



RA type

中實迴轉空壓缸

ROTARY AIR CYLINDER

使用說明書

INSTRUCTION MANUAL

Original instructions



重要 Important Notes :


- 請仔細閱讀本說明書，充分瞭解之後再使用本製品。
本說明書請妥善保管，製品使用者變更時，請將此說明書交給新的使用者。
- Before you use the product. Please read this instruction carefully.
Keep the instruction carefully. If the user of the product altered,
please hand the instruction to the new user.



◎ 序言

為了確保你的安全，在使用你的空壓缸之前，請務必詳閱本說明書內所記載之警告事項，並特別注意文中此  圖形符號下之說明。

◎ 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.



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



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



若未依照此符號底下的說明來操作機械將引起潛在的危險，導致中輕度的傷害。
Indicates an potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



依照此符號底下的說明事先了解製品的性能，可避免不正確的操作夾頭。
Indicates for chuck performance and avoiding errors of mistake.

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瀏覽官網，即刻掌握最新訊息!

**BROWSE THE WEBSITE AND
INSTANTLY GRASP INFORMATION!**

 **AUTOGRIP 佳賀精機**



*2D圖檔(PDF、DWG格式)、3D圖檔(STEP格式)
可以從官網下載。

*You can download the outline drawing
(in pdf or dwg format) and 3D step at AUTOGRIP WEB.



 領英(LinkedIn)



 公眾號



 佳賀精機 AUTOGRIP



 AUTOGRIP MACHINERY



 AUTOGRIP佳賀固力普



注意事項

請詳閱本說明書，並依循指示說明。
若未依照指示，錯誤的使用而致引起的
損傷或意外事，本公司概不負責。

FOR SAFE OPERATION

Please read this manual and following instructions carefully.
We cannot assume responsibility for damage or accidents
caused by misuse, through noncompliance with the safety
instructions.

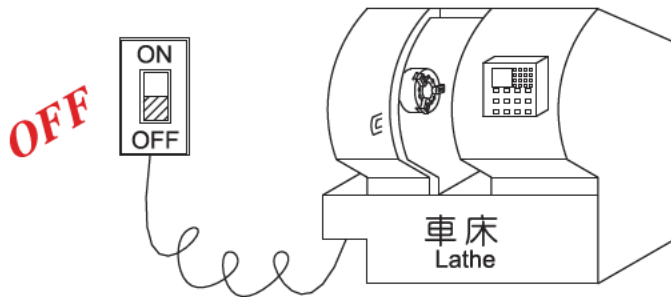


DANGER
危險



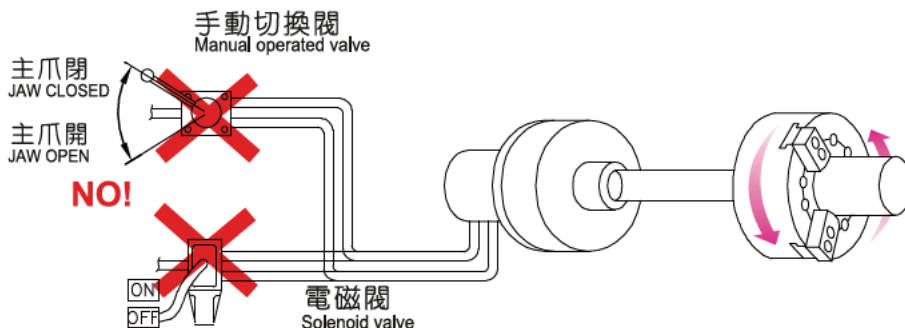
在安裝檢查或更換迴轉缸時，務必關掉所有電源，確保操作者之安全。
SWITCH OFF power before setting, inspecting, lubricating or
changing the cylinder to ensure operator safety.

易發生身體或衣物捲入等意外事故。
To avoid accident of operator body or clothes drawn into machine.



當主軸迴轉時，切勿操作切換閥。
Never operate the selector valve and the solenoid valve and the air supply during the spindle rotation.

將使夾持力喪失，致工作物飛散產生危險。
Causing fly out of the workpiece





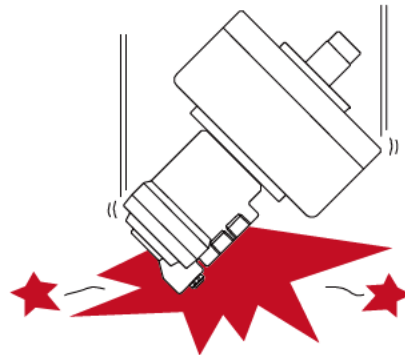
WARNING

警告



勿使空壓缸受到衝擊或碰撞。
Never shock the cylinder.

空壓缸破損，將導致工件飛出之危險。
Danger by fly-out of clamping workpiece in case of
damaging of cylinder.

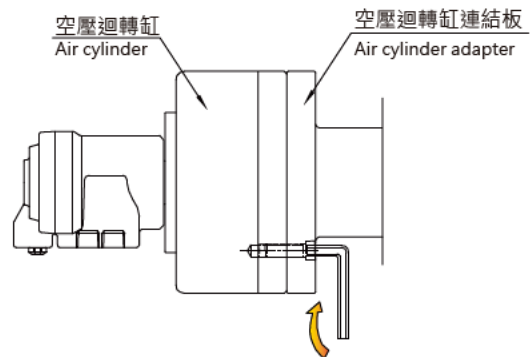


依標準力矩確實鎖緊螺絲。
Tightening the clamp bolts with correct torque.

前鎖側の場合 Front side

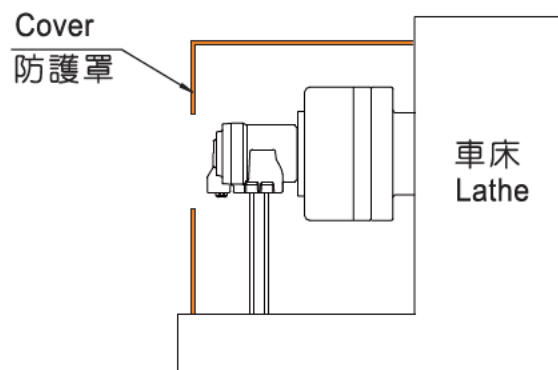
螺絲尺寸 Bolt Size	鎖緊力矩 Tighten torque
M8	31.5 N.m(3.2 kgf.m)
M10	60.0 N.m(6.1 kgf.m)
M12	87.0 N.m(8.9 kgf.m)

空壓缸鬆脫，將導致工件飛出之危險。
Danger by fly-out of clamping workpiece
in case of looseing of cylinder.



迴轉缸外圍須以防護罩蓋住。
Be sure to cover the periphery of cylinder.

如無防護罩，易發生肢體或衣服捲入等意外發生。
Danger by catching of operator in a machine.





WARNING 警告



空壓缸可容許之最高壓力（請參考各空壓缸之最高使用壓力），但設定使用壓力時，需考量夾頭的適用性。
The maximum hydraulic pressure of air cylinder (Please refer to the Max. Pressure of each cylinder), but set air pressure need according to chuck specification.

如氣壓力超過容許最大值，將使空壓缸受損，甚至使夾頭變形或破裂之危險。
If air pressure is exceeded, the air cylinder or the chuck may be deformed or broken.



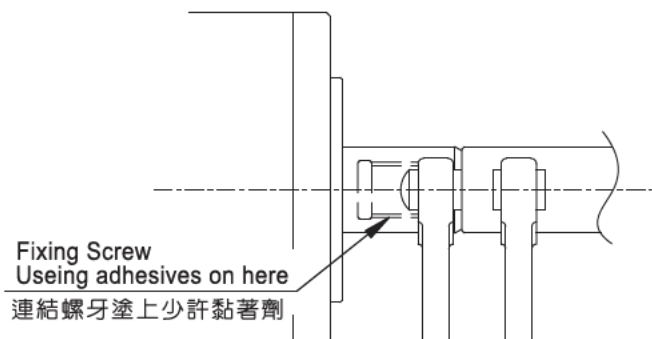
操作機器前，請勿喝酒或服用麻醉性藥物。
Never attempt to operate machine while under take alcohol or drugs.

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



拉桿螺紋處塗上防鬆接著劑，再依標準力矩鎖緊。
Coat the threaded part of the draw bar with adhesive and screw it with the specified torque.

如拉桿鬆脫掉落的話，會使爪行程變短。
If draw bar becomes loosed the jaw stroke of the chuck will becomes short.





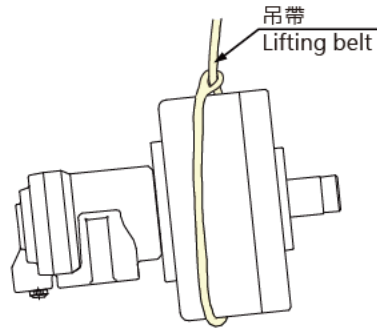
WARNING

警告



拆裝迴轉缸時，請使用吊帶。

When mounting or unmounting the cylinder, use a lifting belt.



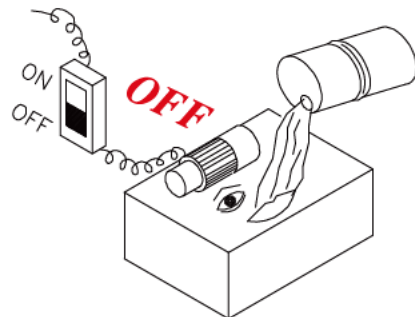
掉落時十分危險。
Danger by dropping.



供給足夠的氣體，且先關掉電源。

Turn of power source and supply air.

氣壓不足將使得氣壓缸動作速度變慢，推力不足，導致夾持力減弱，工件物飛散而十分危險。
Danger by discharge of workpiece incompletely gripped because of slow operation speed or insufficient thrust.



請勿自行改造空壓缸活塞總行程。

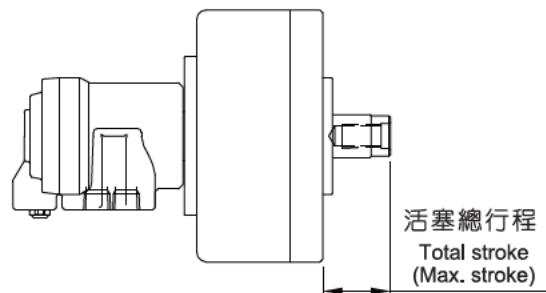
Don't attempt to modify the total stroke of piston by yourself.

不當改造活塞總行程，將損害空壓缸而無法發揮正常功能。

Danger by function damaged of Cylinder.

如有需要改變活塞行程，請與敝公司接洽。

If you have need to do ,please contact AUTOGRIP company.



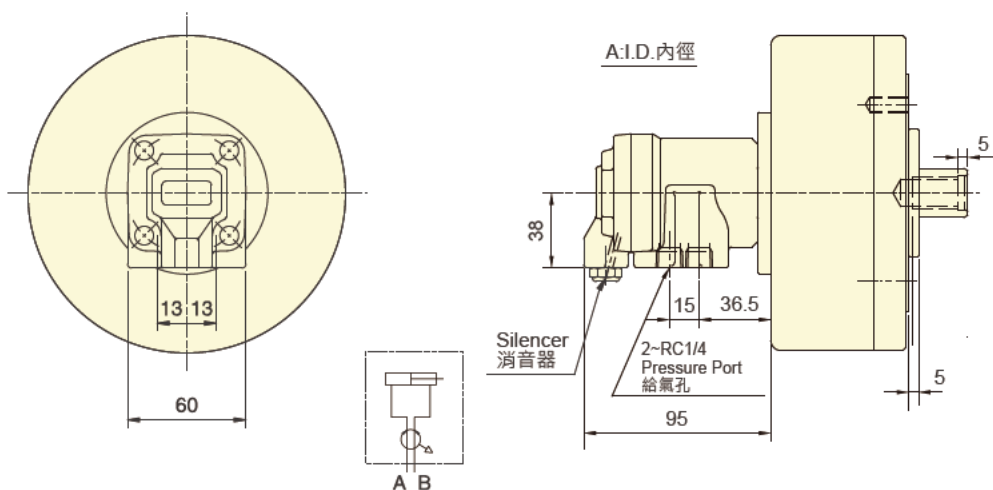
活塞總行程
Total stroke
(Max. stroke)

2. 中實迴轉空壓缸

2.1 中實型迴轉空壓缸規格

2. ROTATING AIR CYLINDER

2.1 Specification of ROTATING AIR CYLINDER



型號	活塞面積 Eff. piston area		行程	最高迴轉數	最高使用壓力	I	重量	空氣洩漏量
Model	伸側 (Extend)	縮側 (Retract)	Piston stroke	Max. speed	Max. pressure	Moment of inertia	Weight	Air Leakage (6kgf/cm ²)
	cm ²	cm ²	mm	min ⁻¹ (r.p.m.)	MPa(kgf/cm ²)	kg·m ²	kg	cc/sec
RA-100	77.0	74.4	15	6000	0.8(8)	0.03	3.9	400
RA-130	131.2	124.7	15	5000	0.8(8)	0.05	5.2	400
RA-170	225.4	219.0	20	5000	0.8(8)	0.18	8.5	400
RA-220	378.6	369.3	25	4000	0.8(8)	0.36	14.5	400
RA-270	571.0	562.9	30	3000	0.8(8)	0.75	18.4	400

3. 安裝

3.1. 中實迴轉空壓缸安裝概要

中實夾頭安裝於車床主軸前方，後方裝置中實迴轉空壓缸，再以拉桿連接。

3. Mounting

3.1. Rotating air cylinder of mounting

Mount the closed center hydraulic chuck to the front of the lathe spindle, and rotating air cylinder to the rear. Connect the both units with draw bar.

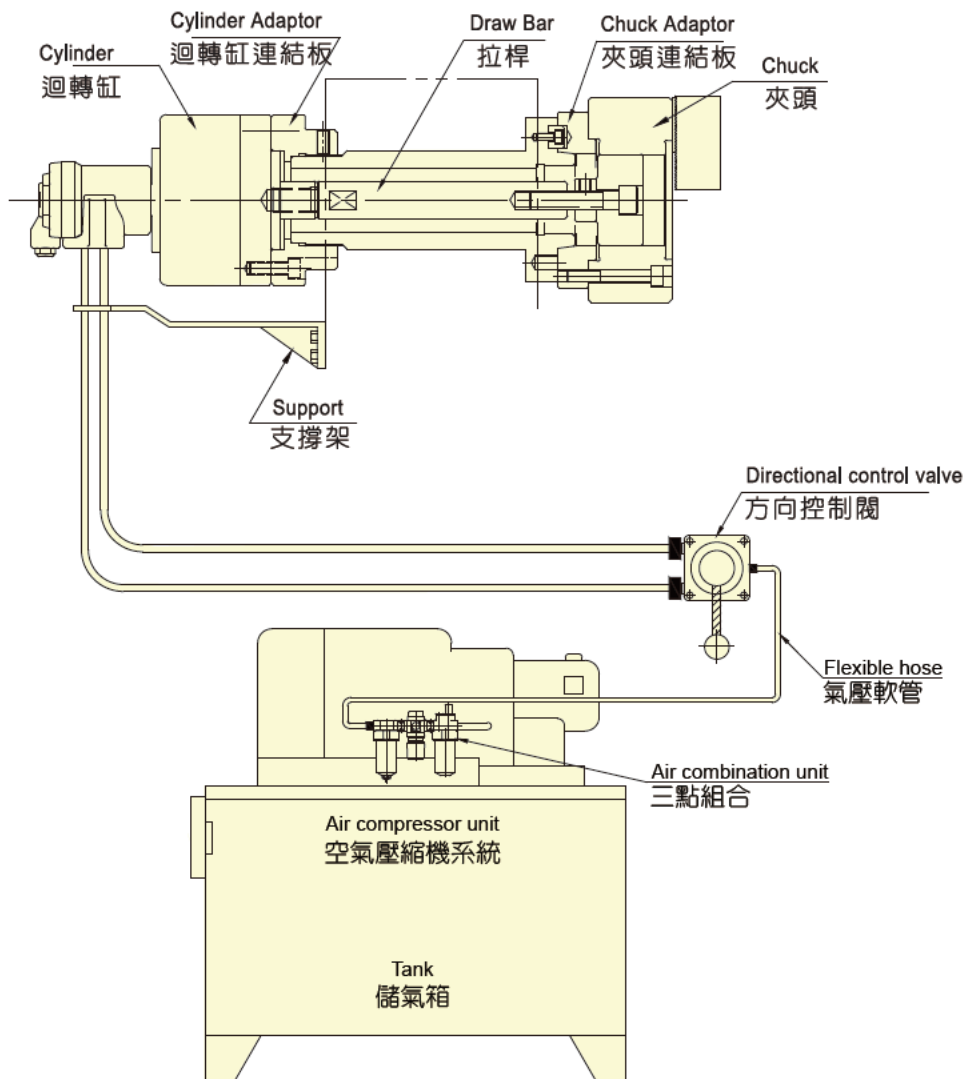


Fig.1

3.2. 空壓缸連結板製作及安裝

3.2. Preparation and mounting of air cylinder adapter

IMPORTANT 留意事項

- ◎ 空壓缸連接板之正面及插口內徑之偏轉超過 0.005mm 將使空壓缸因震動而縮短使用壽命。
- 確使空壓缸裝置儘量靠近車床主軸支撐處。(參見圖 3)
- 確實裝上固定螺絲以防止連結板鬆脫。

- ◎ Keep the run-out on air cylinder adapter front face and the run-out on its inside diameter both within 0.005mm, Excessive vibration can cause vibration and markedly shortened cylinder service life.
- Be sure air cylinder near the spindle support of the lathe.(see Fig.3)
- Prevent loosening of the adapter remember to provide the set screw.

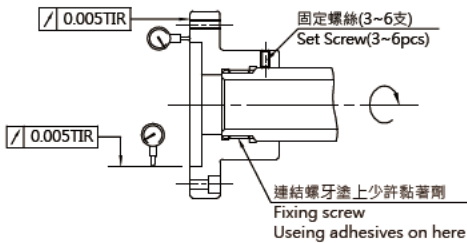


Fig.2 油壓缸連結板的偏擺量測
Run-out Measurement of Cylinder Adaptor

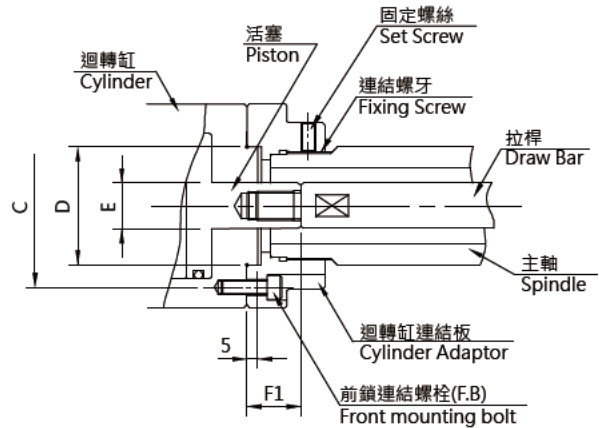


Fig.3 空壓缸連結板的安裝
Mounting of Cylinder Adaptor

型號 Model	RA-100	RA-130	RA-170	RA-220	RA-270
寸法 Dimintions					
C	80	90	100	130	130
D(F7)	60	65	80	110	110
E	22	25	25	30	35
F1(Max.)	50	45	45	50	55
F.Bolt 前鎖連結螺栓	6~M8	6~M8	6~M10	6~M12	6~M12

3.3. 拉桿的製作與安裝

- 參考圖 4 及圖 5 以決定拉桿長度。
- 使活塞完全伸出外部時，在旋入拉桿。

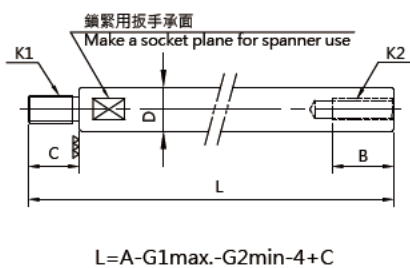


Fig.4 拉桿詳圖 Detail of Draw Bar

3.3. Preparation and mounting of draw bar

- Reference Fig4, Fig5 determine the length of draw bar.
- With the piston rod thoroughly extraced outside, serew the draw bar into piston rod.

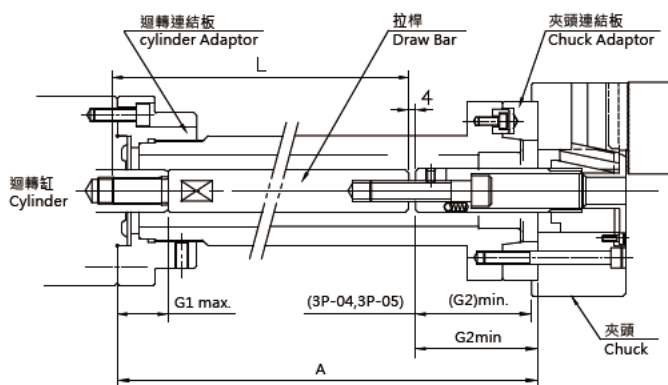


Fig.5 拉桿的安裝 Mounting of Draw Bar

迴轉缸型式 Cylinder Type	搭配夾頭型式 Matching chuck	B	C	D	G1 max.	G2 min.	K1	K2	L
RA-100	3P-04	30	20	22	50	3	M12x1.75	M10x1.5	A-37
RA-130	3P-05	40	25	45	45	-6	M16x2.0	M12x1.75	A-18
RA-170	3P-06					82.6		M16x2.0	A-106.6
RA-220	3P-08		30	50	50	106	M20x2.5	M20x2.5	A-130
	3P-10					133			A-157
RA-270	3P-12		35	55	55		M24x3.0		A-157

- 依上表求得 A 值 (空壓缸連接板至夾頭連接板) 之距離，可得知拉桿長度 L。
- 範例：在 3P-08、RA-220 配合中，A 值為 mm 拉桿總長 $L = A - 130 = 800 - 120 = 680\text{mm}$
- 拉桿與活塞桿之螺紋須相同。

- Use the table to find A (between air cylinder adaptor and back plate) and determine the dimension L.
- Example: Type 3P-08, RA-220 the distance A is 800mm. so that the overall length of the draw bar will be 680mm. $L = A - 130 = 800 - 120 = 680\text{mm}$.
- Accurate threading must be provided on the draw bar in conformity with the threads on the piston rod.



- 螺牙鬆動是造成振動的主要原因。
- 以抗拉強度 380MPa (38kg/mm²) 以上之材料製作拉桿。

- Insecure threads will cause the draw pipe to vibrate.
- For pipe strength, use the material of tensile strength 380MPa (38kg/mm²) of or more.

3.4. 安裝空壓缸

IMPORTANT 留意事項

- 空壓缸連接板之正面及插口內徑之偏轉超過 0.005mm，將使空壓缸因震動而縮短使用壽命。
- 確使空壓缸裝置儘量靠近車床主軸支撐處。(參見圖 6)
- 確實裝上固定螺絲以防止連結板鬆脫。

3.4. Mounting of air cylinder

- Keep the run-out on air cylinder adapter front face and the run-out on its inside diameter both within 0.005mm, Excessive vibration can cause vibration and markedly shortened cylinder service life.
- Be sure air cylinder near the spindle support of the lathe.(see Fig.6)
- Prevent lossening of the adapter remember to provide the set screw.

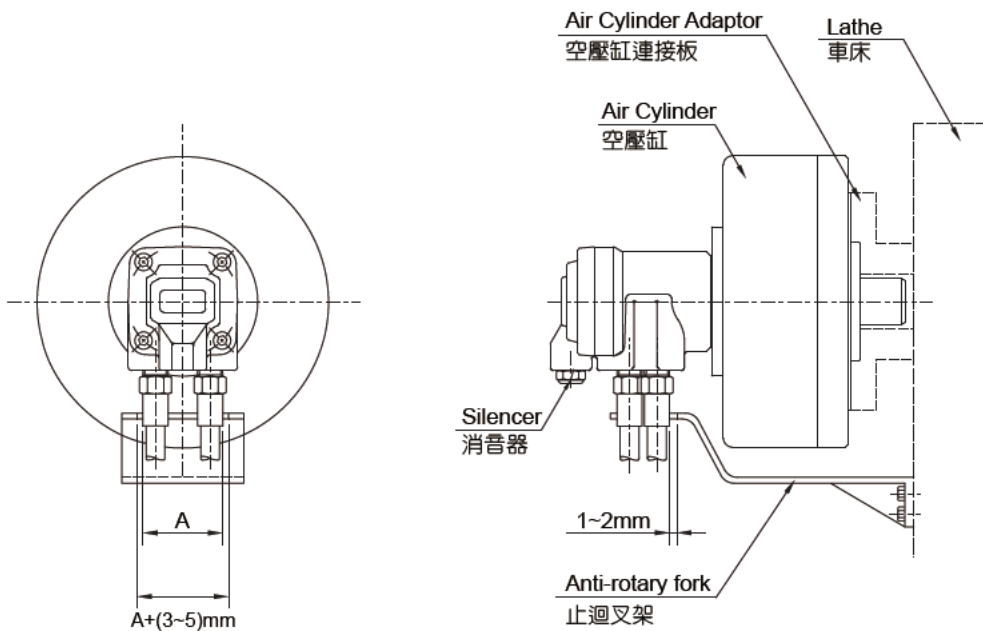


Fig.6

3.5 安裝空壓缸的正確方式及鎖緊力矩

3.5 Use correct method and tightening torque to mounting air cylinder.

IMPORTANT 留 意 事 項

- 空壓缸安裝於連接板其固定螺絲應越深越好，如下圖所示。
- 螺紋鎖入長度須距離空壓缸螺紋深度約 2mm。

- When mounting a air cylinder on the air cylinder adapter, screw as deep as illustrated below.
- Screwing length of the bolt should be the screw tapped length minus 2mm.

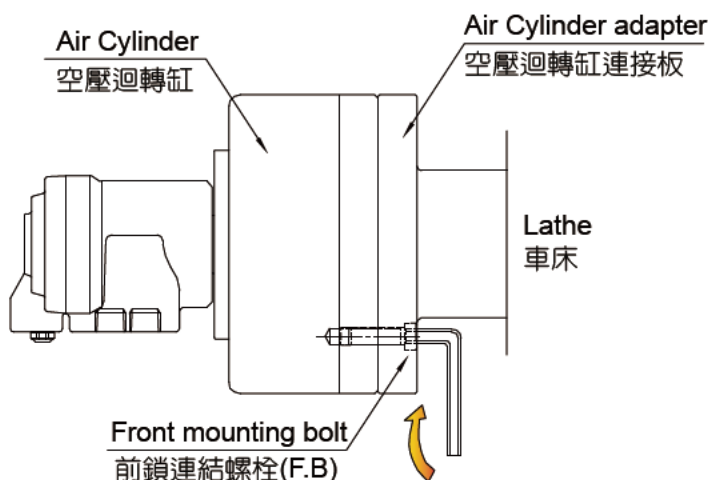


Fig.7



WARNING 警 告

- 依下表力矩而鎖緊螺絲。
- 由於空壓缸為鋁合金材質，故其鎖緊力矩約為夾頭同規格螺絲鎖緊力矩之 80%

- Tighten the mounting bolts conforming to each torque specified as follows.
- Each torque values above is shown with a tightening torque at 80% of hydraulic pressure chuck bolts because the air cylinder is made of alumin

螺絲尺寸 Bolt Size	鎖緊力矩 Tighten torque
M8	31.5N.m(3.2kgf.m)
M10	60.0 N.m(6.1 kgf.m)
M12	87.0 N.m(8.9 kgf.m)

4. 配管 (Piping)

空壓缸的迴轉閥部位，有 Rc1/4 的氣壓進給孔二處，及後端有排氣孔一處。排氣孔通常只會洩漏出大約 400cc/sec 的空氣，但使用之空氣如含有過多水份，有時會落下含有油質的水滴，故請時常維護空氣壓縮機於含水份最少的狀況，才不會產生不良影響。

4.Piping

There are two Rc 1/4 pressure ports in the rotary valve of the cylinder and a air drain port in the back end. Generally there are about 400cc/sec air leaking from the drain port , but if there is too much water in the air the drain port would sometimes dripdown some oleaginous drops, therefore, always keep the air compressor on the condition of containing the least water so as to prevent troubles.

4.1 迴轉閥部位的止迴

迴轉空壓缸以高速轉動的話，因軸承的阻力，迴轉閥部位多少會產生一些扭矩。為了承受這種扭矩所產生的反作用力，配管材料上如使用鋼管或將迴轉閥固定在車床的某一部位的話，力量會強迫施加到整體空壓缸之上，因而造成振動或故障。

因此，請使用具柔軟性的配管材料，而迴轉閥部位請使用有餘裕間隙的止迴叉架，如圖 8 所示：

4.1 Design the circuit

When the rotary air cylinder rotates at a high speed, the resistance caused by the bearing will certainly generate some torque. If the steel pipes should be used or the rotary valve is fixed in the lathe, the force will lay on the whole body of the air pressure cylinder, which will lead to shaking or troubles. In order to sustain the reaction force created by torque, the piping material should be flexible and an anti-rotary fork with interval while traveling should be used to coordinate the operation of the rotary valve. (Show fig.8.)

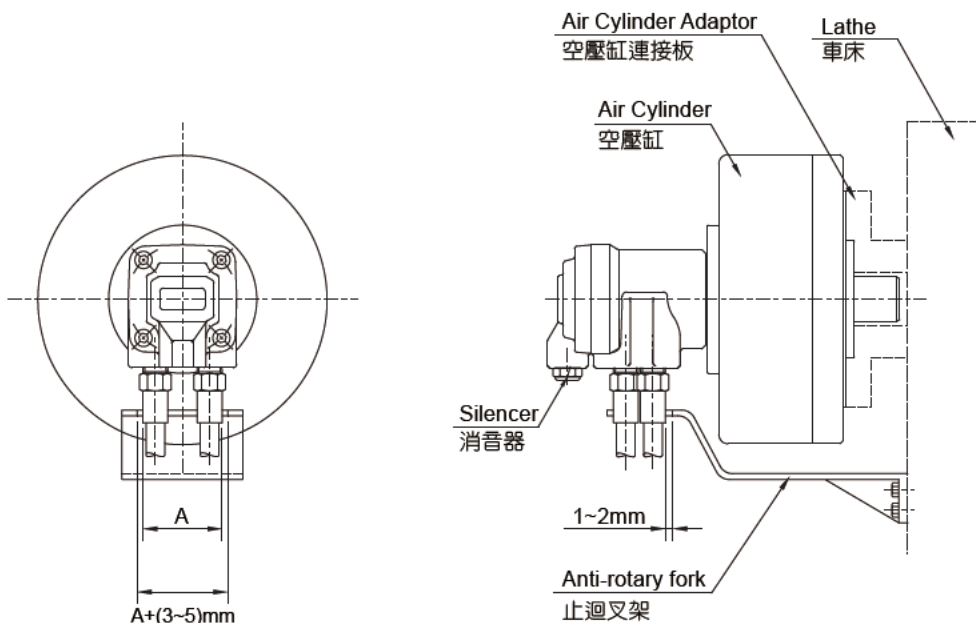


Fig.8

5. 壓縮空氣

要使空壓缸以所需的速度產生動作，必須組合具有充分容量的空氣壓縮機，配管管徑及空氣調質器才行。

所須要的空氣供給量，其計算方法如下：

Q：所須的空氣供給量 (L/min)(A.N.R.)

Needed air supply

q：空壓缸往返 次所須的空氣消耗量 (air consumption)..... (L)(A.N.R.)

The air consumption needed for the cylinder go up and down

t：週期時間（從工件安裝到切削後取下的時間）..... (min)

The time cycle (from install the work piece to take it down after cutting)

a：迴轉閥的空氣洩漏量 (L/min)(A.N.R.)

Air leakage of the rotary valve

p：使用空氣壓力 (MPa)

Air pressure

N：同時使用的空壓缸數

Numbers of the cylinders operating simultaneously

1) 1 個使用的場合

For usage of 1 set

$Q > q/t + a + 10$

計算例：

以 RA-170 型使用一個時，從規格表查出

拉側受壓面積 219 cm²

行程 20mm(=2cm)

壓受壓面積 225.4 cm²

空氣洩漏量

0.4 L/ sec(A.N.R.)

P = 0.5 Mpa

$q = (219 \times 2 + 225.4 \times 2) \times (0.5 + 0.1013) / 0.1013 / 1000 = 5.3 \text{ (L) [A.N.R.]}$

$a = 0.4 \times 60 = 24.0 \text{ (L/min) [A.N.R.]}$

由公式 1) Formula 1

$Q = 5.3 / 2 + 24.0 + 10 = 36.7 \text{ (L/min) [A.N.R.]}$

壓縮空氣在迴轉空壓缸中，不僅能以所需的速度使空壓缸作動，同時也有冷卻及潤滑軸承的功用。

未使用乾淨且適切加入潤滑油的空氣時，會加速各部位的損耗，顯著縮短壽命。

請使用過濾度 5μm 以下的空氣濾清器，及符合 ISO VG32 標準的潤滑油。

5. Pressure Air

To operate the rotary air cylinder at the speed of necessary, there must be air compressor with enough capacity and piping with suitable diameter as well as good air quench and tempering machine.

The calculation methods of the needed air supply can be shown as followings:

Q：所須的空氣供給量 (L/min)(A.N.R.)

Needed air supply

q：空壓缸往返 次所須的空氣消耗量 (air consumption)..... (L)(A.N.R.)

The air consumption needed for the cylinder go up and down

t：週期時間（從工件安裝到切削後取下的時間）..... (min)

The time cycle (from install the work piece to take it down after cutting)

a：迴轉閥的空氣洩漏量 (L/min)(A.N.R.)

Air leakage of the rotary valve

p：使用空氣壓力 (MPa)

Air pressure

N：同時使用的空壓缸數

Numbers of the cylinders operating simultaneously

2) 數個使用的場合

For usage of many sets

$Q > N \times (q/t + a + 10)$

Calculation:

The usage occasion of 1 set of RA-170 type, referring to the specification table 1.

Eff. piston area of retract 219 cm²

Stroke 20 mm

Eff. piston area of Extend

..... 225.4 cm²

Air leakage

..... 0.4 L/ sec(A.N.R.)

t = 2 min

The compressed air in the rotary air cylinder can only operate the cylinder at desired speed but also cool down and grease the bearing.

Should- the air in use is inadequately burned and failed to fusion with the grease, it would speed up the breaking down of the parts, shorten the life span of the parts.

Please use the air filter whose filtering degree is below 5 μm, and the standard of the grease in use should be accord with ISO VG32.

• 推薦油品 Oil Recommended

- (1) super multi-oil32
- (2) diamond R032

- (3) mobil DTE(light)
- (4) shell terrace32
- (5) esso tereso32

6. 安裝與使用

安裝與使用時，請勿將消音氣孔堵塞，以免造成背壓而損壞迴轉閥，產生異常漏氣現象。並請定期拆下消音器清除水漬與油垢，以免堵塞。

6.Using and installing

Don't block the silencer while installing and using otherwise it will cause back-pressure to damage rotary valve and leaking problem. And to avoid any blockage for take apart the silencer in regular to clean grease and spot.

7. 操作測試

- (1) 為慎重起見，請檢查各部位的螺絲是否鬆脫。
- (2) 以 0.1~0.2MPa 的空氣壓力確認空壓缸的運轉之後，以 200~300r/min 轉動主軸，一邊注意各部位的振動或異音，邊慢慢提高轉數。
- (3) 此時請千萬注意，身體勿靠近或觸及迴轉部位。

7. Test Run

- (1) Make sure the screws are firmly fixed.
- (2) Operate the cylinder at 0.1~0.2MPa air pressure, then rotate the spindle at the speed of 200~300 r/min, push up the revolution little by little while check if there is vibration or noise.
- (3) Please stay away from the rotation parts of the cylinder; do not touch the turning parts.

8. 維修檢查

8.1 檢查潤滑油

- 軸承的冷卻及潤滑，是由空氣及加在空氣中的潤滑油負責進行的，請經常注意潤滑器的油面及空氣濾清器的污染狀況。有關潤滑器及空氣濾清器的檢查方法，請依照廠商的使用說明書進行。

8.2 分解與清潔

- 空壓缸若正確安裝，使用乾淨且適切加入潤滑油的空氣，即能保有很長的壽命。但因某些原因造成故障時，必須分解並配合需要更換零件才行。

分解順序

(A) 分解空壓缸本體

- (1) 鬆開空壓缸蓋的螺栓，取下空壓缸蓋。
- (2) 將活塞從空壓缸拔出。

(B) 分解迴轉閥

- (1) 在未分解空壓缸本體之前，即可將迴轉閥整體取下，但作業前請務必先將空壓缸內部的壓力釋放掉。
- (2) 取下安裝迴轉軸的螺母，將迴轉閥從空壓缸拔出。
- (3) 取下後端蓋及 C 型扣環。
- (4) 將迴轉閥體和軸承一起拉出。

分解時請注意：

分解時請對照各零件的記號進行之。

組裝時請注意：

請注意各零件是否有髒污，組裝時請充分塗抹潤滑油。

8.Maintenance & inspection

8.1 Check the grease

- The cooling and lubrication of the bearing is by means of the air and grease that is added in the air, please note the oil face of the lubricator and the pollution of the air cleaner. Please refer to the instruction to inspect the lubricator and the air cleaner.

8.2 Disassembling and cleaning

- The rotary air cylinder can be durable if it is installed properly and adopted cleaning air that contained enough grease, but if there is something wrong with it, it must be disassembled to replace some parts.

The procedures for disassembling

(A) Disassemble the body of the air cylinder

- (1) Unclench the screw bolts of the air cylinder cover, take off the cylinder cover.
- (2) Extract the piston from the air cylinder.

(B) Disassemble the rotary valve

- (1) Take down the rotary valve before the disassembling of the body of the air cylinder, please NOTE: make sure the pressure is released before taking down the rotary valve.
- (2) Unclench the screw nut of the rotary shaft; extract the rotary valve from the air cylinder.
- (3) Take off the back cover and the C snap ring.
- (4) Pull out the valve body and bearing.

Note:

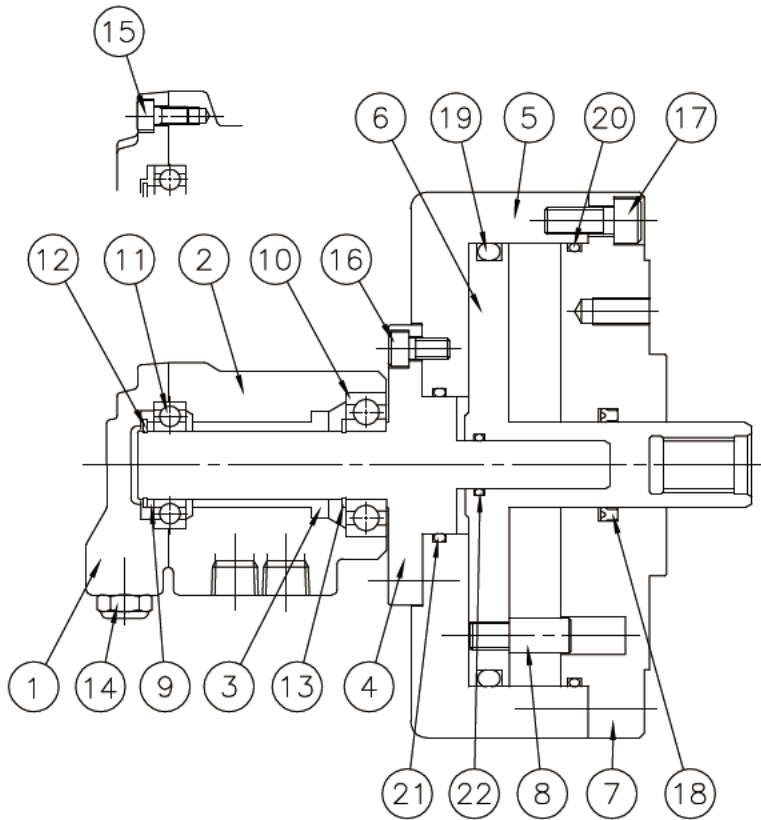
When disassembling the parts, please perform it according to the mark of the parts.

Note:

When assembling the cylinder, please make sure the parts are clean, and smear enough grease on the parts.

9. 中實迴轉空壓缸零件圖 (RA 型)

9. Parts list of ROTATING AIR CYLINDER(RA Type)



零件表 Parts List

No.	零件名稱	Name of parts	數量 Qty
1	閥蓋	Cover	1
2	閥體	Valve Housing	1
3	閥體襯套	Valve Housing	1
4	迴轉軸	Rotary Shaft	1
5	缸體	Cylinder Body	1
6	活塞	Piston	1
7	缸蓋	Cover	1
8	固定銷	Pin	2
9	墊圈	Washer	1

No.	零件名稱	Name of parts	數量 Qty
10	軸承	Bearing	1
11	軸承	Bearing	1
12	C 型扣環	Snap ring	1
13	C 型扣環	Snap ring	1
14	消音器	Silencer	1
15	六角孔圓頭螺栓	Hex. cap screw	4
16	六角孔圓頭螺栓	Hex. cap screw	6
17	六角孔圓頭螺栓	Hex. cap screw	6or12or18

消耗零件表 Consumable Parts

No.	零件名稱 Name	RA-100	RA-130	RA-170	RA-220	RA-270	數量 Qty
18	U 型環 U-ring	PNY22	PNY25		PNY30	PNY35	1
19	O 型環 O-ring	G95	P120	G160	G210	G260	1
20	O 型環 O-ring	G95	G125	AS568-259	AS568-267	AS568-274	1
21	O 型環 O-ring	G40					1
22	O 型環 O-ring	P14					1



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佳賀精機股份有限公司
AUTOGrip MACHINERY CO., LTD.

513006 彰化縣埔心鄉明聖路一段229號
No. 229, Sec. 1, Mingsheng Rd., Puxin Township,
Changhua County 513006, Taiwan

T +886-4-822-8719
F +886-4-823-5719
E sales@autogrip.com.tw
www.autogrip.com.tw



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