ST1-S

User Manual

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SHINI

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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 ST1-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 agent 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, and in accordance with design of specifications and wiring instructions.

● Use safety fence to indicate working area while 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 is no following matters in the compressive air such as 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.

⚠ 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.

The warning marks and its meanings:

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

5		Caution! High temperature
6		No Flame

1.3 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 button can be released by turning it clockwise.

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

1.4 Transportation and Storage

During transporting the robot, working underneath the robot is forbidden.

⚠️

If it is necessary to remove or reinstall the robot, please contact the agent or manufacturer for help. The manufacturer and agent do not have any responsibility for injuries or damage if the customers remove robots themselves.

1.4.1 Transportation

1. ST1-S series robot is fix on a steel structure base and packaged with crate.
2. Before transporting, fasten the sliding base to prevent any collision.
3. The arms are free to slide when electric power and pneumatic supply are off. Push the arms upwards to lock them.
4. During the transporting, please keep the robot away from other objects, in order to avoid damages.
5. Should increase plastic bag out of the robot, and if necessary, pumping vacuum and put desiccant in the packing during the long-distance transportation,
6. The temperature between -25℃ to 55℃ during the transportation, for short transportation (inner 24 hours), the temperature can not 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.
If there is any damage caused by transport, please:
1) Feedback immediately to the transportation companies and our company.
2) Claim damages to the shipping company; fill in the file requests for compensation.
3) Retain the damaged items stand-by for testing. Until the testing is completed, do not return the damaged items.

1.4.2 Transportation after Unpacking

1. After taking apart the package, first removed the supporting plate, so that the arm rotated 90 degrees, and the vertical with beams (see the picture). To do as the following:

1) Release 6 fixed screws on the supporting board, remove the packing support plate.

2) Rotating beams and arm slowly, so that the arm and the beam was vertical.

3) Lock the arm connecting plate and the sliding seat by the 6 screws on the supporting plate.

Note: 1) Remove the packing support plate should be careful to prevent the arm wrist and the machine damage or personal injury.

2) Lock the arm connecting plate and the sliding seat, ensure that the arm in vertical state.

2. There is a ring in the parts box when the robot sent, after taking apart the package, the ring is installed on the "T"-type block of the vertical beam, using with the two ends of beam. (See the picture)

Note: After hoisting, please keep rings of the vertical beam, and use again next time.
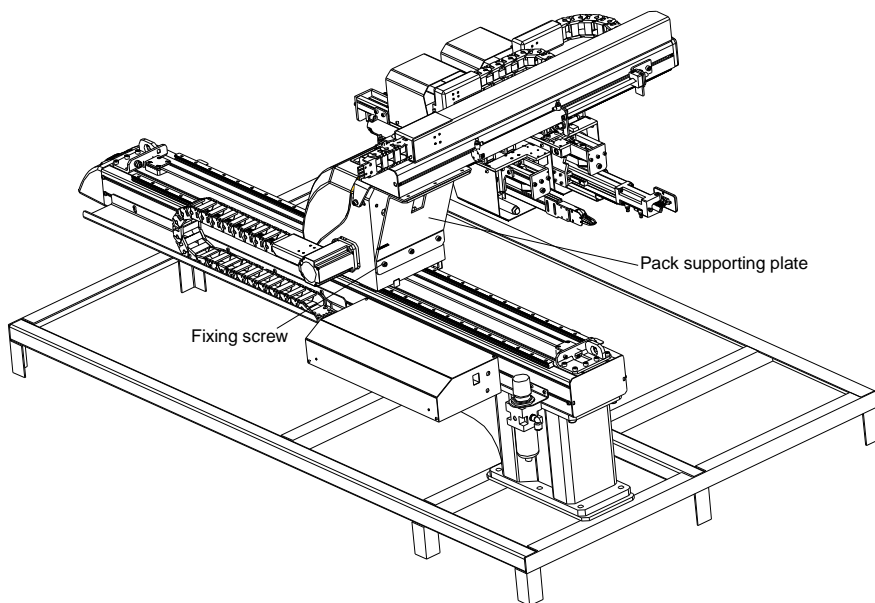
Picture 1-1 Packing of ST1-S and ST1-T-S
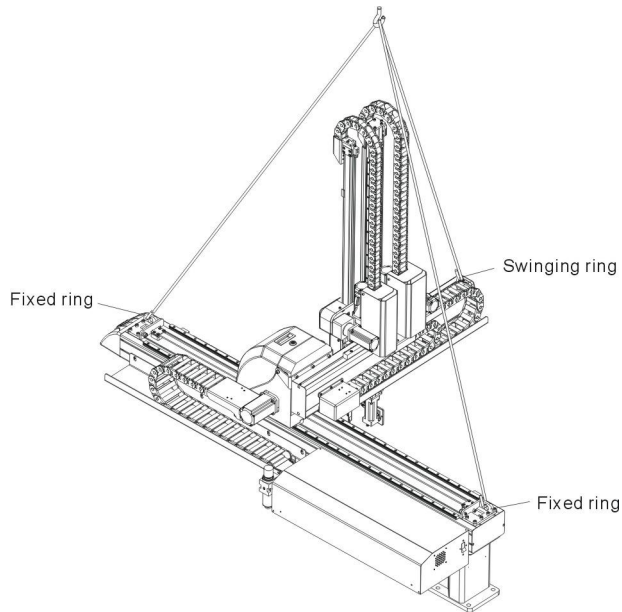
Picture 1-2 Hanging transportation of ST1-S and ST1-T-S

1.4.3 Storage

1. Switch off the main air source and power, if 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, please anti-rust, and if necessary place film to prevent dust and erosion.

1.4.4 Operation Environment

1. Temperature: between +5℃ to +40℃
2. Humidity: Temperature +40℃, relative humidity 50%
3. Elevation: Under 1000 meters above sea level
4. Stop using the product immediately when the following occurs:
5. Power cable is damaged
6. Air tube is damaged
7. Machine breaks down or dissembled by unauthorized personnel.
8. There are organic solvent, acidic phospholipids, sulfurous acid, and chlorine, flammable and explosive dangerous matter in compressed air pressure is not enough or too high.

1.4.5 Retirement

When the robot goes to its end of service life, it should be demolished according to different martial (metal, oil, lubricants, plastics, rubber, etc.) to split in different ways. Deal with the machine according to local requirements; ensure the commission company as the best.

Any problem during using the SHINI ST1-S Series Robot, please contact the company or the local vendor.

1.5　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.

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2 Installation

2.1 Instruction

2.1.1 Safety Issue

1. Before installation, please read this chapter carefully.
2. Fix robot on the base before operating.
3. After installing robot, indicate the working area with safety fence.
4. The hand controller should be placed outside of the safety fence.
5. Keep the air pipe in good way during installation.
6. The power connection should be performed only by authorized electrician.
7. Connecting cable and the grounded should obey the local rules and regulations.
8. The grounded wire can not attach to the water pipes, gas pipes, telephone lines or television cables.
9. Use the independent cable and power switch, the diameter of main power wire can not be less than the wire of control box.
10. The end of the power wire must be safety and immobility.

2.1.2 Compressed Air Connection

1. According to the filter specifications to choose a suitable hose connected between the air source and the filter.

Note: Before connecting hoses, clean the hoses by compressed air. To ensure that there is no cuttings, sealing tapes in it.

2. Check the air connection of control box in good conditions, without bending conditions.

2.1.3 Electric Power Connection

1. The electrical connection should be performed only by authorized electrician.
2. Shut off the power supply before connecting.
3. Set up the safety electrical outside of the control system to keep the control system works in normally.
4. Before installation, wiring, operation, and maintenance must be familiar with instructions 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.

The power requirements are given on the type 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 authorized electrician and should be in accordance with any applicable regulations.

2.1.4 Safety Fence

1. After installing the robot, indicate the safety fence outside the scope of the robot working area.
2. The hand controller should be fixed outside of the safety fence.
3. Stick the warning signals on outstanding place of the fence.

2.1.5 Mounting Preparation
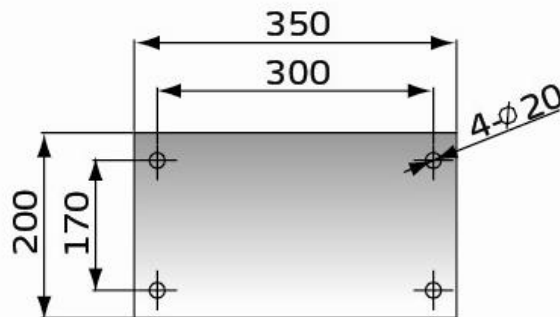
1. Before drilling, switch off the injection molding machine and then turn off the power, avoid the scrap-iron into the mold.
2. Stick the drilling picture on the installing surface of IMM.
3. Use the center punch to assist drilling.
4. Place the magnetic drill on the fixing plate, use drill bits (Φ14) to drill 6 holes about 30mm depth.
5. Tapping. Use M16 tap to produce internal 6 screws threads about 25mm depth.

2.1.6 Mounting Instruction

1. Should avoid vibration, collision and falling, when transfer the top of IMM.
2. Alignment holes, using the 8mm torque wrench turn to 77Nm tightens the M16 × 30 hex socket screws.

Note: if with the connection base, fix it on the injection molding machine, then fix robot on connection base.

2.2　Equipment Specification

2.2.1　ST1-S Dimensions (unit: mm)
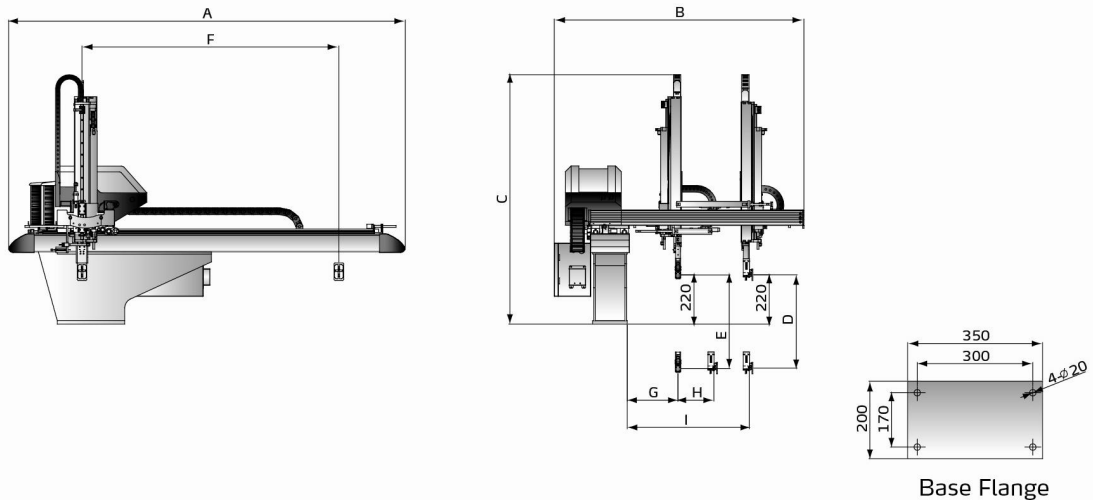
Picture 2-1: ST1-S Dimensions

2.2.2　Model Specification

Chart 2-1：Specification List 1 (ST1-S)

Model		ST1-650-1200- S1	ST1-650-1200D- S1	ST1-650-1200T- S1	ST1-650-1200DT- S1
Application IMM(ton)		50 ~ 150	50 ~ 150	50 ~ 150	50 ~ 150
Traverse Stoke(mm)		1200	1200	1200	1200
Crosswise Stoke(mm)	200	200	200	200	200
	-	-	120	-	120	120
Vertical Stroke(mm)		650	650	650	650
Max Load(kg)		3	3	3	3
Min Pick-out Time(sec)		1.4	1.4	1.3	1.3
Min Cycle Time(sec)		8.5	8.5	8.3	8.3
Air Pressure Range(bar)		4 ~ 6	4 ~ 6	4 ~ 6	4 ~ 6
Max Air Consumption (NL/cycle)*		12	22	10	20
Net Weight(kg)		160	190	165	195
Dimensions (mm)	A	1930	1930	1930	1930
	B	1300	1300	1300	1300
	C	1470	1470	1200	1200
	D	650	650	650	650
	E	650	650	650	650
	F	1200	1200	1200	1200
	G	130	130	130	130
	H	130	130	130	130
	I	800	800	800	800

Chart 2-2: Specification List 2 (ST1-S)

Model		ST1-750-1300T-S1	ST1-750-1300DT-S1	ST1-850-1300T- S1	ST1-850-1300DT- S1
Application IMM(ton)		150 ~ 200	150 ~ 200	200 ~ 280	200 ~ 280
Traverse Stoke(mm)		1300	1300	1300	1300
Crosswise Stoke(mm)	200	200	200	200	200
	-	120	-	120	120
Vertical Stroke(mm)		750	750	850	850
Max Load(kg)		3	3	3	3
Min Pick-out Time(sec)		1.4	1.4	1.5	1.5
Min Cycle Time(sec)		8.5	8.5	8.6	8.6
Air Pressure Range(bar)		4 ~ 6	4 ~ 6	4 ~ 6	4 ~ 6
Max Air Consumption(NL/cycle)*		12	22	14	23
Net Weight(kg)		180	210	195	225
Dimensions (mm)	A	2030	2030	2030	2030
	B	1300	1300	1300	1300
	C	1250	1250	1300	1300
	D	750	750	850	850
	E	750	750	850	850
	F	1300	1300	1300	1300
	G	130	130	130	130
	H	130	130	130	130
	I	800	800	800	800

aNote: 1. "M" stands for middle mold detector, suit for 3-plate mold.

   "EM12" stands for EUROMAP12 communication interface.

   "EM67" stands for EUROMAP 67 communication interface.

   "N"stands for non-operation side, operation without "N"

  2. Power supply: 1Φ，200~240V，50/60Hz.

  3. "*"max air consumption for suction device 60Nl/min.

2.2.3 Pneumatic Source Requirement

Compressed air is connected by 3/8-Φ12 trachea. Filter pressure valve with a clear scale line, convenient adjustment. Bring adjustment knob upward and with a clockwise rotation, pressure increases; counterclockwise rotation, air pressure decreases, the pressure range between 0 to10bar. After adjustment, Please press the adjustment knob to lock pressure.

Required supply pressure: 4bar-6bar
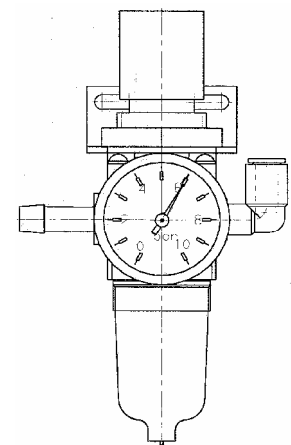
When the pressure is equal or drop below than 4 bar,

the robot will stop working and alarm. When the pressure up to 6bar, It will affect the service life of pneumatic components.

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 cable conductor and CEE plug.

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

2.3.2 Interface with the Injection Molding Machine

The robot is equipped with standard electrical interfaces according to Euromap12 and Euromap67.

⚠ 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 to and from the IMM.
● When press the emergency stop switch on hand controller, the error message emergency stop must also be indicated at the IMM. And when press the emergency stop on IMM, the emergency stop signal must also be indicated at the robot.

2.3.3 Adjusting the Axis Positions

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

2.3.4 Adjusting the X-Position

The X-positions are determined by the stops A, B.
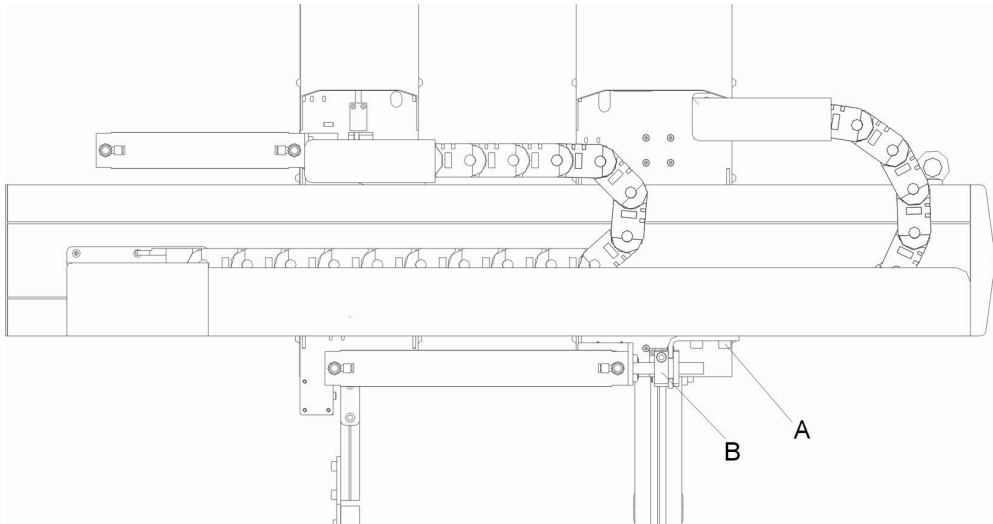
Bracket "A" on X1 axes (main arm) is for adjusting the end-position, and stop package "B" is for adjusting the stroke length and the 0-position.

Bracket "A" on axes X2 (sub-arm) is for adjusting the 0-position, and stop package "B" is for adjusting the stroke length and the end-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 mold and the Y-axis. First, the end position of the X-axis must be adjusted.

Adjusting the End-Position of X1 Axis:
1) Run the X1-axis to its end position
2) Release bracket "A"
3) Push bracket "A"to shock absorber, in the compression state
4) Fix the stop package"A"

Adjusting the 0-Position of X1-Axis（the length of stroke）:

1) Release stop package "B"

2) Run the X1-axis to the 0-position

3) Manually push cylinder piston rod to the fully extended state

4) Fix the stop package"B"

Adjusting the 0-Position of X2-axis:

1) Run the X2 -axis to its 0-position

2) Release bracket "A"

3) Manually push bracket"A"to ole-strut, in the compression state

4) Fix the stop package"A"

Adjusting the End-Position of X2-Axis（the length of stroke）:

1) Release stop package"B"

2) Run the X2-axis to its end- position

3) Manually push cylinder piston rod to the fully extended state

4) Fix the stop package"B"

2.3.5 Adjusting the Y- Position

Set the end-position of Y-axis by adjusting up-going shock absorber.

Adjusting the End-Position of Y-axis:

1) Loosen shock absorber on the end position

2) Push the cylinder on Y-axis to its end position

3) Rotate the up-going shock absorber to the in the fully compression state

4) Fix the shock absorber

The withdrawal position can be set using the stop package.

Adjusting the Withdrawal Position

1) Run the Y-axis to its end position

2) Seal off the compressed air

3) Loosen the Y-axis stop package

4) Manually push Y-axis to the desired position

5) Push stop package to ole-strut, in the compression state

6) Fix the Y-stop-package

Note: The down shock absorber completely compressed, the top position of shock absorber shall not be lower than the origin of position sensor switch, if not, when arm down, the down-block will damage the origin sensor switch.

2.3.6 Adjusting the Z-Position

The Z-axis position can be set using servo control system.

2.4   Gripper and Suction Monitoring

2.4.1 Gripper Setting

If the gripper didn't clamp parts in opened state or in the closed state, the light of the magnetic switch is off. If the gripper clamed parts, the magnetic switch is on.

Adjusting the Magnetic Switch:

1. Loosen the screw which is fixed on the magnetic switch.
2. Make the light on when gripper clamp the parts, if not make the light off.
3. Tighten the fixing screw after finishing adjustment.

During the robot working, if the grippers not clamp the part, the robot will stop operating and alarm.

2.4.2 Suction Setting

1. The default setting is 4bar, it can be adjusted according to the actual needs.
2. Digital pressure switch marked with scale, the internal of the digital pressure switch has a red ruler, which connected with the adjustment screw, when the rotation adjustments screw, the red ruler will move too.
3. Need to adjust the pressure, the user can rotate red ruler to set the value by the hex key, clockwise rotation, the value increased, counter-clockwise rotation, the value decrease.

2.4.3 Digital Pressure Switch Setting

The following paragraphs are the steps to adjusting digital pressure switch.
For **CKD** Pressure Switch:

1. Hysteresis mode:

A. Press "Mode" 2 seconds in measurement mode in to "Comparative output 1 mode setting". Press up/down key till the screen display "HYS".

B. Press "Mode" once into "Comparative output 2 mode setting". Press up/down key till the screen display "OFF".

C. Press "Mode" once into "N.o./N.c. selection"(Normal open or normal close). Press up/down key till the screen display "NC".

D. Press "Mode" once into "Response time setting". Press up/down sets the response time (default setting: 2.5ms).

E. Press "Mode" once into "Displayed color of the main display selection". Press up/down key till the screen display "R-ON".

F. Press "Mode" once back to measurement mode.

G. Pressure value range setting:

The upper limit: for example "-50", press "Mode" screen display "L0-1", press up/down set the valve to "-50".

The lower limit: for example "-30", press "Mode" screen display "H1-1", press up/down set the valve to "-50".

Note: if the lower limit value smaller than the upper limit, pressure switch will display pressure "DOWN" error message.

2. Lock button:

After setting value, press "Mode" and "down" keys together till screen displays "LOCK, ON". This operation is preventing error change pressure value.

Remove lock button:

Press "Mode" and "down" keys together till screen display "LOCK, OFF".

For **SMC** Pressure Switch:

A. Press "S" for 2 seconds till screen displays "F**", use up/down keys to select "F0", press "S" into "unit selection mode", use up/down keys to select "PA", press "S" complet setting and back to "function selection mode", screen displays "F0".

B. Press up/down till screen displays "F1", press "S" into "OUT1 specifition setting", and use up/down keys to select "HYS", press "S" into "out mode setting".

C. Use up/down keys to select "L-n", press "S" into "pressure setting".

D. Use up/down keys to set pressure to "-50" (the value can be changed according to application). Press "S" into "Hysteresis mode".

E. Use up/down keys to set value to "2". Press "S" into "displayed color of the main display selection".

F. Use up/down keys to select "Sor", press "S" back to "fuction selected mode".

G. Press "S" for 2 seconds back to "measurement mode".

For **AirTAC** Pressure Switch:

A. Press "Set" 2 seconds into "Easy mode", use up/down keys to select "HYS".

B. Press "Set" again, use up/down keys to select "HYS".

C. Press "Set", use up/down keys to select "1o2o".

D. Press "Set", use up/down keys to set the value to "2".

E. Press "Set", use up/down keys to select "R-on".

F. Press "Set", use up/down keys to select "KPA".

G. Press "Set" 2 seconds back to "measurement mode".

H. Press "Set" in "measurement mode" changes the value of "1-H" to "-30".

I. Press "Set" changes the value of "1-H" to "-30".

2.5   Robot and IMM Interface

ST1-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.

2.5.1 Euromap67Interface

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

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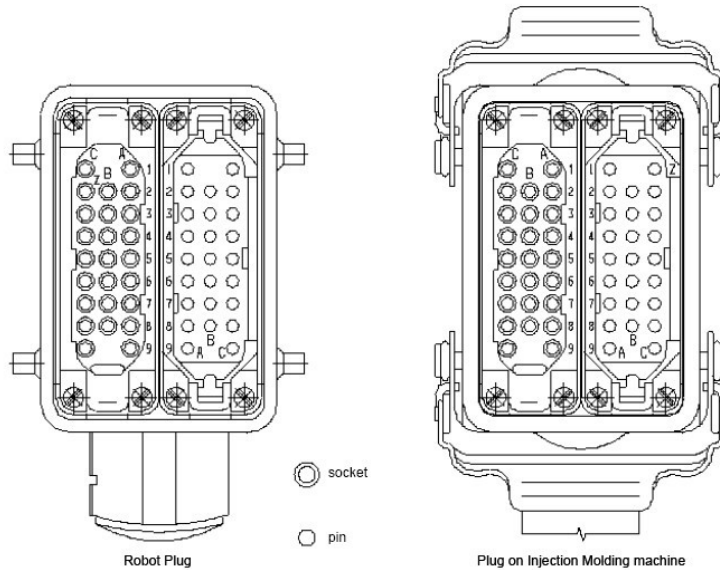
The robot-injection molding machine interface is designed according to the directives of Euromap67, which states:

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

2.5.1.1 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).
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

2.5.1.2　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)
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

2.5.2 Euromap12 Interface

The interface consists of the plug connection between the injection molding machine and the robot:
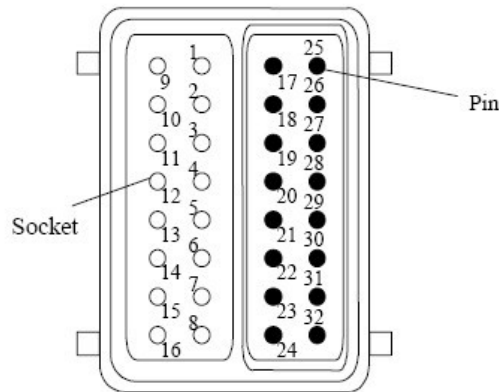
The robot-injection molding machine interface is designed according to Euromap12, which state:
Unless otherwise noted, the signals are maintained during the described function.

2.5.2.1   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)

	Core pullers free for robot to travel in
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
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

2.5.2.2   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)
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 Features

1. Conveniences: I/O circuit connection using convenience plug-in design, easy to installation and maintain.
2. Security: With safety switches on each limited positions.
3. Function: With stack function.
4. Withdrawal: Pick out the spure quickly and accurately, place spure precision, ensure not to collision products.
5. Humanization: Use the humanization control system, easy to operate.
6. Package: Mainly used wrist packing designs, which can save room, avoid

damage during transportation.

3.2 Functions

3.2.1 Function Description

ST1-S series robot is mainly used for injection molding product and the spure removed, all major parts of the robot are equipped with shock absorber devices and magnetic sensor switch, there is a die locking device with high security features on the arms. The main arm with quickly-pick, accurately-put function, it is not only guarantee the glove extract speed also ensure that the object is not damaged. For the convenience of users packaging, this series robot with stack function, users can achieve two-stack (the X-axis and Y-axis) and Z-axis direction of an arbitrary stack.

3.2.2 Malfunction Protection

Both the origin position and end position of the robot's stroke parts are with limit sensor switch. The devices of the limit position are on the two ends of the stroke axis (Z axis) and vertical axis (X axis), prevent robot anti-falling.

3.2.3 Shock Absorber

There are shock absorbers on the main arm up/down position, sub-arm up/down position, and the position of main arm forward and sub-arm backward. The main arm backward position and the forward position of sub-arm with air-cushion devices, which can reduce the impact of the robot when it is operating.

3.2.4 Fuction Detection

ST1-S series robot with one magnetic reed switch and one proximity switch on vertical cylinder forward and backward, proximity switch on both up and down cylinders on arm.

3.2.5 Pick and Place

The arm with quiclly-picj and accurately-put function, you can adjust the flow regulationg valve on the main arm to change the putting speed.

3.2.6 Stacking Function

This series robot with the stack function, choose the stack function of X axis and

Y axis in the control system. Stack on X axis can make two layer (start-point and end-point) stacked. The end-point and middle-point can be stacked through Y-axis stack, while the middle-point can be adjusted as your needed.

3.2.7 Self-protection

There is a cylinder anti-falling cylinder at below of the arm ,which can effectively prevent the personal injury or machine damage caused by arm down or lack of air pressure. If air pressure is insufficient, the pressure sensor output signal, the arm back to up-limited, the arm was locked by ejected anti-falling cylinder piston rod. If the pressure is enough, anti-fall cylinder piston rod returns back.

When the robot's arm in locked state, if need manually push arm up and down, use flat tool to move anti-falling cylinder piston rod back, avoid damage to the arm or anti-falling cylinder.

3.2.8 Emergency Stop Button

The emergency stop button is located on the hand controller.

When an emergency stop button is pressed, the power is turned off. The gripper and vacuum valves and the vacuum pump are not disconnected, to avoid dropping parts from the gripper. In addition, the controllers will remain under power to allow indication of error messages.

If robot goes out of order or need emergency stop for examinations, press the emergency stop button to ensure safety operation.

3.3 Default Setting

1. Speed of transverse: the initial setting is 85%.
2. Pressure sensor: the initial setting is 4bar, if air pressure is less than 4bar, the robot will stop working and alarm.
3. Filter regulating valve: the factory setting is 6bar.
4. Vacuum pressure switch: the factory setting is -50.

3.4 ST1-S Robot Reversing

The robot dropping side is at operation side (factory default setting). The following paragraph is the instruction for changing robot dropping side (operation side to non-operation side). For the safety purpose, please turn off electrical power and pneumatic supply before carrying on the instruction.

1. Unscrew the proximity sensor X103 and move it up to the same level as X102, then screw X103. Unscrew the proximity sensor X102 and move it down to the same level as where X103 was, and then screw X102. See picture 3-1, picture 3-2.

Picture 3-1： before modified

Picture 3-2： after modified

2. Move all "outside IMM safety zone blocks" to the other end of the beam. See picture 3-3, picture 3-4.

Picture 3-3: before modified

Picture 3-4: after modified

3. Move in mold sensor blocks to Z-axis belt fixed block, keep the distance about to 180mm. See picture 3-5.

4. Open the sliding seat on the Z-axis, and then exchange the socket position of X103 and X102 on the circuit board U2. See picture 4-1, 4-2.
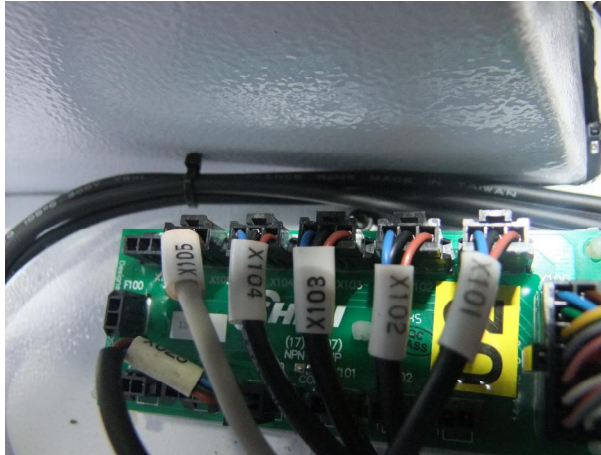
Picrure 3-5: before modified
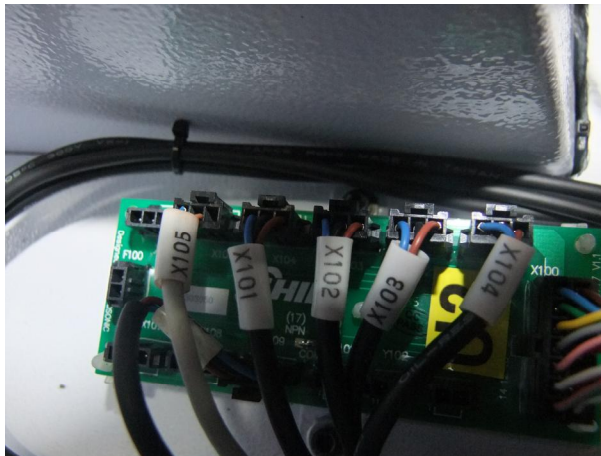
Picture 3-6: after modified

5. Change robot direction to reverse in hand controller. See picture 3-7,3-8.
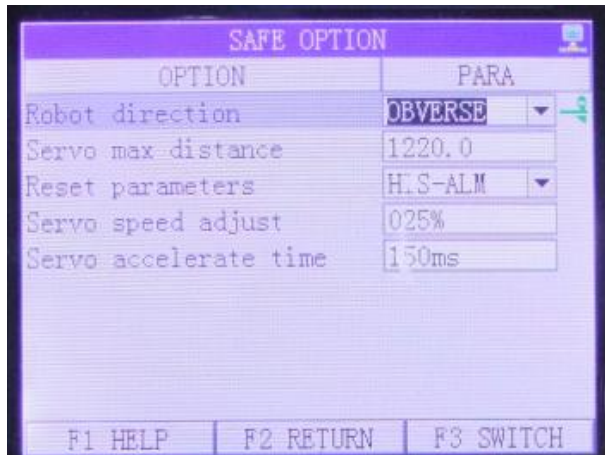
Picture 3-7: before modified
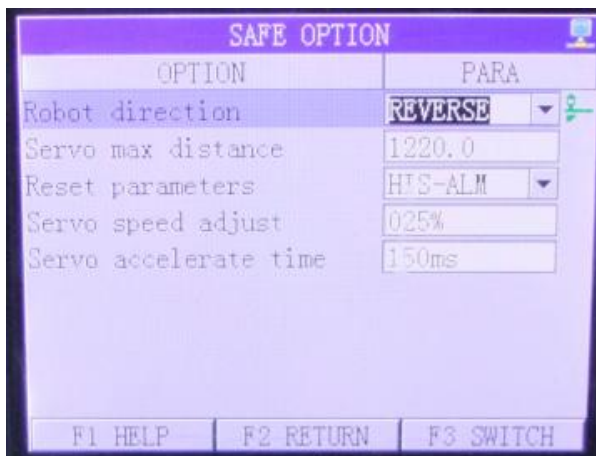
Picrue 3-8: after modified

6. Horizontal rotate robot base 180 degree and move to the other end of beam then tighten it.

7. Robot reversing result checking. Press "home position", robot will move reverse. After robot back to home position, Z-axis home position sensor(X103) light up. When robot running, limit sensor light up.

4 **Operating Instruction**

4.1 Hand Controller

4.1.1 Operation Pannel of Hand Controller

Picture 4-1

SHINI

4.1.2 Action Marks

	Main arm down		Main arm up		Main arm backward
	Main arm forward		Sub-arm down		Sub-arm forward
	Sub-arm backward		Sub-arm up		Main arm vacumm on
	Main arm vacumm off		Main arm grasp off		Main arm grasp on
	Sub-arm grip on		Sub-arm grip off		Main arm vertical
	Main arm horizontal		Mold open		Mold close
	Ejector backword		Ejector forward		Traverse
	Traverse in to pick up position		Loop 1		Loop 2
	Delay time		Combination		
	Extend 1 input on		Extend 1 input off		
	Extend 2 input on		Extend 2 input off		
	Extend 3 input on		Extend 3 input off		
	Extend 1 output on		Extend 1 output off		Extend 1 pulse on
	Extend 2 output on		Extend 2 output off		Extend 2 pulse on
	Extend 3 output on		Extend 3 output off		Extend 3 pulse on

4.1.3 Home Position

After power on, press [Reference / Home], robot back to home position.

4.1.4 Manual Mode

Press [STOP] robot stop running, then press [Manual] shows the display as picture 4-2, then can manually set and adjust robot function. (Ensure robot "mold open" signal is on, and forbidden touch mold at the manual mode.)
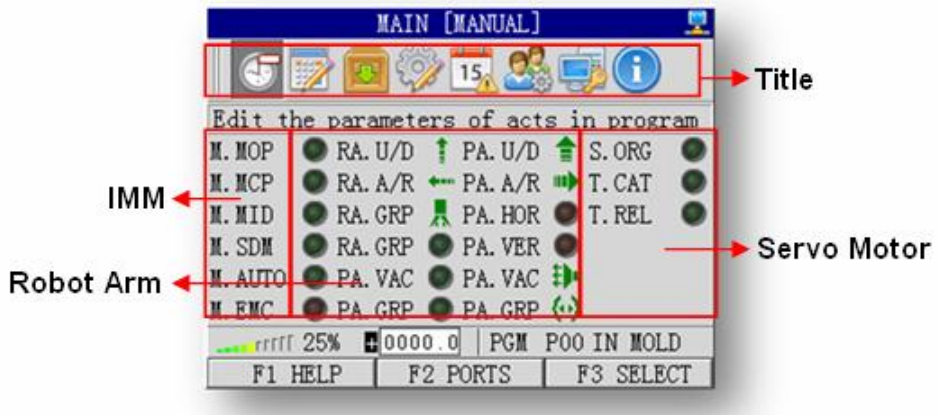
Picture 4-2

In the manual page shows the status information of servo motor, robot arm and IMM. The users can real-time monitor robot operation.

Ø IMM status: display IMM 5 input signals (mold open, mold close, medium mold, safety door, and IMM automation) and one output signal (movable mold).

Ø Robot arm status: real-time monitor robot main arm and sub-arm, arm going-up or going-down, arm forward or backward and so on.

Ø Servo motor status: reactions traverse axis inside mold or outside mold or in home position. Servo motor current position and traverse axis manual speed display at bottom screen.

   a. Servo current position: the actual position of traverse axis, the unit is mm

(millimeter).

b. Current action: robot present action.

 main arm up/down

 main arm forward/backward

 sun-arm up/down

 sub-arm forward/backward

▲ up

▼ down

◀ left

▶ right

 increase value, manually increase servo speed

 decrease value, manually decrease servo speed

 online help

 F2 function

 F3 function

 main arm vacuum on/off

 main arm grasp on/off

 main arm vertical/horizontal

sub-arm grip on/off

traverse out

traverse in

mold open/close, teach mode function

ejector forward/backward, teach mode function

delay time, teach mode function

loop, teach mode function

combination, teach mode function

extend input, teach mode function

extend output, teach mode function

auxiliary extended 1

auxiliary extended 2

stop

c.Emergency stop

Any emergency please press the "emergency stop button" all movement is stopped immediately, an error screen is displayed, see as picture 4-3. The emergency stop button can be released by turning it clockwise. Press "Home" key, the system into manual mode, shows main menu page.
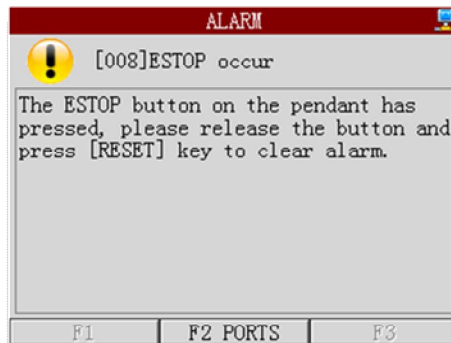
Picture 4-3

d. Online help

Online help use to guide during operation and fast master operation. No need to look up user manual step buy step.

Any help during operation please press F1 key, system will give help guide information according to robot current action. Press F1 key, online help information will appearance on hand controller.

Press F1 again or Return to close online help and continue last operation.
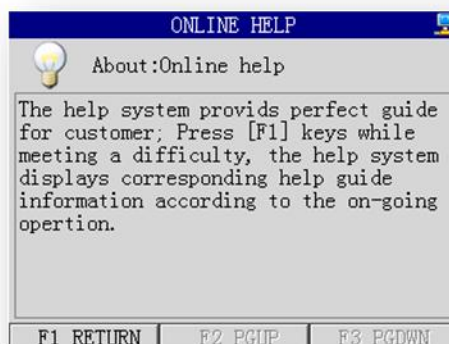
Picture 4-4

4.2 Function Instructions

4.2.1 Select Parameter

Select and setting parmeter, etc. System up, see picture 4-5.
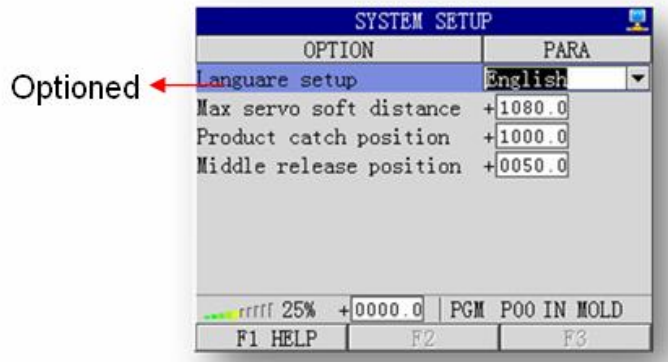
Picture 4-5

System setup including 4 settings: language setup, max servo soft distance, product catch position and middle release position. Press Ç/È to select settings which will be marked with blue.

Other pages parameter settings the same as the system setup.

4.2.2   Modfy Parameter

After selected, the parameter can be modified. Fox example, in auto mode, press ON+/OFF- to setup IMM safety door stop or not stop during auto running.

SDM Open Stop   NO STOP   ▼ ✕

Picture 4-6

4.2.3   Input values

Input values, etc. production schedule, see picture 4-7.

Production schedule   0010000
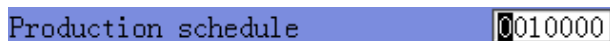
Picture 4-7

Two methods:

Ø **Use number keys:**

Press Å/Æ move cusor to desired position then input digit (0 to 9 on keypad).
For example, input 2008, press Å/Æ move cursor to thousand place, then input 2, 0, 0, 8.

Ø **Use** ON+/OFF- **:**

Press Å/Æ move cusor to desired position then press ON+/OFF- to choose desired

digit. For example, input 2008, press Å/Æ move cursor to thousand place, then press / to choos 2, repeat operation till input 2008.

4.2.4 Adjust Servo Position and Speed

Press following three keys to adjust servo position and speed:

Traverse: change the mode of traverse axis. Total 4 modes: continue move, move 10mm, move 1mm and move 0.1mm.

Trv.in (Travese in): robot arm in traverse mode, press robot arm will traverse in. For example, in continue mode, press robot arm begin traverse in. Press again robot stop traverse in. In move 10mm mode, press robot traverse in 10mm.

Trv.out (Traverse out): operations the same as traverse in.

The servo control box is showed bellow, unit mm:

The value in box stands for servo position, accurate to 0.1mm. The cursor position indicated the current servo action mode. "+" stands for traverse continue mode. Cursor at tens place stands for traverse move 10mm. Cursor at ones place for traverse move 1mm. Cursor after point stands for traverse move 0.1mm.

Press to change traverse mode (continue→move 10mm→move 1mm→move 0.1mm).

System displayed the manual speed of servo on screen. In manual mode, the fastest speed is 50％.

06%

Above picture shows the speed is 6%. At manual mode, press +/- key to adjust servo speed, the lowest speed is 1% and the fastest speed is 50%.

4.2.5 Save Parameters

Press "Enter" to save parameters and return to main menu page.

Press "Return" to give up saving, screen shows as the following picture, press "Exit" will exit without save. Press "Return" again to back to main menu page.

Note: system parameters reset, if press "Return" will directly give up saving.

4.3   Manual and Automatic Operation

4.3.1 Introduction

System manual and auto operation is in main page.

System has 4 run working states:

1) Manual: operate the robot via hand controller

2) Auto stand-by: system in the auto stand-by mode, be ready to auto running or single period running

3) Auto running: system is executing the current program

4) Single cycle: system executes the current program only one cycle. If the cycle is finished then return to auto stand-by mode

4.3.2 Robot Arm Operation

Control robot via hand controller manual keys:

	Main arm up/down: If main arm going-up, press this key main arm will going-down. If main arm going-down, press this key main arm will going-up.
	Main arm forward/backward: If main arm moving backward, press this key main arm will move forward. If main arm moving forward, press this key main arm will move backward.
	Vacuum on/off: If vacuum off, press this key will vacuum on (suckt parts). If vacuum on, press this key will vacuum off (release parts).
	Grasp on/off: If grasp off, press this key will grasp on (grasp parts). If grasp on, press this key will grasp off (release parts).
	Cylinder rotate horizontal/vertical: If cylinder in horizontal state, press this key cylinder will rotate vertical. If cylinder in vertical state, press this key cylinder will rotate horizontal.
	Sub-arm up/down: If sub-arm going-up, press this key sub-arm will going-down. If sub-arm going-down, press this key sub-arm will going-up.
	Sub-arm forward/backward: If sub-arm moving backward, press this key sub-arm will move forward. If sub-arm moving forward, press this key sub-arm will move backward.
	Grip on/off: If grip off, press this key will grip on (grip parts). If grip on, press this key will grip off (release parts).

Traverse :

In manual mode, control robot traverse operation in main menu or IO watch page.

Extend Output :

In manual mode, press "output" monitor each extend output ports in main menu, see as picture 4-8.

Picture 4-8

Press Ç/È to move the cursor to select the output port, and press +/- key to control the selected output port status, "+" stands for output signal, "-" stands for stop output signal.

4.3.3 Automatic Operation

Select auto program

In manual mode, on main page, press "Auto" into auto running.
In manual mode, on main page, press F3 to select auto program. System memory saves 28 team programs (P00 to P27).The standard program (P00 to P09) can not modify but can modify the parameters, program options and position. Usually, these 10 standard programs can meet customers' needs.
For some customized programs, please in teach mode to edit programs. System can saves 18 teams (P10 to P27) at most.

Select auto program, see as picture 4-9.
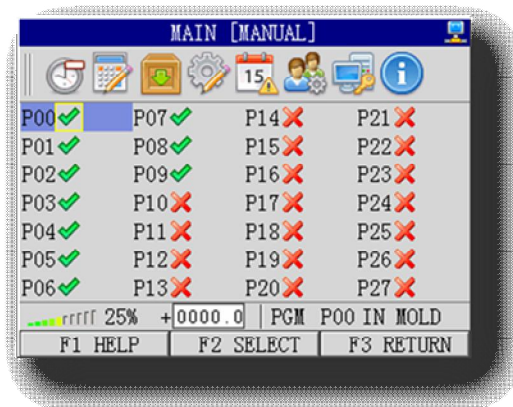
Picture 4-9

Select program with ✅ (edited program) for robot auto running program.
❌ stands for empty program and cannot be robot auto running program. If user not edit program, the P10 to P27 are all empty programs.

Press Ç/È/Å/Æ to select program. Press "Return" or F3 key to cancel select and return to main page, press "Enter" or F2 key to affirm selected program and return to main page. Press auto key will set selected program as current program and system into auto stand-by mode.

Enter Auto Mode

Press "Auto" to start the automation operation. Please pay attention to:

Ø Do not adjust the machinery or parts while robot arm in auto operation.

Ø Do not attempt to pick up dropped products or clean the arm while it is operation.

Ø Ensure there are no people or obstructions in the robot arm movable range.

Ø Any irregular problems please stop robot and contract with supervisor.

Ø If the robot has not been used for a long period of time, clean and lubricate all contact surfaces, then operate the unit for about 30 minutes.

Auto mode including: auto stand-by and auto running statues. Press "Auto" once into auto stand-by page, system into auto stand-by mode.
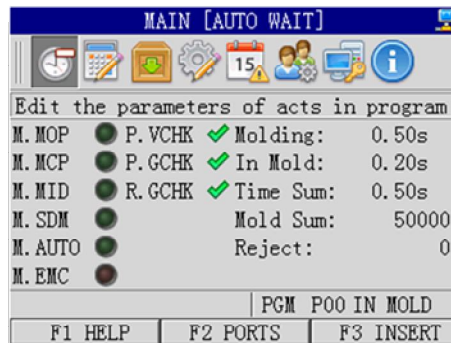
Picture 4-10

Press F3 to start single loop running or press "Auto" to start auto running while system in auto stand-by mode.

Single loop is one cycle robot movements. It is not affect the mold time, period time, cycle time and mold count.

System will calculate the mold time, period time and mold count and so on while system is auto running.

In auto running mode, press "Stop" robot will stop running and system back to stand-by mode. In auto running mode, press "Manual" system back to manual mode.

In auto stand-by or auto running mode, forbidden manually operate robot. Each cycle time displays at period time page.

Ø **Molding (ejection time):** injection molding machine one cycle production time.

Ø **In mold:** the duration while robot inner the mold. Reflect the time of robot to take out products from IMM.

Ø **Time sum (cycle time):** the time of one cycle movement.

Ø **Mold sum:** calculate the sum of good products.

Ø **Reject:** calculate the number of reject when IMM output signal to robot.

Detaile program information refer to Chapter 4.5.3.

Press F2 into IO watch page when system in auto mode.

4.4 Switch Manual and Auto Mode
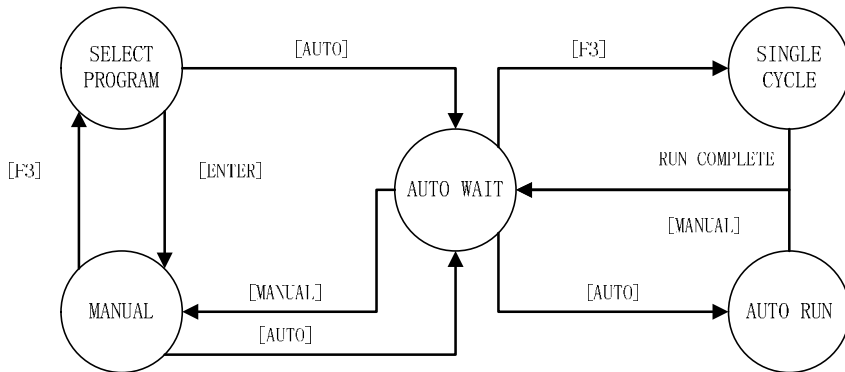
4.5 System Setup

4.5.1 Setup Page

There are total 9 options on menu bar: action parameters, program parameters, pile area setup, system parameters, IO monitor, and alarm list, customize program, safety parameters and system information. In main page, press left/right key to select option and press "Enter" to into selected setup page.

4.5.2 Action Setting

The action parameters setup page lists the parameters of action in current program, see picture 4-11.

Picture 4-11

Press up/down key to select action, F2 for page up, F3 for page down. The detail parameters modified methods as following:

⯀	**Traverse to pick up position:** The lowest servo speed is 10% and the fast is 100%. Press +/- keys to adjust the speed.	
⯀ ⯀	**Loop:** The loop area of servo motor, the lowest speed is 10% and the fast is 100%. Press +/- keys to adjust the speed.	
⯀	**Traverse:** Servo traverse speed and position, please reference to Chapter 4.2.4, the lowest speed is 10% and the fast is 100%. Press +/- keys to adjust the speed.	
⊕	**Combination:** The combination actions from begin to end are executed at the same time. There is no parameter to be modified.	

Expect above 4 actions, other actions with delay parameters. The delay time should be inner 0.00 to 9.99 second.

⚠ Note: the parameters setups have been limited for safety: All parameters can be setup in manual mode. System delay parameters can be setup in auto mode, action speed and position parameters only can be setup in manual mode.

4.5.3 Program Setting

Program Parameter:

Only in manual mode the parameters can be modified.

Program setting is including program parameter and count parameter. Press F2 to swich them.

Program parameter page see picture 4-12:
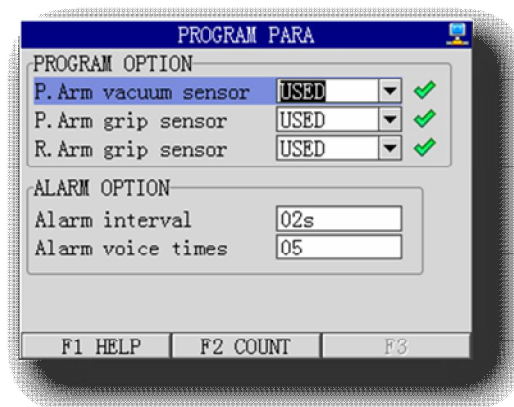
Picture 4-12

Program parameter including:

Main arm vacuum sensor: if choose "USED", the part hasn't been picked up or dropped, system will alarm. If choose "NOT USED", the part hasn't been picked up or dropped, system won't alarm.

Main arm grasp sensor: if choose "USED", the part hasn't been graspped or dropped, system will alarm. If choose "NOT USED", the part hasn't been gripped or dropped, system won't alarm."

Sub-arm grip sensor: if choose "USED", the part hasn't been gripped or dropped, system will alarm. If choose "NOT USED", the part hasn't been gripped or dropped, system won't alarm."

Alarm internal: set the alarm sound interval. The value can be set from 0 to 99 (at most). "0"stands for 0 second and alarm sound continued.

Alarm voice times: alarm times can be set form 0 to 99 (at most). "0"stands for

no alarm, even alarm interval has been set.

Press F2 switch to count parameter page.

Count Parameter:

Picture 4-13

Production schedule: the option is used to set the number of the production. In auto running mode, the number will decrease one after robot takes one part. Robot will stop auto running and alarm when number is reduced to 0. Open IMM safety door will clear alarm and robot go on auto running. Set the number to 0 means no production schedule.

Production sample: the option is used to set robot when to get samples. "1000"stands for every 1000 parts get one sample. "0"stands for no samples.

Reject alarm counter: the option is used to set the numbers of reject. Robot will alarm and stop auto running when reach the setting numbers. "0"stands for without countering reject.

Experience production: the option is used to set sample numbers for testing machine before auto running. "0" stands for no testing.

EXO.1 interval: "0" stands for "extend output 1 machine" outputs move signal once for each part. "5" stands for machine outputs move signal once for each 5 products (the 6th, 12ed, 18th, 24th…part).

EXI.1 interval: "0" stands for "extend input 1 machine" inputs move signal once for each part. "5" stands for machine inputs move signal once for each 5 products (the 6th, 12ed, 18th, 24th…part).

Press F2 switch to program parameter page.

4.5.4 Loop Parameters

The user should set loop parameters and sample position parameters if system has set cycle actions and production sample.

Each program can have two loop areas at the same time, loop 1 and loop 2.

If current program just has "loop 1 setup" or "loop 2 setup", the user just should set loop 1 or loop 2 parameters. If current program has loop 1 and loop 2 setup, the user should set both of the parameters.

Press F2 switch loop 1 and loop 2 setting page.

Loop 1 "position" setting page see picture 4-14:
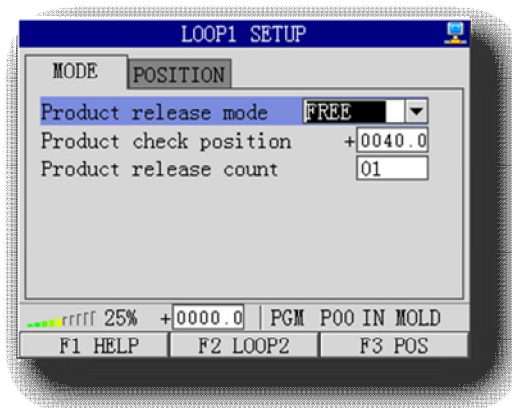
Picture 4-14

The loop 1 setup page including two areas: mode and position. Press F3 to switch mode and position page. Press Ç/È to select parameter.

Product release mode: set the mode of loop, regular mode or free mode.

Product check position: set the position of samples and rejects.

Product release count: set the products positions in loop. In regular mode, the user can set 99 positions at most. But in free mode, the user just can set 10 positions at most.

Product release in regular mode, the first position and release interval should be setted, see picture 4-15. If product release in free mode, each product's position and release interval should be setted, see picture 4-16.
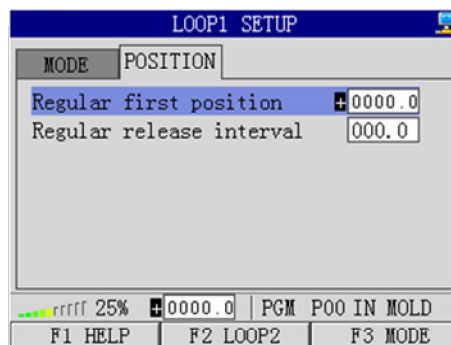
Picture 4-15
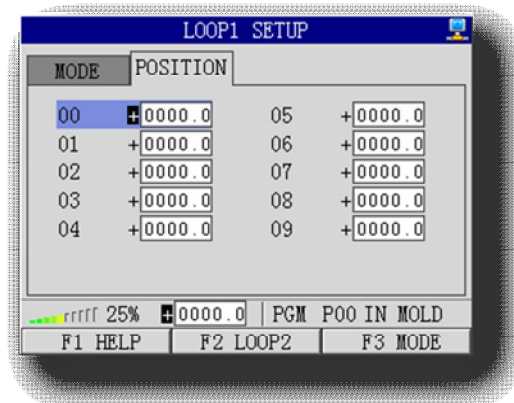
Picture 4-16

Regular mode:

Regular first position: the first product postion in loop.

Regular release interval: the distance between two products.

Free mode:

In free mode, the user can set 10 products release positions at most. Press Ç/È/Å/Æ to select position.

4.5.5 System Setup

System setup page, see picture 4-17:
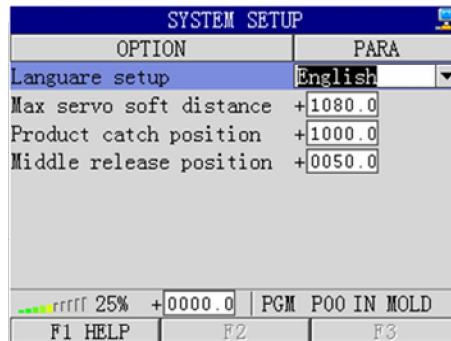
Picture 4-17

Language setup: the system supports simplified Chinese and English. Press +/- keys can change the system interface language.

Max servo soft distance: the maximum travel distance for traverse axis. The value must not exceed the physical maximum distance.

Product catch position: the position of robot picks up product in mold. This position must in mold safety sensor range and less than system max stroke.

Middle release position: the max down stroke of robot out of mold.

4.5.6 IO Monitor

In IO monitor page display all input and output signals. The "port monitor in"

page including the statues of IMM, robot arm, servo and extend input, see picture 4-18. The "port monitor out" page including the statues if IMM, robot arm, servo and extend output, see picture 4-19. F2 for page up, F3 for page down.
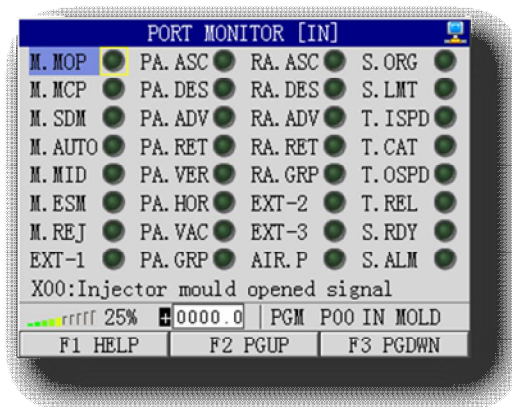
Picture 4-18
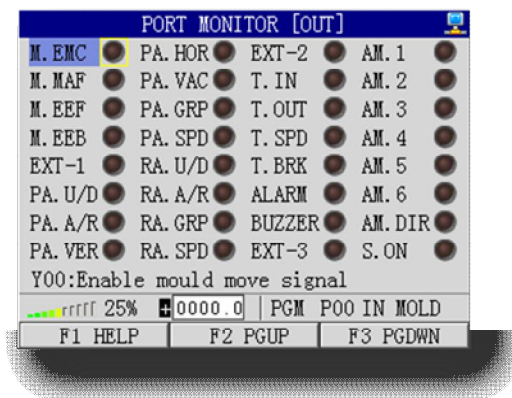
Picture 4-19

Even the system alarm, the user also can into IO monitor page to get troubleshooting.

Press Ç/È/Å/Æ to select port, the port number and define will display on screen.

4.5.7 History Alarm

The alarm time, reasons and robot arm states will be saved in system. The last 30 alarm records can be keep in system.

In "history alarm" page to look up records, see picture 4-20. Press F2 and F3 to page up and down.
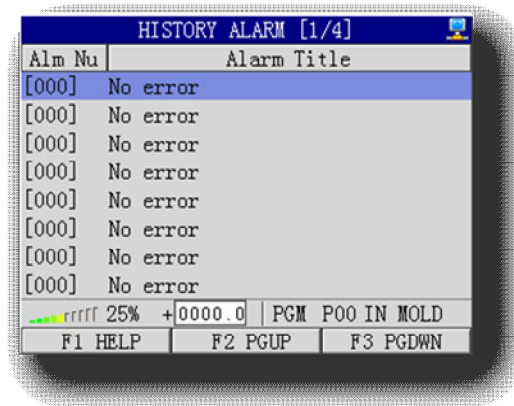
Picture 4-20

Select one alarm number, press F1, the detail message will display on the screen, see picture 4-21.
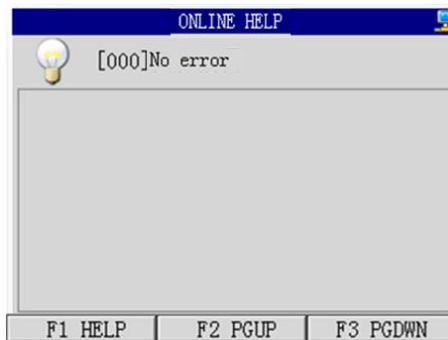
Picture 4-21

4.5.8 Teach Program

The 10 standard programs (P00 to P09) can be used. System can save 18 customized programs (P10 to P27) at most. Edit any programs only in teach program page, see picture 4-22.

Picture 4-22

✔ stands for teached programs, ✘ stands for empty program. F2 for deleting, F3 to begin teach program.

⚠ The empty and current program can not be deleted.

Teach Operation:

Press F3 into teach program page. One program can teach 100 actions at most, and one screen shows 18 actions. If the selected program is not empty, the user can select program numbers and modify them.

Each program has 3 areas: number, action, and parameter.

Picture 4-23

Number:

The action numbers of one program, from 0 to 99.

Action:

Different icons show different actions. See following table for more actions information. No icon stands for no action.

Parameters:

Shows teach motions parameter, the parameter section displays the content vary with different motions, can be generally divided into three types: "position speed parameter", "time parameter", "speed parameter".

(icon)	Travese: The action has two parameters: servo speed and servo position.
(icon) (icon)	Loop: Servo speed parameters.
(icon)	Combination: It is not an actual robot action, no parameters.

Note:The other actions have delay time parameters.

Cursor in number area:

`0` stands for cursor in number area and teaching No.0 action. System is not excute action and waiting the user to input action.

Cursor in action area:

`1 ◀▌▌ 0.50s` stands for cursor in action area and teached action. For example, when cursor in number area pressing "main arm forward" key, then input "main arm forward" action and cursor moves to action area.

`0 ⊥⊥ +1150.0  050%` stands for cursor in number area and system had one action (traverse). If press other actions keys, for example "main arm forward/backward" key, "main arm forward" will replace "traverse" action, cursor moves to action area.

If no need to replace action, press È to save action and move cursor to next number area, see following pictures. If press Ç will delete No.4 action and move cursor to last number area.

4	0.50s	4	0.50s
5	0.50s	5	0.50s

Cursor in action area:

When cursor in action area, the user can replace and mover actions. For example, the actural action is "main arm forward", press "main arm forward/backward" key replace action to "main arm backard", see the following picture.

1   ▐▐▶ 0.50s

After choosed action, press Æ move cursor to parameter area and modify parameter, see following picture:

1   ◀▐▐ 0.50s

If no need to modify parameter, press È move cursor to next number area, see following pictures. Press Ç to delete modify parameter and move cursor to last number area.

4	0.50s	4	0.50s
5	0.50s	5	0.50s

But if action is delay action, combination or traverse, cursor will directly move to parameter area.

Cursor in parameter area:

Total three kinds of parameters:

Position and speed: 0 ⊞0000.0 050%

Delay time: 1 ◀▐▐ 0.50s

Speed: 5 050%

Keys in Teach Mode:

	main arm up/down Cursor at number area: press this key to input main arm up or down action. **Note:** if can not insert main arm up/down action, system will alarm and display reasons, like robot arm in mold and hasn't got "mold open" signal. Cursor at action area: if robot main arm in down state, press this key will change to up. **Note:** if can not input main arm up/down action, system will alarm and display reasons. Cursor at parameter area: this key is used as digit 1.
	main arm forward/backward Cursor at number area: press this key to input main arm forward or backward action. **Note:** if can not input main arm forward/backward action, system will alarm and display reasons. Cursor at action area: if robot in main arm forward state, press this key will change to backward. **Note:** if cannot input main arm forward/backward action, system will alarm and display reasons. Cursor at parameter area: this key is used as digit 2.
	vacuum on/off Cursor at number area: press this key to input vacuum on or off. Cursor at action area: if robot in vacuum on state, press this key will change to off. Cursor at parameter area: this key is used as digit 3.
	main arm grasp on/off Cursor at number area: press this key to input main arm grasp on or off action. Cursor at action area: if robot in main arm grasp on state, press this key will change to off. Cursor at parameter area: this key is used as digit 4.
	main arm cylinder horizontal/vertical Cursor at number area: press this key to input cylinder horizontal or vertical action. Note: if main arm down in mold, cylinder cannot horizontal or vertical, system will alarm and display error message.

	Cursor at action area: if cylinder in horizontal state, press this key will change to vertical. Cursor at parameter area: this key is used as digit 5.
	sub-arm up/down Cursor at number area: press this key to input sub-arm up or down key. **Note:** if robot hasn't got "mold open" signal, sub-arm cannot move up/down, system will alarm and display error message. Cursor at action area: if sub-arm in down state, press this key will change to up. Note: if can not input sub-arm up/down action, system will alarm and display error message. Cursor at parameter area: this key is used as digit 6.
	sub-arm forward/backward Cursor at number area: press this key to input sub-arm forward or backward action. Note: if cannot input sub-arm forward/backward action, system will alarm and display error message. Cursor at action area: if robot in sub-arm forward state, press this key will change to backward. Cursor at parameter area: this key is used as digit 7.
	sub-arm grip on/off Cursor at number area: press this key to input sub-arm grip on or off action. Cursor at action: if robot in sub-arm grip on state, press this key will change to off state. Cursor at parameter area: this key is used as digit 8.
Trv.out	**Traverse out:** Cursor at number area: this key is unused. Cursor at action area: this key is unused. Cursor at parameter area: if in position speed, press this key to modify position parameter, refer to **chapter 4.2.4**. If in delay time parameter, this key is used as digit 9.

Trv.in 0	**traverse in:** Cursor at number area: this key is unused. Cursor at action area: this key is unused. Cursor at parameter area: if in position speed, press this key to modify position parameter, refer to **chapter 4.2.4**. If in delay time parameter, this key is used as digit 0.
Traverse	**travese:** Cursor at number area: press this key to input robot traverse action. **Note:** if cannot input traverse action, system will alarm and display error message. Cursor will directly move to parameter area. Cursor at parameter area: press this key to change servo traverse mode.
Close / Open	**mold open/close:** Cursor at number area: press this key to input mold open or mold close action. Cursor at action area: if in mold open state, press this key will change to mold close. Cursor at parameter area: this key is unused.
Front / Back	**ejector forward/backward** Cursor at number area: press this key to enable ejector forward or backward. Cursor at action area: if ejector in forward state, press this key ejector will change to backward. Cursor at parameter area: this key is unused.
Loop	**loop:** Cursor at number area: press this key to input loop 1 or loop 2 action. **Note:** if program had with loop 1 and loop 2 action, press this key, system will alarm and display error message. If robot arm down outside mole cannot input loop, system will alarm and display error message. Cursor at action area: if in loop 2 action, press this key will change to loop 1. Press È/Å to set loop parameters.

	Cursor at parameter area: this key is unused.
COMBI ⊕	**combination:** Cursor at number area: press this key to begin combination or end combination. **Note:** if last action is beginning combination, press this key will end combination. Cursor at action area: this key is unused. Cursor at parameter area: this key is unused.
Time ⊕	**time:** Cursor at number area: press this key to input delay action. Cursor at action area: after inputting combination, cursor will not stop here. Cursor at parameter area: this key is unused.
Input	**extend input:** Cursor at number area: press this key, screen will toggle to extend input signal page. Choose one input signal, testing or not testing signal.
Output	**extend output:** Cursor at number area: press this key, screen will toggle to extend output signal page. Choose one output signal, testing or not testing signal.
ON +	**+:** Cursor at number area: this key is unused. Cursor at action area: this key is unused. Cursor at parameter area: if in position speed, press this key to adjust speed. If in delay time parameter, press this key to add value.
OFF −	**-:** Cursor at number area: this key is unused. Cursor at action area: this key is unused. Cursor at parameter area: if in position speed, press this key to adjust speed. If in delay time parameter, press this key to reduce value.

▲	**up:** Cursor at number area: press this key to delete action and move to last number area. Cursor at action area: press this key to delete actrual action, cursor will move to number area. Cursor at parameter area: press this key to delete action, cursor will move to number area.
▼	**down:** Cursor at number area: press this key to save action, cursor will move to next number area. If no action, cursor cannot move to next number area. Cursor action area: press this key to confirm and save parameter, cursor will move to next number area. Cursor parameter area: pres this key moves to number area.
◄	**left:** Cursor at number area: this key is unused. Cursor at action area: this key is unused. Cursor at parameter area: if in delay time parameter, this key is used as numbers.
►	**right:** Cursor at number area: this key is unused. Cursor at action area: press this key, cursor moves to parameter area. Cursor at parameter area: if in delay time parameter, this key is used as numbers.

Teach Safety Rules:

During teaching program please follow the safety rules, after teaching please save it and back to main menu page. System will check it and alarm if any programs go against the following safety rules:

1. Has one "mold open" action at least.
2. Has one "mold close" action at least.
3. About mold, the first action must be "mold open" and match with "mold close" action.
4. About mold, the last action must be "mold close".
5. Only has one "loop 1" action.
6. Only has one "loop 2" action.
7. Combination can not be "input" action.
8. Combination can not be input "mold open" and "mold close" action.
9. Combination can not be input "ejector forward" and "ejector backward" action.
10. Main arm action (main arm vacuum on, main arm vacuum off, main arm grip on, main arm grip off, main arm up, main arm down, main arm forward, main arm backward, main arm vertical, main arm horizontal) only can teach once in program combination.
11. Sub-arm action (sub-arm grip on, sub-arm grip off, sub-arm up, sub-arm down, sub-arm forward, sub-arm backward) only can teach once in program combination.
12. Traverse axis action (loop 1, loop 2, and traverse) only can teach once in program combination.
13. Any output extended actions (output high signal, output low signal, output pulse signal) only can teach once in program combination.
14. Traverse and main arm up/down, or traverse and sub-arm up/down cannot together exist in program combination.
15. Robot must return to original position at the end of teaching program.
16. Combination begins and combination ends must be matched

Output Signal

In teach mode, move cursor to number area, press ![Input] / ![Output] system into exend in/out page, see picture 4-24.
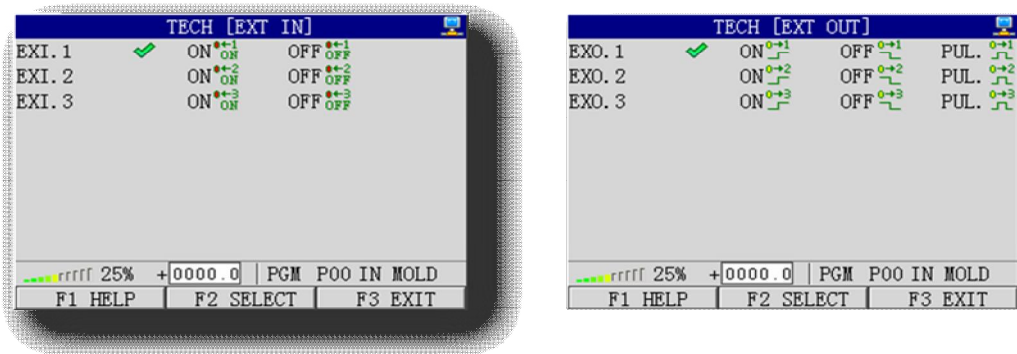
Picture 4-24

Extend in: Total 3 extend input ports. Press Ç/È to choose extend port. Press Å/Æ to choose extend port on or off. "On" stands for testing extend input port, "off" stands for not testing extend input port.

Press F2 to save operation and return to last page, press F3 to give up operation and back to main screen.

Extend out: Total 3 extend output port, each port has 3 types of signals.

High level: output one high level signal.

Low level: output one low level signal.

Pulse: output one pulse signal. Output one high level signal, a period of delay time, then output one low level signal.

Press Ç/È to choose port number, press Å/Æ to choose types of signal. F2 to save operation and return to last page, F3 to give up operation and back to main screen.

Write Teach Program

Customized program can be saved at P10 to P25. P00 to Po9 are system standard programs, can not be changed.

If reading one program (P00 to P09), press "Enter", system into program saving page and choose one program number (P10 to P25) to save it.

If reading one program (P10 to P25, etc.P10), press "Enter", the program will be saved as P10. If do not want saved it as P10, please press "AUX3", system into program saving page and save the program as desired name.

Press "Return" to give up teaching program and back to main page.

4.5.9 System Safety Setup

Seting safety in safe option page.

Picture 4-25

Usage of middle mold: middle mold use or unused. If select middle mold use, after IMM mold open and middle mold open, robot arm can going-down. If IMM without middle mold, set this option to unused.

Safe door open stop: the safe door option used to setup whether robot stop auto running if the safe door is opened. If set this option to stop, then robot will stop auto running if the safe door is opened, close safe door at this time robot will continue auto running.

Rotate limit in mold: product rotate in mold or not. Please select it according to requirements, otherwise will damage mold.

Traverse limit in mold: traverse in mold or not. Please select it according to requirements, otherwise will damage IMM and robot.

Rotate initial: the initial rotate status is used to setup the rotate status when robot at the home position. Can set to rotate vertical or horizontal.

Selection wait mode: standby mode, the option is used for select the robot standby mode when auto running; IN MOLD: Robot will wait the MOP signal (mold open signal) in the mold area; OUT MOLD: Robot will wait the MOP signal (mold open signal) out of the mold area; The wait mode selection must be match with the current program.

⚠️

> Please setup the safety parameters carefully! Incorrect setting may crause accident!

> Please setup the traverse limit in mold to pretect mold and machine equipments.

Press F3 into manufactory setup page, see picture 4-26.
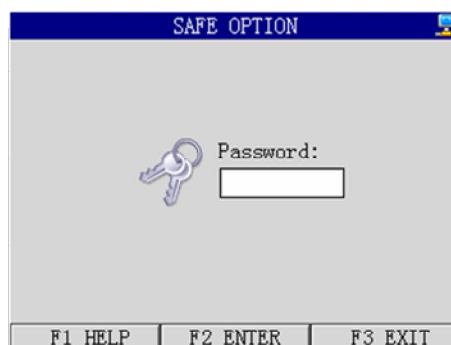
Picture 4-26

Input password: 1234, press F2 into safe option page (picture 4-27), or press F3 back to main screen.
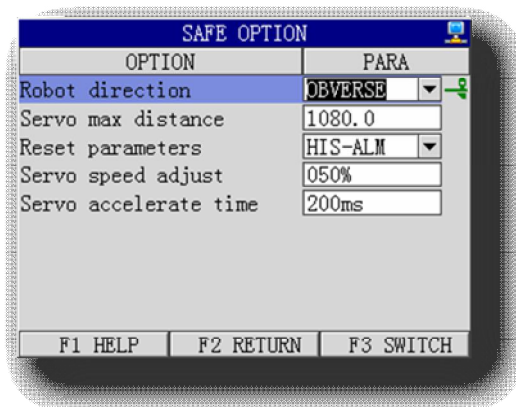
Picture 4-27

Robot direction: the option is used to setup the direction of robot mounted on injection molding machine. Note: this setup must be right. After changing direction, please re-back to home position.

Max physical distance: the option is used to setup robot max traverse displacement. Note: this setup must be right, otherwise will damage machine equipments.

Reset parameters: the parameters of history alarm, product sum and system overall reset can be reset. Press F3 to reset parameter.

History alarm: reset 30 records at most.

Product sum: rest product numbers to 0.

System overall reset: including action program, max physical distance, etc.

Servo speed: min: 1%, max: 100%.

Servos accelerate time: set the accelerate time of servo start and stop. The higher speed of servo, the longer accelerate time.

Maintenance molds: "0" stands for no setting. If setting value, when system running to the setting value will stop automatic running. Reset it robot will able automatic running again.

Press F3 into safte option page to select each sensor "used" or "not used", see picture 4-28.
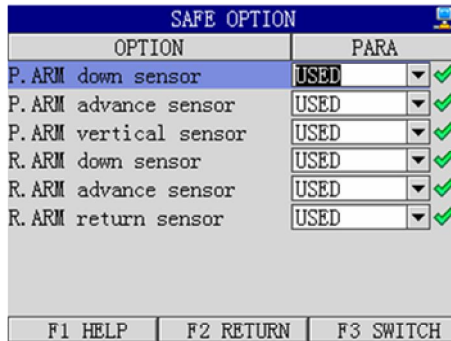
Picture 4-28

4.5.10 System Information
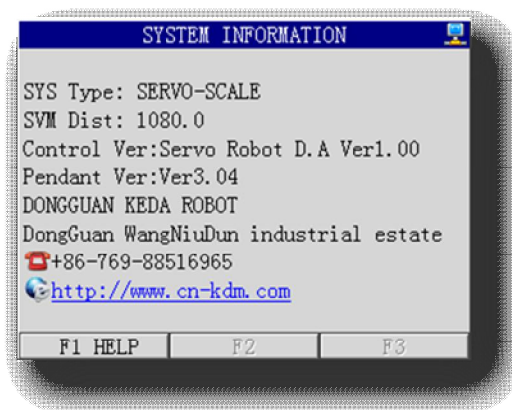
This page displays manufacturer's series umbers, max displacement, version, company name, address, telephone and website.

4.5.11 Standard Programs
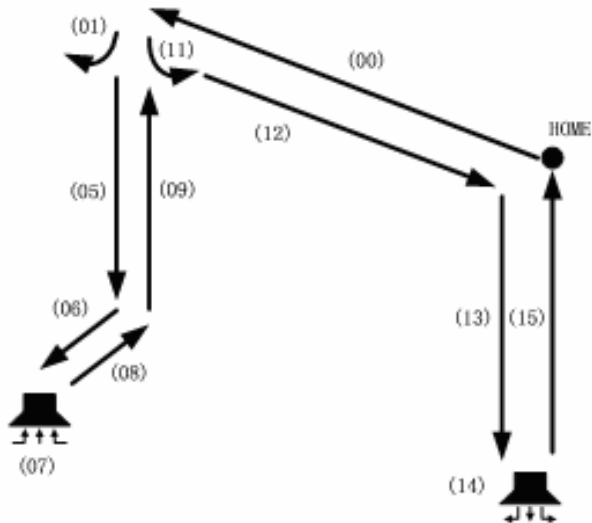
P00

Step	Action	Value
(00)	Traverse in to pick up position	SPD 050%
(01)	Main arm horizontal	0
(02)	Mold open	0
(03)	Ejector forward	0
(04)	Main arm down	0.80
(05)	Main arm forward	1.00
(06)	Main arm vacuum on	0.40
(07)	Main arm backward	0
(08)	Main arm up	0
(09)	Mold close	0
(10)	Main arm vertical	0
(11)	Loop 1	SPD 050%
(12)	Main arm forward	1.00
(13)	Main arm down	1.60
(14)	Main arm vacuum off	0.40
(15)	Main arm up	0

P01
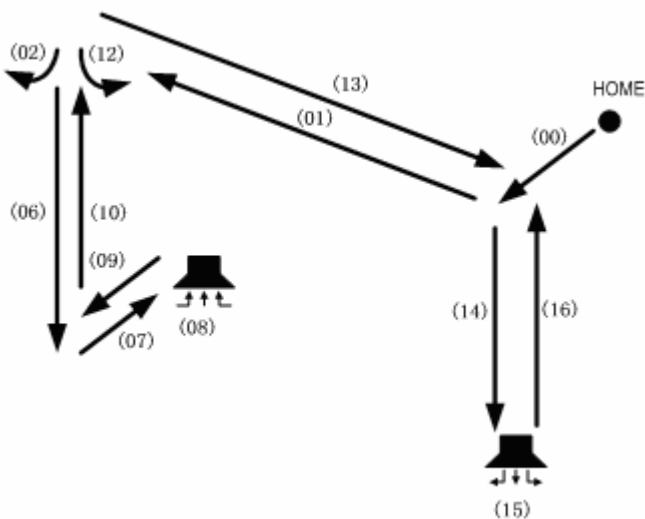
Step	Action	Value
(00)	Main arm forward	1.00
(01)	Traverse in to pick up position	SPD 050%
(02)	Main arm horizontal	0
(03)	Mold open	0
(04)	Ejector forward	0
(05)	Delay	0
(06)	Main arm down	0.80
(07)	Main arm backward	0
(08)	Main arm vacuum on	0.40
(09)	Main arm forward	1.00
(10)	Main arm up	0
(11)	Mold close	0
(12)	Main arm vertical	1.00
(13)	Loop 1	SPD 050%
(14)	Main arm down	1.00
(15)	Main arm vacuum off	0.40
(16)	Main arm up	0

P02
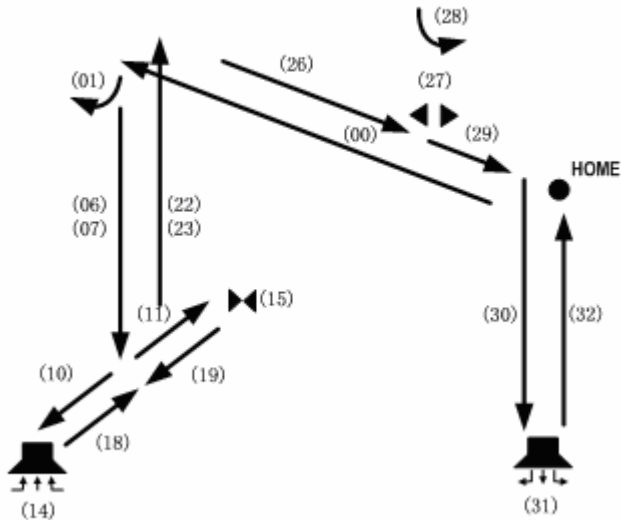
(00) Traverse in to pick up position	SPD 050%
(01) Main arm horizontal	0
(02) Mold open	0
(03) Ejector forward	0
(04) Delay	0
(05) Combination begin	0
(06) Main arm down	0.80
(07) Sub-arm down	0.80
(08) Combination end	0
(09) Combination begin	0
(10) Main arm forward	1.00
(11) Sub-arm backward	1.00
(12) Combination end	0
(13) Combination begin	0
(14) Main arm vacuum on	0.40
(15) Sub-arm grip on	0.40
(16) Combination end	0
(17) Combination begin	0
(18) Main arm backward	1.00
(19) Sub-arm forward	1.00
(20) Combination end	0
(21) Combination begin	0
(22) Main arm up	0
(23) Sub-arm up	0
(24) Combination end	0
(25) Mold close	0
(26) Traverse to sprue position	SPD 050%
(27) Sub-arm grip off	0
(28) Main arm vertical	0
(29) Loop 1	SPD 050%
(30) Main arm down	0.80
(31) Main arm vacuum off	0.4
(32) Main arm up	0

P03
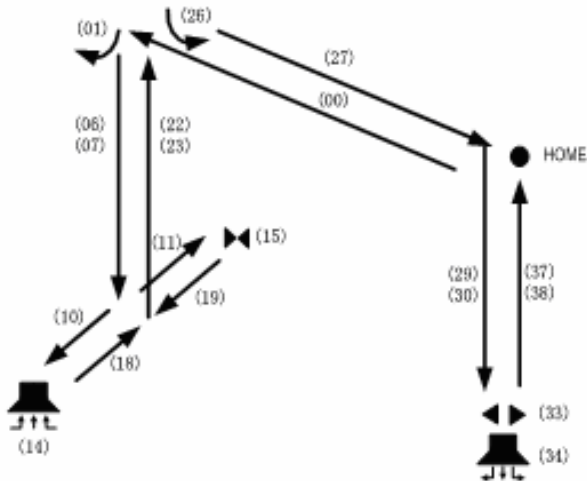
(00) Traverse in to pick up position		SPD 050%
(01) Main arm horizontal		0
(02) Mold open		0
(03) Ejector forward		0
(04) Delay		0
(05) Combination begin		0
(06) Main arm down		0.80
(07) Sub-arm down		0.80
(08) Combination end		0
(09) Combination begin		0
(10) Main arm backward		1.00
(11) Sub-arm backward		1.00
(12) Combination end		0
(13) Combination begin		0
(14) Main arm vacuum on		0.40
(15) Sub-arm vacuum on		0.40
(16) Combination end		0
(17) Combination begin		0
(18) Main arm forward		1.00
(19) Sub-arm forward		1.00
(20) Combination end		0
(21) Combination begin		0
(22) Main arm up		0
(23) Sub-arm up		0
(24) Combination end		0
(25) Mold close		0
(26) Main arm vertical		1.00
(27) Loop 1		SPD 050%
(28) Combination begin		0
(29) Main arm down		0.80
(30) Sub-arm down		0.80
(31) Combination end		0
(32) Combination begin		0
(33) Sub-arm grip off		0
(34) Main arm vacuum off		0
(35) Combination end		0
(36) Combination begin		0
(37) Main arm up		0
(38) Sub-arm up		0
(39) Combination end		0

P04

(00) Combination begin	0
(01) Main arm forward	1.00
(02) Sub-arm backward	1.00
(03) Combination end	0
(04) Traverse in to pick up position	SPD 050%
(05) Main arm horizontal	0
(06) Mold open	0
(07) Ejector forward	0
(08) Delay	0
(09) Combination begin	0
(10) Main arm down	0.80
(11) Sub-arm down	0.80
(12) Combination begin	0
(13) Combination end	0
(14) Main arm backward	1.00
(15) Sub-arm forward	1.00
(16) Combination end	0
(17) Combination begin	0
(18) Main arm vacuum on	0.40
(19) Sub-arm grip	0.40
(20) Combination end	0
(21) Combination begin	0
(22) Main arm forward	1.00
(23) Sub-arm backward	1.00
(24) Combination end	0
(25) Combination begin	0
(26) Main arm up	0
(27) Sub-arm up	0
(28) Combination end	0
(29) Mold close	0
(30) Traverse to cut sprue	SPD 050%
(31) Sub-arm grip off	0
(32) Main arm vertical	0.40
(33) Loop 1	SPD 050%
(34) Main arm up	1.60
(35) Main arm vacuum off	0.40
(36) Main arm up	0

P05

(00) Combination begin	0	
(01) Main arm forward	1.00	
(02) Sub-arm backward	1.00	
(03) Combination end	0	
(04) Traverse in to pick up position	SPD 050%	
(05) Main arm horizontal	0	
(06) Mold open	0	
(07) Ejector forward	0	
(08) Delay	0	
(09) Combination begin	0	
(10) Main arm down	0.80	
(11) Sub-arm down	0.80	
(12) Combination begin	0	
(13) Combination end	0	
(14) Main arm backward	1.00	
(15) Sub-arm forward	1.00	
(16) Combination end	0	
(17) Combination begin	0	
(18) Main arm vacuum on	0.40	
(19) Sub-arm vacuum	0.40	
(20) Combination end	0	
(21) Combination begin	0	
(22) Main arm forward	1.00	
(23) Sub-arm backward	1.00	
(24) Combination end	0	
(25) Combination begin	0	
(26) Main arm up	0	
(27) Sub-arm up	0	
(28) Combination end	0	
(29) Mold close	0	
(30) Main arm vertical	1.00	
(31) Loop 1	SPD 050%	
(32) Combination begin	0	
(33) Main arm down	0.80	
(34) Sub-arm down	0.80	
(35) Combination end	0	
(36) Combination begin	0	
(37) Sub-arm grip off	0	
(38) Main arm vacuum off	0	
(39) Combination end	0	
(40) Combination begin	0	
(41) Main arm up	0	
(42) Sub-arm up	0	
(43) Combination end	0	

P06
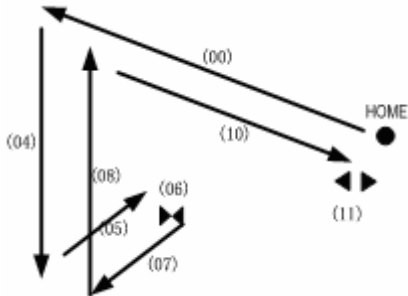
(00) Traverse in to pick up position	SPD 050%
(01) Mold open	0
(02) Ejector forward	0
(03) Delay	0
(04) Sub-arm down	0.80
(05) Sub-arm backward	1.00
(06) Sub-arm grip on	0.40
(07) Sub-arm forward	0
(08) Sub-arm up	0
(09) Mold close	0
(10) Traverse out	SPD 050%
(11) Sub-arm grip off	0

P07
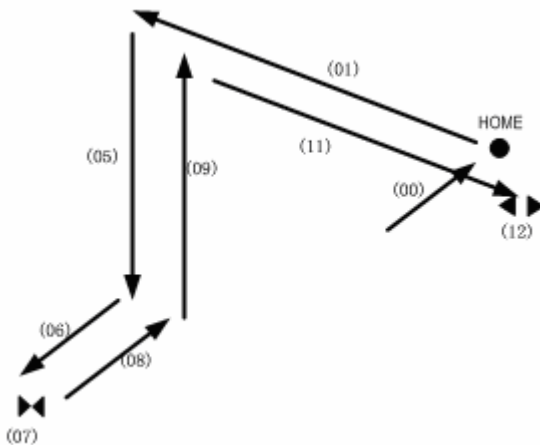
(00) Sub-arm backward	1.00
(01) Traverse in to pick up position	SPD 050%
(02) Mold open	0
(03) Ejector forward	0
(04) Delay	0
(05) Sub-arm down	0.80
(06) Sub-arm forward	1.00
(07) Sub-arm grip on	0.40
(08) Sub-arm backward	0
(09) Sub-arm up	0
(10) Mold close	0
(11) Traverse out	SPD 050%
(12) Sub-arm grip off	0

P08
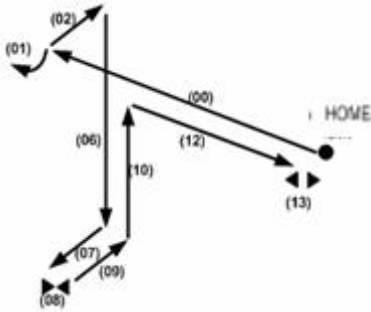
(00) Traverse in to pick up position		SPD 050%
(01) Main arm horizontal		0
(02) Sub-arm backward		1.00
(03) Mold open		0
(04) Ejector forward		0
(05) Delay		0
(06) Sub-arm down		0.80
(07) Sub-arm forward		1.00
(08) Sub-arm grip on		0.40
(09) Sub-arm backward		1.00
(10) Sub-arm up		0
(11) Mold close		0
(12) Loop 1		SPD 050%
(13 Sub-arm grip off		0.40

P09
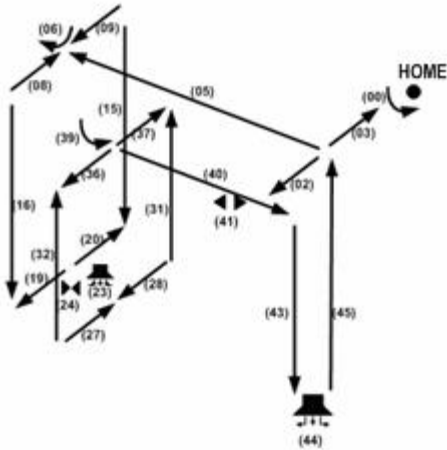
(00) Main arm vertical	1.00
(01) Combination begin	0
(02) Main arm forward	1.00
(03) Sub-arm backward	1.00
(04) Combination end	0
(05) Traverse to pick up position	SPD 050%
(06) Main arm horizontal	0
(07) Combination begin	0
(08) Main arm backward	1.00
(09) Sub-arm forward	1.00
(10) Combination end	0
(11) Mold open	0
(12) Ejector forward	0
(13) Delay	0
(14) Combination begin	0
(15) Main arm down	0.80
(16) Sub-arm down	0.80
(17) Combination end	0
(18) Combination begin	0
(19) Main arm forward	1.00
(20) Sub-arm backward	1.00
(21) Combination end	0
(22) Combination begin	0
(23) Main arm vacuum on	0.40
(24) Sub-arm grip on	0.40
(25) Combination end	0
(26) Combination begin	0
(27) Main arm backward	1.00
(28) Sub-arm forward	1.00
(29) Combination end	0
(30) Combination begin	0
(31) Main arm up	0
(32) Sub-arm up	0
(33) Combination end	0
(34) Mold close	0
(35) Combination end	0
(36) Main arm forward	0
(37) Sub-arm backward	0
(38) Combination end	0
(39) Main arm vertical	1.00
(40) traverse out	SPD 050%
(41) Sub-arm grip off	0
(42) Loop 1	SPD 050%
(43) Main arm down	1.60
(44) Main arm vacuum off	0.40
(45) Main arm up	0

5 **Error Connection**

Error	Caused	Troubleshooting
Alarm No. E001 The main control board error.	Main control action error.	Please turn off the power supply and restart system. If still alarming, please contact with manufacture.
Alarm No. E002 Data access error.	System memory access error.	Please turn off the power supply and restart system. If still alarming, please contact with manufacture.
Alarm No. E003 Low air pressure.	Robot air low pressure.	Robot working in low air pressure is not safety. Please check air pressure, press "Reference" key to resume normal value (4-5kg).
Alarm No. E004 Servo not ready.	Servo driver error.	Robot servo driver not ready. Please check and restart it.
Alarm No. E005 Servo alarm.	Robot servo driver alarm.	Please check servo driver. After troubleshooting, please restart servo driver.
Alarm No. E006 Robot traverse limit.	Robot arm moves to traveser limit position.	Turn off system and check servo driver. Move robot arm out of limit position and restart system.
Alarm No. E007 Servo position not safety when robot arm down.	Servo alarm, mold safety signal off.	Please check the servo motor and mold safety signal.
Alarm No. E008 Hand controller emergency stop.	The emergency stop button on hand controller is pressed.	Release emergency stop button and press "Reference" key.
Alarm No. E009 IMM emergency stop.	The emergency stop button of IMM is pressed.	Release emergency stop button and press "Reference" key on hand controller, check the wirings connection.
Alarm No. E010 Production plan finished.	Robot in auto mode, the picked up products reached the setting numbers.	Please press "Reference" key into manual mode to continue running.
Alarm No. E011 Reject exceeded.	Robot in auto mode, the reject exceeded the setting numbers.	Please press "Reference" key into manual mode and check IMM production.
Alarm No. E012	Undefined	Undefined
Alarm No. E013 Main arm forward error.	When robot main arm forward with backward signal.	Please check the cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E014 Main arm backward error.	When robot main arm backward with forward signal.	Please check the cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E015 Main arm horizontal error.	When robot main arm horizontal with vertical signal.	Please check the cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E016 Main arm vertical error.	When robot main arm vertical with horizontal signal.	Please check the flip cylinder, valve and sensor. After troubleshooting, press "Reference" key.

Alarm No. E017 Sub-arm up error.	When robot sub-arm up with down signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E018 Sub-arm down error.	When robot sub-arm down with up signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E019 Main arm up error.	When robot main arm up with down signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E020 Main arm no down finished signal.	When robot main arm down without finished down signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E021 Main arm no up finished signal.	When robot main arm up without up finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E022 Main arm no down finished signal.	When robot main arm down without down finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E023 Sub-arm no up signal.	When robot sub-arm up without up signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E024 Sub-arm down with up finished signal.	When robot sub-arm down with up finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E025 Main arm rotate error.	Robot arm with rotate horizontal and vertical signal.	Please check sensor. After troubleshooting, press "Reference" key.
Alarm No. E026 Main arm rotate horizontal error.	Robot main arm in horizontal state, but without horizontal finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E027 Main arm rotate vertical error.	Robot main arm in vertical state, but without vertical finished or with horizontal finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E028 Main arm grasp error.	Robot aim arm in grasp state, but without grasp signal.	Product dropped or sensor damaged. Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E029 Main arm vacuum error.	Robot main arm in vacuum state, but without vacuum signal.	Product dropped or sensor damaged. Please check vacuum generators. After troubleshooting, press "Reference" key.
Alarm No. E030 Main arm forward error.	When robot arm forward without forward finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E031 Main arm backward error.	When robot arm backward without backward finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference" key.
Alarm No. E032 Sub-arm grip error.	When robot sub-arm in grip state, but without grip signal. Product dropped or sensor	Please check cylinder, valve and sensor. After troubleshooting, press"Reference"key.

	damaged.	
Alarm No. E033 Sub-arm no forward finished signal.	Robot sub-am in forward state, but without forward finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press"Reference"key.
Alarm No. E034 Sub-arm no backward finished signal.	Robot sub-am in backward state, but without backward finished signal.	Please check cylinder, valve and sensor. After troubleshooting, press"Reference"key.
Alarm No. E035 Robot traverse error.	For safety, when robot arm at home position, if main arm in vertical state, robot can not traverse. If main arm in horizontal state, robot can traverse.	Please adjust main arm cyclider to vertical.
Alarm No. E036 Sub-arm forward error.	Robot sub-arm in forward state, but with backward signal.	Please check cylinder, valve and sensor. After troubleshooting, press"Reference"key.
Alarm No. E037 Sub-arm backward error.	Robot sub-arm in backward state, but with forward signal.	Please check cylinder, valve and sensor. After troubleshooting, press "Reference"key.
Alarm No. E038 Main arm up in mold not safety.	Forbidden main arm in vertical state going-up in mold.	Refer to Chapter system safety.
Alarm No. E039 Main arm down in mold not safety.	Forbidden main arm in vertical state going-down in mold.	Refer to Chapter system safety.
Alarm No. E040 Safety door opened.	In system safety setting, if choose "use safety door", robot will alarm when safety door opened.	Close safety door or press "Reference" back to manual mode. Refer to Chapter system safety.
Alarm No. E041 Mold open signal disappeared when arm down in mold.	When robot arm down to pick up product, mold open signal disappeared.	Please check IMM working state and signal wirings connection. After troubleshooting, press "Reference" key.
Alarm No. E042 Middle mold signal disappeared when arm down in mold.	When robot arm down to pick up product, middle signal disappeared.	Please check IMM working state, signal wiring connection and middle mold option in system safety. After troubleshooting, press "Reference" key.
Alarm No. E043 No middle mold signal.	Robot no middle mold signal, arm cannot going-down.	If middle mold had opened, please check IMM signal wirings connection and middle mold option in system safety. After troubleshooting, press "Reference" key.
Alarm No. E044 No mold open signal.	Robot no mold open signal, arm cannot going-down.	If mold had opened, pleas check IMM signal wirings connection and robot I/O circuit board. After troubleshooting, press "Reference" key.

Alarm No. E045 X-axis move not safety.	X-axis in down sate or up-sensor no signal.	Please adjust robot arm in safety working area. X-axis can safety move only at pick-up position or going-up state.
Alarm No. E046 Y-axis move not safety.	Y-axis down not at place positon or pick-up position.	Please check the sensor.
Alarm No. E047 Rotating not safety.	Robot arm in mold or mold safety senero not woring.	Please check the system setting.
Alarm No. E048 Z-axis not safety.	Robot arm up position sensor not working.	Please check the sensors.
Alarm No. E049 Placing postion not safety.	Placing position over than current position and sensor not working.	Please check loop setting and sensor.
Alarm No. E050 Extend 4 input action overtime.	In setting delay time, robot hasn't got extend 4 input signal (high level or low level).	Please check signal source.
Alarm No. E051 Extend 1 input action overtime.	In setting delay time, robot haven't got extend 1 input signal (high level, low level or pulse signal).	Please check signal source.
Alarm No. E052 Extend 2 input action overtime.	In setting delay time, robot haven't got extend 2 input signal (high level, low level or pulse signal).	Please check signal source.
Alarm No. E053 Extend 3 input action overtime.	In setting delay time, robot haven't got extend 3 input signal (high level, low level or pulse signal).	Please check signal source.
Alarm No. E054 Main arm up overtime.	Main arm goes up, after the delay time end, robot still hasn't got "up finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E055 Sub-arm up overtime.	Sub-arm going-up, after the delay time end, robot still has't got "up finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E056 Main arm horizontal overtime.	Main arm rotate horizontal, after the delay time end, robot still hasn't got "horizontal finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E057 Main arm vertical overtime.	Main arm rotate vertical, after the delay time end, robot still hasn't got "vertical finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E058 Main arm down overtime.	Main arm goes down, after the delay time end, robot still has got "up finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E059 Sub-arm down overtime.	Sub-arm goes down, after the delay time end, robot still has got "up finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E060	Main arm vacuum on, after	Please check vacuum generator, valve,

Main arm vacuum overtime.	the delay time end, robot still gets "vacuum" signal.	sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E061 Main arm vacuum off overtime.	Main arm vacuum off, after the delay time end, robot still gets "vacuum" signal (products haven't been placed down).	Please check vacuum generator, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E062 Traverse overtime.	Robot traverse hasn't moved to desired position.	Please turn off robot power supply, check servo driver and wirings. After troubleshooting reboot system.
Alarm No. E063 Main arm grip overtime.	Main arm grip on, after the delay time end, robot still hasn't got "grip product" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E064 Main grip off overtime.	Main arm grip off, after the delay time end, robot still grips product.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E065 Sub-arm grip overtime.	Sub-arm grip on, after the delay time, robot still hasn't got "grip product" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E066 Sub-arm grip off overtime.	Sub-arm grip off, after the delay time, robot still gets "grip product" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E067 Main arm forward overtime.	Main arm forward, after delay time end, robot still gets "backward finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E068 Main arm backward overtime.	Main arm backward, after delay time end, robot still hasn't got "backward finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E069 Sub-arm forward overtime.	Sub-arm forward, after delay time end, robot still gets "backward finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E070 Sub-arm backward overtime.	Sub-arm backward, after delay time end, robot still hasn't got "backward finished" signal.	Please check cylinder, valve, sensor and air pressure. After troubleshooting, press "Reference" key.
Alarm No. E071 Extend 5 input action overtime.	In setting delay time, robot hasn't got extend 5 input signal (high level, low level or pulse signal).	Please check signal source.
Alarm No. E072 No mold open signal, forbidden traverse in.	Robot standby outside mold, only when robot gets "mold open" signal, arm can traverse in.	Please check the IMM "mold open signal" and wirings connection. After troubleshooting, press "Reference" key.
Alarm No. E073 No middle mold open signal, forbidden traverse in.	Robot standby outside mold, only when robot gets "middle mold open" signal, arm can traverse in.	Please check IMM woring state, signal wirngs connection and "middle mold" opitin in system safety. After troubleshooting, press "Reference" key.
Alarm No. E074	Robot standby outside mold,	Please check IMM woring state, signal

Mold open signal disappeared.	IMM mold open, robot traverse in and forbidden IMM open/close mold, then mold open signal disappeared.	wirngs connection. After troubleshooting, press "Reference" key.
Alarm No. E075 Middle mold signal disappeared.	Robot standby outside mold, IMM choose "use milled mold" and mold open, robot traverse in and forbidden IMM open/close mold, then middle mold signal disappeared.	Please check IMM woring state, signal wirngs connection and "middle mold" opitin in system safety. After troubleshooting, press "Reference" key.

SHINI

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 should 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 ⚠ must be observed according to regulations so that fully functionality of this equipment can be guaranteed.

⚠ Before carrying out maintenance work, and entering the safety zone of the robot, the main switch and compressed air must be disconnected and the compressed air system must be evacuated.

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.

6.3   Maintenance cycle

In accordance with the maintenance cycle, make work in the best way.

Daily Maintenance	Monthly Maintenance	Quarterly Maintenance
1. Swab robot.	1. Use air clean filter.	Brush oil on to the axis.
2. Filter drainage.	2. Check the screws on all part	
3. Check the air pressure.	whether tightened.	

4. Check bolt connection robot and injection molding machine whether tighten. 5. Check all block settings whether tightened.	3. Confirm whether the pipelines break or loose. 4. Check and adjust the operating speed.	

7 Assembly Diagram

7.1   Traverse Unit (ST1-S and ST1-T-S)
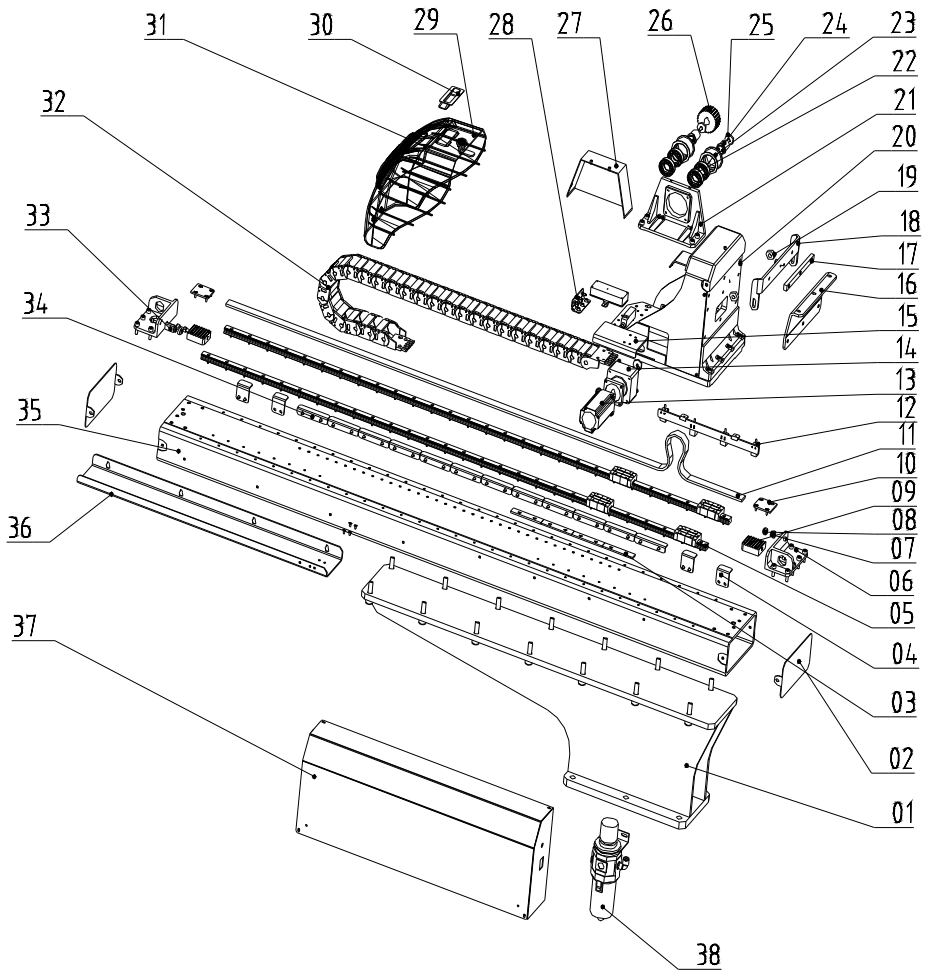
Picture 7-1

7.1.1 Parts List

Table 7- 1: Travese Unit Parts List

No.	Name	Part Number			
		ST1-650-1200-S	ST1-650-1200D-S	ST1-750-1300-S	ST1-750-1300D-S
1	BASE	-	-	-	-
2	END COVER OF BEAM	-	-	-	-
3	IN MOLD HOME POSITION PLATE	BL71001410020	BL71001410020	BL71001410020	BL71001410020
4	LIMITED SENSOR PANEL	BL69335000020	BL69335000020	BL69335000020	BL69335000020
5	LINEAR GUIDING RAIL	-	-	-	-
6	BELT FIXING FRAME	BL71010900020	BL71010900020	BL71010900020	BL71010900020
7	BUFFER UNIT	BH91151200010	BH91151200010	BH91151200010	BH91151200010
8	BUFFER CAP	YW80200000000	YW80200000000	YW80200000000	YW80200000000
9	BELT HOLDING PLATE	YW09474000110	YW09474000110	YW09474000110	YW09474000110
10	BELT SPLINT CONNECTIONG PIECE	BL70110100020	BL70110100020	BL70110100020	BL70110100020
11	SYNCHRONOUS BELT	YR00082500100	YR00082500100	YR00082500100	YR00082500100
12	PROXIMITY SWITCH	-	-	-	-
13	SERVO MOTOR	-	-	-	-
14	SPEED REDUCER	YM50940000000	YM50940000000	YM50940000000	YM50940000000
15	TRAVERSE DRAG CHAIN CONNECTER	BL71555300020	BL71555300020	BL71555300020	BL71555300020
16	PACKAGE SUPPORTING FRAME1	BL71555600020	BL71555600020	BL71555600020	BL71555600020
17	FLIP FIXING PLATE	BH10555800010	BH10555800010	BH10555800010	BH10555800010
18	PACKAGE SUPPORTING FRAME2	BL71555700020	BL71555700020	BL71555700020	BL71555700020
19	WASHER	BH79051100110	BH79051100110	BH79051100110	BH79051100110
20	SLIDING SEAT	-	-	-	-
21	MOTOR SUPPORTING FRAME	BH10155000010	BH10155000010	BH10155000010	BH10155000010
23	PULLEY BEARING	YW11600500000	YW11600500000	YW11600500000	YW11600500000
24	PULLEY	BH91030000010	BH91030000010	BH91030000010	BH91030000010
22	CONNECTION SHAFT	BH91303900010	BH91303900010	BH91303900010	BH91303900010

25	SPECIAL WASHER	BL70107700040	BL70107700040	BL70107700040	BL70107700040
26	SYNCHRONOUS PULLEY	YW08621900100	YW08621900100	YW08621900100	YW08621900100
27	MOTOR SYPPORTING COVER	BL21000100520	BL21000100520	BL21000100520	BL21000100520
28	HINGE	YW06253200000	YW06253200000	YW06253200000	YW06253200000
29	LOCK	BL70112100020	BL70112100020	BL70112100020	YW00000000100
30	TRAPEZOID PLASTIC HANDLE	YR40914040000	YR40914040000	YR40914040000	YR40914040000
31	SLIDING SEAT COVER	BL70127000020	BL70127000020	BL70127000020	BL70127000020
32	TRAVESE DRAG CHAIN	YE60250007500	YE60250007500	YE60250007500	YE60250007500
33	BUFFER MOUNT PLATE 3	-	-	-	-
34	SAFETY SENSOR PANEL OF MOLD	BL69002200020	BL69002200020	BL69002200020	BL69002200020
35	ALUMINUM PROFILE OF TRAVERSE	-	-	-	-
36	TRAVERSE DRAG CHAIN SUPPORTING FRAME	-	-	-	-
37	CONTROL BOX	BH72070000250	BH72070000250	BH72070000250	BH72070000250
38	FILTER REGULATING VALVE	YE30320400100	YE30320400100	BL71071420020	YE30301000000

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

Table 7-2: Travese Unit Parts List

No.	Name	Part Number	
		ST1-850-1400-S	ST1-850-1600D-S
1	Base	-	-
2	End cover of beam	-	-
3	In mold home position plate	BL71001410020	BL71001410020
4	Limited sensor panel	BL69335000020	BL69335000020
5	Linear guiding rail	-	-
6	Belt fixing frame	BL71010900020	BL71010900020
7	Buffer unit	BH91151200010	BH91151200010
8	Buffer cap	YW80200000000	YW80200000000
9	Belt holding plate	YW09474000110	YW09474000110
10	Belt splint connectiong piece	BL70110100020	BL70110100020
11	Synchronous belt	YR00082500100	YR00082500100
12	Proximity switch	-	-
13	Servo motor	-	-
14	Speed reducer	YM50940000000	YM50940000000
15	Traverse drag chain connecter	BL71555300020	BL71555300020
16	Package supporting frame1	BL71555600020	BL71555600020
17	Flip fixing plate	BH10555800010	BH10555800010
18	Package supporting frame2	BL71555700020	BL71555700020
19	Washer	BH79051100110	BH79051100110
20	Sliding seat	-	-
21	Motor supporting frame	BH10155000010	BH10155000010
23	Pulley bearing	YW11600500000	YW11600500000
24	Pulley	BH91030000010	BH91030000010
22	Connection shaft	BH91303900010	BH91303900010
25	Special washer	BL70107700040	BL70107700040
26	Synchronous pulley	YW08621900100	YW08621900100
27	Motor sypporting cover	BL21000100520	BL21000100520
28	Hinge	YW06253200000	YW06253200000
29	Lock	BL70112100020	BL70112100020
30	Trapezoid plastic handle	YR40914040000	YR40914040000
31	Sliding seat cover	BL70127000020	BL70127000020
32	Travese drag chain	YE60250007500	YE60250007500
33	Buffer mount plate 3	-	-
34	Safety sensor panel of mold	BL69002200020	BL69002200020
35	Aluminum profile of traverse	-	-
36	Traverse drag chain supporting frame	-	-
37	Control box	BBH72070000250	BH72070000250
38	Filter regulating valve	YE30320400100	YE30320400100

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

Table 7- 3: Travese Unit Parts List

No.	Part	Part Number			
		ST1-700-1400T-S	ST1-700-1400DT-S	ST1-900-1600T-S	ST1-900-1600DT-S
1	Base	-	-	-	-
2	End cover of beam	-	-	-	-
3	In mold home position plate	BL71001410020	BL71001410020	BL71001410020	BL71001410020
4	Limited sensor panel	BL69335000020	BL69335000020	BL69335000020	BL69335000020
5	Linear guiding rail	-	-	-	-
6	Belt fixing frame	BL71010900020	BL71010900020	BL71010900020	BL71010900020
7	Buffer unit	BH91151200010	BH91151200010	BH91151200010	BH91151200010
8	Buffer cap	YW80200000000	YW80200000000	YW80200000000	YW80200000000
9	Belt holding plate	YW09474000110	YW09474000110	YW09474000110	YW09474000110
10	Belt splint connecting piece	BL70110100020	BL70110100020	BL70110100020	BL70110100020
11	Synchronous belt	YR00082500100	YR00082500100	YR00082500100	YR00082500100
12	Proximity switch	-	-	-	
13	Servo motor	-	-	-	-
14	Speed reducer	YM50940000000	YM50940000000	YM50940000000	YM50940000000
15	Traverse drag chain connecter	BL71555300020	BL71555300020	BL71555300020	BL71555300020
16	Package supporting frame1	BL71555600020	BL71555600020	BL71555600020	BL71555600020
17	Flip fixing plate	BH10555800010	BH10555800010	BH10555800010	BH10555800010
18	Package supporting frame2	BL71555700020	BL71555700020	BL71555700020	BL71555700020
19	Washer	BH79051100110	BH79051100110	BH79051100110	BH79051100110
20	Sliding seat	-	-	-	-
21	Motor supporting frame	BH10155000010	BH10155000010	BH10155000010	BH10155000010
23	Pulley bearing	YW11600500000	YW11600500000	YW11600500000	YW11600500000
24	Pulley	BH91030000010	BH91030000010	BH91030000010	BH91030000010
22	Connection shaft	BH91303900010	BH91303900010	BH91303900010	BH91303900010
25	Special washer	BL70107700040	BL70107700040	BL70107700040	BL70107700040
26	Synchronous pulley	YW08621900100	YW08621900100	YW08621900100	YW08621900100
27	Motor sypporting cover	BL21000100520	BL21000100520	BL21000100520	BL21000100520
28	Hinge	YW06253200000	YW06253200000	YW06253200000	YW06253200000
29	Lock	BL70112100020	BL70112100020	BL70112100020	YW00000000100
30	Trapezoid plastic handle	YR40914040000	YR40914040000	YR40914040000	YR40914040000
31	Sliding seat cover	BL70127000020	BL70127000020	BL70127000020	BL70127000020
32	Travese drag chain	YE60250007500	YE60250007500	YE60250007500	YE60250007500
33	Buffer mount plate 3				
34	Safety sensor panel of mold	BL69002200020	BL69002200020	BL69002200020	BL69002200020
35	Aluminum profile of traverse	-	-	-	-
36	Traverse drag chain supporting frame	-	-	-	-
37	Control box	BBH72070000250	BH72070000250	BH72070000250	BH72070000250
38	Filter regulating valve	YE30320400100	YE30320400100	BL71071420020	YE30301000000

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

7.2 Vertical Unit (ST1-S)

Picture 7-2

7.2.1 Parts List

Table 7- 4: ST1-S Vertical Parts List

No.	Name	Part Number			
		ST1-650-1200-S	ST1-650-1200D-S	ST1-750-1300-S	ST1-750-1300D-S
1	Cover of drag	BL70105000020	BL70105000020	BL70105000020	BL70105000020
2	Vertical drag on main arm	YE60250003100	YE60250003100	YE60250003100	YE60250003100
3	Vertical drag on sub-arm	YE60250005500	YE60250005500	YE60250005500	YE60250005500
4	Vertical drag frame on sub-arm	-	-	-	-
5	Shock absober	-	-	-	-
6	Vertical cylinder on sub-arm	YE30321000000	YE30321000000	YE30321000000	YE30321000000
7	Left cover of vertical	BL70107000020	BL70107000020	BL70107000020	BL70107000020
8	Vertical aluminum profile	BH91801600010	BH91801600010	BH91801600010	BH91801600010
9	Vertical cylinder holder frame of sub-arm	-	-	-	-
10	Piston rod	YW09055000300	YW09055000300	YW09055000300	YW09055000300
11	Linear gudiding rail	YW31157600000	YW31157600000	YW31157600000	YW31157600000
12	Sub-arm	-	-	-	-
13	Main arm	-	-	-	-
14	Limit block	BH91202500110	BH91202500110	BH91202500110	BH91202500110
15	Lifting rings	YW09000800000	YW09000800000	YW09000800000	YW09000800000
16	Right cover of vertical	BH91905000010	BH91905000010	BH91905000010	BH91905000010
17	Fixing frame of vertical cylinder	-	-	-	-
18	Vertical cylinder on main arm	-	-	-	-
19	Vertical cylinder on main arm	YE30321500000	YE30321500000	YE30321500000	YE30321500000
20	Vertical drag frame on main arm	BL70111000020	BL70111000020	BL70111000020	BL70111000020
21	Vertical drag supporting frame	BL70550900020	BL70550900020	BL70550900020	BL70550900020

*means possible broken parts.   **means easy broken part, and spare backup is suggested. Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

Table 7- 5: ST1-S Vertical Parts List

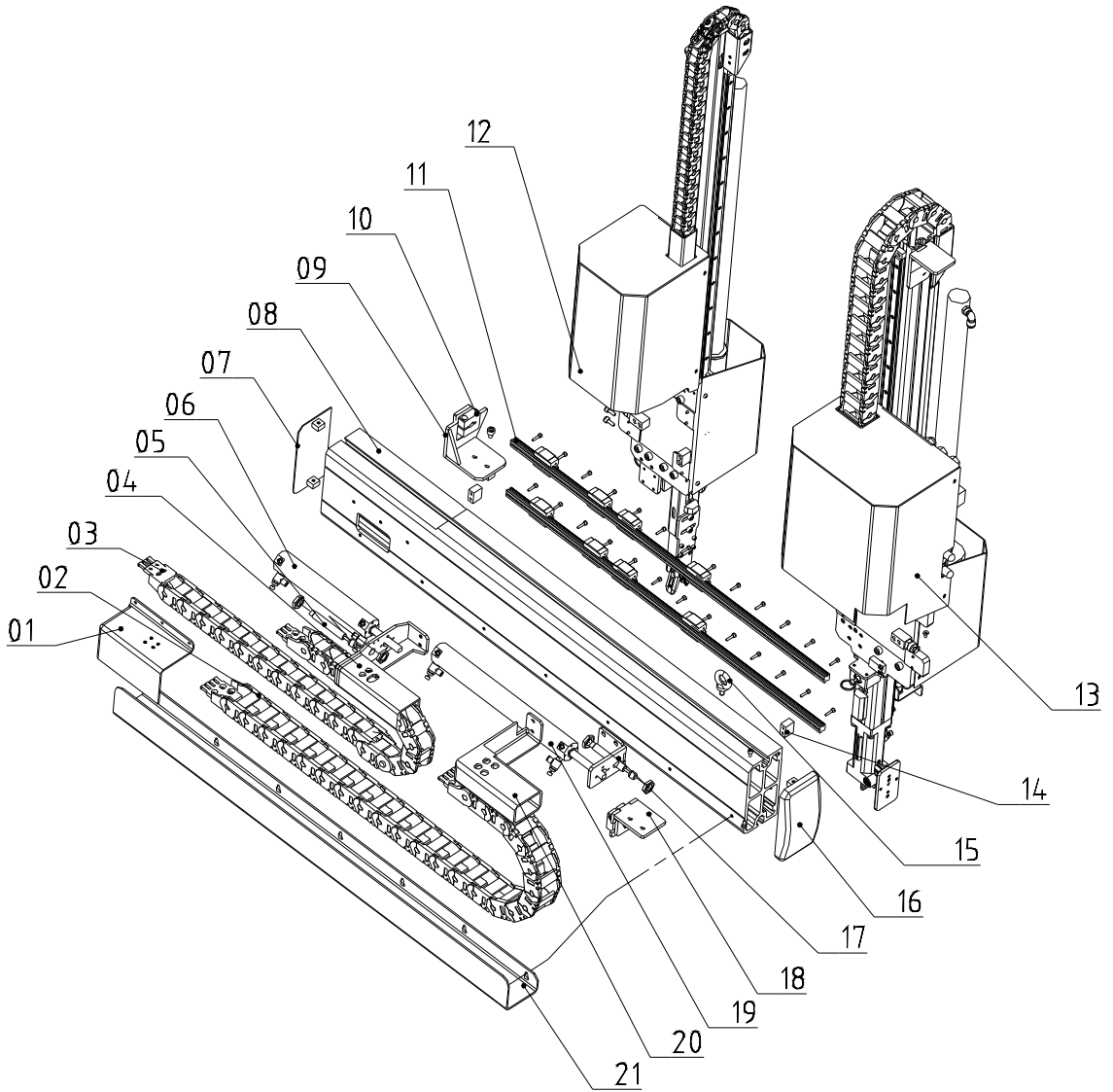| No.	Name	Part Number	
		ST1-850-1400-S	ST1-850-1400D-S
1	Cover of drag	YE60250003100	YE60250003100
2	Vertical drag on main arm	BL70105000020	BL70105000020
3	Vertical drag on sub-arm	YE60250005500	YE60250005500
4	Vertical drag frame on sub-arm	-	-
5	Shock absober	-	-
6	Vertical cylinder on sub-arm	YE30321000000	YE30321000000
7	Left cover of vertical	BL70107000020	BL70107000020
8	Vertical aluminum profile	BH91115000010	BH91115000010
9	Vertical cylinder holder frame of sub-arm	-	-
10	Piston rod	YW09055000300	YW09055000300
11	Linear gudiing rail	-	-
12	Sub-arm	-	-
13	Main arm	-	-
14	Limit block	BH91202500110	BH91202500110
15	Lifting rings	YW09000800000	YW09000800000
16	Right cover of vertical	BH91905000010	BH91905000010
17	Fixing frame of vertical cylinder	-	-
18	Vertical cylinder on main arm	-	-
19	Vertical cylinder on main arm	YE31325100000	YE31325100000
20	Vertical drag frame on main arm	BL70111000020	BL70111000020
21	Vertical drag supporting frame	BL70190900020	BL70190900020

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

7.3 Main Arm Unit (ST1-S)

Picture 7-3

7.3.1 Parts List

Table 7- 6: ST1-S Main Arm Parts List

No.	Name	Parts Number			
		ST1-650-1200-S	ST1-650-1200D-S	ST1-750-1300-S	ST1-750-1300D-S
1	Rotation board	BH10550900020	BH10550900020	BH10550900020	BH10550900020
2	Spare frame for air pipe	BL70102600020	BL70102600020	BL70102600020	BL70102600020
3	Steel covers of main arm	-	-	-	-
4	Aluminum cover of main arm	-	-	-	-
5	Drag chain on main arm (up/down)	YE60250003700	YE60250003700	YE60250003700	YE60250003700
6	Drag chian connector on main arm	BL70108000020	BL70108000020	BL70108000020	BL70108000020
7	Down baffle on main arm	-	-	-	-
8	Main arm aluminum profile	-	-	-	-
9	Linear guiding rail	-	-	-	-
10	Cylinder on main arm (up/down)	YE30326700000	YE30326700000	YE30325700000	YE30325700000
11	Shock absorber	YW10255020000	YW10255020000	YW10255020000	YW10255020000
12	Silencer sleeve 20	YW80200000000	YW80200000000	YW80200000000	YW80200000000
13	Air pipe connection plate on main arm	-	-	-	-
14	Connection cover of main arm	-	-	-	-
15	Digital display pressure switch	YW80204050000	YW80204050000	YW80204050000	YW80204050000
16	Relay mounting plate on main arm	-	-	-	-
17	Pneumatinc distribution block on main arm	-	-	-	-
18	Magnetic valve	-	-	-	-
19	Main arm mounting plate	-	-	-	-
20	Buffer unit	BH91181200010	BH91181200010	BH91181200010	BH91181200010
21	Buffer cap	YW80200000000	YW80200000000	YW80200000000	YW80200000000
22	Falling-proof cylinder	YE30055000350	YE30055000350	YE30055000350	YE30055000350
23	Proximity switch	-	-	-	-
24	Mian arm supporting frame	-	-	-	-
25	Mian arm falling-proof stop plate	-	-	-	-
26	Cylinder holder frame on main arm	-	-	-	-

*means possible broken parts.   **means easy broken part, and spare backup is suggested. Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

Table 7- 7: ST1-S Main Arm Parts List

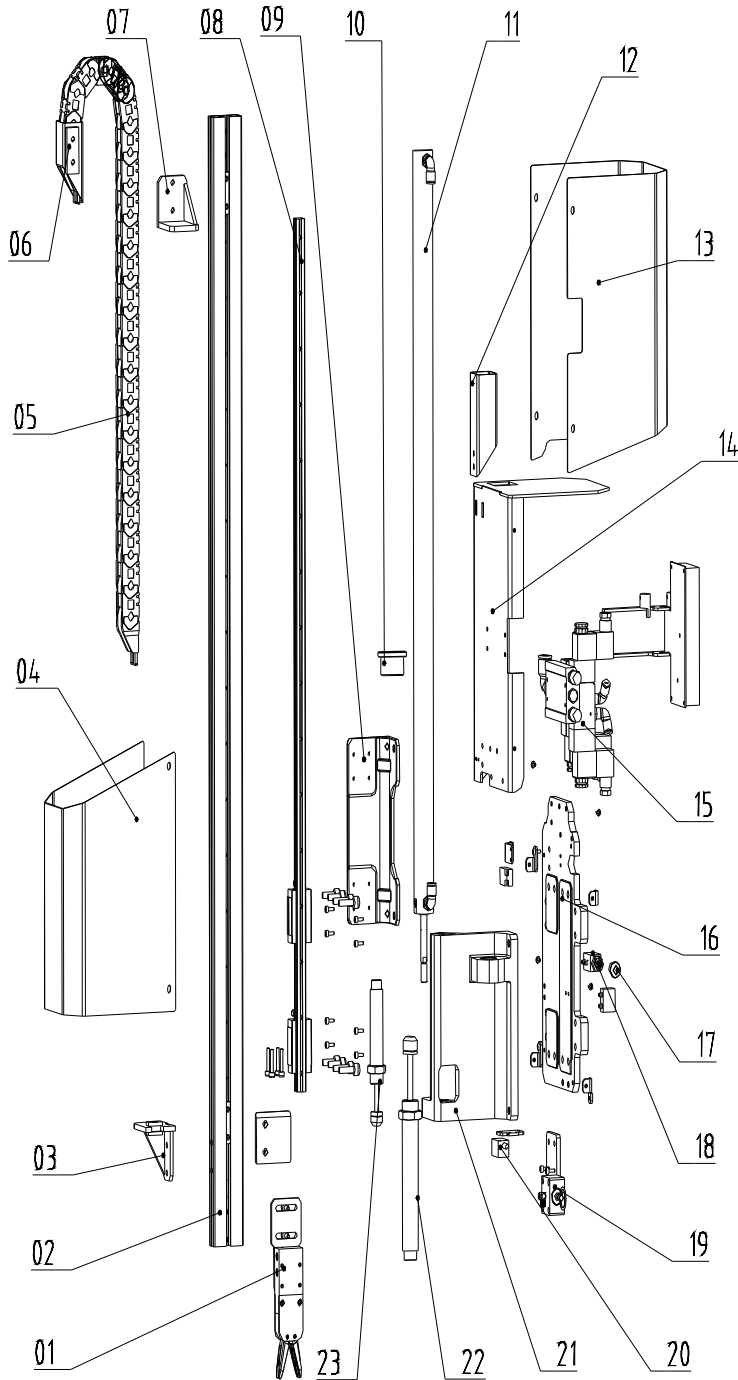| No.	Name	Part Number	
		ST1-850-1400-S	ST1-850-1400D-S
1	Rotation board	BH10550900020	BH10550900020
2	Spare frame for air pipe	BL70102600020	BL70102600020
3	Steel covers of main arm	-	
4	Aluminum cover of main arm	-	
5	Drag chain on main arm (up/down)	YE60250003700	YE60250003700
6	Drag chian connector on main arm	BL70108000020	BL70108000020
7	Down baffle on main arm	-	-
8	Main arm aluminum profile	-	-
9	Linear guiding rail	YW31118000200	YW31118000200
10	Cylinder on main arm (up/down)	YE30128500000	YE30128500000
11	Shock absorber	YW10255020000	YW10255020000
12	Silencer sleeve 20	YW80200000000	YW80200000000
13	Air pipe connection plate on main arm	-	
14	Connection cover of main arm	-	-
15	Digital display pressure switch	YW80204050000	YW80204050000
16	Relay mounting plate on main arm	-	-
17	Pneumatinc distribution block on main arm	-	-
18	Magnetic valve	-	-
19	Main arm mounting plate	-	-
20	Buffer unit	BH91181200010	BH91181200010
21	Buffer cap	YW80200000000	YW80200000000
22	Falling-proof cylinder	YE30055000350	YE30055000350
23	Proximity switch	-	
24	Mian arm supporting frame	-	-
25	Mian arm falling-proof stop plate	-	
26	Cylinder holder frame on main arm	-	

*means possible broken parts.   **means easy broken part, and spare backup is suggested. Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

7.4 Sub-arm Unit (ST1-S)

Picture 7-4

7.4.1 Parts List

Table 7- 8: ST1-S Sub-arm Parts List

No.	Name	Part Number			
		ST1-650-1200-S	ST1-650-1200D-S	ST1-750-1300-S	ST1-750-1300D-S
1	Gripper	-	BH70401200040	-	BH70401200040
2	Aluminum profile of sub-arm	-	-	-	-
3	Cylinder holder frame on sub-arm	-	-	-	-
4	Steel cover on sub-arm	-	-	-	-
5	Dran chain on sub-arm (up/down)	-	YE60154800000	-	YE60154800000
6	Drag connector on sub-arm (up/down)	-	-	-	
7	Down baffle on sub-arm	-	-	-	
8	Linear guide rail	-	-	-	
9	Slider mounting plate	-	-	-	-
10	Cylinder on sub-arm (up/down)	-	YE30257100000	-	YE30258200000
11	Cylinder fixing cap	-	-	-	
12	Drag chain connector on sub-arm	-	BL71011500020	-	BL71011500020
13	Connection cover on sub-arm	-	-	-	-
14	Air pipe connection plate on sub-arm	-	-	-	-
15	Magnetic valve	-	-	-	-
16	Sub-arm mounting plate	-	-	-	-
17	Buffer unit		BH91181200010	-	BH91181200010
18	Buffer cap	-	YW80200000000	-	YW80200000000
19	Anti-falling cylinder	-	YE30055000350	-	YE30055000350
20	Proximity switch	-	-	-	-
21	Sub-arm holder frame				-
22	Shock absorber	-	YW10255020000	-	YW10255020000
23	Shock absorber	-	YW10203010000	-	YW10203010000

*means possible broken parts.   **means easy broken part, and spare backup is suggested. Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

Table 7- 9: ST1-S Sub-arm Parts List

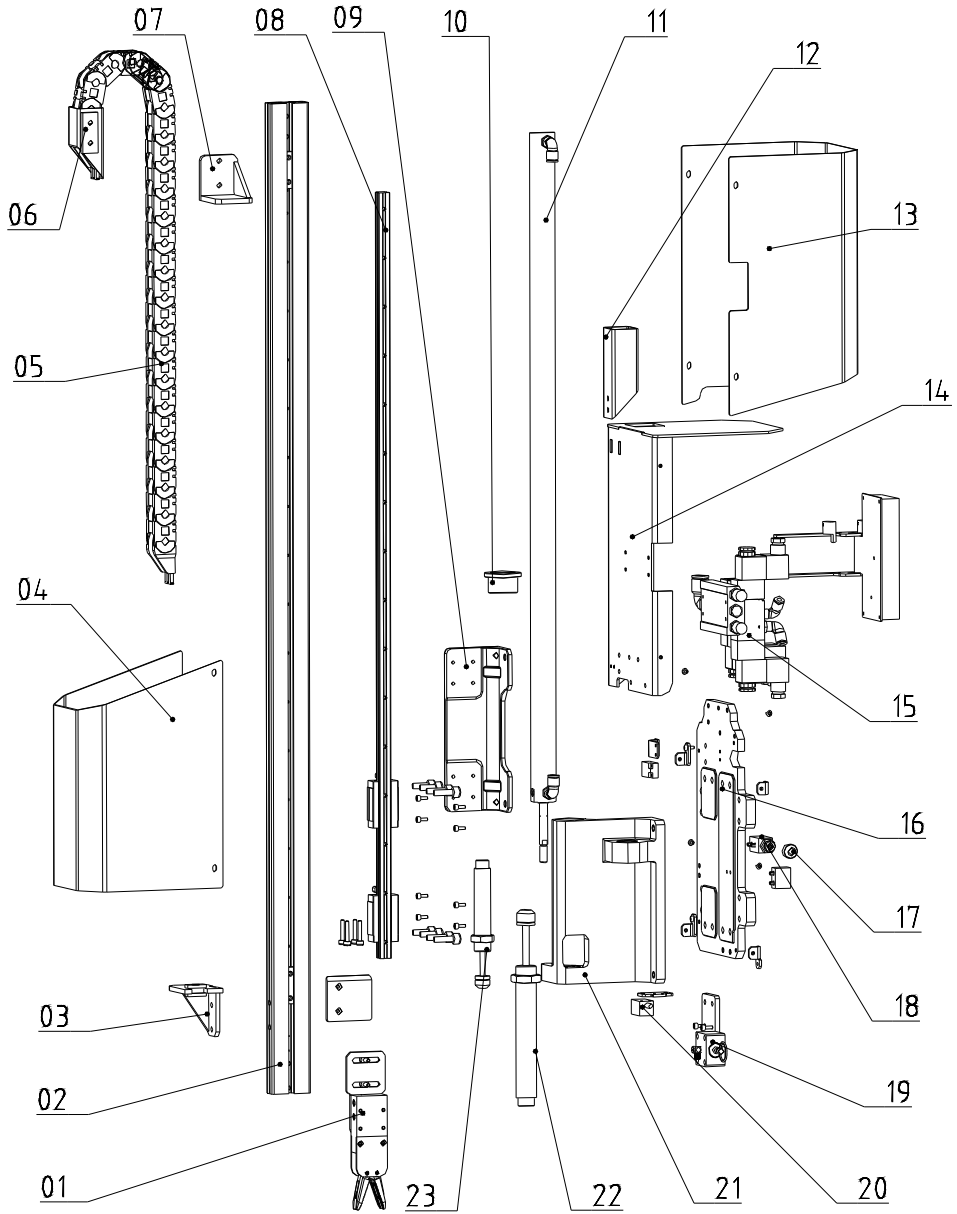| No.	Name	Part Number	
		ST1-850-1400-S	ST1-850-1400D-S
1	Gripper	-	BH70401200040
2	Aluminum profile of sub-arm	-	
3	Cylinder holder frame on sub-arm	-	
4	Steel cover on sub-arm	-	-
5	Dran chain on sub-arm (up/down)	-	YE60154800000
6	Drag connector on sub-arm (up/down)	-	-
7	Down baffle on sub-arm	-	-
8	Linear guide rail	-	YW31118000200
9	Slider mounting plate	-	-
10	Cylinder on sub-arm (up/down)	-	YE30259600000
11	Cylinder fixing cap	-	-
12	Drag chain connector on sub-arm	-	BL71011500020
13	Connection cover on sub-arm	-	-
14	Air pipe connection plate on sub-arm	-	-
15	Magnetic valve	-	-
16	Sub-arm mounting plate	-	-
17	Buffer unit	-	BH91181200010
18	Buffer cap	-	YW80200000000
19	Anti-falling cylinder	-	YE30055000350
20	Proximity switch	-	
21	Sub-arm holder frame	-	-
22	Shock absorber	-	YW10255020000
23	Shock absorber	-	YW10203010000

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

7.5 Main Arm (ST1-T-S)

Picture 7-5

7.5.1 Parts List

Table 7- 10: ST1-T-S Main Arm Parts List

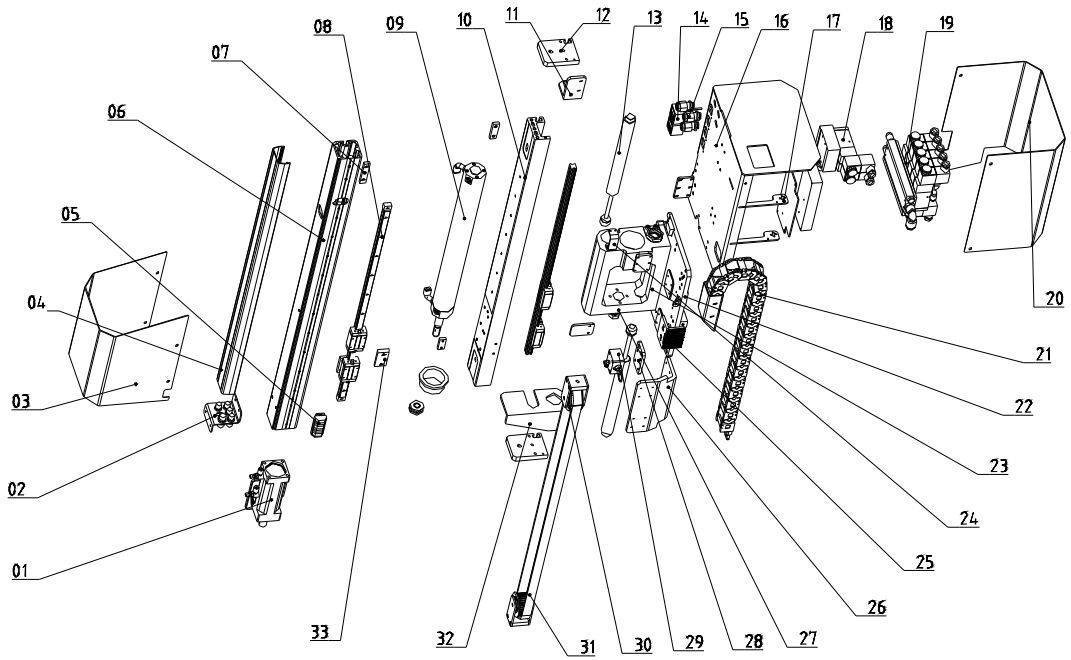| No.	Name	Part Number			
		ST1-700-1400T-S	ST1-700-1400DT-S	ST1-900-1600T-S	ST1-900-1600DT-S
1	Flip cylinder	BH10550900020	BH10550900020	BH10550900020	BH10550900020
2	Spare frame for air tube	BH10550900020	BH10550900020	BH10550900020	BL70102600020
3	Steel cover of main arm 2	BL70122000020	BL70122000020	BL70122000020	BL70122000020
4	Aluminum cover of main arm	BH13171300010	BH13171300010	BH13019130010	BH13019130010
5	Air tube connection plate	YW09601400110		YW09601400110	
6	Aluminum profile fo main arm	BH13170300010	BH13170300010	BH13019160010	BH13019160010
7	Sensor fixing plate	YW09601400110	YW09601400110	YW09601400110	YW09601400110
8	Linear guide rail	YW31002017000	YW31002017000		
9	Cylinder on main arm (up/down)	-	-	-	-
10	Aluminum profile of main arm	BH13171400010	BH13171400010	BH13019120010	BH13019120010
11	Down baffer plate of sub-arm				
12	Tooth plate 1	BL70019000020	BL70019000020	BL70019000020	BL70019000020
13	Shock absorber				
14	Digit display pressure switch	YE15300102500	YE15300102500	YE15300102500	YE15300102500
15	Wirings connection pipe				
16	Air tube connection plate	-	-	-	-
17	Terminal bottom frame 1	BL70110700040	BL70110700040	BL70110700040	BL70110700040
18	Pneumatic distribution block on main arm	BH72551100050	BH72551100050	BH72551100050	BH72551100050
19	Magnetic valve				
20	Steel cover of main arm 1	BL70120900020	BL70120900020	BL70120900020	BL70120900020
21	Drag chain on main arm (up/down)	BL70012800020	BL70012800020	BL70012800020	BL70012800020
22	Main arm mounting plate				
23	Drag chain connector of main arm				
24	Proximity switch mounting plate				
25	Belt fixing plate				
26	Fixing plate of pulley 2	BL70102500020	BL70102500020	BL70102500020	BL70102500020
27	Main arm supporting frame	-	-	-	-
28	Cylinder holder frame of main arm				
29	Anti-falling cylinder on main arm	-	-	-	-
30	Pulley on telescopic arm	BH13014130010	BH13014130010	BH13014130010	BH13014130010
31	Synchronous belt	-	-	-	-
32	Sensor fixing plate	-			

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

7.6 Sub-arm (ST1-T-S)

Picture 7-6

7.6.1 Parts List

Table 7- 11: ST1-T-S Sub-arm Parts List

No.	Name	Part Number			
		ST1-700-1400T-S	ST1-700-1400DT-S	ST1-900-1600T-S	ST1-900-1600DT-S
1	Gripper	-	BH70401200040	-	BH70401200040
2	Aluminum profile of sub-arm	-	BH78071430110	-	BH79901600510
3	Linear guide rail mounting plate 3	-	BL70021000040	-	BL70021000040
4	Steel cover of sub-arm	-	BL70503200020	-	BL70503200020-
5	Falling blank 2 of sub-arm	-		-	
6	Linear guide rail	-		-	
7	Anti-falling cylinder on sub-arm	-	-	-	-
8	Pulley on telescopic arm	-	BH13014130010	-	BH13014130010
9	Synchronous belt	-		-	
10	Driven tooth of sub-arm	-	-	-	-
11	Drag chian connector on sub-arm 2 (up/down)	-		-	
12	Drag chian on sub-arm (up/down)	-	-	-	-
13	Aluminum profile of sub-arm	-	BH78714180010	-	BH79901600410
14	Going-down buffer stopper of sub-arm	-		-	
15	Fixing blet plate 1	-	BL70019000020	-	BL70019000020
16	Shock absorber	-		-	
17	Air tube connection plate on sub-arm	-		-	
18	Magnetic valve	-		-	
19	Relly mounting plate on sub-arm	-		-	
20	Cover of sub-arm	-	BL70500600020	-	BL70500600020
21	Limit stopper	-	BH91202500110	-	BH91202500110
22	Limit fixed block	-		-	
23	Sub-arm soupporting frame	-	-	-	-

24	Sub-arm mounting plate	-		-	
25	Cylinder mounting plate on sub-arm	-		-	
26	Anti-falling cylinder	-	YE30055000350	-	YE30055000350
27	Proximity switch mounting plate 3	-	-	-	-
28	Up-going buffer stopper of sub-arm	-		-	

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

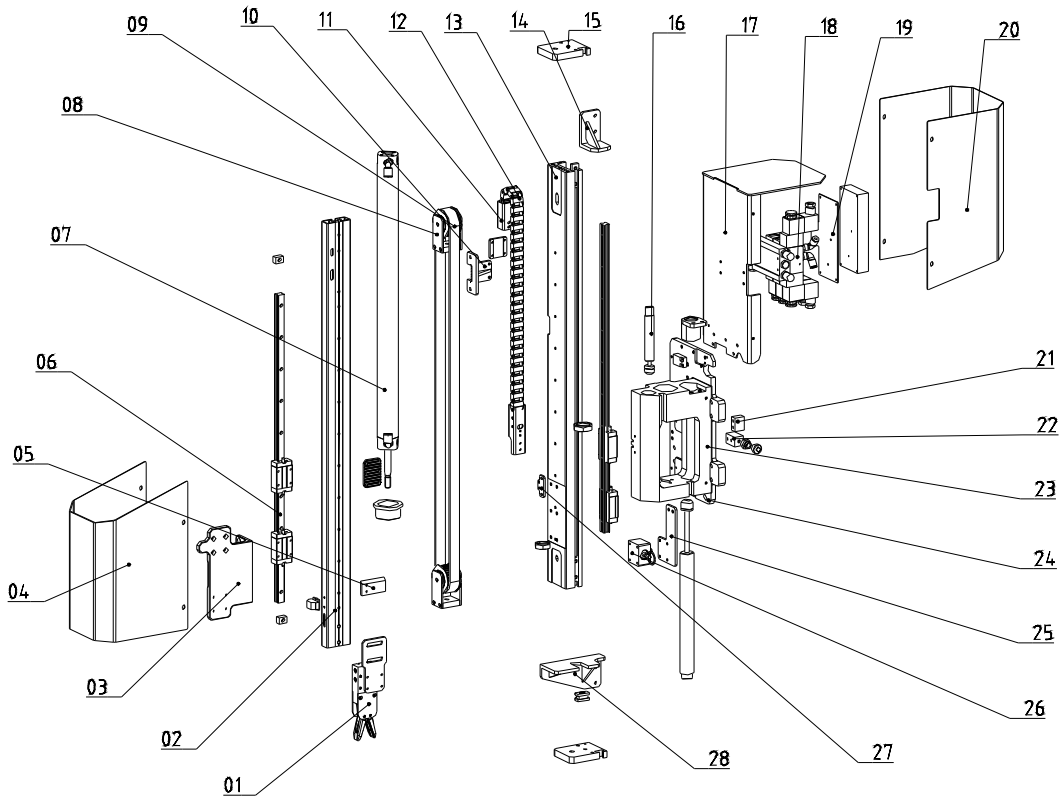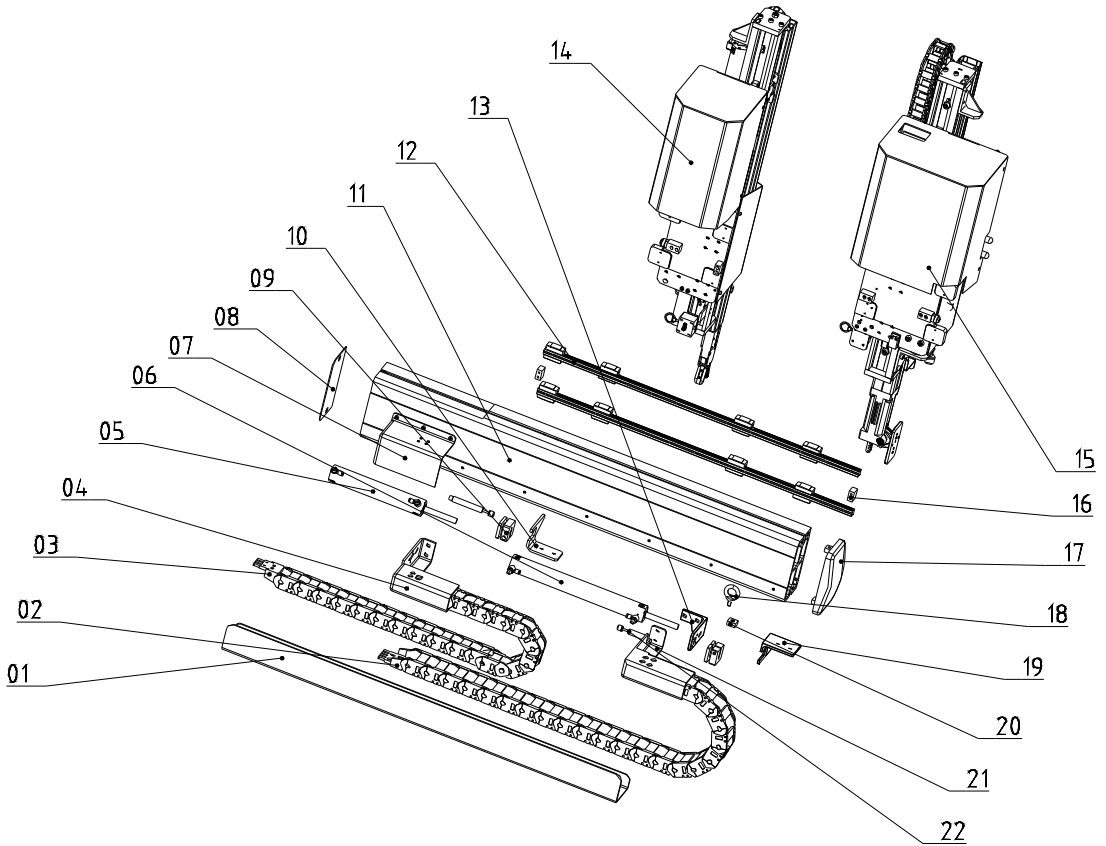## 7.7   Vertical (ST1-T-S)

Picture 7-7

7.7.1 Parts List

Table 7- 12: ST1-T-S Vertical Parts List

No.	Name	Part Number			
		ST1-700-1400T-S	ST1-700-1400DT-S	ST1-900-1600T-S	ST1-900-1600DT-S
1	Drag supporing frame on vertical	BL70550900020	BL70550900020	BL70190900020	BL70190900020
2	Drag chain of main arm	-	-	-	-
3	Vertical drag of sub-arm	BL70150900020	BL70150900020	BL70150900020	BL70150900020
4	Vertical drag frame of sub-arm	-	BL70101070020	-	BL70101070020-
5	Vertical cylinder of sub-arm	-	-	-	-
6	Vertical cylinder of main-arm	-	-	-	-
7	Drag cover of vertical	BL70105000020	BL70105000020	BL70105000020	BL70105000020
8	Left cover of vertical arm	BL70107000020	BL70107000020	BL70107000020	BL70107000020
9	Piston rod	YW09055000300	YW09055000300	YW09055000300	YW09055000300
10	Cylinder holder frame of sub-arm	BL70150900020	BL70102200040	BL70150900020	BL70102200040
11	Aluminum profile of vertical	BH91801600010	BH91801600010	-	-
12	Linear guide rail	-	-	-	-
13	Fixing frame of vertical cylinder	BL70103000040	BL70103000040	BL70103000040	BL70103000040
14	Sub-arm	-	BH78701400110	-	BH78901600110
15	Main arm	BH78701400010	BH78701400010	BH78901600010	BH78901600010
16	Limit stopper	BH91202500110	BH91202500110	BH91202500110	BH91202500110
17	Right cover of vertical arm	BH91905000010	BH91905000010	-	BH91905000010
18	Lift ring	BH13014130010	YW09000800000	BH13014130010	YW09000800000
19	Vertical cylinder holder frame of main arm	BH91801600010	BL70104000040	-	BL70104000040
20	Fixng block of lift ring	-	BH91101600110	-	BH91101600110
21	Vertical drag frame of main arm	BH91801600010	BL70500400020	BH91801600010	BL70500400020
22	Shock absorber	-	-	-	-

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.
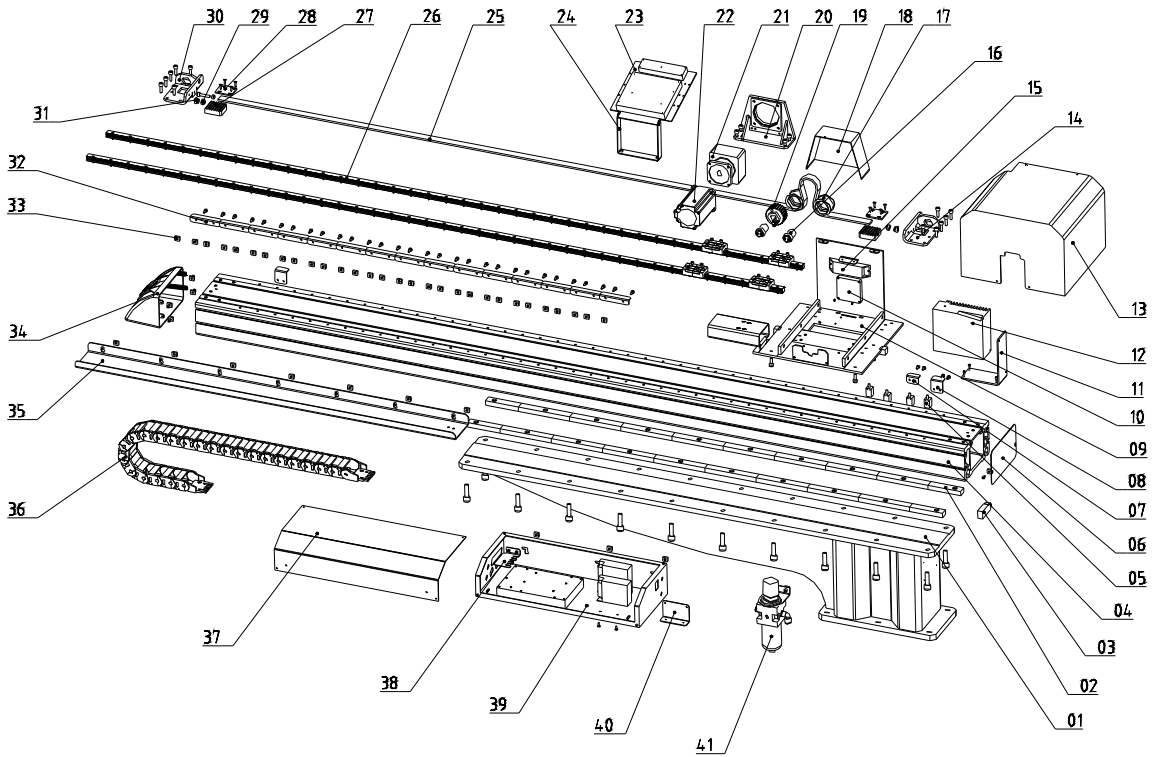
7.8   Traverse Unit (ST1-T-S: Middle Telescopic Arm)

Picture 7-8

7.8.1 Parts List

Table 7- 13: ST1-T-S (Middel Telescopic Arm) Traverse Parts List

No.	Name	Part Numner			
		ST1-1100-1800T	ST1-1100-1800DT	ST1-1300-2000T	ST1-1300-2000T
1	Base	BW21132000000	BW21132000000	BW21132000000	BW21132000000
2	Beams fixed block	-	-	-	-
3	Pressure switch	-	-	-	-
4	Beam	BH72111800010	BH72111800010	-	-
5	Proximity switch	-	-	-	-
6	Beam's end cover	BL70103300020	BL70103300020	BL70103300020	BL70103300020
7	Home position sensor plate	BL69363000020	BL69363000020	-	-
8	Limit sensor plate	BL69363000020	BL69363000020	BL69363000020	BL69363000020
9	Sliding base	BL72118000020	BL72118000020	BL72118000020	BL72118000020
10	Exhaust fan	YM50801502400	YM50801502400	YM50801502400	YM50801502400
11	Deriver mounting plate	-	-	-	-
12	Servo driver	-	-	-	-
13	Cover of sliding base	BL72105000020	BL72105000020	BL72105000020	BL72105000020
14	Belt fixing supporting frame 2	-	-	-	-
15	Braking resistor	YE20200450000	YE20200450000	YE20200450000	YE20200450000
16	Connectiong shaft	BH91304800010	BH78111000010	BH78111000010	BH78111000010
17	Pulley	BH91030000010	BH78112000010	BH78112000010	BH78112000010
18	Cover of motor supporting frame	BL72108200020	BL72108200020	BL72108200020	BL72108200020
19	Synchronous pulley	YW08621900000	-	YW08621900000	-
20	Motor supporting frame	BL72109000040	BL72109000040	BL72109000040	BL72109000040
21	Speed reducer	-	-	-	-
22	Servo motor	-	-	-	-
23	Traverse terminal mounting plate	BL72103000020	BL72103000020	BL72103000020	BL72103000020
24	Tranverse terminal bottom supporting frame	BL72104100020	BL72104100020	BL72104100020	BL72104100020
25	Synchronous belt	YR00082500100	YR00082500100	YR00082500100	YR00082500100
26	Linear guide rail	YW31002526000	YW31002526000	-	-
27	Belt pressing plate	YW09564900110	YW09564900110	YW09564900110	YW09564900110
28	Belt cleat connection parts	-	-	-	-
29	Buffer cap	-	-	-	-
30	Belt fixing frame 1	-	-	-	-
31	Buffer	BH91151200010	BH91151200010	BH91151200010	BH91151200010
32	Safety mold sensor plate	BL69002200020	BL69002200020	BL69002200020	BL69002200020

33	Fixing plate	-	-	-	-
34	End cover of traverse beam	BH74000100010	BH74000100010	BH74000100010	BH74000100010
35	Traverse drag supporting frame	BL72110800020	BL72110800020	-	-
36	Traverse drag	YW06251500000	YW06251500000	YW06251500000	YW06251500000
37	Cover of control box	BL72107000020	BL72107000020	BL72107000020	BL72107000020
38	Connecting plate of grounded	BL70126000020	BL70126000020	BL70126000020	BL70126000020
39	Conttol box	BL72106000020	BL72106000020	BL72106000020	BL72106000020
40	Wave filter fixing plate	-	-	-	-
41	Filter regulating valve	YE30400015000	YE30400015000	YE30400015000	YE30400015000

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

Table 7- 14: ST1-T-S (Middel Telescopic Arm) Traverse Parts List

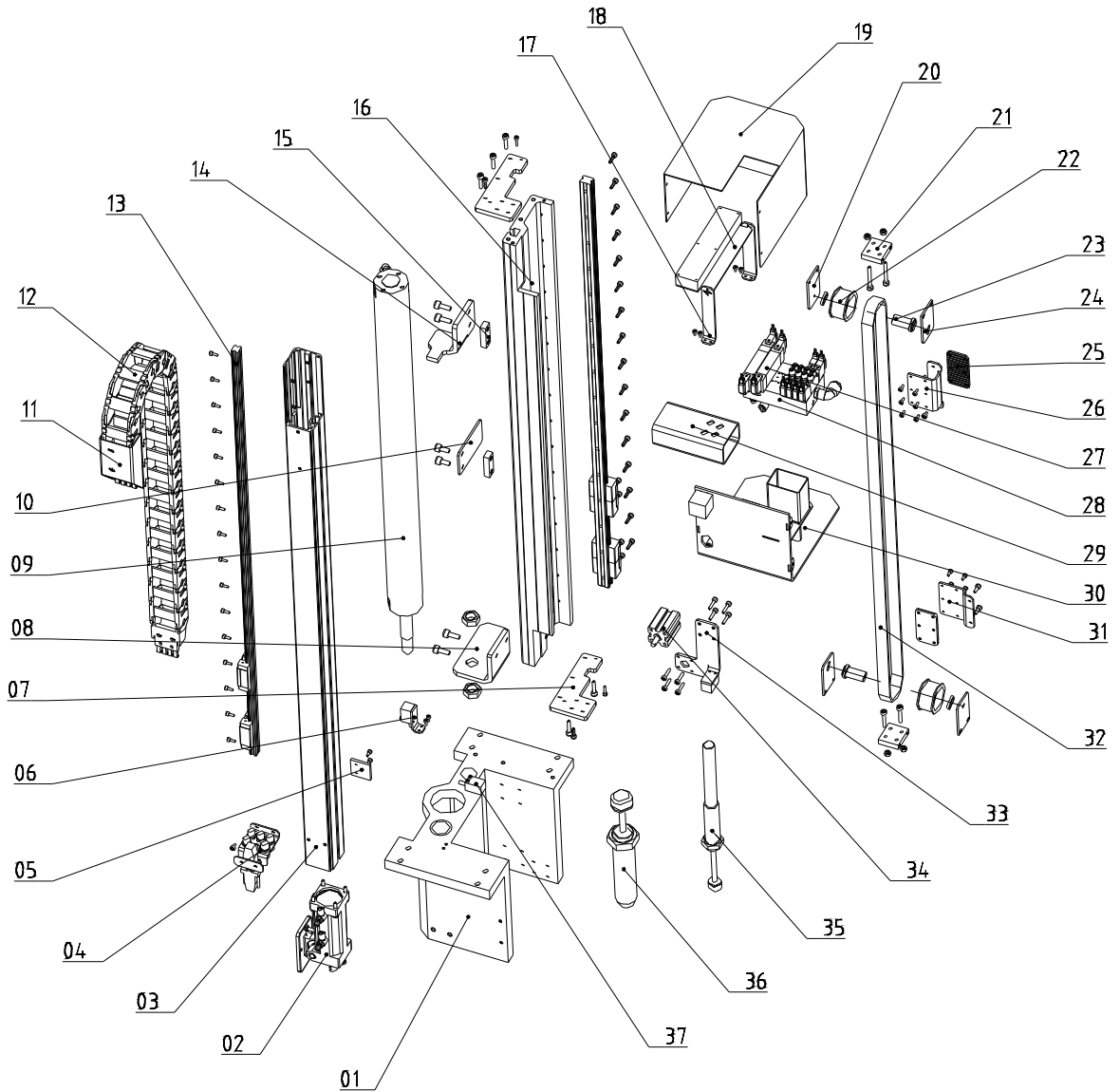| No.	Name	Part Number	
		ST1-1500-2200T	ST1-1500-2200DT
1	Base	BL72182470020	BL72182470020
2	Beams fixed block	-	-
3	Pressure switch	-	-
4	Beam	BH72152200010	BH72152200010
5	Proximity switch	-	-
6	Beam's end cover	BL70103300020	BL70103300020
7	Home position sensor plate	-	-
8	Limit sensor plate	BL69363000020	BL69363000020
9	Sliding base	BL72118000020	BL72118000020
10	Exhaust fan	YM50801502400	YM50801502400
11	Deriver mounting plate	-	-
12	Servo driver	-	-
13	Cover of sliding base	BL72105000020	BL72105000020
14	Belt fixing supporting frame 2	-	-
15	Braking resistor	YE20200450000	YE20200450000
16	Connectiong shaft	BH78111000010	BH78111000010
17	Pulley	BH78112000010	BH78112000010
18	Cover of motor supporting frame	BL72108200020	BL72108200020
19	Synchronous pulley	YW08621900000	YW08621900000
20	Motor supporting frame	BL72109000040	BL72109000040
21	Speed reducer	-	-
22	Servo motor	-	-
23	Traverse terminal mounting plate	BL72103000020	BL72103000020
24	Tranverse terminal bottom supporting frame	BL72104100020	BL72104100020
25	Synchronous belt	YR00082500100	YR00082500100
26	Linear guide rail	-	-
27	Belt pressing plate	YW09564900110	YW09564900110
28	Belt cleat connection parts	-	-
29	Buffer cap	-	-
30	Belt fixing frame 1	BL71010900020	BL71010900020
31	Buffer	BH91151200010	BH91151200010
32	Safety mold sensor plate	BL69002200020	BL69002200020
33	Fixing plate	-	-
34	End cover of traverse beam	BH74000100010	BH74000100010
35	Traverse drag supporting frame	-	-
36	Traverse drag	YW06251500000	YW06251500000
37	Cover of control box	BL72107000020	BL72107000020
38	Connecting plate of grounded	BL70126000020	BL70126000020
39	Conttol box	BL72106000020	BL72106000020
40	Wave filter fixing plate	-	-
41	Filter regulating valve	YE30400015000	YE30400015000

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

7.9　Main Arm ST1-T-S (Middel Telescopic Arm)

Picture 7-9

7.9.1 Parts List

Table 7- 15: ST1-T-S (Middel Telescopic Arm) Main Arm

No.	Name	Part Number			
		ST1-1100-1800T	ST1-1100-1800DT	ST1-1300-2000T	ST1-1300-2000T
1	Main arm mounting frame	BH13000400010	BH13000400010	BH13000400010	BH13000400010
2	Rotation unit	BH73000100050	BH73000100050	BH73000100050	BH73000100050
3	Aluminum profile of main arm	BH72111801010	BH72111801010	-	-
4	Spare frame for air tube	BL70102600020	BL70102600020	BL70102600020	BL70102600020
5	Up-going sensor plate	BL72112000020	BL72112000020	BL72112000020	BL72112000020
6	Mounting plate of proximity switch	BL72128000020	BL72128000020	BL72128000020	BL72128000020
7	Pulley tightening plate	BL72113000020	BL72113000020	BL72113000020	BL72113000020
8	Cylinder holder frame of main arm (up/down)	BL72301600040	BL72301600040	BL72301600040	BL72301600040
9	Cylinder on main arm (up/down)	YE31505500000	YE31505500000	-	-
10	Arm belt fixing plate	-	-	-	-
11	Drag connector of main arm	BL70108000020	BL70108000020	BL70108000020	BL70108000020
12	Drag chain on main arm (up/down)	YE60250003100	YE60250003100	YE60250003100	YE60250003100
13	Linear guide rail	YW31008202000	YW31008202000	-	-
14	Arm down-going stopper plate	BL72112000040	BL72112000040	-	-
15	Sensor fixing plate	YW09601400110	YW09601400110	YW09601400110	YW09601400110
16	Aluminum profile of main arm	BH72111803010	BH72111803010	-	-
17	Terminal bottom frame on main arm	-	-	-	-
18	Terminal mounting plate of main arm	-	-	-	-
19	Steel cover of main arm	BL72111000020	BL72111000020	BL72111000020	BL72111000020
20	Pulley fixing plate 2	BL72110600020	BL72110600020	BL72110600020	BL72110600020
21	Pulley fixing plate 3	BL72300500040	BL72300500040	BL72300500040	BL72300500040
22	Pulley on telescopic arm	BH78011000010	BH78011000010	BH78011000010	BH78011000010
23	Connecting shaft of telescopic arm	BH78010900010	BH78010900010	BH78010900010	BH78010900010
24	Pulley fixing plate 1 of pulley	BL72301700020	BL72301700020	BL72301700020	BL72301700020
25	Belt pressing plate	BL72122000040 BL72227000040	BL72122000040 BL72227000040	BL72122000040 BL72227000040	BL72122000040 BL72227000040
26	Belt down-going fixing plate on main arm	BL72111900020	BL72111900020	BL72111900020	BL72111900020
27	Magnetic valve	-	-	-	-

| 28	Pneumaitc distribution block on main arm	BH78010100050	BH78010100050	BH78010100050	BH78010100050
29	Vertical drag connector on main arm	BL72121000020	BL72121000020	BL72121000020	BL72121000020
30	Air tube connector on main arm	BL72111700020	BL72111700020	BL72111700020	BL72111700020
31	Main arm belt up-going fixing plate	BL72111800020	BL72111800020	BL72111800020	BL72111800020
32	Synchronous belt	YR00052000200	YR00052000200	YR00052000200	YR00052000200
33	Anti-falling cylinder frame on main arm	BL72122000020	BL72122000020	BL72122000020	BL72122000020
34	Anti-falling	YE30201540000	YE30201540000	YE30201540000	YE30201540000
35	Shock absorber 1	YW10258020000	YW10258020000	YW10258020000	YW10258020000
36	Shock absorber 2	YW80366000000	YW80366000000	YW80366000000	YW80366000000
37	Proximity switch	-	-	-	-

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

Table 7- 16: ST1-T-S (Middel Telescopic Arm) Main Arm

No.	Name	Part Number	
		ST1-1500-2200T	ST1-1500-2200DT
1	Main arm mounting frame	BH13000400010	BH13000400010
2	Rotation unit	BH73000100050	BH73000100050
3	Aluminum profile of main arm	-	-
4	Spare frame for air tube	BL70102600020	BL70102600020
5	Up-going sensor plate	BL72112000020	BL72112000020
6	Mounting plate of proximity switch	BL72128000020	BL72128000020
7	Pulley tightening plate	BL72113000020	BL72113000020
8	Cylinder holder frame of main arm (up/down)	BL72301600040	BL72301600040
9	Cylinder on main arm (up/down)	-	-
10	Arm belt fixing plate	-	-
11	Drag connector of main arm	BL70108000020	BL70108000020
12	Drag chain on main arm (up/down)	YE60250003100	YE60250003100
13	Linear guide rail	-	-
14	Arm down-going stopper plate	-	-
15	Sensor fixing plate	YW09601400110	YW09601400110
16	Aluminum profile of main arm	-	-
17	Terminal bottom frame on main arm	-	-
18	Terminal mounting plate of main arm	-	-
19	Steel cover of main arm	BL72111000020	BL72111000020
20	Pulley fixing plate 2	BL72110600020	BL72110600020
21	Pulley fixing plate 3	BL72300500040	BL72300500040
22	Pulley on telescopic arm	BH78011000010	BH78011000010
23	Connecting shaft of telescopic arm	BH78010900010	BH78010900010
24	Pulley fixing plate 1 of pulley	BL72301700020	BL72301700020
25	Belt pressing plate	BL72122000040 BL72227000040	BL72122000040 BL72227000040
26	Belt down-going fixing plate on main arm	BL72111900020	BL72111900020
27	Magnetic valve	-	-
28	Pneumaitc distribution block on main arm	BH78010100050	BH78010100050
29	Vertical drag connector on main arm	BL72121000020	BL72121000020
30	Air tube connector on main arm	BL72111700020	BL72111700020
31	Main arm belt up-going fixing plate	BL72111800020	BL72111800020
32	Synchronous belt	YR00052000200	YR00052000200
33	Anti-falling cylinder frame on main arm	BL72122000020	BL72122000020
34	Anti-falling	YE30201540000	YE30201540000
35	Shock absorber 1	YW10258020000	YW10258020000
36	Shock absorber 2	YW80366000000	YW80366000000
37	Proximity switch	-	-

*means possible broken parts.   **means easy broken part, and spare backup is suggested. Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

7.10 Sub-arm (ST1-T-S: Middel Telescopic Arm)
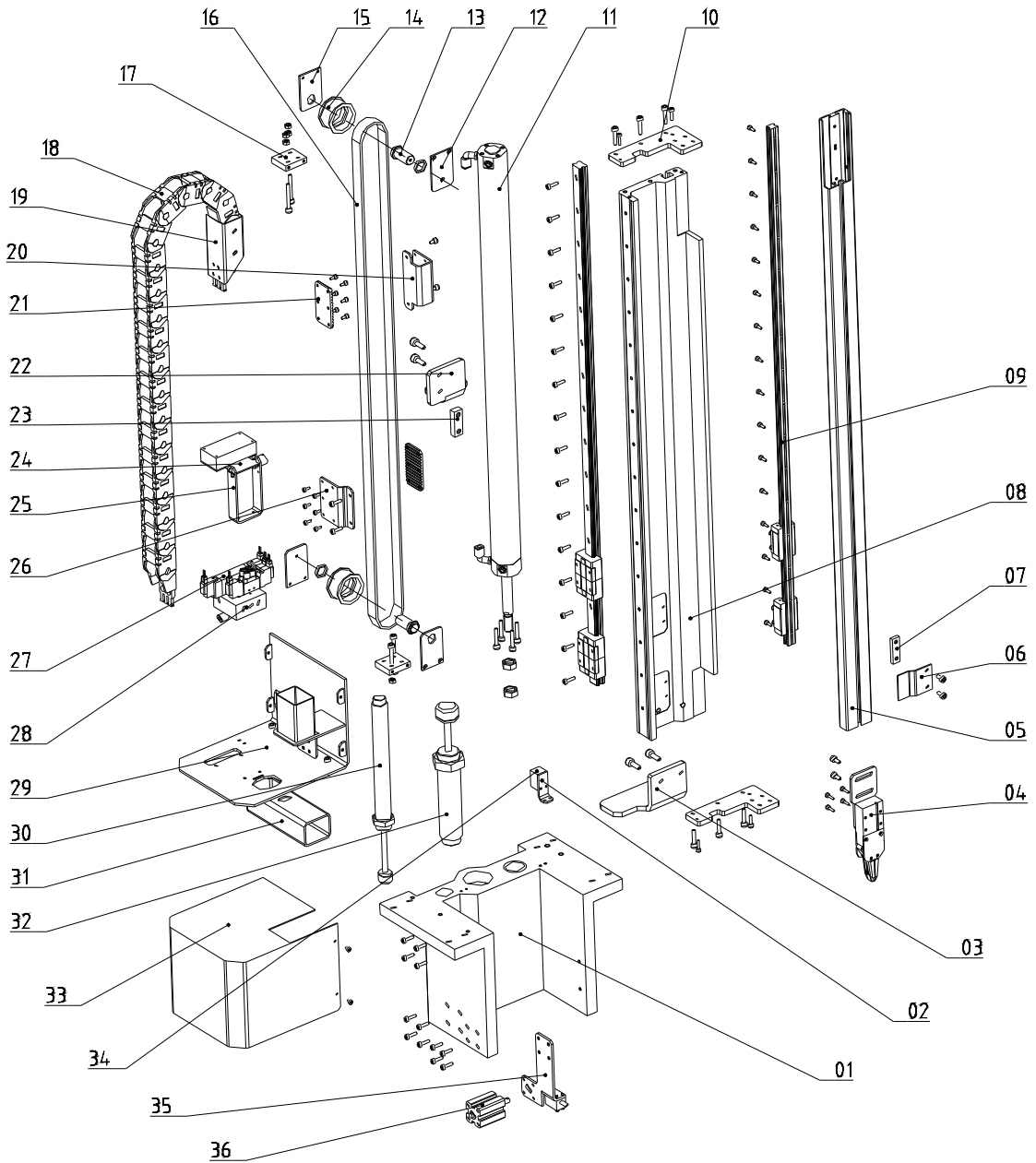
Picture 7-10

7.10.1   Parts List

Table 7- 17：ST1-T-S (Middel Telescopic Arm) Sub-arm

No.	Name	Part Number			
		ST1-1100-1800T	ST1-1100-1800DT	ST1-1300-2000T	ST1-1300-2000T
1	Sub-arm mounit plate	-	BH13000303010	-	BH13000303010
2	Fixing plate of proximity switch	-	BL72001120020	-	BL72001120020
3	Cylinder (up/down) holder frame on sub-arm	-	BL72100800040	-	BL72100800040
4	Gripper	-	BH70401200040	-	BH70401200040
5	Aluminum profile of sub-arm	-	BH78180020010	-	BH78180020010
6	Stack sensor sheet	-	BL72110500020	-	BL72110500020
7	Sensor fixing plate	-	YW09601400110	-	YW09601400110
8	Connection aluminum profile of sub-arm	-	BH78180100040	-	-
9	Linear guide rail	-	YW31008202000	-	-
10	Pulley tightening plate	-	BL72113000020	-	BL72113000020
11	Cylinder (up/down) on sub-arm	-	YE31405750000	-	-
12	Pulley fixing plate 2	-	BL72110600020	-	BL72110600020
13	Connecting shaft of telescopic arm	-	BH78010900010	-	BH78010900010
14	Pulley on telescopic arm	-	BH78011000010	-	BH78011000010
15	Pulley fixing plate 1	-	BL72301700020	-	BL72301700020
16	Synchronous belt	-	YR00052000200	-	YR00052000200
17	Pulley fixing plate 3	-	BL72300500040	-	BL72300500040
18	Drag (up/down) on sub-arm	-	YE60250005500	-	YE60250005500
19	Drag (up/down) connector on sub-arm	-	BL72000900020	-	BL72000900020
20	Belt down-going fixing plate on sub-arm	-	-	-	-
21	Belt pressing plate	-	BL72122000040	-	BL72122000040
22	Arm down-going baffer	-	BL72001100040	-	BL72001100040
23	Cylinder fixing plate	-	BH91451600110	-	BH91451600110
24	Terminal mounting plate on sub-arm	-	-	-	-
25	Terminal bottom frame on sub-arm	-	-	-	-
26	Belt up-going fixing plate on sub-arm	-	BL72100400020	-	BL72100400020
27	Magnetic valve	-	-	-	-
28	Penmatic distribution block on sub-arm	-	BH70258300040	-	BH70258300040

| 29	Air tube connection plug on sub-arm	-	BL72100700020	-	BL72100700020
30	Shock absorber 1	-	YW10258020000	-	YW10258020000
31	Vertical drag connector on sub-arm	-	BL72000900020	-	BL72000900020
32	Shock absorber 2	-	YW80366000000	-	YW80366000000
33	Steel cover of sub-arm	-	BL72100600020	-	BL72100600020
34	Proximity switch	-	-	-	-
35	Anti-falling cylinder supporting frame of sub-arm	-	BL72100500020	-	BL72100500020
36	Anti-falling cylinder	-	YE30201540000	-	YE30201540000

*means possible broken parts.   **means easy broken part, and spare backup is suggested. Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

Table 7- 18：ST1-T-S (Middel Telescopic Arm) Sub-arm

No.	Name	Part Number	
		ST1-1500-2200T	ST1-1500-2200DT
1	Sub-arm mounit plate	-	BH13000303010
2	Fixing plate of proximity switch	-	BL72001120020
3	Cylinder (up/down) holder frame on sub-arm	-	BL72100800040
4	Gripper	-	BH70401200040
5	Aluminum profile of sub-arm	-	BH78180020010
6	Stack sensor sheet	-	BL72110500020
7	Sensor fixing plate	-	YW09601400110
8	Connection aluminum profile of sub-arm	-	-
9	Linear guide rail	-	-
10	Pulley tightening plate	-	BL72113000020
11	Cylinder (up/down) on sub-arm	-	-
12	Pulley fixing plate 2	-	BL72110600020
13	Connecting shaft of telescopic arm	-	BH78010900010
14	Pulley on telescopic arm	-	BH78011000010
15	Pulley fixing plate 1	-	BL72301700020
16	Synchronous belt	-	YR00052000200
17	Pulley fixing plate 3	-	BL72300500040
18	Drag (up/down) on sub-arm	-	YE60250005500
19	Drag (up/down) connector on sub-arm	-	BL72000900020
20	Belt down-going fixing plate on sub-arm	-	-
21	Belt pressing plate	-	BL72122000040
22	Arm down-going baffer	-	BL72001100040
23	Cylinder fixing plate	-	BH91451600110
24	Terminal mounting plate on sub-arm	-	-
25	Terminal bottom frame on sub-arm	-	-
26	Belt up-going fixing plate on sub-arm	-	BL72100400020
27	Magnetic valve	-	-
28	Penmatic distribution block on sub-arm	-	BH70258300040
29	Air tube connection plug on sub-arm	-	BL72100700020
30	Shock absorber 1	-	YW10258020000
31	Vertical drag connector on sub-arm	-	BL72000900020
32	Shock absorber 2	-	YW80366000000
33	Steel cover of sub-arm	-	BL72100600020
34	Proximity switch	-	-
35	Anti-falling cylinder supporting frame of sub-arm	-	BL72100500020
36	Anti-falling cylinder	-	YE30201540000

*means possible broken parts.   **means easy broken part, and spare backup is suggested.
Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

7.11 Crosswise Unit (ST1-T-S: Middle Telescopic Arm)
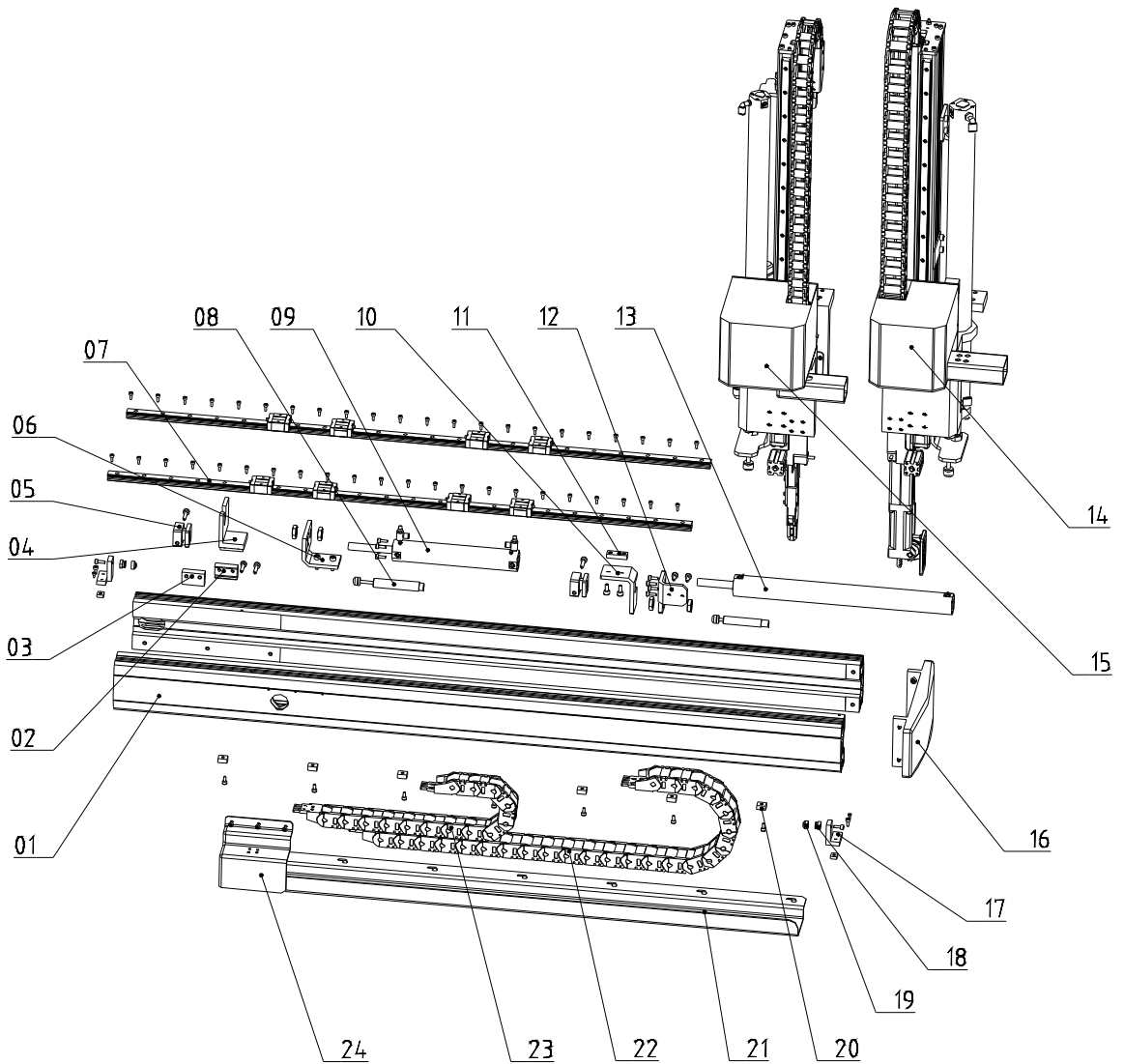
Picture 7-11

7.11.1　Parts List

Table 7- 19:　ST1-T-S (Middle Telescopic Arm) Crosswise Unit

No.	Name	Part Number			
		ST1-1100-1800T	ST1-1100-1800DT	ST1-1300-2000T	ST1-1300-2000T
1	Crosswise beam base	-	-	-	-
2	Buffer fixing block 6	BH78511300040	BH78511300040	BH78511300040	BH78511300040
3	Buffer fixing block 5	BH78511200040	BH78511200040	BH78511200040	BH78511200040
4	Cylinder holder frame on sub-arm	-	-	-	-
5	Crosswise cylinder rod clamping device	BH78110000040	BH78110000040	BH78110000040	BH78110000040
6	Crosswise cylinder fixing frame on sub-arm	-	BL72104000040	-	BL72104000040
7	Linear guide rail	-	YW31002011000	-	
8	Shock absorber	-	-	-	-
9	Crosswise cylinder on sub-arm	-	BL72100800040	-	BL72100800040
10	Crosswise cylinder holder on main arm	-	-	-	-
11	Sensor fixing sheet	YW09601400110	YW09601400110	YW09601400110	YW09601400110
12	Crosswise cylinder fixing frame of mian arm	BL72101100040	BL72101100040	BL72101100040	BL72101100040
13	Crosswise cylinder on main arm	YE31140108400	YE31140108400	YE31140108400	YE31140108400
14	Main arm	BH78111800010	BH78111800010	BH78111800010	BH78111800010
15	Sub-arm	-	BH78180021010	-	BH78180021010
16	Right cover of crosswise beam	BH91905000010	BH91905000010	BH91905000010	BH91905000010
17	Limit baffer 3	-	-	-	-
18	Buffer installation part	-	-	-	-
19	Buffer cap	-	-	-	-
20	Crosswise drag mounting plate	-	-	-	-
21	Crosswise drag supporting frame	-	-	-	-
22	Crosswise drag on main arm	YE60250003100	YE60250003100	YE60250003100	YE60250003100
23	Crosswise drag on sub-arm	-	YE60250005500	-	YE60250005500
24	Cover of crosswise	BL72101800020	BL72101800020	BL72101800020	BL72101800020

*means possible broken parts.　**means easy broken part, and spare backup is suggested. Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.

## Table 7- 20: ST1-T-S (Middle Telescopic Arm) Crosswise Unit

No.	Name	Part Number	
		ST1-1500-2200T	ST1-1500-2200DT
1	Crosswise beam base	-	-
2	Buffer fixing block 6	BH78511300040	BH78511300040
3	Buffer fixing block 5	BH78511200040	BH78511200040
4	Cylinder holder frame on sub-arm	-	-
5	Crosswise cylinder rod clamping device	BH78110000040	BH78110000040
6	Crosswise cylinder fixing frame on sub-arm	-	BL72104000040
7	Linear guide rail	-	-
8	Shock absorber	-	-
9	Crosswise cylinder on sub-arm	-	BL72100800040
10	Crosswise cylinder holder on main arm	-	-
11	Sensor fixing sheet	YW09601400110	YW09601400110
12	Crosswise cylinder fixing frame of mian arm	BL72101100040	BL72101100040
13	Crosswise cylinder on main arm	YE31140108400	YE31140108400
14	Main arm	BH78111800010	BH78111800010
15	Sub-arm	-	BH78180021010
16	Right cover of crosswise beam	BH91905000010	BH91905000010
17	Limit baffer 3	-	-
18	Buffer installation part	-	-
19	Buffer cap	-	-
20	Crosswise drag mounting plate	-	-
21	Crosswise drag supporting frame	-	-
22	Crosswise drag on main arm	YE60250003100	YE60250003100
23	Crosswise drag on sub-arm	-	YE60250005500
24	Cover of crosswise	BL72101800020	BL72101800020

*means possible broken parts.   **means easy broken part, and spare backup is suggested. Please confirm the version of manual before placing the purchase order to gurantee that the item number of the spare part is in accordance with the real object.
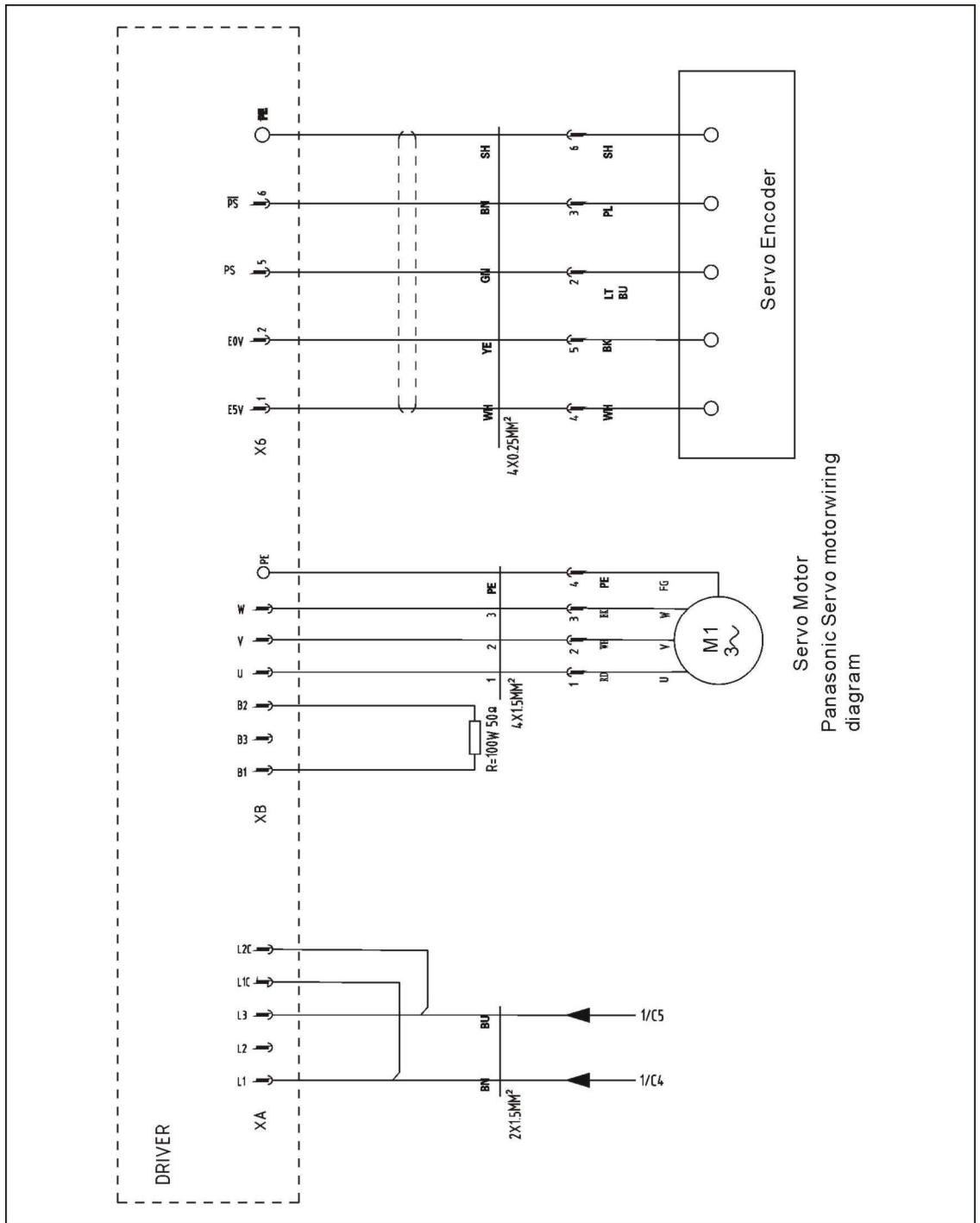
8 Electric Control Chart

8.1 Non-euromap Electric Control Chart

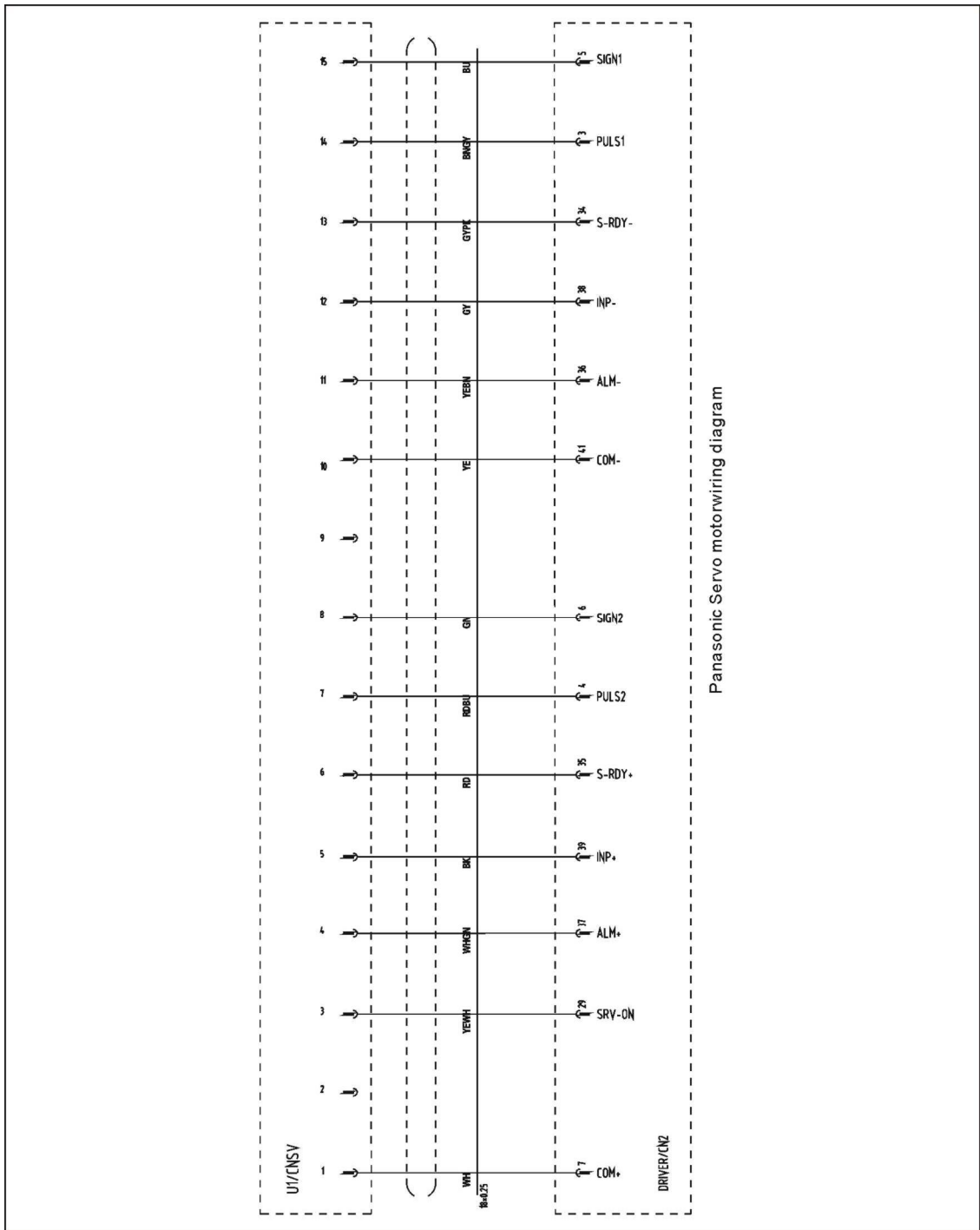### 8.1.1   The Power Input Wiring Diagram
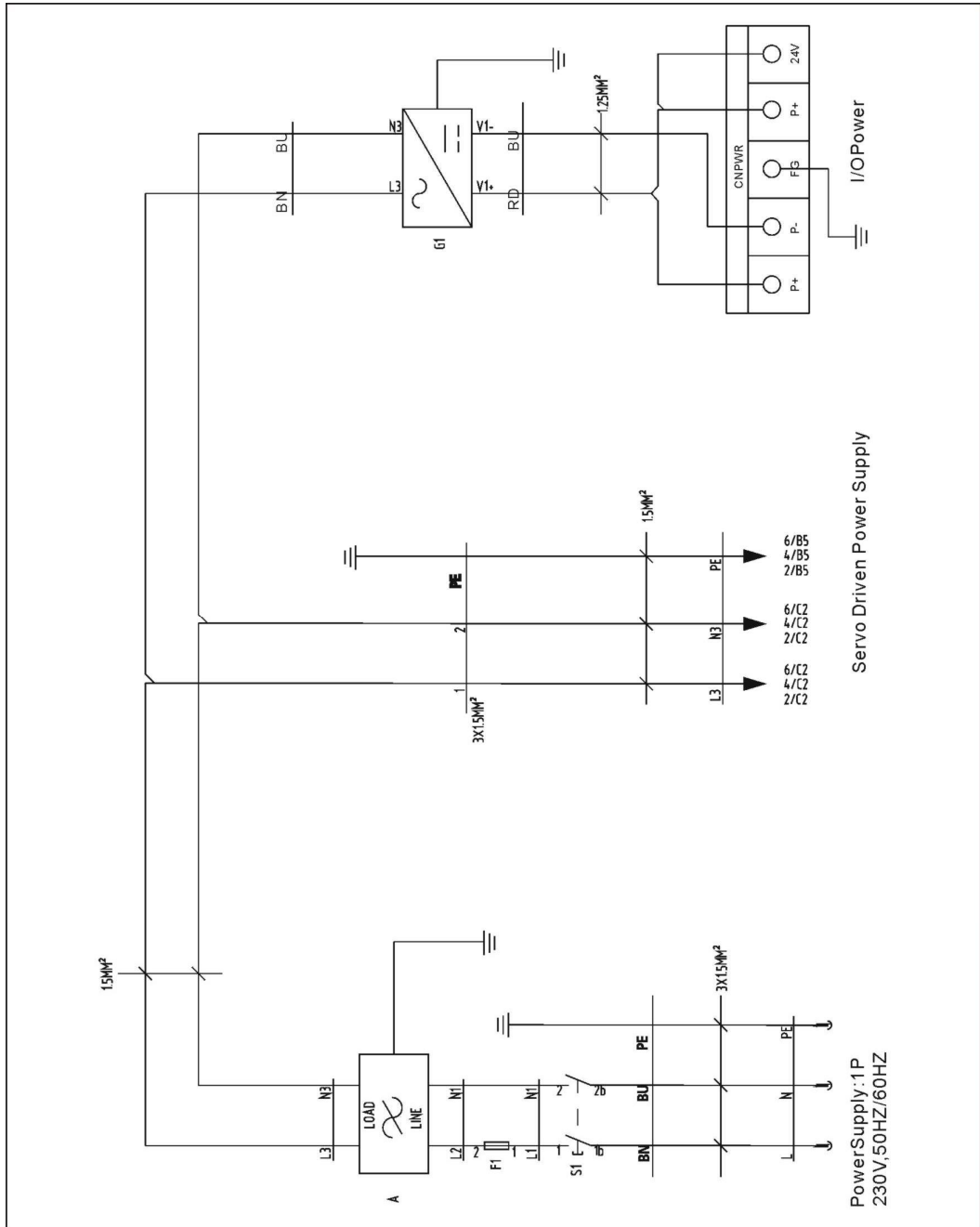
Picture 8-1

8.1.2 The Panasonic Servo Motor and Servo Driver Wiring Diagram
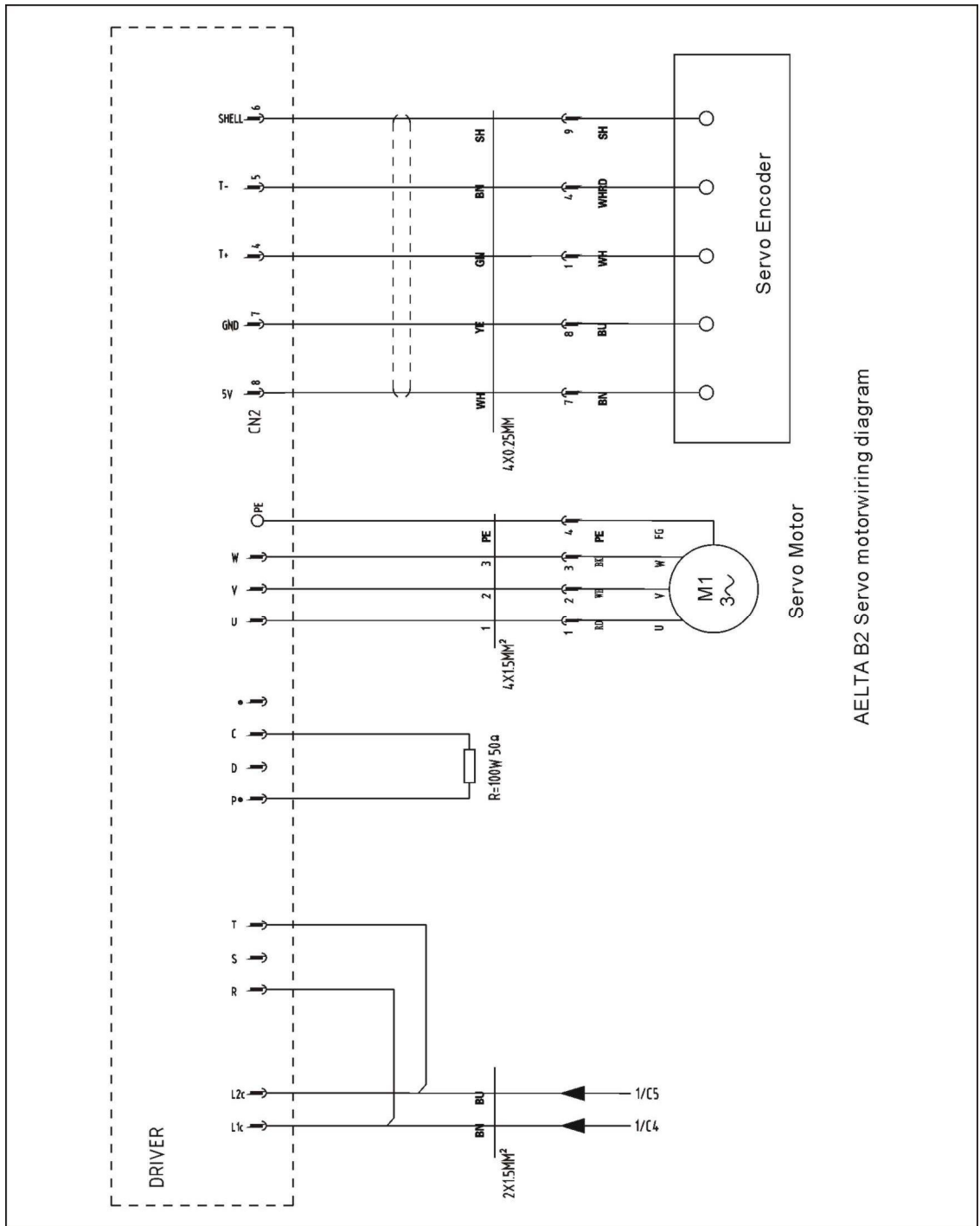

Picture 8-2

8.1.3 The Panasonic Servo Motor and I/O Board Wiring Diagram

Picture 8-3

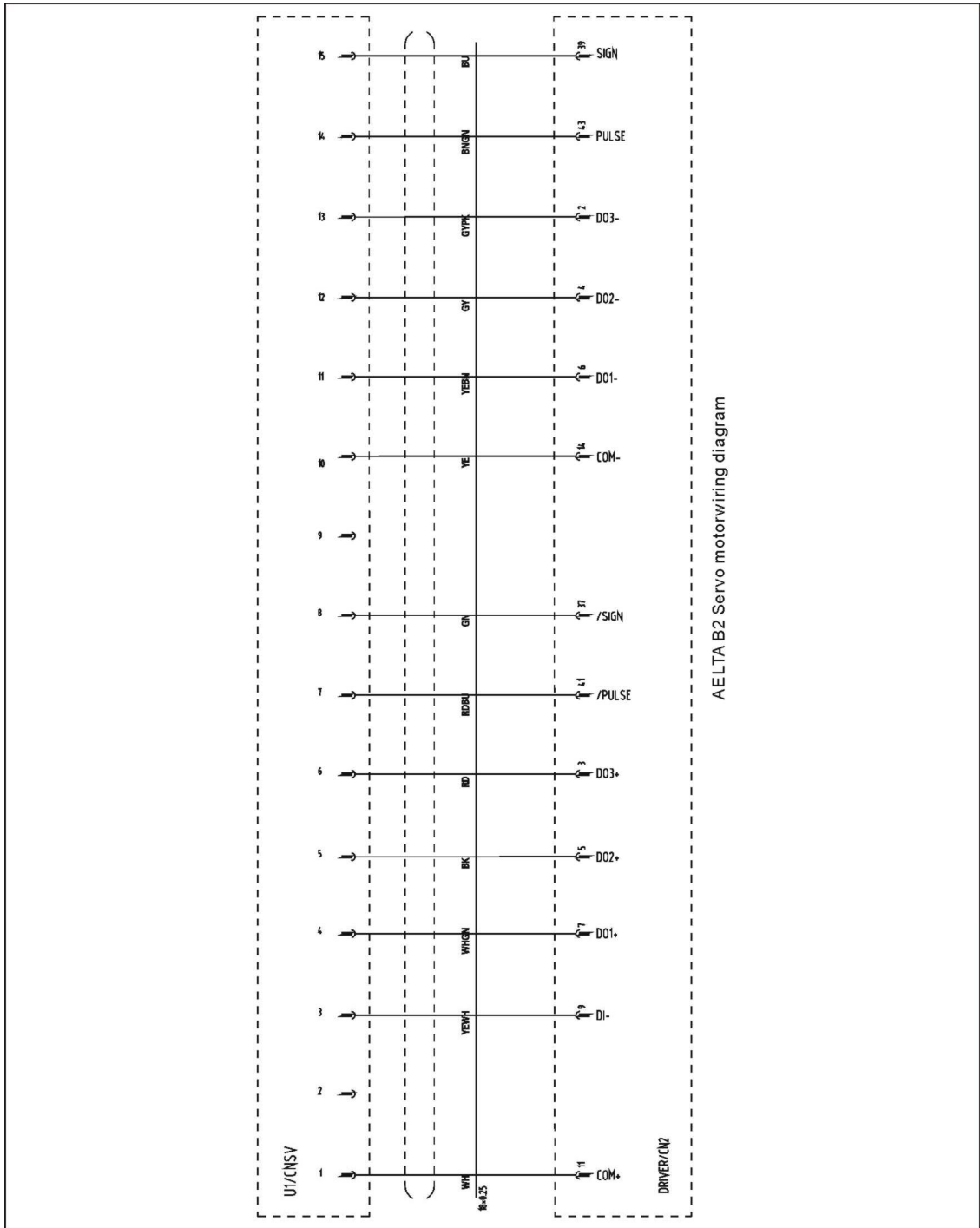## 8.1.4　The Delta Servo Motor and Servo Driver Wiring Diagram

Picture 8-4

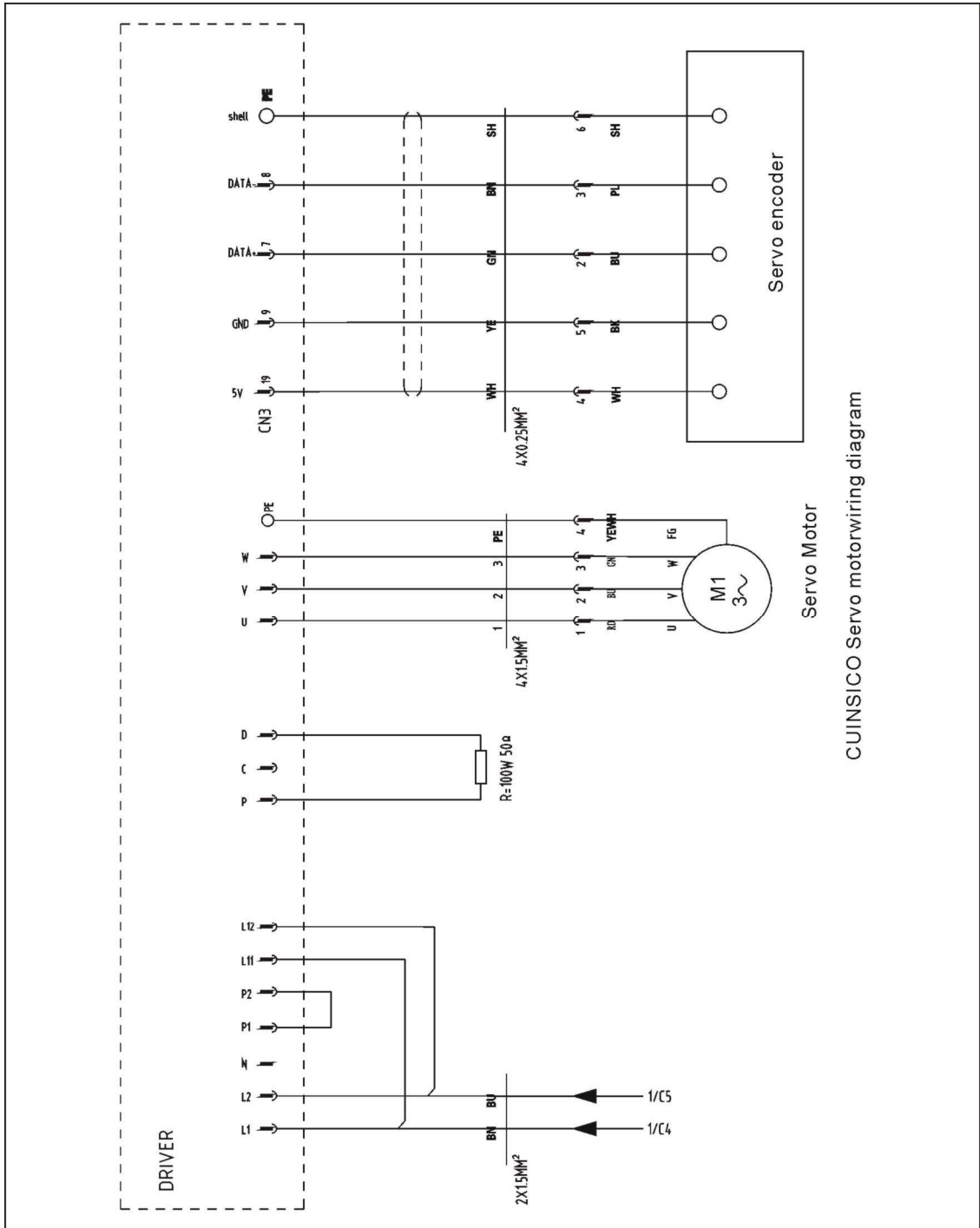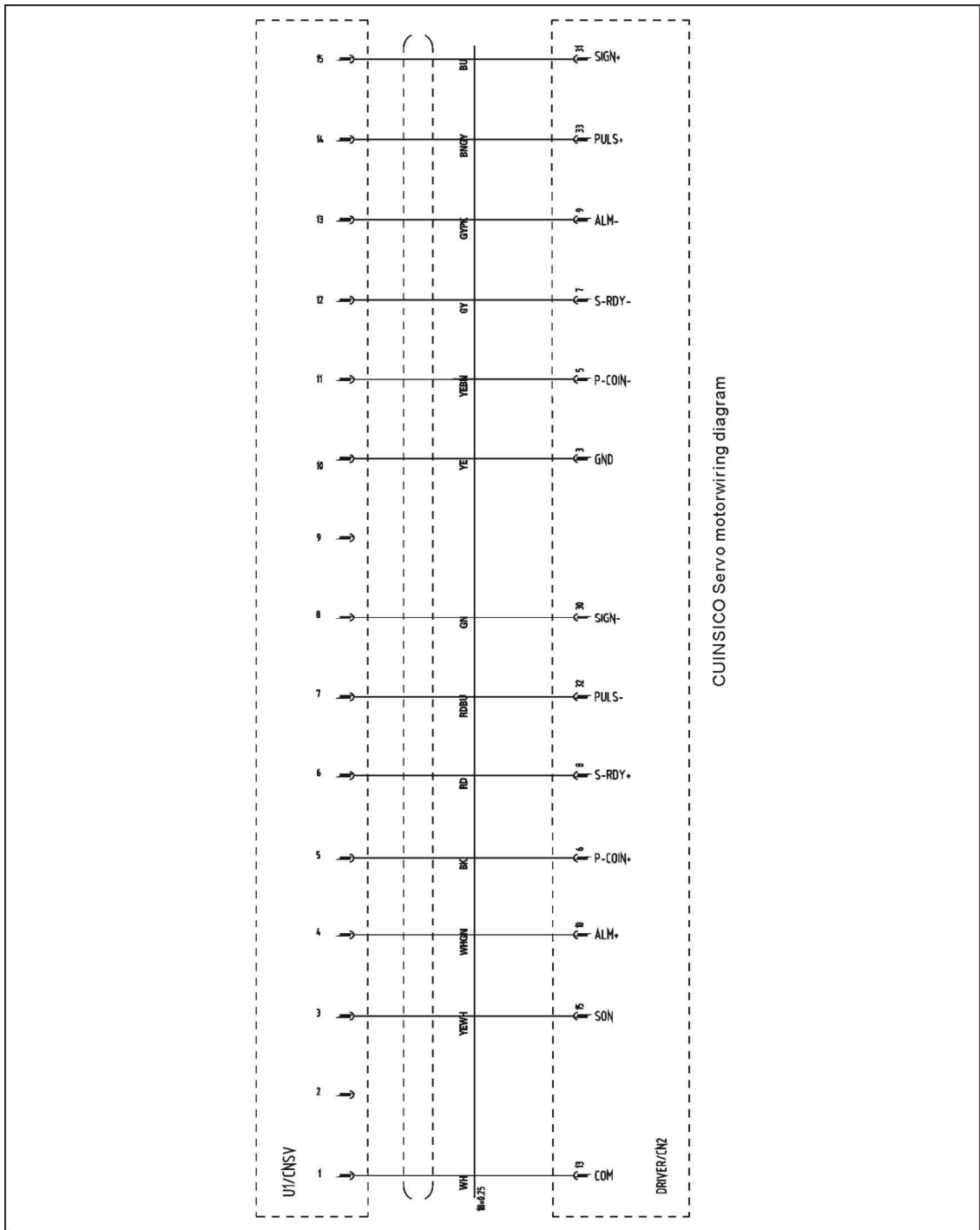## 8.1.5 The Delta Servo Motor and I/O Board Wiring Diagram

Picture 8-5

8.1.6 The Cuinsico Servo Motor and Servo Driver Wiring Diagram

Picture 8-6
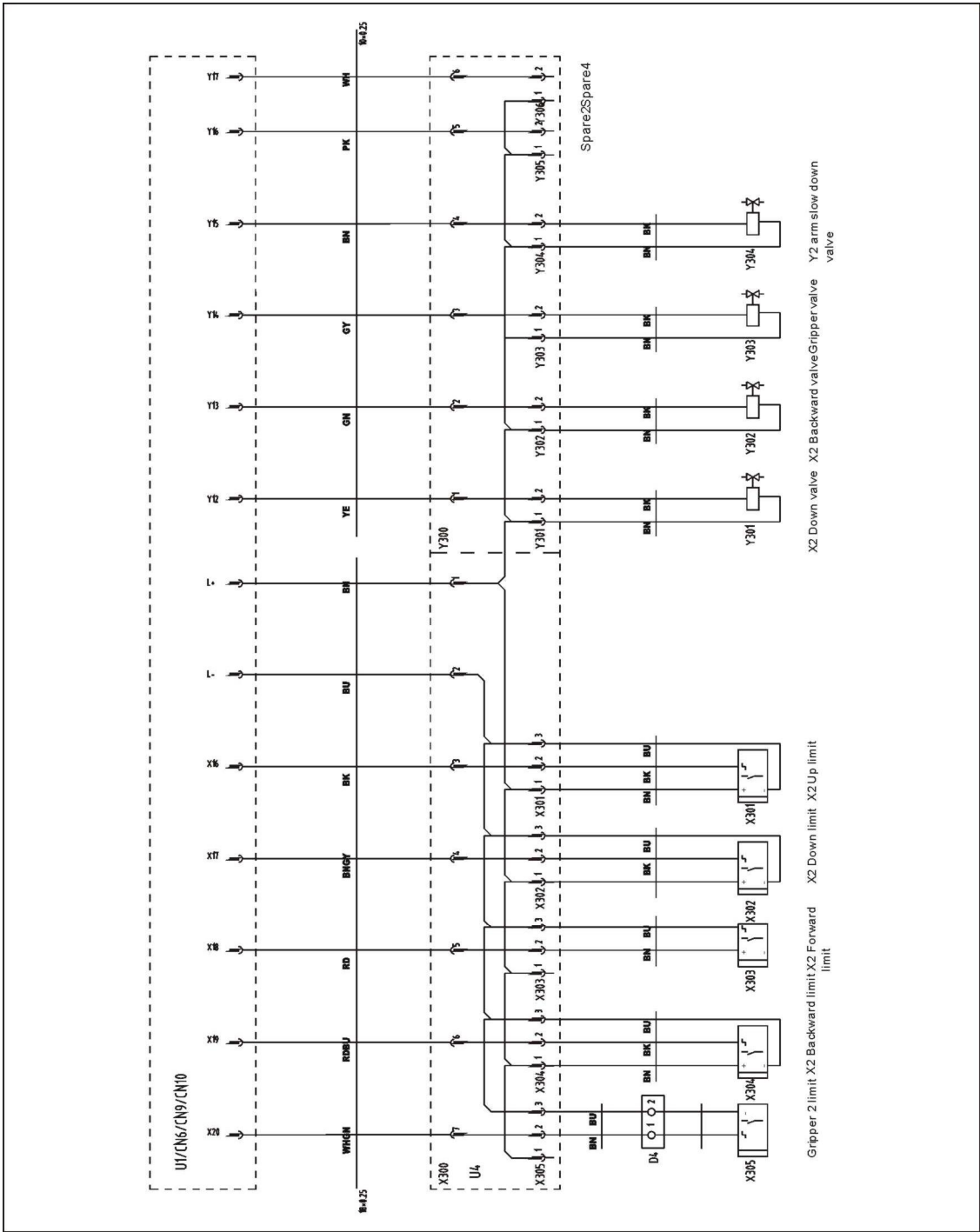
8.1.7 The Cuinsico Servo Motor and I/O Board Wiring Diagram
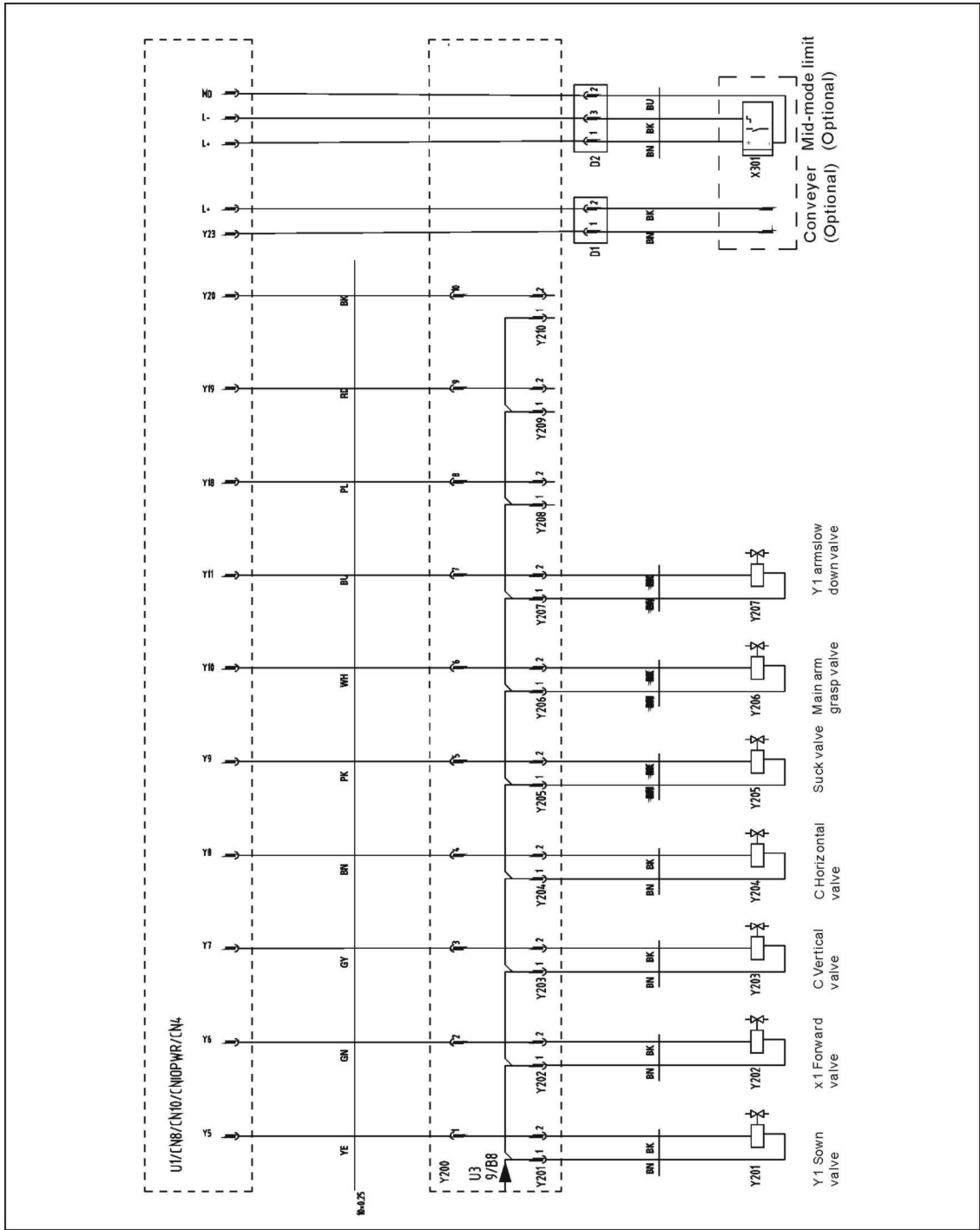

Picture 8-7

8.1.8 Z-axis I/O Board Wiring Diagram

Picture 8-8

8.1.9 Main Arm Wiring Diagram
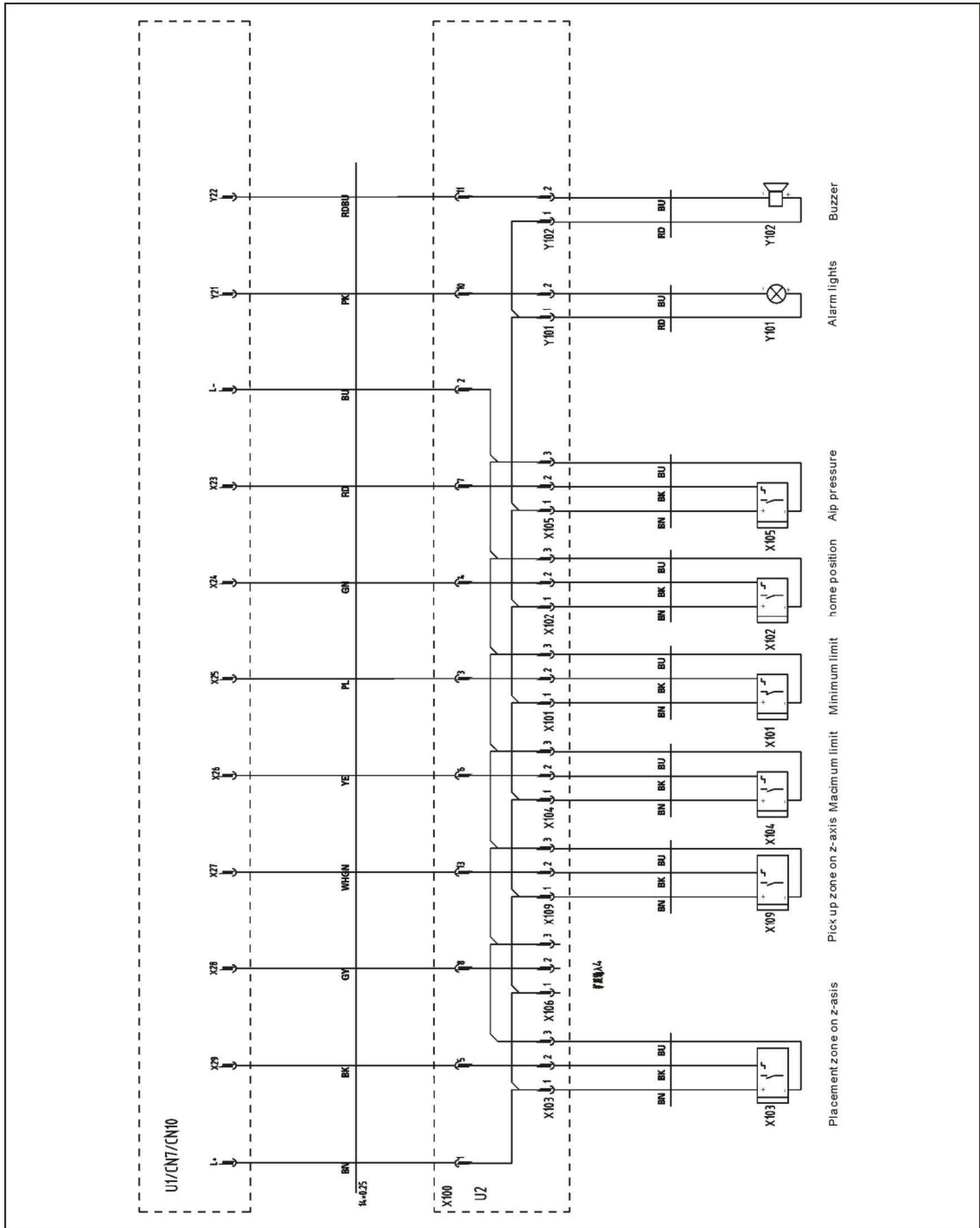
Picture 8-9

8.1.10   Sub-arm Wiring Diagram
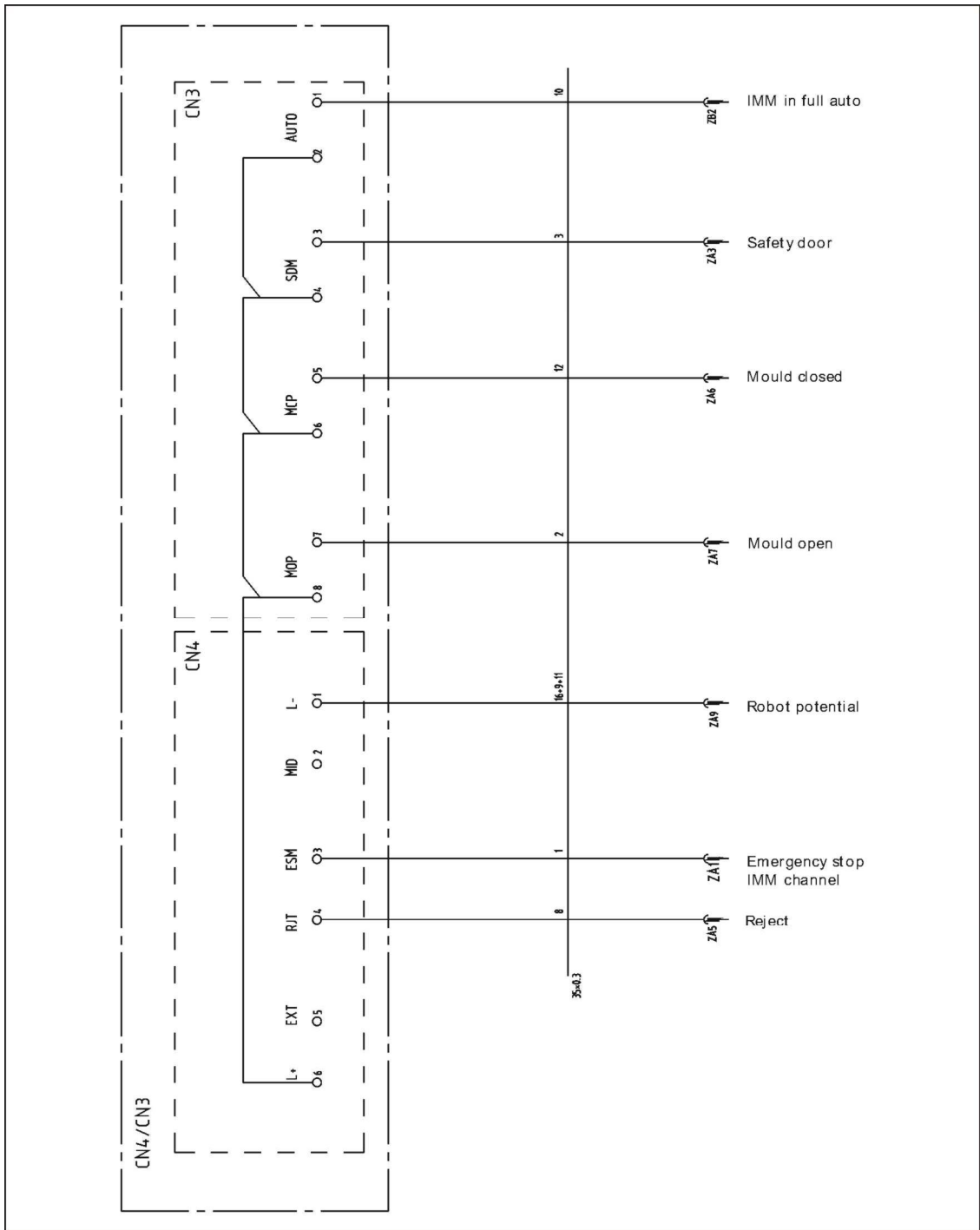

Picture 8-10

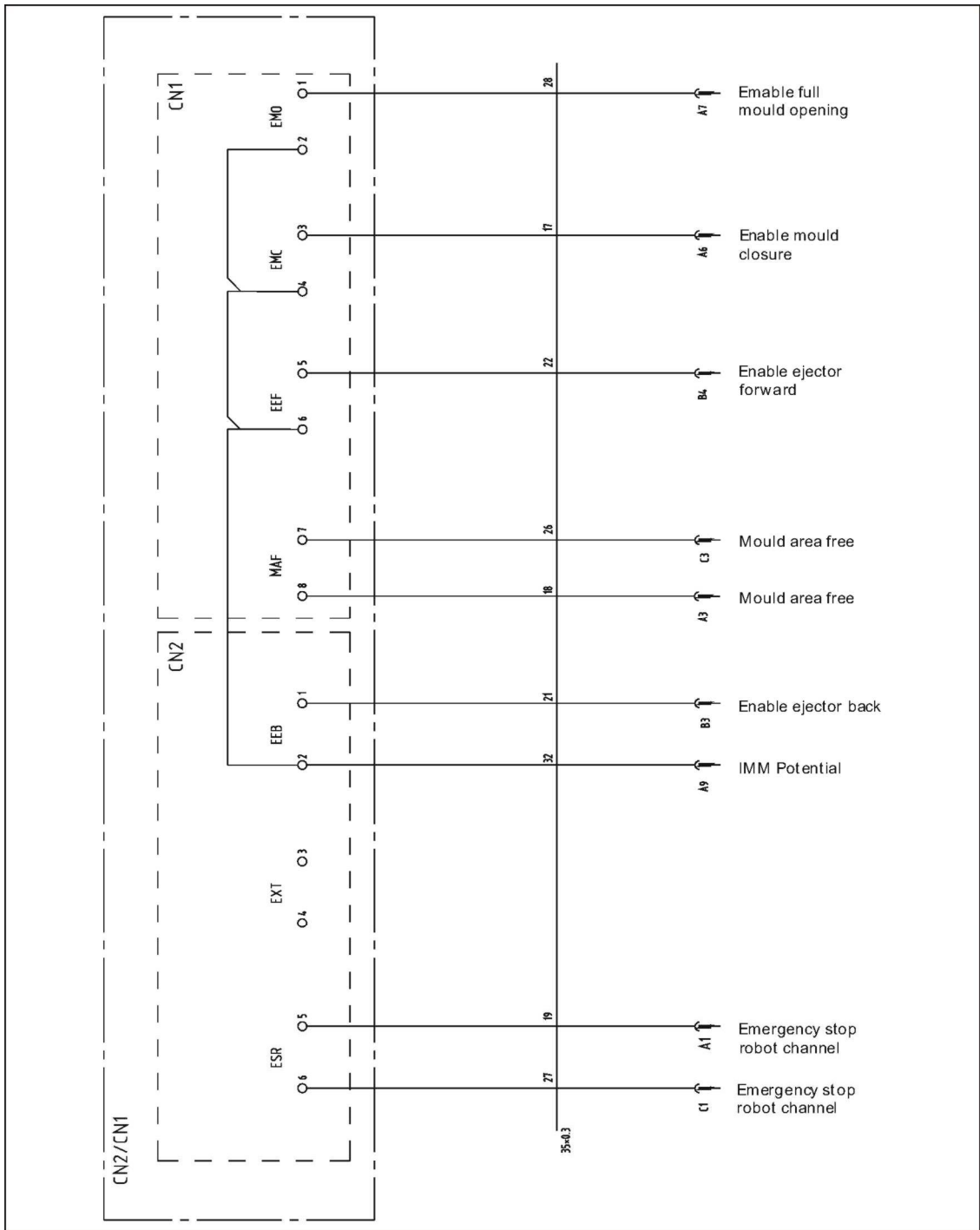## 8.1.11　Main Arm Output Wirng Diagram

Picture 8-11

8.1.12   Signals Input Wiring Diagram

Picture 8-12

8.1.13　Signals Output Wiring Diagram

Picture 8-13