Shandong Chenxuan Robot Science and Technology Co., Ltd.
Technical scheme of steel coil handling project

Shandong Chenxuan Robot Science and Technology Co., Ltd.

2022-10-29

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1. Project Overview

The scheme mainly selects 1 set of SDCX-RMD300 series robots and supporting Shandong Chenxuan series controllers and demonstrator, 1 set of robot magnetic suction gripper and supporting tools, 1 robot base, 1 set of safety fence and electrical control system according to the user's production process flow.

2. Project Design Basis

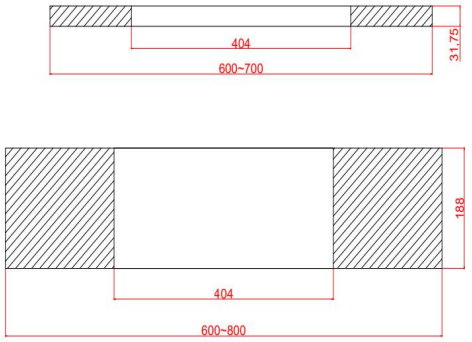
Loading and blanking objects: Carbon steel coil

Appearance of the workpiece: As shown in the figure below

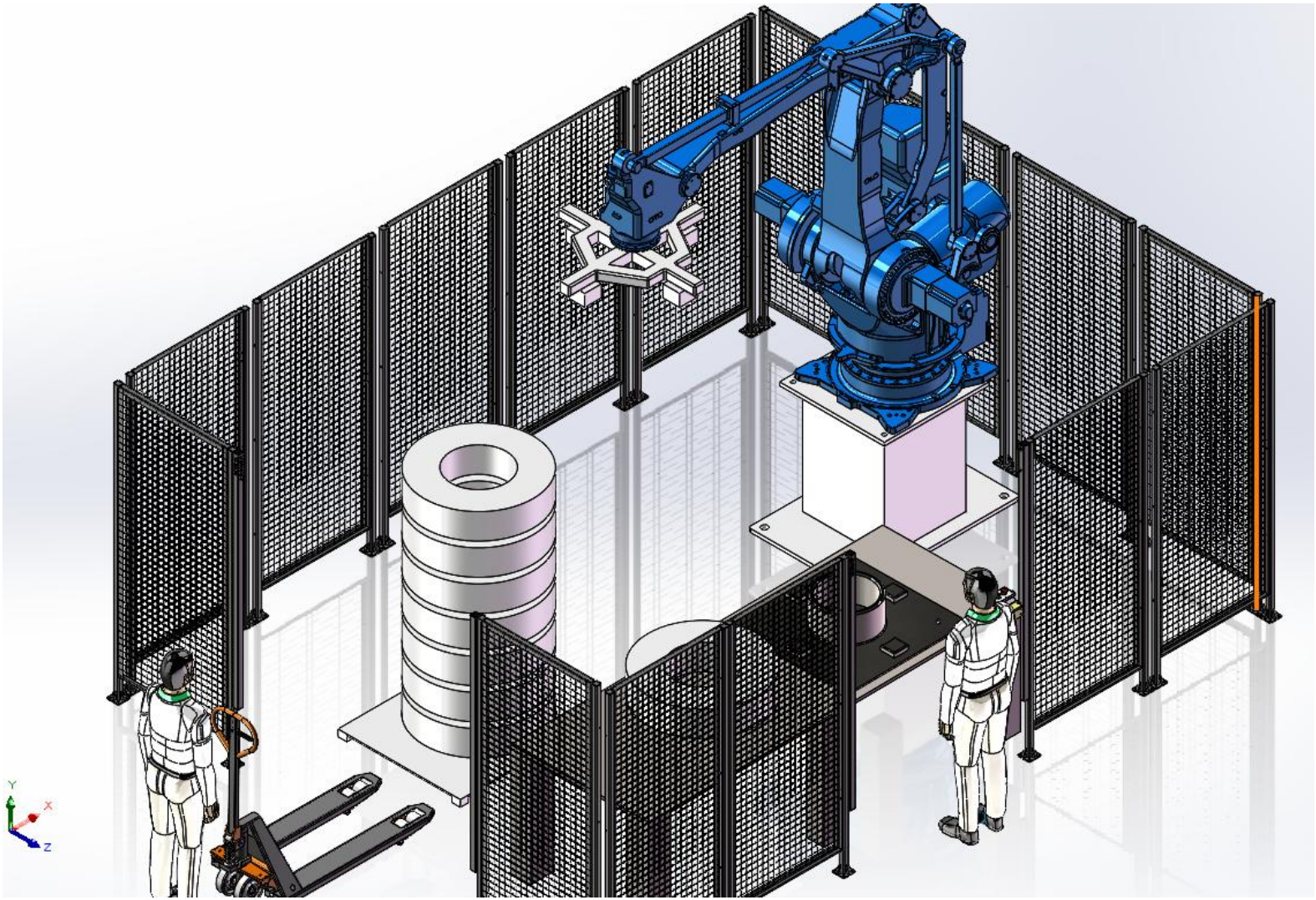
Individual Product Weight: Mmax≤300kg;

There are 22 single disk products or 9-10 rewound products in one group;

Technical requirements: Carry out handling operation according to steel coil packing process, with functions such as accurate grasping by robots and power failure without falling.



II. Scheme Layout



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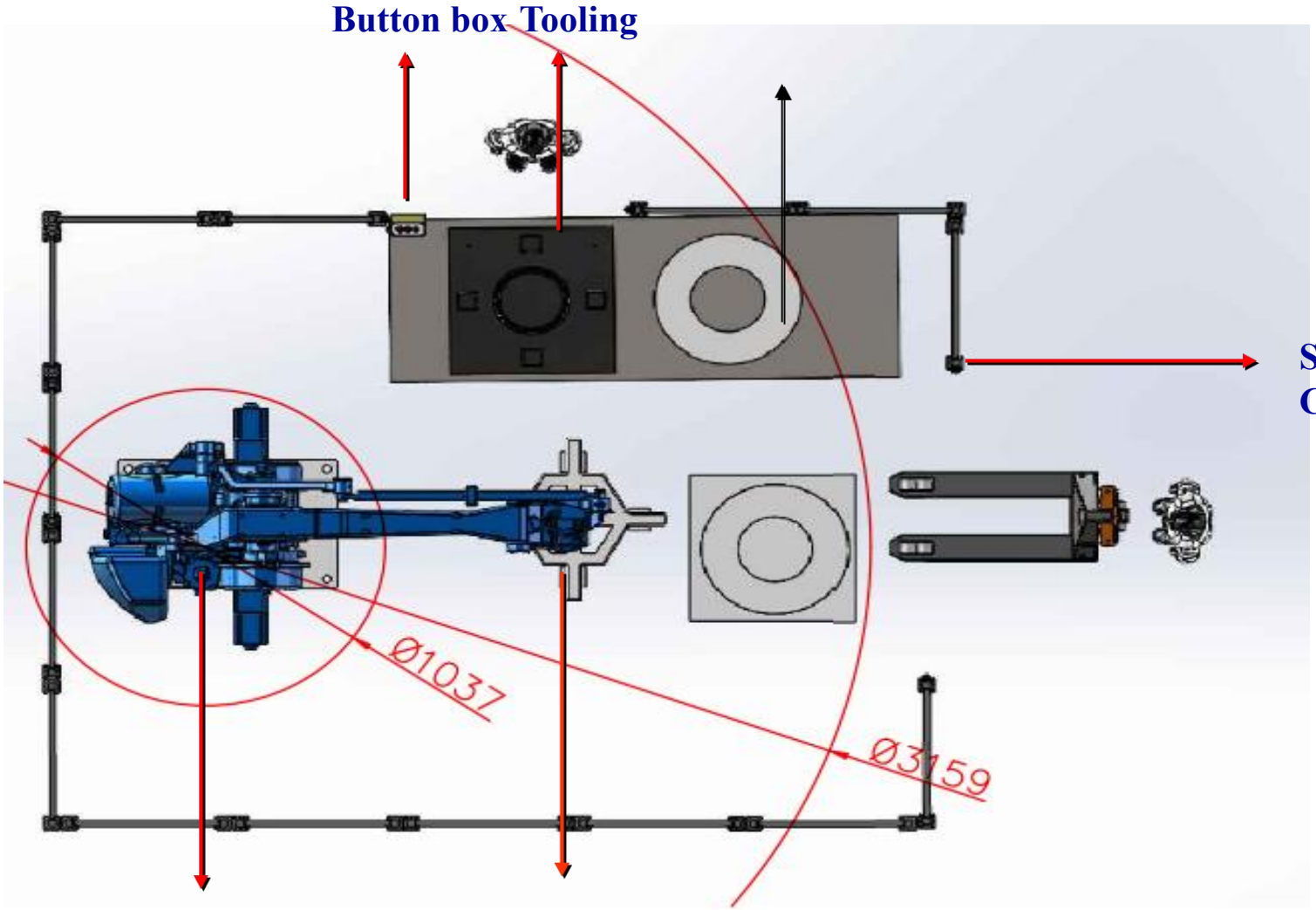


III. Workflow

3.1 Conditions for workstation operation

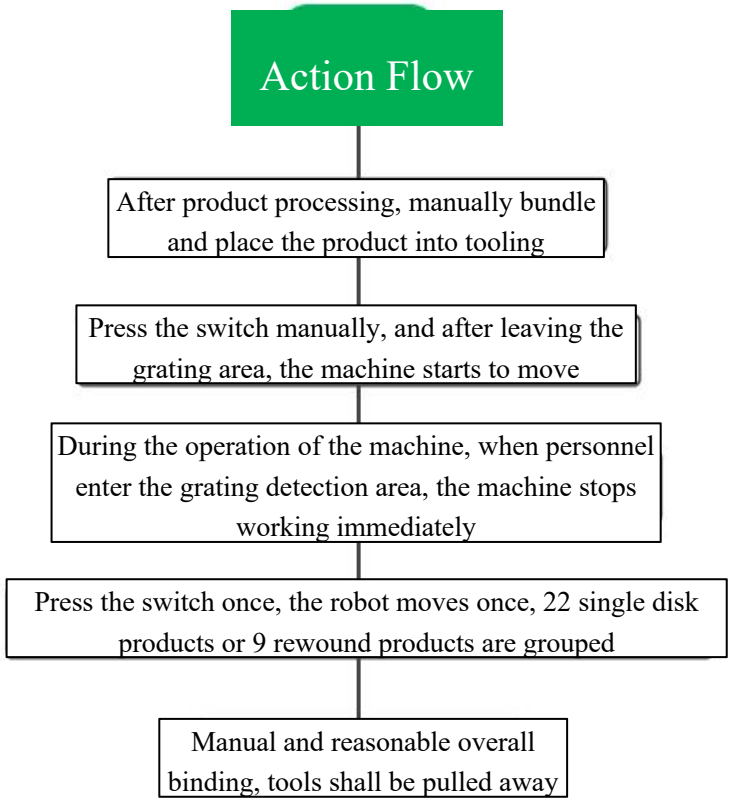
(1) Manually align the tooling with location pin and assemble to workbench;

(2) There is no alarm prompt after the equipment is powered on and the equipment is ready;

(3) The robot stops at the work origin, and the robot running program is the corresponding production program;

(4) Confirm safety door/lock show safety signal and start the workstation;

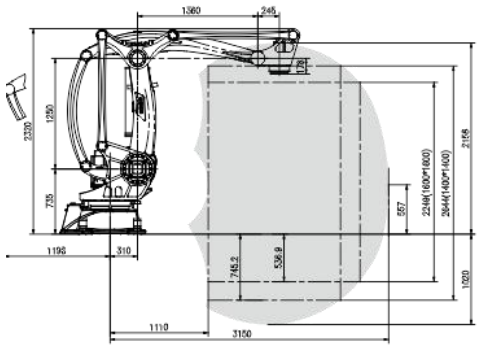
3.2 Description of workflow (as shown at right)

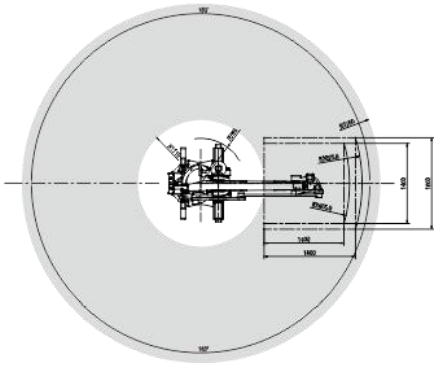


IV. Equipment List

Projects	S/N	Name	Quantity.	Remarks
Robots	1	SDCX-RMD300	1 Set	Provided by Chenxuan
	2	Sucker device	1 Set	
	3	Robot heightened base	1 Set	
	4	YRC 1000 Series Controller	1 Set	
	5	Tooling	1 Set	
	5	Safety fence	1 Set	Optional
Related Services	6	Installation and Commissioning	1 item	
	7	Packaging and Transportation	1 item	
	8	Technical Training	1 item	

5.1 SDCX-RMD300 Robot





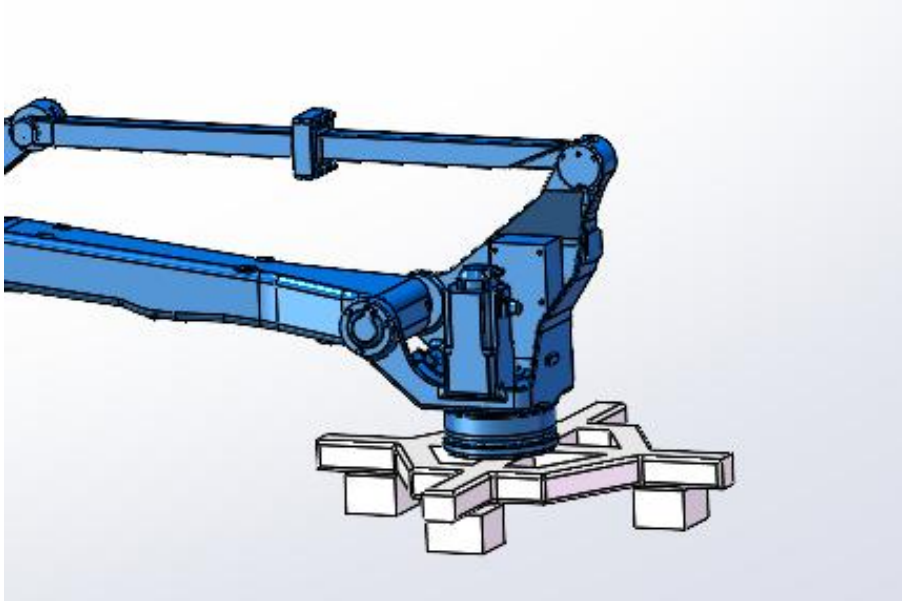
Model No.	Degree of Freedom	Driving mode	Payload (Kg)	Repeated positioning accuracy (mm)	Range of motion (°)				Maximum speed (°/s)				Allowable load inertia of wrist (kg·m2)	Circular beat (cycle/hour)	Radius of motion (mm)	Local Weight (Kg)
					J1	J2	J3	J4	J1	J2	J3	J4				
RMD300	4	AC servo drive	300	±0.5	± 180	± +100~ −44	± +121~ −15	± 360	85	90	100	190	134	1000°	3150	1500
RMD200	4	AC servo drive	200	±0.3	± 180	± +100~ −44	± +121~ −15	± 360	105	107	114	242	78	1300°	3150	1500
RMD160	4	AC servo drive	160	±0.3	± 180	± +100~ −44	± +121~ −15	± 360	123	123	128	300	78	1500°	3150	1500
RMD120	4	AC servo drive	120	±0.3	± 180	± +100~ −44	± +121~ −15	± 360	128	126	135	300	78	1560°	3150	1500
RMD50	4	AC servo drive	50	±0.2	± 178	± +90~ −40	± +65~ −78	± 360	171	171	171	222	4.5	1700°	2040	660
RMD20	4	AC servo drive	20	±0.08	± 1170	± +115~ −25	± +70~ −90	± 360	170	170	185	330	0.51	1780°	1720	256
RMD08	4	AC servo drive	8	±0.08	± 170	± +90~ −40	± +68~ −90	± 360	251	195	195	367.5	0.25	1800°	1433	180

5.2 Robot Gripper Device

(1) The robot adopts electromagnetic gripper fixture, to clamp workpiece stably and accurately, realizing automatic and intelligent production process.

(2) The maximum weight of a single workpiece to be transported shall not exceed 300 kg.

The pictures are for reference only, subject to final design.



5.3 Robot heightened base

The robot base is used to adjust the installation height of the robot, expand the working coverage area and ensure that the robot stably covers the working point;
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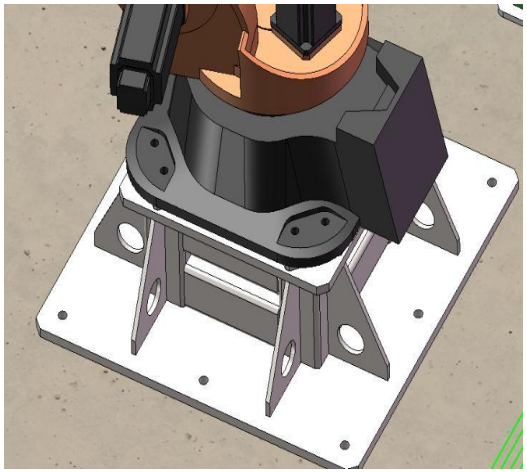

5.4 Tooling

Complete constraints of multiple degrees of freedom, ensure the grasping accuracy of the manipulator, improve product stacking quality
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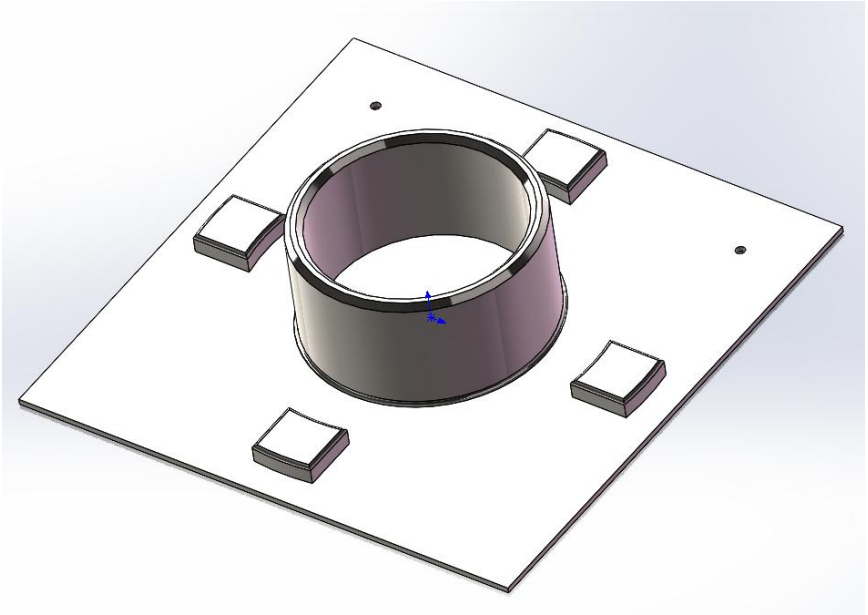

6.5 Shandong Chenxuan Series Controller

1) With the proprietary control system independently developed by YASKAWA, the motion control is high-speed and stable;

2) Various communication modes are supported;

3) The equipment operating system is simple, which improves the convenience of operation and is more conducive to the realization of quality management;

4) Rich and varied internal functions to meet customer personalized requirements;

5) Reasonable humanized design and energy saving design;

6) The pictures are for reference only, subject to final choice;

Projects	Specification
Structure	Dustproof construction IP54(back FAN: IP2X)
External size	598(W) ×427(D)×490(H) mm, 125L
Gross Weight	Below 75kg (built-in external 3-axis)
Cooling method	Indirect cooling
Ambient temperature	When powered on: 0℃~+45℃, during storage: -10℃~+60℃
Relative humidity	Max 90%(no condensation)
Scale height	2,000m (but there is a temperature delay) (note) Conditions above elevation 1,000m: Decrease by 1% for every 100m rise in highest ambient temperature.
Power Supply Specifications	Three-phase, AC380V~440V (+10%~-15%) 50/60Hz (±2%)
Input output signal	Special signal: Input 19, Output: 6 Universal signal: Input 40, Output: 40 (transistor Output: 32 Relay output: 8)
Position control mode	Serial communication mode (encoder specification)
Memory Capacity	JOB: 200,000 Program Points, 10,000 Robot Commands CIO ladder diagram: 20,000 Program Points
Add Slot	PCI express: 2 Card Slot
LAN (Upper Connection)	2 (10BASE-T/100BASE-TX)
Serial port I/F	RS-232C: 1
Control mode	Servo Software
Drive unit	Servo Pack for AC Servo
Paint color	Front: Light grey (equivalent to color card N7.7) Main body: Dark grey (equivalent to color card N3)

5.6 Teaching Programmer

1) Designed according to modern human structural mechanics, the grip is more comfortable;

2) LCD touch screen capable of point-touch control facilitates human-computer interaction and improves working efficiency;

3) Support hot plug, wired communication, multiple robots can be shared, more universal;

4) The function layout is clear at a glance, and you can get started quickly in 10 minutes;

5) The pictures are for reference only, subject to final choice;

■Teaching Programmer Specifications

Projects	Specification
External size	152(W)×53(D)×299(Thick) mm
Gross Weight	0.730 kg
Material	Reinforced plastics
Operating the machine	Select key, shaft operation key, value/application key, switch mode key with key (teach mode, online mode, remote mode), emergency stop, function key, SD card I/F device (SD card is optional), USB port (USB2.0 1 piece)
Display	5.7"TFT color LCD touch screen VGA (640x480 pixels)(Chinese character, hiragana, katakana, English, digital, others)
Protection grade	IP54
Length of cable	Standard: 8m, max (optional): 36m (Additional extension cable)

6.7 Safety fence

1. Set the protective fence, the safety door or the safety grating and the safety lock and other devices and carry out necessary interlocking protection.
2. The safety door shall be set at the proper position of the safety fence. All doors shall be equipped with safety switch and button, the reset button and the emergency stop button.
3. The safety door is interlocked with the system through safety lock (switch). When the safety door is opened abnormally, the system stops and gives an alarm.
4. Safety protection measures guarantee the safety of personnel and equipment through hardware and software.
5. The safety fence can be provided by Party A himself. It is recommended to weld with high-quality grid and paint with yellow warning stoving varnish on the surface.

5.8 Electrical Control System

1.Including system control and signal communication between equipment, including sensors, cables, trunking, switches, etc.;
2.The automatic unit is designed with three-color alarm lamp. During normal operation, the three-color lamp displays green; and if the unit fails, the three-color lamp will display red alarm in time;
3.There are emergency stop buttons on the control cabinet and the demonstration box of the robot. In case of emergency, the emergency stop button can be pressed to realize the system emergency stop and send out alarm signal at the same time;
4.Through the demonstrator, we can compile many kinds of application programs, which can meet the requirements of product renewal and adding new products;
5.All emergency stop signals of the whole control system and the safety interlock signals between the processing equipment and robots are connected to the safety system and the interlocked control is conducted through the control program;
6.The control system realizes the signal connection between running equipment including the robot, gripper and machining tools;
7.Machine tool system needs to realize signal exchange with robot system.

5.9 Operating environment (provided by Party A)

Power supply	•Power supply: Three-phase four-wire AC380V±10%, voltage fluctuation range ±10%, frequency: 50HZ; •The power supply of robot control cabinet shall be equipped with independent air switch; •Robot control cabinet must be grounded with grounding resistance less than 10Ω; •The effective distance between the power source and the robot electric control cabinet shall be within 5 meters.
Air source	•The compressed air shall be filtered out of water, gas and impurities, and the output pressure after passing through FRL shall be 0.5~0.8Mpa; •The effective distance between the air source and the robot body shall be within 5 meters.
Foundation	•Treat with the conventional cement floor of Party A's workshop, and the installation base of each equipment shall be fixed to the ground with expansion bolts; •Strength of concrete: 210 kg/cm^2; •Thickness of concrete: More than 150 mm; •Foundation unevenness: Less than ±3mm.
Environmental Conditions	•Ambient temperature: 0~45 ℃; •Relative humidity: 20%~75%RH (no condensation is allowed); •Vibration acceleration: Less than 0.5G
Miscellaneous	•Avoid flammable and corrosive gases and fluids, and do not splash oil, water, dust, etc.; •Do not approach the source of electrical noise.