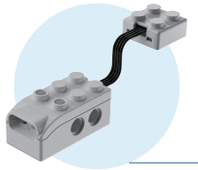
## Grayscale Sensor

The grayscale sensor utilizes the principle of infrared light reflection to detet the distance and the gray scale of objects. The sensor is equipped with digital technology to filter out the interference of infrared light with common intensity.



**Notice:**

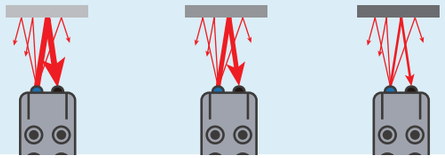
1.The sensor cable is made of silicone. Please avoid pulling, stretching or using building blocks or gears to squeeze it which may cause the cable to break.

2.When removing the sensor, please use a splitter. Do not pull the wires.

## Instruction

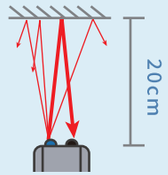
### Color Measurement

In a fixed distance situation, different objects' gray scale or certain colors can be detected through infrared reflection frequency.
The darker the color, the weaker the reflected light, and the feedback value is larger. The lighter the color, the stronger the reflected light, and the feedback value is smaller.

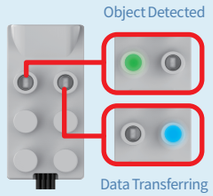


### Distance Measurement

The sensor can measure objects within approximately 20cm.




### Indicator Light Explanation



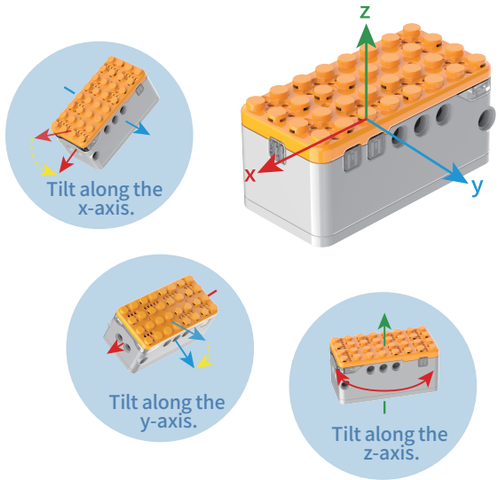

## Product Details

Product Name: Robot Master Tournament
Model No.: MKZ-RM-TRT
Suitable Age: 6+
Made in China

**Warning!!!**
**Do not aim at eyes or face.**
**Do not use projectiles not provided by the manufacturer!**
**Contains small parts, not suitable for children under 3 years old.**
**Contains small balls, may pose a choking hazard, not suitable for children under 3 years old.**
**The toy should not be connected to more than the recommended number of power sources. Battery charging must be supervised by an adult.**
**Maintenance: This product should not be submerged in water or used in damp environments. Please wipe surface stains with a dry cloth before use.**
**The user manual contains important information, please keep it for reference.**

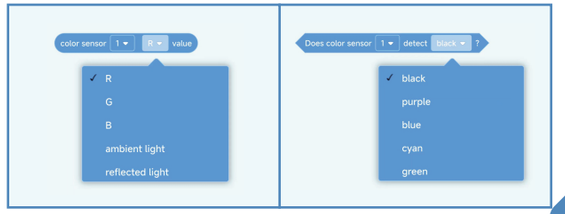
## Smart Gyroscope

The smart gyroscope sensor is built into the hub and it can detect the tilt angles in three directions.



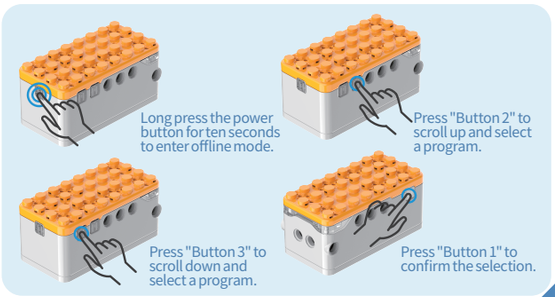

## Color Sensor

The color sensor features powerful capabilities, including color mode, reflection light mode, ambient light mode and RGB mode.
1. The color mode can detect various colors.
2. Reflection light mode measures the intensity of reflected light from objects.
3. Ambient light mode detects the brightness of the environment.
4. RGB mode measures the values of R, B, and G for the detected color.

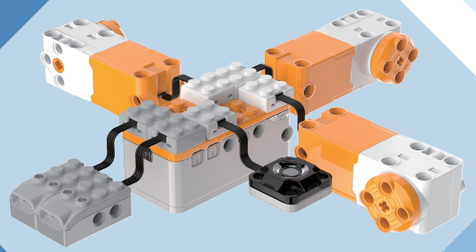



## Offline Mode

Long press the power button for ten seconds to enter offline mode. In this mode, the robot can execute programs stored within itself and perform fully automatic tasks.
・The hub controller can store up to 7 programs.
・Use "Button 2" to scroll up and select a program, and "Button 3" to scroll down and select a program. Different programs will illuminate different LED lights.
・Press "Button 1" to confirm the selection, and the hub controller will execute the chosen program.




makerzoid



iOS Android

APP Download

# MANUAL

## Robot Master Tournament

MKZ-RM-TRT

# Package Contents:

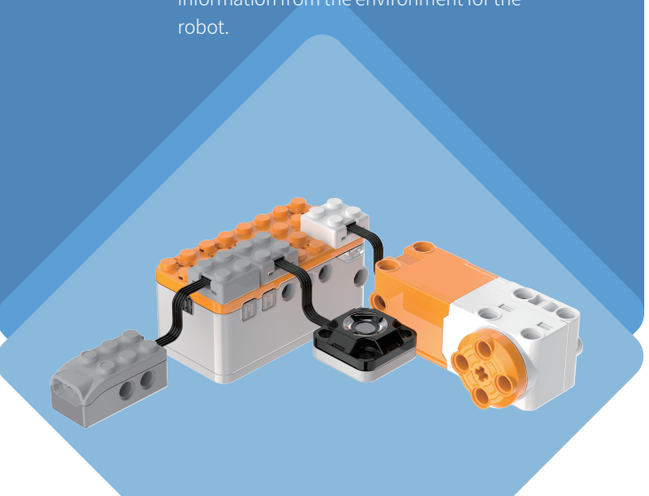
**This product includes 4 important electronic components:**
1. Hub Controller
2. Servo Motor
3.Color Sensor
4. Grayscale Sensor

**Hub Controller:**
Equipped with a gyroscope, 2 LED lights, and capable of storing 7 programs.

**Servo Motor:**
Equipped with advanced chips for direct sampling and calculation of the feedback signal from the motor encoder. Internally structured with position and speed loops, allowing for precise movements.

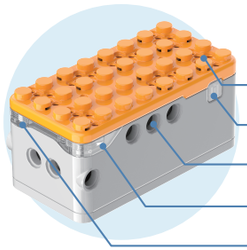
**Grayscale Sensor:**
Utilizes infrared principles to measure distance, avoid obstacles, and perform line tracking, enhancing the intelligence of the robot.

**Color Sensor:**
This sensor is powerful, featuring color mode, reflection light mode, ambient light mode, and RGB mode. It provides abundant optical information from the environment for the robot.



## Hub Controller

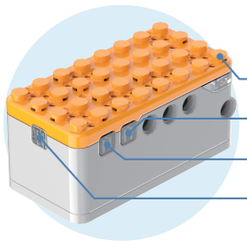
The smart controller has 7 cross ports, which can be used for connecting servo motors, color sensor, and grayscale sensors.
It is equipped with 2 LED lights, a gyroscope, and can store up to 7 programs simultaneously. It also has 1 TYPE-C USB data interface.
It supports online programming and offline program execution.



### Front:

① Electronic device interfaces x 7
② Button 1
③ Building block socket
④ LED light 1
⑤ LED light 2

**Note:**
Button 1: Confirm program execution in offline mode.
Electronic device interfaces: Can be used to connect servo motors, color sensor and grayscale sensors. Can recognize up to 4 servo motors, 4 color sensors, and 4 grayscale sensors.



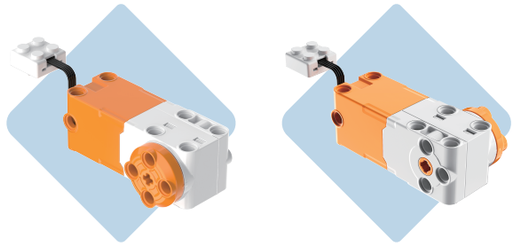
### Back:

⑥ Building block point
⑦ Button 2
⑧ Button 3
⑨ Power switch button

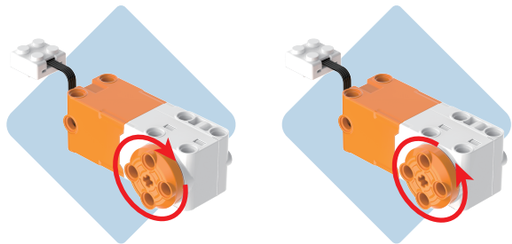
**Note:**
Button 2: Scroll up to select a program in offline mode.
Button 3: Scroll down to select a program in offline mode.

## Servo Motor

The servo motor is extremely powerful as it serves both as a motor and a sensor.
When used as a motor, it harnesses electrical energy to convert into kinetic energy, providing power for the robot to move.
Additionally, as an advanced sensor, it can precisely read the servo motor's instantaneous angle and current speed during movement.
We can manually rotate the motor and observe the current angle data in the programming interface.



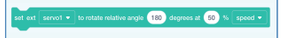
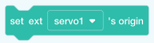
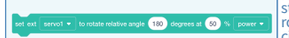
**Principle:**
The servo motor operates on closed-loop control. It is equipped with advanced chips that directly sample and calculate the feedback signals from the motor encoder. Internally, it consists of position and velocity loops, allowing the motor to achieve precise movements.



**Note:**
1. The motor wire is made of silicone. Please avoid pulling, stretching or using building blocks or gears to squeeze it which may cause the wire to break.
2. When removing the motor connector, please use a splitter. Do not pull the wire.

## How To Use The Servo Motor

There are five ways to control the servo motor during the programming process.

| Modules (Motor Control) | Functions |
|---|---|
|  | By setting the power, you can control the motor's rotation. The higher the power, the greater the motor output, and the faster the rotation. Power range is (-100 to 100). |
|  | By setting the speed to control the motor's rotation, the motor can maintain a stable speed. The faster the speed is set, the faster the rotation will be. Speed range (-100 to 100). |
|  | By setting the absolute angle, the motor can be precisely controlled. The angle range is from (0 to 359 degrees). |
|  | The servo motor stop mode includes options to maintain position, coasting, braking, or maintaining the last set value. |
|  | Relative position reset allows you to set any position as the zero point for relative angles. |
|  | Relative angle refers to the rotation starting from the position set as zero. It can rotate to any angle you set, with each full circle being 360 degrees, and the maximum value is +- 800,000,000 degrees. |
|  | By setting the circumference of the wheel, you can specify it in millimeters, centimeters, or inches. |
|  | By setting the circumference of the wheel, you can enable precise distance travel for the car using servo motors, with options for millimeters, centimeters, and inches as units. |

| Modules (Data Reading) | Functions |
|---|---|
| ext servo 1 's power | Read current power of the motor. |
| ext servo 1 's speed | Read current speed of the motor. |
| ext servo 1 's position | Read current absolute angle of the motor. |
| ext servo 1 's counted degrees | Read current relative angle of the motor. |
| is ext servo 1 stalled | Detect whether the motor is stalled. |
| is ext servo 1 done | Detect whether the motor has completed rotation. |

**Battery Installation Instructions:**
1. Non-rechargeable batteries cannot be charged.
2. Rechargeable batteries should be charged under adult supervision.
3. Different battery models or new and old batteries should not be mixed.
4. Depleted batteries should be removed from the product.
5. Toys should not be connected to more than one power source.
6. Rechargeable batteries should be removed from the toy before charging.
7. Batteries should be inserted with the correct polarity.
8. Power terminals must not be short-circuited.