



Matrice 30 Series Redundancy Systems Report

The Matrice 30 Series platforms are designed with extensive system and sensor redundancies to maximize flight safety and reliability. These redundancies and safety mechanisms include: dual flight control system sensors, dual control signal links, dual intelligent batteries, dual transmission links, obstacle sensor system redundancies, and three-propeller emergency landing.

I. Flight Control Sensor Redundancy

Dual inertial measurement unit

An inertial measurement unit (IMU) measures the aircraft's real-time three-axis acceleration and angular velocity, and helps calculate the aircraft's velocity, position, and attitude angle. The M30 is designed with an industrial-grade IMU redundancy, in addition to fault diagnostics mechanisms and redundancy switching algorithms. In the unlikely case that the main IMU fails, the backup IMU will activate to maintain flight safety and reliability.

Dual Barometer

A barometer determines relative altitude based on atmospheric pressure, and provides precise altitude readings for the aircraft. The M30 Series dual barometer redundancy design allows the drone to switch to the backup barometer if the primary one fails, ensuring flight stability and aircraft reliability.

Dual RTK Antennas + GNSS Module

The Real Time Kinematic (RTK) system provides centimeter level and altitude positioning accuracy to the M30 series. Dual system redundancy of RTK Antennas and GNSS Module ensures stable working of positioning system.

In addition to maintaining the drone's heading, the dual RTK antennas also back up the compasses so that the drone can safely and stably navigate complex environments with electromagnetic interference. At the same time, the dual antennas are mutually redundant, and both can be used as antennas for RTK positioning system and GNSS Modules.

Dual Compass

A compass provides heading information for the drone. The M30 Series has two compasses to ensure that it continues on the right course even if one of the compasses fails. Meanwhile, the compasses are backed up by the two antennas in the RTK modules, so that in the case where the RTK modules are blocked, the compasses can still help the drone maintain course.

Six Pairs of Vision Sensors

The vision sensor pairs provide binocular machine vision, which senses changes in the aircraft's position and attitude, visually positioning the aircraft while helping it sense obstacles. If one or more of the sensor pairs are down (Less than 6), the ToF sensors and the remaining vision sensors can still keep the drone functioning safely.



Obstacle Sensing Range:

Upward / Down / Backward / Left / Right: 33m

Forward: 30 m

Six Infrared ToF Sensors

Infrared ToF sensors resolve the distance to an object using time-of-flight techniques, measuring the round-trip time of an infrared light signal. The M30 Series is equipped with ToF sensors that provide real-time information on the surroundings of all six sides of the aircraft. When operated at night or in lowlight conditions, and if the vision system is out of commission, the drone can still rely on the ToF sensors to maintain obstacle sensing abilities.

Obstacle Sensing Range: 0.1 - 10 m FOV 30°

2. Control Signal Redundancy

The communication link between flight control system and the Electric Speed Controller System uses Serial Peripheral Interface (SPI) and Universal Asynchronous Receiver-Transmitter (UART) dual redundancy to ensure safe and stable communication between the flight control system and ESC system.

3. Dual Intelligent Batteries

The M30 series uses dual battery power supply, when the aircraft is flying. If a single battery fails, the other battery can also maintain the normal operation of the aircraft to ensure a safe landing.

4. Dual Transmission Links

The M30 series has a four-antenna redundancy design, with each single antenna being capable of providing the aircraft with transmission services. Meanwhile, both the 2.400 to 2.4835 GHz and the 5.725 to 5.850 GHz bands are supported, so in high-interference environments where one band becomes unavailable, the drone will automatically switch to the other band.

In addition, the M30 series also supports OcuSync 3 Enterprise and 4G network transmission to work simultaneously, providing an extra layer of transmission redundancy flight safety to the greatest extent.

5. Dual Remote Controller Redundancy

The dual remote controller mode of the M30 Series allows each of the two operators to take over control of the aircraft and payloads quickly in the case where communication is lost between the RC and the drone. Operations can continue seamlessly without compromising flight safety.

6. Additional System Designs to Maximize Safety and Reliability

Three-propeller Emergency Landing

In the unlikely case of a motor malfunction during flight, the M30 Series can make an emergency landing with just three propellers/motors. Basic controls, such as ascending, descending, and horizontal movements, are

<http://www.dji.com/matrice-30>



still in place. Inevitably, the drone and the payload will be damaged during the landing, but the operator can choose to land somewhere away from people or buildings to keep them safe.

ADS-B Receiver

M30 Series is equipped with DJI AirSense, a technology that enhances airspace safety by providing the operator with real-time information about airplanes and helicopters within 20 km, including their position, altitude, heading, and velocity. The risk of a close encounter with another aircraft is sent to the pilot in real-time in the DJI Pilot app, so informed decisions can be made quickly to ensure safety.