M5Stack K138

M5Stamp Fly Drone Development Kit User Manual

Model: M5Stamp Fly (K138)

Introduction

The M5Stamp Fly is an advanced, open-source quadcopter development kit designed for education, research, and various drone development projects. It features the powerful M5StampS3 as its main controller, integrating a comprehensive suite of sensors for precise flight control and environmental interaction. This manual provides essential information for setting up, operating, maintaining, and troubleshooting your M5Stamp Fly kit.

It is recommended to use the M5Stamp Fly with an M5Atom Joystick Bluetooth Controller (sold separately) for optimal control and functionality.

Product Overview

The M5Stamp Fly kit is engineered with a focus on programmability and sensor integration, making it a versatile platform for drone enthusiasts and developers.

An overhead view of the M5Stamp Fly drone, showcasing its compact design, four propellers with protective guards, and the central M5StampS3 controller board. The board features various components and connectors, including a USB port.

Key Features:

- **Main Controller:** M5StampS3 with ESP32-S3 microcontroller, offering advanced features such as WiFi and OTG/CDC support.
- **Integrated Sensors:**
  - BMI270 6-axis gyroscope and BMM150 3-axis magnetometer for attitude and direction detection.
  - BMP280 barometric pressure sensor for precise altitude hold.
  - Two VL53L3 distance sensors for obstacle avoidance.
  - PMW3901MB-TXQT optical flow sensor for hovering and displacement detection.
  - INA3221AIRGVR for real-time current/voltage monitoring.
- **Power System:** 300mAh high-voltage lithium battery and four high-speed coreless motors.
- **Interactive Elements:** Built-in passive buzzer for audio feedback, WS2812 RGB LEDs for status indication, and a reset button.
- **Expansion:** Two Grove connectors for additional sensors and peripherals, enabling extensive customization.
- **Control:** Preloaded with debugging firmware, controllable via ESP-NOW protocol (e.g., with M5Atom Joystick). Supports automatic and manual flight modes.
- **Open-Source:** Firmware source code is open-source, facilitating learning and development.

Setup Guide

1. Unboxing and Inspection

Carefully remove all components from the packaging. Verify that all items listed in the product description are present and undamaged. The kit includes the M5Stamp Fly drone and a 300mAh lithium battery.

2. Battery Installation and Charging

- Locate the battery connector on the M5Stamp Fly.
- Connect the provided 300mAh lithium battery to the drone's battery port. Ensure the polarity is correct.
- Before first use, fully charge the battery using a compatible USB charger connected to the drone's USB-C port. The charging indicator (if present, typically an LED) will change status upon full charge.

3. Initial Power On and Firmware Check

- Once the battery is connected, the drone should power on. Observe the WS2812 RGB LEDs for initial status indications.
- The M5Stamp Fly comes preloaded with debugging firmware. For advanced development or custom firmware, refer to the official M5Stack documentation and GitHub repositories for flashing instructions.

4. Connecting to a Controller (e.g., M5Atom Joystick)

- If using an M5Atom Joystick (sold separately), ensure it is also powered on and configured for ESP-NOW communication.
- Follow the pairing instructions provided with your M5Atom Joystick to establish a connection with the M5Stamp Fly. This typically involves a specific button sequence or software configuration.

Operating Instructions

1. Pre-Flight Checklist

- Ensure the battery is fully charged.
- Verify all propellers are securely attached and free from damage.
- Confirm the flight area is clear of obstacles and people.
- Ensure the M5Stamp Fly and your controller are properly paired and communicating.

2. Flight Modes

The M5Stamp Fly supports both automatic and manual flight modes, depending on the loaded firmware and controller capabilities.

- **Automatic Mode:** Utilizes integrated sensors (VL53L3 for distance, BMP280 for altitude, PMW3901MB-TXQT for optical flow) to assist with stable hovering, altitude hold, and obstacle avoidance. This mode is ideal for beginners or for precise maneuvers like flips.
- **Manual Mode:** Provides direct control over the drone's movements, relying more on user input. This mode is suitable for experienced users or for custom flight patterns.

3. Basic Flight Controls (with M5Atom Joystick example)

While specific controls may vary based on firmware and controller, typical drone controls include:

- **Throttle (Vertical Movement):** Typically controlled by the left joystick (up/down).
- **Yaw (Rotation):** Typically controlled by the left joystick (left/right).
- **Pitch (Forward/Backward):** Typically controlled by the right joystick (up/down).
- **Roll (Left/Right Sideways Movement):** Typically controlled by the right joystick (left/right).
- **Take-off/Landing:** Often a dedicated button or a specific joystick combination.
- **Flips/Special Maneuvers:** Activated via specific button presses or joystick movements in automatic mode.

Always refer to the specific documentation for the firmware loaded on your M5Stamp Fly and your chosen controller for detailed control mapping.

4. Sensor Utilization

- **VL53L3 Distance Sensors:** Used for obstacle detection and avoidance. The drone can be programmed to automatically adjust its flight path when an obstacle is detected within a certain range.
- **BMP280 Barometric Pressure Sensor:** Provides accurate altitude readings, enabling stable altitude hold functionality.
- **PMW3901MB-TXQT Optical Flow Sensor:** Essential for precise hovering and displacement detection, especially in indoor environments where GPS signals are unavailable.

Maintenance

1. Battery Care

- Always use the recommended charging method.
- Do not overcharge or over-discharge the battery.
- Store batteries in a cool, dry place away from direct sunlight and extreme temperatures.
- If the battery swells or shows signs of damage, discontinue use immediately and dispose of it properly.

2. Propeller Inspection and Replacement

- Regularly inspect propellers for cracks, bends, or chips. Damaged propellers can affect flight stability and efficiency.
- To replace a propeller, gently pull the old one off the motor shaft and push a new one firmly into place. Ensure the correct propeller type (clockwise/counter-clockwise) is installed on the correct motor.

3. Cleaning

- Use a soft, dry cloth to clean the drone's body and components.
- Avoid using liquid cleaners or solvents, as they may damage electronic components.
- Gently remove any dust or debris from sensors and motor areas using a soft brush or compressed air.

4. Firmware Updates

Periodically check the official M5Stack website or GitHub repository for firmware updates. Updates can improve performance, add new features, or fix bugs. Follow the provided instructions carefully when performing firmware updates.

Troubleshooting

Problem	Possible Cause	Solution
Drone does not power on.	Battery not connected or discharged.	Ensure battery is securely connected and fully charged.
Drone does not respond to controller.	Not paired, out of range, or controller battery low.	Re-pair the drone and controller. Ensure they are within range. Charge controller battery.
Unstable flight or drifting.	Damaged propellers, uncalibrated sensors, or uneven motor thrust.	Inspect and replace damaged propellers. Perform sensor calibration (if supported by firmware). Check for debris in motors.
Obstacle avoidance not working.	VL53L3 sensors obstructed or firmware issue.	Clean sensor lenses. Verify obstacle avoidance is enabled in firmware settings.
Short flight time.	Battery degradation or inefficient flight.	Ensure battery is fully charged. Consider replacing old batteries. Optimize flight patterns.

Specifications

Feature	Detail
Brand	M5Stack
Model Name	M5Stamp Fly
Model Number	K138
Main Controller	M5StampS3 (ESP32-S3)
Connectivity	Bluetooth, USB, Wi-Fi (ESP-NOW protocol for control)
Battery	300mAh High-Voltage Lithium Battery (Included)
Motors	Four High-Speed Coreless Motors
Sensors	BMI270 (6-axis Gyroscope), BMM150 (3-axis Magnetometer), BMP280 (Barometric Pressure), 2x VL53L3 (Distance), PMW3901MB-TXQT (Optical Flow), INA3221AIRGVR (Current/Voltage Monitoring)
Dimensions	3.2"L x 3.2"W x 1.22"H (approx.)
Item Weight	36.8 Grams (approx. 1.3 ounces)
Material	Carbon Fiber, Plastic
Age Range (Description)	10+ Years
Skill Level	Intermediate

Feature	Detail
Maximum Range	3 Meters (Control range, may vary with environment)
Operating Temperature	Up to 40 Degrees Celsius

Warranty and Support

For detailed warranty information, please refer to the official M5Stack website or the documentation included with your purchase. M5Stack provides resources and support for their open-source products.

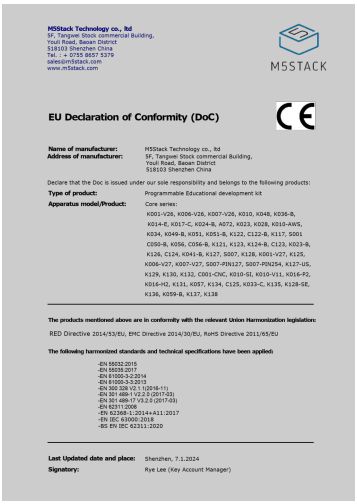
For technical support, firmware updates, and community forums, please visit theM5Stack Official Website or their GitHub repository.
Additional protection plans may be available for purchase from your retailer. Please check with your point of purchase for details on extended warranties or service plans.

Related Documents - K138

	M5STAMP C3 ESP32 IoT Development Board User Manual Explore the M5STAMP C3, M5Stack's smallest ESP32 system board. This manual details its features, specifications, and provides quick start guides for Arduino IDE, Bluetooth, and WiFi development, making it ideal for IoT applications.
	M5STACK Dinmeter: Product Overview and Quick Start Guide Comprehensive guide to the M5STACK Dinmeter, an embedded development board powered by M5StampS3. Features include a 1.14-inch screen, rotary encoder, and extensive connectivity. Learn about its specifications and how to perform WiFi and BLE scans with Arduino IDE.
	M5Stack Atom Echo: Compact Programmable Smart Speaker & IoT Device Discover the M5Stack Atom Echo, a small, ESP32-based smart speaker with Wi-Fi, Bluetooth, Speech-to-Text (STT), and Grove interface. Ideal for voice control, IoT projects, and music playback.

	[M5Stack Atom-Lite: Compact ESP32 Development Board | Overview & Specs] Discover the M5Stack Atom-Lite (SKU: C008), a compact ESP32-PICO-D4 development board for embedded systems and IoT. Learn about its features, specifications, GPIO, software compatibility (Arduino, UiFlow), and applications.
	[M5Stack Tab5: ESP32-P4 IoT Development Device with Wi-Fi 6] Explore the M5Stack Tab5, a versatile and expandable smart-IoT terminal development device featuring the ESP32-P4 RISC-V processor, ESP32-C6 Wi-Fi 6 module, 5-inch IPS display, 2MP camera, and extensive connectivity options for IoT prototyping and industrial automation.
	[M5STACK Flow Gateway: Multifunctional IoT Expansion Module] Detailed overview, specifications, and quick start guide for the M5STACK Flow Gateway, a multifunctional expansion module with CAN bus interfaces, Wi-Fi, BLE, and more. Includes Arduino installation instructions.

Documents - M5Stack – K138



M5Stack Technology co., ltd
5F, Tangwei Stock commercial Building,
Youli Road, Baoan District
518103 Shenzhen China
Tel. : + 0755 8657 5379
sales@m5stack.com
www.m5stack.com

M5STACK

EU Declaration of Conformity (DoC)

CE

Name of manufacturer:	M5Stack Technology co., ltd
Address of manufacturer:	5F, Tangwei Stock commercial Building, Youli Road, Baoan District 518103 Shenzhen China

Declare that the Doc is issued under our sole responsibility and belongs to the following products:

Type of product:	Programmable Educational development kit
Apparatus model/Product:	Core series: K001-V26, K006-V26, K007-V26, K010, K048, K036-B, K014-B, K017-C, K024-B, A072, K023, K028, K010-AWS, K034, K049-B, K051, K001-B, K122, C122-B, K117, S001 C050-B, K056, C056-B, K121, K123, K124-B, C123, K023-B, K126, C124, K041-B, K127, S007, K128, K001-V27, K125, K006-V27, K007-V27, S007-PIN127, S007-PIN254, K127-US, K129, K130, K132, C001-CNC, K010-SI, K010-V31, K016-P2, K016-H2, K131, K057, K134, C125, K033-C, K135, K128-SE, K136, K059-B, K137, K138

The products mentioned above are in conformity with the relevant Union Harmonization legislation:

RED Directive 2014/53/EU, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU

The following harmonized standards and technical specifications have been applied:

-EN 55032:2015
-EN 55035:2017
-EN 61000-3-2:2014
-EN 61000-3-3:2013
-EN 300 328 V2.1.1(2016-11)
-EN 301 489-1 V2.2.0 (2017-03)
-EN 301 489-17 V3.2.0 (2017-03)
-EN 62311:2008
-EN 62368-1:2014+A11:2017
-EN IEC 63000:2018
-BS EN IEC 62311:2020

Last Updated date and place: Shenzhen, 7.1.2024
Signatory: Rye Lee (Key Account Manager)

[pdf] Decleration of Conformity Catalog

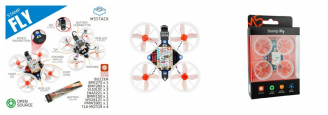
res EU Declaration of Conformity DoC M5Stack DOC core mouser catalog additional |||

M5Stack Technology co., ltd 5F, Tangwei Stock commercial Building, Youli Road, Baoan District 518103 ... I, K010-V11, K016-P2, K016-H2, K131, K057, K134, C125, K033-C, K135, K128-SE, K136, K059-B, K137, **K138** The products mentioned above are in conformity with the relevant Union Harmonization legislati...

lang:en score:24 filesize: 86.05 K page_count: 2 document date: 2024-07-24

Stamp Fly

SKU:K138



Description

M5Stamp Fly is a programmable open-source quadcopter kit, featuring the StampS3 as the main controller. It integrates a BMI270 6-axis gyroscope and a BMM150 3-axis magnetometer for attitude and direction detection. The BMP280 barometric pressure sensor and two VL53L3 distance sensors enable precise altitude hold and obstacle avoidance. The PMW3901MB-TXQT optical flow sensor provides displacement detection. The kit includes a buzzer, a reset button, and WS2812 RGB LEDs for interaction and status indication. It is equipped with a 300mAh high-voltage battery and four high-speed coreless motors. The PCB features an INA3221AIRGVR for real-time current/voltage monitoring and has two Grove connectors for additional sensors and peripherals. Preloaded with debugging firmware, the Stamp Fly can be controlled using an Atom Joystick via the ESP-NOW protocol. Users can choose between automatic and manual modes, allowing for easy implementation of functions like precise hovering and flips. The firmware source code is open-source, making the product suitable for education, research, and various drone development projects.

1/7 | Update Time: 2024-07-24

[pdf] User Manual Instructions Datasheet

Stamp Fly Mouser Electronics Jul 24 2024 · M5Stamp is a programmable open source quadcopter kit featuring the StampS3 as main controller It integrates BMI270 6 axis M5Stack Technology 3475591 3476095 srsltid AfmBOookLn6dVbnw7Zn45TaKdg50NshAB2hPU0bCC bjFVh82i8FDlq5 mouser datasheet 2 1117 |||

Stamp Fly SKU:**K138** Description M5Stamp Fly is a programmable open-source quadcopter kit, featuring the StampS3 as the main controller. It integrates a BMI270 6-axis gyroscope and a BMM150 3-axis magnetometer for attitude and direction detection. The BMP280 barometric pressure sensor and two VL53L3 d...

lang:en score:23 filesize: 2.96 M page_count: 9 document date: 2024-07-24