Robot Controller Manual

Version：v0.0.1

Date：2026.01.22

Preface

Document Overview

Dear User:

Thank you for choosing our robot.We are honored to provide you with this high-performance and highly reliable product.To ensure that you can make the most of the robot's various features,we have specially prepared this user manual,hoping to offer you useful references and assistance.This manual outlines the necessary information for the proper use of the robotic system.

To improve the reliability,design,and functionality of our products,the information in this manual is subject to change without prior notice and does not constitute a commitment by the manufacturer.The manufacturer shall not be liable for any direct,indirect,special,incidental,or consequential damages arising from the use of the product or documentation,(even if advised of the possibility of such damages.

Our products undergo rigorous testing and inspection to ensure that the robotic system's performance meets our company's standards.However,using this product outside the environments described in this manual may affect its fundamental performance.

The controller is an integrated drive and control unit designed for use with SCARA robots.It is characterized by its lightweight structure,rich functionality,easy installation,and convenient expansion.The MRC-100 controller is compatible with various SCARA robot models,including the desktop-mounted P series with load capacities of 3Kg,6Kg,10Kg,20Kg,and 40Kg;the suspended E series with load capacities of 4Kg and 10Kg;the 360°desktop-mounted R series with a load capacity of 6Kg;and the wall-mounted W series with a load capacity of 6Kg.The MRC-200 controller is used with SCARA robot models with load capacities of 60Kg and 100Kg.These controllers are widely applied in industries such as mobile phones,plastics,automotive,electronics,and pharmaceuticals.

Th is manual provides product informat ion,installat ion and environment detai ls,wir ing,safety,and other content related to the MRC-100 and MRC-200

Safety Precaut ions[Please Adhere Strictly]

Danger

- Do not use the robot in areas with water,in environments containing corrosive or flammable gases,or near combustible materials.
- Do not use the robot in areas with water,in environments containing corrosive or flammable gases,or near combustible materials.
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- Do not use the robot in areas with water,in environments containing corrosive or flammable gases,or near combustible materials.
- Follow the operational steps and requirements outlined in the respective manuals.
- Do not enter the robot's motion range.
- Consider contingency plans for sudden movements of t he robot in your direction.
- Ensure designated safe zones are established as a precaution.
- Accidental entry into the robot's motion range or collision with the robot may result in personal injury.Additionally,in case of abnormal operation, immediately press the emergency stop button.

Attention

- Before conducting robot teaching operations,check the following items and ensure any abnormalities are addressed promptly.
- Verify that all connections are secure.
- Inspect external wiring coverings and packaging for any damage.
- Do not frequently switch the power on and off for the controller.
- If the teach pendant is accidentally left on the robot,tool,or on the ground,it may collide with the robot or tool during operation,potentially causing personal injury or equipment damage.
- Do not modify,disassemble,or repair the equipment without authorization.

Contents

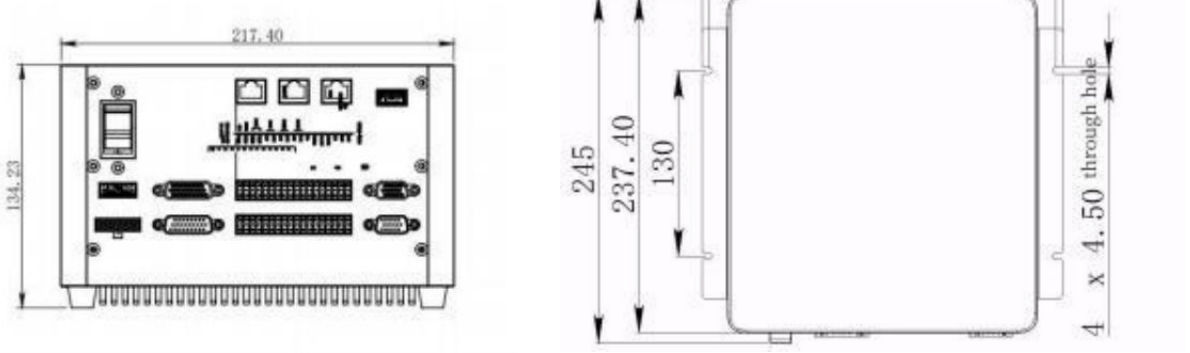
1.Product Information

1.1 Product Model

--MRC-100 Suitab le for P3-P40 Series
--MRC-200 Suitab le for P60-P100 Series
--MRC-600 Suitab le for S Series
--MRC-700 Suitab le for S Series

1.2 Dimensions Specifications

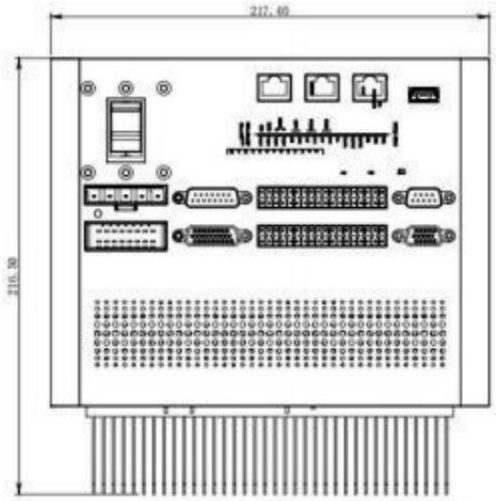
1.2.1 MRC-100

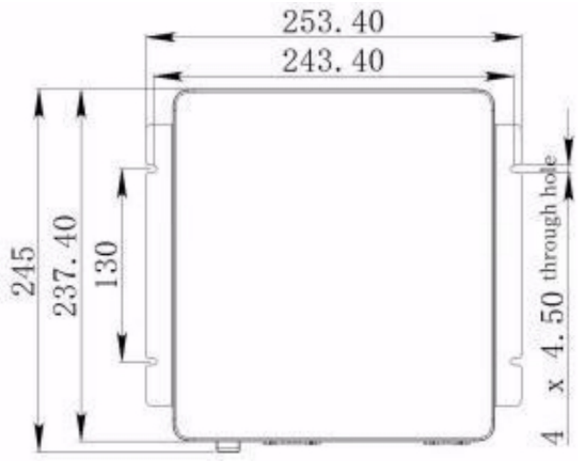


Device Dimens ions:Length:217.40 mm,Width:237.40 mm,Height:134.23 mm

(Suitable for P3-P40 Series)

1.2.2 MRC-200

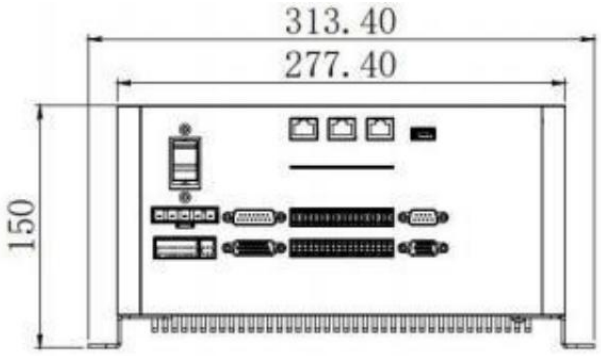


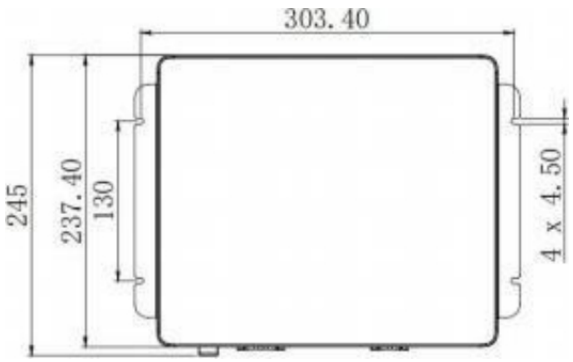


Device Dimensions: Length:217.40 mm, Width:237.40 mm, Height:216.50 mm

(Suitable for P60-P100 Series)
[Unit:mm]

1.2.3 MRC-600

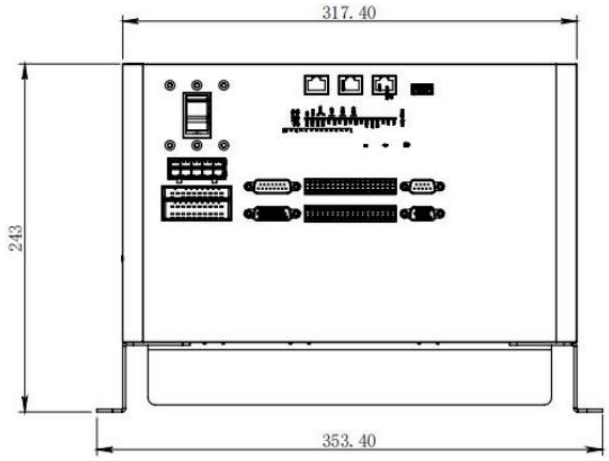


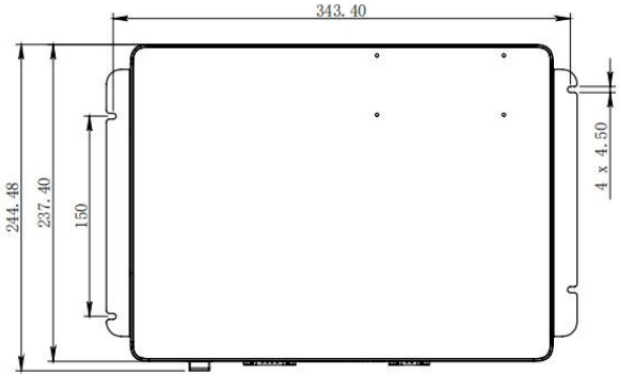


Device Dimensions:Length:217.40mm,Width:237.40 mm,Height:216.5 mm

(Suitable for S Series)
[Unit:mm]

1.2.4 MRC-700





Device Dimensions:Length:317.40 mm,Width:237.40 mm,Height:243mm

(Suitable for S Series)
[Unit:mm]

1.3 Component Overview

1.3.1 MRC-100 Component Overview

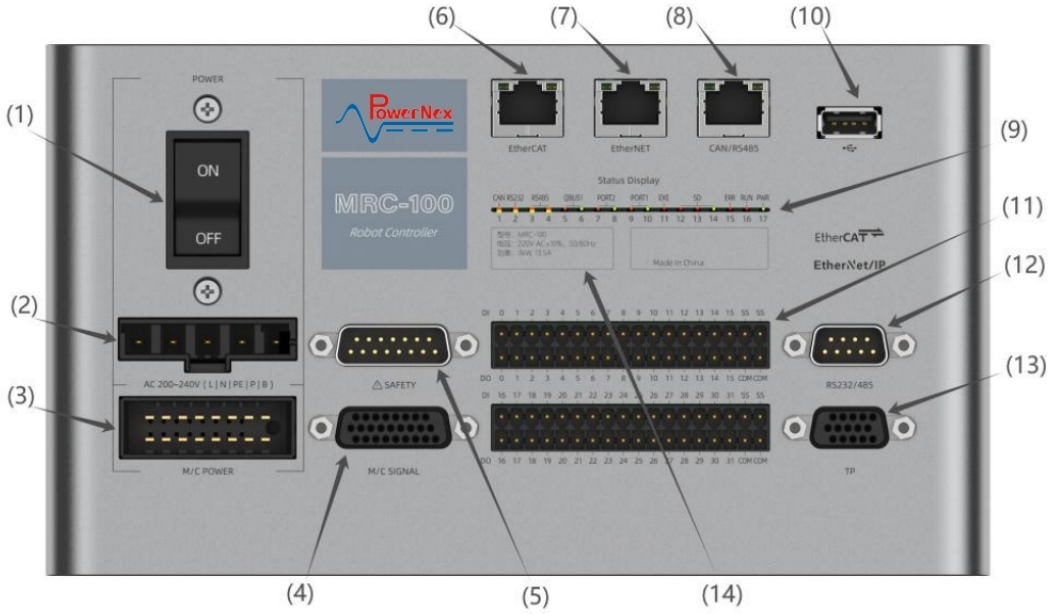


Figure 1-1 Component Information

Serial Number	Name	Function Description	Reference
(1)	POWER Switch	Controller power switch	-
(2)	AC Power Interface	For inputting AC220V power to the controller	3.1 AC Power Supply
(3)	M/C POWER(Power Line Interface)	For connecting the robot's power line	3.2 M/C Power Interface
(4)	M/C SIGNAL(Encoder Line Interface)	For connecting the robot's encoder line	3.3 M/C SIGNAL Encoder Interface
(5)	SAFETY Port	For connecting emergency stop,safety guard door,and other safety-related input signals	4.4 STO Pin Distribution
(6)	EtherCAT Interface	Fieldbus communication interface	3.4 Communication Port Description
(7)	EtherNET Interface	Network port for PC-based debugging software	3.4 Communication Port Description
(8)	CAN/RS485 Interface	For CAN/RS485 communication with external devices	3.4 Communication Port Description
(9)	Indicator Light	Displays the connection status of the controller	1.5 Overview of Indicator Panel
(10)	USB Interface	USB 2.0 interface	-
(11)	I/O Interface	For connecting 16-bit standard input ID and 16-bit standard output DO	3.5 I/O Interface Description
(12)	RS232/485	For RS232/485 communication with external devices	3.6 RS232/485 Interface Description
(13)	TP Port	Dedicated interface for the teach pendant	3.7 TP Interface Description
(14)	Product Information	Records product model,serial number,and other information	-

1.3.2 MRC-200 Component Overview

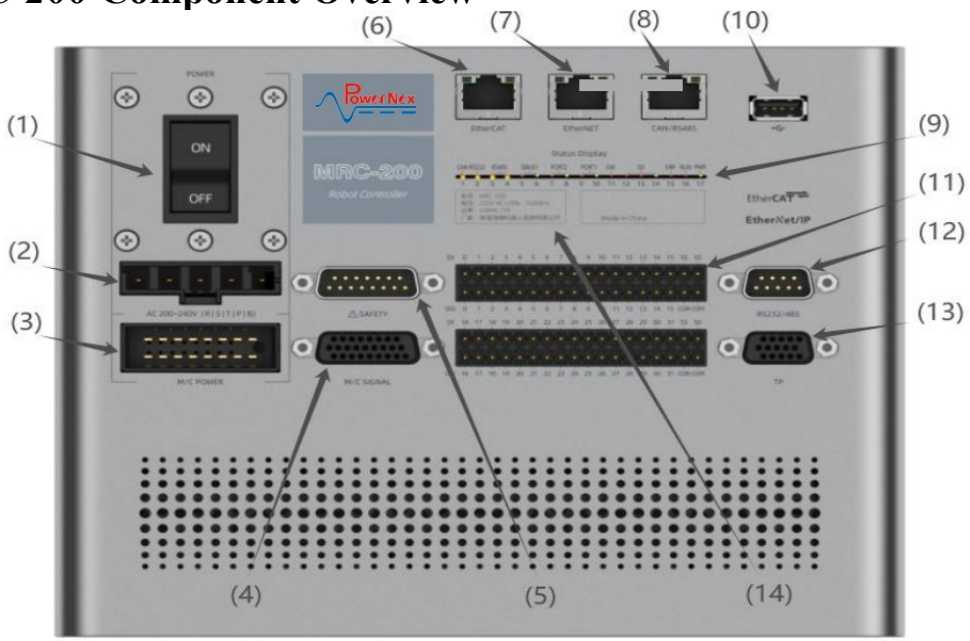


Figure 1-2 Component information

Serial Number	Name	Function Description	Reference
(1)	POWER Switch	Controller power switch	-
(2)	AC Power Interface	For inputting AC220V power to the controller	3.1 AC Power Supply
(3)	M/C POWER(Power Line Interface)	For connecting the robot's power line	3.2 M/C Power Interface
(4)	M/C SIGNAL(Encoder Line Interface)	For connecting the robot's encoder line	3.3 M/C SIGNAL Encoder Interface
(5)	SAFETY Port	For connecting emergency stop,safety guard door,and other safety-related input signals	4.4 STO Pin Distribution
(6)	EtherCAT Interface	Fieldbus communication interface	3.4 Communication Port Description
(7)	EtherNET Interface	Network port for PC-based debugging software	3.4 Communication Port Description
(8)	CAN/RS485 Interface	For CAN/RS485 communication with external devices	3.4 Communication Port Description
(9)	Indicator Light	Displays the connection status of the controller	1.5 Overview of Indicator Panel
(10)	USB Interface	USB 2.0 interface	-
(11)	I/O Interface	For connecting 16-bit standard input ID and 16-bit standard output DO	3.5 I/O Interface Description
(12)	RS232/485	For RS232/485 communication with external devices	3.6 RS232/485 Interface Description
(13)	TP Port	Dedicated interface for the teach pendant	3.7 TP Interface Description
(14)	Product Information	Records product model,serial number,and other information	-

1.3.3 MRC-600 Component Overview

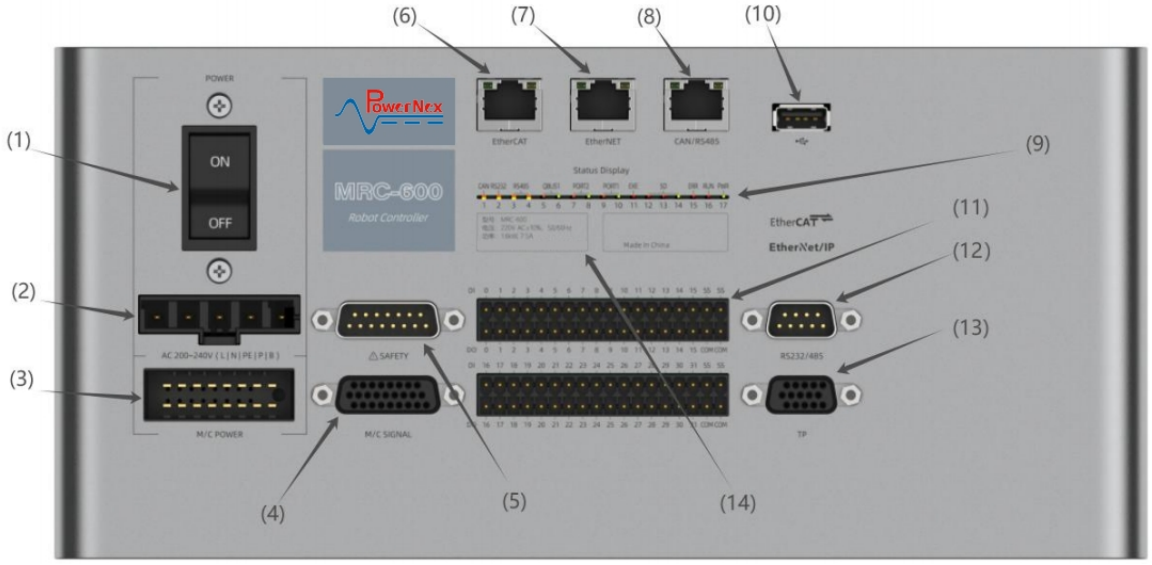


Figure 1-3 Component information

Serial Number	Name	Function Description	Reference
(1)	POWER Switch	Controller power switch	-
(2)	AC Power Interface	For inputting AC220V power to the controller	3.1 AC Power Supply
(3)	M/C POWER(Power Line Interface)	For connecting the robot's power line	3.2 M/C Power Interface
(4)	M/C SIGNAL(Encoder Line Interface)	For connecting the robot's encoder line	3.3 M/C SIGNAL Encoder Interface
(5)	SAFETY Port	For connecting emergency stop,safety guard door,and other safety-related input signals	4.4 STO Pin Distribution
(6)	EtherCAT Interface	Fieldbus communication interface	3.4 Communication Port Description
(7)	EtherNET Interface	Network port for PC-based debugging software	3.4 Communication Port Description
(8)	CAN/RS485 Interface	For CAN/RS485 communication with external devices	3.4 Communication Port Description
(9)	Indicator Light	Displays the connection status of the controller	1.5 Overview of Indicator Panel
(10)	USB Interface	USB 2.0 interface	-
(11)	I/O Interface	For connecting 16-bit standard input ID and 16-bit standard output DO	3.5 I/O Interface Description
(12)	RS232/485	For RS232/485 communication with external devices	3.6 RS232/485 Interface Description
(13)	TP Port	Dedicated interface for the teach pendant	3.7 TP Interface Description
(14)	Product Information	Records product model,serial number,and other information	-

1.3.4 MRC-700 Component Overview

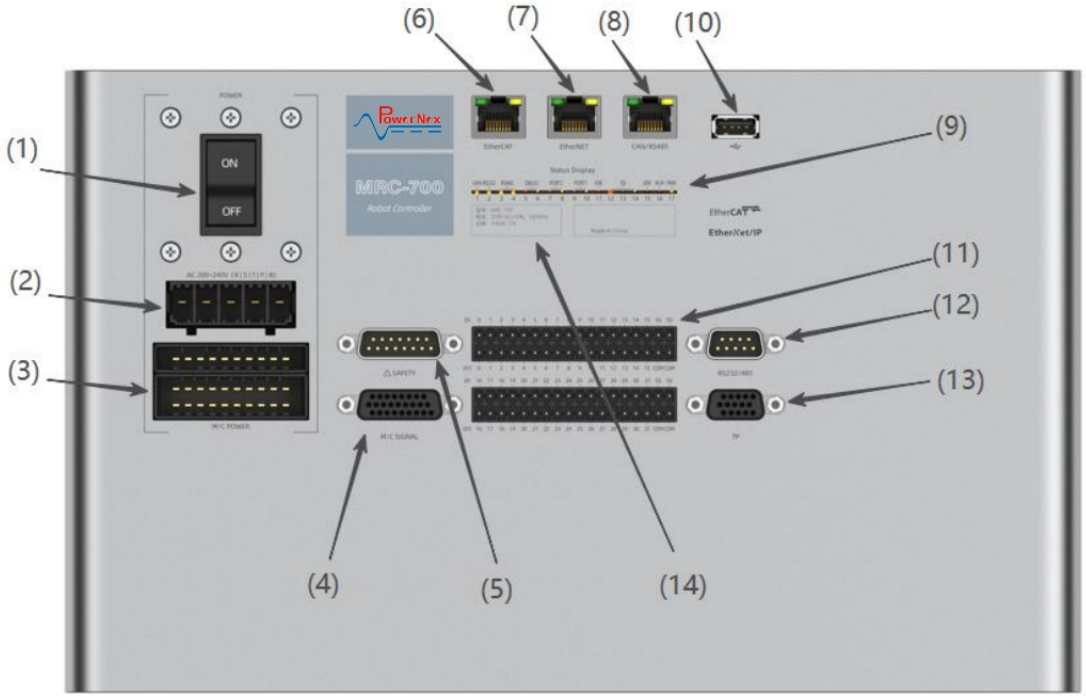


Figure 1-4 Component information

Serial Number	Name	Function Description	Reference
(1)	POWER Switch	Controller power switch	-
(2)	AC Power Interface	For inputting AC220V power to the controller	3.1 AC Power Supply
(3)	M/C POWER(Power Line Interface)	For connecting the robot's power line	3.2 M/C Power Interface
(4)	M/C SIGNAL(Encoder Line Interface)	For connecting the robot's encoder line	3.3 M/C SIGNAL Encoder Interface
(5)	SAFETY Port	For connecting emergency stop,safety guard door,and other safety-related input signals	4.4 STO Pin Distribution
(6)	EtherCAT Interface	Fieldbus communication interface	3.4 Communication Port Description
(7)	EtherNET Interface	Network port for PC-based debugging software	3.4 Communication Port Description
(8)	CAN/RS485 Interface	For CAN/RS485 communication with external devices	3.4 Communication Port Description
(9)	Indicator Light	Displays the connection status of the controller	1.5 Overview of Indicator Panel
(10)	USB Interface	USB 2.0 interface	-
(11)	I/O Interface	For connecting 16-bit standard input ID and 16-bit standard output DO	3.5 I/O Interface Description
(12)	RS232/485	For RS232/485 communication with external devices	3.6 RS232/485 Interface Description
(13)	TP Port	Dedicated interface for the teach pendant	3.7 TP Interface Description
(14)	Product Information	Records product model,serial number,and other information	-

1.4 Technical Specifications

1.4.1 MRC-100 Technical Specifications

Item	Specification
Model	MRC-100
Maximum Control Axes	4 Axes
Supported Robot Models	P3 / P6 / P10 / P20 / P40
Motion Modes	PTP(Point-To-Point)Mode Line(Continuous Path)Mode
IO	Input:16(Standard),Output:16(Standard)
Interface configurat ion	EtherCAT(network port))*1、EtherNet(network port))*1 CAN/RS485(network port))*1、USB2.0*1 RS232/485(ser ia l port)*1、Safety door interface*1
Communication Protocol(Standard)	EtherNet/IP(Slaver Station)、EtherCAT(Masterr Station) ModBus-TCP/RTU(Master/Slaver Station) TCP/IP、Mitsubish PLC-MC Protocol(Slaver Station)
Communication Protocol(Extended)	PROFINET(Master Station)-Additional integration of a gateway module is required.
Rated capacity	Maximum input power 4kW The actua l rated capacity depends on the type,motion and load of the robot. P3 : 0.8 Kw E4 : 1.1 Kw P6/R6 : 1.2 Kw P10 : 2.4 Kw P20/P40/E10 : 2.65 Kw
Input Voltage	220V AC±10%
Frequency	50Hz
Noise	50dB
Operating Environment Temperature	5~45℃
Controller Net Weight	6KG

1.4.2 MRC-200 Technical Specifications

Item	Specification
Model	MRC-200
Maximum Control Axes	4 Axes
Supported Robot Mode ls	P60 / P100
Motion Modes	PTP(Point-To-Point)Mode Line(Continuous Path)Mode
IO	Input:16(Standard),Output:16(Standard)
Interface configurat ion	EtherCAT(network port))*1、EtherNet(network port))*1 CAN/RS485(network port))*1、USB2.0*1 RS232/485(ser ia l port)*1、safety door interface*1
Communication Protocol(Standard)	EtherNet/IP(Slaver Station)、EtherCAT(Master Station) ModBus-TCP/RTU(Master/Slaver Station) TCP/IP、Mitsubishi PLC-MC Protocol(Slave Station)
Communication Protocol(Extended)	PROFINET(Master Station)-Add it iona l gateway module required
Rated capacity	Maximum input power7.5 Kw The actua l rated capacity depends on the type,mot ion and load of the robot. P60/P100：4.6 Kw
Input Voltage	220V AC±10%/380V AC±5%
Frequency	50Hz
Noise	50dB
Operating Environment Temperature	5~45℃
Controller Net Weight	9KG

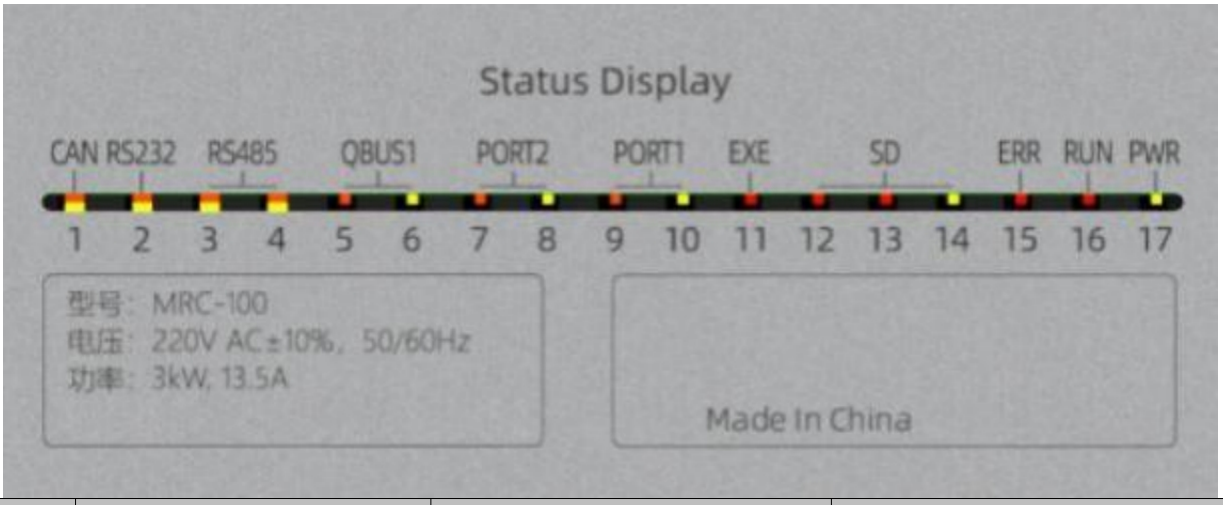
1.4.3 MRC-600 Technical Specifications

Item	Specification
Model	MRC-600
Maximum Control Axes	6 Axes
Supported Robot Models	S4 / S5 / S6 / S7
Motion Modes	PTP(Point-To-Point)Mode Line(Continuous Path)Mode
IO	Input:16(Standard),Output:16(Standard)
Interface configurat ion	EtherCAT(network port))*1、EtherNet(network port))*1 CAN/RS485(network port))*1、USB2.0*1 RS232/485(ser ia l port)*1、safety door interface*1
Communication Protocol(Standard)	EtherNet/IP(Slave Station)、EtherCAT(Master Station) ModBus-TCP/RTU(Master/Slave Station) TCP/IP、Mitsubish i PLC-MC Protocol(Slave Station)
Communication Protocol(Extended)	PROFINET(Master Station)-Add it iona l gateway module required
Rated capacity	Maximum input power7.5 Kw The actua l rated capacity depends on the type,mot ion andload of the robot. S4：1.6 Kw S5/S6：1.9 Kw
Input Voltage	220V AC±10%
Frequency	50Hz
Noise	50dB
Operating Environment Temperature	5~45℃
Controller Net Weight	7KG

1.4.4 MRC-700 Technical Specifications

Item	Specification
Model	MRC-700
Maximum Control Axes	6 Axes
Supported Robot Models	S12 / S25
Motion Modes	PTP(Point-To-Point)Mode Line(Continuous Path)Mode
IO	Input:16(Standard),Output:16(Standard)
Interface configurat ion	EtherCAT(network port))*1、EtherNet(network port))*1 CAN/RS485(network port))*1、USB2.0*1 RS232/485(ser ia l port)*1、safety door interface*1
Communication Protocol(Standard)	EtherNet/IP(Slave Station)、EtherCAT(Maste Stationr) ModBus-TCP/RTU(Master/Slave Station) TCP/IP、Mitsubish i PLC-MC Protocol(Slave Station)
Communication Protocol(Extended)	PROFINET(Master Station)-Add it iona l gateway module required
Rated capacity	Maximum input power7.5 Kw The actua l rated capacity depends on the type,mot ion andload of the robot.
Input Voltage	220V AC±10%
Frequency	50Hz
Noise	50dB
Operating Environment Temperature	5~45℃
Controller Net Weight	10 KG

1.5 Indicator Panel Overview



Serial Number	Indicator	Function	Description
1	CAN Indicator	CAN Communication Status	Green:Link established; Red:Data transmission in progress
2	RS232 Indicator	RS232 Communication Status	Green:Link established; Red:Data transmission in progress
3	RS485-1 Indicator(Display)	InternalRS485 Communication	Green:Link established; Red:Data transmission in progress
4	RS485-2 Indicator	External RS485 Communication	Green:Link established; Red:Data transmission in progress
5	QBUS1 Indicator(Data)	Fieldbus Data Transmission Status	Red blinking:Data transmission active
6	QBUS1 Indicator(Link)	Fieldbus Connection Status	Green steady:Physical layer connected
7	Port-2 Indicator(ECAT Data)	EtherCAT Data Transmission	Red blinking:Process data exchange ongoing
8	Port-2 Indicator(ECAT Com)	EtherCAT Communication Status	Green steady:EtherCAT network synchronized
9	Port-1 Indicator(ETH Data)	Ethernet Data Transmission	Red blinking:TCP/IP packet transfer active
10	Port-1 Indicator(ETH Link)	Ethernet Link Status	Green steady:PHY layer connection established
11	EXE Indicator	Internal Reservation	Reserved for system internal use
12	SD Indicator 1		
13	SD Indicator 2		
14	SD Indicator 3		
15	ERR Indicator	System Error Status	Red blinking:Fault ondition detected
16	RUN Indicator	System Operational Status	Red blinking:System in ready state
17	PWR Indicator	System power-on indicator	Steady green:The system is powered on

2.Installat ion and Environment

2.1.Installation environment requirements

This product must be placed in its packag ing before installat ion.If it is not used for the time being,in order to comply with the company's warranty range and future maintenance,it is necessary to pay attention to the following matters when storing:

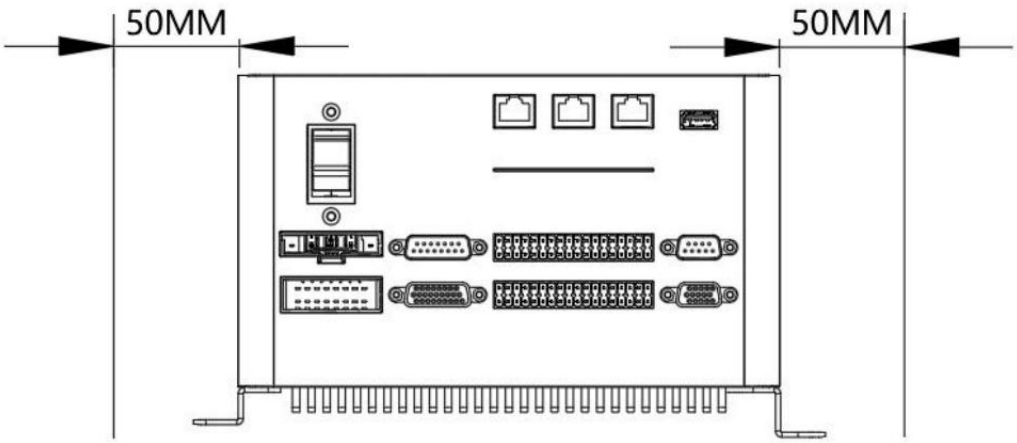
*Storage temperature range:-20°to+65°
*Robot operating temperature range:0°to 40°.
*Controller operating temperature range:0°to 55°,if the ambient temperature exceeds 45°p lease maintain good ventilation.

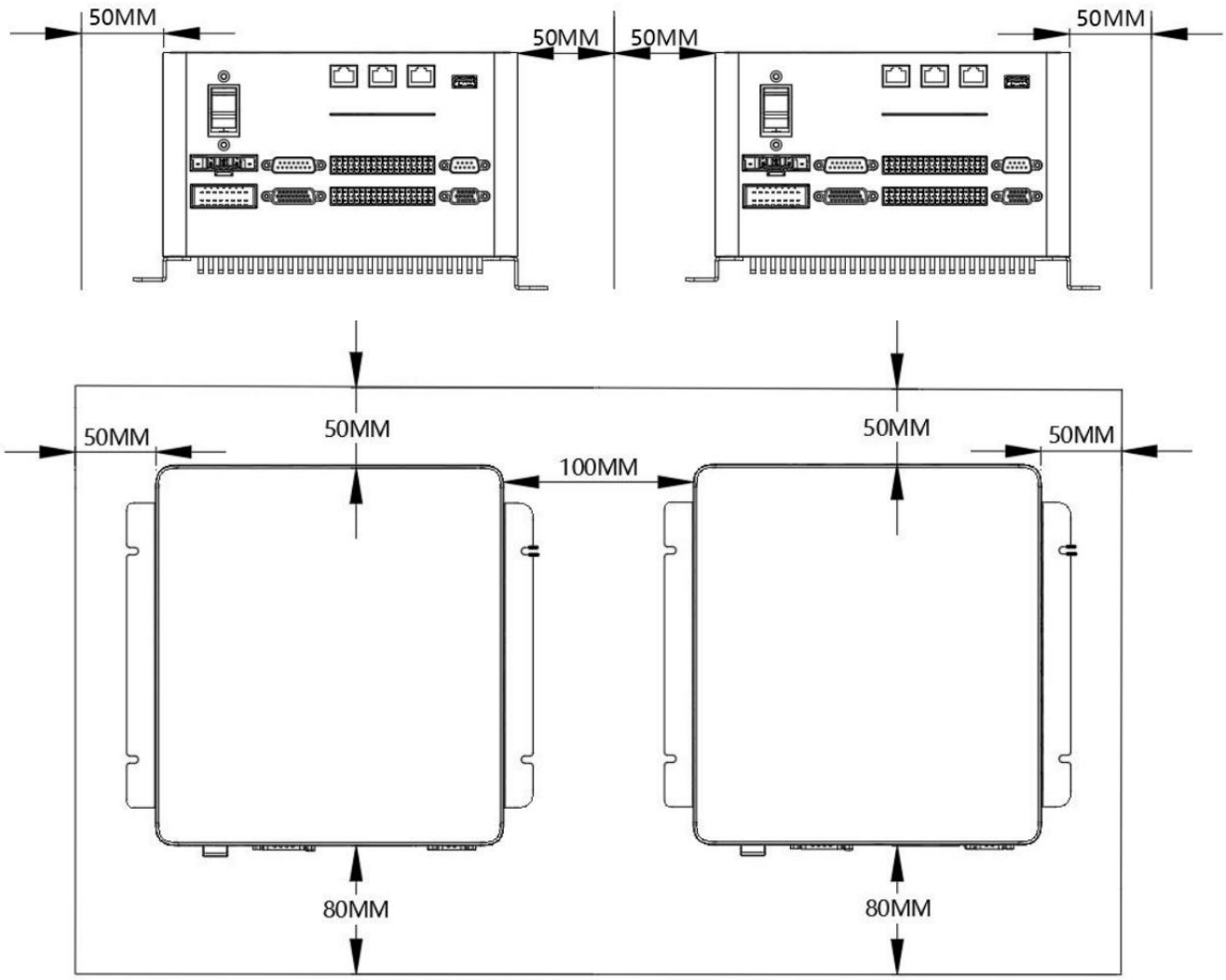
It is recommended to keep the temperature be low 45°for a long period of time.
*Relative humidity range:0%to 90%dew free.
*No high heat device,no water drop lets,no steam,no dust,no corrosion,no flammable items,no liquid,no metal particles,no electromagnetic interference signals.

2.2.Installat ion parameter

The installat ion d irect ion must be as shown in the following figure:
In order for the cooling cycle to be effective,the adjacent items and baffles above and be low the controller must be retained when installing it Plenty of space.

During installation,the suction and exhaust holes of the controller cannot be sealed,nor can they be p laced upside down.




50MM
50MM
50MM
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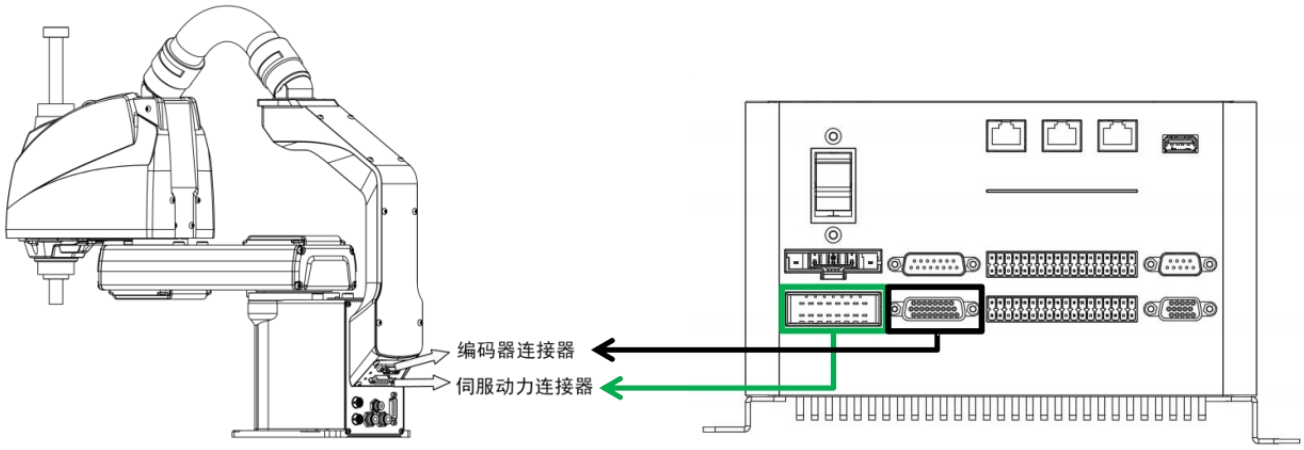
50MM
50MM
100MM
80MM
80MM

2.3.The controller is connected to the robot



2.4. Matters needing attention

When appropriate environmental conditions cannot be met,take protective measures appropriate to the current environment,such as masking the controller with a enclosure with a cool ing system.
Avoid d irect sun l ight on the controller in the installat ion environment.
Avoid dust,dust,soot,salt,iron filings,corrosive liquids,and corrosive gases in the air.

In the installation environment,do not install the device in the area of external vibration or impact.

In the installation environment,do not install the device in an area containing electrical interference sources such as relays and contactors.

In the installation environment,avoid installation in an environment that is prone to strong magnetic product ion and strong electric field.

In order to maintain the function of the robot system and ensure safe use,set up the controller in a location that meets the following conditions.

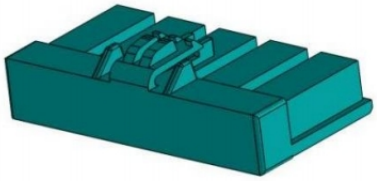
The controller is not c lean grade specification.When located in a c lean room,take relevant measures to adapt to the c lean room environment,such as using a box with an exhaust structure or cooling structure to cover the controller.

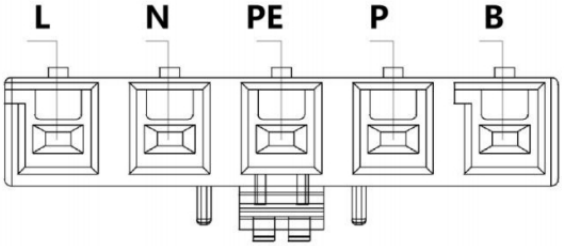
Locate the controller near the socket and in a p lace where it is easy to unload the plug.

3.interface definition

3.1 AC Power Interface

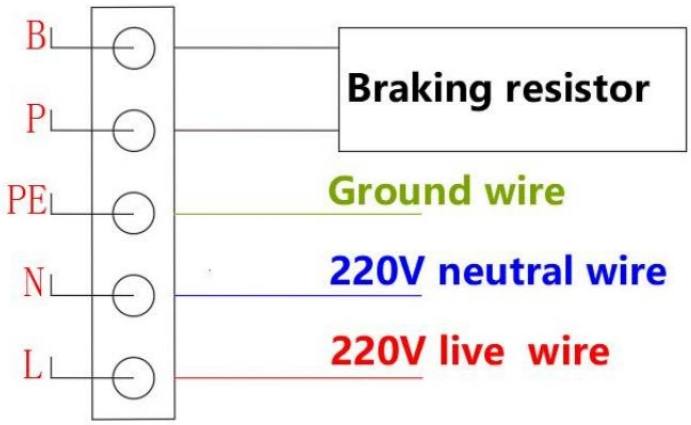
3.1.1 AC220V interface Definition



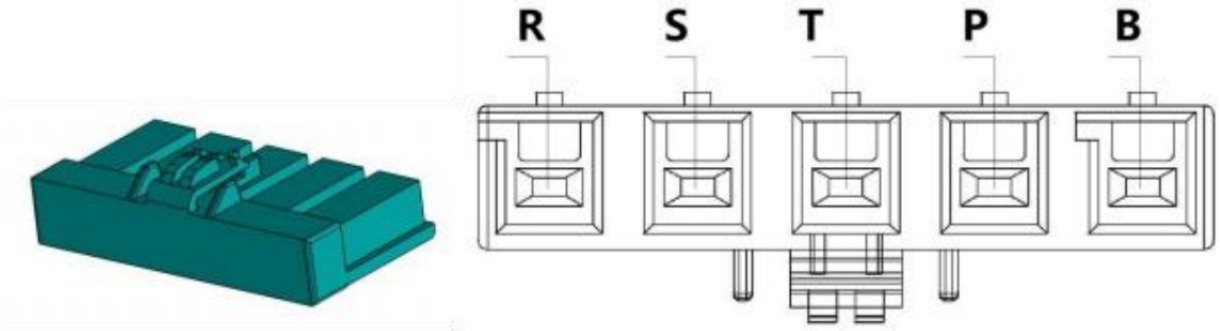


Pin Number	Definition	Description	Remarks
1	L	Single-phase AC Live Wire	
2	N	Single-phase AC Neutral Wire	
3	PE	Ground Wire	
4	P	Brake Resistor	
5	B	Brake Resistor	

3.1.2 MRC-100/MRC-600 Wiring diagram

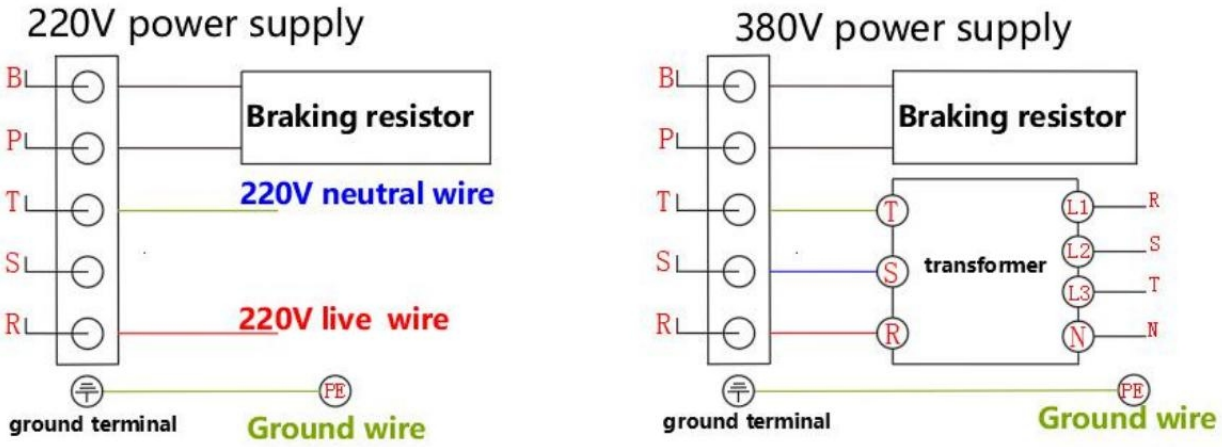


3.1.3 AC380V Interface definition



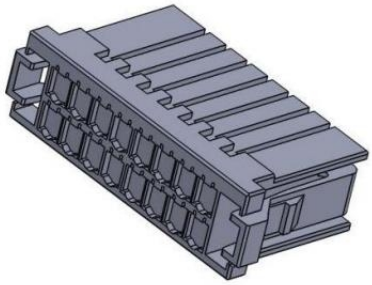
Pin Number	Definition	Description	Remarks
1	R	220V:single-phase AC live line 380:three-phase AC R-phase(L1)live wire	
2	S	220V:empty 380:three-phase AC S-phase(L2)live wire	
3	T	220V:single-phase AC neutral line 380:three-phase AC T-phase(L3)fireline	
4	P	Brake resistance	
5	B	Brake resistance	

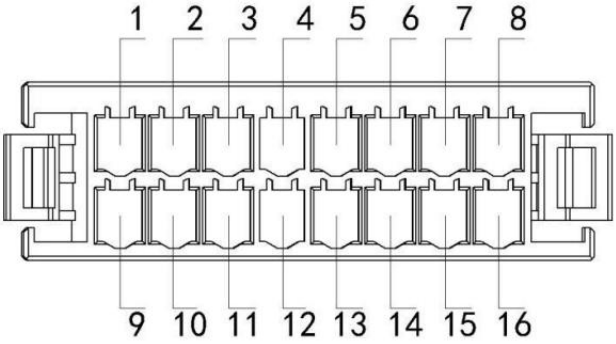
3.1.4 MRC-200/MRC-700 Wiring diagram



3.2 M/C POWER Power line interface

3.2.1 Four-axis Power Cable Interface

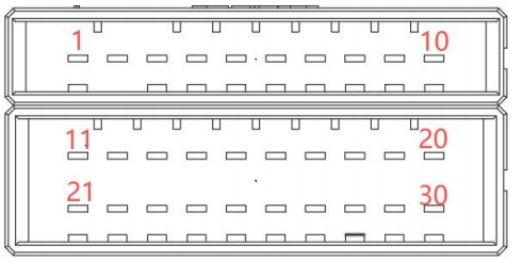




3.2.2 Definition of the Four-axis Power Cable Interface

Pin	Definition	Colour	Remarks	Pin	Definition	Colour	Remarks
1	U1	Yellow1	Motor U Phase Output for Axis 1	9	W3	Brown 3	Motor W Phase Output for Axis 3
2	V1	Yellow2	Motor V Phase Output for Axis 1	10	U4	Pink 1	Motor U Phase Output for Axis 4
3	W1	Yellow3	Motor W Phase Output for Axis 1	11	V4	Pink 2	Motor V Phase Output for Axis 4
4	U2	Black1	Motor U Phase Output for Axis 2	12	W4	Pink 3	Motor W Phase Output for Axis 4
5	V2	Black2	Motor V Phase Output for Axis 2	13	DC24V	White 1	Internal Output Power DC 24V
6	W2	Black	Motor W Phase Output for Axis 2	14	Brake	White 2	Body Brake Control for Axes 3/4
7	U3	Brown1	Motor U Phase Output for Axis 3	15	DC0V	White 3	Internal Output Power DC 0V
8	V3	Brown2	Motor V Phase Output for Axis 3	16	PE	Yellow-Green	Ground Wire
Suitable for MRC-100 / MRC-200 series							

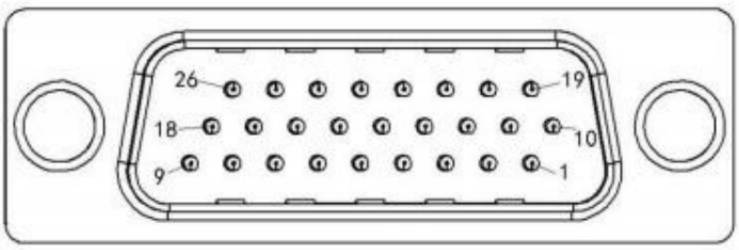
3.2.3 Six-axis Power Cable Interface



3.2.4 Definition of the Six-axis Power Cable Interface

Pin	Definition	Colour	Notes	Pin No.	Definition	Colour	Notes
1	U1	Black 1	Axis 1 Motor U-Phase Output	16	W5	Black 29	Axis 5 Motor W-Phase Output
2	V1	Black 2	Axis 1 Motor V-Phase Output	17	U6	Black 31	Axis 6 Motor U-Phase Output
3	W1	Black3	Axis 1 Motor W-Phase Output	18	V6	Black 32	Axis 6 Motor V-Phase Output
4	U2	Black5	Axis 2 Motor U-Phase Output	19	W6	Black 33	Axis 6 Motor W-Phase Output
5	V2	Black6	Axis 2 Motor V-Phase Output	20	S1	Black 9	Axis 1 Motor Brake
6	W2	Black7	Axis 2 Motor W-Phase Output	21	S2	Black 10	Axis 2 Motor Brake
7	U3	Black19	Axis 3 Motor U-Phase Output	22	S3	Black 11	Axis 3 Motor Brake
8	V3	Black20	Axis 3 Motor V-Phase Output	23	S4	Black 12	Axis 4 Motor Brake
9	W3	Black21	Axis 3 Motor W-Phase Output	24	S5	Black 13	Axis 5 Motor Brake
10	/	/	/	25	S6	Black 14	Axis 6 Motor Brake
11	U4	Black23	Axis 4 Motor U-Phase Output	26	DC24	Black 15	Internal Output Power DC24V
12	V4	Black24	Axis 4 Motor V-Phase Output	27	DC0V	Black 16	Internal Output Power DC0V
13	W4	Black25	Axis 4 Motor W-Phase Output	28	/		
14	U5	Black27	Axis 5 Motor U-Phase Output	29	/		
15	V5	Black28	Axis 5 Motor V-Phase Output	30	/		
Applicable to MRC-600/MRC-700 Series							

3.3 M/C SIGNAL Encoder Wire Interface



3.3.1 Four-axis Encoder Cable Interface

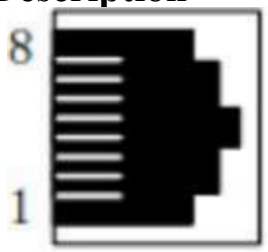
Pin Number	Definition	Colour	Remarks	Pin Number	Definition	Colour	Remarks
1	1-T+	Red	Differential Positive for Encoder Axis 1	14	4-T-	Orange and black	Differential Negative for Encoder Axis 4
2	1-T-	Red and Black	Differential Negative for Encoder Axis 1	15	4-5V	Brown	Power Positive
3	1-5V	Blue	Power Positive	16	4-GND	Brown and black	Ground Wire
4	1-GND	Blue and Black	Ground Wire	17	/		/
5	2-T+	Yellow	Differential Positive for Encoder Axis 2	18	/		/
6	2-T-	Yellow and Black	Differential Negative for Encoder Axis 2	19	/		/
7	2-5V	Green	Power Positive	20	/		/
8	2-GND	Green and Black	Ground Wire	21	/		/
9	3-T+	Purple	Differential Positive for Encoder Axis 3	22	/		/
10	3-T-	Purple and Black	Differential Negative for Encoder Axis 3	23	/		/
11	3-5V	Grey	Power Positive	24	/		/
12	3-GND	Grey and Black	Ground Wire	25	/		/
13	4-T+	Orange	Differential Positive for Encoder Axis 4	26	/		/
			This pin definition table is only applicable to the four-axis robot.				

3.3.2 Six-axis Encoder Cable Interface

Pin Number	Definition	Colour	Remarks	Pin Number	Definition	Colour	Remarks
1	1 - T+	Green	Differential Positive for Encoder Axis 1	14	4 - T-	yellow	Differential Negative for Encoder Axis 4
2	1 - T-	Yellow	Differential Negative for Encoder Axis 1	15	4 - 5V	Brown	Power Positive
3	1 - 5V	Brown	Power Positive	16	4 - GND	White	Ground Wire
4	1 - GND	White	Ground Wire	17	5 - T+	Green	Differential Positive for Encoder Axis 5
5	2 - T+	Green	Differential Positive for Encoder Axis 2	18	5 - T-	yellow	Differential Negative for Encoder Axis 5
6	2 - T-	Yellow	Differential Negative for Encoder Axis 2	19	5 - 5V	Brown	Power Positive
7	2 - 5V	Brown	Power Positive	20	5 - GND	White	Ground Wire
8	2 - GND	White	Ground Wire	21	6 - T+	Green	Differential Positive for Encoder Axis 6
9	3 - T+	Green	Differential Positive for Encoder Axis 3	22	6 - T-	Yellow	Differential Negative for Encoder Axis 6
10	3 - T-	Yellow	Differential Negative for Encoder Axis 3	23	6 - 5V	Brown	Power Positive
11	3 - 5V	Brown	Power Positive	24	6 - GND	White	Ground Wire
12	3 - GND	White	Ground Wire	25	/		/
13	4 - T+	Green	Differential Positive for Encoder Axis 4	26	/		/
This pin definition table is only applicable to six-axis robots.							

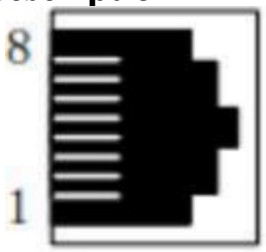
3.4 Communication Port Description

3.4.1 EtherCAT Interface Description



Ser ial Number	Def in it ion	Remarks
1	DP_PHYO_TX+	Transmit Data+
2	DP_PHYO_TX-	Transmit Data-
3	DP_PHYO_RX+	Receive Data+
4	/	
5	/	
6	DP_PHYO_RX-	Receive Data-
7	/	/
8	/	/
Note:EtherCAT is only used as a master station and does not currently support slave station functionality.		

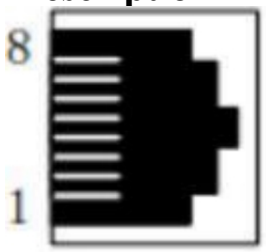
3.4.2 EtherNET Interface description



RJ45 100Mbps Ethernet port,used for connecting to PC debugging software(default IP is 192.168.1.220)

Pin Number	Definition	Remarks
1	Transceive Data+	Transmit Data+
2	Transceive Data-	Transmit Data-
3	Receive Data+	Receive Data+
4	/	
5	/	
6	Receive Data-	Receive Data-
7	/	
8	/	

3.4.3 CAN/RS485 Interface Description



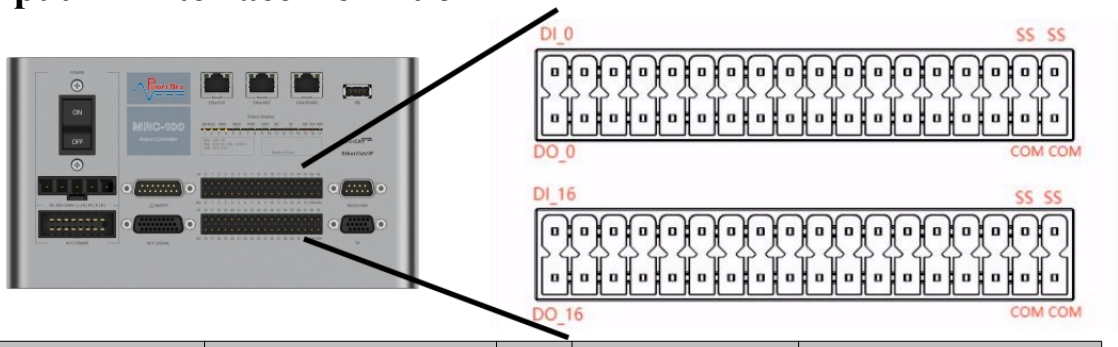
Pin Number	Definition	Remarks
1	CAN-H	High Level CAN Bus
2	CAN-L	Low Level CAN Bus
3	GND	Common Ground for RS485 Master and CAN
4	485-A	RS485 Master A
5	485-B	RS485 Master B
6	/	
7	/	/
8	/	/

3.5 Connecting Input DI

3.5.1 Input DI Port Specif icat ions

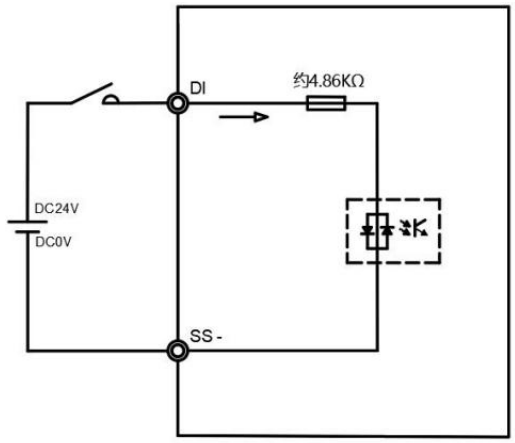
Item	Specification
Number of Input Channels	32
Input Type	Compatible with NPN and PNP(Standard NPN)
Wiring Method	Crimp-type terminal,2-wire,common ground
Common Method	One common terminal for every 16 points
Input Voltage Range	DC 24V(+10%to-10%)
Input Signal Current	7mA/DC 24V
Input Resistance	4.86kΩ
Input ON Sensitivity Current	Above 5.35mA
Input OFF Sensitivity Current	Above 2.1mA
Input Voltage Threshold	VI H_Min:15V VIL_Max:5V
Input Response Frequency	5kHz
Input Response Time	Below 0.1ms
External Input Power Range	DC 5V to 30V
Maximum Load Current	0.25A per point,2A for 8 points
Voltage Drop when ON	Below 1V
Leakage Current when OFF	0.1mA/DC 24V
Pulse Waveform	Pulse Width:Above 100us Rise/Fall Time:Below 50us
Isolation Voltage Level	1.5kVrms
Factory Configuration	16 Input Channels

3.5.2 Input DI Interface Definition



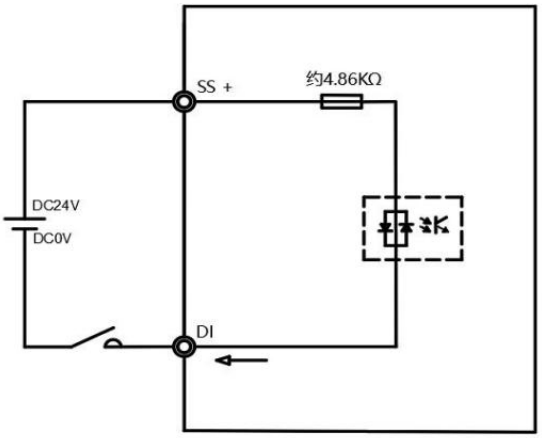
PIN	I/O Number	Name	PIN	I/O Number	Name
1	DI_0	Standard Input 0	37	DI_16	Standard Input 16
2	DI_1	Standard Input 1	38	DI_17	Standard Input 17
3	DI_2	Standard Input 2	39	DI_18	Standard Input 18
4	DI_3	Standard Input 3	40	DI_19	Standard Input 19
5	DI_4	Standard Input 4	41	DI_20	Standard Input 20
6	DI_5	Standard Input 5	42	DI_21	Standard Input 21
7	DI_6	Standard Input 6	43	DI_22	Standard Input 22
8	DI_7	Standard Input 7	44	DI_23	Standard Input 23
9	DI_8	Standard Input 8	45	DI_24	Standard Input 24
10	DI_9	Standard Input 9	46	DI_25	Standard Input 25
11	DI_10	Standard Input 10	47	DI_26	Standard Input 26
12	DI_11	Standard Input 11	48	DI_27	Standard Input 27
13	DI_12	Standard Input 12	49	DI_28	Standard Input 28
14	DI_13	Standard Input 13	50	DI_29	Standard Input 29
15	DI_14	Standard Input 14	51	DI_30	Standard Input 30
16	DI_15	Standard Input 15	52	DI_31	Standard Input 31
17	SS	Common Terminal for D I_0~DI_15	53	SS	Common Terminal for DI_16~DI_31
18	SS	Common Terminal for D I_0~DI_15	54	SS	Common Terminal for DI_16~DI_31
Note:The factory configuration is for 16 inputs.The32 input configuration is optional.					

3.5.3 Connection Method



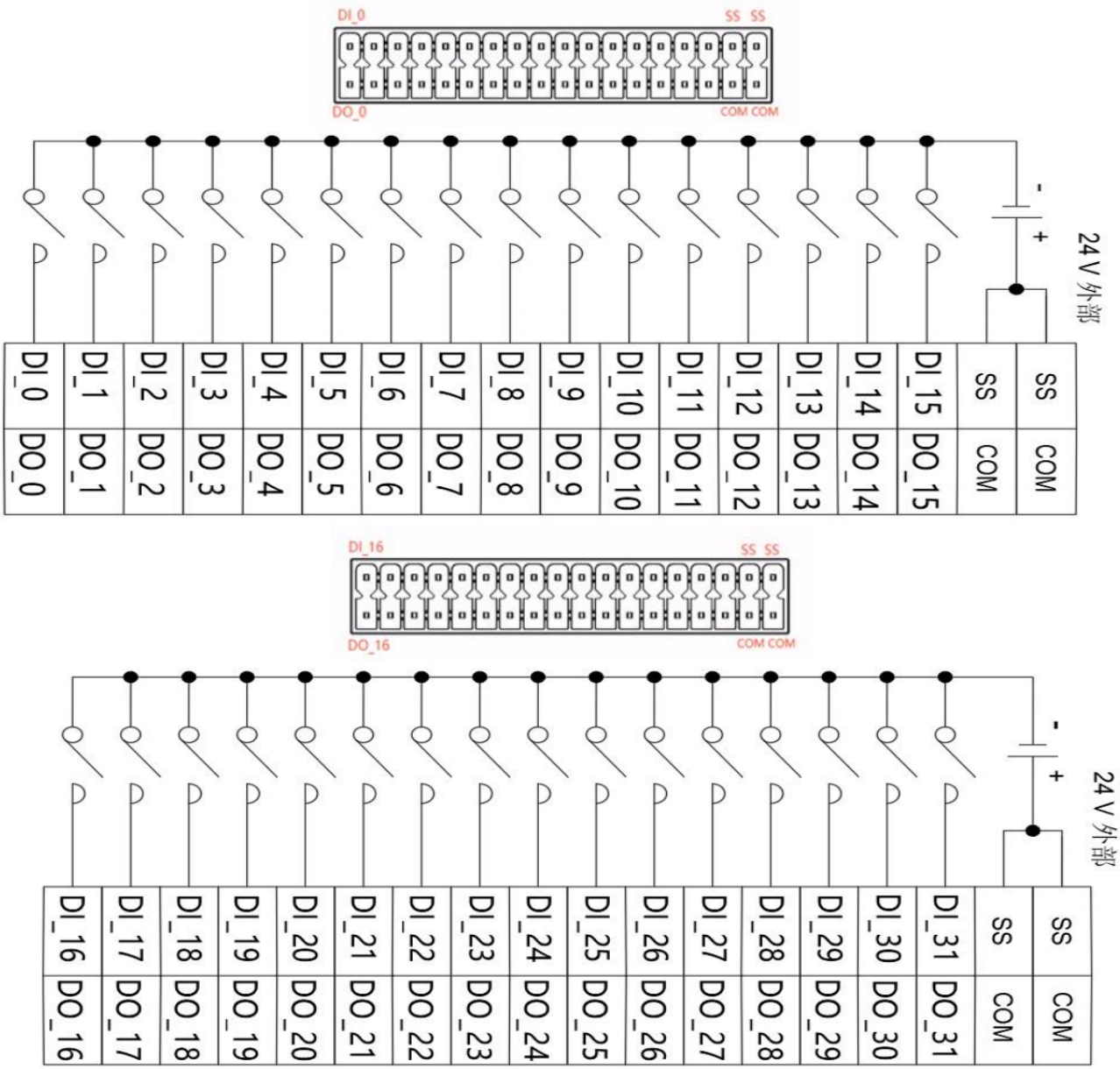
PNP

Common Cathode(SOURCE Mode)



NPN

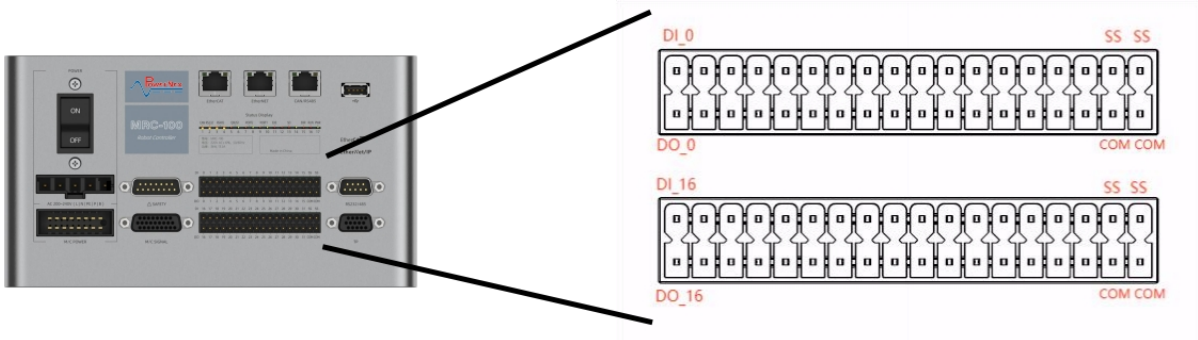
Common Anode(SINK Mode)



3.5.4 Output DO Port Specifications

Item	Specification
Number of Output Channels	32
Output Type	NPN
Wiring Method	Crimp-type terminal,2-wire,common ground
Common Method	One common terminal for every 16 points
Input Voltage Range	DC 24V(+10%to-10%)
Input Signal Current	7mA/DC 24V
Input Resistance	4.86kΩ
Input ON Sensitivity Current	Above 5.35mA
Input OFF Sensitivity Current	Above 2.1mA
Input Voltage Threshold	VIH_Min：15V VIL_Max：5V
Output Response Frequency	5kHz
Output Response Time	Below 0.1ms
External Power Range	DC 5V to 30V
Maximum Load Current	0.25A per point,2A for 8 points
Voltage Drop when ON	Below 1V
Leakage Current when OFF	0.1mA/DC 24V
Pulse Waveform	Pulse Width: Above 100us Rise/Fall Time: Below 50us
Isolation Voltage Level	1.5kVrms
Factory Configuration	16 Output Channels

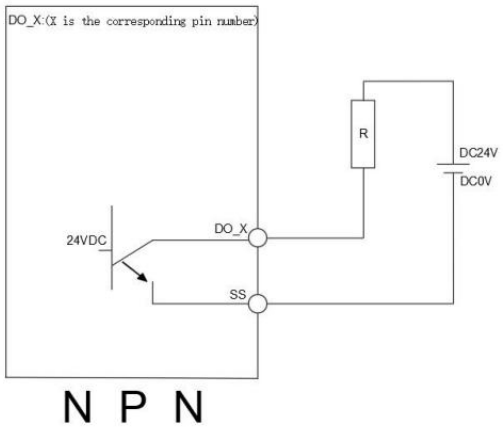
3.5.5 Output DO Port Definition

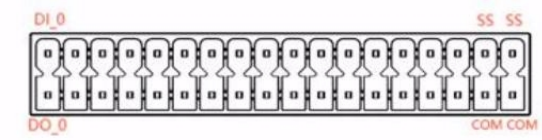


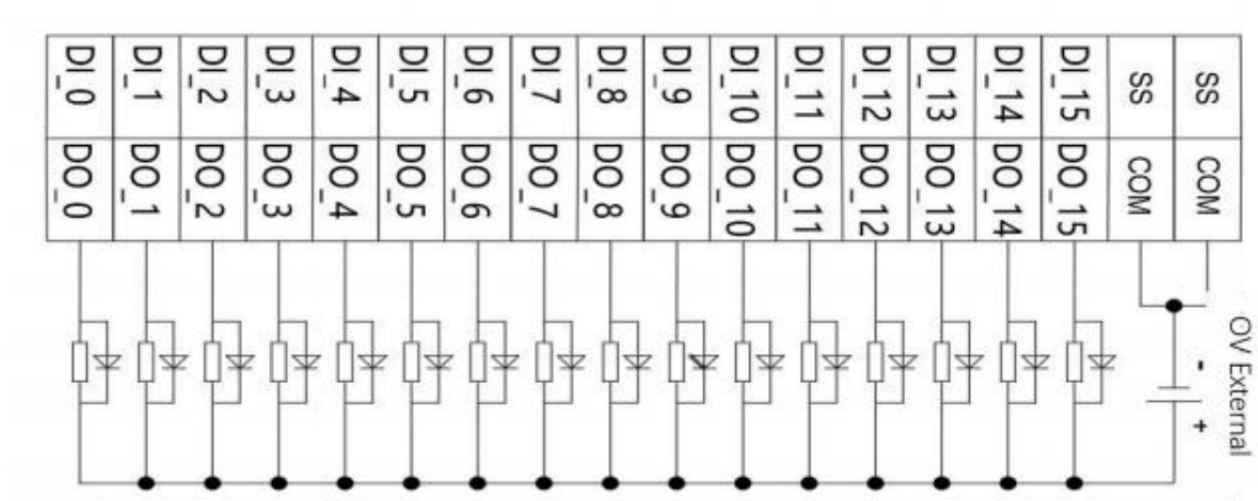
PIN	I/O Number	Name	PIN	I/O Number	Name
19	DO_0	Standard Output 0	55	DO_16	Standard Output 16
20	DO_1	Standard Output 1	56	DO_17	Standard Output 17
21	DO_2	Standard Output 2	57	DO_18	Standard Output 18
22	DO_3	Standard Output 3	58	DO_19	Standard Output 19
23	DO_4	Standard Output 4	59	DO_20	Standard Output 20
24	DO_5	Standard Output 5	60	DO_21	Standard Output 21
25	DO_6	Standard Output 6	61	DO_22	Standard Output 22
26	DO_7	Standard Output 7	62	DO_23	Standard Output 23
27	DO_8	Standard Output 8	63	DO_24	Standard Output 24
28	DO_9	Standard Output 9	64	DO_25	Standard Output 25
29	DO_10	Standard Output 10	65	DO_26	Standard Output 26
30	DO_11	Standard Output 11	66	DO_27	Standard Output 27
31	DO_12	Standard Output 12	67	DO_28	Standard Output 28
32	DO_13	Standard Output 13	68	DO_29	Standard Output 29
33	DO_14	Standard Output 14	69	DO_30	Standard Output 30
34	DO_15	Standard Output 15	70	DO_31	Standard Output 31
35	COM	Common Terminal for DO 0~DO 15	71	COM	Common Terminal for DO 16~DO 31
36	COM	Common Terminal for DO 0~DO 15	72	COM	Common Terminal for DO 16~DO 31

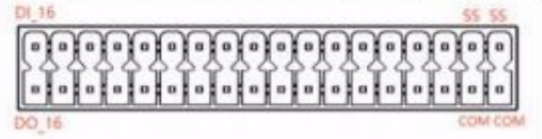
Note: The factory configuration is for 16 outputs. The 32 output configuration is optional.

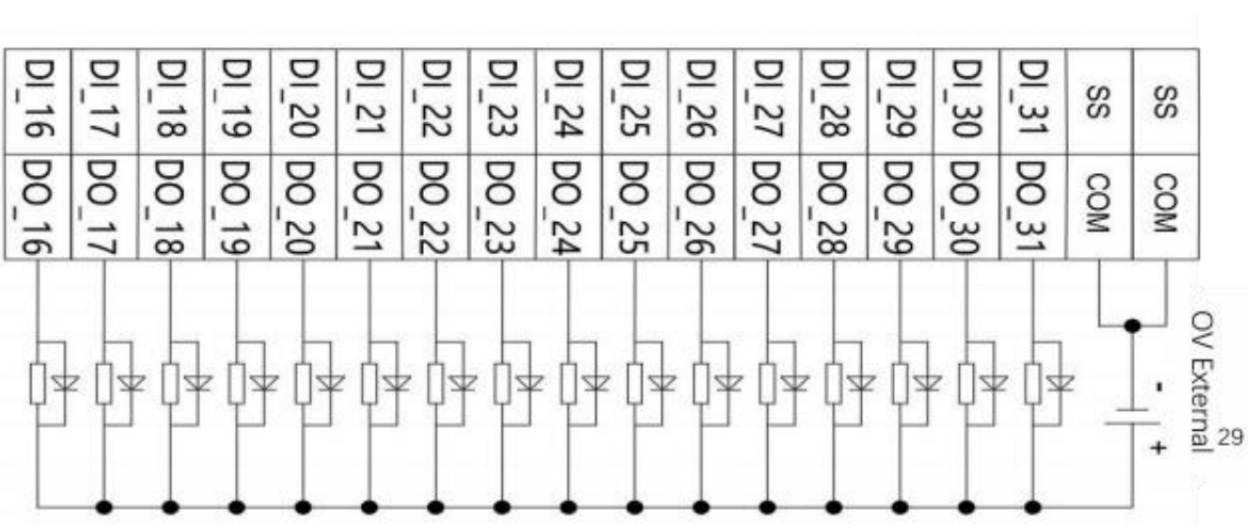
3.5.6 Connect ion Method



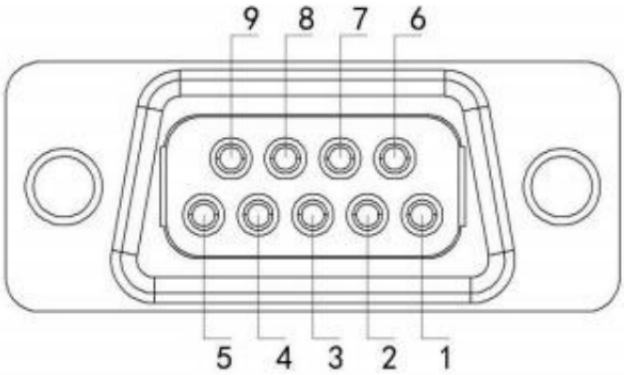








3.6 RS232/485



3.6.1 RS232/485 Interface Definition

Pin Number	Definition	Remarks
1	2RS485+	Driver(internal)RS-485 positive terminal
2	2RS485-	Driver(internal)RS-485 negative terminal
3	GND(internal)	Driver(internal)RS-485 shield ground
4	3RS485+	RS485 transmitter(TxD)
5	3RS485-	RS485 receiver(RxD)
6	RS232+	RS232 transmitter(TxD)
7	RS232-	RS232 receiver(RxD)
8	GND(common)	Shield ground
9	/	

3.7 Connecting the Teach Pendant

3.7.1 Teach Pendant Interface Definition

Pin Number	Definition	Remarks	Pin Number	Definition	Remarks
1	TX+	Teach pendant to controller communication wire	9	/	
2	TX-		10	/	
3	RX+		11	RS485+	RS485 Transmitter - Serial Port COM1
4	RX-		12	RS485-	RS485 Transmitter - Serial Port COM1
5	DC24V	Positive terminal of 24V power	13	/	
6	SDI0	Teach pendant emergency stop	14	/	
7	SDI0-1		15	DC0V	Negative terminal of 0V power
8	SDI1	Teach pendant manual/automatic input	/	/	

4.Safety function

4.1 overview

Safety functions are defined in IEC61508-1:

·safety-related systems comprising one or more electrical/electronic/programmable electronic devices;

·covers possible hazards arising from the failure of safety functions performed by E/E/PE safety-related systems;

·mainly for E/E/PE safety-related systems whose fai lure has an impact on human and/or environmental safety;

·considers E/E/PE safety-related systems,other technical safety-related systems and external risk reduction facilities so that safety specifications for E/E/PE safety-related systems can be determined in a systematic and risk-based manner.

In order to protect the operator from the dangerous action of the moving parts of the machine,reduce the risk when using the machine,and improve its safety,the robot controller has built-in safety features.

The functional safety of the robot is prevented by safe torque shutdown(STO),which prevents accidental starting and uncontrolled stopping.

Th is section descr ibes the features and uses of the STO funct ion of the robot controller.

4.2 STO Function Definition

The STO function is defined as an uncontrolled stop in the standard EN/IEC 61800-5-2 and corresponds to the stop category 0 of IEC 60204-1.

The EN/IEC 61800-5-2 standard defines the functions required for the safety of speed-regulated electric drive systems.According to this standard,when the STO function is enabled,electric motors that may cause movement will not be app lied.The STO function can be used in situations where a power outage is required to prevent accidental start-up.

4.3 Security function risk assessment

When using the STO security feature,be sure to conduct a risk assessment of the device to confirm that the device meets the security level specified in the standard.

Even when STO funct ional ity is used,the following dangers may st i ll exist:

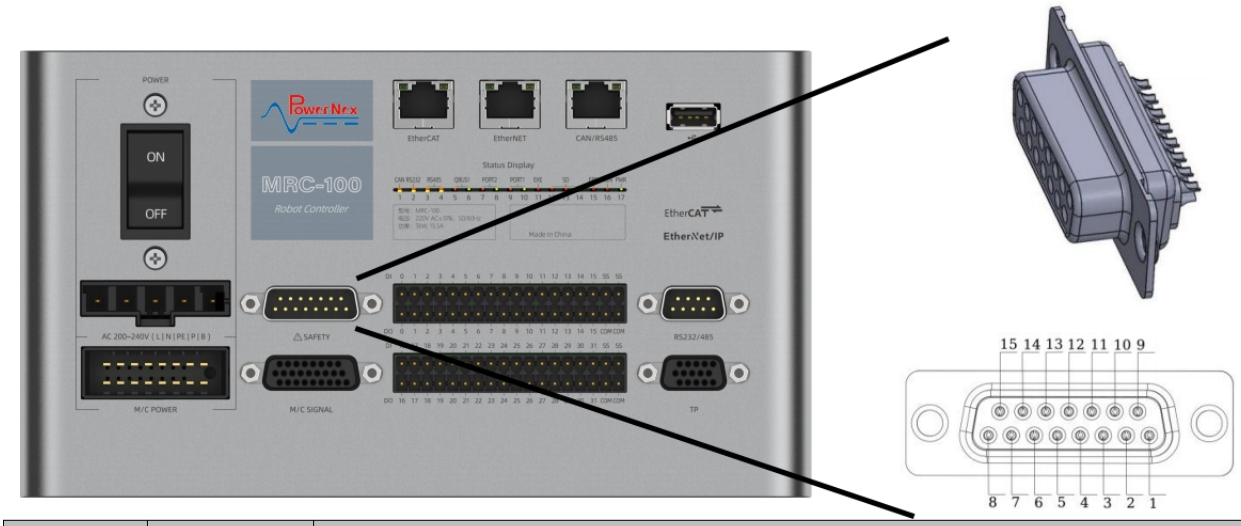
·If the power component of the servo controller fails and causes a short circuit between the servo motors,the servo motors can operate and continue to be excited within a maximum electrical Angle of 180 degrees.Be sure to use this action without causing danger.

·When mechan ical installat ion and rep lacement of the controller,p lease be sure to perform a confirmation test for this function.If a connect ion error occurs,the normal use of this function may be affected,resulting in danger.

·The input power to the controller is not cut off when this function is performed.When maintaining and inspecting the controller,please work after the power is off.

4.4 STO pin distri bution

Dec lare the approximate location and p in distribution of the STO interface in the robot controller.

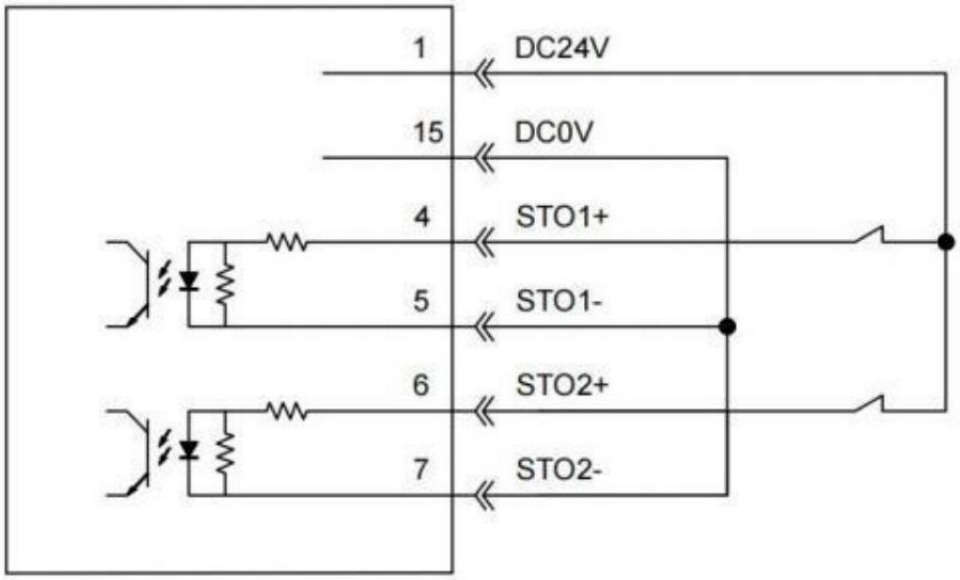


Pin Number	Definition	Remarks
1	DC24V	24V power supply positive terminal provided inside the controller
2	SDI0-1	Indicator scram access point
3	DC0V	
4	STO1+	Internal ST0 port 1 of the controller
5	STO1-	
6	STO2+	Internal ST0 port 2 of the controller
7	STO2-	
8	SDO0	System alarm status output(low)
9	SDO1	Program running status output(low)
10	/	/
11	/	/
12	/	/
13	/	/
14	/	/
15	DC0V	24V power supp ly negat ive terminal provided ins ide the controller
The default factory STO1/2 has already shorted the internal power supply		

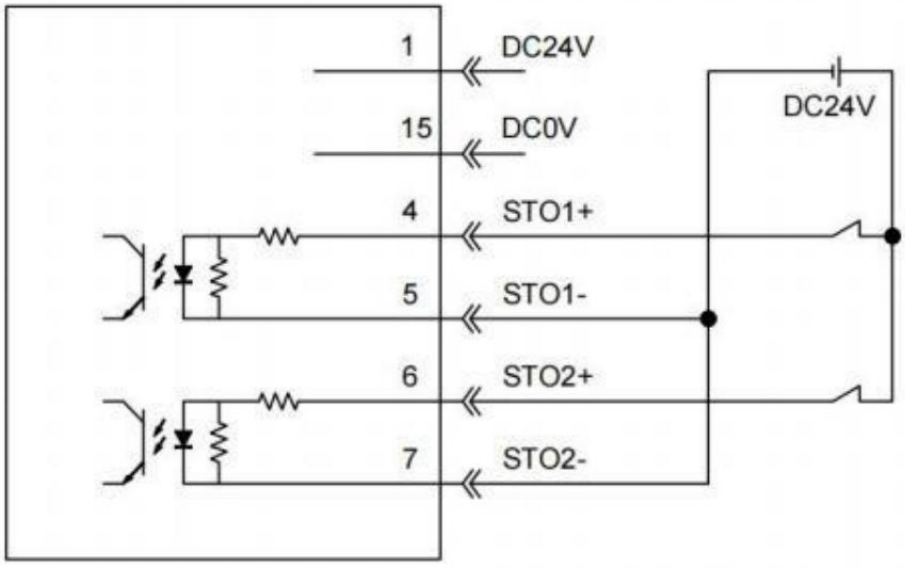
4.5 STO function implementation and wiring

The safe torque off(STO)function of the robot controller is to forcibly turn off the drive signal of the power device inside the servo driver from the safety input signal through the hardware circuit,thus turning off the output torque of the motor.

STO Connected to Internal 24V Power Supply



STO Connected to External 24V Power Supply



4.6 STO action timing

STO act ion sequence d iagram dur ing normal operat ion of robot controller: