SS-550/650/750-S

User Manual

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1. Safety

📖 Before starting up the robot for the first time, please review this manual thoroughly and familiarize yourself with the operation of the robot. Improper use may injure personnel and/or damage the robot, mold or molding machine.

1.1 Safety Regulations

- Please review this manual thoroughly and familiarize yourself with the operation of the robot, before starting up the robot for the first time. Maintenance should be performed by qualified personnel only.
- The SS-S series robot is designed for injection molding machine (IMM) ONLY.
- Any modification or change to the original design of the robot is forbidden.
- Any improper installation and operation may result in injury to personnel and/or damage to equipments.
- Please contact the manufacturer or local vender immediately if there is any problem with robot when operate it.
- Please note that our robot must be cooperated with other safety device (i.e. safety door) in order to operate in normal condition.
- Ensure all installations are met with safety requirements before operating.
- Without the written consent of the manufacturer, any damage or lost caused by the modification or use beyond the user manual, the manufacturer will not have any responsibility.

1.2 Safety Concerns

- The maintenance, repair, etc, must be executed by professionally trained personnel.
- Any unrelated personnel should keep away from robot working area while it is operating. All electrical wiring must be completed by professionals.
- Please use safety fence indicate working area while robot installation.
- For the safety operation, the hand controller should be placed outside the robot working area.

- Ensure bolts and nuts are tightened with torque wrench while installation.
- Ensure there are no following matters in the compressive air: phosphate-containing oil, organic solvents, sulfite gas, chlorine, acids and stale compressor oil.
- The air pressure should be kept at 6MPa ±0.1MPa while operation.
- Remove anything from the top of the robot to prevent falling due to vibration.
- Press EMERGENCY STOP button immediately when accident occurs.
- Do not modify the robot body and control box. Please contact manufacturer or vendor if any change is required.
- Turn off power supply and compressed air before maintenance and adjustment. Also set up warming signs and safety fences.
- Please use parts of SHINI if there is any replacement is required.
- Our robots meet all corresponding safety standards.
- Please read the user manual carefully as a safety guideline.
- Unauthorized personnel must inform the relative supervisor and understand all safety rules before entering robot working area.
- Please order a new user manual from the manufacturer or vendor if the user manual is damaged.

⚠

Product owner has the responsibility to ensure the operators, maintenance staffs and relative staffs have read user manual thoroughly.

⚠

Any modifications or other applications to robot should obtain the written consent from the manufacturer, for safety purpose.

⚠ Electrical system!
If not comply with safety recommendations as described in the electrical system symbols will result in an electric shock personnel occur.

⚠ The safeguarding required for operation of the robot is not including in our standard scope of supply (except special equipment), since adaptation to specific site conditions is required. If such safeguarding is

provided by you, please note that it must be installed prior to startup of the equipment in order to be included in the safety circuit of the system upon startup.

⚠ Please press down emergency stop button immediately if any accident occurs (clamped by the gripper), and turn off air supply to open the gripper.

1.3 The Warning Marks and Its Meanings

No.	Marks	Meaning
1		Do Not Touch
2		Caution, danger
3		Caution! Electric shock

No.	Marks	Meaning
4		Caution! Mechanical injury
5		Caution! High temperature
6		No Flame

1.4 Emergency Stop

The emergency stop button is located on the hand controller.

When the emergency stop button is pressed, the power is turned off. The gripper and vacuum valves and the vacuum generator are not disconnected in order to avoid dropping parts from the gripper. In addition, the control system and the hand controller will remain under power to allow indication of error messages.

The emergency stop circuits of the robot and of the injection molding machine are connected by the Euromap12 and Euromap67 interface. Therefore when the emergency stop button on the molding machine is pressed the robot will also stop and vice versa.

Any problem during using Shini robots, please contact our company or the local vendor.

Headquarters & Taipei Factory:	TEL: (02)26809119
China Service Hotline:	TEL: 800-999-3222
Dongguan Factory:	TEL: (0769)83313588
Ningbo factory:	TEL: (0574)86719088

1.5 Transportation and Storage

⚠

Prohibit persons underneath the robot during transportation.

⚠

If there is compelling reason for moving or re-installing the robot, please enquire for assistance from the manufacturer or agents. If you do not comply with this mandatory requirement, result in the injury to any personnel and equipment, the robot manufacturer will not have any responsibility.

1.5.1 Transportation

1. The series robot before sending out package in crates, and at the bottom of the crate with gap left, convenient to use forklift to move.
2. Before the transporting, lock the arm anti-falling bolter, prevent arm out during

transportation.

3. The arm may swing, before transporting, turn the shock absorber on rotation cylinder to the limiting position, and fixed the arm, prevent damage to the arm.

4. During the transporting, prevent collision to damage the robot.

5. In the long-distance transport, should increase plastic bag, and if necessary vacuum pumping and put desiccant in.

6. The temperature between -25℃ to 55℃ during the transportation, for short transportation (in 24 hours), the temperature cannot higher than 70℃.

The robot you order before sending out the factory, it is confirmed in good working condition, please check whether there is any damage during carrying or transporting. Please be carefully, when dismantling of components and packaging, if the robot has found the injury, you can use the package again.

Any damage caused by transportation, please:

1) Feedback immediately to the transporting companies and our company.

2) Claim to the shipping company; fill in the file requests for compensation.

3) Retain damaged items for testing. During the wait for tests, do not return the damaged items.

1.5.2 Storage

1. Switch off the air supply and main power, if the robot is not in use for a long time.

2. Robots should be stored in ventilated, dry room to prevent rust and damping.

3. If not use for a long time, anti-rust of the robot, and if necessary place film to prevent dust and rain water corrosion.

1.5.3 Unpacking Transportation

1. Use a special strap and hook (cotton non-slip strap, the min load 80kg) to lift up robot. Recommends order them from the manufacturer.

2. Lift up robot as the picture 1-1 shows.

3. All personnel keep 1 meter away from robot at least when lifting up robot. Forbids any personnel enter into the bottom of robot.
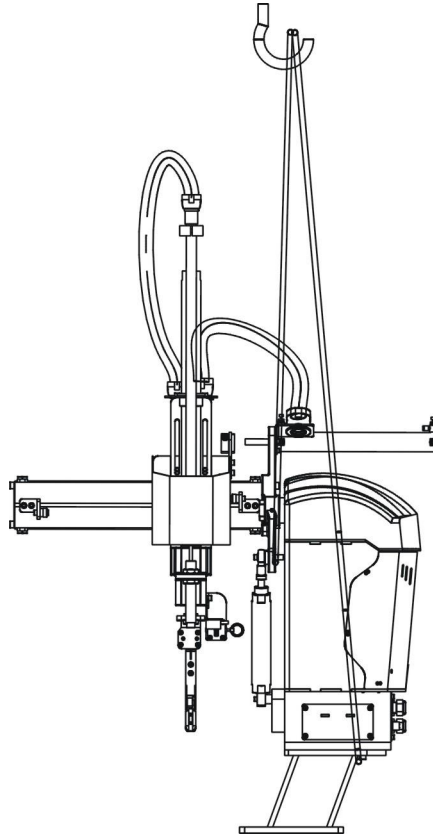
Picture 1-1: Lift Up Robot

1.5.4 Operation Environment

1. Temperature: Between +5℃ to +40℃
2. Humidity: Temperature +40, relative humidity 50%
3. Elevation: Under 1000 meters above sea level
4. In order to ensure the robot operate normally, please stop using when:
    ① Power wire is broken.
    ② Air hose is broken.
    ③ Robot goes wrong or dismantles without professional, before the professional overhauling.
    ④ Air pressure is not enough or too high (normal: 0.6mpa±0.1mpa).
    ⑤ There are organic solvent, acidic phospholipids, sulfurous acid, chlorine and flammable and explosive dangerous matter in the compressed air.

1.5.5 Retirement

When the robot goes to the end of service life and cannot be maintenance, dismantle it. When dismantle the component parts according to its naturemistrials (metal, oil and lubricants, plastics, rubber, etc.) in different ways. Entrust the authorized commission company and abide the local laws andregulations of solid industrial waste treatment.

1.6 Exemption Clause

The following statements clarify the responsibilities and regulations born by any buyer or user who purchases products and accessories from Shini (including employees and agents).

Shini is exempted from liability for any costs, fees, claims and losses caused by reasons below:

1. Any careless or man-made installations, operation and maintenances upon machines without referring to the Manual prior to machine using.

2. Any incidents beyond human reasonable controls, which include man-made vicious or deliberate damages or abnormal power, and machine faults caused by irresistible natural disasters including fire, flood, storm and earthquake.

3. Any operational actions that are not authorized by Shini upon machine, including adding or replacing accessories, dismantling, delivering or repairing.

4. Employing consumables or oil media that are not appointed by Shini.

2. Installation

2.1 Instruction

2.1.1 Safety Issue

1. Before installation, please read this chapter carefully.
2. Follow the installation guide to prevent accidents.
3. Please check robot and all parts in good condition.
4. Check anti-falling cylinder is normally.
5. Fix the robot base before operating.
6. Indicate the safety fence outside of the robot operation area.
7. Place the hand controller outside of the safety fence.
8. Keep the air hose in good condition when installing robot.
9. The power connection should be performed only by an authorized electrician.
10. Cable connection should obey the local regulations. The grounded wire cannot attach to the water pipe, gas pipe, television cables or telephone lines.
11. Use the independent cable wire and power switch. The diameter of main power's wire cannot be less than the control box's wire.

2.1.2 Compressed Air Connection

1. According to the filter specification to choose a suitable hose, then connect it between the gas source and the filter.

Note: Before connecting hoses, clean the hose by compressed air. To ensure that there is no cuttings, seal tapes, and so on in the hose.

2. Check the compressed air connection in control box without bending conditions.
3. Turn on the air supply and adjust the air pressure to 5bar at the filter regulator valve.

2.1.3 Electric Power Connection

1. The power connection should be performed only by an authorized electrician.
2. Before connecting, cut off the main power supply.
3. Set up safety electrical to protect the control system. Because the power supply informally will destroy the control system.

4. Before installation, wiring, operation, and maintenance please familiar with installation guide as well as machinery, electronics and security attentions.
5. Ground the wire before robot operating.
6. Wire grounding should connect to metal and keep away from inflammable matter.

2.1.4 Safety Fence

1. Indicate the safety fence outside of the robot operation area, after installing robot. The safety fence should meet the EN294 requirements.
2. Place the hand controller outside of the safety fence.
3. Stick warning logos on the safety fence.

2.1.5 Mounting Preparation
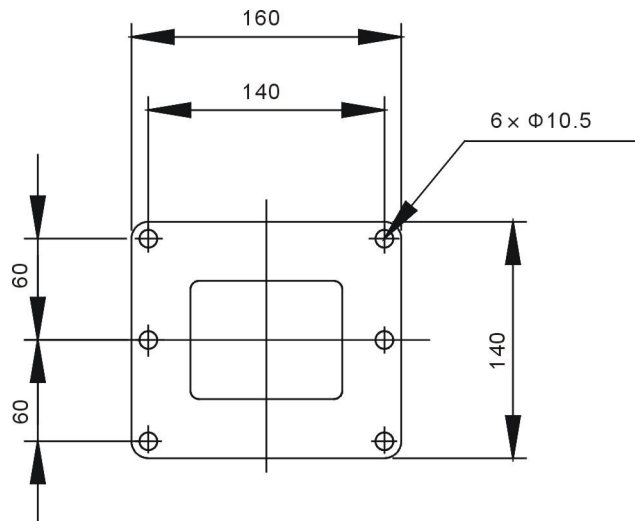
Picture 2-1: Drilling Sticker

1. Before drilling, switch off the IMM then turn off the power supply in order to prevent any damage to the mold.
2. Put the drilling sticker (as the picture) on the installing surface of IMM.
3. Use the center punch to fix the positions.
4. Place electrical drill with magnet base on the fixing plate, use 8.5 drill bits to drill 6 holes about 30mm depth.
5. Use M10 tap to produce 6 internal screw threads about 25mm depth.

2.1.6 Mounting Instruction

1. Avoid sharp pounding; collision and falling when transfer the robot to the top of IMM.

2. Adjust the torque spanner to 77Nm after the robot has been fixed on the right position; tighten the M10 × 30 hex socket bolt screws.

2.2 Dimensions (Unit: mm)
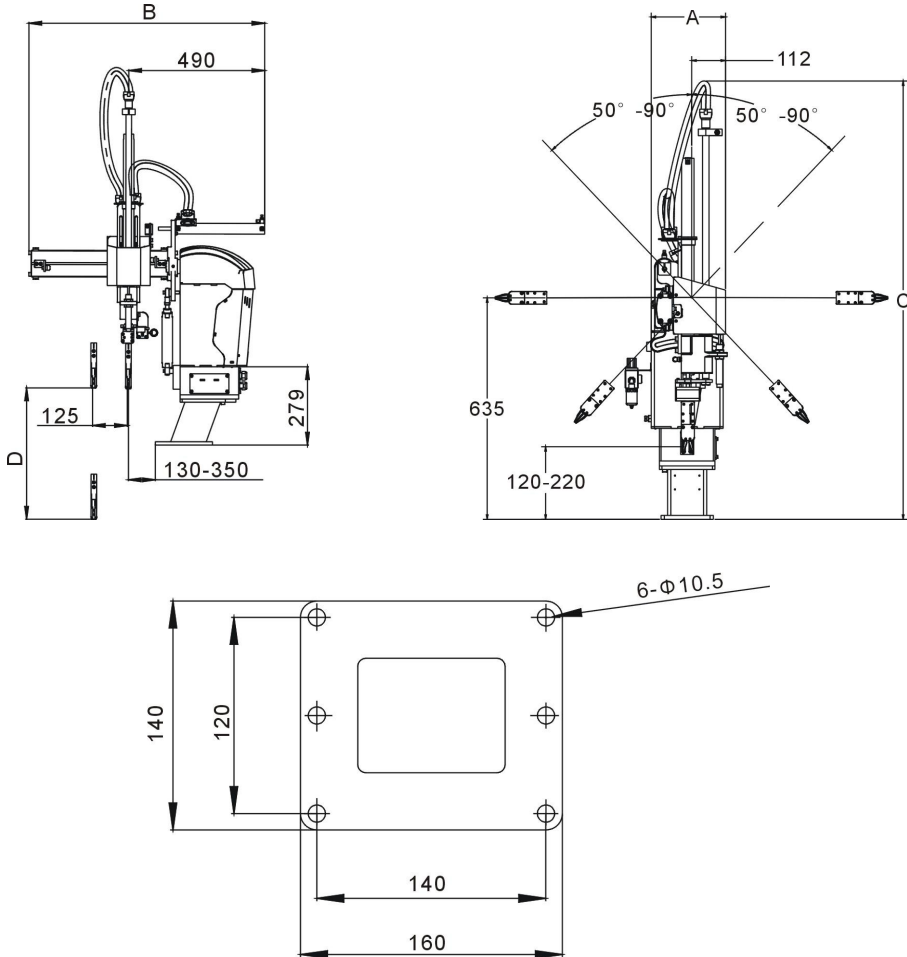
Picture 2-2: SS-S Dimensions

2.2.1 Model Specification

Table 2-1: SS-S Robot Specification List

Model		SS-650-S1	SS-650T-S1	SS-750T-S1
IMM (ton)		50-200	50-200	150-250
Crosswise Stroke (mm)		120	120	200
Vertical Stroke (mm)		0-650	0-650	0-750
Swing Angle (deg)		50-90	50-90	50-90
Max.load(with fixture)(Kg)		0.5	0.5	0.5
Min Pick-out Time (sec)		0.9	0.9	1
Min Cycle Time (sec)		4.4	4.2	4.8
Air Pressure (bar)		4-6	4-6	4-6
Max Air Consumption (Nl/cycle)*		13	12	13
Weight (kg)		36	48	49
Dimensions(mm)	A	1460	1200	1250
	B	320		
	C	820		
	D	100		
	E	430		

Note: 1. "V" stands for vacuum device.
　　　　"M" stands for middle mold detector, suitable for three-plate mold.
　　　　 "R" stands for claw rotating group.
　　　　"EM12" stands for Euromap 12 communication interface.
　　　　"EM67" stands for Euromap 67 communication interface.
　　　　"N" stands for non-operation side,operation side without "N"
　　 2. Power supply requirement: 1Φ, 230V, 50Hz.
　　 3. "*" Max air consumption for vacuum device 30Nl/min.

2.2.2 Pneumatic Source Requirement

This is connected to the regulator with 1/4-Φ10 air hose.
A shut off valve provide off the main compressed air line.

Required supply pressure: 5bar

When the pressure drop below 4bar, the robot will stop working and alarm.

Compressed air consumption depends on the robot accessories.
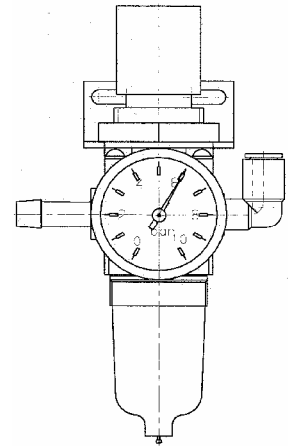
2.3 Electrical Connection

2.3.1 Main Power Supply

The power requirements are given on the serial plate of the robot. The power connection is provided through a normal power cord and a CEE plug.

⚠️ The power connection should be performed only by an authorized electrician according to applicable electric utility regulations.

2.3.2 Interface with the Injection Molding Machine

SS-S series robots are available with 2 different interface versions to communicate with the injection molding machine:
●Euromap12
●Euromap67
Both versions are described in the chapter 2.6.

⚠️ Connection of the interface plug to the machine and testing of all signals must be done by a specialist in injection molding machines and robots. Preferably, this should be done by one of our service engineers together with a qualified service engineer for the injection molding machine.

⚠ The interface signal functions must be carefully tested, as improper operation may cause malfunction or damage to the robot and molding machine.

⚠ In particular, the functions of the safety circuits must be thoroughly checked:
● Testing the Emergency Stop signals from and to the IMM.
● When the Emergency Stop switch is activated on the hand controller, the error message emergency stop must also be indicated at the IMM. After acknowledging the error message, the emergency stop must be activated at the IMM. Emergency stop must also occur at the hand controller device and be indicated on the display.

2.4 Axes Adjustment

⚠ While adjusting, make sure that the robot cannot be run and that the compressed air supply is shut off.

2.4.1 Adjusting the X-Position

Picture 2-3: Stop Package

The x-position is determined by the stop package.
The stopper is for adjusting the 0-position.

Before running in to the mold range with the Y-axis for the first time, you must check whether the X-positions can be reached without damaging the mode and the Y-axis.

First, the end position of the X-axis must be adjusted.

Adjusting the end position
1) Run the X-axis to its end position
2) Push the axis to the desired position manually
3) Fix the stop package

Adjusting the 0-position (stroke length)
5) Run the X-axis to 0-position
6) Release stop package
7) Push the axis to the desired 0-position
8) Fix the stop package

2.4.2 Adjusting the Y-Position

The upper position is given by the end-position-damper.
The withdraw position can be set using the stop block.

Adjusting the withdrawal position:
1) Run the Y-axis to its end position
2) Seal off compressed air
3) Loosen Y-axis stop package
4) Push the Y-axis to the desired position manually
5) Push Y-stop to its lowest position
6) Fix the Y-stop-package

Picture 2-4: Y Stop Package

⚠ If the Y-axis is shifted, also the withdrawal position changes.

2.4.3 Adjusting the Z-Position

The Z-position is determined by adjusting the position of the shock absorber.

Before adjusting, release the compressed air.

1) Loosen the nuts on the rotate cylinder

2) Adjust the rotate cylinder into the desired position

3) Tighten the nuts in place

The Z-position must be adjusted so that the Y-axis can be fully run out.

In the Z 0-position, the Y-axis must be run out to outside the mode area.

Picture 2-5: Rotate Cylinder

2.5 Gripper and Suction Setting

2.5.1 Gripper Setting

When the gripper is opened (did not pick up parts), the light of the magnetic switch should be off. When the gripper picks up parts, the light of the magnetic switch should be on. When the gripper is closed (did not pick up parts), the light of magnetic switch should be off.

Adjusting the magnetic switch

1. Loosen the fixing screw on the magnetic switch

2. When gripper picks parts the light of magnetic switch on, if gripper hasn't picks

parts, the light off.

3. Tighten the fixing screw after finishing adjustment.

During the robot operation, if the gripper not clamps the parts, the robot will stop operating and alarm.
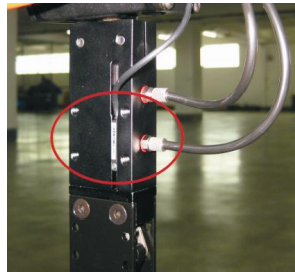
Picture 2-6: Magnetic Switch

2.5.2 Suction Setting

Compressed air source setting:

The pressure sensor is set at the minimum air pressure when the machine is working, that is, when the input pressure exceeds the value, it will feedback to the system to ensure that the machine work properly. The factory setting of pressure value is 0.4Mpa. As the machine has compressed air loss during working, the value about 0.07Mpa. Therefore, the lowest pressure is 0.4Mpa, the machine can work properly. The atmospheric pressure should be higher than 0.47Mpa.

If you need to modify the value, please do it step by step:

a. Release the A screw

b. Rotating turntable B to "+", it demands for the higher air pressure to "-", it demands for the lower air pressure.

c. Testing whether the switch output, please check the "pressure limit" of "monitor" page on control panel.
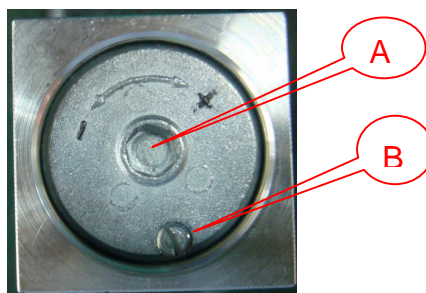
Suction pressure setting:

The suction with negative-pressure measuring function, when negative pressure is set to the preinstalled value, it will feedback and output to the system. The negative pressure value set -60% as factory setting. So, when negative pressure up to -60%, signal output.

If need to modify the value:

Loosing screw C.

Rotate screw D, Counterclockwise rotation in order to reduce negative pressure value; Clockwise to increase the negative pressure value.

After setting, lock screw D.   Adjusting the negative pressure values as well as adjusting the delay time of adsorption action. If the vacuum generator in a certain situation, the lower the negative pressure values, longer time need. Adjust vacuum delay time while adjusting negative pressure value. Usual, the lower pressure, the delay time is longer.
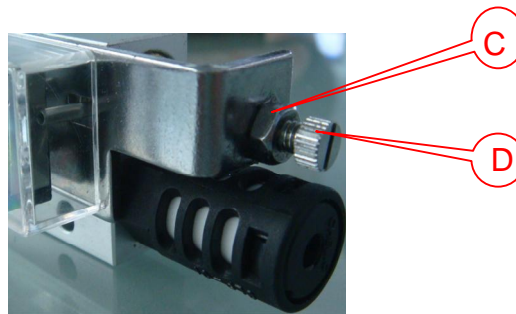
2.6 Robot and IMM Interface

SS-S series robots are available with 2 different interface versions to communicate with the injection molding machine:

●Euromap67

●Euromap12

Both versions are described in the following chapters.

2.6.1 Euromap67 Interface

Euromap67 interface defines the connection plug between the injection molding machine and the robot:

socket

pin

Robot Plug   Plug on Injection Molding machine
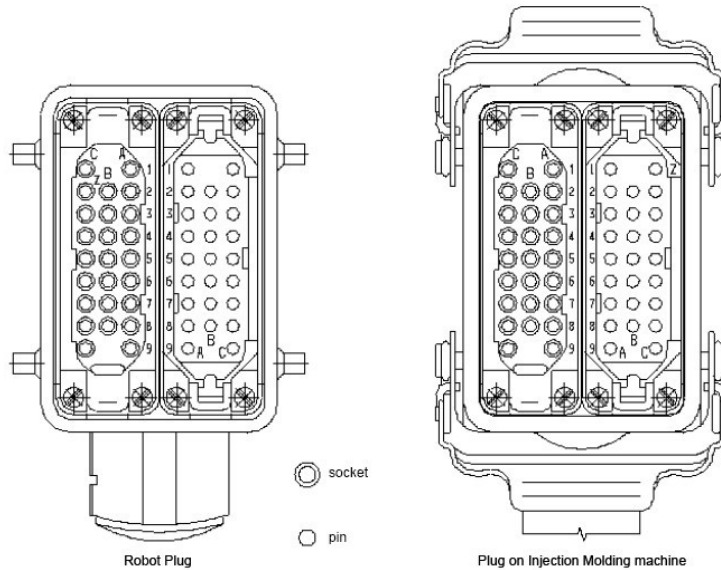
The robot-injection molding machine interface is designed according to the directives of Euromap67, which states:

Unless otherwise noted, the signals, which are maintained during the described function.

2.6.1.1 The Injection Molding Machine Output Signals

Contact No.	Function
ZA1 ZC1	**Emergency stop channel 1** The emergency stop switch of the injection molding machine is used to interrupt the emergency stop circuit of the robot.
ZA2 ZC2	**Emergency stop channel 2** The emergency stop switch of the injection molding machine is used to interrupt the emergency stop circuit of the robot.
ZA3 ZC3	**Safety system active channel 1** For protecting against hazardous motions of the robot. The switch is closed when the safety system of the injection molding machine is active.
ZA4 ZC4	**Safety system active channel 2** For protecting against hazardous motions of the robot. The switch is closed when the safety system of the injection molding machine is active.
ZA5 Optional	**Reject** The signal is HIGH when the molded piece is a reject. The switch is closed when the tool is open and must remain HIGH at least until "close tool enabled" (see pin contact No.A6).
ZA6	**Mold closed** HIGH signal when tool closing has been completed, the signal "close tool enabled" is no longer necessary (see pin contact No.A6).

Contact No.	Function
ZA7	**Mold open** HIGH signal if the mold opening position is equal or more than the required position. Inadvertent alteration to mold opening stroke smaller than that required for the robot to approach must be impossible.
ZA8 Optional	**Mold at intermediate position** HIGH signal when the mold opening has reached the specified intermediate position and remains HIGH until the mold is completely open. the signal may be used in two ways: 1) The mold stops in the intermediate position, whereupon a signal is sent to the robot. Complete opening of the IMM takes place through the signal "complete mold opening enabled" (see pin A7). 2) The IMM transmits the signal, but does not remain in the intermediate position. Signal is LOW when the intermediate.
ZA9	**Signal voltage robot 24V DC**
ZB2	**Fully automatic mode injection molding machine** HIGH signal, when operating the injection molding machine tighter with the robot is possible.
ZB3	**Ejector back position** HIGH signal when the ejector is back, regardless of the position of the movable tool plate. The signal acknowledges "ejector back enabled" (see pin contact No.B3).
ZB4	**Ejector forward position** HIGH signal when the ejector is forward. The signal acknowledges "ejector forward enabled" (see pin contact No.B4).
ZB5	**Core pullers 1 free for robot to approach** HIGH signal when the core pullers are in position for removal of the injection moiling.(see pin contact No.B5)
ZB6	**Core pullers 1 in position to remove molding** HIGH signal when the core pullers are in position for removal of the injection molding.(see pin contact No.B6)
ZB7 Optional	**Core pullers 2 free for robot to approach** HIGH signal when the ejector is back ,regardless of the position of the movable tool plate, are in position for the robot to approach.（see pin contact No.B7）
ZB8 Optional	**Core pullers 2 in position to remove molding** HIGH signal when the core pullers are in position for removal of the injection molding.(see pin contact No.B8)
ZC5/ZC6/ZC7	Reserved for future Euromap signal
ZC8	Free
ZC9	Signal ground robot 0V

2.6.1.2 Robot Output Signals

Contact No.	Function
A1 C1	**Emergency stop of robot channel 1** Opening of the switch contacts of the robot must shut off the control system of the molding machine.
A2 C2	**Emergency stop of robot channel 2** Opening of the switch contacts of the robot must shut off the control system of the molding machine.
A3 C3	**Mold Ares Free** Signaling is effected by the limit switch at the travel –in rail .the switch is opened when the travel –in rail, in the region of the injection molding machine, leaves its starting position before it is moved into the tool area. If the switch is open, neither a closing nor opening motion of the tool may take place. Even when the control system of the robot is shut off, the switch must work as described.
A4 C4	Reserved for future Euromap signal.
A5	Free
A6	**Complete mold opening enabled** HIGH signal when the robot is far enough out of the tool that it can be closed and when other robot control systems enable closing of the tool .the signal remains HIGH signal for the duration of the tool –closing operation, in the event of a LOW signal due to a disturbance, the tool-closing motion must be absorbed. Note: the signal "close tool enabled" may not be linked with other or signals in any operating mode.(see pin contact No.ZA47)
A7 Optional	**Complete mold opening enabled** HIGH signal when the robot is far enough out of the tool that it can be closed and when other robot control systems enable closing of the tool .the signal remains HIGH signal for the duration of the tool –closing operation, in the event of a LOW signal due to a disturbance, the tool-closing motion must be aborted. Note: the signal "close tool enabled" may not be linked with other or signals in any operating mode.(see pin contact No.ZA47)
A8	Reserved for future Euromap signal
A9	Signal ground IMM 24V DC
B2	**Robot operation mode** LOW signal when the robot mode switch is "operation with injection molding machine", HIGH signal when the robot mode switch is "no operation with injection molding machine" HIGH signal when the robot is switched off.
B3	**Ejector back enabled** HIGH signal when the removal operation has been performed far enough for the motion "ejector back "to be carried out. the signal is HIGH for the duration of the motion "ejector back ".the signal must be maintained at least until the signal "ejector back "from the molding machine (see pin contact No.ZB3).
B4	**Ejector forward enabled** HIGH signal when the removal operation has been performed far enough for the motion "ejector back" to be carried out. the signal is HIGH for the duration of the motion "ejector back ".the signal must be maintained at least until the signal "ejector back "from the molding machine(see pin contact No.ZB4).
B5 Optional	**Enable movement of core pullers 1 to position for the robot to approach freely.** HIGH signal when the motion of the core pullers is to the position for the robot to approach freely is enabled. (see pin contact No.ZB5)

Contact No.	Function
B6 Optional	**Enable movement of core pullers 1 to position for removal of the molding.** When the motion of the core pullers is to the position for removal of the molding is enabled.
B7 Optional	**Enable movement of core pullers 2 to position for the robot to approach freely.** HIGH signal when the motion of the core pullers is to the position for the robot to approach freely is enabled. (see pin contact No.ZB7)
B8 Optional	**Enable movement of core pullers 2 to position for removal of the molding.** When the motion of the core pullers is to the position for removal of the molding is enabled. (see pin contact No.ZB8)
C5 C8	Free
C6 C7	Reserved for future Euromap signal
C9	Reserved for future Euromap signal

2.6.2 Euromap12 Interface

The interface consists of the plug connection between the injection molding machine and the robot:
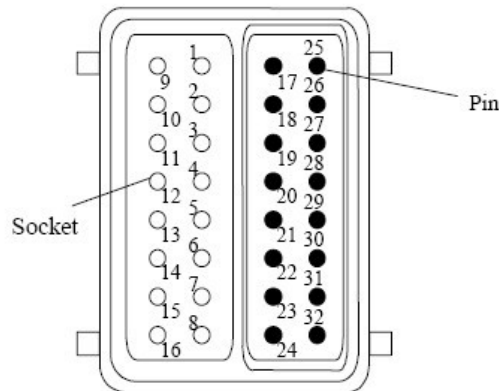
The robot-injection molding machine interface is designed according to Euromap12, which state:

Unless otherwise noted, the signals are maintained during the described function.

2.6.2.1 Injection Molding Machine Output Signals

Plug Contact No.	Function
1，9	**Emergency stop of machine** The emergency stop switch of the injection molding machine is used to interrupt the emergence stop circuit of the robot.
2	**Mold open** The switch contact (pin contact 16) is closed when mould opening position is equal or more than required position. Inadvertent alteration to mould opening stroke smaller than that required for the handing device to approach must be impossible.
3，11	**Safety system active** The switch contact is closed when safety devices (e.g. safety guard, footboard safety, etc.) on the injection molding machine are operative so that dangerous movements of the handing device/robot are possible. The signal is active in any operation mode.
4	**Ejector back** The switch contact is closed when the ejector has been retracted regardless of the moving platen position. (See pin contact No.16) acknowledgement f or the "Enable ejector back" signal (see pin contact No 21), when the ejector sequence is selected. (see pin contact No.16)
5	**Ejector forward** The switch contact (see pin contact No.16) is closed when the ejector has been advanced. The signal is the acknowledgement signal for the "enable ejector forward" (see pin contact No 22). It is recommended to close the switch contact when the ejector sequence not in use. (see pin contact No.16)
6 Optional	**Core pullers free for robot to travel in** Switch (see pin contact No.16) is closed when the core pullers, regardless of the position of the movable tool plate, are in position for free travel –in of the robot.
7 Optional	**Core pullers in position for removal of injection moldings** Switch (pin contact No.16) is closed when the core pullers are in position for removal of the injection molding.
8 Optional	**Reject** Switch (see pin contact No.16) is closed when the molded piece is a reject. the switch must be closed when the tool is open and must remain closed at least until "enable mould close" (see pin contact No.17)
10	**Fully automatic mode injection molding machine** Switch (see pin contact No.16) is closed when the operating mode selector switch is on "semi-automatic" or "fully automatic mode".
12	**Mold closed** Switch (see pin contact No.16) is closed when the mould closing has been completed, the signal "enable close" is no longer necessary. (see pin contact No.17)
13 Optional	Free

Plug Contact No.	Function
14 Optional	**Mold at intermediate position** Switch (see pin contact No.16) is closed when the IMM has reached the specified intermediate position and remains closed until the IMM is completely open .the signal may be used in two ways: 1) Mould opening stops on intermediate position and gives start signal to handling device/robot. mould opening restarts with the signal "Enable full mould opening"(see contact No.28) 2) Mould opening doesn't stop on intermediate position, however gives the signal to handling device/robot. (see pin contact No.16) The switch contact is open when intermediate mould opening position is not in use.
15 Optional	Free
16	Signal voltage of robot

2.6.2.2 Robot Output Signals

Contact No.	Function
17	**Enable mould close** The switch contact (see pin contact No.32) is closed when the robot is retracted enough for start of mould closure. the switch contact must remain closed at least until "mould closed" (see pin contact No.12)
18，26	**Mould area free** The switch contact is closed when the robot is retracted enough for start of mould closure. If the switch contact opens as a result of a fault, mould closing must be interrupted. The switch contact must be closed if the robot is switch off. It is recommended to close the switch contact when the robot is unselected.
19，27	**Emergency stop of robot** Opening of the switch contacts of the robot must shut off the control system of the molding machine.
20	**Operation with robot** The switch contact (see pin contact No.32) is open when the robot mode switch is "Operation with injection molding machine". The switch contact is closed when the handling device mode switch is: "No operation with injection molding machine" the switch contact (see pin contact No.32) is closed when the robot is switched off.
21	**Enable ejector back** The switch contact (see pin contact No.32) is closed when the handling device enables the movement for ejector back, the switch contact must remain closed at least until "Ejector back" signal is given by injection molding machine(see contact No 4)
22	**Enable ejector forward** The switch contact (see pin contact No.32) is closed when the handing device enable the movement for ejector forward. the switch contact must remain closed at least until "ejector forward" signal is given by the injection molding machine(see contact No 5)
23 optional	**Enable motion of core pullers for removal of injection moldings** The switch contact (contact no. 32)is closed when the enable motion of core pullers for removal of injection moldings It is recommended that the switch contact remains closed at least until "the core back to end" signal is given by injection molding machine(see contact No 7)

Contact No.	Function
24 optional	**Enable motion of core pullers for removal of injection moldings** The switch contact (contact no. 32)is closed when the enable motion of core pullers for removal of injection moldings It is recommended that the switch contact remains closed at least until "the core back to end" signal is given by injection molding machine(see contact No 7)
25	Reserved for future use by EUROMAP
28 optional	**Enable full mould opening** The switch contact (see pin contact No.32) is closed when the handling device has taken the part and allows to continue mould opening. The switch contact must remain closed until "mould open" signal is give by the injection molding machine (see contact No 2). If the switch contact is not used it must be open.
29	Reserved for future Euromap signal
30	Free
31	Free
32	Voltage of IMM

3. General Description

3.1 SS-S Series Abstract

The SS-S series robot is designed for rapid and precise removal of spure and runner from injection molding machine, and place them into granulator for recycling. Simple product removal is applicable with optional vacuum generator and EOAT.

This series robot designed with elegant appearance; aluminum profiles are largely used to provide compact and streamlined appearance. Swing directions are moving directions in order to provide safety mechanically and electrically. Fast mold changing design provides simple method for changing molds. The base is rotatable for 90℃ by releasing the handle. Branded pneumatic accessories provide extensive use life. Removable electric circuit stands allows easy maintenance.

Picture 3-1: SS-550-S

3.2 SS-S Application

1. SS-550-S is suitable for injection molding machine under 150T clamp force.
2. SS-650-S is suitable for injection molding machine under 200T clamp force.
3. SS-750-S is suitable for injection molding machine under 250T clamp force.

3.3 SS-S Features

1. The guide rod used alloy material, small friction and wearable.
2. The gripper comes with sensor and rotate wrist device.
3. Shock absorber and proximity switch made rotate cylinder moves smoothly.
4. Shock absorber and magnetic switch made crosswise cylinder smoothly moves forward or backward.
5. Fast mold changing design provides simple method for changing molds. The base is rotatable for 90℃ by releasing the handle.
6. Easy to change robot reversing: loosen bolt and push cylinder to the other side.
7. Branded pneumatic accessories provide extensive use life. Removable electric circuit stands allows easy maintenance.
8. Use movable mounting frame for electrical accessories.
9. Dialogic hand controller provides English, Japanese, Traditional Chinese and Simplified Chinese. Other languages are applicable. There are 8 standard programs and memory for up to 80 customized programs with self fault detection.
10. Extra sets of I/O pins are available for other applications.
11. Designed to Euromap12, Euromap67 and SPI to provide plug and use.

3.4 Functions

3.4.1 Function Description

Designed for rapid and precise removal of sprue and runner from injection molding, and place them into granulator for recycling. Simple product removal is applicable with optional vacuum generator and EOAT. Suitable for injection molding machine under 250T clamp force.

In order to ensure the robot works smoothly, there are shock absorbers and magnetic sensor switches on the main parts of the robot, and having pneumatic cut off protection device on arms.

3.4.2 Stroke Measuring

There are magnetic switches (picture a) on the front and back of the crosswise stroke cylinder and having the proximity switches on the left and right sides of the rotation cylinder and arms (picture b), use to measure whether the cylinder stroke is normal.

There is a magnetic switch on the gripper (picture c), use to measure whether gripper picks up parts. If any parts of robot go wrong, it will stop working and alarm till eliminate troubles.

Magnetic Switch	Proximity Switch b	Magnetic Switch c

3.4.3 Shock Absorber

Picture 3-2: Shock Absorber on Crosswise

3.4.4 Functions Adjustment

3.4.4.1 Mold Change

Fast mold changing design provides simple method for changing molds. The base is rotatable for 90℃ by releasing the handle

Picture 3-3: Handle

3.4.4.2 Reversing

The robot arm fixed on curved slide, easy to change robot reversing. The following are the steps:

1. Loosen the bolt which fixed rotate cylinder, moves rotate cylinder to the other side, and then fix it.

2. Move the switch (in non-power and non-pneumatic state) on circuit board form "L" to "R" position. "L" stands for left position; "R" stands for right position.
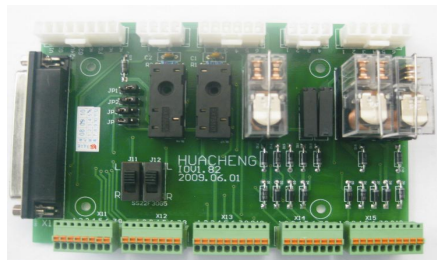
Picture 3-4: Reversing Switch

3.5 Safety Function

3.5.1 Safety Protection

The robot with cut off pneumatic protection device (picture 3-7) can prevent the damages cause by arm falling when air pressure is not enough.

If the air pressure is not enough, the sensor will output the signal. The robot's arm keeps in current position or returns to the up limit position, then the pneumatic cut off protection device locks the piston rod (if the arm out from inner mold, it will keep at current position, if out from the outside of mold, the arm will back to the up limit position).

When the air pressure is sufficient, the pneumatic cut off protection device will set free and the robot will work again. In addition, there is a manual ring on the device. When the air pressure is insufficient and the arm is in locked state, the customer can manually pull the ring and pull out the piston rod to move it.

Picture 3-5: Pneumatic Protection Device

3.5.2 Emergency Stop

There is the emergency stop button on the hand controller. When the emergency stop button is pressed, the robot will stop working. The gripper and vacuum valve and the vacuum generator are not disconnected in order to avoid dropping parts from the gripper. In addition, the hand controller will remain under power to allow indication of error messages. If robot goes wrong or need to maintenance, please press the emergency stop button to ensure operation safety.

Picture 3-6: Emergency Stop Button

3.6 Adjusting and Setting

3.6.1 Default Setting

When the robot sends out of the factory:

1. The direction of the arm rotation is left.
2. The pressure sensor is 4bar. If the air pressure is less than 4bar, the robot will stop working and alarm.
3. The filter-regulator setting in 5bar.

3.6.2 Adjusting the Height of the Gripper

1. If the vertical stroke is not enough to pick out the parts in mold, adjust the height of baffle plate as well as adjust the height between gripper and base.
2. If the baffle plate is at the up limit, the arm was still unable to get down picking out the parts in mold, loosening fixed screw on arm, and moving arm to the lower position.

3.6.3 Change Mold and Maintenance

The robot with the change mold function convenience to change mold or maintenance. Loose the fixed screw below the base, rotate the base 90°. After adjustment, rotate base back and lock the fixing screw.

Picture 3-7: Robot Base

3.6.4 Air Pressure Adjustment

1. After installing the robot, rotate the air pressure adjustment button which on the filter regulator, adjust the pressure to the 5bar (default setting).
2. All the drive-cylinder fittings are used speed control fitting. Adjust the air flow to change the speed of the drive-cylinder.
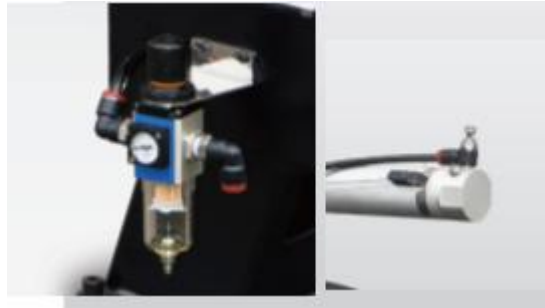
Picture 3-8: Filter Regulator

3.6.5 Shock Absorber

Before the robot send out of our factory, it has been tested strictly. But, because of the different working surroundings, the robot may be not operating smoothly as expected.

Adjust the shock absorber, the steps as flowing:

1. There is an adjustment shock absorber on rotation cylinder. Loosen the adjustment knob by inner hexagon spanner in counterclockwise direction, adjust the knob lightly to desired point.

Note: There is scale numbers (1 to 9) on shock absorber, 1 means the minimum buffer, 9 is the maximum. While adjusting, let the yellow point aims at the desired scale. After adjusting, tighten the fixing screw in clockwise direction.

Picture 3-9: Shock Absorber Adjustment Scale

2. Both the cylinders on the arm and crosswise stroke are with built-in buffer device. Adjust the buffering as your demands.

Note: According the cylinder's model to choose the size of the adjustment tool. Adjust in clockwise direction, the buffering power become large, counterclockwise direction is reverse.
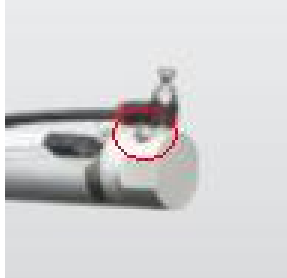
Picture 3-10: Buffer Device

3.6.6 The Position of Swinging-in Adjustment

In general, the position of the arm swinging-in is in vertical statement. If the mold is special designed, and the injection door is not in the center of the mold, you can loosen the fixed nut on shock absorber of rotation cylinder to adjust the limited height and the position of the arm swing-in.

Picture 3-11: Rotate Cylinder

3.6.7 Adjusting the Swing-out Angle

The range of swing-out angle is 50 to 90 degree. You can adjust the position of the shock absorber on the rotation cylinder to adjust the swing-out angle.

a. When arm swing left; rotate the right buffer in counterclockwise to increase the swing-out angle, in clockwise direction is reversing.

b. When arm swing right, rotate left buffer in counterclockwise to increase the swing-out angle, in clockwise direction is reversing.

3.7 Check Before Using

After installation, please check:

1. All parts connected fasten.

2. Air hose and electrical wiring connected well.

3. Anti-falling cylinder is normal.

4. All sensors are working.

Any alarm during operation, please refer to **chapter 5 Error Correction**.

4. Operation Instructions

4.1 Hand Controller

4.1.1 The Panel of Hand Controller

Picture 4-1: the Panel of Hand Controller

4.1.2 Keys

Arm up/down

Arm forward/backward

Gripper on/off

Arm swing-in/swing-out

Vacuum on/off

41(71)

SP 6 — Spare valve on/off (use to control the conveyor and transporter.)

↑↓ 7 — Sub-arm up/down

←→ 8 — Sub-arm forward/backward

▯ 9 — Spare, gripper on/off

锁模 0 — Mold close

4.2 Manually Operation

Press **MANUAL** key, toggle the display to the manual operation. Press the keys on the hand controller to set desired robot action.

⚠ Before manually setting, please confirm:

    1. The "mold open" signal.

    2. Insure arms will not knock against surrounding subjects.

```
** Manual Input **

      NoAct
```
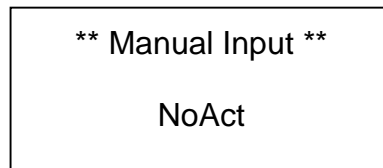
4.3 Automatic Operation

Press **AUTO** key, show the display, and enter into auto operating model.

Auto time (AutoTime): Record current automatic cycle time.

Set yield (SetYield): Anticipate the production quantity of the enactment. When the current yield arrives to the set yield quantity, the robot will alarm.

Current yield (CurYield): the quantities robot picks.

Current action (CurrAct): current action of robot.

Set time (Settime): The current time of the whole usage.

Operate time (Operatetime): The current action is physically time use.

Note: if robot or IMM alarm but robot should keep auto running, press **AUTO** key

to turn off the alarm. If press **STOP** key, robot will back to home position and stop auto running. Press **AUTO** key again, robot into auto running.

```
AutoTime  25.0
SetYield   5000
CurYield   4500
NoAct    0.0  0.0
```

CurrAct   Settime   Operatetime

4.4 System Operation

4.4.1 Stand-by Mode

After power on, the control system enter into the self-examination page, and then enter to the STAND-BY page. Also can press **STOP** key into STAND-BY page when robot operating normally. Press the **FUNC** keys to set the desired function, after setting, press the **STOP** key to save the setting and back to stand-by page.

4.4.2 Language

After entering into stand-by page, press **LANG** key to set language. Press **ENTER** key to change between simplified Chinese, traditional Chinese, English and Japanese.

Lang: English

4.4.3 The Function Setting

In stand-by page, press **FUNC** key to enter the function choice page. Press

or key on the hand controller, use cursor to choice the desired function, press **ENTER** key to change and save the setting.

```
Eje.Use:Use

MainChck:Positv

SubCkeck:Positv

VacmChck:Use
```

1. Ejection relation (Eje.Use):

NoUse: "Enable ejector forward" and "Enable ejector back", the signals output all
time.

Use: After opening mold, output "enable ejector forward" signal.

2. Main gripper examination (MainChck):

Positive: examine gripper in positive. If the gripper picks up parts successfully,
the gripper outputs signal ON.

Negative: examine gripper in negative. If the gripper picks up parts successfully,
the gripper outputs signal OFF.

NoUse: not examine gripper. Whether gripper picks up parts successfully or
not, it is not testing the signals.

3. Sub-gripper examination (SubCkeck): the same as the main gripper.

4. Vacuum examination (VacmCkck):

NoUse: in auto operation, it is not test the vacuum signals.

Use: in auto operation, if the vacuum suckers sucking parts successfully, it is
output signal ON.

4.4.4 Special Function

In stand-by page, press **FUNC** key twice, enter into the password setting page,
input "5488", then press **ENTER** key to enter the special function page. Press
UP/DOWN key, use the cursor to move to desired function key, press **ENTER**
key to save and acknowledge the setting.

PrerCnt:0	Stay:NoUse	DoorOpen:Orig
CycTime:60.0	Sound:ON	PressChk:Use
AlarmTime:12.0	ProdClr:OFF	AutoSignalNoUse
SafeDoor:Use	StopSafe:Use	

1. Spare counter (PrerCnt):

If the value is 00 for not using spare counter. If setting the value, the spare valve output counters according to movement of sub-interval mold.

If value is 1 stands for each mold output the spare valve, 2 stands for two molds output spare valve once only.

2. Cycle time (CycTime):

The cycle time is for robot monitors pick-out action. Means the maximum time from current cycle complete to the next Injection Machine mold opened limit. If waiting time exceed the set value, alarm raise.

3. Alarm time (AlarmTime):

Setting the alarming period time, exceed the time, the robot will stop alarm but the alarming page will still indicate on the screen.

4. Safety door (SafeDoor):

NoUse: not testing the signals of safety door.

Note: This state only refers authorized people to use this setting, when installing and testing robot. After finishing, it must be set at "use" of state.

Use: When arm down to pick up the parts, the safety door can test the signals.

5. Waiting outside of mold (Stay):

NoUse: robot operates in auto mode, the arms wait inside for next cycle, as the module program action.

Use: robot operates in auto mode, the arms wait outside for next cycle, and then rotate inside before the module program action.

6. Key sound (Sound):

Off: No sound while pressing.

On: Sound while pressing.

7. Products' number cleared (ProdClr):

Off: robot operates in auto mode, set the products' number, when reaching the setting number, the robot will stop and alarm.

On: In auto mode, not counter the products' number, the number always shows "0".

8. Stop uses the safety door (StopSafe):

NoUse: The injection molding machine locks mold not controlled by the robot. The robot stop working and "open mold finished", allow injection molding machine close mold for a long-term.

Note: This state only refers authorized people to use this setting, when install and testing robot. After finishing, it must be set at "use" of state.

Use: When robot stops working and "open mold finished", the door must open and close one time, then enable the IMM closed mold.

9. Door open (DoorOpen):

Reset: In robot auto operating mode, open the safety door and the arm will return to origin point.

Stop: In robot auto operating mode, open the safety door and arm stops working at once.

10. Air pressure checks (PressChk):

NoUse: not test air pressure signal.

Use: when the air pressure is not reach the setting, arm stop working. The hand controller will show air pressure is not enough.

11. Fully auto (AutoSignal):

NoUse: not test the fully auto operating signals.

Use: When having the fully auto operating signals, the robot can work in auto mode. When the signal cut off, the robot will stop when the action cycle finished.

4.4.5 Molds Select

In stand-by page, press **SAVE** key to enter into molds choice page (No.0 to No.99 molds can be choiced). Choice the desired molds and press **ENTER**

keyto save the setting.

```
**MoldSele**

Select:(0-99)?00
```

4.4.6 Mold Set

To copy the mold recipe, press **SAVE** key twice to enter into copy molds page. The user can choose one program from 0-99 to read it and then put it into 20-99 to memory as the code of the mold.

```
**CopyMold**

Read:(0-99)?00

Writ:(20-99)?20
```

4.4.7 Teach

In stand-by page, press **TEACH** Key to enter the TEACH page.

```
**Prog**

Read:(0-99)?00

Writ:(20-99)?20
```

```
**Prog**

2002Thim.Dly01

2003MainDown01

2004MoldEnd
```

Read the standard action program (0-19 set) or user defined program (20-99 set), save to the program contents change behind again 20-99 set.

After set "read" press **ENTER** key, the curser move to "write", then set the "write" program, press **ENTER** key to enter the teach program. In action area, press up/down key to correct step by step, after doing it, modification complete after

press **ENTER** key and current recipe is saved. The robot will work and turn to next program.

2 0	0 3	main arm down	0 1
modes number	steps number	action	action time

INSERT: input one order without actions in the teach program.

DELETE: delete one order from teach program.

Note:

a. Must have "mold open" signal from injection molding machine, then can enter into the TEACH page.

b. In teach mode, the robot will work according to the steps. Please pay special attention to the arm's displacement to prevent collision.

c. All molds action begins from original point and at the end of the cycle back to it, otherwise the action program is incomplete and robot cannot operate in auto mode.

Original point actions

1. Arm upgoing	2.Crosswise back	3. Rotation in	4.Chamfer wrist
5. Gripper open	6. Suction off	7.Spare output/input off	

4.4.8 Time Setting

In stand-by page or auto page, press **TIME** key to enter into the time modification page. Press up/down key to move the cursor to proper step. Press **ENTER** key after modify.

Note:

1: The time of after the step-by-step action sequence is the working delay time, the delay time end, executing the current action.

2: If an action needs limit ON/OFF check, after time delay, the act starts and the next step action will wait until the limit signal arrived.

```
2000Yield    0          UpLmt           ●
2001OpenDly 0.1         DownLmt         ○
2002Thim.Dly 0.1        MainGripsLmt    ○
2003MainDown0.1         SuckLmt         ○
```

4.4.9 I/O Monitor

In stand-by or auto page, press **WATCH** key to enter into the I/O monitor page. Use the up/down key to move the cursor and monitor the input and output signals.

No.	INPUT LS SQL	No.	OUTPUT
1	UpLmt	1	DownValve
2	DownLmt	2	ForwValve
3	MainGripsLmt	3	MainGripsValve
4	SuckLmt	4	SuckValve
5	MiddLmt	5	RotateInValve
6	PressLmt	6	RotateOutValve
7	RotateInLmt	7	SpareValve
8	RotateOutLmt	8	AlarmValve
9	ForwLmt	9	ClosePermit
10	BackLmt	10	UrgentStopOut
11	UrgentStopIn	11	Eje.BackPermit
12	OpenCmpl	12	Eje.ForwPermit
13	SafeDoor		
14	Eje.BackLmt		
15	Eje.ForwLmt		
16	AutoSignal		
17	CloseFinsh		

4.5 Standard Action Program

Program 0: Clip the moving side

0000 produce quantity	0001 open mold delay	0002 ejection delay
0003 the main arm down	0004 the main arm forward	0005 the main arm clip

0006 main arm backward   0007 main arm up   0008 rotate outside

0009 the main arm down   0010 main arm put down   0011 main arm up

0012 rotate inside

Program 1: Clip the fix side

0100 produce quantity   0101 open mold delay   0102 ejection delay

0103 main arm forward   0104 main arm down   0105 main arm backward

0106 the main arm clip   0107 main arm forward   0108 main arm up

0109 rotate outside   0110 main arm down   0111 main arm put down

0112 main arm up   0113 rotate inside

Program 2: Clip the fix side

0200 produce quantity   0201 open mold delay   0202 ejection delay

0203 main arm down   0204 The main arm clip   0205 main arm forward

0206 main arm up   0207 main arm backward   0208 rotate outside

0209 main arm down   0210 main arm put down   0211 main arm up

0212 rotate inside

Program 3: Clip the moving side

0300 produce quantity   0301 open mold delay   0302 ejection delay

0303 main arm forward   0304 main arm down   0305 the main arm clip

0306 main arm backward   0307 main arm up   0308 main arm forward

0309 rotate outside   0310 main arm down   0311 main arm put down

0312 main arm up   0313 rotate inside

Program 4: Suck the moving side

0400 produce quantity   0401 open mold delay   0402 ejection delay

0403 main arm down   0405 vacuum absorb   0406 main arm backward

0407 main arm up   0408 rotate outside   0409 main arm down

0410 the vacuum put   0411 main arm up   0412 rotate inside

Program 5: Clip and Suck the moving side

0500 produce quantity   0501 open mold delay   0502 ejection delay

0503 main arm down   0504 main arm forward   0505 vacuum absorb

0506 the main arm clip   0507 main arm backward   0508 main arm up

0509 rotate outside   0510 main arm down   0511 the vacuum put

0512 main arm up   0513 main arm down   0514 main arm put down

0515 main arm up   0516 rotate inside

Program 6: Mold inside put down to the moving side

0600 produce quantity   0601 open mold delay   0602 ejection delay

0603 main arm down   0604 main arm forward   0605 the main arm clip

0606 main arm backward   0607 main arm put down   0608 main arm up

Program 7: Mold inside put down to the fix side

0700 produce quantity   0701 open mould delay   0702 ejection delay

0703 main arm forward   0704 main arm down   0705 main arm backward

0706 the main arm clip   0707 main arm forward   0708 main arm put down

0709 main arm up

5. Error Correction

Error	Error Caused	Error Correction
After power on, the display on the hand controller is not light.	1. Emergency Stop key on the hand controller was pressed. 2. 37P plugs loosed or not connected. 3. Power wire errors. 4. Fuse burning-off.	1. Losing the Emergency Stop key on the hand controller. 2. Check the 37P plugs. 3. Check the power wire. 4. Check and change the fuse.
The screen of hand controller is dark, when power ON.	Under voltage.	Adjusting the screw in lateral face of the controller until the display of hand controller clearly.
Error Number 01 05 R.In Lmt ON 06 R.Out Lmt ON	Both the rotation in and out limit having signals.	1. When the arm is swing in, check the light of rotation out limit is lighting all the time. 2. When the arm is swing out, check the light of rotation in limit is lighting all the time. 3. Check I/O connecting wire. 4. Whether having troubles on power board.
Error Number02 01 Rise lmt ON	Down valve worked already, having the signal of down valve .The motion of arm downing doesn't finish in set time.	1. Whether the air pressure is too low. 2. Whether the arm go down. 3. Whether having the signal of up limit. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 03 01 Rise lmt OFF	Down valve no motion, and the up limit no signal, the motion of the arm upping don't finish in set time.	1. Whether the air pressure is too low. 2. Whether the arm go up. 3. Whether having the signal of up limit. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error number 04 05 Vacuum ON 04 Suck lmt OFF	The sucker working and the vacuum suck no signal input.	1. Whether the air pressure is too low. 2. Check if sucker suck the products and liquid the air. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 05 04 Main Clip ON 02 Main Clip lmt OFF	Main clip valve working, main clip limit no input.	1. Whether the air pressure is too low. 2. Whether the main clip testing function is right. 3. Check if the main clip can clip the products. 4. Check I/O connecting wire. 5. Whether having trouble on power board.

Error	Error Caused	Error Correction
Error Number 07 07 Vacuum OFF 04 Suck lmt ON	Suck valve no action, vacuum suck having signal.	1. Check if the suck limits having signals. 2. If the suck magnetic valve having trouble. 3. Check I/O connecting wire. 4. If having trouble on power board.
Error Number 08 04 Main Clip OFF 02 M.Clip lmt ON	Main clip valve no working .main clip signal on.	1. Whether the main clip having signal. 2. Whether the main sack magnetic valve having trouble. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 10 06 R.out ON 06 R.Out Lmt OFF	Rotation out valve working, rotation out limit off, the action didn't finish in the schedule time.	1. Whether the air pressure is too low. 2. Whether the robot rotating out. 3. Check Whether the rotation limit having signals. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 11 06 R.out OFF 05 R.Out Lmt OFF	Rotate out valve no action; rotate in limit doesn't input, the rotate in doesn't finish in the schedule time.	1. Whether the air pressure is too low. 2. Whether the robots rotating in. 3. Whether the rotating having signal. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 12 04 Main Clip ON 02 M.Clip lmt ON	Main clip on, main clip limit no input.	1. Whether main clip valve testing function is reverse. 2. Whether the air pressure is too low. 3. Check Whether the main clip can clip the products. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 14 03 main forward valve On 09 main backward lmt On	Main forward valve working, main backward valve having signal.	1. Whether the air pressure is too low. 2. Whether the robot go forward. 3. Whether having the backward limit signal. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 15 03 main forward valve Off 09 main backward lmt Off	Main forward valve no action, backward limit no input, the backward action didn't finished in the schedule time.	1. Whether the air pressure is too low. 2. Whether the robot go backward. 3. Whether having the backward limit signal. 4. Check I/O connecting wire. 5. Whether having trouble on power board.

Error	Error Caused	Error Correction
Error Number 31 01 Rise lmt OFF Not Origin	Up limit no signal, Robot not return in the waiting point.	1. Press stop key to reset. 2. Whether the air pressure is too low. 3. Check if the up limit having signal. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 32 05 R.In Lmt OFF Not Origin	Rotation in limit no signal input, Robot doesn't return the waiting point.	1. Press stop key to reset. 2. Whether the air pressure is too low. 3. Check if the rotation in limit having signals. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 33 06 R.Out Lmt ON Not Origin	Rotation out limit no signal input, Robot not returns in the waiting point.	1. Press stop key to reset. 2. Whether the air pressure is too low. 3. Check if the rotation out limit having signals. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 34 07 Mid.Mold lmt OFF Not Origin	When manual or teach, middle mold limit no signal input.	1. Whether the indicator light of proximity switch on middle mold on. 2. Whether having the signal of middle mode in the monitor. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 35 10 Mold Open Lmt OFF Not Origin	When manual or teach, the opened mold limit no signal input.	1. Check the injection molding machine if open mold completely. 2. Check the computer of the injection molding machine if allows the robots to use. 3. Check the computer of the injection molding machine if having the open mold limit signal output. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 45 Before Rotate 02 MainDownON	Before the arm rotating, main down valve working.	1. Before rotating, don't operate the main arm down motion, must close the down valve.
Error Number 47 Before Rotate 01 uplimit OFF	Before Rotate the up limit has no signal input.	1. Whether arm in up condition. 2. Whether having the signal on up limit. 3. Check I/O connecting wire. 4. Whether having trouble on power board.

Error	Error Caused	Error Correction
Error Number 50 10 Mold Opened ON 07 MidMold Off	Mold opened signal input, No middle mold signal.	1. Whether the indicator light of proximity switch on middle mold on. 2. Whether having the signal of middle mode in the monitor. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 51 06 R.Out LmtOFF 05 R.In LmtOFF	Out limit and in limit no signal input at the same time.	1. When rotating in, check the indicator light of the rotary switch on or not. 2. When rotating out, check the indicator light of the rotary switch on or not. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 52 Before descend 04 Main Clip ON	Before arm descending, Main arm grip valve working.	1. Whether having main grip, before arm descending, Main arm grip off.
Error Number 54 Before descend 07 Vacuum ON	Before arm descending, vacuum suck Valve working.	1. Whether operating the vacuum suck, before arm descends, vacuum suck Valve off.
Error Number 55 Before descend 10 Mold OpenedOFF	Before arm descending, no mold opened signal input.	1. Check the injection molding machine if open mold completely. 2. Check the computer of the injection molding machine if allows the robots to use. 3. Check the computer of the injection molding machine if having the open mold signal output. 4. Check I/O connecting wire. 5. If having trouble on power board.
Error Number 56 Before descend 07 MidMoldOff	Before arm descending, No middle mold signal.	1. Check if the indicator light of proximity switch on middle mold on. 2. Check the middle mold signal on or not. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 57 Before descend 09 Safety DoorOFF	Before arm descending, no safety door signal.	1. Check if the safety door of the injection molding machine off. 2. Check if having the safety door signal. 3. Check I/O connecting wire. 4. Whether having trouble on power board.

Error	Error Caused	Error Correction
Error Number 58 09 Mold OpenedON 08 Safety DoorOFF	Safety door use, signal input when opened mold. No safety door signal.	1. Check if the safety door of the injection molding machine off. 2. Check if the safety door of electronic control having signaled. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 59 Open Wait Over	Injection molding machine cycle open mold time too long.	1. Extending the cycle time of the robots, more than the cycle time of injection molding machine opening mold.
Error Number 60 When descend 10 Mold Opened OFF	Arm go down, opened mold signal OFF.	1. Whether the open mold signal of the injection molding machine OFF. 2. Check I/O connecting wire if poor contact. 3. Whether having trouble on power board.
Error Number 61 When descend 07 Mid. Mold signal OFF	Arm go down, middle plate confirmation signal OFF.	1. The input signal of the middle mold if normal. 2. The light of sensor switches of the middle mold ON or not. 3. Check I/O connecting wire if poor contact.
Error Number 62 13 Emergency OFF Emergency Event	Injection molding machine carry out emergency stop.	1. Losing the emergency stop key of the electronic control. 2. Losing the emergency stop key of the injection molding machine. 3. Check the connection line of the emergency stop signal.
Error Number 70 Not Right Program no use	The teach program is not complete.	1. Set the teach program again, robot should return in the waiting point at last.
Error Number 71 Set Yield Arrive	Current yield reach to setting.	1. Increasing the number of the set yield. 2. Clearing current yield.
Error Number 72 Act Not Exe .Mold	Controlled the arm up and down by hand, not according the auto program.	Controlled the arm up and down by hand, it must correspond the forward or backward position in auto program. Or will damage the mold.
Error Number 73 when stay out Dais Out Lmt Off press stop key	Stay outside, rotate outside limit OFF.	1. Press STOP key to rotate out. 2. Check the rotating signal input or not. 3. Check I/O connecting wire if poor contact. 4. If having trouble on power board.
Error Number 74 Air pressure not enough	Air pressure of robots is not enough.	1. Check if the air pressure of robots is enough. 2. Whether the signal of air pressure is normal. 3. Check I/O connecting wire. 4. Whether having trouble on power board.

Error	Error Caused	Error Correction
Error Number 75 Main up lmt On main down lmt On	Both main arm up limit and down limit having signals.	1. Main arm up, down limit switch OFF or not. 2. Main arm down, up limit switch OFF or not. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 76 Main Forw lmt ON Main back lmt ON	Both main arm go forward and backward limit having signal input.	1. Main arm go forward, back limit switch OFF or not. 2. Main arm go backward, forward limit switch OFF or not. 3. Check I/O connecting wire 4. Whether having trouble on power board.
Error Number 77 Main Down OFF Main down lmt ON	Descends valve, no input the down limit, the action didn't finished in schedule time.	1. Whether air pressure is too low. 2. Arms if down or not. 3. Whether having the signal when down limit. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 78 MainDown OFF Main down lmt ON	Having the down limit signal, no down action.	1. Down limit off or not. 2. Whether the magnetic valve having trouble. 3. Check I/O connecting wire. 4. Whether having trouble on power board.
Error Number 79 MainForw ON MainForw lmt OFF	Forward valve working, no input the signal; the action didn't finish in schedule time.	1. Whether the air pressure is too low. 2. Whether the arm having go forward action. 3. Whether having signal when forward limit. 4. Check I/O connecting wire. 5. Whether having trouble on power board.
Error Number 80 MainForw OFF MainForw lmt ON	Signal input, no forward valve action.	1. Whether having the forward limit signal. 2. Whether the forward magnetic valve having trouble. 3. Check I/O connecting wire.
Error Number 81 Robot working in auto, the injection molding machine has no signal.	When the robot working in auto, there is having no auto signal of injection molding machine on controller.	1. Whether the injection molding machine turn in fully automation. 2. Check if having the fully automatic signal. 3. Check I/O connecting wire. 4. Whether having trouble on power board.

6. Maintenance

6.1 General

Please observe the prescribed maintenance intervals. Proper maintenance ensures trouble-free functioning of the robot. Proper maintenance is necessary in order that the warrantee be fully enforceable.

⚠ Maintenance should be performed by qualified personnel only.

⚠ Maintenance and responsibility for safety equipment becomes the responsibility of the system operator once he accepts the robot.

⚠ Please note, in particular, that safety instructions marked with a ⚠ must be observed according to regulations so that fully functionality of this equipment can be guaranteed.

6.2 Lubrication Requirements

Remove the old grease from the guide shafts and scraper rings of the bearing using a cloth. Then apply the new grease to the guide shafts using a brush.

As well as all roller bearing greases according to DIN 51825. Lubrication NGL12 observes to DIN51818 standard.

Recommended Lubricants:

MANUFACTURER	TYPE:
SHELL	ALVANIA G2
	DARINA GREASE 2
MOBIL	MOLYKOTE LONG TERM 2PLUS
	MOBILGREASE 28
	MOBILUX 3
ESSO	UNIREX N3
KLUBER	ISOFLEX NBU 15
	ISOFILEX NCA 15

6.3 Maintenance

In accordance with the maintenance schedule, make robot operates in best way.

Daily Maintenance	Monthly Maintenance	Quarterly Maintenance
1. Swab. 2. Filter drainage. 3. Check the pressure of air supply. 4. Check bolt which connected the robot and injection molding machine whether tighten. 5. Check all block settings whether tightened.	1. Use air gun to clean filter. 2. Check the screws on all parts whether tightened. 3. Confirm whether the pipeline breaks or loosed. 4. Check the speed of adjustment.	1. Brush grease to the guide shafts.

7. The Assembly Chart

7.1 Mechanical Assembly

7.1.1 Base Chart
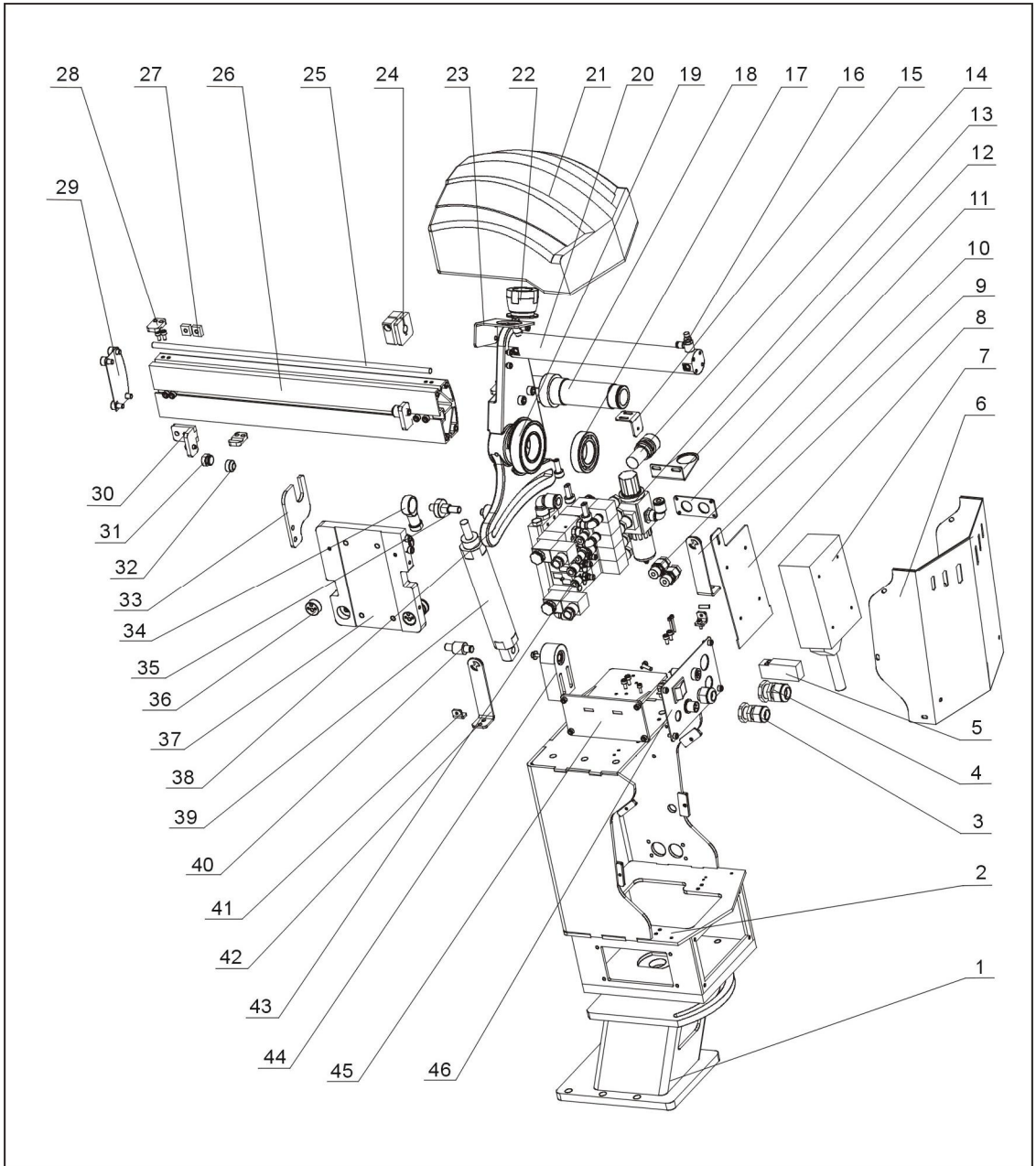
Picture 7-1: Base Chart

7.1.2 Parts List

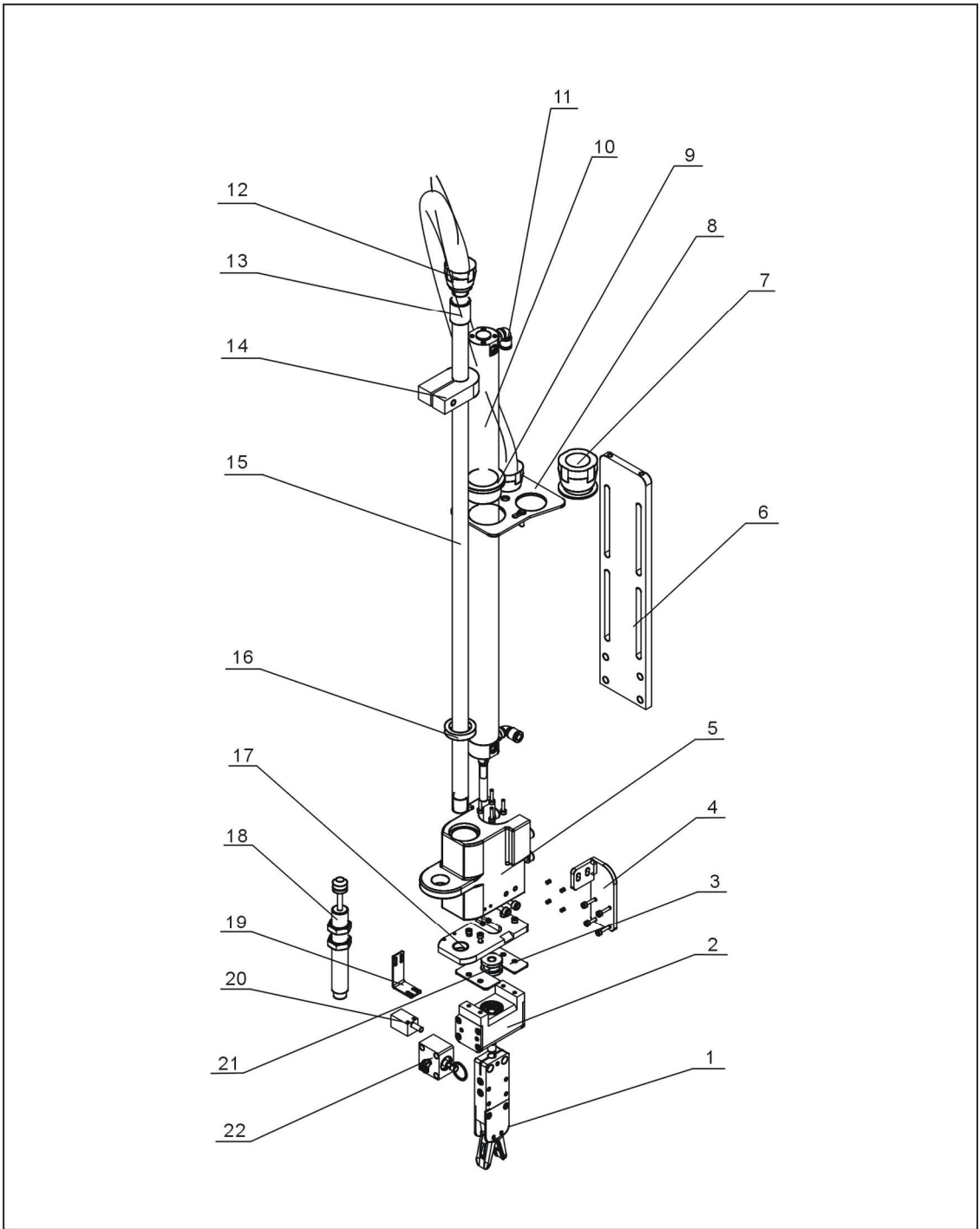| No.	Name	Part Number		
		SS-550-S	SS-650-S	SS-750-S
1	Base	BL70550110020	BL70550110020	BL70550110020
2	Holder	BL70550201020	BL70550201020	BL70550201020
3	PG135 cable glands	YE67013500000	YE67013500000	YE67013500000
4	PG18 cable glands	YE67001800000	YE67001800000	YE67001800000
5	Pressure sensor	-	-	-
6	Control box	BL70551601020	BL70551601020	BL70551601020
7	Circuit board	-	-	-
8	Circuit board mounting plate	-	-	-
9	Circuit board supporting frame 1	-	-	-
10	silencer mounting plate	-	-	-
11	three-way pipe fittings	-	-	-
12	Filter mounting bracket	YE15500200000	YE15500200000	YE15500200000
13	Filter	YE15500200000	YE15500200000	YE15500200000
14	Buzzer	-	-	-
15	PCB bracket	-	-	-
16	Speed control fitting 1/8-Φ6	YW80061800300	YW80061800300	YW80061800300
17	Deep groove ball bearings 6007	YW11600700000	YW11600700000	YW11600700000
18	Crosswise axis mounting shaft	BH71550401040	BH71550401040	BH71550401040
19	Deep groove ball bearings 6208	YW11620800000	YW11620800000	YW11620800000
20	Cylinder (crosswise) B05-MALC32 × 125-S	YE31321500500	YE31321500500	YE31321500500
21	Crosswise axis mounting base	BH71550301010	BH71550301010	BH71550301010
22	Hose straight fitting WQG1-P29B/AD34.5	YE67129040100	YE67129040100	YE67129040100
23	The bellows bracket	BL70551401020	BL70551401020	BL70551401020
24	Piston rod clamp	YW09055000300	YW09055000300	YW09055000300
25	Linear guides	YW09550700300	YW09550700300	YW09550700300
26	Aluminum profiles	BH71551601010	BH71551601010	BH71551601010
27	Fixed slider	YW09161400110	YW09161400110	YW09161400110

No.	Name	Part Number		
		SS-550-S	SS-650-S	SS-750-S
28	Linear guide plate	BL70550801020	BL70550801020	BL70550801020
29	Profiles baffle	BL70550901020	BL70550901020	BL70550901020
30	Buffer mounting plate	BL70551301020	BL70551301020	BL70551301020
31	Buffer 1	BH91151200010	BH91151200010	BH91151200010
32	Silencer sleeve (dark green)	YW80200000000	YW80200000000	YW80200000000
33	Cylinder piston rod holder	BL70551801020	BL70551801020	BL70551801020
34	Internally threaded rod end bearings	-	-	-
35	Angle adjustment shaft	BH71551201040	BH71551201040	BH71551201040
36	Wheel fasteners	BH71552001040	BH71552001040	BH71552001040
37	Arm mounting plate	BH71551701010	BH71551701010	BH71551701010
38	Profiles mounting frame	BH71550501010	BH71550501010	BH71550501010
39	Rotate cylinder MAL32 × 125-S-CA	YE31321250000	YE31321250000	YE31321250000
40	Cylinder mounting shaft	BH71551101040	BH71551101040	BH71551101040
41	Universal mounting plate	BL71014700020	BL71014700020	BL71014700020
42	Circuit board supporting frame 2	-	-	-
43	Magnetic valve 4V-08/DC24V	YE32421000200	YE32421000200	YE32421000200
44	Rotate cylinder fixed block	BH71551001040	BH71551001040	BH71551001040
45	Power supply mounting plate	-	-	-
46	Control Panel	BL70551501020	BL70551501020	BL70551501020

7.1.3 Arm Chart

Picture 7-2: Arm Chart

7.1.4 Part List

| No.	Name	Part Number		
		SS-550-S	SS-650-S	SS-750-S
1	Gripper	YE31055000300	YE31055000300	YE31055000300
2	Rotate wrist	BW30055000200	BW30055000200	BW30055000200
3	Fixed block plate	BL70550351010	BL70550351010	BL70550351010
4	Anti-falling cylinder mounting plate	BL70550371010	BL70550371010	BL70550371010
5	Cylinder bracket	BH71552201010	BH71552201010	BH71552201010
6	Arm adjustment plate	BH71552101010	BH71552101010	BH71552101010
7	The bellows bracket	BL70550390010	BL70550390010	BL70550390010
8	Hose straight fitting	YE67129040100	YE67129040100	YE67129040100
9	Fixed cylinder cap			
10	Cylinder (up/down)	YE30325500000	YE30325500000	YE30325500000
11	L-type quick connector	YW80180800000	YW80180800000	YW80180800000
12	Hose straight fitting	YE67012000100	YE67012000100	YE67012000100
13	Internal thread fitting			
14	Arm down stopper	BH71550601040	BH71550601040	BH71550601040
15	Arm guide rod (up/down)	YW09147700000	YW09147700000	YW09147700000
16	Rubber stopper ring	YR40382740000	YR40382740000	YR40382740000
17	Gripper fixed plate	BL70550311040	BL70550311040	BL70550311040
18	Shock absorber	YW82205000000	YW82205000000	YW82205000000
19	Proximate switch mounting plate	BL70550380010	BL70550380010	BL70550380010
20	Proximate switch			
21	Piston rod fasteners	BH71550411010	BH71550411010	BH71550411010
22	Anti-falling cylinder	YE30055000350	YE30055000350	YE30055000350

7.2 Electrical Control Charts
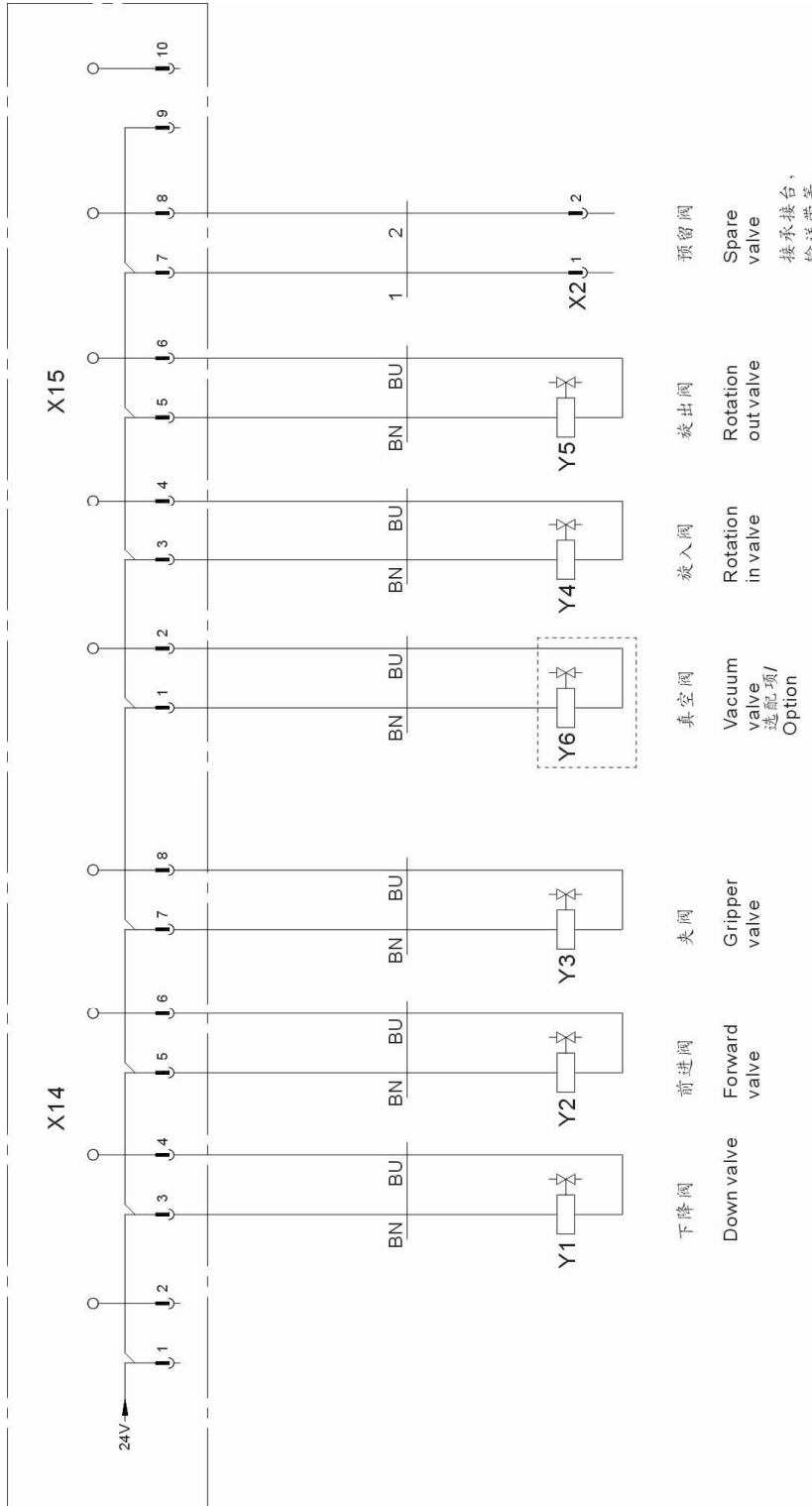
7.2.1 Pneumatic Schematics
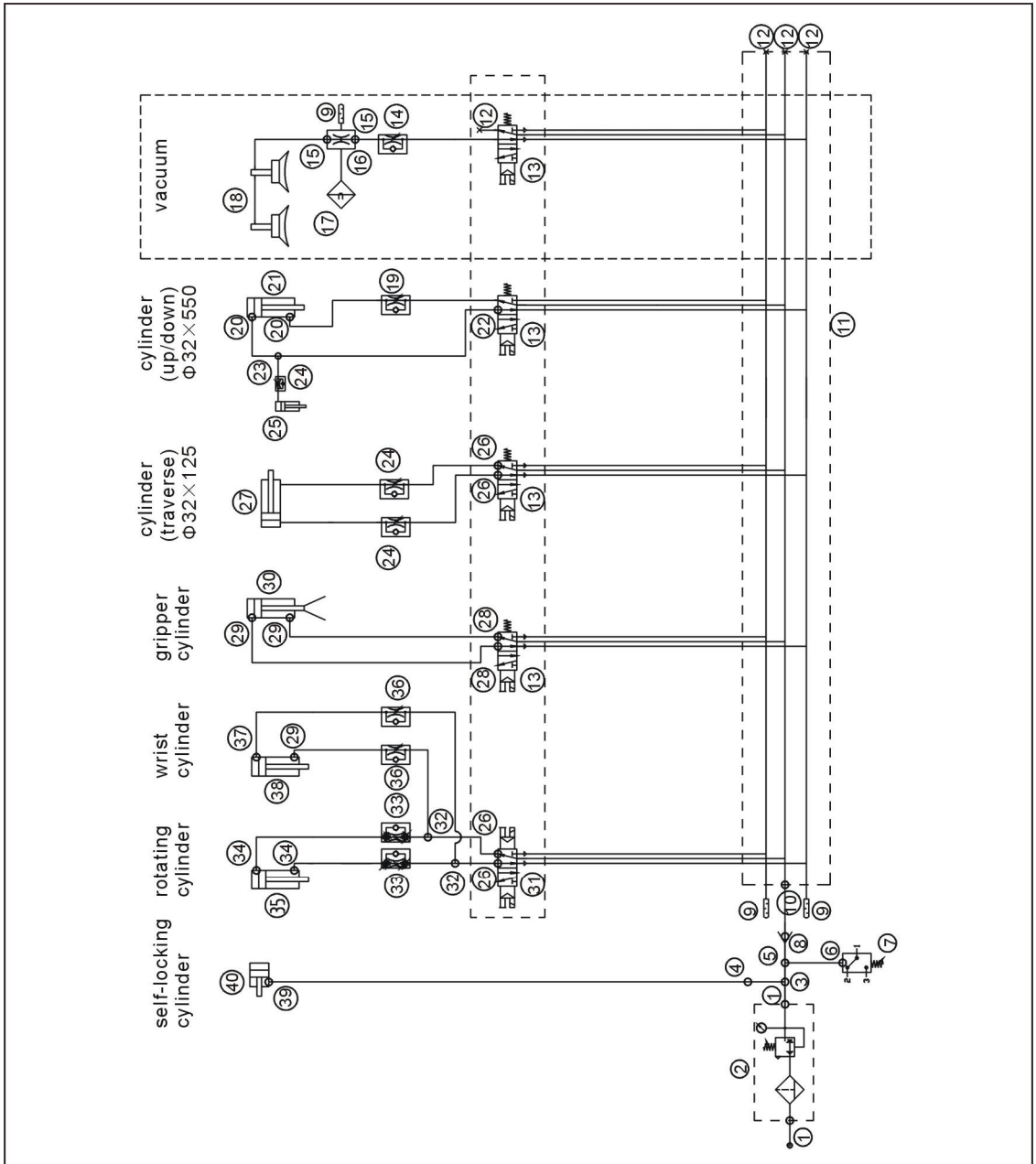
Picture 7-3: Pneumatic Schematics

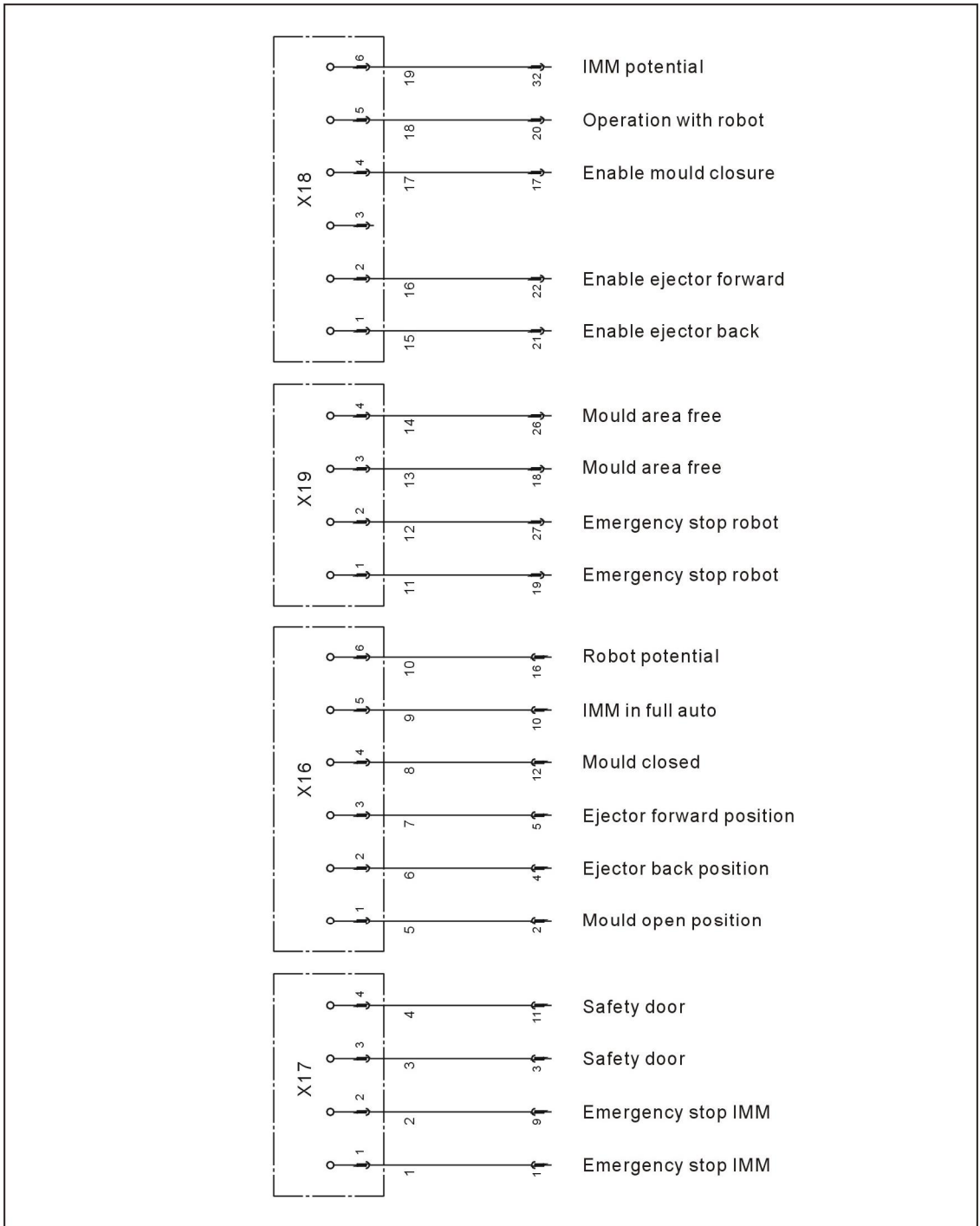## 7.2.2　The Main Control Board Input Wiring Diagram
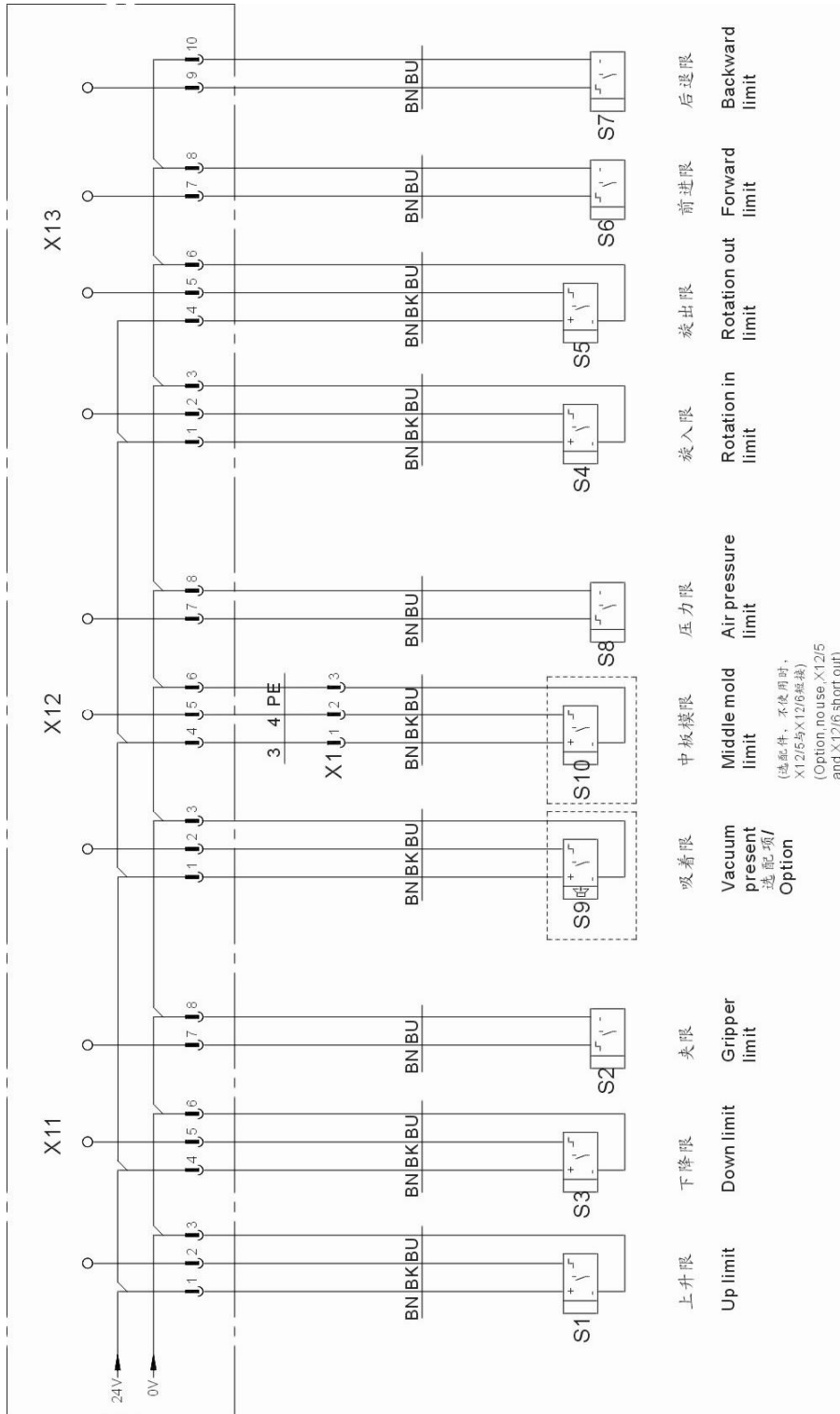
Picture 7-4: The Main Control Board Input Wiring Diagram

7.2.3 The Main Control Board Output Wiring Diagram

Picture 7-5: The Main Control Board Output Wiring Diagram

7.2.4 The Main Control Signal Wiring Diagram

X18

6	19 — 32	IMM potential
5	18 — 20	Operation with robot
4	17 — 17	Enable mould closure
3		
2	16 — 22	Enable ejector forward
1	15 — 21	Enable ejector back

X19

4	14 — 26	Mould area free
3	13 — 18	Mould area free
2	12 — 27	Emergency stop robot
1	11 — 19	Emergency stop robot

X16

6	10 — 16	Robot potential
5	9 — 10	IMM in full auto
4	8 — 12	Mould closed
3	7 — 5	Ejector forward position
2	6 — 4	Ejector back position
1	5 — 2	Mould open position

X17

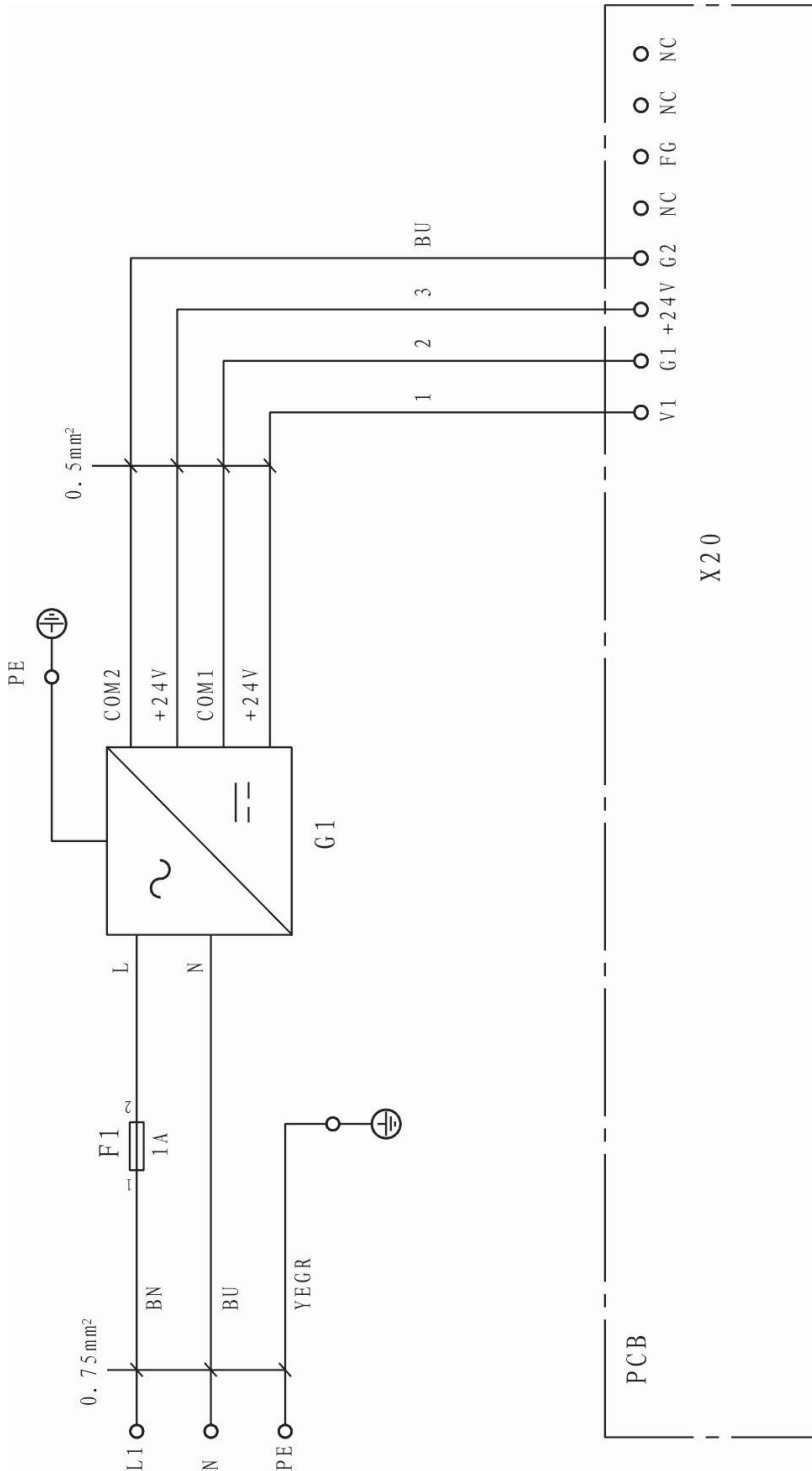|		
4	4 — 11	Safety door
3	3 — 3	Safety door
2	2 — 9	Emergency stop IMM
1	1 — 17	Emergency stop IMM

Picture 7-6: The Main Control Signal Wiring Diagram

7.2.5 The Main Control Panel Layout
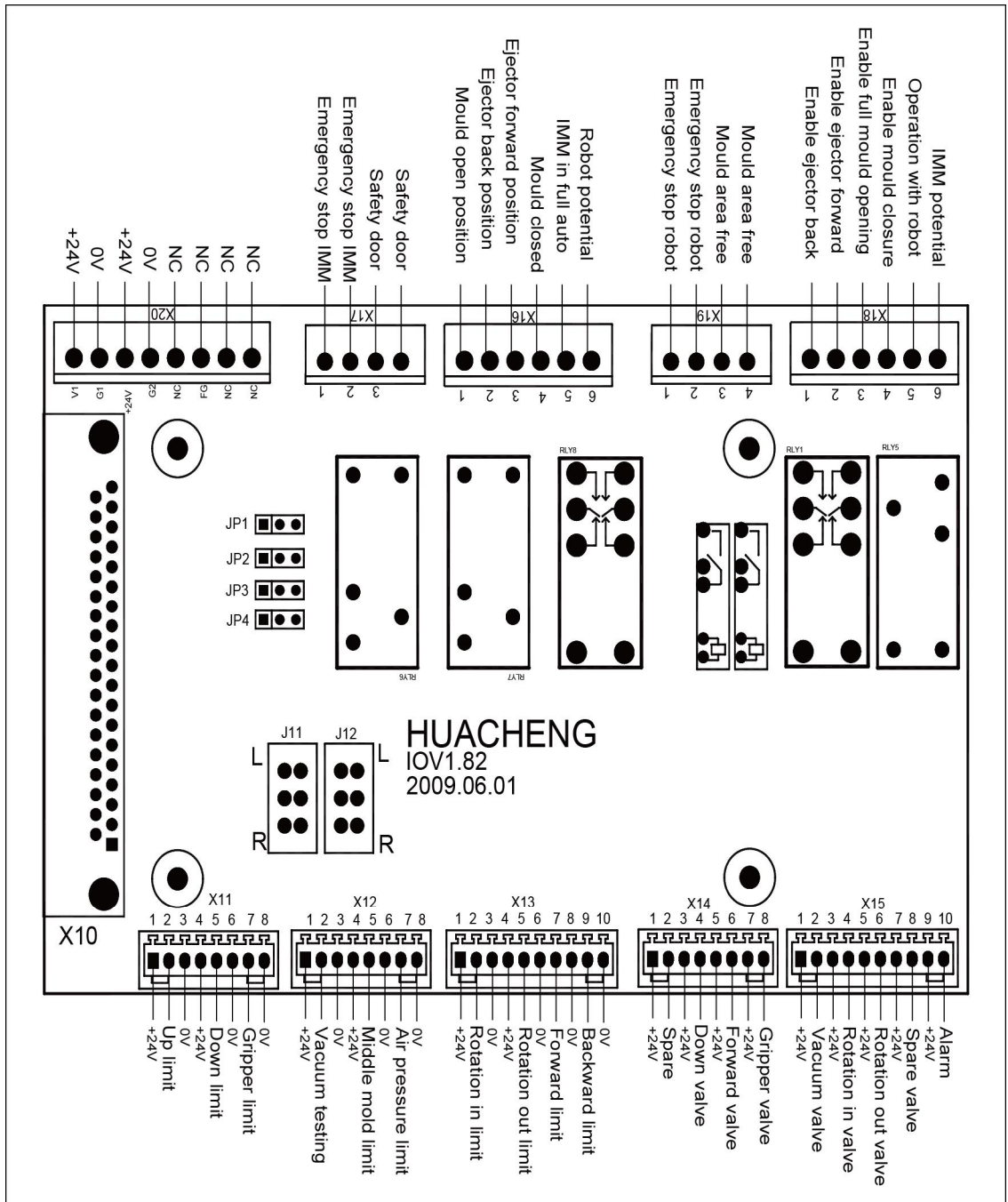
Picture 7-7: The Main Control Panel Layout

7.2.6 Control Power Diagram

Picture 7-8: Control Power Diagram

Appendix: Electrical Components List

序号/NO.	符号/Symbol	名称/Name	制造商/Manufacturer	型号/Type	规格/Specification	数量/Number	物料编号/Material Number	备注/Remark
1	F1	熔断器底座/Fuse holder	FUYUAN	OP530	250VAC 10A	1	E3202008	-----
2		熔断器芯/Fuse	FUYUAN	--	1A 250V	1	E3205002	-----
3	G1	直流电器/DC power	MEANWELL	NES-35-24	IN=100-240VAC OUT=24V	1	Y1400301	-----
4	PCB	微电脑板/Microcomputer Board	HUACHENG	EM12	24V,12V	1	Y1401901	-----
5		手控器/Control box	HUACHENG	EM12				
6	S1,S3,S4,S5	近接开关/Proximity switch	FOTEK	QL-05N	NPN 10-30VDC	4	Y1500405	-----
7	S2	磁性开关/Magnetic sensitive switch	CHELIC	CS-9D	DC5-120V AC5-120V 50mA	1	E1009000	-----
8	S6,S7	磁性开关/Magnetic sensitive switch	CHELIC	CS-130	DC5-240V AC5-240V 100mA	2	E1013000	-----
9	S8	压力开关/Pressure switch	NORGREN	0880300	3A 250V	1	Y1106600	-----
10	Y1,Y2,Y3	电磁阀/Valve	NORGREN	V51B517A-A213J	24VDC 2W	3	Y1105020	-----
11	Y4,Y5	电磁阀/Valve	NORGREN	V51B511A-A213J	24VDC 2W	1	Y1105021	-----
12	X1,X2	防水连接头/Waterproof Connector	AOPULO	AQF-16	3P	2 / 2	ES208016 / ES208017	-----
13	X3	重载接头/Heavy Duty Connector	WAIN	HD-032-M(1-16)	10A 250V/4KV/3	1	E6203201	-----
14		电缆/Cable	HAOTONG		20×0.3mm²	6m	YE50032000000	
15		电缆/Cable	HAOTONG		5×0.75mm²	1.8m	F2101004	
16		电缆/Cable	HAOTONG		5×0.3mm²	1.6m	YE50030500000	
17		电缆/Cable	HONGYI		3×0.75mm²	5m	YE62075300000	
18								
19								
20								
21								