



Articulated Robot Controller - RCA610

User Manual





Multi Axis Robot

- Pick-and-place / Assembly / Array and packaging / Semiconductor / Electro-Optical industry / Automotive industry / Food industry
- Articulated Robot
 - Delta Robot
 - SCARA Robot
 - Wafer Robot
 - Electric Gripper
 - Integrated Electric Gripper
 - Rotary Joint



Single Axis Robot

- Precision / Semiconductor / Medical / FPD
- KK, SK
 - KS, KA
 - KU, KE, KC



Direct Drive Rotary Table

- Aerospace / Medical / Automotive industry / Machine tools / Machinery industry
- RAB Series
 - RAS Series
 - RCV Series
 - RCH Series



Ballscrew

- Precision Ground / Rolled
- Super S series
 - Super T series
 - Mini Roller
 - Ecological & Economical lubrication Module E2
 - Rotating Nut (R1)
 - Energy-Saving & Thermal-Controlling (C1)
 - Heavy Load Series (RD)
 - Ball Spline



Linear Guideway

- Automation / Semiconductor / Medical
- Ball Type--HG, EG, WE, MG, CG
 - Quiet Type--QH, QE, QW, QR
 - Other--RG, E2, PG, SE, RC



Medical Equipment

- Hospital / Rehabilitation centers / Nursing homes
- Robotic Gait Training System
 - Hygiene System
 - Robotic Endoscope Holder



Bearing

- Machine tools / Robot
- Crossed Roller Bearings
 - Ball Screw Bearings
 - Linear Bearing
 - Support Unit



AC Servo Motor & Drive

- Semiconductor / Packaging machine / SMT / Food industry / LCD
- Drives-D1, D1-N, D2T
 - Motors-50W-2000W



Driven Tool Holders

- All kinds of turret
- VDI Systems
 - Radial Series, Axial Series, MT
 - BMT Systems
 - DS, NM, GW, FO, MT, OM, MS



Linear Motor

- Automated transport / AOI application / Precision / Semiconductor
- Iron-core Linear Motor
 - Coreless Linear Motor
 - Linear Turbo Motor LMT
 - Planar Servo Motor
 - Air Bearing Platform
 - X-Y Stage
 - Gantry Systems



Torque Motor (Direct Drive Motor)

- Inspection / Testing equipment / Machine tools / Robot
- Rotary Tables-TMS,TMY,TMN
 - TMRW Series
 - TMRI Series

Safety and Notice

1. Safety Information

- Safety Responsibility and Effect
 - ⊙ This safety information neither contains how to design, install and run a complete workstation or production line, nor ensure the whole system safety. In order to guarantee personal safety, all machines must be designed and installed according to the industrial safety regulations.
 - ⊙ Users of *HIWIN* robot have the responsibility to design and install the safety devices in compliance with the industrial safety regulations, used to protect personal safety.
 - ⊙ In compliance with the safety information on industrial robot described in this manual can't guarantee that *HIWIN* robot will not occur any safety accident.
- Safety Operation Principle
 - ⊙ Emergency Stop button (on Teach Pendant or from external emergency stop switch) must be pressed before turning off the power, and then disconnect the power switch.
 - ⊙ After turning off the power switch, the operator must wait for green indicator (PC indicator) to disappear then remove or turn off the main power.
 - ⊙ After turning off the power switch, do not restart it immediately. Please wait for 30 seconds to restart.
 - ⊙ The controller contains lead-acid battery. It may cause the lack of electricity by natural wearing and will not be able to be turned on successfully. If it is idle for a long time, please maintain the power transmission at least every 3 months and keep it on lasting for 24 hours. Or take out the battery and keep the voltage of the battery over 13V.
 - ⊙ When the voltage of the battery is too low causing failure to turn on the controller, please take out the battery and charge it with the external power source until the voltage is over 13V. Or replace the battery with a new one and then try to turn it on again.
 - ⊙ Flipping it 90 degrees on the side or turning it over 180 degrees are forbidden while installing the controller. This is to protect the internal

battery component.

- ⊙ While connecting to the external I/O or the signal, please operate in the condition that the power switch is turned off to prevent from a shortcut caused by mistaken touch in the process, and resulting in damage.

2. Description Related to Safety

I. Safety Symbol

- ⊙ Please carefully read and make sure to follow this manual before operating the robot. The following are the safety symbol used in this manual.

Symbol	Description
 DANGER	Failure to follow the description of this symbol will cause serious personal injury. Please make sure to follow those requirements to ensure safety.
 WARNING	Failure to follow the description of this symbol will cause personal injury or product damage. In order to guarantee the safe use of this product, please follow this regulation strictly.
 CAUTION	Failure to follow the description of this symbol will result in improper operation. In order to guarantee the safe use of this product, please make sure to follow this regulation.

II. Safety Grade

- ⊙ The following symbols are frequently used for safety notice. Please carefully read the following notices and always follow them before operating the robot.

 DANGER	<ul style="list-style-type: none"> ❖ Do not store the machine in the environment with corrosive gas, with flammable gas or close to the flammable object. ❖ Do not operate the machine in the environment with moisture, water or grease. ❖ Do not operate the machine at the place where vibration or the strong impact occurs.
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 <p>DANGER</p>	<ul style="list-style-type: none">❖ Do not immerse the electric wires into grease or water.❖ Do not connect or operate the machine with wet hands.❖ Please ensure the controller is grounded.❖ Keep hands away from the inner part of the controller while it is connecting to the power or during operating.❖ Do not touch the heat sink, regenerative resistance, the power supply or the computer inside the controller. While it is operating due to its high temperature.❖ Be sure power is disconnected prior to move, connect, check and maintain the controller, and ensure to operate under the condition of no electrical shock risk.❖ The emergency stop switch must be installed in an appropriate location where it can be operated easily. When the robot acts abnormally, it could immediately stop the robot from causing serious safety accident.❖ Do not open the controller cover without permission. If there's any questions, please contact our engineers.
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 <p>WARNING</p>	<ul style="list-style-type: none">❖ Do not stand on the product or put heavy objects on it.❖ Do not block the vent or put foreign objects into it.❖ Please ensure the controller is fixed on the base.❖ Do not pull the connector violently or twist the electric wires excessively.❖ Do not frequently switch the power switch and the control button.❖ Please ensure that the robot, the emergency stop switch and the controller are functioning properly before performing any work.❖ Do not turn off the power switch during the operation.❖ Do not open, modify, disassemble and maintain the machine without permission.❖ The power must be disconnected when the machine does not operate in a long time.
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CAUTION

- ❖ All operations must be executed by the trained staff.
- ❖ The controller must be kept away from high voltage or components that may generate electromagnetic field which will lead to robot malfunction or damage.
- ❖ When the robot is used to demonstrate, the operation speed should keep low and always keep an eye on the operating condition to prevent the workpiece from dropping or causing danger to operator.
- ❖ Do not turn off the power of the controller when modifying the program or parameter. Otherwise, the data stored in the controller will be damaged or lost.

3. Safety Notice

I. Safety Risk

i. Installation

- Ordinary Risk
 - ⊙ The installation procedures must follow this manual.
 - ⊙ The emergency stop switch must be installed in an appropriate location where it can be operated easily, so that the operator can immediately stop the robot system in an emergency.
 - ⊙ The person who installs the robot must be trained and authorized.
 - ⊙ Always follow the installation and safety requirements described in this manual to ensure personal safety.
- Risk without electric shock
 - ⊙ A safety area must be set outside the working range of the robot, and a safety device must be used to prevent the personnel entering without permission.
 - ⊙ After the brake of a servo motor is released, the robot will move due to the gravity and it may injure the operator.
 - ⊙ When installing or disassembling any mechanical parts, be aware of falling parts which may injure the operator.
 - ⊙ Be aware of high temperature produced by the controller.
 - ⊙ Do not allow any action of climbing on the robot.

ii. End effector

- ⊙ The end effector can be classified as two types:
 - A. Gripper: Used to load and unload, such as pneumatic gripper, electric gripper and vacuum sucker.
 - B. Tool: Used to process, such as welding, cutting and surface treatment.
- ⊙ The gripper-type end effector should prevent the workpiece from dropping or damaging when the robot experiences a power error or other errors. More attention should be paid at the design stage.
- ⊙ The end effector could be equipped with the control unit. The position must be noted to avoid the robot interference when the end effector is installed.

 WARNING	❖ The tool-type end effector is usually equipped with high voltage, high temperature or active shaft. Special attention should be paid during the operation.
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iii. Pneumatic and Hydraulic Systems

- ⊙ More attention should be paid to the pressure remained in the pneumatic and hydraulic systems after the power is disconnected.
- ⊙ The internal pressure must be released before the pneumatic and hydraulic systems are maintained.
- ⊙ When the pneumatic and hydraulic systems are operated, the clamped workpiece could drop owing to the insufficient pressure or gravity.
- ⊙ The pneumatic and hydraulic systems must be equipped with the relief valve, so that the operator can be applied in an emergency.

 WARNING	❖ More attention should be paid to the pressure in the pneumatic and hydraulic systems which are usually several times more than the atmosphere pressure.
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iv. Risk caused by the working environment

- ⊙ The industrial robots can be applied for the different industrial environments.
- ⊙ All operating procedures must be specified by the professional evaluation and according to the industrial safety regulations.
- ⊙ Maintenance must be conducted by the trained personnel who clearly understand the procedures for the whole system and other possible risks.
- ⊙ When the operating procedures are interrupted, the special attention should be paid during the troubleshooting.

II. Emergency Stop

- Emergency Stop Definition
 - ⊙ When the emergency stop is executed, the power supplied from the servo driver to the motor will be disconnected and all actions will be stopped.
 - ⊙ If the procedures are recovered, the emergency stop switch should be reset.
 - ⊙ Avoid using the emergency stop instead of the normal stop procedure to shut down the robot system. Otherwise, it may cause unnecessary damage to the robot system.
- Emergency Stop Switch
 - ⊙ The *HIWIN* robot is equipped with two emergency stop switches, where one is installed on the teach pendant and the other is directly connected to the controller via the cable. If additional emergency stop switches are required, other connection can be applied for the same purpose.
 - ⊙ Based on the relevant industrial safety regulations, the emergency stop switch is directly connected to the controller of the robot via the physical wires.

4. Warranty Terms and Conditions

The period of warranty shall commence at the received date of HIWIN product (hereafter called “product”) and shall cover a period of 12 months.

The warranty does not cover any of the damage and failure resulting from:

- The damage caused by using with the production line or the peripheral equipment not constructed by HIWIN.
- Operating method, environment and storage specifications not specifically recommended in the product manual.
- The damage caused by changing installation place, changing working environment, or improper transfer after being installed by the professional installer.
- Product or peripheral equipment damaged due to collision or accident caused by improper operation or test by the unauthorized staff.
- Installing non-genuine HIWIN products.

The following conditions are not covered by the warranty:

- Product serial number or date of manufacture (month and year) cannot be verified.
- Using non-genuine HIWIN products.
- Adding or removing any components into/out the product without authorized.
- Any modification of the wiring and the cable of the product.
- Any modification of the appearance of the product; removal of the components inside the product. e.g., removal of the cover, product drilling or cutting.
- Damage caused by any natural disaster. i.e., fire, earthquake, tsunami, lightning, windstorms, floods, tornado, typhoon and hurricane etc.

HIWIN does not provide any warranty or compensation to all the damage caused by above-mentioned circumstances unless the user can prove that the product is defective.

For more information towards warranty terms and conditions, please contact the technician or the dealer who you purchased with.

 WARNING	<ul style="list-style-type: none">❖ Improper modification or disassemble the robot might reduce the robot function, stability or lifespan.❖ The end-effector or the cable for devices should be installed and designed by a professional staff to avoid damaging the robot or robot malfunction.❖ Please contact the technical support for special modification coming from production line set up.❖ For the safety reason, any modification for HIWIN product is strictly prohibited.
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Content

1. Specifications.....	11
1.1 Standard Specification	11
1.2 Standard and Optional Equipment.....	12
1.3 Appearance Dimensions.....	13
1.4 Appearance Component.....	14
1.5 Operating Environment.....	15
1.6 Sticker and Label	16
2. Installation.....	18
2.1 Installation Dimensions	18
2.2 Basic Connection Structure.....	19
2.3 Instruction of Controller ON/OFF Procedure	20
2.4 Motor Cable Connection (CN2).....	21
2.5 Emergency Stop Switch Connection (CN3)	22
3. External Input/ Output	24
3.1 Function I/O	25
3.2 Digital I/O	26
3.3 Example of Connection.....	27
3.4 RS-232 Port.....	33
3.5 Network Connection	35
4. Teach Pendant	36
5. Maintenance.....	38
5.1 Lead-Acid Battery.....	38
5.2 Fan Filter.....	39

Version Update

Edition	Date	Applicable Scope	Note
1.0	2017.06.02	RCA610	First release
1.1	2017.08.28	RCA610	Modify emergency stop circuit description
1.2	2018.01.15	RCA610	Modify relative humidity range
1.3	2018.03.06	RCA610-GA	Add current leakage, emergency stop, IPC danger warning sign, arm grounding map, use of network

1. Specifications

1.1 Standard Specification

The following table shows the standard specifications of the robot controller.

Item		<i>HIWIN</i> Robot Controller
Model No.		RCA610
Controlled Manipulator		RA610-1355 RA610-1476 RA610-1672 RA610-1869
Positioning control		PTP (point-to-point) CP (continuous path)
Joint control		AC servo control
Operating system		HRSS
Memory capacity	Fixed point	5000
	Step number	10000
Teaching method		Teach pendant
Communication interface	RS232	1
	Ethernet	2
	USB	2
External I/O	Emergency stop input	Input : 1
	Function I/O	Input : 8 Output : 8
	Digital I/O	Input : 24 Output : 24
Power	Input power range (VAC)	Three Phase AC 200-240
	Power capacity (KVA)	3.1
	Power frequency (HZ)	50/60
	Voltage drop (msec)	10 or less
	Rating output current (A)	10
	Current leakage (mA)	100
Weight (kg)		48
IP grade		20
Temperature range for workplaces (°C)		0~45
Relative humidity (%RH)		20~75 (non-condensing)
Grounding		Below100Ω

1.2 Standard and Optional Equipment

The following table shows the items of the standard equipment for the robot controller.

Item	HIWIN Part No.	Remark
CN2, Motor Power Signal Cable	AH300T01	Refer to CH 2.4
CN3, Emergency Stop Connector, 15pin Soldering Head (male)	461800DQ	Refer to CH 2.5
CN3, Emergency Stop Connector, 15pin Soldering Head (male) Casing	461800DR	Refer to CH 2.5
I/O connector,37pin Soldering Head (male)	461800Z3	Refer to CH 3
I/O connector,37pin Soldering Head (male) Casing	461800Z2	Refer to CH 3
Teach Pendant	AH300U01	Refer to CH 4

The following table shows the items of robot controller optional equipment.

Item	HIWIN Part No.	Remark
CN3 Emergency Stop Switch Unit	4C7006F1	Refer to CH 2.5
CN3, Emergency Stop Connector, 15pin Soldering Head (male)	461800DQ	Refer to CH 2.5
CN3, Emergency Stop Connector, 15pin Soldering Head (male) Casing	461800DR	Refer to CH 2.5
I/O connector,37pin Soldering Head (male)	461800Z3	Refer to CH 3
I/O connector,37pin Soldering Head (male) Casing	461800Z2	Refer to CH 3
External I/O Extension Module _(Note1)	4C920005	Refer to CH 3
External I/O Wiring Kit	4C201DY1	Refer to CH 3
Primary Dust Filter, 200MM X 80MM X 5MM	4657003X	Refer to CH 5.2
Primary Dust Filter, 75MM X 90MM X 5MM	4657003Y	Refer to CH 5.2
Primary Dust Filter, 385MM X 90MM X 5MM	4657003Z	Refer to CH 5.2
Lead-Acid Battery	4C9E0002	Refer to CH 5.1

*Note1:

Standard Digital I/O:

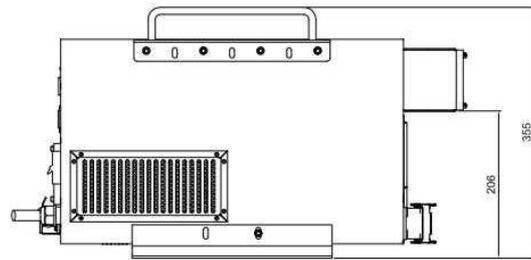
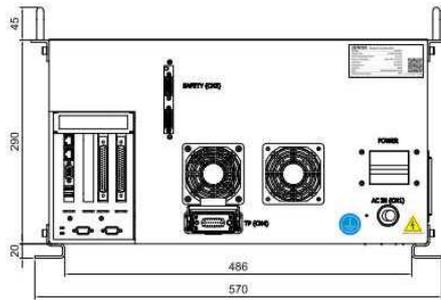
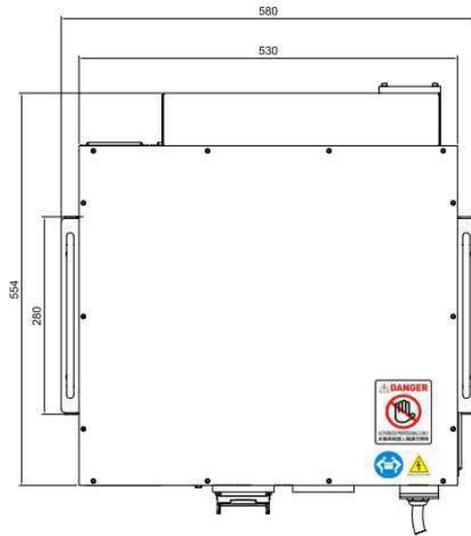
24 Input and 24 Output

Maximum Expansion:

16 Input and 16 Output (Optional)

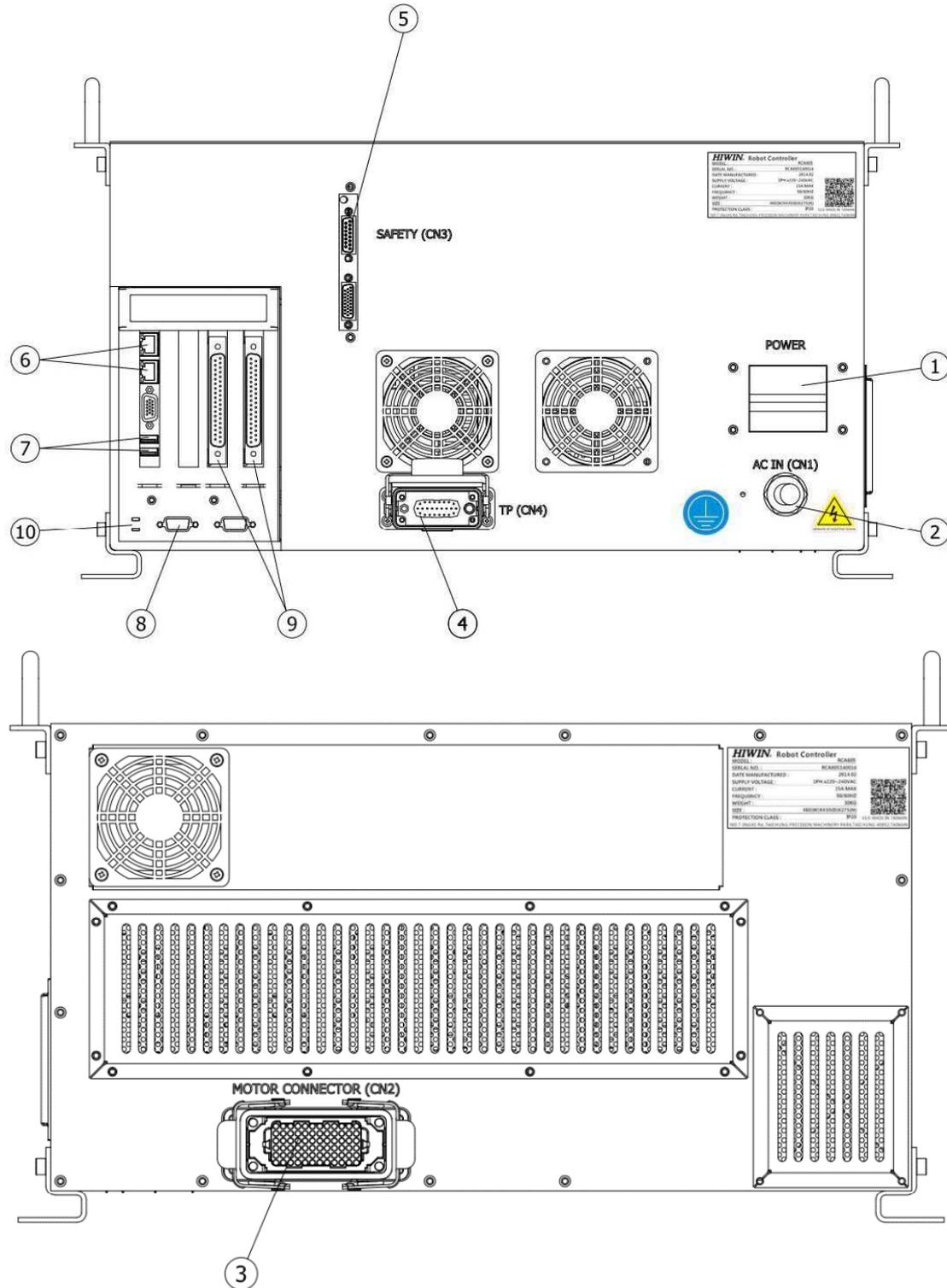
1.3 Appearance Dimensions

The following shows the appearance dimensions of the robot controller (Unit: mm).



1.4 Appearance Component

The function of each connector outside the controller



No.	Item	Description
1	Power Switch	Switch power ON/OFF
2	Main Power Source	Inlet three phase AC220V
3	Motor Connector (CN2)	Connect robot controller to the robot manipulator
4	Teach Pendant Connector (CN4)	Teach pendant signal transmission
5	Emergency Stop Connector (CN3)	Connect to external emergency stop device
6	Network Connector	Ethernet signal transmission
7	USB Connector	USB signal transmission
8	RS232 Connector	RS232 signal transmission
9	I/O Connector	I/O signal transmission
10	Controller Power Indicator Green Light	Display ON/OFF status

1.5 Operating Environment

The robot controller employs the IEC protection rating as IP20 (open). In addition, IP20 indicates the protection rating for the solid, not for grease and water.

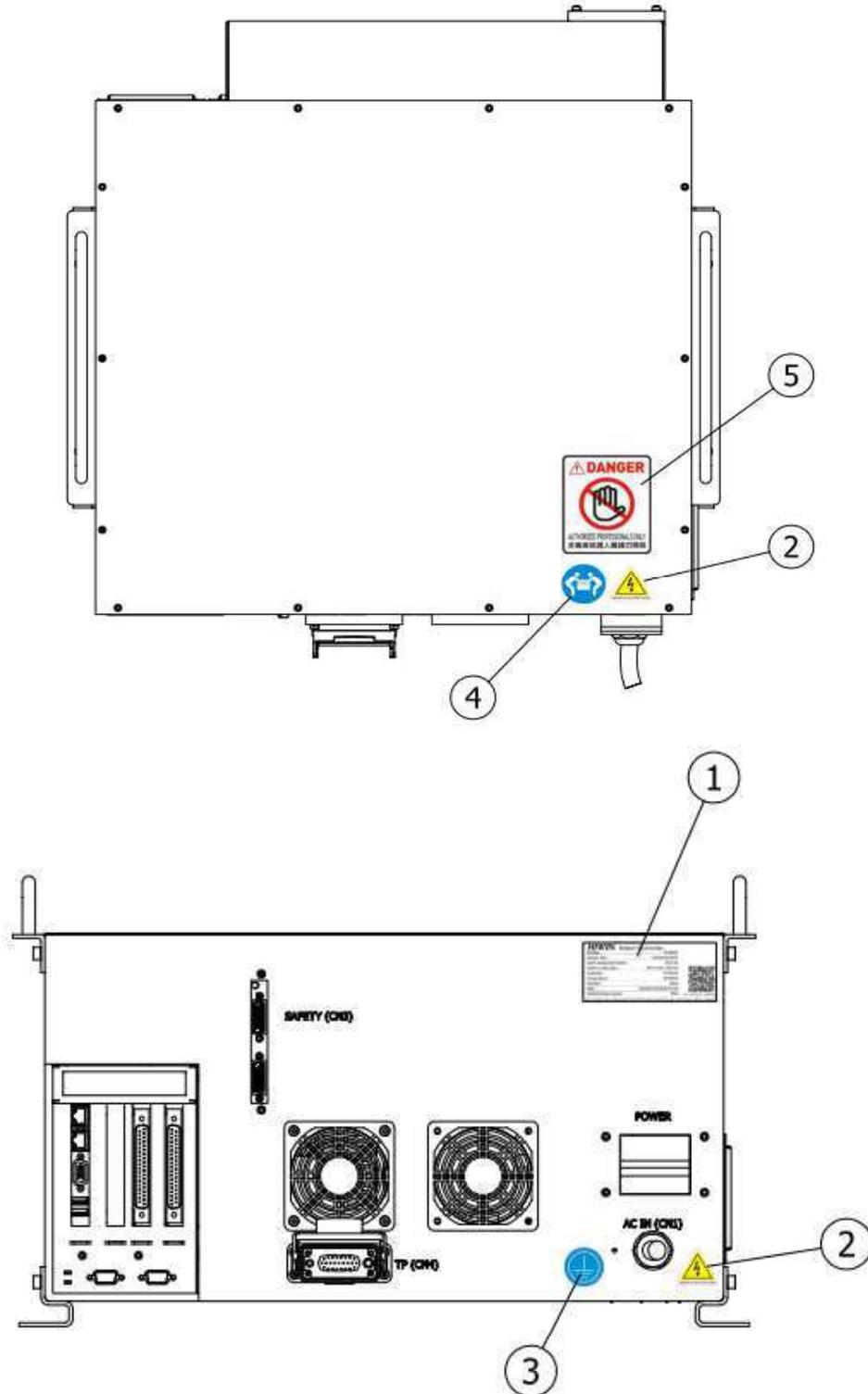
IEC specification of IP20:

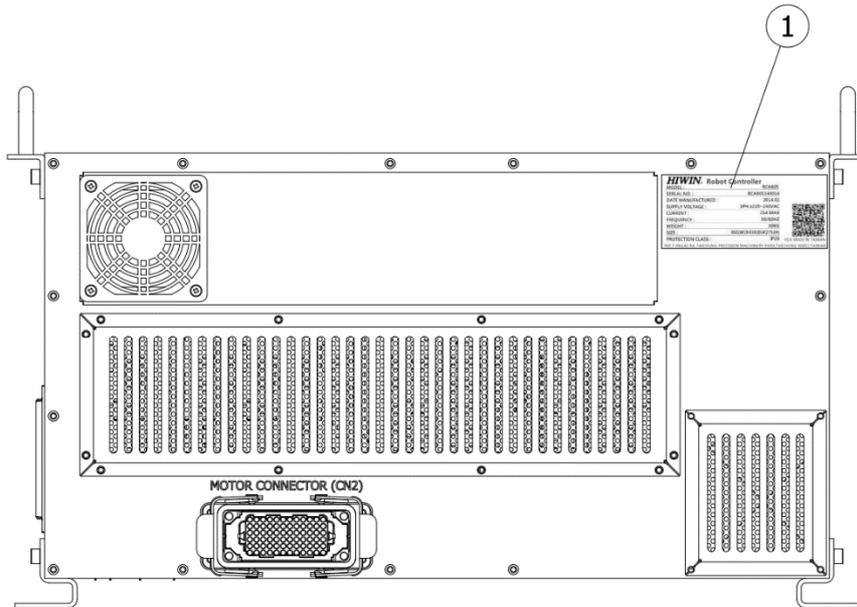
When a 12mm diameter iron ball enters the test machine with an external force of 3.1kg±10%, it will not pass through the protection level of the opening.

 WARNING	<ul style="list-style-type: none"> ❖ The controller should not be placed at the environment with moisture, with high temperature, under direct sunlight or potentially explosive environment. ❖ Please keep the controller away from the strong electric field or the magnetic field. ❖ Because the vents are set on the right side of the controller, please ensure a space of 50mm from the right. ❖ Please place the controller at flat surface, and avoid shaking.
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1.6 Sticker and Label

The following shows the appearance stickers and labels on the robot controller.



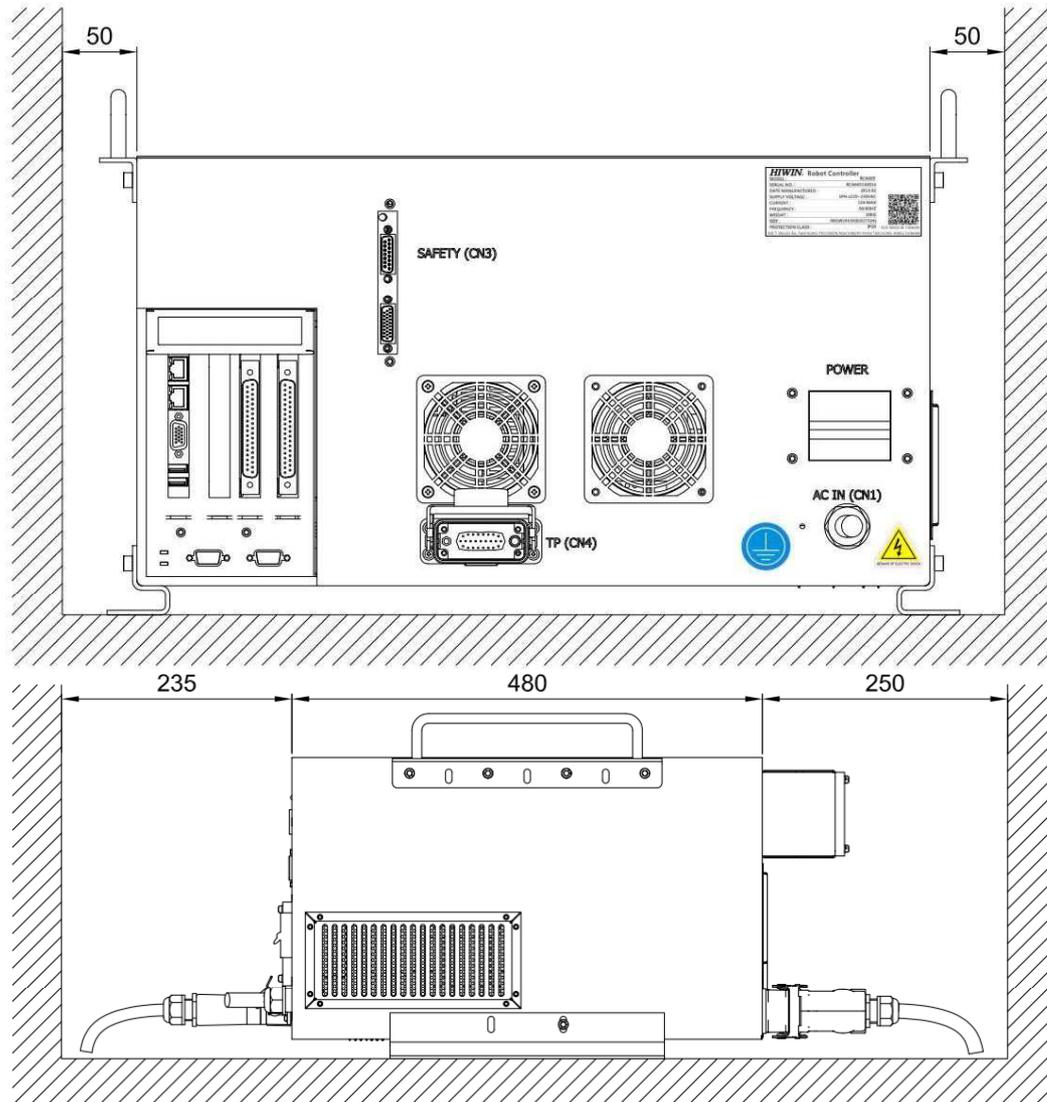


Sticker No.	Illustration	Description
1	<p>HIWIN Robot Controller MODEL: RCA610-1476 SERIAL NO.: _____ MANUFACTURED: _____ SUPPLY VOLTAGE: THREE PHASE 200-240 VAC RATED CURRENT: 10A FREQUENCY: 50/60HZ WEIGHT: 45KG SIZE: 480(D)X530(W)X290(H) PROTECTION CLASS: IP20 V1.6 MADE IN TAIWAN NO.7 JINGKE Rd.,TAICHUNG PRECISION MACHINERY PARK,TAICHUNG 40852,TAIWAN</p> 	Controller specification
2	 <p>BEWARE OF ELECTRIC SHOCK</p>	Beware of electric shock
3		Grounding
4		Transport by multiple people
5	 <p>DANGER  AUTHORIZED PROFESSIONALS ONLY 非專業維護人員請勿開啓</p>	Danger: authorized professionals only

2. Installation

2.1 Installation Dimensions

The following shows the connector installation space. Please reserve some space for the connecting wires to avoid interference as they bend. (Unit: mm)

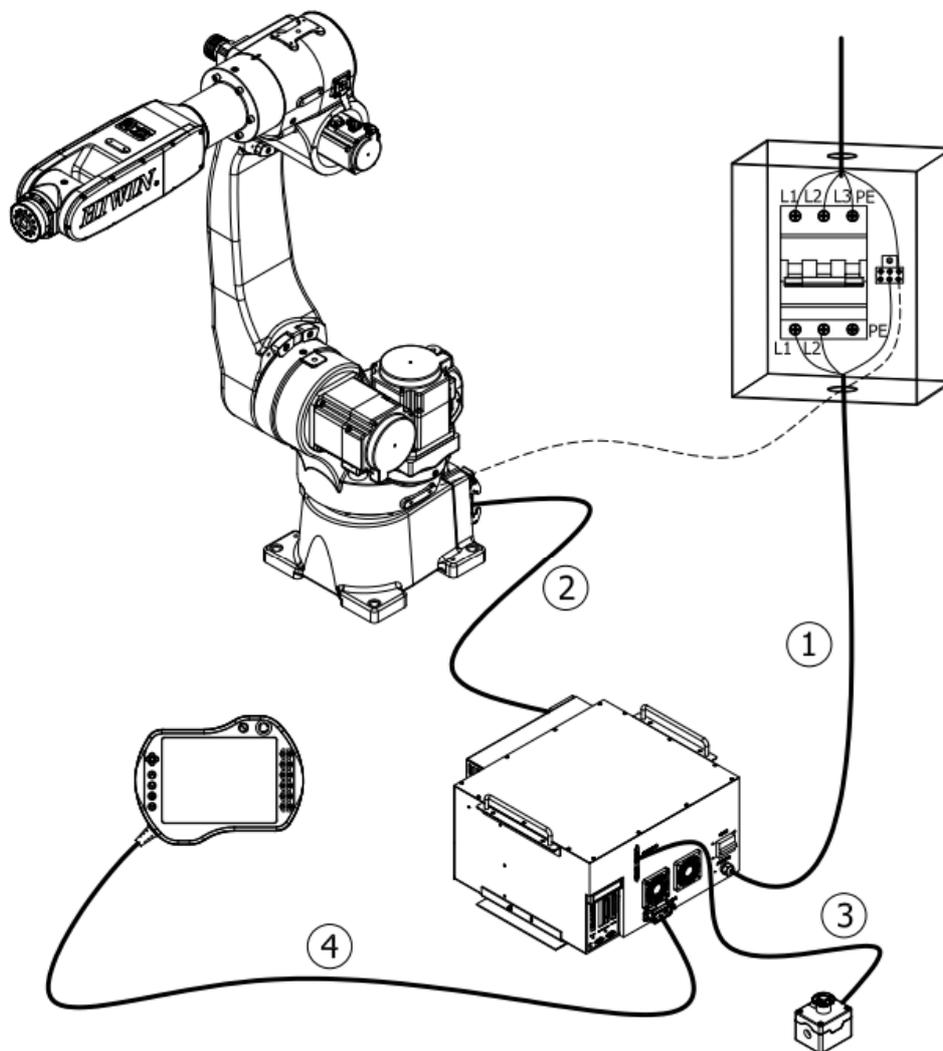


CAUTION

- ❖ Controller should keep upright while installing as the illustration shows. Flipping it 90 degrees on the side and turning it over 180 degrees are forbidden while installing the controller. This is to protect the internal battery component.

2.2 Basic Connection Structure

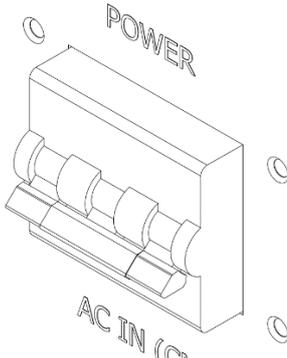
The picture below is an example of basic connection structure. This controller needs to be supplied with three-phases AC200-240V, and the ground connection should be separated from main power breaker. Instead of connecting the ground by devices or system ground, the best way is to connect to power ground directly, and high-quality wires which diameters are 14AWG or more should be used. The power can be turned on and tested after connecting the main components mentioned below. It is suggested that the grounding of manipulator is connected to the power grounding directly.



No.	Item
1	CN1 Main Power Cable
2	CN2 Motor Cable
3	CN3 Emergency Stop Switch
4	CN4 Teach Pendant

 CAUTION	<ul style="list-style-type: none"> ❖ Do not connect any switch and breaker to the ground wire. ❖ The grounding resistance should be under 100Ω. ❖ Please ensure the robot is firmly installed before starting the operation test to prevent the robot topples during the test.
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2.3 Instruction of Controller ON/OFF Procedure

Item	Illustration	Instruction
Power Switch		<p>Controller ON: After the power is connected, turn the power switch to state “ ”.</p> <p>Controller OFF: (1) Operate the robot to a safe posture, and then stop the motion. (2) Press the emergency stop button. (3) Turn the power switch on the controller panel to state “O”. (4) 8 seconds after switch to state “O”, the controller starts its shut down procedure. Before cutting off the power, make sure the controller is entirely turned off. (Refer to CH1.4, wait for the indicator [10] to disappear)</p>

 WARNING	<ul style="list-style-type: none"> ❖ If you want to stop a moving robot, you should go through the normal procedure and press the stop button instead of the emergency stop. ❖ Please stop the robot and press the emergency stop button before turning it off. Directly cut off the power while robot is moving may cause an unexpected danger.
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2.4 Motor Cable Connection (CN2)

Description:

The motor cable connects the robot and the controller.



Connection method:

<p>The motor connection port on the controller is CN2 connector which is designed mistake-proofing. If it cannot be plugged in, please rotate and connect it again.</p>	
<p>Plug the motor cable into CN2 connector, and secure the safety lock indeed.</p>	



WARNING

- ❖ Plug the connector in the direction parallel to the pins to avoid the internal pins being crooked and deformed.
- ❖ According to different operating condition, the temperature of the cable would rise slightly. Remove plastic cover before connection.

2.5 Emergency Stop Switch Connection (CN3)

Description:

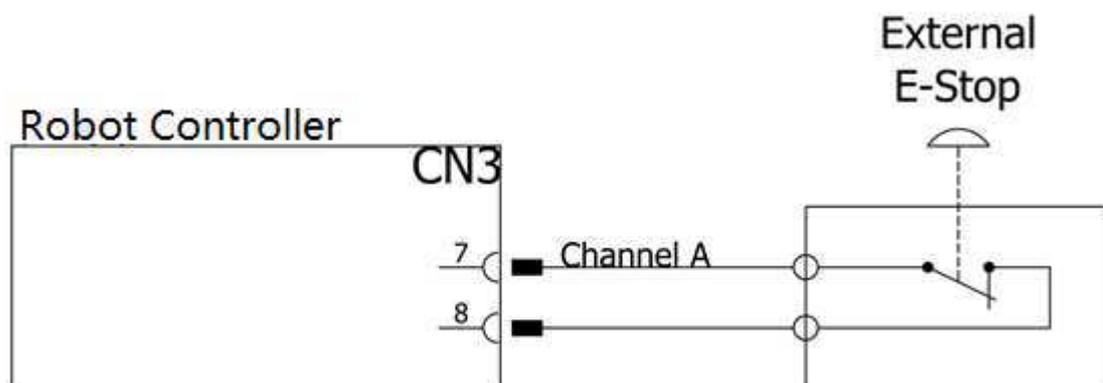
Connector CN3 is a female DSUB-15 connector for emergency stop.

Emergency stop switch external connection cable and a button box are the optional equipment. DSUB-15 soldering connector (male) is included in the connector kit.



Emergency stop switch wiring diagram

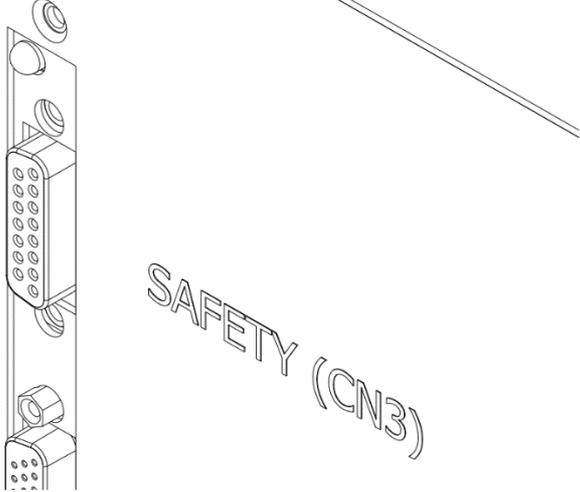
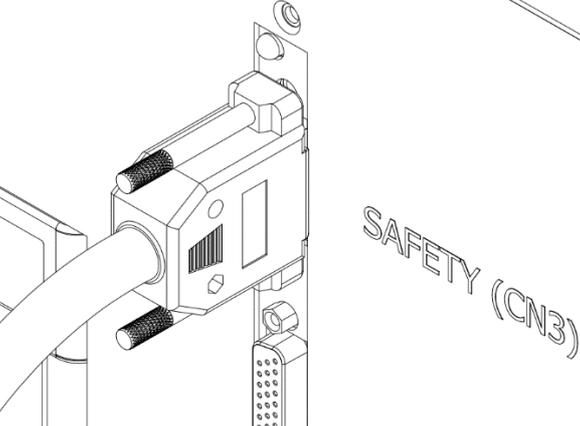
Controller emergency stop connector is a single circuit contact, which should be connected with an external dual circuit emergency stop device additionally. This device should be a dry contact (uncharged) switch. Ensure the connector is connected correctly and the emergency stop device is accessible to the operator before the robot functions.



DANGER

- ❖ The emergency stop device must be connected with the controller and be placed at the position accessible to operator. the signal and power should not contact or get close to any metal. Wrong method of using can cause a severe damage or loss of life and property.

Connection Method:

<p>The connector of emergency stop device on controller is CN3 which is designed mistake-proofing. If it cannot be plugged in, please rotate and connect it again.</p>	
<p>Plug the connector into CN3 and secure the screws indeed.</p>	



CAUTION

- ❖ Please ensure this emergency stop switch and the emergency stop on the teach pendant are all reset before the robot functions.

3. External Input/ Output

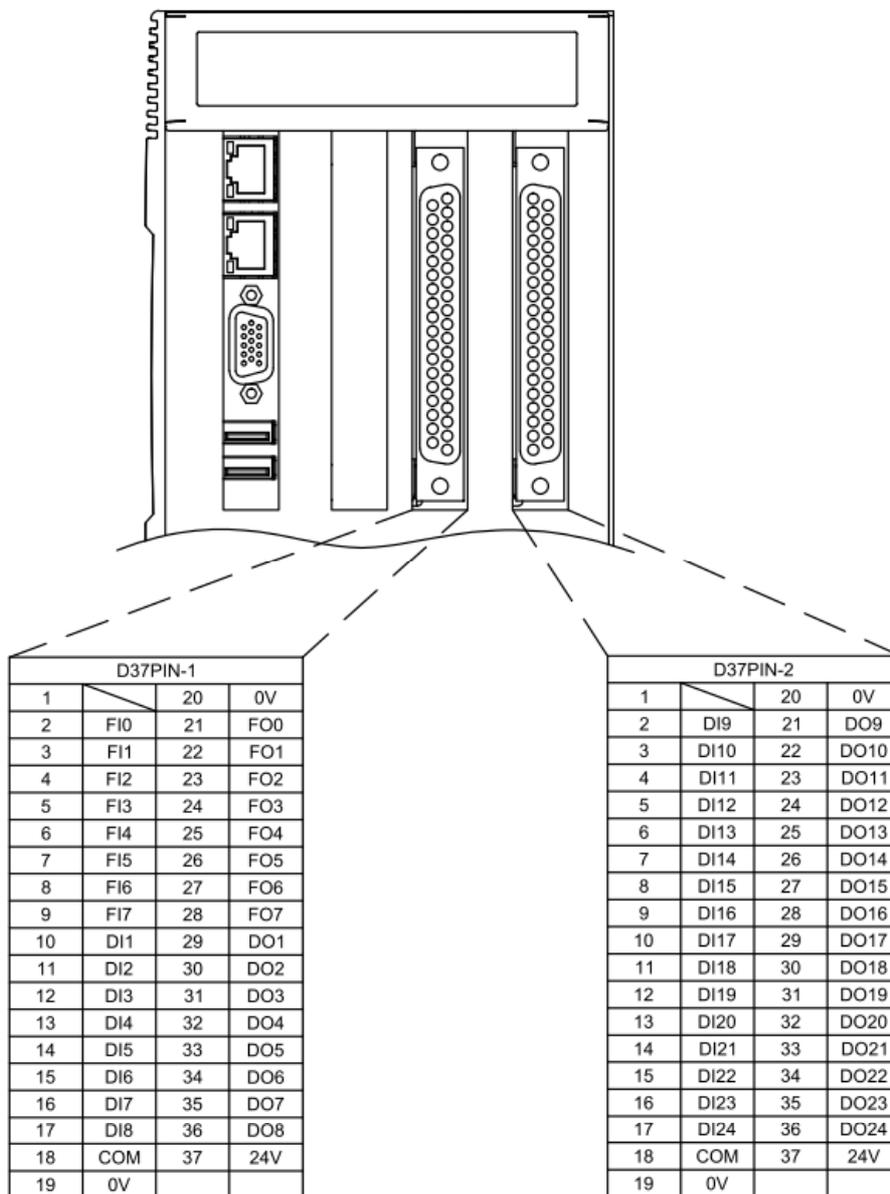
Description:

External Input/ Output consists of two DSUB-37, including FI8/FO8 and DI24/DO24.

An external I/O wiring kit (optional equipment) contains connecting wire and terminal block. Connector kit contains DSUB-37 soldering connector.

There are two types of controller external I/O:

- (1) Function I/O (FI/O)→ specific function I/O
- (2) Digital I/O (DI/O)→ external I/O for customer’s configuration

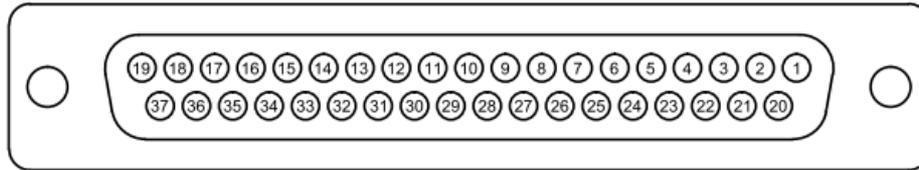


3.1 Function I/O

Description:

Standard equipment has function I/O of 8IN/8OUT, which are all in the D37PIN-1 connector.

Function I/O List



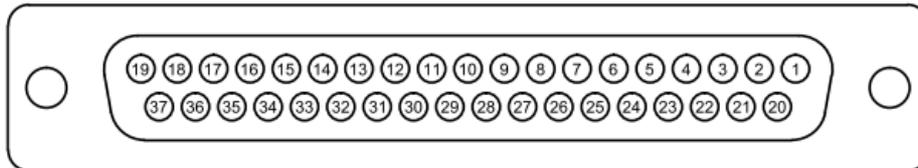
INPUT		
Pin	Parameter	Function
2	START	Execute program
3	HOLD	Pause program
4	STOP	Stop program
5	ENBL	Enable Function I/O
6	RSR1/PNS1	Robot service request 1 / program selection 1
7	RSR2/PNS2	Robot service request 2 / program selection 2
8	RSR3/PNS3	Robot service request 3 / program selection 3
9	RSR4/PNS4	Robot service request 4 / program selection 4
OUTPUT		
Pin	Parameter	Function
21	RUN	Program running
22	HELD	Program pausing
23	FAULT	Controller failure
24	READY	Controller ready
25	ACK1/SNO1	RSR 1 feedback signal / selection program No. 1
26	ACK2/SNO2	RSR 2 feedback signal / selection program No. 2
27	ACK3/SNO3	RSR 3 feedback signal / selection program No. 3
28	ACK4/SNO4	RSR 4 feedback signal / selection program No. 4

3.2 Digital I/O

Description:

Standard equipment has 24IN/24OUT digital I/O, distributed in D37PIN-1 and D37PIN-2 connectors.

Digital I/O List



D37PIN-1			
Pin	Parameter	Pin	Parameter
10	DI[1]	29	DO[1]
11	DI[2]	30	DO[2]
12	DI[3]	31	DO[3]
13	DI[4]	32	DO[4]
14	DI[5]	33	DO[5]
15	DI[6]	34	DO [6]
16	DI[7]	35	DO [7]
17	DI[8]	36	DO [8]

D37PIN-2			
Pin	Parameter	Pin	Parameter
2	DI[9]	21	DO[9]
3	DI[10]	22	DO[10]
4	DI[11]	23	DO[11]
5	DI[12]	24	DO[12]
6	DI[13]	25	DO[13]
7	DI[14]	26	DO[14]
8	DI[15]	27	DO[15]
9	DI[16]	28	DO[16]
10	DI[17]	29	DO[17]
11	DI[18]	30	DO[18]
12	DI[19]	31	DO[19]
13	DI[20]	32	DO[20]
14	DI[21]	33	DO[21]
15	DI[22]	34	DO[22]
16	DI[23]	35	DO[23]
17	DI[24]	36	DO[24]

3.3 Example of Connection

1. External OUTPUT are all NPN (current sinking) output and OUTPUT signal is 0V. Pin20 (0V) and pin37 (24V) are supply voltage for OUTPUT which is supplied by external power source and the power connection cannot be reversed.
2. External INPUT can be NPN (current sinking) or PNP (current sourcing) input, adjusted with pin18 (COM), pin19 (0V) is the supply voltage for INPUT which is supplied by external power source and the power connection cannot be reversed.

COM→24V: NPN INPUT

COM→0V: PNP INPUT

3. Pin20 (0V) and pin37 (24V) of OUTPUT in the same DSUB-37 connector are the supply voltage, which should be connected to the same power supply.
4. Pin 18 (COM) and pin19 (0V) of INPUT in the same DSUB37 connector should be connected to the same power supply. The COM voltage level, which is the same, cannot be separated.
5. OUTPUT and INPUT in the same DSUB-37 connector can be connected to different power supplies to provide reference voltage level.
6. D37PIN-1 and D37PIN-2 can be connected to different power supplies to provide reference voltage level.

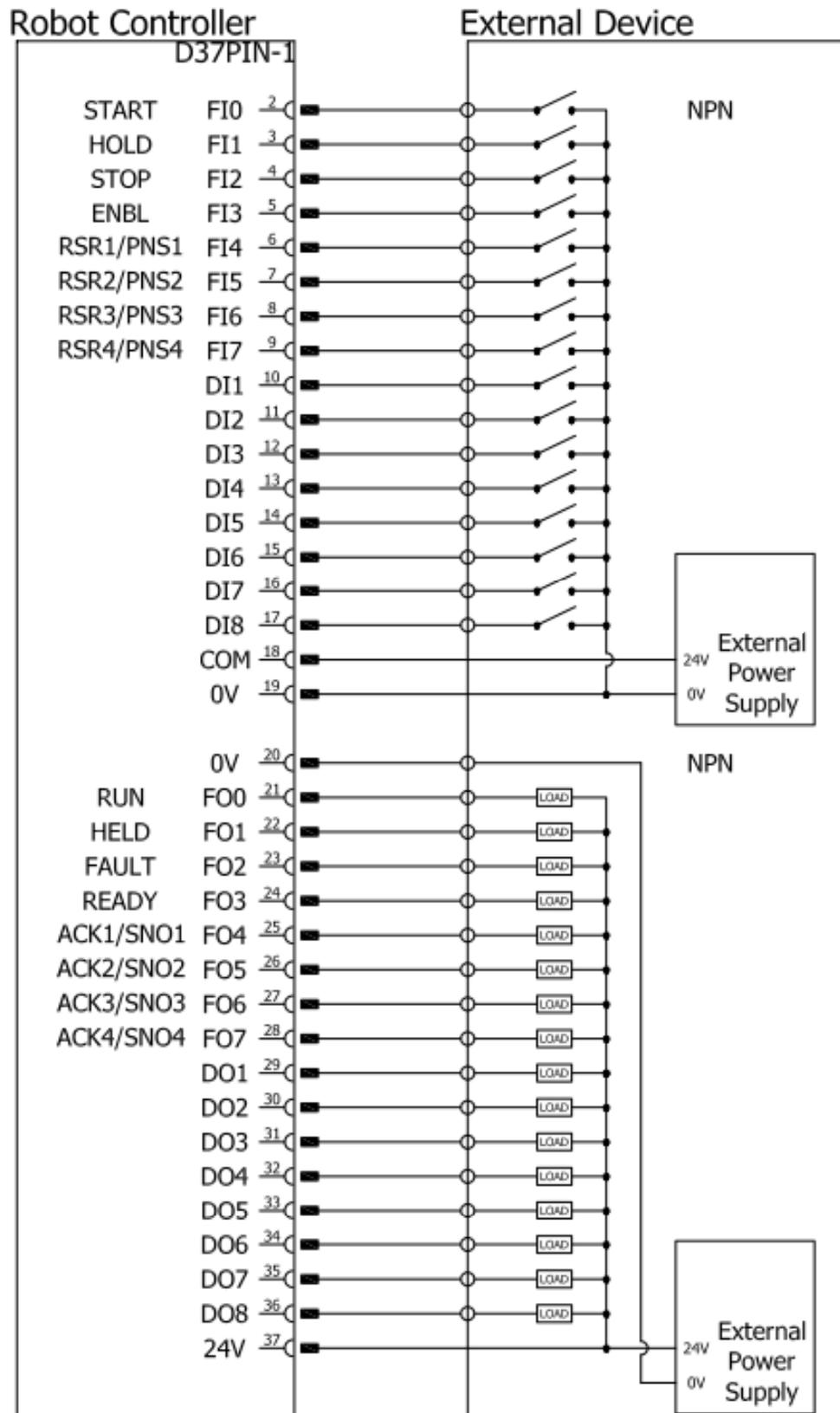


CAUTION

- ❖ The maximum current at the single output supplied by external output is 100mA.
- ❖ The OUTPUT supplied by controller is all NPN output, which cannot be modified. The INPUT can be modified into NPN or PNP type by adjusting COM voltage.

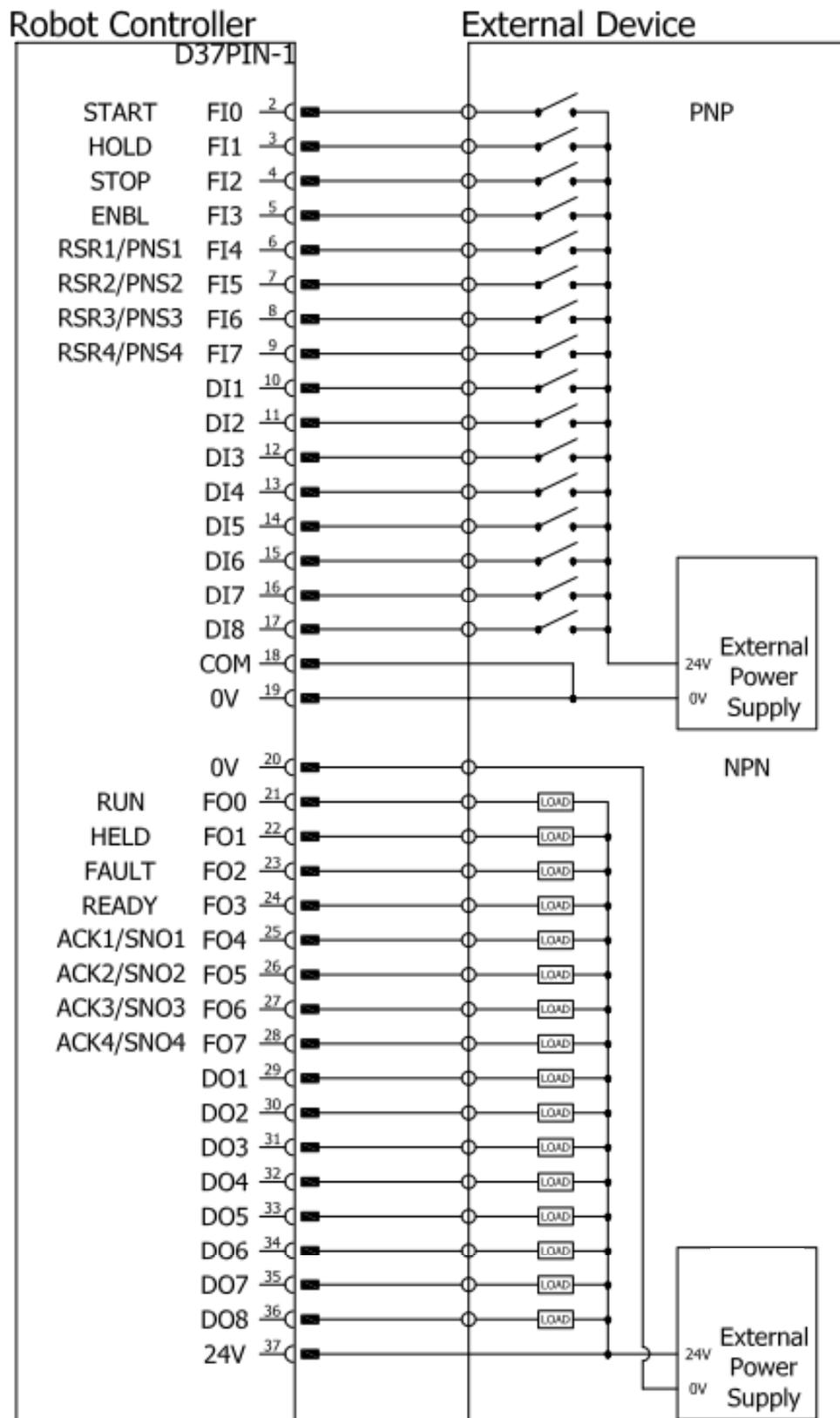
D37PIN-1

INPUT: NPN OUTPUT: NPN



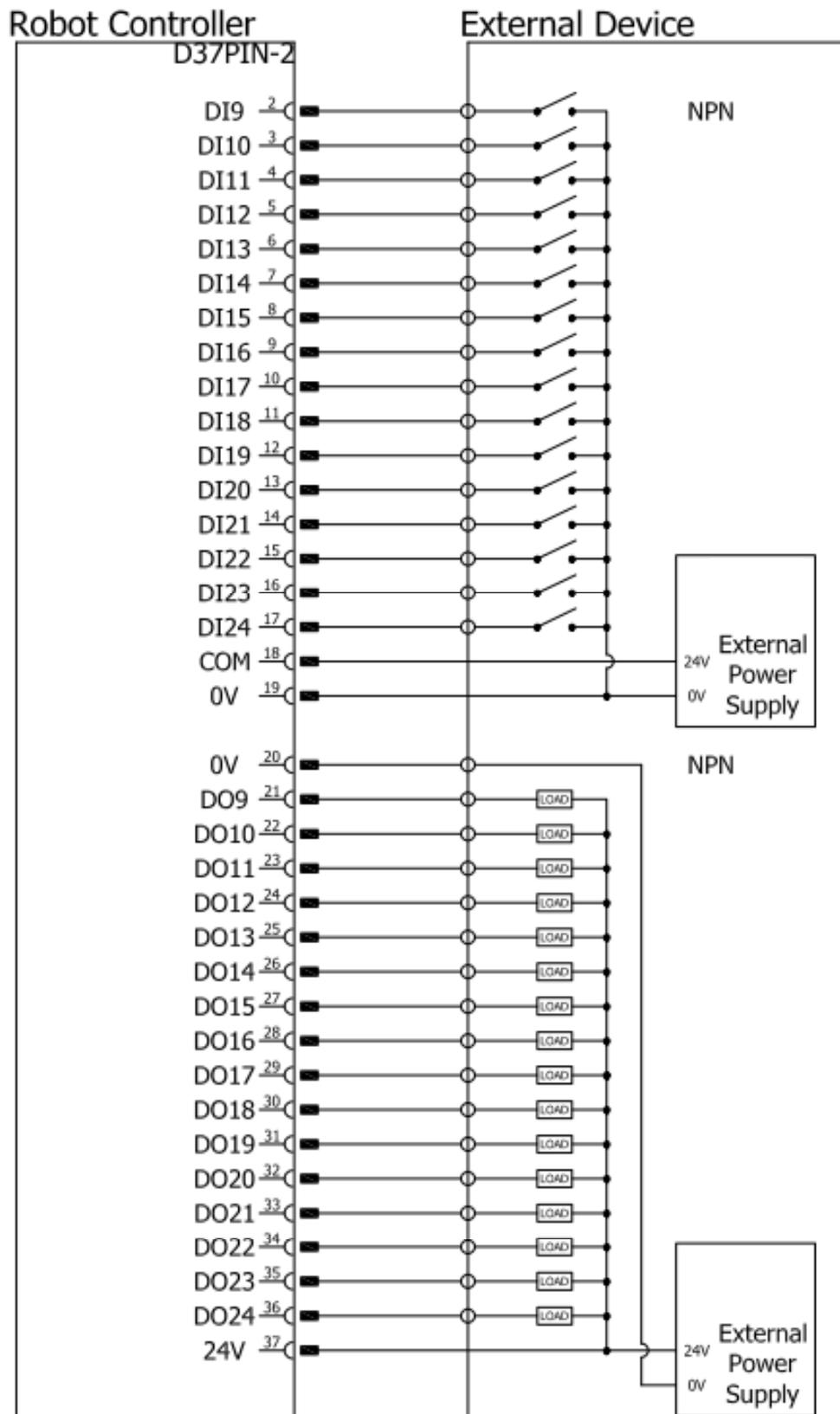
D37PIN-1

INPUT: PNP OUTPUT: NPN



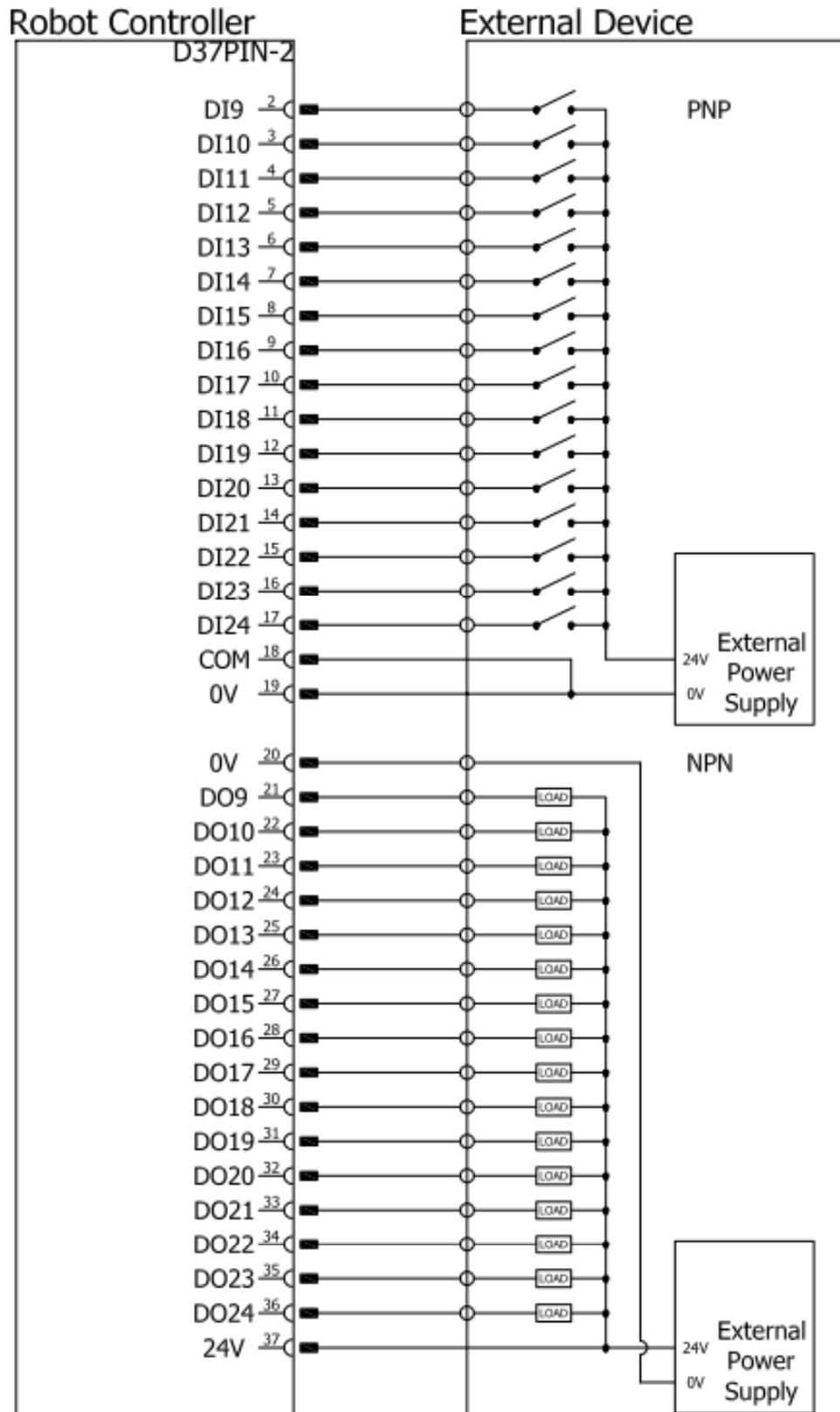
D37PIN-2

INPUT: NPN OUTPUT: NPN

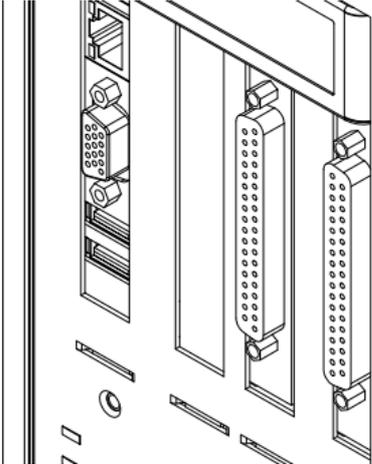
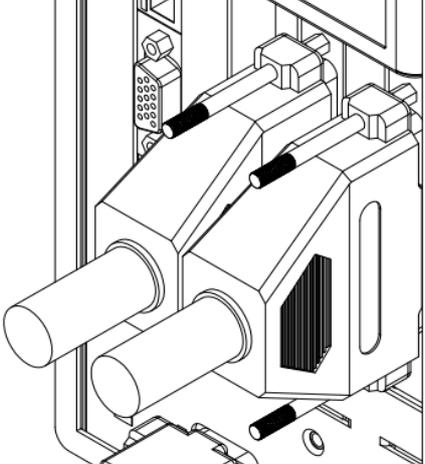


D37PIN-2

INPUT: PNP OUTPUT: NPN



Connection method:

<p>There are two I/O connectors (DSUB-37) on the controller which is designed mistake-proofing. If it cannot be plugged in, please rotate and connect it again.</p>	
<p>Plug the connector in and secure the screw indeed.</p>	

 <p>DANGER</p>	<ul style="list-style-type: none"> ❖ No signal or power supply should be close to or in contact with any metal case. Wrong method of using can cause a severe damage or loss of life and property.
----------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

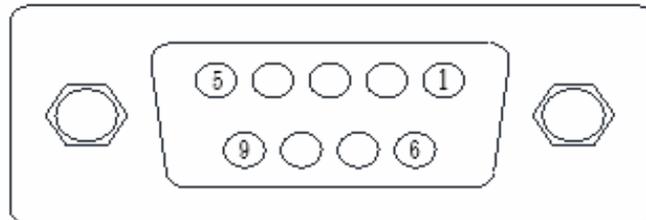
 <p>WARNING</p>	<ul style="list-style-type: none"> ❖ To prevent the internal component from damage, any wiring operation must be done only when the controller is disconnected.
-----------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

 <p>CAUTION</p>	<ul style="list-style-type: none"> ❖ Please make sure the screws on the connector are secured.
-----------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------

3.4 RS-232 Port

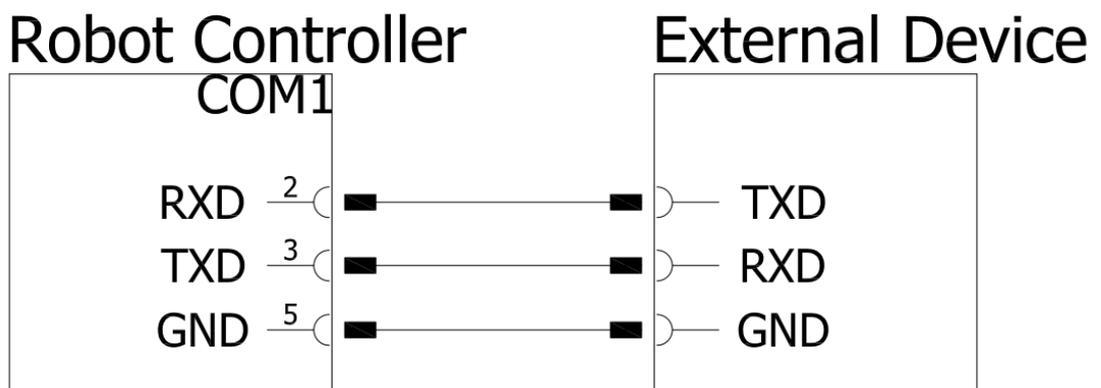
Description:

The following figure shows the pin assignment of RS-232 controller.

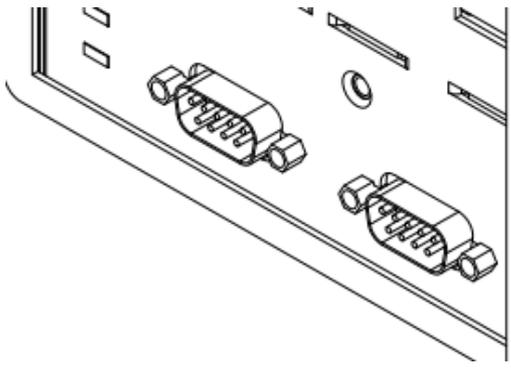
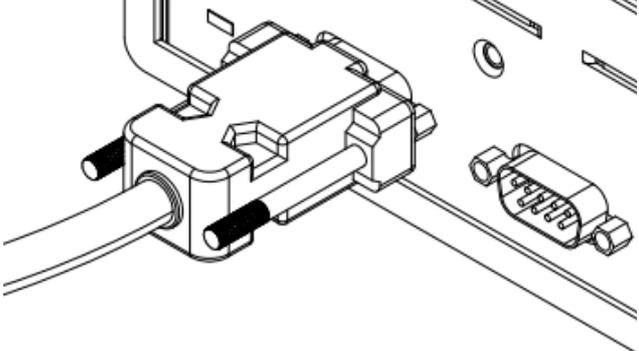


Pin	Description
2	RXD-Receiver
3	TXD-Transmit
5	GND -Ground

The following figure shows the connection method with external device.



Connection method:

<p>The I/O connector of controller is COM1, which is designed mistake-proofing. If it cannot be plugged in, please rotate and connect it again.</p>	
<p>Plug the connector in and secure the screw indeed.</p>	

 <p>DANGER</p>	<ul style="list-style-type: none"> ❖ No signal or power supply should be close to or in contact with any metal case. Wrong method of using can cause a severe damage or loss of life and property.
----------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

 <p>WARNING</p>	<ul style="list-style-type: none"> ❖ To prevent the internal component from damage, any wiring operation must be done only when the controller is disconnected.
-----------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

 <p>CAUTION</p>	<ul style="list-style-type: none"> ❖ Please make sure the screws on the connector are secured.
-----------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------

3.5 Network Connection

Description:

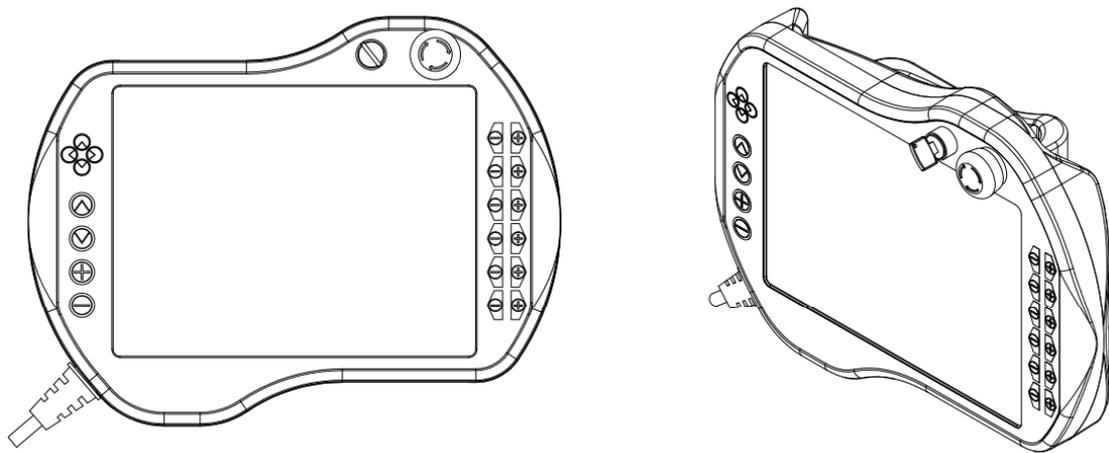
During connecting to the network ports, it is recommended to use a shield wire cable, which can be attached to the network cable with a magnetic ring.

Remark: The model number of the magnetic ring can be 7471132 (wurth elektronik) or items with the same specification.

4. Teach Pendant

Description:

The Teach Pendant provides the program edit, program management and motion position teaching etc. In addition, for user's safety, the Teach Pendant is equipped with the Emergency Stop Switch and the Enable Switch (Note 1).



Teach Pendant Specification:

Item	HIWIN Robot Teach Pendant
Model No.	TP02
Dimensions	318x245x107 mm ³
Weight	1.4 kg
Protection Rating	IP20
Display	10.2" touch screen
Resolution	1024x768 pixels
Mode	Manual, Auto and Lock
Physical Button	20keys + Enable Switch + Emergency Stop Switch + Key Switch
Cable Length	5m

*note 1: instruction on enable switch:

In T1 and T2 mode, the enable switch must be held at center position to start the robot. In Auto mode (AUT) and External Auto mode (EXT), the enable switch should be held at center position only in the moment it starts, and then release.

The Enable Switch has three positions:

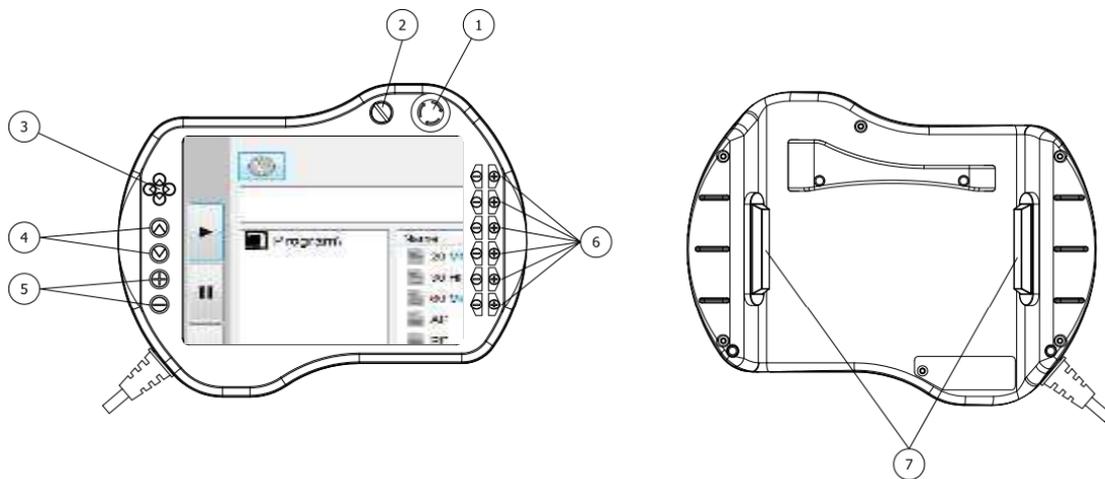
- (1) Not pressed → The robot can't move.
- (2) Center position → The robot can move and teach

(3) Fully pressed → The robot can't move.

In addition, the enable switch on both side has the same function.

 WARNING	<ul style="list-style-type: none"> ❖ It is forbidden to use Teach Pendant in the high dust concentration and high grease concentration environment since its protection rating is IP20. ❖ To ensure the Teach Pendant functions normally, any impact and fall are forbidden.
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Names and functions on Teach Pendant



Button Definition:

No.	Item	Function Description
1	Emergency Stop Switch	Disable servo and directly stop the robot.
2	Mode Switch	Switch mode operation: Manu, Auto and Lock
3	XY-Axis T1 Key	In the T1 mode, control the movement in XY-axis.
4	Z-Axis T1 Key	In the T1 mode, control the movement in Z-axis.
5	Speed Key	Adjust the robot speed
6	T1 Key	Adjust the value in each axis in the different mode.
7	Enable Switch	When pressing one of the switches, the robot can start to move; the robot will stop directly when releasing this switch or pressing it to the end.

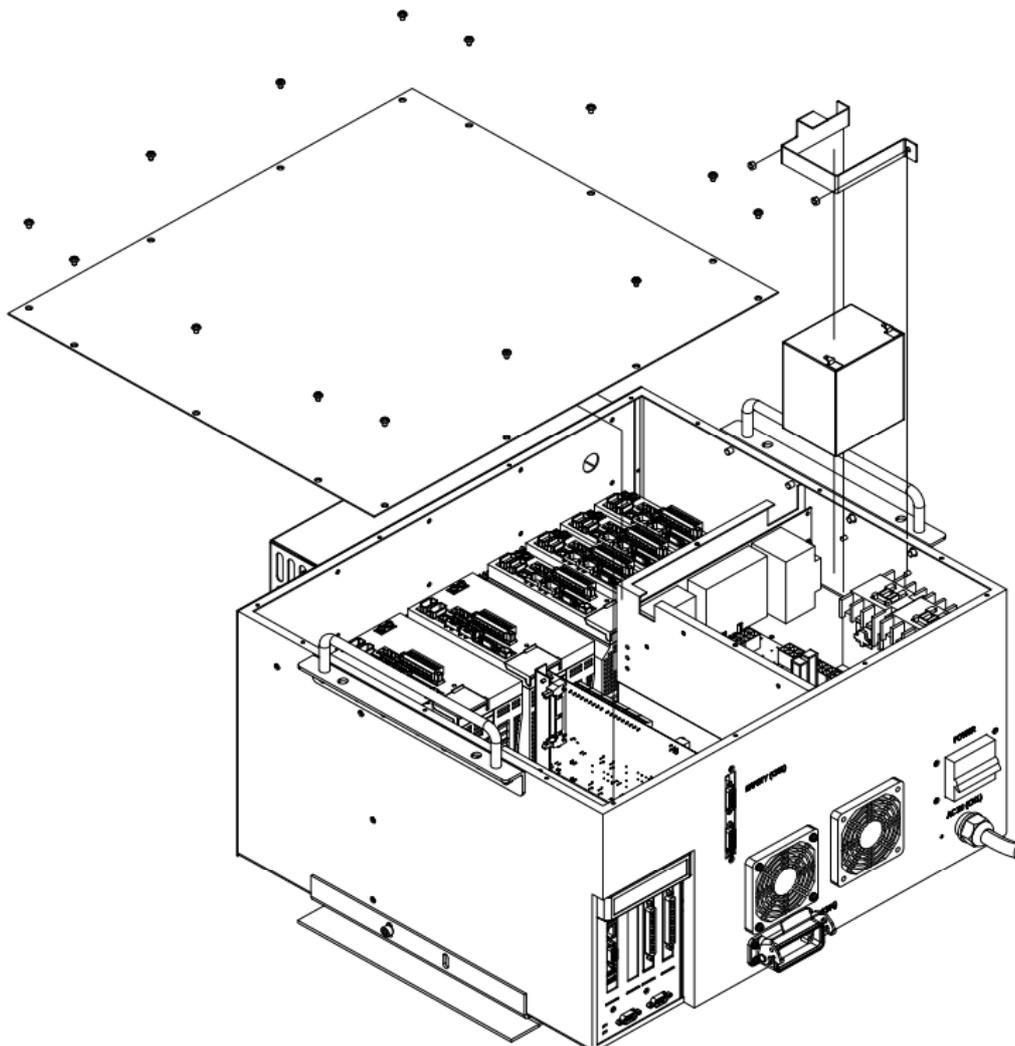
5. Maintenance

5.1 Lead-Acid Battery

There's a lead-acid battery in the controller which lifespan is about 3 to 5 years. Please replace the battery when low voltage causing the controller unable to turn on or due to insufficient power.

Battery Replacement Steps:

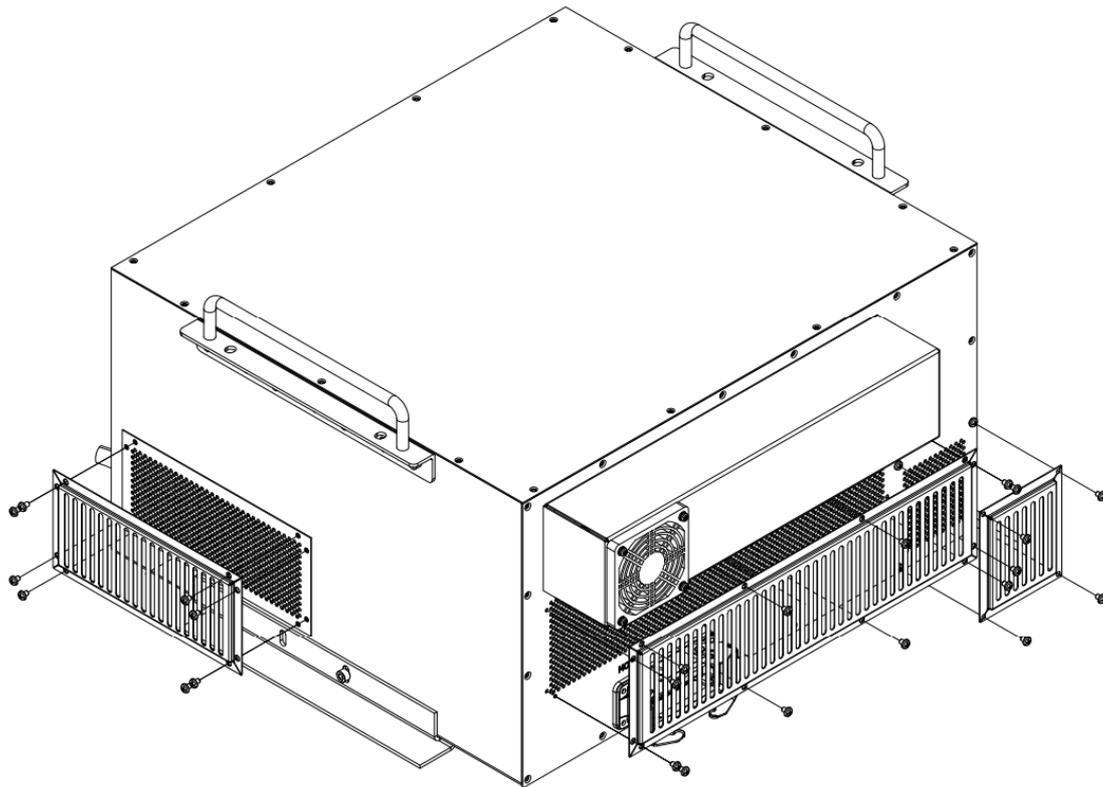
- (1) Remove 16 pieces of M4 Phillips screws on the cover and remove the cover.
- (2) The battery is located on the right side in the cabinet. Remove the two power cable connected to the battery.
- (3) Remove the two M4 hexagonal nuts on the battery holder then take out and replace the battery.
- (4) After ensuring the battery is placed back in position, connect it with the power cable. Install the cover in order after confirm that all the cable is connected securely.



5.2 Fan Filter

Every air inlet outside the cabinet contains filter, which has the function of blocking external foreign material, enhancing the air convection and support heat dissipation. Please decide the frequency of filter replacement according to working environment.

- (1) Remove M4 Phillips screws on the cover.
- (2) Replace internal filter.
- (3) Install the cover in order.



CAUTION

- ❖ If poor convection occurs due to the foreign material accumulated in filter, it may cause internal overheat and crash.

Articulated Robot Controller-RCA610 User Manual

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