[User Guide] SRC-F10 \ SRC-R10-EN-V1.0

SRC-F10 \ SRC-R10Core Controller

Instructions for Use

Thank you for your purchase.

Only qualified personnel who have received corresponding operation training and obtained qualifications are allowed to use this product.

Please refer to EN-1525:1997 specification for suggestions on using this product to manufacture mobile robots.

The use and maintenance behavior of mobile robots manufactured by this product shall comply with GB T 36507-2018 safety specifications for the use, operation and maintenance of industrial vehicles.

Disclaimer

We have checked the content of this document. However, it cannot be guaranteed that the description is completely consistent with the product. We will often check the content of the description and make necessary corrections in subsequent editing.

Technical data are subject to change without prior notice.

Tips

- Please read the product description carefully before using the product.
- Do not disassemble the controller for unauthorized maintenance personnel. Before use, please fix the controller on a stable plane.
- Please keep the controller dry to avoid overheating of components in the case, and do not cover or block the heat dissipation port.
- Before connecting the controller to the power supply, please confirm the power supply voltage value and the connection mode of the power supply terminals meet the requirements.
- Please place the power cord where it will not be trampled, and do not pile up anything on the power cord.
- Before you need to connect or unplug any device, make sure that all power cables have been unplugged in advance.
- Please pay attention to all the precautions and warnings mentioned in the manual. If an exception occurs during the use of the device, contact a professional.
- Please do not place or store the equipment in an environment with an ambient temperature higher than 70°C, otherwise it will cause irreversible damage to the equipment.
- This document cannot replace the technical agreement. If the content in this document conflicts with the technical agreement, please refer to the technical agreement or contract description.
- Shanghai Seer Intelligent Technology Corporation reserves the right to finally interpret the terms of this document.

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Table of Contents

Document History

Version	Date of publication	Explanation
V1.0	2025-3-11	First edition

1. Overview

1.1 Product introduction

This product is a general controller designed for mobile robots (AGV, AMR, etc.), providing mobile robots major functions with core map construction, positioning and navigation, model editing and others. The controller is adapted to a variety of mainstream laser radars, and provides rich I/O, CAN, RS485 and other interfaces for connecting various sensors and driver equipment. This product integrates the core components of mobile robots into one, and with powerful client software, it can help users to quickly complete the manufacture and application of mobile robots.

1.2 Feature overview

Boot mode	Provide a one-click system switch interface
Digital input	Provide 10 digital input interfaces
Digital output	Provide 10 controllable power supply output interfaces
Power supply monitoring	Monitoring system power supply voltage, battery power status

Battery management	For batteries with output switches, provide corresponding battery switch management ports.
Emergency stop	Provides the function of one emergency stop input and one emergency stop output.
Communication bus	Provide RS485, CAN, Ethernet, USB and other communication bus interfaces
Attitude induction	The built-in six-axis acceleration sensor can accurately sense the attitude of the controller.
Warm and wet environment	Built-in temperature and humidity sensors can effectively sense the environment inside the controller.
Network interface	Integrated two-port Gigabit network switch and 2.4/5GHz Dual-frequency Wifi.

Table 1-1

1.3 Product size and environment

Overall size: 171 * 118.5 * 38mm

Operating temperature: -30 °C~ 55 °C

Working humidity: 10~ 90% relative humidity, no condensation

Storage temperature: -30 °C~ 70 °C

Protection level: IP20

1.4 External power supply requirements

Overall specifications	The mobile robot is powered by battery, and the battery has two commonly used specifications, 24V and 48V. The controller needs to provide stable 24V power supply through stabilized power supply or stabilized module. (It cannot be connected to the same power source as inductive loads.)
Voltage	24V（±10%）
Ripple and noise	150mVpp
Overall power	12W (Excluding Power DO load)

Table 1-2

1.5 Size and installation

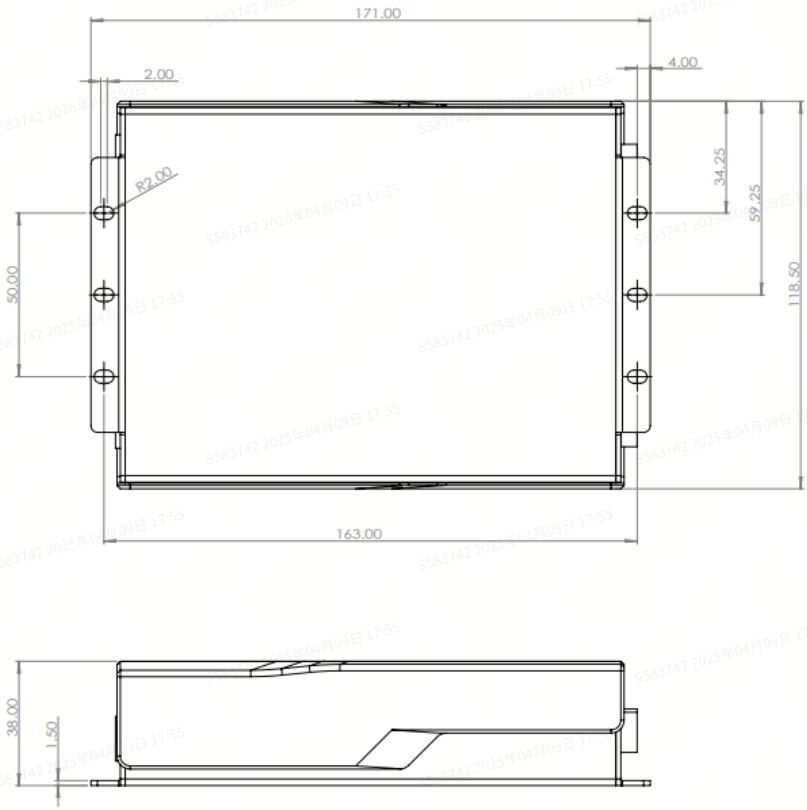


Figure 1-1

1.6 Gyroscope coordinates

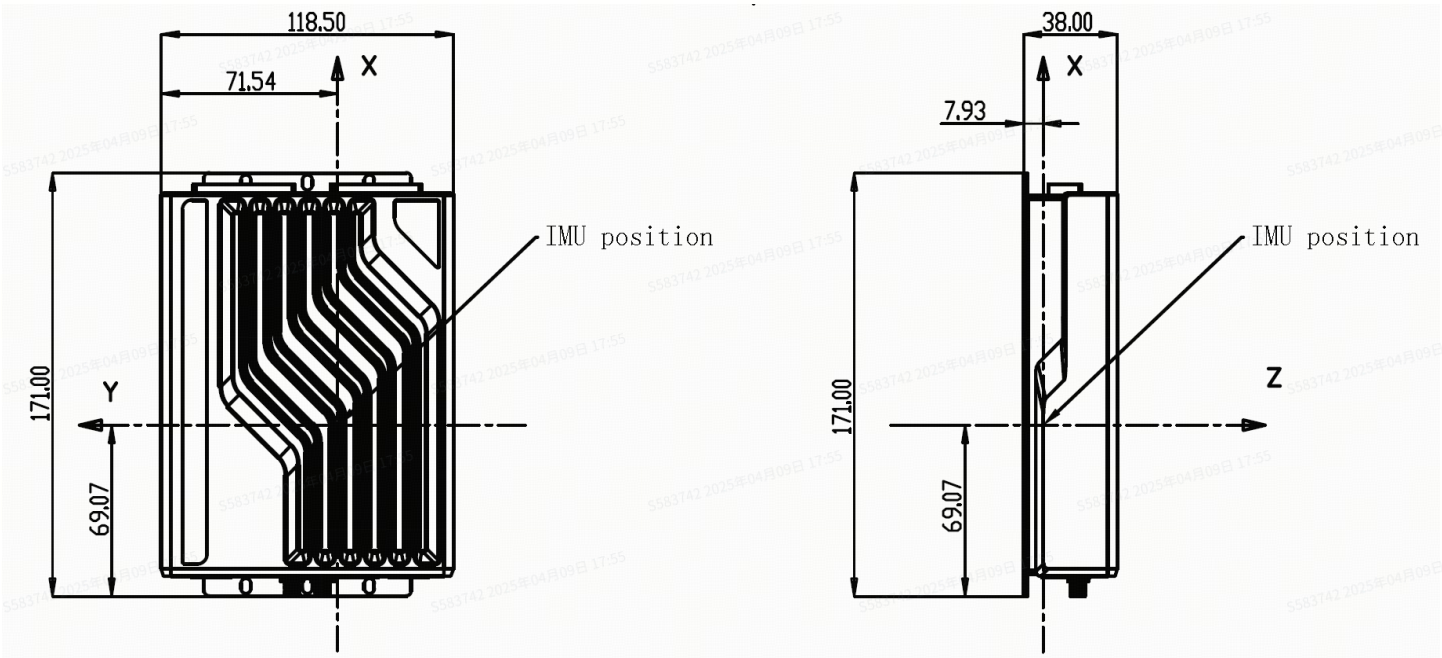


Figure 1-2

2. Operation Principle

2.1 Interface definition

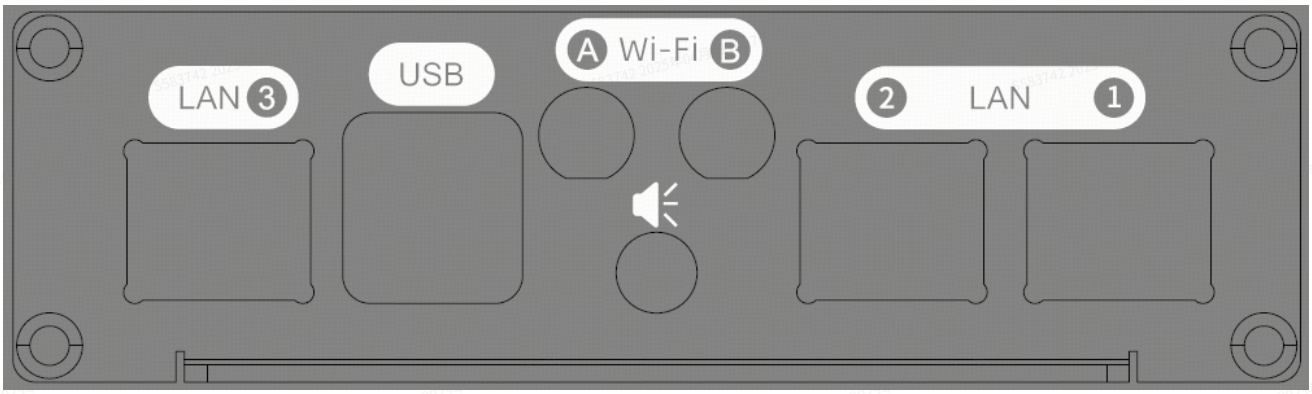


Figure 2-1

From left to right: Network port 3, USB, WiFi-A, WiFi-B, audio interface, Network port 2, Network port 1

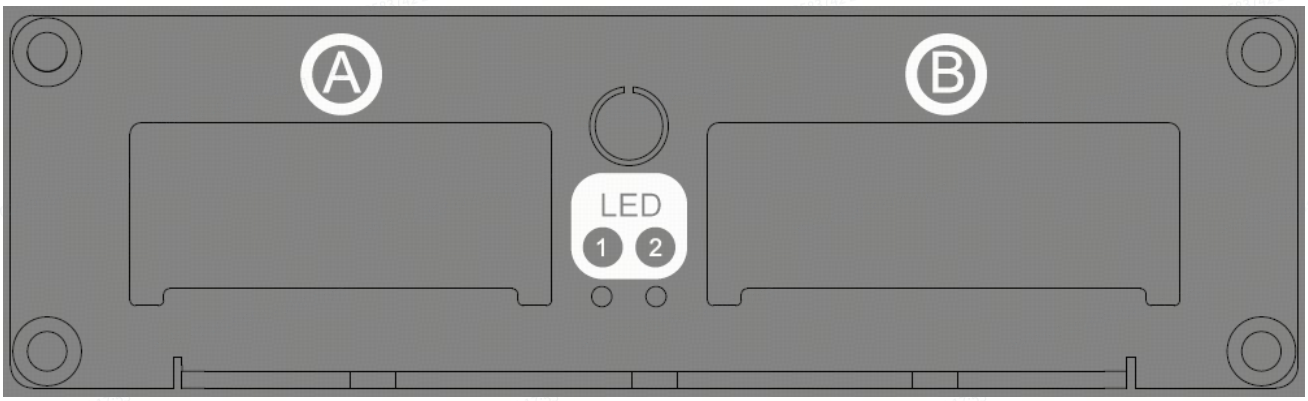


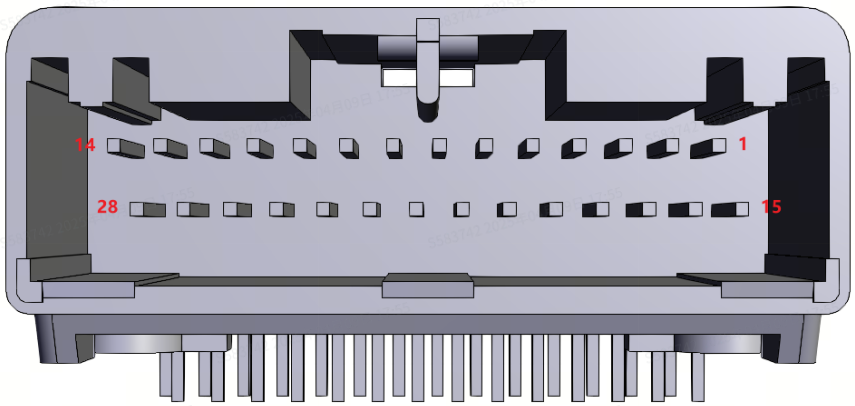
Figure 2-2

Public view of the connector

	LED1 status	LED2 status	System state
Normal boot process light indication	Slow flashing (once every 1s)	Remains off	Power on the controller, turn on the battery switch, and wait for the serial port boot status signal.
	Simultaneous slow flashing (once every 1s)	Simultaneous slow flashing (once every 1s)	Serial port boot status signal received and wait for the WiFi boot signal.
	Always bright	Slow flashing (once every 1s)	Turn on WiFi power and wait for PMU Server heartbeat packet.
	Always bright	Always bright	The PMU Server heartbeat packet received, and the controller has completed normal boot process.

Abnormal state	Always bright	Remains off	PMU Server heartbeat packet lost.
	Slow flashing (once every 1s)	Always bright	Press the button.
Upgrade	Simultaneous flashing (once every 0.5s)	Simultaneous flashing (once every 0.5s)	Firmware upgrade.
	Alternating slow flashing (once every 1s)	Alternating slow flashing (once every 1s)	BootLoader upgrade.

A: J2



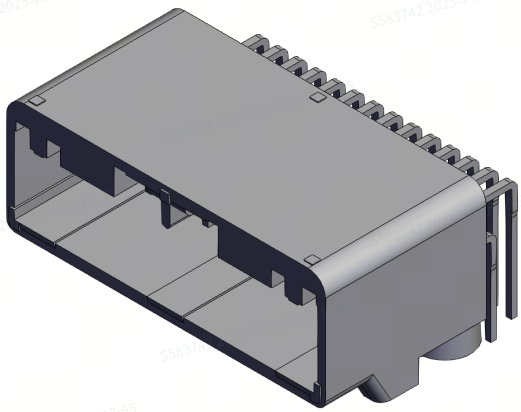
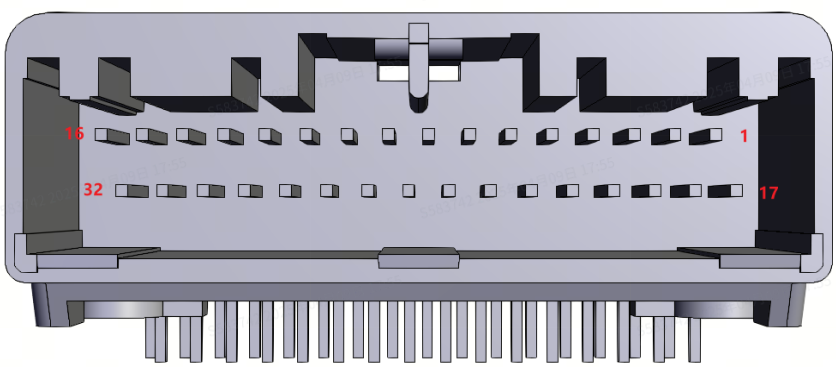


Figure 2-3 Figure 2-4

B:J1



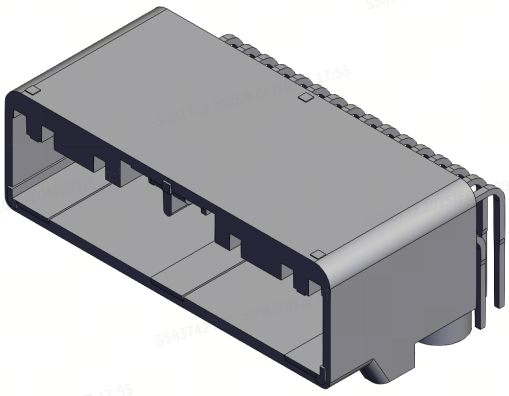


Figure 2 - 5 Figure 2 - 6

2.2 Connector pin definition

A: 28Pin connector J2

[1]RS485_A0 (Isolated type, and battery communication is recommended) (Enter/dev/RS485_0 in the model)	[15]GND08
[2]RS485_B0 (Isolated type, and battery communication is recommended) (Enter/dev/RS485_0 in the model)	[16]Power-on indicator light
[3]RS485_A1 (Enter/dev/RS485_1 in the model)	[17]N.C
[4]RS485_B1 (Enter/dev/RS485_1 in the model)	[18]N.C
[5]RS485_B6 (Enter/dev/RS485_6 in the model)	[19]N.C
[6]RS485_A6 (Enter/dev/RS485_6 in the model)	[20]RS485_GND (Isolate the ground of RS485, and use it in combination with pins 1 and 2)
[7]CAN_H1 (isolated type) (Select port1 in the model)	[21]CAN_H2 (isolated type) (Select port2 in the model)
[8]CAN_L1 (isolated type) (Select port1 in the model)	[22]ICAN_L2 (isolated type) (Select port2 in the model)
[9]GND07	[23]CAN_GND (Isolate the ground of CAN, and use it in combination with pins 7, 8, 21 and 22)
[10]VBAT_DET (Battery voltage detection, it is used as a charging station controller)	[24]DO_04
[11]N. C (CAN_L3, for maintenance)	[25]BAT_SWITCH_O
[12]N. C (CAN_H3, for maintenance)	[26]BAT_SWITCH_N
[13]EM_OUT1-	[27]BOOT_KEY

[14]EM_OUT1+	[28]EMC_KEY

Table 2-1

B: 32Pin connector J1

[1]GND01	[17]24V input +
[2]GND02	[18]24V input +
[3]DO_03	[19]DO_07
[4]DO_02	[20]DO_06
[5]DO_01	[21]DO_05
[6]DO_00	[22] GND03
[7]DO_09	[23] GND04
[8]DO_08	[24] GND05
[9]DI_09	[25]DI_08
[10]DI_00	[26]DI_04
[11]DI_01	[27]DI_05
[12]DI_02	[28]DI_06
[13]DI_03	[29]DI_07
[14]DI_CHG_IN (Manual charging signal input)	30. RS485_A4 (Enter/dev/RS485_4 in the model)
15. RS485_A3 (Enter/dev/RS485_3 in the model)	31. RS485_B4 (Enter/dev/RS485_4 in the model)
16. RS485_B3 (Enter/dev/RS485_3 in the model)	[32]GND06

Table 2-2

Note: Different colors represent different function blocks.

2.3 Emergency stop interface

- SRC-F10\SRC-R10 provides an emergency stop switch of one normally closed logic.
- The emergency stop input signal pin of SRC-F10\SRC-R10 is J2-28. The emergency stop switch should use a normally closed logic switch. The internal of the controller is set to pull up by default. Externally, it is only necessary to connect the signal to the normally closed emergency stop button and then pull it to the ground.
- See "Figure 2-5" for the logic diagram of emergency stop input.

Figure 2-5

- The SRC-F10\SRC-R10 has a set of independent dry contact switches, which are used as emergency stop output signals. The output signal pins are distributed at 13/14 pins of J2 connector, and the maximum output is 120mA. See "Figure 2-6" for the logic diagram of emergency stop output.

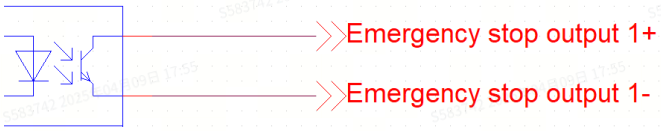


Figure 2-6

2.4 DI interface

The DI of SRC-F10\SRC-R10 supports the detection of sensors with NPN output. When the DI input signal pin is at a low level (GND), it is in the triggered state. When it is floating or connected to a 24V high level, it is in a non-trigger state.

- The SRC-F10\SRC-R10 has a total of 10 DI input interfaces.
- It has an independent detection port for detecting the connection of a manual charger.
- Please use the DI interface function after wiring according to the correct wiring definition.
- The logic diagram of the interface is shown in "Figure 2-7".

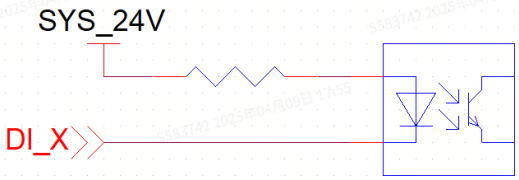


Figure 2-7

2.5 One-key power-on/off interface

For the selection of the power-on button, it is recommended to give priority to the self-reset button with 1NC + 1NO + LED. The signal pin J2 - 27 is connected to the normally closed end of the self-reset button, and the other end of the switch is connected to GND. The power-on logic diagram is shown in "Figure 2 - 8".

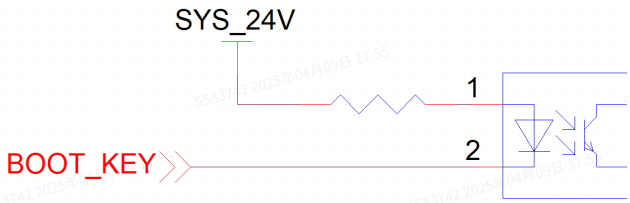


Figure 2-8

The two ends of the normally open contact on the power-on key are connected to J2-25 and J2-26 respectively. If you want to achieve one-key power on and off, that is, the battery switch is controlled by the controller, you also need to connect the battery switch to J2-25 and J2-26.

After pressing the boot key, the NO switch closes, causing the connected battery switch to close, so that the battery supplies power externally. At the same time, after pressing the power-on button, the NC switch disconnects. The system detects the boot signal, and the controller will electronically lock the battery switch at both ends of the NO contact through an electronic self-locking switch to keep the battery switch closed. The internal logic diagram of the battery switch control is shown in "Figure 2-9".

Figure 2-9

2.6 Charging signal

The controller provides a manual charging indication signal. When the robot is not being charged, the manual charging signal is left in suspension. When the robot is connected to a manual charger, the manual charging signal is connected to the ground, and the controller receives the manual charging signal.

2.7 Communication interface

- The SRC-F10\SRC-R10 controller provides three standard CAN interfaces. Among the three CAN interfaces, two are isolated CAN interfaces (CAN1 and CAN2) and one is non-isolated CAN interface (CAN3).
- Connect the corresponding isolated ground for the isolated bus.
- Connect the motor driver to CAN1 and CAN2.
- CAN3 is used for controller upgrade maintenance and is not used in normal times.
- To be compatible with different devices, the CAN interface of the controller is equipped with a 120-ohm terminal resistor by default. The CAN interface is generally used to connect motor drivers.
- The SRC-F10\SRC-R10 controller provides 5 channels of RS485, all of which are controlled by the main chip (RS485_0, RS485_1, RS485_3, RS485_4, RS485_6).
- The RS485 interface is generally used to connect ambient lights, QR code cameras, batteries, etc.
- RS485_0 is an isolated RS485 and can be used for battery communication.
- Please use the communication function after correctly connecting the wires according to the wiring definition.

2.8 DO output interface

- The SRC-F10\SRC-R10 controller provides 10 digital output interfaces. The device outputs are all PNP-type outputs, providing an external output voltage of 24V.
- The switching state of each DO interface can be individually controlled via software.
- When the actuator belongs to inductive load, such as a relay, contactor, solenoid valve, etc., a fly-back diode needs to be added to the actuator to eliminate the interference of the back electromotive force generated when the inductive load is disconnected on the system circuit. For the connection method of the fly-back diode, please refer to Appendix 2: Inductive Loads Connection Method.
- Please use the DO output function after correctly connecting the wires according to the wiring definition.

- The maximum load capacity of DO8 - DO9 is 24V/1A, and the rest support a maximum of 24V/0.4A. (Current accuracy: ±15%)

2.9 Power interface

- The power supply voltage of SRC - 1X00 is 24VDC. An external DCDC is used for power supply, with a ripple requirement of ⩽150mVpp. The minimum working current of the system is 500mA (excluding the power supply requirements of DO).
- If there is an external DO output, please use a suitable DCDC.
- Motor drivers or other large power equipment are prohibited from sharing a DCDC with the controller.
- Please connect the power cord of SRC-F10\SRC-R10 correctly according to the wiring definition before turning on the controller. Be sure to check that the wiring is correct before turning it on. Note that the positive and negative poles should not be reversed.

2.10 Power indicator light interface

- The 16th pin of J2 on the SRC-F10\SRC-R10 controller is the power-on indicator light interface, which outputs an external voltage of 24V and can provide a current of 500mA.

2.11 External interface

- In addition to J1 and J2, the controller also provides 3 RJ45 Ethernet interfaces, 2 SMA antenna interfaces, 2 USB 3.0 interfaces, and 1 audio interface.
- Network ports 1 and 2 are Gigabit Ethernet ports with switching functions. They are generally connected to external sensors or used as debugging ports and cannot be used to expand WiFi.
- Network port 3 is a 100Mbps Ethernet port and is an independent port. It is not configured with a fixed network segment and can be defined by users according to their needs. It is used to expand WiFi, serve as a debugging port, connect external devices, etc.

3. Reference Electrical Schematic Diagram

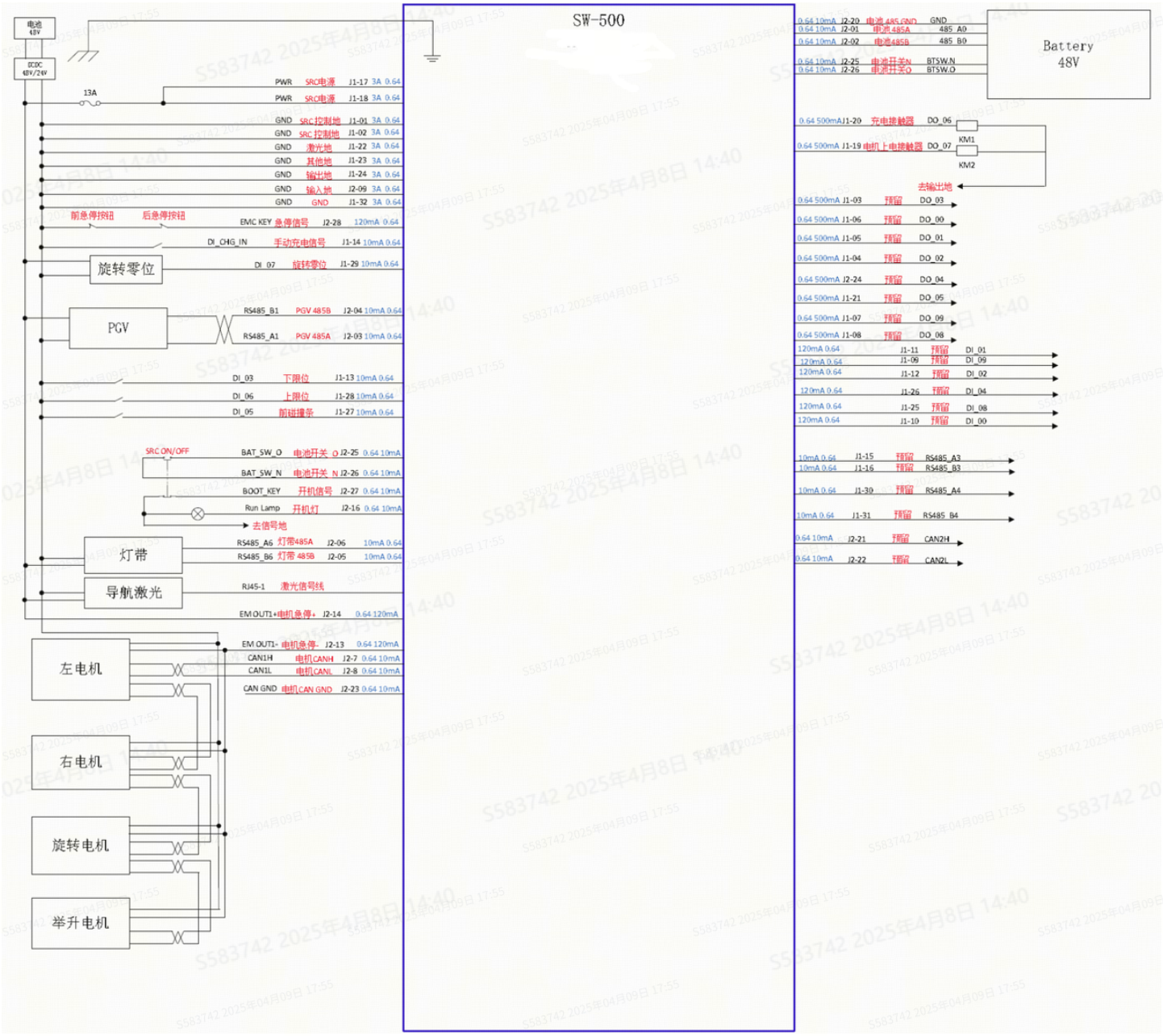


Figure 3-1

4. Wire Harness Drawing

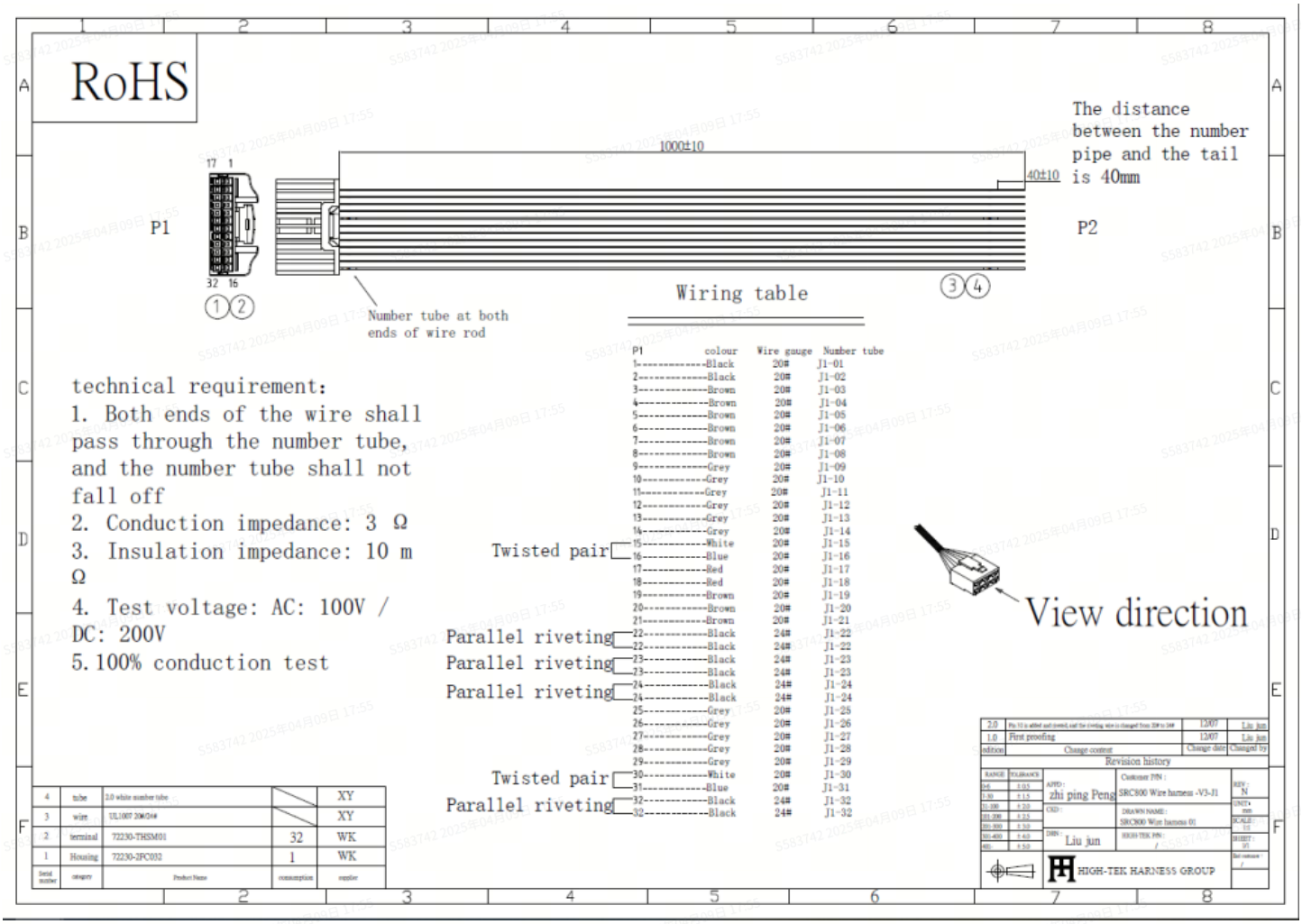

RoHS
The distance between the number pipe and the tail is 40mm
P1
P2
1000±10
40±10
Number tube at both ends of wire rod
Wiring table
technical requirement:
1. Both ends of the wire shall pass through the number tube, and the number tube shall not fall off
2. Conduction impedance: 3 Ω
3. Insulation impedance: 10 m Ω
4. Test voltage: AC: 100V / DC: 200V
5. 100% conduction test
Twisted pair
Parallel riveting
Twisted pair
Parallel riveting
View direction
HIGH-TEK HARNESS GROUP

Figure 4-1

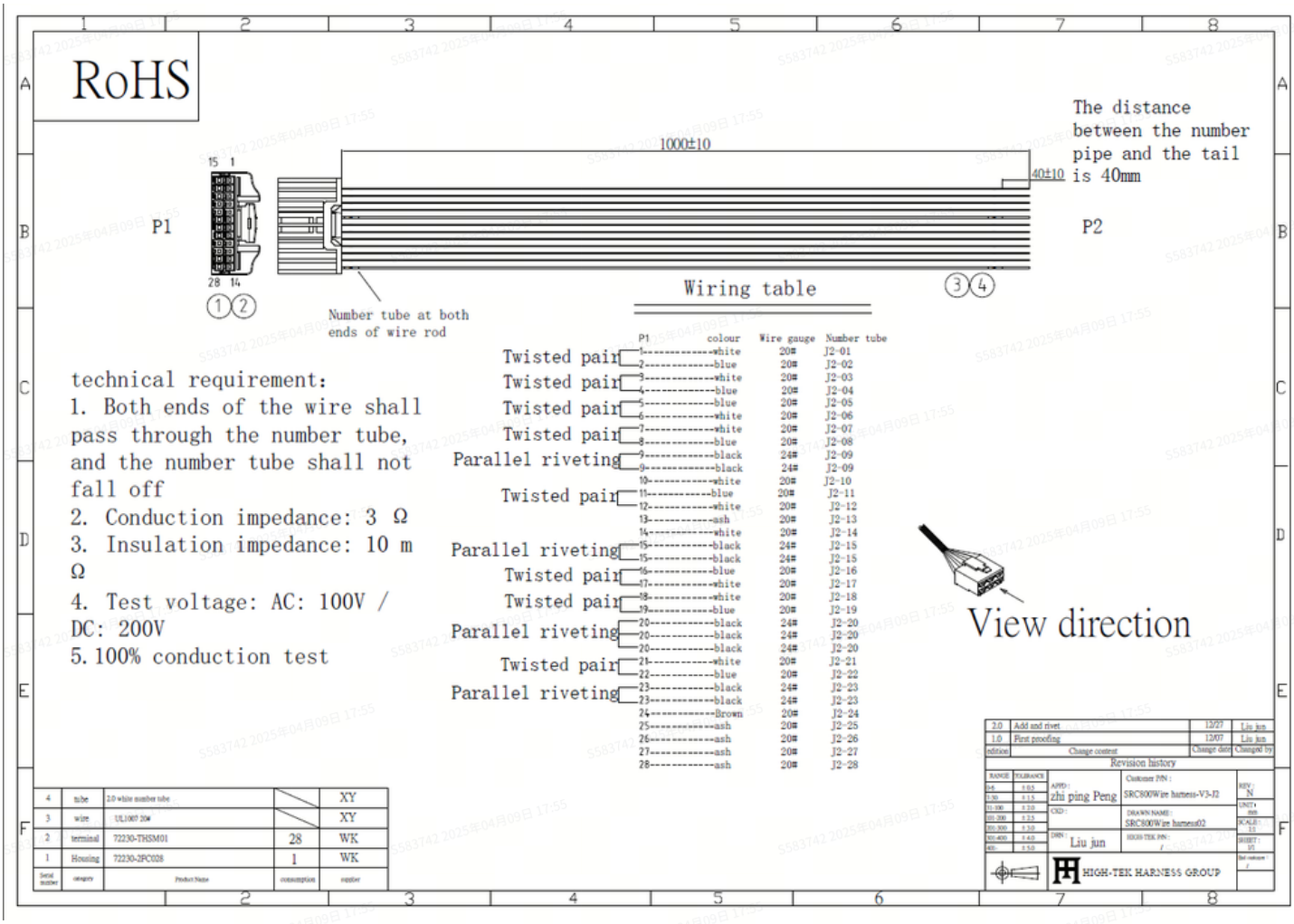


Figure 4-2

5. Precautions

Please be sure to follow the following requirements, otherwise it may affect safety or cause damage to the controller.

1. For safety reasons, please be sure to choose the battery with short-circuit protection. If you are not sure, please add an air switch at the battery output.
2. To improve the safety of the controller and the entire vehicle, the controller shell should be connected to the vehicle body, and the vehicle body must be grounded through a well-conducting ground connection.
3. Please insulate the exposed wires.
4. For RS485 and CAN cables, please use evenly twisted-pair cables. Connect the isolated bus to the isolated ground. Connect the non-isolated bus to the controller system ground.
5. Before plugging or unplugging the J1 and J2 connectors, please power off the controller.
6. When shutting down, please press the power-off button. Do not turn off the battery directly, otherwise it is likely to cause hardware or software failures of the controller.

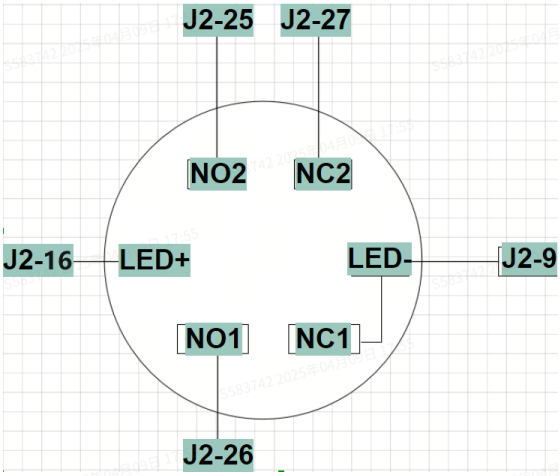
7. It is prohibited to install other software programs inside the controller system, otherwise it will lead to unpredictable errors.
8. Do not connect inductive loads such as DO motors to the DCDC power supply that powers the controller.

It is recommended to follow the following steps for the first power-on test:

1. Check whether the terminal block is well grounded.
2. Check whether the positive and negative poles of the terminal block are mixed.
3. Check whether the controller is well grounded.
4. Check whether the positive pole of the DCDC input terminal is short-circuited to the ground.
5. Check whether the positive pole of the DCDC output terminal is short-circuited to the ground.
6. Check whether the positive pole of the motor power supply is short-circuited to the ground.
7. Check whether the positive and negative poles of the motor power supply are reversed.
8. Check whether the positive pole of the laser power supply is short-circuited to the ground.
9. Check whether the positive and negative poles of the laser power supply are reversed.
10. Before the first power-on, disconnect the laser power supply and the motor driver power supply.
11. If there is no abnormality during power-on, connect the motor driver power supply and power on after shutting down.
12. If there is no abnormality during power-on, connect the laser power supply and power on after shutting down.
13. Start the debugging test.

Appendix 1 Common Questions

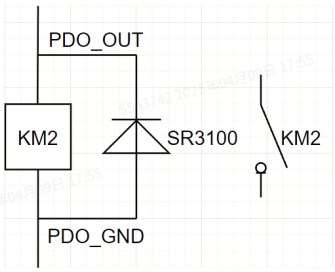
1. Power-on key connection method



2. Inductive load connection method

How should inductive loads such as relays and contactors be connected to the DO port?

Inductive loads such as relays, contactors, and solenoid valves must be connected with fly-back diodes to eliminate the interference caused by the back electromotive force generated when the inductive loads are disconnected to the system circuit. The cathode of the fly-back diode should be connected to the DO output, and the anode should be connected to the DO ground.



The possible interference hazards if the fly-back diode is not added:

- The laser communication will be interfered, and the controller may issue an alarm indicating that the laser connection has failed.
- The Linux system of the controller crashes. The network interface at 192.168.192.5 cannot communicate, and Roboshop cannot be connected.
- Both 192.168.192.4 and 192.168.192.5 cannot communicate.

When connecting a contactor, please determine the internal resistance and take-off current of the contactor coil, and do not exceed the output current (1A) of the PDO.

The recommended model of the diode: SR3100

Maximum Ratings and Electrical Characteristics @T_A=25°C unless otherwise specified

Single Phase, half wave, 60Hz, resistive or inductive load.
For capacitive load, derate current by 20%.

Characteristic	Symbol	SR320	SR330	SR340	SR350	SR360	SR380	SR3100	SR3150	SR3200	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	20	30	40	50	60	80	100	150	200	V
RMS Reverse Voltage	$V_{R(RMS)}$	14	21	28	35	42	56	70	105	140	V
Average Rectified Output Current @T_L = 95°C (Note 1)	I_O	3.0									A
Non-Repetitive Peak Forward Surge Current 8.3ms Single half sine-wave superimposed on rated load (JEDEC Method)	I_{FSM}	80									A
Forward Voltage @I_F = 3.0A	V_{FM}	0.5			0.75		0.85		0.92		V
Peak Reverse Current @T_A = 25°C At Rated DC Blocking Voltage @T_A = 100°C	I_{RM}	0.5 20							0.02 10		mA
Typical Junction Capacitance (Note 2)	C_j	250									pF
Typical Thermal Resistance (Note 1)	$R_{\theta JA}$	20									°C/W

3. The impact of a delayed battery output after the battery switch is closed on startup

If you use the battery switch of the controller to control the battery's power supply to the outside and disconnection of the external power supply, and there is a delay in the power output after the battery switch is closed, you need to press and hold the power-on button. The holding time must be longer than the time of the battery's delayed output. After the power-on light turns on, release the power-on button immediately.

Appendix 2 Glossary

English abbreviation	Chinese name
SRC	Seer Robotics Controller
DI	Digital input
DO	Digital output
RS232	Standard Asynchronous Transmission Interface
RS485	Standard API for differential asynchronous transmission
CAN	Controller local area network
RJ45	eight-core ethernet twisted pair socket
DCDC	DC-DC stabilized power supply