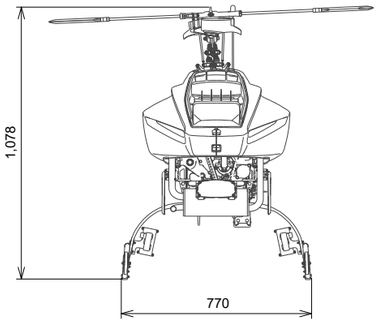
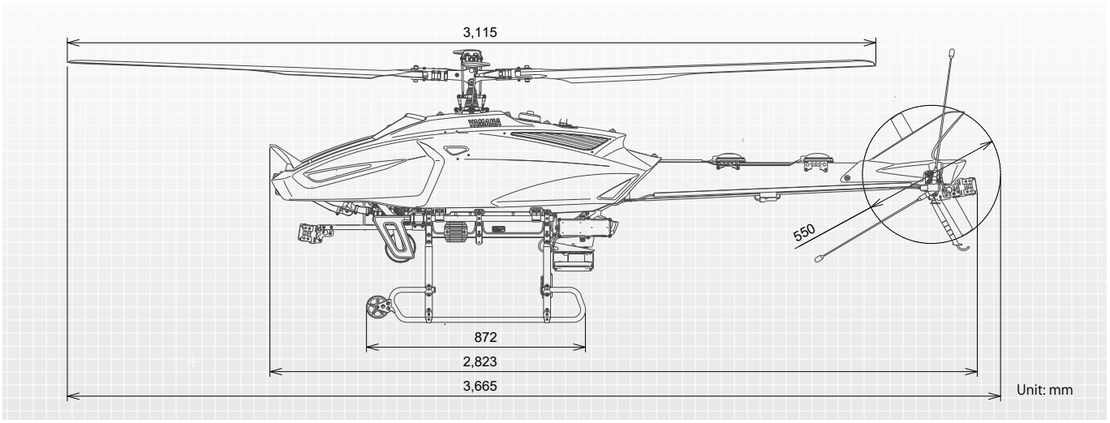
SPECIFICATIONS

Specification Data/Appearance and Dimensions

Manufacturer model		FAZER R	FAZER R AP
Performance	Control system	YACS III (YAMAHA Attitude Control System-Cruise control)	
Operational dimensions *1	Main rotor diameter	3,115mm	
	Tail rotor diameter	550mm	
	Overall length･Overall width･Overall height	3,665mm･770mm･1,078mm	
	Handling weight *2	73kg	74.8kg
Engine	Type	4-cycle, horizontally opposed 2-cylinder	
	Cylinder displacement	390cc	
	Maximum output	20.6kw	
	Starting system	Electric starter	
	Fuel	Regular gasoline	



*1 Dimensions are based on the design drawing so there may be an error of ±10mm in actual measurements.
*2 The handling weight indicates the weight in the condition in which the oil is fully applied to the helicopter body, a full fuel tank, and it is equipped with the L59 sprayer body (excluding the sprayer tank).



Liquid sprayer (Maximum chemical payload: 32L (8.5gal)※OPTIONAL; 4L/min, 8L/min)

Type	FAZER R	FAZER R AP
Cassette tank capacity	4.2gal×2	
Discharge method	Gear system pump/flat type nozzle	
Discharge volume	Side nozzle of 1.3-2.0L/minute (Speed-linked system)	
	Center nozzle of 0.65-1.0L/minute (Speed-linked system)	
Nozzle interval	1,434mm	
Equipment weight	7.9kg (Including 4.2gal tank×2)	8.2kg (Including 4.2gal tank×2)

Granular sprayer (Maximum granular agents payload: 30kg)

Type	FAZER R	FAZER R AP
Hopper capacity	15Kg × 2	
Discharge method	Spinner system (Diameter: 300mm)	
Discharge volume	Maximum: 5kg/minute (For granular agents of 1kg)	
Spinner speed	440 ~ 700rpm	
Dry weight	7.8kg (Including 15kg hopper×2)	8.0kg (Including 15kg hopper×2)

Safety Precautions

- Read this Operation Manual carefully in order to use the product properly.
- Be sure to perform regular inspections and maintenance.
- Please check the surrounding conditions thoroughly before use.
- Be sure to wear a helmet and a mask.
- Check the weather forecast to avoid flight in poor weather conditions.
- Be sure to take the Skytech Academy training.
- Secure the storage location for the helicopter bodies and accessories to prevent theft and illegal use.
- Be sure to conform to “Guidelines for safe flight of unmanned aircraft” from the Ministry of Land, Infrastructure, Transport and Tourism and “Guidelines for aerial spraying of agricultural chemicals” from the Ministry of Agriculture, Forestry and Fisheries of Japan.

YAMAHA

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URL https://www.yamahamotorsports.com/Precision-Agriculture.php

(July 2024)

Dealer

YAMAHA
Revs Your Heart

Yamaha Unmanned Helicopter for Agriculture Applications

FAZER R

Agriculture from The Sky

The agricultural landscape is surrounded by dynamic environments that are constantly evolving. Yamaha Motor has demonstrated remarkable adapt-ability in responding to these evolving conditions, developing solutions change for nearly 30 years since the introduction of the R50 unmanned helicopter for agricultural applications.

Our core approach to product development is rooted in a deep respect for agriculture and its workers. We view our social mission as recognizing the vital role agriculture plays and addressing the challenges faced by agriculture workers. With this in mind, we have continuously advanced our development efforts to keep pace with their evolving needs.

The unmanned FAZER R helicopter delivers significant labor-saving and operational efficiency. Additionally, the FAZER R AP, equipped with Auto Pilot and automated spraying capabilities, responds to the demand of modern agriculture. Together, they continue to evolve, striving to be the ultimate tool for the agricultural industry.

Unmanned helicopters are becoming increasingly sought after in the agricultural industry

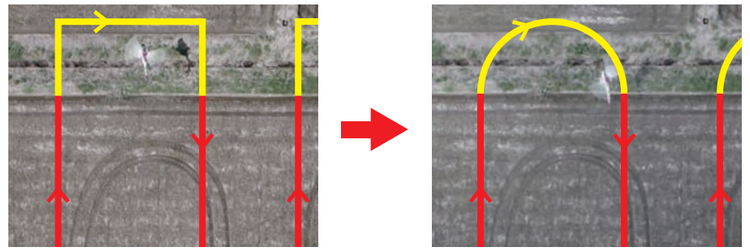
- Wheat pest control
- Direct-seeded rice paddy
- Weeding of rice paddy
- Pine beetle control
- Fertilization of rice paddy
- Rice paddy pest control
- Soybean and adzuki bean pest control
- Fungiside for winegrape
- Other vegetables

Equipped with the functions required for effective spray applications

Site-first development has been achieved because of Yamaha's three decades of experience in aerial spray applications.
Equipped with the capability to reduce the burden on the operator.
Enables effective and efficient spray operations.

NEW High-speed turn-assist

Increased turn speed results in higher productivity. Speedy turn achieved within half the time usually required.



Traditional turn-assist　　High-speed turn-assist

* In the turn-assist operation:
When spraying begins in cruise control mode, the helicopter automatically slows down when the spray switch is turned off at the field's end, turns at the fixed interval, and then accelerates back to its original speed. To resume spraying, simply press the spray switch again at the end line. Additionally, slowing down and turning points can be customized to match the field's specific shape.

NEW Remote engine start

As the engine can now be started remotely, work time is reduced and user-friendliness is improved.

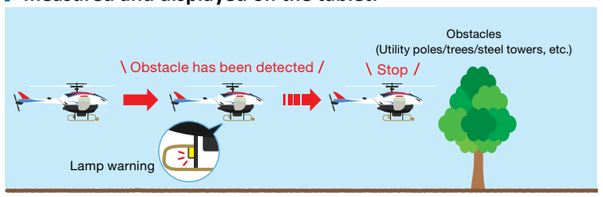
Obstacle detection function

Warning mode

When an obstacle is detected within range, the distance between the helicopter and the obstacle is communicated to the operator through a specific lighting pattern on the obstacle detection warning lamp.

Brake mode

The "Obstacle Detection ON" mode has been renamed to "Brake Mode". In addition to issuing a warning, when an obstacle is detected while the helicopter is moving forward or backward, the system will automatically engage the "brakes" to prevent contact with the obstacle. The altitude hold sensor has a function to maintain a helicopter at a pre-set height above crops under certain conditions. With this function, the helicopter can adjust its flight altitude according to the terrain and the vegetation so that agricultural chemicals can be applied more consistently. Also, the distance from the ground or the top of the target crops to the helicopter can be measured and displayed on the tablet.



Performance of FAZER R for High Reliability

Technologies developed over the years through the RMAX, FAZER and FAZER R models have evolved into the superior performance that provides both excellent performance and high reliability.

Engine

More powerful engine

- Performance enhancements in the cam profile
- Compression ratio is optimized (high compression ratio)
- Muffler is optimized to reduce exhaust resistance

Long flight endurance

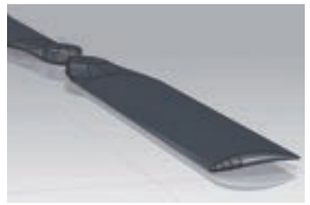
- Fuel tank of 1.4gal enables continuous flights up to 50minutes.

* Varies depending on the field condition.

Tail rotor

- Developed the optimum design of the 3D blade shape based on technical guidance from JAXA (*)
  Improved aerodynamic efficiency of tail rotor
- Lightweight carbon fiber and laminated constitution that does not scatter when broken
- Enhanced mobility and operational response

* JAXA (Japan Aerospace Exploration Agency).
National Research and Development Agency that promotes the research and development in the space aeronautics field



Antenna performance

- Improved accuracy of azimuth direction with dual GNSS antennas

Automatic positioning hovering function

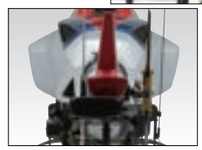
Automatic positioning hovering function using the optical flow camera when the GNSS is lost

Smooth takeoff and landing

- Since the main mast is inclined to the right by 2.5 degrees, landing stability has been improved by simultaneous landing of the left and right skids of horizontal takeoff without aileron input
- GPS control that covers from takeoff to landing

Improvement of Reliability

- Dual helicopter control system
- Flight switch relocated to the transmitter side to improve operability
- Engine auto stop function (Engine automatically stops when idling continues for 10+ minutes on the ground)
- Security enhancement through one-to-one correspondence between the transmitter and the receiver of helicopter



Helicopter control system

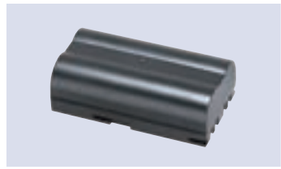
- Cruise control easily enables “constant speed flight”
- Upper limit speed can be set with increments of 1km/h (within the range of 16-20km/h)
- The YACS II control system enhances the stability of flight speed, height and azimuth direction to achieve the intended flight path
- Influences on flight stability by changes in the flight environment such as a gusts or a change in atmospheric pressure are reduced

Operator friendly and intuitive display

- Simple and easy-to-understand control panel
- Improved conveniences such as downsized transmitter battery, improved detachability, and extended use time.
- Unified warning lamp indications

Control panel

Warning lamp of signal type



Transmitter battery

Environmental friendliness

- Sound noise is reduced from 73dB to 70dB compared with the conventional “RMAX” (when measured at a separate location 50m using our measuring method)
- Clean exhaust gas from 4-cycle engine

Sprayer

Responds to the needs of the agriculture for various spraying applications.

Liquid sprayer

A switch to toggle the spray mode is provided in the control box, making it easier to switch between 7.5m width spraying, large volume spraying, and 10m width spraying.

* It is necessary to mount respective spray parts (sprayer kit: optional) for 10m width spraying and large volume spraying.

Corresponding to 10m width spraying

With the optional 10m width spraying kit installed on the sprayer, you can easily achieve 10m width spraying, which helps increase productivity while simultaneously reducing fuel consumption, simply by changing out nozzles and switching the spray mode.

Large volume sprayer kit

The standard sprayer, equipped with the optional large volume spray kit, doubles the usual spray volume. This enhancement allows for a broader range of target crops to be effectively sprayed.

10m width sprayer

Granular spreader

Handling a variety of granular agents

- The spray width (spinner speed) can now be selected with the spinner speed adjustment switch in the sprayer control box.
- The shutter opening can now be changed with the transmitter spraying volume.
- When performing variable fertilizing, a flight is performed while adjusting the shutter opening by the servomotor.
- Secured the discharge volume by selecting the shutter with different opening area in accordance with the grain diameter.

Granular sprayer

Sprayer control box
Spinner speed adjustment switch

Small shutter for 1kg agents

Large iron coating shutter for scouring and fertilizer

Granular sprayer

Handling of a variety of granular agents by combinations of use-specific shutters and spinner cover
* The sprayer for the AP helicopter also has the same function

• Spinner Cover 2 shall be installed overlapping the 7.5 width cover • Can be installed with five bolts after the spinner is removed	**Spinner Cover 1**	**Spinner Cover 2 (A cover for additional variable fertilization)**
Large shutter	**Fixed opening spray** **Set the opening according to the transmitter volume (Iron coating scouring and fertilizer)**	**Variable spraying (fertilizer)**
Small shutter (when the shutter cover is in use)	**Fixed opening spray** **Set the opening according to the transmitter volume (Granular agents of 1kg)**	**Spraying with a narrow spray width**

Liquid Sprayer Cassette Tank/Granular Spreader Hopper

■ 4.2gal capacity tank has been adopted for the liquid sprayer.

* Liquid sprayer is provided with two 16L tanks.

4.2gal tank ×2

■ 15kg hopper has been adopted for the granular spreader.

* Granular sprayer is provided with two 15kg hoppers.

15kg hopper ×2

List of options

A variety of options are prepared according to the intended use.

Helicopter-related

Transport wheel
Highly rigid and highly durable transport wheel (also available for RMAX)

Helicopter cover
Dedicated cover that matches the helicopter shape

Helicopter battery charger
Dedicated charger for helicopter shield battery

Others

Radio monitor
For 10 frequencies

Anemometer
(with the temperature indication function)
Indication of wind velocity, azimuth and temperature

* Design is subject to change without notice.

Sprayer-related

10m width sprayer kit
It is possible to perform the spraying of 10m width by mounting the parts of sprayer kit on the standard specification.

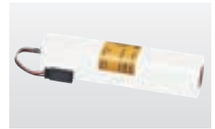
Large volume sprayer kit
Until now, it was necessary to replace the sprayer body to change from the standard liquid sprayer to the large volume sprayer, now, it is possible to achieve a spraying volume (4L/minute) that is twice as large as the conventional spraying volume by only mounting the parts of the large volume sprayer kit on the standard liquid sprayer.

Dedicated transmitter for spraying
* Equivalent to dedicated transmitter for spraying for RMAX

Dedicated transmitter for spraying
Charger for the batteries
* Equivalent to RMAX transmitter charger

Dedicated receiver for spraying
* To use the dedicated spraying transmitter, it is necessary to install it on the helicopter. Helicopters installed with a receiver can be used for the liquid sprayer. 8L/min is also available as an option.

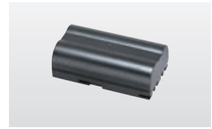
Charger adapter for dedicated transmitter for spraying
* Equivalent to RMAX transmitter adapter



Dedicated transmitter for spraying battery
* Equivalent to RMAX Transmitter battery

Transmitter-related

Transmitter battery charger
Spare charger for transmitter battery



Transmitter battery
Spare battery for transmitter

Transmitter case
Storage case that can efficiently store the items required for helicopter operation

FAZER R logo sticker
With the helicopter illustration. Can be used for various purposes in addition to the transmitter case.

Transmitter strap
* The logo will be FAZER.

FAZER R AP

Benefits of Auto Pilot (=AP)

Spray applications encounter a variety of challenges. The primary feature of the AP functionality is its ability to achieve uniform spraying, eliminating inconsistencies caused by operator skill. This advancement facilitates safe, efficient and productive spray operations. AP offers a cutting-edge solution for the spraying industry.

Spray on a wide field at once

- It is possible to spray a wide field with one flight
- Spraying and turning is completed within the field boundary
- Travel time and distance of the operator and navigator are reduced
- Effective spraying is performed regardless of the skill of the operator
- Fatigue reduction for the operator and navigator

Five selectable flight modes

Five flight modes are available, which can be selected by the operator depending on field condition and the skill of the operator.

Postural control mode	Normal mode	Cruise control mode
Turn assist (high-speed turn) mode	Auto pilot mode	

Liquid sprayer

The settings of spray velocity of 25km/h and 10m width enables to reduce flight times, leading to cost reduc-tion. (Only in the AP mode)

Specification of 25km/h and 10m width

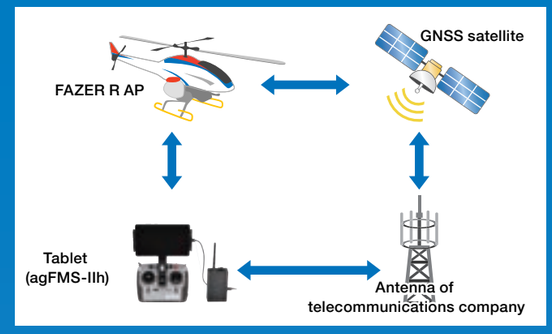
Nozzle layout viewed from the bottom face

Chemical level sensor

When the tank level reaches the predefined volume or lower, the sensor is activated to stop spraying and the Auto Pilot maintains the location in the hovering/standby condition.

Network RTK System

Communication system uses esstablished network lines. Secondary use of data has been enabled by capturing accurate locational information of the field without establishing a base station. (Coming Soon)



AP control application “agFMS-IIh”

“agFMS” developed for smart agriculture, including the creation of spray routes, precise control of flight and spray parameters, secondary use of data, etc.

To create a route, measure the field first and then set the points in sequence.

▶ Display the field information

▶ Create a spray route

▶ Various display/ management functions

▶ Utilization and linkage of data

Automatic flight proceeded by tablet operation

1. START SCREEN

2. AUTO TAKE OFF

3. START SPRAYING

4. AUTO FLIGHT

5. RETURN TO HOME

6. AUTO LANDING

Compatible with variable rate fertilization systems

In combination with the Auto Pilot, it is possible to spray additional fertilizer according to growth requirements. YSAP can be used to convert growth data into the mesh representation to determine the fertilizer spray volume.

(Only JAPAN model)