ST3/5

Fully Servo Driven Robot

User Manual

Date: Jun, 2016

Version: V1.5 (English)

SHINI

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1. Safety

 Before starting up the robot for the first time, please review this manual thoroughly and familiarize yourself with the operation of the robot. Improper use may injure personnel and/or damage the robot, mould or moulding 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 ST3/5-S series robot is designed for injection moulding 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 equipment.
- Please contact the manufacturer or local agent immediately if there is any problem with robot when operate it.
- Please note that our robot must be cooperated with other safety device (i.e. safety door) in order to operate in normal condition.
- Ensure all installations are met with safety requirements before operating.
- Without the written consent of the manufacturer, any damage or lost caused by the modification or use beyond the user manual, the manufacturer will not have any responsibility.

1.2 Safety Concerns

- The maintenance, repair, etc, must be executed by professionally trained personnel.
- Any unrelated personnel should keep away from robot working area while it is operating. All electrical wiring must be completed by professionals, and in accordance with design of specifications and wiring instructions.
- Use safety fence to indicate working area while installation.
- For the safety operation, the hand controller should be placed outside the robot working area.
- Ensure bolts and nuts are tightened with torque wrench while installation.
- Ensure there is no following matters in the compressive air such as phosphate-containing oil, organic solvents, sulfite gas, chlorine, acids and stale compressor oil.
- The air pressure should be kept at 6MPa ±0.1MPa while operation.
- Remove anything from the top of the robot to prevent falling due to vibration.
- Press EMERGENCY STOP button immediately when accident occurs.
- Do not modify the robot body and control box. Please contact manufacturer or vendor if any change is required.
- Turn off power supply and compressed air before maintenance and adjustment. Also set up warming signs and safety fences.

- Please use parts of SHINI if there is any replacement is required.
- Our robots meet all corresponding safety standards.
- Please read the user manual carefully as a safety guideline.
- Unauthorized personnel must inform the relative supervisor, and understand all safety rules before entering robot working area.
- Please order a new user manual from the manufacturer or vendor if the user manual is damaged.

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

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

Electrical System

As a result of non-compliance with safety recommendations electrical system symbols described, will lead to risk of electric shock persons in the event.

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.

No.	Marks	Meaning	No.	Marks	Meaning
1		Do Not Touch	4		Caution! Mechanical injury
2		Caution, dangerous	5		Caution! High temperature
3		Caution! Electric shock	6		No Flame

1.3 Emergency Stop

The emergency stop button is located on the hand controller.

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

The emergency stop button can be released by turning it clockwise.

The emergency stop circuit of the robot and the injection moulding machine are connected by the Euromap12 or Euromap67 interface. Therefore when the emergency stop button on the moulding 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) ST3/5-S series robot is fix on a steel structure base and packaged with crate.
2) Before transporting, fasten the sliding base to prevent any collision.
3) The arms are free to slide when electric power and pneumatic supply are off. Push the arms upwards to lock them.
4) During the transporting, please keep the robot away from other objects, in order to avoid damages.
5) Should increase plastic bag out of the robot, and if necessary, pumping vacuum and put desiccant in the packing during the long-distance transportation,
6) The temperature between -25℃ to 55℃ during the transportation, for short transportation (inner 24 hours), the temperature can not higher than 70℃.

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

If there is any damage caused by transport, please:

Feedback immediately to the transportation companies and our company.

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

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 figure). To do as the following:
   i. Release 6 fixed screws on the supporting board, remove the packing support plate.
   ii. Rotating beams and arm slowly, so that the arm and the beam was vertical.
   iii. Lock the arm connecting plate and the sliding seat by the 6 screws on the supporting plate.

   Note:

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

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 Fig.1-1)

Note: After hoisting, please keep rings of the vertical beam, and use again next time.

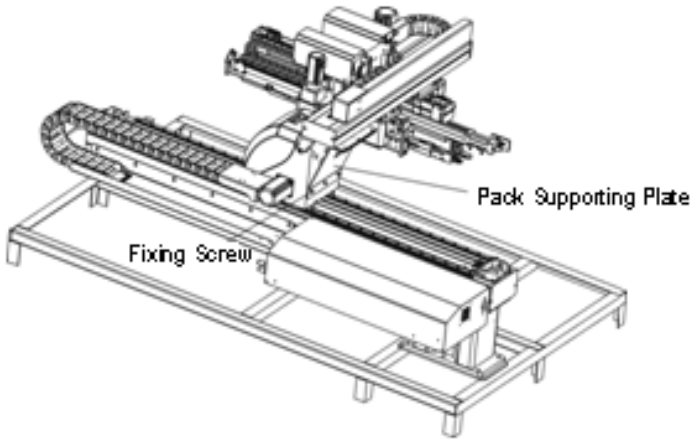


Fig.1-1: Packing of ST3-T and ST5-T

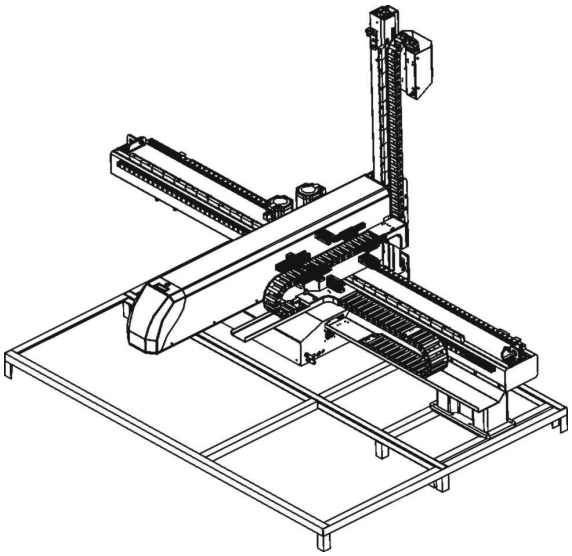


Fig.1-2: Packing of ST3-LT

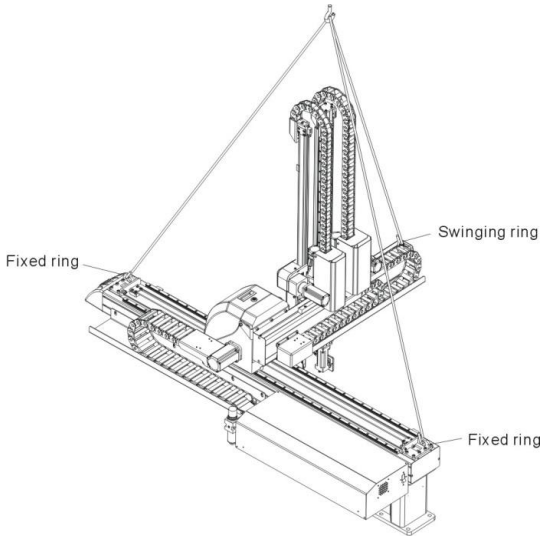


Fig.1-3: Hanging transportation of ST3-T

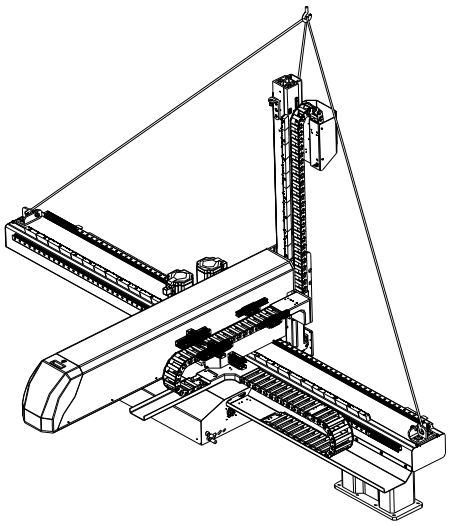


Fig.1-4: Hanging transportation of ST3-LT

1.4.3 Storage

1) Switch off the main air source and power, if robot is not in use for a long time.
2) Robots should be stored in ventilated, dry room to prevent rust and damping.
3) If not use for a long time, please anti-rust, and if necessary place film to prevent dust and erosion.

1.4.4 Operation Environment

1) Temperature: between +5℃ to +40℃
2) Humidity: Temperature +40℃, relative humidity 50%
3) Elevation: Under 1000 meters above sea level
4) Stop using the product immediately when the following occurs:
   i. Power cable is damaged
   ii. Air tube is damaged
   iii. Machine breaks down or dissembled 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 martial (metal, oil, lubricants, plastics, rubber, etc.) to split in different ways. Deal with the machine according to local requirements; ensure the commission company as the best.

Any problem during using the SHINI ST3/5-Series Robot, please contact the company or the local vendor.

1.5 Exemption Clause

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

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

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

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.

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

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

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

2. Installations

2.1 Instructions

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 can not be less than the wire of control box.
10) The end of the power wire must be safety and immobility.
11) Wire terminals should be safe and secure

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.
3) 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.
7) 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 sign on an obvious spot of the fence

2.1.5 Mounting Preparation

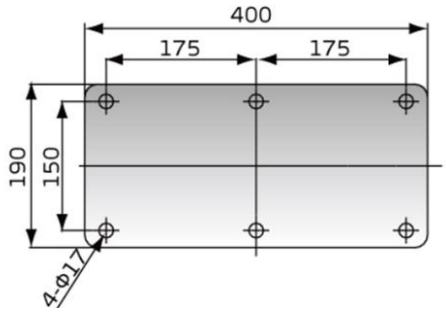


Fig.2-1: Drilling for ST3/5 small model (traverse stroke <1100mm)

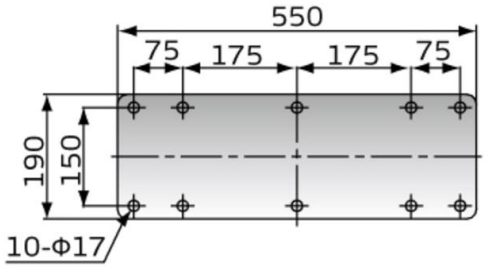


Fig.2-2: Drilling for ST3/5 small Model (traverse stroke ≥1100mm)

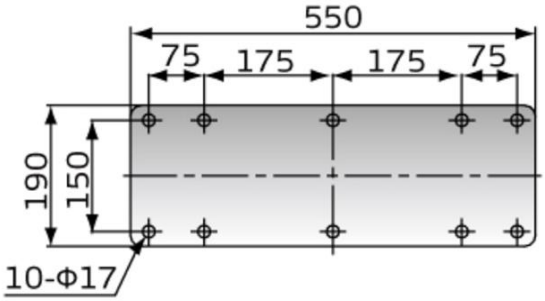


Fig.2-3: Drilling for ST3/5 medium model (traverse stroke <1500mm)

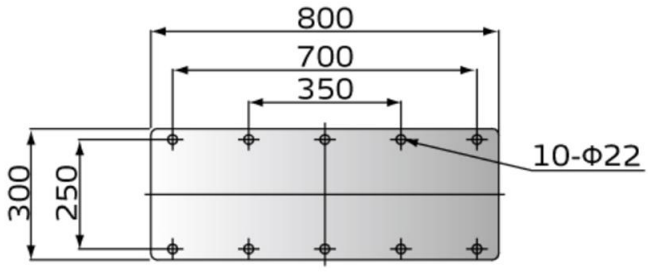


Fig.2-4: Drilling for ST3/5 medium model (traverse stroke ≥1500mm)

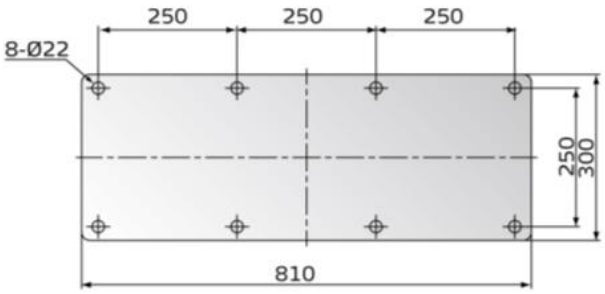


Fig.2-5: Drilling for ST3/5 large model

Before drilling, switch off the injection moulding machine and then turn off the power, avoid the scrap-iron into the mould.

Stick the drilling picture on the installing surface of IMM.

Use the center punch to assist drilling.

Place the magnetic drill on the fixing plate, use drill bits (Φ14) to drill 6 holes about 30mm depth.

Tapping. Use M16 tap to produce internal 6 screws threads about 25mm depth.

2.1.6 Mounting Instructions

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

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 moulding machine, then fix robot on connection base.

2.2 Robot Specifications

2.2.1 ST3 Small Model Robot (Single-Stage Arm)

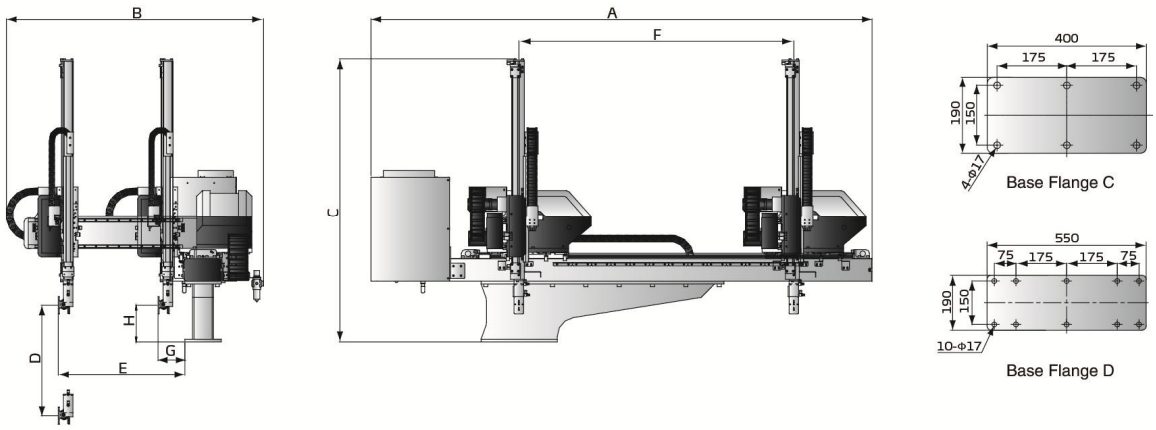


Fig.2-6: ST3 small model (single-stage arm)

Table 2-1: ST3 small model specifications 1

Model		**ST3-700-1200**	**ST3-700-1400**	**ST3-800-1400**	**ST3-900-1600**
Application IMM (ton)		50~80	80~180	180~220	220~280
Traverse Stroke (mm)		1200	1400	1400	1600
Crosswise Stroke (mm)		470	470	470	560
Vertical Stroke (mm)		700	700	800	900
Max Load (kg)		3	3	3	5
Min Pick-out Time (sec)		1.3	1.3	1.3	1.4
Min Cycle Time (sec)		5.2	5.2	5.2	5.8
Air Pressure Range (bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		4	4	4	4
Net Weight (kg)		240	240	250	270
Base Type		Base C	Base C	Base C	Base C
Dimensions(mm)	A	2680	2680	2880	2880
	B	1350	1350	1450	1450
	C	1490	1590	1690	1690
	D(max)	700	800	900	900
	E(max)	610	610	710	710
	F(max)	1400	1400	1600	1600
	G	155	155	155	155
	H	200	200	200	200

Table 2-2: ST3 small model specifications 2

Model		ST3-1000-1600	ST3-1100-1800	ST3-1200-1800
Application IMM (ton)		280~320	320~400	400~450
Traverse Stroke (mm)		1600	1800	1800
Crosswise Stroke (mm)		610	690	690
Vertical Stroke (mm)		1000	1100	1200
Max Load (kg)		5	5	5
Min Pick-out Time (sec)		1.4	1.6	1.6
Min Cycle Time (sec)		6.2	6.5	6.8
Air Pressure Range (bar)		4-6	4-6	4-6
Max Air Consumption (NL/cycle)*		4	4	4
Net Weight (kg)		280	300	310
Base Type		Base C	Base D	Base D
Dimensions(mm)	A	2880	3120	3120
	B	1490	1570	1570
	C	1800	1900	2000
	D(max)	1000	1100	1200
	E(max)	775	855	855
	F(max)	1600	1800	1800
	G	165	165	165
	H	180	180	180

Note:(1) “M” stands for middle mold detector. (Suitable for three-plate mold.)
“EM12” stands for EUROMAP 12 communication interface.
“EM67” stands for EUROMAP 67 communication interface.
“N” stands for non-operation side,operation side without “N”
(2) Power supply requirement: 1Φ, 200~240V, 50/60Hz.
(3) “ * ” Max air consumption for suction device 60Nl/min.

2.2.2 ST3-T Small Model Robot (Telescopic Arm)

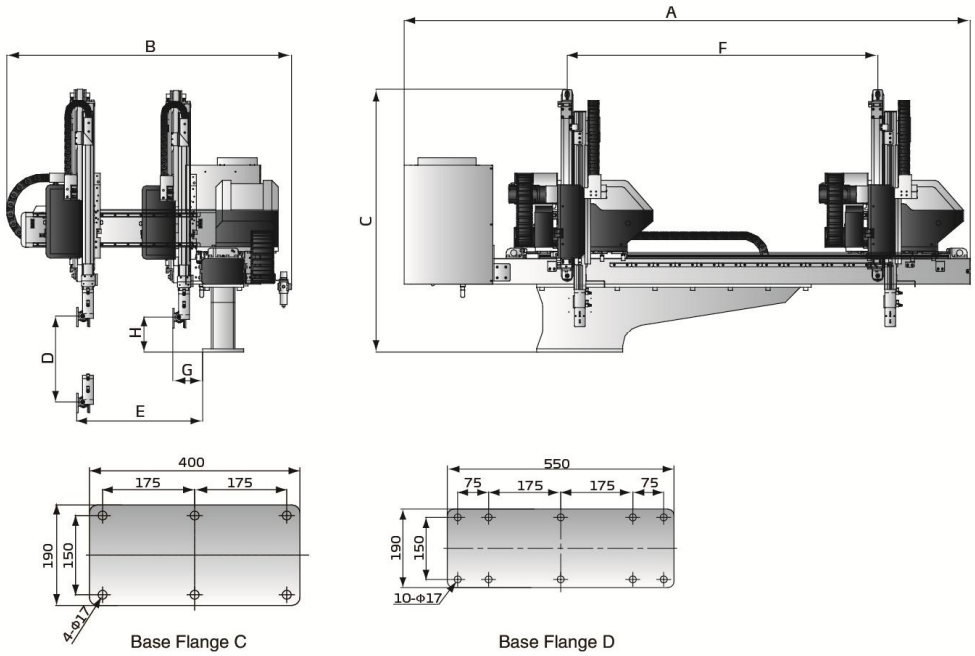


Fig.2-7: ST3-T small model (telescopic arm) dimensions

Table 2-3: ST3-T small model (telescopic arm) specifications 1

Model		ST3-700-1200T	ST3-700-1400T	ST3-700-1400HT	ST3-800-1400T
Application IMM(ton)		50-80	80-180	80-180	180-220
Traverse Stroke(mm)		1200	1400	1400	1400
Crosswise Stroke(mm)		425	425	425	425
Vertical Stroke(mm)		700	700	700	800
Max Load(kg)		3	3	3	3
Min Pick-out Time(sec)		1.2	1.2	0.8	1.2
Min Cycle Time（sec）		5	5	4.5	5
Air Pressure Range(bar)		4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)		4	4	4	4
Net Weight(kg)		240	240	245	250
Base Type		Base C	Base C	Base C	Base C
Dimensions (mm)	A	2480	2680	2680	2680
	B	1365	1365	1365	1365
	C	1220	1220	1220	1270
	D	700	700	700	800
	E	630	630	630	630
	F	1200	1400	1400	1400
	G	155	155	155	155
	H	170	170	170	170

Table 2-4: ST3 small model (telescopic arm) specifications 2

Model		ST3-900-1600T	ST3-900-1600HT	ST3-1000-1600T	ST3-1100-1800T	ST3-1100-1800HT	ST3-1200-1800T
Application IMM (ton)		220-280	220-280	280-320	320-400	320-400	400-450
Traverse Stroke (mm)		1600	1600	1600	1800	1800	1800
Crosswise Stroke (mm)		525	525	650	680	680	680
Vertical Stroke (mm)		900	900	1000	1100	1100	1200
Max Load(kg)		5	5	5	5	5	5
Min Pick-out Time (sec)		1.3	1	1.3	1.5	1.2	1.5
Min Cycle Time(sec)		5.5	4.8	6	6.2	5	6.5
Air Pressure Range (bar)		4-6	4-6	4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)		4	4	4	4	4	4
Net Weight(kg)		270	275	280	300	300	310
Base Type		Base C	Base C	Base C	Base D	Base D	Base D
Dimensions (mm)	A	2880	2880	2940	3120	3120	3120
	B	1465	1465	1550	1610	1610	1610
	C	1330	1330	1380	1440	1440	1490
	D	900	900	1000	1100	1100	1200
	E	720	720	805	865	865	865
	F	1600	1600	1600	1800	1800	1800
	G	155	155	155	155	155	155
	H	180	180	200	200	200	200

Note:(1)“M” stands for middle mold detector. (Suitable for three-plate mold.)
“EM12” stands for EUROMAP 12 communication interface.
“EM67” stands for EUROMAP 67 communication interface.
“N” stands for non-operation side,operation side without “N”
(2)Power supply requirement: 1Φ, 200~240V, 50/60Hz.
(3) “ * ” Max air consumption for suction device 60Nl/min.

2.2.3 ST3-T Medium Telescopic Model Robot (Stationary-Beam Type)

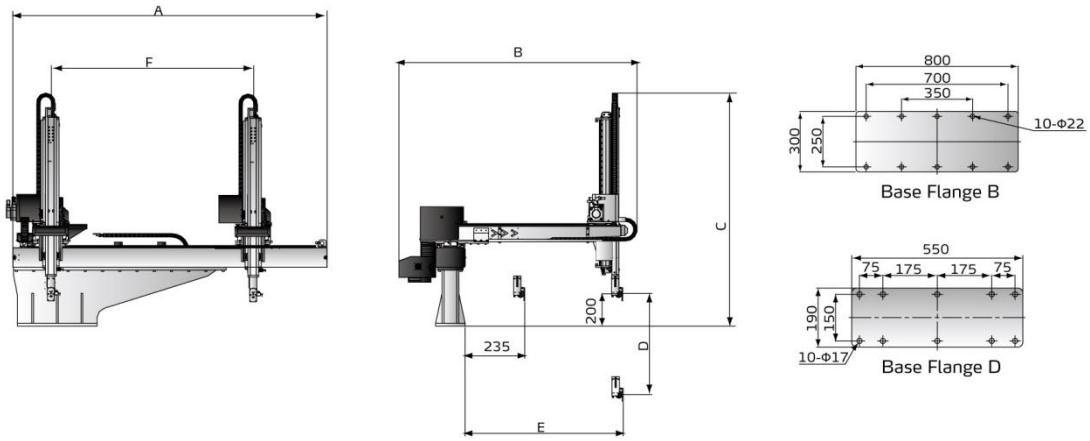


Fig.2-8: ST3-T medium telescopic model (stationary-beam type) dimensions

Table 2-5: ST3-T medium telescopic model (stationary-beam) specifications

Model		ST3-1300-2000T	ST3-1400-2000T	ST3-1500-2200T	ST3-1600-2200T	ST3-1700-2200T
Application IMM(ton)		450-600T	450-600T	600-700T	700-850T	700-850T
Traverse Stroke(mm)		2000	2000	2200	2200	2200
Crosswise Stroke(mm)		800	900	900	1000	1100
Vertical Stroke(mm)		1300	1400	1500	1600	1700
Max Load(kg)		10	10	12	12	12
Min Pick-out Time(sec)		3	3	3.2	3.3	3.4
Min Cycle Time(sec)		12.5	13	13.5	14	15
Air Pressure Range(bar)		4-6	4-6	4-6	4-6	4-6
Max Air Consumption (NL/cycle)		6	6	6	6	6
Net Weight(kg)		500	530	550	580	600
Base Type		Base D	Base D	Base D	Base B	Base B
Dimensions (mm)	A	2800	2800	3000	3000	3000
	B	2000	2100	2100	2250	2350
	C	1700	1750	1800	2050	2150
	D(max)	1300	1400	1500	1600	1700
	E(max)	1050	1150	1150	1250	1250
	F(max)	2000	2000	2200	2200	2200

Note:(1)“M” stands for middle mold detector. (Suitable for three-plate mold.)
“EM12” stands for EUROMAP 12 communication interface.
“EM67” stands for EUROMAP 67 communication interface.
“N” stands for non-operation side,operation side without “N”
(2)Power supply requirement: 1Φ, 200~240V, 50/60Hz.
(3)“ * ” Max air consumption for suction device 60Nl/min.

2.2.4 ST3-MT Medium Telescopic Model Robot (Movable-Beam Type)

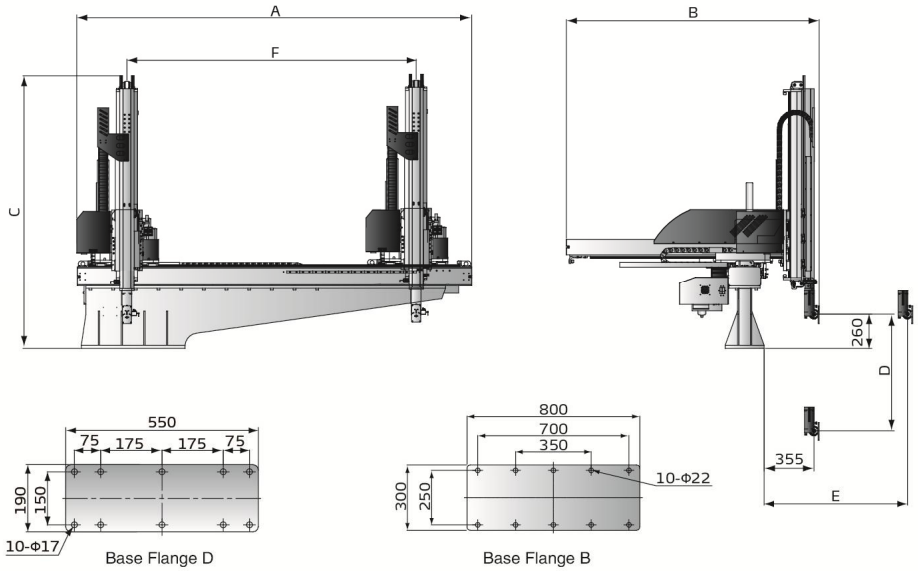


Fig.2-9: ST3-MT medium telescopic model (movable-beam type) dimensions

Table 2-6: ST3-MT medium telescopic model (movable-beam) specifications 1

Model		ST3-1200-1800MT	ST3-1300-2000MT	ST3-1400-2000MT	ST3-1500-2200MT	ST3-1600-2200MT	ST3-1700-2200MT
Application IMM(ton)		300-450T	450-600T	450-600T	600-700T	700-850T	700-850T
Traverse Stroke(mm)		1800	2000	2000	2200	2200	2200
Crosswise Stroke(mm)		800	800	900	900	1000	1000
Vertical Stroke(mm)		1200	1300	1400	1500	1600	1700
Max Load(kg)		10(15)	10(15)	10(15)	10(15)	20（30）	20（30）
Min Pick-out Time(sec)		2.8	3	3	3.2	3.3	3.4
Min Cycle Time（sec）		12	12.5	13	13.5	14	15
Air Pressure Range(bar)		4-6	4-6	4-6	4-6	4-6	4-6
Max Air Consumption(NL/cycle)		6	6	6	6	6	6
Net Weight(kg)		480	500	530	550	580	600
Base Type		Base D	BaseD	BaseD	Base B	Base B	Base B
Dimensions (mm)	A	2847	3047	3047	3247	3247	3247
	B	1617	1617	1717	1717	1817	1817
	C	1790	1840	1890	1940	2020	2070
	D(max)	1200	1300	1400	1500	1600	1700
	E(max)	1155	1155	1255	1255	1355	1355
	F(max)	1800	2000	2000	2200	2200	2200

Table 2-7: ST3-MT medium telescopic model (movable-beam) specifications 2

Model		ST3-1800-2400MT	ST3-1900-2400MT	ST3-2000-2800MT	ST3-2100-2800MT	ST3-2200-3000MT
Application IMM(ton)		850-1400T	850-1400T	1400-1800T	1400-1800T	1800-2400T
Traverse Stroke(mm)		2400	2400	2800	2800	3000
Crosswise Stroke(mm)		1200	1200	1200	1400	1400
Vertical Stroke(mm)		1800	1900	2000	2100	2200
Max Load(kg)		20（30）	20（30）	20（30）	20（30）	20（30）
Min Pick-out Time(sec)		3.6	3.6	3.8	3.8	4
Min Cycle Time（sec）		16	17	17.5	18	19
Air Pressure Range(bar)		4-6	4-6	4-6	4-6	4-6
Max Air Consumption(NL/cycle)		6	6	6	6	6
Net Weight(kg)		650	670	690	720	750
Base Type		Base B	Base B	Base B	Base B	Base B
Dimensions (mm)	A	3447	3447	3847	3847	4047
	B	2017	2017	2017	2270	2270
	C	2120	2170	2220	2270	2320
	D(max)	1800	1900	2000	2100	2200
	E(max)	1555	1555	1555	1755	1755
	F(max)	2400	2400	2800	2800	3000

Note:(1)“M” stands for middle mold detector. (Suitable for three-plate mold.)
“EM12” stands for EUROMAP 12 communication interface.
“EM67” stands for EUROMAP 67 communication interface.
“N” stands for non-operation side,operation side without “N”
(2)Power supply requirement: 1Φ, 200~240V, 50/60Hz.
(3) “ * ” Max air consumption for suction device 60Nl/min.

2.2.5 ST3-LT Large Telescopic Model Robot (Movable-Beam Type)

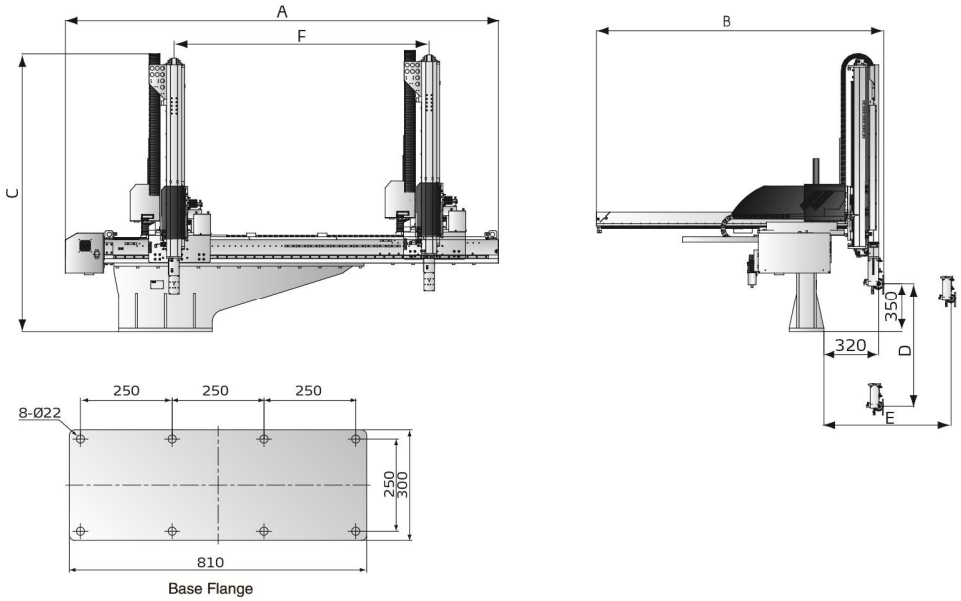


Fig.2-10: ST3-LT large telescopic model dimensions

Table 2-8: ST3-LT large telescopic model specifications

Model		ST3-1800-2400LT	ST3-2000-2800LT	ST3-2200-3000LT	ST3-2600-3200LT	ST3-3000-3400LT
Application IMM(ton)		850-1400T	1400-1800T	1800-2400T	2400-3000T	3000-3600T
Traverse Stroke(mm)		2400	2800	3000	3200	3400
Crosswise Stroke(mm)		1340	1500	1500	1660	1820
Vertical Stroke(mm)		1800	2000	2200	2600	3000
Max Load(kg)		40(60)	40(60)	40(60)	40(60)	40(60)
Min Pick-out Time(sec)		3.8	4.0	4.2	4.5	5.0
Min Cycle Time(sec)		20	22	24	26	28
Air Pressure Range(bar)		4-6	4-6	4-6	4-6	4-6
Max Air Consumption(NL/cycle)		8	8	8	8	8
Net Weight(kg)		920	950	990	1010	1080
Dimensions (mm)	A	3800	4200	4400	4600	4800
	B	2500	2650	2650	2820	2980
	C	2400	2500	2600	2800	3000
	D(max)	1800	2000	2200	2600	3000
	E(max)	1750	1900	1900	2050	2250
	F(max)	2400	2800	3000	3200	3400

Note:(1)“M” stands for middle mold detector. (Suitable for three-plate mold.)
“EM12” stands for EUROMAP 12 communication interface.
“EM67” stands for EUROMAP 67 communication interface.
“N” stands for non-operation side,operation side without “N”
(2)Power supply requirement: 1Φ, 200~240V, 50/60Hz.
(3)“ * ” Max air consumption for suction device 60Nl/min.

2.2.6 ST5 Small Model Robot (Single-Stage Arm)

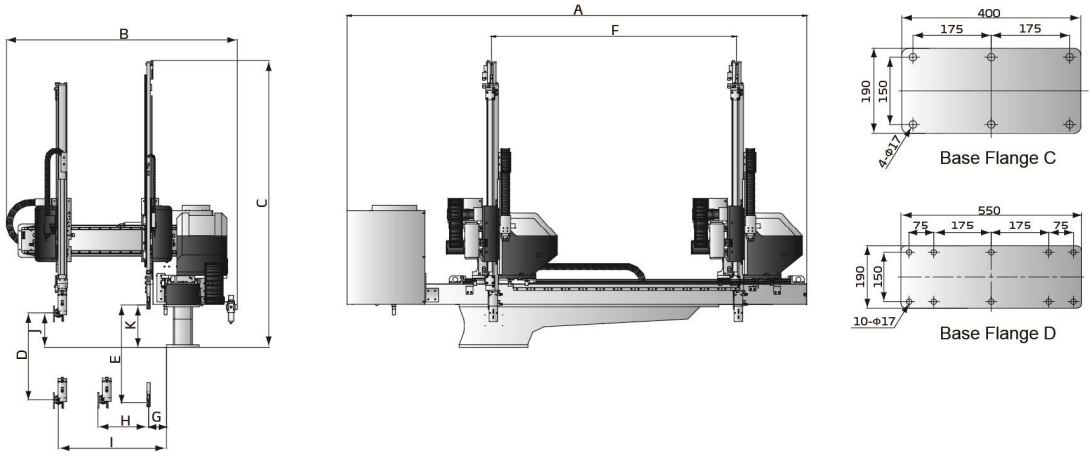


Fig.2-11: ST5 small model robot(single-stage arm) dimensions

Table 2-9: ST5 small model robot (single-stage arm) specifications

Model		ST5-700-1200D	ST5-700-1400D	ST5-800-1400D	ST5-900-1600D	ST5-1000-1600D	ST5-1100-1800D	ST5-1200-1800D
Application IMM(ton)		50-80	80-180	180-220	220-280	280-320	320-400	400-450
Traverse Stroke(mm)		1200	1400	1400	1600	1600	1800	1800
Crosswise stroke(mm)	Main Arm	370	370	370	420	530	590	590
	Sub-arm	370	370	370	420	530	590	590
Vertical Stroke(mm)	Main Arm	700	700	800	900	1000	1100	1200
	Sub-arm	750	750	850	950	1050	1150	1250
Max Load(kg)		3	3	3	5	5	5	5
Min Pick-out Time(sec)		1.3	1.3	1.3	1.4	1.4	1.6	1.6
Min Cycle Time(sec)		5.2	5.2	5.2	5.8	6.2	6.5	6.8
Air Pressure(bar)		4~6	4~6	4~6	4~6	4~6	4~6	4~6
Max Air Consumption (NL/cycle)		4	4	4	4	4	4	4
Net Weight(kg)		260	280	290	310	320	340	350
Base Type		Base C	Base C	Base C	Base C	Base C	Base D	Base D
Dimensions (mm)	A	2540	2740	2740	2960	2960	3160	3160
	B	1390	1390	1390	1410	1600	1660	1660
	C	1630	1630	1730	1830	1930	2030	2130
	D(max)	700	700	800	900	1000	1100	1200
	E(max)	750	750	850	950	1050	1150	1250
	F(max)	1200	1400	1400	1600	1600	1800	1800
	G(min)	145	145	145	135	135	135	135
	H(min)	160	160	160	160	180	180	175
	I(max)	650	650	650	690	835	895	895
	J	150	150	150	150	180	180	180
	K	190	190	190	190	190	190	190

Note:(1)“M” stands for middle mold detector. (Suitable for three-plate mold.)
“EM12” stands for EUROMAP 12 communication interface.
“EM67” stands for EUROMAP 67 communication interface.
“N” stands for non-operation side,operation side without “N”
(2)Power supply requirement: 1Φ, 200~240V, 50/60Hz.
(3)“ * ” Max air consumption for suction device 60Nl/min.

2.2.7 ST5-T Small Telescopic Model Robot

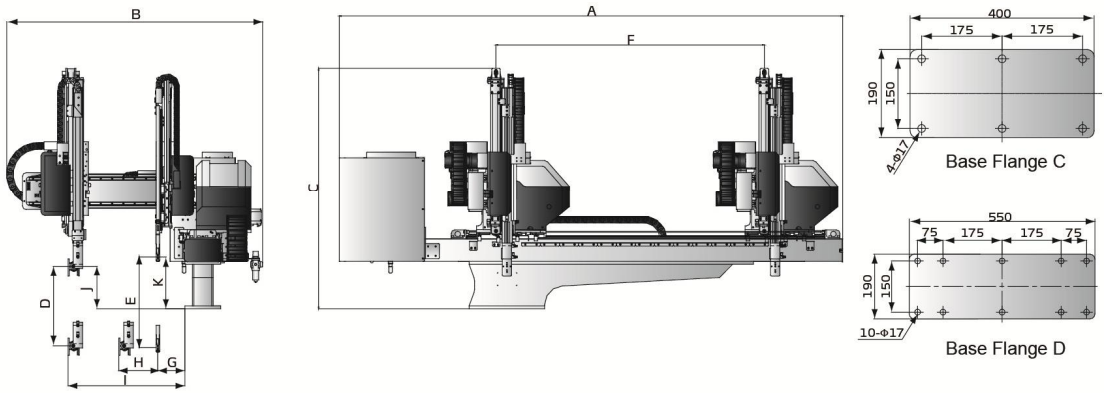


Fig.2-12: ST5 small telescopic model robot dimensions

Table 2-10: ST5 small telescopic model robot specifications

Model		ST5-700-1200DT	ST5-700-1400DT	ST5-800-1400DT	ST5-900-1600DT	ST5-1000-1600DT	ST5-1100-1800DT	ST5-1200-1800DT
Application IMM(ton)		50-80	80-180	180-220	220-280	280-320	320-400	400-450
Traverse Stroke(mm)		1200	1400	1400	1600	1600	1800	1800
Crosswise (mm)	Main Arm	320	320	320	370	475	535	535
	Sub-arm	320	320	320	370	475	535	535
Vertical (mm)	Main Arm	700	700	800	900	1000	1100	1200
	Sub-arm	750	750	850	950	1050	1150	1250
Max Load(kg)		3	3	3	5	5	5	5
Min Pick-out Time(sec)		1.2	1.2	1.2	1.3	1.3	1.5	1.5
Min Cycle Time(sec)		5	5	5	5.5	6	6.2	6.5
Air Pressure (bar)		4~6	4~6	4~6	4~6	4~6	4~6	4~6
Max Air Consumption (NL/cycle)		4	4	4	4	4	4	4
Net Weight(kg)		280	280	290	310	320	340	350
Base Type		Base C	Base C	Base C	Base C	Base C	Base D	Base D
Dimensions (mm)	A	2535	2735	2735	2955	2955	3155	3155
	B	1430	1430	1430	1490	1610	1670	1670
	C	1220	1220	1270	1340	1400	1460	1520
	D	700	700	800	900	1000	1100	1200
	E	750	750	850	950	1050	1150	1250
	F	1200	1400	1400	1600	1600	1800	1800
	G	185	185	185	185	185	185	185
	H	140	140	140	140	135	145	145
	I	645	645	645	700	805	865	865
	J	175	175	175	185	205	205	205
	K	220	220	220	245	245	245	245

Note:(1)“M” stands for middle mold detector. (Suitable for three-plate mold.)
“EM12” stands for EUROMAP 12 communication interface.
“EM67” stands for EUROMAP 67 communication interface.
“N” stands for non-operation side,operation side without “N”
(2)Power supply requirement: 1Φ, 200~240V, 50/60Hz.
(3)“ * ” Max air consumption for suction device 60Nl/min.

2.2.8 ST5 Medium Telescopic Model Robot

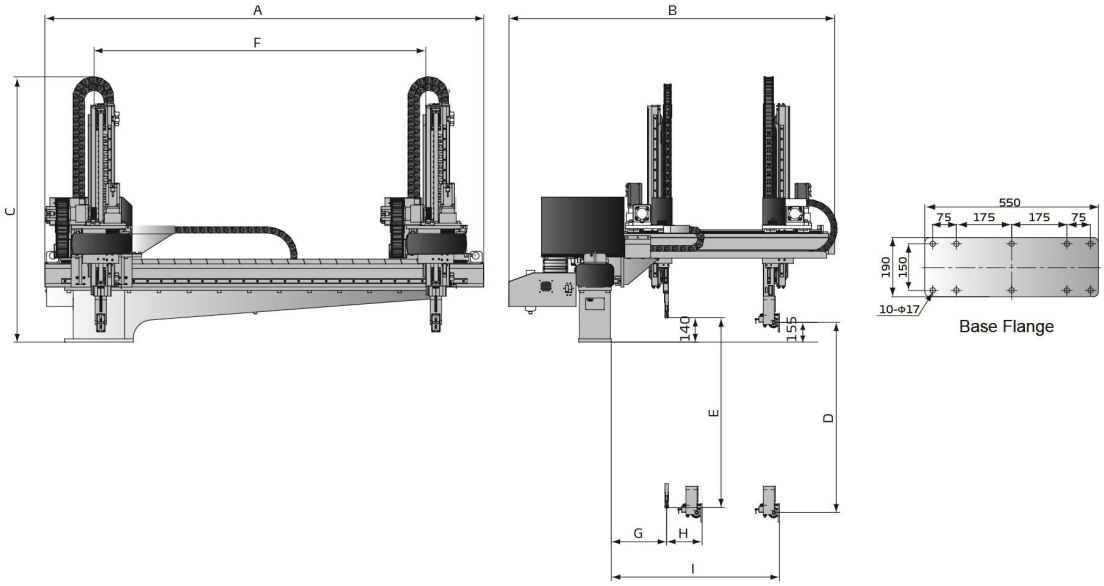


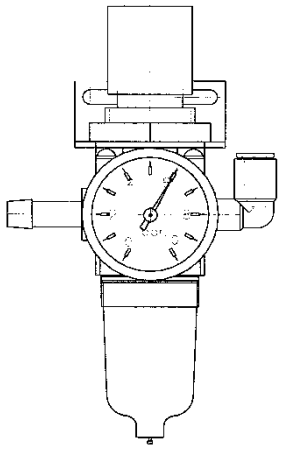
Fig.2-13: ST5 medium telescopic model robot

Table 2-11: ST5 medium telescopic model robot specifications

Model		ST5-1300-2000DT	ST5-1500-2200DT
Application IMM(ton)		450~650	650~850
Traverse Stroke(mm)		2000	2200
Crosswise(mm)	Main Arm	630	750
	Sub-arm	630	750
Vertical(mm)	Main Arm	1300	1500
	Sub-arm	1350	1500
Max Load(kg)		10	12
Min Pick-out Time(sec)		3.2	3.5
Min Cycle Time(sec)		9	9.5
Air Pressure Range(bar)		4-6	4-6
Max Air Consumption (NL/cycle)		5	5
Net Weight(kg)		810	930
Dimensions (mm)	A	2800	3000
	B	2020	2140
	C	1650	1750
	D(max)	1300	1500
	E(max)	1350	1550
	F(max)	2000	2200
	G(min)	245	245
	H(min)	170	170
	I(max)	1100	1220

Note:(1)“M” stands for middle mold detector. (Suitable for three-plate mold.)
“EM12” stands for EUROMAP 12 communication interface.
“EM67” stands for EUROMAP 67 communication interface.
“N” stands for non-operation side,operation side without “N”
(2)Power supply requirement: 1Φ, 200~240V, 50/60Hz.
(3)“ * ” Max air consumption for suction device 60Nl/min.

2.2.9 Pneumatic Source Requirement



Compressed air is connected by 1/4—Φ10 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 8bar. After adjustment, Please press the adjustment knob to lock pressure.

Required supply pressure: 4bar-6bar

When the pressure is equal or drop below than 4 bar, the robot will stop working and alarm. When the pressure up to 6bar, It will affect the service life of pneumatic components.

Compressed air consumption depends on the robot accessories.

To calculate the actual usage for your device exactly, see the standard values from the following table:

2.3 Electrical Connection

2.3.1 Main Power Supply

The power requirements are given on the serial plate of the robot, the power connection is provided through cable conductor and CEE plug.

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

2.3.2 Interface with The Injection Moulding Machine

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

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

The interface signal functions must be carefully tested, as improper operation may cause malfunction or damage to the robot and moulding 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 Gripper and Vacuum Monitor

2.4.1 Gripper Settings

If the gripper does not clamp parts in opened state or in the closed state, the light of the magnetic switch is off. If the gripper clamps parts, the magnetic switch is on.

Adjusting the Magnetic Switch:

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

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

2.4.2 Pressure Switch Settings

The default pressure setting is 4bar, it can be adjusted according to the actual needs.

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.

Need to adjust the pressure, the user can rotate red ruler to set the value by the hex key, clockwise rotation, the value increased, counter-clockwise rotation, the value decrease.

2.4.3 CKD Digital Pressure Switch Settings

1) Hysteresis mode
   i. c". Press up/down key till the screen display "HYS".
   ii. Press "Mode" once into "Comparative output 2 mode setting". Press up/down key till the screen display "OFF".
   iii. Press "Mode" once into "N.o./N.c. selection"(Normal open or normal close). Press up/down key till the screen display "NC".
   iv. Press "Mode" once into "Response time setting". Press up/down sets the response time (default setting: 2.5ms).
   v. Press "Mode" once into "Displayed color of the main display selection". Press up/down key till the screen display "R-ON".

vi. Press “Mode” once back to measurement mode.

2) Pressure value range settings

i. The lower limit: for example “-50”, press “Mode” screen display “L0-1”, press up/down set the valve to “-50”.

ii. The upper limit: for example “-20”, press “Mode” screen display “H1-1”, press up/down set the valve to “-50”.

Note: if the lower limit absolute value smaller than the upper limit absolute value, 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”.

2.5 Robot and IMM Interface

ST3(5) series robots are available with 2 different interface versions to communicate with the injection moulding machine:

- Euromap67
- Euromap12

Both versions are described in the following chapters.

2.5.1 Euromap67 Interface

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

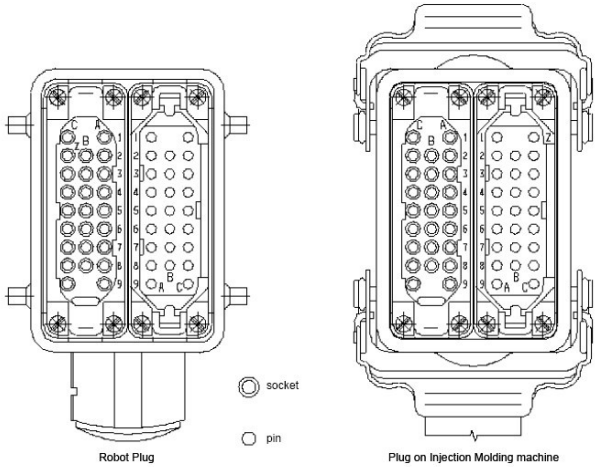


Fig.2-14: Euromap 67 interface plug

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

All signals are continuous signals unless otherwise noted.

2.5.1.1 IMM Output Signals (EM67)

Table 2-12: Signals from IMM (EM67)

Contact No.	Function
ZA1 ZC1	**Emergency stop channel 1** The emergency stop switch of the injection moulding 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 moulding machine is used to interrupt the emergency stop circuit of the robot.
ZA3 ZC3	**Safety devices of machine channel 1** For protecting against hazardous motions of the robot. The switch is closed when the safety devices of the injection moulding machine is active.
ZA4 ZC4	**Safety devices of machine channel 2** For protecting against hazardous motions of the robot. The switch is closed when the safety devices of the injection moulding machine is active.
ZA5 Optional	**Reject** HIGH signal when the moulding is a reject. HIGH signal when the mould is open and must remain HIGH until "Enable mould closure" (see pin contact No.A6).
ZA6	**mould closed** HIGH signal when the mould closing is completed, the signal "Enable mould closure" is no longer required (see pin contact No.A6).
ZA7	**mould open position** HIGH signal when the mould opening position is equal or more than the required position. Inadvertent alteration to mould opening stroke smaller than that required for the handling robot approach must be impossible.
ZA8 Optional	**Intermediate mould opening position** HIGH signal when mould opening reaches a set position than mould opening position. The signal remains HIGH to the end of mould opening position. Two sequences are possible with this signal: 1) mould opening stops on intermediate position and gives start signal to robot. mould opening restarts with the signal "Enable full mould opening" (see pin A7). 2) mould opening does not stop on intermediate position, however gives the signal to robot. At this sequence the signals "Enable full mould opening"(see pin A7) Low signal when intermediate mould opening position is not in use.
ZA9	**Supply from robot** 24 V DC (Reference potential)
ZB2	**Enable operation with robot (Automatic)** HIGH signal when the IMM is able to operated with robot.
ZB3	**Ejector back position** HIGH signal when the ejector has been finally retracted regardless of the moving platen position.The signal is the acknowledgement for the "Enable ejector retraction" signal (see pin contact No.B3) when the ejector sequence is selected.

Contact No.	Function
ZB4	**Ejector forward position** HIGH signal when the ejector has been advanced. The signal is the acknowledgement signal for the “Enable ejector advance “(see pin contact No.B4).
ZB5	**Core pullers 1 free for robot to approach** HIGH signal when the core pullers are in position for removal of the injection moiling.(see pin contact No.B5)
ZB6	**Core pullers 1 in position to remove moulding** HIGH signal when the core pullers are in position for removal of the injection moulding.(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 moulding** HIGH signal when the core pullers are in position for removal of the injection moulding.(see pin contact No.B8)
ZC5/ZC6/ZC7	Reserved for future use of Euromap
ZC8	Not fixed by EUROPAM, manufacturer dependent
ZC9	**Supply form robot** 0V (Reference potential)

2.5.1.2 Robot Output Signals (EM67)

Table 2-13: Signals from robot (EM67)

Contact No.	Function
A1 C1	**Emergency stop of robot channel 1** The switch contact opening causes emergency stop of the IMM.
A2 C2	**Emergency stop of robot channel 2** The switch contact opening caused emergency stop of the IMM.
A3 C3	**mould Area Free** The switch contact is closed when the robot is outside the mould area and does not interfere with mould opening and closing movements. The switch contact must be opened when the robot leaves its start position. If the switch contact is open neither opening nor closing of the mould may occur. The signal must have the described effect even when the robot is switched off. It is recommended to close the switch conact when the robot is unselected.
A4 C4	Reserved for future use by EUROMAP
A5	Not fixed by EUROMAP, manufacturer dependent
A6	**Enable mould closure** HIGH signal when the robot is retracted enough to start of mould closure. The signal must remain HIGH at least until ”mould closed” (see pin ZA6) is available. If the signal is LOW as a result of a fault, mould closing must be interrupted.
A7 Optional	**Enable full mould opening** HIGH signal when the robot has taken the part and allows to continue mould opening. The signal must remain HIGH until ”mould open” signal is given by the IMM. (see pin contact No.ZA7)
A8	Reserved for future use by EUROMAP
A9	**Supply from IMM** 24V DC/ 2A (Reference potential)
B2	**Robot operation mode** LOW signal when the robot mode switch is “Operation with injection moulding machine”, HIGH signal when the robot mode switch is “No operation with injection moulding machine”. HIGH signal when the robot is switched off.
B3	**Enable ejector back** HIGH signal when the robot enables the movement for ejector back.The signal must remain HIGH at least until “Ejector back“ signal is given by the injection moulding machine (see pin contact No.ZB3).
B4	**Enable ejector forward** HIGH signal when the robot enables the movement for ejector forward The signal must remain HIGH at least until “Ejector forward” signal is given by the injection moulding machine(see pin contact No.ZB4).
B5 Optional	**Enable movement for robot to approach freely** HIGH signal when the robot is in position to enable movement for robot to approach freely. It is recommended that the signal remains high at least until ”Core pullers 1 free for robot to approach” signal is given by IMM.(see pin contact No.ZB5)

Contact No.	Function
B6 Optional	**Enable core pullers 1 to remove the moulding.** HIGH signal when the robot is in position to enable core pullers 1 to remove the moulding. It is recommended that the signal remains HIGH at least until ”Core pullers 1 free for robot to approach” signal is given by IMM.(see pin contact No.ZB5)
B7 Optional	**Enable movement for the robot to approach freely.** HIGH signal when the robot is in position to enable movement for robot to approach freely. It is recommended that the signal remains high at least until ”Core pullers 2 free for robot to approach” signal is given by IMM(see pin contact No.ZB7)
B8 Optional	**Enable core pullers 2 to remove the moulding.** HIGH signal when the robot is in position to enable core pullers 2 to remove the moulding. It is recommended that the signal remains HIGH at least until ”Core pullers 2 free for robot to approach” signal is given by IMM.(see pin contact No.ZB8)
C5 C8	Not fixed by EUROMAP, manufacturer dependent
C6 C7	Reserved for future use by EUROMAP
C9	**Supply from IMM** 0V (Reference potential)

2.5.2 Euromap12 Interface

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

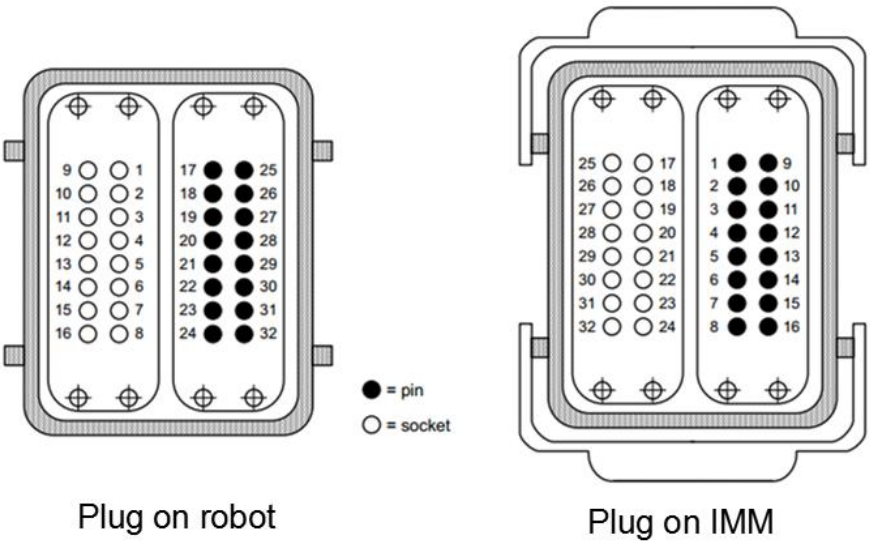


Fig.2-15: Euromap 12 interface plug

The robot-injection moulding machine interface is designed according to Euromap12, which state:
All signals are continuous signals unless otherwise noted.

2.5.2.1 IMM Output Signals (EM12)

Table 2-14: Signals from IMM (EM12)

Plug Contact No.	Function
1，9	**Emergency stop of machine** Opening the switch contact causes emergency stop of the robot.
2	**Mould open position** 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 robot to approach must be impossible.
3，11	**Safety devices of machine** The switch contact is closed when safety devices (e.g. safety guard, footboard safety, etc.) on the injection moulding machine are operative so that dangerous movements of the handing device/robot are possible. The signal is active in any operation mode.
4	**Ejector back position** 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 retraction” signal (see pin contact No 21), when the ejector sequence is selected. (see pin contact No.16)

Plug Contact No.	Function
5	**Ejector forward position** 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 advance” (see pin contact No 22). It is recommended to close the switch contact when the ejector sequence not in use. (see pin contact No.16)
6 Optional	**Core pullers free for robot to approach** The switch contact(see pin contact No.16) is closed when the core pullers, regardless of the position of the movable tool plate, are in position for robot free to approach.
7 Optional	**Core pullers in position to remove moulding** The switch contact(pin contact No.16) is closed when the core pullers are in position to remove moulding.
8 Optional	**Reject** The switch contact(see pin contact No.16) is closed when the moulding is a reject. The switch contact must close then the mould is open and must remain closed at least until “Enable mould closure” (see pin contact No.17)
10	**Enable operation with robot (Automatic)** The switch contact(see pin contact No.16) is closed when the IMM is set to “semi-automatic” or “Automatic mode”.
12	**Mould closed** The switch contact(see pin contact No.16)is closed when the mould closing is completed, the signal “Enable mould closure” is then no longer required. (see pin contact No.17)
13 Optional	Not fixed by EUROMAP, manufacturer dependent
14 Optional	**Intermediate mould opening position** The switch contact (see pin contact No.16) is closed when mould opening reaches a set position smaller than mould opening position. Two sequences are possible with this signal: 1) mould opening stops on intermediate position and gives start signal to handling device/robot. mould opening restarts with the signal ”Enable full mould opening”(see contact No.28) 2) mould opening does not stop on intermediate position, however gives the signal to handling device/robot. (see pin contact No.16) The switch contact is open when intermediate mould opening position is not in use.
15 Optional	No fixed by EUROMAP, manufacturer dependent
16	Signal voltage of robot

2.5.2.2 Robot Output Signals (EM12)

Table 2-15: Signals from robot (EM12)

Contact No.	Function
17	**Enable mould close** The switch contact (see pin contact No.32) is closed when the robot is retracted enough for start of mould closure. the switch contact must remain closed at least until “mould closed” (see pin contact No.12)
18，26	**Mould area free** The switch contact is closed when the robot is outside the mould area and does not interfere with mould opening and closing movements. The switch contact must be opened when the robot leaves its start position. If the switch contact is open neither opening nor closing of the mould may occur. It is recommended to close the switch contact when the robot is unselected.
19，27	**Emergency stop of robot** The switch contacts causes emergency stop of the injection moulding machine.
20	**Robot operation mode** The switch contact (see pin contact No.32) is open when the robot mode switch is “Operation with injection moulding machine”. The switch contact is closed when the handling device mode switch is: “No operation with injection moulding machine” the switch contact (see pin contact No.32) is closed when the robot is switched off.
21	**Enable ejector back** The switch contact (see pin contact No.32) is closed when the handling device enables the movement for ejector back, the switch contact must remain closed at least until ‘’Ejector back’’ signal is given by injection moulding machine(see contact No 4)
22	**Enable ejector forward** The switch contact (see pin contact No.32) is closed when the handing device enable the movement for ejector forward. The switch contact must remain closed at least until “Ejector forward” signal is given by the injection moulding machine(see contact No 5)
23 optional	**Enable core pullers to remove the moulding** The switch contact (contact no. 32)is closed when the robot is in position to enable core pullers to remove the moulding It is recommended that the switch contact remains closed at least until “Core pullers in position to remove the moulding” signal is given by IMM(see contact No 7)
24 optional	**Enable movement for robot to approach freely** The switch contact (contact no. 32)is closed when the robot is in position to enable movement for robot to approach freely It is recommended that the switch contact remains closed at least until “Core pullers free for robot to approach ” signal is given by IMM(see contact No 6)
25	Reserved for future use by EUROMAP
28 optional	**Enable full mould opening** The switch contact (see pin contact No.32) is closed when the robot has taken the part and allows to continue mould opening. The switch contact must remain closed until “mould open” signal is give by the IMM (see contact No 2).If the switch contact is not used it must be open.
29	Reserved for future use by EUROMAP
30	Not fixed by EUROMAP, manufacturer dependent
31	Not fixed by EUROMAP, manufacturer dependent
32	Voltage of IMM

3 . General Description

3.1 ST3(5) Series Robots Summary

The ST3(5) series robots are designed for rapid and precise removal of products from injection moulding machine, and place them at desired locations. ST3 robots are suitable for hot runner system; ST5 robots are suitable for 2-plate mold, 3-plate mold and hot runner system.

Fig.3-1: ST3 robot appearance

Fig.3-2: ST5 robot appearance

3.2 ST3 (5) Series Robot Application Range

1) ST3 (5)-550-1000(D) is suitable for IMM under 100T clamp force
2) ST3 (5)-700-1400(D) is suitable for IMM between 100T to 200T clamp force
3) ST3 (5)-900-1600(D) is suitable for IMM under 200T to 300T clamp force
4) ST3 (5)-1100-1800(D) is suitable for IMM between 300Tto 450T clamp force
5) ST3 (5)-700-1400T(DT) is suitable for IMM between 100T to 200T clamp force
6) ST3 (5)-900-1600T(DT) is suitable for IMM between 200T to 300T clamp force
7) ST3-1600-2200LT is suitable for IMM between 650T to 850T clamp force
8) ST3-1800-2400LT is suitable for IMM between 850T to 1600T clamp force
9) ST3-2200-2600LT is suitable for IMM between 1600T to 2400Tclamp force
10) ST3-2600-2800LT is suitable for IMM between 2400T to 2800Tclamp force
11) ST3-3000-3000LTis suitable for IMM between 2800T to 3600Tclamp force

3.3 Features

- Compact structure and streamlined appearance.
- I/O circuit using quick plug-in design, easy to install and maintain.
- The limit positions with safety switches, high security.
- With stack function.
- Quickly pick up, slowly put down. Maintain the speed and ensure that goods will not get bump.
- Humanization control system, easy to operate.
- Wrist packaging designs, save the packaging room, avoid damage during transportation.

3.4 Functions

3.4.1 Introduction

ST3(5) series robots are mainly used to remove injection moulding product and sprue. ST3 robots are suitable for hot runner system while ST5 robots are suitable for 2-plate mould, 3-plate mould and hot runner system. There are limit sensors on every axes' limit position. Every axes are driven by servo, run fast and locate precisely. Each axes limit position have limit sensors to make sure the robots work safety.

3.4.2 Limitation Sense and Limit Function

Each axes origin and end positions have limit sensor switch and limit function device, both software and hardware protection to prevent robots losing control.

3.4.3 Simultaneous Function

Each axes can move simultaneously to shorten operating cycle

3.4.4 Electrical Self-protection Function

Each axis arms are driven by servo motor with brake resistor to prevent the arms drop down due to immediate power supply failure

3.4.5 Emergency Stop

Hand Controller has emergency stop button to stop the robot. Once the button pressed, the robot will stop but the gripper and vacuum valve will still function to prevent dropping parts from the gripper. Moreover, the hand controller will remain power and indicate an error message. When the robot malfunction or need to under maintenance, press the emergency stop button to ensure operation safety.

3.5 Default Settings

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 -60.

3.6 ST3(5) Robot Reversing

The following paragraph is the instruction for reversing ST3(5) 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 错误！未找到引用源。 and 错误！未找到引用源。.

Fig.3-3: Sensor position before modifying

Fig.3-4: Sensor position after modifying

2) Move all the outside mold safety sensor plates from right side of traverse beam as shown in Fig.3-5 to the left side. Then move the home position sensor plate from the left side of traverse beam to the right side at the position of 100mm distance from the limit position 2 sensor plate, see Fig.3-6.

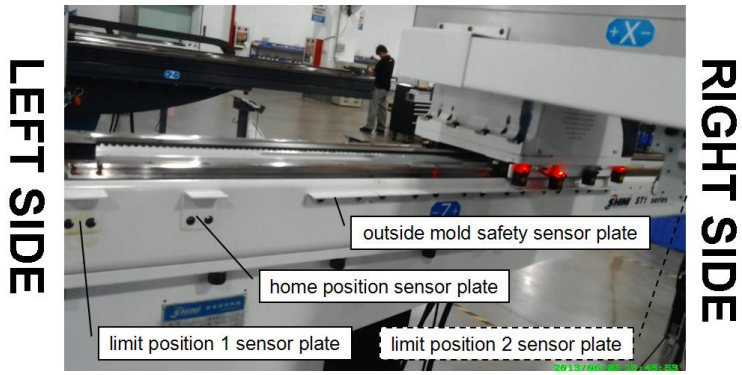


Fig.3-5: Sensor plate position before modifying

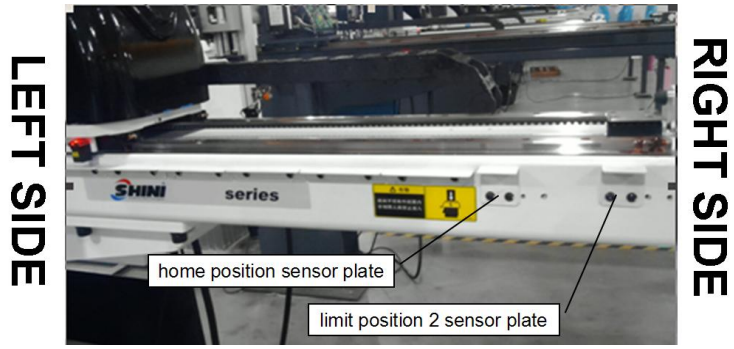


Fig.3-6: Sensor plate position after modifying

3) Move the in-mold safety sensor plate from the left side of traverse beam to the right side at the position of 180mm distance from the synchronous belt fixing frame as shown in Fig.3-7.

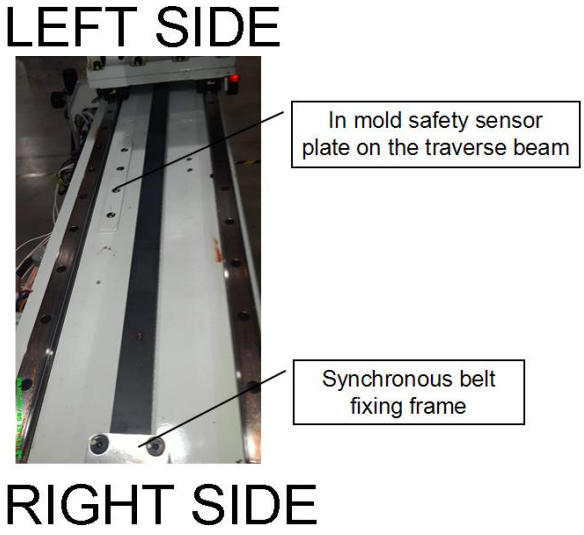


Fig.3-7: Outside IMM safety zone blocks after modifying

4) Open the sliding seat on the Z-axis, and then exchange the X101 with X104 socket positions on U2 board, exchange the X102 with X103 socket positions. See Fig.3-8.

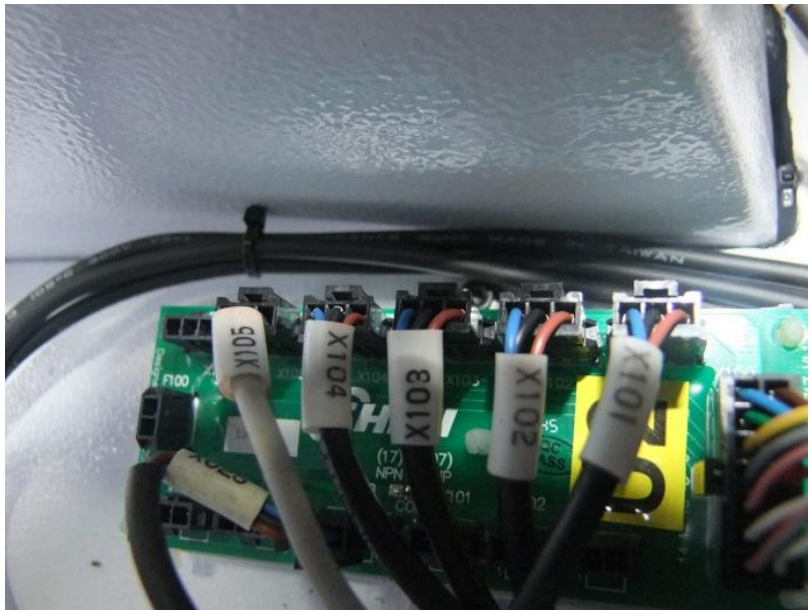


Fig.3-8: Before exchanging X102 with X103

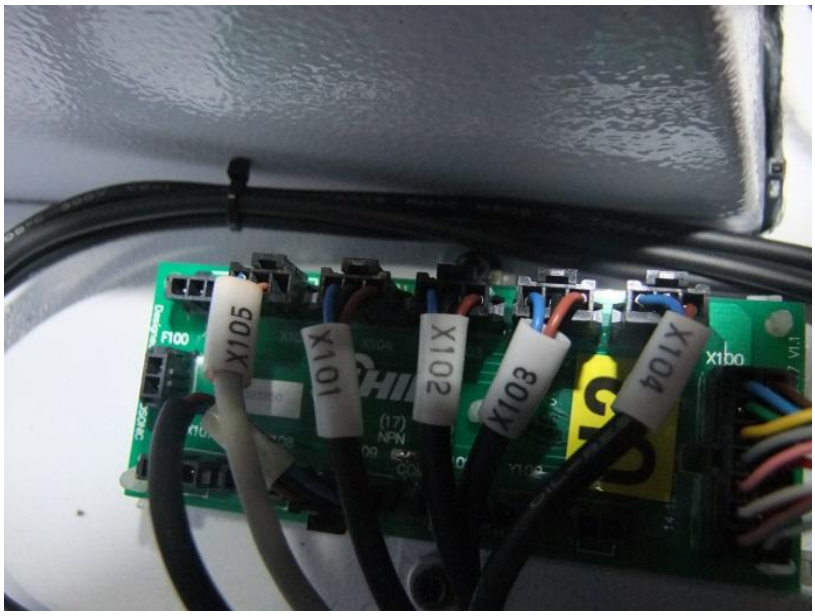


Fig.3-9: After exchanging X102 with X103

5) Unscrew the bolts on the traverse beam, except the base rotate the machine 180°（or rotate the base 180°), then fixed the machine on the base.
6) Set the servo motor direction in the controller. Click ***Function--Servo Setup--Axis*** to enter the page as shown in Fig.3-10, and change the motor direction from CW to CCW (if default setting is CCW then change to CW). If the controller does not have the function as mentioned above, follow below instructions.

Fig.3-10: Servo motor direction before reversing

7) Set traverse servo driver A5 parameter ***Pr.006*** and ***Pr.012*** from value '**1**' to '**0**'. [For ST3-MT and ST3-LT models set its parameter ***Pr.002*** and ***Pr.012*** from value '**0**' to '**1**'] If traverse servo driver is A4 then set its parameter ***Pr.041*** and ***Pr.046*** from value '**1**' to '**0**'. See Fig.3-11. for the traverse servo location. See Fig.3-12. for the Panasonic servo driver setting instructions.

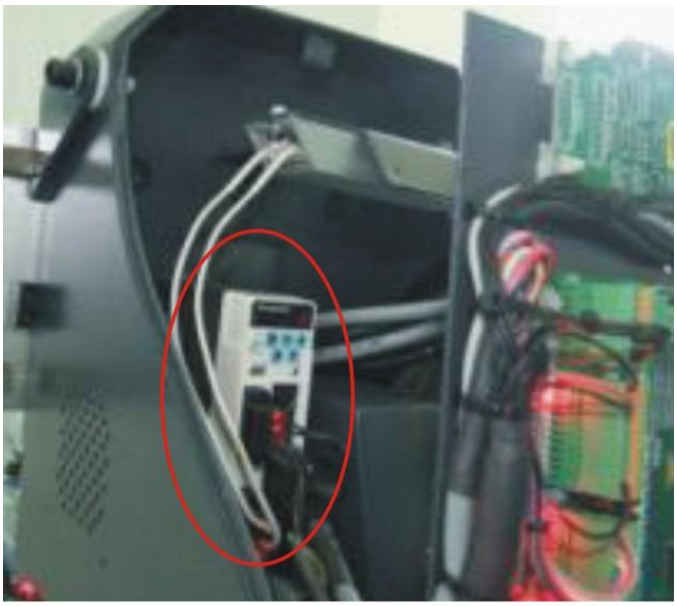


Fig.3-11: Traverse servo driver location

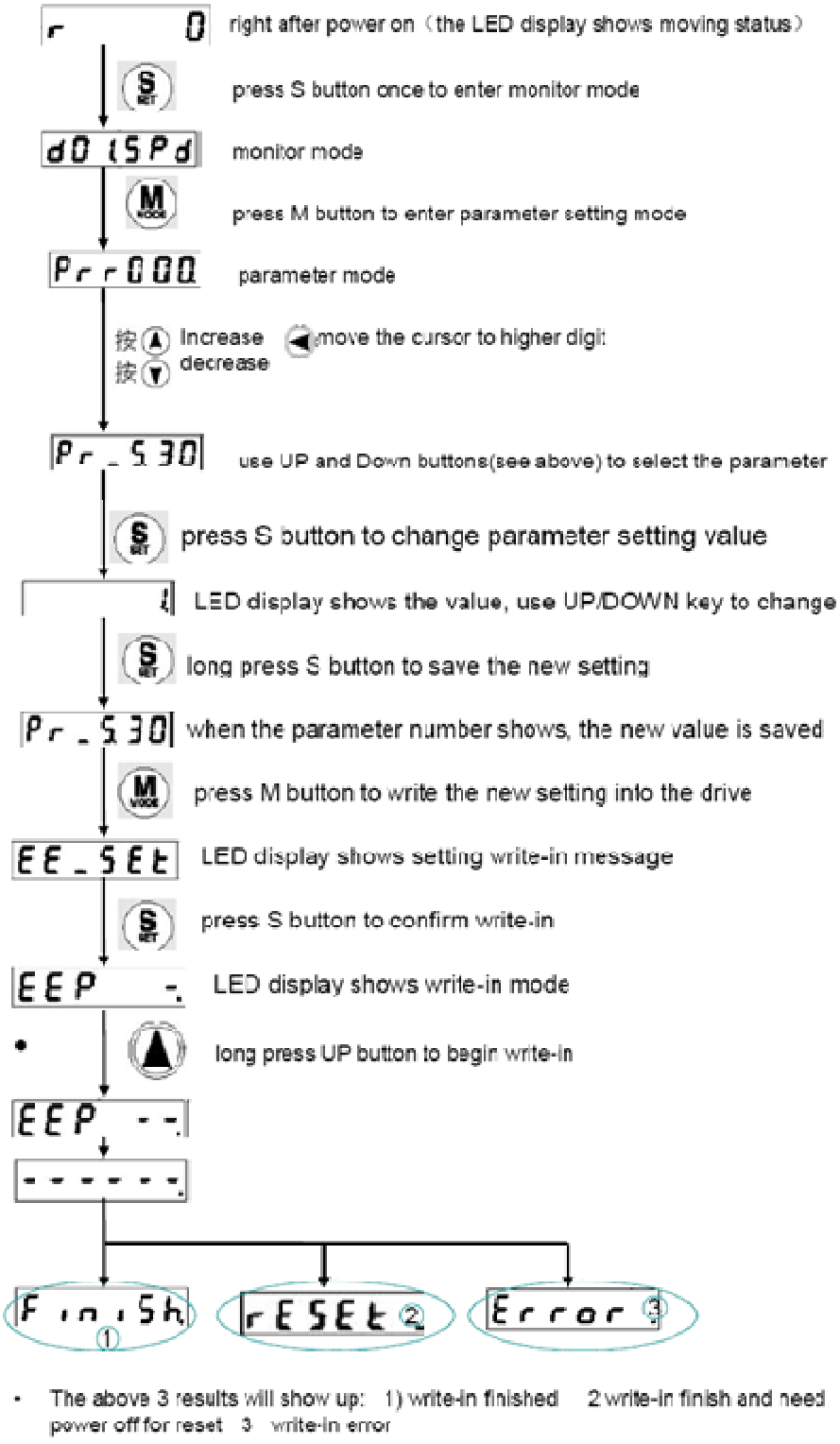


Fig.3-12: Panasonic servo driver setting instructions

8) Check reversing result.

i. In manual mode, axis-Z traverse in or out direction is reversed after changing

ii. Press '***Homing move***' at short-key page to check whether the robot go back to home position and the Axis-Z home position sensor (X103) light is on.

iii. During robot normal operation, limit position sensor (X101 & X104) light is off.

4. Operating Instructions

4.1 Hand Controller

Fig.4-1: Hand controller front view

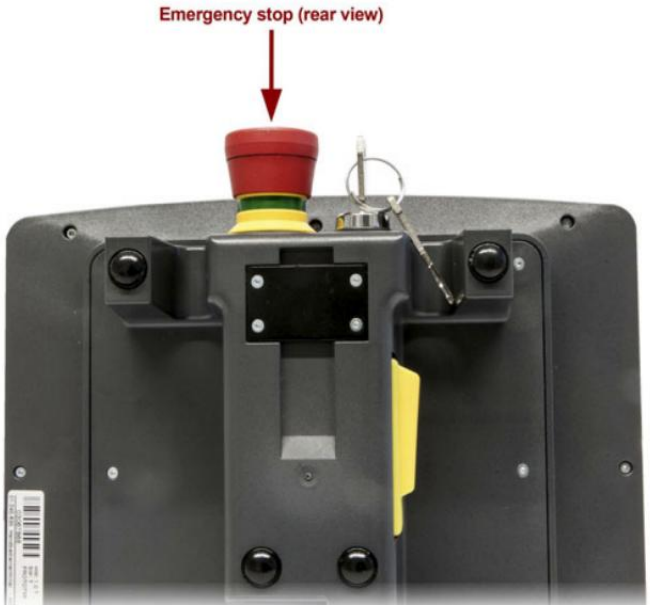


Fig.4-2: Hand controller rear view

4.2 Main Screen

Turn on hand controller and enter into main screen as shown in Fig.4-3.

Fig.4-3: Main Screen

The main screen shows the robot current basic state,user can understand in intuitive way,and can set basic operating parameters on this page,such as the run rate,password login , electrical switches and servo on/off，

In the bottom of the page, there are five buttons,divided into 5 major functional fields.

	Enter function page Including teach settings,system setting,servo setting。		Alarming page Current and recent alarm detailed information,to facilitate analysis the cause of the malfunction.
	Manual operation page Including manual function,and the additional components of manual functions.		Return Exit the current screen and return to the previous screen
	Conventional setting Including language settings,password settings,and the unit switching function.		

Fig.4-4 shows the main screen display the significance of the various contents and functions.

Fig.4-4: Main screen function

1) Operation mode marks

	The initial state,manual mode is turned off;this model, motor enable closed
	The initial state,manual mode;this model,motor enable opened
	Run automatically。
	Single step move STOP。
	Single step running

2) Reference points

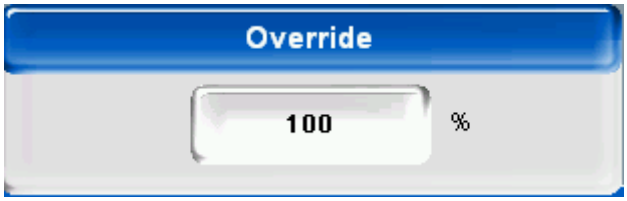
 Robot with no reference points.

 Decided reference points of robot

3) Procedure editing
When this mark is displayed,manual operation can not carry out。

 In procedure editing

4) Current mode name： the name of currently programme。
5) Current date
6) Current time
7) Log in grade
By input the different levels of passwords to get different levels of permission.
8) SRV-ON start button
Turn on or turn off SRV-ON
9) Working speed setting
Equivalently setting the speed ratio，can be set from 0-100%.
Click here to see a dialog box for setting rates, the rate be set from 0 to 100%



10) Short-key function. Click here to see a dialog box as shown in below figure.

Fig.4-5: Main screen short-key function

i.  Use/Not use robot. When in not use, the signals are fully given out to IMM and the IMM does not cooperate with the robot; when in use, the signals are given out according to the settings, and the IMM cooperate with the robot signals. Switch between use and not use to complete and signal resetting when required. Note: Stop the IMM before stop the robot, activate the IMM before activate the robot, in order to prevent time shift.

ii.  Use/Not use robot. When in not use, the signals are fully given out to IMM and the IMM does not cooperate with the robot; when in use, the signals are given out according to the settings, and the IMM cooperate with the robot signals. Switch between use and not use to complete and signal resetting when required. Note: Stop the IMM before stop the robot, activate the IMM before activate the robot, in order to prevent time shift.

iii.  Manual/Automate. In manual mode, press this button to automate the robot. In automation mode, press this button to switch to manual mode.

iv.  Start auto mode. In the auto mode, press this button to start run the Robotautomatic, i.e.After pressed  , Robot will run in auto mode

v.  Stop auto mode /help. During the auto mode, press this button to stop auto mode. Otherwise press this button to show the help message. Note: The LED light indicates there is a help message

vi.  Input/output signals monitor. (Monitor the Euromap signals, spare input and output, sucker, functions input or output, etc.)

vii.  Arm resetting. (Press this button, the robot's arm will into reset mode; if press emergency stop button, and presstwice, the system will adjust the touch-screen; if the "DIVIDE BY ZERO" error happened, press emergency stop button and press twice to correct this error.

viii.  Single step. (When robot in single step mode, press this button once can set one step. The "one step" is one action in the teach program.)

ix.  Switch to single step. (In auto mode, press this button, system will switch to single step.)

x.  Reset sucking clamp. (Press this button, it will display the sucking clamp which needed rested, then choice.)

xi.  Into teachprogram expressed.

xii. 

Emergency stop button. Press this button, the robot will stop working at once, motor enable will be cut off and the emergency stop messages will display on the screen.

11) Alarm message: showing the last time alarm message.
12) Produce massage: shows the running time of each cycle, as well as the number of finished products.
13) Current position of the robot.

4.3 Function Page

Click Function on main screen to enter the function page. See Fig.4-6.

Fig.4-6: Function page

1) Enter into sub-function of teach page
2) Set stand-by points and status
3) Stack setting: Can set five groups .All the parameters only can make changes in the program editing mode ,as the parameters of the stack depends on the mould and products
4) Enter the input control output screen
5) Setting the scope of security protection
6) Set the feedback signal, or whether the other function signal test or use
7) Write setup
8) Setting the parameters of production
9) Set some parameters of system functions.
10) Enter the servo parameters settings
11) Enter the machine configuration settings
12) Enter the file manager page, save and edit teaching and system file

4.3.1 Teach

Click *Function--Teach* to enter teach mode page as shown in Fig.4-7.

Fig.4-7: Teach mode page

1) Enter the program monitor page.
2) Enter the program editor page.
3) Enter the variables page.

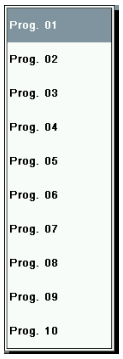
4.3.1.1 Program Monitor

Click *Function--Teach--Program Monitor* to enter the page as shown in Fig.4-8.

Fig.4-8: Program monitor page

When the robot runs in automation mode, the main program will turn to the current instrustion and highlighted in “dark gray” color. In the meanwhile, the right side will show the current instruction details.

1) Choose the program. Click to choose desired program.



Use the bar to switch different programs.

2) Program movement sequence number: Edit the orders of program actions.
3) The current instruction: Set the parameters of the current action.
4) Current action.

4.3.1.2 Program Editor

Click *return* and back to teach page. Click *Program Editor* to enter the page as shown in Fig.4-9.

Fig.4-9: Program editor page

1) Exit the program edit
2) Enter palletise setup
3) Enter standby setup
4) Command group

Table 4-1: Servo motor commands list

Group	Command/ Schematic	Function	Parameter	Unit
	Linkage 	All linear axes Direct move to the set corresponding position	terminal point on axis 1	mm/Inch
			terminal point on axis 2	mm/Inch
			terminal point on axis 3	mm/Inch
			terminal point on axis 4	mm/Inch
			terminal point on axis 5	mm/Inch
			speed	% relative to max.speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Interval position	mm/Inch
			Safety time	S (moving monitor time)
	S-linkage 	All linear axes achieve S linkage	terminal point on axis 1	mm/Inch
			terminal point on axis 2	mm/Inch
			terminal point on axis 3	mm/Inch
			terminal point on axis 4	mm/Inch
			terminal point on axis 5	mm/Inch
			S radian	mm/Inch
			P2 position 1	- （select radian direction）
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Interval position	mm/Inch
			Safety time	S (moving monitor time)
	Z-axis operation 	Z-axis run to absolute position	Final position	mm/Inch
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	X-axis 1 operation 	X-axis 1 run to absolute position	Arm selection	Main arm/Sub arm
			Final position	mm/Inch
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	X-axis 2 operation 	X-axis 2 run to absolute position	Axis-X Final position	mm/Inch
			Axis-X2 Final position	mm/Inch
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)

Group	Command/ Schematic	Function	Parameter	Unit
	Y-axis 1 operation 	Y-axis run to absolute position	Arm selection	Main arm/Sub arm
			Final position	mm/Inch
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	Y-axis 2 operation 	Y-axis run to absolute position	Axis-Y Final position	mm/Inch
			Axis-Y2 Final position	mm/Inch
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	4th-axis operation 	4th-axis run to absolute position	Final position	angle
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	5th-axis operation 	5th-axis run to absolute position	Final position	angle
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	6th-axis operation 	6th-axis run to absolute position	Final position	angle
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	Stack procedure 	Using stack procedure	Choose stack procedure (1~5)	[-]
	Reset stack parameter 	Reset all stack parameter	Choose stack procedure (1~5)	[-]

Group	Command/ Schematic	Function	Parameter	Unit
	Move circle 	Move Circle	center of a circle	mm/inch
			center of a circle	mm/inch
			speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	Standby 	Standby program	speed	% relative to max speed
			acceleration	% relative to max acceleration
			deceleration	% relative to max deceleration
			Safety time	S (moving monitor time)
	Gripper setting 	Gripper ON/ OFF	select gripper	Gripper 1~5
			state setting	ON/OFF
	Vacuum setting 	Vacuum ON/ OFF	Select Vacuum	Vacuum 1~4、blow 1~4
			state setting	ON/OFF
	Output setting 	Output setting	Select output	Output 1~96
			state setting	ON/OFF
	Select auxiliary signal output 	Select auxiliary signal output	Select auxiliary signal	Signal options: conveyor belt, fuel injection, lift
			state setting	ON/OFF
	Set user parameter 	Set the selected user parameter	Select the user parameter	Parameter 1~10
			State setting	[-]
	Set EM12 output 	EM12 output	Select EM12 output signal	[-]
			State setting	ON/OFF
	Set EM67 output 	EM67output	Select EM67 output signal	[-]
			State setting	ON/OFF

Group	Command/ Schematic	Function	Parameter	Unit
	Set variable increase 	Increase 1 selected user	Select the user parameter	Parameter 1~10
			State setting	Precise positioning / smooth movement
	Set variable decrease 	Reduce 1 selected user	Select the user parameter	Parameter 1~10
			State setting	Precise positioning / smooth movement
	Wait for delay 	Wait delay time until conditions satisfied	Delay time	s
	Wait gripper signal 	Wait for clamp until conditions satisfied	Select clamp	[-]
			State setting	ON/OFF
	Wait vacuum signal 	Wait for vacuum until conditions satisfied	Select vacuum	[-]
			State setting	ON/OFF
	Wait input signal 	Wait for input signal until conditions satisfied	User signal selection	[-]
			State setting	ON/OFF
	Wait other function input 	Waiting for auxiliary signal until conditions satisfied	Auxiliary input selection	[-]
			State setting	ON/OFF
	Waiti variable 	Waiting for user parameter until conditions satisfied	User parameter setting	[-]
			Condition selection	[-]
			setting value	[-]
	Wait EM12 signal 	Waiting for EM12 signal input until conditions satisfied	EM12 input selection	[-]
			State setting	[-]

Group	Command/ Schematic	Function	Parameter	Unit
	Wait EM67 signal 	Waiting for EM67 signal input until conditions satisfied	EM67 input selection	[-]
			State setting	[-]
	Wait program synchronization completed 	Wait for the synchronization program end for this wait until the end of simultaneously running selected end.	synchronization program selection	[-]
			State setting	Precise positioning / smooth movement
	Wait servo axis position signal 	Choose to wait for the servo axis to meet the set conditions.Procedures have been waiting for until conditions satisfied.	Servo setting	[-]
			condition selection	[-]
			position setting	[-]
	Label mark 	Insert jump Logo position, insert the jump logo, the jump label automatically increase	[-]	[-]
	Jump to label/mark 	Unconditional jump to jump logo	Jump logo selection	[-]
	Sync program 	Using Sync program	Selecting Sync program	Sync program 2~10
			State setting	Precise positioning / smooth movement
	Jump to gripper signal 	After the clamp to meet the condition setting ,turn to the jump logo	clamp selection	Clamp 1~5
			State setting	ON /OFF
			Select jump logo	[-]
	Jump to vacuum signal 	The Vacuum to meet the conditions settings , turn to the jump logo	Vacuum selection	Sucker1~4
			State setting	ON /OFF
			Select jump logo	[-]
	Jump to input signal 	Selected user input to meet the conditions settings, turn to the jump logo	Select user input	[-]
			State setting	ON /OFF
			Select jump logo	[-]

Group	Command/ Schematic	Function	Parameter	Unit
	Jump to function input signal 	The auxiliary input signal to meet the state settings ,turn to the jump logo	Auxiliary input signal selection	[-]
			State setting	ON /OFF
			Select jump logo	[-]
	Jump to Variable signal 	User parameters to meet the conditions settings, turn to the jump logo	Select the user parameter name	[-]
			State setting	ON /OFF
			Jump values setting	[-]
			Select jump logo	[-]
	Jump to EM12 signal 	Selected EM 12 to meet the input conditions settings, turn to the jump logo.	Input selection	[-]
			State setting	ON /OFF
			Select jump logo	[-]
	Jump to EM67 signal 	Selected EM 67 to meet the input conditions settings, turn to the jump logo.	Input selection	[-]
			State setting	ON /OFF
			Select jump logo	[-]
	Jump to axis position signal 	selected servo-axis position to meet the conditions settings ,turn to the jump logo	Servo selection	[-]
			Conditions selection	[-]
			Position settings	[-]
			Select jump logo	[-]
Error on program		An action error		
Action end		Action end logo		
Action start		Action start logo		

1) Select action

After selecting the action, it will be appeared the current parameter setting screen.

2) Insert/Delete command

 insert the new order。

 Delete the current order。

 complete insert / delete。

3) Standard Program

a) Program starts

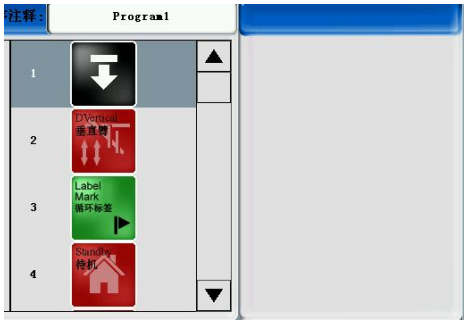


Fig.4-10: Standard program command 1

b) Axis-Y and Axis-Y2 run to absolute position 0mm

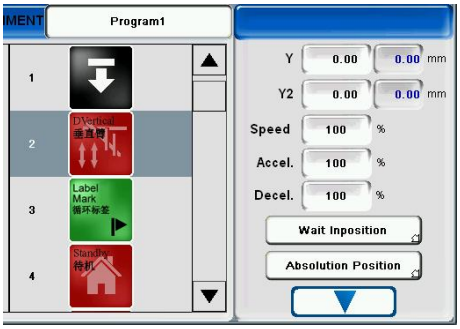


Fig.4-11: Standard program command 2

c) Label mark 1

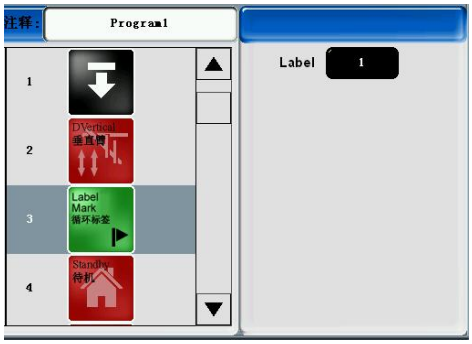


Fig.4-12: Standard program command 3

d) Robot moves to standby position and waits for IMM open mold

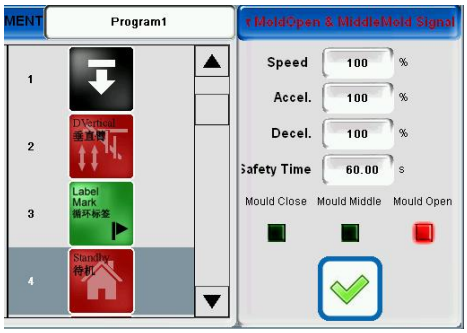


Fig.4-13: Standard program command 4

e) Axis-Y and axis-Y2 move to absolute position 600mm after IMM open mold

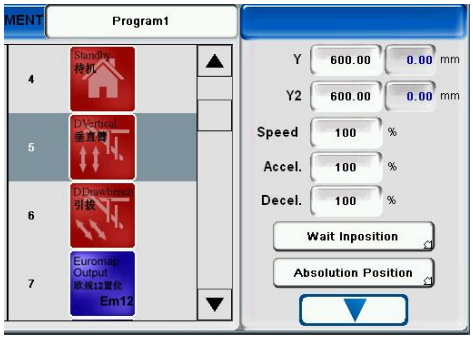


Fig.4-14: Standard program command 5

f) Axis-X and axis-X2 move to absolute position 0mm

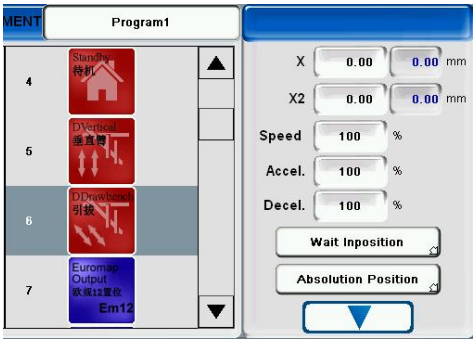


Fig.4-15: Standard program command 6

g) Enable ejector forward

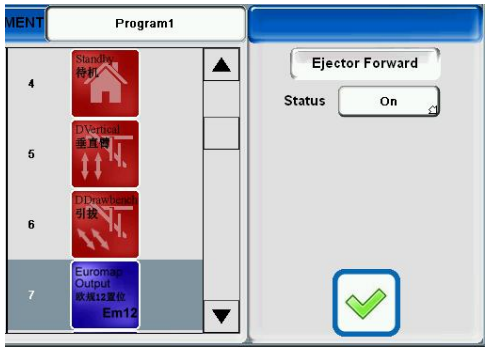


Fig.4-16: Standard program command 7

h) Turn on vacuum 1

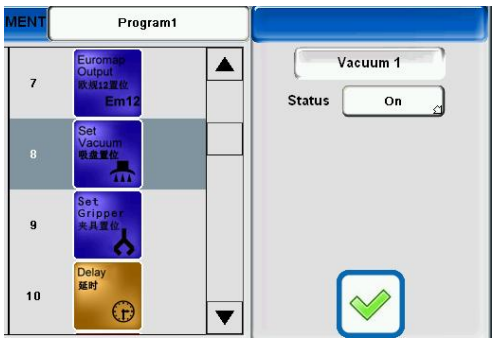


Fig.4-17: Standard program command 8

i) Turn on gripper 1

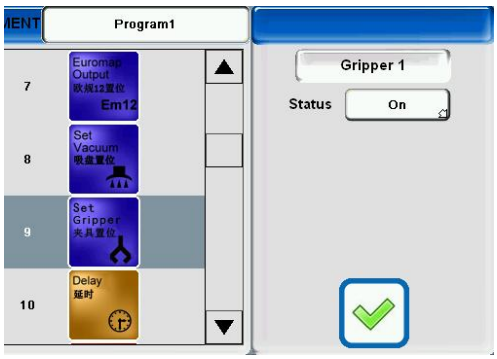


Fig.4-18: Standard program command 9

j) Delay 0.50sec

Fig.4-19: Standard program command 10

k) Axis-X and axis-X2 move to the absolute position 200mm

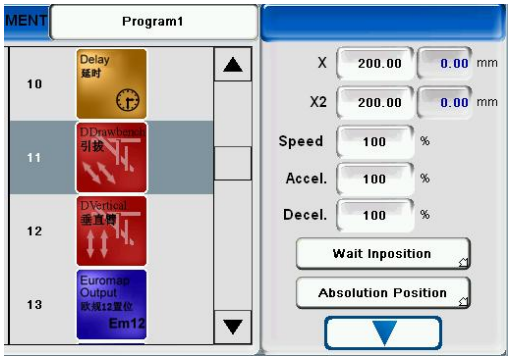


Fig.4-20: Standard program command 11

l) Axis-Y and axis-Y2 move to the absolute position 0mm

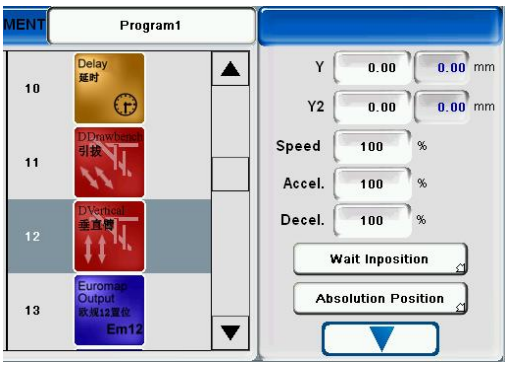


Fig.4-21: Standard program command 12

m) Disable ejector forward

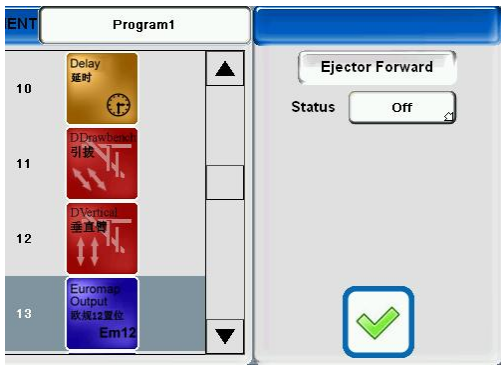


Fig.4-22: Standard program command 13

n) Enable mold close

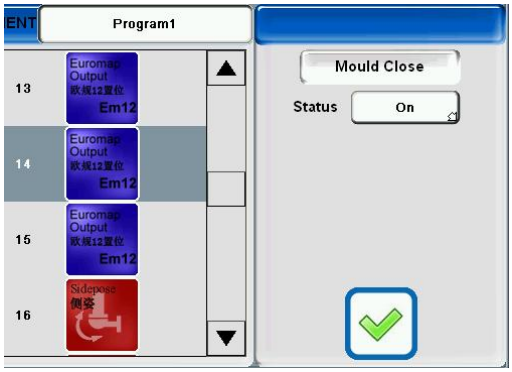


Fig.4-23: Standard program command 14

o) Enable mold area forward

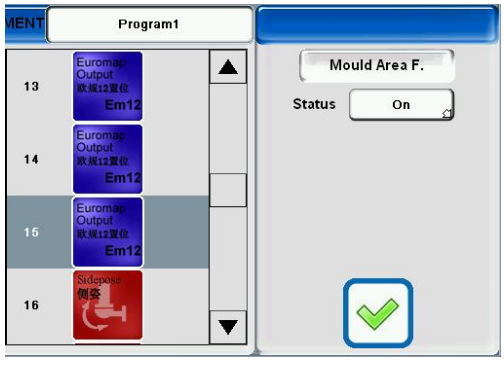


Fig.4-24: Standard program command 15

p) Axis-C turns 90 degree

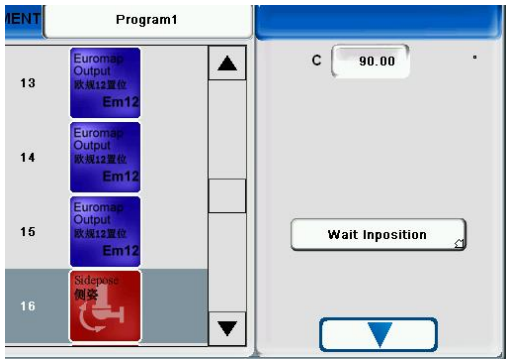


Fig.4-25: Standard program command 16

q) Axis-Z moves to the absolute position 1600mm

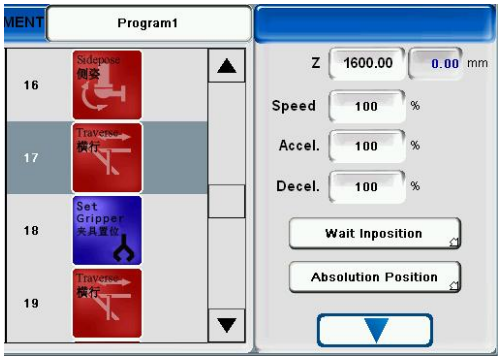


Fig.4-26: Standard program command 17

r) Turn off gripper 1

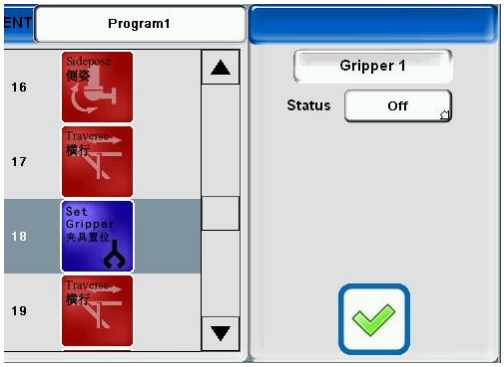


Fig.4-27: Standard program command 18

s) Axis-Z moves to the absolute position 1800mm

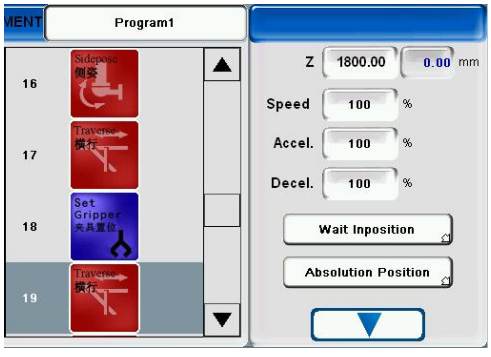


Fig.4-28: Standard program command 19

t) Axis-Y moves to the absolute position 800mm

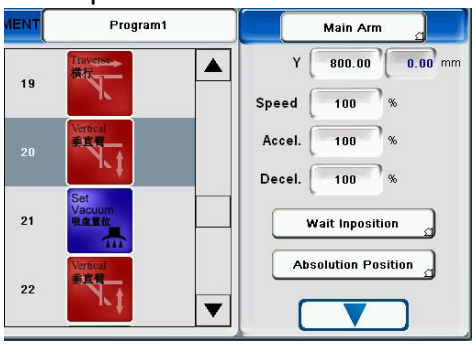


Fig.4-29: Standard program command 20

u) Turn off vacuum 1

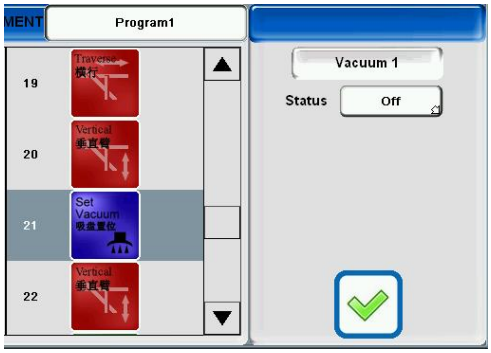


Fig.4-30: Standard program command 21

v) Axis-Y moves to the absolute position 0mm

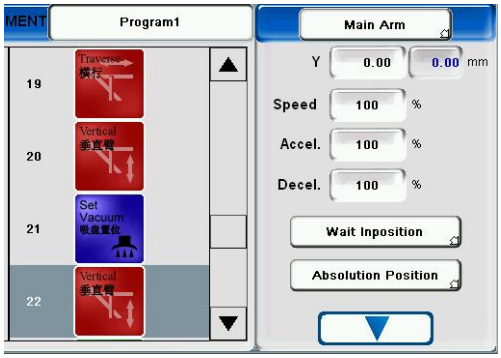


Fig.4-31: Standard program command 22

w) Jump to label mark 1

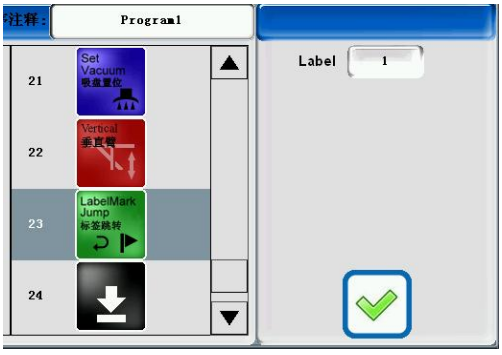


Fig.4-32: Standard program command 23

x) Program ends

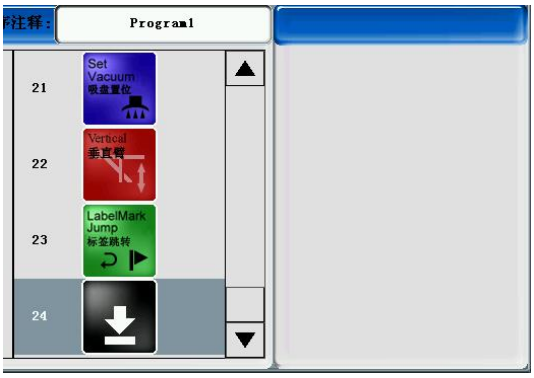


Fig.4-33: Standard program command 24

4.3.1.3 Variables

Click ***Function*** --***Teach***--***Variables*** to enter the page as shown in Fig.4-34.

Fig.4-34: Variables page

4.3.2 Standby Setup

Click ***Function--Standby Setup*** and enter the page as shown in Fig.4-35.

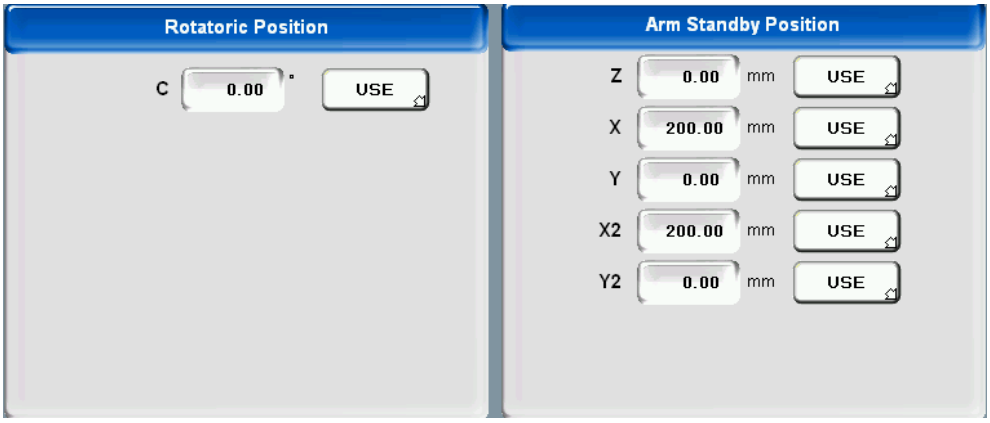


Fig.4-35: Standby Setup page

Since standby and stack both are depending on the mould, all parameters can only modified and saved during editing the program.
Rotatoric Position: Set rotate axis C degree
Arm standby position: Set the position of three coordinate axes Z,X, Y or five axes, Z, X, Y, X2, Y2.

4.3.3 Palletise Setup

In the program editor page, click ***Palletise Setup*** on the right hand side to enter the page as shown in Fig.4-36 or click ***Function--Palletise Setup***.

Fig.4-36: Palletise program setup page

1) Program edits logo. When this logo appears that meanings the current program being edited.
2) Stack group.
3) Setting palletize parameter zone.

When point 1 program edit logo does not appear, meaning no program is editing at the moment, then the total stack parameter settings menu, and orders will be locked, so only under the program edit mode, stack parameter can set.The parameters not in program editing mode as shown in Fig.4-37 .

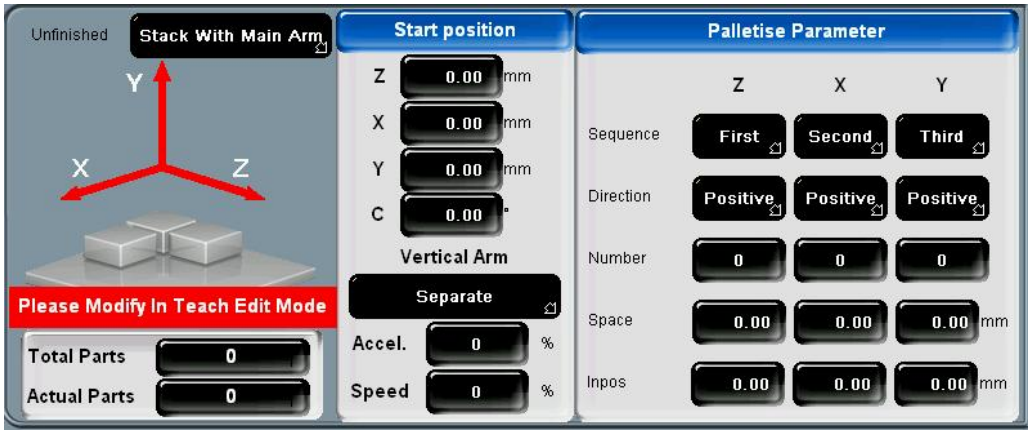


Fig.4-37: No program is editing at the moment

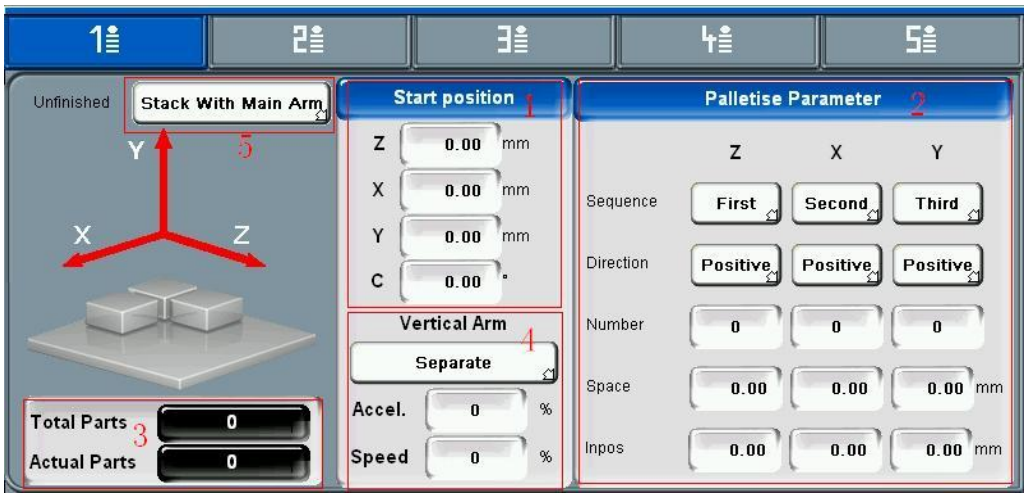


Fig.4-38: Start position. Put Z, X, Y position of the first product.

1) Palletise parameter
   a) Order setting: Set the Z, X, Y stack in the order, the first, increase which direction.
   b) Direction setting: Set the Z, X, Y direction, including forward and reverse.
   c) Stacking amount setting: Set the number of three directions placement.
   d) Product size: The spacing between the adjacent two products
2) Recording
   a) Stacking number, the user set the number of all directions stacking; the system automatically calculates the current total number of the stack.
   b) Current number, displays the current product is which one in currently stacked.

For example

Example1:

Start position: Z/1000.00、X/400.00、Y/800.00
Sequence: Z/first、X/second、Y/third;
Direction: Z/ positive、X/ reverse、Y/ positive;
Number of parts: Z/4、X/4、Y/3;
Part space: Z/50.00、X/40.00、Y/30.00。
Total parts: 48
The first parts placed on(Z，X，Y)=（1000，400，800）point.
The second parts placed on(Z，X，Y)=（1050，400，800）point.

Example2:

Start position: Z/1000.00、X/400.00、Y/800.00
Sequence: Z/ second、X/ first、Y/ third;
Direction: Z/ positive、X/ reverse、Y/ positive;
Number of parts: Z/4、X/4、Y/3;
Part space: Z/50.00、X/40.00、Y/30.00。
Total parts: 48
The first parts placed on(Z，X，Y)=（1000，400，800）point.
The second parts placed on(Z，X，Y)=（1000，360，800）point.

3) Set speed and acceleration speed for palletise
4) Set main arm or sub arm to palletise

4.3.4 Safety Setup

Click ***Function--Safety Setup*** to enter the page as shown in Fig.4-39.

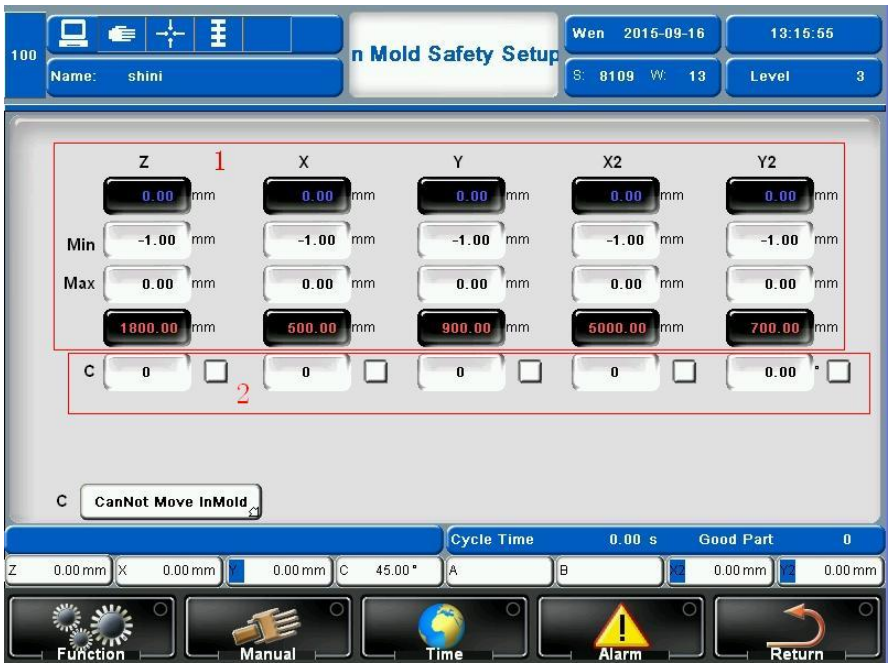


Fig.4-39: Safety Setup page

Setup all servo axes' safety maximum and minimum value. While robot exceed the value then stop automatically.
Setup all pneumatic axes safety angle. While the rotation axis exceed the set angle then stop automatically.
Setup all axes maximum and minimum safety value to form a 3D safety space as shown in Fig.4-40.

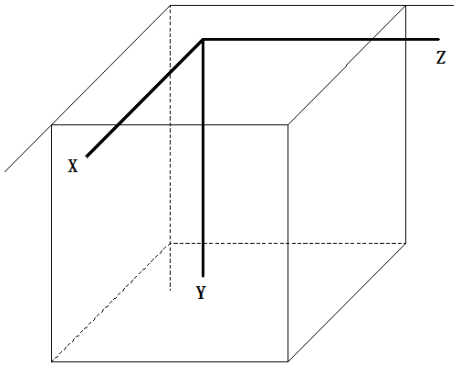


Fig.4-40: Safety space

4.3.5 Check Setup

Click ***Function--Check Setup*** to enter the page as shown in Fig.4-41.

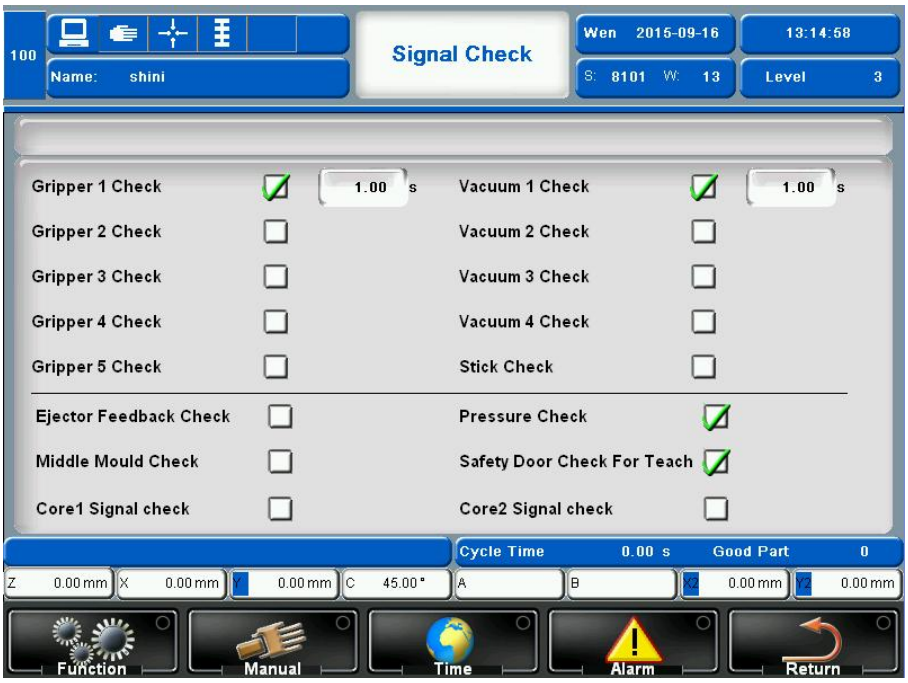


Fig.4-41: Check Setup page

Set whether to check corresponding signal.If choose to check, then system will alarm if the set time does not detect any signal during the automatic operation
As shown in above figure.

☑ (Check)

☐ (No check)\

4.3.6 Produce Setup

Click ***Function--Produce Setup*** to enter the page as shown in Fig.4-42 and see the details as shown in Table 4-2.

Fig.4-42: Produce setup page

Table 4-2: Produce setup details

Total Quantity	-	Display of total circulation modulus
Good Part	-	Display the number of finished products
Reject Part	-	Display the number of reject part
Quantity Setup	-	Setup the quantity for this modulus
Reject Alarm Setup	-	Setup the number of reject products to alarm
Operation monitor time	-	Setup operation cycle time, if the cycle time is exceeded then alarm

4.3.7 System Setup

Click ***Function--System Setup*** to enter the page as shown in Fig.4-43.

Fig.4-43: System Setup page

4.3.7.1 System Settings

The details of system settings bar as shown in Table 4-3.

Table 4-3: System settings details

Teach mode	On Off	On → All position can only be inserted by manual teach mode Off → All position can be inserted by manual input
Insert Delay Automatically	On Off	On → During teach motion, system will insert a delay automatically for every new inserted motion Off → No delay command will be inserted, if user need a delay, need to insert manually
Start from last Command	On Off	On → Able to continue operation after alarm Off → No further operation after alarm
Gripper reset when move standby	On Off	On → After troubleshooting, gripper restore to position automatically Off → After troubleshooting, gripper need to restore to position manually
Vacuum reset when move standby	On Off	On → After troubleshooting, vacuum restore to the position automatically Off → After troubleshooting, vacuum need to restore to the position manually
Safety door process		Set safety door alarm way during automatic operation -- Switch to manual -- Switch to semi-automation -- Decrease turn to semi-automation -- Shut off motor
Vision		Set whether to enable outside vision
Get Eur.Signal type when cycle run		Choose machine input EUROMAP signal source -- From IMM -- From simulator
Euromap signal protection mode		Set Euromap output signal limit tuning -- Arm origin -- Standby point -- Safe point
Axis Z move condition		Set condition for axis Z movement

4.3.7.2 Time and Language

Fig.4-44: Time and language bar window

1) Language setup: Click the bar to select the language
2) Switch Unit : SI system or English system
3) Time
   a) Screensaver Delay Time
   b) Low Brightness Delay. If no operation within this value, the screen brightness will be lower.
   c) Password Protect Delay
4) Parameters automatic save setup
5) Set Date/time
6) Change Password

4.3.8 Servo Setup

Click **Function**--**Servo Setup** and enter the page as shown in Fig.4-45.

Fig.4-45: Servo setup page

Axis Assignment	Set each axis name and set origin sequence	Actual Speed Current	Check each axes' speed, torque, electricity (torque and electricity only available to Sigmatek servo)
Axis Configuration	Set operating parameters: position, speed	Feedback Offset	Check motor origin angle (only available to Sigmatek servo)
Axis	Set each axis gain, maximum speed, maximum position and etc.	Reset Setup	Reset parameters
DaisDriver Para	Set driver parameters (only available to Sigmatek servo)	RESET	Long press this button and reset parameters
Arm Y Force Limit	Set axis-X and axis-X2 servos' output torque monitoring	Reboot	Long press this button to reboot hand controller

4.3.8.1 Servo Axis Assignment

Click ***Function--Servo Setup--Axis Assignment*** to enter the page as shown in Fig.4-46.

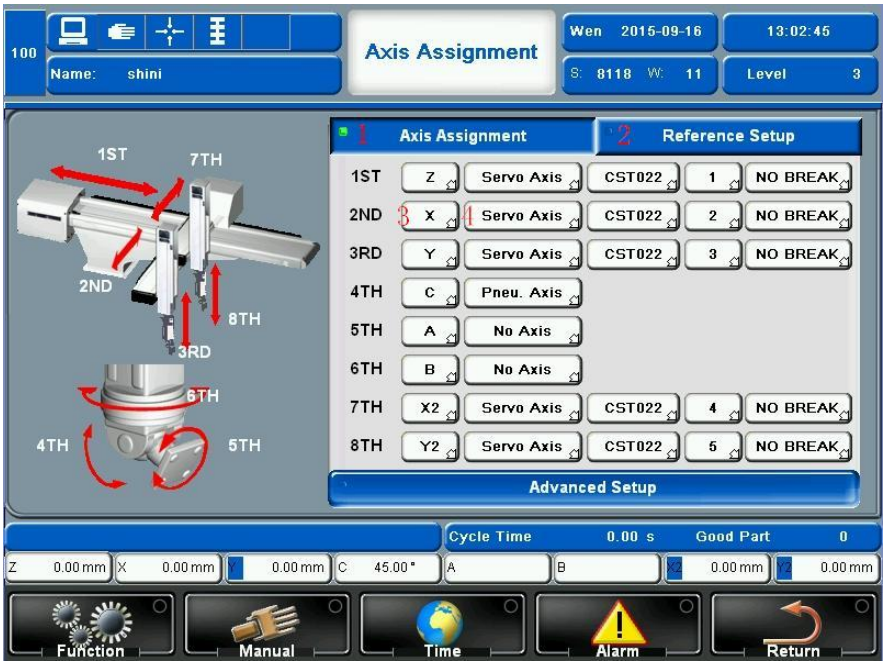


Fig.4-46: Axis assignment page

1) Servo axis assignment window
2) Reference Setup window
3) Current axis name

Can choose from X , Y , Z , C , B , A , Y1 , Y2 , Z1 , Z2 , C1 , C2

4) Axis type setup

Can choose from servo axis, pneumatic axis or no axis

Click ***Reference Setup*** bar and enter the page as shown in Fig.4-47.

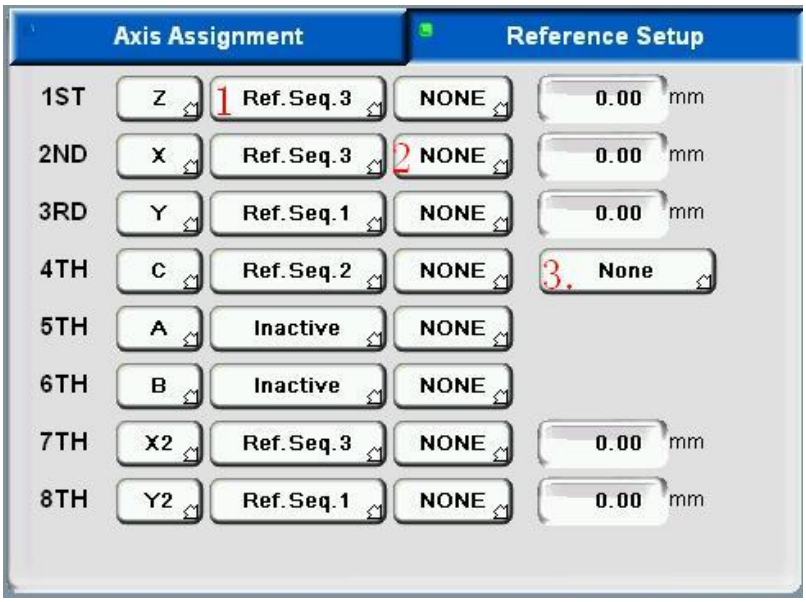


Fig.4-47: Reference Setup bar details

1) Set homing sequence
   Total 8 axes can set 6 levels homing sequence
2) Choose reference point
   Can choose none or reference point
3) Set each axes origin offset

After all axes are back to the home position, if there is deviation from the ideal position, the home position offset setting can make it back to ideal position. Servo axis's position offset unit is mm; pneumatic axis's position offset can choose from none, maximum value and minimum value.

4.3.8.2 Axis Configuration

Click ***Function--Servo Setup--Axis*** Configuration to enter the page as shown in Fig.4-48.

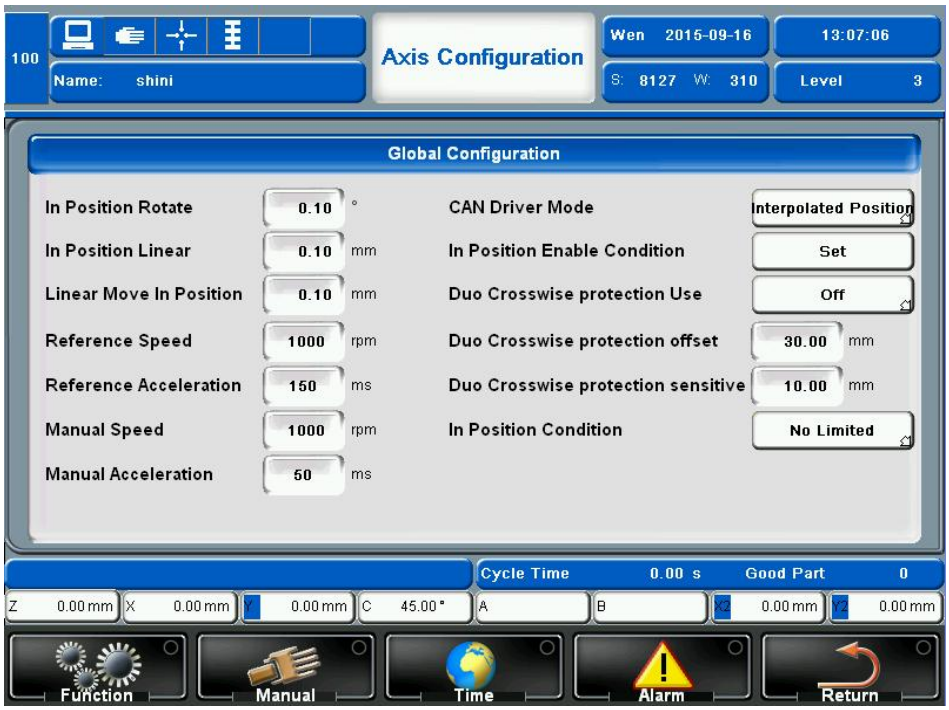


Fig.4-48: Axis configuration page

1) In Position Rotate

It is set as the minimum deviation angle to determine whether the axis is in the position, the operation unit is degree. For example, to rotate 30°, we set the minimum deviation angle as 0.10°, then when the servo axis rotate to 29.90°, the system will consider the axis is in the position.

2) In Position Linear

Set the minimum deviation distance to determine whether the axis is in the position,the operation unit is mm. For example, to move 30mm, set the value as 0.10mm, then when the servo axis move to 29.90mm, the system will consider the axis is in the position.

3) Reference Speed

Motor speed when going back to the origin. Unit : RPM

4) Reference Acceleration

Motor accelerate time when going back to the origin. Unit: ms. Noted: The shorter of accelerate time, the greater of accelerating.

5) Manual Speed

Max. motor operating speed under manual control. Unit: RPM.

6) Manual Acceleration

Max. motor acceleration under manual control. Unit: ms. Noted: The shorter of accelerate time, the greater of accelerating.

7) Duo crosswise protection Use

Turn on this setting if the robot has two crosswise arms.

8) Duo crosswise protection offset

For example, set this value as 30mm (the minimum distance between two crosswise arms), the robot will stop and alarm if the distance are below the setting. Only ST5 is available to this setting.

9) Duo crosswise protection sensitive

The safety distance will be detected while the arm movement larger than this set value.

4.3.8.3 Servo operating parameter setup

Click ***Function--Servo Setup--Axis***to enter the page as shown as Fig.4-49.

Fig.4-49: Axis setting page

1)Axis bar

Select the axis that required configuration in this bar, total are 8 axes and can be divided into servo axis and pneumatic axis.

2)Axis configuration window

There are two parts to be set in this window, control parameters and servo parameters. The parameters details are as shown in the table below.

Table 4-4: Axis configuration details

Control parameter configuration		
Arm number	[-]	Single/ double
Motor direction	[-]	Set moving direction
Pitch	mm	Set Synchronous Wheel parameter
Tooth number	[-]	Set Synchronous Wheel parameter
Gear ratio	[-]	Set gear ratio
KV	1/s	Position gain
VU	[-]	Speed gain
Maximum Drag limit	mm	The maximum deviation between command speed and actual speed. If the value exceed the maximum deviation, system will alarm, servo position overrun
Servo parameter configuration		
Software minimum position	mm	Minimum position allowed, recommend to set at -1.00
Software maximum position	mm	Maximum position allowed, depend on machine dimensions
Motor speed	RPM	Set motor rated rotation speed. Please set the value on the motor nameplate
Vmax	[-]	Calculated by motor speed automatically, user no need to calculate
Amax	mm/s^2	Maximum acceleration of the motor accelerating from static to the desired speed

The configuration of pneumatic axes as shown in Fig.4-50 and its details as shown in table 4-5.

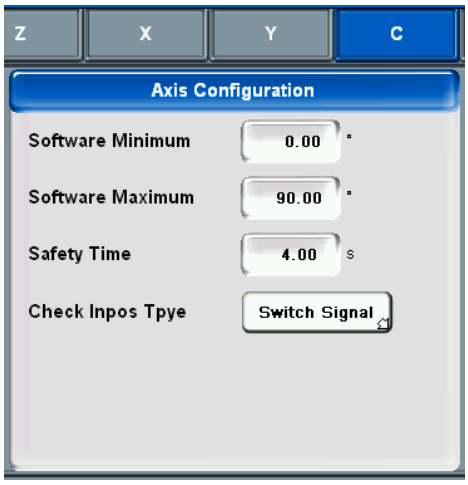


Fig.4-50: Axis configuration window

Table 4-5: Servo axis parameter configuration details

.**Servo axis parameter configuration**		
Software Minimum	°	Minimum position allowed
Software Maximum	°	Maximum position allowed
Safety time	s	After a set safety time passed, the pneumatic axis completed an action but system haven't detected any feedback signal, then alarm
Check Inpos Type	-	Set position detection type, set switch signal/time

4.3.9 Files manager

Click ***Function--Files Manager*** to enter the page as shown in Fig.4-51.

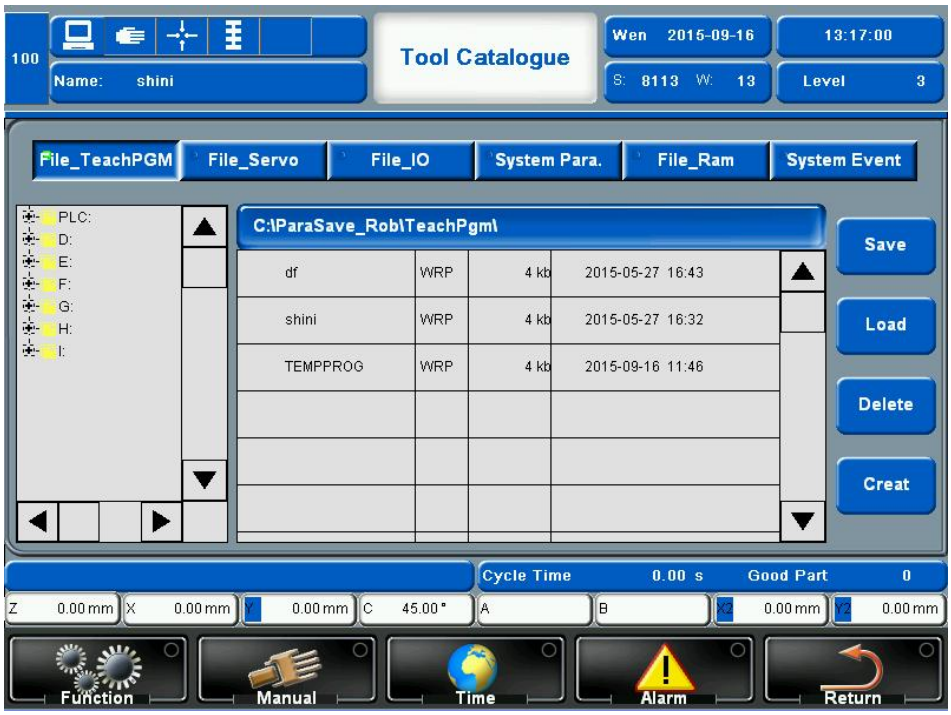


Fig.4-51: File manager page

In this page, teach file can be saved, loaded, deleted and created. Servo parameters, input & output, system parameters also can be saved and loaded in here.

4.3.10 Manual Settings

Click ***Manual*** in the main menu to enter the page as shown in Fig.4-52.

Fig.4-52: Manual page

1) Enter Gripper page.
2) Enter Vacuum/Air Blow page.
3) Enter EM12 input monitor page.
4) Enter EM12 manual output page.
5) Enter Function input monitor page.
6) Enter Function output monitor page.
7) Enter EM67 input monitor page.
8) Enter EM67 manual output page.
9) Enter Jog operation page.
10) Enter Data Analyzer page.
11) Enter spare input monitor page.
12) Enter spare output monitor page.

4.3.11 Gripper

Click ***Manual--Gripper*** to enter the page as shown in Fig.4-53.

Fig.4-53: Gripper page

- Gripper status

 Gripper disconnected  Gripper connected

 Connect gripper button, click to open gripper

 During gripper open, the corresponding signal does not feedback. This signal indicate gripper disconnected.

 Indicate gripper has gripped a product, if gripper does not grip any product, its status will not change. Noted: During assembly, the signal may connect to wrong port.

 Disconnect gripper button, click to close gripper

4.3.12 Vacuum/ Air Blow

Click ***Manual--Vacuum/AirBlow*** to enter the page as shown in Fig.4-54

Fig.4-54: Vacuum/AirBlow page

- Vacuum/Air Blower Status

 Vacuum/ Air Blower disconnected  Vacuum/ Air Blower connected

 Connect vacuum/ air blower , click to open vacuum

 During vacuum open, the corresponding signal does not feedback. This signal indicate vacuum disconnected

 Indicate vacuum has suck a product, if vacuum does not suck any product, its status will not change. Noted: During assembly, the signal may connect to wrong port.

 Disconnect vacuum/air blower button, click to open vacuum disconnected signal, re-click to close vacuum.

4.3.13 EM12 Inputs

Click ***Manual--EM12 Inputs*** to enter the page as shown in Fig.4-55.

Fig.4-55: EM12 Inputs page

Input: Check each EM12 input signal status, signal available  or no signal 

4.3.14 EM12 Outputs

Click ***Manual--EM12 Outputs*** to enter the page as shown in Fig.4-56.

Fig.4-56: EM12 Outputs page

Output: Display and test EM12 output signal status

 (Force to output position)

 (Force to output restore position)

4.3.15 Robot In

Click ***Manual--Robot In*** to enter the page as shown in Fig.4-57.

Fig.4-57: Robot In page

Input: Check each function input signal status

Signal available

No signal

4.3.16 Robot Out

Click ***Manual--Robot Out*** to enter the page as shown in Fig.4-58.

Fig.4-58: Robot out page

Output: Display and test function output signal status

 (Force to output position)

 (Force to output restore position)

4.3.17 EM67 inputs

Click ***Manual--E67 Inputs*** to enter the page as shown in Fig.4-59.

Fig.4-59: EM67 signal inputs page

Input: Check each EM67 input signal status

 Signal available

 No signal

4.3.18 EM67 Outputs

Click ***Manual--E67 Outputs*** to enter the page as shown in Fig.4-60.

Fig.4-60: EM67 signal outputs page

Output: Display and test each EM67 output signal status

 Force to output position

 Force to output restore position

4.3.19 Jog

Click ***Manual --JOG*** to enter the page as shown in Fig.4-61.

Fig.4-61: Jog page

1) Choose the require servo axis
2) Operation speed button, arrow indicates operation direction

 (High speed (or pneumatic axis operation)

 (Medium speed

 (Low speed

3) Horizontal in tuning
4) Horizontal out tuning
5) Position column to set distance tuning, speed column to set current speed (count by percent, full speed is 100%)
6) Actual speed, count by percent

Click rotational axis bar (example: axis-C) to enter the page as shown in Fig.4-62.

Fig.4-62: Rotational axis bar page

Only have two motion, vertical or horizontal

4.3.20 Inputs

Click ***Manual--Input*** to enter the page as shown in Fig.4-63.

Fig.4-63: Input page

Input: Check each spare input signals status

Signal available

No signal

4.3.21 Output

Click ***Manual--Output*** to enter the page as shown in Fig.4-64.

Fig.4-64: Output page

Output: Display and test the spare output signal status

 (Force to output position

 (Force to output restore position

4.4 Time

Click ***Time*** to enter the page as shown in Fig.4-65.

Fig.4-65: Time settings page

1) Set ejector front/back enable delay period, cycle monitor period, mold open interval time, air blow delay period and conveyor belt run time
2) Monitor other time

4.5 Alarms and Logs

Click Alarm to enter the page as shown in Fig.4-66.

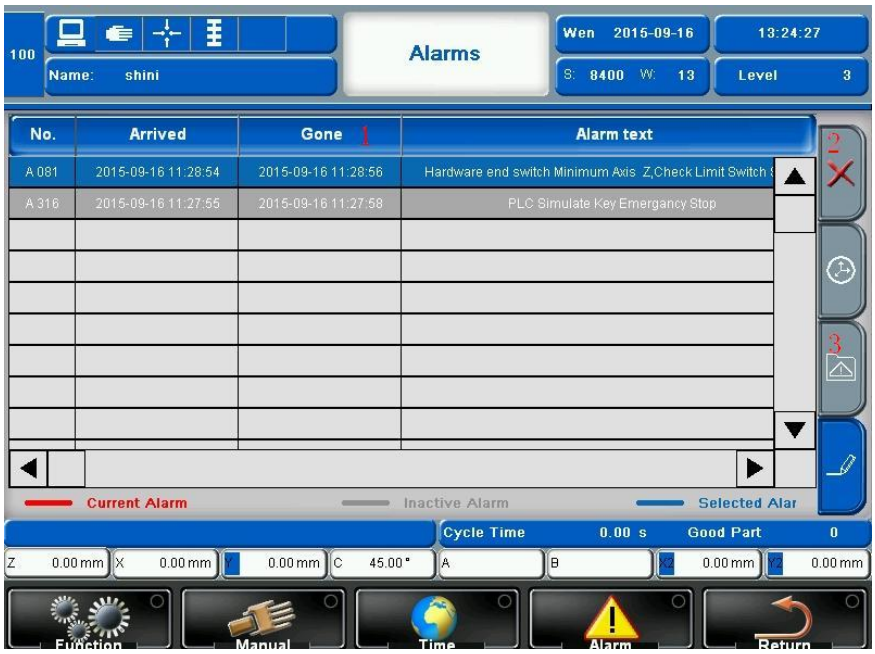


Fig.4-66: Alarm page

1) Alarm information details. Including alarm sequences, alarm trigger time and date, alarm response time and date and description of the alarm details information
2) Clear the responded alarms. If the alarm has already been responded, then all the responded alarms can be deleted in the list.
3) Enter the operating record page
4) See Table 4-6 alarm message instruction.

Table 4-6: Alarm details

No	Alarm	Description	Solution
A 004 to A 011	Servo Axis** internal minimum distance	**is (X/Y/Z/A/B/C/Y2/Z2) total 8 axes Current**axis's actual position smaller than set minimum position	In the manual page, move the axis to the range of minimum position Function/Servo Setup/ Servo operation parameter configuration/**/Servo parameter configuration -> software minimum position, actual position need to greater than this value, recommend to set at -1.00mm
A 012 to A 019	Servo Axis** internal maximum distance	**is (X/Y/Z/A/B/C/Y2/Z2) total 8 axes Current**axis's actual position greater than set maximum position	In the manual page, move the axis to the range of maximum position Function/Servo Setup/ Servo operation parameter configuration/**/Servo parameter configuration -> software maximum position, actual position need to greater than this value, depend on machine dimensions

No	Alarm	Description	Solution
A 020 to A 027	Servo axis ** position has exceeded	**is (X/Y/Z/A/B/C/Y2/Z2) Total 8 axes Servo operation cannot follow CNC command speed	Function/Servo Setup/ Servo operation parameter setup/**/ Control parameter configuration –> Maximum position deviation, set the first value greater than second value 1mm, second value shows the actual deviation Function/Servo Setup/ Servo operation parameter setup/**/ control parameter configuration -> Set the KV value a bit higher, recommend to add 50 each time Adjust operation acceleration, Function/Servo Setup/ Servo Operation speed configuration
A 028 to A 035	Servo Axis ** alarm	**is (X/Y/Z/A/B/C/Y2/Z2) total 8 axesServo error	Module CST022 has not been detected Module CST022 +24V/+5V power supply error Servo amplifier alarm an error
A 036 to A 043	Servo axis**minimum position limit	**is(X/Y/Z/A/B/C/Y2/Z2)total 8 axes Minimum limit sensor got signal input	Robot exceed limit position, check robot Transducer error, check the transducer
A 044 to A 051	Servo axis** maximum position limit	**is（X/Y/Z/A/B/C/Y2/Z2）total 8 axes Maximum limit sensor got signal input	Robot exceed limit position, check robot Transducer error, check the transducer
A 052	Pressed Emergency stop	Emergency stop button in the hand controller has been pressed	Crosswise rotate the emergency button Function/System setup page, **Stop then reboot** Function **Open**, this alarm will only disappear by reboot. If choose **Close**, the alarm will disappear automatically
A 053	Pressure error	Air pressure error	Check air source pressure
A 054	Pressed IMM emergency stop button	Detected IMM emergency stop button has been pressed	Check IMM emergency stop button Check the wiring
A 055	Safety facilities error	IMM safety door open	Check IMM safety door status Check the wiring
A 056	Quantity finished	Set quantity has finished	Function/Quantity setup page -> Setup quantity
A 057	Reject products reached the set limit	Reject products reached the set limit to alarm	Function/Quantity setup page -> Reject alarm setup
A 058	Exceed cycle time	Cycle time exceed the set protection time	Function/Quantity Setup -> Motion monitor time
A 060	Safety zone detection error	Robot current position beyond safety zone	Check robot current actual position Function/Safety point setup page, set the corresponding safety zone
A 061	Gripper error	Gripper action exceeds the set monitoring time	Function/Signal setup -> Gripper*Detection *.**s
A 062	Open mold signal error	Open mold signal and close mold signal conflict	Check IMM output signal
A 063	Vacuum error	Vacuum action exceeds the set monitoring time	Function/ Signal setup -> Vacuum*detection *.**s
A 064	Axis Z not in home position	Axis Z deviated from the home position	Axis Z beyond the origin vertex 1mm^3 cube, check the actual position of the robot and the mold open signal

4.5.1 History Logs

Click the point 3 in Fig. 4-66 to enter the page as shown in Fig. 4-67.

Fig.4-67: Protocol page

1) Operation record details, including record type (alarm/operating instruction), operation number/ alarm number, alarm trigger times, last recorded trigger record, last record responded time and alarm/operation's detail description.
   Scroll the horizontal bar to the right side as shown in Fig. 4-68 to check the alarm text.
2) Go back to ***Alarm*** page.

Fig.4-68: Scroll the horizontal bar to the right side

4.5.2 Message

When the user input the password which do not meet the access level, the page will pop an alert as shown in Fig. 4-69.

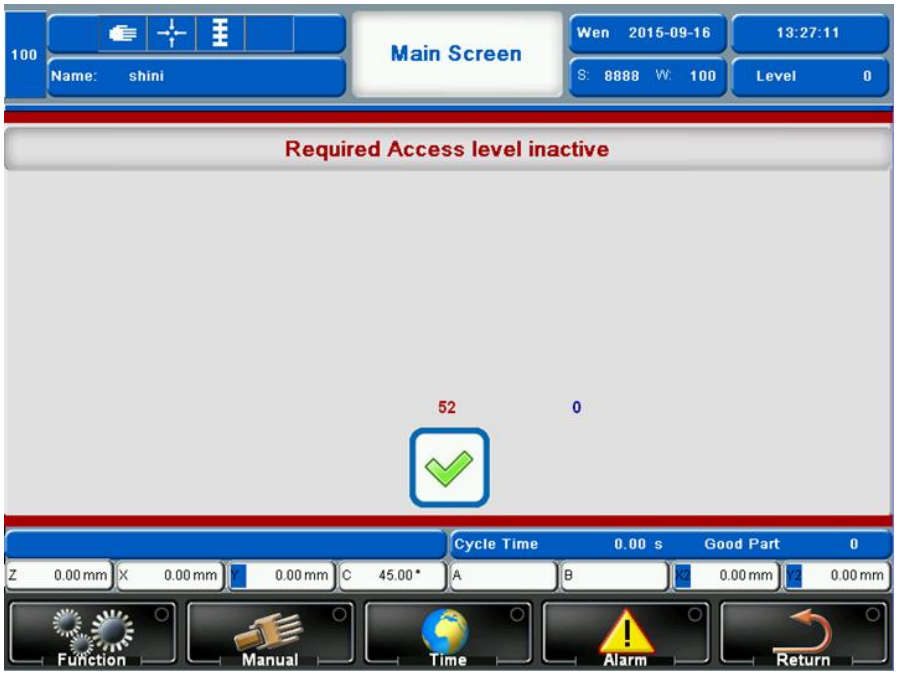


Fig.4-69: Alert for requiring higher level password

5. Hardware Configuration list (I/O)

5.1 ST3 I/O

Table 5-1: ST3 I/O configuration list

Input/Output	Module	Functions	Softkey	HardKey	Wiring
Inputs	CEZ181/00	EM Emergency Stop 1	1	1	
		EM Emergency Stop 2			
		EM Safety Device 1	2	2	
		EM Safety Device 2			
		EM Reject	3	3	
		EM Mould Close	4	4	
		EM Mould Open	5	5	
		EM Intermediate Mould open			
		EM Supply From Handing (+24V)			
		EM Machine on (Enable operating)	6	6	
		EM Ejector Back	7	7	
		EM Ejector Front	8	8	
		EM Core Puller 1 Position 1	9	9	
		EM Core Puller 1 Position 2	10	10	
	CDI163/01	EM Core Puller 2 Position 1	11	1	X1-1
		EM Core Puller 2 Position 2	12	2	X1-2
		Emergency Stop	13	3	X1-3
		Mould Area Free	14	4	X1-4
		Middle Mould Input	15	5	X2-1
		Air Source Pressure Input	16	6	X2-2
		Sensor Input	17	7	X2-3
		Weigh Up Input	18	8	X2-4
		Spare Input1	19	9	X3-1
		Spare Input2	20	10	X3-2
		Spare Input3	21	11	X3-3
		Spare Input4	22	12	X3-4
		Spare Input5	23	13	X4-1
		Axle1 Limit min	24	14	X4-2
		Axle1 Limit max	25	15	X4-3
		Axle1 Reference	26	16	X4-4
	CDI163/02	Axle2 Limit min	27	1	X1-1
		Axle2 Limit max	28	2	X1-2
		Axle2 Reference	29	3	X1-3
		Axle3 Limit min	30	4	X1-4

Input/Output	Module	Functions	Softkey	HardKey	Wiring
		Axle3 Limit max	31	5	X2-1
		Axle3 Reference	32	6	X2-2
		Axle4 Limit min	33	7	X2-3
		Axle4 Limit max	34	8	X2-4
		Vacuum1	35	9	X3-1
		Vacuum2	36	10	X3-2
		Vacuum3	37	11	X3-3
		Vacuum4	38	12	X3-4
		Gripper1	39	13	X4-1
		Gripper2	40	14	X4-2
		Gripper3	41	15	X4-3
		Gripper4	42	16	X4-4
Outputs	CEZ181/00	EM Emergency Stop 1	1	1	
		EM Emergency Stop 2			
		EM Mould Area Free	2	2	
		EM enable Mouldclose	3	3	
		EM enable Mouldopen	4	4	
		EM Supply From Machine (+24V)			
		EM Robot On (Enable operating)	5	5	
		EM enable Ejector back	6	6	
		EM enable Ejector front	7	7	
	CTO163/04	EM enable Core1 Position1	13	1	X1-1
		EM enable Core1 Position2	14	2	X1-2
		EM enable Core2 Position1	15	3	X1-3
		EM enable Core2 Position2	16	4	X1-4
		Vacuum1	17	5	X2-1
		Vacuum2	18	6	X2-2
		Vacuum3	19	7	X2-3
		Gripper1	20	8	X2-4
		Gripper2	21	9	X3-1
		Axle4 go Forward (only if pneumatic)	22	10	X3-2
		Axle4 go Backward (only if pneumatic)	23	11	X3-3
		Conveyor Belt Output	24	12	X3-4
		Lubrication Output	25	13	X4-1
		Elevator Output	26	14	X4-2
		Arms Break	27	15	X4-3
		Alarm Lamp out	28	16	X4-4

5.2 ST5 I/O

Table 5-2: ST5 I/O configuration list

Input/ Output	Module	Functions	Softkey	HardKey	Wiring
Inputs	CEZ181/00	EM Emergency Stop 1	1	1	
		EM Emergency Stop 2			
		EM Safety Device 1	2	2	
		EM Safety Device 2			
		EM Reject	3	3	
		EM Mould Close	4	4	
		EM Mould Open	5	5	
		EM Intermediate Mould open			
		EM Supply From Handing (+24V)			
		EM Machine on (Enable operating)	6	6	
		EM Ejector Back	7	7	
		EM Ejector Front	8	8	
		EM Core Puller 1 Position 1	9	9	
		EM Core Puller 1 Position 2	10	10	
	CDI163/01	EM Core Puller 2 Position 1	11	1	X1-1
		EM Core Puller 2 Position 2	12	2	X1-2
		Axle2 Limit min	13	3	X1-3
		Axle2 Limit max	14	4	X1-4
		Axle2 Reference	15	5	X2-1
		Axle3 Limit min	16	6	X2-2
		Axle3 Limit max	17	7	X2-3
		Axle3 Reference	18	8	X2-4
		Vacuum1	19	9	X3-1
		Vacuum2	20	10	X3-2
		Gripper1	21	11	X3-3
		Gripper2	22	12	X3-4
		Axle4 Limit min	23	13	X4-1
		Axle4 Limit max	24	14	X4-2
		Spare Input1	25	15	X4-3
		Spare Input2	26	16	X4-4
	CDI163/02	Axle1 Limit min	27	1	X1-1
		Axle1 Limit max	28	2	X1-2
		Axle1 Reference	29	3	X1-3
		Limit Min Axle1 second Arm	30	4	X1-4
		Limit Max Axle1 second Arm	31	5	X2-1
		Reference Axle1 second Arm	32	6	X2-2

Input/ Output	Module	Functions	Softkey	HardKey	Wiring
		Limit Min Axle2 second Arm	33	7	X2-3
		Limit Max Axle2 second Arm	34	8	X2-4
		Reference Axle2 second Arm	35	9	X3-1
		Axle5 Limit min	36	10	X3-2
		Axle5 Limit max	37	11	X3-3
		Vacuum3	38	12	X3-4
		Vacuum4	39	13	X4-1
		Gripper3	40	14	X4-2
		Gripper4	41	15	X4-3
		Spare Input3	42	16	X4-4
	CDM163/03	Emergency Stop	43	1	X1-1
		Mould Area Free	44	2	X1-2
		Middle Mould Input	45	3	X1-3
		Air Source Pressure Input	46	4	X1-4
		Sensor Input	47	5	X2-1
		Weigh Up Input	48	6	X2-2
		Spare Input4	49	7	X2-3
		Spare Input5	50	8	X2-4
Outputs	CEZ181/00	EM Emergency Stop 1	1	1	
		EM Emergency Stop 2			
		EM Mould Area Free	2	2	
		EM enable Mouldclose	3	3	
		EM enable Mouldopen	4	4	
		EM Supply From Machine (+24V)			
		EM Robot On (Enable operating)	5	5	
		EM enable Ejector back	6	6	
		EM enable Ejector front	7	7	
	CTO163/04	EM enable Core1 Position1	13	1	X1-1
		EM enable Core1 Position2	14	2	X1-2
		EM enable Core2 Position1	15	3	X1-3
		EM enable Core2 Position2	16	4	X1-4
		Axle4 go Forward (only if pneumatic)	17	5	X2-1
		Axle4 go Backward (only if pneumatic)	18	6	X2-2
		Vacuum1	19	7	X2-3
		Vacuum2	20	8	X2-4
		Gripper1	21	9	X3-1
		Gripper2	22	10	X3-2
		Axle5 go Forward (only if pneumatic)	23	11	X3-3
		Axle5 go Backward (only if pneumatic)	24	12	X3-4

Input/ Output	Module	Functions	Softkey	HardKey	Wiring
		Vacuum3	25	13	X4-1
		Vacuum4	26	14	X4-2
		Gripper3	27	15	X4-3
		Gripper4	28	16	X4-4
	CDM163/03	Conveyor Belt Output	29	1	X3-1
		Lubrication Output	30	2	X3-2
		Elevator Output	31	3	X3-3
		Arms Break	32	4	X3-4
		Alarm Lamp out	33	5	X4-1
		Spare Output1	34	6	X4-2
		Spare Output2	35	7	X4-3
		Spare Output3	36	8	X4-4

6 . Maintenance

6.1 General

Please noted 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.

 After the buyer accepts the robot, the responsibility for maintenance and equipment safety check are borne by the buyer.

 NOTED! The safety instructions marked with  must be followed according to the safety guide to ensure the robot functionality. During maintenance or before robot arm enter to safety zone, should close the main switch, release the air pressure and exhaust the gas in the air pressure system. Especially for the air pressure robot, the valve and compressed air must be clean.

6.2 Lubrication Requirement

Use cloth to remove the old grease from the guide shafts and the bearing scraper rings. Then use brush to apply new grease to the guide shafts.

All roller bearing grease should compliance with DIN 51825 standard.

6.3 Maintenance

Maintenance the robot according to the cycle to keep the robot to work in best performance

Daily Maintenance	Monthly Maintenance	Quarter Maintenance
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.	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.	Brush oil on to the axis.

7 . Assembly Diagram

7.1 ST3 & ST3-T traverse Unit

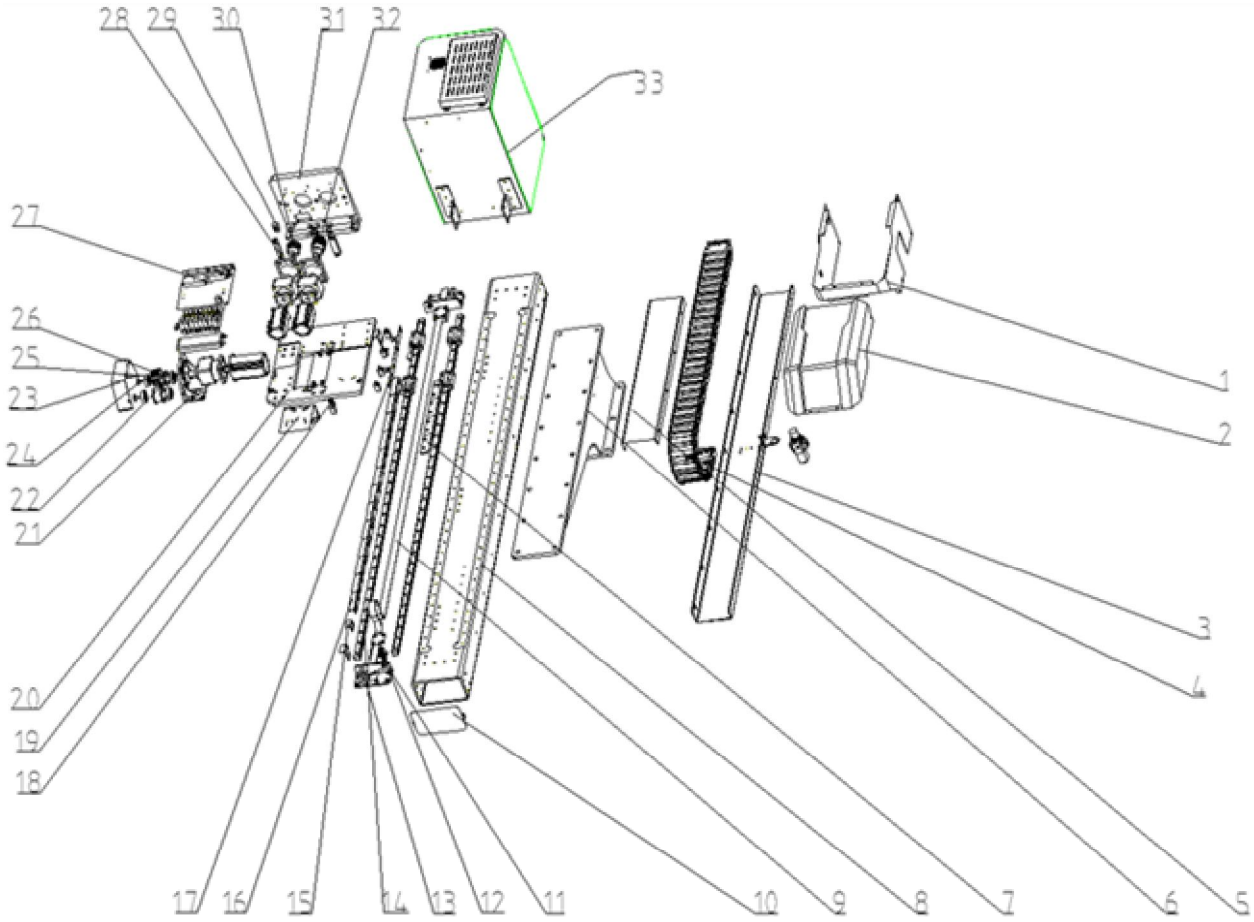


Fig.7-1: ST3 & ST3-T traverse unit (small model) exploded view

Table 7-1: Parts BOM for ST3 traverse unit

NO.	Part Name	BOM NO.		
		ST3-700-1400/ ST3-700-1400T	ST3-900-1600/ ST3-900-1600T	ST3-1100-1800/ ST3-1100-1800T
1	Sliding seat part 03	BL77051315020		
2	Sliding seat cover	BL81000200420		
3	Supporting frame of Trav. drag chain	BL70371420020	BL74030706120	BL76110013520
4	E2/000 drag chain	YE68225000900		
5	Drag chain cover	BL73714001320	BL73160004420	BL76110013520
6	Base	BH10591100010	BL74160005220	BW21132000000
7	In mold sensor plate	BL81023900020		
8	Traverse beam	BH79570001510	BH74160017010	BH74110014210
9	Synchronous belt	YR00082500100		
10	Traverse beam cover	BL81020600020		
11	Belt splint pressure plate	YW09564900110		
12	Belt splint connection piece	BL70110100020		
13	Fixing frame of belt	BL71010900020		
14	Linear guide rail	YW31015880000	YW31214000500	YW31232000000
15	Home position sensor plate	BL69363000020		
16	In-mold safety sensor plate	BL69002200020		
17	Mounting plate for proximity switch	BL73032802720		
18	Mounting plate for in-mold sensor	BL77051002220		
19	Drag chain connector	BL74030706120		
20	Sliding seat part 01	BH74051515010		
21	Motor supporting frame	BL71051000020		
22	Pulley	BH91030000010		
23	Cover of motor supporting frame	BL21000100520		
24	Washer	BL70107700040		
25	Synchronous wheel	YW08550200200		
26	Connecting shaft	BH91303900010		
27	Mounting frame of traverse terminal	BL77051902220		
28	Bottom frame of traverse terminal	BH79052001510		
29	Fixed block	BH91051500040		
30	Synchronous wheel 1 of crosswise unit	YW08513800000		
31	Sliding seat part 02	BH79051601510		
32	Synchronous wheel 2 of crosswise unit	YW08513800100		
33	Control box unit	BH79140000710		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.2 ST3 & ST3-T Crosswise Unit

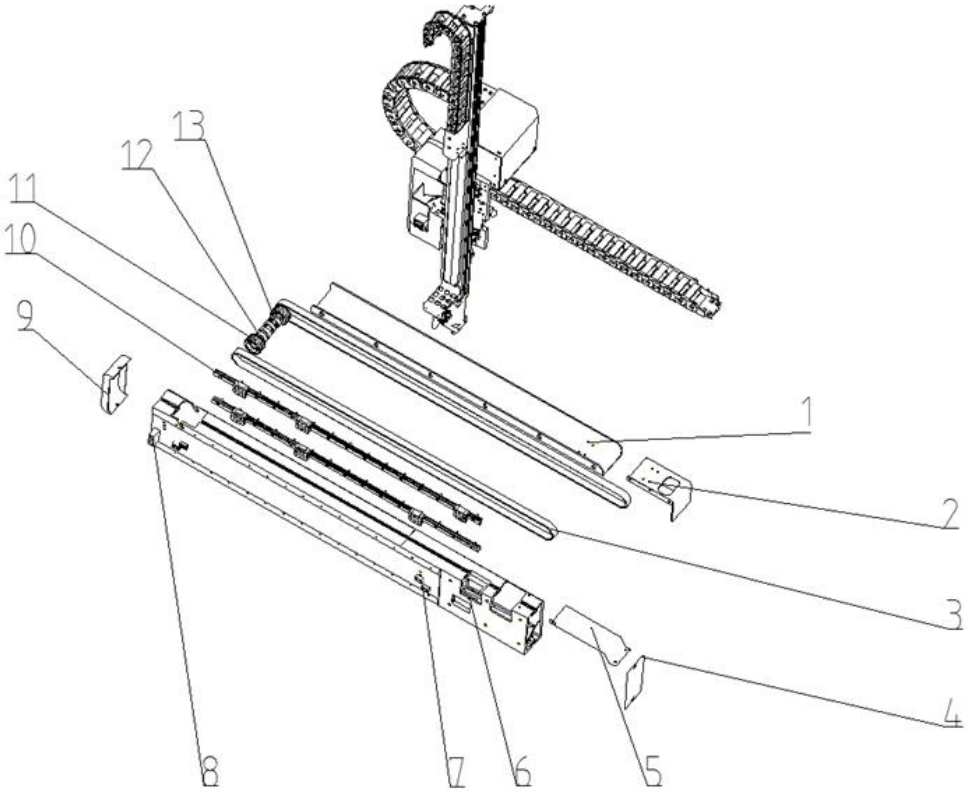


Fig.7-2: ST3 Crosswise unit (single-stage arm) exploded view

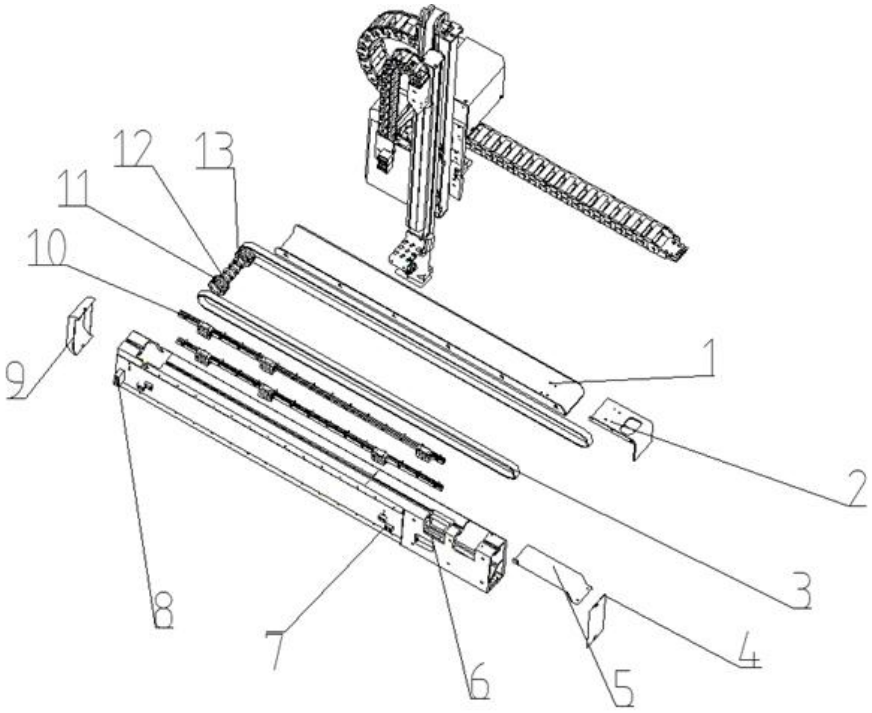


Fig.7-3: ST3-T Crosswise unit (telescopic arm) exploded view

Table 7-2: Parts BOM for ST3 crosswise unit

No.	Name	BOM NO.		
		ST3-700-1400/ ST3-700-1400T	**ST3-900-1600/ ST3-900-1600T**	**ST3-1100-1800/ ST3-1100-1800T**
1	Supporting frame of crosswise drag chain	BL77571401120	BL77591600120	BL70591630020
2	Cover of crosswise drag chain	BL70507000020		
3	Synchronous belt	YR00052000200		
4	Cover of crosswise beam 1	BL81020600120		
5	Synchronous belt cover	BL77052602220		
6	Crosswise beam	BH79570001610	BH73160003410	BH74110014810
7	Sensor plate of crosswise	BH70405000040		
8	Limit block of crosswise	BH81020500010		
9	Cover of crosswise beam 2	BL81021100020		
10	Linear guide rail	YW31519000000	YW31001594000	YW31001562000
11	Driven wheel	YW08513800200		
12	Shaft	BH79052101510		
13	Bearing	YW11160300000		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare

Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.3 ST3 & ST5-D Main-arm Unit (single-stage arm)

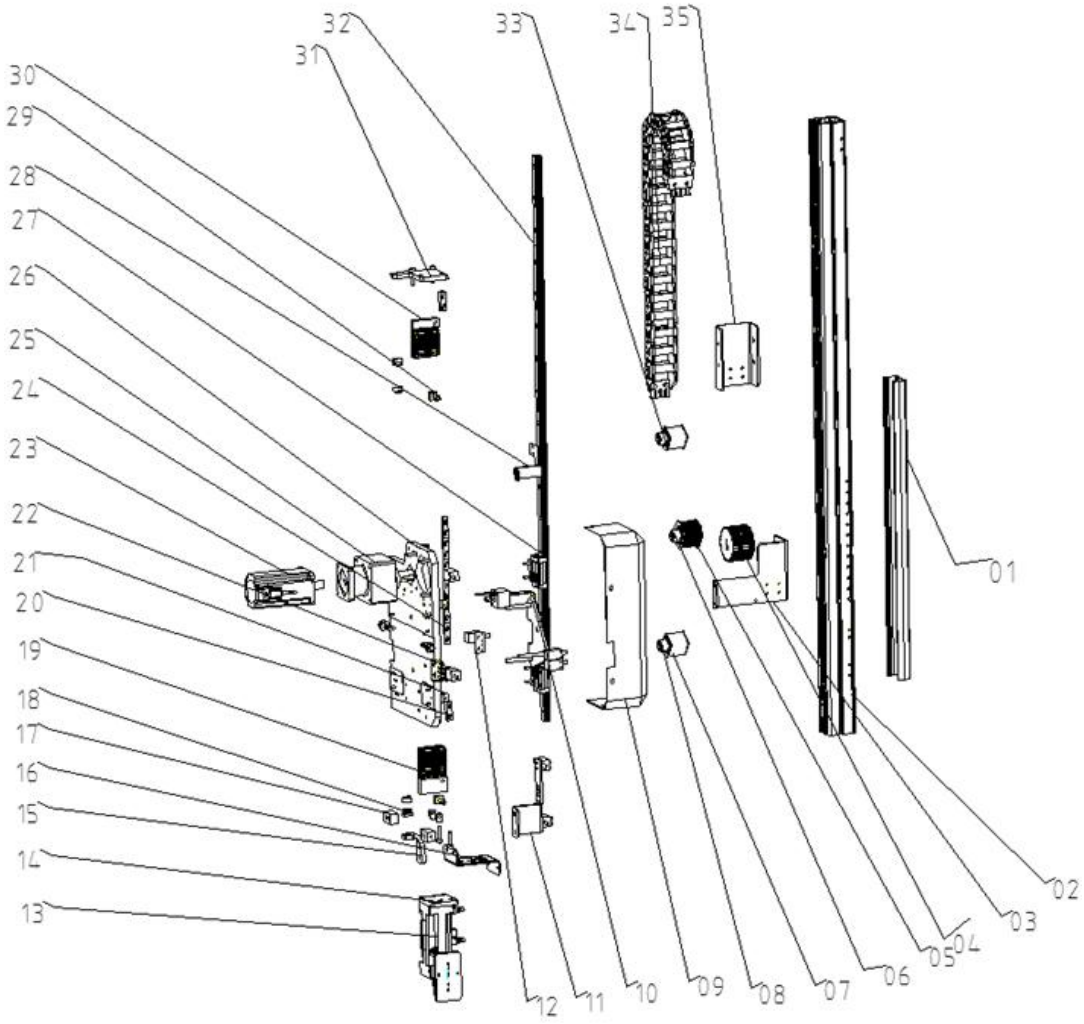


Fig.7-4: ST3 Main-arm unit (single-stage arm) exploded view

Table 7-3: Parts BOM for ST3 main-arm unit(single-stage arm)

No.	Name	BOM NO.		
		ST3-700-1400 ST5-700-1400D	ST3-900-1600 ST5-900-1600D	ST3-1100-1800 ST5-1100-1800D
1	Main arm cover	BH81270001910		
2	Main arm beam	BH73140003510	BH74160014110	BH74110015410
3	Main arm drag chain 1	BL81021402820		
4	Main arm driving wheel	YW08033600000		
5	Main arm driven wheel	YW08533200100		
6	Connecting shaft	BH73033700010		
7	Pulley	BH91050700010		
8	Proximity switch block	BL73034100020		
9	Main arm mounting frame cover	BL73036100120		
10	Home position sensor plate	BL76050206220		
11	Mounting plate 1 for proximity switch	BL73039000020		
12	Mounting plate 2 for proximity switch	BL73030000020		
13	Flip cylinder	BH10550900020		
14	Main arm belt fixing block	BH70380200040		
15	Anti-collision mounting plate	BL77054800020		
16	Spare air tube frame	BL73034505520		
17	Limit block	BH91051500040		
18	Spare air tube frame	BL73034505520		
19	Belt pressure plate 2	BH73032800040		
20	Arm limit sensor plate	BH70263600040		
21	Mounting plate	BL71014700020		
22	Home position sensor plate	BL76050206220		
23	Main arm motor	YM10040000600		
24	Arm limit sensor plate	BH70263600040		
25	Main-arm gearbox	YM50040000000		
26	Main arm mounting plate	BH73036003040		
27	Guide Block	YW31150000600		
28	Limit sensor mounting plate	BL73035003320		
29	Belt fixing slider	BL73038000020		
30	Belt pressure plate 1	BH73033100040		
31	Belt fixing plate	BL81021002720		
32	Linear guide rail	YW31001562000	YW31001524000	YW31148019000
33	Bearing	YW11600300000		
34	Drag chain	YE60150000000		
35	Drag chain connector	BL81021502920		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.4 ST3-T & ST5-DT Main-arm unit (Telescopic arm)

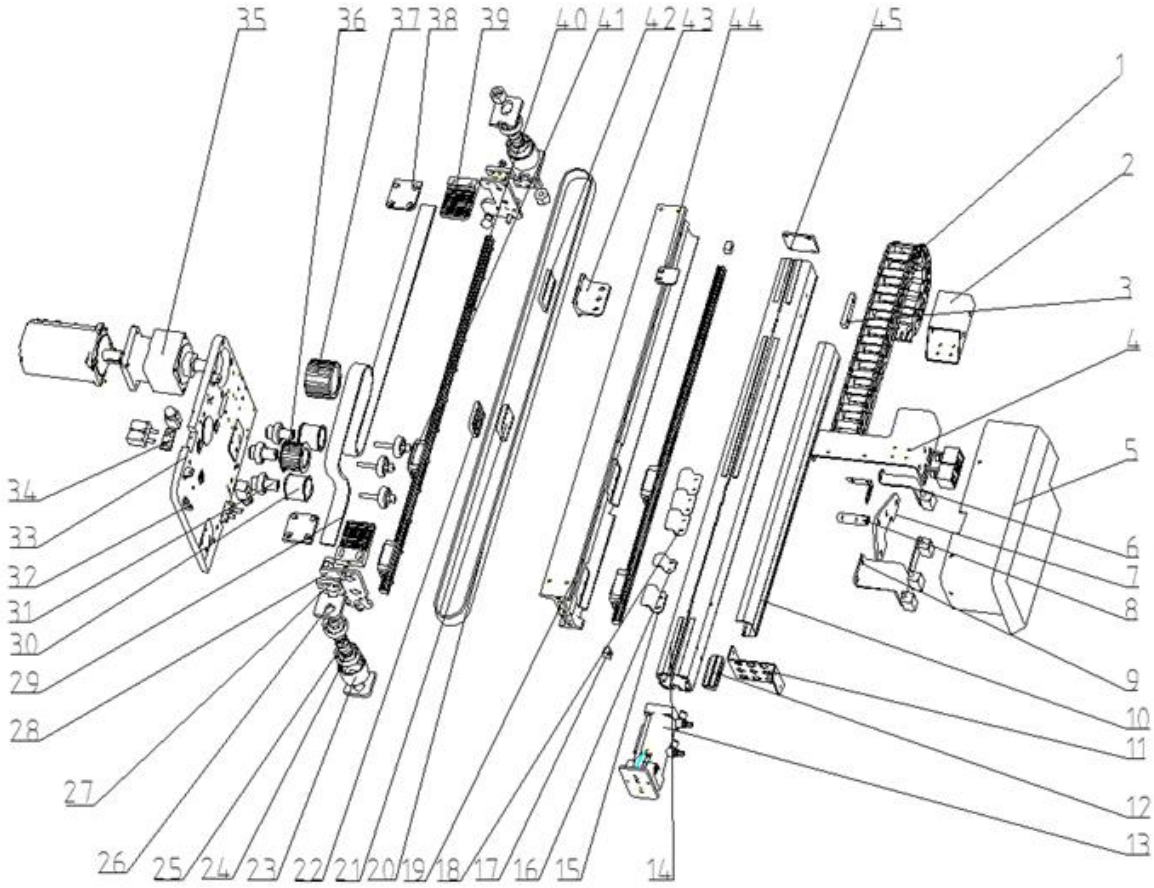


Fig.7-5: ST3-T Main-arm unit(telescopic arm) exploded view

Table 7-4: Parts BOM for ST3 Main-arm Unit(Telescopic Arm)

No.	Name	BOM NO		
		ST3-700-1400T ST5-700-1400DT	ST3-900-1600T ST5-900-1600DT	ST3-1100-1800T ST5-1100-1800DT
1	Drag chain	YE60150000000		
2	Drag chain connector 1	BL77055000020		
3	Tension pulley	BH81021100010		
4	Drag chain connector 2	BL77056916420		
5	Main arm mounting bracket cover	BL77050402220		
6	Limit sensor mounting plate	BL81020500220		
7	Driven wheel connecting plate	BH81270001110		
8	Proximity switch cover	BL73034100020		
9	Proximity switch mounting plate	BL77051702220		
10	Main arm beam cover	BH81270001110	BH81290000610	YX50171300000
11	Spares air tube frame	BL73034505520		
12	Wago terminal block	YE60263340000		
13	Flip cylinder	BH10550900020		
14	Main arm beam	BH74140017210	BH79590001610	BH73110001810
15	Limit sensor plate	BL81000201020		
16	Home position sensor plate	BL81000200920		
17	Slider limit block	BL70300000020		
18	Safety sensor plate	BL81000200820		
19	Main arm telescopic beam	BH74140017410	BH79590001510	BH73110001710
20	Synchronous belt	YR00052500100		
21	Belt splint pressure plate	BH81022200010		
22	Belt splint fixing plate	BL81024700620		
23	Tension pulley	BH81021100010		
24	Bearing	YW11600420000		
25	Tension pulley connection shaft	BH81021000010		
26	Pulley fixed base	BL81021300220		
27	Buffer part	BH91181200010		
28	Belt fixing plate	BL81024400620		
29	Synchronous belt	YR00052500100		
30	Pulley	BH91050700010		
31	Shaft	BH79053600010		
32	Mounting plate	BL71014700020		
33	Main arm mounting plate	BH79050101540		
34	Mounting plate 2 for proximity switch	BL73030000020		
35	Gearbox	YM50750750000		
36	Main arm driven wheel	YW08533200100		
37	Main arm driving wheel	YW08033600000		
38	Belt fixing adapter plate	BL70110100020		

No.	Name	BOM NO		
		ST3-700-1400T ST5-700-1400DT	ST3-900-1600T ST5-900-1600DT	ST3-1100-1800T ST5-1100-1800DT
39	Belt pressure plate 1	BH81021700010		
40	Linear guide rail	YW31001572000	YW31152760000	YW31204000000
41	Guide Block	YW31151100000		
42	Belt splint pressure plate	BH81022300010		
43	Belt splint fixing plate	BH81021500010		
44	Limit sensor mounting plate	BL81022000220		
45	Main arm beam cover 2	BL81000200020		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.5 ST5-D & ST5-DT Traverse Unit

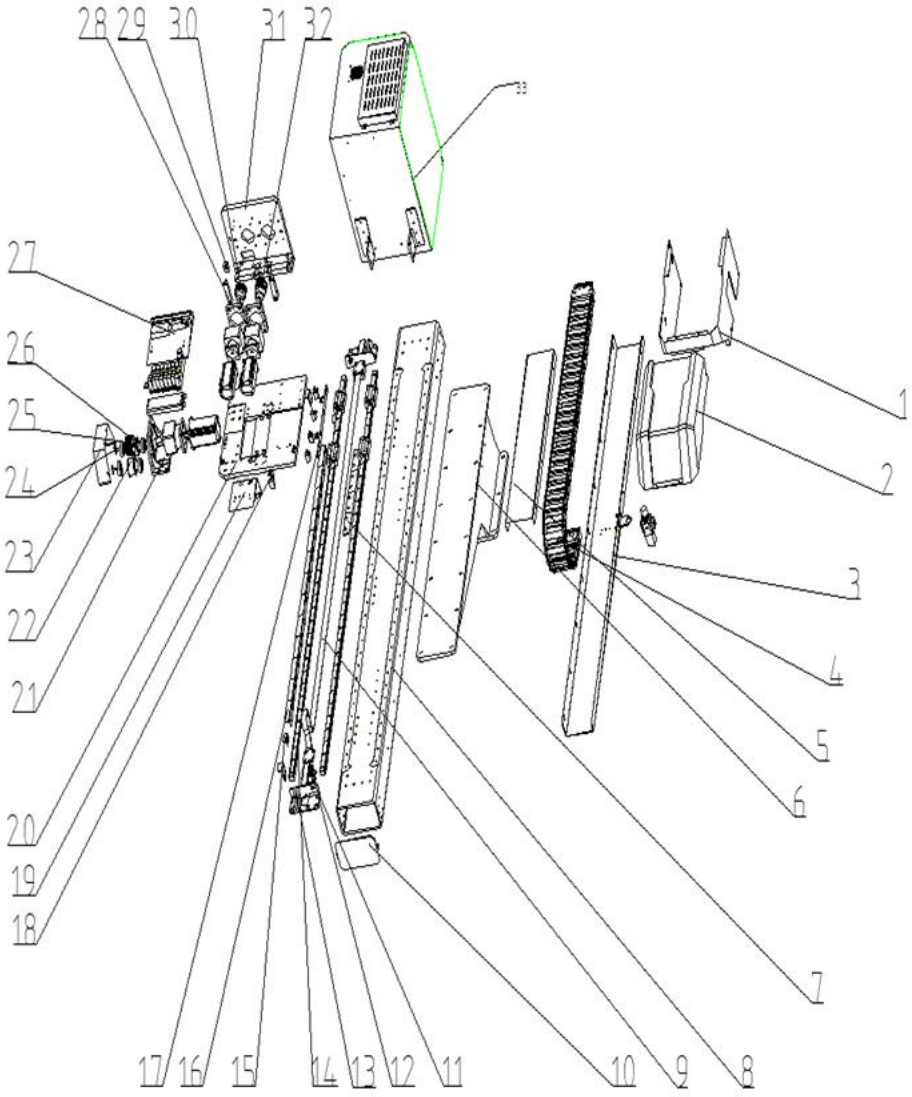


Fig.7-6: ST5 & ST5-T traverse unit exploded view

Table 7-5: Parts BOM for ST5 & ST5-T traverse unit

NO.	Part Name	BOM NO		
		ST5-700-1400D/ ST5-700-1400DT	ST5-900-1600D/ ST5-900-1600DT	ST5-1100-1800D/ ST5-1100-1800DT
1	Sliding seat part 03	BL77051315020		
2	Sliding seat cover	BL81000200420		
3	Supporting frame of Trav. drag chain	BL70371420020	BL74030706120	BL73031902220
4	E2/000 drag chain	YE68225000900		
5	Drag chain cover	BL73714001320	BL73160004420	BL76110013620
6	Base	BH10591100010	BL74160005220	BW21132000000
7	In mold sensor plate	BL81023900020		
8	Traverse beam	BH79570001510	BH74160017010	BH74110014210
9	Synchronous belt	YR00082500100		
10	Traverse beam cover	BL81020600020		
11	Belt splint pressure plate	YW09564900110		
12	Belt splint connection piece	BL70110100020		
13	Fixing frame of belt	BL71010900020		
14	Linear guide rail	YW31015880000	YW31214000500	YW31232000000 (ST5-D) YW31232000800 (ST5-DT)
15	Home position sensor plate	BL69363000020		
16	In-mold safety sensor plate	BL69002200020		
17	Mounting plate for proximity switch	BL73032802720		
18	Mounting plate for in-mold sensor	BL77051002220		
19	Drag chain connector	BL74030706120		
20	Sliding seat part 01	BH74051515010		
21	Motor supporting frame	BL71051000020		
22	Pulley	BH91030000010		
23	Cover of motor supporting frame	BL21000100520		
24	Washer	BL70107700040		
25	Synchronous wheel	YW08550200200		
26	Connecting shaft	BH91303900010		
27	Mounting frame of traverse terminal	BL77051902220		
28	Bottom frame of traverse terminal	BH79052001510		
29	Fixed block	BH91051500040		
30	Synchronous wheel 1 of crosswise unit	YW08513800000		
31	Sliding seat part 02	BH79051601510		
32	Synchronous wheel 2 of crosswise unit	YW08513800100		
33	Control box unit	BH79140000710		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.6 ST5-D & ST5-DT Crosswise Unit

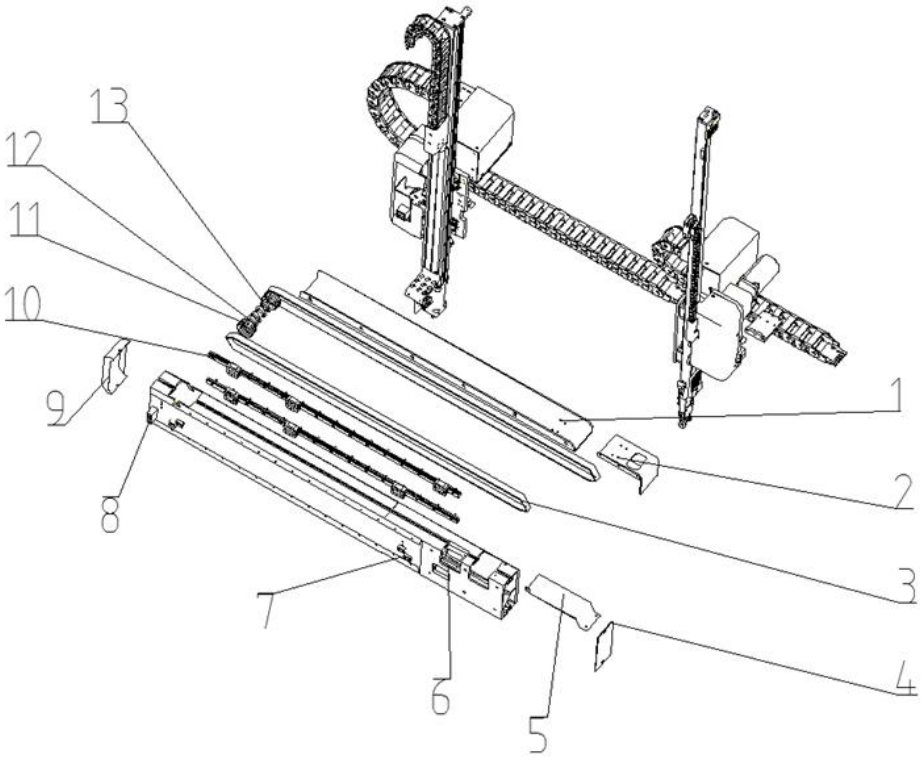


Fig.7-7: ST5 crosswise unit(single-stage arm) exploded view

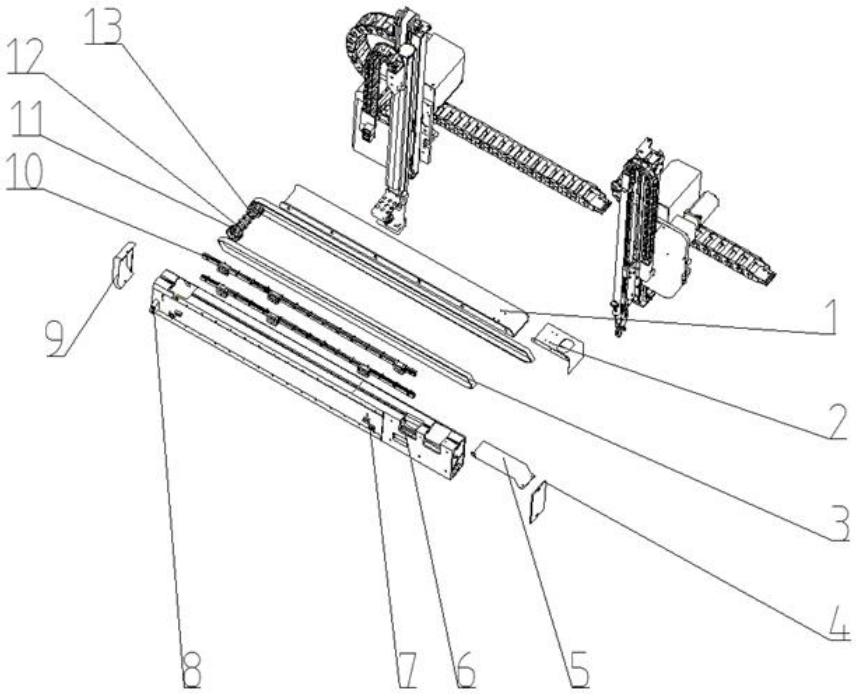


Fig.7-8: ST5-T: Crosswise unit (telescopic arm) exploded view

Table 7-6: Parts BOM for ST5 crosswise unit

No.	Name	BOM NO.		
		ST5-700-1400D/ ST5-700-1400DT	ST5-900-1600D/ ST5-900-1600DT	ST5-1100-1800D/ ST5-1100-1800DT
1	Supporting frame of crosswise drag chain	BL77571401120	BL77591600120	BL70591630020
2	Cover of crosswise drag chain	BL70507000020		
3	Synchronous belt	YR00052000200		
4	Cover of crosswise beam 1	BL81020600120		
5	Synchronous belt cover	BL77052602220		
6	Crosswise beam	BH79570001610	BH79160005110	BH79110004510
7	Sensor plate of crosswise	BH70405000040		
8	Limit block of crosswise	BH81020500010		
9	Cover of crosswise beam 2	BL81021100020		
10	Linear guide rail	YW31519000000	YW31001594000	YW31001562000
11	Driven wheel	YW08513800200		
12	Shaft	BH79052101510		
13	Bearing	YW11160300000		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

Table 7-7: Parts BOM for ST5-T crosswise unit(telescopic arm)

No	Name	BOM NO.	
		ST5-700-1400DT	ST5-900-1600DT
1	Main arm crosswise drag chain	-	-
2	Crosswise drag chain cover	BL70507000020	BL70507000020
3	Sub-arm crosswise drag chain	-	-
4	Left cover of crosswise arm	BL70107000020	BL70107000020
5	Crosswise aluminium profile	BH79714100110	BH79591600010
6	Gear rack fixing plate	-	-
7	Gear rack	YW31714100200	YW31602850000
8	Linear guide rail	-	-
9	Sub-arm	BH79571400150	BH79591600150
10	Main arm	BH79571400050	BH79591600050
11	Crosswise sensor plate	BH70405000040	BH70405000040
12	Limit block	BH79051300010	BH79051300010
13	Right cover of crosswise arm	BH91905000010	BH91905000010
14	Supporting frame of crosswise drag chain	BL77571401120	BL77591600120

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.7 ST5-D Sub-Arm unit (Single-stage arm)

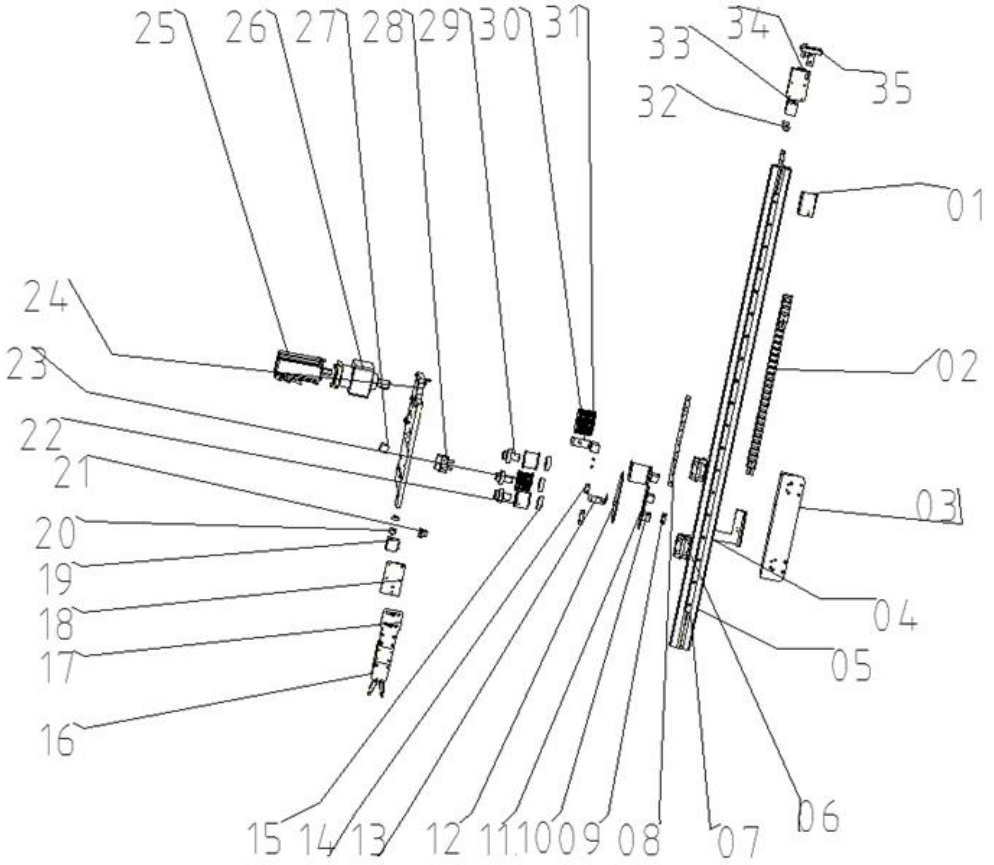


Fig.7-9: ST5 Sub-arm unit (single-stage arm) exploded view

Table 7-8: Parts BOM for ST5 sub-arm unit

No.	Name	BOM NO.		
		ST5-700-1400D	ST5-900-1600D	ST5-1100-1800D
1	Sub-arm drag chain connector 2	BL76054712720		
2	Drag chain	YE30101000200		
3	Sub-arm mounting plate 2	BH74054512740		
4	Sub-arm drag chain connector 1	BL76054412620		
5	Sub-arm beam	BH79570000910	BH74160013510	BH74110014010
6	Guide block	YW31151100000		
7	Linear guide rail	YW31001511000	YW20151320000	YW31001580000
8	Home position sensor plate	BH70457700040		
9	Belt fixing slider	BL76054806620		
10	Sensor switch	YE15018500300		
11	Mounting plate 1 for proximity switch	BL76054200020		
12	Driven wheel adapter plate	BL76055012120		
13	Proximity sensor wiring cover	BL73034100020		
14	Limit sensor plate	BH70263600040		
15	Bearing	YW11600300000		
16	Gripper	BH70401200040		
17	Gripper mounting plate	YW09103000000		
18	Sub-arm belt pressure plate	BH79054912510		
19	Anti-collision mounting plate	BH79056112610		
20	Buffer piece	BH91181200010		
21	Wago terminal block	YE60260301000		
22	Pulley	BH91050700010		
23	Driven wheel	YW08533200100		
24	Sub-arm mounting plate 1	BH79054100040		
25	Motor	YM10040000600		
26	Gearbox	YM50540000000		
27	Limit block	BH91051500040		
28	Mounting plate 2 for dual-proximity switch	BL73030000020		
29	Connecting shaft	BH79055312010		
30	Mounting plate 2 for proximity switch	BL76055805820		
31	Driving wheel	YW08033600000		
32	Muffler	YW80200000000		
33	Anti-collision mounting plate	BH79056112610		
34	Belt pressure plate	BH79055712310		
35	Belt fixing plate	BL76055605540		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare

Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.8 ST5-DT Sub-arm unit (Telescopic arm)

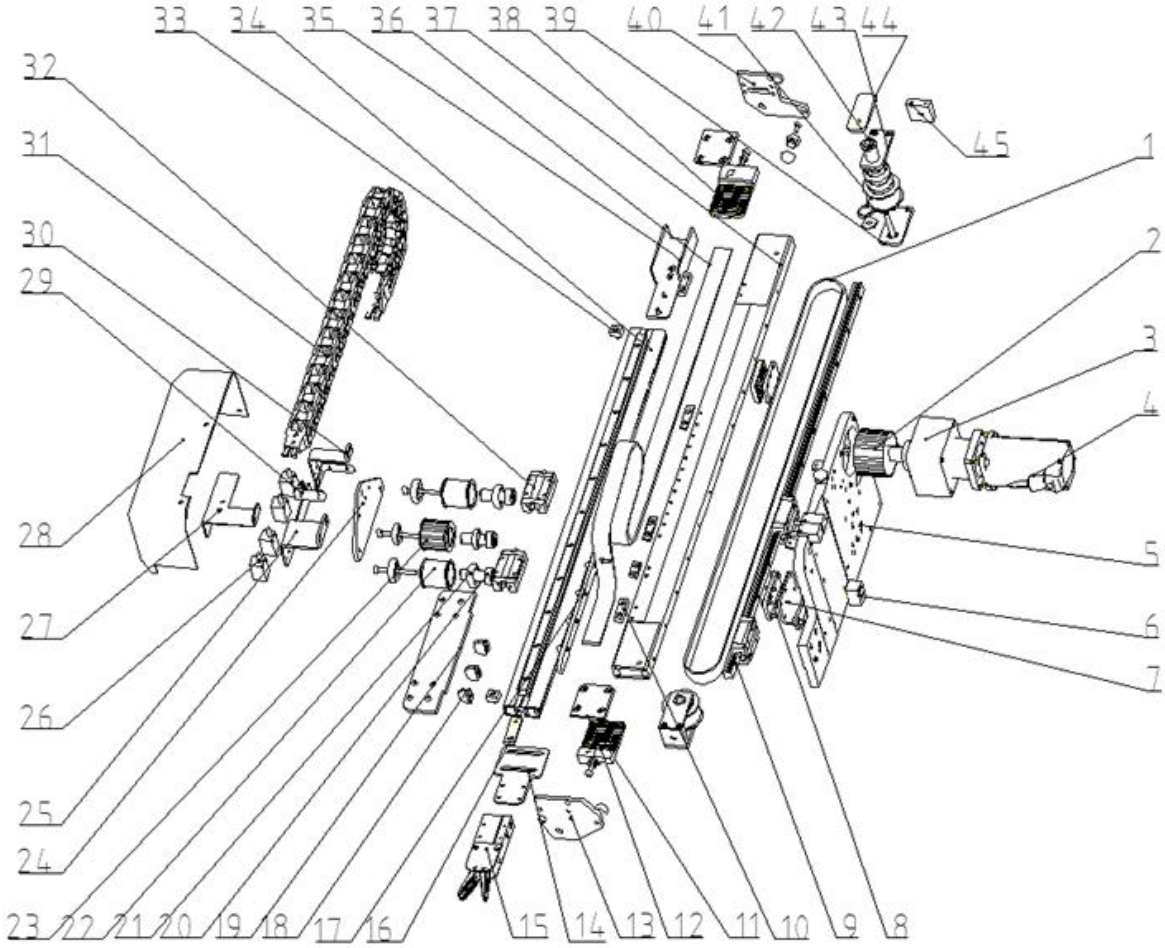


Fig.7-10: ST5-DT sub-arm unit(telescopic arm) exploded view

Table 7-9: Parts BOM for ST5-DT sub-arm unit (telescopic arm)

No.	Name	BOM NO.		
		ST5-700-1400DT	ST5-900-1600DT	ST5-1100-1800DT
1	Synchronous belt	YR00320000000		
2	Driving Wheel	YW08033600000		
3	Gearbox	YM50040000000		
4	Motor	YM10040000600		
5	Sub-arm mounting plate	BH79051201540		
6	Tension shaft 1	BH78050800010		
7	Synchronous belt fixing plate 2	BL77002130040		
8	Synchronous belt fixing plate 1	BL77052300020		
9	Linear guide rail	YW31001572000	YW31007600000	YW31001594000
10	Limit sensor plate	BH70263600040		
11	Belt pressure plate 2	BH74054815610		
12	Belt fixing plate 1	BH74055915810		

No.	Name	BOM NO.		
		ST5-700-1400DT	ST5-900-1600DT	ST5-1100-1800DT
13	Belt fixing plate 2	BL77055217220		
14	Gripper mounting plate	BL77054516820		
15	Gripper	BH70401200040		
16	Sensor fixing block	YW09601400110		
17	Guide block mounting plate	BL77055317420		
18	Wago terminal (Gray)	YE60260301000		
19	Wago terminal (blue)	YE60263340000		
20	Sub-arm shaft 1	BH79252200010		
21	Bearing	YW11600200000		
22	Sub-arm shaft 2	BH79252100010		
23	Driven wheel	YW08432800000		
24	Driven wheel adapter plate	BL77055517620		
25	Proximity switch mounting plate	BL77054416720		
26	Sensor switch	YE15018500300		
27	Drag chain fixing plate	BL77054717020		
28	Sub-arm frame cover	BL77054316620		
29	Proximity sensor wiring cover	BL73034100020		
30	Limit sensor mounting plate	BL77055617720		
31	Drag chain	YE60154800000		
32	Guide block	YW31151100000		
33	Limit block	BL70300000020		
34	Sub-arm beam	BH74140016710	BH74160016810	BH79110000310
35	Drag chain connector	BL77054616920		
36	Synchronous belt	YR00052500100		
37	Sub-arm telescopic beam	BH74160017710		
38	Belt pressure plate 2	BH74054815610		
39	Tension wheel side plate 3	BL77035140020		
40	Belt splint pressure plate	BL77055117120		
41	Tension wheel	BH73306000010		
42	Tension shaft 2	BH78050800010		
43	Tension wheel side plate 1	BL74323000020		
44	Tension wheel plate	BL77055417520		
45	Tension wheel side plate 2	BL74322000040		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.9 ST3-MT Traverse unit

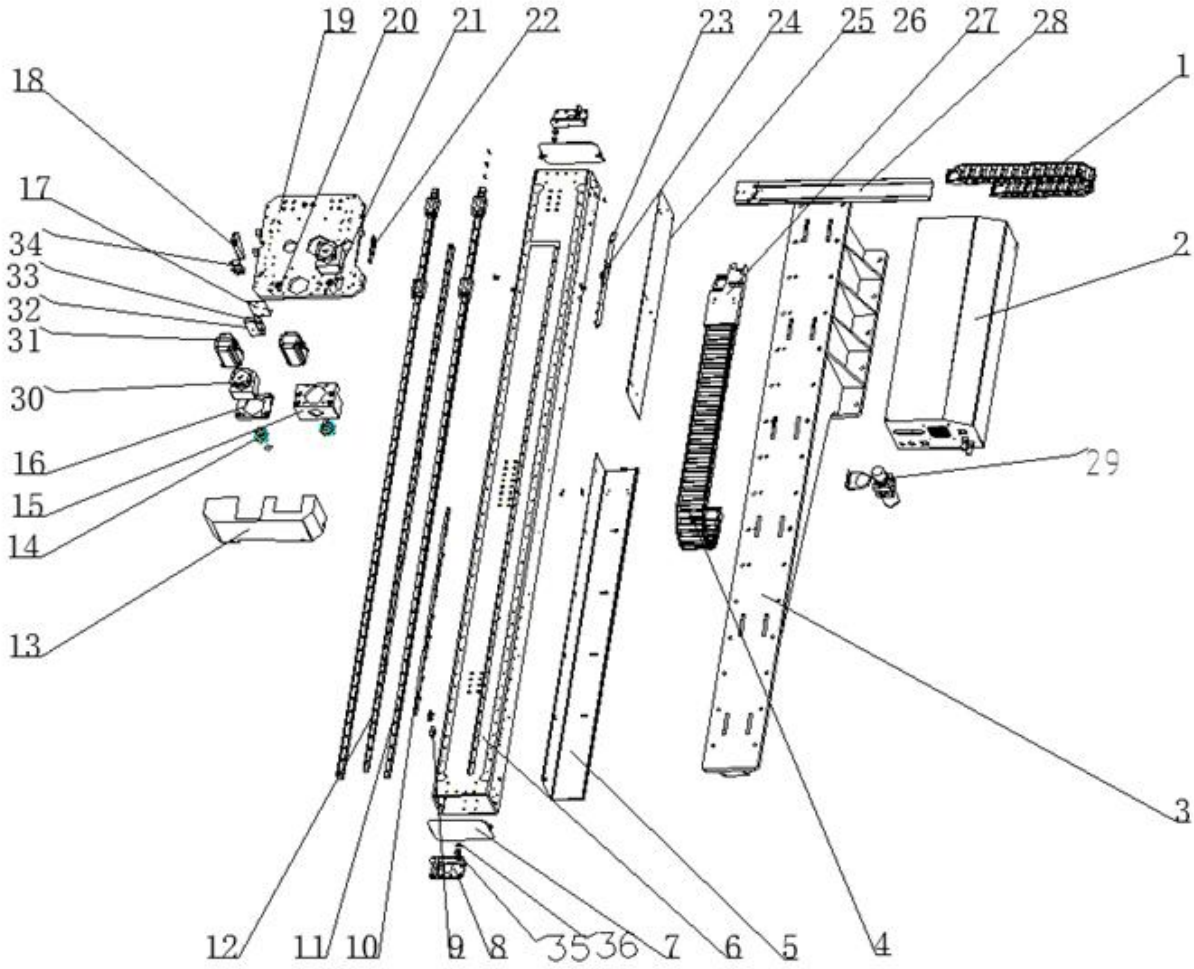


Fig.7-11: ST3-MT traverse unit exploded view

Table 7-10: Parts BOM for ST3-MT traverse unit

NO.	Part Name	BOM NO.		
		ST3-1600-2200MT	ST3-1800-2400MT	ST3-2000-2800MT
1	Drag chain	YE68250510000		
2	Control box	BH73313200150		
3	Base	BL73160006420		
4	Drag chain	YE68251010000		
5	Drag chain	YW31154600000		
6	Supporting frame of Trav. drag chain	BH73160005810	BH73180030210	-
7	Traverse beam cover	BL73033604520		
8	Belt fixing frame	BL71010900020		
9	Limit sensor plate	BH73321900010		
10	Home position sensor plate (Outside mold)	BL74036800020		
11	Guide rail	YW31286000100	YW31142000500	-
12	Rack	YW30255500600	YW30180000000	-
13	Sliding seat cover	BL73034402520		
14	Gear	YW08005320000		
15	Gearbox mounting base	BH73034830610		
16	Adjustable plate	BH73036600510		
17	Electrical circuit mounting late	BL74032508520		
18	Sensors mounting frame	BL74032908120		
19	Sliding seat	BH73032200540		
20	Eccentric wheel to belt	BL74031710140		
21	Eccentric wheel of crosswise 1	BH73317000010		
22	Traverse unit switch mounting frame	BL74032108720		
23	Home position sensor plate	BL69363000020		
24	Eccentric wheel of crosswise 2	BH73317000010		
25	Traverse unit switch mounting frame	BL74032108720		
26	Wiring frame	BL73033802620		
27	Drag chain	BL73035102520		
28	Supporting frame of Cross. drag chain	BL73160001520		
29	Filter regulator valve	YE30301000000		
30	Gearbox	YM50975000000		
31	Motor	YM10075000500		
32	Circuit board	YE64351700000		
33	Limit pressure switch	YE15018500300		
34	Sensor switch	YE15010806000		
35	Buffer piece	BH91151200010		
36	Muffler	YW80200000000		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.10 ST3-MT Crosswise Unit

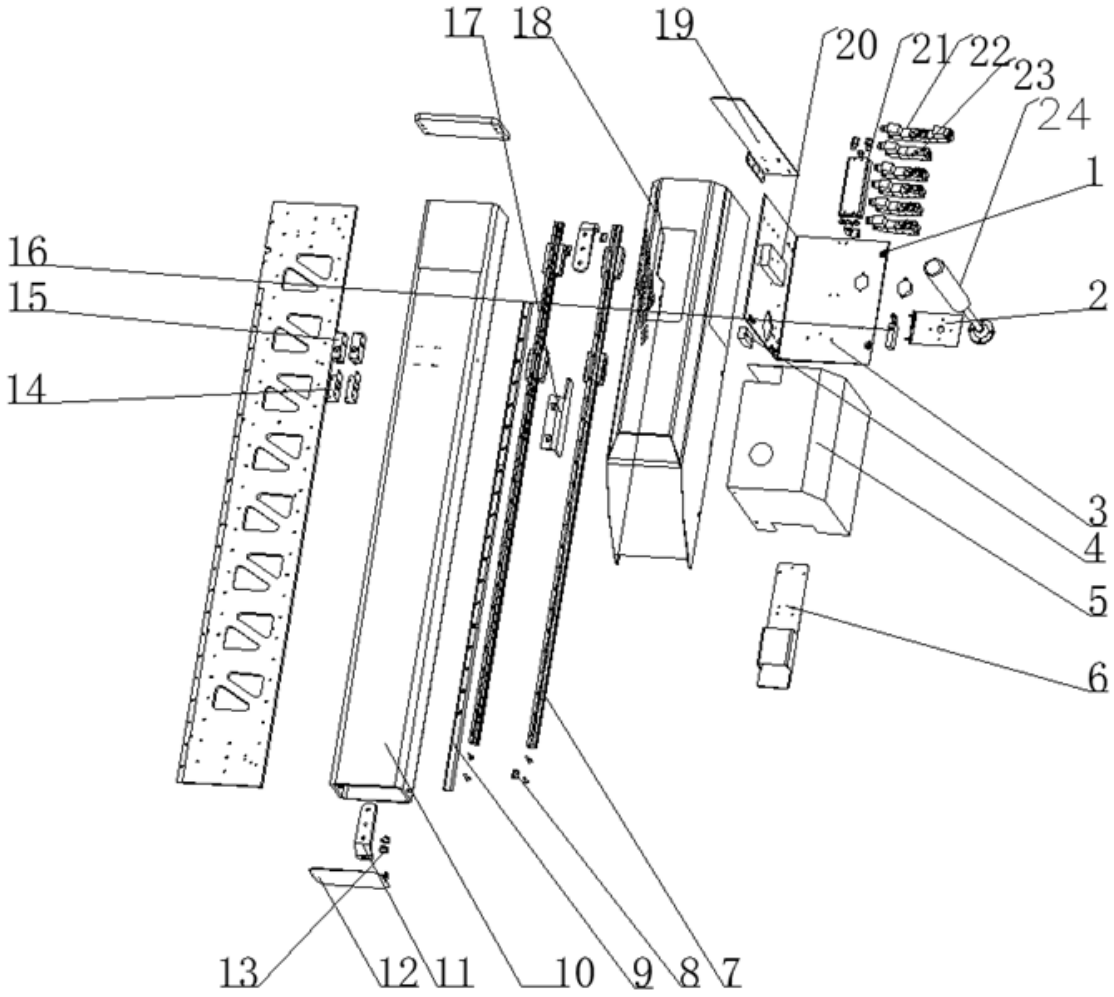


Fig.7-12: ST3-MT crosswise Unit exploded view

Table 7-11: Parts BOM for ST3-MT crosswise unit

No	Name	BOM NO		
		ST3-1600-2200MT	**ST3-1800-2400MT**	**ST3-2000-2800MT**
1	Mounting plate	BL71014700020		
2	Light mounting frame	BL71180001620		
3	Wiring mounting frame 1	BL75182300020		
4	Wiring mounting frame 2	BL75182400520		
5	Wiring mounting cover	BL75182500020		
6	Drag chain supporting plate 1	BL73031900620		
7	Guide rail	YW31160000800	YW31170000600	-
8	Sensor plate	BH70405000040		
9	Rack	YW30135000000		
10	Crosswise beam	BH73160006010	BH73180036110	-
11	Position limit plate	BL74031210440		
12	Traverse beam cover	BL74033710420		
13	Buffer piece	BH73328000010		
14	Vacuum generator mounting plate	BL75187500020		
15	Vacuum generator	YE30130800000		
16	Limit pressure switch	YE15010806000		
17	Position limit piece	BL73031706520		
18	Crosswise beam cover	BL75183200020		
19	Drag chain supporting plate 2	BL73032000620		
20	Circuit board	YE64351400000		
21	Distribution plate	YW80225600000		
22	Magnetic Valve 1	YE30522400000		
23	Magnetic Valve 2	YE32220412400		
24	Two-color lights	-		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.11 ST3-MT Main-arm unit

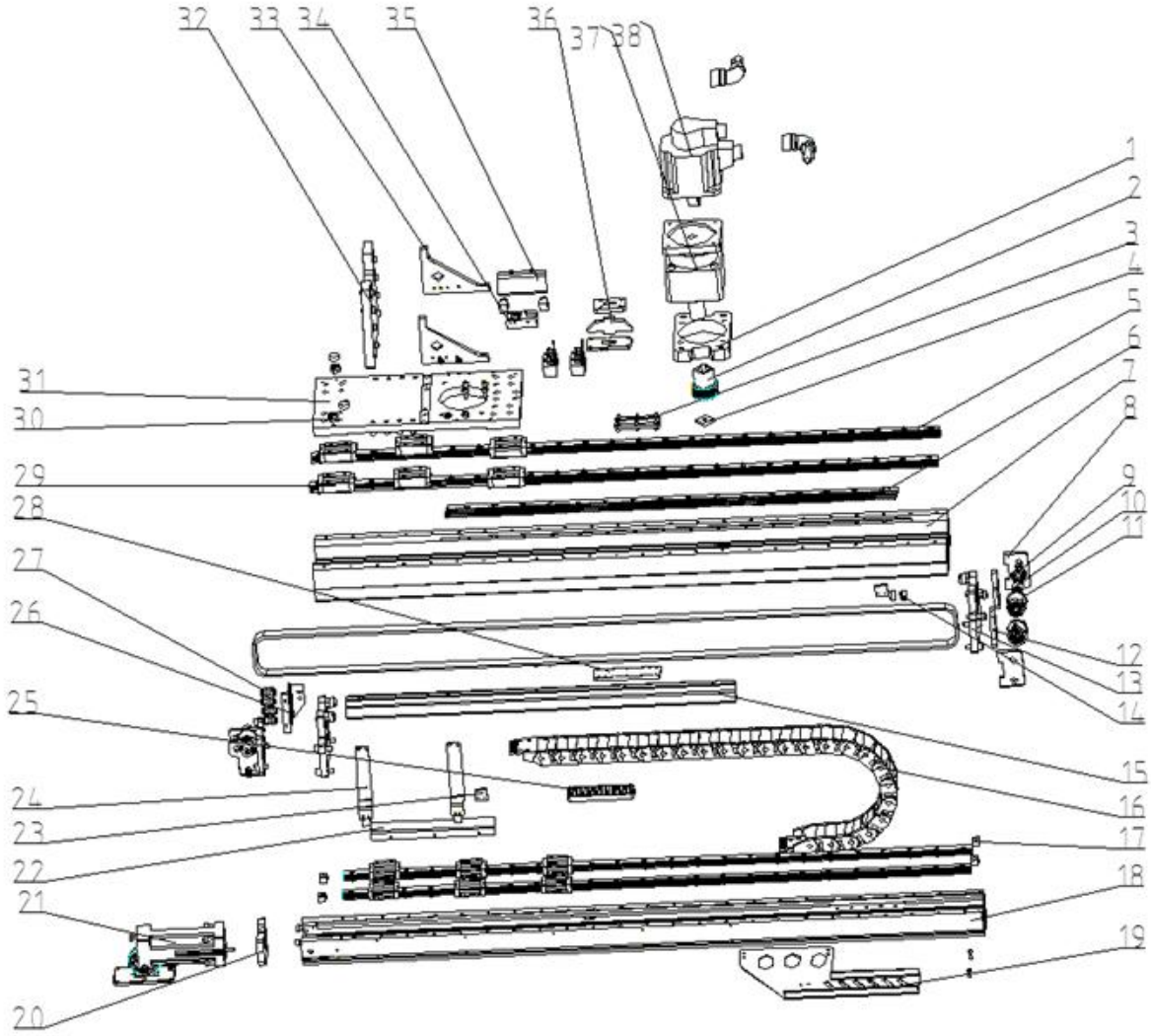


Fig.7-13: ST3-MT Main-arm unit(telescopic arm) exploded view

Table 7-12: Parts BOM for ST3-MT main-arm unit

No.	Name	BOM NO.		
		ST3-1600-2200MT	ST3-1800-2400MT	ST3-2000-2800MT
1	Gearbox mounting plate	BH73185300010		
2	Gear	YW08804000000		
3	Belt splint	BL73039400640		
4	Washer	BL72125000020		
5	Guide rail	YW31142000500	YW31154000100	-
6	Rack	YW30160000600		
7	Main-arm beam	BH73035000510		
8	Tension pulley fixing 1	BL73039000640		
9	Bearing	YW11600300000		
10	Tension pulley shaft	BH73038900510		
11	Tension pulley	BH73038800510		
12	Tension pulley fixing 2	BL73039600640		
13	Belt fixing plate	BH73037600510		
14	Limit sensor plate	BL75187000020		
15	Gearbox mounting plate	BL73035300620		
16	Drag chain	YW06251500000		
17	Slider block	BH78013300040		
18	Main-arm telescopic beam	BH73035100510		
19	Drag chain supporting plate	BL73038100620		
20	Transitional plate 1	BH73038300510		
21	Flip cylinder	BH73035001540		
22	Home position sensor plate	BL75187700020		
23	Limit sensor plate	BL75187000020		
24	Transitional plate 2	BH73038400510		
25	Main-arm fixing tooth plate	BH73039500510		
26	Spares air tube frame	BL73001230220		
27	Quick connector φ6	YW80020606000		
28	Belt splint 2	BL73039200640		
29	Guide block	YW31002000200		
30	Buffer piece	BH79054300010		
31	Main-arm fixing plate 1	BH73185300010		
32	Main-arm fixing plate 2	BH73037900540		
33	Main-arm mounting frame	BL73038000620		
34	Switch mounting frame	BL75187200020		
35	Proximity switch mounting plate	BL75186200020		
36	Tooth plate	BL73039300620		
37	Gearbox	YM50915000000		
38	Motor	YM10415100000		

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare

Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.12 ST3-LT Traverse Unit

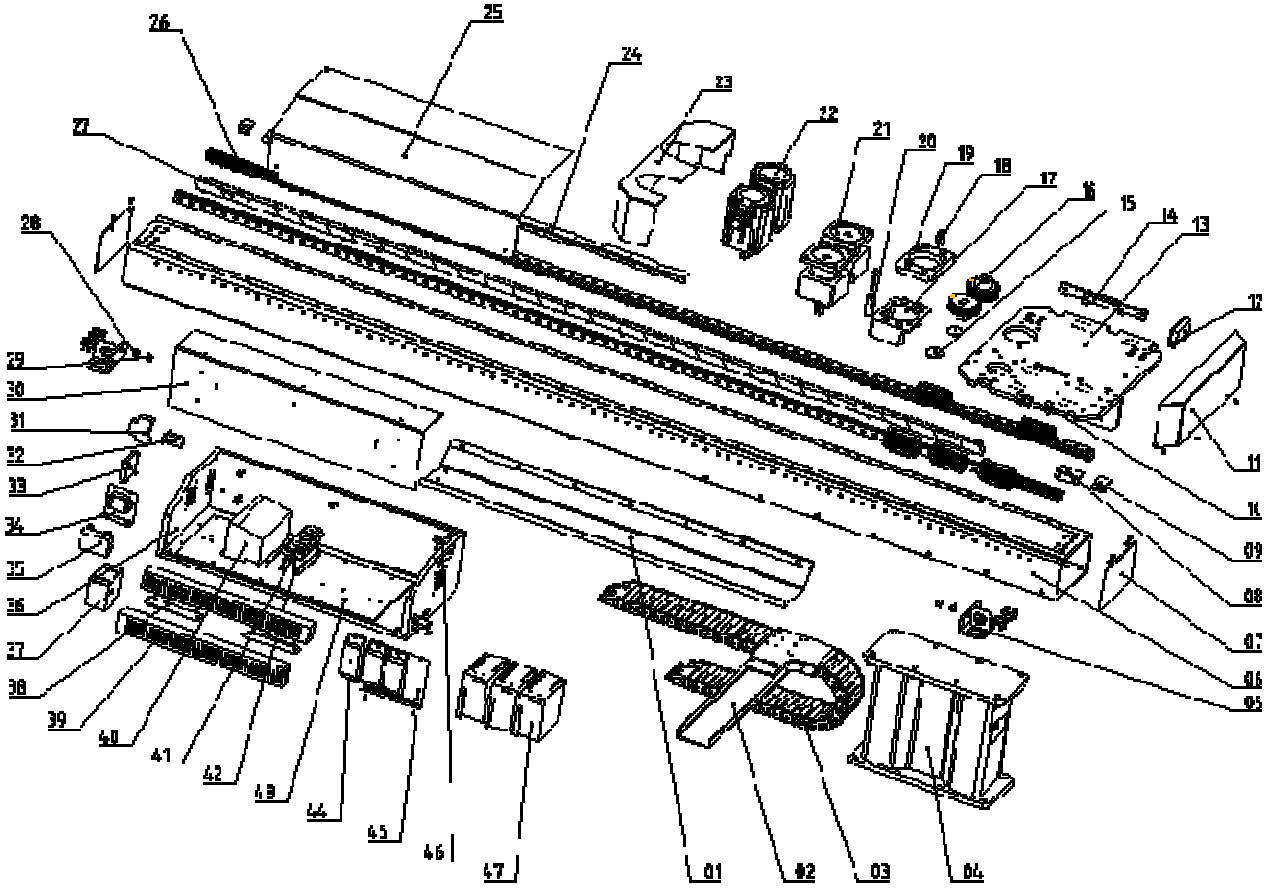


Fig.7-14: ST3-LT traverse unit exploded view

Table 7-13: Parts BOM for ST3-LT traverse unit 1

NO.	Name	BOM NO.		
		ST3-1600-2200LT	ST3-1800-2400LT	ST3-2200-2600LT
1	Supporting frame for traverse drag chain	BL75316200020	-	BL75323300020
2	Supporting frame for drag chain	-	-	-
3	Traverse drag chain	-	-	-
4	Base	BL75318400020	BL75318400020	BL75318400020
5	Limit frame	-	-	-
6	Traverse beam	BH73162200010	BH73182400010	BH73323100010
7	Traverse beam end cover	BL75131800020	BL75131800020	BL75131800020
8	Home position sensor plate	BL69363000020	BL69363000020	BL69363000020
9	Limit sensor plate	BL75035300020	BL75035300020	BH73321900010
10	Proximity switch	-	-	-
11	Main frame cover 2	BL75321000220	BL75321000220	BL75321000220
12	Mounting plate for Axis-XZ end	BL75327000020	BL75327000020	BL75327000020
13	Main frame part 1	BH73034600040	BH73034600040	BH73322500010

NO.	Name	BOM NO.		
		ST3-1600-2200LT	ST3-1800-2400LT	ST3-2200-2600LT
14	Mounting plate for traverse proximity switch	-	BL75035200020	BL75322100020
15	Washer for speed reducer	BL75131600040	BL75131600040	BL75131600040
16	Gear	YW08107900000	YW08107900000	YW08107900000
17	Mounting plate for crosswise speed reducer	BH73314000010	BH73314000010	BH73321400010
18	Traverse eccentric wheel	BH73310300040	BH73310300040	BH73310300040
19	Mounting plate for traverse speed reducer	BH73131200020	BH73131200040	BH73321200010
20	Crosswise eccentric wheel	BH73317000040	BH73317000040	-
21	Speed reducer	-	-	-
22	Servo motor	-	-	-
23	Main frame cover 1	BL75130900020	BL75130900020	BL75322900020
24	Mold area sensor plate	BL75333000020	BL75035400020	BH73322000010
25	ST3-L-T control box cover welded assemblies	-	BL75034000020	BL75034000020
26	Linear guide rail	-	-	-
27	Traverse gear rack	YW30031600000	YW08280900000	YW30220000000
28	Buffer unit	BH73328000010	BH73328000010	BH73328000010
29	Buffer cap	-	-	-
30	Mounting frame for control box	-	-	-
31	Breaker	YW80562100000	YW80562100000	YW80562100000
32	Breaker mounting frame	BL75334000020	BL70512000020	BH73322700050
33	Exhaust fan	-	-	-
34	Mounting frame for wave filter	-	-	-
35	Cover of wave filter	-	-	-
36	Control box welded assemblies	BL75322000020	BL75033900020	BL75033900020
37	Power supply	-	-	-
38	U-groove supporting plate	-	-	-
39	U-groove	-	-	-
40	SIGMATEK module	-	-	-
41	Magnetic valve	-	-	-
42	Supporting plate for relay board	-	-	-
43	Galvanized plate	-	-	-
44	Brake resistor	YE20200450000	YE20200450000	YE20200450000
45	Mounting plate for ST3-L-T breaker resistor	BL75324000020	BL75324000020	BL75324000020
46	Ground wire connecting plate	BL70126000020	-	-
47	Driver	-	-	-

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

Table 7-14: Parts BOM for ST3-LT traverse unit 2

No.	Name	BOM NO.	
		ST3-2600-2800LT	ST3-3000-3300LT
1	Supporting frame for traverse drag chain	-	-
2	Supporting frame for drag chain	-	-
3	Traverse drag chain	-	-
4	Base	-	-
5	Limit frame	-	-
6	Traverse beam	-	-
7	Traverse beam end cover	-	-
8	Home position sensor plate	-	-
9	Limit sensor plate	-	-
10	Proximity switch	-	-
11	Main frame cover 2	-	-
12	Mounting plate for Axis-XZ end	-	-
13	Main frame part 1	-	-
14	Mounting plate for traverse proximity switch	-	-
15	Washer for speed reducer	-	-
16	Gear	-	-
17	Mounting plate for crosswise speed reducer	-	-
18	Traverse eccentric wheel	-	-
19	Mounting plate for traverse speed reducer	-	-
20	Crosswise eccentric wheel	-	-
21	Speed reducer	-	-
22	Servo motor	-	-
23	Main frame cover 1	-	-
24	Mold area sensor plate	-	-
25	ST3-L-T control box cover welded assemblies	-	-
26	Linear guide rail	-	-
27	Traverse gear rack	-	-
28	Buffer unit	-	-
29	Buffer cap	-	-
30	Mounting frame for control box	-	-
31	Breaker	-	-
32	Breaker mounting frame	-	-
33	Exhaust fan	-	-
34	Mounting frame for wave filter	-	-
35	Cover of wave filter	-	-
36	Control box welded assemblies	-	-
37	Power supply	-	-
38	U-groove supporting plate	-	-
39	U-groove	-	-
40	SIGMATEK module	-	-
41	Magnetic valve	-	-
42	Supporting plate for relay board	-	-
43	Galvanized plate	-	-
44	Brake resistor	-	-
45	Mounting plate for ST3-L-T breaker resistor	-	-
46	Ground wire connecting plate	-	-
47	Driver	-	-

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare

Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.13 ST3-LT Crosswise Unit

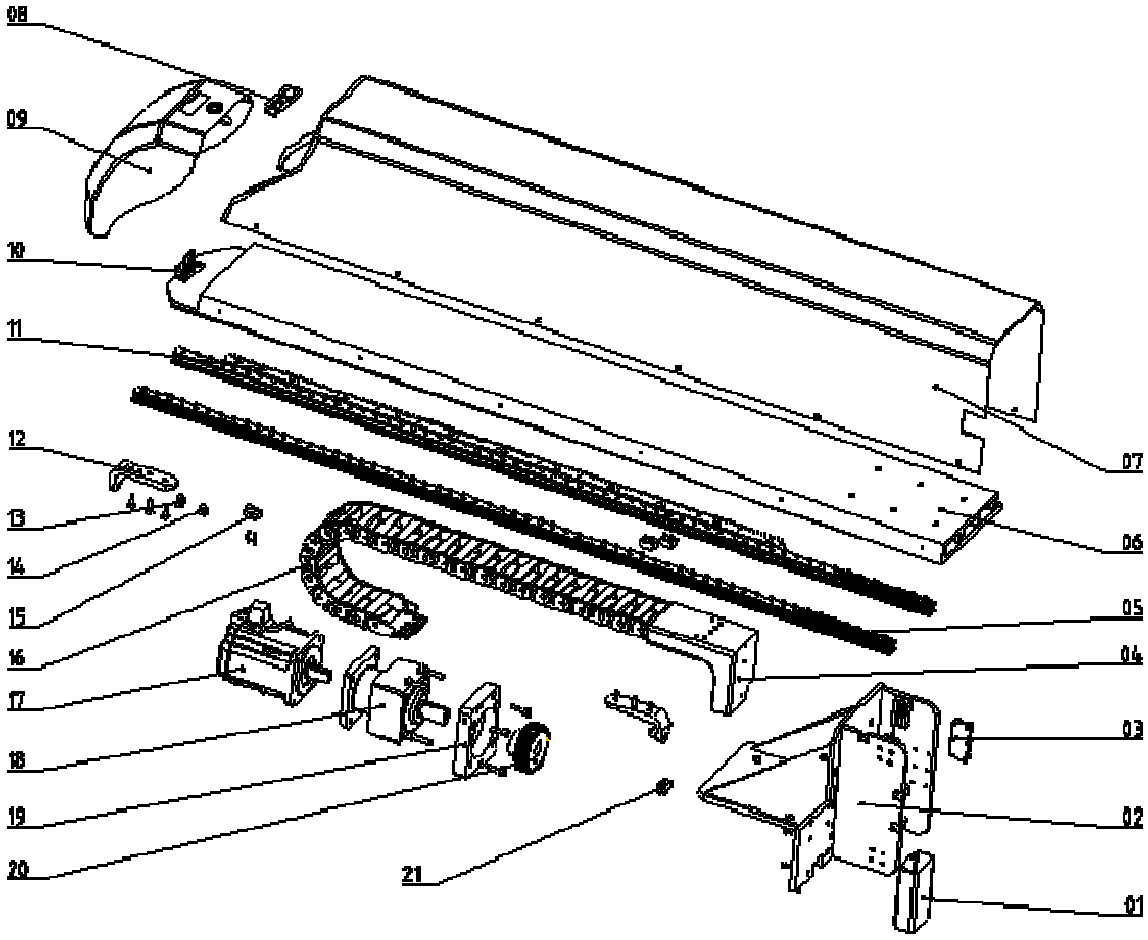


Fig.7-15: ST3-LT crosswise unit exploded view

Table 7-15: Parts BOM for ST3-LT crosswise unit

No.	Name	BOM NO.		
		ST3-1600-2200LT	ST3-1800-2400LT	ST3-2200-2600LT
1	Drag chain connector (up/down)	BL75311300020	BL75311300020	BL75311300020
2	Fixing plate for arm	-	-	-
3	Tooth plate (up/down)	-	-	-
4	Crosswise drag chain connector	BL75312000020	BL75312000020	BL75312000020
5	Linear guide rail	-	-	-
6	Crosswise aluminium profile	BH73131610010	BH73318200010	BH73322300210
7	Crosswise profile welded assemblies	BL75162200020	BL75318330020	BL75322300020
8	T-plastic handle	YR40914040000	YR40914040000	YR40914040000
9	Sliding seat	BL70012700020	BL70012700020	BL70012700020
10	Hinge	YW06253200000	YW06253200000	YW06253200000
11	Crosswise gear rack	-	-	-
12	Crosswise limit plate	BL75314000040	BL75314000040	BL75314000040
13	Buffer unit	-	-	-
14	Buffer cap	-	-	-
15	Crosswise sensor fixing block	BL75310000040	BL75310000040	BL75310000040
16	Crosswise drag chain	-	-	-
17	Servo motor	-	-	-
18	Speed reducer	-	-	-
19	Mounting plate for speed reducer (up/down)	BH73323900010	BH73323900010	BH73323900010
20	Gear	-	-	-
21	Proximity Switch	-	-	-

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

7.14 ST3-LT Main-arm unit

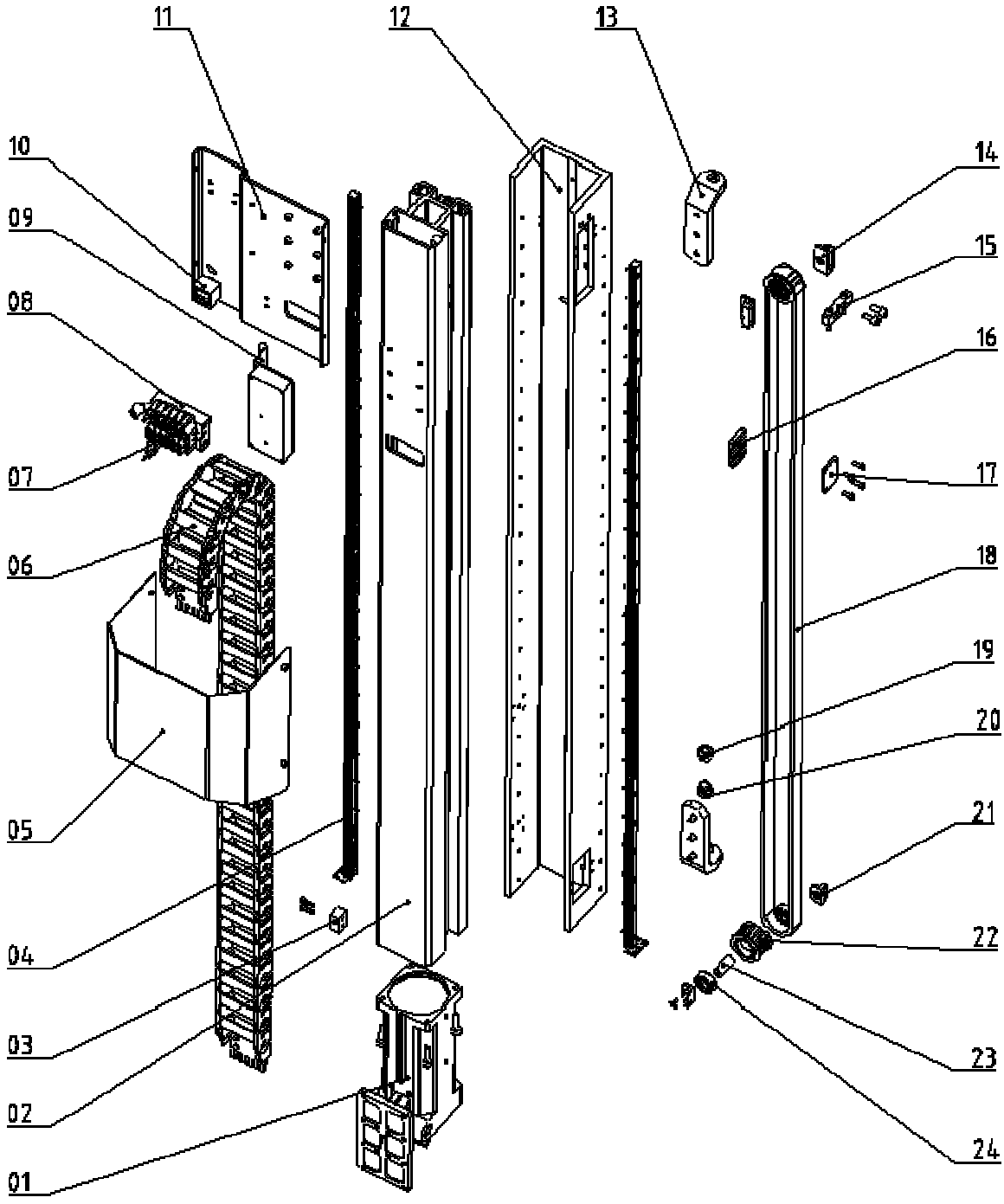


Fig.7-16: ST3-LT main-arm unit exploded view

Table 7-16: Parts BOM for ST3-LT main-arm unit

No.	Name	BOM NO.		
		ST3-1600-2200LT	ST3-1800-2400LT	ST3-2200-2600LT
1	Flip mechanism	BH73300030010	BH73300030010	BH73300030010
2	Main arm aluminium profile	BH73316220010	-	BH73322300410
3	Crosswise sensor fixing plate	BL75310000040	BL75310000040	BL75310000040
4	Linear guide rail	-	-	-
5	Mounting plate cover for distribution plate	-	-	-
6	Main arm drag chain	-	-	-
7	Magnetic valve	-	-	-
8	Distribution plate	-	-	-
9	Terminal mounting frame of axis Y	BL75316000020	BL75316000020	BL75321600020
10	Digital pressure switch	-	-	-
11	Distribution mounting plate	-	-	-
12	ST3-L-T transition profile	-	-	-
13	Vertical limit plate	BL75033100040	BL75033100040	BL75033100040
14	Pulley fixing part 1	-	-	-
15	Pulley tuning plate	-	-	-
16	Vertical tooth plate 2	BH73323130040	BH73323130040	BH73323130040
17	Synchronous belt pressure plate	BH73323140040	BH73323140040	BH73323140040
18	Synchronous belt	-	-	-
19	Buffer cap	-	-	-
20	Buffer unit	-	-	-
21	Pulley fixing part 2	-	-	-
22	Pulley welded assemblies	-	-	-
23	Bearing Shaft	-	-	-
24	Bearing	-	-	-

*Indicate a potential damage item; ** indicate likely to damage item, recommend to spare
Please check the manual version number first before procurement to make sure the BOM tally with actual part.

8 . Pneumatic Schematic Diagram

8.1 ST3& ST3-T pneumatic schematic diagram

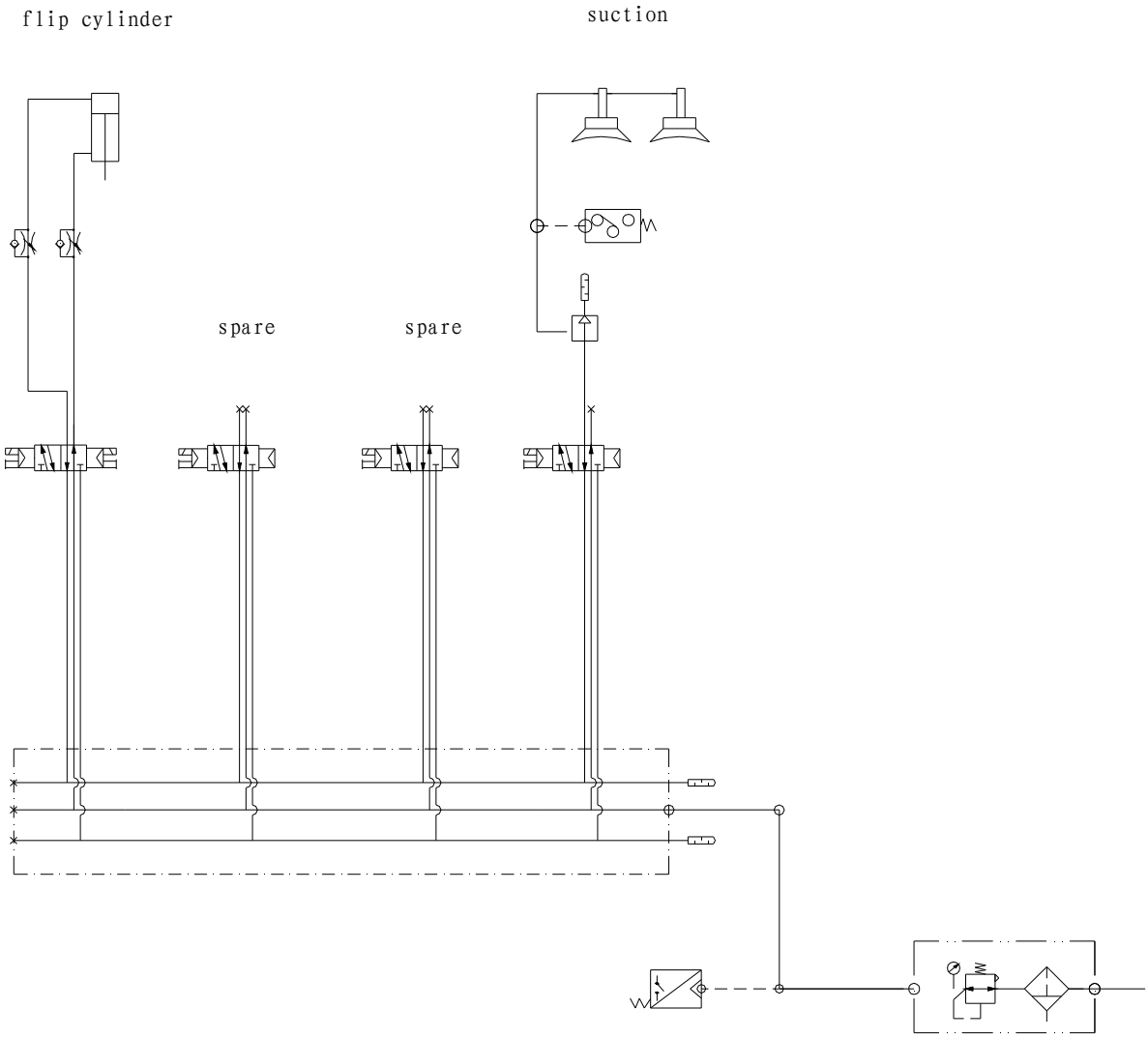


Fig.8-1: ST3 & ST3-T pneumatic schematic diagram

8.2 ST5 pneumatic schematic diagram

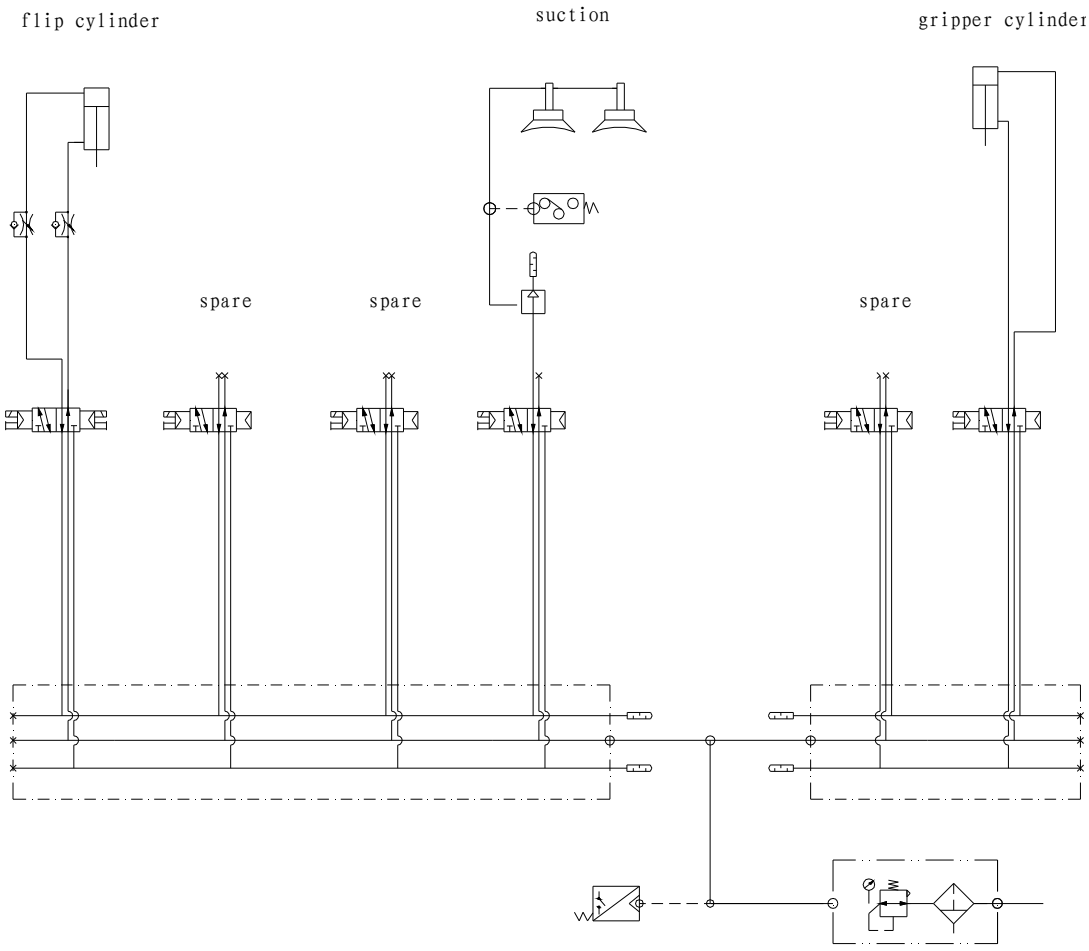


Fig.8-2: ST5 & ST5-T pneumatic schematic diagram

9 . ST3 Electrical-Pneumatic Control Diagram

9.1 ST3 Power supply wiring diagram

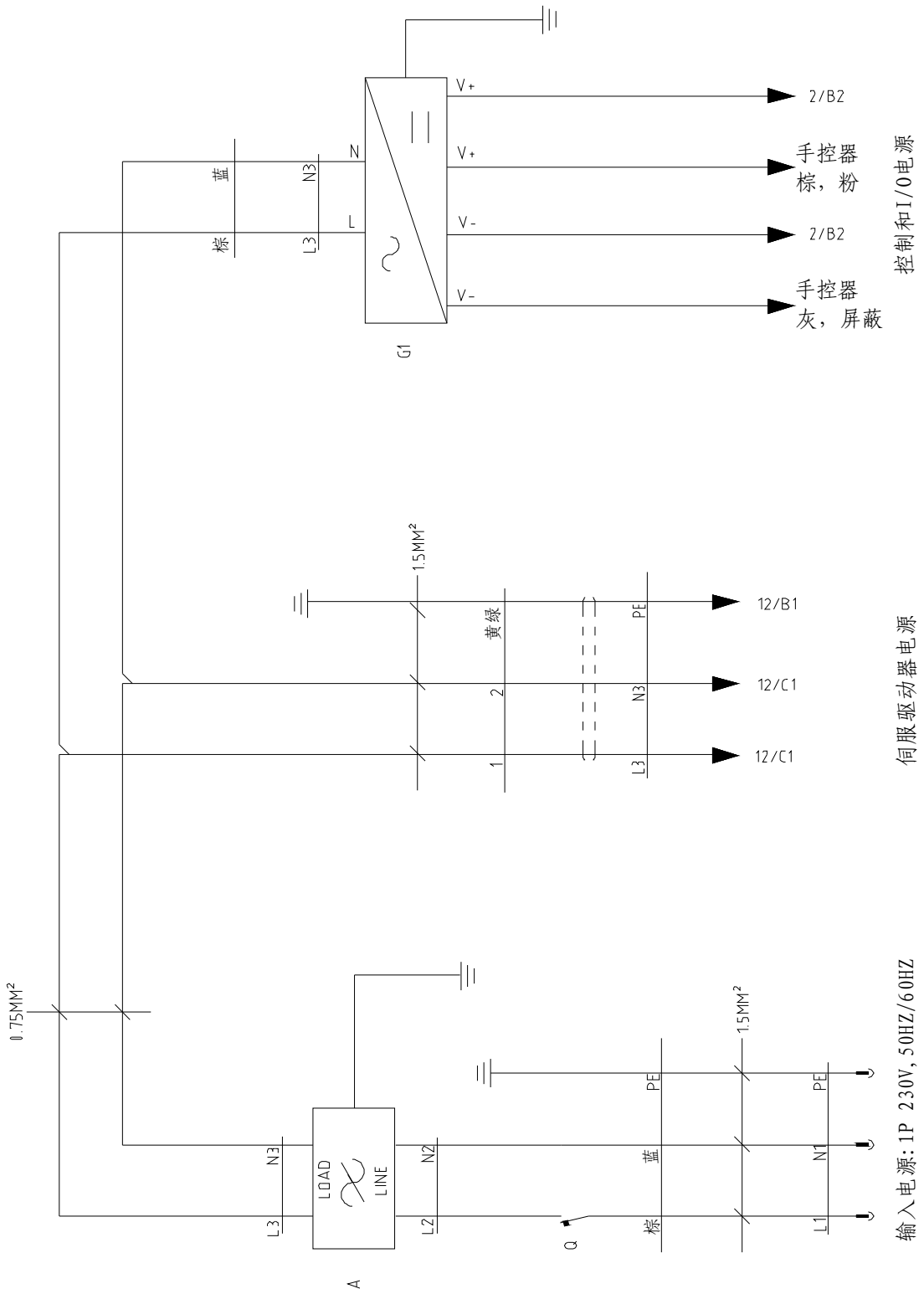


Fig.9-1: ST3 power supply wiring diagram

9.2 ST3 Each I/O module electrical wiring diagram

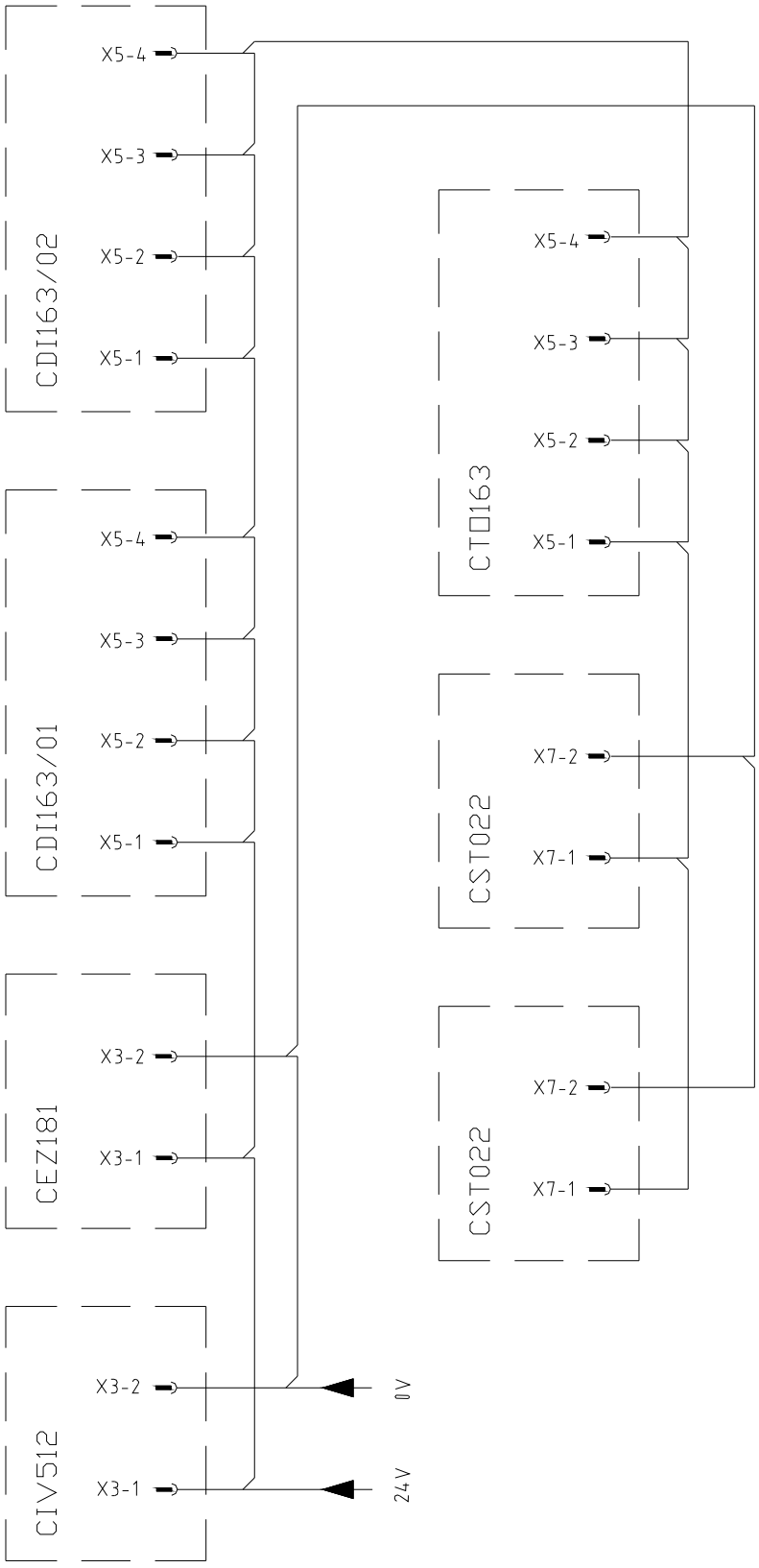


Fig.9-2: ST3 Each I/O module wiring diagram

9.3 ST3 Traverse unit I/O signal wiring diagram

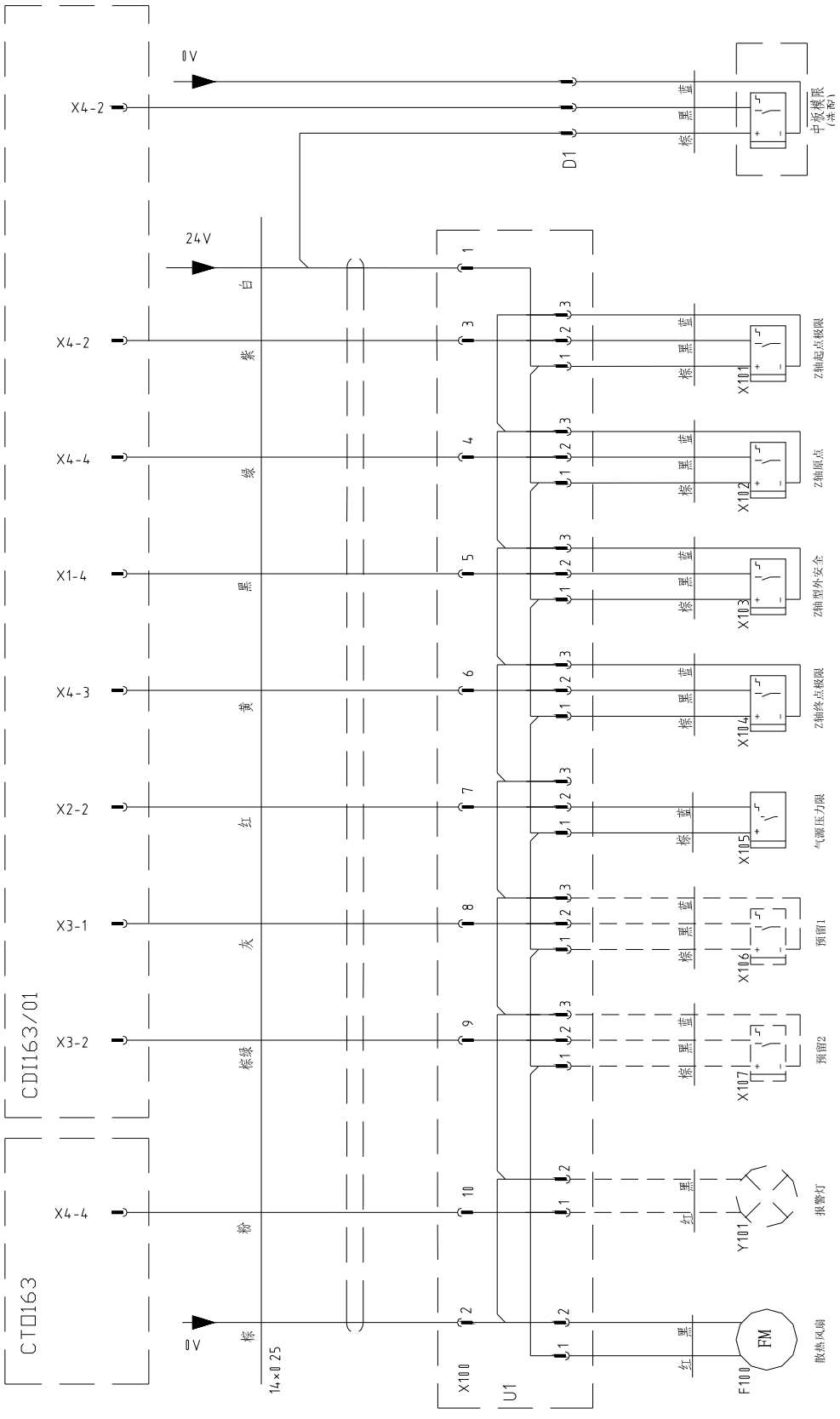


Fig.9-3: ST3 Traverse unit I/O module wiring diagram

9.4 ST3 Main-arm unit input signal wiring diagram

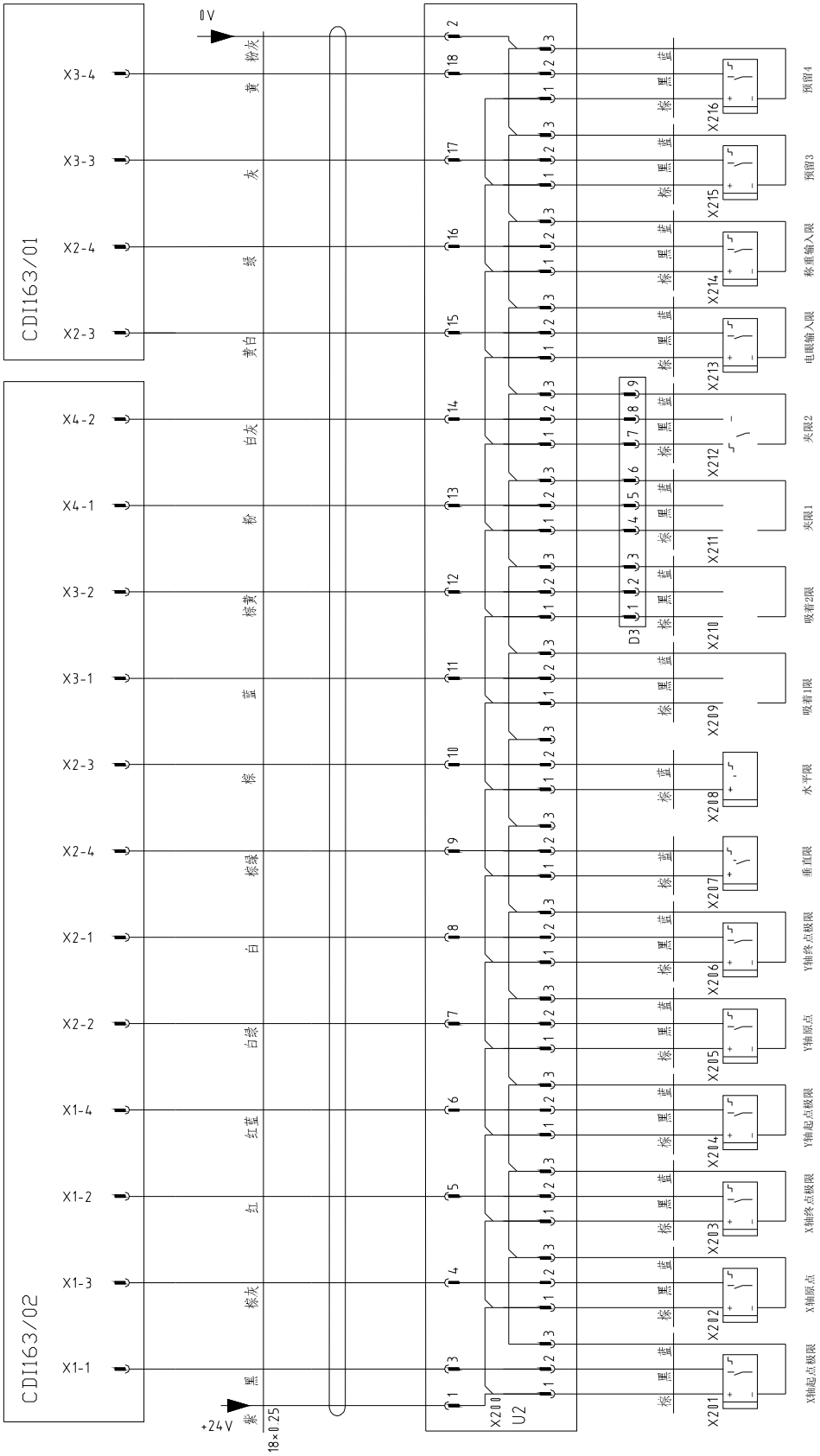


Fig.9-4: ST3 Main-arm unit input signal wiring diagram

9.5 ST3 Main-arm unit output signal wiring diagram

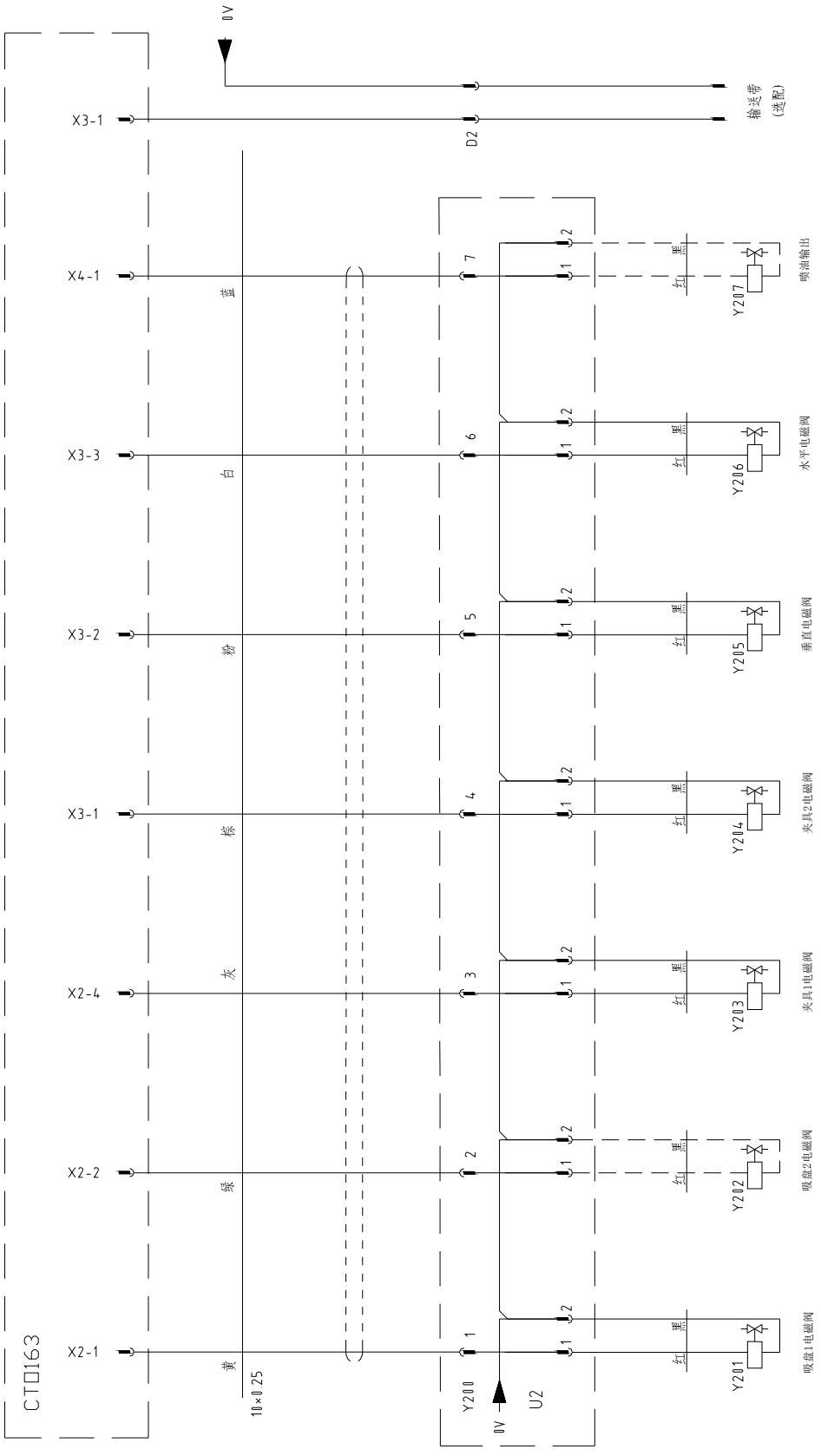


Fig.9-5: ST3 Main-arm unit output signal wiring diagram

9.6 ST3 Axis-Z servo driver I/O signal wiring diagram

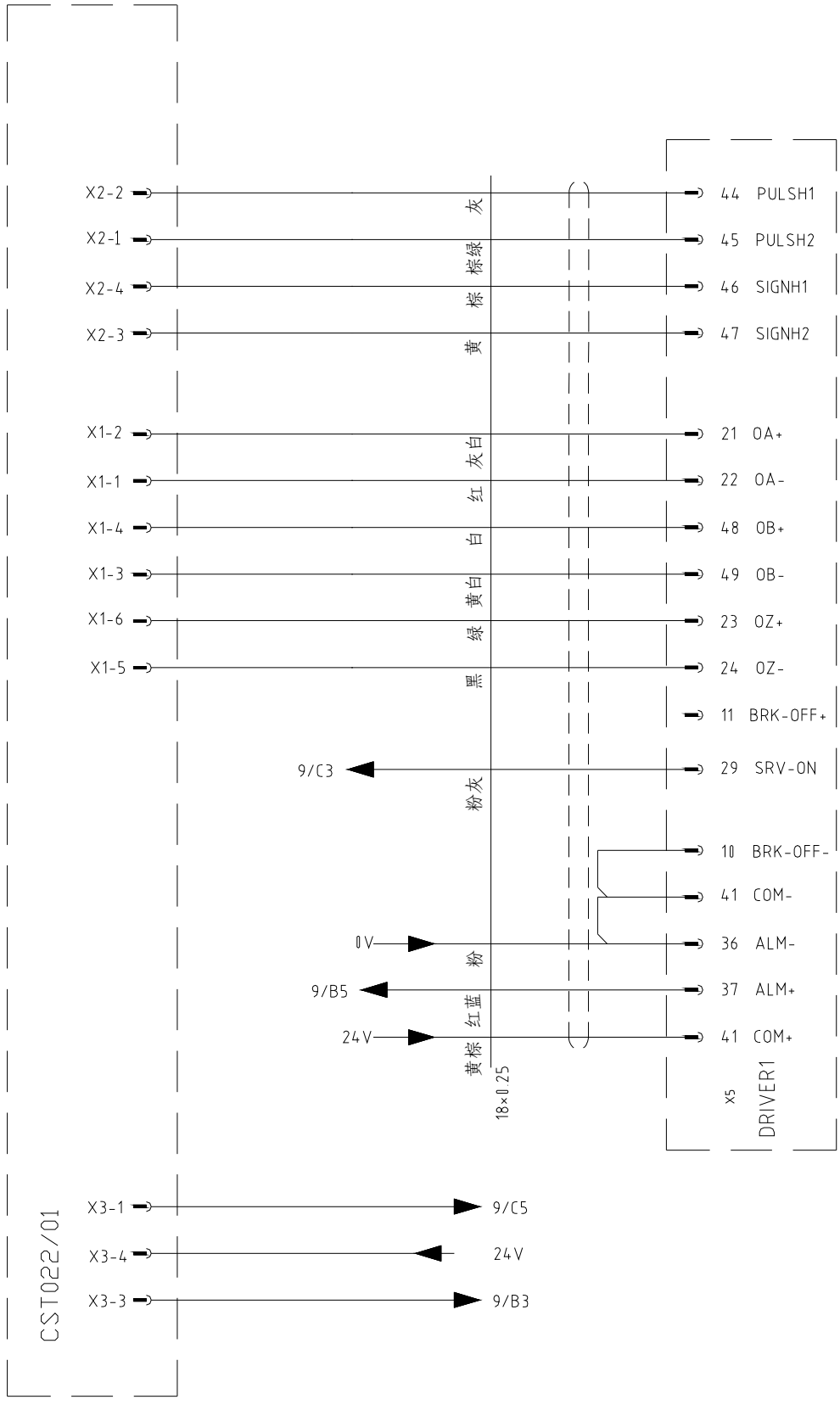


Fig.9-6: ST3 Axis-Z servo driver I/O signal wiring diagram

9.7 ST3 Axis-X servo driver I/O signal wiring diagram

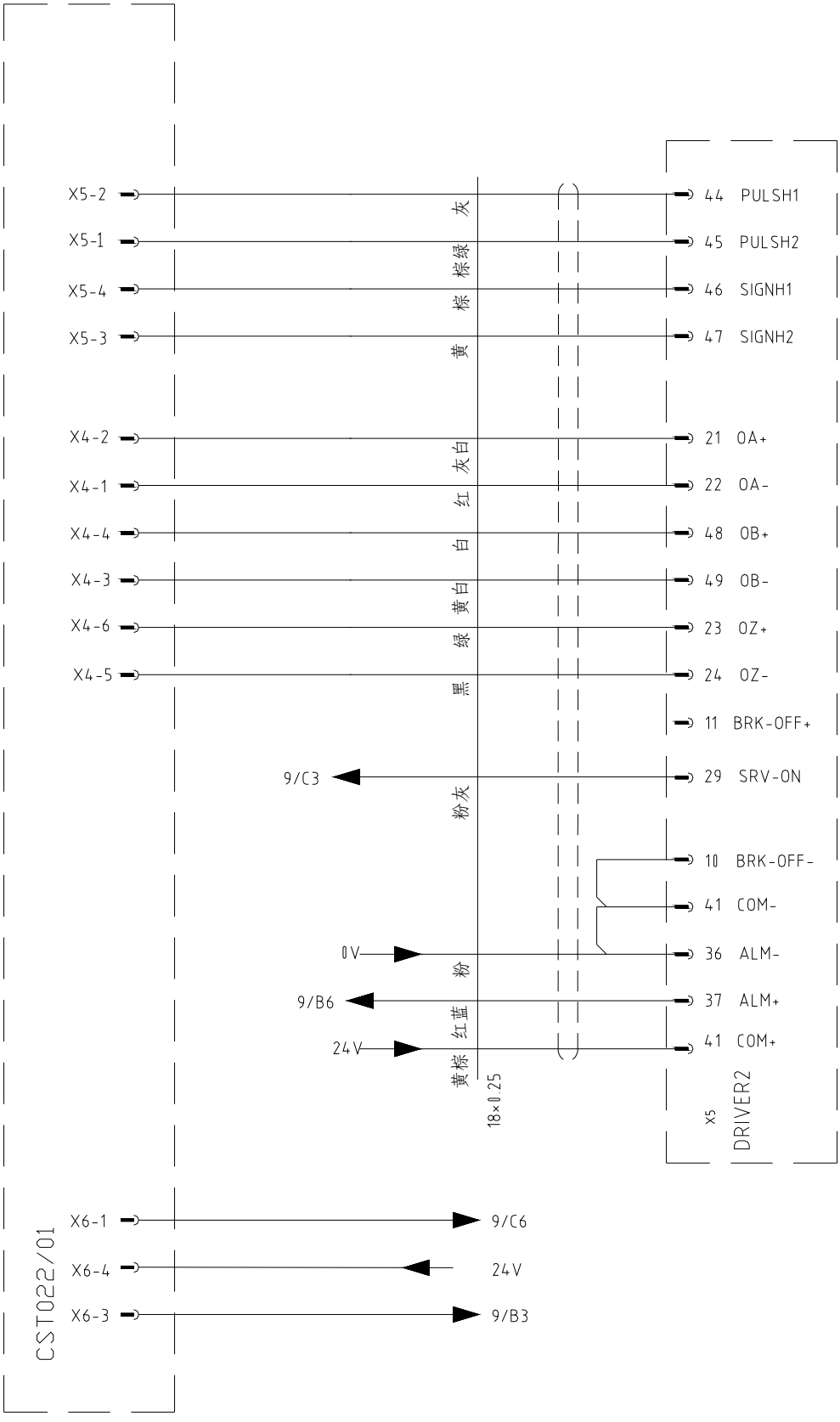


Fig.9-7: ST3 Axis-X servo driver I/O signal wiring diagram

9.8 ST3 Axis-Y servo driver I/O signal wiring diagram

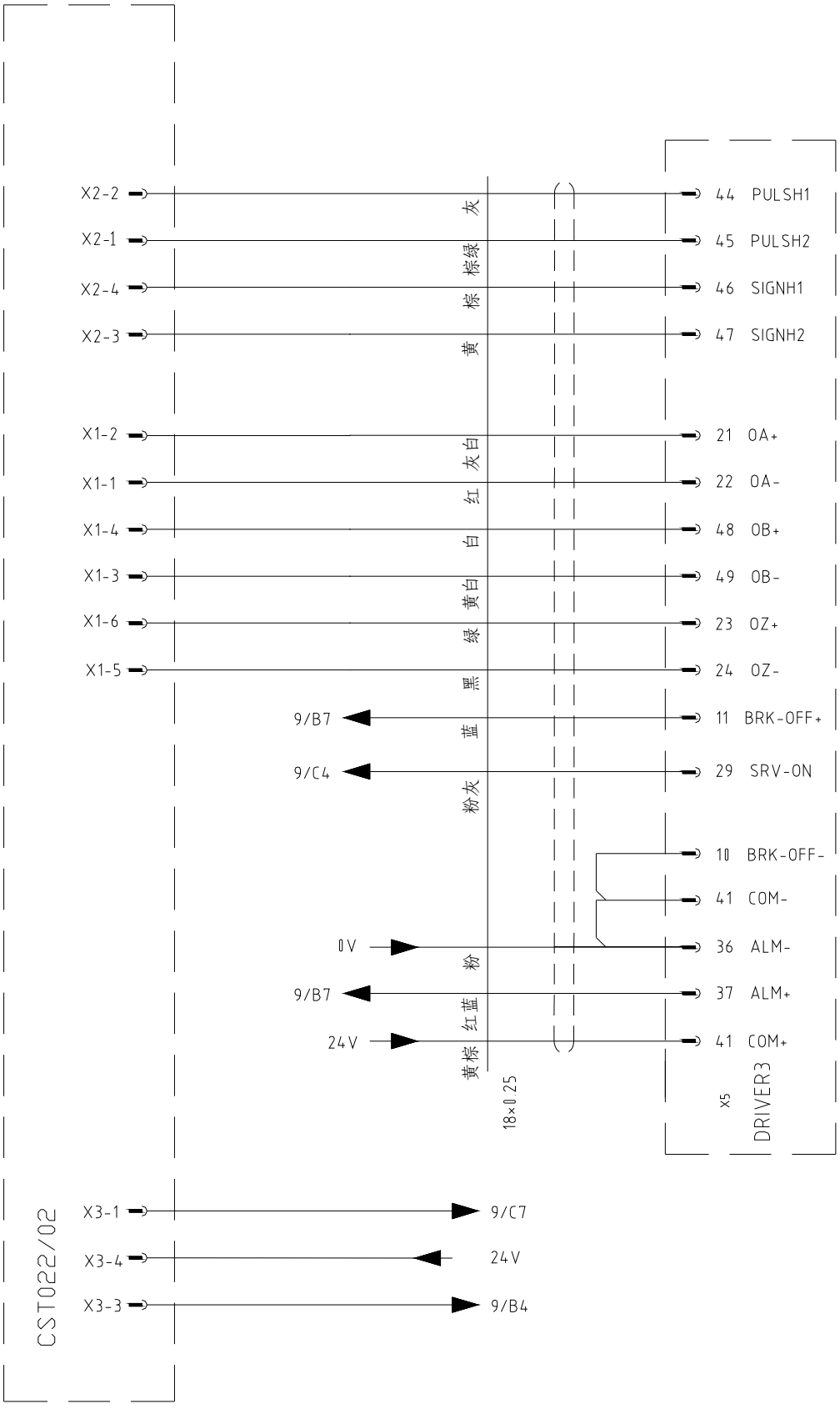


Fig.9-8: ST3 Axis-Y servo driver I/O signal wiring diagram

9.9 ST3 Intermediate relay wiring diagram

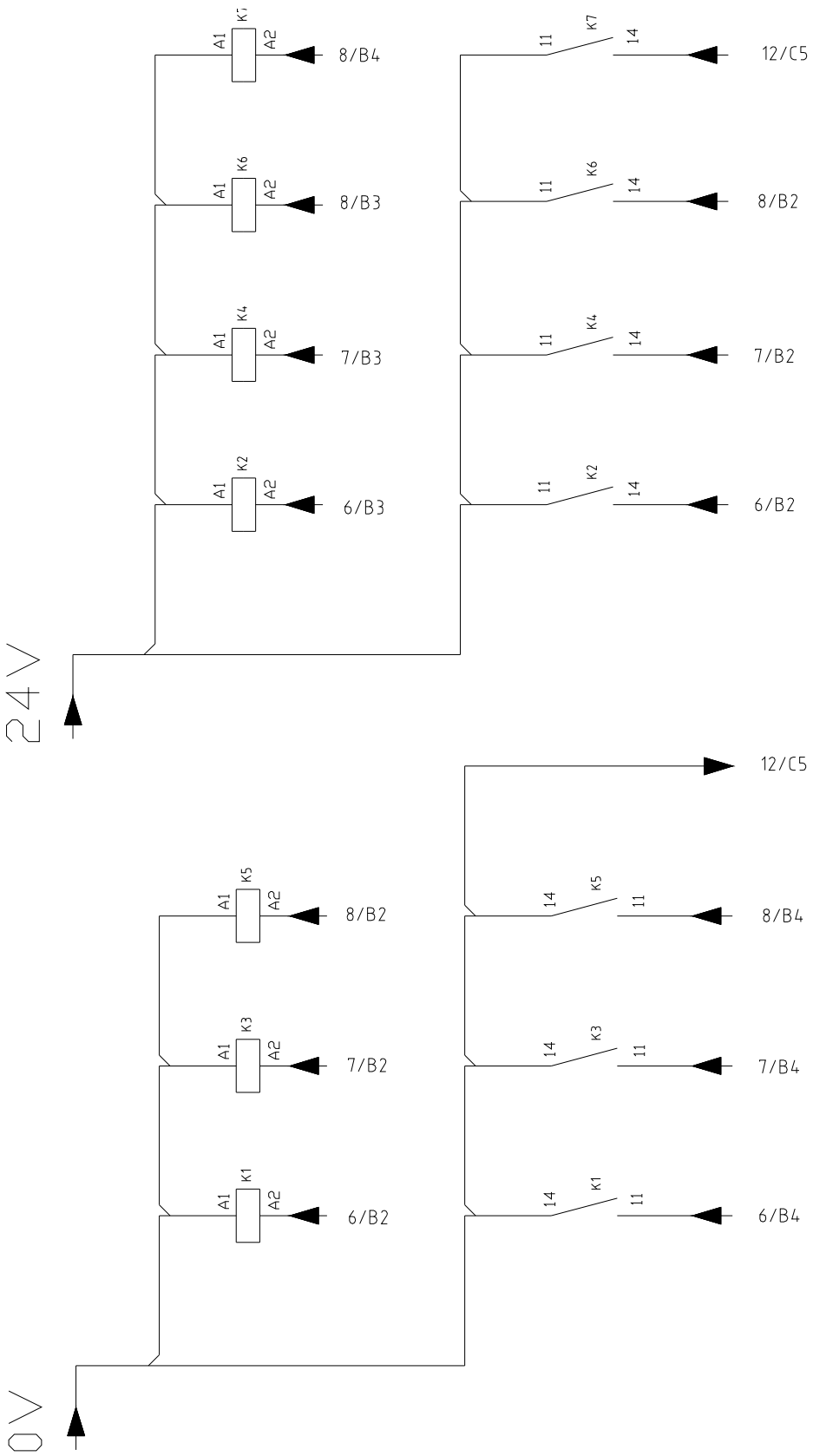


Fig.9-9: ST3 Intermediate relay wiring diagram

9.10 ST3 Axis-Z servo motor wring diagram

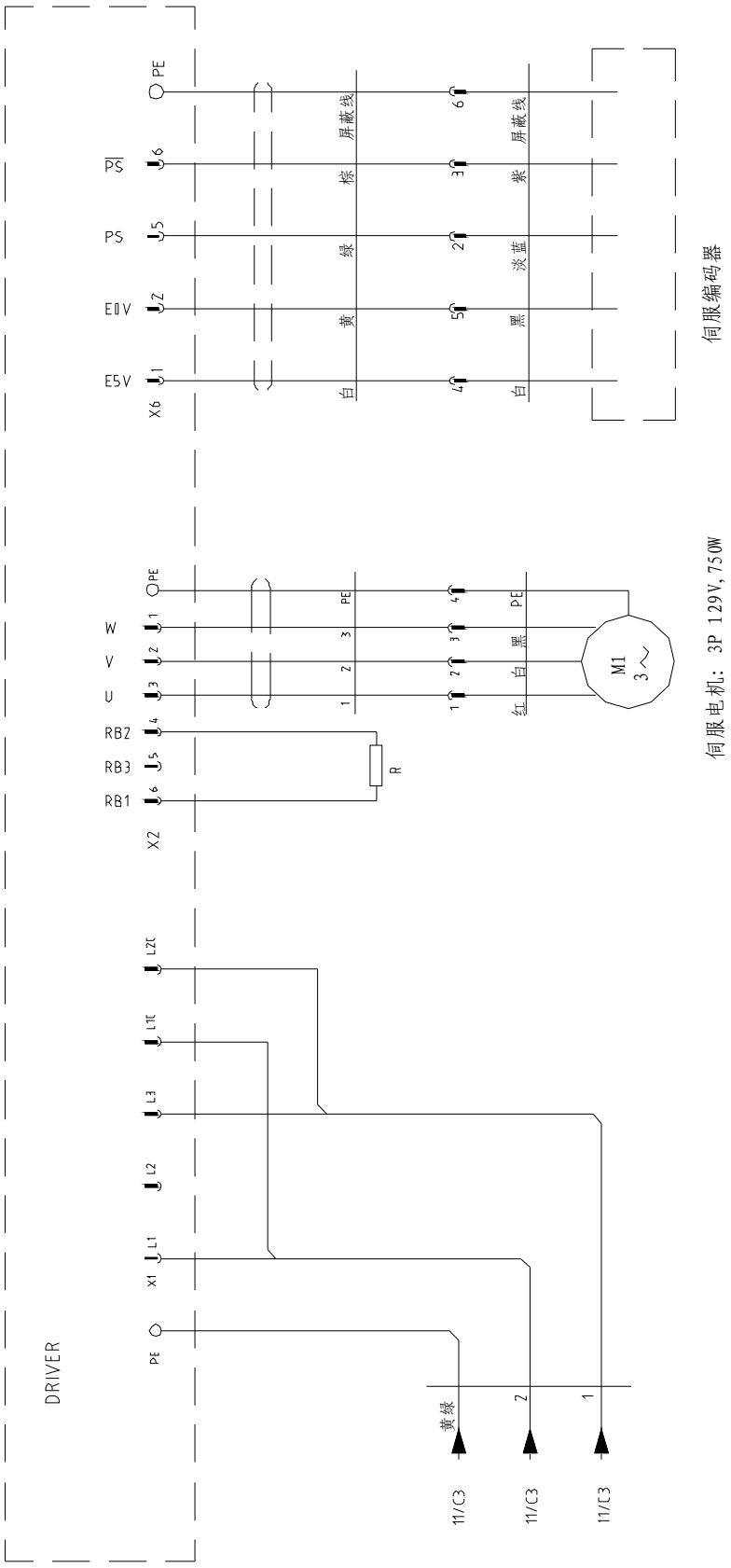


Fig.9-10: ST3 Axis-Z servo motor wiring diagram

9.11 ST3 Axis-X servo motor wiring diagram

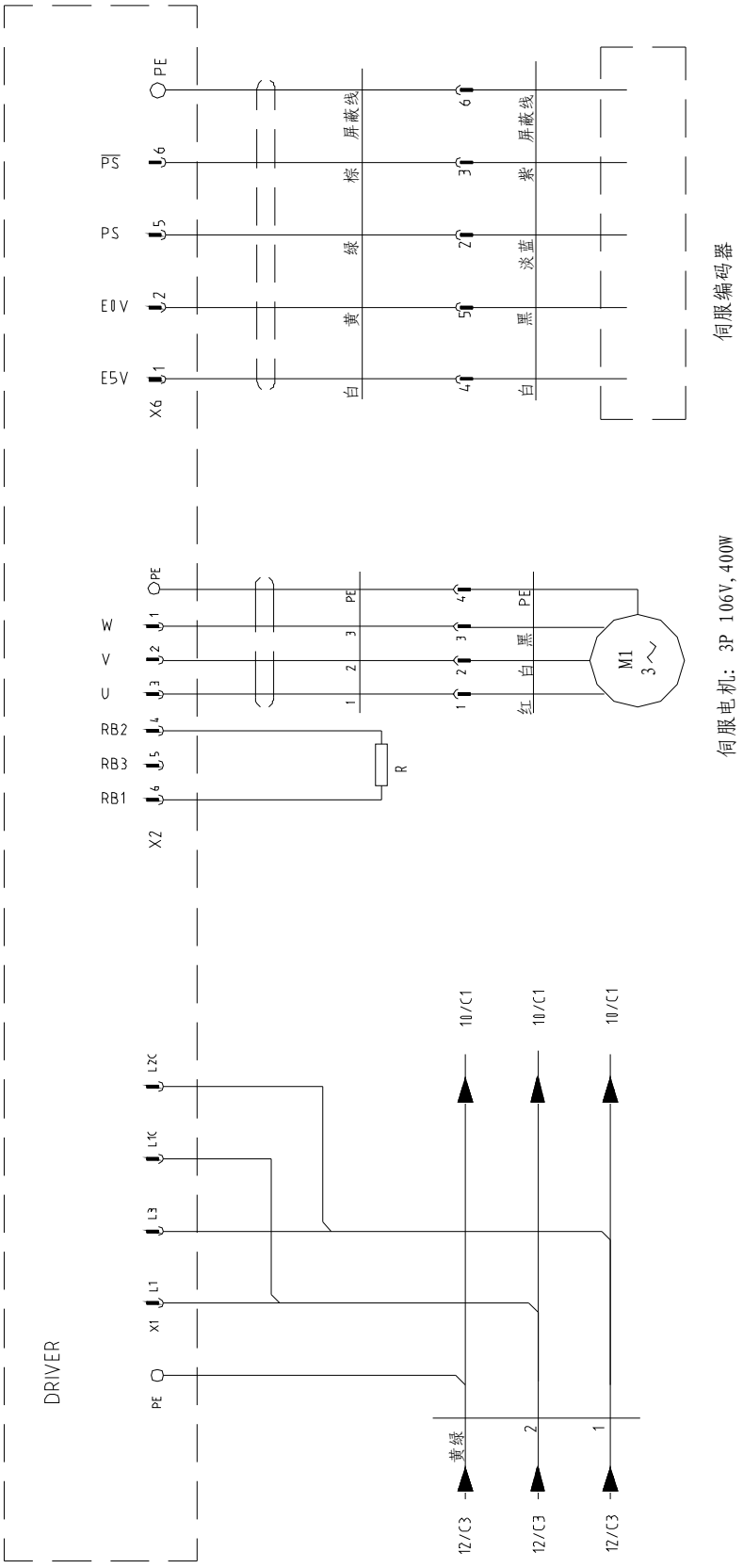


Fig.9-11: ST3 Axis-X servo motor wiring diagram

9.12 ST3 Axis-Y servo motor wiring diagram

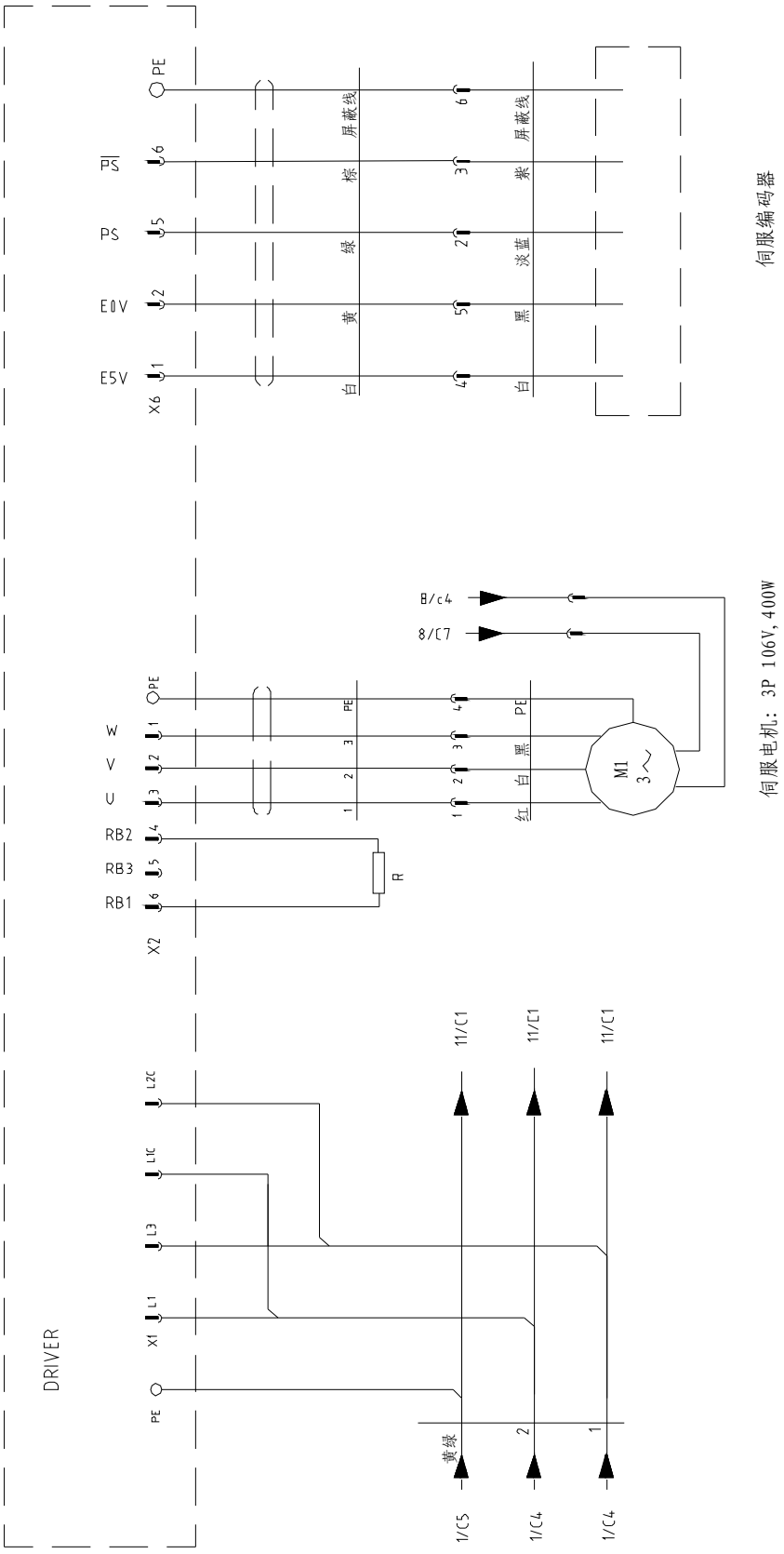


Fig.9-12: ST3 Axis-Y servo motor wiring diagram

9.13 ST3 EM67 input signal wiring diagram

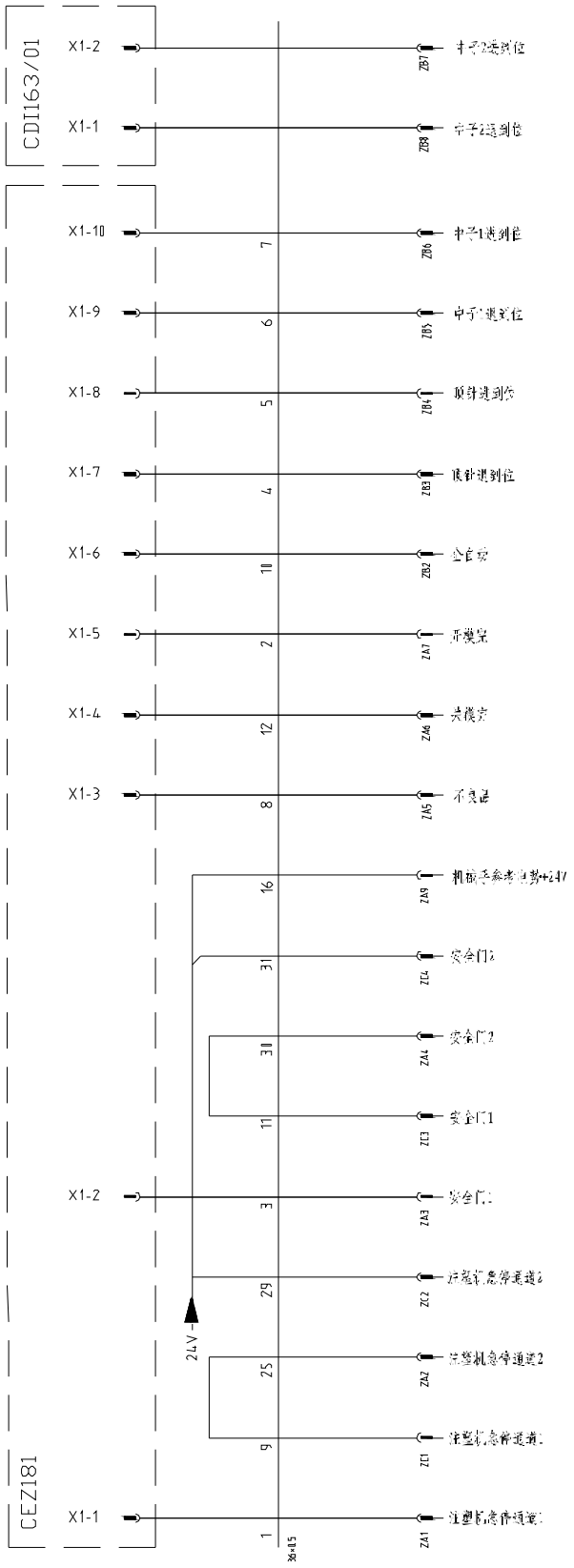


Fig.9-13: ST3 EM67 input signal wiring diagram

9.14 ST3 EM67 output signal wiring diagram

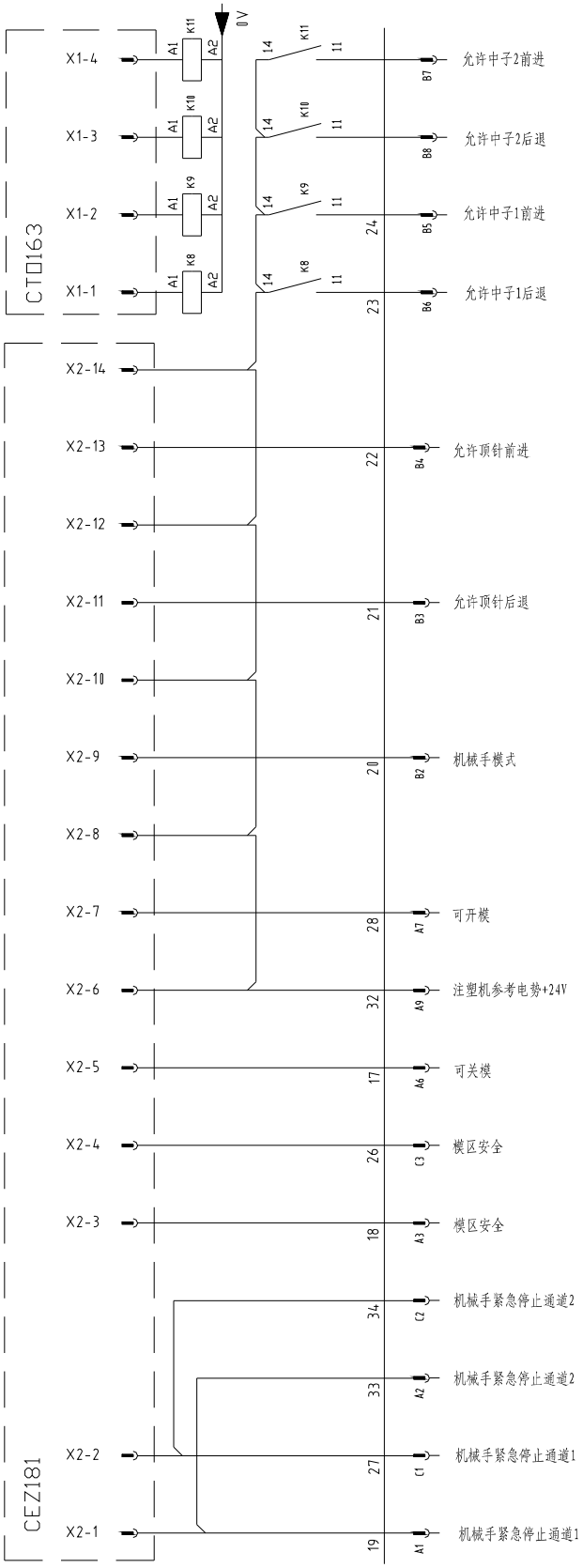


Fig.9-14: ST3 EM67 output signal wiring diagram

9.15 ST3 SIGMATEK module board

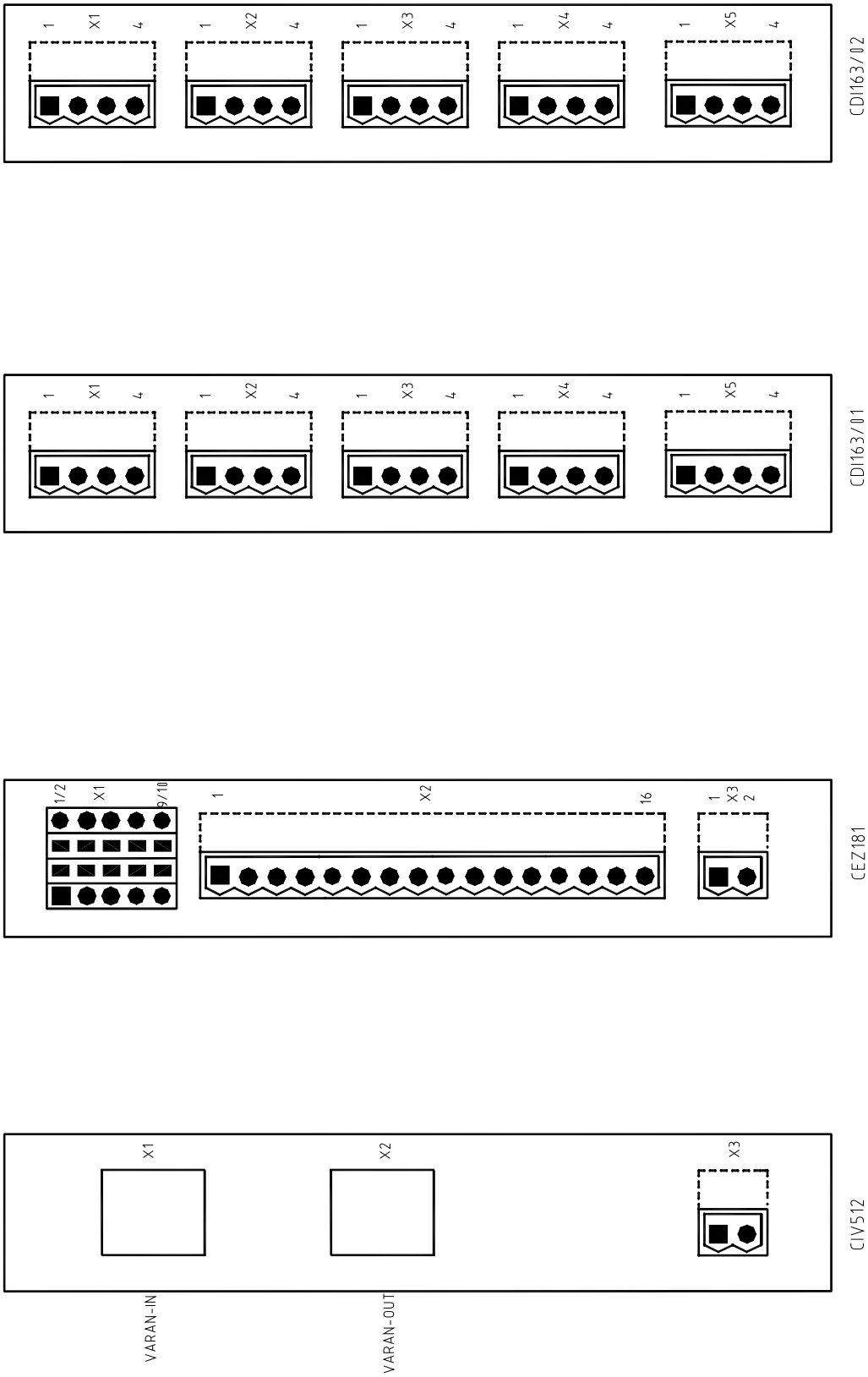


Fig.9-15: ST3 SIGMATEK Module board 1

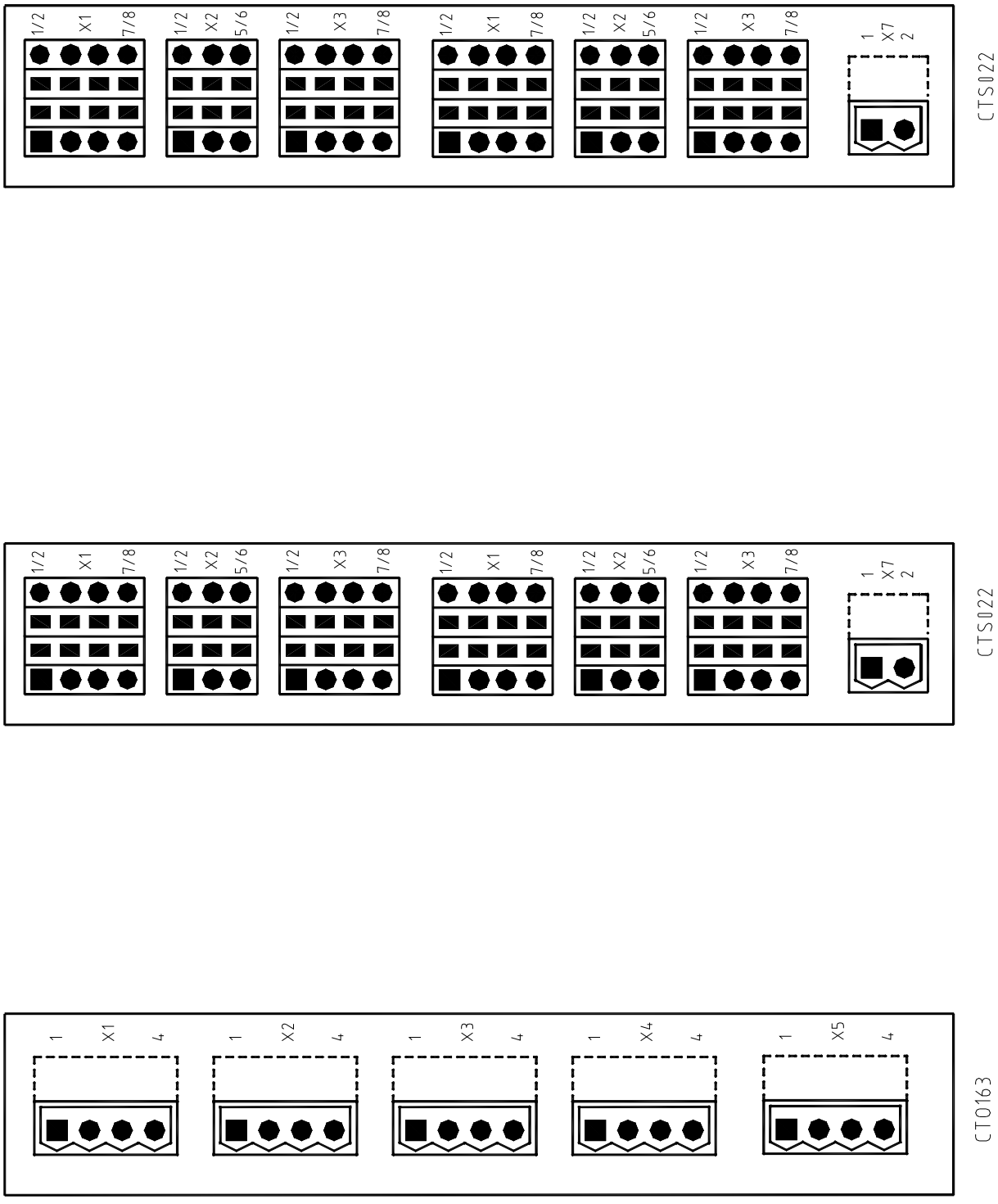


Fig.9-16: ST3 SIGMATEK Module board 2

9.16 ST3 Traverse unit board

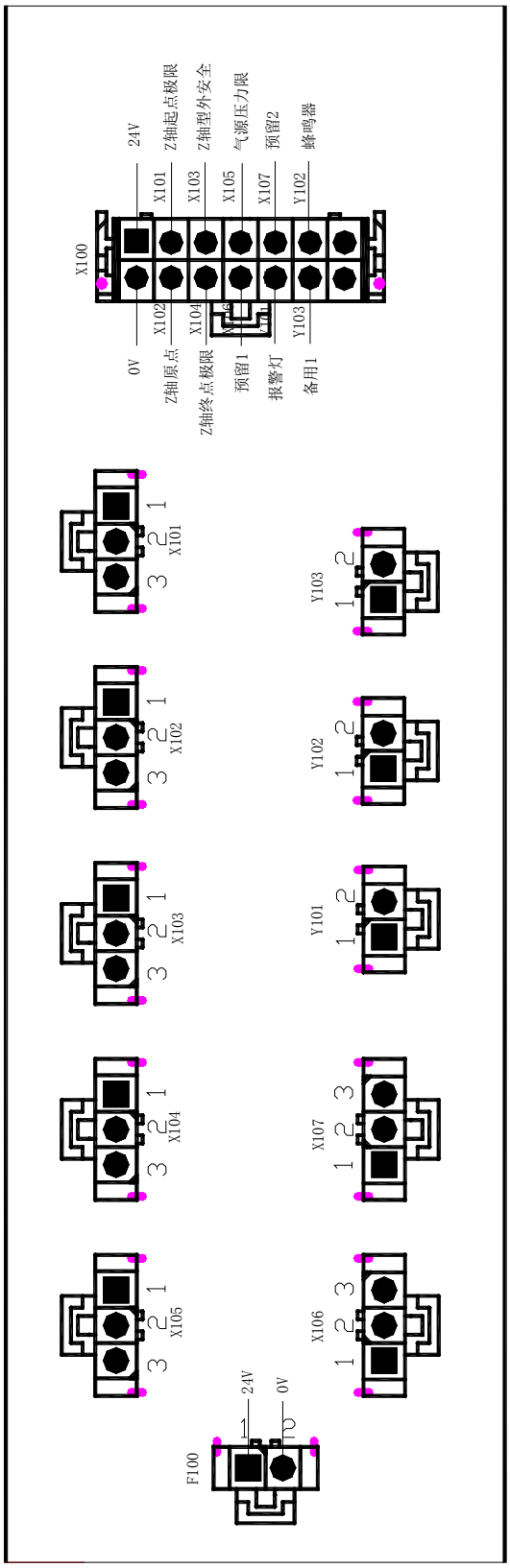


Fig.9-17: ST3 Traverse unit board

9.17 ST3 Main-arm unit board

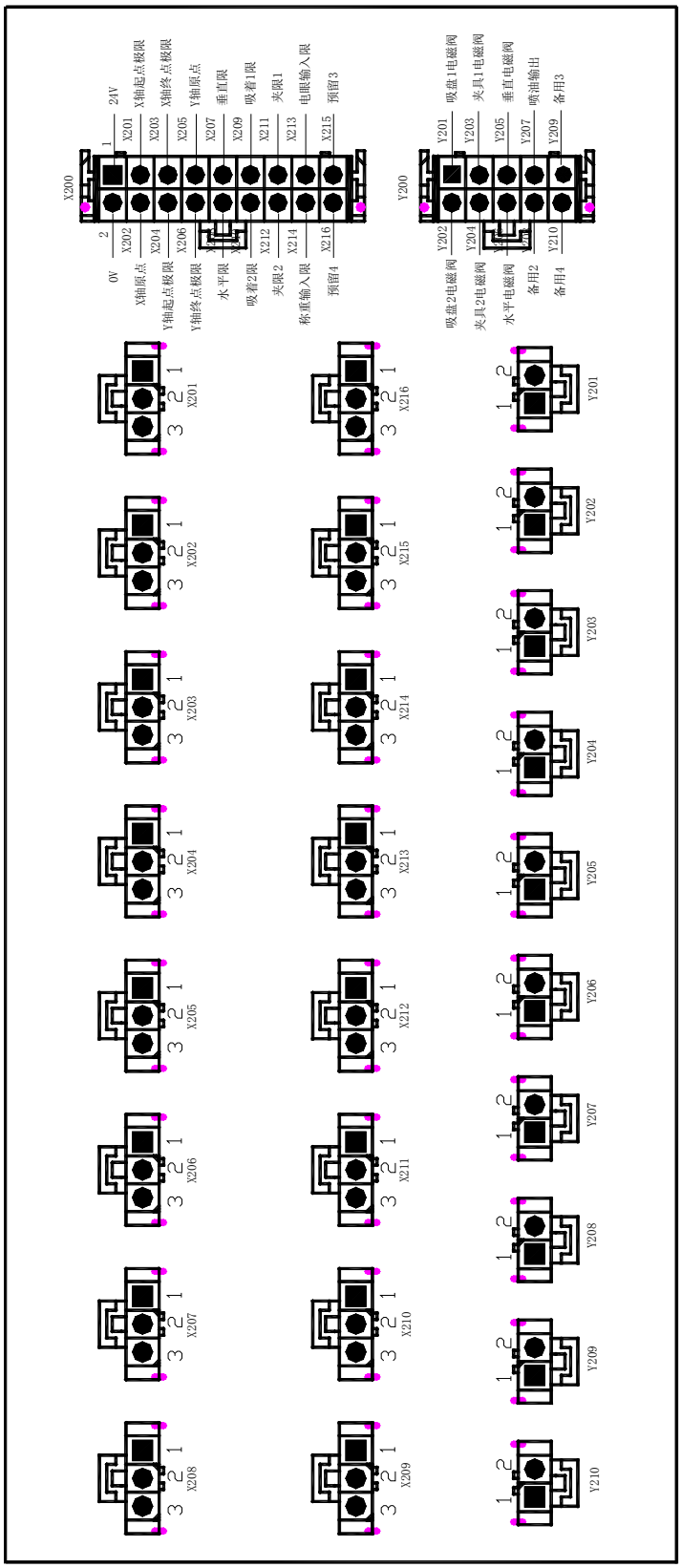


Fig.9-18: ST3 Main-arm unit board

10 .ST5 Electrical-Pneumatic Control Diagram

10.1 ST5 Power supply wiring diagram

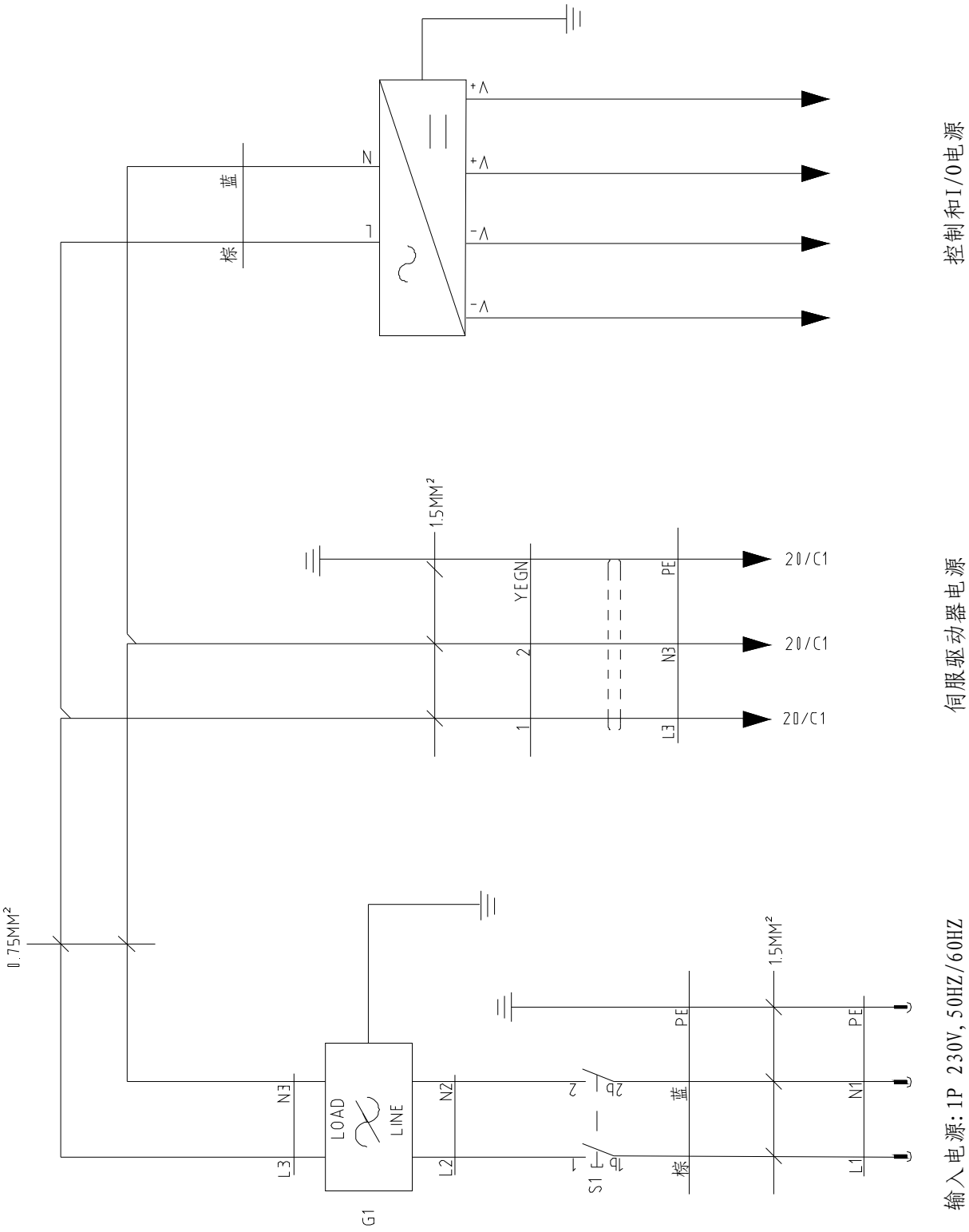


Fig.10-1: ST5 Power supply wiring diagram

10.2 ST5 Each I/O module electrical wiring diagram

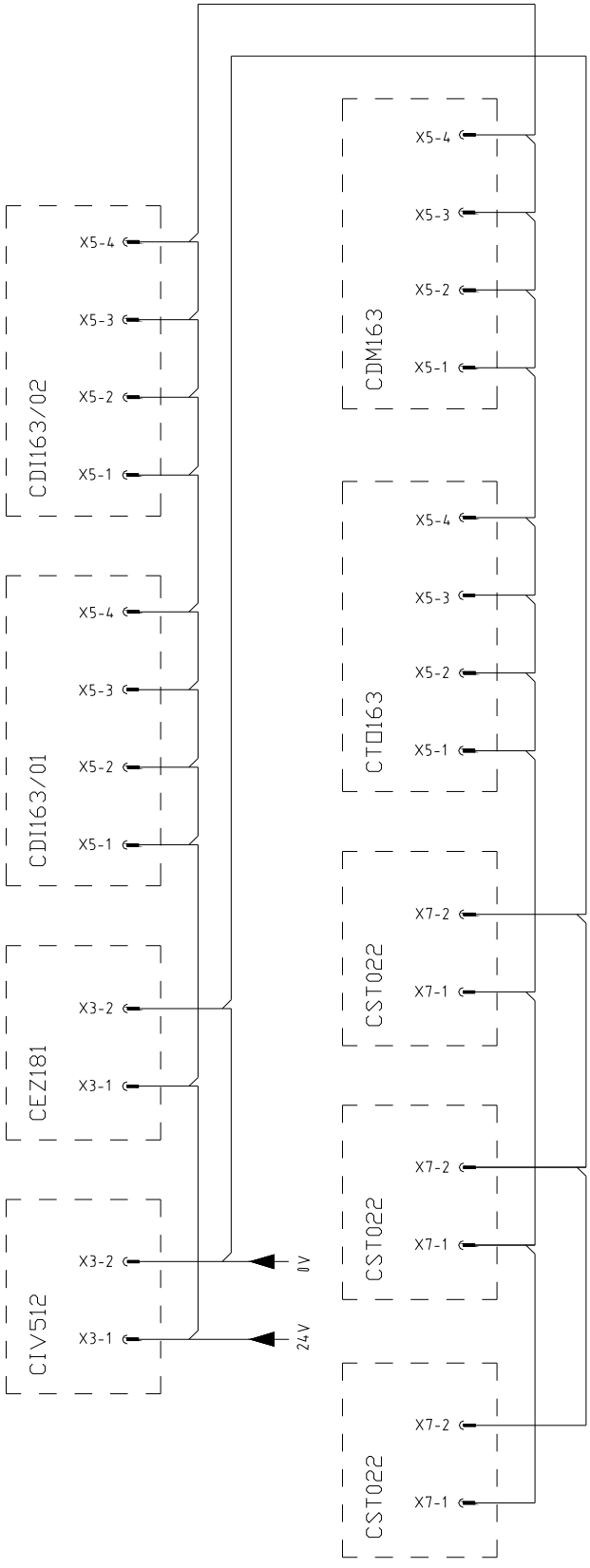


Fig.10-2: ST5 Each I/O module electrical wiring diagram

10.3 ST5 Traverse unit I/O signal wiring diagram

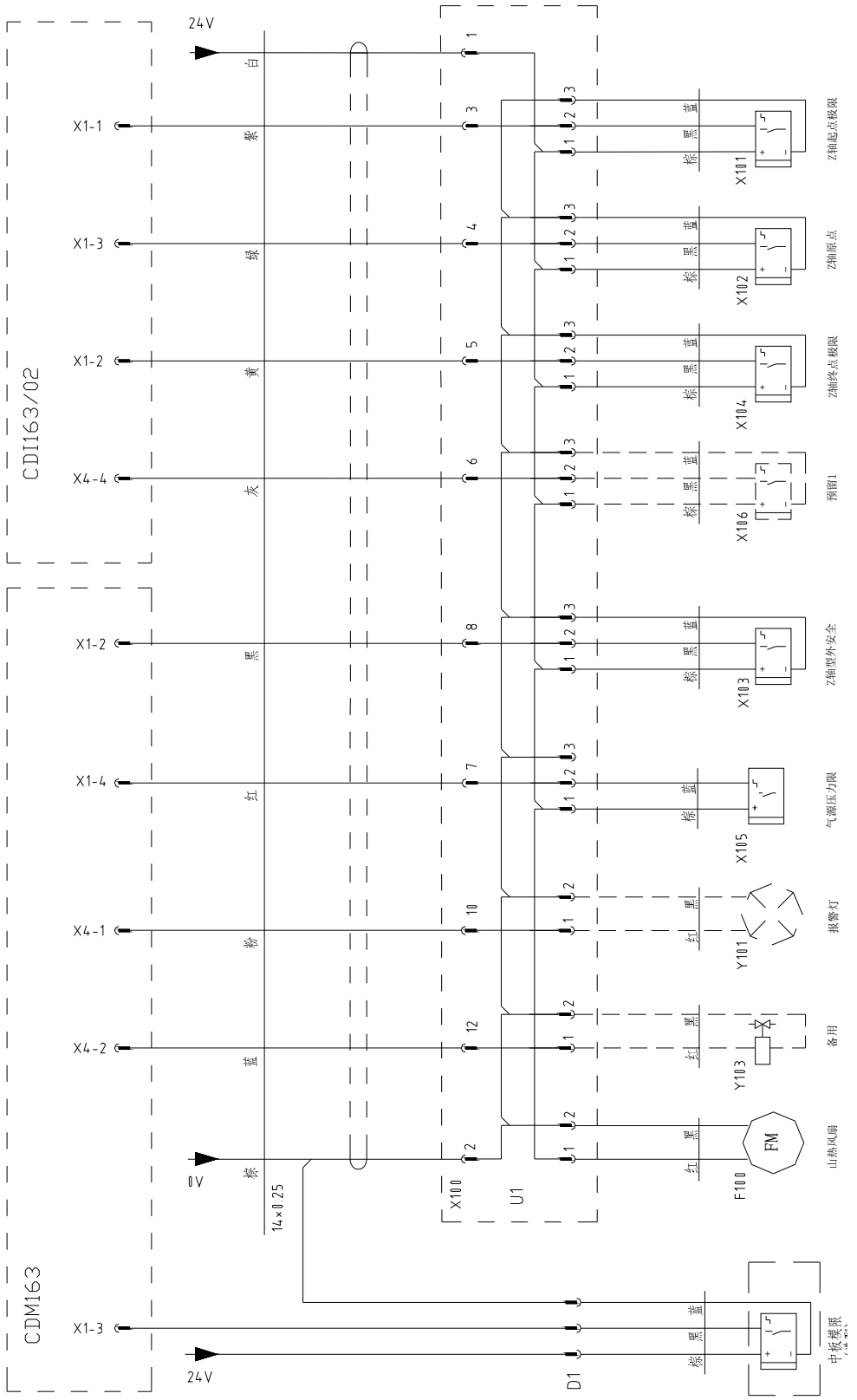


Fig.10-3: ST5 Traverse unit I/O signal wiring diagram

10.4 ST5 Main-arm unit input signal wiring diagram

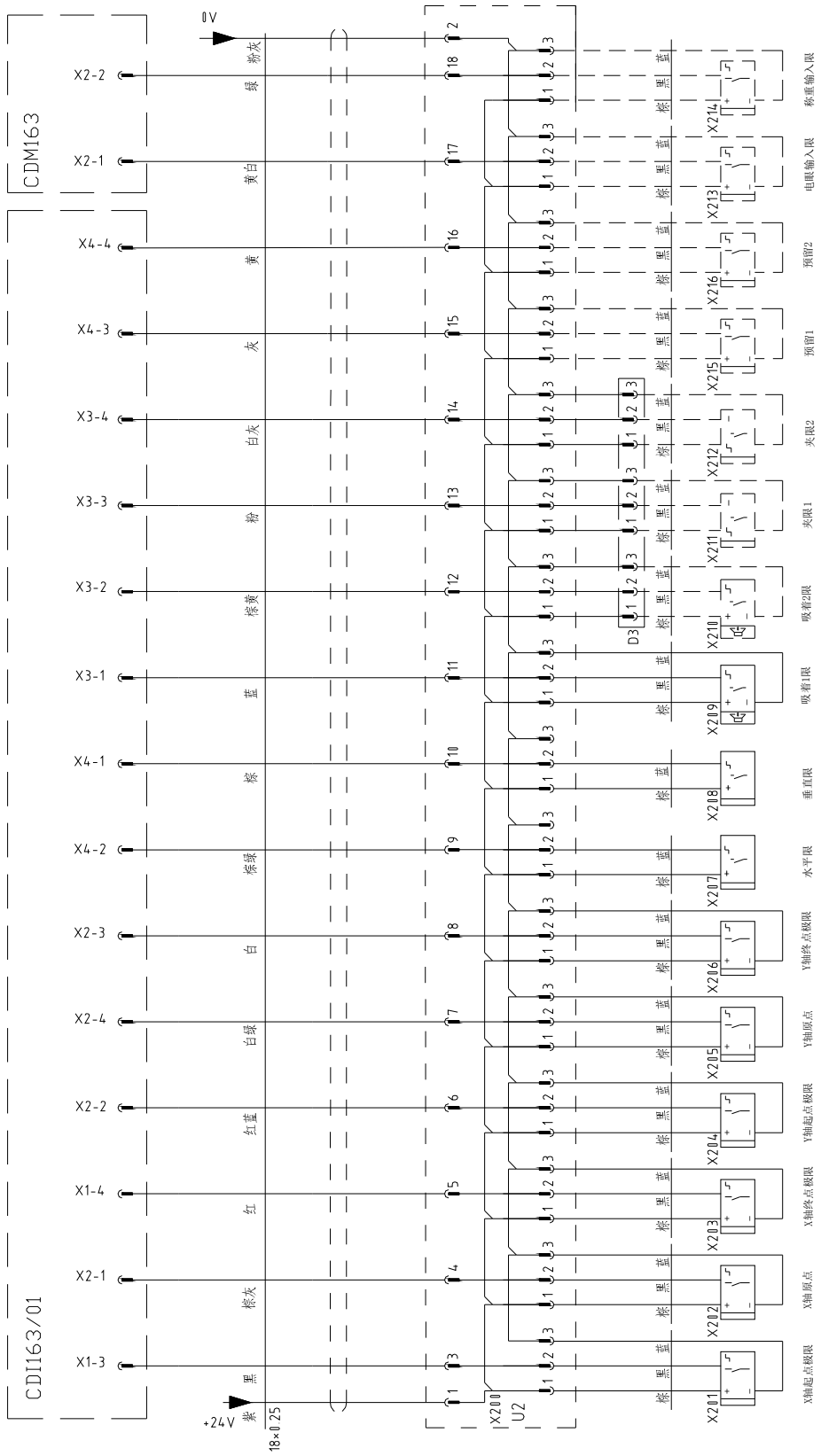


Fig.10-4: ST5 Main-arm unit input signal wiring diagram

10.5 ST5 Main-arm unit output signal wiring diagram

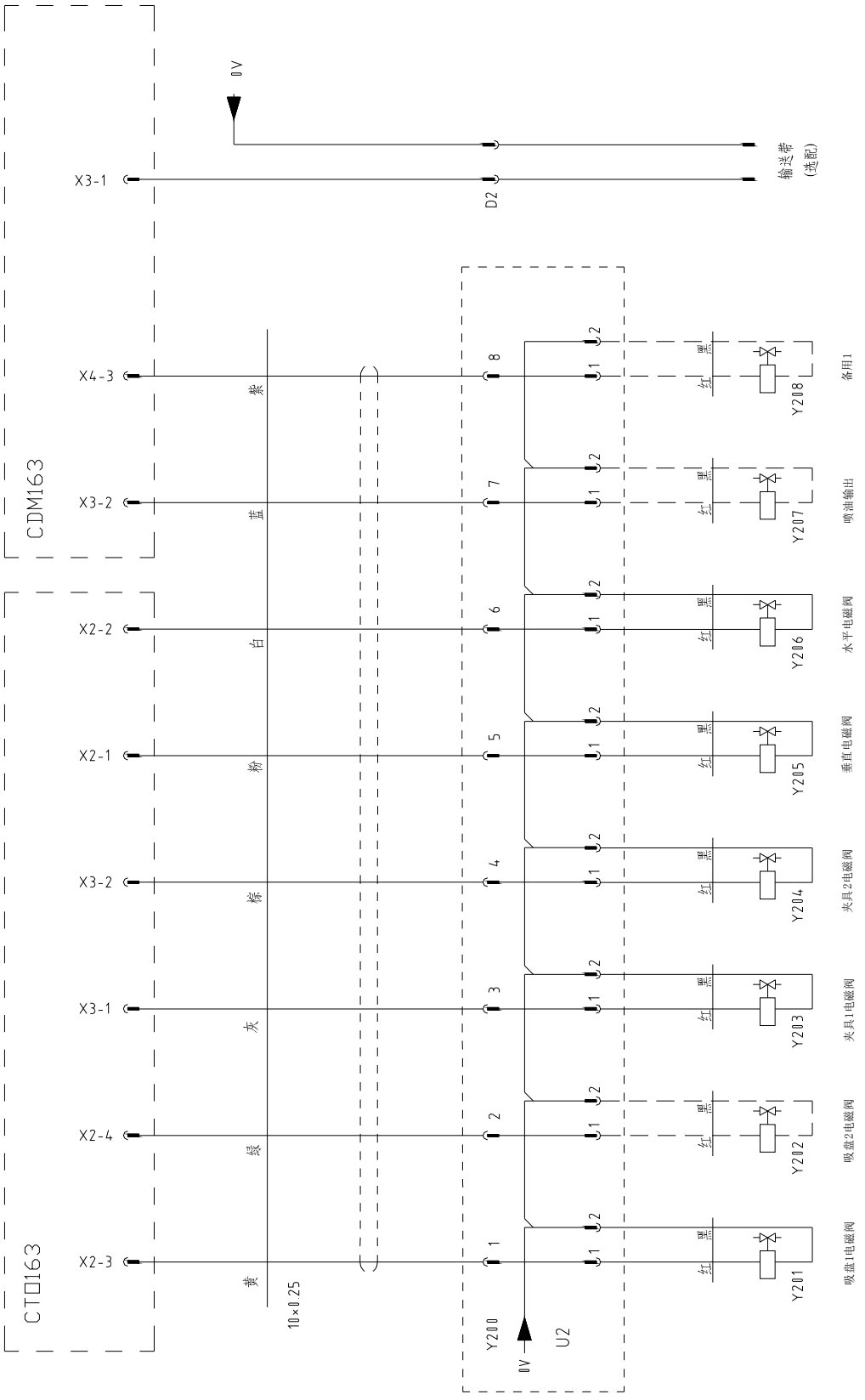


Fig.10-5: ST5 Main-arm unit output signal wiring diagram

10.6 ST5 Sub-arm unit input signal wiring diagram

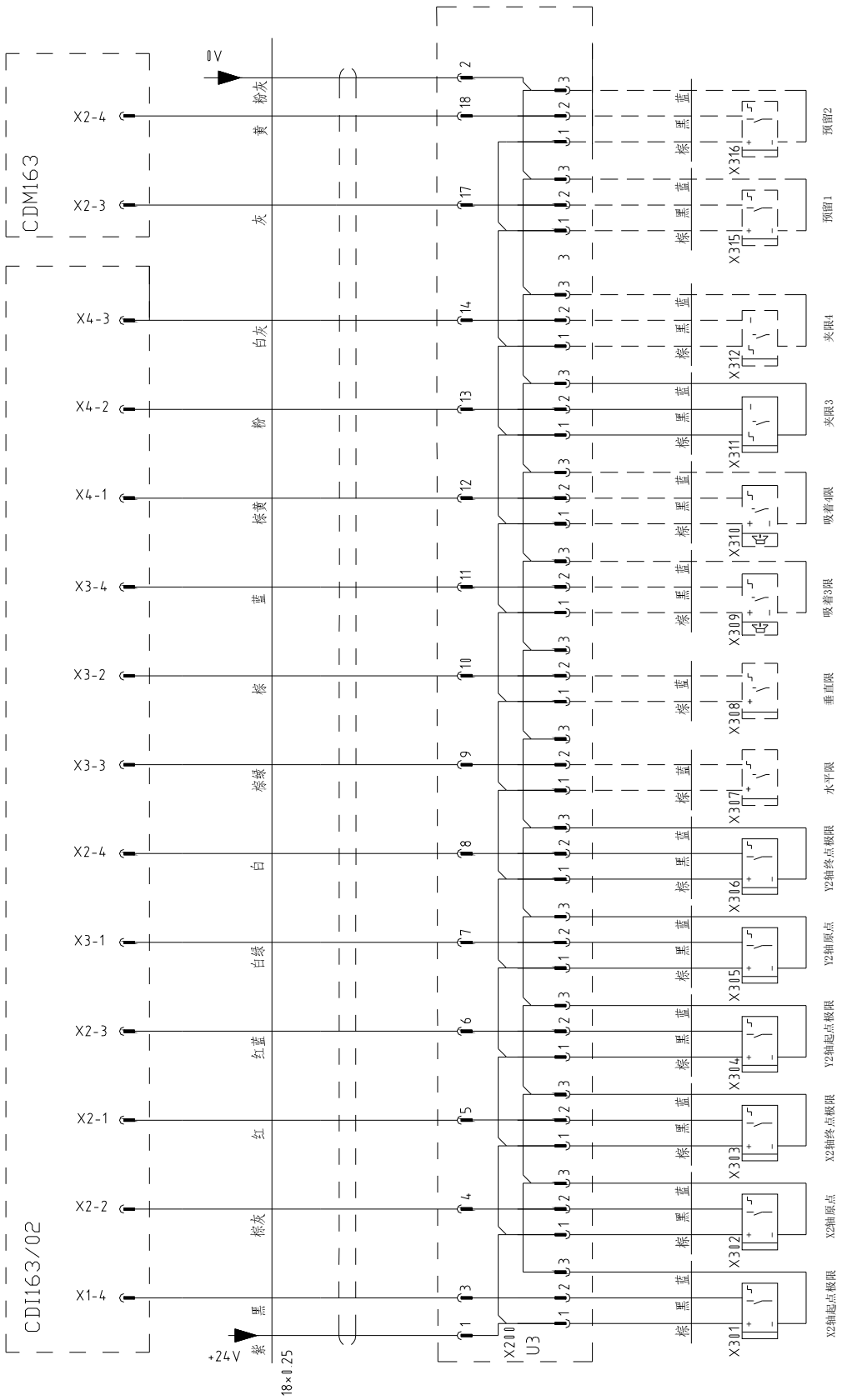


Fig.10-6: ST5 Sub-arm unit output signal wiring diagram

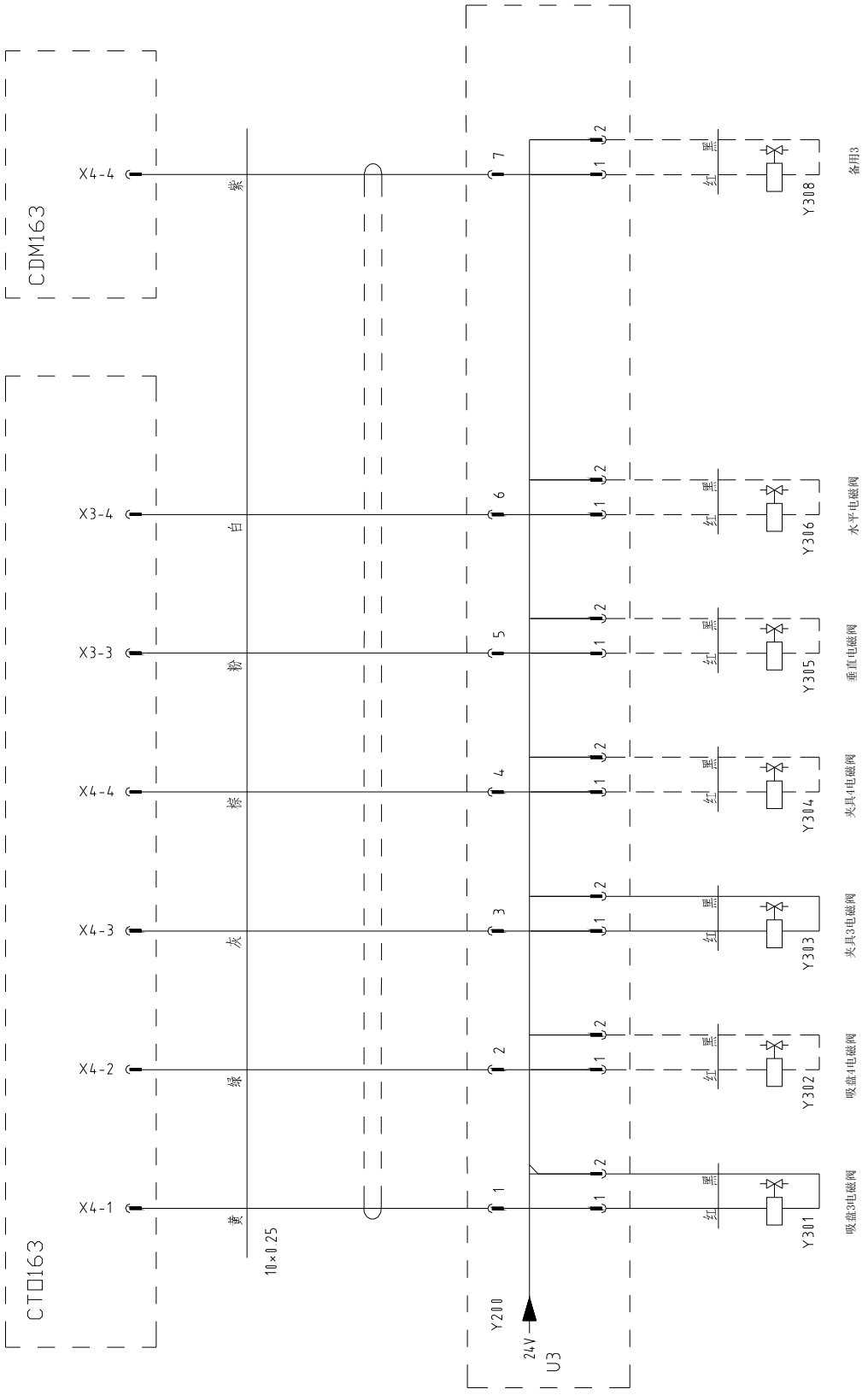


Fig.10-7: ST5 Sub-arm unit output signal wiring diagram

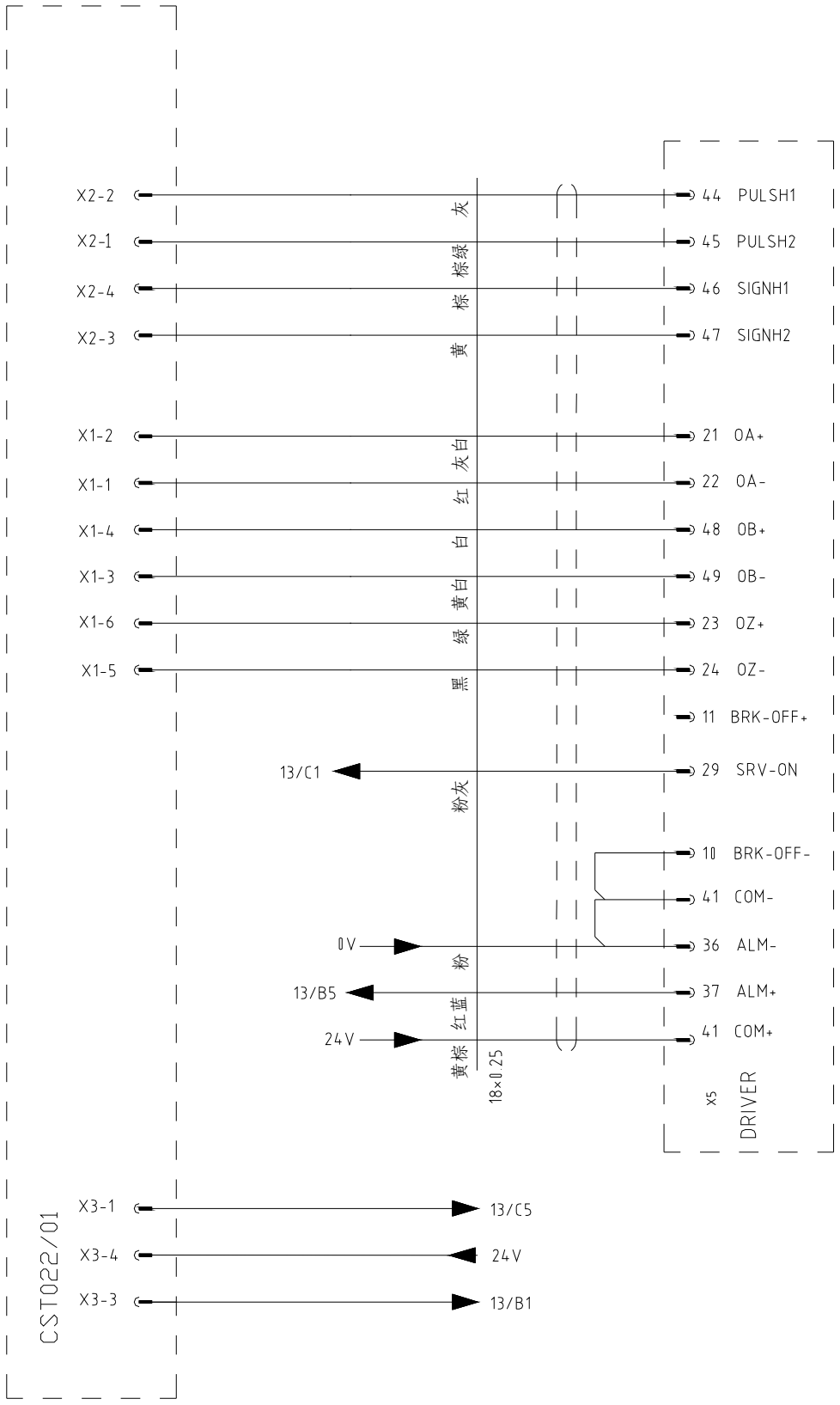


Fig.10-8: ST5 Axis-Z servo driver I/O signal wiring diagram

10.7 ST5 Axis-X servo driver I/O signal wiring diagram

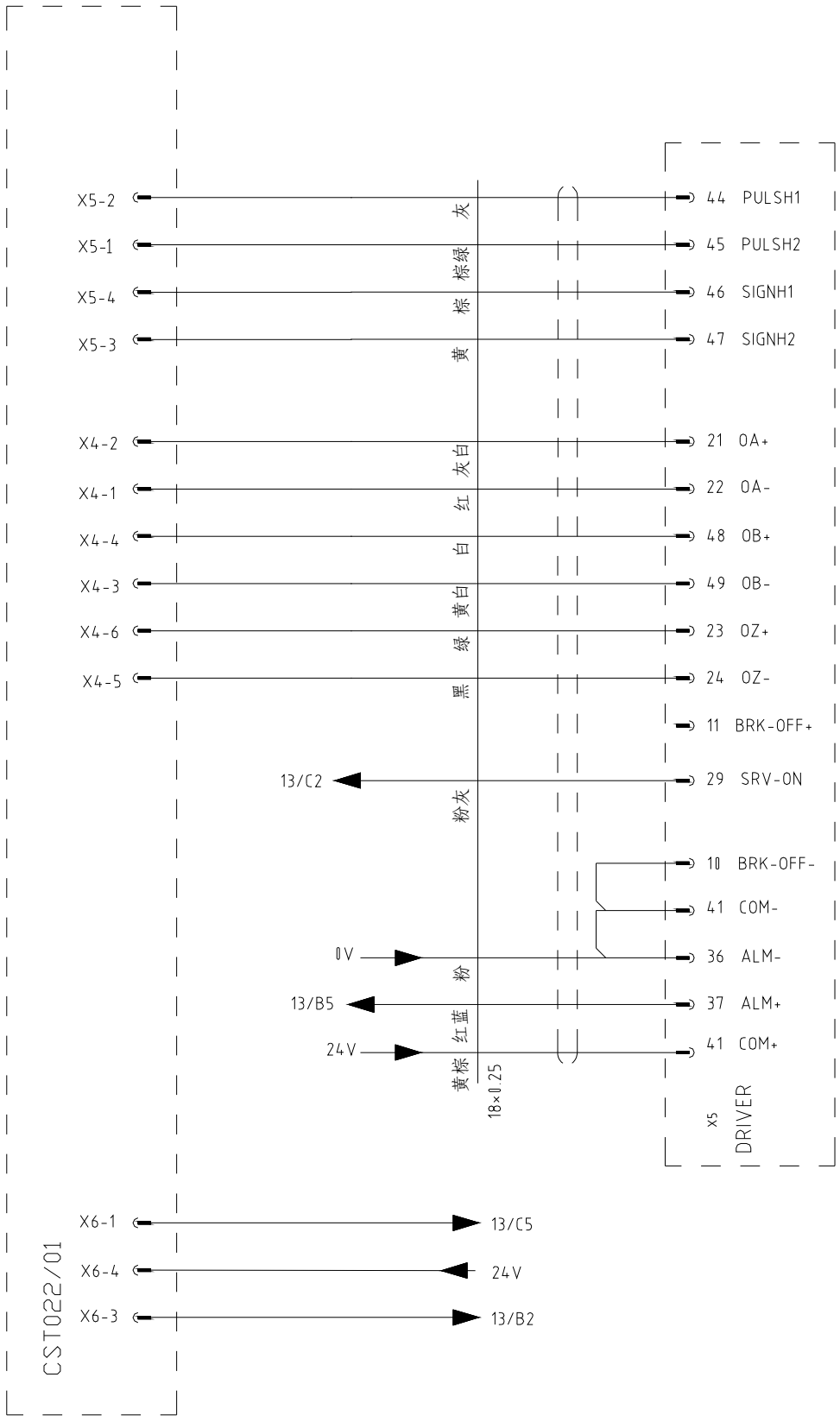


Fig.10-9: ST5 Axis-X servo driver I/O signal wiring diagram

10.8 ST5 Axis-Y servo driver I/O signal wiring diagram

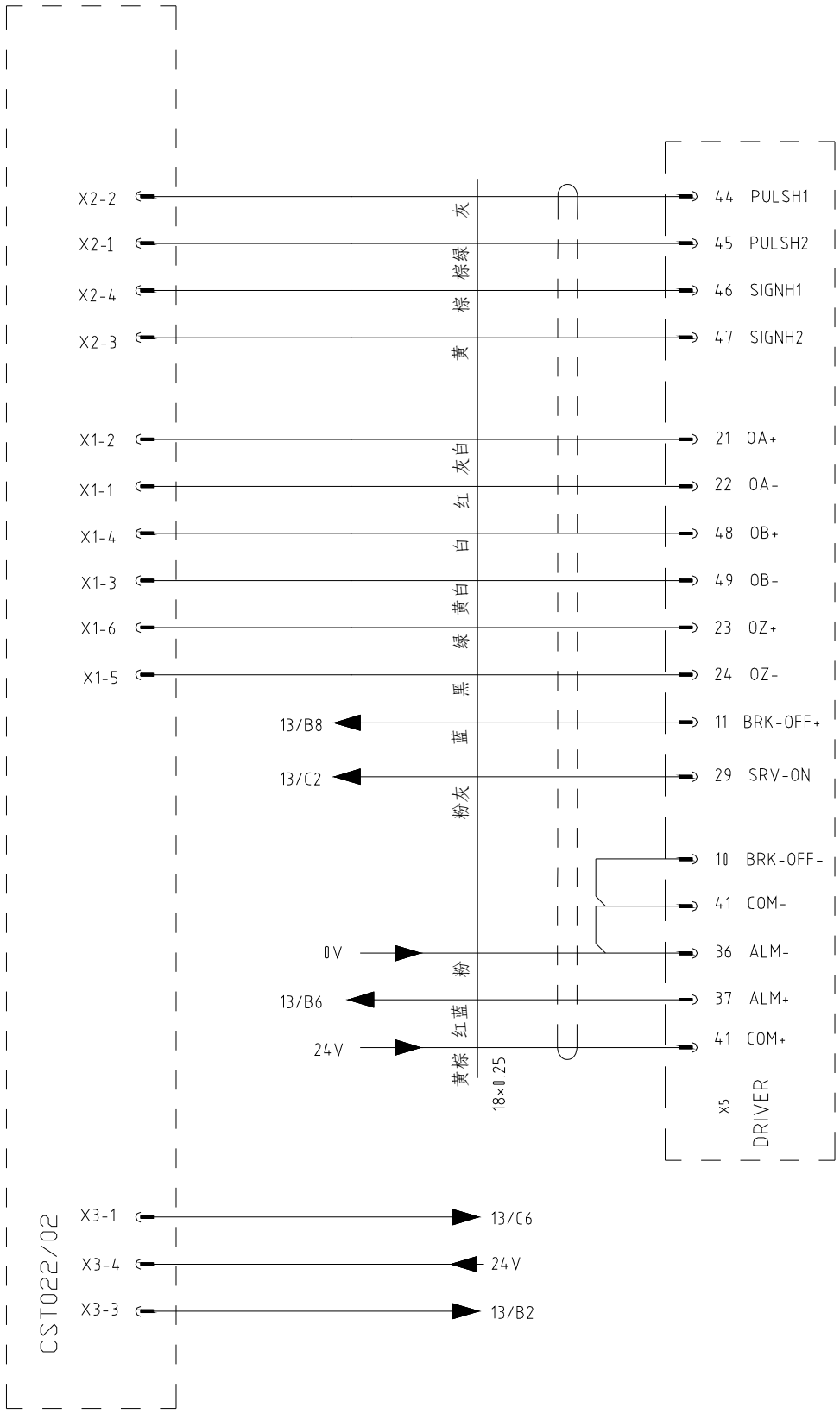


Fig.10-10: ST5 Axis-Y servo driver I/O signal wiring diagram

10.9 ST5 Axis-X2 servo driver I/O signal wiring diagram

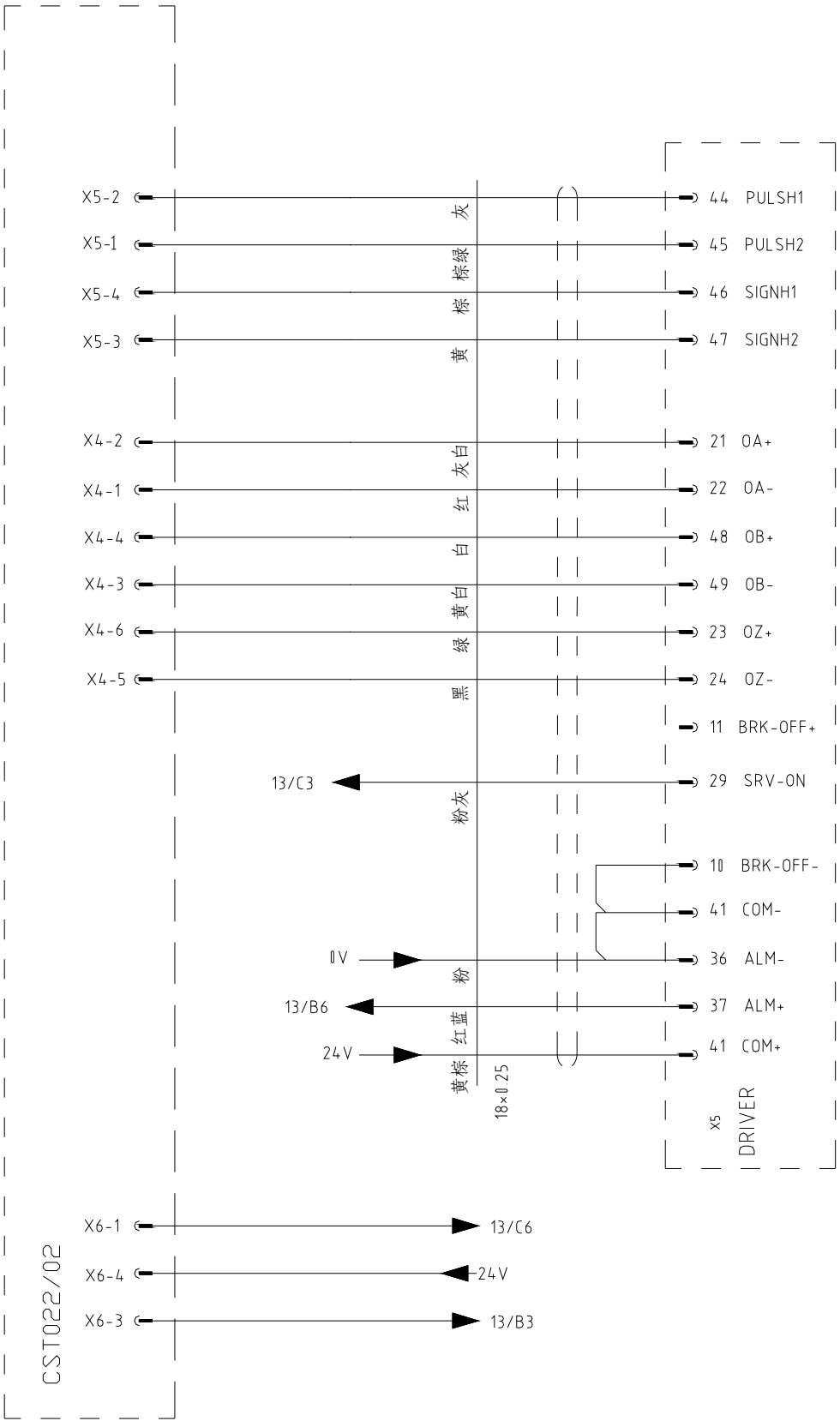


Fig.10-11: ST5 Axis-X2 servo driver I/O signal wiring diagram

10.10 ST5 Axis-Y2 servo driver I/O signal wiring diagram

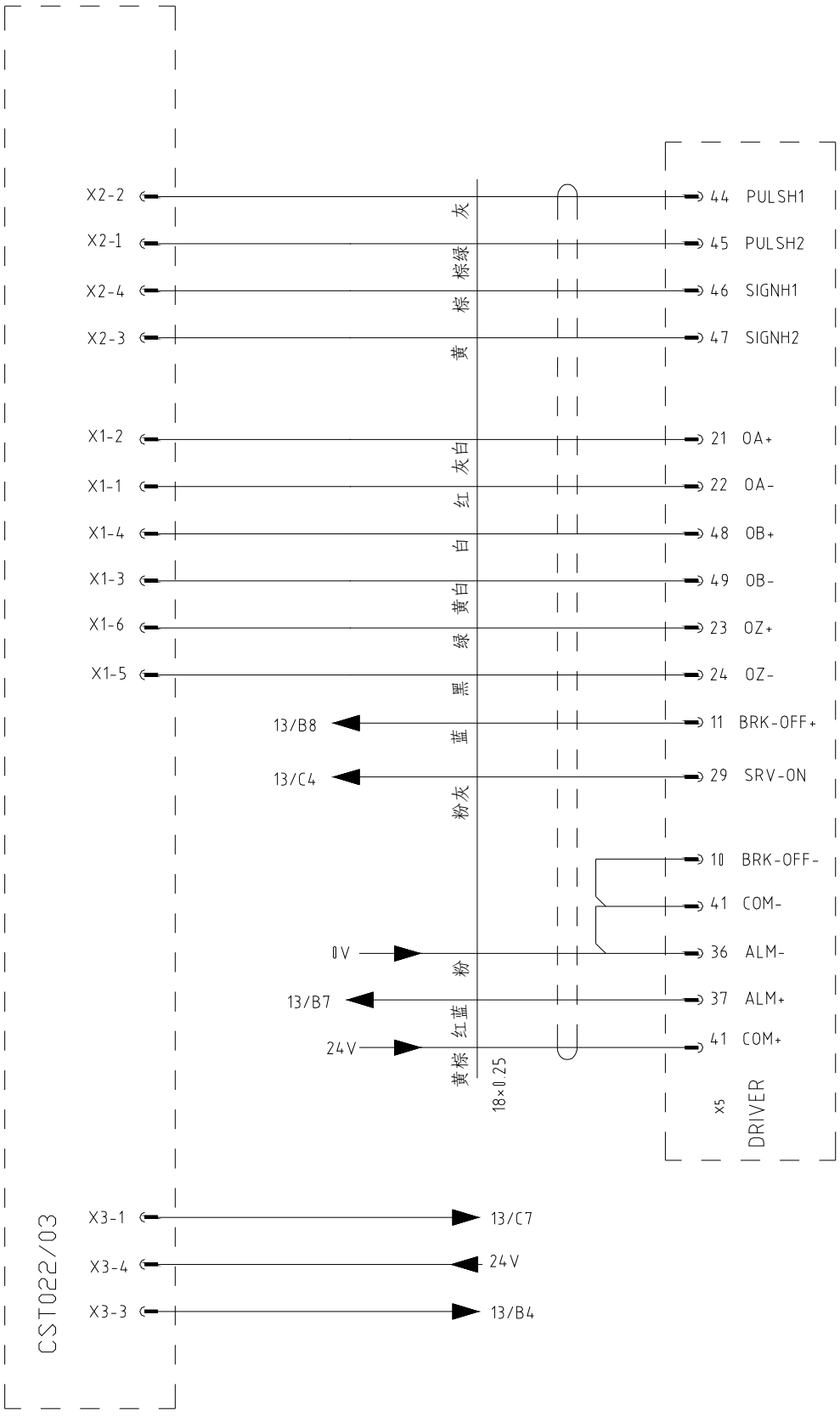


Fig.10-12: ST5 Axis-Y2 servo driver I/O signal wiring diagram

10.11 ST5 Intermediate relay wiring diagram

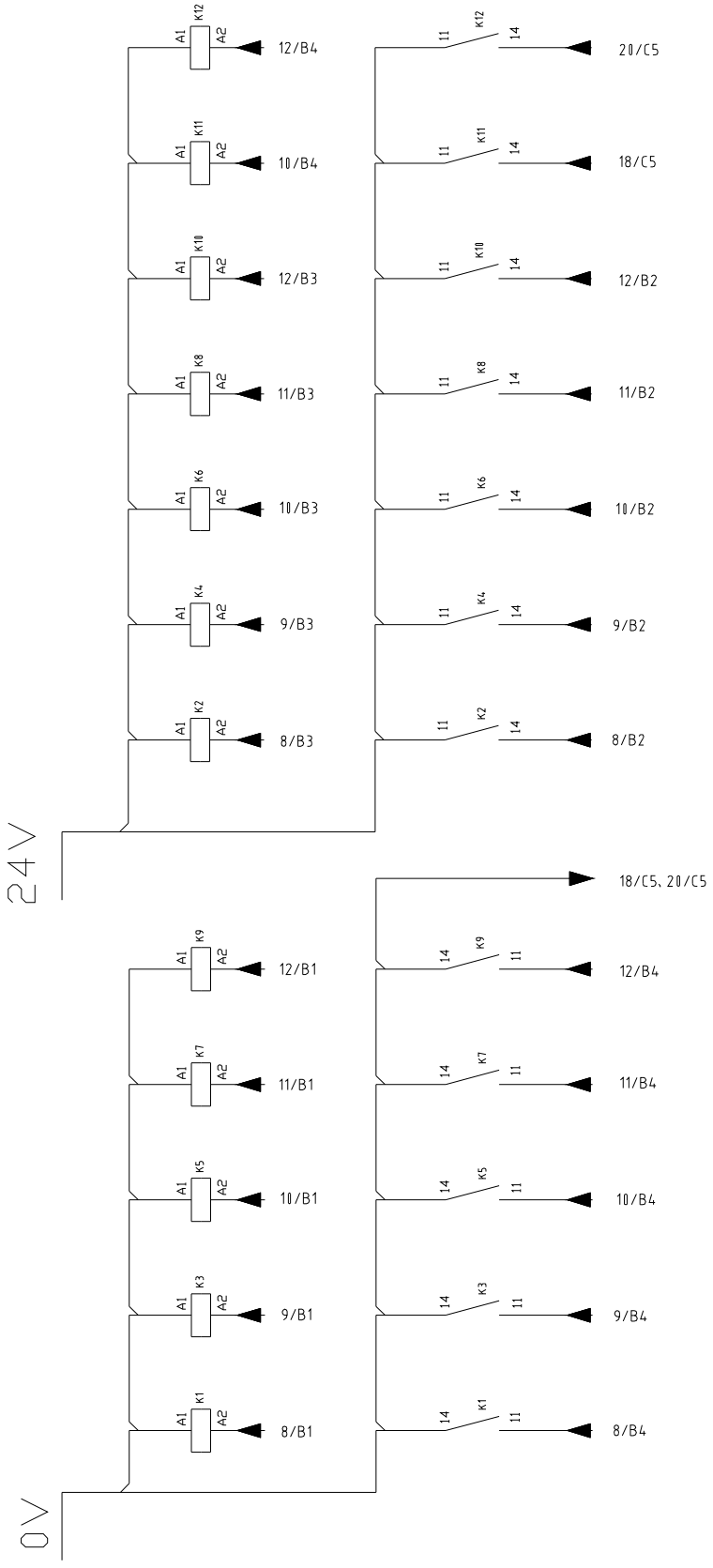


Fig.10-13: ST5 Intermediate relay wiring diagram

10.12 ST5 EM67 input signal wiring diagram

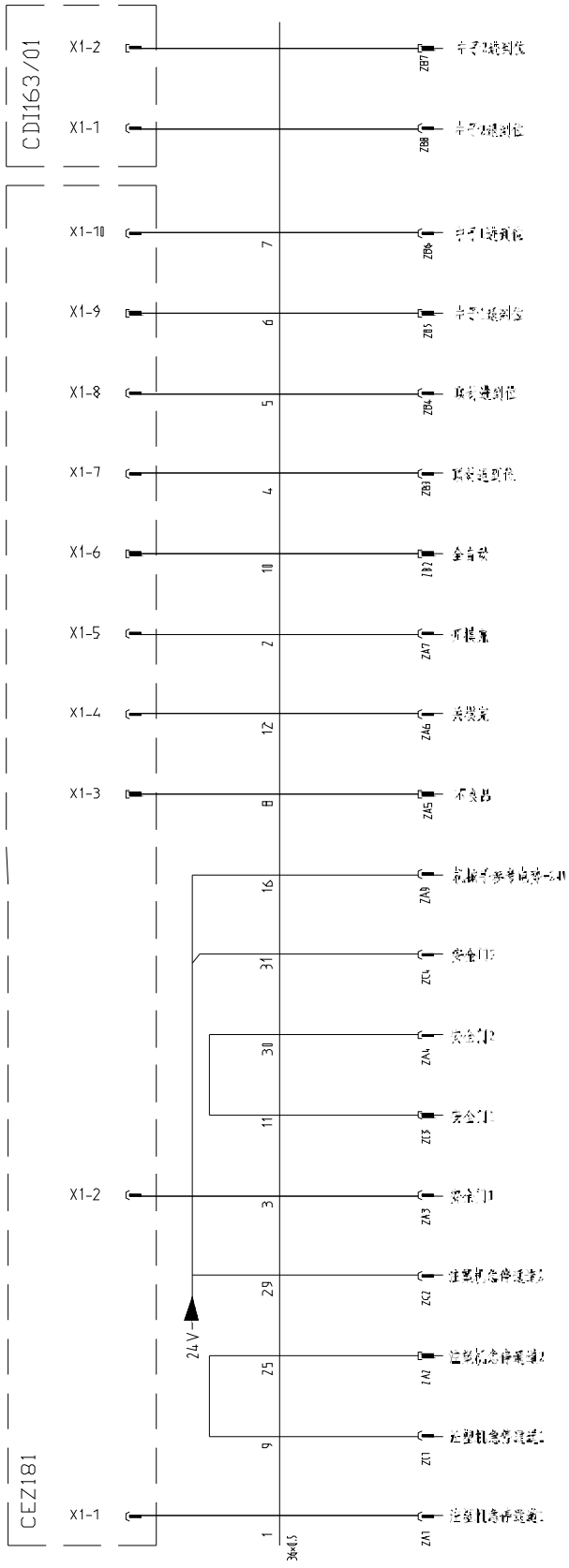


Fig.10-14: ST5 EM67 input signal wiring diagram

10.13 ST5 EM67 output signal wiring diagram

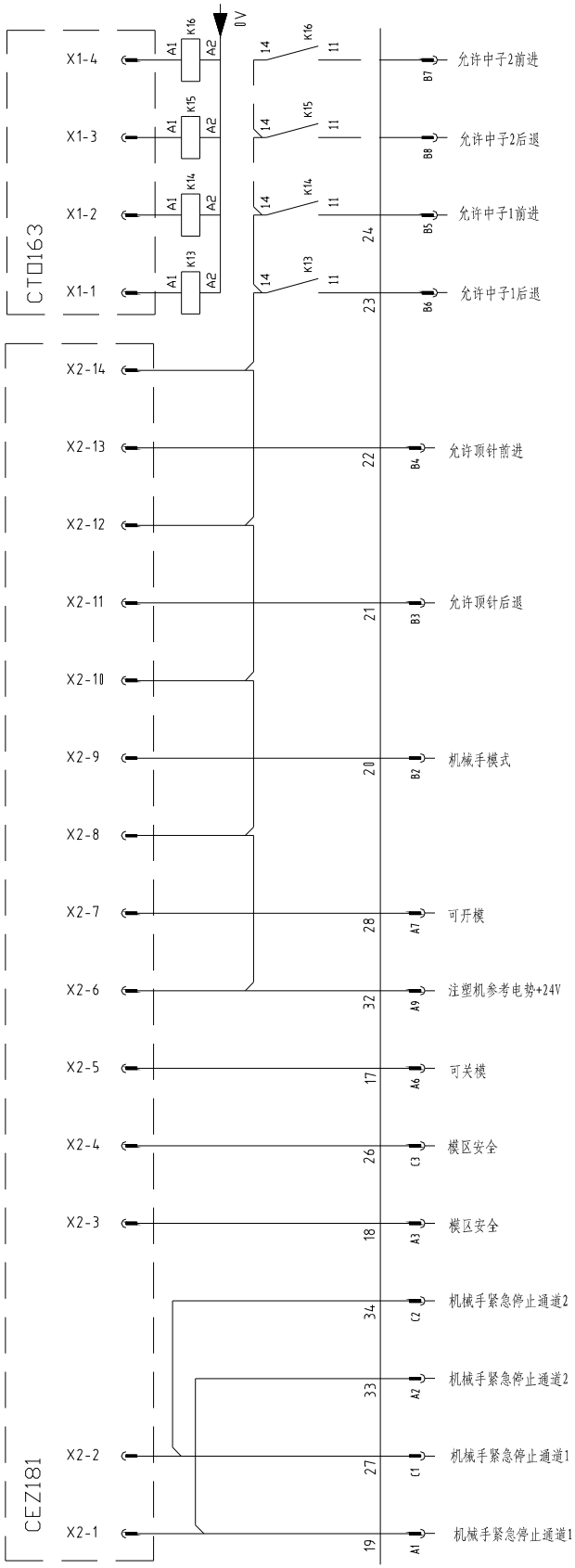


Fig.10-15: ST5 EM67 output signal wiring diagram

10.14 ST5 Axis-Z servo motor wiring diagram

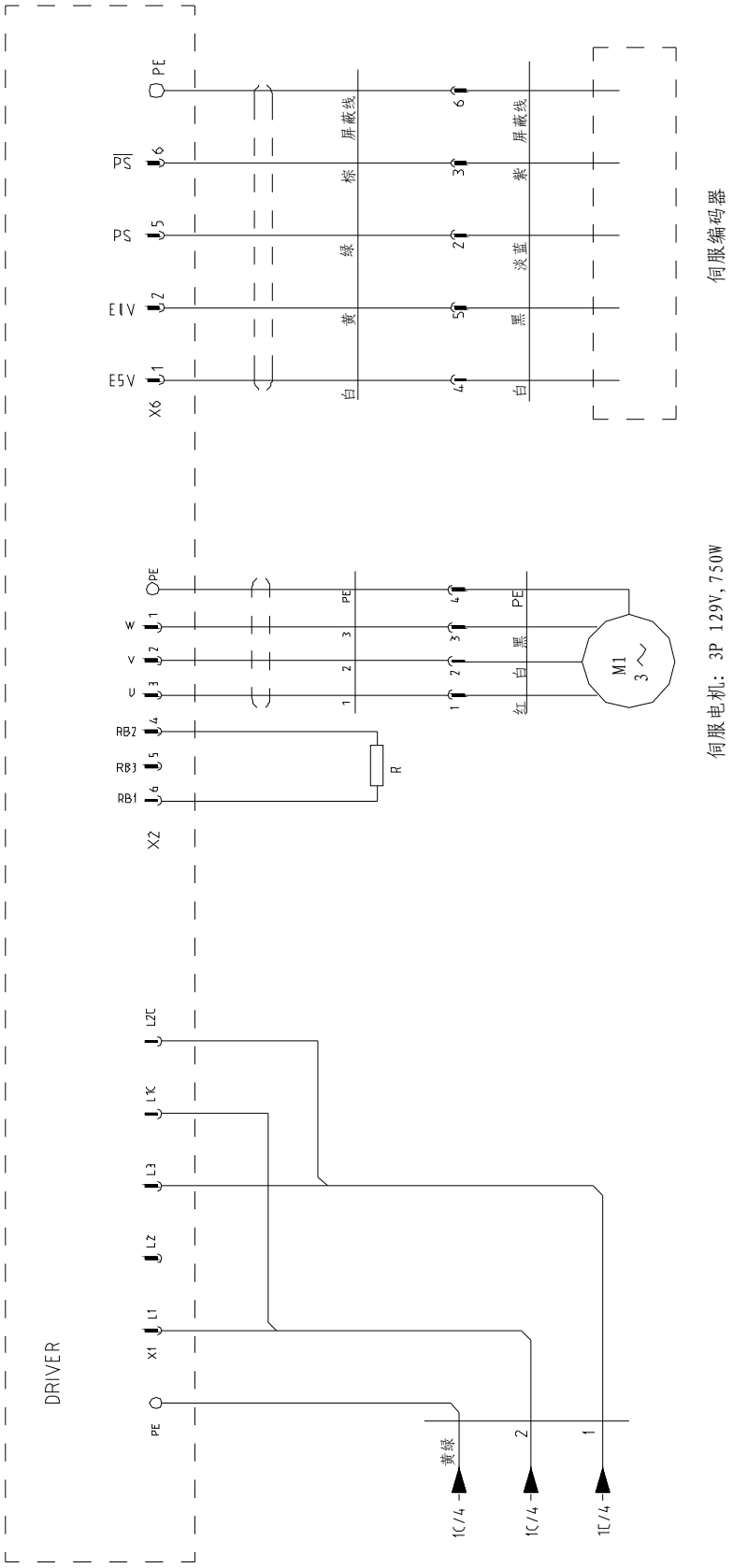


Fig.10-16: ST5 Axis-Z servo motor wiring diagram

10.15 ST5 Axis-X servo motor wiring diagram

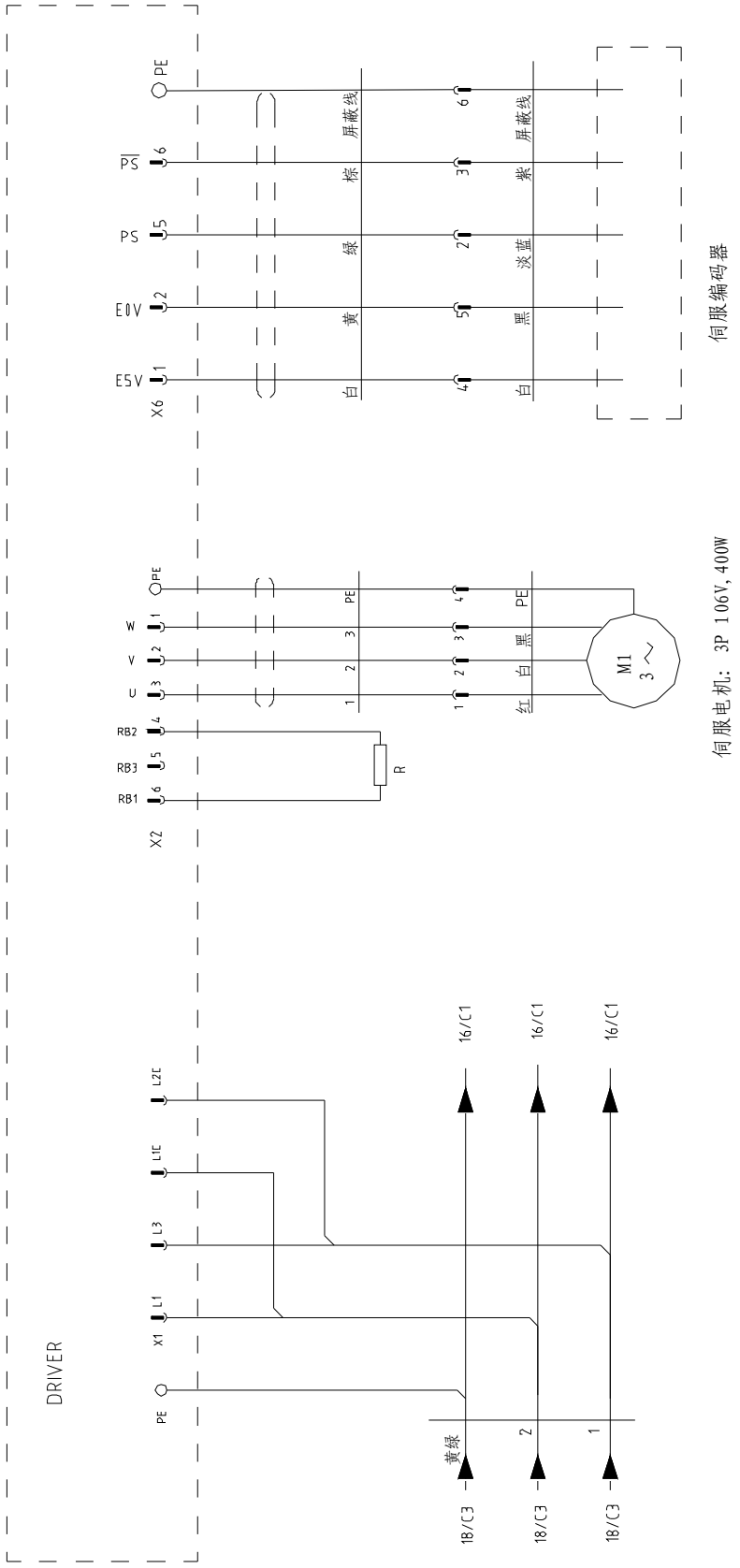


Fig.10-17: ST5 Axis-X servo motor wiring diagram

10.16 ST5 Axis-Y servo motor wiring diagram

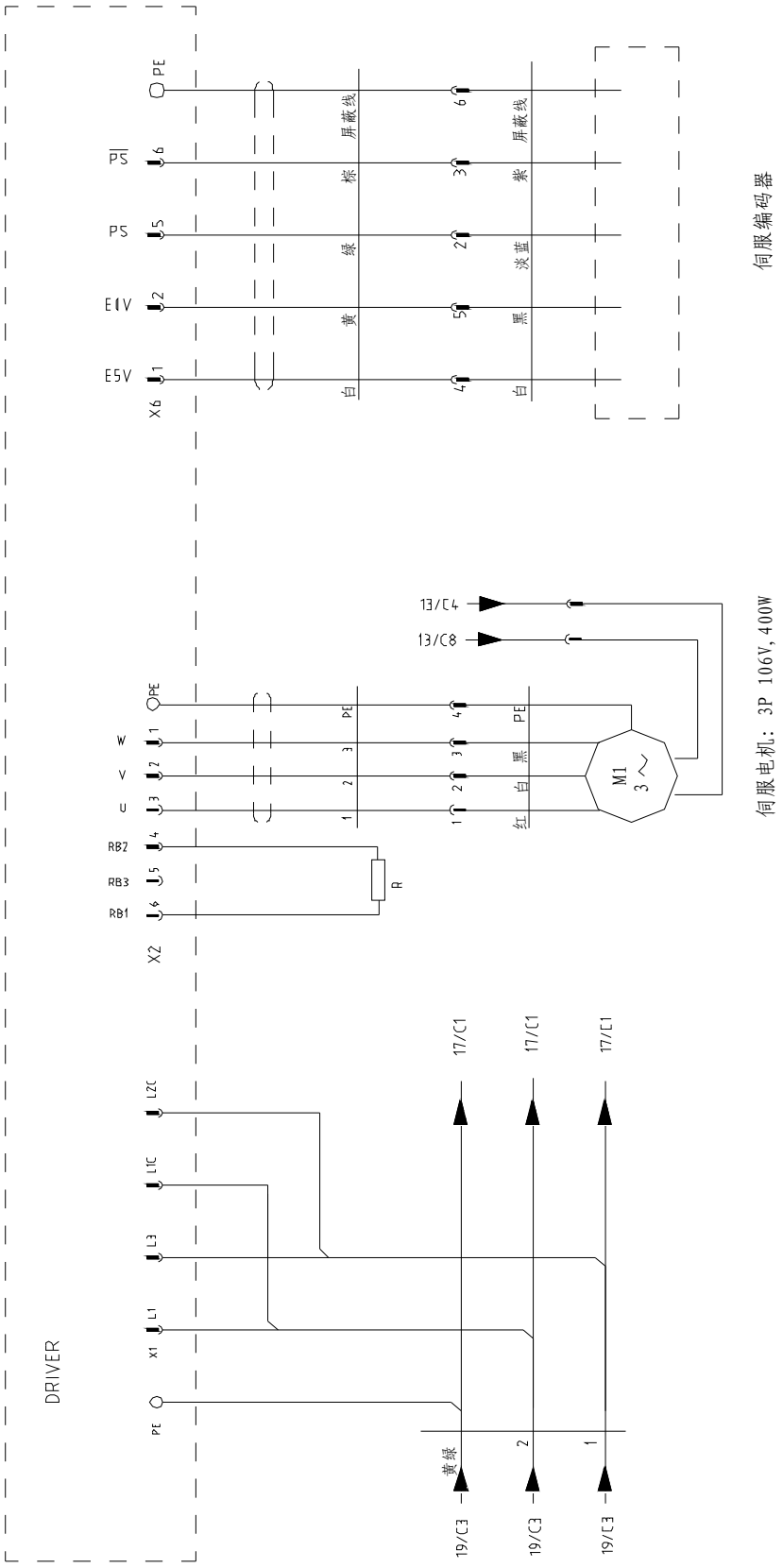


Fig.10-18: ST5 Axis-Y servo motor wiring diagram

10.17 ST5 Axis-X2 servo motor wiring diagram

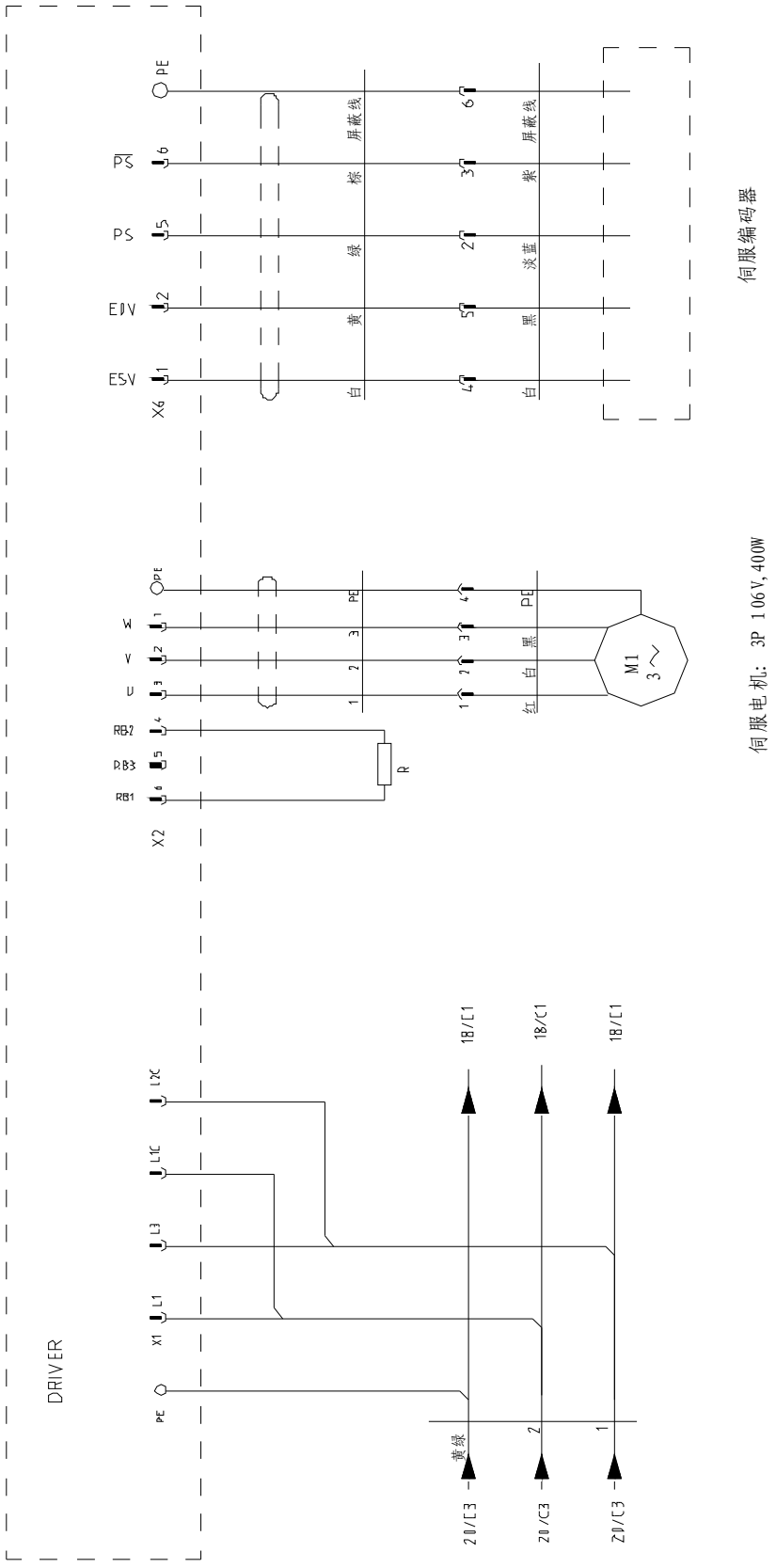


Fig.10-19: ST5 Axis-X2 servo motor wiring diagram

10.18 ST5 Axis-Y2 servo motor wiring diagram

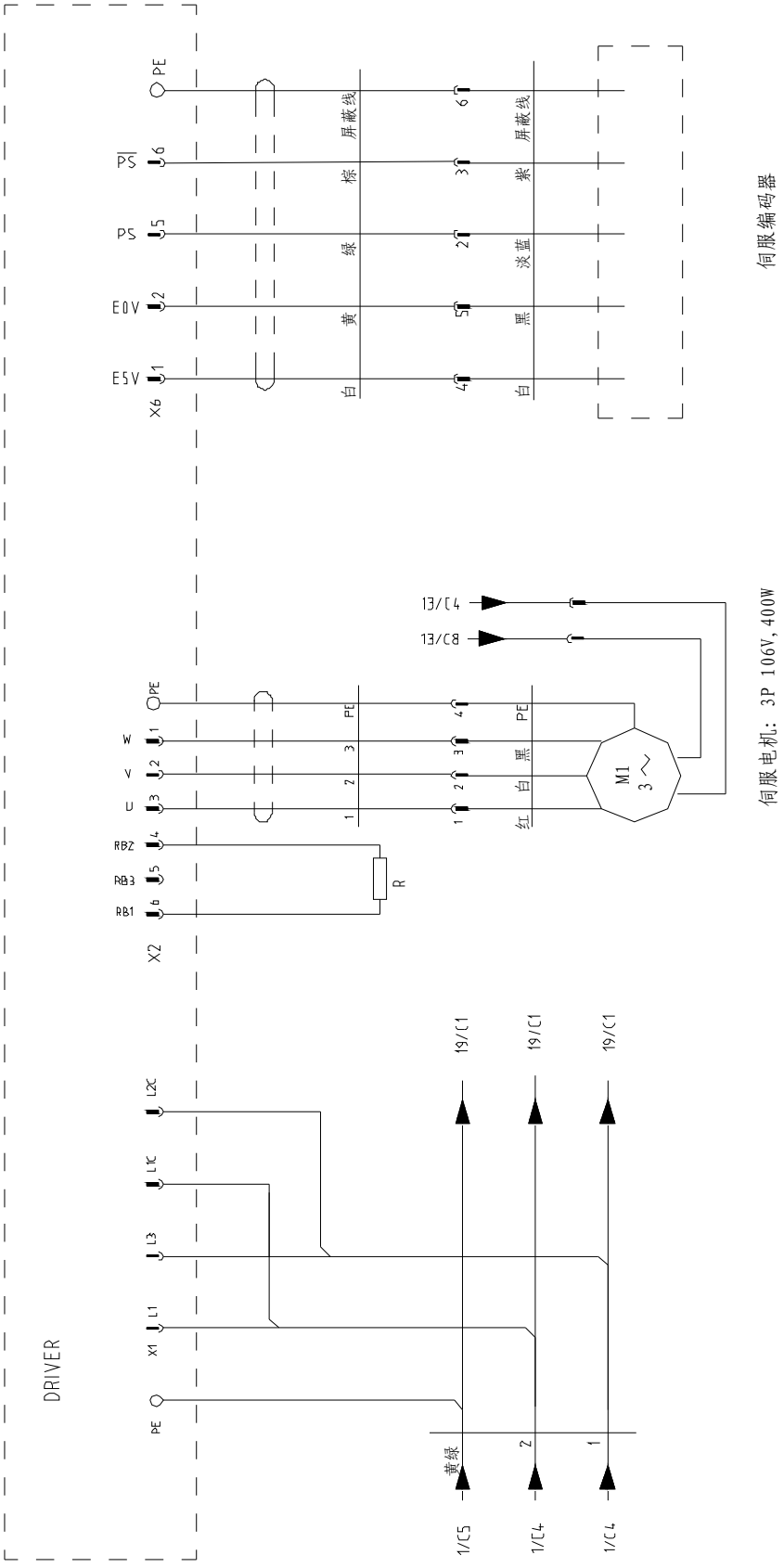


Fig.10-20: ST5 Axis-Y2 servo motor wiring diagram

10.19 ST5 SIGMATEK module board

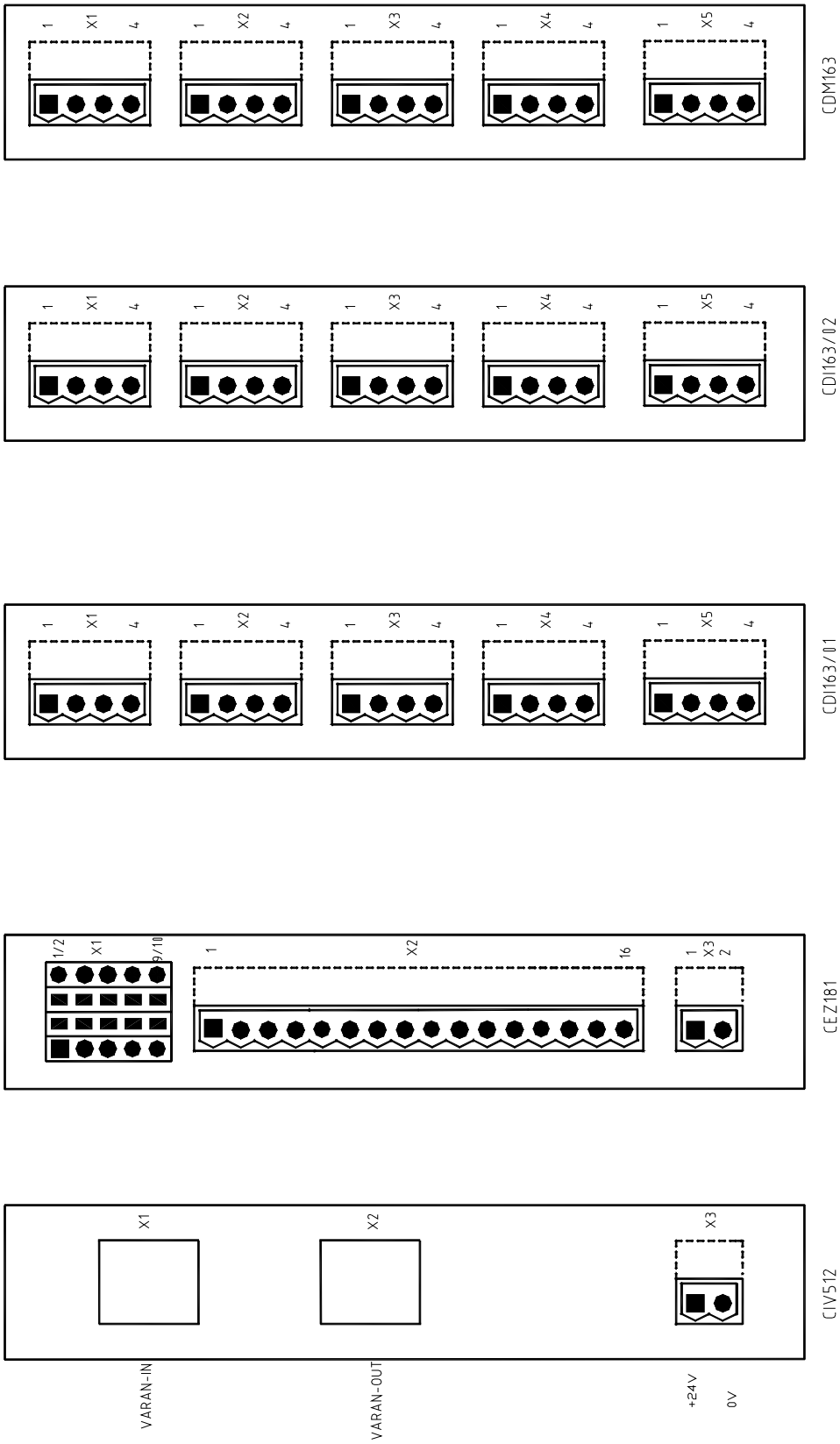


Fig.10-21: ST5 SIGMATEK module board 1

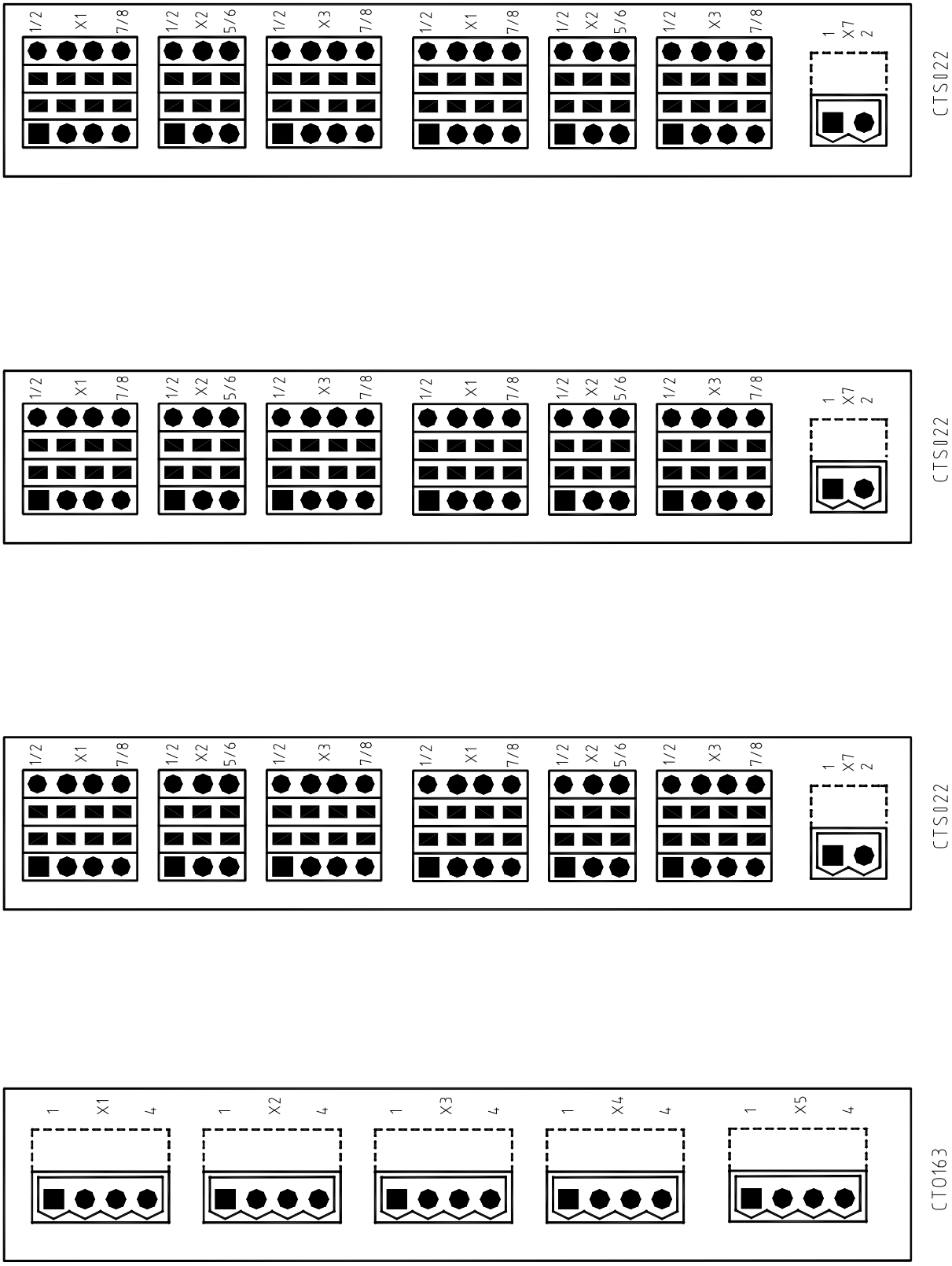


Fig.10-22: ST5 SIGMATEK module board 2

10.20 ST5 Traverse unit board

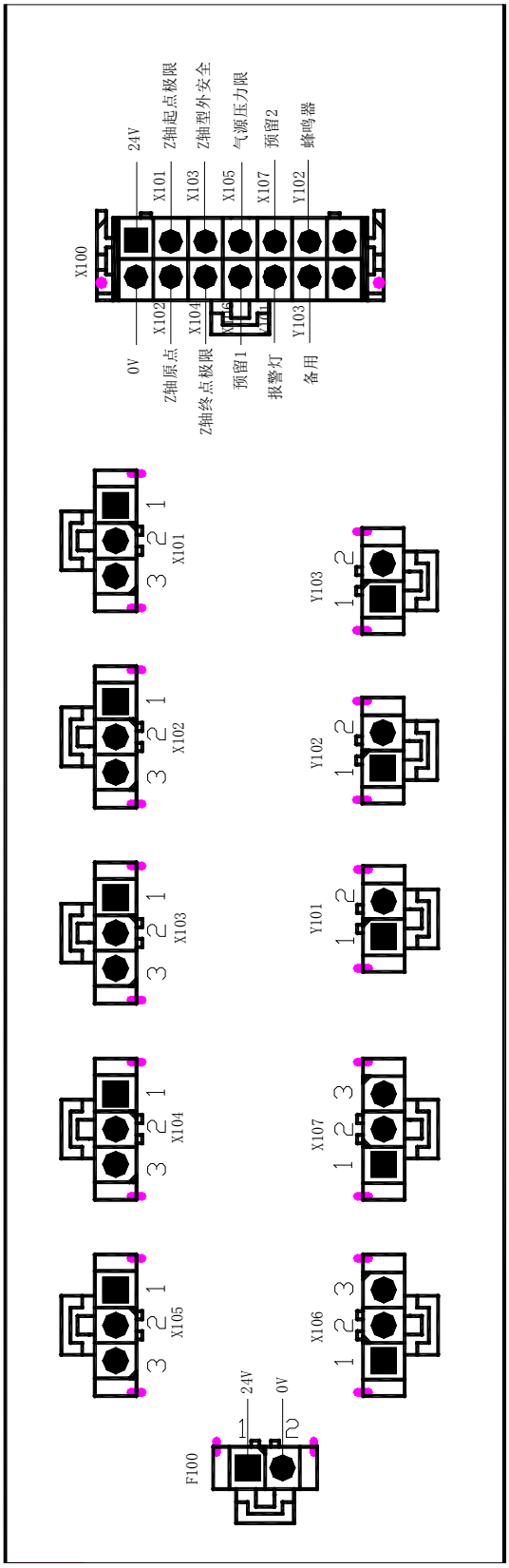


Fig.10-23: ST5 Traverse unit board

10.21 ST5 Main-arm unit board

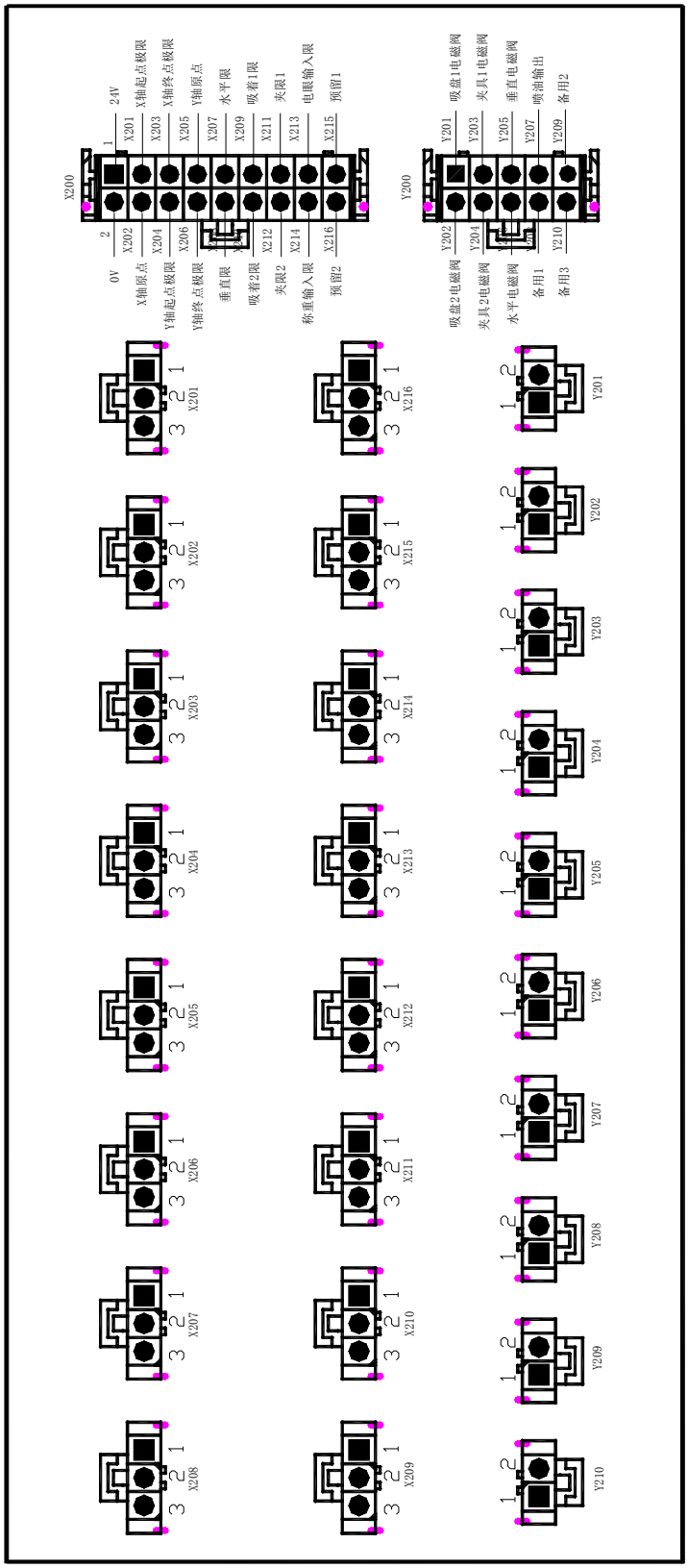


Fig.10-24: ST5 Main-arm unit board

10.22 ST5 Sub-arm unit board

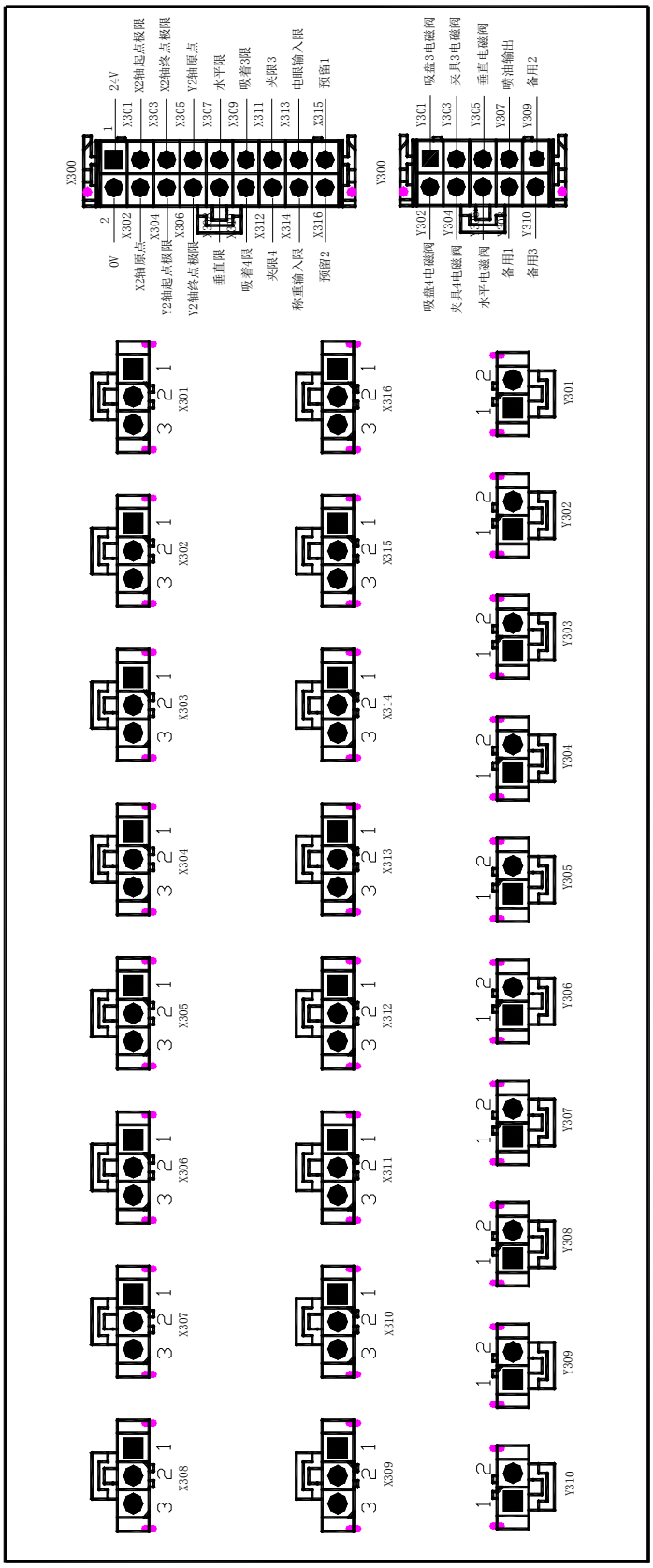


Fig.10-25: ST5 Sub-arm unit board