5	0.096	NB-208
M1870	70	25	183	69(7036)	4.0(40.8)	4.2	4700	26.5	0.095	N-210
M1875	75	25	183	69(7036)	4.0(40.8)	4.2	4700	26	0.095	N-210
M1878	78	25	183	69(7036)	4.0(40.8)	4.2	4700	25.5	0.095	NB-210
M2078	78	23	234	88(8973)	4.0(40.8)	4.5	3800	36.5	0.15	N-212
M2085	85	30	234	88(8973)	4.0(40.8)	4.5	3800	37.5	0.15	N-212
M2091	91	30	234	88(8973)	4.0(40.8)	4.5	3800	37	0.15	N-212
M2511S	117.5	23	336	120(12236)	4.0(40.8)	7.0	2800	53	0.41	N-215, N-218
ML2814	145	42	350	106.8(10584)	3.3(33.6)	9	2000	87	1.08	N-220
ML2816	166.5	42	350	106.8(10584)	3.3(33.6)	9	2000	72	0.9	N-220
ML3320	205	42	416.9	136.9(13960)	3.3(33.6)	10	1600	103	1.09	N-224

◎ 註1) 總流量的測定是在油壓壓力30kgf/cm<sup>2</sup>及油溫50°C的情況。

◎ 註2) 活塞推力的計算公式

$$\text{使用油壓力(MPa)} - 0.25(\text{MPa})$$

$$\text{活塞推力(kN)} = \text{最大拉桿出力(kN)} \times \frac{\text{最大使用油壓力(MPa)} - 0.25(\text{MPa})}{\text{最大拉桿出力(kN)}} \times \frac{\text{使用油壓力(MPa)} - 0.25(\text{MPa})}{\text{最大使用油壓力(MPa)} - 0.25(\text{MPa})}$$

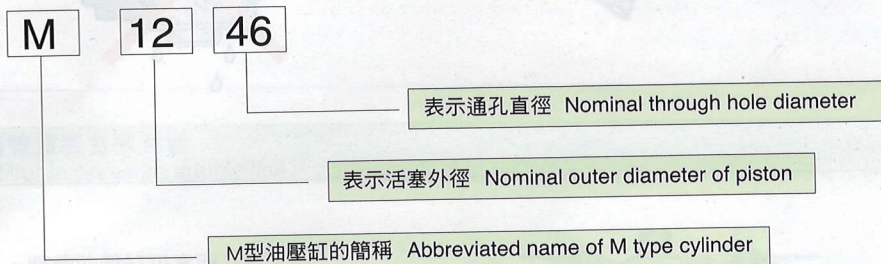
◎ 註3) 以下為AUTOSTRONG油壓缸型式的表示方法，請依照型式的稱呼方法，對照規格表來了解產品的機能

◎ 註4) 自鎖機構

防止油壓缸內部壓力的驟降，即使當高速迴轉時由於電力喪失或油壓供應的損害而造成油壓壓力驟降到不正常的低標準下。

範例：

Example



◎ Note 1: Total leakage value is measured when hydraulic pressure is 30 kgf/cm<sup>2</sup> and oil temperature is 50°C

◎ Note 2: How to find piston thrust

$$\text{Piston thrust(kN)} = \text{Max. draw bar force (kN)} \times \frac{\text{Operating pressure(MPa)} - 0.25(\text{MPa})}{\text{Max. operating pressure(MPa)} - 0.25(\text{MPa})}$$

◎ Note 3: The following explains AUTOSTRONG Brand Standard Cylinder.

Please understand specifications and functions by referring to the following procedures for the nominal designation of model.

◎ Note 4: The Lock Valve

Temporarily maintains the hydraulic pressure in the cylinder if the pump pressure is immediately reduced because power fails or the hydraulic pump troubles.

### 3. 安裝 Mounting

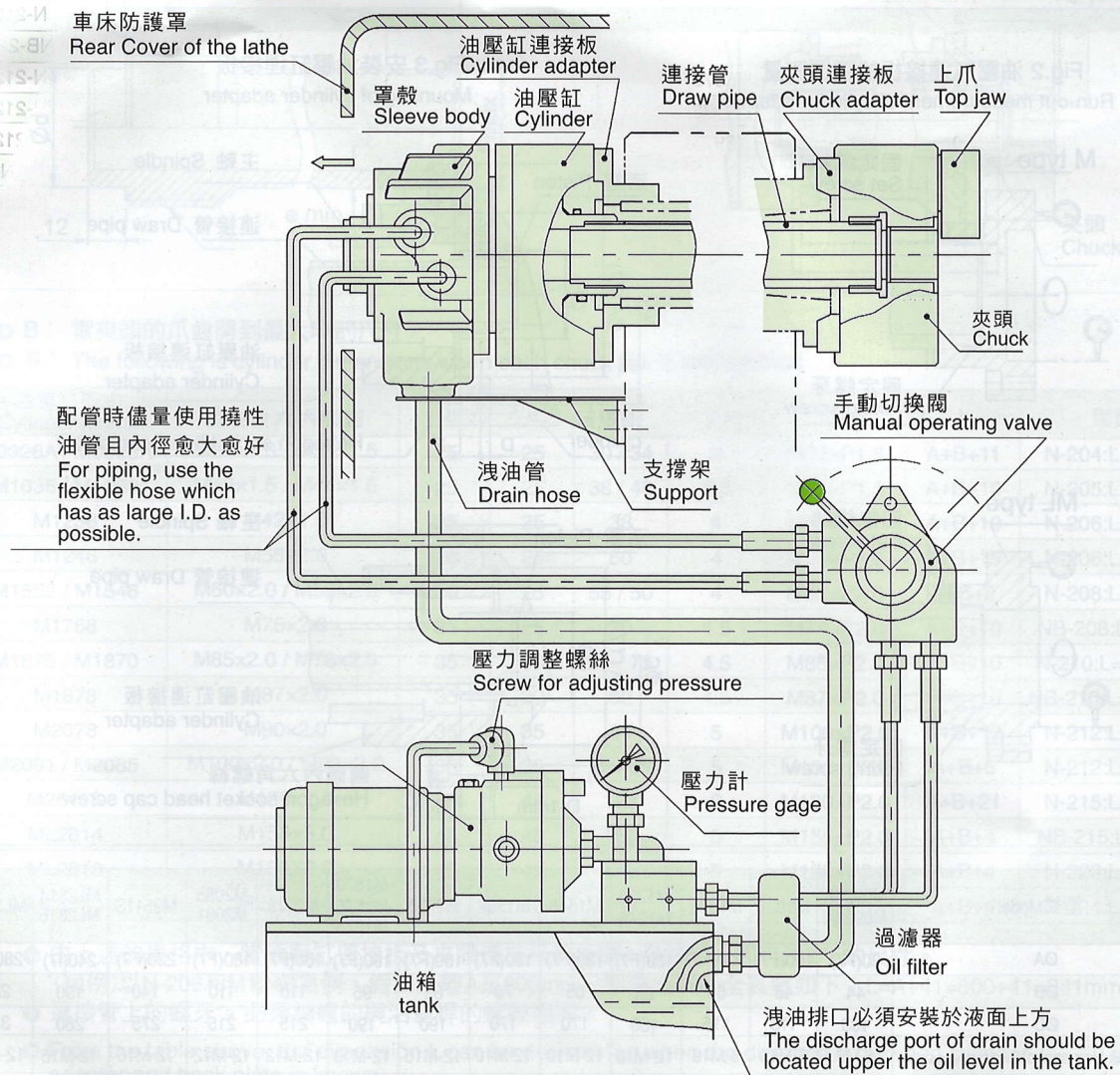
#### 3-1 安裝概要 Outline of mounting

- ◎ 首先將中空油壓夾頭安裝於車床主軸的前方，高速迴轉中空油壓缸裝於後方，而二者以連接管來連接。
- ◎ Mount the through-hole power chuck to the front of the lathe spindle, and the high speed through-hole rotary hydraulic cylinder to the rear. Connect both units to draw pipe.

#### IMPORTANT 注意事項

- ◎ 在油壓缸後方的車床後蓋上，必須安裝一種與罩殼尺寸相似的通風窗，並且供給油的配管須置於防護罩外，如此油壓缸產生的熱量可以由此散去。
- ◎ The window with the size similar to sleeve body or air passage should be provided on the rear cover of the lathe behind the cylinder, so that the heat generated from the cylinder may go out from it.

Fig.1



### 3-2 油壓缸連接板的製作及安裝

#### Preparation and mounting of cylinder adapter

**IMPORTANT**  
注意事項

- ◎ 校正油壓缸連接板平面及接合圓徑的偏擺在0.005mm以內，過多的偏擺會造成震動而導致油壓缸使用壽命減短。
- ◎ Keep the run-out on cylinder adapter front face and the run-out on its socket diameter both within 0.005 mm. Excessive vibration can cause vibration and markedly shortened cylinder service life.
- ◎ 把油壓缸裝在距離車床主軸托架愈近愈好，而油壓缸連接板的安裝方式及量測偏擺的方法請參考(Fig.2,3)。
- ◎ 一定要裝上固定螺絲才能防止連接板的鬆動。
- ◎ Set the cylinder as close as possible to the spindle support of the lathe. The examples of cylinder adapter installation method and run-out measuring method are shown in Fig.2,3
- ◎ Be sure to provide the set screw to prevent loosening of the adapter.

Fig.2 油壓缸連接板的偏擺測量  
Run-out measurement of cylinder adapter

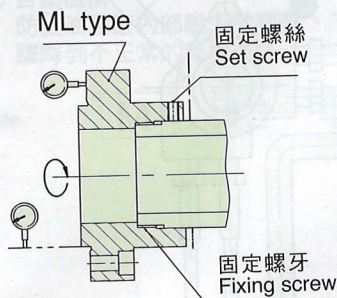
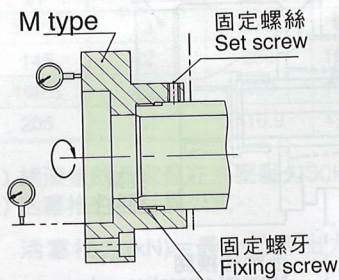
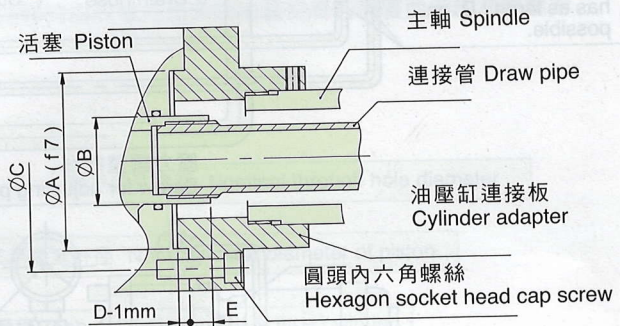
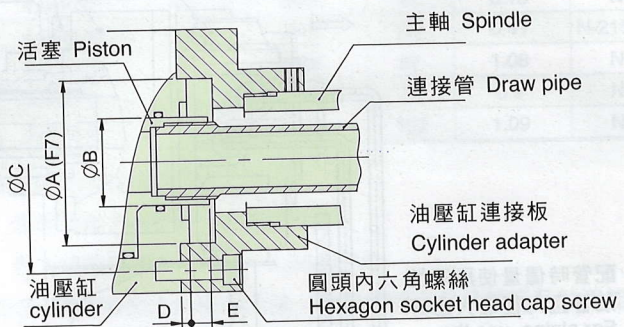


Fig.3 安裝油壓缸連接板  
Mounting of cylinder adapter



型式 Model	M0926A M0928A	M1036	M1038	M1236 M1246	M1546	M1552	M1768	M1870 M1875 M1878	M2078	M2085 M2091	M2511S	ML2814 ML2816	ML3320
ØA	80(F7)	100(F7)	100(F7)	100(F7)	130(F7)	130(F7)	160(F7)	160(F7)	180(F7)	180(F7)	230(F7)	240(f7)	280(f7)
ØB	44	48	50	65	65	70	85	95	110	110	140	190	230
ØC	100	115	115	130	170	170	190	190	215	215	275	280	320
內六角螺絲 Hex socket head cap screw	6-M8	6-M10	6-M10	12-M10	12-M10	12-M10	12-M10	12-M10	12-M12	12-M12	12-M16	12-M16	12-M20
D	5	5	5	5	5	5	5	5	5	5	6	6	6
E (MAX.)	9	10	10	10	17	17	20	20	18	25	18	41	41

## 3-3 連接管的製作及安裝

## Preparation and mounting of draw pipe

- ◎ 連接管的長度請依下列計算。(Figs.4,5)
- ◎ 使活塞完全伸出外部時，將連接管旋入活塞內。
- ◎ Determine the length of draw pipe as follows. (Figs.4,5)
- ◎ With the piston rod thoroughly extracted outside, screw the draw pipe into piston rod.



- ◎ 把活塞及連接管螺牙部位完全清潔後，塗上少許的接合膠，依照規定的力矩將兩者鎖緊。(參考P.5)
- ◎ Degrease the threaded sections of the cylinder and the draw pipe completely before applying adhesives thinly and screw them.

Fig.4 連接管構造圖 Detail of draw pipe

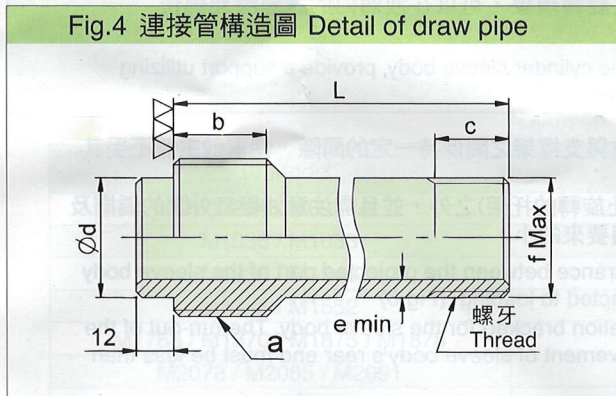
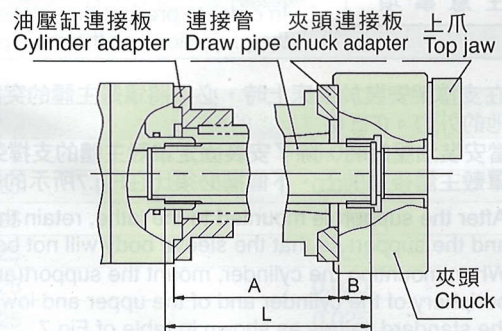


Fig.5 連接管裝配圖 Installation of draw pipe



- ◎ B：當夾頭的爪齒開到最大時的尺寸。
- ◎ B：The following is cylinder dimensions when each chuck jaw is fully opened.

油壓缸型式 Cylinder model	a	b	c	d(f7)	e Min.	f Max.	L	備註
M0926A / M0928A	M34×1.5 / M38×1.5	25	25	30 / 34	3	M32×P1.5	A+B+11	N-204:L=A+29
M1036 / M1038	M42×1.5 / M44×1.5	25	25	38 / 40	3.5	M40×P1.5	A+B+10	N-205:L=A+28
M1236	M42×1.5	25	25	38	4	M55×P2.0	A+B+10	N-206:L=A+36
M1246	M55×2.0	30	25	50	4	M55×P2.0	A+B+15	N-206:L=A+41
M1552 / M1546	M60×2.0 / M55×2.0	30	25	55 / 50	4	M60×P2.0	A+B+8	N-208:L=A+39
M1768	M75×2.0	35	25	70	4.5	M74×P2.0	A+B+10	NB-208:L=A+41
M1875 / M1870	M85×2.0 / M78×2.0	35	30	80 / 75	4.5	M85×P2.0	A+B+10	N-210:L=A+38.5
M1878	M87×2.0	35	30	82	4.5	M87×P2.0	A+B+10	NB-210:L=A+38.5
M2078	M90×2.0	35	35	84	5	M100×P2.0	A+B+12	N-212:L=A+43
M2091 / M2085	M100×2.0 / M93×2.0	35	35	95 / 89	5	M100×P2.0	A+B+5	N-212:L=A+36
M2511S	M130×2.0	45	48	123	6	M130×P2.0	A+B+21	N-215:L=A+65
ML2814	M158×3.0	45	48	150	5	M155×P2.0	A+B+4	NB-215:L=A+48
ML2816	M180×3.0	45	48	170	5	M190×P3.0	A+B+4	N-220:L=A+47
ML3320	M215×3.0	45	48	210	5	M215×P3.0	A+B+4	N-224:L=A+53

- ◎ 由上述的表格中，當油壓缸連接板及夾頭連接板的距離A得知時，即可決定L的尺寸。  
(範例)以N-206和M1246為例，假如距離A是800mm，則連接管的全長將如下： $L=A+41=800+41=841\text{mm}$
- ◎ 連接管上的螺牙“a”必須精確的與活塞桿的螺紋相同。
- ◎ From the table above, the dimension L can be determined when the distance A between cylinder adapter and back plate is known.  
(Example):When the distance A is 800 mm in case of N-206 and M1246, the overall length of the draw pipe will be as follows: $L=A+41=800+41=841\text{mm}$
- ◎ Accurate threading must be provided on the draw pipe in conformity with the threads on the piston rod.

**IMPORTANT**  
注意事項

- ◎ 螺牙鬆動是造成連接管震動的主要原因。
- ◎ Insecure threads will cause the draw pipe to vibrate.

### 3-4 安裝油壓缸 Mounting of cylinder

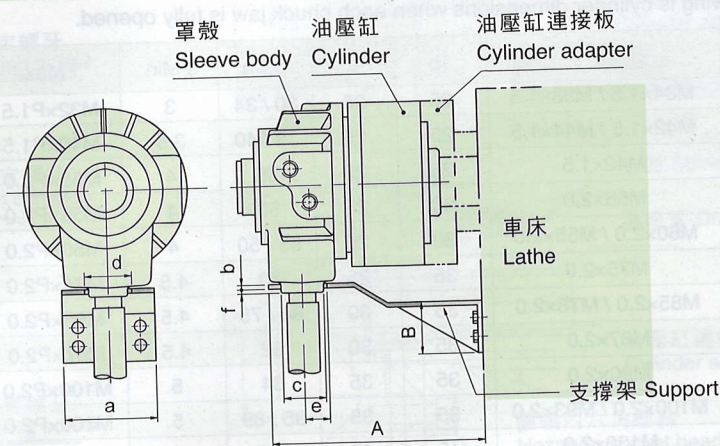
- ◎ 安裝油壓缸時必須使洩油口在最底部，否則由於油壓缸的結構，將使得液壓油在罩殼的兩端溢出來。
- ◎ Mount the cylinder with the drain port on the bottom. Otherwise, hydraulic oil will overflow from both ends of the sleeve body because of the cylinder structure.

**IMPORTANT**  
注意事項

- ◎ 為了防止油壓缸的罩殼主體發生旋轉現象，可以在洩油口的底座突起部位安裝一個支撐架。
- ◎ In order to prevent the rotation of the cylinder sleeve body, provide a support utilizing the projections on the drain port base.

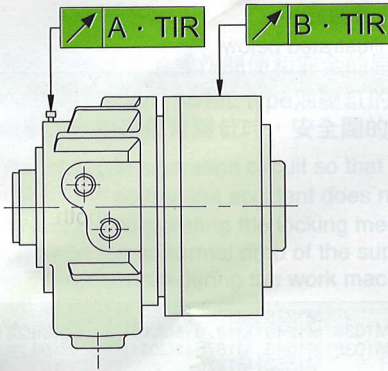
- ◎ 在支撐架安裝於車床上時，必須將罩殼主體的突出部位與支撐架之間保持一定的間隙，使罩殼主體不受其他的外力。(Fig.6)
- ◎ 當安裝油壓缸時，除了安裝固定罩殼主體的支撐架(防止旋轉的托架)之外，並且需注意油壓缸外圍的偏擺及罩殼主體後端的上、下偏擺必須比在Fig.7所示的標準值要來的小。
- ◎ After the support is mounted to the lathe, retain the clearance between the projected part of the sleeve body and the support so that the sleeve body will not be subjected to loading. (Fig.6)
- ◎ When mounting the cylinder, mount the support(anti-rotation bracket) for the sleeve body. The run-out of the periphery of the cylinder and of the upper and lower movement of sleeve body's rear end must be less than the standard values as shown in table of Fig.7.

Fig.6 支撐架裝配圖 Mounting of support

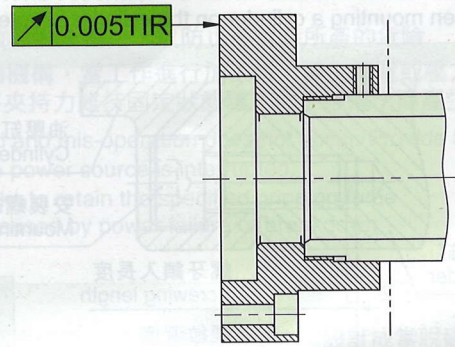


型式 Model	尺寸 Dim.	A	B	a	b	c	d	e	f
M0926A / M0928A	依車床的長度來決定 To be determined depending on the lathe.			75	4.5	Ø44	47	30	1
M1036 / M1038				75	4.5	Ø53	56	30	1
M1236 / M1246				75	4.5	Ø47	50	30	1
M1546 / M1552				75	6	Ø47	50	30	1
M1768 / M1870 / M1875 / M1878				80	6	Ø47	50	30	1
M2078 / M2085 / M2091				80	6	Ø47	50	30	1
M2511S				90	6	Ø55	58	35	1
ML2814 / ML2816				120	6	Ø85	90	50	1
ML3320				120	6	Ø85	90	50	1

## 油壓缸裝配圖 Mounting of cylinder



## 油壓缸連接板 Cylinder adapter



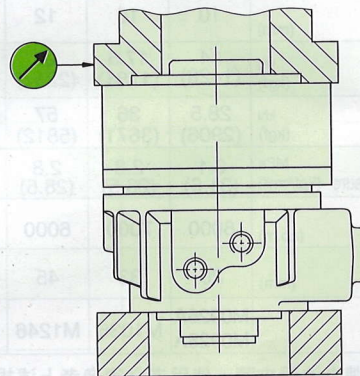
型式 Model	A	B
M0926A / M0928A	0.025	0.020
M1036 / M1038	0.025	0.020
M1236 / M1246	0.025	0.020
M1546 / M1552	0.025	0.020
M1768 / M1870 / M1875 / M1878	0.025	0.020
M2078 / M2085 / M2091	0.025	0.025
M2511S	0.025	0.025
ML2814 / ML2816	0.05	0.05
ML3320	0.05	0.05

Fig.7 安裝後油壓缸的偏擺量 Run-out of cylinder after installation

- ◎ 為了能夠得到上列所需的數值，油壓缸連接板前端的偏擺必須為最小(0.005 TIR以下)。
- ◎ In order to obtain the required value shown above, run-out on cylinder adapter front face should be minimized (max. 0.005 TIR).

## 安裝油壓缸連接板 Mounting of cylinder adapter

- ◎ 當安裝油壓缸連接板與車床後端合為一體時，垂直放置連接板如右圖所示。
- ◎ 因此須先校正油壓缸外徑及連接板外徑之偏擺量於0.01mm以下。
- ◎ When mounting the cylinder adapter to the lathe after integrating it to the cylinder, vertically place the adapter as shown in the following figure.
- ◎ Center the cylinder adapter according to the periphery of the cylinder. (0.01mm or less)



### 3-5 油壓缸安裝螺絲的鎖緊力矩

#### Tightening torque for cylinder mounting bolts

- ◎ 安裝油壓缸於油壓缸連接板時，鎖緊安裝螺絲如下圖所示，儘量愈深愈好。
- ◎ When mounting a cylinder on the cylinder adapter screw as deep as illustrated below.

型式 Model	M0926A M0928A	M1036 M1038	M1236 M1246 M1546 M1552	M1768 M1870 M1875 M1878	M2085 M2091	M2511S	ML2814 ML2816	ML3320
螺絲規格 Bolt size	M8	M10	M10	M10	M12	M16	M16	M20
螺紋深度 Thread depth	15	17	20	20	24	32	32	32

◎ 固定螺絲之螺紋鎖入長度，須距離油壓缸螺紋深度2mm  
 ◎ Screwing length of the bolt should be the screw tapped length minus 2mm



- ◎ 鎖緊安裝螺絲時，須依照下表所示之規定力矩鎖緊
- ◎ Tighten the mounting bolts conforming to each torque specified as follows.

螺絲規格 Bolt size	M8	M10	M12	M16	M20
鎖緊力矩 Tightening torque	31.5N·m (3.21kgf·m)	60N·m (6.1kgf·m)	87N·m (8.9kgf·m)	205N·m (20.9kgf·m)	323N·m (32.9kgf·m)

- ◎ 由於油壓缸是鋁合金的材質，所以其鎖緊力矩大約本公司之油壓夾頭(比較同規格的螺絲)的80%
- ◎ Each torque values above is shown with a tightening torque at 80% of hydraulic power chuck bolts because the cylinder material is aluminum.

### 3-6 適合油壓夾頭規格

#### Matching power chucks specification

- ◎ 為配合本油壓缸之使用，本公司強力推薦AUTOSTRONG油壓夾頭，其相關規格如下：
- ◎ The matching AUTOSTRONG chucks are strongly recommended as shown in the following table.

型式 Model	N-204	N-205	N-206	N-208	NB-208	N-210	NB-210	N-212	N-215	N-218	N-220	N-224
拉桿行程 plunger stroke (mm)	10	10	12	16	16	19	19	23	23	23	23	26
最大容許拉力 Max. pull force (kN (kgf))	14 (1428)	17.5 (1784)	22 (2243)	34.9 (3558)	34.9 (3558)	43 (4385)	43 (4385)	57 (5812)	71 (7240)	71 (7240)	90 (9177)	90 (9177)
最大夾持力 Max. gripping force (kN (kgf))	28.5 (2906)	36 (3671)	57 (5812)	89 (9075)	89 (9075)	111 (11319)	111 (11319)	147 (14990)	180 (18355)	180 (18355)	234 (23861)	234 (23861)
最大使用油壓力 Max. operating pressure (MPa (kgf/cm <sup>2</sup> ))	3.1 (31.6)	2.8 (28.5)	2.8 (28.5)	2.6 (26.5)	2.16 (22.0)	2.7 (27.5)	2.7 (27.5)	2.7 (27.5)	2.3 (23.5)	2.3 (23.5)	3.0 (30.6)	2.6 (26.5)
最高轉速 Max. speed (r.p.m)	8000	7000	6000	5000	5000	4200	4200	3300	2500	2000	1800	1400
通孔直徑 Through hole (mm)	26	33	45	52	66	75	78	91	117.5	117.5	180	205
適合油壓缸 Matching cylinder	M0926A M0928A	M1036	M1246	M1552	M1768	M1875	M1878	M2091	M2511S	M2511S	ML2816	ML3320

- ◎ 若使用其它廠牌之油壓夾頭，使用者必須參考上述規格。
- ◎ 所有油壓缸其聲壓值皆低於70dBA。
- ◎ If other chucks are to be used, users must refer to the corresponding specifications of AUTOSTRONG chucks.
- ◎ The noise levels of all cylinders are less than 70 dBA.

## 4. 油壓迴路設計說明

### Hydraulic circuit diagram

油壓迴路的設計是基於操作簡便和安全的原則，並且提供失效的安全迴路，以防止停電時所產的危險

- ◎ AUTOSTRONG M/ML type油壓缸的油壓迴路含有自鎖機構，當工作進行加工時，發生停電或壓力源故障所產生的壓力異常降低時，安全閥的機構產生效用，將夾持力維持固定狀態讓工件不致飛出而產生危險

Design the hydraulic operation circuit so that it is easily operated and mis-operation does not occur. Provide the fail-safe circuiting so that the accident does not occur even if the power source is interrupted.

- ◎ The unit is incorporating the locking mechanism which works to retain the specified gripping force even when the abnormal drop of the supplied pressure is caused by power failure or breakdown of pressure source during the work machining.



- ◎ 如果使用4路2位電磁閥作油壓缸之切換作用，那麼油壓迴路就必須設計成當脫磁狀態時，工件仍處於被夾持狀態。
- ◎ In order to make the change-over of cylinder by use of the 4-port 2-position electromagnetic valve, the hydraulic circuit should be so designed as to grip the work when solenoid controlled is demagnetized.

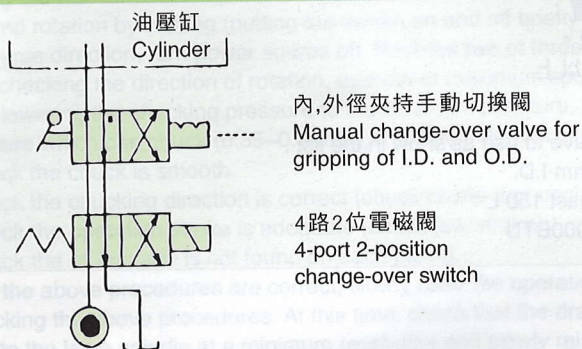


- ◎ 為了防止由內徑夾持切換至外徑夾持所產生的錯誤操作，必須提供一個內外徑夾持的切換閥。(Fig.8)
- ◎ Provide the inner dia./ outer dia. Gripping change valve in order to prevent mis-operation when changing from the inter dia. Gripping to outer dia. Gripping. When the solenoid valve is used for this change valve, use the 4-port 2-position valve with position stop. The designation circuit is to be maintained(Fig.8)



- ◎ 配備之油管孔徑必須符合油壓缸油管之孔徑，如使用較小的管徑，會因為輸油阻力增大而降低運作速度。
- ◎ Select the bore diameter of operation equipment which corresponds to the piping bore diameter of cylinder. The piping resistance increases as the diameter becomes small and speed is slow.

Fig.8



## 5. 安裝控制閥、油壓系統及管路

### Attachment of control valve, hydraulic units and piping

- ◎ 在便於手動操作的地方，安裝一個手動的切換控制閥來控制夾頭的開啟／關閉。
- ◎ 儘量將油壓系統安裝於靠近油壓缸的地方，因此洩油管能夠保持平直，而且油壓錶能夠清楚的被看見。
- ◎ 儘量使用內徑大的油管。
- ◎ Attach the manual operated valve in the place convenient to handle on the machine.
- ◎ Install the hydraulic unit in the place close to the cylinder, where the drain pressure gage dial can be clearly observed.
- ◎ Use the pipe which has as large I.D. as possible.



- ◎ 將油管內部雜物灰塵儘量清出後再安裝，如果油管內部有雜物將導致油壓缸的過熱，十分的危險。
- ◎ Remove any dirt completely from inside of the pipe and then install it. Dirt in the cylinder can be a cause of cylinder overheating.

#### IMPORTANT 注意事項

油壓缸的配管必須使用撓性油管，可以防止油管的彎曲及張力阻礙了油壓缸的作動。配管時的注意事項。

- ◎ 使用內徑 $\phi 32$ 的洩油管。
- ◎ 為了檢查油壓油是否停滯使用透明乙烯基的油管或相同材質的油管。
- ◎ 必須有一定的斜度以利油壓油的流動及排除空氣。
- ◎ 油箱的洩油口必須於油面以上。(Fig.1)
- ◎ 使用於油壓油的幫浦必須至少有20L/min的流出量，然而油壓壓力的控制必需由幫浦的控制器或減壓閥分開來控制。

Be sure to use the flexible hose for piping to the cylinder so that the bending force and tensile force are not applied to the cylinder.

- ◎ use a drain hose of 32 mm I.D.
- ◎ In order to check the stagnation of hydraulic oil, use transparent vinyl hose or equivalent.
- ◎ Provide a slope to make oil flow and eliminate air inclusion.
- ◎ The drain discharge port should be located upper the oil level in the tank. (Fig.1)
- ◎ For hydraulic oil supply, the variable capacity type pump which has the discharge capacity or 20 liters/min or more is used. Oil pressure is set with pump's own control device or a reduction valve which is provided separately from the system.

#### IMPORTANT 注意事項

大型油壓缸ML type必須配置：

- ◎ 使用內徑 $\phi 39$ 的洩油管。
- ◎ 油壓箱容油量150公升以上
- ◎ 油冷機12000BTU以上

ML type hydraulic cylinder have to use as show in the list .

- ◎ use a drain hose of 39mm I.D.
- ◎ oil tank capacity of at least 150 L
- ◎ oil cooler of at least 12000BTU

◎ 若使用其它廠牌之油壓夾頭，使用者必須參考上述規格。

◎ If other chucks are to be used, users must refer to the corresponding specifications of AUTO-STRONG.

◎ The noise levels of all cylinders are less than 70 dBA.

## 6. 油壓油 Hydraulic oil

- ◎ 為了能常保滿意的操作油壓缸，我方推薦使用黏性在30-50cST(溫度40°C)的油壓油(相當於ISO VG32和VG46)。
- ◎ For satisfactory operation of the cylinder it is recommended to use the hydraulic oil whose viscosity is 30~50 cSt at the temperature of 40°C (Equivalent to ISO VG32 and VG46)

### IMPORTANT 注意事項

- ◎ 油壓油必須有抗磨損及不起泡的特質，為了保持油壓缸良好的運作，在油壓供應系統中必須安裝20 $\mu$ m的濾油網。
- ◎ The hydraulic oil should have anti-abrasive and anti-foaming characteristic. In order to retain good performance of the cylinder, be sure to include the filter of 20 $\mu$ m in the pressure supply system.

- ◎ 油壓油的品質將影響油壓缸的溫升、洩油量、作動速度，因此請依照幫浦的使用說明來調整油壓油。
- ◎ Since hydraulic oil is influenced to the cylinder heating, drain volume and operation speed, regulate the oil according to the instruction manual of the pump unit.

## 7. 運轉測試 Test run

- (1) 確認所輸入的電壓與所指定的相同。
- (2) 試運轉時，先將油壓壓力調整把手開到最小的位置，而後迅速切換開關一次，檢查油壓幫浦的旋轉方向是否正確，如果是以相反方向來旋轉更換之相電源中的二條線後，啟動開關以全速來運轉。
- (3) 首先將油壓的壓力設定於低壓，此低油壓力要足夠使夾頭產生作動(0.35~0.5MPa)，設定完畢後，依下列步驟檢查。
  - 檢查夾頭的作動是否順暢。
  - 檢查作動方向是否正確(夾頭爪的開合)。
  - 檢查作動行程是否足夠(夾頭爪的行程)。
  - 檢查各部位的管路有無漏油的現象。

依照上敘的事項檢查正確後，慢慢的增加壓力直到所需要的油壓力時，再檢查一次，同時查看洩油管的油是否順暢的流下。

- (4) 將車床主軸的轉速設定於最小值，檢查油壓缸的偏擺狀況及管路有無異常，若一切正常則再慢慢的增加速度。一旦有震動的情況發生，必須再次檢查油壓缸連接板的偏擺狀況。
- (5) 如果油壓油的油溫不高時(低於30°C)，以最大速度的1/3來運轉溫機。

- (1) Confirm the voltage is as specified.
- (2) During the test run, set the pressure adjustment handle at the minimum level and check the direction of pump rotation by inching (putting the switch on and off briefly in alternation). If the pump is rotated in reverse direction, turn power source off. Reverse two of three powerswires. After checking the direction of rotation, operate at maximum speed.
- (3) After lowering the chucking pressure to the minimum pressure, set the pressure to the low pressure which can chuck (0.35~0.5MPa) and check the following procedures.
  - Check the chuck is smooth.
  - Check the chucking direction is correct (chuck clamp and unclamp directions).
  - Check the operation stroke is adequate (chuck jaw stroke).
  - Check the oil leakage is not found on each piping.

When the above procedures are correct, slowly raise the operation pressure to the rated pressure, rechecking the above procedures. At this time, check that the drain smoothly flows.

- (4) Rotate the lathe spindle at a minimum revolution and slowly raise the revolution unless there is the run-out of cylinder and fault of supporter or piping. If the rotary vibration is extreme, recheck the run-out of adapter.
- (5) In case of the oil temperature is low (below 20~30°C), make the run-in operation at the rotational speed of approx. 1/3 of max. speed.



◎ 當油壓缸的周圍溫度急劇地升高時，即，由主軸皮帶輪發熱產生的熱傳導、油壓缸周圍有特殊熱源等，或是當機械長時間的連續運轉沒有切換操作，會因為內置的自鎖機構導致油壓缸內壓上升，這些因素都會造成油壓缸故障而無法作動。特別是在運轉測試時最容易發生無法作動的現象，因此，要頻繁的切換油壓缸使活塞能經常的往復運動。

◎ When the ambient temperature of cylinder rises suddenly, i.e., when the machine is continuously operated for long hours without changing operation or with heat generation of main shaft pulley occurring or special heat source exists around the cylinder, the sealed pressure into the cylinder rises because of a built-in locking mechanism, thereby causing cylinder malfunction. Especially, during running-in, this trouble is apt to occur. Therefore, frequently make reciprocating motions of the piston.

◎ 當油壓缸的運轉逐漸變得不正常，請採取下列步驟：

1. 如果主軸仍在運轉中，立即停止運轉。
2. 轉動油壓系統中控制夾頭壓力設定減壓閥把手，增加夾頭壓力大約0.5MPa，而後重覆油壓缸切換開關的變換來測試油壓缸的運動。
3. 如果油壓缸的運轉仍然不正常，逐步的增加夾頭預設壓力每次約0.5MPa，再重覆上述(2)的過程來測試油壓缸的運動。  
然而增加的預設壓力不可超過夾頭最大油壓力的30%。  
當油壓缸的的運轉回復到正常時，將預設壓力回復到原來的程度。
4. 如果油壓缸的運轉雖然經過上(3)的方法操作許多次而且預設壓力已達到最大值，仍然無法恢復正常，那將夾頭預設壓力回復到正常程度，將電源關掉等到油壓缸的表面溫度回降與室溫相當時，重覆(2)和(3)的方法來測試油壓缸的運動。油壓缸的溫度可以用風槍或類似的裝置將空氣吹到油壓缸上來降低。
5. 當溫度降低後油壓缸的運動仍然無法恢復正常，將夾頭連接螺帽鬆開，而將連接部分取出來確認油壓缸的運動。

◎ When the cylinder becomes inoperative, operate the machine with the following procedures for normal operation as well as test run.

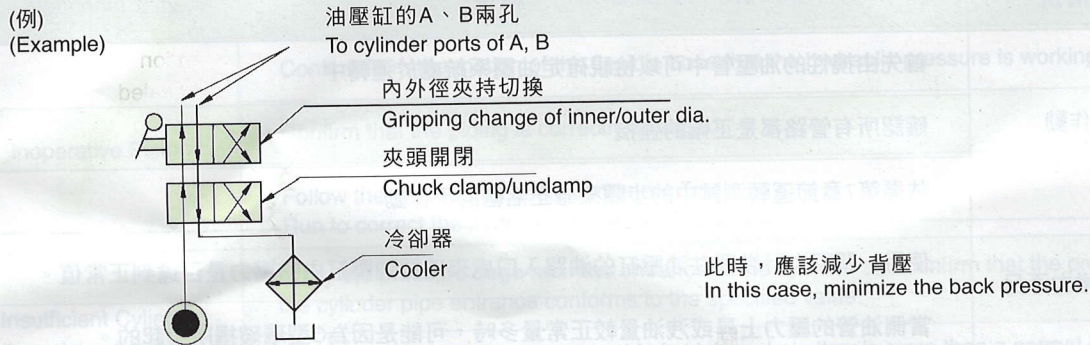
1. Stop the spindle if it is rotating.
2. Turn the pressure adjustment handle of reducing valve provided on the hydraulic unit for the purpose of chuck pressure setting (cylinder pressure setting), and raise the pre-set chuck pressure by approx. 0.5MPa. Then make the repeated changeovers of the cylinder operation changeover switch to confirm cylinder motion.
3. If the cylinder remains inoperative, gradually increase the pre-set chuck pressure (by approx. 0.5MPa each) and repeat the same procedures as described in above (2) for confirmation of cylinder motion. At this time, upper limit of pressure is added by 30% of maximum chuck pressure. When the cylinder operation is recovered, bring back the pre-set chuck pressure to the normal level.
4. When the normal cylinder operation can not be recovered despite that the pre-set chuck pressure is brought up to maximum value and that the operations described in above (3) are made several times, bring the preset chuck pressure down to the normal level and turn off the power. Then let it cool down until the cylinder surface temperature becomes nearly the same as room temperature, and repeat the procedures stated in(2) and (3) above to check the cylinder motion. The cylinder can be cooled faster by blowing air on the cylinder with an air gun or equivalent.
5. When the cylinder operation never recovers even after it is cooled, loosen the draw-nut of the chuck side and take off the connection for confirmation of cylinder motion.

## 8. 油壓油溫度上昇

### Temperature rise of hydraulic oil

- ◎ 連續高速的運轉將導致油溫的升高而造成油封材質及油壓油的快速惡化，使用冷卻裝置，保持溫度低於60°C。
- ◎ Continuous high speed operation causes a considerable increase of oil temperature, rapidly deteriorating the sealing materials and the hydraulic oil. Keep the oil temperature below 60°C by use of a cooler.

Fig.9



## 9. 維護及檢查

### Maintenance and inspection

- ◎ 當漏油的情況出現時，分解油壓缸清洗和更換O型環，此時在處理油壓缸時必須很小心，因為它一部分是由輕合金製造。

油壓系統

- 清潔吸油口過濾網約2-3個月一次。
- 檢查油壓油約半年一次，如果已經變質，請更換。

- ◎ When the oil leakage observed, disassemble the cylinder for cleaning and replacement of O-ring.

At the time, handle the cylinder with care as it partly uses the light alloy.

Hydraulic Unit :

- Clean the suction strainer in every 2-3 months.
- Check the hydraulic oil in every half year and replace it if it is deteriorated.



- ◎ 當操作機械使用最大油壓力及最高轉速時，每使用25萬回後分解檢查內部零件，並更換油封。
- ◎ 當突壓力過大時，會造成油壓缸作動不良及損壞，所以必須調整節流閥來降低突壓力。
- ◎ When operating the machine with maximum hydraulic pressure and maximum speed, disassemble it at every 250 thousand of use and replace the seal and check each component.
- ◎ When surge pressure is greatly applied, thereby causing cylinder failure and damage. Therefore, adjust the throttle valve to reduce the surge pressure.



- ◎ 每星期檢查止回閥之斷電裝置是否正常，檢查方法，先讓夾頭夾持一圓棒後關掉電源，查看工件是否會鬆脫，不會鬆脫表示功能正常，如鬆動表示功能失效，須立刻送廠檢修。
- ◎ The safety device for power failure should be checked once a week. The checking procedure is to grip a workpiece first, then turn off the power. Inspect the gripping condition of the workpiece. If the workpiece is clamped tightly, it indicates the safety device works effectively. Otherwise, the safety function fails. Please call your local distributor for repair service.

## 10. 故障排除 Troubleshooting

故障發生時的處理方法

◎ 先停止轉動，再依下表之狀況來下對策。

不正常情況	對策
活塞不作動	首先由撓性的油壓管中可以檢視確定油壓系統處於運轉中。
	確認所有管路都是正確的連接。
	依循第7章節運轉測試中的步驟來修正活塞的不作動。
油壓缸的推力不足	使用一個壓力計裝置在油壓缸的油路入口處來確認油壓缸內的壓力是否達到正常值。
	當側油管的壓力上昇或洩油量較正常量多時，可能是因為O型環破損所引起的。
溫度上昇	首先確定油壓油的黏度是否合乎標準。
	檢查油箱內的油壓油是否足夠，若已經減少須再補充。
	如果因為周圍環境的溫度升高而造成油箱的散熱不良，使用風扇或冷卻裝置來控制油溫。
幫浦噪音	防止吸入空氣。
	檢查油箱內的油壓油是否足夠，若已經減少須再補充。
	當油箱有過多的雜質堆積或液壓油品質已惡化，很可能油壓幫浦已發生不正常的磨損，須馬上修理。
隔油槽漏油	讓洩油管傾斜一個角度，以利排除空氣。
	檢查油壓箱內的油，在洩油時，油面是否保持在刻度線內。
	檢查油壓缸的洩氣栓或油壓箱是否被雜物所阻塞。
備註：簡單的故障請自行處理，如故無法排除或特殊狀況時，可通知各地經銷商或寄回本公司處理。	

## 10. 故障排除 Troubleshooting

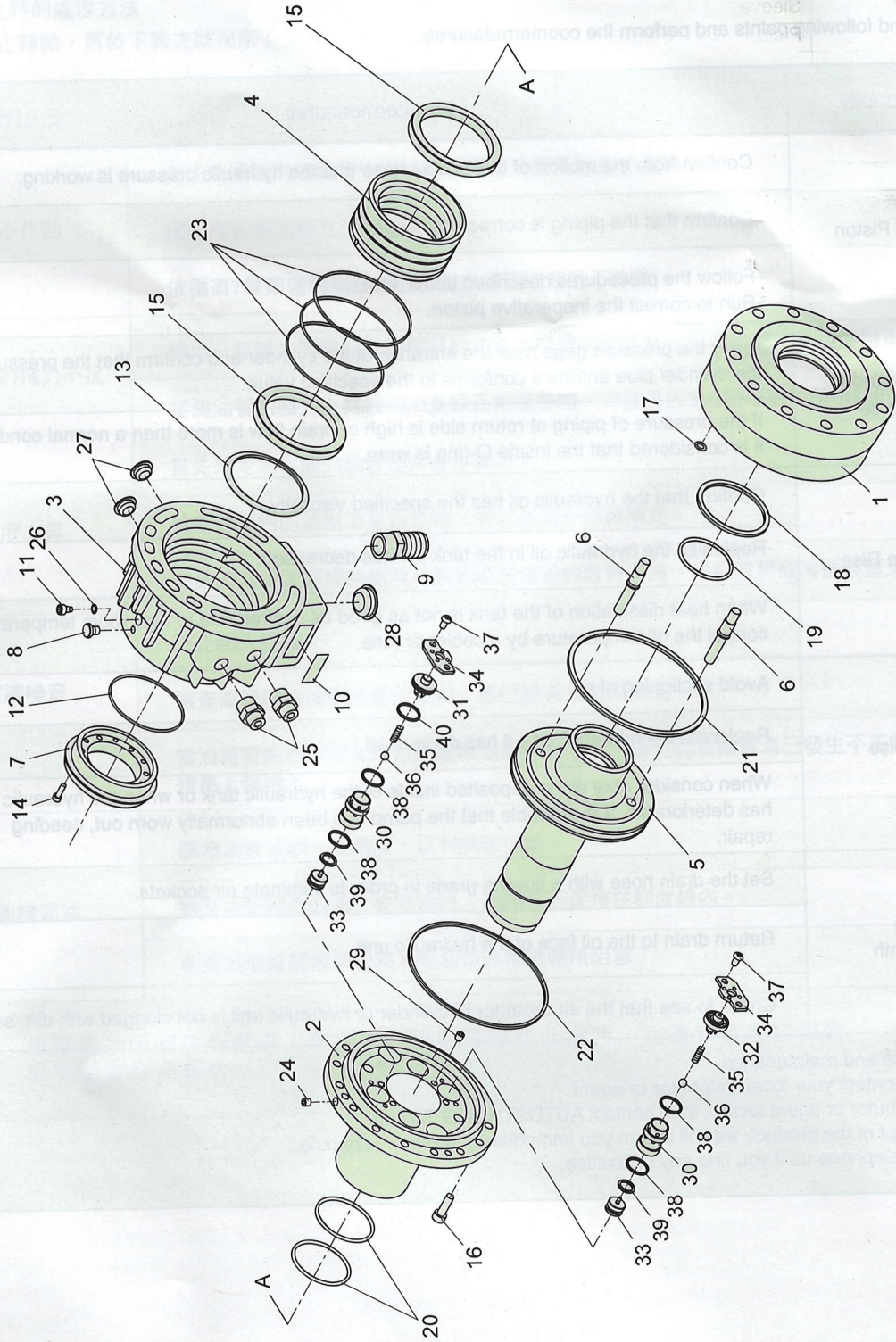
If troubled;

© Stop and following points and perform the countermeasures.

Nonconformity	Countermeasures
Inoperative Piston	Confirm from the motion of the flexible hose that the hydraulic pressure is working.
	Confirm that the piping is correctly arranged.
	Follow the procedures described under Test Run to correct the inoperative piston.
Insufficient Cylinder Propulsive Force	Apply the pressure gage near the entrance of the cylinder and confirm that the pressure in the cylinder pipe entrance conforms to the specified value.
	If the pressure of piping at return side is high or drain flow is more than a normal condition, it is considered that the inside O-ring is worn.
Temperature Rise	Confirm that the hydraulic oil has the specified viscosity.
	Replenish the hydraulic oil in the tank if it has decreased.
	When heat dissipation of the tank is not as good as desired due to high room temperature, control the oil temperature by a cooler or fans.
Pump Noise	Avoid suctioning of air.
	Replenish the hydraulic oil if it has decreased.
	When consider able dirt is deposited inside of the hydraulic tank or when the hydraulic oil has deteriorated, it is probable that the pump has been abnormally worn out, needing repair.
Oil leakage from labyrinth	Set the drain hose with a flowing grade in order to eliminate air pockets.
	Return drain to the oil face of the hydraulic unit.
	Check to see that the air breather of cylinder or hydraulic unit is not clogged with dirt, etc.
<p>For service and maintenance</p> <ul style="list-style-type: none"> <li>· Please contact your local distributor or agent.</li> <li>If no distributor or agent locally, then contact AUTOSTRONG Taiwan.</li> <li>· On receipt of the product, we will inform you immediately of repair schedule.</li> <li>· Please telephone us if you find any difficulties.</li> </ul>	

### 11-1 M型零件分解圖

### Parts list of M type

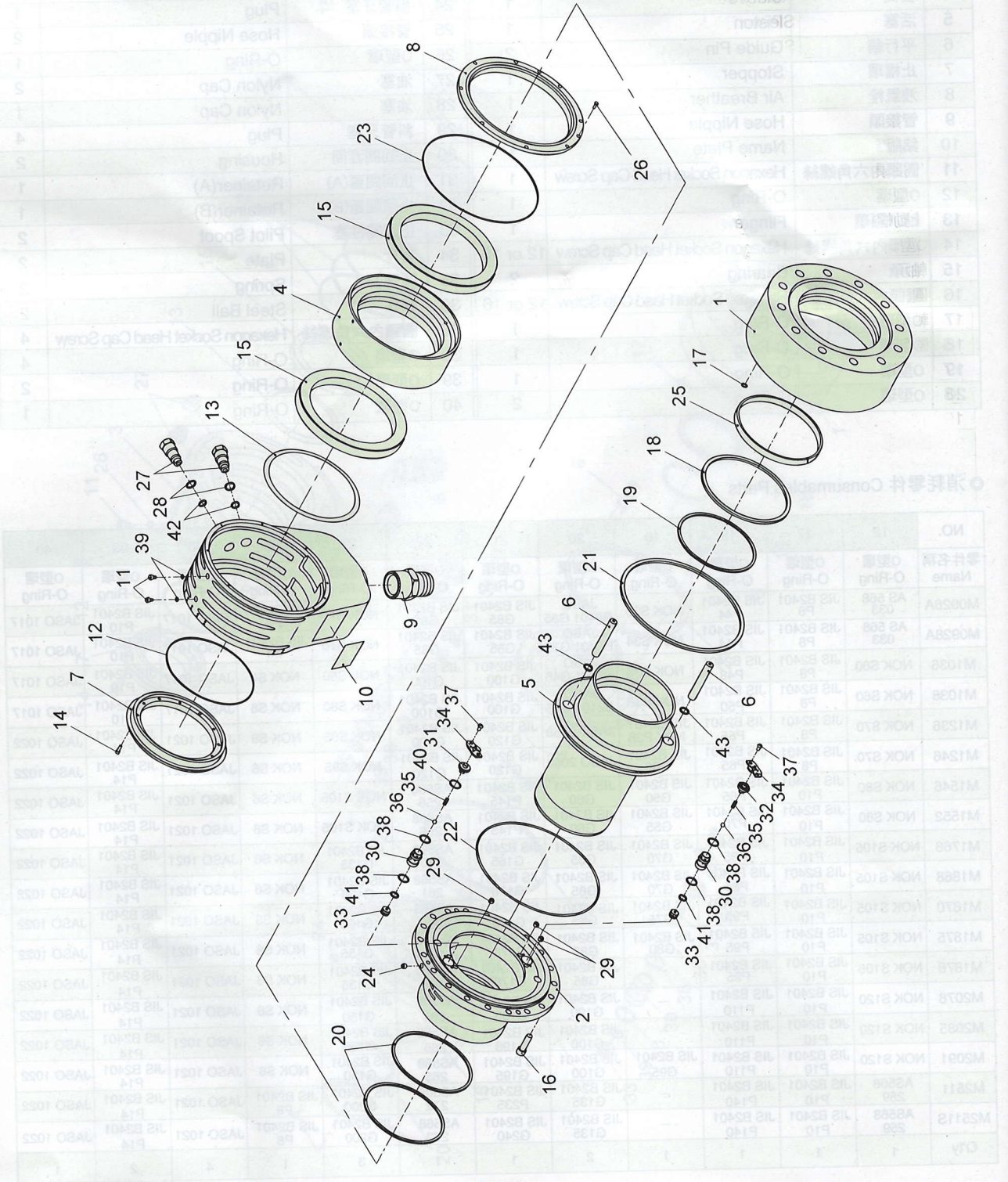


NO.	零件名稱	Name	Q'ty	NO.	零件名稱	Name	Q'ty
1	油壓缸	Cylinder	1	21	O型環	O-Ring	1
2	迴轉閥	Rotary Valve	1	22	O型環	O-Ring	1
3	罩殼	Sleeve Body	1	23	O型環	O-Ring	3
4	套筒	Sleeve	1	24	斜管牙塞	Plug	1
5	活塞	Piston	1	25	管接頭	Hose Nipple	2
6	平行銷	Guide Pin	2	26	O型環	O-Ring	1
7	止檔環	Stopper	1	27	油塞	Nylon Cap	2
8	洩氣栓	Air Breather	1	28	油塞	Nylon Cap	1
9	管接頭	Hose Nipple	1	29	斜管牙塞	Plug	4
10	銘版	Name Plate	1	30	止回閥套筒	Housing	2
11	圓頭內六角螺絲	Hexagon Socket Head Cap Screw	1	31	止回閥蓋(A)	Retainer(A)	1
12	O型環	O-Ring	1	32	止回閥蓋(B)	Retainer(B)	1
13	軸承隔環	Flinger	1	33	止回閥柱塞	Pilot Spool	2
14	圓頭內六角螺絲	Hexagon Socket Head Cap Screw	12 or 16	34	套片	Plate	2
15	軸承	Bearing	2	35	彈簧	Spring	2
16	圓頭內六角螺絲	Hexagon Socket Head Cap Screw	12 or 16	36	鋼珠	Steel Ball	2
17	O型環	O-Ring	1	37	圓頭內六角螺絲	Hexagon Socket Head Cap Screw	4
18	O型環	O-Ring	1	38	O型環	O-Ring	4
19	O型環	O-Ring	1	39	O型環	O-Ring	2
20	O型環	O-Ring	2	40	O型環	O-Ring	1

## ◎ 消耗零件 Consumables Parts

NO.	12	17	18	19	20	21	22	23	26	38	39	40
零件名稱 Name	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring	O型環 O-Ring
M0926A	AS 568 033	JIS B2401 P8	JIS B2401 P44	NOK S30	JASO B2401 G35	JIS B2401 G85	JIS B2401 G85	NOK S70	JIS B2401 P4	JASO 1017	JIS B2401 P10	JASO 1017
M0928A	AS 568 033	JIS B2401 P8	JIS B2401 P44	NOK S34	JASO B2401 G35	JIS B2401 G85	JIS B2401 G85	NOK S70	JIS B2401 P4	JASO 1017	JIS B2401 P10	JASO 1017
M1036	NOK S60	JIS B2401 P8	JIS B2401 P48	NOK S38	JASO B2401 G45	JIS B2401 G100	JIS B2401 G100	NOK S80	NOK S6	JASO 1017	JIS B2401 P10	JASO 1017
M1038	NOK S60	JIS B2401 P8	JIS B2401 P50	NOK S38	JASO B2401 G45	JIS B2401 G100	JIS B2401 G100	NOK S80	NOK S6	JASO 1017	JIS B2401 P10	JASO 1017
M1236	NOK S70	JIS B2401 P8	JIS B2401 P65	JIS B2401 NOK P38	JASO 2053	JIS B2401 G120	JIS B2401 G120	NOK S95	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M1246	NOK S70	JIS B2401 P8	JIS B2401 P65	JIS B2401 G50	JASO 2053	JIS B2401 G120	JIS B2401 G120	NOK S95	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M1546	NOK S80	JIS B2401 P10	JIS B2401 P65	JIS B2401 G50	JIS B2401 G60	JIS B2401 P145	AS568 256	NOK S105	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M1552	NOK S80	JIS B2401 P10	JIS B2401 P70	JIS B2401 G55	JIS B2401 G60	JIS B2401 P145	AS568 256	NOK S105	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M1768	NOK S105	JIS B2401 P10	JIS B2401 P85	JIS B2401 G70	JIS B2401 G85	JIS B2401 G165	AS568 260	JIS B2401 G135	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M1868	NOK S105	JIS B2401 P10	JIS B2401 P85	JIS B2401 G70	JIS B2401 G85	JIS B2401 G170	AS568 261	JIS B2401 G135	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M1870	NOK S105	JIS B2401 P10	JIS B2401 P95	JIS B2401 G75	JIS B2401 G85	JIS B2401 G170	AS568 261	JIS B2401 G135	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M1875	NOK S105	JIS B2401 P10	JIS B2401 P95	JIS B2401 G80	JIS B2401 G85	JIS B2401 G170	AS568 261	JIS B2401 G135	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M1878	NOK S105	JIS B2401 P10	JIS B2401 P95	—	JIS B2401 G85	JIS B2401 G170	AS568 261	JIS B2401 G135	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M2078	NOK S120	JIS B2401 P10	JIS B2401 P110	—	JIS B2401 G100	JIS B2401 G195	AS568 265	JIS B2401 G150	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M2085	NOK S120	JIS B2401 P10	JIS B2401 P110	—	JIS B2401 G100	JIS B2401 G195	AS568 265	JIS B2401 G150	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M2091	NOK S120	JIS B2401 P10	JIS B2401 P110	JIS B2401 G95	JIS B2401 G100	JIS B2401 G195	AS568 265	JIS B2401 G150	NOK S6	JASO 1021	JIS B2401 P14	JASO 1022
M2511	AS568 259	JIS B2401 P10	JIS B2401 P140	—	JIS B2401 G135	JIS B2401 P235	AS568 272	JIS B2401 G200	JIS B2401 P8	JASO 1021	JIS B2401 P14	JASO 1022
M2511S	AS568 259	JIS B2401 P10	JIS B2401 P140	—	JIS B2401 G135	JIS B2401 G240	AS568 272	JIS B2401 G200	JIS B2401 P8	JASO 1021	JIS B2401 P14	JASO 1022
Q'ty	1	1	1	1	2	1	1	3	1	4	2	1

### 11-2 ML型零件分解圖 Parts list of ML type



NO.	零件名稱	Name	Q'ty	NO.	零件名稱	Name	Q'ty
1	油壓缸	Cylinder	1	23	O型環	O-Ring	1
2	迴轉閥	Rotary Valve	1	24	斜管牙塞	Plug	1
3	罩殼	Sleeve Body	1	25	耐磨環	Wear Ring	1
4	套筒	Sleeve	1	26	圓頭內六角螺絲	Hexagon Socket Head Cap Screw	10
5	活塞	Piston	1	27	入油接頭	Feed Nipple	2
6	平行銷	Guide Pin	2	28	O型環	O-Ring	2
7	止檔環	Stopper	1	29	斜管牙塞	Plug	4
8	隔油環	Splash Plate	1	30	止回閥套筒	Housing	2
9	管接頭	Hose Nipple	1	31	止回閥蓋(A)	Retainer(A)	1
10	銘版	Name Plate	1	32	止回閥蓋(B)	Retainer(B)	1
11	止動螺絲	Set screw	2	33	止回閥柱塞	Pilot Spool	2
12	O型環	O-Ring	1	34	套片	Plate	2
13	軸承隔環	Flinger	1	35	彈簧	Spring	2
14	圓頭內六角螺絲	Hexagon Socket Head Cap Screw	6	36	鋼珠	Steel Ball	2
15	軸承	Bearing	2	37	圓頭內六角螺絲	Hexagon Socket Head Cap Screw	4
16	圓頭內六角螺絲	Hexagon Socket Head Cap Screw	20	38	O型環	O-Ring	4
17	O型環	O-Ring	1	39	O型環	O-Ring	2
18	O型環	O-Ring	1	40	O型環	O-Ring	1
19	O型環	O-Ring	1	41	O型環	O-Ring	2
20	O型環	O-Ring	2	42	O型環	O-Ring	2
21	O型環	O-Ring	1	43	O型環	O-Ring	2
22	O型環	O-Ring	1				

## ◎ 消耗零件 Consumables Parts

NO.	零件名稱 Name	ML2814	ML2816	ML3320	Q'ty
12	O型環 O-Ring	NOK S200	NOK S200	NOK S240	1
17	O型環 O-Ring	JIS B2401 P10	JIS B2401 P10	JIS B2401 P10	1
18	O型環 O-Ring	JIS B2401 P190	JIS B2401 P190	JIS B2401 P230	1
19	O型環 O-Ring	JIS B2401 P150	JIS B2401 G170	GS210	1
20	O型環 O-Ring	JIS B2401 G175	JIS B2401 G175	JIS B2401 G215	2
21	O型環 O-Ring	JIS B2401 P270	JIS B2401 P270	JIS B2401 P320	1
22	O型環 O-Ring	GS275	GS275	GS320	1
23	O型環 O-Ring	NOK S265	NOK S265	NOK AS568-278	1
28	O型環 O-Ring	JIS B2401 P18	JIS B2401 P18	JIS B2401 P18	2
38	O型環 O-Ring	JASO 1021	JASO 1021	JASO 1021	4
39	O型環 O-Ring	NOK S6	NOK S6	NOK S6	2
40	O型環 O-Ring	JASO 1022	JASO 1022	JASO 1022	1
41	O型環 O-Ring	JIS B2401 P14	JIS B2401 P14	JIS B2401 P14	2
42	O型環 O-Ring	JIS B2401 P14	JIS B2401 P14	JIS B2401 P14	2
43	O型環 O-Ring	JIS B2401 P16	JIS B2401 P16	JIS B2401 P16	2

## 12. 集水盒

### Coolant collector

- ◎ 集水盒可以與油壓缸分開購買，需要時可參考下表之規格來配合。
- ◎ 集水盒與二個近接開關安裝在一起，活塞行程的動作即由此二個近接開關來檢測。
- ◎ A coolant collector is available separately from cylinder. When it is needed, please specify from the models tabulated below.
- ◎ Two proximity switches are attached to the coolant collector, by which operation of the cylinder can be checked.

型式 Model	適用油壓缸 Matching Cylinder
CM09B	M0926A / M0928A
CM10B/CM10B1	M1036 / M1038
CM12B	M1236 / M1246
CM15B8	M1546 / M1552
CM18B	M1768 / M1870 / M1875 / M1878
CM18BK	MK1881

型式 Model	適用油壓缸 Matching Cylinder
CM20B	M2085 / M2091
CM25B	M2511S
CM28B	ML2814 / ML2816
CM33B	ML3320

## 13. 集水盒(含行程檢知)

### Coolant collector (With stroke control)

#### 1. 概要

集水盒適用於AUTOSTRONG之M型迴轉油壓缸能夠順利的收集流動於連接管內的切削油。集水盒裝置2個近接開關能檢視油壓缸活塞的動作位置，用來偵測工件是在夾持或非夾持的狀態。

#### 2. 規格

近接開關使用BES516-329-E3R(BALLUFF)的標準規格，如需要其他規格，請與本公司連絡。

#### 1. General

The coolant collector is mounted to AUTOSTRONG rotary hydraulic cylinder model M to collect smoothly the cutting oil which flows inside the draw pipe. The coolant collector has two pieces proximity switches for checking electrically the piston operation of a cylinder and for the detection of chucking/unchucking of a workpiece.

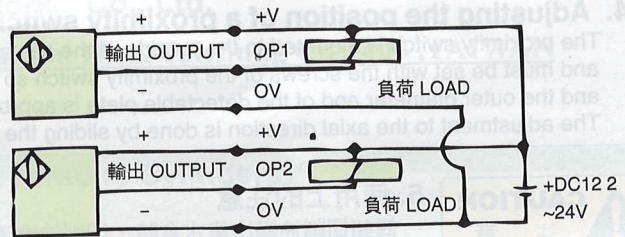
#### 2. Specification

The proximity switch is of a standard BES516-329-E3R(BALLUFF) and if requiring other types, please contact us.

型式 Model	BES516-329-E3R (BALLUFF)
規格 Spec.	
電壓 Power supply	DC12/24V
負荷容量 Switching cap	200mA
輸出規格 Output type	NPN

## 端子接線 TERMINAL CONNECTIONS

型式 Model	BES516-329-E3R (BALLUFF)
符號 Spec.	
OP2	黑 BLACK
+V	棕 BROWN
OV	藍 BLUE
OP1	黑 BALCK



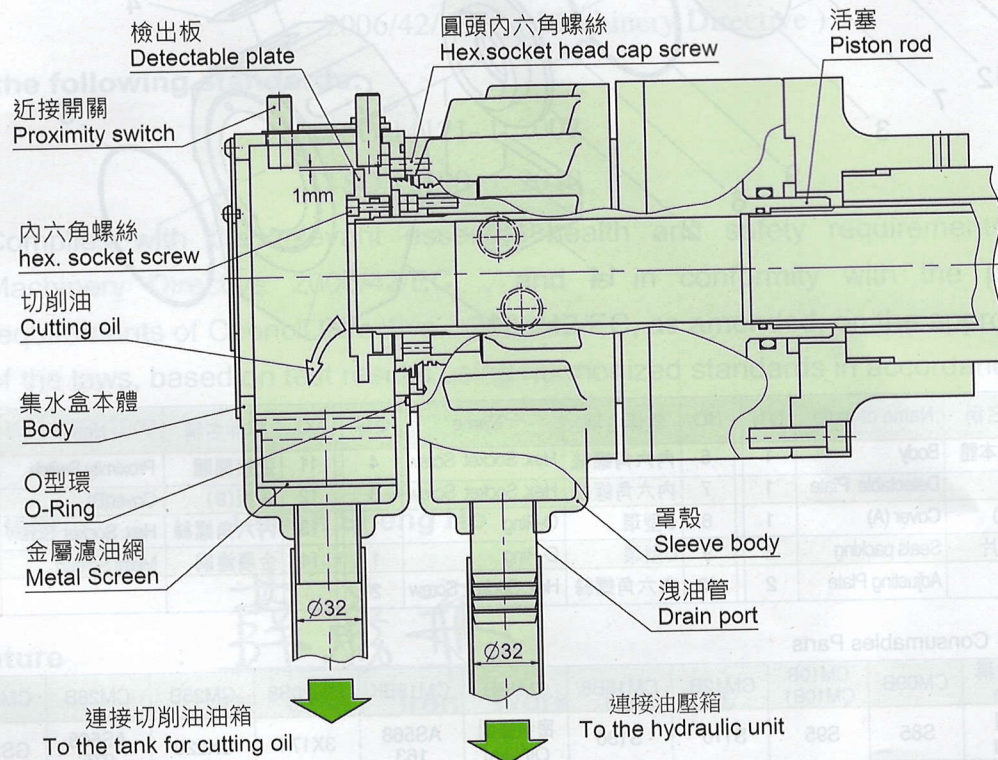
## 3. 安裝

集水盒本體在與罩殼配合面上預先安裝一個油封後，將集水盒安裝在油壓缸的後端。檢出板安裝於油壓缸活塞桿時必須鎖到底，接著鎖緊內六角螺絲來防止檢出板轉動。(螺絲規格M4鎖緊力矩22kgf·cm)  
在集水盒下端鎖入管接頭及油管，為了讓切削油能順利流下避免受到阻塞，必須將油管適度傾斜角度，建議使用內徑 $\varnothing 32$ 的透明乙炔基油管，以便檢視油的流動情形。(Fig.10)

## 3. Mounting

Insert the seals between the coolant collector main body and the sleeve body, and mount the coolant collector to the cylinder rear end. Mount the detectable plate to the cylinder piston rod completely. Then, Prevent from turning around the detectable plate by hex. socket screw. (Bolt size M4 tightening torque 22kgf·cm)  
To smoothly collect the cutting oil flowing into the coolant collector, we recommend to make the piping adequately inclined so the cutting oil not to stagnate inside the hose. It is recommended to use transparent vinyl hose for checking flow condition. (inside dia.  $\varnothing 32$ ) (Fig.10)

Fig.10



#### 4. 近接開關的位置調整

近接開關安裝於集水盒外圍之接合板上，調整近接開關尾端與檢出板外徑保持1mm的距離，並可藉由接合板的滑動來調整近接開關之軸向位置。

#### 4. Adjusting the position of a proximity switch

The proximity switch is mounted to the outside of the coolant collector body through the adjusting plate and must be set with the screws of the proximity switch so that the distance between the proximity switch and the outer diameter end of the detectable plate is approx. 1mm.

The adjustment to the axial direction is done by sliding the adjusting plate.



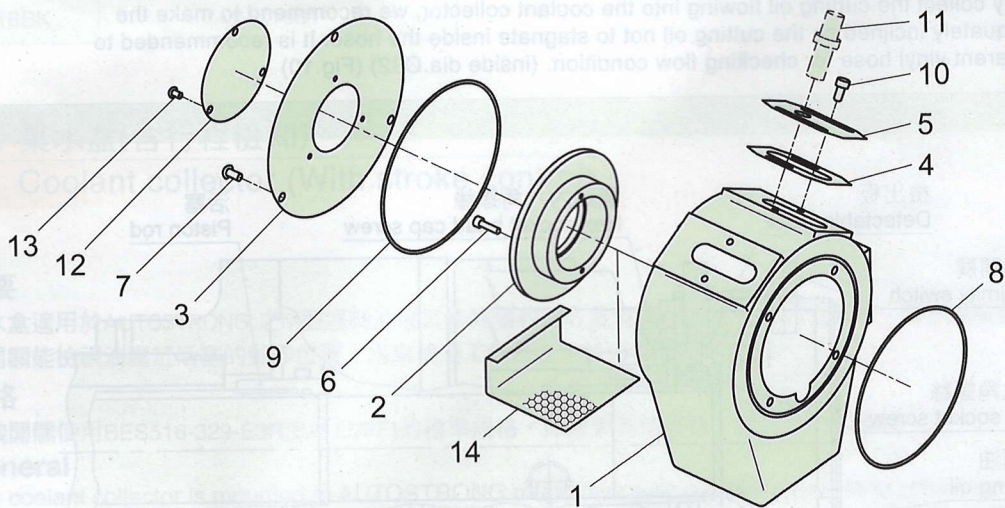
#### 5. 使用上的注意

假如切削油滿出集水盒時，切削油會流入罩殼內，與油壓缸之油壓油混在一起而影響油壓油的油質，因此必需時常清潔金屬濾網，使油不會積存於集水盒內。所以，要十分注意不要讓鐵屑阻塞了濾網。

#### 5. Notices on use

If coolant oil flows over from the coolant collector, it flows over to the sleeve body side. Therefore, clean the metal screen frequently so that the coolant oil does not collect. Thus, be careful not to clog the metal screen with swart.

#### 6. 集水盒(含行程檢知)零件分解圖Coolant collector (With stroke control) parts list



NO.	零件名稱	Name of parts	Q'ty	NO.	零件名稱	Name	Q'ty	NO.	零件名稱	Name	Q'ty
1	集水盒本體	Body	1	6	內六角螺絲	Hex. Socket Screw	4	11	近接開關	Proximity Switch	2
2	檢出板	Detectable Plate	1	7	內六角螺絲	Hex. Socket Screw	3	12	蓋板(B)	Cover(B)	1
3	蓋板(A)	Cover (A)	1	8	O型環	O-Ring	1	13	內六角螺絲	Hex. Socket Screw	3
4	油封墊片	Seals packing	2	9	O型環	O-Ring	1	14	金屬濾網	Metal Screen	1
5	接合板	Adjusting Plate	2	10	內六角螺絲	Hex. Socket Screw	2				

#### ◎ 消耗零件 Consumables Parts

NO.	零件名稱 Name	CM09B	CM10B CM10B1	CM12B	CM15B8	CM18B	CM18BK	CM20B8	CM25B	CM28B	CM33B
8	O型環 O-Ring	S85	S95	S110	S130	密封墊圈 Oil seal	AS568 163	3X174	3X220	AS568 275	GS320
9	O型環 O-Ring	S85	S85	S120	S120	AS568 164	AS568 164	AS568 164	3X205	S260	3X305