

ST2

Two Axes Servo Driven Robot Touchpad Hand Controller User Manual

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1. Safety



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

1.1 Safety Regulations

- Please review this manual thoroughly and familiarize yourself with the operation of the robot, before starting up the robot for the first time. Maintenance should be performed by qualified personnel only.
- The ST2 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 operates 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 robot 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 matter 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 \pm 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 warning 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.
- 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		<p>Caution! High temperature</p>
6		<p>No Flame</p>

1.3 Emergency Stop Button

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 Euomap12 or Euomap67 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. The ST2 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°C to 55°C during the transportation, for short transportation (inner 24 hours), the temperature cannot higher than 70°C .

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.

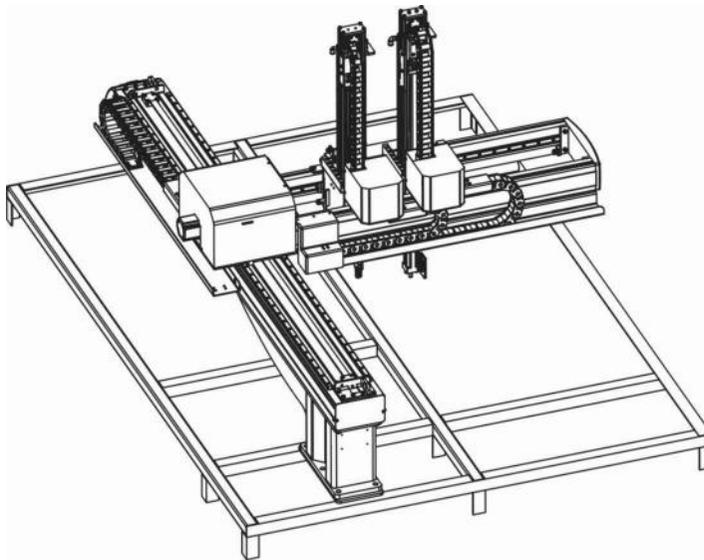
- 2) Rotating beams and arm slowly, so that the arm and the beam was vertical.
- 3) Lock the arm connecting plate and the sliding seat by the 6 screws on the supporting plate.

Note:

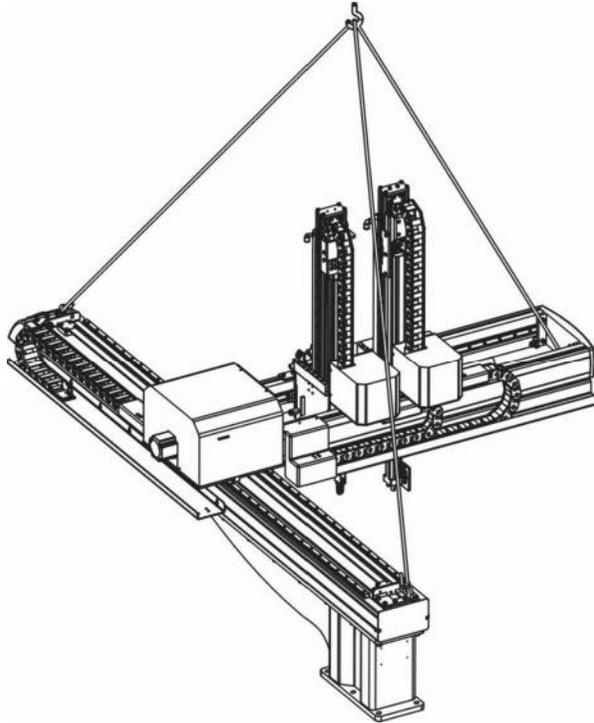
- 1) Remove the packing support plate should be careful to prevent the arm wrist and the machine damage or personal injury.
- 2) Lock the arm connecting plate and the sliding seat, ensure that the arm in vertical state.

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 ST2



Picture 1-2: Hanging transportation of ST2-T

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°C to +40°C
2. Humidity: Temperature +40°C, relative humidity 50%
3. Elevation: Under 1000 meters above sea level
4. Stop using the product immediately when the following occurs:
 - I. Power cable is damaged.
 - II. Air tube is damaged.
 - III. Machine breaks down or disassembled by unauthorized personnel.
 - IV. There are organic solvent, acidic phospholipids, sulfurous acid, and chlorine, flammable and explosive dangerous matter in compressed air.

V. 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 material (metal, oil, lubricants, plastics, rubber, etc.) to split in different ways. Deal with the machine according to local requirements; ensure the commissioning company as the best.

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.

Any problem during using the SHINI ST2 Series Robot, please contact the company or the local vendor.

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

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 cannot 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 cannot 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.

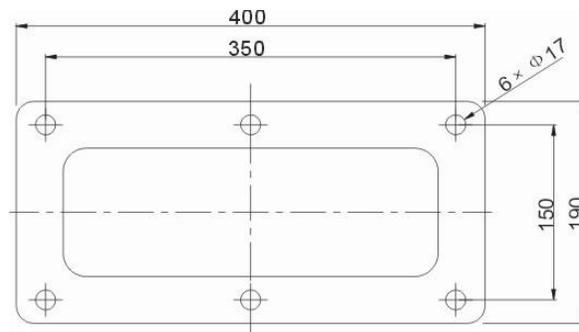


The power connection should be performed only by authorized electrician and should be in accordance with any applicable regulations.

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 ($\Phi 14$) 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

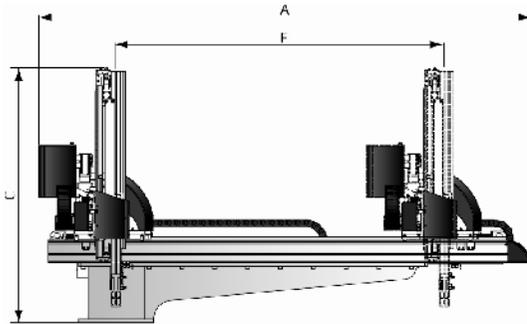
1. Should avoid vibration, collision and falling, when transfer the top of IMM.

2. Alignment holes, using the 8mm torque wrench turn to 77Nm tightens the M16 × 30 hex socket screws.

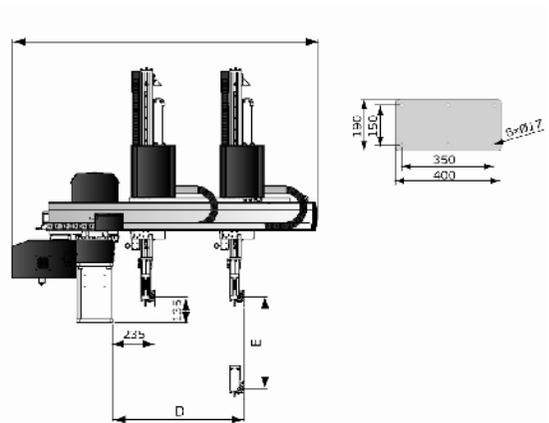
Note: if with the connection base, fix it on the injection molding machine, then fix robot on connection base.

2.2 Equipment Specification

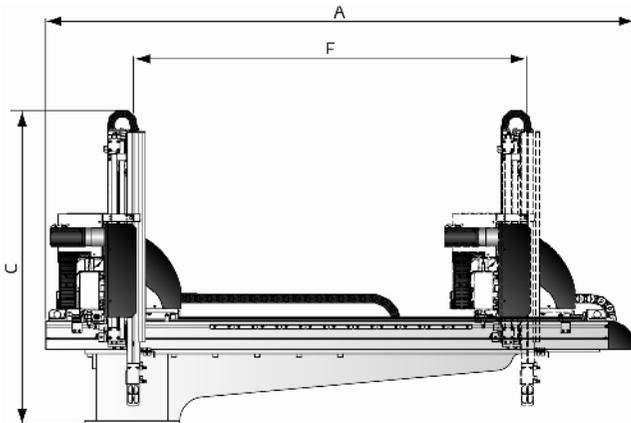
2.2.1 ST2 Dimensions (unit: mm)



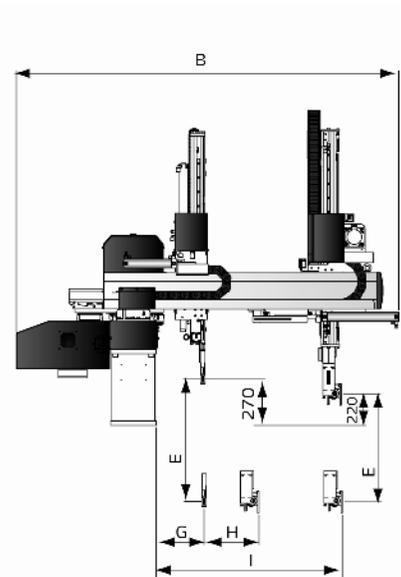
Picture 2-1: ST2-T (X and Z servo)

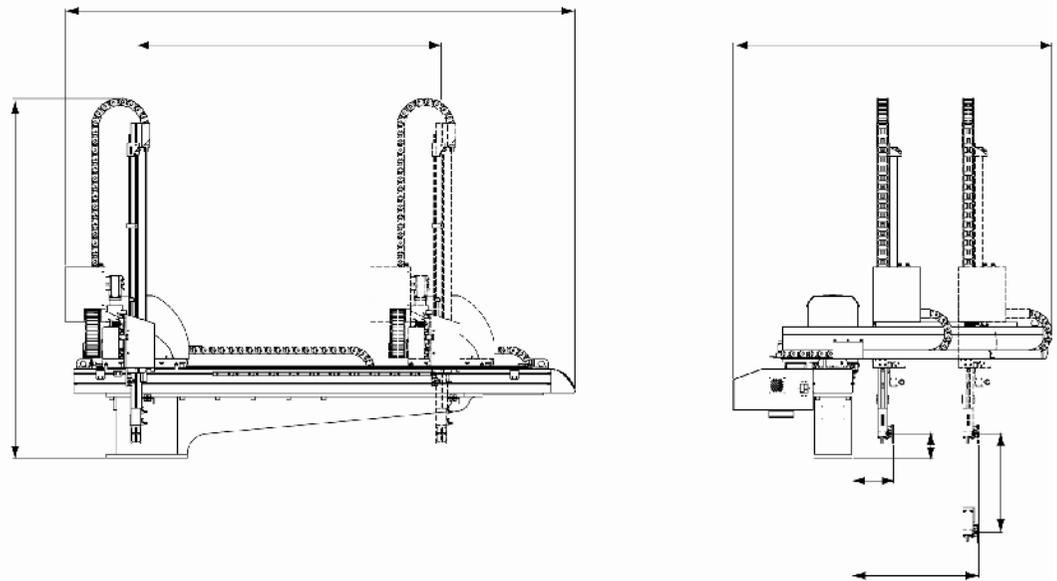


Picture 2-2: Base Flange (uniform)



Picture 2-3: ST2-T (Y and Z servo)





Picture 2-4: ST2 (X and Z servo)

2.2.2 Model Specification

Chart 2-1: ST2 Specification List

Model		ST2-700-1400	ST2-700-1400T	ST2-700-1400D	ST2-700-1400DT
IMM (ton)		100-200	100-200	100-200	100-200
Traverse Stroke (mm)		1400	1400	1400	1400
Crosswise Stroke (mm)	Main Arm	480	480	480	480
	Sub-arm	/	/	100	100
Vertical Stroke (mm)	Main Arm	700	700	700	700
	Sub-arm	/	/	750	750
Max Load (with tool) (kg)		3	3	3	3
Min Pick (sec)		2.0	1.8	2.0	2.0
Min Cycle Time (sec)		6.5	6.3	6.5	6.3
Air Pressure (bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		9	7.5	11	13
Net Weight (kg)		240	250	260	270
Dimension (mm)	A	2300	2300	2300	2300
	B	1430	1430	1430	1430
	C	1250	1250	1250	1250
	D(max)	700	700	700	700
	E(max)	/	/	750	750
	F(max)	1400	1400	1400	1400
	G(max)	/	/	120	120
	H(max)	/	/	180	180
	I(max)	680	680	680	680

Note: 1. "M" stands for middle mold detector (suitable for three-plate mold).

- “EM12” stands for Euromap 12 communication interface.
 “EM12” stands for Europa 67 communication interface.
 2. “*”Max air consumption for vacuum device 60NI/min.
 3. Power supply: 1Φ, 200~240V, 50/60Hz.

Model		ST2-900-1600	ST2-900-1600T	ST2-900-1600D	ST2-900-1600DT
IMM (ton)		200-300	200-300	200-300	200-300
Traverse Stroke (mm)		1600	1600	1600	1600
Crosswise Stroke (mm)	Main Arm	250	250	250	250
	Sub-arm	/	/	150	150
Vertical Stroke (mm)	Main Arm	900	900	900	900
	Sub-arm	/	/	950	950
Max Load (with tool) (kg)		3	3	3	3
Min Pick (sec)		2.2	2	2.2	2.3
Min Cycle Time (sec)		6.8	6.5	6.8	6.9
Air Pressure (bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		11	9.5	13	15
Net Weight (kg)		250	260	270	280
Dimension (mm)	A	2500	2500	2500	2500
	B	1550	1550	1550	1550
	C	1350	1350	1350	1350
	D(max)	900	900	900	900
	E(max)	/	/	950	950
	F(max)	1600	1600	1600	1600
	G(max)	/	/	120	120
	H(max)	/	/	180	180
I(max)		800	800	800	800

- Note: 1. “M” stands for middle mold detector (suitable for three-plate mold).
 “EM12” stands for Euromap 12 communication interface.
 “EM12” stands for Europa 67 communication interface.
 2. “*”Max air consumption for vacuum device 60NI/min.
 3. Power supply: 1Φ, 200~240V, 50/60Hz.

Model		ST2-1100-1800	ST2-1100-1800T	ST2-1100-1800D	ST2-1100-1800DT
IMM (ton)		300-450	350-450	350-450	350-450
Traverse Stroke (mm)		1800	1800	1800	1800
Crosswise Stroke (mm)	Main Arm	480	480	480	480
	Sub-arm	/	/	200	200
Vertical Stroke (mm)	Main Arm	1100	1100	1100	1100
	Sub-arm	/	/	1150	1150
Max Load (with tool) (kg)		5	5	5	5
Min Pick (sec)		2.2	2.0	2.5	2.4
Min Cycle Time (sec)		6.7	6.3	7.5	7.3
Air Pressure (bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		12	10	15	18
Net Weight (kg)		300	310	320	340

Dimension (mm)	A	2700	2700	2700	2700
	B	1670	1670	1670	1670
	C	1450	1450	1450	1450
	D(max)	1100	1100	1100	1100
	E(max)	/	/	1150	1150
	F(max)	1800	1800	1800	1800
	G(min)	/	/	120	120
	H(min)	/	/	180	180
I(max)	920	920	920	920	

Note: 1. "M" stands for middle mold detector (suitable for three-plate mold).

"EM12" stands for Euromap 12 communication interface.

"EM12" stands for Eurompa 67 communication interface.

2. "*"Max air consumption for vacuum device 60NI/min.

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

Model		ST2-1300-2000T	ST2-1300-2000DT	ST2-1500-2200T	ST2-1500-2200DT
IMM (ton)		450-650	450-650	650-850	650-850
Traverse Stroke (mm)		2000	2000	2200	2200
Crosswise Stroke (mm)	Main Arm	400	400	400	400
	Sub-arm	/	200	/	200
Vertical Stroke (mm)	Main Arm	1300	1300	1500	1500
	Sub-arm	/	1350	/	1550
Max Load (with tool) (kg)		10	10	12	12
Min Pick (sec)		3.2	3.2	3.5	3.5
Min Cycle Time (sec)		8.5	8.5	9	9
Air Pressure (bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		10	11	12	15
Net Weight (kg)		500	550	550	600
Dimension (mm)	2500	2700	2700	2900	2900
	1550	1890	1890	1950	1950
	1350	1600	1600	1700	1700
	D(max)	1300	1300	1500	1500
	E(max)	/	1350	/	1550
	F(max)	2000	2000	2200	2200
	G(max)	/	120	/	120
	H(max)	/	170	/	170
I(max)	1100	1100	1150	1150	

Note: 1. "M" stands for middle mold detector (suitable for three-plate mold).

"EM12" stands for Euromap 12 communication interface.

"EM12" stands for Eurompa 67 communication interface.

2. "*"Max air consumption for vacuum device 60NI/min.

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

Model		ST2-Y700-1400	ST2-Y700-1400D	ST2-Y700-1400T	ST2-Y700-1400DT
IMM (ton)		100-200	100-200	100-200	850-1600
Traverse Stroke (mm)		1400	1400	1400	1400
Crosswise Stroke (mm)	Main Arm	150	150	150	150
	Sub-arm	/	100	/	100
Vertical Stroke (mm)	Main Arm	700	700	700	700
	Sub-arm	/	750	/	750
Max Load (with tool) (kg)		3	3	3	3
Min Pick (sec)		1.8	2.2	1.8	2.2
Min Cycle Time (sec)		6.5	6.6	6.4	6.6
Air Pressure (bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		7	12	7	15
Net Weight (kg)		250	270	260	280
Dimension (mm)	A	2300	2300	2300	2300
	B	1430	1430	1430	1430
	C	1600	1350	1350	1350
	D(max)	700	700	700	700
	E(max)	/	750	/	750
	F(max)	1400	1400	1400	1400
	G(max)	/	120	/	120
	H(max)	/	180	/	180
I(max)		680	680	680	680

Note: 1. "M" stands for middle mold detector (suitable for three-plate mold).

"EM12" stands for Euromap 12 communication interface.

"EM12" stands for Europa 67 communication interface.

2. "*"Max air consumption for vacuum device 60NL/min.

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

Model		ST2-Y900-1600T	ST2-Y900-1600DT	ST2-Y900-1600	ST2-Y900-1600D
IMM (ton)		200-300	200-300	200-300	200-300
Traverse Stroke (mm)		1600	1600	1600	1600
Crosswise Stroke (mm)	Main Arm	250	250	250	250
	Sub-arm	/	150	/	150
Vertical Stroke (mm)	Main Arm	900	900	900	900
	Sub-arm	/	950	/	950
Max Load (with tool) (kg)		3	3	3	3
Min Pick (sec)		1.8	2.1	2	2.1
Min Cycle Time (sec)		6.5	7	6.5	7
Air Pressure (bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		9	15	8.5	15
Net Weight (kg)		260	280	250	270
Dimension (mm)	A	2500	2500	2500	2500
	B	1550	1550	1550	1550
	C	1450	1450	1450	1450
	D(max)	900	900	900	900
	E(max)	/	950	/	950

	F(max)	1600	1600	1600	1600
	G(max)	/	120	/	120
	H(max)	/	180	/	180
	I(max)	800	800	800	800

Note: 1. "M" stands for middle mold detector (suitable for three-plate mold).

"EM12" stands for Euomap 12 communication interface.

"EM12" stands for Eurompa 67 communication interface.

2. "*"Max air consumption for vacuum device 60NI/min.

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

Model		ST2-Y1100-1800	ST2-Y1100-1800D	ST2-Y1100-1800T	ST2-Y1100-1800DT
IMM (ton)		300-450	300-450	300-450	300-450
Traverse Stroke (mm)		1800	1800	1480	1480
Crosswise Stroke (mm)	Main Arm	400	400	300	300
	Sub-arm	/	200	/	150
Vertical Stroke (mm)	Main Arm	1100	1100	1100	1100
	Sub-arm	/	1150	/	1150
Max Load (with tool) (kg)		8	8	8	8
Min Pick (sec)		2.2	2.5	2.2	2.5
Min Cycle Time (sec)		7.2	7.5	7.2	7.5
Air Pressure (bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		13	18	13	18
Net Weight (kg)		430	450	440	460
Dimension (mm)	A	2700	2700	2700	2700
	B	1830	1830	1830	1830
	C	1500	1500	1550	1550
	D(max)	1100	1100	1100	1100
	E(max)	/	1150	/	1150
	F(max)	1800	1800	1800	1800
	G(max)	/	120	/	120
	H(max)	/	180	/	180
	I(max)	920	920	920	920

Note: 1. "M" stands for middle mold detector (suitable for three-plate mold).

"EM12" stands for Euomap 12 communication interface.

"EM12" stands for Eurompa 67 communication interface.

2. "*"Max air consumption for vacuum device 60NI/min.

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

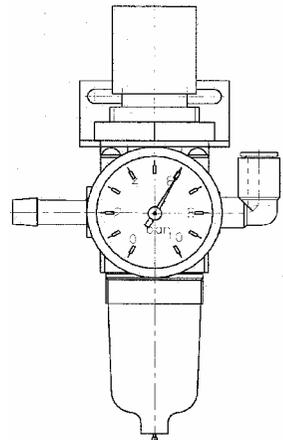
Model		ST2-Y1300-2000T	ST2-Y1300-2000DT	ST2-Y1500-2200T	ST2-Y1500-2200DT
IMM (ton)		450-650	450-650	650-850	650-850
Traverse Stroke (mm)		2000	2000	2200	2200
Crosswise Stroke (mm)	Main Arm	400	400	400	400
	Sub-arm	/	200	/	200
Vertical Stroke (mm)	Main Arm	1300	1300	1500	1500
	Sub-arm	/	1350	/	1550
Max Load (with tool) (kg)		10	10	12	12
Min Pick (sec)		3.2	3.2	3.5	3.5

Min Cycle Time (sec)	8.5	8.5	9	9
Air Pressure (bar)	4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*	15	30	18	35
Net Weight (kg)	450	480	470	500
Dimension (mm)	A	2700	2700	2900
	B	1890	1890	1950
	C	1600	1600	1700
	D(max)	1300	1300	1500
	E(max)	/	1350	/
	F(max)	2000	2000	2200
	G(max)	/	120	/
	H(max)	/	170	/
I(max)	1100	1100	1150	1150

- Note: 1. "M" stands for middle mold detector (suitable for three-plate mold).
 "EM12" stands for Euromap 12 communication interface.
 "EM12" stands for Europa 67 communication interface.
 2. "*"Max air consumption for vacuum device 60NI/min.
 3. Power supply: 1Φ, 200~240V, 50/60Hz.

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 to 10bar. 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 bars, the robot will stop working and alarm. When the pressure up to 6bar, It will affect the service life of pneumatic components.

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.



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.

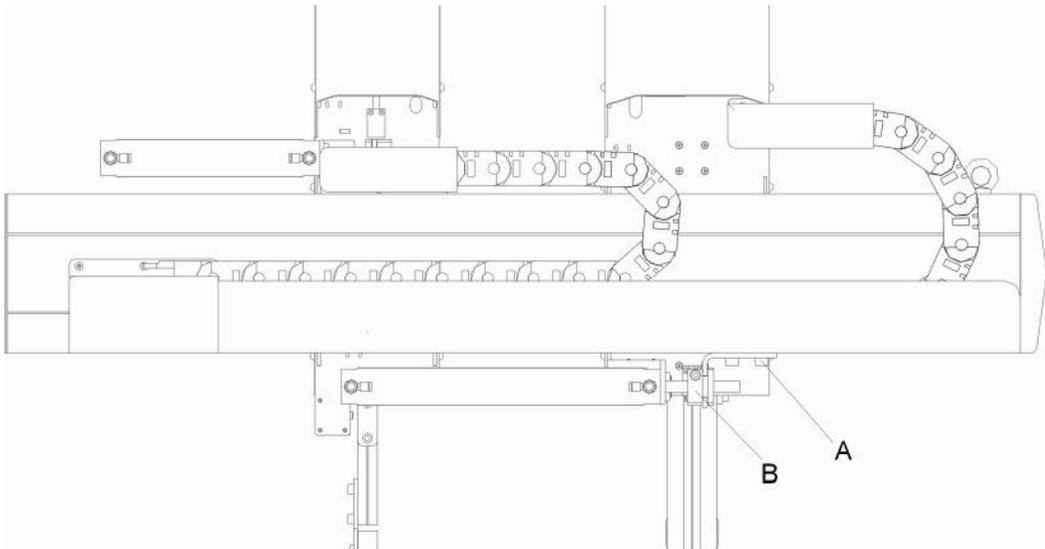
2.4 Adjusting the Axis Positions



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

2.4.1 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”

2.4.2 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, and the down-block will damage the origin sensor switch.

2.4.3 Adjusting the Z-position

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

2.5 Gripper and Suction Monitoring

2.5.1 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 clamped 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.

2.5.2 Vacuum Setting

1. The default setting is 4 bars, 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.

2.5.3 Digital Pressure Switch Setting

CKD digital 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.
2. 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 “-30”.

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

3. Lock button:

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

4. Remove lock button:

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

SMC Digital Pressure Switch Setting:

1. 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” complete setting and back to “function selection mode”, screen displays “F0”.
2. Press up/down till screen displays “F1”, press “S” into “OUT1 specification setting”, and use up/down keys to select “HYS”, press “S” into “out mode setting”.
3. Use up/down keys to select “L-n”, press “S” into “pressure setting”.
4. Use up/down keys to set pressure to “-50” (the value can be changed according to application, usual the value is “2”). Press “S” into “displayed color of the main display selection”.
5. Use up/down keys to select “Sor”, press “S” back to “function selected mode”.
6. Press “S” for 2 seconds back to “measurement mode”.

2.6 Robot and IMM Interface

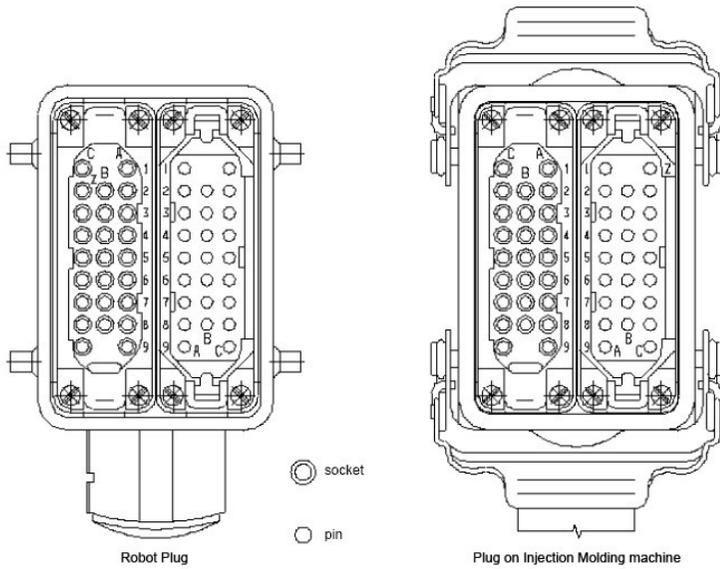
ST2 series robots are available with 2 different interface versions to communicate with the injection molding machine:

- Euromap67
- Euromap12

Both versions are described in the following chapters.

2.6.1 Euromap67

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



The robot-injection molding machine interface is designed according to the directives of Euromap67, which states:

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

2.6.1.1 The Injection Molding Machine Output Signals

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

ZA6	Mold closed HIGH signal when tool closing has been completed, the signal “close tool enabled” is no longer necessary (see pin contact No.A6).
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 molding.(see pin contact No.B5)
ZB6	Core pullers 1 in position to remove molding HIGH signal when the core pullers are in position for removal of the injection molding.(see pin contact No.B6)
ZB7 optional	Core pullers 2 free for robot to approach HIGH signal when the ejector is back ,regardless of the position of the movable tool plate, are in position for the robot to approach. (see pin contact No.B7)
ZB8 optional	Core pullers 2 in position to remove molding HIGH signal when the core pullers are in position for removal of the injection molding.(see pin contact No.B8)
ZC5/ZC6/ZC7	Reserved for future Euromap signal
ZC8	Free
ZC9	Signal ground robot 0V

2.6.1.2 Robot Output Signals

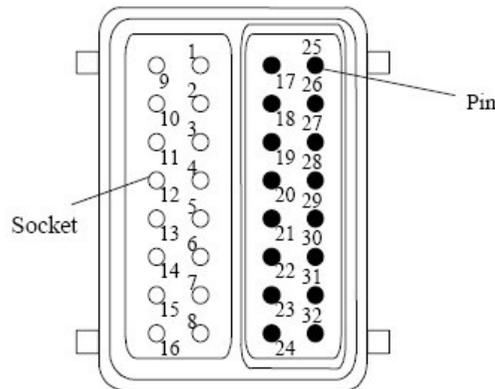
Contact No.	Function
A1 C1	Emergency stop of robot channel 1 Opening of the switch contacts of the robot must shut off the control system of the molding machine.
A2 C2	Emergency stop of robot channel 2 Opening of the switch contacts of the robot must shut off the control system of the molding machine.

A3 C3	<p>Mold Areas Free</p> <p>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.</p>
A4 C4	Reserved for future Euromap signal.
A5	Free
A6	<p>Complete mold opening enabled</p> <p>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)</p>
A7 optional	<p>Complete mold opening enabled</p> <p>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)</p>
A8	Reserved for future Euromap signal
A9	Signal ground IMM 24V DC
B2	<p>Robot operation mode</p> <p>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.</p>
B3	<p>Ejector back enabled</p> <p>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).</p>
B4	<p>Ejector forward enabled</p> <p>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).</p>
B5 Optional	<p>Enable movement of core pullers 1 to position for the robot to approach freely.</p> <p>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)</p>
B6 Optional	<p>Enable movement of core pullers 1 to position for removal of the molding.</p> <p>When the motion of the core pullers is to the position for removal of the molding is enabled.</p>
B7 Optional	<p>Enable movement of core pullers 2 to position for the robot to approach freely.</p> <p>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)</p>
B8 Optional	<p>Enable movement of core pullers 2 to position for removal of the molding.</p> <p>When the motion of the core pullers is to the position for removal of the molding is enabled. (see pin contact No.ZB8)</p>

C5 C8	Free
C6 C7	Reserved for future Euromap signal
C9	IMM power supply 0V

2.6.2 Euromap12 Interface

The interface consists of the plug connection between the injection molding machine and the robot:



The robot-injection molding machine interface is designed according to Euromap12, which state:

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

2.6.2.1 Injection Molding Machine Output Signals

Plug Contact No.	Function
1, 9	Emergency stop of machine The emergency stop switch of the injection molding machine is used to interrupt the emergence stop circuit of the robot.
2	Mold open The switch contact (pin contact 16) is closed when mould opening position is equal or more than required position. Inadvertent alteration to mould opening stroke smaller than that required for the handling 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 handling 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	<p>Ejector forward</p> <p>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).</p> <p>It is recommended to close the switch contact when the ejector sequence not in use. (see pin contact No.16)</p>
6 Optional	<p>Core pullers free for robot to travel in</p> <p>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.</p>
7 Optional	<p>Core pullers in position for removal of injection moldings</p> <p>Switch (pin contact No.16) is closed when the core pullers are in position for removal of the injection molding.</p>
8 Optional	<p>Reject</p> <p>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)</p>
10	<p>Fully automatic mode injection molding machine</p> <p>Switch (see pin contact No.16) is closed when the operating mode selector switch is on “semi-automatic” or “fully automatic mode”.</p>
12	<p>Mold closed</p> <p>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)</p>
13 Optional	Free
14 Optional	<p>Mold at intermediate position</p> <p>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:</p> <p>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)</p> <p>2) Mould opening doesn't stop on intermediate position, however gives the signal to handling device/robot. (see pin contact No.16)</p> <p>The switch contact is open when intermediate mould opening position is not in use.</p>
15 Optional	Free
16	Signal voltage of robot

2.6.2.2 Robot Output Signals

Contact No.	Function
17	<p>Enable mould close</p> <p>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)</p>
18, 26	<p>Mould area free</p> <p>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.</p> <p>It is recommended to close the switch contact when the robot is unselected.</p>

19, 27	<p>Emergency stop of robot</p> <p>Opening of the switch contacts of the robot must shut off the control system of the molding machine.</p>
20	<p>Operation with robot</p> <p>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.</p>
21	<p>Enable ejector back</p> <p>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)</p>
22	<p>Enable ejector forward</p> <p>The switch contact (see pin contact No.32) is closed when the handling 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)</p>
23 Optional	<p>Enable motion of core pullers for removal of injection moldings</p> <p>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)</p>
24 Optional	<p>Enable motion of core pullers for removal of injection moldings</p> <p>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)</p>
25	Reserved for future Euromap signal
28 Optional	<p>Enable full mould opening</p> <p>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.</p>
29	Reserved for future Euromap signal
30	Free
31	Free
32	Voltage of IMM

3. General Description

3.1 Abstract

The ST2 series robot is designed for rapid and precise removal of sprue and products from injection molding machine. One arm and double arms, standard and telescopic arms are selected according to the application of 2-plate mold, 3-plate mold or hot runner system.



Model: ST2



Model: ST2-T

3.2 Features

1. Compact structure and streamlined appearance.
2. I/O circuit using quick plug-in design, and easy to install and maintain.
3. The limit positions with safety switches, high security.
4. With stack function.
5. Pick the objects up quickly, put the objects down slowly. It will not affect the speed, but also ensure that goods will not be bumps.
6. Humanization control system, easy to operate.
7. Wrist packaging designs, which can save the packaging room, avoid damage during transportation.

3.3 Function

3.3.1 Function Description

The ST2 robot is mainly used for rapid and precise removal of sprue and products from injection molding machine. High efficient shock absorbers allow fast and precise pneumatic driven motion. Position limit sensor and blocks effectively prevent mechanical and electrical malfunctions. Control board with short circuit function. Multiple stop points in Z axis, convenient for package. Y-axis servo stacking function provides multiple stop points in Y1 and Z axis. X-axis servo stacking function provides multiple stop points in X1 and Z axis.

3.3.2 Position Check Function

Magnetic switches on crosswise arm cylinders (forward and backward), and proximity switches on cylinders (crosswise arm forward and backward, arm up and down) to sensor each movements. Magnetic switches on sub-arm gripper and main arm rotation mechanical to sensor grip products and rotation movements. Any accident, machine stop running and alarm immediately till troubleshooting.

3.3.3 Buffer Function

Shock absorbers on arms (up, down, forward, backward) allow fast and precise pneumatic driven motion, prevent mechanical.

3.3.4 Position Limit Function

Position limit sensors on traverse begin and end positions, blocks on Z and X

effectively prevent mechanical and electrical malfunctions.

3.3.5 Products Protection Function

Main arm pick-out products quickly and placing slowly. The placing speed can be adjustment through throttle valve on main arm.

3.3.6 Falling-proof Function

There is a cylinder falling-proof 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 falling-proof cylinder piston rod. If the pressure is enough, falling-proof cylinder piston rod returns back.

3.3.7 Emergency Stop

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

3.4 Default Setting

1. The traverse speed is at 85% of the full speed.
2. The pressure sensor switch is at 4bar, when air pressure is less than 4bar, the machine will stop working and alarm.
3. The filter valve is at 6bar.
4. The vacuum pressure sensor is at -50.

3.5 ST2 Robot Reversing

The following paragraph is the instruction for changing ST2 robot dropping side (Operation side to non-operation side). For safety, please turn off the electrical power and pneumatic supply before operating.

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: Sensor position before modified



Picture 3-2: Sensor position after modified

2. Move all “Outside IMM safety zone blocks” from the end of the beam to another end of the beam, see picture 3-3, 3-4.



Picture 3-3: Outside IMM safety zone blocks before modified

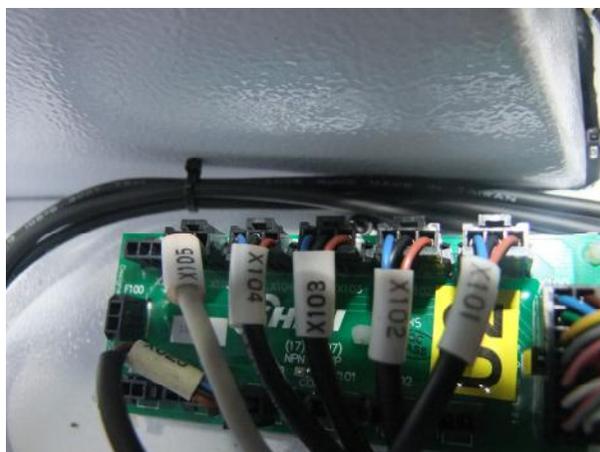


Picture 3-4: Outside IMM safety zone blocks after modified

3. Move the origin block from the end of the beam to another end of beam, 180mm away from the fixing belt block. See picture:



4. Open the sliding seat on the Z-axis, and then exchange the X101 and X104 socket positions on U2 board, exchange the X102 and X103 socket positions. See picture 3-5 and 3-6.



Picture 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: Direction Before Modified



Picture 3-8: Direction 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



- F1: Reference/home position. Press F1 and safety switch, robot will reference.
- F2: Stop. In auto running mode, press F2, robot stop auto running and switch to manual mode.
- F3: Auto. When function button switch to “AUTO”, press F3 robot will begin auto running. Note: before stopping auto running, please stop IMM firstly. Before starting auto running, please start IMM firstly.
- F4: Spare button.
- F5: Cylinder rotates horizontal manually. In manual mode, press F5, cylinder rotates horizontal.
- F6: Cylinder rotates vertical manually. In manual mode, press F6, cylinder rotates vertical.



Vacuum 1: Robot in manual mode, press this button, vacuum 1 on or off.



Vacuum 2: Robot in manual mode, press this button, vacuum 2 on or off.



Grip 1: Robot in manual mode, press this button, grip 1 on or off.



Grip 2: Robot in manual mode, press this button, grip 2 on or off.



Grip 3: Robot in manual mode, press this button, grip 3 on or off.



Grip 4: Robot in manual mode, press this button, grip 4 on or off.



Emergency stop button: Press this button, robot stop immediately, screen displays emergency stop error message.



Function button: Switch to “AUTO”, robot into auto stand-by page. Switch to “STOP”, if robot in auto running, robot will stop running and into auto stand-by page, and robot cannot manually move. Switch to “MANUAL”, robot into manual mode, each axis can move manually.

4.2 Main Screen

The main screen displays the system status and the operations, easy for operation. The flowing is the details of main screen.

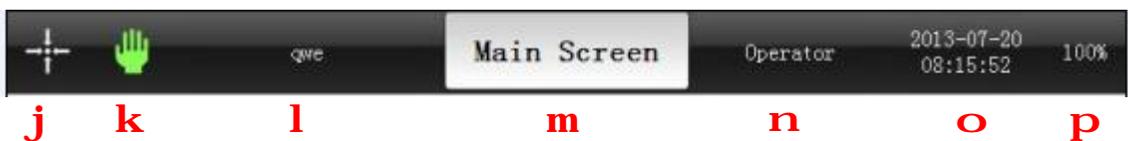
After power on, the system autos into main screen see as the picture:



Picture 4-1: ST2 Main Screen

- ① **Title Bar:** Display the current system screen, status, current program name, user, date, time and so on.
- ② **Alarm Message:** Display the last alarm message.
- ③ **Servo Position:** Display the current position of servo motor, touch it and toggle the screen to servo control page.
- ④ **Function Key:** Touch it and into function menu page.

4.3 Menu Title Bar



- ① **Servo reference position:** Feedback the servo motor reset conditions (reset home position, reference). Touch it servo motor will reset home position.

	No reference position: after power on, the servo motor without home position reset.
	Reference position: after power on, the servo motor had home position reset.

② **Operation mode symbol:** Display current operation mode.

	Manual mode: current system allows manually operation.
	Auto stand-by mode: auto running, one cycle running and one step running.
	Auto mode: auto running current program.
	One cycle running: auto running current program in one cycle.
	Single-step running: running current program in one step.

③ **qwe:** Display current program name. If no program running, it displays “no program”.
Touch it and into program control page.

④ **Main Screen:** Current screen.

⑤ **Operator:** Display current user. There are 4 levels user: operator, advanced operator, administrator, advanced administrator. Touch it and into user control page.

⑥ **Date and time:** Display current date and time. Touch it and into date and time page.

⑦ **Speed:** Display the robot running speed, touch it into speed setting page.

4.4 Function Menu

	system running page Auto running, one cycle running, and one-step running operation.
	watch page Watch the I/O port status, allows manually operate of I/O in manual mode.
	function menu page Setup the parameters of system and servo motor, user interface and so on.
	teach page Running new teach program and setting current parameters.
	alarm page Alarm message (current and recent) details, convenient for malfunction analysis.



HOME

home page

Touch it and system back to home page.

5. User Management

5.1 User Level

Total 4 levels:

- Ø **Operator:** default user level, login without password. This level just enables to reset 0-position, auto running, watch I/O and some basic operations.
- Ø **Advance operator:** login needs password and it can be modified. Beyond the operator level operations, the advanced operator can execute manual operation, loading current program and so on.
- Ø **Administrator:** login needs password (password: 88888888) and it can be modified. Allow executing all operations, except the special operations for system manufacturer.
- Ø **Advance Administrator:** login needs password, the highest user level. This is for manufacturer to manage and update system.

The following is the operations for each level user. “√” stands for authorities, “×” stands for no authorities.

Allowed Operation	Operator	Advance Operator	Administrator	Advance Administrator
reset 0-position	√	√	√	√
loading current program	×	√	√	√
program management	×	×	√	√
modify system date and time	×	×	√	√
manually operate servo	×	√	√	√
operate program	√	√	√	√
others manually operate	×	√	√	√

teach program	x	x	√	√
system parameter	x	x	√	√
signal configuration	x	x	√	√
reset system parameter	x	x	√	√
servo safety parameter	x	x	√	√
servo machine parameter	x	x	√	√
user interface	x	x	√	√
machine position operate	x	x	√	√
manufacturer management	x	x	x	√
system update	x	x	x	√

5.2 Login

Touch current user name on title bar in to “User Manager” page, first page is login.

1) **Select User:** select user to login. Advance operator, administrator, and advance

administrator can be selectable, because the operator login no needs password.

2) **Input Password:** input user level password.

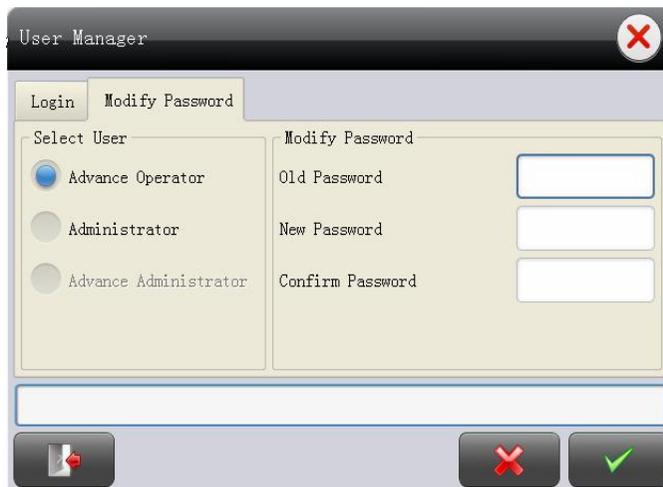
3) : Confirm, touch and acknowledge the user login.

4) : delete, touch and cancel user login, the screen back to last page.

5) : log out, touch it the system back to default user (operator) level.

5.3 Modify Password

The second page of “User Manager” is “modify password”.



1) **Old Password:** input old password.

2) **New Password:** input new password.

3) **Confirm Password:** input the new password once again.

5.4 Input Password

The password can be 1 to 8 characters, including numbers, capital letters and lowercase letters. Touch input password box, the virtual keyboard will appear on the screen, see as the flowing:



1) **Display password:** display input password, 1 (at least) to 8 (at most) characters.

2) : backspace, delete one character before cursor.

3) : confirm, acknowledge the password.

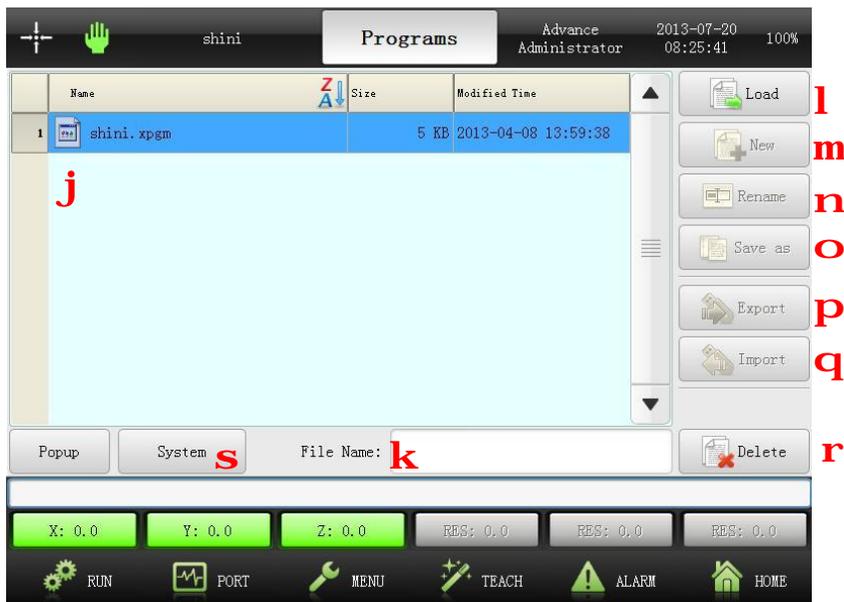
4) : shift; shift the capital letters and lowercase letters.

6. System Program Management

6.1 Introduce

Touch current program name on the title bar into programs page. The program can be saved in system or USB memory. User can switch save storage in program.

Programs page, see as the picture:



- ① **Name:** Display all system programs name.
- ② **File Name:** Input new name when create new program, rename and save as program.
- ③ **Load:** Loading the selected program as the current program.
- ④ **New:** Create new program.
- ⑤ **Rename:** Rename the selected program.
- ⑥ **Save as:** Copy the selected program and save as the new program name.
- ⑦ **Export:** Export selected program to USB memory.
- ⑧ **Import:** Import selected program in USB memory to system storage.
- ⑨ **Delete:** Delete the selected program.
- ⑩ **System/USB Memory:** Display program storage in system or USB memory. Touch and shift the locations between system and USB memory.

storage location	instruction
------------------	-------------

system storage	Programs storage in system, touch it and shift to USB memory.
USB memory storage	Programs storage in USB memory, touch it and shift to system storage.

6.2 Export Program

Export program from system to USB memory, the steps as flowing:

- 1) Plug in USB memory.
- 2) Shift to system storage.
- 3) Select the program in system, for example: Test2.
- 4) Input new name for selected program, for example: UTest2.
- 5) Touch “export”, copy Test2 to USB memory and named as UTest2.
- 6) Touch “popup”.
- 7) Unplug USB memory, complete export.

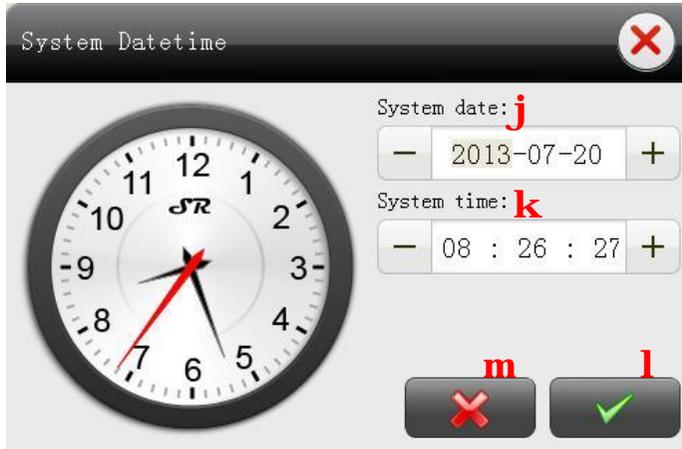
6.3 Import Program

Import program from USB memory to system, the steps as flowing:

- 1) Plug in USB memory.
- 2) Shift to USB memory storage.
- 3) Select the program in USB memory, for example: UTest3.
- 4) Input new name for selected program, for example: Test3.
- 5) Touch “import”, copy UTest3 to system and named as Test3.
- 6) Touch “popup”.
- 7) Unplug USB memory, complete import.

7. System Date and Time

Touch Date and Time on the title bar into modify page.



① **System date:** touch the date, “+” for plus, “-” for minus.

② **System time:** touch the time, “+” for plus, “-” for minus.

③ : Confirm, save and acknowledge the date and time.

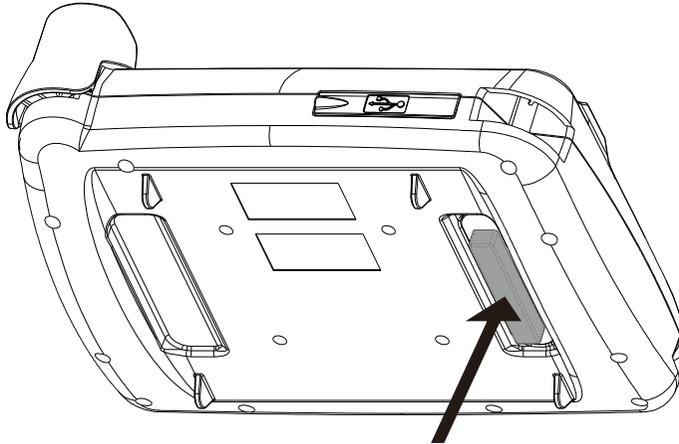
④ : Delete, give up to modify date or time, back to last page.

Date form: year-month-date, the earliest date in the system is January 1, 2000. Time form: hour-minute-second, 24 hours in one day.

8. Manually Operate

8.1 Manual Enable Switch

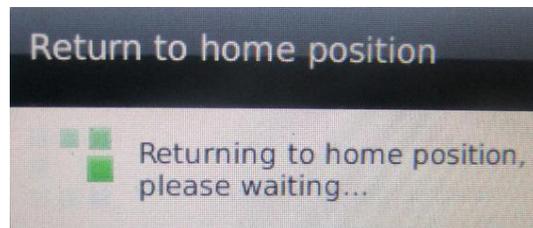
The hand controller with manual switch, avoid improper use and injure personnel or damage the robot, mold or molding machine. Please ensure the manual switch had been press down during manually operations.



Picture 8-1: 3 positions enable switch

8.2 Servo Home Position Setting

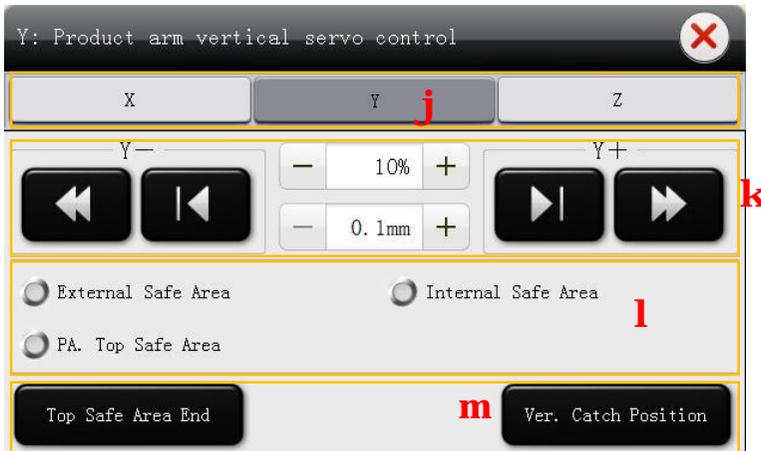
In manual mode, press the manual enable switch, then touch , servo return to home position.



During servo return to home position, please do not touch the manual enable switch, or the servo will stop return to home position.

8.3 Servo Setting

In manual mod, touch servo symbol into servo setting page. Ensure the servo had returned to home position or the servo control page cannot be login.



- ① **Servo axis:** Select the servo axis, for example choose Y as servo axis, and touch Y into setting page.
- ② **Servo Control:** Control servo in plus or minus, speed, displacement manually.

	servo operating in plus/minus Press the button, servo operating in plus/minus. Press again, servo stops operating.
	tuning servo in plus/minus Press the button, tuning the servo operating value in plus or minus.

- ③ **Safety signal:** Display servo operating areas: external safe area, internal safe area, PA. (main arm) top safety area.
- ④ **Position shortcuts:** Servo quickly moves to desired position. Position shortcuts vary of the servo axes.

Servo axis	Position Shortcuts 1	Position Shortcuts 2
X-axis	safe area starting in mold	safe area endpoint in mol
Y-axis	mold top stand-by area end	catch position in mold
Z-axis	traverse to catch position	traverse to placement position

Servo position shortcut details see as the chapter 11.3.3.

Note: ensure manual enable switch had been pressed down when manually setting servo. During setting servo do not touch the manual enable switch.

8.4 Port Monitor Setting

In manual mode, on main screen page, touch “port monitor” into setting page. Setting port output including: pneumatic, IMM, servo, ext. output and ext. input.

Setting pneumatic, see as the picture:



Touch symbol to on or off port:

	OFF Touch and on the port.
	ON Touch and off the port.

Note: before touch the ON or OFF port, please ensure the manual enable switch had been pressed down.

9. Program Setting

Touch program operating into “Run Control” page. Set current programs in manual, auto, cycle or step.

Program setting see as the picture:



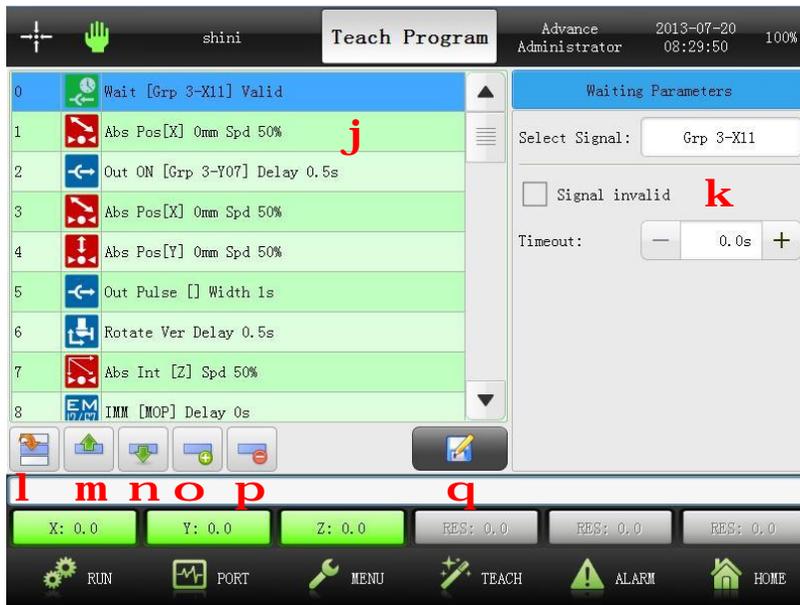
- ① Current programs order list: the list of current programs.
- ② **Statistics:** Display auto program running messages.
 Productions: the numbers of finished products in auto program running.
 Plan Surplus: the numbers of target plan.
 Cycle Time: one cycle in auto program.
- ③ **IMM Signals:** Display the signals of IMM.
- ④ **Manual:** In stand-by mode, touch Manual and the system into manual mode.
 In auto mode, touch Manual and the system will stop auto running and into stand-by mode.
- ⑤ **Auto:** In manual mode, touch Auto and the system into auto stand-by mode.
 In auto stand-by mode, touch Auto and the system into auto running mode.
- ⑥ **Cycle:** In auto stand-by mode, touch Cycle, after one cycle system will back to auto stand-by mode.
- ⑦ **Step:** In auto stand-by mode, touch Step and the system executes current program step by step.

- ⑧ **Follow:** In auto running mode, touch “Follow”, the system will follow current program.

10. Teach Program

Touch “Teach” to modify current programs. In Manual mode into Teach Program, the current programs can execute adding or deleting program orders, adjusting position, editing parameters. In auto mode into teach mode, the current programs only can execute editing parameters.

Teach Program see as the picture:



- ① Order list: Current program orders list.
- ② Position Parameters: Parameters of current order.
- ③ Position: Touch  order list will roll to current order position.
- ④ : Up, order move up.
- ⑤ : Down, order down to next position.
- ⑥ : Insert, insert one new order.
- ⑦ : Delete, delete the selected order.
- ⑧ : Save, save the modified orders and parameters.

11. Function Page

11.1 Function Menu

Touch MENU into function menu page:



- 1) **System Setup:** setup system parameters, running parameters, signals and reference parameters.
- 2) **Servo Setup:** setup servo parameters, including each servo axis safety area, stroke and direction.
- 3) **UI Setup:** setup user interface, parameters, language and screen.
- 4) **Adjustment:** adjust servo position in low speed, if robot didn't return to home position.
- 5) **Information:** the messages of system manufacturer.
- 6) **Software Update:** software update and setup startup screen.
- 7) **Calculator:** beyond the base functions also with trigonometric function, logarithm, index and so on.
- 8) **Elec Gear Calculator:** special servo electric gear calculator, easy for installation and adjustment.
- 9) **System Log:** display operation records and dairy checking.

11.2 System Setup

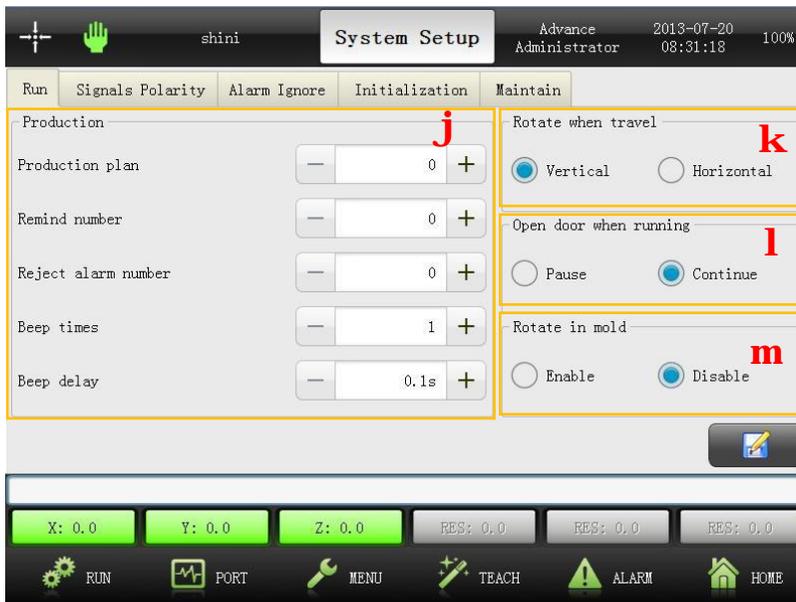
11.2.1 System Parameter

In function menu page, touch “system setup” into setting page. Total with 3 pages: run, signals and reset.

- 1) Run: setup running system parameters, like production plan, remind number and so on.
- 2) Signals: usage and polarity inversion.
- 3) Reset: reset parameters to default setting, including system, servo, user password and cavity numbers.

After setting, touch “save” button to save the modified.

11.2.2 Running Parameter



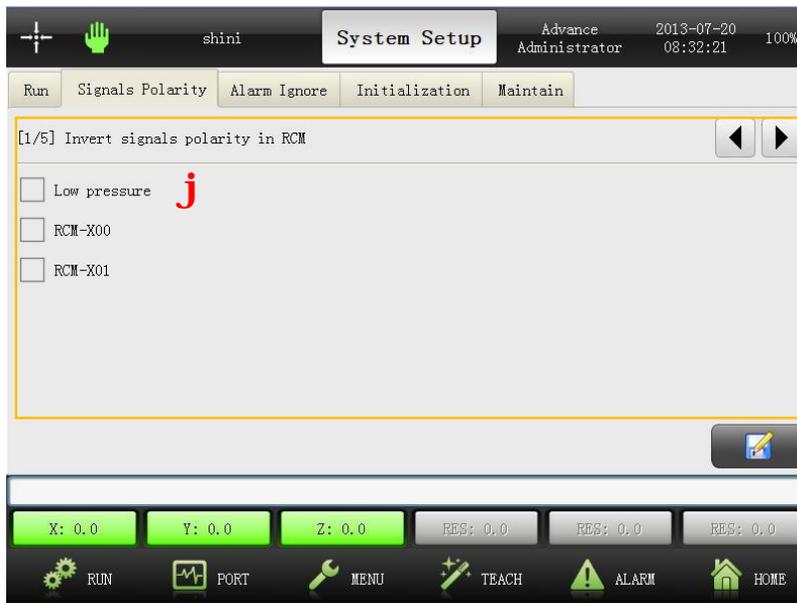
1) Production:

- Ø **Production plan:** product production plan. When getting the planed quantity, the system will stop running and remain have got the quantity. “0” stands for without production plan.
- Ø **Remind number:** setup reminds number. When getting the number, the system will alarm, touch the “auto” or open and close IMM safety door, robot will keep auto running. “0” stands for without remind number.
- Ø **Reject alarm number:** setup total reject number, over this number, the system will

alarm. "0" stands for without reject alarm.

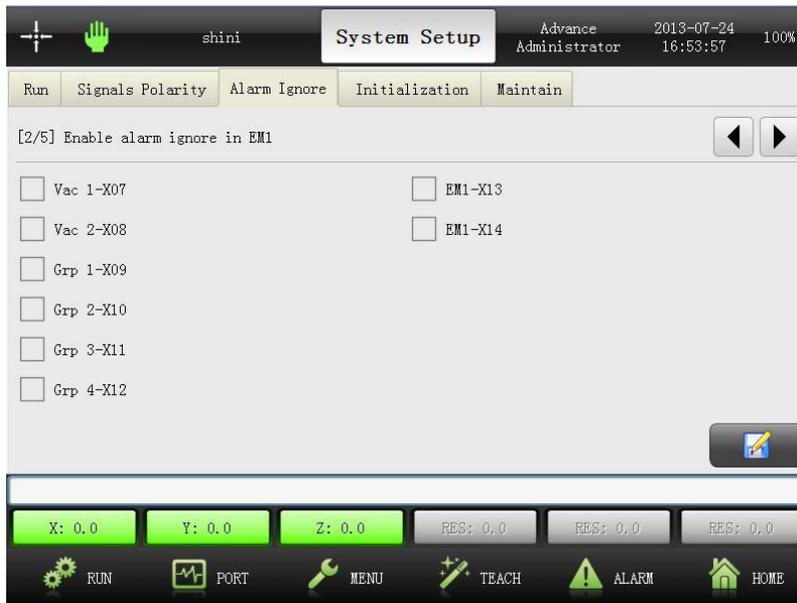
- Ø **Beep times:** setup the beep alarm times.
- Ø **Beep delay:** setup beep alarm delay time.
- 2) **Rotate when travel:** during robot arm traverse, main arm vertical or horizontal.
- 3) **Open door when running:** during system running, open the IMM safety door, the system stop or continue running.
- 4) **Rotate in mold:** enable or disable main arm rotate in mold.

11.2.3 Signals Polarity



Polarity Inversion: for example, touch "Low pressure" for setting low air pressure in minus.

11.2.4 Alarm Ignore



Enable alarm ignore in EM1: extension module 1 enable alarm ignore. For example, touch “Vac 1-07” to ignore it alarm.

11.2.5 Initialization



Select signals use or not use. If use “IMM mold close signal”, please press “IMM MCP”.

12. Maintain



- 1) **Maintain Number:** set the production number. After system up to this number, please reset it.
- 2) **Reset system parameters:** reset to system default setting.
- 3) **Reset servo parameters:** reset to servo default setting.
- 4) **Reset passwords:** reset advance administrator and administrator password to default setting.
- 5) **Clear production sum:** clear auto production number to 0.

12.1 Servo Setting

12.1.1 Servo Parameters

In function menu page, touch servo setup, total with 6 setting, safety, Shortcut, Hor (crosswise axis), Ver (vertical axis), Other and Dir (direction).

- 1) **Safety:** setup safety area for each servo axis.
- 2) **Shortcut:** quickly locate position for each servo axis in manual mode.
- 3) **Hor:** setup parameters of crosswise axis.
- 4) **Ver:** setup parameters of vertical axis.
- 5) **Other:** setup parameters of traverse axis.
- 6) **Dir:** setup directions of each servo axes.

After setting, press “save” to acknowledge and save servo settings.

12.1.2 Safety Setup

The following picture display “Safety” for Z and X servo, main arm (vertical axes) top safe area was marked with grey.



- 1) **Vertical axes top safe area:** setup main arm down stroke in mold and this stroke will not influence mold closed. The stroke begins with 0, user can setup safety area end point.
Note: during setting safety area, the safety area sensor on main arm must with signal to avoid wrong setting.
- 2) **Horizontal axes safe area:** setup stroke according to the distance of mold open. The ending point must greater than beginning point. During setting the stroke, the safety area sensor on traverse in mold must with signal to avoid wrong setting.
- 3) **Travelling (traverse) axes external safe area:** setup the stroke of traverse placing outside mold. The ending point must greater than beginning point. During setting the stroke, the safety area sensor on traverse outside mold must with signal to avoid wrong setting.
- 4) **Travelling (traverse) axes internal safe area:** setup the stroke of traverse picking in mold. The ending point must greater than beginning point. During setting the stroke, the stacking sensor on traverse in mold must with signal to avoid wrong setting.

In order to guarantee servo parameters correctness, servo coordinate location cannot input by manual. Manually move servo to desired position, touch synchronous button, then input servo desired position value.

Note: please carefully set each servo axes safe areas to prevent accidents!

12.1.3 Shortcut



The above picture is display “Shortcut” for Z and X servo,

- 1) **Travel (traverse) position for catch:** setup traverse position when robot arm down to catch products in mold.
- 2) **Travel (traverse) position for release:** setup traverse position when robot arm down to release products outside mold.
- 3) **Product arm vertical position for catch:** setup vertical arm position when robot arm down to catch products in mold.

Press  or input numbers to value.

12.1.4 Servo Machine Parameter



The above picture is display “Distance_Speed” for Z and X servo, vertical axes will be marked with grey.

- 1) **Software distance:** setup software distance for servo axes (Z and X). The software distance limits servo running stroke in manual mode or auto mode.
- 2) **Speed:** setup running speed for servo axes (Z and X), slowest is 1%, fastest is 100%.
- 3) **Acceleration:** setup accelerated speed for servo axes (Z and X), slowest is 1%, and fastest is 100%.
- 4) **Deceleration:** setup deceleration for servo axes (Z and X), slowest is 1%, fastest is 100%.

Note: the servo speed cannot over than servo rate speed!

12.1.5 Servo Direction

Setting servo direction (clockwise and counterclockwise) in this page, see as the picture:



The above picture is display “Direction” for Z and X servo, vertical direction will be marked with grey.

13. User Interface Setup

In function menu page, touch UI setup, see as the picture:



- 1) **Language:** select different language.
- 2) **Screensave time:** setup save screen time, 0m stands for no save screen, 30m is the longest time.
- 3) **Backlight brightness:** adjust backlight of screen, 1 for darkest, 9 for brightest.
- 4) **Recalibrate the touch screen:** if screen appears error, touch “Recalibrate” button to recalibrate.
- 5) **Vibration feedback:** selected it, if system alarming, the hand controller will vibrate to remind user.
- 6) **Key tone:** selected it, press hand controller buttons with sound.
- 7) **Touch tone:** selected it, touch screen with sound.
- 8) **Frequency:** 3 levels for key tone/touch tone frequency:
 - Ø 1: low
 - Ø 2: high
 - Ø 3: standard

13.1 Position Adjustment

Control servo running in slow speed in adjustment page, if robot without home position resetting after system starting. If robot with pneumatic arm, user also can remote adjustment of crosswise axis (if robot has position motor).

Servo and pneumatic position adjustment see as the picture:



13.2 Software Updating

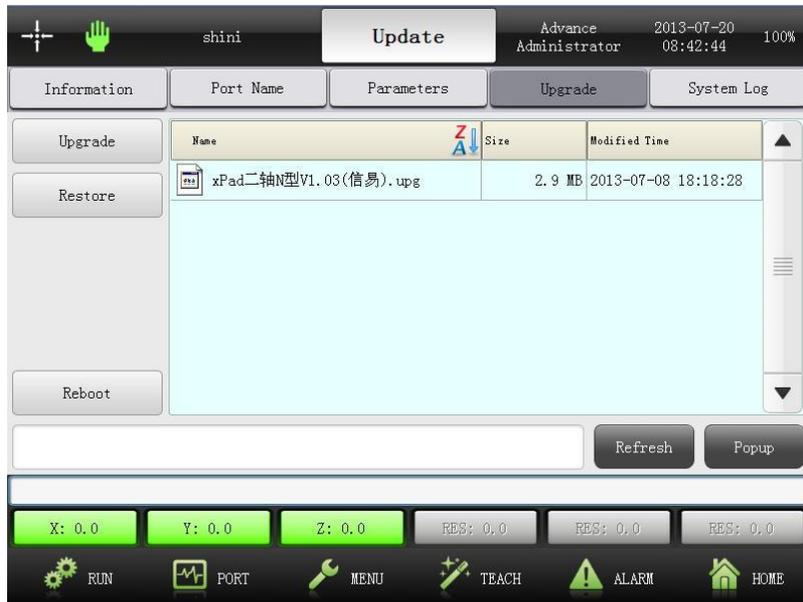
In function menu page, touch “software updating” into setting page. This operation belongs to advance administrator.

Setup splash, wallpaper, information. All the pictures should be saved as image format, see as the following table:

image name	size	format	instruction
Splash.png	800×600	png	plash: image of startup screen
Wallpaper.png	800×407	png	wallpaper: image of stand-by screen
Information.png	800×407	png	information: vendor information image displays in system

The system and servo parameter can be export or import though USB port. User can setup lot of parameters for robots.

Software updating see following picture:

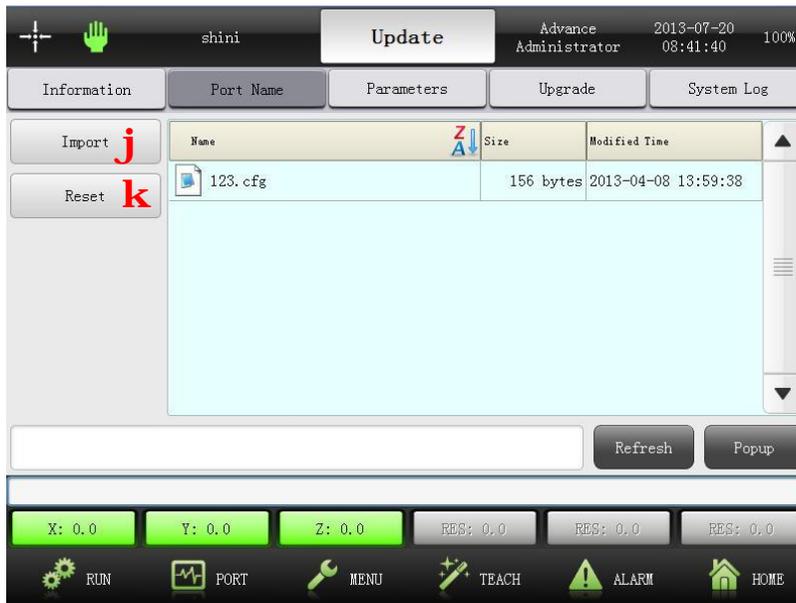


13.2.1 Update Information



- 1) **Splash**: import startup screen images from USB memory.
- 2) **Wallpaper**: import stand-by screen from USB memory.
- 3) **Information**: import manufacturer information from USB memory.
- 4) **Popup**: touch “popup” before unplugging USB memory.
- 5) **Refresh**: touch refresh to search files in USB memory.

13.2.2 Update Port Name



- 1) **Import:** import file from USB memory and save it as desired name.
- 2) **Reset:** reset the port to initial value.

13.2.3 Update Parameters



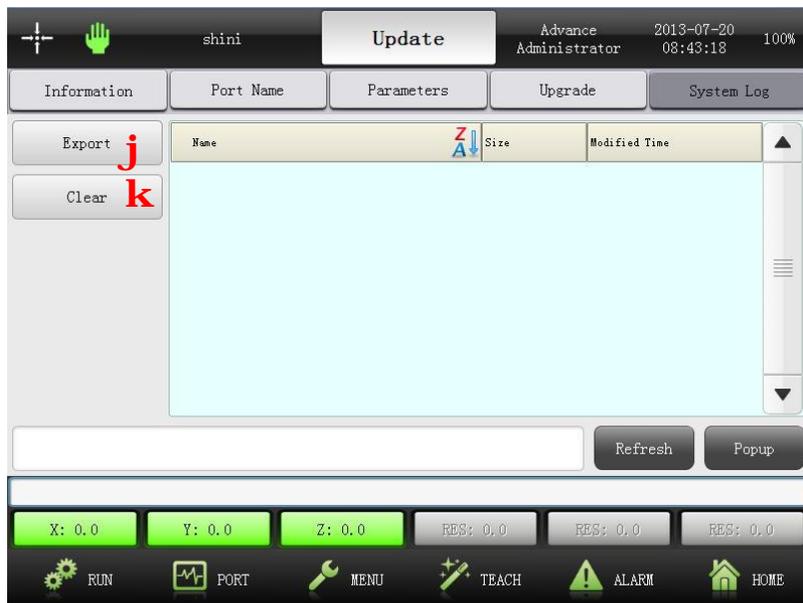
- 1) **Export:** export system and servo parameters to USB memory.
- 2) **Import:** import system and servo parameters from USB memory to system.

13.2.4 Update Software



- 1) **Upgrade:** upgrade system software.
- 2) **Restore:** restore system software.
- 3) **Reboot:** reboot system software.

13.2.5 System Log



- 1) **Export:** export system log.

2) **Clear:** clear system log.

The USB memory should be FAT32 forma.

The following are the steps of updating hand controller software:

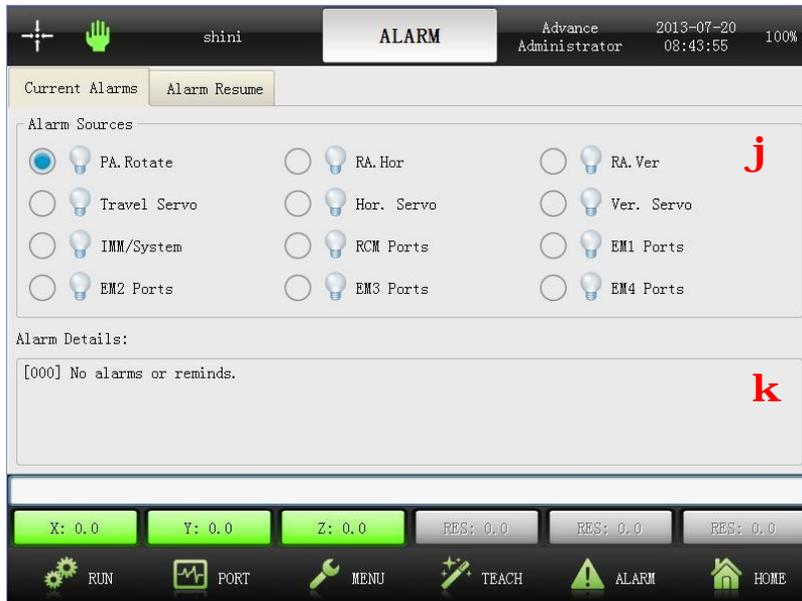
- 1) Copy updating files to USB memory
- 2) Plug USB memory to hand controller
- 3) Touch “upgrade”
- 4) After updating, touch “popup”
- 5) Unplug USB memory
- 6) Touch “refresh” or turn off power supple, reboot hand controller.

14. Alarm Message

14.1 Current Alarms

Touch “ALARM”, current alarm message displays on first page. Total display 12 messages one page and assort as alarm reasons.

Current alarms message see following picture:



- 1) **Alarm Sources:** total with 12 alarm sources. If alarming, the signal light will bright to remind. Touch the bright alarm source, alarm details appears at the bottom.
- 2) **Alarm Details:** display alarm sources details.

14.2 Alarm Resume

Alarm resume displays on second page, memory last 300 alarm messages.



14.3 Alarm Message Instruction

Alarm No.	Alarm Message
[000]	No any remind or alarm.
[001]	Sub-arm movement invalid.
[002]	Main arm movement invalid.
[003]	IMM order command invalid.
[004]	Program command invalid.
[005]	System running invalid.
[006]	System status invalid.
[007]	Parameter invalid.
[008]	Order command invalid.
[009]	The type of extension invalid.
[010]	Program number invalid.
[011]	Program loop not end.
[012]	Program loop not begin.
[013]	Program order commands not end.
[014]	Program no ends order.

[015]	More than one servo shortcut in combination.
[016]	More than one main arm vertical in combination.
[017]	More than one sub-arm movement in combination.
[018]	Movements' combination more than 10.
[019]	This action can not appear in combination.
[020]	Program combine invalid and not ends.
[021]	System variables cannot be written.
[022]	Program variables cannot be written.
[023]	Input variables cannot be written.
[024]	Output variables cannot be written.
[025]	User variables overflow.
[026]	The number of stacking 1 is invalid.
[027]	The number of stacking 2 is invalid.
[028]	The areas of stacking 2 are invalid.
[029]	The number of inserting is invalid.
[030]	The areas of inserting are invalid.
[031]	No IMM full automatic signal.
[032]	No IMM safety door signal.
[033]	Production plan had been finished.
[034]	Reject exceed in auto mode.
[035]	Program cannot be modified in auto mode.
[036]	System running mode is wrong.
[037]	System status is wrong.
[038]	System cannot be changed during operating.
[039]	Disable mold close, sub-arm not in safety area.
[040]	Disable mold close, main arm not in safety area.
[041]	Disable rotate, main arm in mold and down-going.
[042]	Sub-arm cannot down-going, robot not in safety area.
[043]	No "mold open" signal, sub-arm cannot down-going.
[044]	No "medium mold open" signal, sub-arm cannot down-going.
[045]	Vertical arm no "home position" signal.
[046]	Robot cannot into auto mode when outside mold.
[047]	No selected program.

[048]	No extension signal.
[049]	Main arm rotate horizontal on home position.
[050]	Main arm rotate vertical on home position.
[051]	Servo not rest to home position.
[052]	Main arm not in home position, servo axis traverse not safety.
[053]	Sub-arm not in home position, servo axis traverse not safety.
[054]	No "mold open" signal, main arm up/down not safety.
[055]	No "medium mold open" signal, main arm up/down not safety.
[056]	Traverse axis not in safety area, main arm up/down not safety.
[057]	Main arm crosswise stroke exceed mold safety area.
[058]	Servo axes cannot run simultaneously in manual mode.
[059]	Sub-arm not in position.
[060]	System requires maintenance, please contact with the vendor.
[061]	Servo cannot be inserting running, in manual mode.
[062]	The current program is empty, the system cannot enter automatically.
[063]	System is busy, please hold on...
[064]	Program error and cannot continue to run.
[065]	The program does not allow deleting.
[066]	IMM safety door is opened, robot stops auto running, please check the setting.
[067]	System main board error, please contact with manufacturer.
[068]	Disable main arm down in mold when rotation cylinder in horizontal.
[069]	Next order: main arm crosswise stroke exceed software distance. The order cannot be excused.
[070]	Next order: main arm vertical stroke exceed software distance. The order cannot be excused.
[071]	Next order: main arm robot traverse stroke exceed software distance. The order cannot be excused.
[072]	Robot arm in mold safety area, but no signal.
[073]	Robot arm outside mold safety area, but no signal.
[074]	Robot arm not in traverse safety area (inside and outside mold),

	main arm up/down not safety.
[075]	Main arm in safety area, but no signal.
[076]	The sub-program index of matrix or loop location is invalid.
[077]	The number of sub-loop location program is invalid.
[078]	The pick-out number up to setting in auto mode.
[079]	The orders cannot be nested during combination.
[080]	System requires rotation cylinder horizontal when main arm traverse.
[081]	With “mold opened” signal, but no “middle mold open confirm” signal.
[082]	Robot in auto running, but no IMM auto signal.
[128]	Rotation cylinder in horizontal, but hasn’t horizontal signal.
[129]	Rotation cylinder in horizontal, but with vertical signal.
[130]	Rotation cylinder in vertical, but hasn’t vertical signal.
[131]	Rotation cylinder in vertical, but with horizontal signal.
[132]	Sub-arm down-going, but without signal.
[133]	Sub-arm down-going, but with up-going signal.
[134]	Sub-arm in up-going, but without signal.
[135]	Sub-arm in up-going, but with down-going signal.
[136]	Crosswise axis in forward, but with forward position signal.
[137]	Crosswise axis in forward, but with backward signal.
[138]	Crosswise axis in backward, but without signal.
[139]	Crosswise in backward, but with forward position signal.
[140]	X servo axis alarm.
[141]	X servo axis not ready.
[142]	X servo axis not on position signal.
[143]	Y servo axis alarm.
[144]	Y servo axis not ready.
[145]	Y servo axis not on position.
[146]	Z servo axis alarm.
[147]	Z servo axis not ready.
[148]	Z servo axis not on position.
[149]	IMM emergency stop, please check it.

[150]	Robot emergency stop! The robot emergency stop button is pressed.
[151]	Air pressure is low, please check robot air source.
[152]	Sub-arm in mold and down, but “mold open signal” is disappeared.
[153]	Sub-arm in mold and down, but “middle mold open confirm signal” is disappeared.
[154]	Main arm in mold and down, but “mold open signal” is disappeared.
[155]	Main arm in mold and down, but “middle mold open confirm signal” is disappeared.
[156]	X servo axis running to minus limit.
[157]	X servo axis running to plus limit.
[158]	Y servo axis running to minus limit.
[159]	Y servo axis running to plus limit.
[160]	Z servo axis running to minus limit.
[161]	Z servo axis running to plus limit.
[162]	Y servo axis on 0-position, but no home position signal.
[163]	Servo axis location overtime.
[164]	Servo axis index is invalid.
[165]	IO extension 1 communication error.
[166]	IO extension 2 communication error.
[167]	IO extension 3 communication error.
[168]	IO extension 4 communication error.
[171]	Main arm down-going, but no down position signal.
[172]	Main arm down-going, but with up position signal.
[173]	Main arm up-going, but no up position signal.
[174]	Main arm up-going, but with down position signal.
[175]	Crosswise forward, but no forward position signal.
[176]	Crosswise forward, but with back position signal.
[177]	Crosswise backward, but no backward position signal.
[178]	Crosswise backward, but with forward position signal.

15. Maintenance

15.1 General

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

15.2 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.

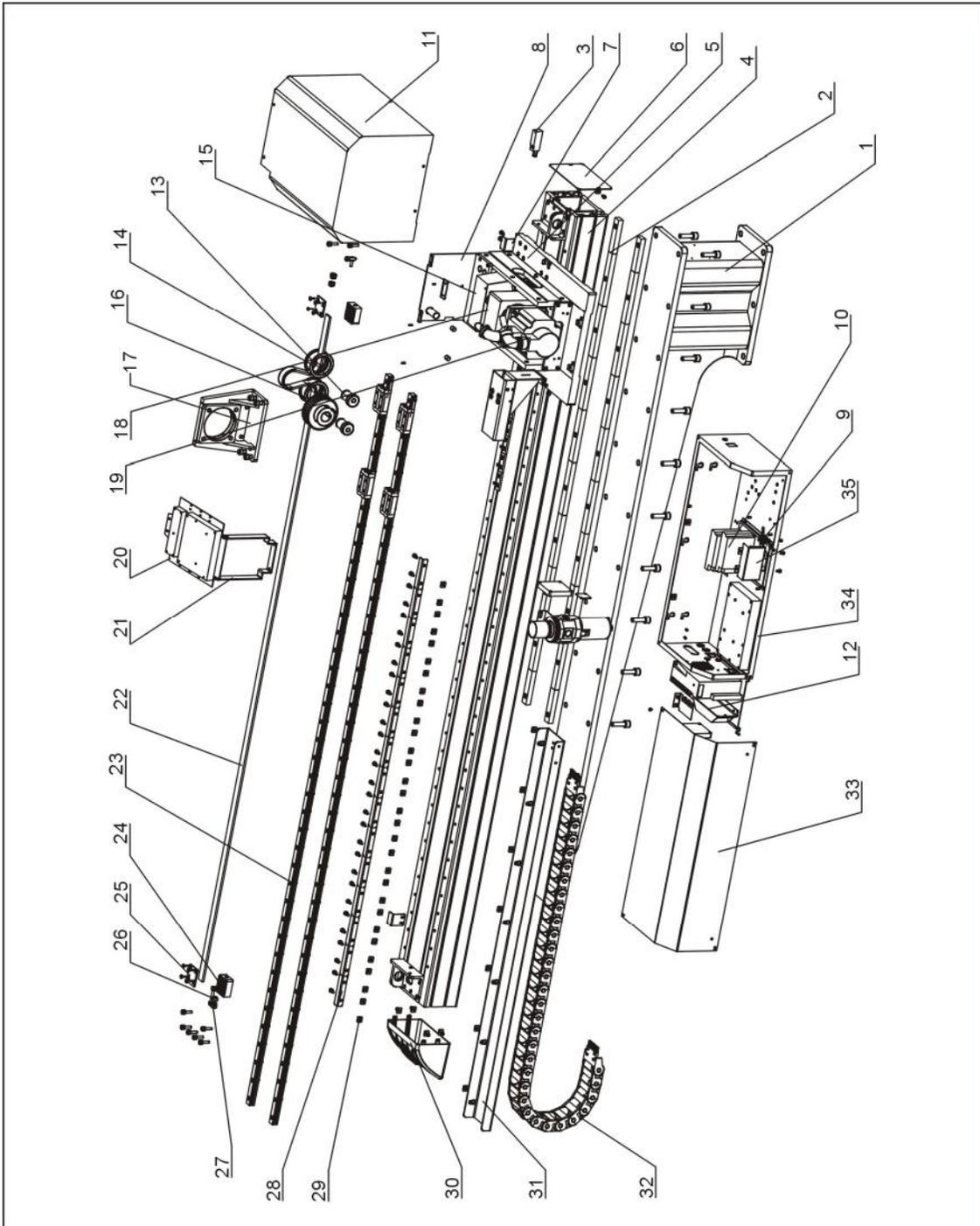
15.3 Maintenance Cycle

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

Daily Maintenance	Monthly Maintenance	Quarterly Maintenance
<ol style="list-style-type: none"> 1. Swab robot. 2. Filter drainage. 3. Check the air pressure. 4. Check bolt connection robot and injection molding machine whether tighten. 5. Check all block settings whether tightened. 	<ol style="list-style-type: none"> 1. Use air clean filter. 2. Check the screws on all part whether tightened. 3. Confirm whether the pipelines break or loose. 4. Check and adjust the operating speed. 	<ol style="list-style-type: none"> 1. Brush oil on to the axis.

16. Assembly Diagram

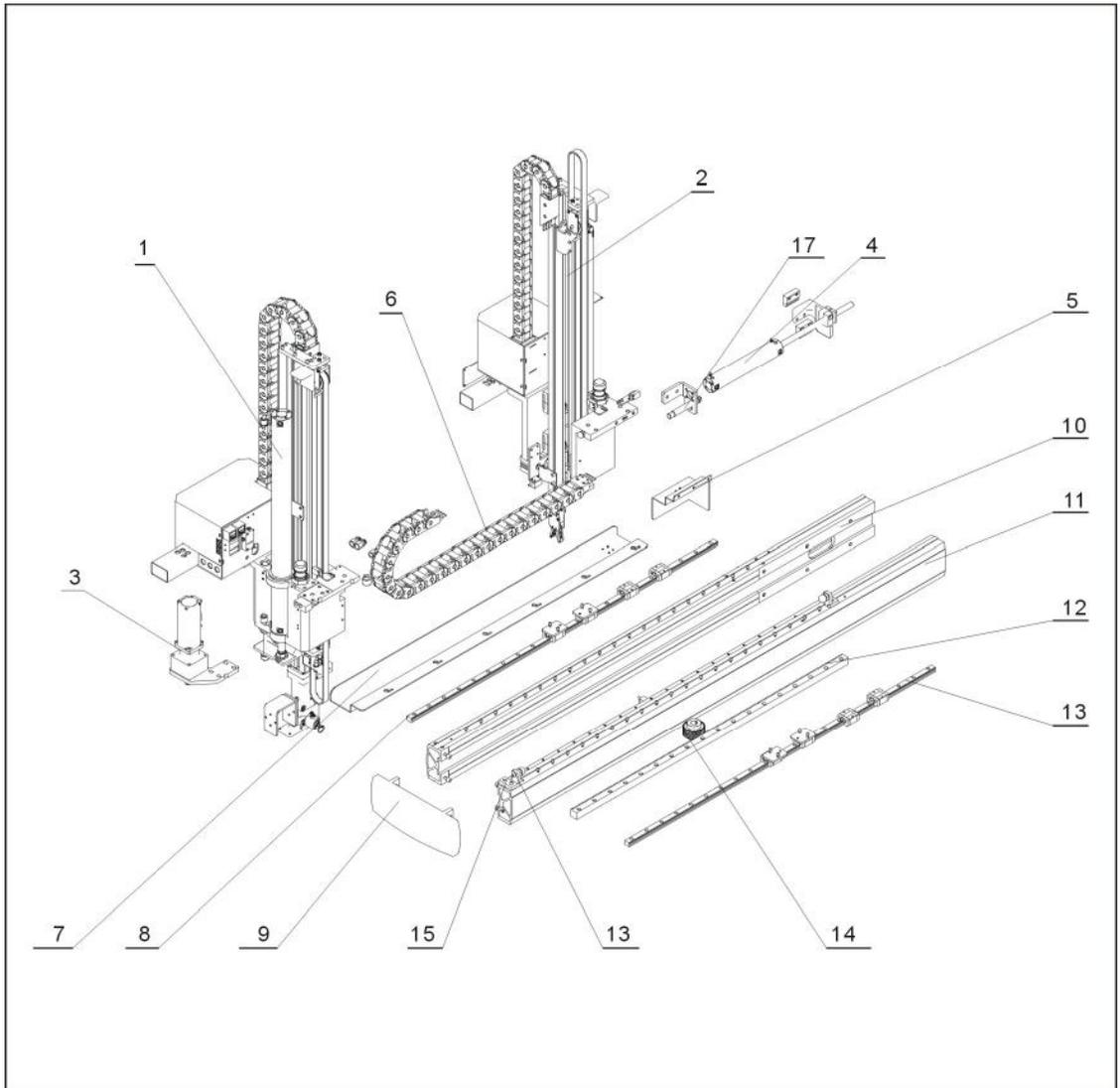
16.1 Traverse Unit



- | | | |
|------------------------------|----------------------------------|-------------------------------|
| 1. Base | 2. Block of fixing traverse beam | 3. Adjustment pressure switch |
| 4. traverse aluminum profile | 5. Proximity switch | 6. End cover of traverse beam |

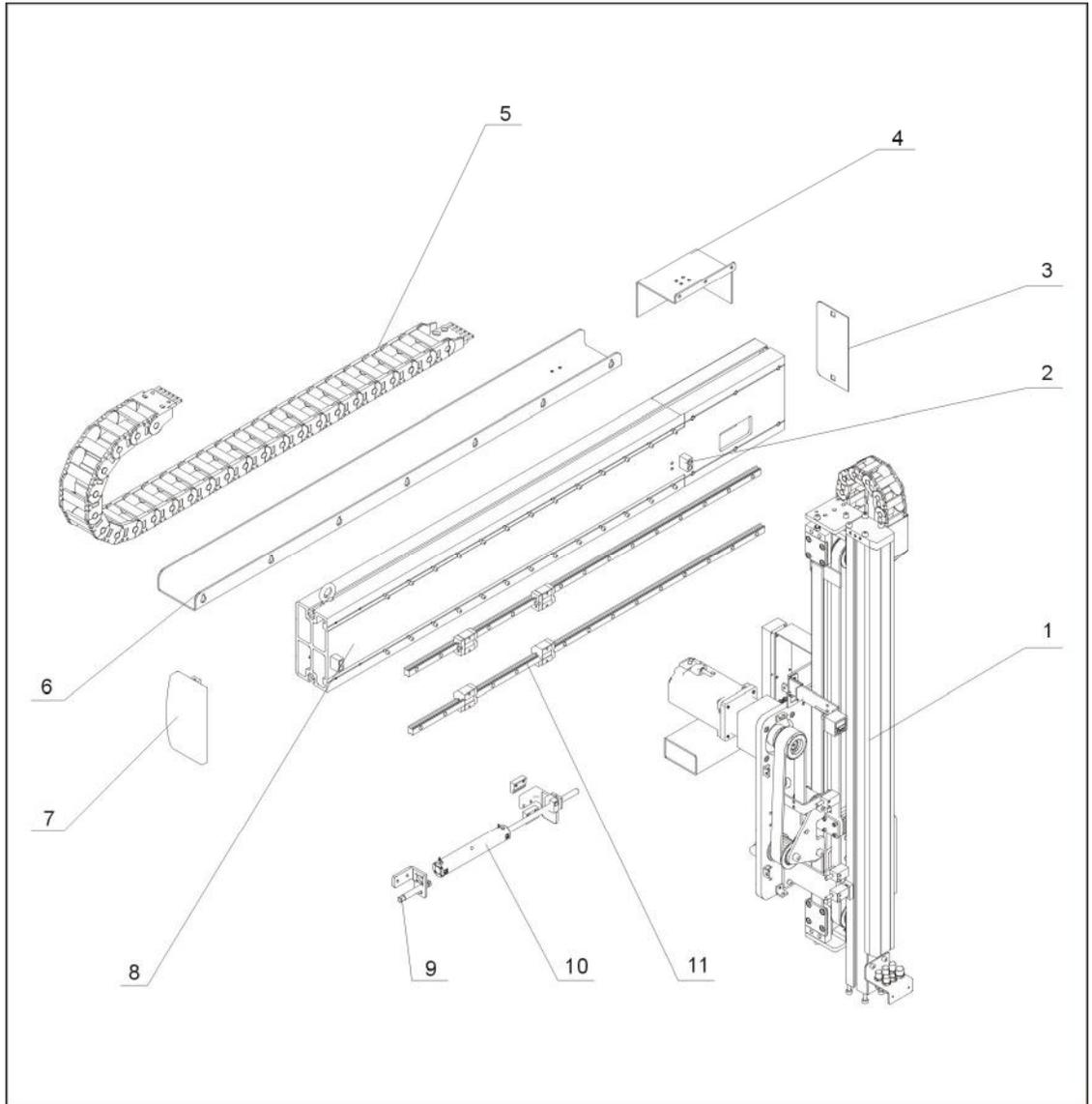
- 7. Home position sensor plate
- 8. Sliding seat
- 9. Mounting plate of motor drive
- 10. Motor drive
- 11. Cover of for sliding seat
- 12. Fuse
- 13. Connection shaft
- 14. Pulley
- 15. Cover of motor supporting frame
- 16. Synchronous wheel
- 17. Motor supporting frame
- 18. Speed reducer
- 19. Servo motor
- 20. Mounting frame for traverse terminal
- 21. Bottom frame for traverse terminal
- 22. Synchronous belt
- 23. Linear guiderail
- 24. Belt platen
- 25. Connection unit of belt splint
- 26. Buffer cap
- 27. buffer unit
- 28. Sensor plate of mold safety
- 29. Fixed slider
- 30. End cover
- 31. Supporting frame of traverse drag chain
- 32. Traverse drag chain
- 33. Cover for control box
- 34. Control box unit
- 35. Mounting plate of filter

16.2 Crosswise Unit (Z and X servo)



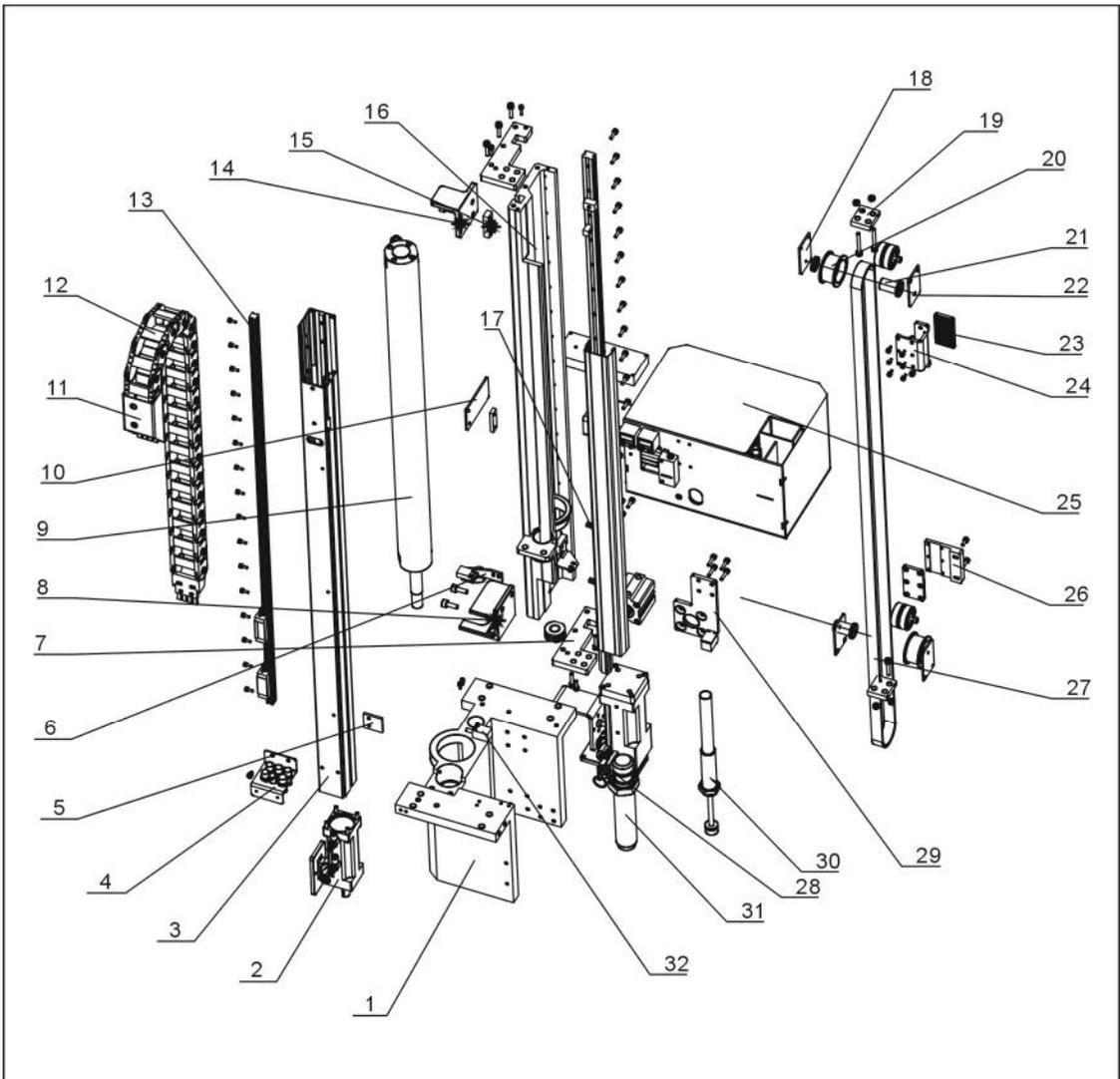
- | | |
|-------------------------------------|-----------------------------------|
| 1. Main arm | 2. Sub-arm |
| 3. Servo motor on X-axis | 4. Sub-arm cylinder |
| 5. Cover of drag chain on crosswise | 6. Drag chain |
| 7. Linear guiderail on X-axis | 8. Supporting frame of drag chain |
| 9. Cover of crosswise beam | 10. Crosswise beam 1 |
| 11. Crosswise beam 2 | 12. Gear rack on crosswise axis |
| 13. Slider | 14. Gear on crosswise |
| 15. Buffer unit | 16. Buffer cap |
| 17. Shock absorber | |

16.3 Crosswise Unit (Z and Y servo)



- | | | |
|-------------------------------------|---------------------|------------------------------|
| 1. Main arm | 2.buffer unit | 3.cover of crosswise beam 1 |
| 4. cover of drag chain on crosswise | 5. Drag chain | 7. Cover of crosswise beam 2 |
| 6. Supporting frame of drag chain | 8. Crosswise beam | 9. Shock absorber |
| 10. crosswise cylinder | 11.linear guiderail | |

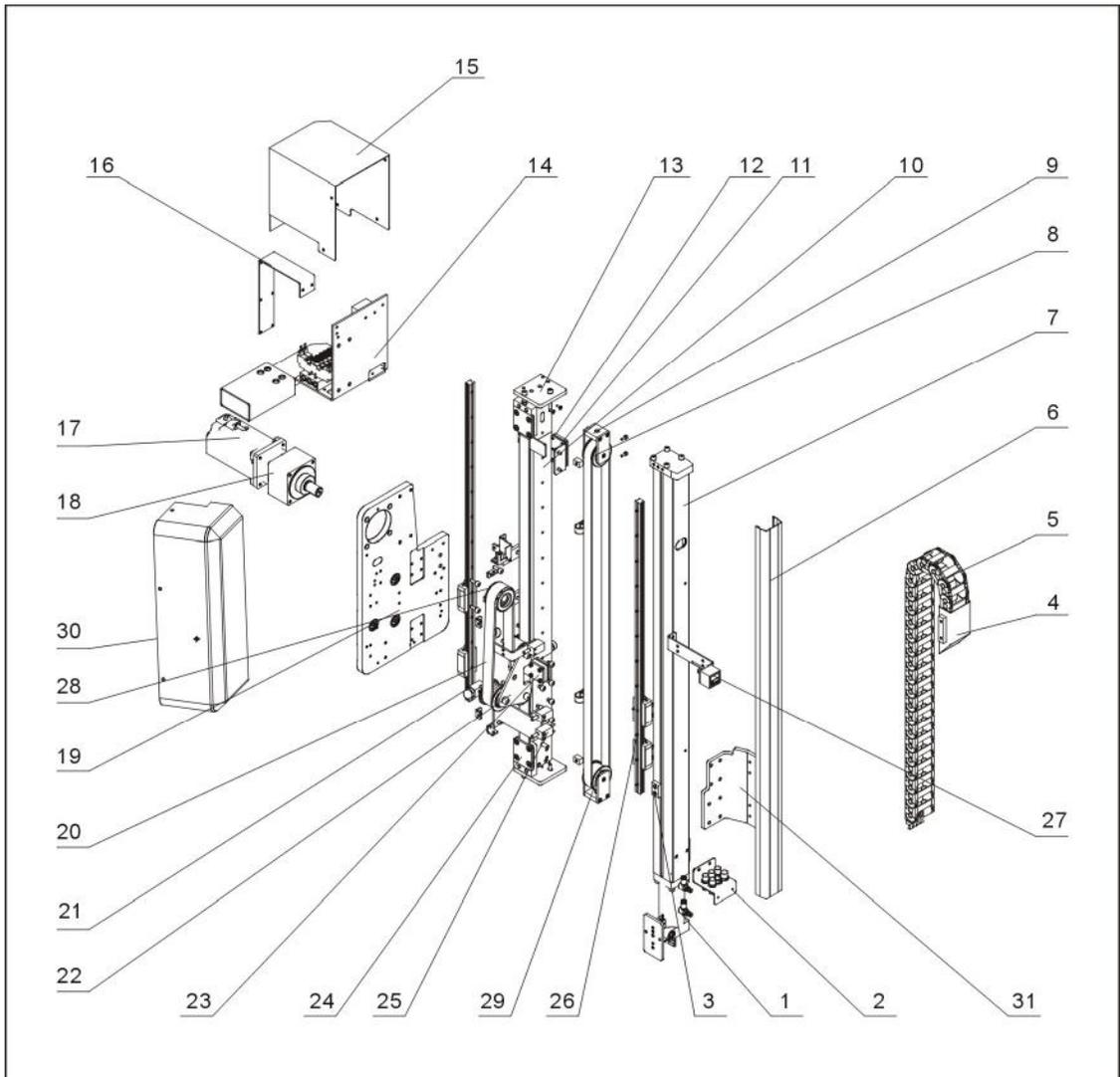
16.4 Main Arm Unit (Z and X servo)



- | | |
|--|--|
| 1. mounting frame of main arm | 2. flip mechanism |
| 3. main arm aluminum profile | 4. spare frame for air tube |
| 5. up sensor block | 6. mounting plate of proximity switch |
| 7. pulley plate | 8. supporting frame of main arm cylinder (up/down) |
| 9. main arm cylinder (up/down) | 10. stack sensor plate |
| 11. drag chain connector of main arm (up/down) | 12. drag chain of main arm (up/down) |
| 13. linear guide way | 14. stopper of arm down |
| 15. fixed block of cylinder | 16. connection profile of main arm |
| 17. bottom frame for terminal | 18. pulley fixed plate 1 |

- | | |
|--|---|
| 19. pulley fixed plate 3 | 20. pulley for telescopic arm |
| 21. connection shaft for telescopic arm | 22. pulley fixed plate 2 |
| 23. plate of belt split | 24. belt down fixed plate of main arm 1 |
| 25. transitional seat for main arm air tubes | 26. belt up fixed plate of main arm 1 |
| 27. synchronous belt | 28. falling proof cylinder of main arm |
| 29. falling proof cylinder | 30. shock absorber 1 |
| 31. shock absorber 2 | 32. proximity switch |

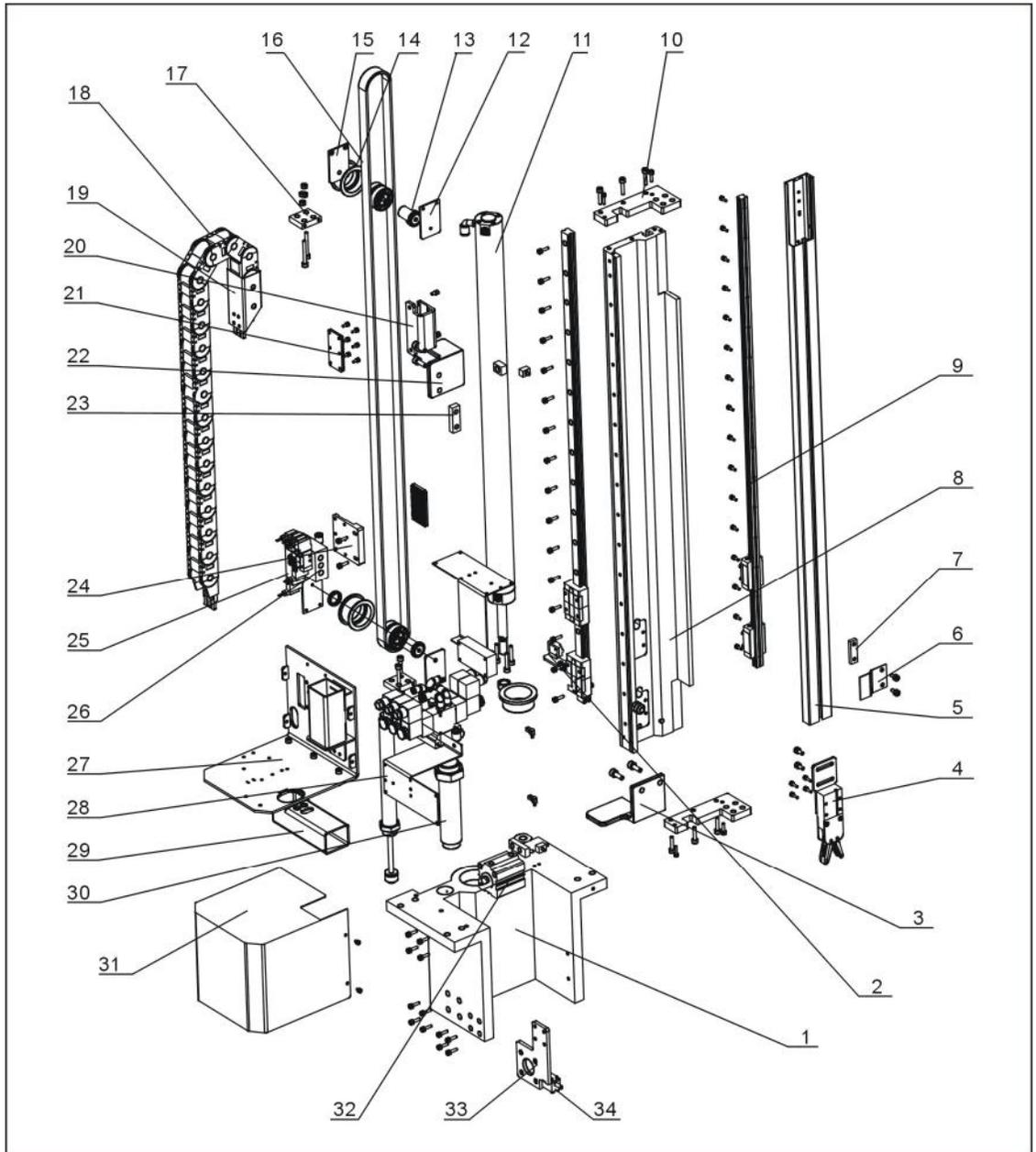
16.5 Main Arm Unit (Z and Y servo)



- | | | |
|--|---|-------------------------------------|
| 1. flip cylinder | 2. spare frame for air tubes | 3. down sensor plate |
| 4. drag chain plate of main arm (up/down) | 5. drag chain | |
| 6. cover of main arm | 7. arm aluminum profile | 8. synchronous belt of main arm |
| 9. pulley fixed plate | 10. connection profile of main arm | 11. belt tooth plate of arm |
| 12. belt down fixed plate of main arm | 13. belt plate | |
| 14. transitional seat for main arm air tubes | 15. cover of main arm transitional seat | |
| 16. mounting plate of main arm relay | 17. servo motor | |
| 18. speed reducer | 19. mounting plate of main arm | 20. synchronous belt |
| 21. anti-crash block | 22. driven wheel plate | 23. belt up fixed plate of main arm |
| 24. belt fixed plate | 25. proximity switch | 26. linear guide way |

27. digital display switch 28. synchronous wheel 29. tension wheel
30. mounting plate of main arm 31. mounting plate of linear guide way

16.6 Sub-arm Unit (Z and X servo)

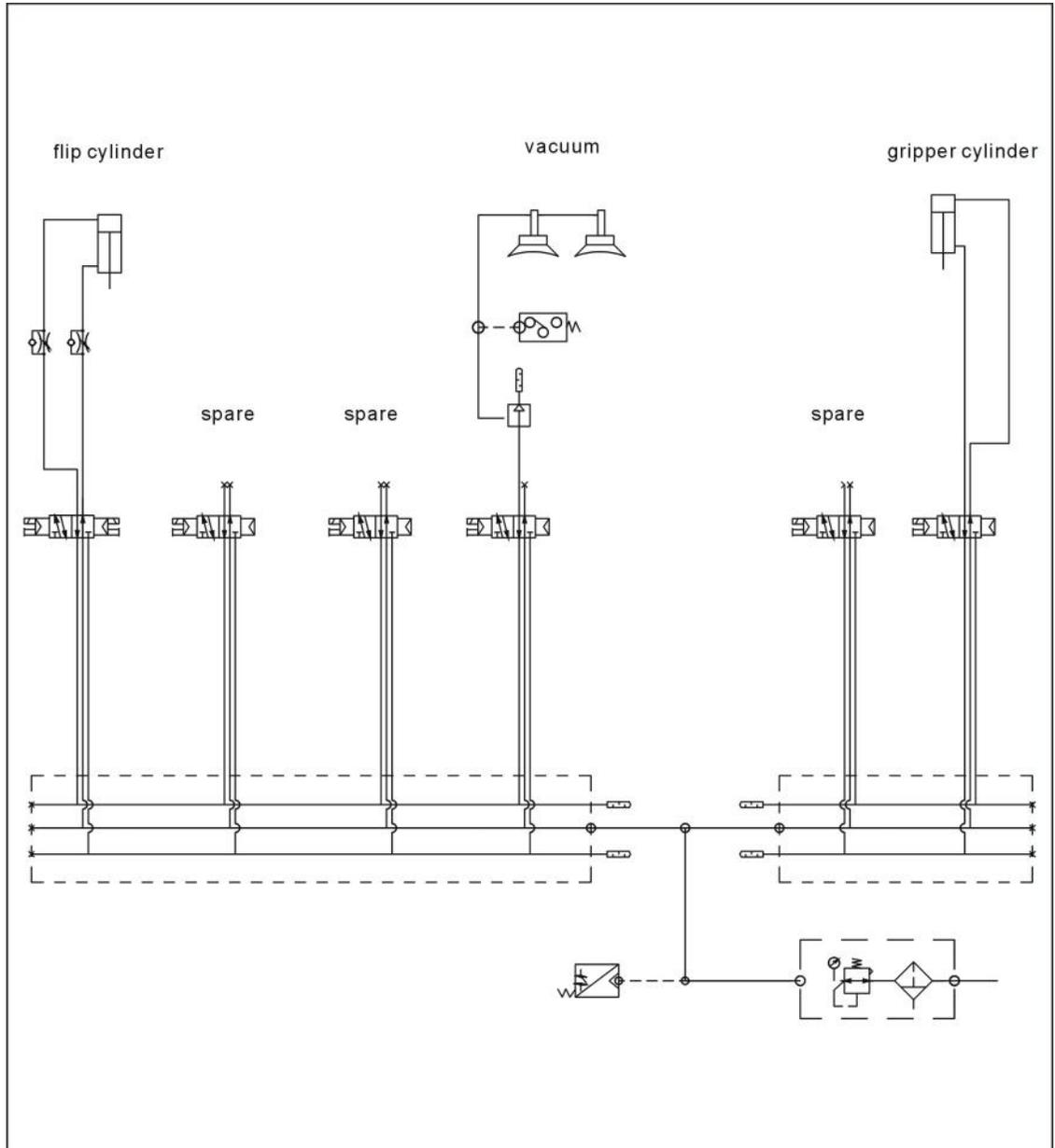


- | | |
|---|---------------------------------------|
| 1. mounting frame of sub-arm | 2. mounting frame of proximity switch |
| 3. supporting frame of sub-arm cylinder (up/down) | 4. gripper |
| 5. sub-arm aluminum profile | 6. stack sensor plate |
| 7. sensor fixed plate | 8. connection profile of sub-arm |
| 9. linear guide way | 10. pulley plate |

- | | |
|---|---------------------------------------|
| 11. cylinder of sub-arm (up/down) | 12. pulley fixed plate 1 |
| 13. connection shaft for telescopic arm | 14. pulley for telescopic arm |
| 15. pulley fixed plate | 16. synchronous belt |
| 17. pulley fixed plate | 18. drag chain of sub-arm (up/down) |
| 19. drag chain connector of sub-arm (up/down) | 20. belt up fixed plate of sub-arm 1 |
| 21. belt splint | 22. stopper of arm down |
| 23. sensor fixed plate | 24. belt up fixed plate of main arm 1 |
| 25. magnetic valve | 26. sub-arm distribution plate |
| 27. connection seat of sub-arm air tubes | 28. shock absorber 1 |
| 29. drag chain connector of sub-arm | 30. shock absorber 2 |
| 31. steel cover of sub-arm | 32. proximity switch |
| 33. falling proof cylinder of sub-arm | 34. falling proof cylinder |

17. Pneumatic Schematic Diagram

17.1 Diagram for ST2



Picture 17-1