UMR USER MANUAL

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UMR USER MANUAL



UMR

AgileX Robotics Team

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Safety Information

This chapter contains important safety information, before the robot is powered on for the first time, any

individual or organization must read and understand this information before using the device. If you have

any questions about use, please contact us at support@agilex.ai. Please follow and implement all

assembly instructions and guidelines in the chapters of this manual, which is very important. Particular

attention should be paid to the text related to the warning signs.

The information in this manual does not include the design, installation and operation of a complete robot application, nor does it include all peripheral equipment that may affect the safety of the complete system. The design and use of the complete system need to comply with the safety requirements established in the standards and regulations of the country where the robot is installed. UMR integrators and end customers have the responsibility to ensure compliance with the applicable laws and regulations of relevant countries, and to ensure that there are no major dangers in the complete robot application. This includes but is not limit:

1. **Effectiveness and responsibility**
   - Make a risk assessment of the complete robot.
   - Connect the additional safety equipment of other machinery defined by the risk assessment together.
   - Confirm that the design and installation of the entire robot system's peripheral equipment, including software and hardware systems, are correct.
   - This robot does not have a complete autonomous mobile robot, including but not limited to automatic anti-collision, anti-falling, biological approach warning and other related safety functions. Related functions require integrators and end customers to follow relevant regulations and feasible laws and regulations for safety assessment. To ensure that the developed robot does not have any major hazards and safety hazards in actual application.
   - Collect all the documents in the technical file: including risk assessment and this manual.
   - Know the possible safety risks before operating and using the equipment.
2. **Environmental Considerations**
   - For the first use ,please read this manual carefully to understand the basic operating content and operating specification.
   - For remote control operation, select a relatively open area to use UMR, because UMR is not equipped with any automatic obstacle avoidance。
   - Use SCOUT MINI always under -10℃~40℃ ambient temperature.
   - If UMR is not configured with separate custom IP protection, its water and dust protection will be IP65
3. **Pre-work Checklist**
   - Make sure each device has sufficient.
   - Make sure UMR does not have any obvious defects.
   - Check if the remote controller battery has sufficient power.
   - Make sure the emergency stop switch is released when using.
4. **Operation**
   - In remote control operation, make sure the area around is relatively spacious.
   - Carry out remote control within the range of visibility.
   - The maximum load of UMR is 70KG. When in use, ensure that the payload does not exceed.
   - When installing an external extension on UMR, confirm the position of the center of mass of the extension and make sure it is at the center of rotation.
   - Please charge in time when the device is low battery alarm(<48v).

- When UMR has a defect, please immediately stop using it to avoid secondary damage.
- when UMR has had a defect, please contact the relevant technical to deal with it, do not handle the defect by yourself。
- always use UMR in the environment with the protection level requires for the equipment.
- do not push UMR directly。
- when charging, make sure the ambient temperature is above 0℃.

5. **Maintenance**

- After 500 hours of operation, check the bolts and nuts of the body. If they are loose, tighten them immediately.
- In order to ensure the storage capacity of the battery, the battery should be stored with electricity, and it should be charged regularly if it is not used for a long time.

CONTENTS

1 UMR Introduction

UMR is a navigation built-in mobile platform for all-round industry applications. Equipped with 15 sensors including LiDAR, depth camera, and ultrasonic sensor, the multi-sensor fusion solution ensures 360° surrounding safety, and has a combination of multiple functions such as the main 360° dual surround range lidar, front binocular blind spot perception, and ultrasonic obstacle detection. Based on the NAVIS system, it achieves system-level intelligent obstacle avoidance, dynamic path planning and other functions, effectively ensuring environmental safety, reliable obstacle avoidance, and human-machine and human-vehicle interaction safety. It is suitable for development and application in a variety of fields, and can be used for the development of special robots such as inspection and exploration, rescue and bomb disposal, special photography, and special transportation to solve robot mobility solutions.

1.1 Product list

Name	Quantity
UMR Robot Body	X1
Battery charger (AC 220V)	X1
Aviation male plug（4Pin）	X1
FS Remote Controller	X1
Usb to can communication module	X1

1.2 Performance parameters

Parameter Type	Item	Values
Size	L*W*H	830*540*410mm
Weight	Weight of body	90kg
	Load	70kg
Battery	Type	lithium iron phosphate battery
	Capacity	24AH
	Voltage	48V
Performance parameter	Max climbing angle	20°
	Max speed	5.4km/h
	Min turning radius	Can spin in place
	Max obstacle crossing	50mm
	Operating temperature range	-10~40℃
Control parameter	Control module	Remote control/command control
	Remote controller	2.4G /max. distance200m
	Communication interface	CAN

1.3 Requirement for development

FS RC transmitter is provided optionally in the factory settings of UMR and it allows users to control the mobile chassis to move and turns.

Network cable ports are reserved after the UMR is installed with navigation. Users can perform secondary development through network ports

2 The Basics

This part will introduce UMR shortly, so that users and developers can have a basic understanding of the UMR .

2.1 Instructions on electrical interfaces

The side electrical interface is shown in Figure 2.1, ① power display switch ②Can2 aviation plug ③ manual charging interface.

When manually charging, the special charger provided by AgileX must be used. It is forbidden to use the automatic charging pile at the same time. When using manual charging, please turn off the power or enter the parking mode.

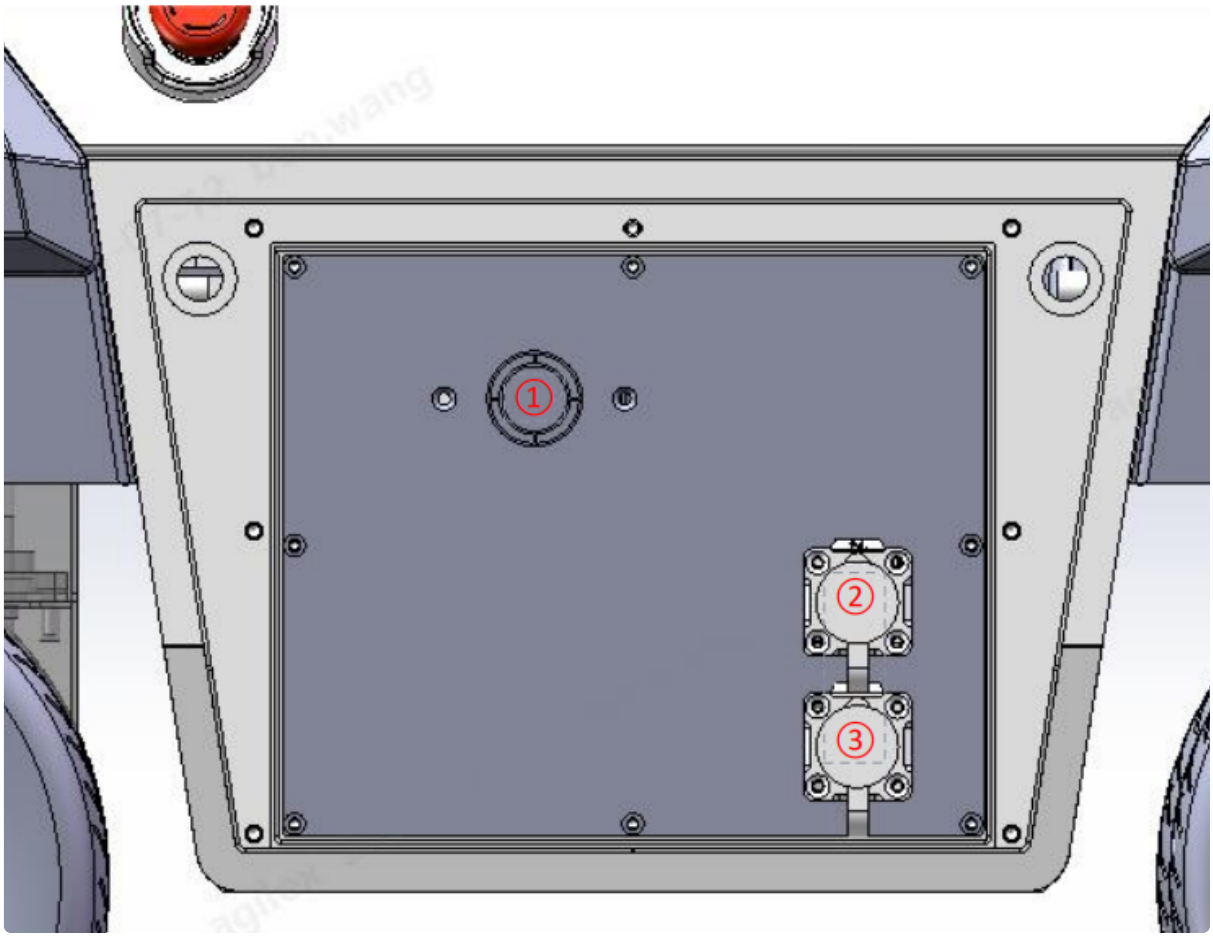


Figure 2.1 The side electrical interface

2.2 Remote control instructions

FS RC transmitter is an optional feature of UMR for users to choose as actually required. With this RC transmitter

designed on the left joystick in this product, users can easily control UMR chassis. Its definitions and

functions are shown in Figure 2.3 for reference. The key SWA、SWC，SWD are not currently enabled. The key SWB is for switch module. Dial to the top for command control mode, dial to the middle for remote control mode. The key S1 can control UMR advance and retreat. The key S2 can control rotation. The key power is power controller, press both “power” can startup. Note, when turning on the remote controller, SWA、SWB、SWC，SWD should be at the top.



Figure 2.3 FS remote controller instructions

2.3 Control instructions and motion instructions

A reference coordinate system is established in accordance with ISO 8855 standard for moving vehicles on ground. The vehicle body of UMR is in parallel with X axis of the established reference coordinate system.

In the controller mode with RC transmitter, pushing S1 forward and backward respectively refers to the movement on the positive and negative directions of axis X. When the S1 is pushed to the maximum position, the speed of movement towards the position direction of axis X reaches the maximum. When the S1 is pushed to the minimum position, the speed of movement towards the negative direction of axis X reaches the maximum.

S2 controls the rotational movement of vehicle body to left and right; pushing the S2 to left and right respectively refers to the rotational movement of vehicle body from the positive direction of axis X to the positive direction of axis Y and from the positive direction of axis X to the negative direction of axis Y. When the S2 is pushed to the maximum position on the left, the rotational linear speed on anticlockwise direction reaches the maximum. When the S2 is pushed to the maximum position on the right, the rotational linear speed on clockwise direction reaches the maximum.

In the control command mode, the positive value of linear speed refers to movement towards the positive direction of axis X, and the negative value of linear speed refers to movement towards the negative direction of axis X; the positive value of

angular speed refers to the rotational movement of vehicle body from the positive direction of axis X to the positive direction of axis Y, and the negative value of angular speed refers to the

rotational movement of vehicle body from the positive direction of axis X to the negative direction of axis Y.

3 Getting Started

Read the NAVIS User Manual and API User Interface for usage development.

3.1 Use and operation

Check
• Check the condition of the vehicle body. Check whether there are significant anomalies; if so, please contact the after-sale service personnel for support； • Check the emergency stop switch status. Ensure that the side emergency stop button is released； • When using for the first time, check whether the power switch in the side electrical panel is pressed. If so, press it and release it. Then it is released； Startup • Press the power switch. Under normal circumstances, the light of the power switch will light up and the voltmeter will normally display the battery voltage； • Check the battery voltage. If the voltage is greater than 48V, the battery voltage is normal. If the battery voltage is low, charge it；
Shutdown
Press the power switch to cut off the power supply； emergency stop Press the e-stop on the side of the UMR；

Remote control basic operation flow

After the UMR is started normally, the remote control is started, and the control mode is selected as the remote control mode. Then the UMR movement can be controlled through the remote control。

3.2 Charging

UMR is equipped with a standard charger to meet customers' charging demand.

The specific charging processing is as follows：

- Make sure UMR chassis is in power-off state;
- Before charging, please make sure that the power switch in the side electrical console is off；
- Plug the charger into the charging interface in the electrical control panel;

- Connect the charger to the power supply and turn on the charger switch to enter the charging state;
- When charging by default, the chassis has no indicator, and whether it is charging needs to see the status indication of the charger.

4 Attention

This Section includes some precautions that should be paid attention to for UMR use and development.

4.1 Battery precautions

- The battery is not fully charged when the product leaves the factory, and the specific battery power can be displayed by the voltage display meter or read from the navigation page;
- Please do not charge the battery after totally used;
- Static storage conditions: the best storage temperature is -10℃~45℃, the battery in the case of storage, it must be about 1 month charge and discharge once, and then make the battery in the full voltage state for storage, do not put the battery in the fire, or heat the battery, do not store the battery at high temperature;
- Charging: Must use the matching lithium battery charger to charge, do not charge the battery below 0℃, do not use non-original standard battery, power supply, charger.

4.2 Application environment precautions

- The operating temperature of UMR is -0℃ to 40℃; please do not use it below -0℃ and above 40℃ outdoors
- The requirements range for relative humidity in the use environment of is 0-100；
- Please do not use it in the environment with corrosive and flammable gases or closed to combustible substances
- Do not place it near heaters or heating elements such as large coiled resistors, etc；
- Except for specially customized version (IP protection class customized), SCOUT MINI is not water-proof, thus please do not use it in rainy, snowy or water-accumulated environment；
- The elevation of recommended use environment should not exceed 1,000m；
- The temperature difference between day and night of recommended use environment should not exceed 25℃；

4.3 Precautions for electrical external extension

- The rear extension power supply current does not exceed 15A, and the total power does not exceed 720W；

4.4 Safety precautions

- In case of any doubts during use, please follow related instruction manual or consult related technical support team；

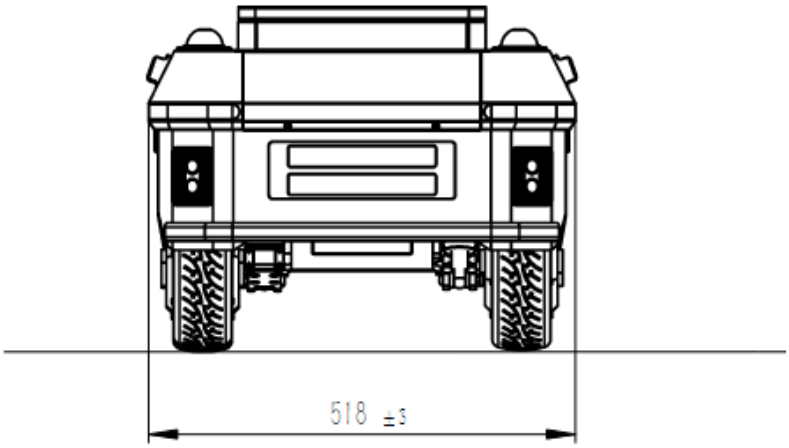
- Before use, pay attention to field condition, and avoid mis-operation that will cause personnel;
- In case of emergency, power off the equipment by hitting the emergency stop button;
- Without technical support and permission, please do not personally modify the internal equipment structure.

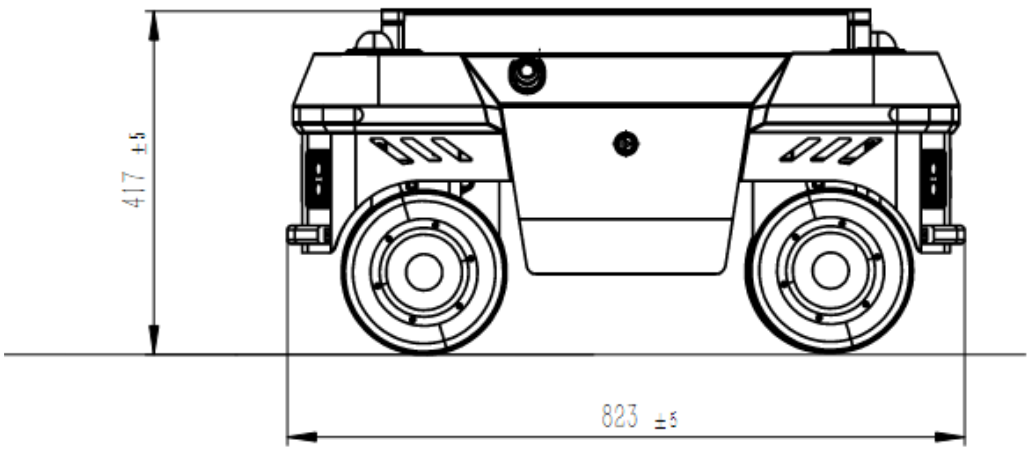
a. Other notes

- When handling and setting up, please do not fall off or place the vehicle upside down;
- For non-professionals, please do not disassemble the vehicle without permission

6 Product Dimensions

6.1 Illustration diagram of product external dimensions





6.2 Top expansion bracket size illustration

