

RoboMaster

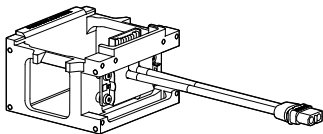
电池架 2

Battery Rack 2

使用说明

User Guide

v1.0



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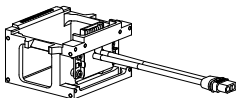
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物品清单

电池架 × 1



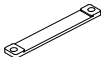
魔术扣带 × 1



魔术扎带 × 1



金属固定片 × 2



M3 螺丝 × 5

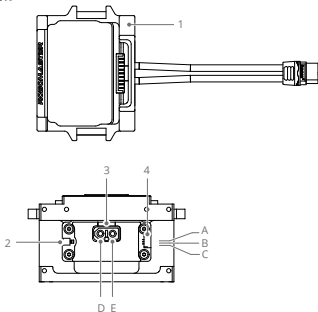


简介

RoboMaster 电池架 2（以下简称“电池架”）是一款专为 RoboMaster 机器人（以下简称“机器人”）设计的电池固定和供电器件。该款电池架安装方式灵活，可固定在不同材质的表面。电池架上配有电池状态指示灯，用于显示电池工作状态、警告和异常信息；配有电池信息接口，可用于监测当前电池电量等数据。

包装内配有魔术扎带，可在振动、冲击等环境下有效防止因电池脱落而导致的断电，提升使用体验。

部件名称



1. 电池架
2. 电池状态指示灯

正常状态

绿灯	每 1 秒闪 1 次	电池正常工作
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警告状态

橙灯	每 1 秒闪 1 次	电池未接通电源
橙灯	每 1 秒闪 2 次	电池温度高 (50°C~75°C)

异常状态		
红灯	每 1 秒闪 1 次	电池异常（表中所列的异常除外）
红灯	每 1 秒闪 2 次	电池温度过高 ($\geq 75^{\circ}\text{C}$)
红灯	每 1 秒闪 3 次	电池有电芯损坏
红灯	每 1 秒闪 4 次	电池硬件异常

3. 电源输出口

用于对外供电，可连接至机器人或裁判系统，从左到右依次为：D 黑色（GND）和 E 红色（+）。

4. 电池信息接口

用于监测电池电量等信息。从上到下依次为：A（GND）、B（SDA）、C（SCL）。

安装

1. 安装魔术扎带和扣带（可选）

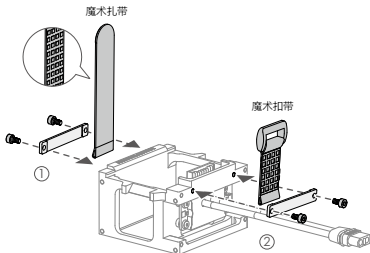
在振动、冲击等环境下使用时，建议将魔术扎带和扣带安装在电池架上，用于防止电池脱落。

安装步骤：

- ① 使用金属固定片和两颗螺丝固定魔术扎带，确保带钩织物一侧向外。
- ② 以同样的方式，在电源输出口一侧安装魔术扣带。



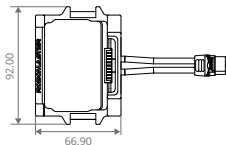
魔术扎带和扣带的安装位置可以调换。



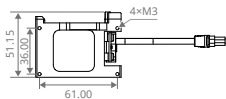
2. 安装电池架

电池架有五个面带螺纹孔。请参考以下尺寸选择安装面，将电池架安装至相应位置。

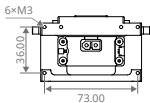
俯视图



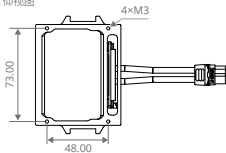
正视图



侧视图



仰视图



单位: mm

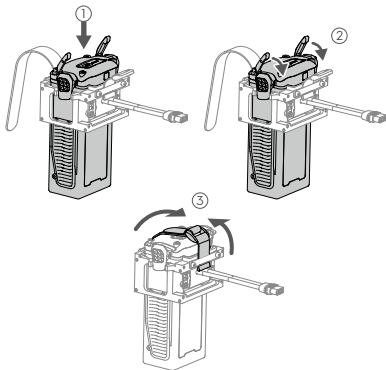


- 电池架上的螺纹孔为 M3，请选择至少三颗合适的螺丝安装电池架。
- 螺纹深度为 6 毫米，请勿使用过长的螺丝，否则可能会导致电池架损坏。

3. 安装电池

电池架安装完毕后，将电池按照箭头①方向插入电池架，按照箭头②方向扣紧电池两侧的卡扣，然后再将魔术扎带绑好，如图示③。请根据需要在电池周边添加缓冲泡棉。

若未安装魔术扎带，则直接将电池按照箭头①方向插入电池架、按照箭头②方向扣紧卡扣即可。



接通电源

安装好电池架并插入电池后，请按照如下步骤接通电池电源：

1. 将电源输出口插入机器人或裁判系统；
2. 先短按电池上方的电源开关一次检查电量，再长按以开启电池电源。电池状态指示灯为绿，代表电池电源已接通。

读取电池信息

电池架支持 I2C 通信协议。将主机连接至电池架的电池信息接口，可以读取电池容量、工作状态等信息。

- 从机地址：0x41（7 位表示）
- 通信速率：100 kHz
- 上拉电阻：作为从机的电池架不内置上拉电阻。主机需要在 SDA 和 SCL 接口均放置 4.7 kΩ 的上拉电阻，保持总线空闲时的高阻态，否则总线会出现死锁、通信失败等问题。

寄存器列表

静态数据的更新时间间隔为 3 秒，动态数据的更新时间间隔为 500 毫秒。

	寄存器名称	读写类型	寄存器地址	数据类型	描述
静态数据	WHO_AM_I	读	0x1F	uint8_t	电池架识别码
	DESIGNED_CAPACITY	读	0x20	uint32_t	设计容量 (mAh)
	LOOP_TIMES	读	0x24	uint16_t	充放电循环次数
	PRODUCTION_DATE	读	0x26	uint16_t	生产日期
	BATTERY_LIFE	读	0x28	uint8_t	寿命百分比 (0~100%)
动态数据	CURRENT_VOLTAGE	读	0x29	int32_t	当前电压 (mV)
	CURRENT_CURRENT	读	0x2D	int32_t	当前电流 (mA)
	TEMPERATURE	读	0x31	int16_t	当前温度 (精确到 0.1℃)
	CAPACITY_PRECENT	读	0x33	uint8_t	容量百分比 (0~100%)
	INTERNAL_STATE	读	0x34	uint8_t	内部状态
	ERROR_STATE	读	0x35	uint8_t	错误状态



部分寄存器的数据需要按特定规则读取。详见“寄存器数据详情”。

寄存器数据详情

WHO_AM_I

数据类型	位域	含义
uint8_t	7:0	固定为从机地址 0x41

PRODUCTION_DATE

数据类型	位域	含义
uint16_t	15:9	1980 到今年的年数
	8:5	月
	4:0	日

INTERNAL_STATE

数据类型	位域	含义	取值
uint8_t	7:2	保留位	无
	:1	与电池的连接状态	默认值为 0。 • 0: 与电池通信异常, 例如电池不在位、电池未开启 • 1: 与电池通信正常
	:0	电池当前输出状态	默认值为 0。 • 0: 小电流状态 (≤ 0.2 A), 此时电池会在开启后 20 分钟自动关闭输出 • 1: 大电流状态 (> 0.2 A), 此时电池不会自动关闭输出

ERROR_STATE

数据类型	位域	含义	取值
uint8_t	:7	保留位	无
	:6	自检异常	• 0: 无错误 • 1: 有错误
	:5	电芯异常	
	:4	电池欠压	
	:3	电池过温	
	:2	电池过流	
	:1	电池放电过载	
	:0	电池放电短路	

规格参数

电池架重量	130 g
电源输出接口接头	XT60
电池架最大持续工作电流	35 A
电池信息接口协议	I2C

部件名称	有害物质									
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)	邻苯二甲酸二正丁酯 (DBP)	邻苯二甲酸二异丁酯 (DIBP)	邻苯二甲酸丁基苯酯 (BBP)	邻苯二甲酸二(2-乙基)己酯 (DEHP)
线路板	×	○	○	○	○	○	○	○	○	○
外壳	×	○	○	○	○	○	○	○	○	○
金属部件 (铜合金)	×	○	○	○	○	○	○	○	○	○
内部线材	×	○	○	○	○	○	○	○	○	○
其他配件	×	○	○	○	○	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。（产品符合欧盟 ROHS 指令环保要求）



Disclaimer

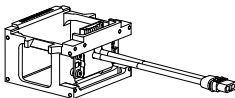
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In the Box

Battery Rack × 1



Magic Buckle × 1



Magic Cable Tie × 1



Metal Fixing Plate × 2



M3 Screws × 5

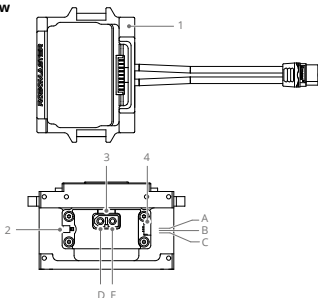


Introduction

The RoboMaster Battery Rack 2 (hereinafter referred to as "Battery Rack") is used to secure and power batteries for RoboMaster robots. The Battery Rack can be mounted on various types of surfaces. The battery status indicator allows you to detect warnings and errors, and the battery information port allows you to monitor data such as the current battery level.

The magic cable tie in the package helps to secure the battery and prevents it from falling off when impacted or used in environments prone to vibration.

Overview



1. Battery Shelf
2. Battery Status Indicator

Normal

Green	Blinks once per second	Battery operating properly
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Warning

Orange	Blinks once per second	Battery not powered on
Orange	Blinks twice per second	Battery temperature high (50° to 75° C)

Error

Red	Blinks once per second	General battery error (excluding the errors listed below)
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Red	Blinks twice per second	Battery temperature too high ($\geq 75^{\circ}\text{C}$)
Red	Blinks three times per second	Battery cell damage
Red	Blinks four times per second	Battery hardware failure

3. Power Output Port

Used to power a robot or referee system. From left to right: D (black cable, GND) and E (red cable, +).

4. Battery Information Port

Used to monitor data such as the current battery level. From top to bottom: A (GND), B (SDA), and C (SCL).

Installation

1. Fixing the Magic Cable Tie and Buckle (Optional)

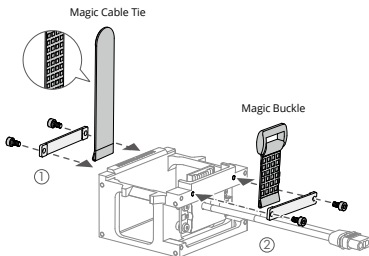
When used in environments prone to vibration or there is a risk of impact, it is recommended to fix the magic cable tie and buckle onto the Battery Rack to prevent the battery from falling off.

Follow the steps below:

- ① Use a metal fixing plate and two screws to fix the magic cable tie. Make sure to position the hook side outwards.
- ② Fix the magic buckle to the side of the power output port in the same manner.



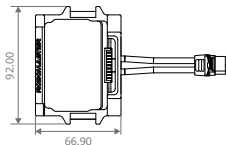
You can swap the positions of the magic cable tie and magic buckle.



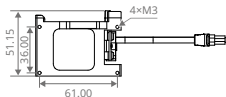
2. Mounting the Battery Rack

The Battery Rack has threaded holes on five sides. Refer to the dimensions in the illustration below when mounting the Battery Rack.

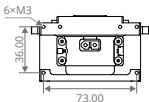
Top View



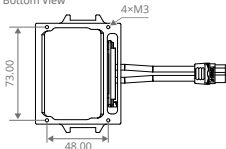
Front View



Side View



Bottom View



Unit: mm

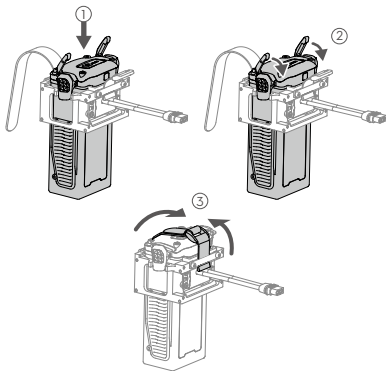


- The Battery Rack has threaded M3 screw holes. A minimum of three M3 screws are required to mount the Battery Rack properly.
- The depth of the threaded holes is 6 mm. DO NOT use screws that are longer than this depth. Otherwise, the Battery Rack may be damaged.

3. Inserting a Battery

After mounting the Battery Rack, insert a battery into the Battery Rack as shown in illustration ①. Fasten the locks on the battery as shown in illustration ②. Then, secure the magic cable tie as shown in illustration ③. You can place foam around the battery based on your needs.

If the magic cable tie is not used, insert a battery into the Battery Rack as shown in illustration ① and fasten the locks on the battery as shown in illustration ②.



Powering on

After mounting the Battery Rack and inserting a battery, power on the battery as follows:

1. Connect the power output port to a robot or referee system.
2. Press the power button on the battery once to check the battery level. Then, press and hold to power on the battery. When the battery is powered on, the battery status indicator turns green.

Retrieving Battery Information

The Battery Rack supports the I2C communication protocol. By connecting your controller device to the battery information port on the Battery Rack, you can read battery capacity, operating status, and other information.

- Target device address: 0x41 (7 bits)
- Communication speed: 100 kHz
- Pull-up resistor: As a target device, the Battery Rack does not have a pull-up resistor. To keep the lines at a high level when the bus is idle, the controller device must add a 4.7 k Ω pull-up resistor to both the SDA and SCL lines. Otherwise, the bus may experience deadlock or communication failure.

List of Registers

Static data is updated every three seconds. Dynamic data is updated every 500 milliseconds.

	Register Name	R/W Type	Register Address	Data Type	Description
Static Data	WHO_AM_I	Read	0x1F	uint8_t	Battery Rack ID
	DESIGNED_CAPACITY	Read	0x20	uint32_t	Design capacity (mAh)
	LOOP_TIMES	Read	0x24	uint16_t	Charge cycles
	PRODUCTION_DATE	Read	0x26	uint16_t	Production date
	BATTERY_LIFE	Read	0x28	uint8_t	Battery life (0 to 100%)
Dynamic Data	CURRENT_VOLTAGE	Read	0x29	int32_t	Instantaneous voltage (mV)
	CURRENT_CURRENT	Read	0x2D	int32_t	Instantaneous current (mA)
	TEMPERATURE	Read	0x31	int16_t	Instantaneous temperature (accurate to 0.1°C)
	CAPACITY_PRECENT	Read	0x33	uint8_t	Capacity percentage (0 to 100%)
	INTERNAL_STATE	Read	0x34	uint8_t	Internal state
	ERROR_STATE	Read	0x35	uint8_t	Error state



Data from certain registers follow specific rules. For more information on how to read this data, see "Register Data Details".

Register Data Details

WHO_AM_I

Data Type	Bit Field	Description
uint8_t	7:0	Target device address (set to 0x41)

PRODUCTION_DATE

Data Type	Bit Field	Description
uint16_t	15:9	Year offset from 1980
	8:5	Month
	4:0	Day of the month

INTERNAL_STATE

Data Type	Bit Field	Description	Value
uint8_t	7:2	Reserved for future purposes	N/A
	:1	Communication status with the battery	The default value is 0. <ul style="list-style-type: none">• 0: abnormal communication. For example, the battery is not in place or powered on.• 1: normal communication.
	:0	Current output status of the battery	The default value is 0. <ul style="list-style-type: none">• 0: low current state (≤ 0.2 A). The battery will automatically turn off output 20 minutes after powering on.• 1: high current state (> 0.2 A). The battery does not automatically turn off output.

ERROR_STATE

Data Type	Bit Field	Description	Value
uint8_t	:7	Reserved for future purposes	N/A
	:6	Self-check error	<ul style="list-style-type: none">• 0: no such error.• 1: an error occurs.
	:5	Battery cell error	
	:4	Battery voltage low	
	:3	Battery overheated	
	:2	Battery current exceeded	
	:1	Battery over discharged	
	:0	Battery short-circuited during discharge	

Specifications

Weight	130 g
Power Output Port Connector	XT60
Max Continuous Current through Battery Rack	35 A
Battery Information Port Protocol	I2C

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