



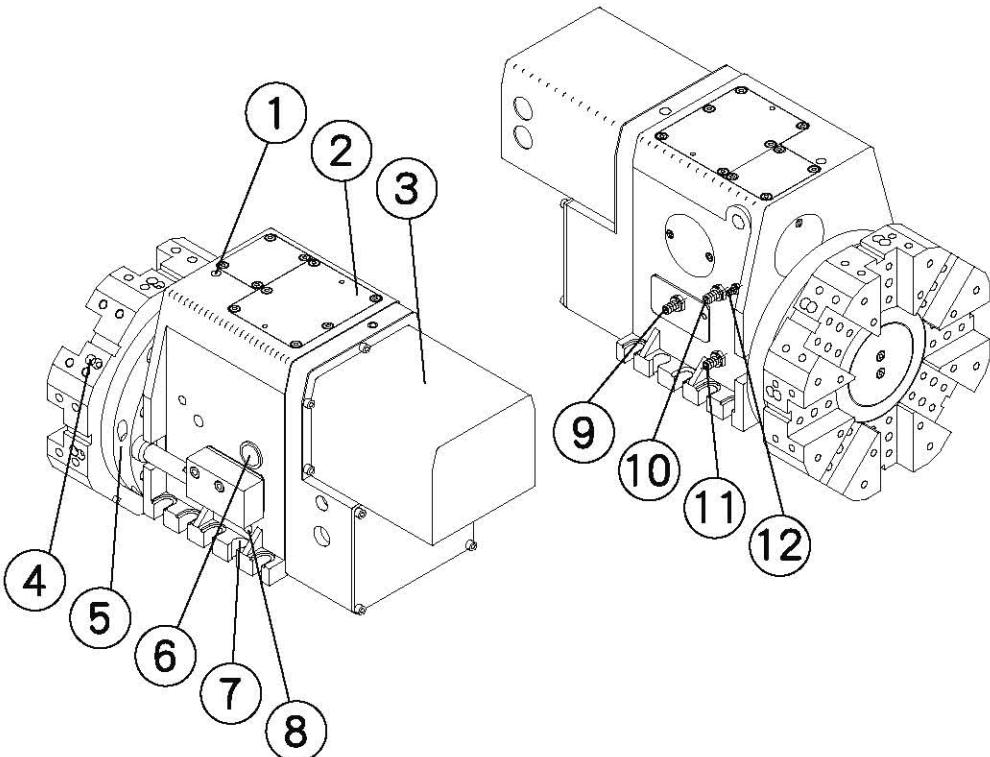
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簡介	Introduction
<ul style="list-style-type: none"><li>◆本刀塔為油壓驅動式,採用DANFOSS高品質油壓馬達,靜音、扭力大、高速、換刀速度約為0.3秒.</li><li>◆刀塔內部機構為日內瓦式間歇機構,配合精密曲齒離合器,換刀定位精準,在0.003mm以內,並且可承受重切削.</li><li>◆採用近接開關,並且精心設計電子感應系統,感應快速,正確、保證決不亂刀.</li><li>◆高品質、無缺點,是本公司信譽的保證,我們有完善的售後服務</li></ul>	<ul style="list-style-type: none"><li>◆ <b>HIGH-SPEED REPLACEMENT ONLY 0.3 SECOND.</b> The turret power to rotate by oil-hydraulic .It is installed with the DANFOSS hydraulic motor and the VICKERS solenoid for silence ,high-torque ,high-speed.</li><li>◆ <b>HIGH-ACCURACY REPEATABILITY IN 0.003mm &amp; NO OVERRUN .</b> The turret structure is one type of the geneva mechanism and the curvic-coupling is used in fixing between tooldisc and the turret .so that the repeatability is controlled in 0.003mm and it is able to bear heavy-cutting.</li><li>◆ <b>NO COUNT ERROR.</b> The count is controlled by the proximity switch and excellent electronics design .For rapidly and correctly four Pre-indexing stations is setted with a view to percieve.</li><li>◆ <b>HIGH-QUALITY &amp; COMPLETE SERVICE-AFTER-SALE.</b> We support technology to our customers and supply spare parts to their disposal.</li></ul>



刀塔規格		TURRET SPEC.			
型號 MODEL		LS-120	LS-160	LS-240	LS-240A
中心高 Center height	mm	63	80	120	120
刀數 Number of tools	N0.	8T	8T	8T/10T/12T	8T/10T/12T
相鄰刀換刀時間 Rotating time(tool-to-tool)	sec	0.35	0.35	0.25	0.25
相鄰刀換刀並鎖緊時間 Rotating time(including locking)	sec	0.45	0.45	0.35	0.35
換最遠刀時間 Total indexing time for 180°	sec	1.6	1.6	1.0/1.2/1.3	1.0/1.2/1.3
換最遠刀並鎖緊時間 Total indexing time for 180° (including locking)	sec	1.8	1.8	1.2/1.4/1.5	1.2/1.4/1.5
刀盤一迴轉時間 (推出--迴轉360° --鎖緊) Rotating a cycle time. (unlocking cycle locking)	rev/min	30	30	50/40/33	50/40/33
曲齒離合器形式 Curvic couplings type		24120- 60xv	24140- 80xv	24180- 120xv	24180- 120xv
油壓馬達型式 Oil hydraulic motor type	DANFOSS	OMM50	OMM50	OMP80/100	OMP80/100
電磁切換閥 Solenoid operated valve		AC 110V DC 24V	AC 110V DC 24V	AC 110V DC 24V	AC 110V DC 24V
近接開關 Proximity switch		X1R5F1	X1R5F1	X2F1	X2F1
工作壓力 Hydraulic working pressure	Kgf/cm²	(25~30)30	(25~30)30	(35~40)35	(35~40)35
流量 Flow rate	L/min.	12	12	40	40
油壓缸拉力 Thrusting force of hyd. cyl.	Kgf	1,602	2,067	4,396	4,396
重現精度 Accuracy of repeatability	mm	0.003	0.003	0.003	0.003
淨重(不含刀盤) N.W. (without tool disc)	Kg	35	43	110	110



1.環首螺栓 2.加油孔 3.油壓馬達 4.切削液出口 5.刀盤連接盤 6.油鏡	7.洩油孔 8.定位銷孔 9.切削液入口 10.推出油壓入口 11.鉗住油壓入口 12.潤滑油孔	1.eye bolt hole 2.oil inlet 3.hyd. motor 4.coolant outlet 5.coupling disc 6.oil indicating window	7.positioning pin hole 8.oil outlet 9coolant inlet 10.unclamp hyd. inlet 11.clamp hyd. inlet 12.lubricant inlet
---	---	--	--

◆油壓馬達(3),為刀塔動力來源。  
 ◆本體會被固定在機台上,並以定位銷(7)為基準。  
 ◆利用本體前方的刀盤連接盤(5),將刀盤與主體結合,且刀盤連接盤上,有切削液出水口(4)。  
 ◆切削液入口(9),將引導切削液,經由主體流到刀盤連接盤(5),再流入刀盤。  
 ◆曲齒離合器,經潤滑油孔(12)潤滑,可降低噪音及良好的嚙合定位。

◆The hyd. motor (3) is the power source of turret.  
 ◆The main body will be locked on the machine frame and positioned by the position pin (7).  
 ◆To employ the coupling disc (5) at front of main body and connecting the coupling disc with main body. There is a coolant outlet (4) on the coupling disc.  
 ◆The coolant inlet (9) will guided the coolant pass through the main body and drained on the coupling disc (5) into the coupling disc.  
 ◆The curvic coupling will be lubricated by lubricant inlet (12) for which can be reduced noise and assured the best of coupling .



# 六鑫-油壓凸輪式車床刀塔

LIO SHING Hydraulic Cam Type Lathe Turret

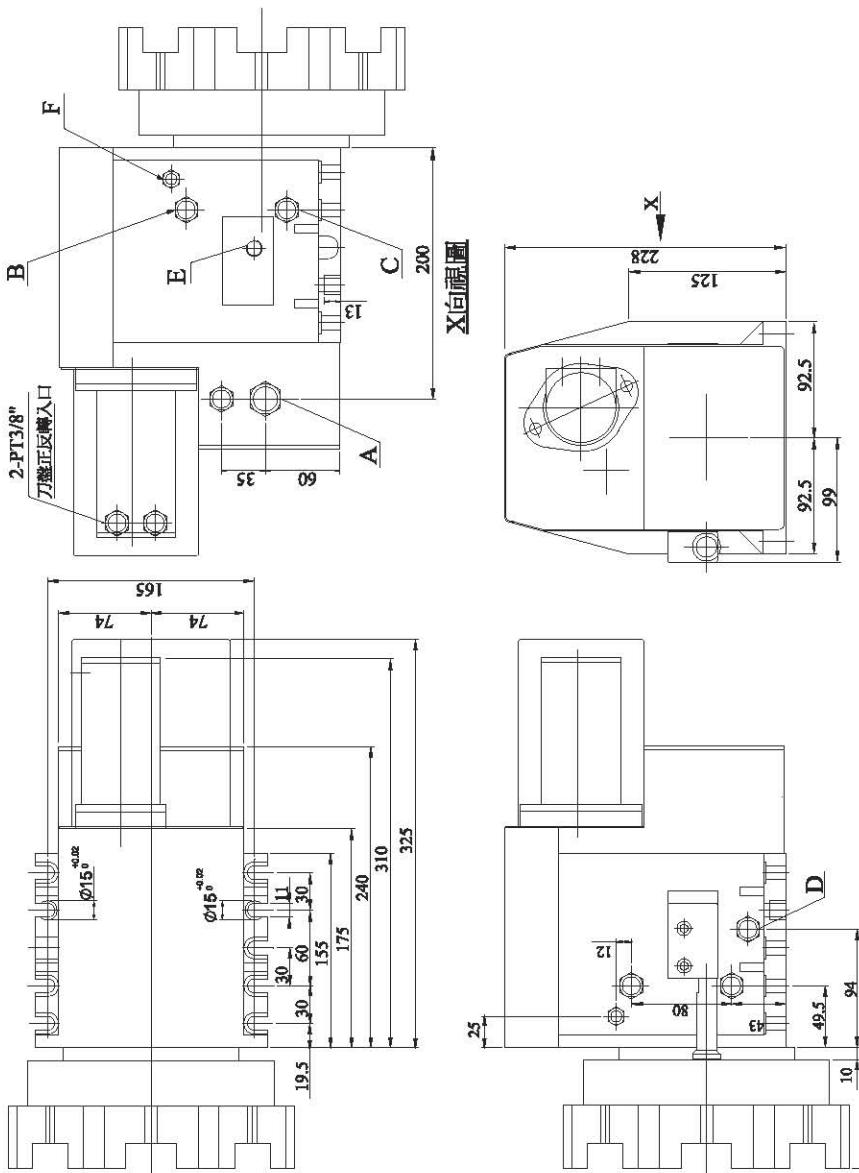
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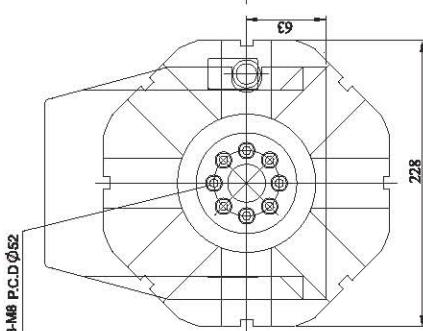
外形尺寸圖

Dimensions

**LS-120**



代號 code	螺孔規格 Threading hole spec	位置 Position
A	PT 1/2"	電線出口 Hole for wire out
B	PT 1/4"	入油孔(P) Hole for fuel in (P)
C	PT 1/4"	回油孔(T) Hole for returning fuel (T)
D	PT 1/4"	洩油孔 Fuel escape
E	PT 1/4"	切削液入口 Hole for cutting liquid
F	PT 1/8"	潤滑油孔 Hole for lubricator

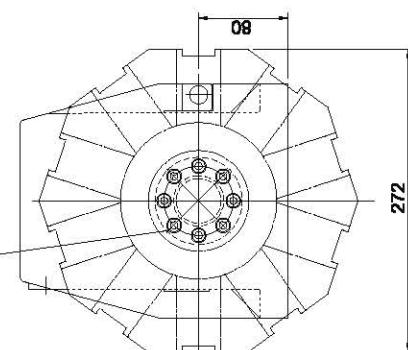
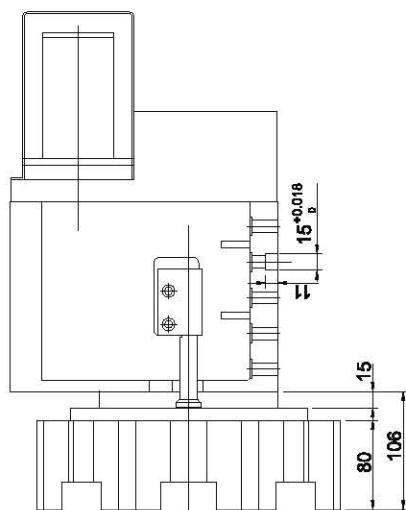
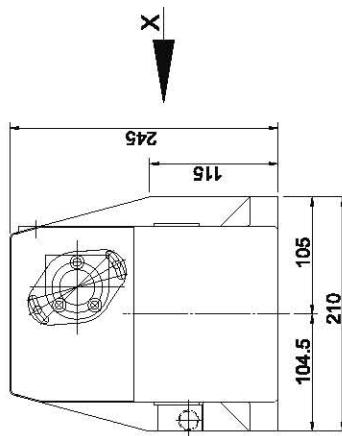
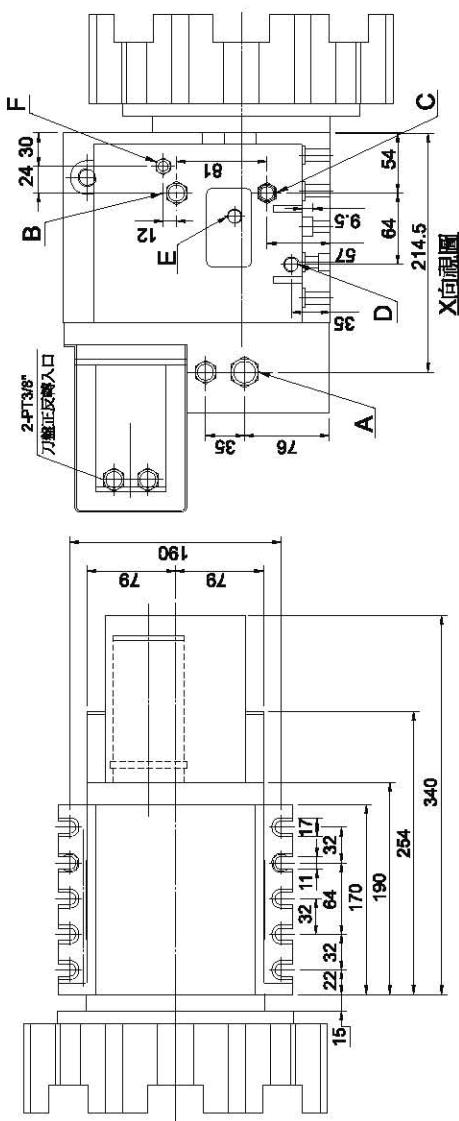




## 外形尺寸圖

## Dimensions

LS-160



B-MRPCD 032

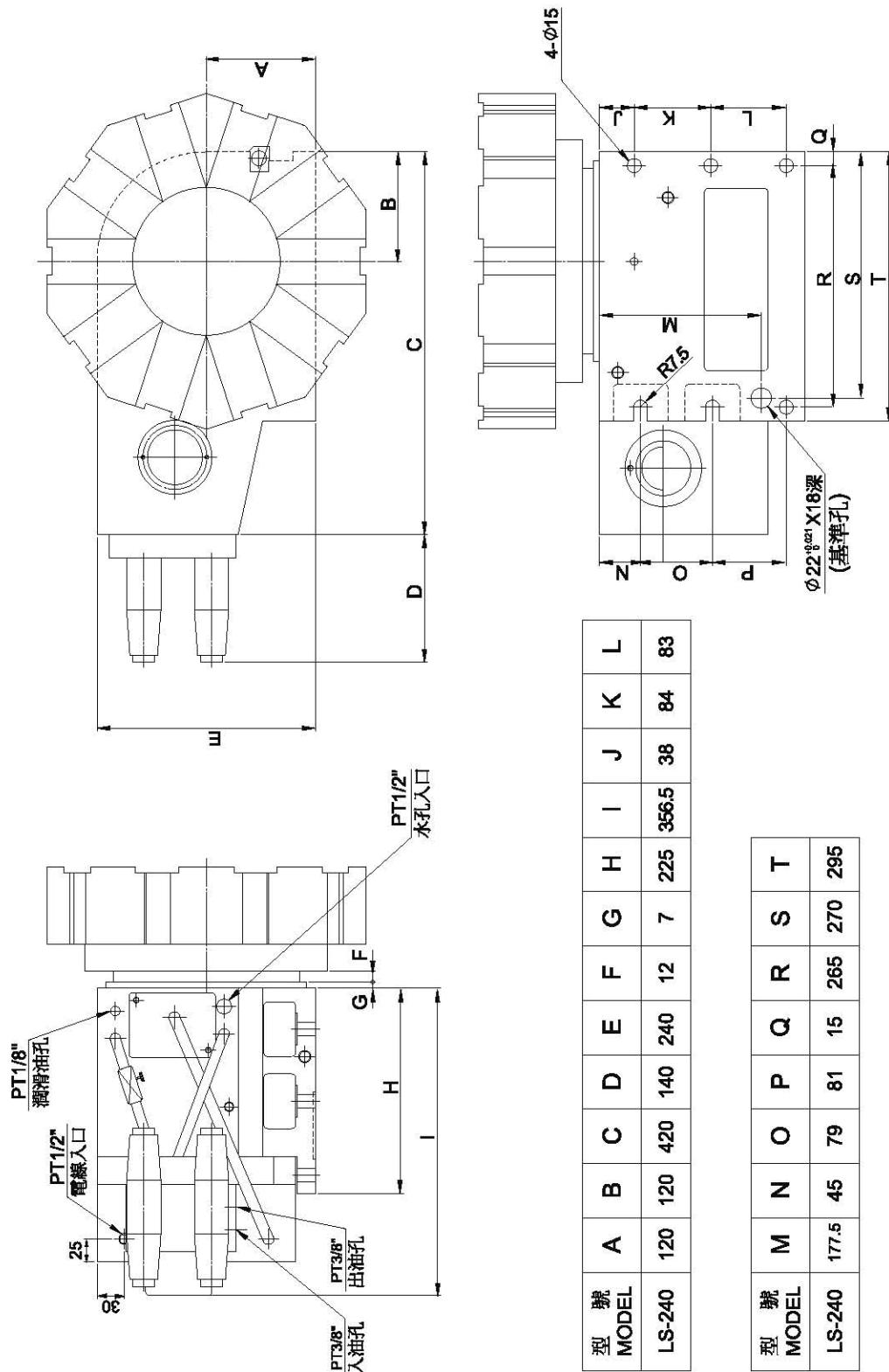
代號 code	螺孔規格 Threading hole spec	位置 Position
A	PT 1/2"	電線出口 Hole for wire out
B	PT 1/4"	入油孔(P) Hole for fuel in (P)
C	PT 1/4"	回油孔(T) Hole for returning fuel (T)
D	PT 1/4"	洩油孔 Fuel escape
E	PT 1/4"	切削液入口 Hole for cutting liquid
F	PT 1/8"	潤滑油孔 Hole for lubricator



## 外形尺寸圖

## Dimensions

LS-240





## 六鑫-油壓凸輪式車床刀塔

頁號

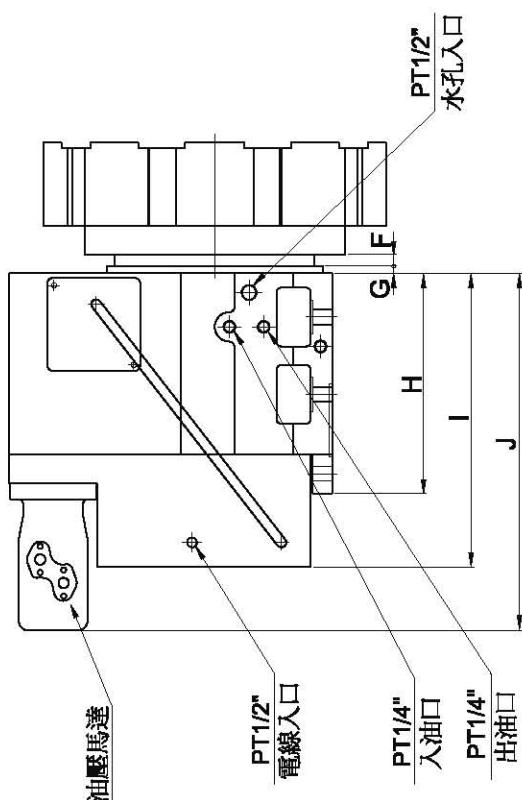
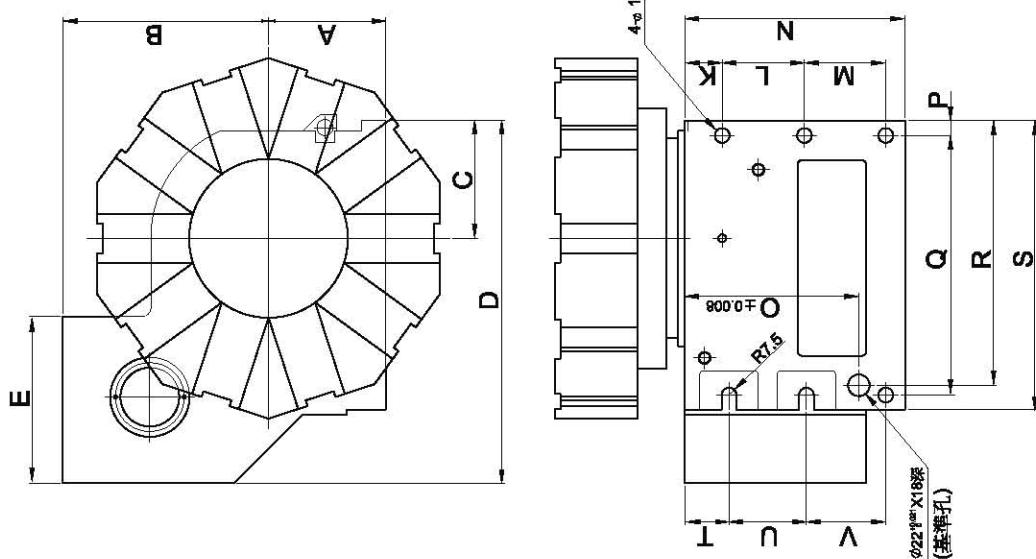
## **LIO SHING Hydraulic Cam Type Lathe Turret**

P4-4

### 外形尺寸圖

## **Dimensions**

LS-240A



型號 MODEL	A	B	C	D	E	F	G	H	I	J	K
型號 MODEL	L	M	N	O	P	Q	R	S	T	U	V
LS-240A	120	210	120	370	170	12	7	225	300	365	38
LS-240A	84	83	225	177.5	15	265	270	295	45	79	81

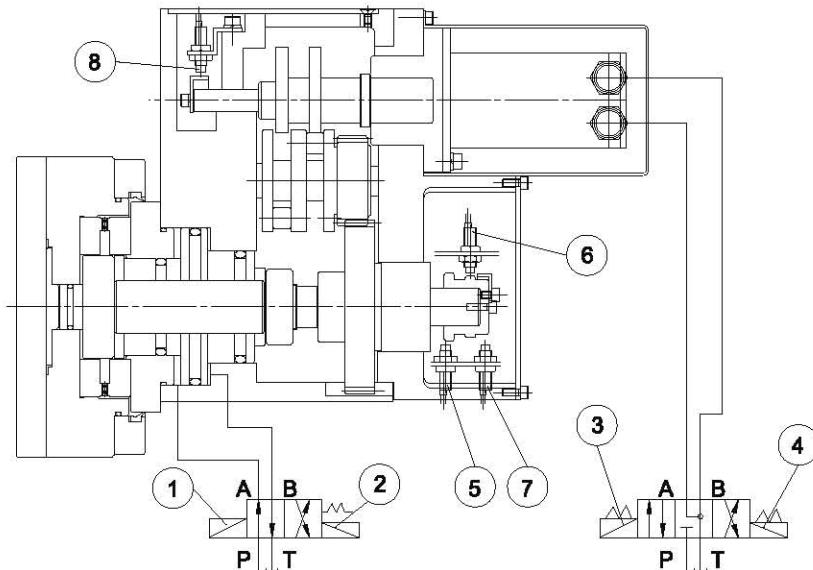


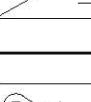
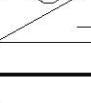
電氣動作	Description of electricity
<p><b>1.刀盤推出感應器：</b>刀盤定位時,為無感應,當欲換刀時,按刀盤啟動開關,刀盤推出,電磁閥動作,將刀盤外推6mm,此時刀盤推出感應器動作,同時由PLC告知的最短路徑,油壓馬達正反轉電磁閥動作,此時刀盤旋轉,並執行分度動作.</p> <p><b>2.分度感應器：</b>刀盤定位時,此感應器有感應,且應調在感應片中間位置,分度感應器為計算刀號用,刀盤每換一把刀,分度感應器就感應一次.</p> <p><b>3.奇偶數計數感應器：</b>為保護亂刀用,刀號為奇數時有感應,偶數時無感應,當換刀動作發生時,如有分度感應器誤動作,當刀盤應停在第一把刀位置,但刀盤卻停在第二把刀位置,此時計數感應器應感應,但刀盤為第二把刀亦即無感應,此時PLC應處理此為亂刀現象,應停止切削動作,並顯示刀盤告警.</p> <p><b>4.刀具原點感應器：</b>此為向PLC宣告,現為第一把刀,當開機時,PLC應處理找尋第一把刀程式,並予以計憶,以便往後之計算,每當刀盤第一把刀感應時,PLC可處理重新記憶刀號為第一把刀.</p> <p><b>5.刀盤定位電磁閥：</b>此電磁閥動作,刀盤往內推,即鉗住.</p> <p><b>6.刀盤推出電磁閥：</b>此電磁閥動作,刀盤往外推出,即無鉗住.</p> <p><b>7.油壓馬達正反轉電磁閥：</b>此電磁閥動作可轉動刀盤正轉或反轉,並以最短路徑之方向旋轉.</p>	<p><b>1. The tool holder disc pushed sensor:</b> During the tool holder disc is positioning for which no sensing. But when want to make tool change and push on starting switches thus ,the tool holder disc will be pushed. so as to sol. Valve actioned the tool holder disc moved out 6mm.for then the sensor will action. Mean while the PLC will be informed the shortest path after that the forward and reverse sol. Valve of hyd. Motor actioned and the tool holder disc will be rotated further more to make indexing in the same time.</p> <p><b>2. Indexing sensor:</b> During the tool holder disc is positioning and the sensor be sensed but the sensoring sheet must be setted in the middle. The indexing sensor for which counting the tool no. and the tool holder disc making tool change once as well as the indexing sensor will be sensed once.</p> <p><b>3. The odd and even number counting sensor:</b> For which to protect the tool change entanglement and the tool no. is odd thus which will be sensed so that the tool no. is even, no sensed. During making tool change and the indexing sensor will misactioned I.e. the tool holder disc be positioned at no.1 toll position but the tool holder disc is stopped at no.2 toll position thus the counting sensor must be sensed but the tool holder disc at no.2 toll position no sensed. Meanwhile, the PLC will mentioned the tool change entanglement and stopped cutting processing. So as to displayed warning.</p> <p><b>4. Tool original sensor:</b> For which announced PLC if that is no.1 tool and starting processing the PLC must managed the no.1 tool program and memory for convenient to count after that I.e. During the no.1 tool be sensed for which the PLC will be managed and memorized the no.1 tool.</p> <p><b>5. The positioning sol. Valve of tool holder disc:</b> The sol. Valve actioned and the tool holder disc will be moved toward inner and clamped.</p> <p><b>6. The pushed sol. Valve of tool holder disc:</b> The sol. Valve actioned and the tool holder disc will be moved toward outer and unclamped.</p> <p><b>7. The forward and reverse sol. Valve of hyd. Motor:</b> The sol. Valve actioned for which the tool holder disc will be rotated forwardly or reversely and those will be rotated in the shortest path.</p>



## 電器系統

## Electric system

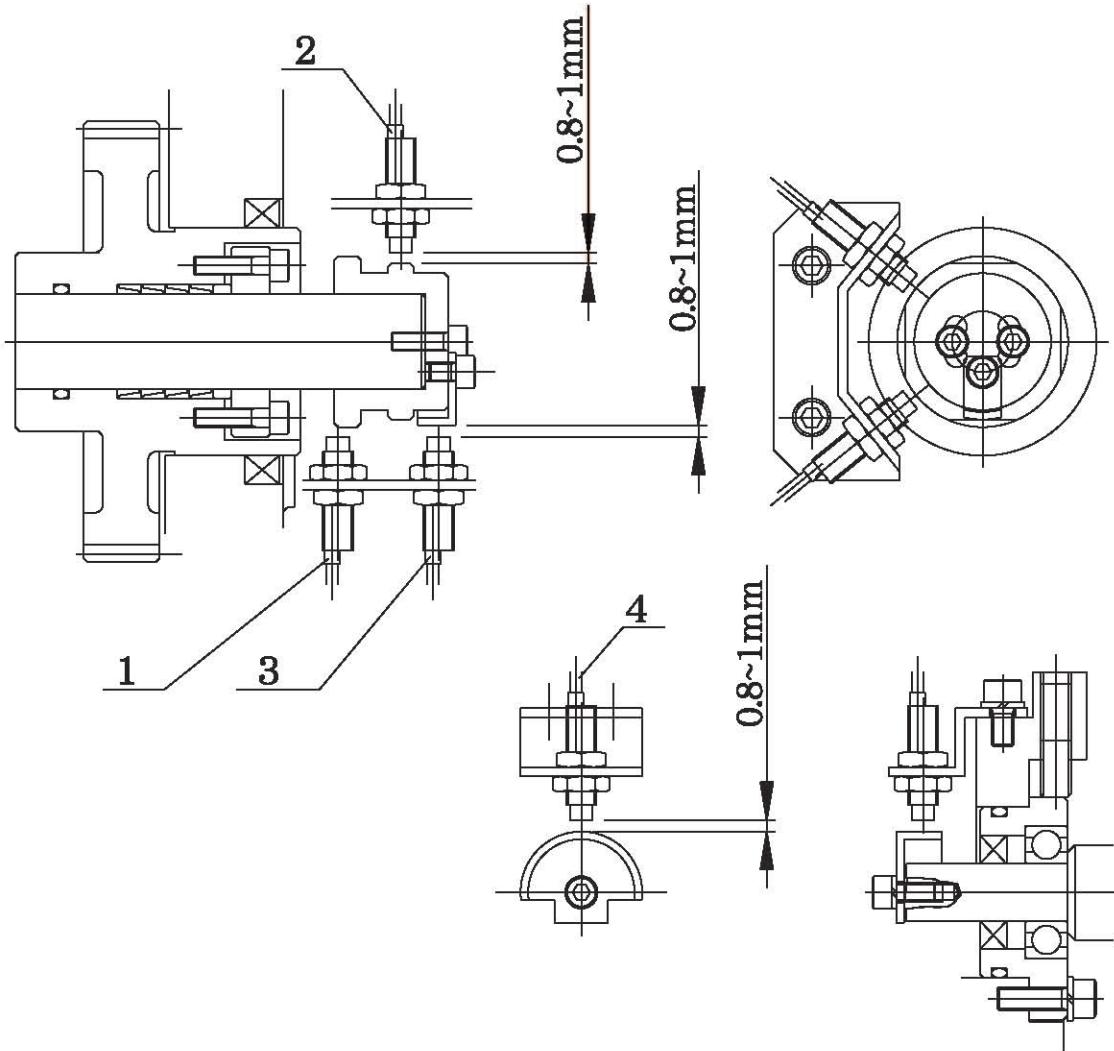


項次	內容	特性	線碼	信號
1	刀盤定位電磁閥 TURRET CLAMP SOL.	24V.DC 38W		E0V
2	刀盤推出電磁閥 TURRET UNCLAMP SOL.	24V.DC 38W		E0V
3	油壓馬達正轉電磁閥 HYDRAULIC MOTOR CW SOL.	24V.DC 38W		E0V
4	油壓馬達反轉電磁閥 HYDRAULIC MOTOR CCW SOL.	24V.DC 38W		E0V
5	刀盤推出感應器 TURRET UNCLAMP SENSOR.	24V.DC, 200mA(負載Load) 輸出Output-PNP-NO		紅red-S24V 黑black- 白white-S0V
6	刀具奇偶數感應器 TOOL COUNTER SENSOR.	24V.DC, 200mA(負載Load) 輸出Output-PNP-NO		紅red-S24V 黑black- 白white-S0V
7	刀具原點感應器 TURRET ORIGIN SENSOR.	24V.DC, 200mA(負載Load) 輸出Output-PNP-NO		紅red-S24V 黑black- 白white-S0V
8	油壓馬達壹迴轉感應器 HYDRAULIC MOTOR ONE-ROTATION SENSOR.	24V.DC, 200mA(負載Load) 輸出Output-PNP-NO		紅red-S24V 黑black- 白white-S0V



## 近接開關調整

## Adjustment of proximity switch



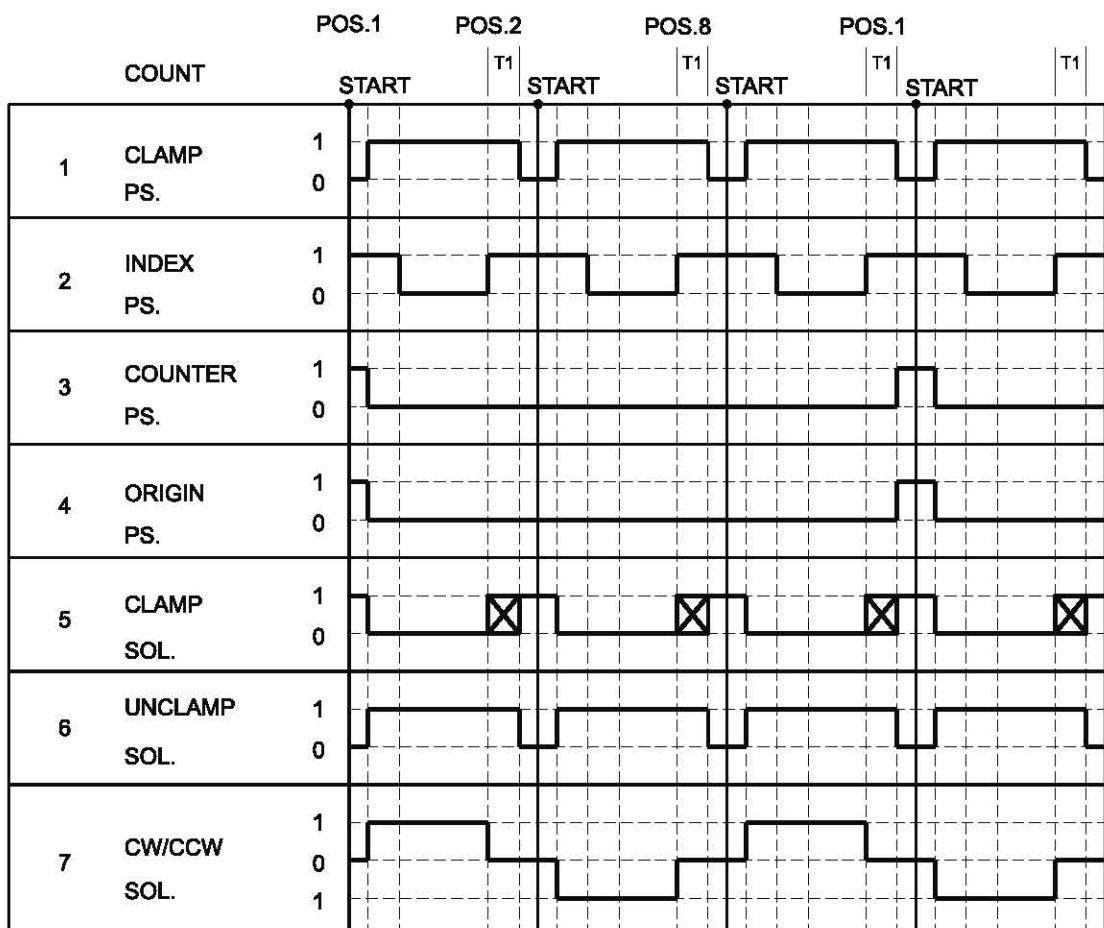
1. 刀盤推出感應器：刀盤定位時，為無感應，刀盤推出時，為有感應，其感應距離為1mm.
2. 奇偶數計數感應器：為保護亂刀用，刀號為奇數時有感應，偶數時無感應，其感應距離為1mm.
3. 刀具原點感應器：此為向PLC宣告，現為第一把刀，其感應距離為1mm.
4. 馬達一迴轉分度感應器：為計算刀號用，刀盤每換一把刀，分度感應器就感應一次。刀盤定位時，此感應器有感應，且應調在感應片中間位置，其感應距離為1mm.

1. **The tool holder disc unclamp sensor:** When the tool holder is positioned and no sensed. But the tool holder unclamp and sensed as for the sensing range is 1mm.
2. **The odd and even tool no. sensor:** For which to protect the tool change entanglement. Those will be sensed for odd no. tool and no sensed for even no. tool. The sensing range is 1mm also.
3. **Tool original sensor:** For which announced to PLC that is no.1 tool and the tool range is 1mm.
4. **Hyd. Motor turning once sensor:** For which counting tool no. I.e. the tool holder disc making tool change once and the indexing sensor will be sensed once. Further more. the sensing sheet must positioned at middle portion when the sensor be sensed and the tool range is 1mm.



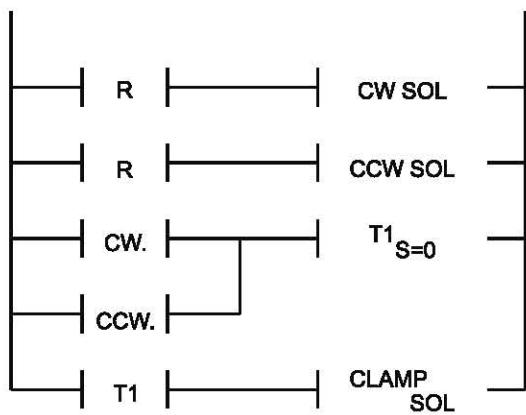
電器動作時序圖

Electric sequence diagram



T1:為定位停止位置,可設延遲動作之時間,以便調整刀盤定位時之適當位置,但通常設定為“0”。

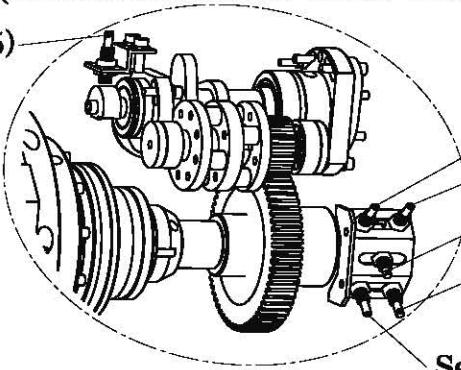
T1:For which the positioning stop site and can be setted delay action time for convenient to adjust the suitable position of tool holder disc positioning. But that is setted “0” in generally.





## 一. 絶對線路配置 (Allocate the absolute-values wire)

Sensor E (5)



Sensor C (3)

Sensor A (1)

Sensor F (6)

Sensor B (2)

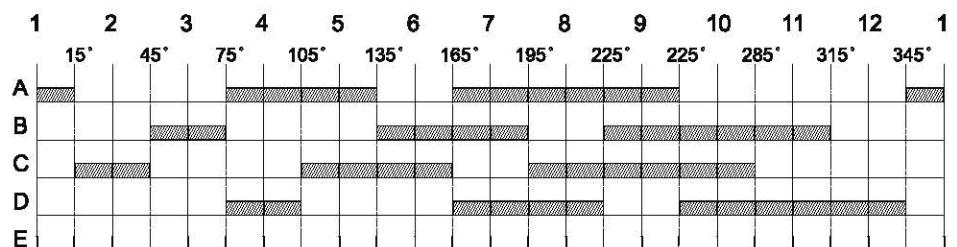
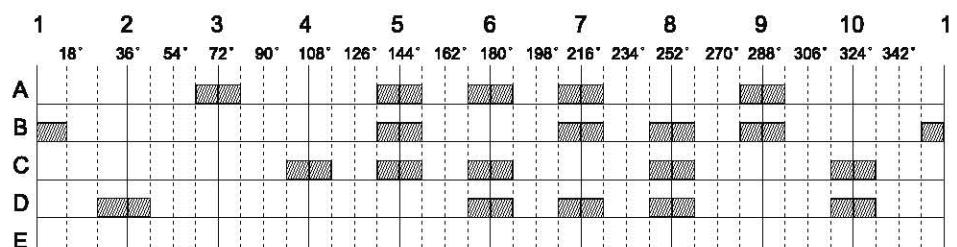
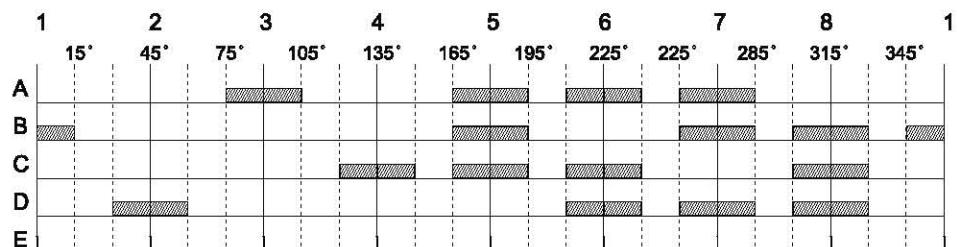
Sensor D (4)

項次 (ITEM)	內容 (CONTENT)	規格 (SPECS)		線碼信號 (SIGN FOR WIRE CODE)
Sensor A (1)	刀位檢出感測器 Sensor for checking Tool position	10-30V DC 100 mA(負載) 輸出-PNP-NO	10-30V DC 100mA(LOAD) OUT PUT-PNP-NO	24V 棕BN 24V 24V 黑BK信號(SING) 24V 藍BU 0V
Sensor B (2)	刀位檢出感測器 Sensor for checking Tool position	10-30V DC 100 mA(負載) 輸出-PNP-NO	10-30V DC 100mA(LOAD) OUT PUT-PNP-NO	24V 棕BN 24V 24V 黑BK信號(SING) 24V 藍BU 0V
Sensor C (3)	刀位檢出感測器 Sensor for checking Tool position	10-30V DC 100 mA(負載) 輸出-PNP-NO	10-30V DC 100mA(LOAD) OUT PUT-PNP-NO	24V 棕BN 24V 24V 黑BK信號(SING) 24V 藍BU 0V
Sensor D (4)	刀位檢出感測器 Sensor for checking Tool position	10-30V DC 100 mA(負載) 輸出-PNP-NO	10-30V DC 100mA(LOAD) OUT PUT-PNP-NO	24V 棕BN 24V 24V 黑BK信號(SING) 24V 藍BU 0V
Sensor E (5)	刀盤停止轉動與鎖緊感測器 Sensor for stoppig turning & Clamp tight from Tool Disk	10-30V DC 100 mA(負載) 輸出-PNP-NO	10-30V DC 100mA(LOAD) OUT PUT-PNP-NO	24V 棕BN 24V 24V 黑BK信號(SING) 24V 藍BU 0V
Sensor F (6)	刀盤鬆開/鎖緊檢出感測器 Sensor for checking Loose Off/clamp tight Tool Disk1	10-30V DC 100 mA(負載) 輸出-PNP-NO	10-30V DC 100mA(LOAD) OUT PUT-PNP-NO	24V 棕BN 24V 24V 黑BK信號(SING) 24V 藍BU 0V
Sol A	刀盤鬆開/鎖緊電磁閥 Sol valve for unclamp/ clamp tight the Tool Disk	DC24V / AC110		A B b P T a
Sol B	刀盤正/反轉電磁閥 Valve for clockwise/anticlockwise rotation of Tool Disk	DC24V / AC110		A B b P T a



## 二.位置檢出訊號圖(Signal diagram for checking position)

	1	2	3	4	5	6	7	8
CAM 1	A		○		○	○	○	
CAM 3	B	○			○		○	○
	C			○	○	○		○
	D	○				○	○	○
COUNTER	E	○	○	○	○	○	○	○





### 三.動作解說(Explain actions)

1. Sensor A,B,C,D: 只供刀位檢測，不做任何動作之啟動訊號。  
1. Sensor A,B,C,D: Only check the Tool position, do not offer any start sign for other action.
  
2. Sensor E: 每換一支刀感應一次，為刀盤停止旋轉並鎖緊之啟動訊號。  
當刀盤旋轉至所需刀位時，Sensor E一感應，即控制刀盤旋轉電磁閥斷電，使刀盤停止旋轉，並啟動刀盤鎖緊之電磁閥，以確保刀盤鎖緊。  
2. Sensor E: Induct one time for every tool Change action, it's a start sign for stopping turning & clamping of Tool Disk. When the tool disc turn to the right position, once Sensor E induct, it will control disk to turn then cut the power of solenoid valve to stop the disk turning , and start sol. for clamping disk, to ensure the disk is clamping tight.
  
3. 鬆開鎖緊之確認訊號。Sensor沒有感應時，即刀盤已鬆開脫離，此時才可啟動刀盤旋轉。  
Sensor感應時，即刀盤已鎖緊，此時即完成換刀動作。  
3. Loose the confirm sign for clamping tight. If sensor is no induct, means the disk already loose away, it is the right time to start the disk turning. When the Sensor induct, the disk already clamp tight, that means the tool change action was finished.
  
4. Sol A (雙頭保持型電磁閥): 控制刀盤鬆開鎖緊。  
4. Sol A (Twin-head sol with 4 holes & 2 positions): Control loose & clamp on disk.
  
5. Sol B (雙頭電磁閥) : 控制刀盤正反轉。  
5. Sol B (Twin-head sol): Control clockwise/anticlockwise rotation of disk.

P.S: 程式設計時，應先記憶每一刀位之訊號組合，以供選刀之判斷。

P.S: When design the program, should memory the sign assembling for each tool position, in order to judge the choice of tools.



#### 四.動作順序(Order of action)

[例: 由1號刀換至4號刀]

[e.g.: From No. 1 tool change to No. 4 tool]

步驟1→ Sol A通電(刀盤鬆開)

Step 1→ Sol A power on (disk loose)

步驟2→ 確認 Sensor F沒有感應，Sol B通電，油壓馬達旋轉。

Step 2→ Confirm Sensor F have no induct, Sol B power on and hydraulic motor turning.

步驟3→ 開始檢測刀位訊號(注意: Sensor E於1,2,3號刀位時均會感應，但未到達4號刀位時，不做鎖緊之動作)，當3號刀位之訊號確認時，應設定Sensor E預備動作，使刀盤轉至4號刀位時，Sensor E一感應，即控制Sol B斷電，刀盤停止旋轉同時控制Sol A使刀盤鎖緊。

Step 3→ Start to check the sign of tool position (note: Sensor E will induct on No. 1,2,3 tool positions; but it will not act the clamping action before arrived No. 4 tool position ), when No. 3 tool positions' sign make sure, should set Sensor E for preparing, to make the tool turn to No. 4 tool position, once Sinsor E induct, will control Sol B with power off, disk stop turning and control Sol A to make disk clamp tight at the same time.

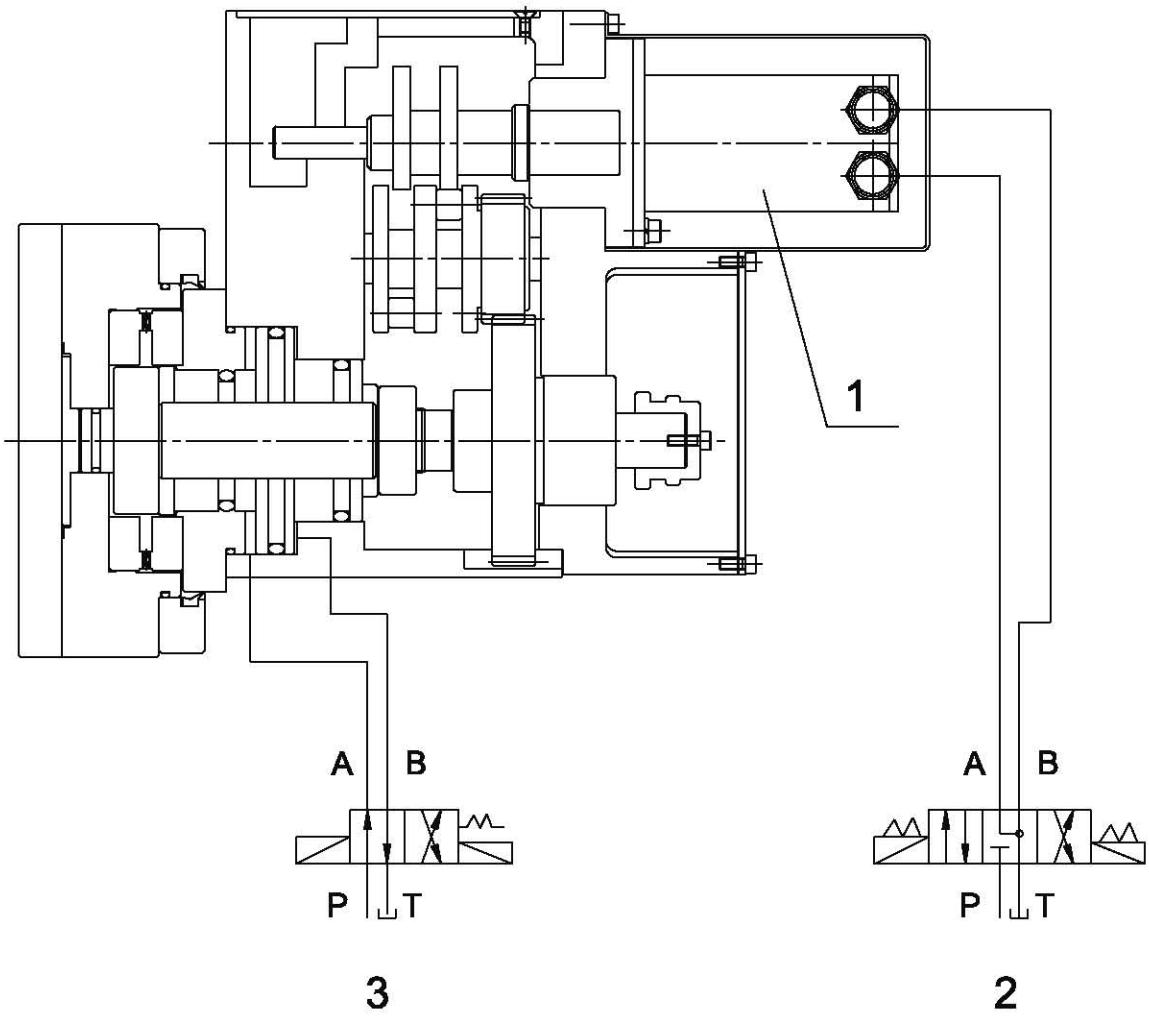
步驟4→ Sensor F 感應即完成換刀動作。

Step 4→ Sensor F induct then tool change action is finished.



## 油壓系統

## Hydraulic system

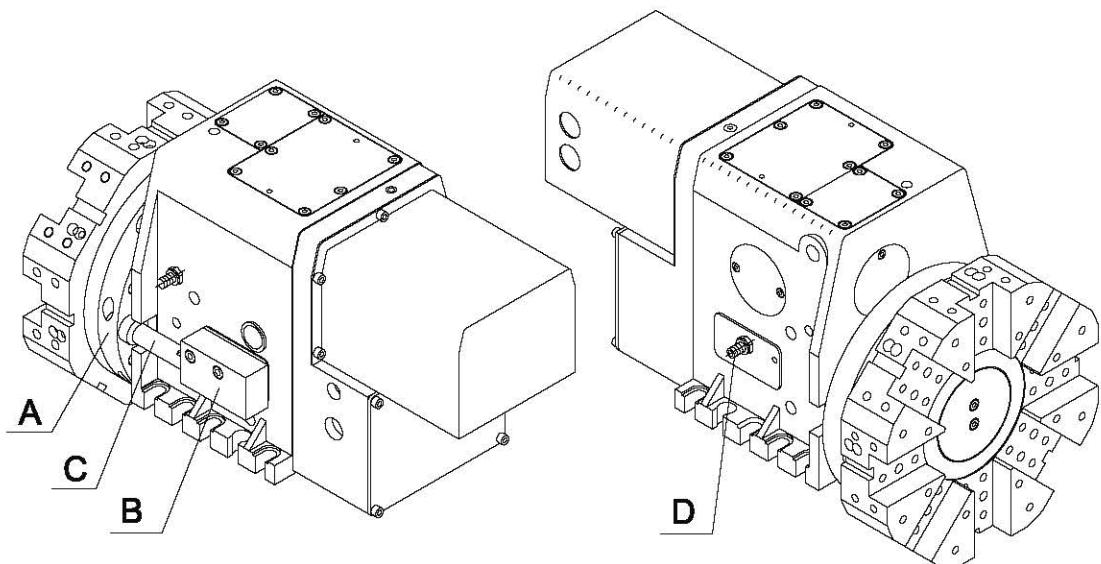


編號 NO.	名稱 Name	LS-120	LS-160	LS-240	LS-240A	備註 Remarks
1.	油壓馬達 Hyd. motor.	OMM 50	OMM 50	OMP80/100	OMP80/100	DANFOSS
2.	油壓馬達電磁閥 Hyd. motor valve	DSG-01-3C4-A110/D24	DSG-01-3C4-A110/D24	DSG-01-3C4-A110/D24	DSG-01-3C4-A110/D24	中間位置A,B,T連通 Middle site and A.B.T. go through
3.	刀盤定位電磁閥 Tool clamp value	DSG-01-3C2-A110/D24	DSG-01-3C2-A110/D24	DSG-01-3C2-A110/D24	DSG-01-3C2-A110/D24	中間位置全封閉 Middle site and enclosed
	流量 Flow volume	12 L/min	12 L/min	40 L/min	40 L/min	
	油壓工作壓力 Hydraulics working pressure	30 Kg/cm²	30 Kg/cm²	35 Kg/cm²	35 Kg/cm²	



切削液供給

Coolant supply



### 切削液

- ◆ 切削液由刀塔側邊的管接頭D,(左右各一)進入切削水座B.
- ◆ 經刀盤封環A,以P10 "O"形環密封,再進入刀盤.
- ◆ 當刀盤往外推出時,切削水座內之機構,可自動將切削水阻隔,不須於每次換刀時,另以電控開關冷卻泵.

#### ◆ 切削液管路保養 :

- 1.拆下管接頭及切削水座之固定螺栓,即可取下切削水座.
- 2.拆下M5之定向螺絲,即可取出切削水管頭C.
- 3.進行檢視"O"型環之外觀及彈簧,若有變形或損傷,即須更新
- .

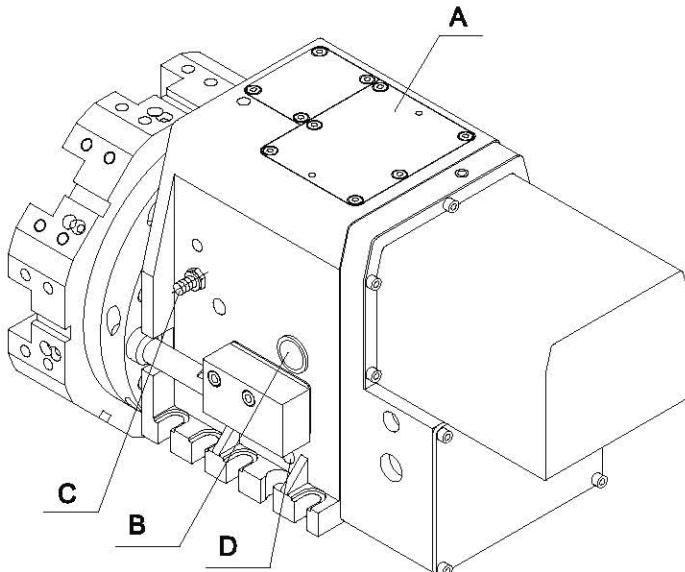
### Coolant Cutting Fluid

- ◆ The coolant cutting fluid is connected on the two side of turret and those from pipe fitting (D) into cutting fluid post(B).
- ◆ And from tool holder disc(A) O ring with P10 into tool holder disc.
- ◆ During the tool holder disc turning outer, thus, the cutting fluid post will be clogged the cutting fluid automatically. So that, those will not controlled by coolant switch or electric switch etc. during processing tool change every time.
- ◆ The maintenance of coolant cutting fluid system :
  1. To take out the pipe fitting and cutting fluid post locking screw for then, the cutting fluid post will be removed.
  2. To take out the M5 screw, for then, the cutting fluid pipe will be removed.
  3. To inspect the O ring profile and spring. If those are deformed or damaged and must be replaced.



## 潤滑系統

## Lubrication system



## ◆齒輪箱潤滑:

- 1.刀塔內部為浸油式潤滑,可降低傳動齒輪及共軛凸輪與滾子之磨耗,並具有降低溫度、噪音與潤滑軸承之效用,可確保整組刀塔機構之壽命。
- 2.刀塔齒輪油,請使用ISO VG220或同等級規格之潤滑油,其最大使用時數,約為4000小時。
- 3.根據刀塔使用狀況,更換潤滑油,潤滑油之油量,可由油鏡(B)得知,當潤滑油量不足,或欲更換潤滑油時,可由加油孔(A)注入潤滑油,當要更換新潤滑油,可由洩油孔(D)排出舊潤滑油。

## ◆曲齒離合器潤滑:

- 1.採強制潤滑方式潤滑,由接頭(C)進入。
- 2.潤滑油由本體進入,經離合器連接板,潤滑曲齒離合器。
- 3.排出為經離合器連接板,進入本體,由本體底部排出。

## ◆The lubrication of gear box:

1. The inner of turret for which lubricated by oil bath lubricating and can be reduced the wastage for transmitting gear, coaxial cam and roller bearings. especially those can be reduced temp noise etc. and lubricating the bearings. Since, those can be assured the complete turret mechanism servicing life.
2. The lubricant of turret please employed ISO VG220 or same grade lubricant and the max. duty cycle time is about 4000 hrs.
3. According to the employment of turret to replace the lubricant. As for the lubricant volume can be viewed from the oil indicating windows (B). During the lubricant is shorted or want replace new lubricant which can be poured from oil inlet (A) and discharged old lubricant from oil outlet (D)

## ◆The lubrication of gear coupling disc:

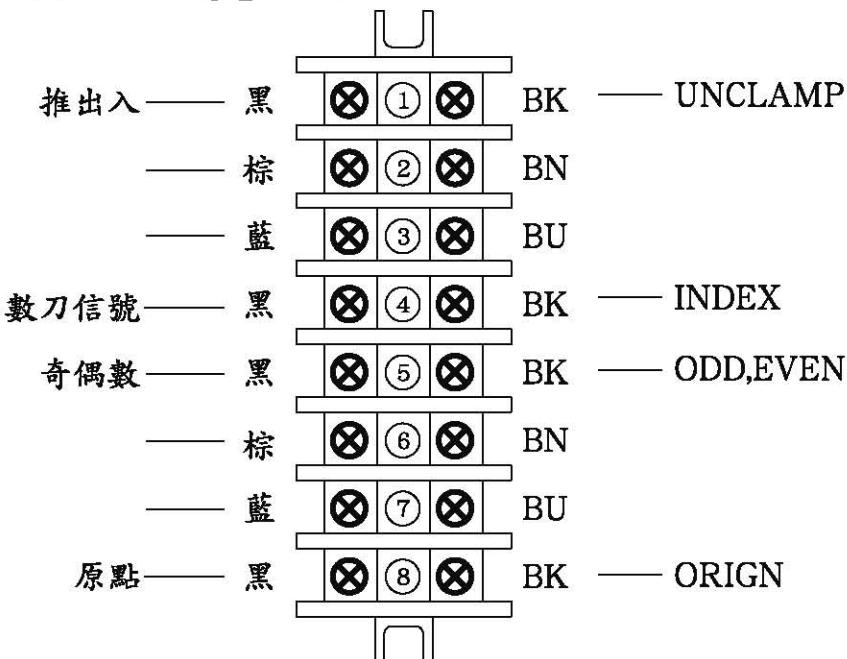
1. The lubricant is adopted the forced lubricating and drained from oil plug(C).
2. The lubricant is get into main body and pass through the dog plate to lubricate the geared coupling disc.
3. The discharge for which pass through the dog plate into the main body and drained out from the bottom of main body.



## 接線圖

## Wiring Plan

## (一) 接線圖 (Wiring plan)

(二) 絶對式近接開關接線圖  
(Wiring for absolute type sensor)