

**ADTECH Robotics Drive System
ADT-RC400**

**User Manual
(Electrical Wiring)**

Information of manual

This manual is edited By ADTECH (SHENZHEN) TECHNOLOGY CO., LTD.

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ADTECH (SHENZHEN) TECHNOLOGY CO., LTD.

Range of manual

This is the first manual of QC400 drive robotic control system concluding full description, drive control for the initial users, to help users select reasonable motor type; followed this specification for drive control electrical wiring between the machine and the robot in detail.

Precautions

※Transport and storage

- Product package iteration of no more than six
- It is not available in the product box on the climb, stand or place heavy objects
- Cannot use drag the cables attached to the product or handling products
- No collision, scratching the Panel and display screen
- Product box should avoid wet, dry and the rain

※Opening inspection

- After opening the packaging please confirm whether you purchased the product
- Check whether the products in transit damage
- Control list identifies whether the part is complete, there is no damage
- Product model, lack accessory or transport damage, please contact with me

※Wiring

- To participate in connections and inspection personnel must have the appropriate skills for professionals
 - Products must be reliable earthling, grounding resistance should be less than 4 ohms; you cannot use the neutral (zero line) instead of ground
 - Wiring must be properly and firmly, so as not to lead to product failure or unexpected consequences
 - And surge absorption diode must be connected in accordance with the regulations are connected with, otherwise you will damage
 - Plug plugs or open the front of the chassis, you must cut off the power supply

※Maintenance

- ☞ Must cut off the power before repair or replacement of components
- ☞ Should check the fault when a short circuit or overload occurs,

troubleshooting before they can restart

- ☞ Cannot pass off frequently, if required to re-apply after a power failure, separated by at least 1 minute

※Others

- ☞ Do not open the Cabinet without permission,
- ☞ Long when not in use, please cut off the power.
- ☞ To pay special attention not to let dust, iron powder into the controllers.
- ☞ Output relay if the use of solid state relays shall be freewheeling diode in parallel in the relay coil. Check if the power supply meets the requirements, put an end to the controller is burnt out.
- ☞ Life of the controller temperature has much to do with the environment, if the processing temperature is too high, please install the cooling fan. Controller working ambient temperature range between 0 °C-60 °C.
- ☞ To avoid high temperatures, humidity, dust or corrosive gas environments.
- ☞ Shake strongly to add buffer rubber Rails.





※Maintenance

Under normal conditions of use (environment conditions: average 30 °C, load 80%, running 12 hours a day), please press the following items for routine checks and regular checks.


Daily Check	Daily	Recognition of environmental temperature, humidity, dust and foreign bodies <ul style="list-style-type: none"> ● There are no abnormal vibrations,
Period Check	1 year	<ul style="list-style-type: none"> ● Substantial part is loose or not ● Terminal block damage


Since the robot system is more complex, dangerous. The manual records and security-related precautions, please strictly observe transactions as recorded.


Safety Precautions and mark


Mark		Mark meaning
	Danger	Use wrongly, it will lead to a dangerous situation, causing serious injury or death
	note	Use wrongly, It will lead to a dangerous situation that may cause personal injury or damage to equipment which caused material damage.
	Ban	Absolutely unenforceable
	Forcibly	Must be implemented

■ **Danger**

Please do not use this system in the flammable and explosive environment.	
	Likely to cause injuries or fire.

Please follow the instructions drawings or wiring.	
	Prone to electrical shock and damage the motor.

In an energized state, do not arbitrarily pull the plug, in the operating state, do not touch the robot operation site.	
	Easy electric shock, causing personal injury.

Energized state, not for wiring, maintenance and other operations, be sure to power at least 5 minutes before proceeding.	
	Easy electric shock.

Please be sure to take a reliable grounding between the drive and the robot body.



When the fault occurs easily lead to electric shock, fire incident, easy to trigger errors.



Non professional personnel, please do not open the drive and control one machine shell, please do not use hand to touch the drive and control of internal components



Easy electric shock



In the case of power, do not touch the power plug of the integrated machine.



Easy electric shock.



Please do not damage, the weight of cable or cable suspended load



Easy electric shock



The energized state, do not plug the drive terminal machine control on



Easy electric shock and short circuit



Running state, do not pull out the terminal on the one machine



Easy electric shock and short circuit



■ Attention

Please pay attention to the drive and control of the motor and the heat of the peripheral equipment.



Easy to burn.

When a fault occurs, the power supply is cut off, the cause is identified and removed, and the low speed running equipment should be removed.



If there are adverse factors, easy to cause false action.

When using the controller and the robot body, it cannot exceed the scope of its specification.



Easily cause damage to the product.

When the robot is moved, it needs to be fixed with the attached fixed tool.



To prevent the lifting arm, due to accidents.

The installation, operation, maintenance and inspection before, be sure to read the instructions carefully, according to the operating instructions in step.



Easy electric shock, fire

Power supply voltage, power capacity must be specified by the company's specifications.




Improper use of equipment failure, easy to cause a fire.


Please correct use of the correct control of each other to drive one machine and robot.





Prone to failure


Should be regularly on the implementation of the robotics drive system maintenance and


inspection operations.	
	Neglect of maintenance and inspection is an important cause of equipment failure and accidents.

Please do not put heavy objects on the product.	
	Easily cause damage








Please correct the wiring in the instruction manual.	
	The wrong wiring way is easy to cause the robot or the drive control one machine damage or cause a fire.



When an exception occurs, please stop.	
	Easy electric shock, personal injury, fire

Need to repair, please contact our company, please do not disassemble.	
	Easy cause trouble.


Do not impact	
	Easy cause trouble


■ Ban


In the course of the robot's movement, no person is allowed to stand in the robot action area.	
	There will be a major injury accident.
Equipment to prevent the movement of the robot in the workplace.	
	When the device is abnormal, it is easy to cause damage.
The emergency stop switch on the handheld display device is prohibited.	
	Robots in an accident or is not running properly, you need an emergency stop switch, stop operation of the equipment.
There is no correct operation of the prohibition on the instruction manual.	
	Incorrect operation will bring about the incorrect operation of the equipment.
Other personnel outside the operating personnel to close to the equipment	
	Touching the dangerous area can cause the injury or the major accident.
When an accident, to cut off the power supply, clear reasons.	
	When there are bad reasons, the robot may have a wrong action, causing adverse consequences.
Users are prohibited to carry out parts of the exchange and transformation.	
	Will reduce the system performance and may malfunction


Please do not remove the cleaning.	
	Easy to cause fire, easy to get electric shock.
Please don't make the product stored in the leaks, water, and other harmful gases in the environment.	
	Prone to failure


 **Forced**


Please keep the sun out of the sun.	
	Easy cause trouble

Please use the specified range.	
	Easily cause burn, failure

Equipment protection cover must be shut off during operation.	
	Open the protective cover will have electric shock, the disabled.

Operator to go through the full training.	
	Incorrect operation will cause the device to malfunction, resulting in disability or major disaster.

If the robot is not in accordance with the specified direction of action, press the emergency stop, stop the equipment operation.	
	Accidents and failures.

Power cord must be used with the specified wire.	
	Prone to fire and failure.

■ Safety regulations

- Before starting the run, we need to know all the tasks of robot in accordance with the program to be executed;
- Robots run in automatic mode, personnel are not allowed to enter any of its movement reach areas;
- When the need for programming, testing and maintenance work, the robot shall be placed under manual mode;
- When debugging personnel enter the robot work area, he shall carry a teach pendant, to prevent others from malfunction;
- When the robot does not work for a long time, the fixture should not place items; it shall be empty machine;
- After a power outage, the main power on the robot should shut down timely, and remove the clamp on the work piece.

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1. System Introduction and Overview of functions

1.1 System components

Drive machine control system mainly consists of the following three parts:

- 1) QC400 drive control system.
- 2) Handheld Flex Pendant
- 3) Connecting Cables

1.1.1 Robotics Drive System instructions

Figure shows the schematic side drive control system machine. The system machine integrated CPU (ARM9 + DSP + FPGA) control module, high-performance servo drive module, I / O module, display module, communication module as a whole.

Interface include: motor power cable, encoder cable, IO lines, and power lines and so on.



1-1 QC400 schematic side

1—Motor power cable, encoder cable, IO line interface

2—Handheld Flex Pendant connector

3—IO board interface

4—Power Line Interface

1.1.2 Flex Pendant Description

Figure shows the schematic view of the front of the handheld box.



1-2 Handheld box front schematic

Rear view of handheld Flex Pendant:



1-3 Rear view of handheld Flex Pendant

Teach operation interface display:



1-4 the user interface display

The Flex Pendant display interface as shown above, according to the actual needs of customers, the robot parameters are set, the teaching pendant specific details are set up and use the "Teach Operation Manual."

1.2 Feature Overview

1.2.1 Technical parameters

Table 1-1 Drive control integrated machine technical parameters

model		ADT-QC400	
Handheld FlexPendant	screen		color display with a resolution of 800 * 600
	programming language		G-code
	Teach mode		Manual Teach
	Size/weight		355mm*248mm*70mm/2KG
Drive control System QC400	Drive control function	control axes	4 axis
		support motor type	supports all-digital AC servo (Sanyo, Panasonic, Tamagawa, Adtech other brands motors)
		Position detection method	detection encoder (incremental / absolute)
		power	single-axis power below 1.2KW, four-axis total power below 3KW
	External input	standard IO	34 road (with optocoupler isolation)
	External output	standard IO	27 Road (6 relays, 21 Road NPN open collector)
	motion control function		circular interpolation, continuous path, the trajectory to follow, all kinds of acceleration and deceleration, etc.
	Coordinate system		joint coordinate system, world coordinate system, the tool coordinate system, User Coordinate System
	Cartesian coordinate		Cartesian coordinate display mode, the joint

	display mode	coordinate
	External communication	RS-232: 2CH (9 pin)、Ethernet: 1CH (100Mbps/10Mbps) USB2.0: 2CH
	Dimensions / Weight	length (including aviation head) 517mm * Width 160mm * high 273mm / 20KG
	Power	Single-phase within AC200V~230V, 50Hz

1.2.2 Product Configuration

Table 1-2 Product Configuration

name	instructions	Qty
QC400	host controller	1 set
Plug	the host power supply plug	1 pcs
USB	USB download cable	1 pcs
serial line	9 female-female serial line	1 pcs
Connecting cable	Cable host and motor, encoder cable	1 pcs
input connecting cable	Input Wiring 37-pin host input port junction	1 pcs
input board	I/O input board	1 piece
output connecting cable	Output Wiring 25-pin output port junction a host	1 pcs
output board	I/O output board	1 piece
RPB06	handheld FlexPendant	1 set

1.2.3 Basic Specifications

Table 1-3 Basic Specifications

Climatic conditions		
temperature	Working	temperature
	Storage and transportation	
Relative humidity	Working	Relative humidity
	Storage and transportation	
Atmospheric pressure		86Kpa~106Kpa

1.2.4 System function

4-axis SCARA robot controller, the hardware part: use innovative motion control system and servo drive system integration design technology to achieve servo drives, the real closed loop control between the controls. The software part, the use of advanced 3D spatial arcs, NURBS interpolation algorithm technology, servo vibration suppression technology, processing speed automatic optimization technology, G-code compatible robot, PLC (IEC61131-3) programming secondary development environment to meet each SCARA robot class applications.

2. External wiring

2.1 System Configuration

Before using the drive control integrated machine, you need to complete the system wiring, wiring distributed as follows:



Figure 2-1 System Configuration

Four-axis horizontal articulated robot plan as follows:

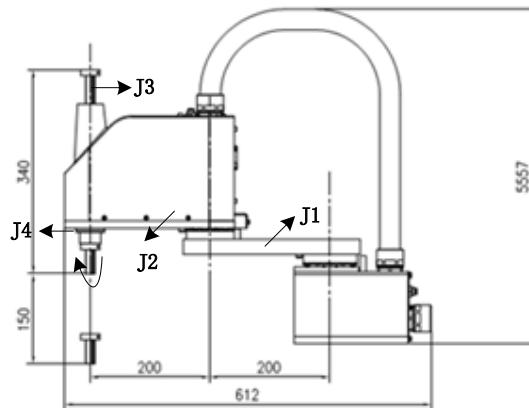


Figure 2-2 horizontal axis robot plan

Industrial robot axes are defined as follows: for the J1 axis arm, the arm of J2 axis, the vertical axis J3 axis, J4 axis rotation axis.

2.2 Product description of each part

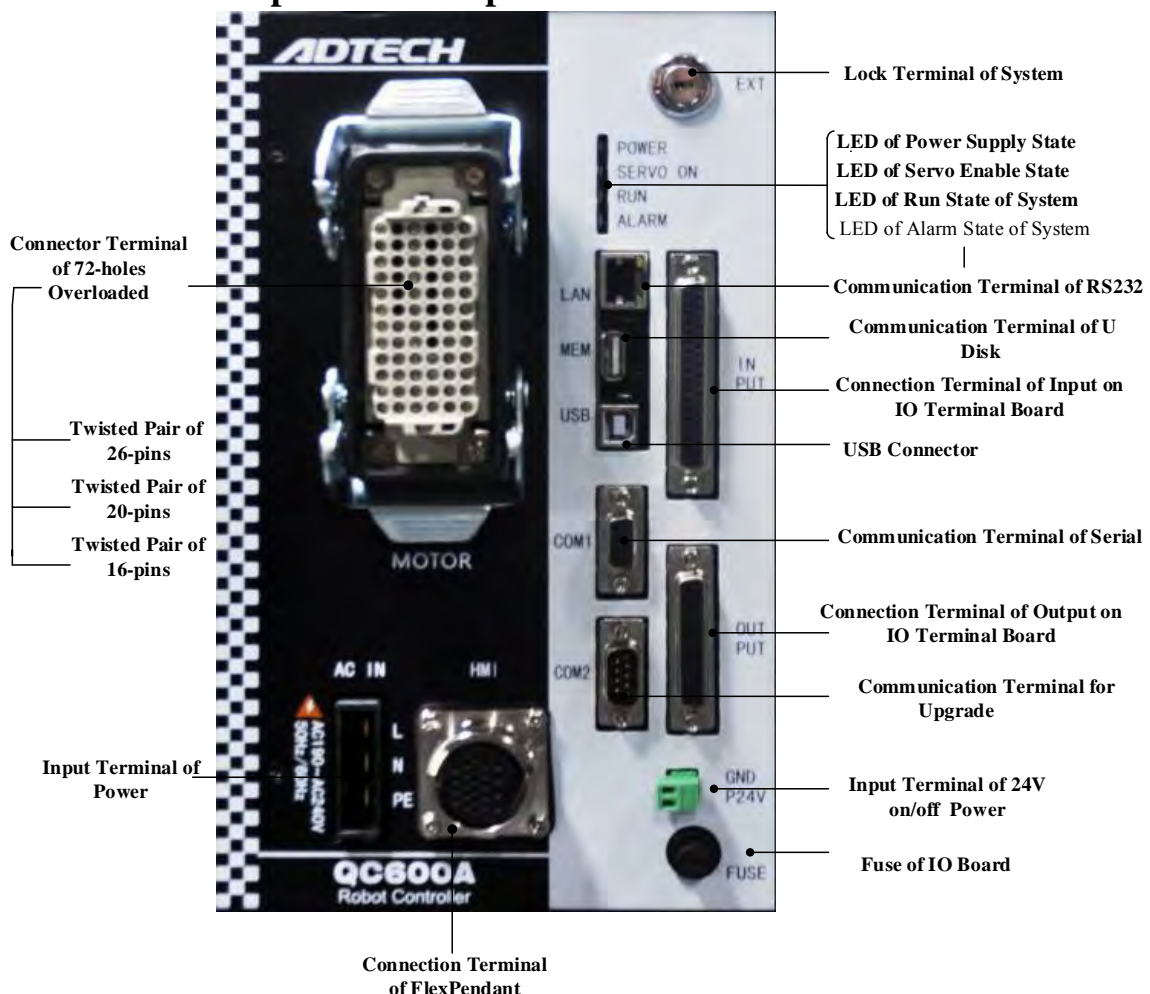


Figure 2-3 illustrates the drive control one Terminal

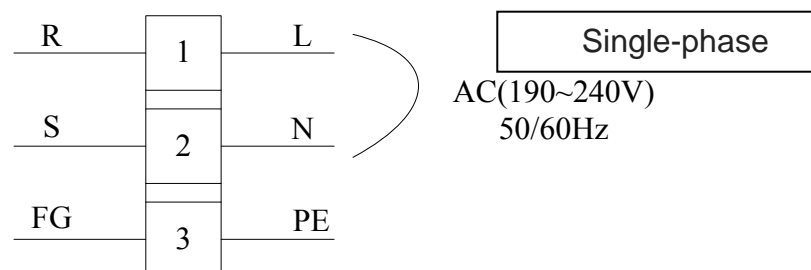
There are many interfaces on QC robot driver system. Every port name and function is showed in the following table

Table 2-1 Port list of robot driver system

Port remark	Name	Function description
MOTOR	72 Pin heavy load connector	Connect servo and I/O
AC IN	190~240VAC power supply	Power supply terminal
HM1	24 wire aviation plug	Teaching pendent connect terminal
EXT	Double stall switch	System lock terminal
POWER	LED indicator light	Indicate Host power status
SERVO ON	LED indicator light	Indicate servo enable status
RUN	LED indicator light	Indicate system running status
ALARM	LED indicator light	Indicate system alarm status
LAN	Ethernet port	Internet communication
MEM	USB2.0 ports	U-disk communication
USB	USB1.1 ports	USB communication
COM1	RS232 ports	Series ports communication
COM2	RS232ports	Series ports communication
INPUT	Input port	IO wire boards terminal
OUTPUT	Output port	IO wire boards terminal
GND	24V Power ground	Out power supply ground
P24	24V Power positive	Out power supply positive
FUSE	Fuse	IO boards 24V fuse

3. Power cord connect

Robot driver system power cord terminal (AC IN) connect is showing as follow picture



Picture 3-1 Power terminal diagram

Terminal spec.: 3 bit, single floor, female, distance of terminal 10.16mm, Black two sides with lock, Total height 29mm, Power cord specification: 3 wire, 200mm, 2.5mm

I/O board should supply additional 24V power. Connect as follow diagram

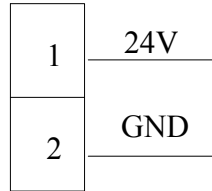


Diagram 3-2 Switching power supply diagram

Table 3-1 switching power supply definition

No. of connector	Signal	Function
1	24V	24V Power
2	GND	Ground

Notice:

After supply 24V to IO boards. There are many digital inputs and output in 16 wire IO boards can be use 24V to customer

4. MOTOR Wiring terminals

4.1 MOTOR Terminal arrangement

Motor port is female 72 hole heavy load connector. The terminal is definition as following diagram

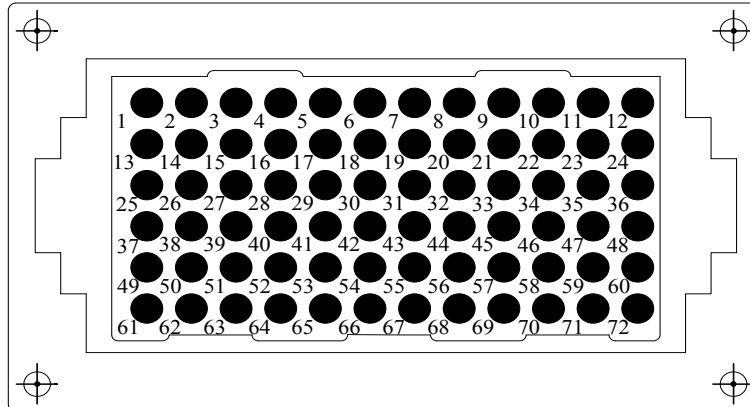


Diagram 4-1 Heavy load connector definition

4.2 MOTOR Terminal Signal Description

Table 4-1 Heavy load connector instruction

72Pin Heavy load connector pin item	Signal instruction
1/4/7/10/13/16	Motor 1/2/3/4/5/6 Power terminal U phase input
2/5/8/11/14/17	Motor 1/2/3/4/5/6 Power terminal V phase input
3/6/9/12/15/18	Motor 1/2/3/4/5/6 Power terminal W phase input
19/20/21/22/23/24	Space
25/26/27/28/29/30	IO Signal input
31/32	Relay 1, Relay 2
33/34/35/36	IO Signal output
37/38	Relay 3, Relay 4
39	Inner 24V power
40	24V _GND
41/42/43/44/45/46/47/48	Space
49/50/57/58/65/66	Motor 1/2/3/4/5/6 Encoder ground pin GND
55/56/63/64/71/72	Motor1/2/3/4/5/6 Encoder ground pin 5V
53/54/61/62/69/70	Motor1/2/3/4/5/6 Encoder signal negative PS1-/ PS2-/ PS3-/ PS4-/ PS5-/ PS6-
51/52/59/60/67/68	Motor 1/2/3/4/5/6 Encoder signal positive PS1+/ PS2+/ PS3+/ PS4+/ PS5+/PS6+

For user connect simply, QC400 factory. With 72 pin male connector, male connector to cable,

User just connect cable terminal to motor's encoder wire, power wire, I/O port. Cable contain

3 pcs including 26 twisted pair, 20 twisted pair, 16 twisted pair

26 Twisted pair——Motor encoder (4 set motor encoder terminal)

20 Twisted pair——Motor U,V,W power (4 pcs motor power terminal)

16 Twisted pair——Input and output signal wire (6 channel input+4 channel output+4channel relay)

4.2.1 26 Encoder definition

Table 4-2 26 twisted pair definition

PCBA	Definition	72 Pin Heavy load connector item	26 wire shield twisted pair (wire color)
Motor 1	GND	49	Gray red
	5V	55	Gray black
	PS1-	53	White red
	PS1+	51	White black
Motor 2	GND	50	Orange red
	5V	56	Orange black
	PS2-	54	Pink red
	PS2+	52	Pink black
Motor 3	GND	57	Yellow red
	5V	63	Yellow black
	PS3-	61	Gray red red
	PS3+	59	Gray black black
Motor 4	GND	58	White red red
	5V	64	White black black
	PS4-	62	Orange red red
	PS4+	60	Orange black black
Motor5	GND	65	Pink red red
	5V	71	Pink black black
	PS5-	69	Yellow red red
	PS5+	67	Yellow black black
Motor 6	GND	66	Gray red red red
	5V	72	Gray black black black
	PS6-	70	White red red red
	PS6+	68	White black black black
Housing			Shield

4.2.2 20 wire power definition

20 wire twisted pair definition is power cable, Definition is as following

Table 4-3 20 wire twisted pair definition

PCBA	Definition	72 Pin Heavy load connector item	20 wire shield twisted pair (wire No.)
Motor 1	U	1	1
	V	2	2
	W	3	3
Motor 2	U	4	4
	V	5	5
	W	6	6
Motor 3	U	7	7
	V	8	8
	W	9	9
Motor 4	U	10	10
	V	11	11
	W	12	12
Motor5	U	13	13
	V	14	14
	W	15	15
Motor 6	U	16	16
	V	17	17
	W	18	18
Shield		Housing	Yellow green

4.2.3 16 core IO line definition

Driver-controller integration in addition to the digital input/output pin end defines multiple input and output, the overloading jilt terminal also defines a certain number of input and output, while the number of the input and output port enough, users do not need the back of the port:

Chart 4-4 16 Core twisted-pair definition

Definition	72PinReloading the connector terminal number	16core shielded twisted-pair (line)
IN28	25	Red gray
IN29	26	gray black
IN30	27	white red
IN31	28	White black
IN32	29	orange red
IN33	30	orange black
Relay1 (Relay23)	31	pink
Relay2 (Relay24)	32	Powder black
OUT19	33	yellow red
OUT20	34	yellow black
OUT21	35	Gray red red
OUT22	36	Gray black black
Relay3 (Relay25)	37	White red red
Relay4 (Relay26)	38	White black black
Interior24V Power	39	Orange red red
GND	40	Orange black black

16 core IO cable end four road relay output, in practical use, the robot motor is often used with the brakes, the relay switch state to open or close the motor brake.

The brake specific instance "wiring" connection mode can be reference.

4.3 Connection instance

Driver-controller integration support of motor encoder types are: panasonic, sichuan, ADTECH, all the more for such as many motor. Wiring for the convenience of customers, enumerated several motor type and its connection mode, provide the reference for the user.

4.3.1 Panasonic motor wiring instance

1) Panasonic 17 absolute encoder wiring

17 Bits Absolute Motor of Panasonic

Definition of Encoder Wire

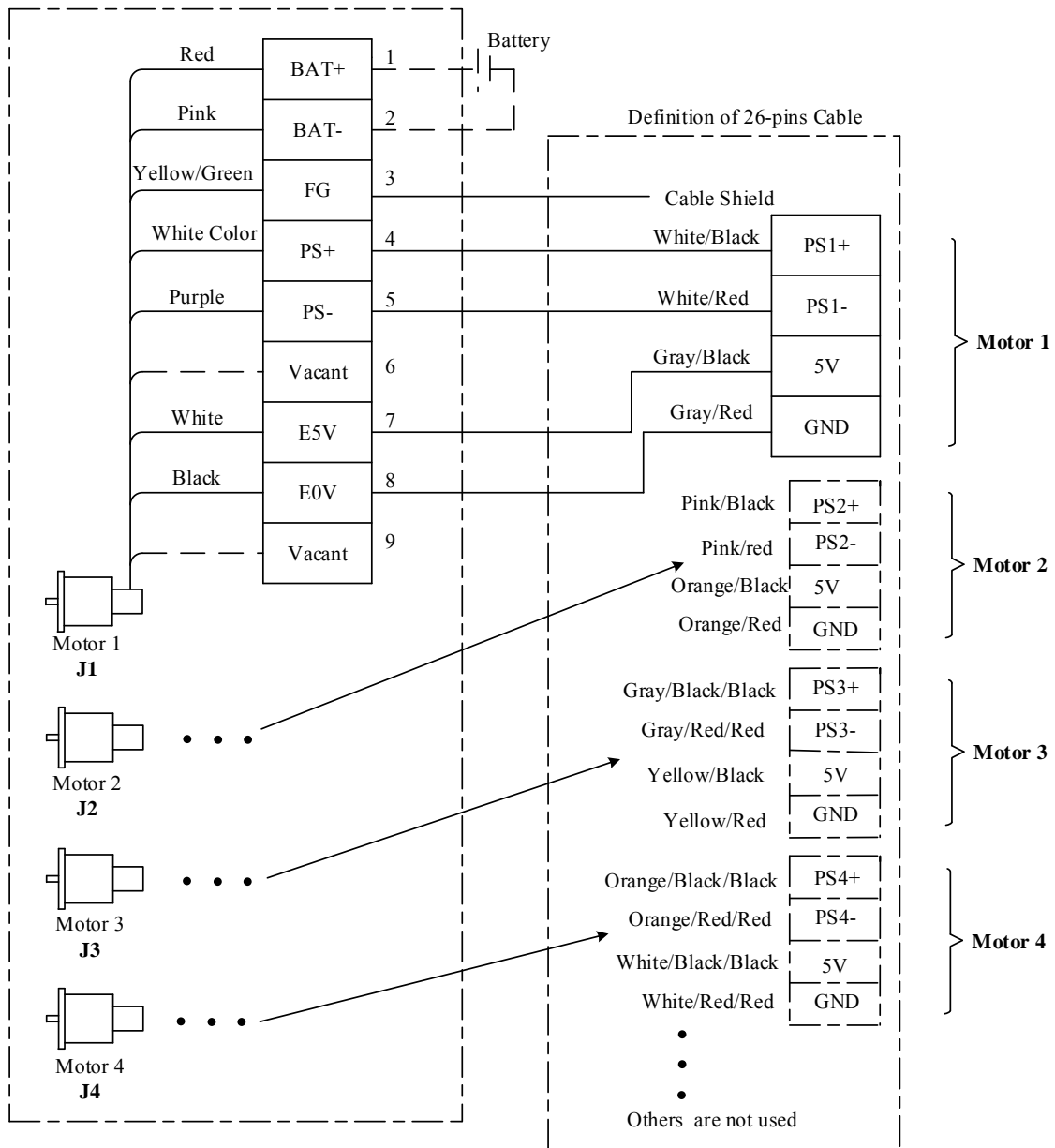


Chart 4-2 Panasonic motor encoder terminal connection

2) Panasonic motor power line connection

17 Bits Absolute Motor of Panasonic

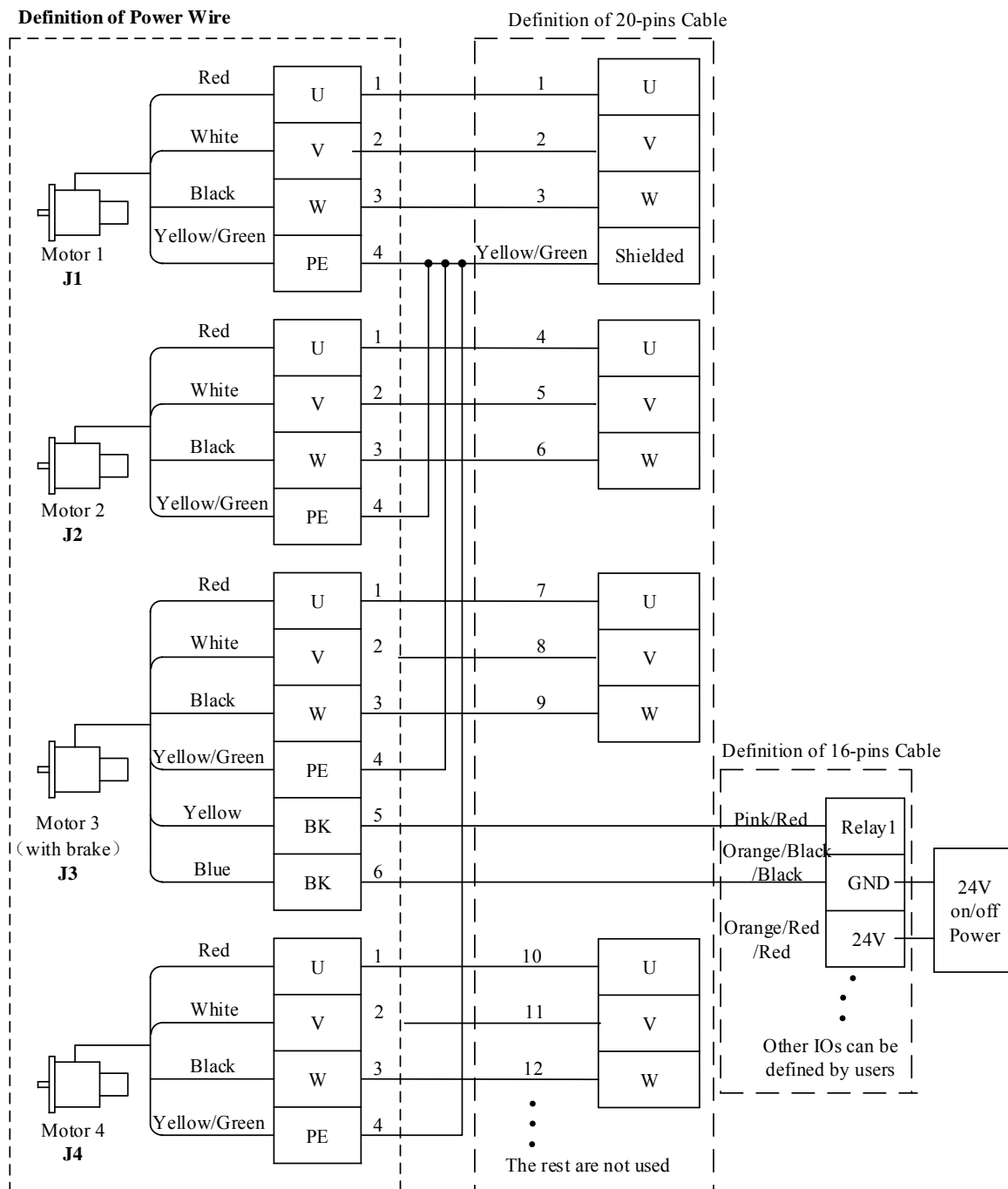


Chart 4-3 Panasonic motor power line side connection

Remark:

Panasonic and QC400 servo motor encoder count procedures defined in the way of counting, UV line number 26 pin cable end connection mode in contrast to the conventional way.

3) Panasonic motor brake line wiring

Due to the actual use of the robot has one or more shaft need with the brakes. And the brakes on and off through the relay of IO board open and close. Concrete implementation way is as follows:

(1) Brake wiring;

(2) IO board 24 v power supply, the specific reference "3 connect the power cord -" connection mode.

17 Bits Absolute Motor of Panasonic

Definition of Brake

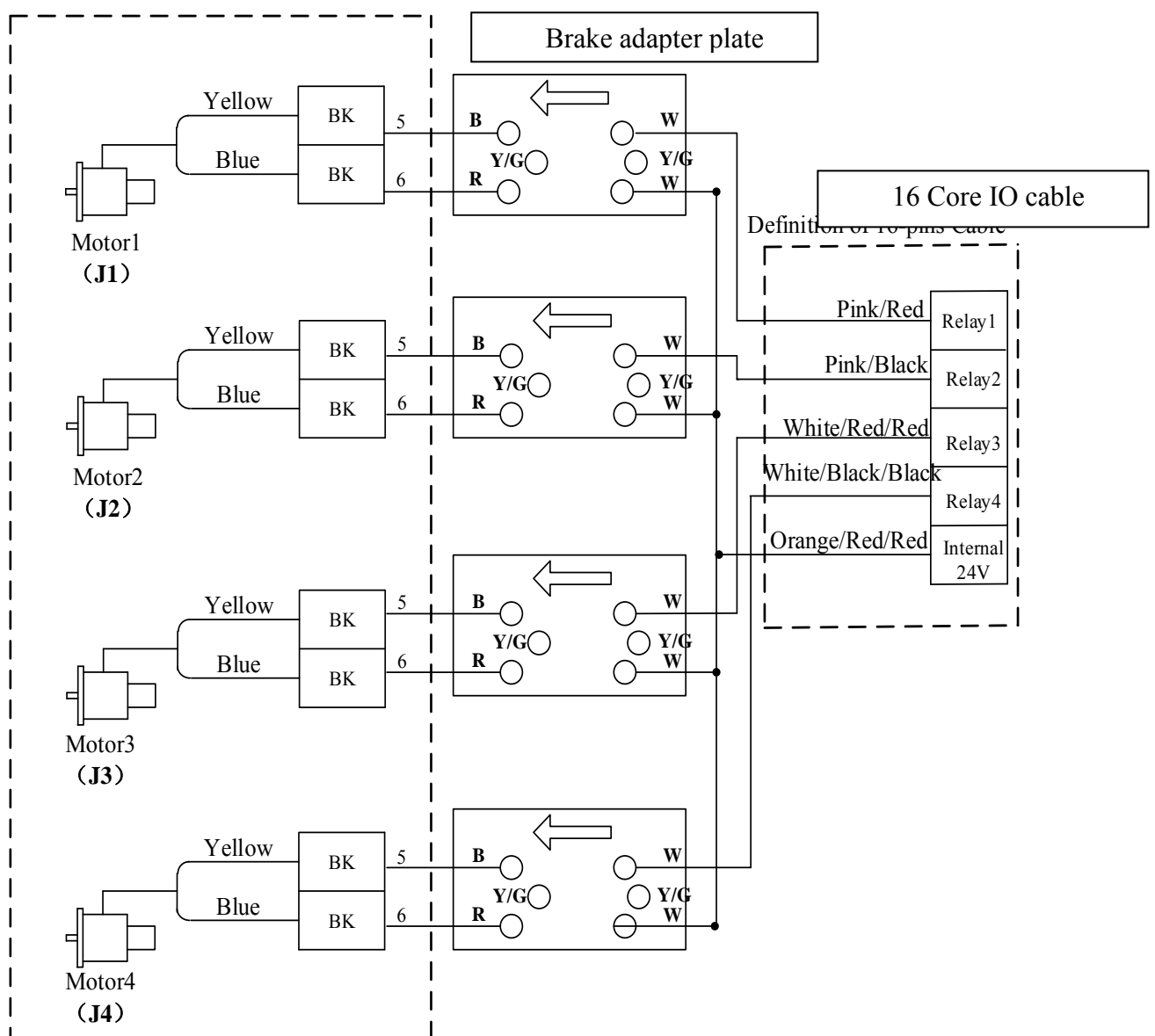


Chart 4-4 Panasonic motor brake end connection

Practice, must be completed according to the main brake end connection, if there is only one axis with the brakes, pick up the shaft brake. Wiring is completed; with the brake port configuration method in teaching device please refer to the "operating manual.

4.3.2 Tamagawa motor wiring instance

1) Tamagawa motor encoder line wiring

17-bits Absolute Motor of TAMAGAWA

Definition of encoder

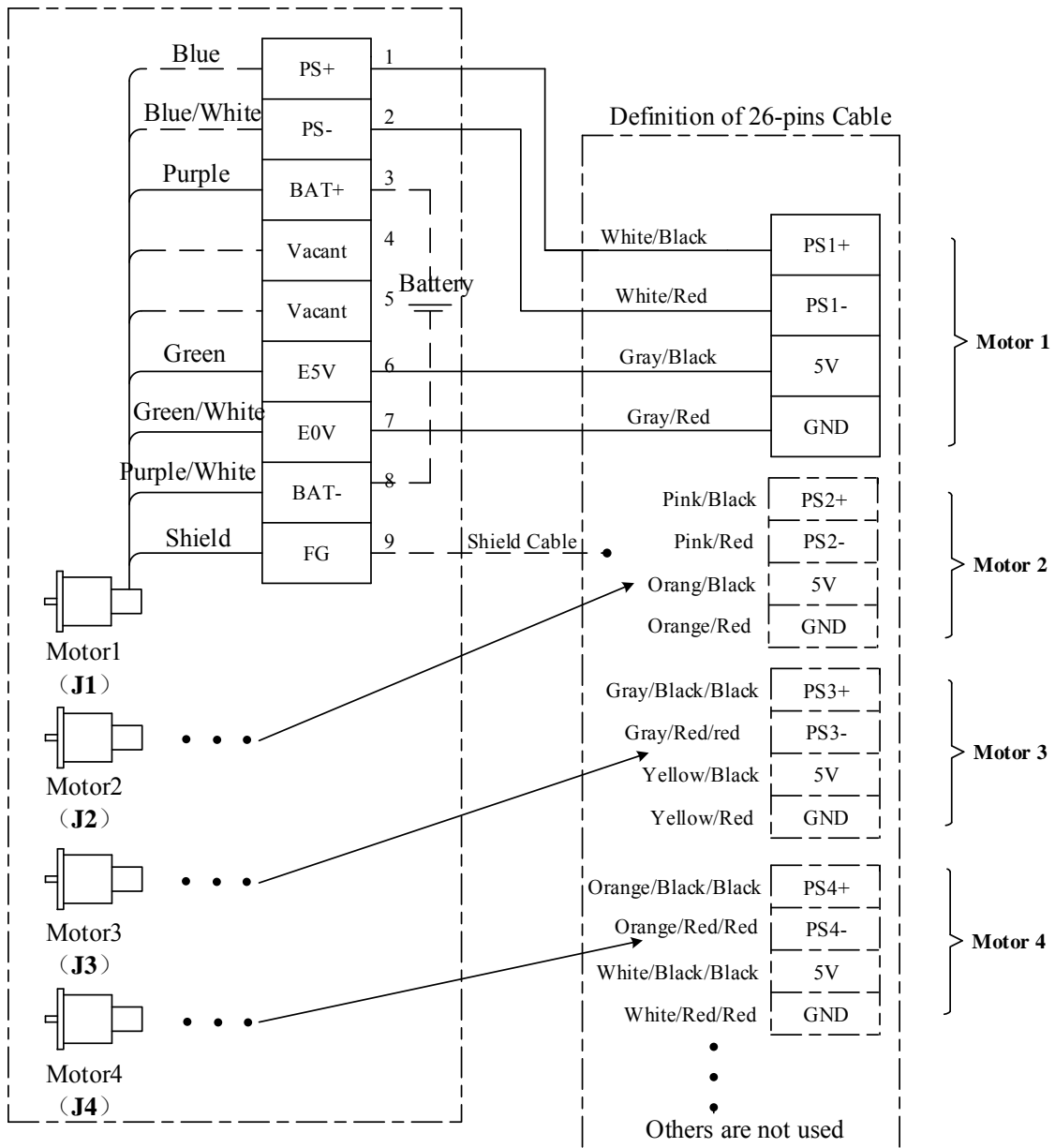


Figure 4-5 Tamagawa motor encoder line wiring

2) Tamagawa motor power line wiring

17-bits Absolute Motor of TAMAGAWA

Definition of encoder

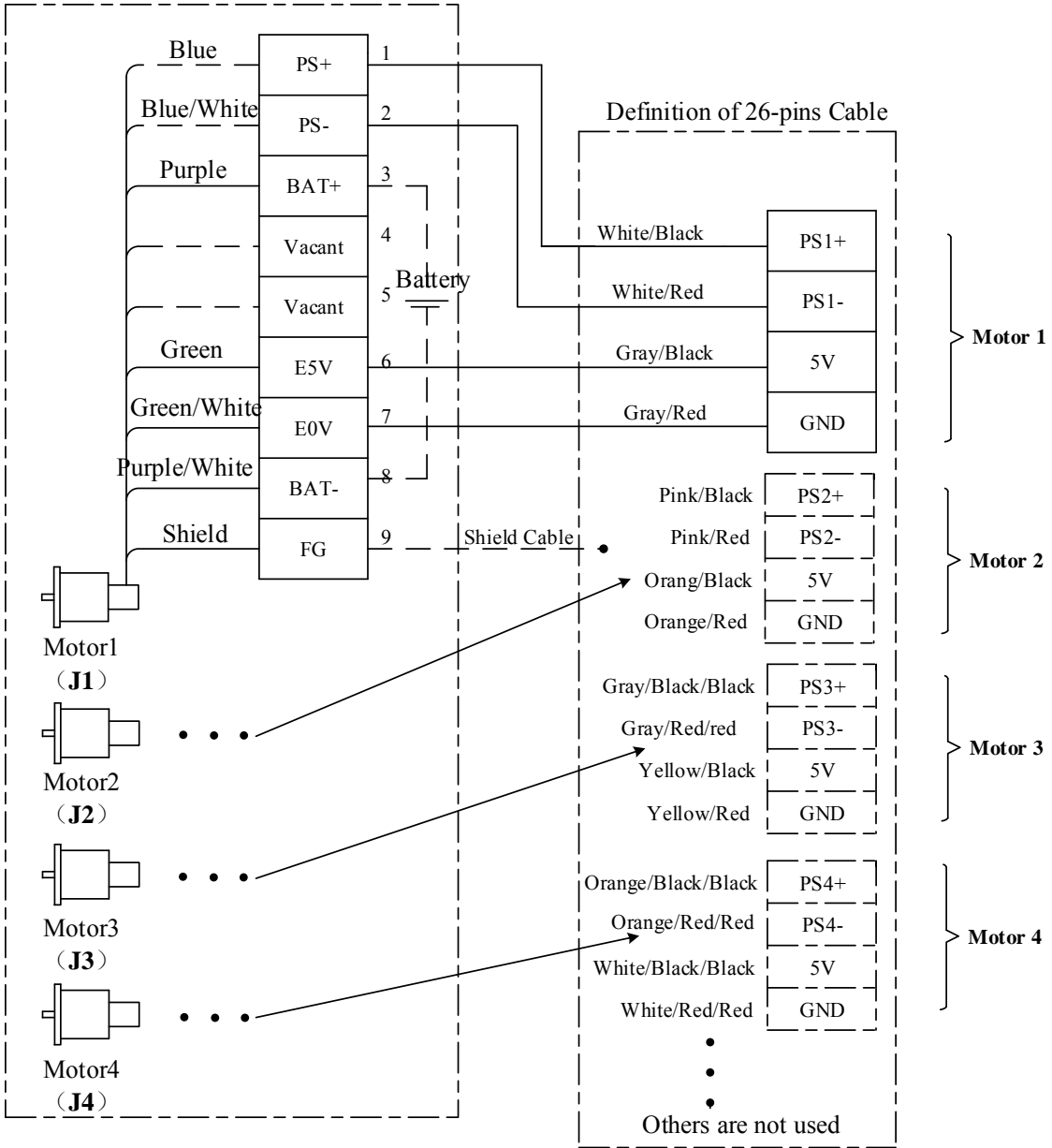


Figure 4-6 Tamagawa motor power line wiring

3) Tamagawa motor brake line wiring

Tamagawa motor brake line wiring and Matsushita Electric brake line wiring is similar. Specific implementation is as follows:

(1) brake wiring;

(2) IO board 24V power supply, specific wiring refer to "3- power cable."

17-bits Absolute Motor of TAMAGAWA

Definition of Brake

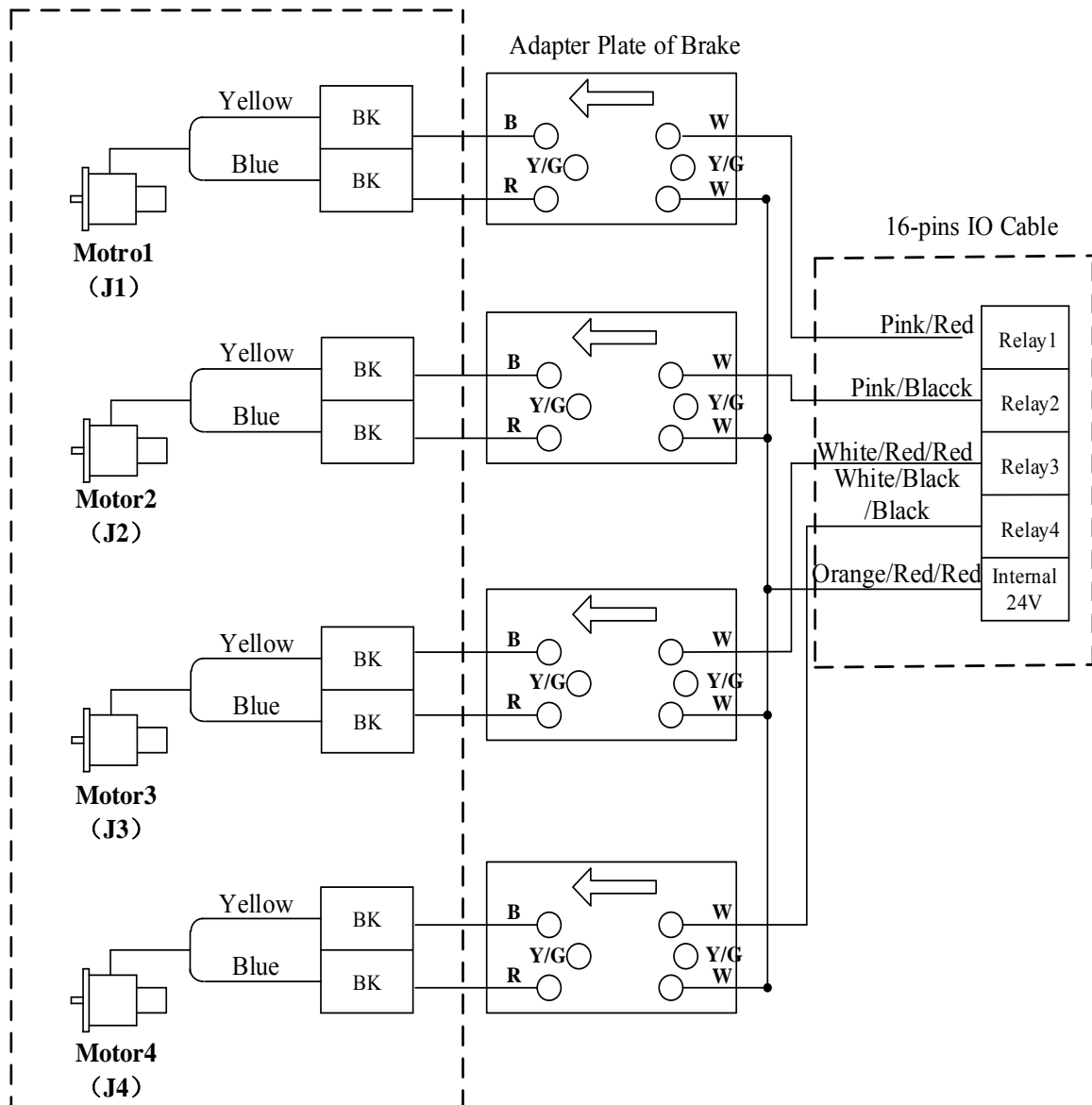


Figure 4-7 Tamagawa motor brake side wiring

Practical application, the need to complete the brakes according to the terminal of the robot body. If only one axis with the brakes, then brake to the shaft. After wiring is complete, the handheld FlexPendant in brake port configuration please refer to "teach Operation Manual."

4.3.3 Sanyo Electric Wiring example

1) Sanyo 17 absolute encoder wiring

17-bits Absolute motor of SANYO

Definition of Encoder

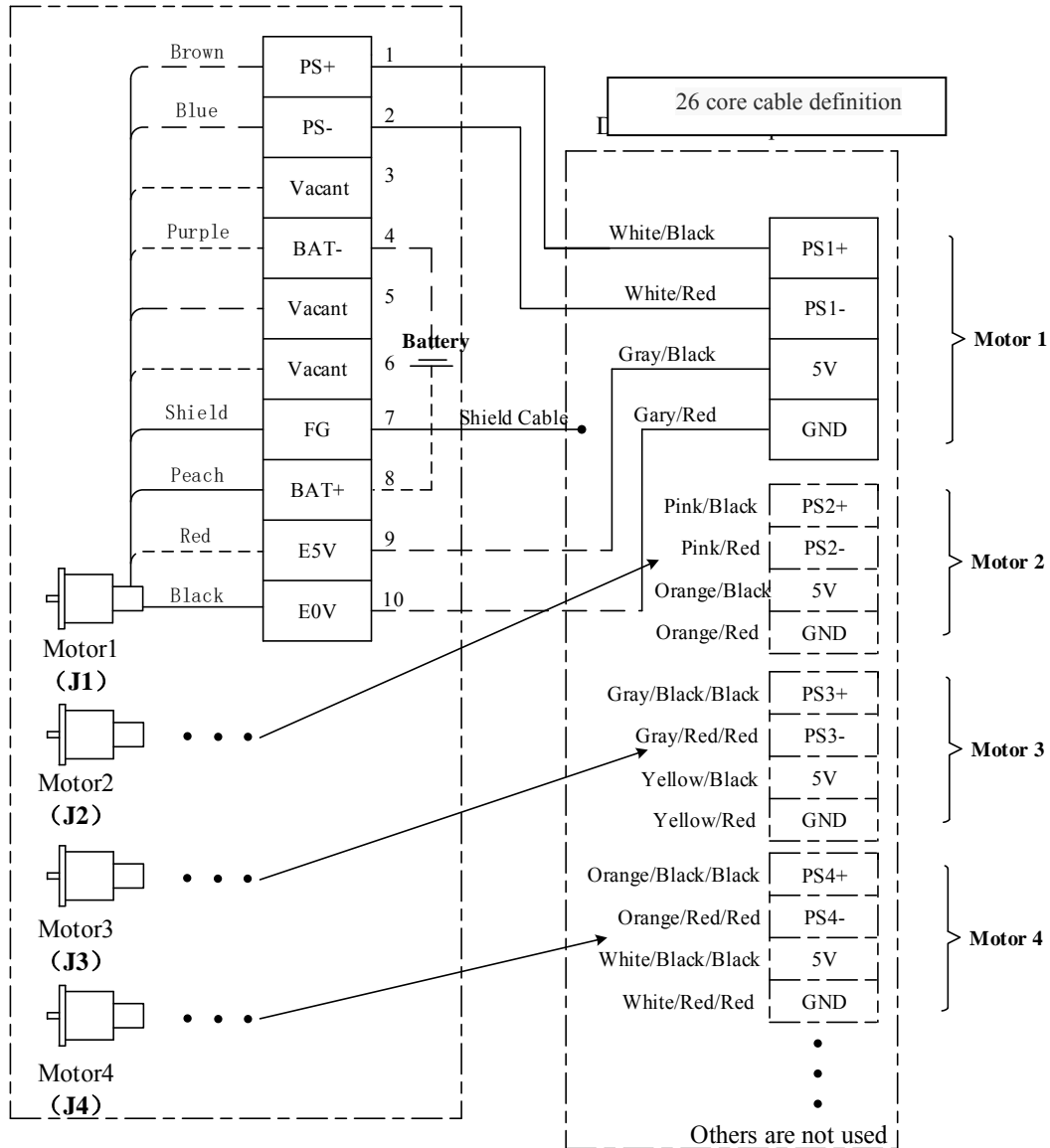


Figure 4-8 Sanyo Electric encoder wiring terminals

2) Sanyo Electric power line wiring

17-bits Absolute motor of SANYO

Definition of Encoder

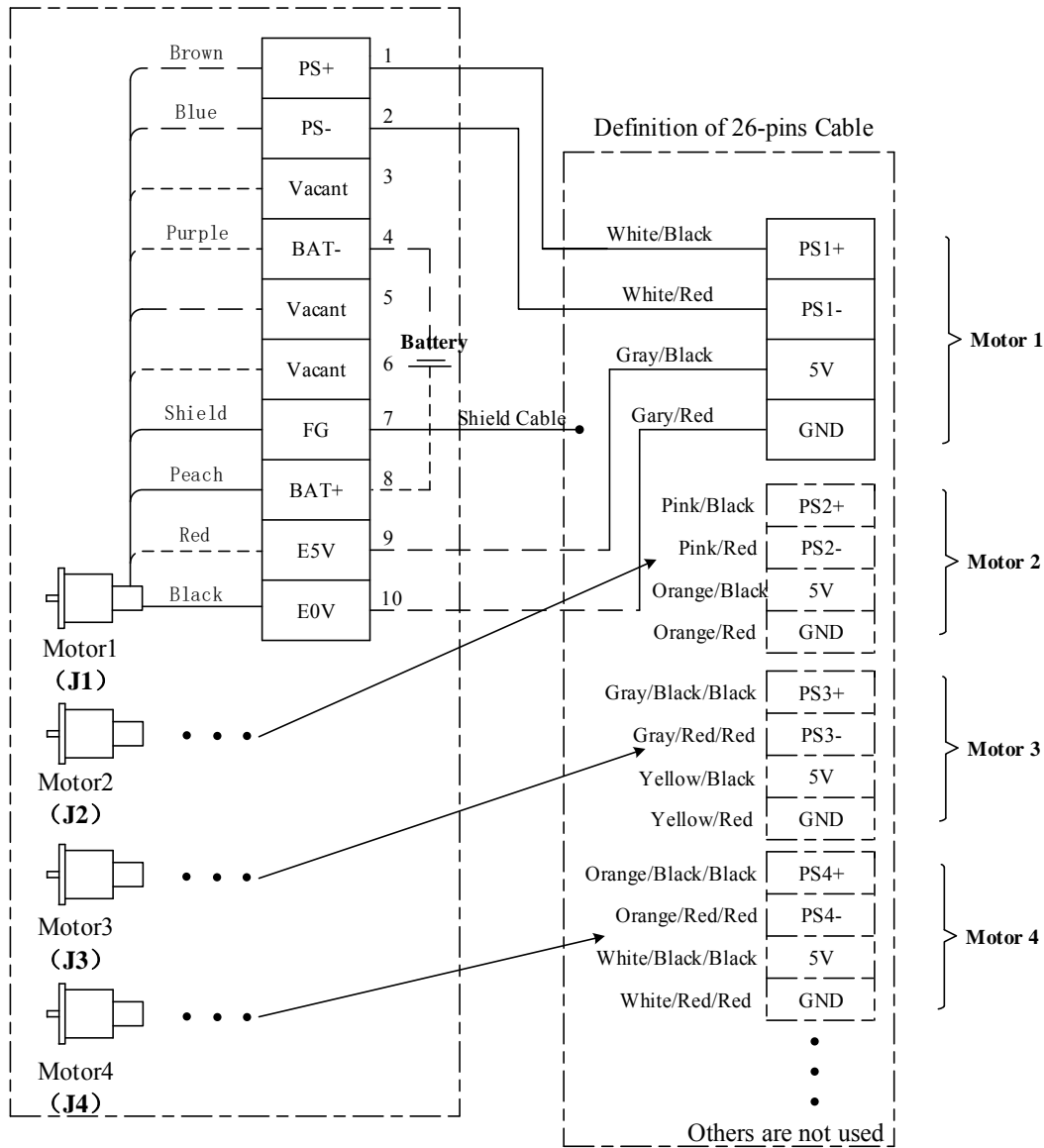


Figure 4-9 Sanyo Electric power line side wiring

note:

Motor-side encoder cable, power cable terminal color definitions for reference only, actual colors and line number with manufacturers to provide prevail; power lines cannot be connected to the end of the shielded cable with the encoder shielded wire to wire ends together; the motor brake via 16pin cable Relay terminal control line can also be controlled through the relay output terminal board.

3) Sanyo Electric Brake line connection

Sanyo Electric Brake wire connection method similar to Matsushita Electric brake line wiring. Specific implementation is as follows:

- (1) brake wiring;
- (2) IO board 24V power supply, specific wiring refer to "3- power cable."

17-bits Absolute Motor of SANYO

Definition of Brake

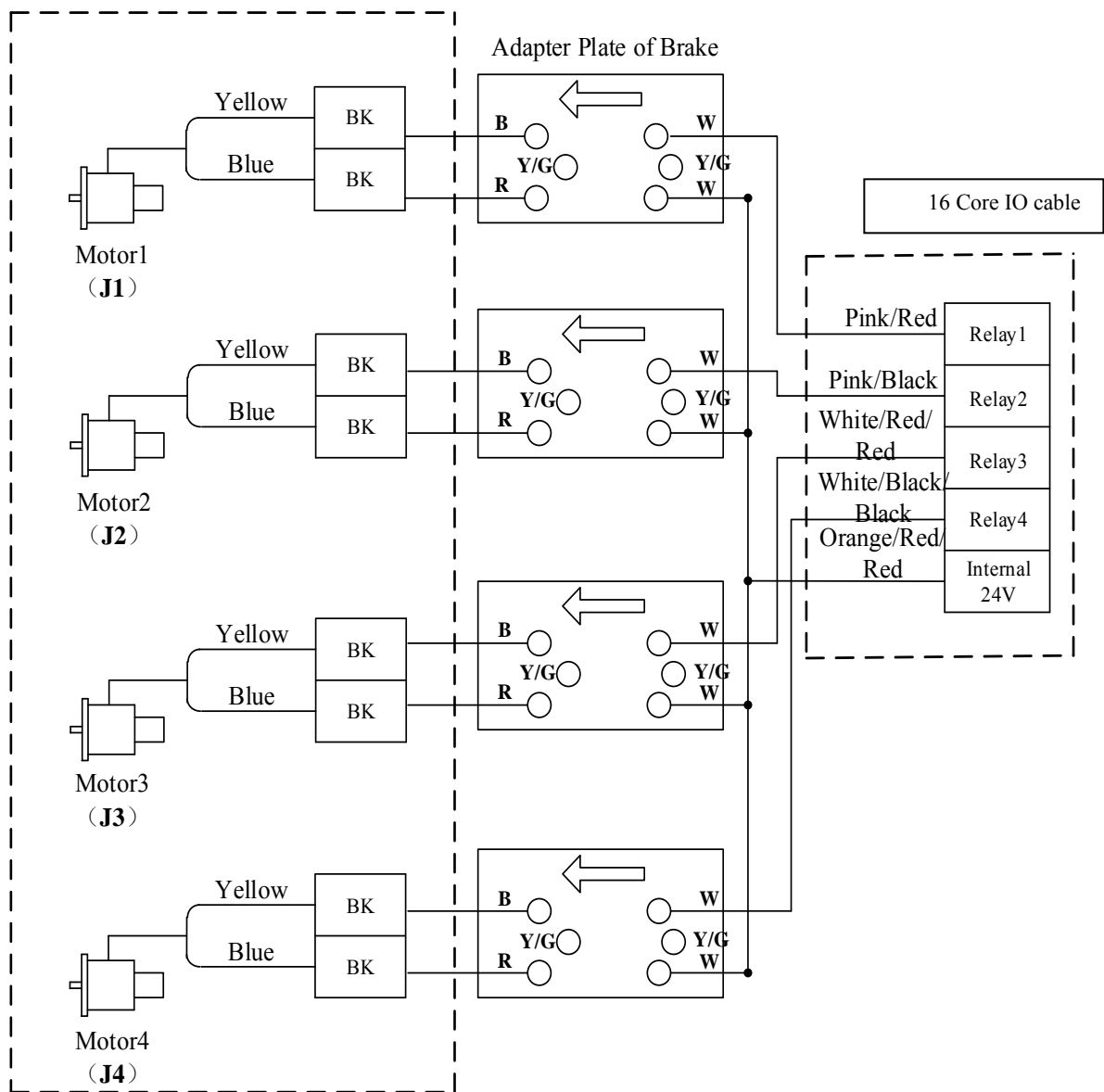


Figure 4-10 Sanyo Electric Brake side wiring

Practical application, the need to complete the brakes according to the terminal of the robot body, if only one axis with the brakes, then brake to the shaft. After wiring is complete, the

handheld FlexPendant in brake port configuration please refer to "teach Operation Manual."

5. Digital input and output interfaces

5.1 digital inputs

QC400 contains an extended wiring board, the board is powered by an external 24V power supply independent, has 34 Road and 27 Road ordinary general input output (with 6 relay outputs), input active level can be determined according to the common terminal of the high voltage configuration or active-low level, the output is open-drain output.

5.1.1 Input interface definition and pin functions

INPUTCOM-- input common: an external 24V or 12V power supply.

Digital input interface uses a 37-pin and 20-pin socket DB head, contains the power and common wire port.

Digital input port pin arrangement as shown:

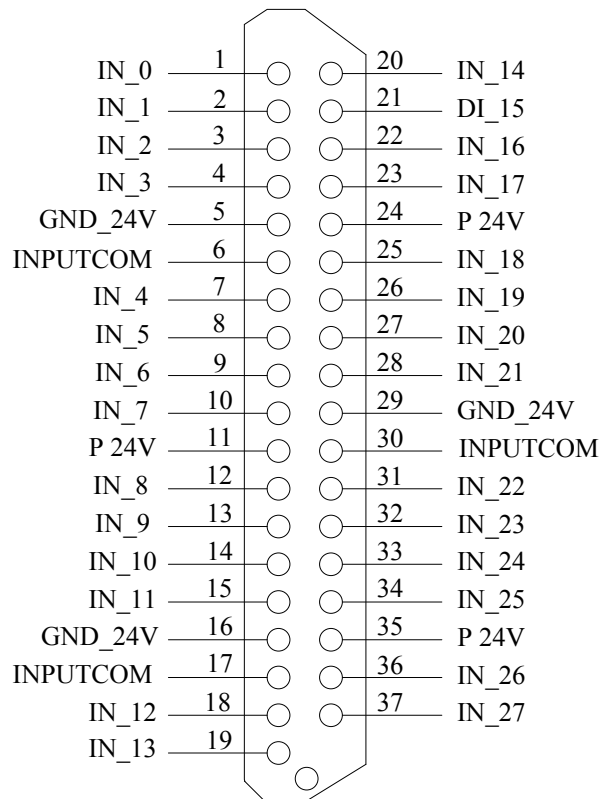


Figure 5-1 digital input ports

Note:

Input board contains three INPUTCOM inputs, customers only need to provide either a common power input terminal can be used for all boards.

Definition of each input port pin function as follows:

Table 5-1 digital input ports are defined

Pin	Interface Definition	Features	Pin	Interface Definition	Features
1	IN0	input port	2	IN1	ordinary general input port
3	IN2	input port	4	IN3	ordinary general input port
5	GND_24V	24V power supply	6	INPUTCOM	input common, then supplied external or internal power supply (24V +)
7	IN4	common input port	8	IN5	general input port
9	IN6	general input port	10	IN7	common input port
11	P24V	internal 24V power supply	12	IN8	general input port
13	IN9	general input port	14	IN10	general input port
15	IN11	general input port	16	GND_24V	24V power ground
17	INPUTCOM	input common terminal, connected to an external or internal power supply provided (24V +)	18	IN12	general input port
19	IN13	general input port	20	IN14	general input port
21	IN15	general input port	22	IN16	general input port
23	IN17	general input port	24	P24V	internal 24V power supply
25	IN18	general input port	26	IN19	general input port
27	IN20	general input port	28	IN21	general input port
29	GND_24V	24V power supply	30	INPUTCOM	input common, then supplied external or internal power supply (24V +)
31	IN22	general input port	32	IN23	general input port
33	IN24	general input port	34	IN25	general input port
35	P24V	internal 24V power supply	36	IN26	general input port
37	IN27	general input port			

5.1.2 Digital input schematic diagram

Digital input brief internal circuit:

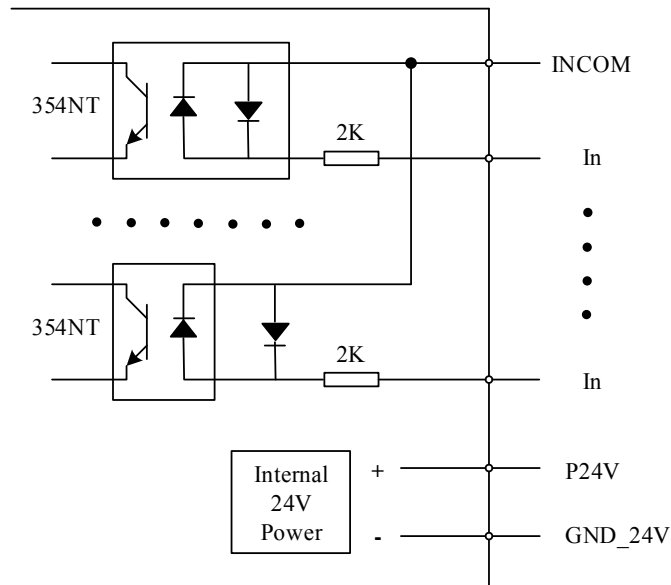


Figure 5-2 Digital Input Internal Circuit

Proximity switches, photoelectric switch wiring diagram is as follows:

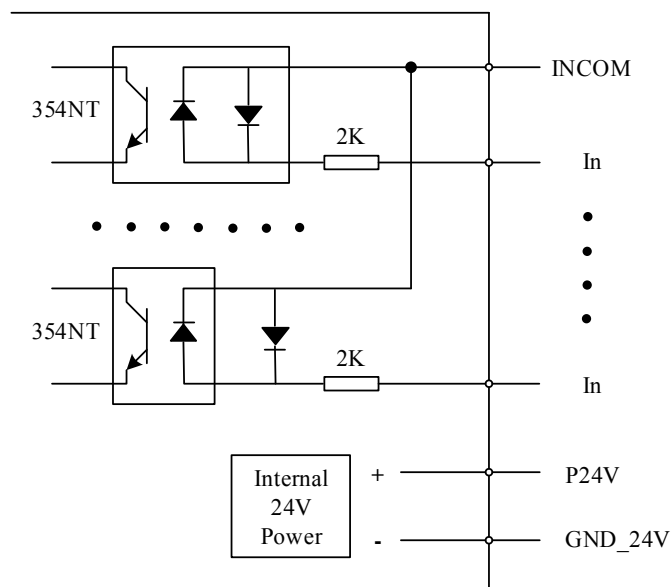


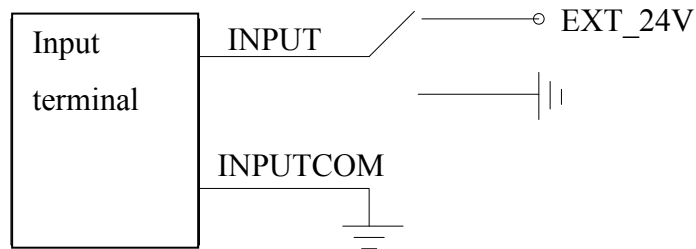
Figure 5-3 Digital input associated wiring diagram

External module "+" side of the power supply for the proximity switch positive, "-" side of the ground proximity switch.

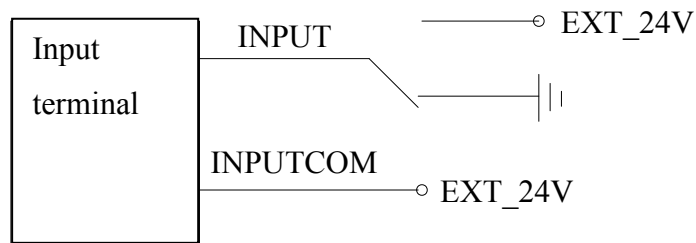
Note:

OUT terminal for the output signal, the general proximity switch selected working power 10-30V, and the NPN output, photoelectric switches is similar.

Common input interface, based on the level of public input conditions corresponding to the input active level is different.



(a) Public grounded, input active high



(b) Public termination high, input active low

Figure 5-4 Input terminal INPUTCOM side wiring

5.2 Digital output interface

5.2.1 Output interface definition and pin functions

Output port use a 25-pin and 20-pin socket DB head, including the power supply wiring port. Digital output port pin arrangement as shown:

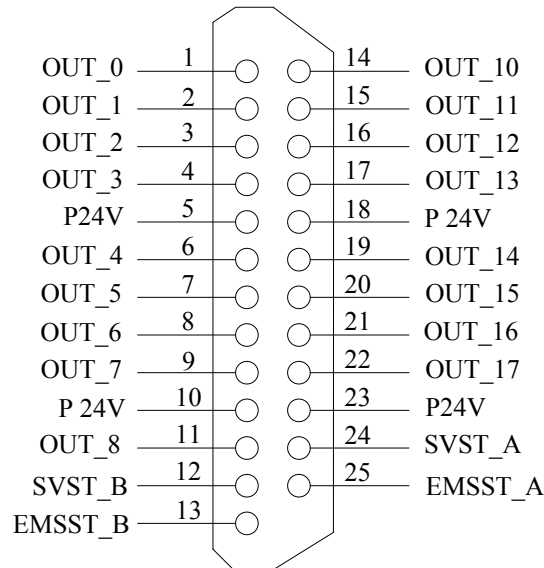


Figure 5-5 Digital output port

After using the external power supply DC24V IO board power supply, the output pin 5,10,18,23 voltages is 24V, it can be supplied to the external use.

System output signal includes two-way relay contact output, which "SVST_A" and "SVST_B" as one relay; "EMSST_A" and "EMSST_B" as another relay.

Output port and pin function definitions as follows:

Table 5-2 Digital Output port definition

Pin	Port Definition	Function DES	PIN	Port Definition	Function DES
1	OUT0	Common output port	2	OUT1	Common output port
3	OUT2	Common output port	4	OUT3	Common output port
5	P24V	internal 24V power supply	6	OUT4	Common output port
7	OUT5	Common output port	8	OUT6	Common output port
9	OUT7	Common output port	10	P24V	internal 24V power supply
11	OUT8	Common output port	12	SVST_B	A Relay interface
13	EMSST_B	Relay B interface	14	OUT10	Common output port
15	OUT11	Common output port	16	OUT12	Common output port
17	OUT13	Common output port	18	P24V	internal 24V power supply
19	OUT14	Common output port	20	OUT15	Common output port
21	OUT16	Common output port	22	OUT17	Common output port
23	P24V	internal 24V power supply	24	SVST_A	A Relay interface
25	EMSST_A	B Relay interface			

5.2.2 Schematic diagram of a digital output

Digital output brief internal circuit:

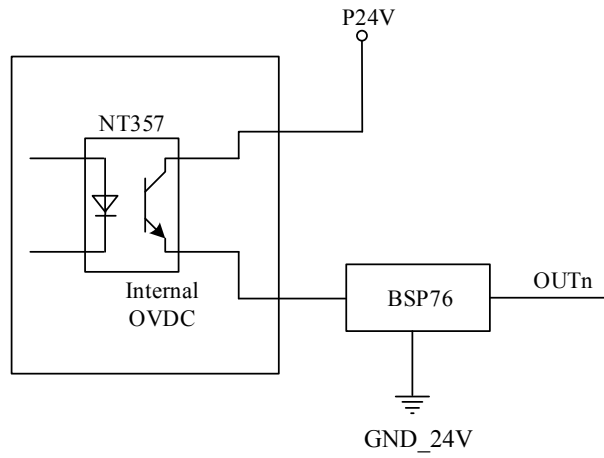


Figure 5-5 Digital output internal circuit

And the machine wiring diagram (spindle forward as an example):

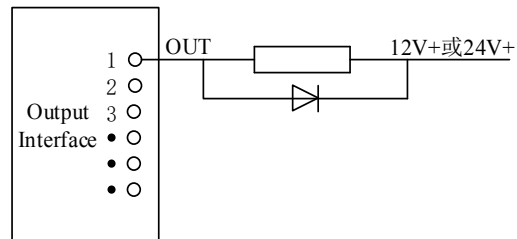


Figure 5-6 the digital output associated wiring diagram

Relay internal circuit:

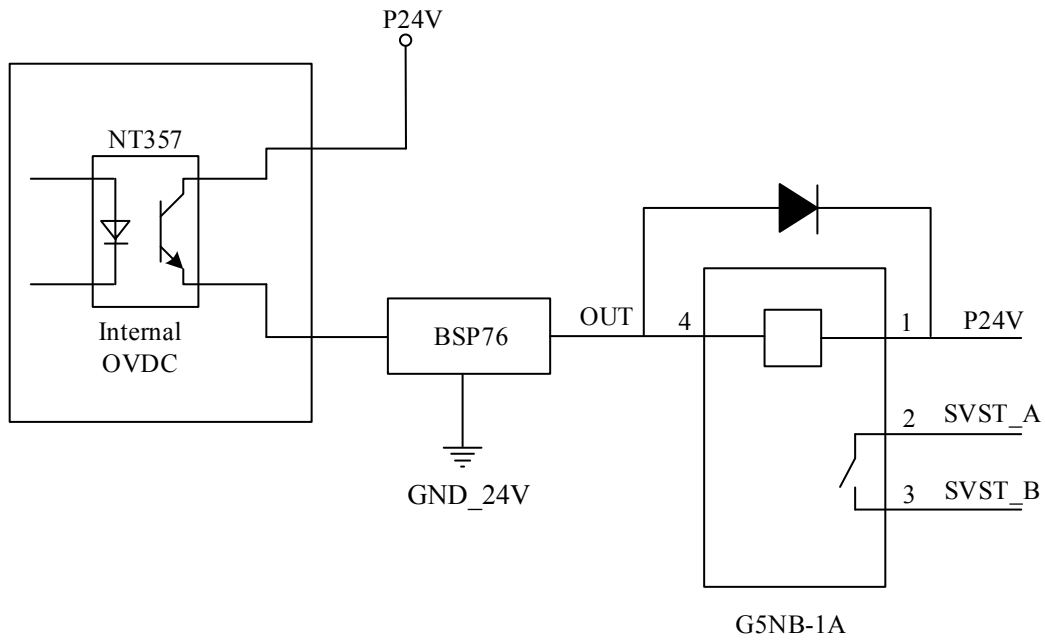


Figure 5-7 Relay Internal Connection diagram

Table 5-3 Relay interface functions

Signal Name	SVST_A ~ SVST_B											
Output port	OUTPUT-12 ~ OUTPUT-24											
Signal logic	<table border="1"> <tr> <td>Output port Signal Output</td> <td>Open</td> <td>Short circuit</td> </tr> <tr> <td>OFF</td> <td>○</td> <td></td> </tr> <tr> <td>ON</td> <td></td> <td>○</td> </tr> </table>	Output port Signal Output	Open	Short circuit	OFF	○		ON		○		
Output port Signal Output	Open	Short circuit										
OFF	○											
ON		○										
Function	Servo status :on , output ports short circuit											
Signal timing	<p>The timing diagram shows three signals: EXT_SVON (I), SVOFF (I), and SVST-A ~ SVST-B (O). EXT_SVON (I) is a pulse that occurs first. SVOFF (I) is a pulse that occurs after EXT_SVON (I). SVST-A ~ SVST-B (O) is a pulse that occurs during the SVOFF (I) pulse.</p>											

Relay output port control panel opening and closing motor brake wiring diagram:

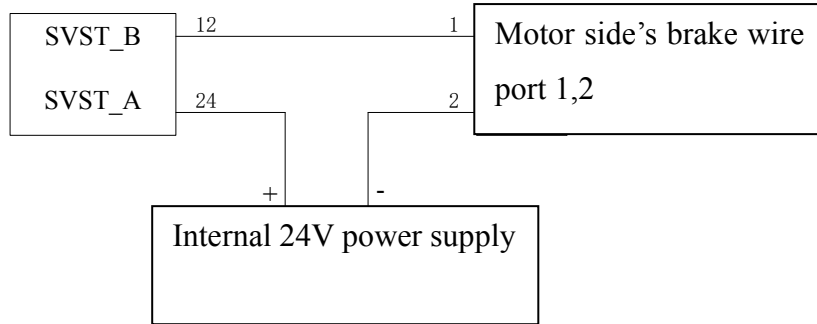


Figure 5-8 Brake-port junctions

Note:

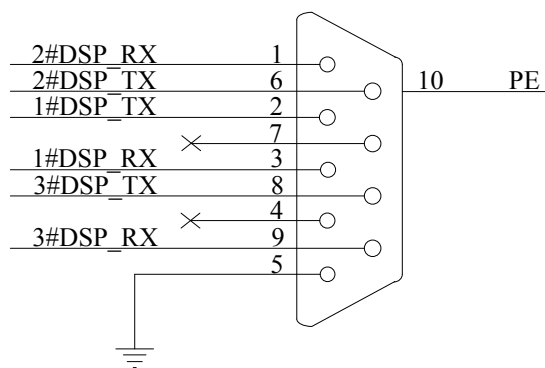
Flexible wiring diagram above, the port number 12 and 24 positions are interchangeable, the motor-side brake line terminals are also used interchangeably.

6 Communication port

6.1 COM1 Port wire drawing

In order to

To facilitate integrated servo drive control program upgrade and maintenance, QC400 and PC via COM1 port to communication, COM1 port using a standard DB9 female terminal, using RS-232 interface, without the level of the adapter plate. Ports defined below:



6-1 COM1Port schematic

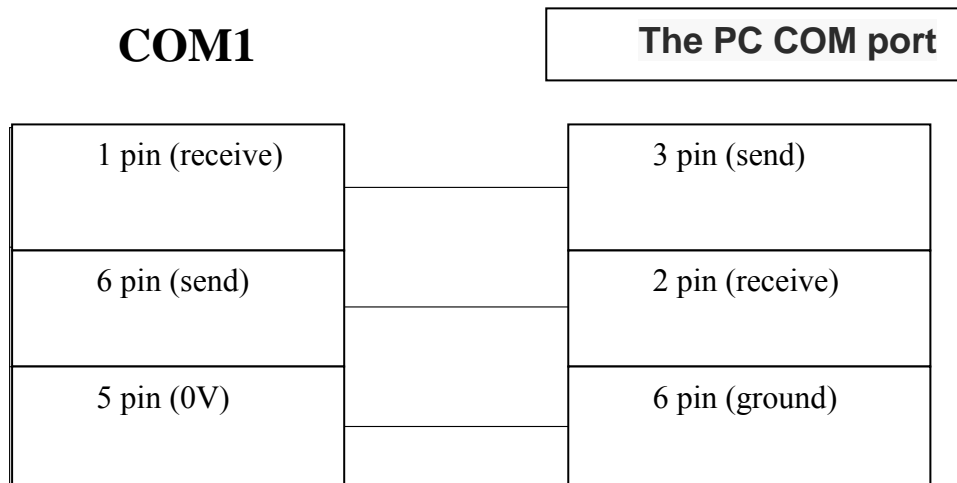
Description of each pin function as shown in Table:

Table 6-1 COM1Terminal Signal Description

Pin Number	Signal Name	Explanation
1	2#DSP_RX	No. 2 DSP chip signal receiving terminal
2	2#DSP_TX	No. 2 DSP chip signal transmitting end

3	1#DSP_RX	No. 1 DSP chip signal receiving terminal
4	Floating	Floating
5	GND	Ground
6	1#DSP_TX	No. 1 DSP chip signal transmitting end
7	Floating	Floating
8	3#DSP_TX	No. 3 DSP chip signal transmitting end
9	3#DSP_RX	No. 3 DSP chip signal receiving terminal
10	PE	Shielded wire

When QC400 robot drive system servo debugging, via COM1 terminal and PC connection, connection Schematic diagram as below:

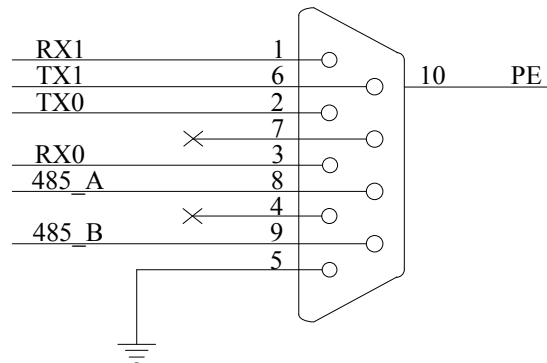


Picture 6-2 COM1 port with PCCOM port connection diagram

6.2 COM2 port connection

Port connection COM2

In order to facilitate the maintenance of robot drive system, the COM2 communication port is provided by QC400. The COM2 port is provided with a standard DB9 head terminal, and the port is defined as the graph:



Schematic diagram of COM2 6-3 port

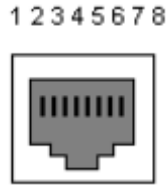
Each pin functions and instructions as shown in the table:

Table 6-2 COM2 terminal signal description

Pin number	Signal name	Explain
1	RX1	First signal receiving end
2	TX0	The 0 signal sending end
3	RX0	The 0 signal receiving end
4	Suspended	Suspended
5	GND	Ground
6	TX1	First signal sending end
7	Suspended	Suspended
8	485_A	Communication interface when using 485
9	485_B	
10	PE	Shielding wire

6.3 LAN port

QC400 robot drive system provide Ethernet interface, support TCP/UDP protocol. Network interface definition is as follows:



Picture 6-4 LANNet export

Each pin functions and instructions as shown in the table:

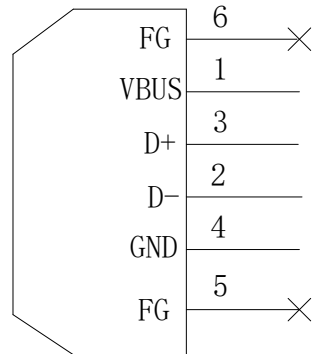
Table 6-3 LAN Network port terminal signal description

Pin number	Signal name	Explain
1	TX+	Send data+
2	TX-	Send data-
3	RX+	Receive data+
4	N/C	Bidirectional data
5	N/C	Bidirectional data
6	RX-	Receive data-
7	N/C	Bidirectional data
8	N/C	Bidirectional data

6.4 USB interface

QC400 Robot drive system Provide standard USB communication interface: USB and MEM;

Port internal pins are arranged as follows:



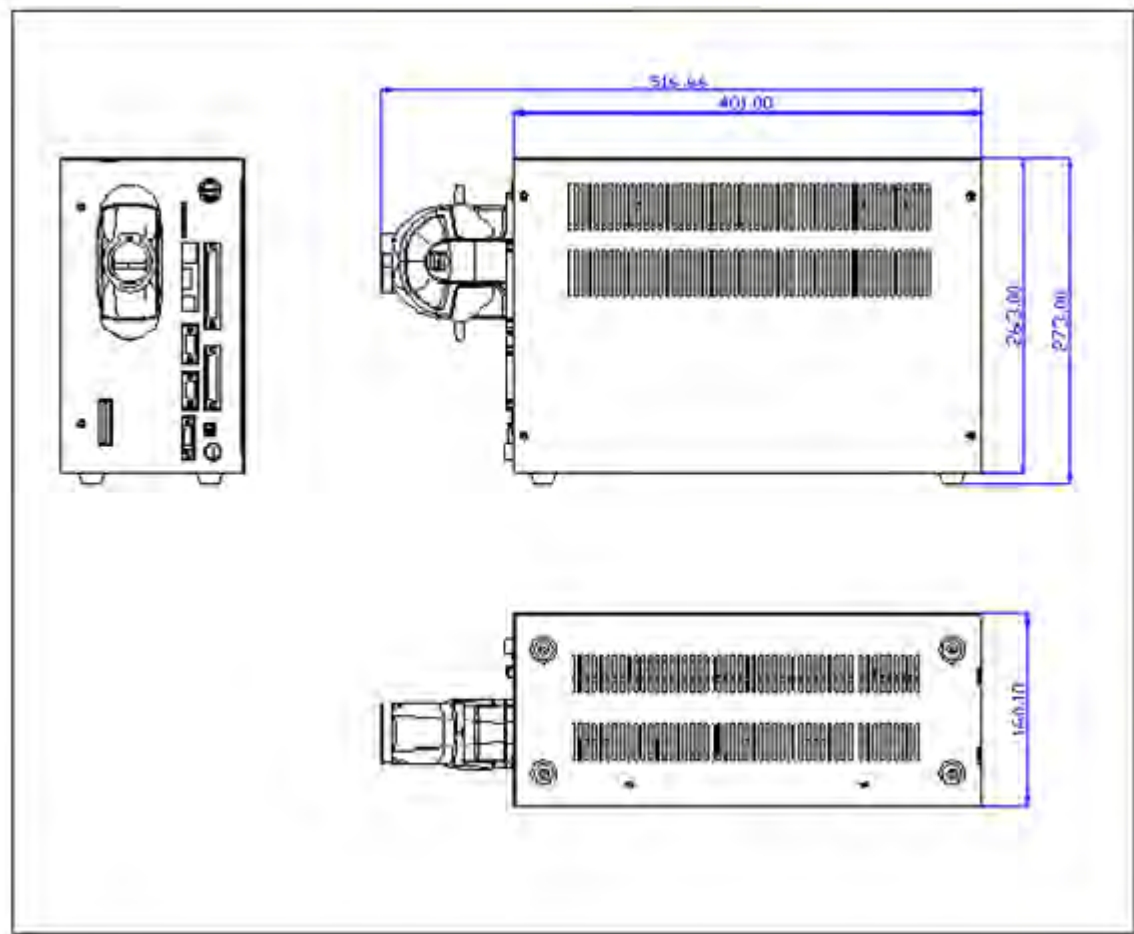
Picture 6-5 USB Terminal

Each pin functions and instructions as shown in the table:

Table 6-4 LAN terminal signal description

Pin number	Signal name	Explain
1	VBUS	USB supply side (+5V)
2	D-	Signal negative
3	D+	Signal positive
4	GND	Ground
5	Suspended	Suspended
6	Suspended	Suspended

6.5 Product installation size chart



Picture 6-6 Robot drive system dimension chart

On the mechanical arm motor power line, the encoder line, IO line connection, must cut off all the main power of the user, before the operation can be carried out.