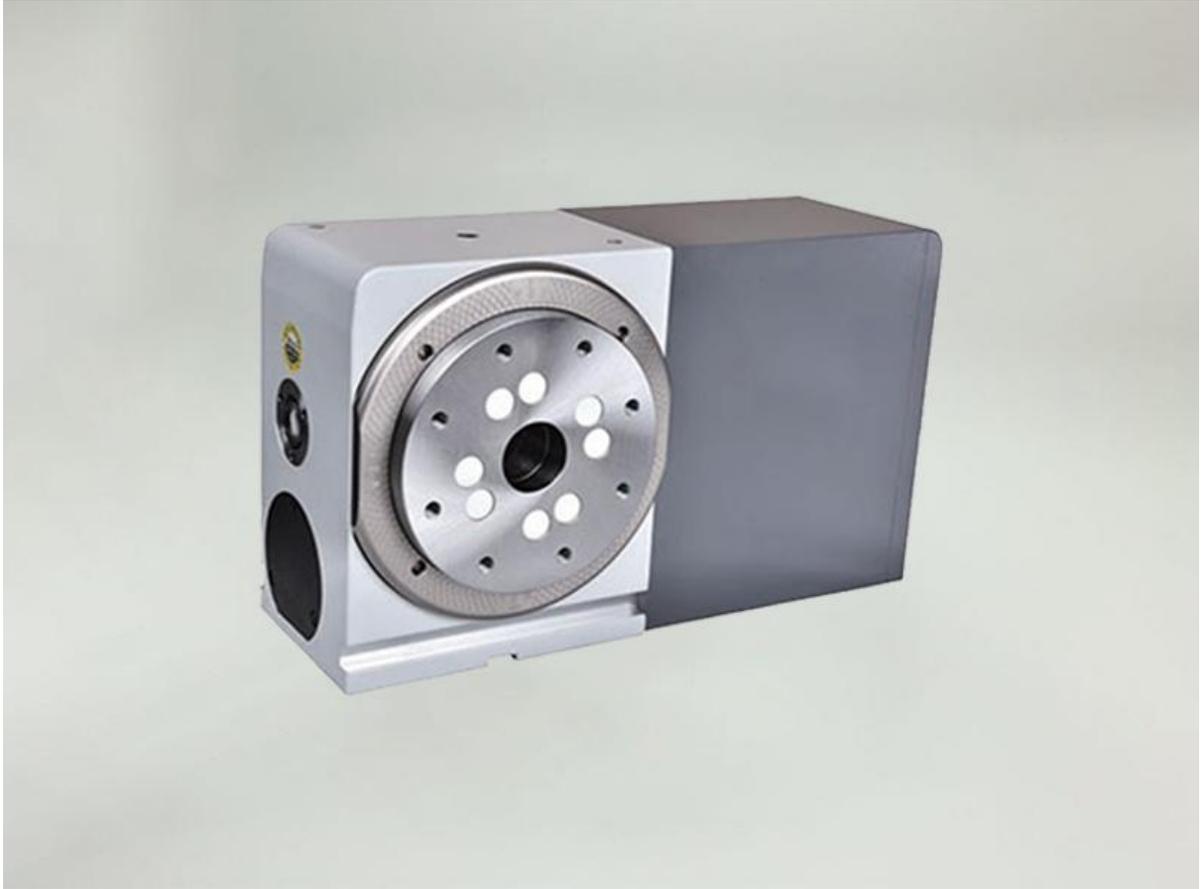


# SILVERCNC ROTARY TABLE

## USER MANUAL



Product Configuration

Operation Instructions

Warranty Policy

Inspection record

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# 1. Brief Introduction

Thank you for purchasing SILVER-C series NC rotary table. This user manual illustrates rotary table operation steps as well as safety precautions. Please read this user manual carefully before installation.

Please keep this manual well by you for future reference.

## 2. Safety Instructions

### 2-1. Before Use

- This user manual explains the operation method of SILVER-C series.
- The product shall be operated by a person with appropriate technical qualifications
- Read this instruction carefully before use and fully understand this instruction
- Contact our technical team when thorough product maintenance and repair are carried on.
- This manual shall be delivery the final user of this product.

### 2-2 Safety Considerations

In order to make users use the product safely and correctly and prevent personal injury or property loss to customers and others, please fully understand the following precautions before using the product.

 <b>Warning</b>	Indicates that if the sign is ignored, the operation may cause death or serious injury and other unexpected contents.
 <b>Attention</b>	Indicates that if this sign is ignored, it may cause personal injury or property loss and other unexpected contents.

Even items marked with "attention" can have serious consequences in some cases. The notes are important, so be sure to follow them.



## Warning

- Do not touch the moving parts when the product is running. Otherwise it could lead to injury.
- Handling, installation, operation, maintenance and inspection shall be carried out by personnel with professional knowledge. Otherwise, it may cause fall, injury, device damage, etc.
- Do not modify this product without permission. Unauthorized modification may cause product damage and may cause accidents during operation.
- When abnormal sound occurs during the use of this product, the work piece or fixture becomes loose and falls off, please stop the operation immediately.
- When operating the product, please be sure to comply with the specifications and conditions specified in the user's manual.



## Attention

- Please make sure the product is consistent with the specifications you ordered before use. If the product is assembled with different specifications, it may cause injury or damage to the device.
- Do not remove the nameplate.
- If abnormal sound or vibration occurs during operation and normal performance cannot be performed, please stop operation immediately for inspection or contact us.
- If the operation output is limited by interference, the motor will be overloaded, which may lead to abnormal temperature rise or even burning loss. Stop immediately if the startup operation is not started.
- When the product is placed on the operating platform for operation, please use the operating platform that allows larger loading weight than the product and ensures sufficient operating space.
- Please wear leather gloves, safety shoes and helmets to avoid hand clamps and injuries when changing the fixture.
- Even if it is been shut down due to power failure, the operator must cut off the leakage switch. Otherwise after the power supply is restored, the power source switch is switched on and may cause personal accident.
- Do not disassemble this product. Our company has made precise adjustment to the product, and random disassembly will lead to the damage of the device.
- Apply LOCTITE 242 or its equivalent to the fastening bolts on the body and output parts, and use torque wrench to tighten at the specified torque. If not tight enough, the operation may lead to loose bolts, parts off, device damage and injury.

### 3. Parameters

#### C120/C160/C170

Item		Unit	C120	C160	C170	Remark
Table Diameter		mm	120	160	170	
Center Height		mm	110	135	150	
Center Bore		mm	Φ30H7	Φ40H7	Φ40H7	
Servo Motor	FANUC	α	αi2S	αi4S	αi4S	Contact us for other motor brands
		β	βi4S	βi4S	βi4S	
	MITSUBISHI		HG105S-A48	HG105S-A48	HG105S-A48	
	YASKAWA		SGM7J-08A	SGM7J-08A	SGM7J-08A	
SIEMENS				1FK7042	1FK7042	
Gear Ratio			1/32	1/32(40)	1/60	
Maximum Speed (Motor rpm: 3000)		r/min	90	90	50	
Indexing Accuracy		arc.sec	±40	±20	±20	
Repeatability		arc.sec	±4	±4	±4	
Allowable load	Vertical	kg	25	50	70	
	Horizontal	kg	-	-	145	
Allowable torque	Horizontal	N.m	7149	8963	10422	
	Continuous holding torque	N.m	109	132	180	
	Continuous holding torque	N.m	150	185	235	
	Allowable bending moment	N.m	201	265	489	
Allowable work inertia		kg.m <sup>2</sup>	0.38	0.45	0.65	
Brake system					Hydraulic	
Locking torque (hydraulic 6Mpa)		N.m	-	-	210	
Net. Weight		kg	30	40	65	

## C200/C250L/C250H

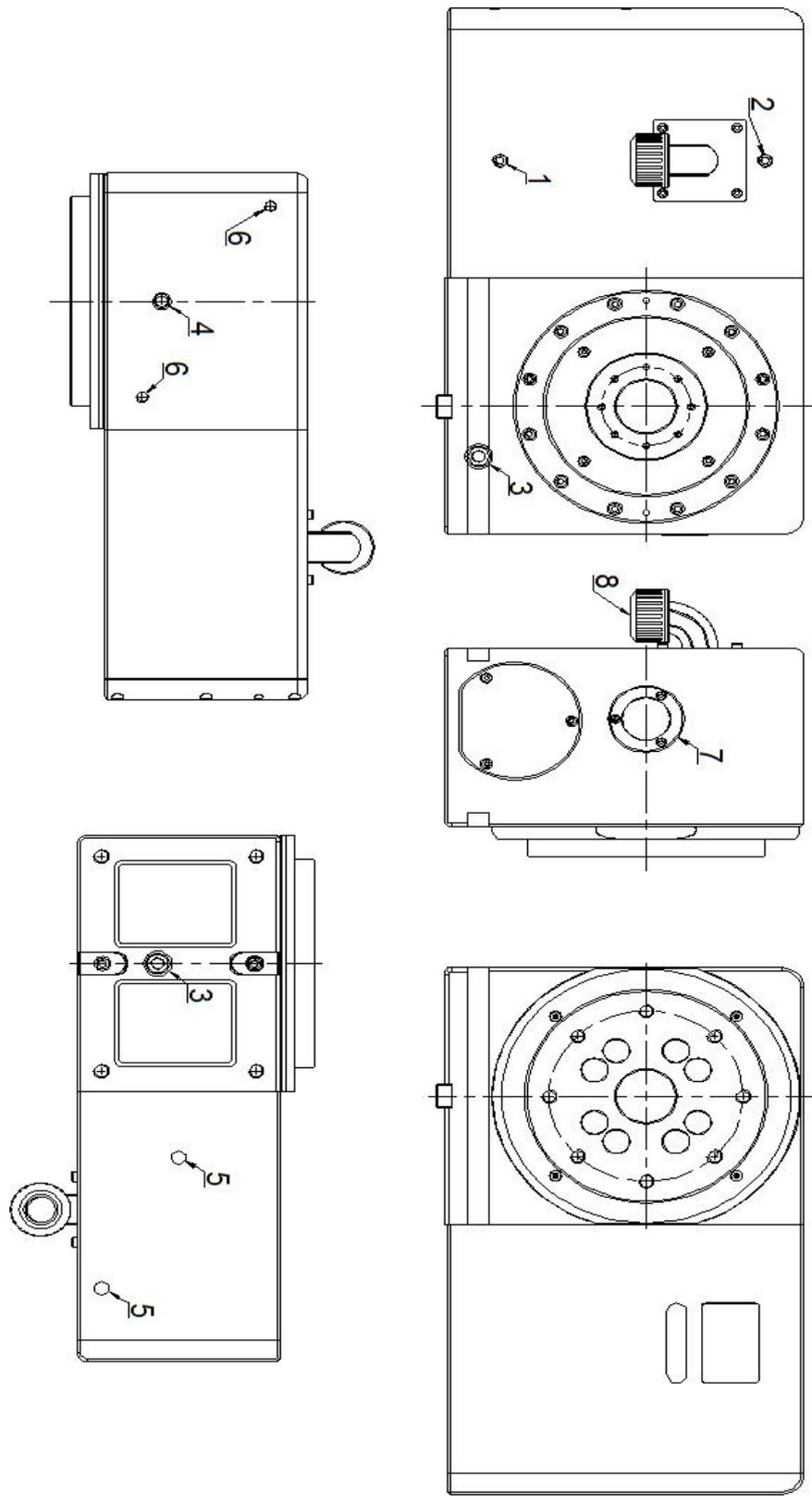
Item		Unit	C200	C250L	C250H	Remark
Table Diameter		mm	200	250	250	
Center Height		mm	160	160	190	
Center Bore		mm	Φ75H7	Φ75H7	Φ75H7	
Servo Motor	FANUC	α	αi8S	αi8S	αi12S	Contact us for other motor brands
		β	βi8S	βi8S	βi12S	
	MITSUBISHI	HG104S-A48	HG104S-A48	HG154S-A48		
	YASKAWA	SGM7G-09A	SGM7G-09A	SGM7G -20A		
SIEMENS			1FK7063	1FK7063	1FK7063	
Gear Ratio			1/60	1/60	1/60	
Maximum Speed (Motor rpm: 3000)		r/min	50	50	50	
Indexing Accuracy		arc.sec	±20	±20	±20	
Repeatability		arc.sec	±4	±4	±4	
Allowable load	Vertical	kg	90	90	130	
	Horizontal	kg	180	180	260	
Allowable torque	Horizontal	N.m	12918	12918	27800	
	Continuous holding torque	N.m	257	257	475	
	Continuous holding torque	N.m	471	471	900	
	Allowable bending moment	N.m	775	775	1450	
Allowable work inertia		kg.m <sup>2</sup>	1.0	1.0	2.6	
Brake system			Hydraulic	Hydraulic	Hydraulic	
Locking torque (hydraulic 6Mpa)		N.m	340	360	600	
Net. Weight		kg	85	93	105	

## C315/C400

Item		Unit	C315	C400	Remark
Table Diameter		mm	315	400	
Center Height		mm	225	265	
Center Bore		mm	Φ105H7	Φ150H7	
Servo Motor	FANUC	α	αi22S	αi22S	Contact us for other motor brands
		β	βi22S	βi22S	
	MITSUBISHI		HG204S-A48	HG204S-A48	
	YASKAWA		SGM7G-30A	SGM7G-30A	
	SIEMENS		1FK7083	1FK7083	
Gear Ratio		Gear Ratio	1/60	1/60	
Maximum Speed (Motor rpm: 3000)		Maximum Speed (Motor rpm: 3000)	50	50	
Indexing Accuracy		Indexing Accuracy	±20	±15	
Repeatability		Repeatability	±4	±4	
Allowable load	Vertical	kg	165	230	
	Horizontal	kg	330	460	
Allowable torque	Horizontal	N.m	31572	44200	
	Continuous holding torque	N.m	690	897	
	Continuous holding torque	N.m	1332	1720	
	Allowable bending moment	N.m	3195	4150	
Allowable work inertia		Allowable work inertia	5.2	9.2	
Brake system				hydraulic	
Locking torque (hydraulic 6Mpa)		Locking torque (hydraulic 6Mpa)	1080	2360	
Net. Weight		Net. Weight	225	335	

# 4. Drawings

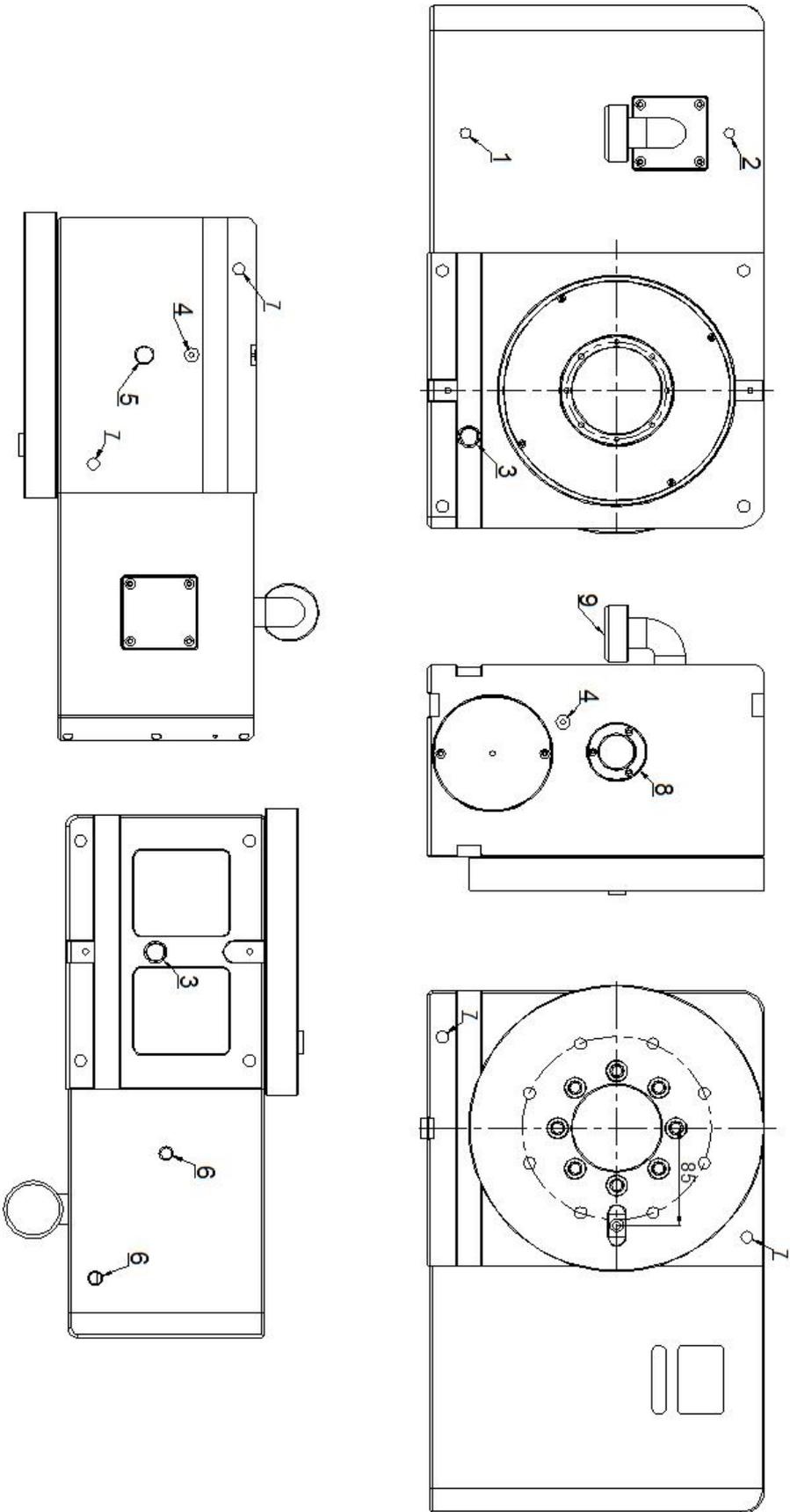
## C120/C160/C170



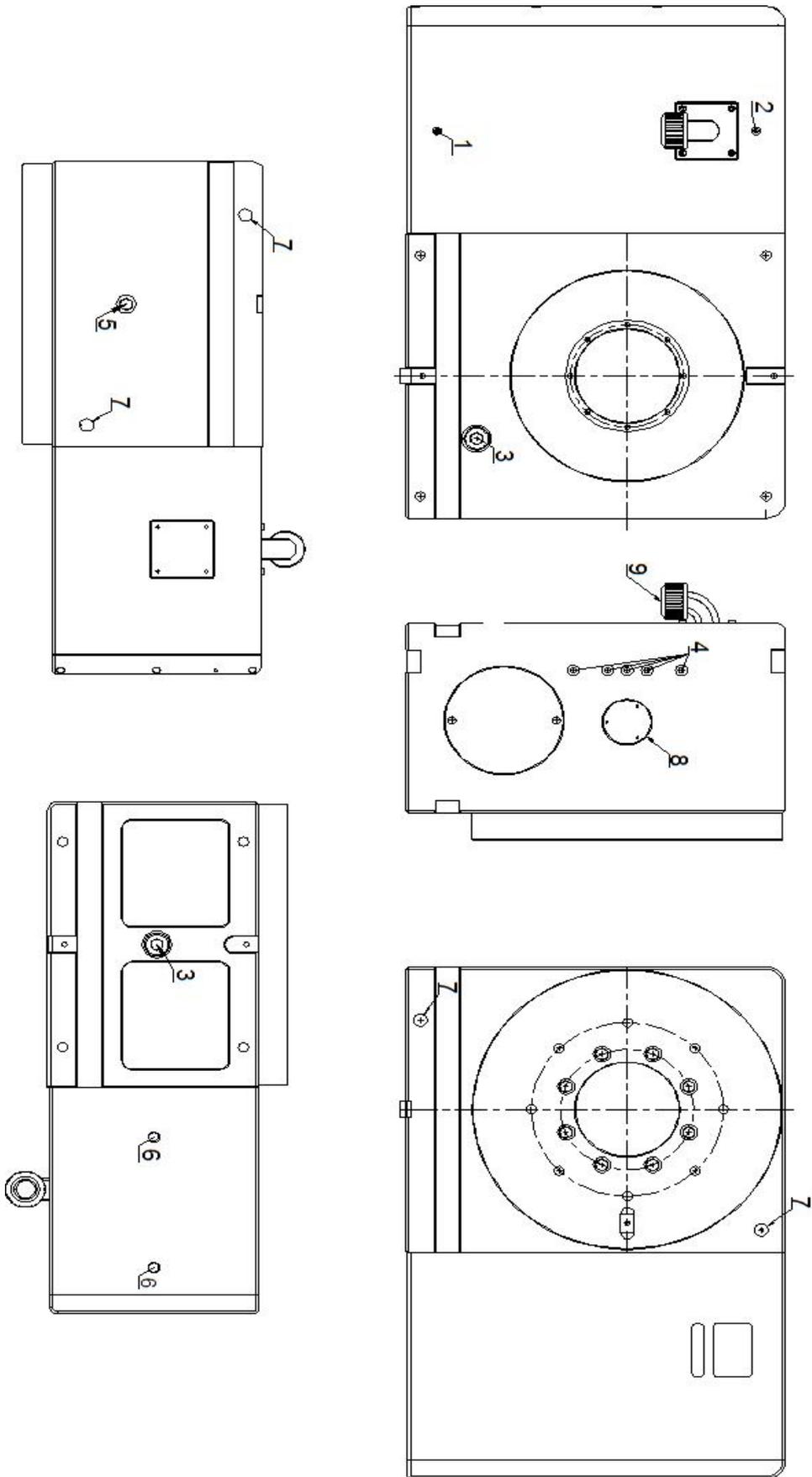
- 1.排气孔 Exhaust vent
- 2.正压投入口 Air feed port
- 3.排油孔 Oil of outlet
- 4.进油口 Oil of inlet

- 5.排水口 Drain hole
- 6.吊环孔 Suspension Loop Hole
- 7.油镜 Oil Mirror
- 8.动力源 Power

**C200/C250L/C250H**



- 1.排气孔 Exhaust vent
- 2.正压投入口 Air feed port
- 3.排油孔 Oil of outlet
- 4.刹车液压口 Brake hydraulic port
- 5.进油口 Oil of inlet
- 6.排水口 Drain hole
- 7.吊环孔 Suspension Loop Hole
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- 6.排水口 Drain hole
- 7.吊环孔 Suspension Loop Hole
- 8.油镜 Oil Mirror
- 9.动力源 Power

# 5. Lubrication

## 5-1 Notes for lubricating oil

Lubricating oil plays an extremely important role in reducing wear, removing heat of friction and preventing rust. Therefore, poor lubrication may lead to short service life and abnormal heat. Please replace and replenish lubricating oil regularly according to the following requirements.

### **Recommended Lubricating Oil: Mobil SHC629**

1. Check oil mirrors regularly

Whether the amount of oil is enough, if not, please add a moderate amount of oil.

2. Lubricating oil replacement

The lubricating oil must be replaced at least once a year. When the lubricating oil deteriorates, please replace it immediately.

## 5-2 Lubricating oil replacement method

1. Clean the oil filling port, oil discharging port and the surrounding area of oil mirror, remove chips and impurities, etc. When refueling, if foreign substances such as impurities are mixed into the lubricating oil, it will lead to product malfunction.
2. Remove the drain hole screw to drain the oil.
3. When discharging lubricating oil, if you open the refueling port at the same time, you can discharge oil faster.
4. Make sure the oil is completely drained.

Remove the chip of sealing tape attached to the filler port.

Wind the sealing tape to the oil drain plug and put the oil drain port on the plug.

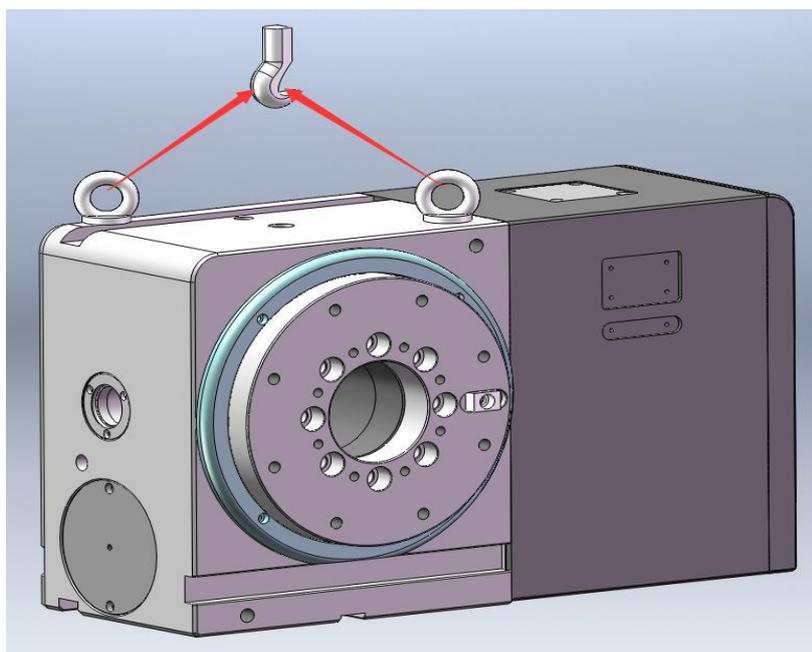
5. Make sure that the drain hole is closed or tightly plugged before the lubricating oil oiling operation. When lubricating oil is added, it is advisable to control the oil plane at the upper limit of the center point of the oil mirror.
6. Check if there is any leakage of lubricating oil, wipe off the oil spilled on and around the device surface.

 **Attention**

- It is forbidden to use non-designated lubricating oil to avoid shortening service life and aging parts.
- Do not replace or add lubricating oil right after the machine running.
- The product may handle high temperature conditions in working that may cause burns if you touch the product or oil. In addition, please note that the internal lubricating oil temperature is higher than the surface temperature of the product. The lubricating oil may leak or and splash。
- When the lubricating oil level does not reach the center of the oil mirror, be sure to add lubricating oil.
- When the used lubricating oil discharged from this product is discarded, please dispose according to local environmental law.
- Under the condition of opening oil discharge port and refueling port, air purging is strictly prohibited. Otherwise, sand, dust will enter into the product internal and lead to failure.
- Please wear gloves and use brushes and other tools to remove chips attached to this product. Do not remove crumbs empty-handed.

## 6. Rotary Table Lifting Operation

- The rotary table should be taken carefully in the lifting operation. Thread the ring bolt and maintain balance of the rotary table while lifting.
- Please choose the lifting appliance in line with the rotary table size and weight for lifting operation.

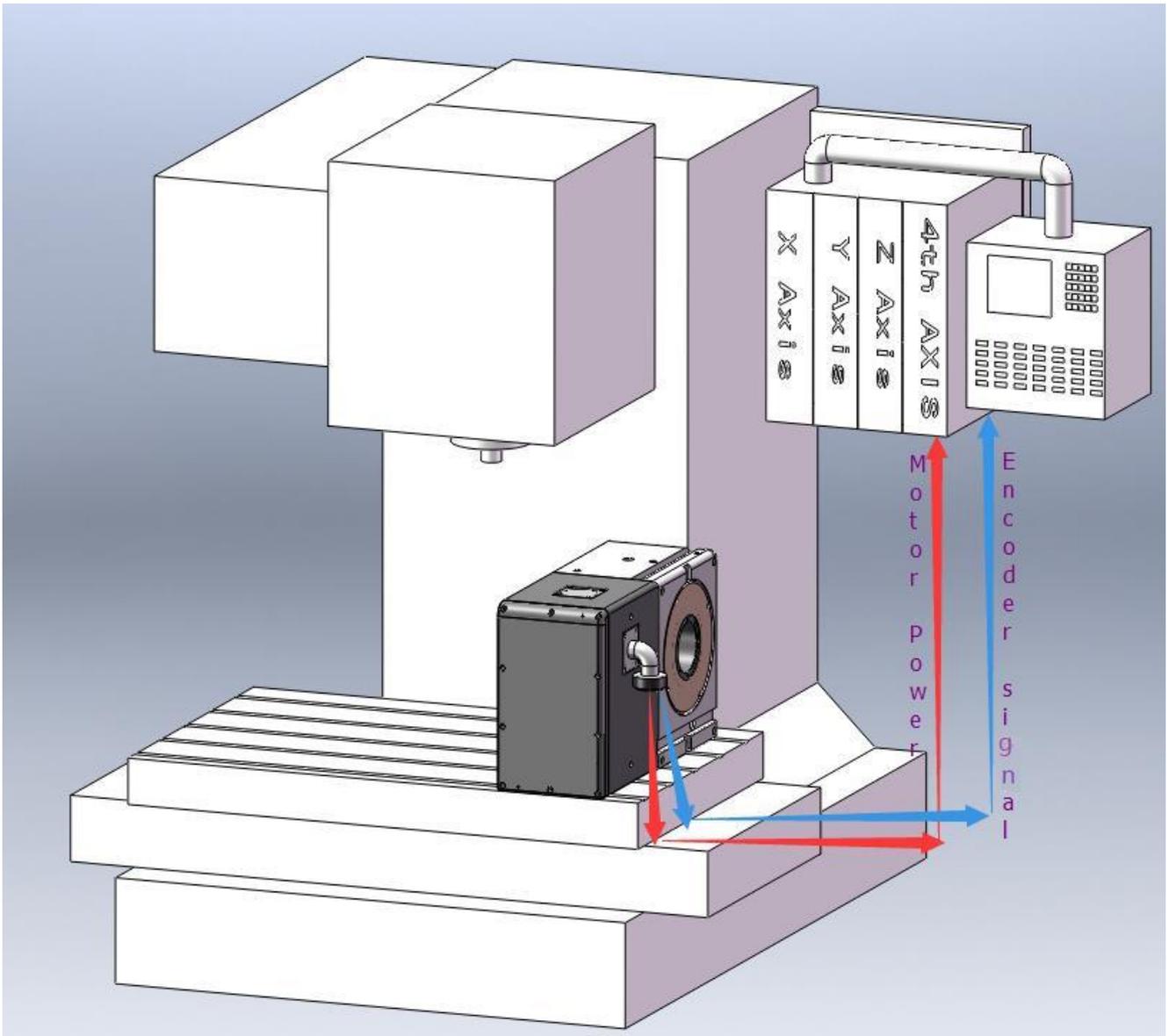


**Unarmed handling is prohibited**



**Don't apply load on motor box**

# 7. Electric Scheme of Rotary Table and Machine tool



## 8. Preparation for Test Run

Please prepare for the rotary table test run following below steps:

### 1. Preparation

- a. Remove the package, move the rotary table to the proper machine tool.
- b. Finish the cleaning and lubrication process.
- c. Test run and accuracy inspection.
- d. Define the system parameters on machine tool.

### 2. Test run

- a. Make sure that the faceplate of the rotary table and the worktables of the machine tool are clean.
- b. Make sure the rotary table is under no-load condition.
- c. Repeat the LOCK-LOOSE brake test (only applicable to rotary tables with hydraulic brake function).
- d. When test the speed of forward and reverse direction, the rotary table must be accelerated gradually.
- e. Perform the mechanical origin reset test (only applicable to rotary tables with zero-position sensor)

\* When a release/lock signal is detected, delay time of 500msec is strongly recommended to ensure that the rotary table is fully relaxed or locked before executing the next command. Avoid damaging parts or causing servo overload.

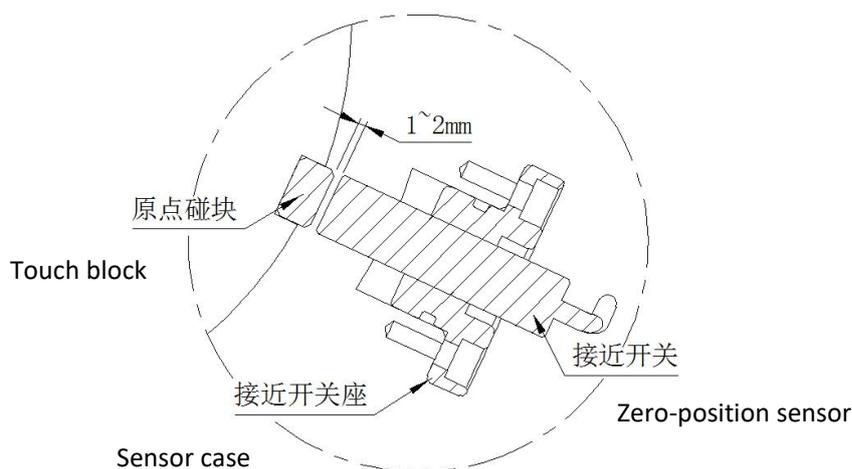
\*Don't start processing before above test run are done. Otherwise the inner structure of the rotary table would get damaged.

## 9. Zero-position adjustment

Our rotary table has zero-position sensor (proximity switch) built inside:

**9-1. when the proximity switch does not work, it may be caused by the following reasons:**

1. The zero-position sensor is damaged.
2. The wirings get loose or are shorted.
3. The distance between the sensor and the touch block is too far. (Remove the sensor case, release nut to adjust proximity switch distance to 1.0mm~2.0mm)



**9-2. Reset Function Illustration:**

1. When the Reset signal is received, the rotary table will rotate in the specified positive direction.
2. When the touch block approach the sensor, the rotary table will slow down and stop at the exact point as defined.
3. When the reference signal of the motor's side expander is received, the rotary table stops rotating.

4. Please repeat the reset rotation test several times, measure the error between the actual and defined stopping position, and set compensation from the machine tool NC control system.

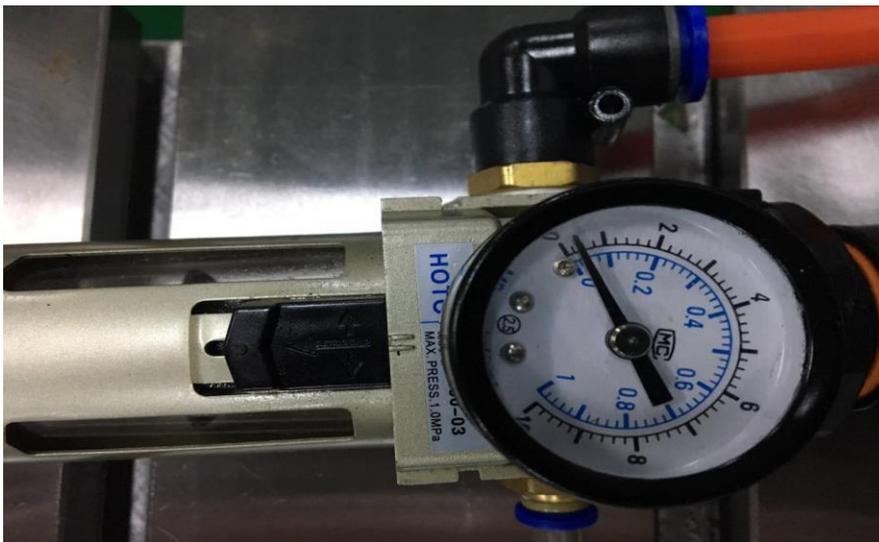
## 10. Drying gas pipeline

Our rotary table has the drying gas interface, in order to prevent the influence of the operating environment on the motor parts (prevent condensation, rust caused by mixing of cutting fluid and damage of electrical equipment).

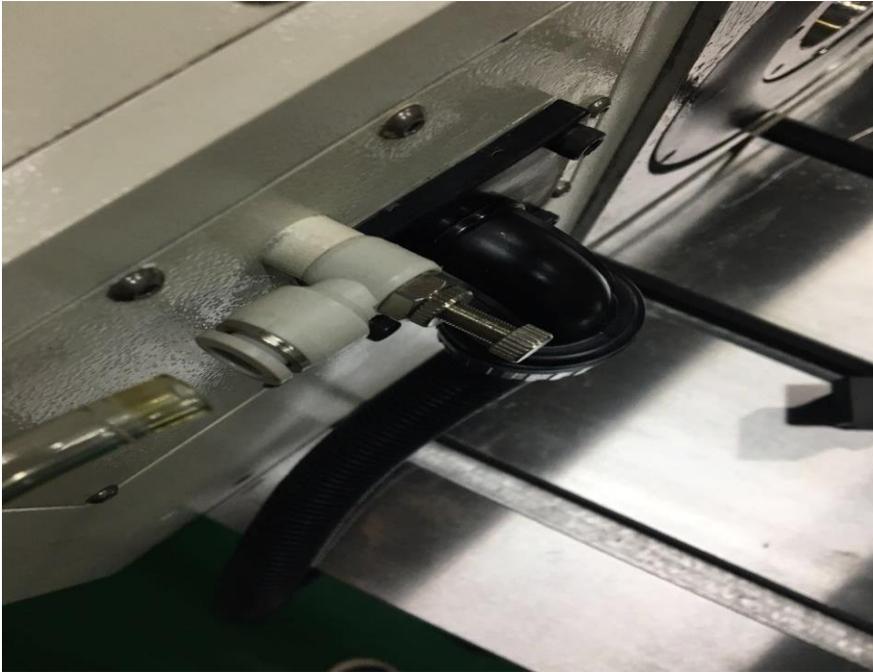
The following are steps of how to connect the drying gas pipeline. Please do prepare clean gas for use.

**Gas pressure: 0.03MPa**

1. Connect the inlet end of regulating air valve to the air pipe and adjust the value to 0.03MPa,



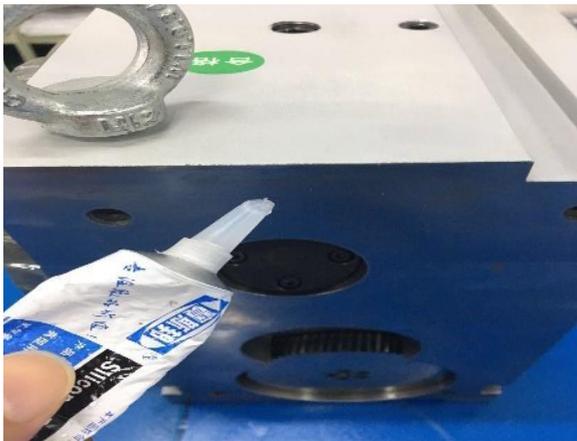
2. Connect the inlet end of regulating air valve to the interface of rotary table :



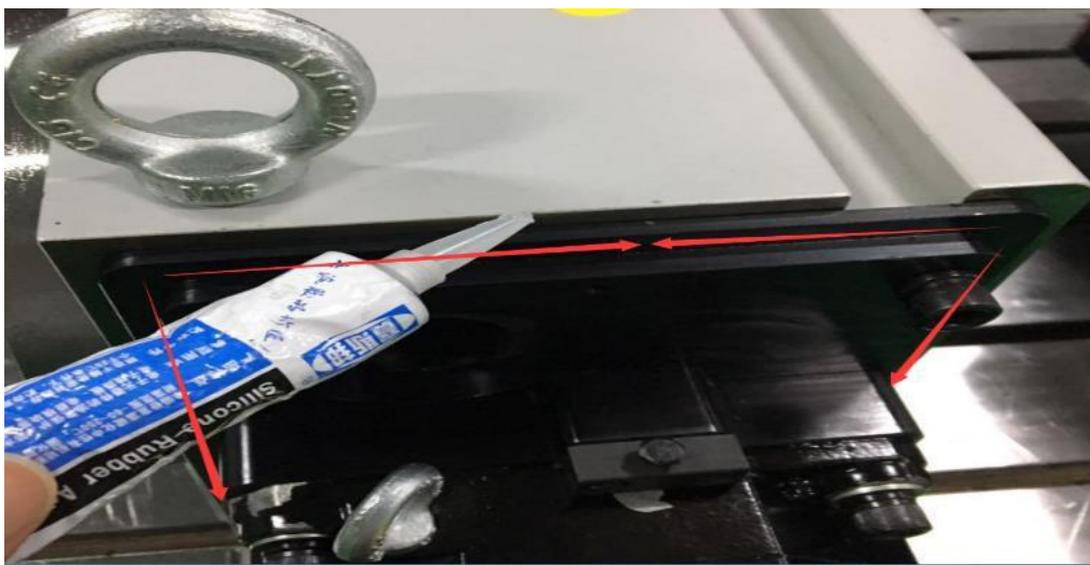
# 11. Sealing Operation

In installation, test run, repair and maintenance operations, sealing must be done carefully following below 4 steps.

1. Evenly apply waterproof sealant such as “silicone rubber E6000” on the contact surface between the rotary table body and the motor connecting plate.



2. After the servo motor installation completed, evenly apply waterproof sealant to the edges of the connecting plate:



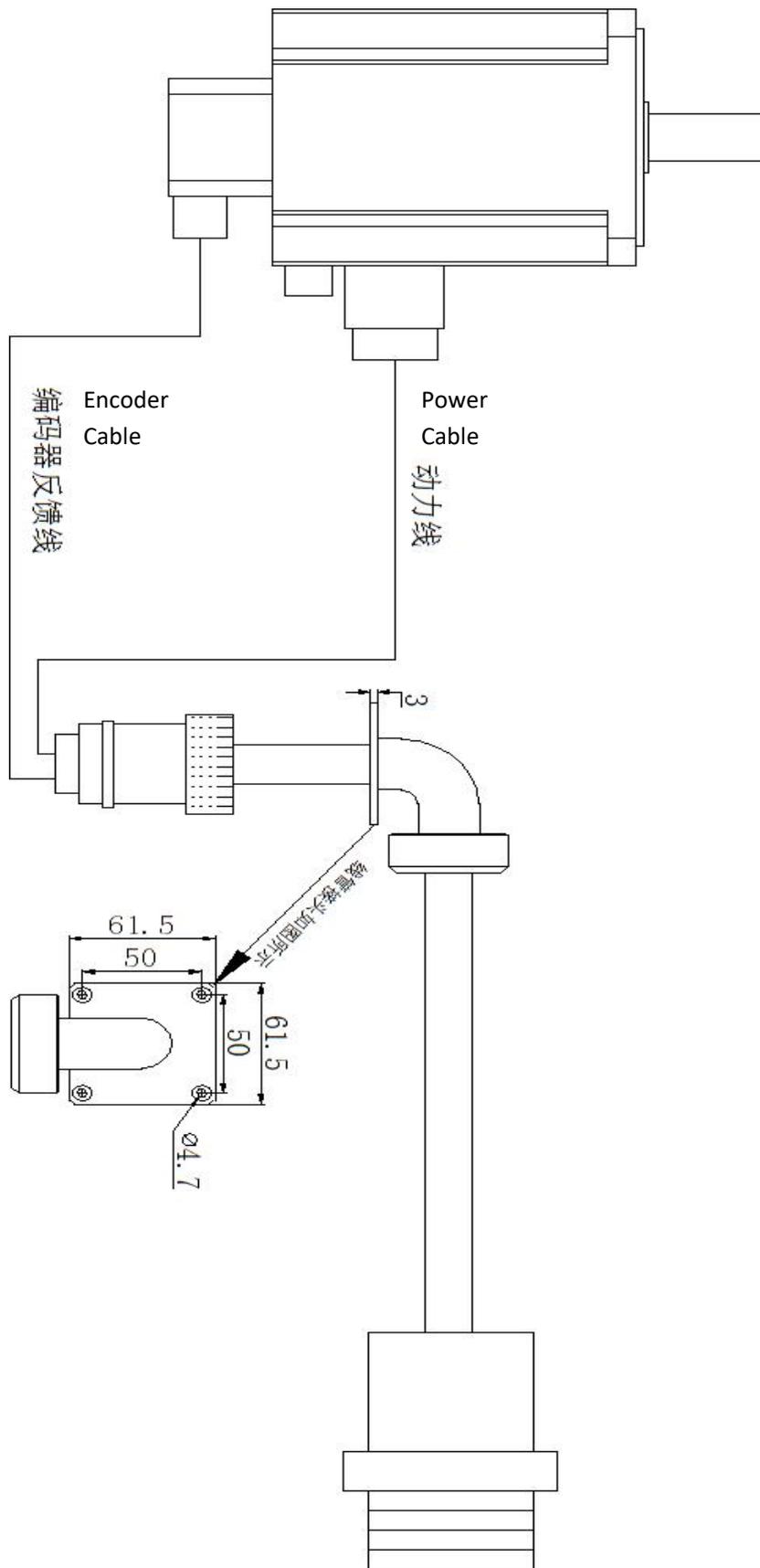
3. Evenly apply waterproof sealant to the mounting surface before the cables are fixed onto the motor box:



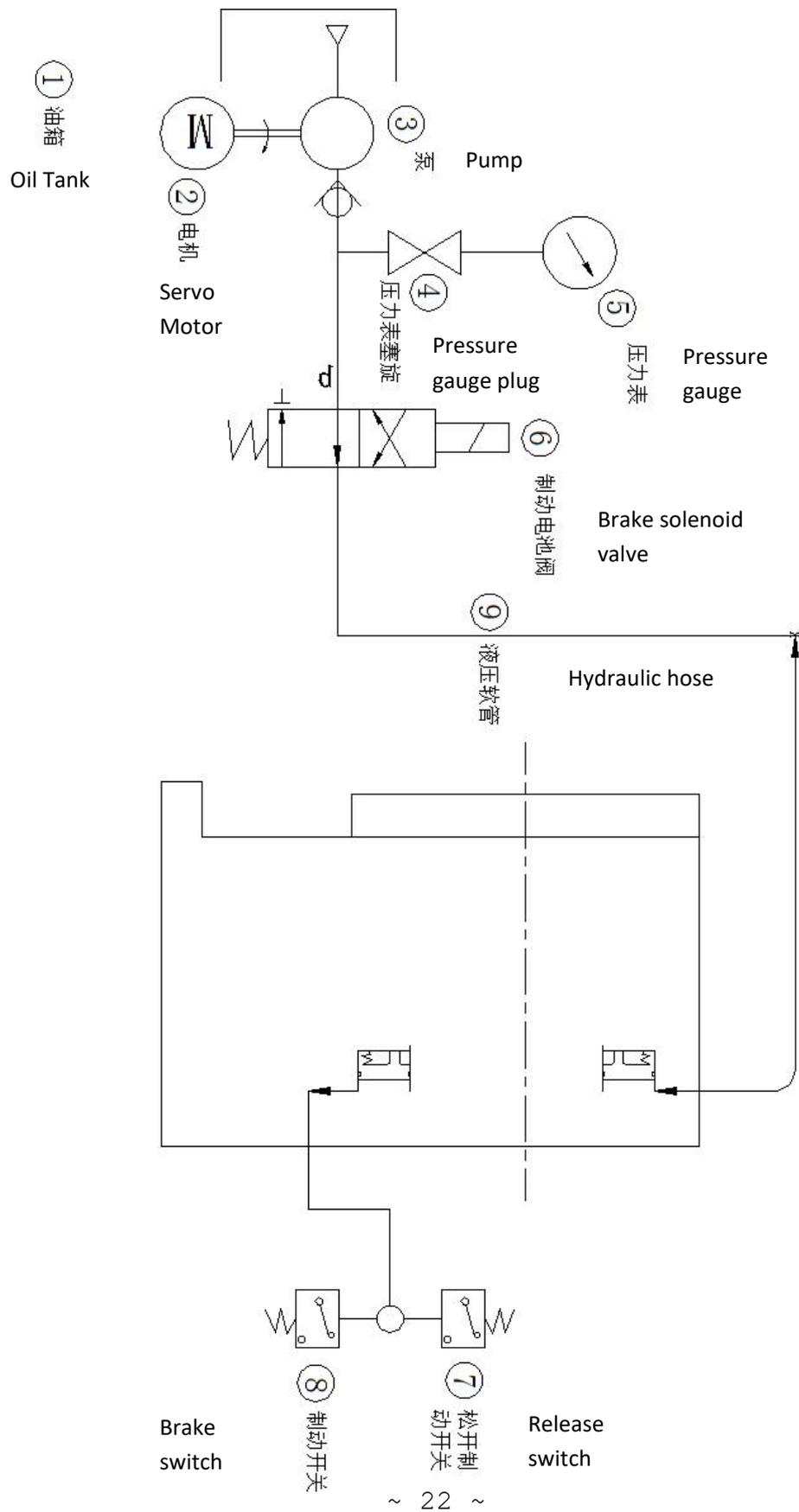
4. After all servo motor accessories are installed, evenly apply waterproof sealant to the mounting surface of motor cover.

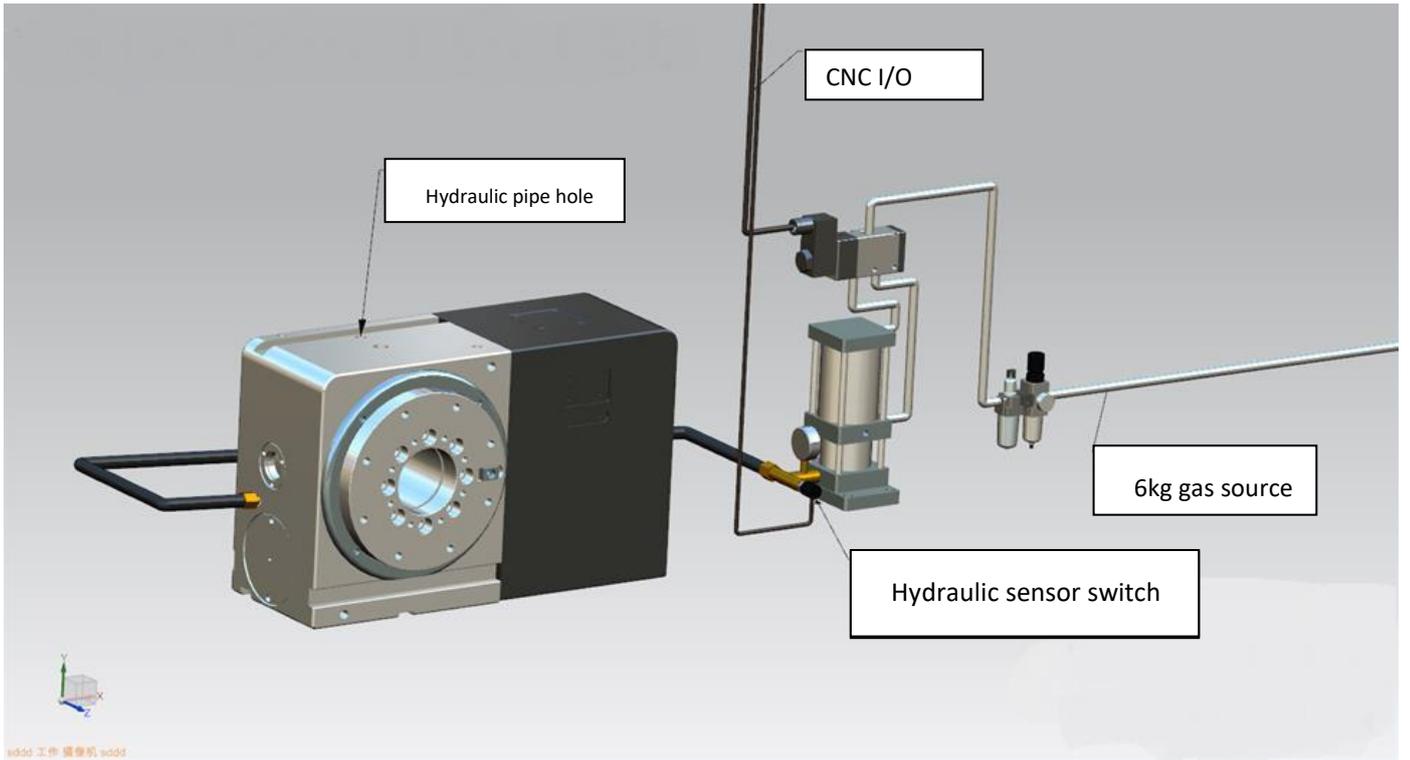


## 12. Electrical Wiring Diagram



# 13. Diagram of hydraulic brake system





## 14. Trouble shooting Reference

Abnormal Occurrence		Possible Reason	Recommended Solution	
NC ROTARY TABLE	B a c k l a s h	Big gap around the cam	Damage or abrasion of roller bearing	Replace roller bearing
		Gap at part of the cam	Detachment of cam	Replace cam
		Gap at part of the faceplate	Detachment of roller bearing	Replace turret
		Gap at part of the faceplate	Damage of roller bearing	Replace turret
		Difference between different rotation turn	Abrasion of roller bearing	Replace turret
	sh a k e	From lateral direction	Loose of output flange	Tighten the bolt
		From both radial and lateral direction	Abrasion of bearing	Replace turret
Sound	High	Wrong contact of parts	Check the parts	
	High, continuous	Broken sealing parts	add lubricant, replace sealing parts	
	High, continuous	Broken gear	Replace gear	
	Low, continuous	Broken gear	Replace gear	
	Low, continuous	Bearing wear	Replace bearing	
	Low, interrupted	Detachment of cam	Replace cam	
	Low, interrupted	Detachment of roller bearing	Replace roller bearing	
Vibration	Low, interrupted	Loose of transmission parts	Replace turret	
	At work	Detachment of cam	Replace cam	
	At work	Detachment of roller bearing	Replace turret	
	At work	Broken gear	Replace gear	
	At work	Bearing wear	Replace turret	
Temperatur e	At stop	Servo motor malfunction	Replace motor	
	Whole case	Insufficiency of lubricant	check lubricant amount and viscosity	
	Near bear	Insufficiency of lubricant; damage of bearing	Replace bearing, check lubricant	
	Near cam	damage of cam and roller	Check lubrication	

		bearing	
Leakage	Near faceplate	Damage of oil seal parts	Replace oil seal
	On flange	Damage of O ring	Replace parts
	Mounting surface of motor case	Damage of O ring	Replace parts

 **Warning**

- Please carry out the maintenance and inspection operation when the device has been completely stopped
- Please disconnect the power source to confirm the safety of the peripheral equipment of this product. Otherwise it may cause personal injuries.
- After the safety cover removed during maintenance and inspection is restored, please carry out the test again to confirm the operation smoothness.
- In order to prevent the power source switch from being connected due to careless contact, please take safety measures, such as setting a protective cover on the power source switch, the "maintenance, inspection operation, do not connect the power supply" sign posted on the power source switch.
- After the power failure, please be sure to disconnect the power switch. If the power switch is re-connected after the power supply is restored, it may cause personal accidents.
- There is residual voltage for a short time after the power is disconnected, so do not work immediately. Please use the meter to confirm beforehand.

# 16. Warranty Policy

Thank you for purchasing SILER NC rotary table.

The SN on nameplate is an internal system tracking number, used for after-sale troubleshooting purpose. Please do not remove the nameplate; otherwise SILVER does not assume warranty liability.

## **Warranty Period**

SILVER warrants our NC rotary table products against defects in materials and workmanship for 1 year or 2000 hours' usage from the date of original purchase.

## **Warranty Coverage**

Within warranty period, SILVER is responsible for the product repair and replacement of parts if the malfunction is caused by the unqualified materials used and assembly mistakes. The customer needs to return malfunctioned product back to the factory for analysis and problem solving.

## **Limitation of Liability**

SILVER does not warrant against normal wear and tear, nor damage caused by accident or abuse, as specified below. The cost of repair (parts and labor) and international shipping charges may apply, depending on the case situation, if SILVER is to help outside the scope of free warranty.

- a. Damage caused by over-load, over-torque operation.
- b. Damage caused by over-speed operation.
- c. Damage caused by loose connections, improper transport or improper installation.
- d. Damage caused by lack of torque protection device.
- e. Damage caused by misuse of the machine, such as lack of regular oil change, improper disassembly and maintenance activities.
- f. Damage and malfunction caused by irresistible forces, natural disasters, environmental factors such as high temperatures, etc.
- g. Other circumstances.