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## Warnings



### **WARNING!**

**Lithium-ion batteries are very dangerous! Improper use of this equipment may cause a fire.**



### **WARNING!**

**Use of this equipment requires at least basic knowledge in electronics and electrical engineering.**



### **WARNING!**

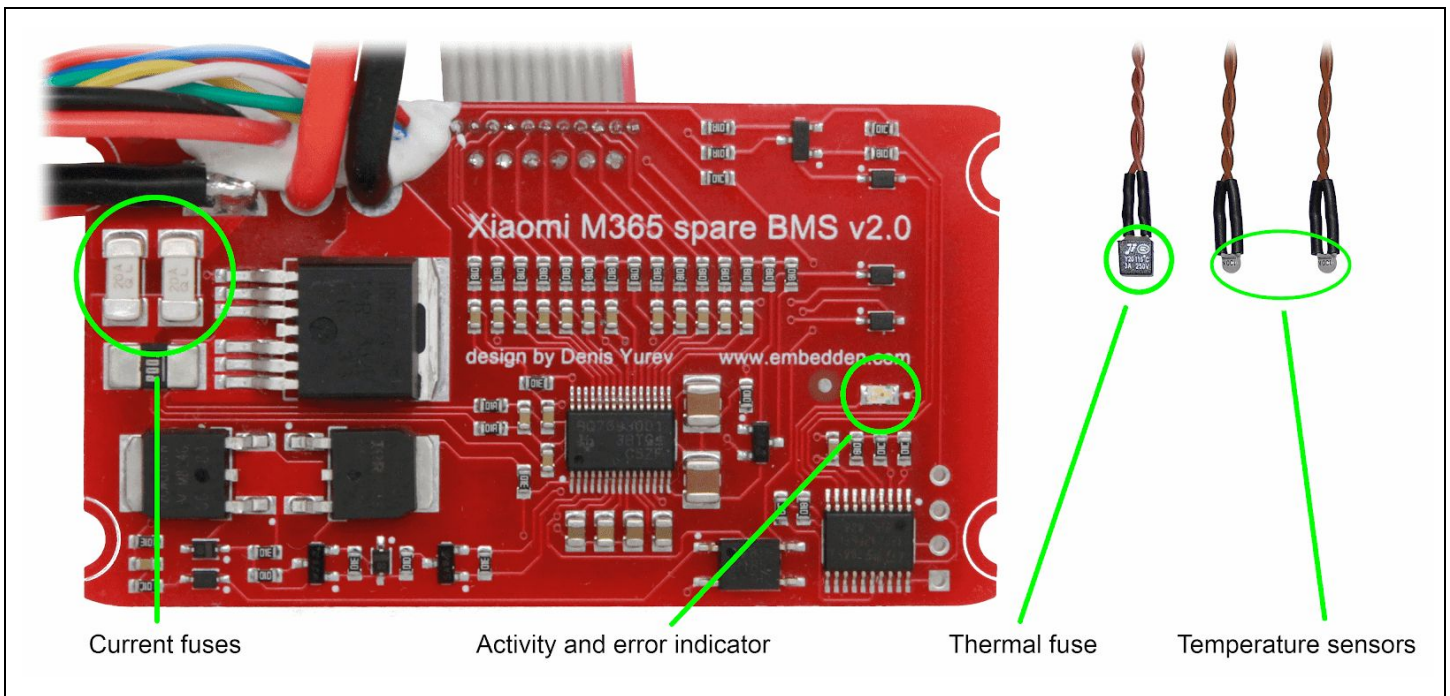
**When installing this equipment, read and follow the manufacturer's instructions exactly.**

## Introduction

Repair BMS is designed to be installed inside a Xiaomi Mijia M365 / M365PRO electric scooter battery instead of an original BMS. This is required when an original BMS fails, or when tuning the battery by replacing all cells with more capacious ones. It is also possible to use this BMS for any self-assembled 10s battery pack.

A battery equipped with a repair BMS is recognized by the Xiaomi Mijia M365 / M365PRO electric scooters as standard, so all the original functionality is preserved. In addition, it becomes possible to flexibly configure many parameters, for example, capacity, discharge curve, serial number, maximum current, and many other parameters.

## General view




Activity and error indicator	Flashes every half second in normal operation. In case of an error, displays its code. For more information on error codes, see the “Troubleshooting” section.
Temperature sensors	Information from these sensors is displayed in the smartphone application. If the sensors detect an excess of the permissible temperature, the BMS temporarily disables charging and discharging the battery.
Thermal fuse	Irreversibly melts at a critical temperature rise of the battery, completely turning off the BMS power and, accordingly, the charge and discharge of the battery.
Current fuses	Irreversibly burn out at a critical overcurrent if the software protection did not work.

## Basic specifications

Supported battery types	Li-ion, Li-pol
Supported battery configurations	10s only
Maximum battery capacity, mA*h	32000
Maximum continuous discharge current, A	30
Maximum continuous charge current, A	2
Effective cells balancing current, mA	1.4

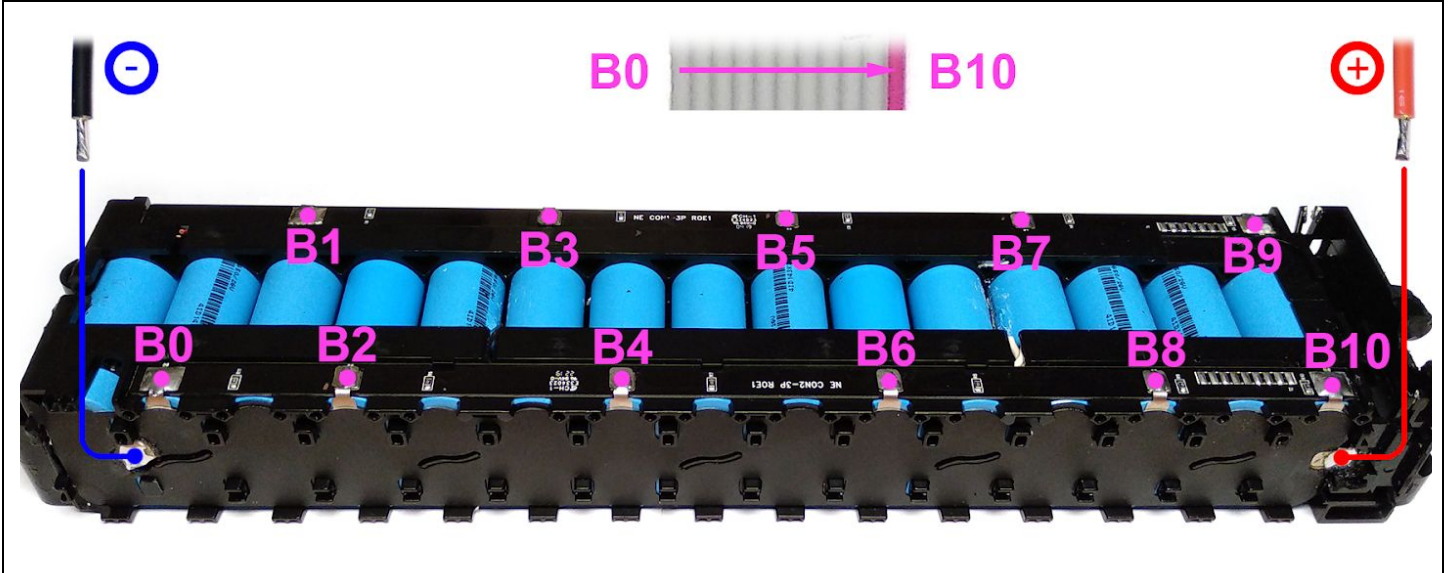
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## Pinout

	Battery pack - negative lead	Connects to the negative lead of the battery pack
	Battery pack - positive lead	Connects to the positive lead of the battery pack
	Balancing cable	Connects to each parallel of the battery pack
	Charging connector	Connects to the charge port of the scooter
	Discharging connector	Connects to the ESC
	Rear light	Connects to the rear light of the scooter
	Data	Connects to the ESC

# Installation

## Xiaomi M365 - wiring diagram

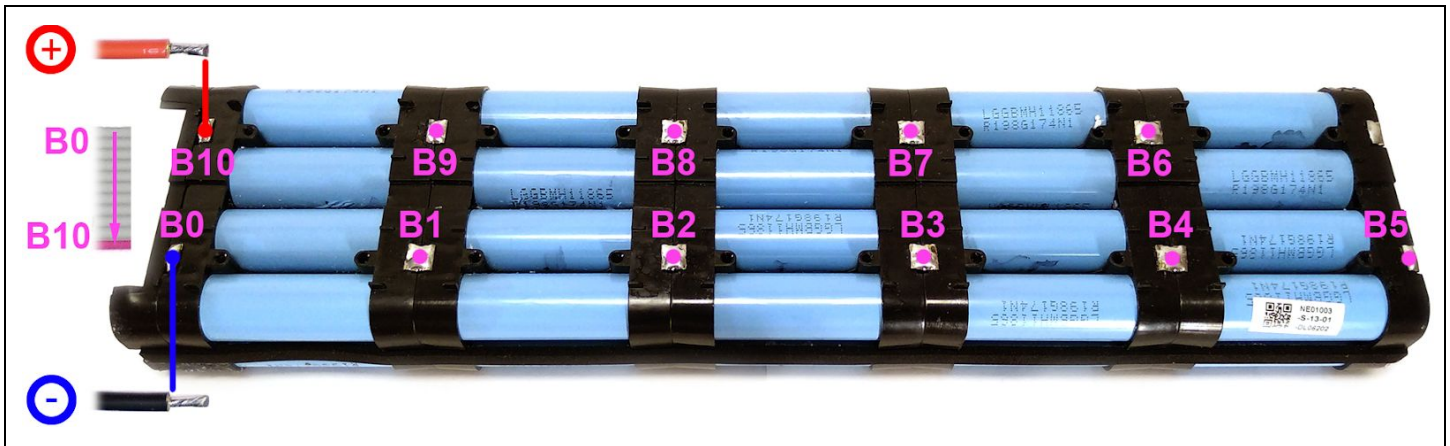


# WARNING!

Follow the wiring sequence, otherwise the BMS may irreparably fail, with a loss of warranty.

1. Connect the black power wire of the BMS to the negative lead of the battery pack.
2. Connect the red power wire of the BMS to the positive lead of the battery pack.
3. Connect the balancing wires in order, starting with B0 and finishing with B10.
4. Install temperature sensors and thermal fuse using a thermal compound or neutral sealant with thermal grease.
5. Solder the connector that comes with the BMS to the rear light wire.
6. Connect the battery to the scooter.
7. To start the BMS for the first time, connect the charger to the scooter. In case of a successful start, the indicator LED will blink on the board.

## Xiaomi M365PRO - wiring diagram



## WARNING!

The cable does not come out of the board in the most convenient way, and when connecting the balancing wires, you have to cross them. The thing is that initially BMS was designed even before the PRO version of the scooter appeared on sale, after which the form of the board was only slightly changed to maintain compatibility.



## WARNING!

Follow the wiring sequence, otherwise the BMS may irreparably fail, with a loss of warranty.

1. Connect the black power wire of the BMS and B0 balancing wire.
2. Connect the balancing wires in order, starting with B1 and finishing with B9.
3. Connect the red power wire of the BMS and B10 balancing wire.
4. Install temperature sensors and thermal fuse using a thermal compound or neutral sealant with thermal grease.
5. Solder the connector that comes with the BMS to the rear light wire.
6. Connect the battery to the scooter.
7. To start the BMS for the first time, connect the charger to the scooter. In case of a successful start, the indicator LED will blink on the board.

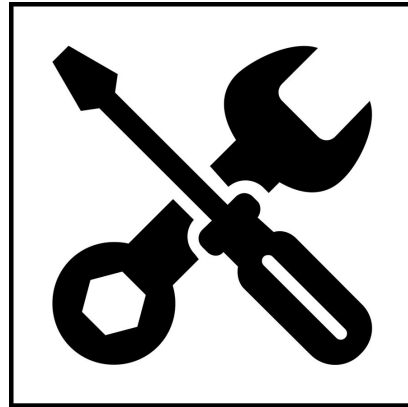


## Installation process video tutorials

[Xiaomi M365 BMS replacement](#)



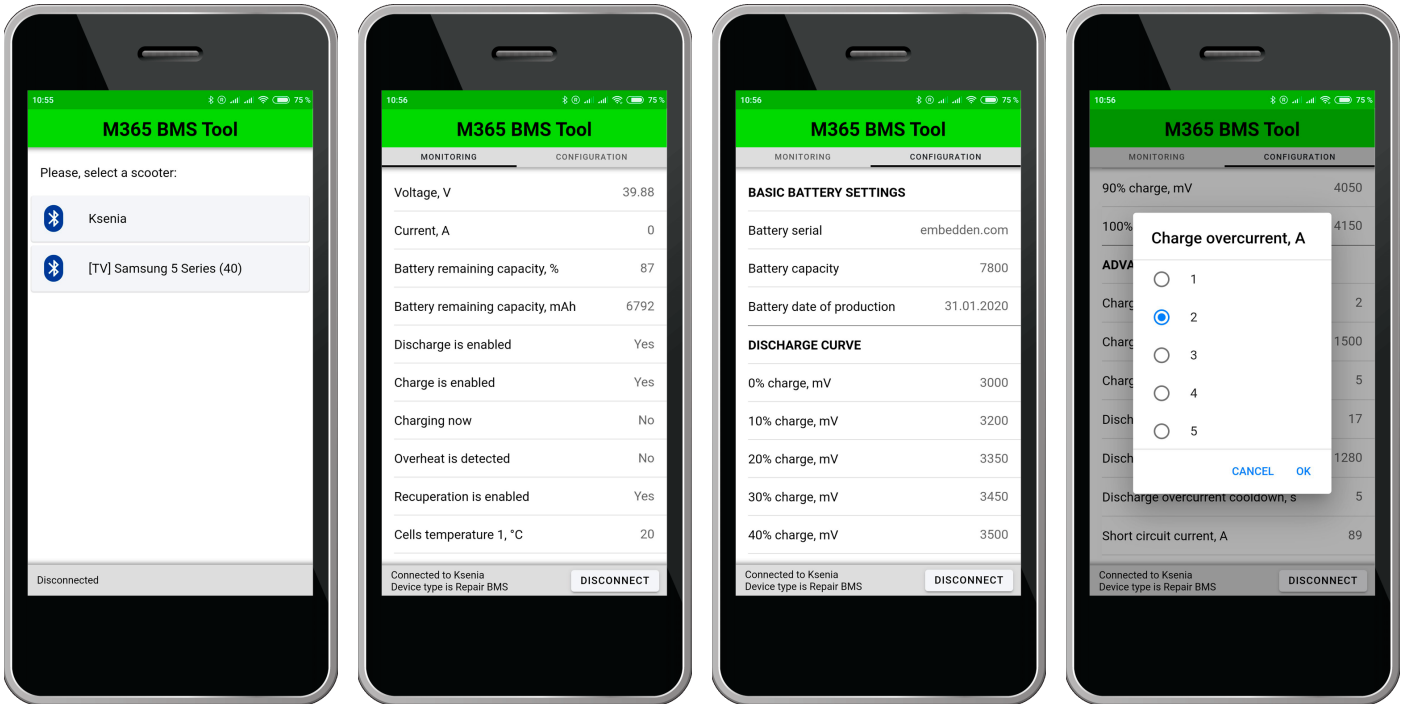
[Xiaomi M365PRO BMS replacement](#)



## Setting up the battery

The repair BMS provides the ability to flexibly configure many parameters. The default values can be left unchanged when the BMS is used just to replace the faulty original Xiaomi M365 board. In the case of the PRO version of the scooter, you must additionally configure the battery capacity. And if you change cells to new ones or even assemble your own battery pack, you need to configure a number of parameters to operate with the new cells.

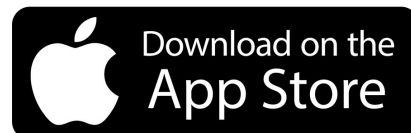
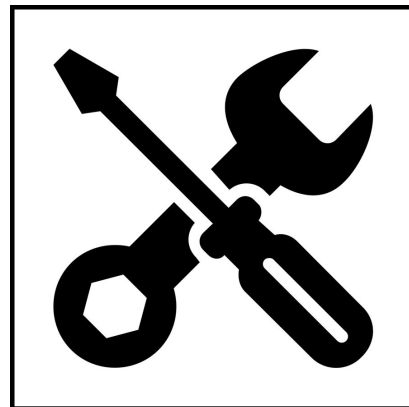
Please, use the “M365 BMS Tool” application to configure your battery:



[Download for Android](#)



[Download for iPhone](#)



## Description of parameters

<b><i>Parameter</i></b>	<b><i>Description</i></b>
Battery serial	This parameter affects only the battery serial number displayed in applications. You can enter your name there or the name of your repair shop.
Battery capacity	Very important parameter, it must be set to the correct value, otherwise, wrong charge level calculation during charge and discharge is possible.
Battery date of production	This parameter affects only the battery production date displayed in applications.
Discharge curve	Sets the correlation between the voltage of the most discharged parallel and the charge level, in percent, at 11 points. For example, by default, 0% is 3100mV, 10% is 3200mV, ..., 90% is 4000mV, 100% is 4100mV. Using this setting, you can carefully adjust the uniformity of the charge level scale to the non-linear characteristic of the battery cells you use.
Charge overcurrent	The maximum continuous charge current, exceeding which during the time determined by the "Charge overcurrent delay" parameter, charging will be disabled for the time determined by the "Charge overcurrent cooldown" parameter.
Charge overcurrent delay	The time after which the protection against exceeding the charge current is activated.
Charge overcurrent cooldown	The time during which charging will be disabled after the protection against exceeding the charge current is activated.
Discharge overcurrent	The maximum continuous discharge current, exceeding which during the time determined by the "Discharge overcurrent delay" parameter, discharging will be disabled for the time determined by the "Discharge overcurrent cooldown" parameter.
Discharge overcurrent delay	The time after which the protection against exceeding the discharge current is activated.
Discharge overcurrent cooldown	The time during which discharging will be disabled after the protection against exceeding the discharge current is activated.
Short circuit current	The maximum continuous discharge current, exceeding which during the time determined by the "Short circuit delay" parameter, discharging will be disabled for the time determined by the "Short circuit cooldown" parameter.
Short circuit delay	The time after which the protection against short circuit is activated.
Short circuit cooldown	The time during which discharging will be disabled after the protection against short circuit is activated.

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## Description of parameters(continuation)

<b>Parameter</b>	<b>Description</b>
Cell overvoltage	Voltage above which at least one parallel is exceeded for a time determined by the “Cell overvoltage delay” parameter, charging is disabled until the voltage drops to the value [Cell overvoltage - Cell overvoltage hysteresis].
Cell overvoltage delay	Time after which the overvoltage protection of the parallel is activated.
Cell overvoltage hysteresis	Hysteresis, which is responsible for how much the parallel voltage should fall after the overvoltage protection is activated, so that the charge is enabled.
Cell undervoltage	Voltage, at which the voltage of at least one parallel is dropped for a time determined by the “Cell undervoltage delay” parameter, the discharge is disabled until the voltage rises to [Cell undervoltage + Cell undervoltage hysteresis].
Cell undervoltage delay	Time after which protection against undervoltage of the parallel is activated.
Cell undervoltage hysteresis	Hysteresis, which is responsible for how much the parallel voltage should increase after the protection against undervoltage is triggered, so that the discharge is enabled.
Balancing mode	Three balancing options: Always - always balance cells, except when their voltage is lower than the value defined by the “Lowest voltage to balance” parameter. Charge & Overvoltage - balance cells during charging or when exceeding the maximum voltage in at least one cell. Never - never balance cells.
BMS shutdown undervoltage	The voltage, when the voltage drops to at least one parallel for 30 seconds, the BMS turns off completely, stopping consuming battery current. This is necessary in case the scooter is left discharged for a long period so that BMS does not overdischarge the battery pack by its own current consumption.
Lowest voltage to balance	The minimum parallel voltage at which it will be balanced.
Cells disbalance threshold	How much should the parallel voltage exceed the voltage of the most discharged parallel in order for balancing to begin.
Recuperation disable cell voltage	If at least one parallel the voltage is higher than this value, a signal is sent to the controller to disable the recuperation.

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## Description of parameters(continuation)

<b><i>Parameter</i></b>	<b><i>Description</i></b>
Critical temperature	If the temperature of at least one temperature sensor is above this value during the time determined by the “Critical temperature delay” parameter, then discharge and charge will be disabled until the temperature of each temperature sensor falls below the [Critical temperature - Critical temperature hysteresis] value.
Critical temperature delay	Time after which the protection against temperature exceeding activates.
Critical temperature hysteresis	Hysteresis, which is responsible for how much the temperature should drop after the protection against temperature exceeding is activated, so that the discharge and charge are enabled again.

## Default parameter values

<b><i>Parameter</i></b>	<b><i>Default value</i></b>
Battery serial	“embedden.com”
Battery capacity, mAh	7800
Battery date of production	19.07.2019
Discharge curve, mV	3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100
Charge overcurrent, A	2
Charge overcurrent delay, ms	2000
Charge overcurrent cooldown, s	10
Discharge overcurrent, A	33
Discharge overcurrent delay, ms	1280
Discharge overcurrent cooldown, s	10
Short circuit current, A	111
Short circuit delay, us	70
Short circuit cooldown, s	10
Cell overvoltage, mV	4200
Cell overvoltage delay, s	4
Cell overvoltage hysteresis, mV	100
Cell undervoltage, mV	3000
Cell undervoltage delay, s	4
Cell undervoltage hysteresis, mV	100
Balancing mode	Charge&Overvoltage
BMS shutdown undervoltage, mV	2600
Lowest voltage to balance, mV	3400
Cells disbalance threshold, mV	30
Recuperation disable cell voltage, mV	4150
Critical temperature, °C	60
Critical temperature delay, s	5
Critical temperature hysteresis, °C	10

# Troubleshooting

## **Trouble:**

The battery does not work, the LED on the BMS board does not blink

## **Solution:**

1. Connect the charger: normally this starts the correctly connected BMS.
2. Check the connection is correct, in case of an error - reconnect correctly.
3. Make sure that all the parallels of the battery pack are OK: their voltage should be in the range of about 2.5 to 4.2 volts.

## **Trouble:**

BMS starts up, but after about 30 seconds it shuts down itself.

## **Solution:**

Check if the voltage drops at least one parallel lower than the “BMS shutdown undervoltage” parameter(it’s default value is 2.6V). If yes, then after starting BMS, leave the charger connected so that the problematic parallel is charged.

## **Trouble:**

BMS flashes LED, but the scooter does not turn on.

## **Solution:**

1. Check battery output voltage. If it is in the range of about 30 to 42 volts, it means that the BMS board and the battery pack are OK, and the problem should be looked for in the scooter controller.
2. If the voltage at the output of the scooter is below 30 volts, pay attention at the blinking LED, it signals errors that disable the discharge of the battery:
  - a) a short flash once per second means at least one of the parallels of the battery is discharged below the level of the “Cell undervoltage” parameter. It is important to understand why this happened. If the battery is completely discharged, and all the cells are evenly discharged to a low level - this is the normal mode of operation, there is nothing to worry about, you just need to connect the charger and charge the battery. But if only one parallel dropped down - this is a cause to look for broken contacts or a faulty cell.
  - b) continuous light - means the protection against overcurrent or short circuit protection has activated. In this case, you just have to wait 10-20 seconds.
  - c) a long flash once a second - it means that the protection against temperature rise has activated. In this case, wait until the temperature drops.
  - d) a short flash every half a second - this is normal mode, there are no errors disabling the discharge of the battery. If the LED blinks like this, but there is no voltage at the BMS output, it means the board malfunction, please contact the technical support.

## Warranty and technical support

I do not accept returns and no longer provide a warranty because there are more and more cases where unqualified customers burn the BMS due to incorrect connection, and then require a warranty exchange. At the same time, if you are a skilled guy, be free to order and install the BMS - it's quality is proved by years and hundreds of installations. I just protect myself from unqualified customers by voiding the warranty.

If you did not find the answer to your question after reading this manual, please, feel free to ask your questions in the special telegram group:

[Xiaomi M365/PRO/1S custom electronics](#)

[by Denis Yurev](#)

