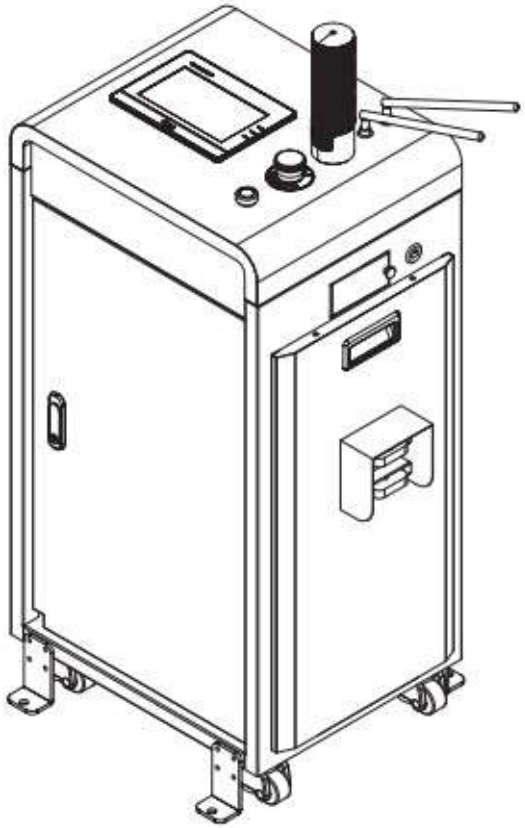
ROBOT Outsourcing Provider Co., Ltd.

Automatic Charging Pile for Forklifts



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Contents

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1 Preface

1.1 Reading Tips

1.1.1 Charging pile and forklift charging pile appeared separately in this document are abbreviations.

1.1.2 Read the User Guide carefully before using the charging pile.

1.1.3 Disassemble and assemble the charging pile by authorized personnel only.

1.1.4 Pay attention to the safety warnings involved in this User Guide.

1.1.5 Contact your dealer immediately in case of any charging pile abnormality.

1.1.6 If you smell an unusual odor when using the charging pile, please cut off the power supply immediately.

1.1.7 The User Guide cannot be used as a substitute for the technical agreement.

1.2 Operational Prohibitions

1.2.1 It is prohibited to use it in an outdoor environment.

1.2.2 It is prohibited to use it in an environment full of dust, powder, and other explosive hazards.

1.2.3 It is prohibited to use it in an environment with high salt content (marine climate).

1.2.1 It is prohibited to use it in extremely severe environments (extreme climate, cold storage, strong magnetic fields, etc.).

2 Safety

Before starting and operating R600LTR-B, please read the contents of this section.

Attention

- Seer disclaims any or all liability if the charging pile or its accessories are damaged, changed or modified in any way.
- Seer cannot be held responsible for any damages caused to the charging pile, accessories or any other equipment due to programming errors or malfunctioning.

2.1 Types of Safety Information

This document contains the following types of safety information.

Warning

- Indicated a potentially dangerous situation that may cause death or serious injury.
- Appropriate preventive measures shall be taken to avoid damage or injury.

Caution

- Indicates a potentially dangerous situation that may cause minor or moderate personal injury, or a prompt to avoid unsafe behavior.
- Appropriate preventive measures shall be taken to avoid damage or injury

Attention

- Indicates important information, including conditions that may cause equipment damage or property loss.

2.2 General Safety Precautions

This chapter contains the general safety precautions.

Installation Location and Precautions

- Please do not install the charging pile in areas with explosive hazards (Zone 0, 1, 2). The sparks generated by static electricity may result in fire or explosion.

Precautions for Electric Shock

- There is a risk of electric shock if you touch the energized parts of the charging pile.
- It is strictly forbidden to disassemble the shell of the charging pile while charging.
- It is strictly forbidden to take out the battery of the robot for charging, otherwise there is a risk of electric shock.

Precautions for Grounding

- There is a risk of electric shock if the charging pile is not grounded.
- The forklift charging pile is equipped with a three-wire (grounded) plug, please use a standard three-wire (grounded) outlet.

Precautions for Operators

- Only those who have received training and qualified correspondingly are allowed to use this charging pile.
- Operation by children is strictly prohibited.

Precautions for Charging

- Use the original charger (48V).

Precautions for Charging

- This forklift charging pile can only be used to charge SFL series of robots.
- Using this forklift charging pile to charge other robots or battery packs will damage the charging pile.
- Do not place or drop metal parts on pole pieces of the charging pile during the charging.

Precautions for Use

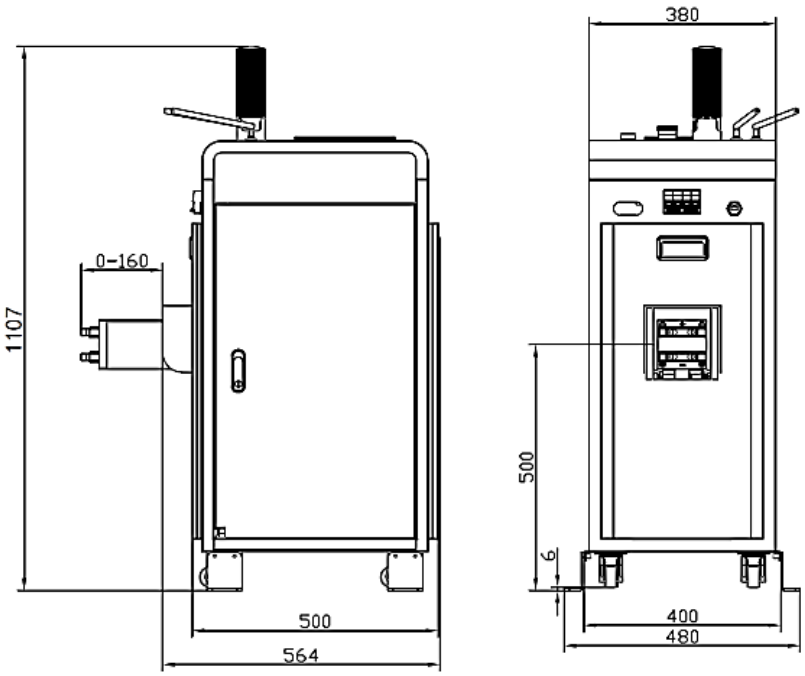
- Connect the power cord to the correct outlet.
- Do not use the charger in a closed or poorly ventilated area.

3 Product Introduction

3.1 Overview

The automatic charger suitable for AMR charging can support the automatic charging function for AMR. Multiple AMRs can share the automatic charger.

3.2 Product Dimensions



No.	Definition	Size (mm)
1	Height of charging pile	1107 mm
2	Ground clearance of pole piece center	500±5 mm
3	Shuttle extension of charging brush	0-190 mm
4	Length of charging pile (with brush retracted)	564 mm
5	Length of charging pile (with brush fully extended)	724 mm
6	Total width (including anchor bolts)	480 mm
7	Width of charging pile	380 mm

3.3 Main Labels

3.3.1 Precautions

3.3.2 Nameplate

		www.rop.co.th +66(0)2 744 9002
Product name: AMR Automatic charging pile	Dimensions: 564x380x1107 mm	Weight: 50 kg
Model:	Input voltage: 220V AC +10%	Frequency: 50 ~ 60 Hz
File number: 0300201027	Output voltage: 16-32V DC	Socket: GB 16A
Charging head projecting length: 190 mm	Output current: 100A DC	Manufacturing date:
Charing head projecting height: 500 + 5 mm	MAX. output power: 3200 W	Serial number:
324/36 Bangna Residence Room 302, Floor 3, Sanphawut Rd., Bangna, Bangkok, Thailand 10260 Tel: +66(0)2 744 9002		CE

3.4 Descriptions of Configuration

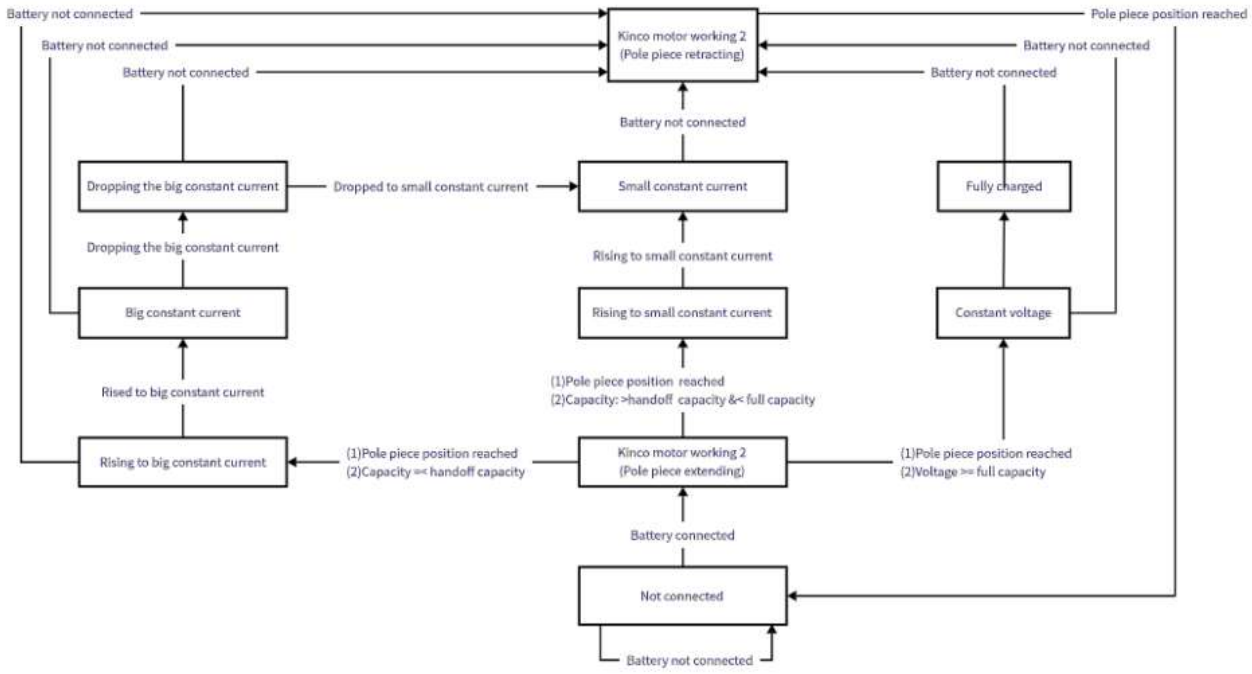
Indications of Tower Lamp		
Color		status
	Orange	Standby
	Green	Running
	Red	Abnormal

3.5 Technical Parameters

Specification	
Dimension (L x W x H)	564 x 380 x 1107 mm
Charging adapter extension length	0-190 mm
Charging adapter extension height	500±5 mm
AC input voltage	220±10% AC V
Input frequency	50/60 Hz
DC output voltage	16-32 DC V
Max output voltage	32 V
DC output current (brush output)	100 DC A
DC output current (manual charging port output)	50 DC A
Max output power	3200 W
Running noise	≤55 dB
Dead weight	50 Kg
Storage temperature	-20-45 °C
Working temperature	0-40 °C
Humidity	5-90 %
Altitude	Up to 2000m
Method of mounting	Ground anchored
Method of cooling	Air cooling
Socket specification	GB 16A
IP Rating	IP 20
Contamination Level	2
Overvoltage Category	II
Power system grounding	TN system
Reference standard	EN 62477-1:2012+A11:2014+A1:2017+A12:2021

3.6 Working Principles

Generally, the charging pile works as follows



4 Getting start

4.1 Accompanied Articles

- Charging pile main body
- Power cord
- Expansion screws 4x

4.2 Installation and Activation

This chapter describes how to install and activate the forklift charging pile.

- Place the charging pile against a wall on a clean, flat, and dry floor.
- Keep the cooling vents on front and rear of the charging pile unblocked to prevent overheating.
- Make sure a proper outlet is provided.
- The charging pile should be on the same plane as the forklift.

Example of correct installation

4.2.1 Boot-up Tutorial

1 Power on the charging pile, open the back cover, and pull the main switch upward to switch it on.

2 Press the SRC switch and wait for a few seconds, when the tricolor lantern and the screen lights up, it indicates the charging pile is boosted up successfully.

4.2.2 Shut-down Tutorial

1 Press the SRC switch button on the charging pile for about 2 seconds to power off the controller.

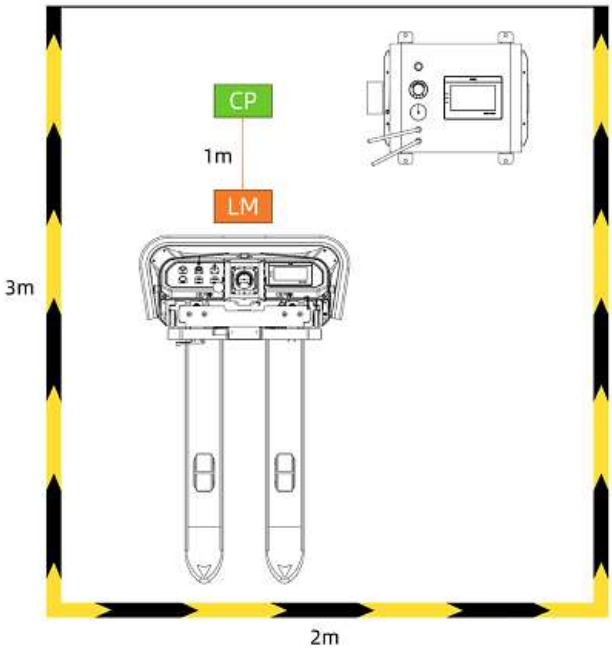
2 Turn the cam switch on the right side of the charging pile rightward.

3 Open the back cover of the charging pile and pull the main switch downward to complete the shutdown.

4.3 Marking the Area of Charging Pile

In the process of docking the charging post (LM point to CP point, about 1 meter), before using the charging pile, mark out the charging location of the robot with a cordon and keep this area free of other objects.

- The cordon indicates that the area is special for the charging pile.
- The charging pile area should be kept free of obstructions to ensure smooth charging of the robot.



Notes

1 The charging pile pole piece is about 150mm apart from the forklift charging pile pole piece.

5. Operation Tutorial

5.1 HMI Display

The HMI display is composed of a screen and the indicators (PWR, CPU, COM); specific information is shown in the figure below

The HMI display is generally divided into [General Information], [Working Status], [Parameter Configuration], [Historical Events], [Operation Log], etc.

5.1.1 Home

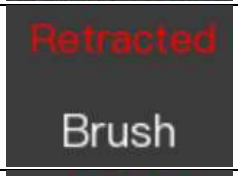
1 The main interface information will be displayed after the display is powered on and communicated properly

2 If it is not communicated, it will display 'PLC NO Response

5.1.2 General Information

Type	Icon	Definition
Time	2021-12-22 15:02:48	Displays real-time time
Working Status	Working status	Hit it to navigate to the interface of Working Status
Parameter Configuration	set up	Hit to navigate to the interface of Parameter Configuration
Historical Events	Historical events	Hit to navigate to the interface of Historical Events
Operation Log	I / O Details	Hit to navigate to the interface of Historical Events
Switching of manual Mode	Switch manual Cancel manual	Hit to switch to the Manual Mode Hit again to cancel the Manual Mode
Start	start up	Operable in manual mode; hit to extend the brush and start charging
Stop	stop	Operable in manual mode; hit to retract the brush and stop charging
Manual charging	Hand	Operable in manual mode; hit to output voltage & current through the manual charging port and start charging
Error cleaning	Clear	Hit to clear the Error report
Version	UI Version: 20211115	Indicates the current firmware version

5.1.3 Working Status

Type	Icon	Definition
Voltage		Real-time display of the voltage distributed during the charging
Current		Real-time display of the current distributed during the charging
Temperature		Real-time display of the controller's current temperature
Control Mode		Real-time display of the charging pile's control mode: Null, Manual, Automatic
Brush Status		Real-time display of the Brush's status: Retraction reached, Moving, Extension reached
Extension Length		Real-time display of the brush's extension length
Running Status		Real-time display of the charging pile's current running status: Standby, Running, Abnormal
Emergency Stop		When the emergency stop is triggered, the icon blinks
IP		Real-time display of the charging pile's current IP address
RBK		Real-time display of the RBK version
Error		When the Error alarm is triggered, this icon blinks
Error Code		When Error appears, the error code is displayed

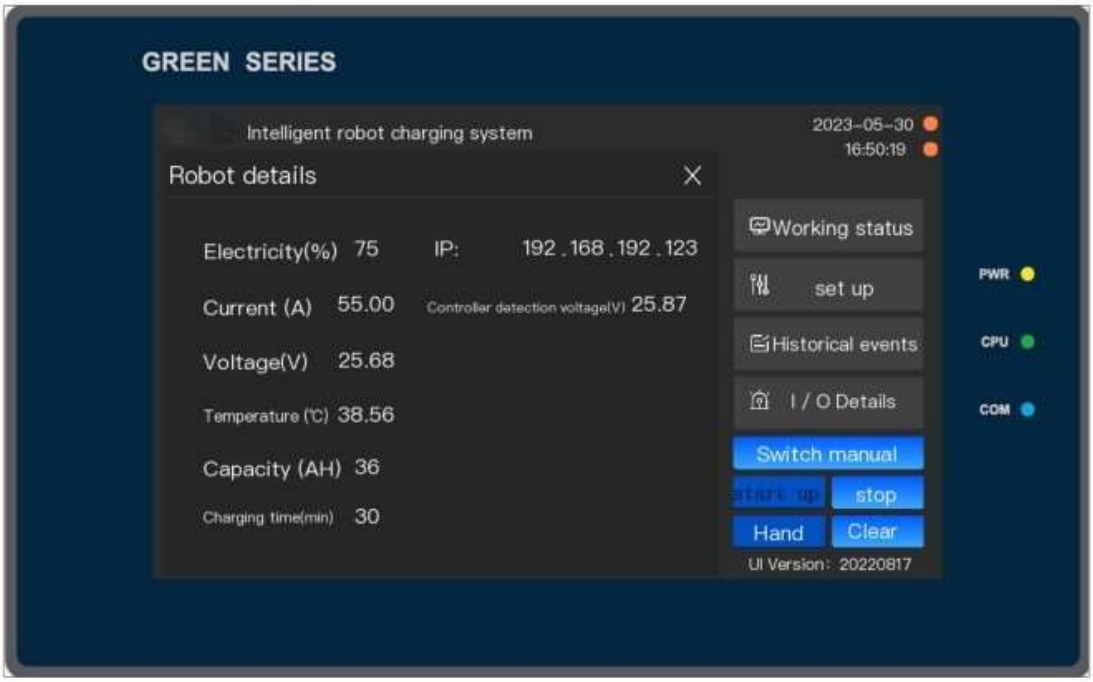
5.1.4 Parameter Configuration

Type	Icon	Definition
Max. current	100.00 A	Displays the maximum output current of charging Hit to configure the parameter of maximum current
Max. voltage	28.00 V	Displays the maximum output voltage of charging Hit to configure the parameter of maximum voltage
Period of manual charging	60	When Manual mode is displayed, click to set the manual charging time
Brush timeout	30 S	When the timeout period that is not triggered in place after the brush board stretches out, can slick to set
Brush extension length	5.00 A	When the current charging pile brush extends the maximum length, can click to set (the maximum length cannot be more than 195mm)
Stop Current	5.00 A	Stop charging when the output current is less than this value
Charging overcurrent	105.00 A	Charging overcurrent, stop charging when the output current exceeds this value
Charging overvoltage	29.20 V	Charging overvoltage, stop charging when the output voltage exceeds this value
System Config.	System settings	Hit to access the interface of System Configuration

Notes

1 The above settings are temporary and will be restored automatically after reboot. If you want to change them permanently, navigate to the profiles to make modifications.

5.1.5 System Configuration



Type	Icon	Definition
Re-boot	Restart OFF	Hit to reboot the screen
Language	Language English	Hit to switch the system language
Logo display	Will logo ON	Hit to hide or show the logo

5.1.6 Historical Events

The HMI can display and record System power on, emergency stop, error message, etc.

5.1.7 Operation Log

The operation records of operators for the HMI display are recorded, such as System power on, emergency stop, error message, etc. The information is saved for 30 days and the earlier events are deleted during the rotation period.

5.1.8 Robot Information

Click on the control mode in the working state to enter the robot information interface, which will display real-time information about the robot currently being charged

5.2 Manual Charging Tutorial

The brush and the manual charging port cannot be used for charging simultaneously.

5.2.1 Charging by Brush plate

You can remotely control the forklift to make the charging pole plate of the forklift truck to fit exactly the charging pole plate of the charging pile, then control the charging pile brush plate to extend by manual, to make the charging pile brush plate contact the charging pole plate of the forklift truck. Turn on the charging relay of the forklift truck (generally DO10), and control the charging pile brush plate to extend and charge by manual. If the current of battery displayed in Roboshop is positive, the forklift starts charging. (If the charging pile brush plate cannot contact the automatic forklift due to uneven ground, it is necessary to remove the charging pile to the flat ground, or adjust the footing of the charging pile so that the charging pile brush plate can contact the forklift charging pole plate smoothly.)

Battery Voltage:	**26.10 V**
Battery Current:	**-12,90 A**

Battery Voltage:	**26.50 V**
Battery Current:	**57.10 A**

5.2.2 Charging by manual charging port

You can control the forklift move to near the charging pile, and use the manual charging cable to connect the charging pile and the manual charging port of the forklift, then click the charging pile screen to switch to the hand Move mode, choose the hand charge button, then it can be charged manually.

If charging is not possible, manually open the forklift charging relay (usually DO10).

Notes

1 The maximum charging current of the manual charging port is 50A.

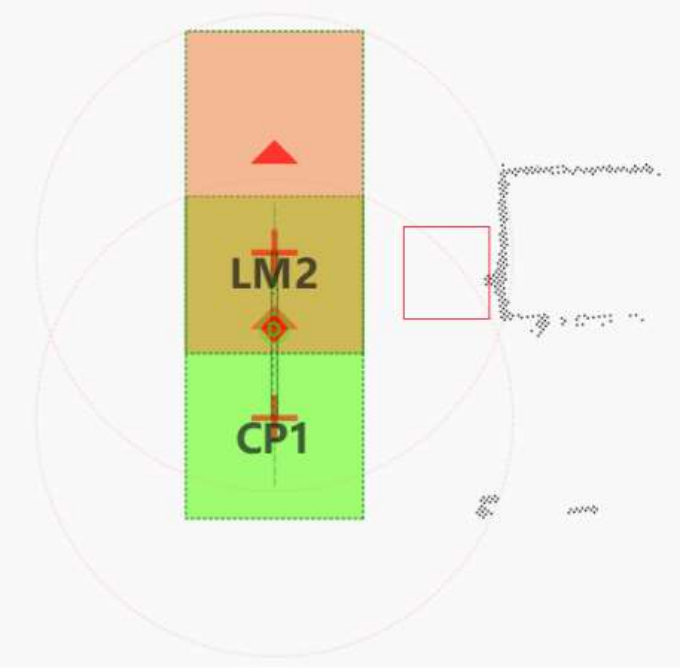
5.3 Automatic Charging Configuration Tutorial

This section describes how to configure the robot to move to the charging pile for automatic charging. Before the configuration, a CP point and a LM point must be set up on the map so that the robot can move to the charging pile and start charging.

Notes

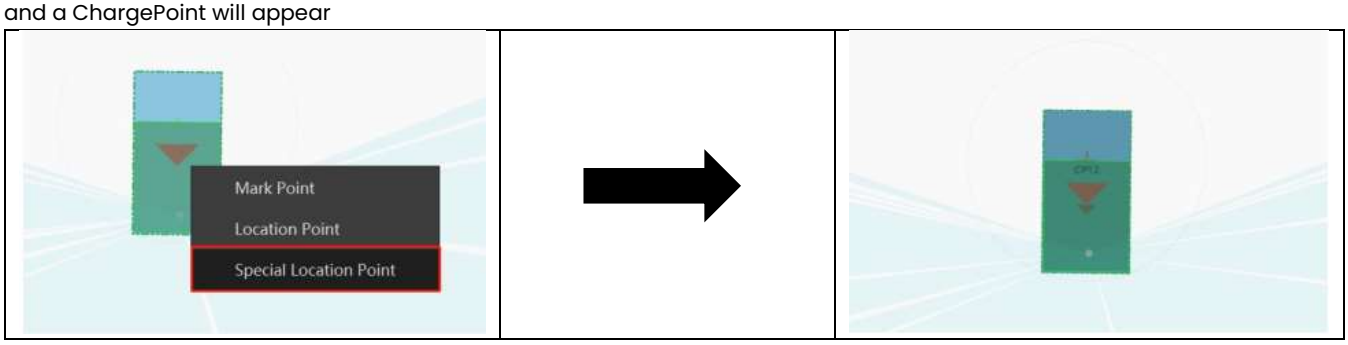
1 AMR steering is strongly prohibited near the charging piles.

5.3.1 Build up a map and plan the charging area, as follows:

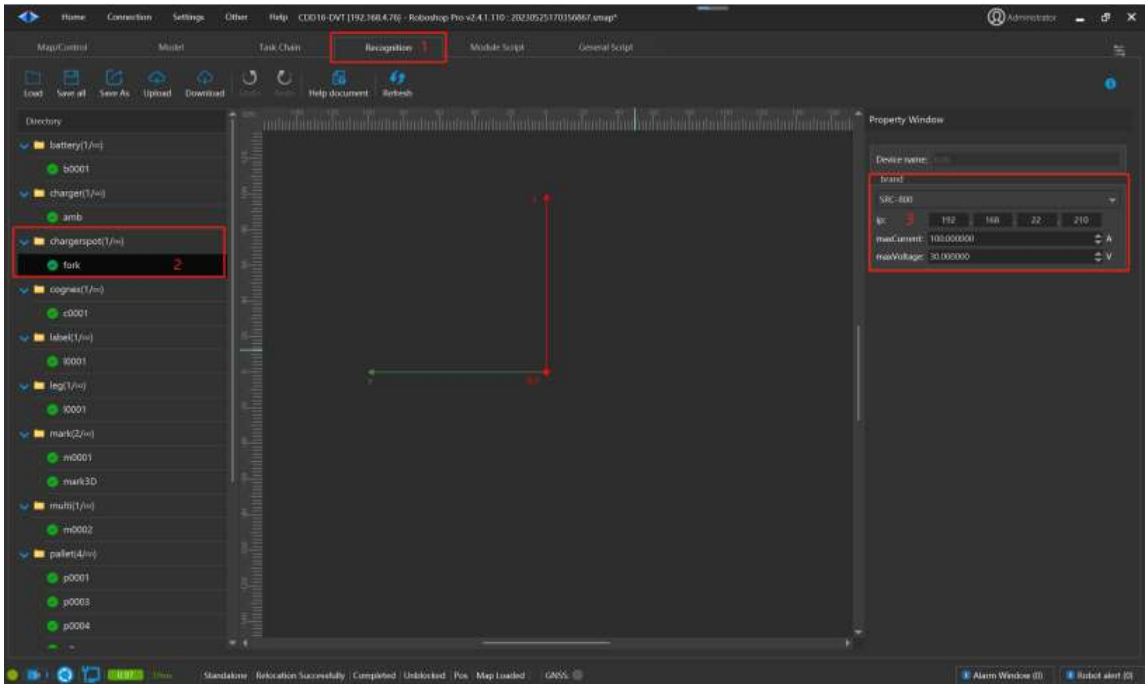


The red box shows the approximate location of the charging pile

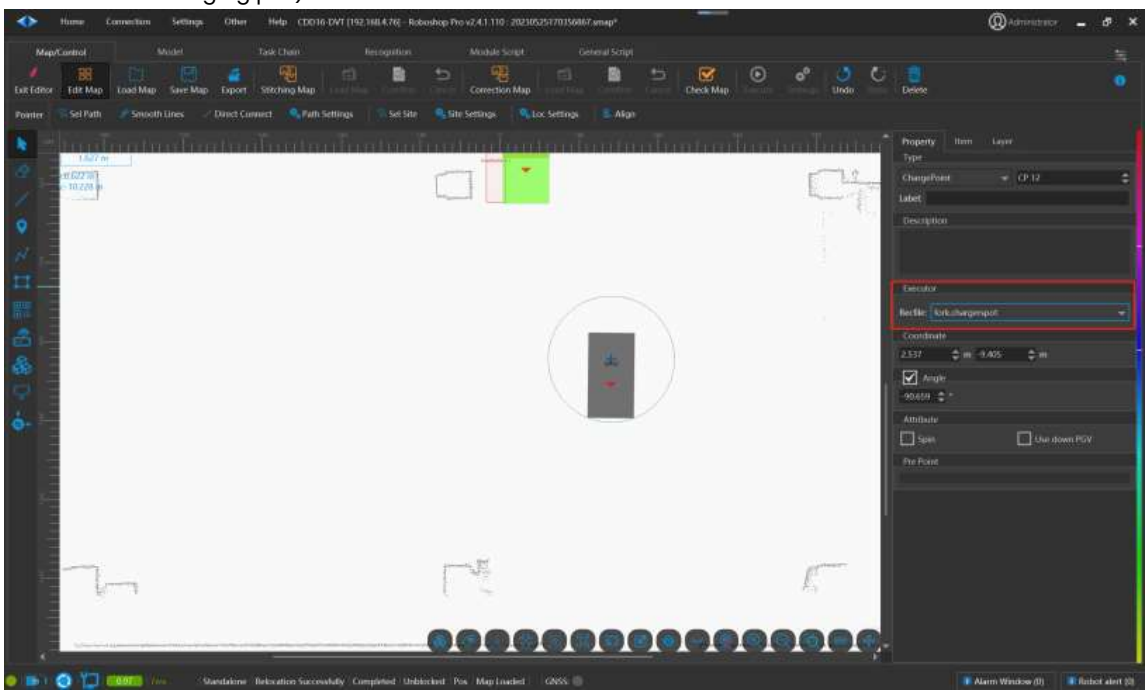
5.3.2 Hover the mouse over the blue rectangle representing the robot, right-click and select **Mark Special Workstation** and a ChargePoint will appear



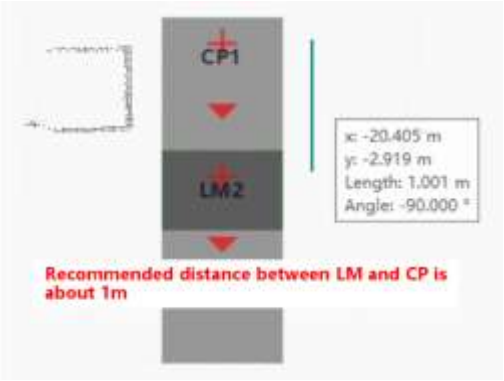
5.3.3 Configure the identification file for the charging pile of forklift. (Enter the IP to establish communication between the forklift and the charging pile)



5.3.4 Select the charging point recognition profile as: fork. Charger (if not selected, it will not enable the forklift to communicate with the charging pile).



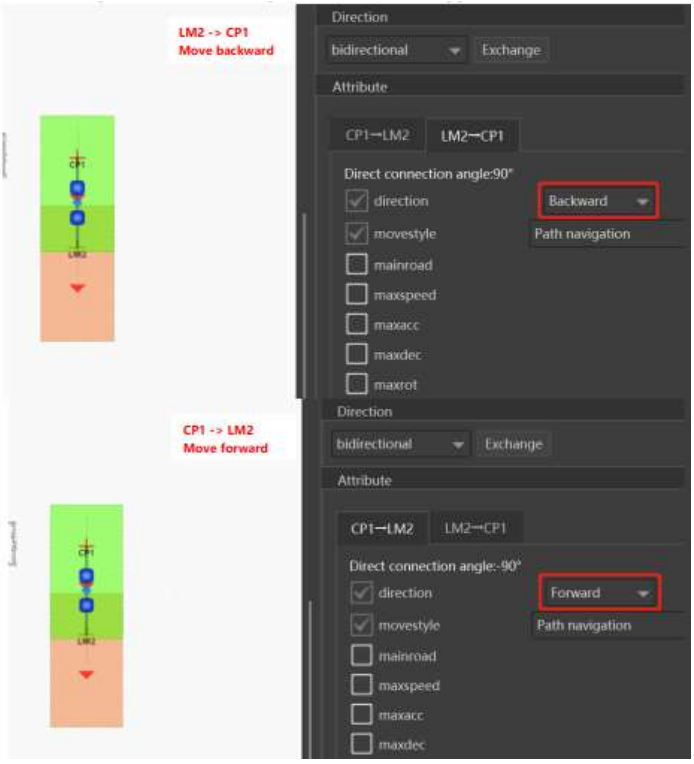
5.3.5 Control the robot and advance to a position about 1m from the CP point, hover the mouse over the blue rectangle representing the robot and right-click to mark the station, an LM point will appear.



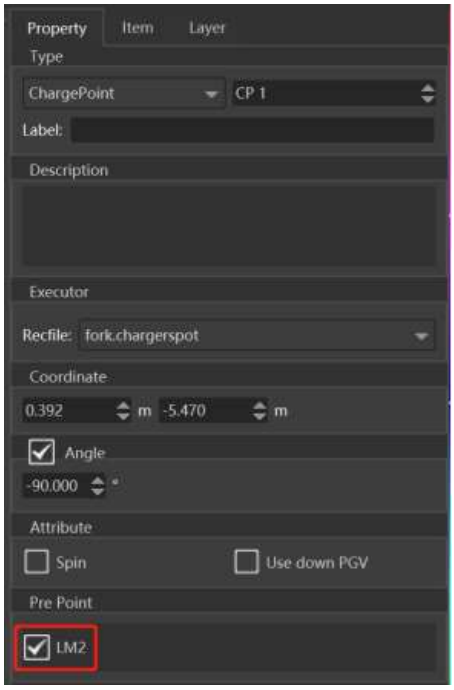
5.3.6 Connect the LM point and CP point, and configure the robot walking direction of LM to CP point and CP to LM point. The direction when forklift entering the charging point is reversed, and its navigation mode is path-navigation. The direction when forklift exiting the charging point is forward, and its navigation mode is also path-navigation. The line between LM2 and CP1must be directly connected.

Note

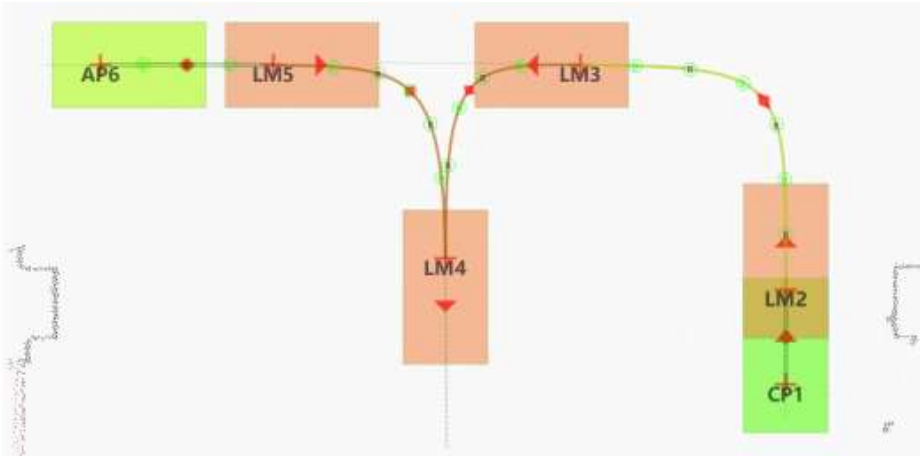
1 If the LM point is below the CP point, the direction is opposite.



5.3.7 Set LM2 as the pre-positioned point of CP1, as follows

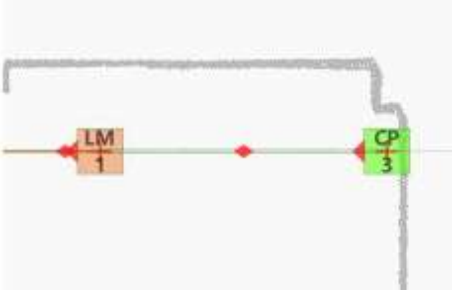


5.3.8 Connect the configured charging points and the pre-positioned points to other stations in the map to generate paths accessible to the robot, as follows



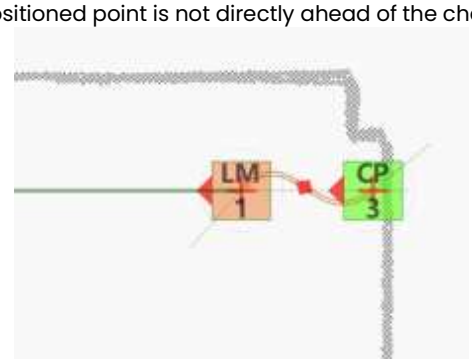
5.3.9 Save and push the map to the robot, and use the path navigation to CP1 to charge automatically.

5.4 Negative Examples



The distance between LM1 and CP3 is too far.

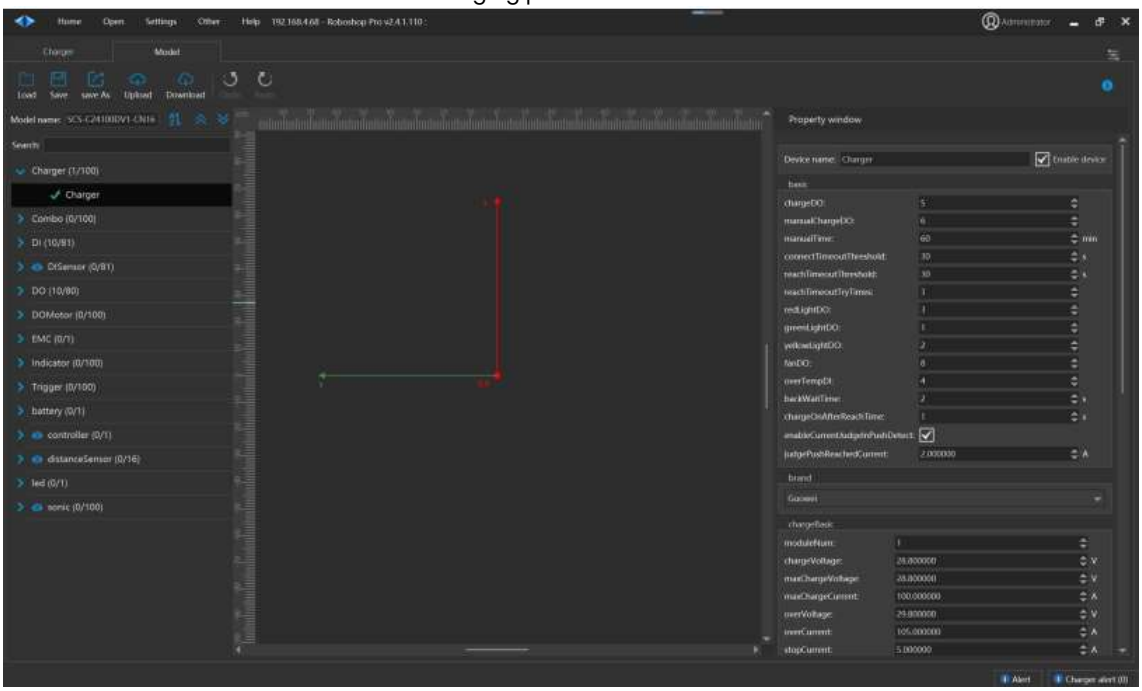
The pre-positioned point is not directly ahead of the charging point



The line between the pre-positioned point and the charging point is not straight

6 Profiles

Function introduction for the model file of the charging pile



Function	Description
Basic	
Charge DO	DO for charging output
Manual Time	Period of manual charging
Connect Timeout Threshold	Communication timeout threshold
Reach Timeout Threshold	DI not triggered timeout threshold
Red Light DO	Red DO will be turned on when charging pile is abnormal.
Green Light DO	GreenDO will be turned on when charging pile is running.
Yellow Light DO	YellowDO will be turned on when charging pile is standby.
Fan DO	FanDO will be turned on when charging pile is running.
Over Temp DI	Overtemperature sensor DI
Back Wait Time	The waiting time before the pole piece is retrieved.
Charge On After Reach Time	How many seconds after the pole is in place to turn on the Charge DO
Enable Current Judgeln Push Detec	Whether to open the output current to detect the position status
Judge Push Reached Current	Pole pieces with how much current is considered to be in place
Brand	Brand of charging module
Charge Baisc	
Module Num	Number of charging modules installed on the charging pile
Charge Voltage	Charging voltage of charging module
Max Charge Voltage	Maximum charging voltage
Max Charge Current	Maximum charging current (the maximum charging current of a single module)
Over Voltage	Threshold of charging overvoltage
Over Current	Threshold of charging overcurrent
Stop Current	The current when the charge stops
Back Ok Current	Stop charging and wait until the current decays to this value, and then pole sheet retracts.
Wait Ju Current Time	When charging starts, the stop current is judged after the time is reached
Rise Big Current Time	Increase the time of big constant current (Increase from 0 to big constant current according to this time)

Function	Description
Charge Basic	
Down Big Current Time	Decrease the time of big constant current (Decrease from big to small constant current according to this time)
Rise Small Current Time	Rising small constant time (rise from 0 to small constant current)
Constant Voltage Time	Drop time of the constant current (Decrease from small constant current to turn off the current)
Auto Basic (Automatic Mode)	
Full Quantity	Full capacity (the current output will be stopped when AMR reaches this value)
Handoff Quantity	Switching power (use big constant current to charge before reaching this value, then use small constant current to charge)
Big Current	Big constant current (output of big constant current, indicating the output of single module)
Small Current	Small constant current (output of big constant current, indicating the output of single module)
Manual Basic (Manual Mode)	
Full Voltage	Full voltage (the current output will be stopped when the robot voltage reaches this value)
Handoff Voltage	Switching voltage (use constant current to before reaching this value, after making Charge with small constant current)
Big Current	Big constant current (output of big constant current, indicating the output of single module)
Small Current	Small constant current (output of big constant current, indicating the output of single module)
Motor Basic	
CanID	Motor canID
Rpm	Motor rpm
Max RPM	Maximum motor rpm
Encode Line	Encoder lines
Ratio	Motor shaft rotates one circle, how many mm it will reach.
Push Positive DI	The pole pieces extend out of the positive DI
Push Negative DI	The pole pieces extend out of the negative DI
Back DI	DI for retracted pole pieces
Push Length	Maximum extension length for pole pieces
Back Length	The distance at which the pole piece retracts
Dist	Motor reaching accuracy

7 Product Maintenance

Before performing any maintenance or troubleshooting activities, please read the content of this chapter, these manual and other related manuals carefully to comprehend the safe maintenance and troubleshooting procedures fully.

Only authorized personnel who have passed safety training and other related training can maintain the robot system. Other related training includes training on robot system as well as training on maintenance organized by the manufacturers, distributors, and local importers.

Operators shall participate in safety training in accordance with national regulations.

Precautions for Using Charging Pile Components

- Only approved parts can be used.
- We declaim any or all liability if unapproved parts are used without authorization. We will not be held responsible for any damage to the charging pile, accessories or any other equipment caused by the use of unapproved parts.

Precautions for Charging Pile Maintenance

- Perform maintenance in strict accordance with this manual. Dismantling or changing of any parts not described in this manual is prohibited without permission. Improper dismantling, changing of parts, or wrong maintenance may result in abnormal charging pile operation and cause serious safety problems.
- Before performing any maintenance on the charging pile, cut off the power supply.

7.1 Charging Pile Maintenance

7.1.1 Keep the charging pile clean, and dust the ventilation vents regularly.

7.1.2 Regularly check whether the charger terminal connectors are firmly connected, without the phenomenon such as looseness or poor contact.

7.1.3 Check whether the charging pile is broken or deformed; whether the cabinet door lock is in good condition and not damaged; whether the charging pile is properly grounded; whether there is any odor inside; whether the charging pile wiring connection is correct.

7.1.4 Check whether the surface of the charging pile is too hot and whether there is water vapor condensation inside.

7.1.5 Check the charging pile and its interface, door lock, power supply, wires and other components for damage, deformation, missing, and any sign of looseness.

7.1.6 When the charging pile is running, listen to the working sound of the relay and other equipment to determine whether the charging pile is properly actuated and whether the heat radiator is functioning properly."

7.1.7 Do not move a charging pile in normal working condition.

7.1.8 Never place the charging pile on the uneven ground.

7.1.9 Never expose it in corrosive and humid atmosphere.

7.1.10 Sufficient space must be reserved for front and back panels of the charging pile to facilitate heat dissipation and ventilation.

7.1.11 Keep away from open flames or heat sources, and avoid high temperatures.