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› WWZMDiB SG90 Micro Servo Motor User Manual

## WWZMDiB SG90

# WWZMDiB SG90 Micro Servo Motor User Manual

Model: SG90

Brand: WWZMDiB

## 1. INTRODUCTION

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The WWZMDiB SG90 Micro Servo Motor is a compact and versatile component designed for various electronic projects, including remote control applications, robotics, and DIY projects with microcontrollers like Arduino and Raspberry Pi. This manual provides essential information for proper installation, operation, and maintenance to ensure optimal performance.

## 2. PACKAGE CONTENTS

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Each package typically includes the following items:

- SG90 9g Micro Servo Motor(s)
- Various Servo Horns (e.g., cross, star, bar types)
- Mounting Screws
- Small Screwdriver (may be included in multi-packs)



Image 2.1: Typical contents of the WWZMDiB SG90 Micro Servo Motor package.

### 3. TECHNICAL SPECIFICATIONS

The following table details the key technical specifications of the SG90 Micro Servo Motor:

Feature	Specification
Brand	WWZMDiB
Model Name	SG90 Micro Servo Motor
Voltage	4.8V ~ 6.0V (DC)
Running Angle	180° ± 1° (500µsec → 2500µsec)
Rotating Direction	Counter Clockwise (500µsec → 2500µsec)
Control System	Change the pulse width
Amplifier Type	Analog controller
Dead Band Width	7 µsec
Material	Plastic
Item Weight	0.07 Kilograms (approx. 2.46 ounces)
Product Dimensions	1 x 1 x 0.5 inches (approx. 32mm x 31.8mm x 12.5mm)

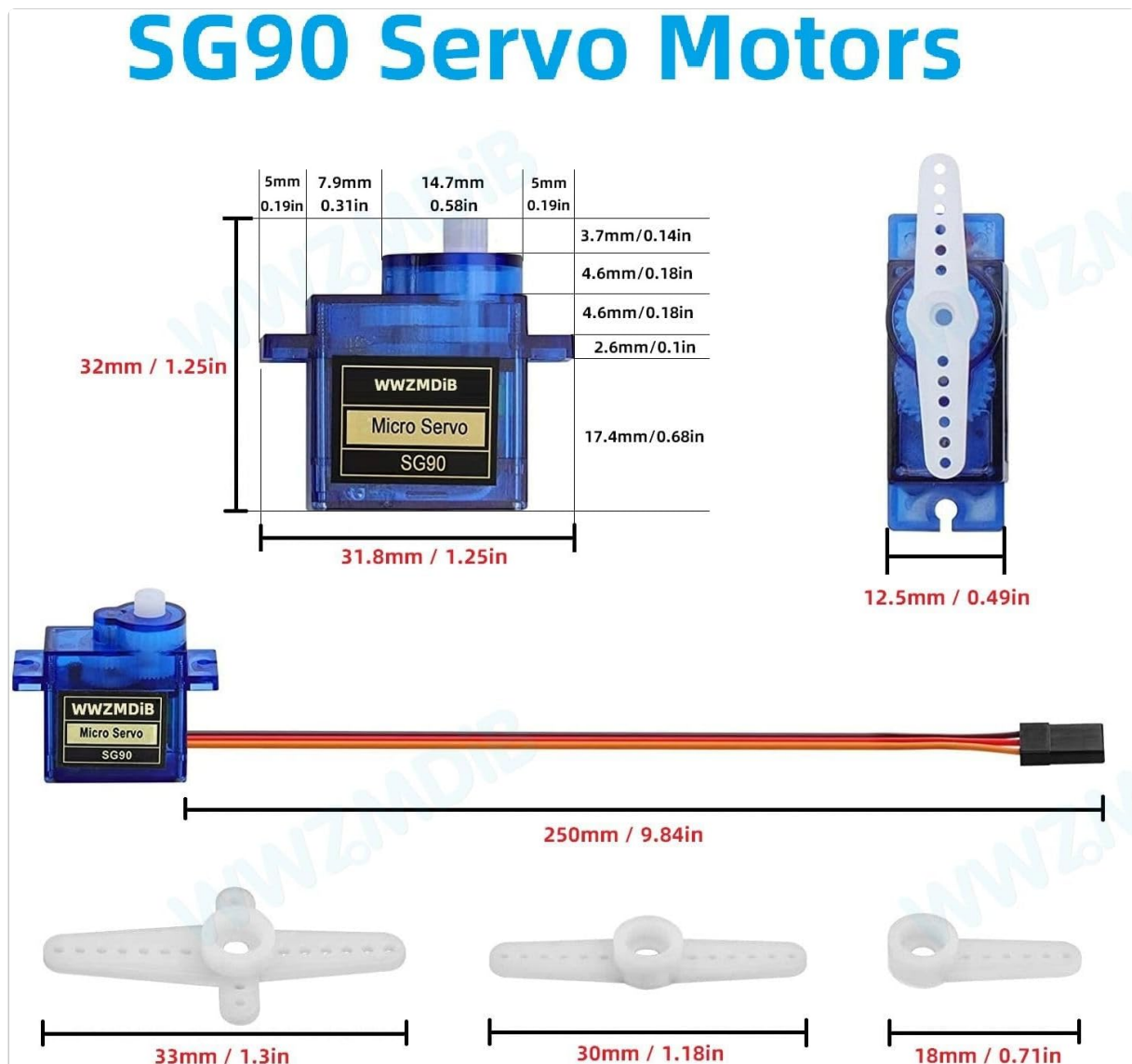


Image 3.1: Physical dimensions of the SG90 Micro Servo Motor and its accessories.

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Video 3.2: This video demonstrates the internal components and testing of a similar 180-degree servo, highlighting its

features and durability.

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**Video 3.3:** An overview of upgraded SG90 servos, showcasing their construction and potential improvements.

## 4. SETUP AND WIRING

The SG90 Micro Servo Motor features a standard 3-wire interface for connection to microcontrollers:

- **Red Wire:** Connects to the 5V power supply.
- **Brown Wire:** Connects to Ground (GND).
- **Yellow Wire:** Connects to a digital pin (e.g., Digital Pin 9 on Arduino) for signal input.

Ensure correct polarity when connecting the wires to avoid damage to the servo or microcontroller.

# SG90 Servo Motors

- ◆ **[SG90 Servo Motors Kit] : for Arduino Raspberry Pi DIY**
- ⚡ **[Voltage] : 4.8V ~ 6.0V**
- ⚠ **[Running angle] : 180°±1° (500→2500 μsec)**
- ⚠ **[Rotating direction] : Counter Clockwise (500→2500μsec)**



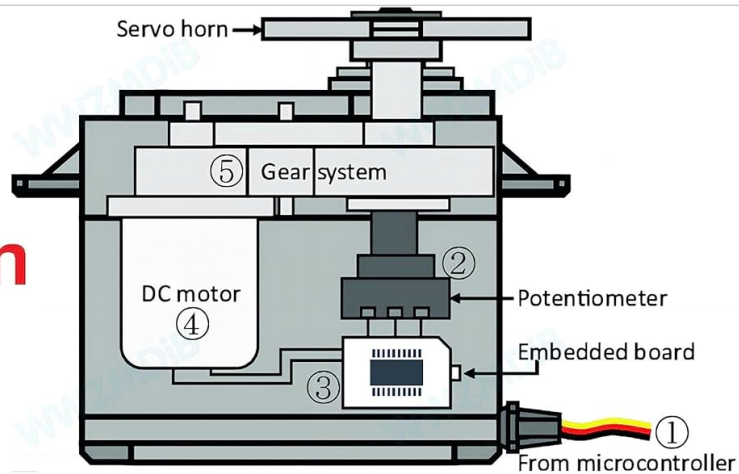
<b>Yellow</b>	Signal	PWM
<b>Red</b>	Positive Pole	(+5V)
<b>Brown</b>	Negative Pole	(0V)GND

Image 4.1: SG90 Servo Motor 3-wire interface and connections.

## 5. OPERATING PRINCIPLES

The SG90 servo motor operates based on Pulse Width Modulation (PWM) signals. A microcontroller sends a PWM signal to the servo, which then interprets this signal to control the rotation of its internal motor.

# Server composition



The microcontroller sends a PWM signal to the server, and the embedded board in the server receives the signal through the signal pins to control the rotation of the motor inside.

The motor drives the gear system, decelerates and then excites the shaft.



The shaft of the servo is connected to a potentiometer.



When the shaft rotates, it drives the potentiometer, so the potentiometer outputs a voltage signal to the embedded board.



The board determines the direction and speed of rotation based on the current position, so it stops exactly at the defined correct position and stays there.

Image 5.1: Internal composition of a servo motor.

The angle of the servo is determined by the duration of the pulse applied to the signal wire. The servo expects to see a pulse approximately every 20 milliseconds. The length of this pulse dictates the motor's position:

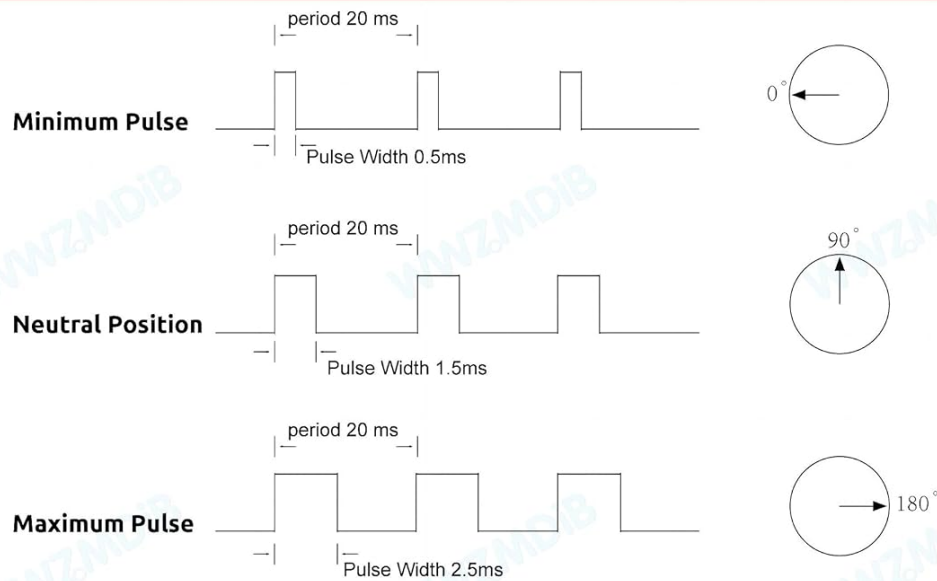
- A pulse width of approximately **0.5 ms** typically corresponds to 0 degrees.
- A pulse width of approximately **1.5 ms** typically corresponds to 90 degrees (neutral position).
- A pulse width of approximately **2.5 ms** typically corresponds to 180 degrees.

Pulse widths between these values will result in intermediate angles. The servo rotates to the commanded position and holds it until a new pulse width is received.

The angle is determined by the duration of a pulse that is applied to the control wire.

This is called **Pulse width Modulation**.

The servo expects to see a pulse every 20 ms. The length of the pulse will determine how far the motor turns.



For example, a 1.5ms pulse will make the motor turn to the 90 degree position (neutral position).

When a pulse is sent to a servo that is less than 1.5 ms, the servo rotates to a position and holds its output shaft some number of degrees counterclockwise from the neutral point.

When the pulse is wider than 1.5 ms the opposite occurs. The minimal width and the maximum width of pulse that will command the servo to turn to a valid position are functions of each servo.

Generally the minimum pulse will be about 0.5 ms wide and the maximum pulse will

Image 5.2: Pulse Width Modulation (PWM) and servo angle control.

## 6. APPLICATIONS

The SG90 Micro Servo Motor is suitable for a wide range of applications due to its small size, light weight, and precise control. Common uses include:

- **Robotics:** Controlling robot arms, grippers, and movement in small robots.
- **RC Models:** Steering in remote control cars, planes, and boats.
- **DIY Projects:** Actuating mechanisms in various Arduino and Raspberry Pi projects, such as automatic doors, camera pan/tilt systems, and sensor-controlled devices.

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**Video 6.1:** Demonstration of the SG90 servo motor in various robotic and DIY applications, including a light-sensitive flag and a robotic arm.

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**Video 6.2:** This video showcases the SG90 micro servo motor's use in RC cars and other robotic applications,

## 7. MAINTENANCE

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To ensure the longevity and reliable operation of your SG90 Micro Servo Motor, consider the following maintenance tips:

- **Keep Clean:** Protect the servo from dust, dirt, and moisture, which can interfere with its internal mechanisms.
- **Avoid Overloading:** Do not apply excessive force or torque beyond the servo's rated specifications, as this can damage the gears or motor.
- **Proper Storage:** Store the servo in a dry, cool environment when not in use.
- **Check Connections:** Periodically inspect wiring for any loose connections or damage.

## 8. TROUBLESHOOTING

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If you encounter issues with your SG90 Micro Servo Motor, consider these common troubleshooting steps:

- **Servo Not Moving:**
  - Check power supply: Ensure the servo is receiving 4.8V to 6.0V.
  - Verify wiring: Confirm that the Red, Brown, and Yellow wires are connected correctly to 5V, GND, and the signal pin, respectively.
  - Check signal: Ensure your microcontroller is sending a valid PWM signal to the servo.
- **Erratic Movement or Jitter:**
  - Power supply issues: Insufficient current from the power supply can cause erratic behavior. Try a separate power supply for the servo if using many.
  - Noise on signal line: Ensure the signal wire is not picking up electrical noise. Keep it away from power lines if possible.
  - Incorrect pulse width: Verify that the PWM signal's pulse width is within the servo's operational range (0.5ms to 2.5ms).
- **Servo Making Noise but Not Moving:**
  - Mechanical obstruction: Check for any physical obstructions preventing the servo horn from moving.
  - Overload: The servo might be trying to move a load that is too heavy. Reduce the load or use a more powerful servo.
  - Damaged gears: Internal gears might be stripped. This often results in a grinding noise.

## 9. WARRANTY AND SUPPORT

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For any warranty claims, technical assistance, or further inquiries regarding your WWZMDiB SG90 Micro Servo Motor, please contact the seller directly through the platform where the purchase was made. Provide your order details for efficient support.