TYPHOON H

USER MANUAL Vcho 3/1

THIS MANUAL DOES NOT SUPERCEDE THE OFFICAL MANUAL

This manual is a personally modified Copy to improve clarity in some Areas and add new information From the vendor and personal/internet

So it is NOT the last word it is always being Updated/changed

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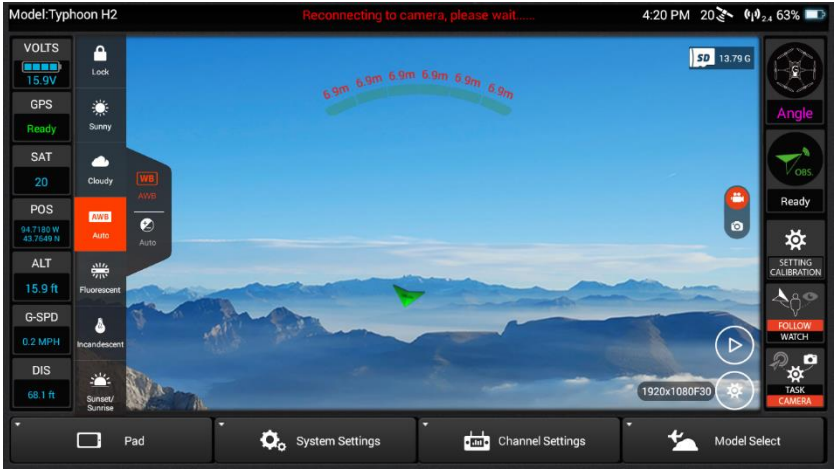


This is a sophisticated consumer product.
*It must be **operated with CAUTION** and **common sense** and requires some basic mechanical ability.*

This product is **not** intended for use by children without direct adult supervision.

AGE RECOMMENDATION: NOT FOR CHILDREN UNDER 14 YEARS OF AGE.

THIS IS NOT A TOY.

All safety precautions, warnings, instructions, warranties, and other collateral information is subject to change at the sole discretion of Yuneec. For the most up to-date information please visit the corresponding product page at www.Yuneec.com or contact the nearest Yuneec office or authorized distributor.

GENERAL SAFETY PRECAUTIONS AND WARNINGS

Read the ENTIRE guide and instruction manual to become familiar with the features of the product before operating it.

Do not use with incompatible components or alter this product in any way outside of the instructions provided by Yuneec.

The start guide and instruction manual contain instructions for safe operation and maintenance. It is essential to read and follow all the instructions and warnings prior to assembly, setup and/or use in order to operate the product correctly and avoid damage or serious injury.

Failure to use this product in the intended manner as described in the instruction manual can result in damage to the product, property and/or cause serious injury to yourself or others. A Radio Controlled (RC) multirotor aircraft, UAS platform, drone, etc. is not a toy!

As the user of this product you are solely and entirely responsible for operating it in a manner that does not endanger yourself, others or result in damage to the product or the property of others.

- Keep your hands, face and other parts of your body away from the spinning propellers/rotor blades and other moving parts at all times. Keep items that could impact or become entangled in away from the propellers/rotor blades including debris, parts, tools, loose clothing, etc.
- Always operate your aircraft in open areas that are free from people, vehicles and other obstructions. Never fly near or above crowds, airports or buildings.
- To ensure proper operation and safe flight performance never attempt to operate your aircraft near buildings or other obstructions that do not offer a clear view of the sky and can restrict GPS reception.
- Do not attempt to operate your aircraft in areas with potential magnetic and/or radio interference including areas near broadcast towers, power transmission stations, high voltage power lines, or in electrical storms, etc.
- Always keep a safe distance in all directions around your aircraft to avoid collisions and/or injury. This aircraft is controlled by a radio signal subject to interference from many sources outside your control. Interference can cause momentary loss of control.
- To ensure proper and safe operation of the automatic landing function in Home Mode you must start the motors with the aircraft in a position that has at least 30 feet (approximately 9 meters) of clear and open space around it and achieve a proper GPS lock.
- Do not attempt to operate your aircraft with any worn and/or damaged components, parts, etc. (including, but not limited to, damaged propellers/rotor blades, old batteries, etc.).
- Never operate your aircraft in poor or severe weather conditions including heavy winds, precipitation, lightning, etc.
- Always operate your aircraft starting with a fully charged battery. Always land as soon as possible after the first battery voltage low warning or land immediately after the second battery voltage low warning (as indicated by the vibrations and audible alerts from the controller.
- Always operate your aircraft when the voltage of the battery in the controller is in a safe range as indicated by the battery charge status icon on the screen of the controller.
- Always keep the aircraft in CLEAR LINE OF SIGHT and under control and keep the controller powered on while the aircraft is powered on.

• Always move the throttle control stick down fully and turn off the motors in the event the propellers blades come into contact with any object.

• Always allow components and parts to cool after use before touching them and flying again.

• Always remove batteries after use and store/transport them per the corresponding guidelines.

• Avoid water exposure to all electronic components, parts, etc. not specifically designed and protected for use in water. Moisture causes damage to electronic components and parts.

• Always keep chemicals, small parts and electronic components out of the reach of children.

• Carefully follow the instructions and warnings included with this aircraft and any related accessories, components or parts (including, but not limited to, chargers, rechargeable batteries, etc.)

The following terms are used throughout the product literature to indicate various levels of potential harm when operating this product:

NOTE: A Procedure, which if not properly followed could create a possibility of property damage and/or possibility of injury.

WARNING or CAUTION: A Procedure, which if not properly followed, creates the probability of property damage, collateral damage and/or serious injury or create a high probability of injury.

IPS PRECAUTIONS

Make sure the camera lens is clean or the indoor positioning system may not be able to position.

Don't let the aircraft fly too fast: the flight speed should be within 8.9 MPH (4m/s) when flying around 3.3 feet (1 meter) over ground; the flying speed should be within 17.9 MPH (8m/s) when flying around 6.6 feet (2 meters) over ground.

Ensure adequate light source and rich ground texture in the surrounding environment when using the indoor positioning system.

When using the indoor positioning system, do not turn on other 40 KHz ultrasonic equipment in the surrounding areas, **including other aircraft**.
When using the indoor positioning system, **stay away from animals because it will issue ultrasound and cause animal anxiety**.

The indoor positioning system is susceptible to light intensity and surface texture and the Ultrasonic may fail to measure the distance on certain sound-absorbing materials, so please take extreme care when using the indoor positioning function.

Indoor Positioning System **may fail to work** in the following environments/conditions:

- When flying rapidly in low attitude.
- Over surfaces of pure color (such as pure red, pure black, pure white and pure green), or over highly reflective surfaces.
- Over surfaces like water or transparent objects.
- Over surfaces of moving objects (such as above large crowds or strong wind blowing over grass or shrubs).
- Over scenes which are rapidly changed or exposed to strong light.
- Over surfaces which are particularly bright (light intensity higher than 10,000 lux) or dark (light intensity lower than 10 lux).
- Over surfaces of ultrasound absorbent material (such as thick blankets).
- Over surfaces of particularly sparse texture, the indoor positioning system may not be able to position.
- Over surfaces of over 30 degree's inclination.
- Over surface texture that is highly repeated (such as small grid bricks of the same color).

LIPO BATTERY WARNINGS AND USAGE GUIDELINES

WARNING: Lithium Polymer (LiPo) batteries are significantly more volatile than alkaline, NiCd or NiMH batteries. All instructions and warnings must be followed exactly to prevent property damage and/or serious injury. The mishandling of LiPo batteries can result in fire.

By handling, charging or using the included LiPo battery you assume all risks associated with LiPo batteries.
If you do not agree with these conditions please return the complete product in new, unused condition to the place of purchase immediately.

• You must always charge the LiPo battery in a safe, well-ventilated area away from flammable materials.

• Never charge the LiPo battery unattended at any time. When charging the battery you must always remain in constant observation to monitor the charging process and react immediately to any potential problems that may occur.

• After flying/discharging the LiPo battery you must allow it to cool to ambient/room temperature before recharging.

• To charge the LiPo battery you must use only the included charger or a suitably compatible LiPo battery charger. Failure to do so may result in a fire causing property damage and/or serious injury.

• If at any time the LiPo battery begins to balloon or swell, discontinue charging or discharging immediately. Quickly and safely disconnect the battery, then place it in a safe, open area away from flammable materials to observe it for at least 15 minutes. Continuing to charge or discharge a battery that has begun to balloon or swell can result in a fire. A battery that has ballooned or swollen even a small amount must be removed from service completely.

• Do not over-discharge the LiPo battery. Discharging the battery too low can cause damage to the battery resulting in reduced power, flight duration or failure of the battery entirely. LiPo cells should not be discharged to below 3.0v each.

• Store the LiPo battery at room temperature and in a dry area for best results.

• When charging, transporting or temporarily storing the LiPo battery the temperature range should be from approximately 40–120° F (5–49° C).

DO:

- Inspect the battery, charger and power supply before charging.
- Ensure correct polarity before connecting batteries, chargers and power supplies.
- Disconnect the battery immediately after charging.

Do not:

- Allow children under 14 years of age to charge batteries.
- Charge a battery if any of the wire leads have been damaged or shorted.
- Attempt to disassemble the battery, charger or power supply.
- Store the battery in the aircraft, a hot garage, car or direct sunlight.

IMPORTANT NOTE: It's safer and better for the longevity of the battery to store it only partially charged for any length of time. storing the battery at approximately 50% charged is typically best

DISCLAIMER

Yuneec Electric Aviation cannot be held liable for any damage, injury for the use of this product in violation with legal regulations, especially in the following circumstances:

Damage and/or injury in violation of legal regulations resulting from a failure to comply with the operating instructions or the instructions at www.yuneec.com, product information, user manual and other legally binding information.

Damage and/or injury in violation of legal regulations brought about by the influence of alcohol, drugs, medication or other narcotics which may impact on the concentration of the user. The same applies to illnesses effecting the concentration of the user (dizziness, tiredness, nausea etc.) or other factors compromising mental and physical capabilities. Intentionally caused damage, injury or violation of legal regulations. Any request for compensation caused by an accident resulting from use of the product.

Damage and/or injury in violation of legal regulations caused by use of the product in a no-fly zone, e.g. next to an airfield, above a motorway or a natural conservation area. Malfunction of the product caused by retrofitting or replacement with components which did not come from Yuneec Electric Aviation.

Damage and/or injury in violation of legal regulations caused by incorrect operation or misjudgment. Damage and/or injury caused by damaged spare parts or not using original Yuneec Electric Aviation spare parts. Damage and/or injury in violation of legal regulations caused by ignoring the low voltage battery warning.

Damage and/or injury caused by knowingly and negligibly flying with a damaged model or one which is unfit to fly, e.g. due to dirt, water penetration, coarse particles, oil or a model which has not been correctly or completely assembled or if the main components exhibit visible damage, defects or missing parts.

Damage and/or injury in violation of legal regulations caused by operating the model in a magnetic field (e.g. high voltage lines, electricity/transformer stations, radio towers, mobile phone masts etc.), a strong wireless signal environment, no-fly zones, poor visibility and in the event of vision impairments or other impacts on the pilot which are left unchecked etc...

Damage and/or injury brought about through a violation of the legal regulations for operating the model, in unsuitable weather conditions, e.g. rain, wind, snow, hail, storms, hurricanes etc.

Damage and/or injury as well as violation of legal regulations caused by force majeure, e.g. collision, fire, explosion, flooding, tsunami, landslide, avalanche, earthquake or other forces of nature.

Damage and/or injury as well as violation of legal regulations caused by the illegal or immoral use of the model, e.g. capturing videos or recording data which infringes upon/harms the privacy of other people.

Damage and/or injury as well as violation of legal regulations caused by incorrect use of the batteries, protection systems, chargers or aircraft. Consequential damage caused by the incorrect operation of any kind of system components and accessory parts, especially memory cards, whereby image or video material from the camera can become defect.

Any non-compliance with legal obligations, personal injury, material damage and environmental damage caused by use and a failure to comply with the local laws and regulations.
Damage and/or injury as well as violation of legal regulations caused by hazardous use without sufficient practical experience.
Damage and/or injury as well as violation of legal regulations caused by flying in legally defined no-fly zones. Further losses which do not fall within the scope of use defined by Yuneec Electric Aviation as improper.

SPECIFICTATIONS

TYPHOON H SPECIFICATIONS

Flight Time	Up to 25 min	Maximum Rotational Rate	85°/s
Size	20.5x18x12.2 in (520x457x310mm)	Maximum Roll Angle	35°
Takeoff Weight	69.8oz (1980g)	Maximum Climbing Speed	11.2 mph (5m/s)
Battery	4S 14.8V LiPo Battery	Maximum Speed In Angle Mode	37 mph (16.5m/s)
Battery Capacity/Voltage	5400mAh 4S/14.8V (79.9Wh)	Maximum Descending Speed	6.7 mph (3m/s)
Charger	SC4000-4	Diagonal base	18.9 in (480mm)
Transmitter	ST16 Ground Station	Frame Arm Length	7.4 in (187mm)
Maximum Flying Height	122m (400ft)(Restricted by FAA)	Landing Gear Size	10.4x7.3 in (265x185mm)

REALSENSE SPECIFICATIONS

Weight	70g	Ground to IPS Distance	14.8ft (4.5m)
Dimensions	6.0*4.2in (153*107mm)	Maximum Speed with Obstacle Avoidance ON	11.2mph (5m/s)
Maximum Detecting Distance for FORWARD Facing Obstacles	32.8ft (10m)		
Distance For Front Collision Avoidance	9.8ft to 23ft (varying according to the environment)	Field of view (Vertical)	40°
		Field of view (Horizontal)	60°

C-GO3-Plus SPECIFICATIONS

Weight	9.0oz (255g)	Electronic Shutter	1/30--------1/8000s
Effective Pixels	12.4 Megapixels	Video Transmission Range	Up to 1.2mile (2km)
Camera Lens	14mm/F2.8	Transmission System	5.2GHz — 5.8GHz
Number of Axis	3	Video UHD	4K UHD 30fps

WIZARD REMOTE CONTROLLER

Dimensions	5.47 X 1.46 X 0.98 in (139 X 37 X 25 mm)	Working Hours	3.5 h
Water Resistant	Yes	Built-In LiPo Battery Voltage / Capacity	3.7V 500mAh

ST16 GROUND STATION

Operating System:	Android™	Video Transmission Distance/Range	FCC Compliance: Up to 1.2 mile (2km)
Number of Channels:	16	(Optimum Conditions):	CE Compliance: Up to 1.2 mile (2km)
Control Transmission Distance/Range:	Up to 1 Mile (1.6km) (Optimum Conditions)	LCD Screen Size:	7”
Video Link Frequency Band:	5.8GHz WiFi	Power by Li-ion Battery Voltage / Capacity:	3.6V 8700mAh 31.32Wh Li-ion

INTRODUCTION

The Typhoon H is an advanced aerial photography and videography platform, perfect for skilled pilots and photographers alike. It offers up to 25 minutes of flight time while filming with a 4K-resolution camera. Settings can be adjusted through the ST16 Ground Station, (an easy and intuitive remote control which features a 7-inch android touchscreen that displays a live feed of your flight). To meet different needs in function and portability, the Typhoon H has two configurations: the professional version with Intel RealSense pre-installed, and the advanced version with Sonar Collision Avoidance, which can be upgraded to the professional version with the purchase of a RealSense module, sold separately. The Typhoon H with Intel ® RealSense ™ technology builds a 3D model of the world in front of it. The Intel ® RealSense ™ module creates a high quality image of its surroundings so the Flight Control System can to make intelligent choices on how to control the drone for the best route around obstacles.

The National and International laws and regulations in force at the time of takeoff must be adhered to.

The Typhoon H comes with a micro SD card with additional documentation on it – copy it to our computer and print out if desired.

The Flight Controller i.e. ST16 operation is described for mode 2 thru out this manual.

I Want to FLY - *What to Know Before You GO*

THERE IS NO QUICK START OR FAST PLUG AND GO FLYING SETUP!!

This is ***NOT*** a toy, it ***WILL*** require reading the manual and practice in an ***OPEN*** area to become familiar with the controls and aircraft flight characteristics.

- 1ST Charge the Batteries
- 2nd Read the Manual to learn the functions, capabilities and Does & Don'ts
- 3rd Re-read the manual. Join a forum, look at some help video's on-line
- USE COMMON SENSE and follow proper SAFTEY practices in its use.
- Misuse or unsafe practices can cause grave injury or property damage.

Do Not turn on the ST16 controller – without the antennas attached, You WILL damage the transmitters/controller.

When charging completes – with the Typhoon H propellers' **OFF!!**

System Checks

Install the Batteries.
Turn on ST16 1st - with antennas **ON**
Remove Camera Cover.
Turn on the Typhoon H 2nd – props **OFF**
After a few seconds - Verify Typhoon H & Camera connected (bond) to ST16 [normally done at factory]

HOW?

On left side of screen, you will see telemetry (data) from the Typhoon H and the ST16 display at top centre will have *"Welcome, Pilot*" and will be displaying whatever the camera is seeing as the background. Top left corner of ST16 will have "*Typhoon H*" for model.
"*SETTING CALIBRATION*" icon/soft key will be lit.
Tap "*System Setting*", Tap "*About Controller*" if connected to the Typhoon H components you will see the version number for or each component, if installed.
Tap [⮌] to go back 1 screen or to acknowledge a pop up.
If you do not have the above – Follow the manual on how to bind ST16 controller to the Typhoon H and Camera.

Tap "*System Setting*" then tap and check the following:

"*Other Settings*", Select the choices you desire and what the Typhoon H has i.e. RealSense Module installed box checked.
"*Mode Select*", is what the ST16 control sticks will control [default is mode 2]
"*Camera Select*", this is where you select the camera model you have.
"*Bind*", this is where you will go to bind to the Typhoon H and Camera
"*Hardware Monitor*", this screen can be used to test/troubleshoot ST16 components and is covered later in the manual

If this is a new out of the box Typhoon H or has been stored away for a while you will need to test/operate the landing gear – *SEE addendum on how to perform this action.*

CALIBRATIONS:

To get to calibration menu – Tap "*SETTING CALIBRATION*" icon/soft key, tap "*CALIBRATION*" then tap your choice.
1st the *Accelerometer* Calibration – *SEE Addendum on proper procedure*.
2nd the *Gimbal* Calibration - *SEE Addendum on proper procedure.*
The above two calibration procedures should be performed on a **LEVEL** surface.
The 1st should also have the aircraft facing ***TRUE NORTH***. So, Get a compass.

3rd the *Compass* Calibration is the hardest of the 3 to do at first - *SEE Addendum on proper procedure*. It will need to be done outside in an open area and free of interference. Be sure to read thru the procedure a couple of times. You may have to do it a couple of times at first as most everyone has.

GPS:

To setup your GPS system for the first time place the Typhoon H and ST16 controller in a clear open sky area and turn both on and let them acquire as many satellites as possible for about 15 minutes. The addendum has general information on this subject to supplement the manual.

The manual covers obstacle avoidance and different flight modes.
But start out by learning to fly in "*Angle*" mode, as "*Smart*" mode can be hard to understand at first. So be sure to read and understand *Smart* mode before using it.

The "*Flying Overview*" section covers aircraft operation/response in *Angle* mode.
At your flying location be sure to set your *Home* mode [RTH] height as follows:
Tap "Settings/Calibration", "Home Altitude", move slider to desired height (See Home Mode section)

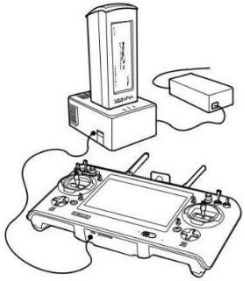
The addendum has a "*Typhoon H Check List*" it is NOT an all-inclusive check list, it covers what should be checked before and at the flight location you choose. Use it as a guide/reference.

Recommend your get the Yuneec "*UAV Pilot*" Simulator to practice on your home computer before going to the field.

CHARGING

Power the charger from a 100- 240V AC outlet using the AC adapter/power supply, or from a 12V-16.8V DC accessory socket/cigarette lighter receptacle in a vehicle using the included adapter.
Plug the aircraft battery into the charger port as illustrated.
A green blinking LED indicates the charger is powered on and ready to charge, and a red blinking LED indicates the battery is charging. It will take approximately 2.5 hours to charge a fully discharged (not over-discharged) battery. A solid green LED indicates the battery is fully charged.

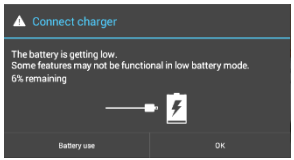
The ST16 Ground Station:
You can charge the ST16 battery by using the supplied USB cable and plugging it into the USB port on the charger side. It will take approximately 5 hours to charge to fully discharged (not over-discharged) battery.



If the ST16 screen is dark just tap the screen to see the charge status.

Caution: *Do not leave a battery in any charger after the battery is fully charged.*

Do NOT *let the ST16's Battery Voltage fall below 40% as performance and control signal strength will fall off.*



Average battery run time with full charge is 1.5 to 2 Hrs.

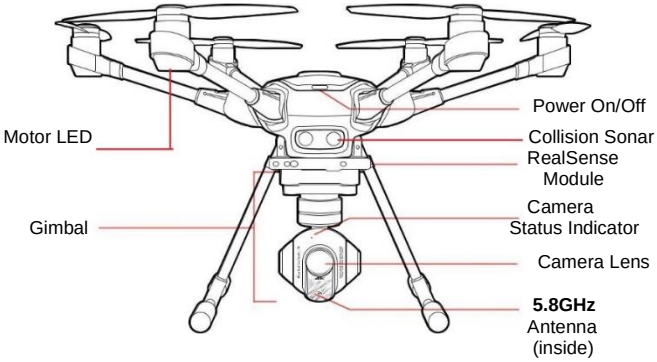
WARNING

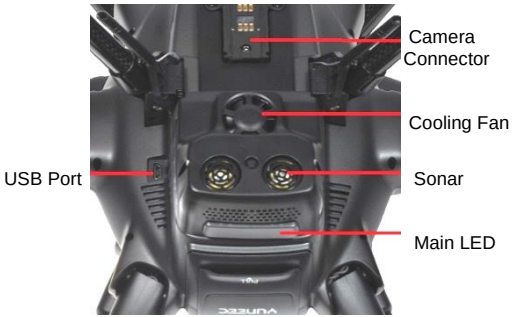
DO NOT *turn power on to the ST16 Controller until all Antennas are installed as damage to the transmitters* ***WILL*** *result.*

The 5.8GHz antenna needs to **point at** the aircraft for best results.

The two 2.4GHz antennas can be in any position you like, for best performance.

OVERVIEW

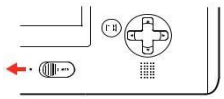


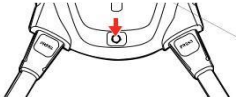


Bottom View
With *RealSense*

PROPER POWER ON/OFF Sequence:

Always turn on the ST16 FIRST and allow it to boot up BEFORE turning on the Typhoon H and ALWAYS turn the Typhoon H off BEFORE turning off the ST16 Ground Station.





- Press and hold the power button on the Typhoon H, release the button when the aircraft emits a rising tune. DO NOT TOUCH OR MOVE the Typhoon H UNTIL THE INITIALIZATION PROCESS IS COMPLETE.
  - The Flight Control System **IMU** (**I**nertia **M**easuring **U**nit) has a preheating time, if air temperature is to cold give it a little extra time.
- Wait for the Typhoon H and the ST16 to acquire as many GPS satellites as possible before flying.

Note:

This may take 15 minutes to complete for a new location or if the aircraft has not been used for an extended period of time or after a Update SO BE PATIENT. The next time will be faster. With Motors OFF Battery consumption will be low.

Aircraft Voltage Level Check

After hearing the raising tone, the *Main* LED indicator will blink **green** for 1 to 2 seconds with a fully charged flight battery, **yellow** for a half charge and **red** with low charge.

WARNING:

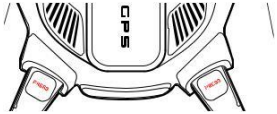
DO NOT *fly with a yellow or red aircraft flight battery performance will be unpredictable*

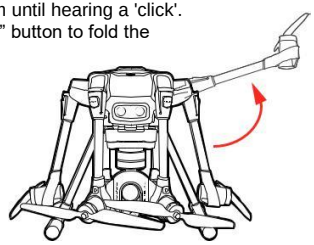
If the *Main* LED blinks red slowly, the initialization has failed. The aircraft needs to be powered off then on again. To power off the aircraft, ***Press and Hold the power button until the aircraft emits a falling tune***.

Assemble the Typhoon H

Step 1: Assembling the ARMS

Unfold the motor arms and raise them until hearing a 'click'. To lower the arms press the "*PRESS*" button to fold the motor arms down.



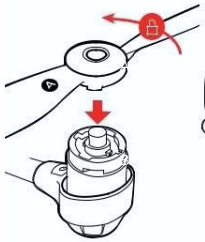


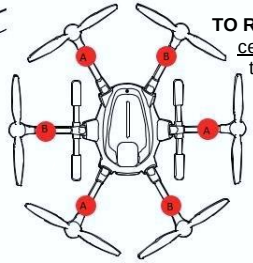
Step 2: Installing the Propellers

Caution

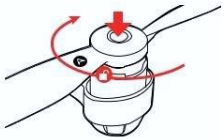
Always ensure propellers are installed properly. The motors are extremely powerful, if installed improperly damage to the aircraft or serious injury could result.

Mount the propellers on the motors by noting the 'A' and 'B' on the motor arms and on the propellers. Mount propeller 'A' on motor 'A' and propeller 'B' on motor 'B' press down and rotate propellers in the direction of the [🔒], and the propellers will lock in place.





TO REMOVE: Press and hold the centre button on the propeller turn in the direction [🔓] points then lift and remove.

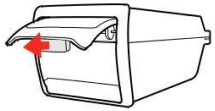


Step 3: Installing the Flight Battery.
Move the battery into the battery compartment with the logo facing up until you hear a '**click**', which means the battery has installed fully and is locked in place.

Note

*Place your hand on the end of the battery (with handle Down) and give it a push with medium force into the Typhoon H so you here that **CLICK!***

To remove Battery: Gently lift the battery end cap to its maximum angle (a position where it is almost horizontal with the GPS cover), then pull the battery out.

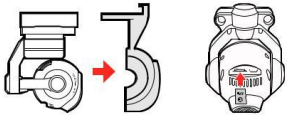


Step 4: Remove Camera Protective Cover and Install SD Card.

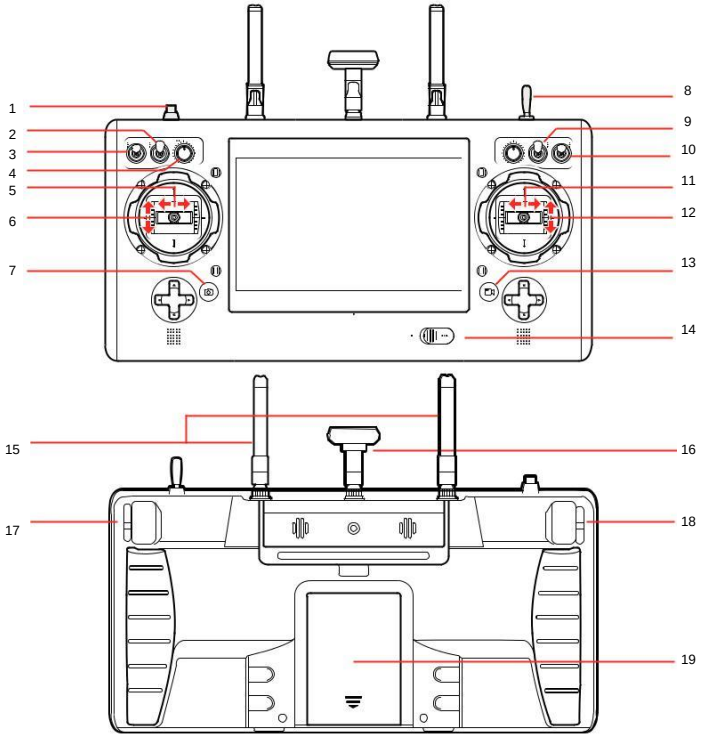
Carefully remove the protective cover from the camera lens. Insert the included 16GB card or any U3 class microSD card (U3 speed is capable of 4K data rate) from 16GB to 128GB. Formatted from the ST16 menu.

WARNING:

Failure to remove the camera cover May damage the gimbal assembly



ST16 FLIGHT CONTROLS



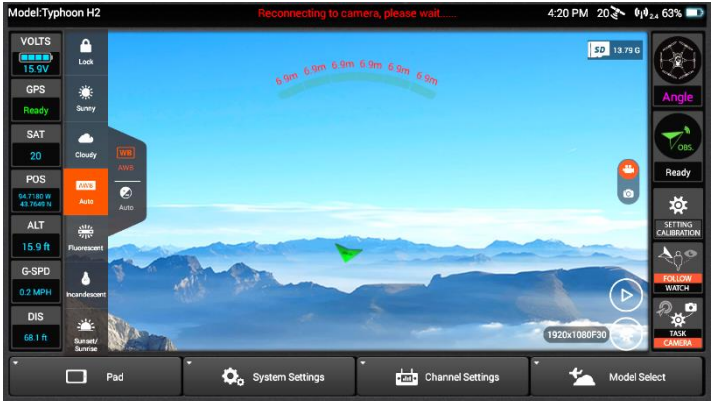
ST16 OVERVIEW

1 Start/Stop Motors Button
2 Pan Mode (Follow Mode/Follow Pan Controllable Mode/Global Mode)
3 Tilt Mode (Angle Mode/ Velocity Mode)
4 Pan Control
5 Rudder/Yaw Control (Mode 2 and Mode 1)
6 Throttle/Altitude Control (Mode 2) Elevator/pitch control (Mode 1)
7 Take Still Photo Button
8 Landing Gear Switch
9 Obstacle Avoidance Switch
10 Flight Mode Selection Switch
11 Aileron/Roll Control (Mode 2 and Mode 1)
12 Elevator/Pitch Control (Mode 2)/Throttle (mode 1)
13 Start/Stop Video Recording Button
14 Power Switch
15 2.4GHz Antenna
16 5.8GHz Antenna
17 Rate Control Slider
18 Tilt Slider
19 Battery Compartment

WARNING

DO NOT turn power on to the ST16 Controller until all Antennas are installed as damage to the transmitter **WILL** result.

The ST16 Display Screen



Some icons will be covered later in thus manual

Left Side

Aircraft Battery Voltage level, **DO NOT** go lower than 14.1v.

Status of GPS i.e. ***Acquiring***, "***Ready"*** (has a **GPS LOCK** on location)
(see addendum for more general information on GPS)

The number of satellites the aircraft has found,
NOT necessary Locked on to all.

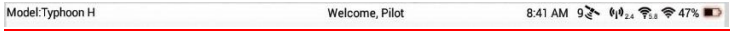
The aircraft Location according to GPS

Aircraft Altitude (height), [Max height set with *Yuneec GUI Software*.]

Aircraft's Speed over **G**round, Max 37mph in Angle Mode, 11mph with Obstacle Avoidance ON

Aircraft's Distance from Controller, [in SMART mode Max. Distance is set with *Yuneec GUI Software*]

Information Bar (Top)



Model: This is the Name of the Model the ST16 *will be controlling*.

8:41AM: is the present time

: The number of satellites the ST16 has found **NOT** necessary Locked on to all


: The 2.4 GHz signal level/strength
Both 2.4 & 5.8Ghz icons need to be present to **properly** Bind to Typhoon H.


: The 5.8 GHz signal level/strength


: Wifi signal level/strength

ST16 Battery charge level in %, Full battery charge is 4.2v.
Recommend not lower than 40%, as signal strength will fall off.

SD Card in Camera with available Free storage

SD Card not detected/missing from Camera.

Right Side

Flight Mode of the Aircraft and ST16 (i.e. *Smart, Angle, Home, IPS etc.)*

OBS Avoid (Obstacle Avoidance) status. **MUST be GREEN to be enabled**

Tap to enter **Setting Menu** for *Home Mode* [RTH] Height, Motor LEDS **on/off** and to Turn ***GPS* on/off**.
Calibration Menu for *Compass*, *Gimbal*, and *Accelerometer*.

Tap to change *Follow Me/Watch Me* selection (mode)

Tap to switch between **Task** (i.e. ***CCC, JOUR, POI, ORBIT, TAKEOFF***) and **Camera** for working with **Photo** or **Video** settings

PAD: Tap to enter the Android operating System. (*Clear flight data*, *Rest* ST16 etc.)

System Settings: Tap to enter ***Bind, Other Settings, Hardware Monitor, Mode Select, Camera Select, and About Controller*** menu.

Channel Settings: Tap to enter the Channel settings which allows changes to the aircraft channels/functions. *Advance Mode* must be turn ON under *System Settings*, *"Other Settings"* to enable this option or else it will be grayed out.
DO NOT change any setting – unless you are knowledgeable in the function of each channel and how it will affect the aircraft operation.

WARNING!!!

Any changes you make will be at your own risk and may cause the aircraft to malfunction and/or crash. Pilot error Crash damage and "fly always" are ***NOT*** *covered under warranty.*

Model Select: Tap to select a different aircraft, delete, copy, and add a new aircraft.

A display of some Flight Modes

Notice the "**G**" on the aircraft icon when the Typhoon H and ST16 connection completes.
If aircraft goes into 5 motor mode (covered later) the bad motor will be Red as shown above and ***EMER*** will be the Mode for a second or two and may switch to **Angle** mode and the motor with the problem will stay Red.

- and + --- Use to increase/Decrease speaker volume

--- To Capture a ST16 Screen Shot, Long press this icon (approx. 3 sec's). Will be saved in the Android "*Gallery"* directory.

--- Home button

--- *BACK* Button to go back to previous screen.

Note

If an ***Information or an Error Pop-Up*** *appears at any time on the ST16 screen and after reading the Pop-Up, tap the "Back" [ ] button to clear the screen.*

To use the **full screen** to view a video or picture double tap the screen in an area without icons. The ST16 will go to Full screen mode, Double tap again to go back.

HDMI OUTPUT on top of ST16

HDMI connector [**standard size**] allows users to view the information displayed on the ST16 screen on an external monitor. This means that a display connected to the HDMI port will show identical information from the ST16 screen to the external screen/monitor.

Double-tapping the screen will hide control displays, providing a full-screen video display on both the ST16 and external monitor.

See Addendum for HDMI Setup and *available output modes* when needed.

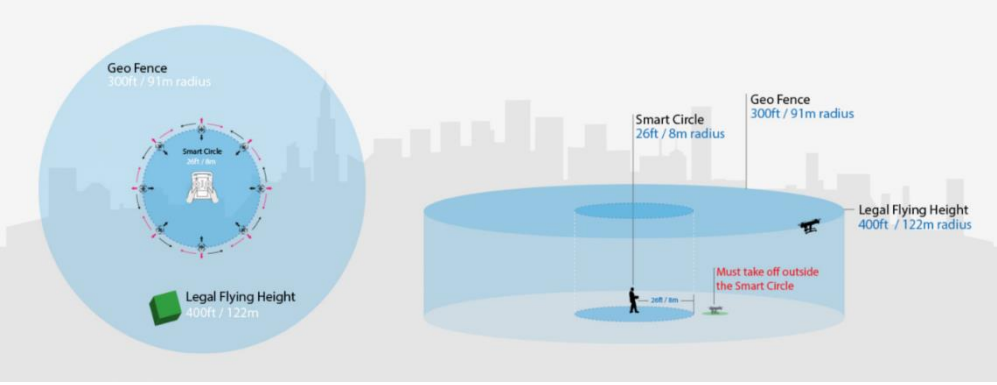
GEO-FENCE

Geo-fence is a virtual barrier that will keep the Typhoon H from traveling to far from the controller [default is 300 feet (91m)]. **Geo-Fence only works in Smart Mode**. This limit can be changed using *Yuneec GUI Software* - we strongly recommend using the default limit at all times.

SMART CIRCLE

GPS establishes a 26 ft. (8 m) diameter circle around the pilot ***in Smart mode*** and will not come closer. The aircraft will back away if an object comes in **FRONT** of it within this distance. This is **not** changeable.

So as the pilot keep this in mind whenever you switch to ***Smart Mode***. (i.e. Follow/Watch Me)



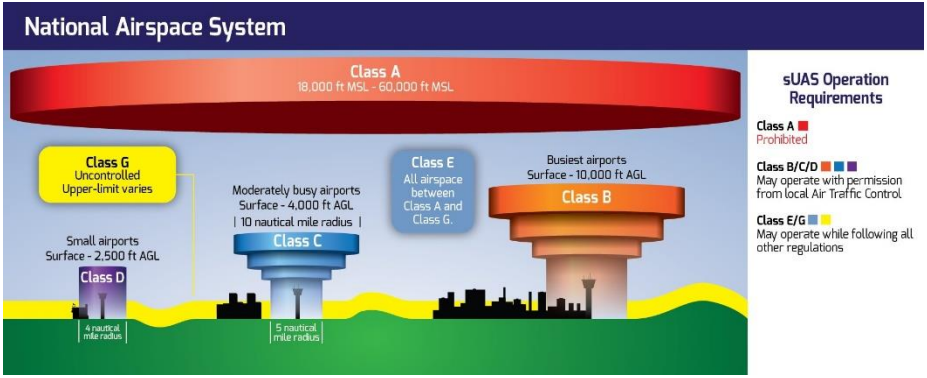
National Airspace System (US)

AGL – Above Ground Level
MSL – Mean Sea Level

Class B & C step wider as they go higher.
You **will need** special software provided by Yuneec in order to fly in some restricted Airspace and also meet FAA requirements.

FAA says no higher than 400ft in Class E&G and less in others.

You **MUST** give right-of-way to all commercial aircraft. These are just some rules of many.

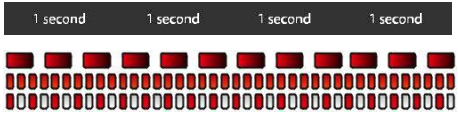


Typhoon H Main LED STATUS
Indications

DURING STARTUP

Main LED Status Indicator

- Initialization failed	Pulses red (3 times/second)
- The Aircraft is in "Bind" Mode	Blinks orange very rapidly (10 times/second)
- The Aircraft is in a No-Fly Zone	Blinks red and white rapidly (5 times/second)



BEFORE/DURING FLIGHT

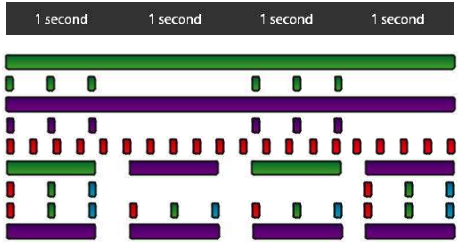
Main LED Status Indicator

- The Aircraft is in Smart Mode with GPS lock	Glows solid green
- The Aircraft is in Smart Mode without GPS lock	Blinks green (3 times/second) then off (for 1 second)
- The Aircraft is in Angle Mode with GPS lock or IPS	Glows solid purple
- The Aircraft is in Angle Mode without GPS lock or IPS	Blinks purple (3 times/second) then off (for 1 second)
- The Aircraft is in Home Mode	Blinks red rapidly (5 times/second)
- Enter Task function	Blink green and purple slowly (1 time/second)
- First Level low Voltage Battery Warning	Blinks red, green and blue every 3 seconds
- Second Level low Voltage Battery Warning	Blinks red, green and blue continuously
- GPS Disabled	Blinks purple (1 flash per second)

NOTE: **White blink** between a solid flight mode indicates enough satellites for ***Watch Me/Follow Me***.

Motor LEDs Indicators

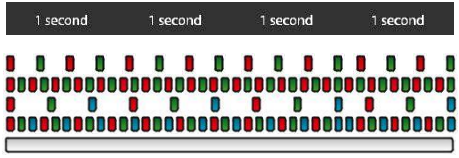
- Battery Voltage Low Warning	Blink rapidly (5 times/second)



FOR CALIBRATION MODES

Main LED Status Indicator

- Compass Calibration Mode Entered	Blinks red and green slowly (2 times/second)
- Compass Calibration Started	Blinks red and green rapidly (5 times/second)
- Accelerometer Calibration Mode Entered	Blinks red, green and blue slowly (1 time/second)
- Accelerometer Calibration started	Blinks red, green and blue rapidly (3 times/second)
- Calibration failed	Glows solid white



CGO3+ CAMERA LED STATUS INDICATIONS

- Without SD-card or SD-card Memory Full	Blinks yellow
- WiFi Error	Blinks red
- WiFi Initialized	Blinks green
- WiFi Connected	Glows solid green
- Recording Video or Taking Still Photos	Blinks green, blue slowly

Obstacle Avoidance (*OBS Avoid*)

Note

Cannot be activated until the aircraft is:
*at least **10 ft. off the ground** and **Landing Gear** up*

Two versions of Obstacle Avoidance for the Typhoon H (Advance and Pro):

- Advance version only has the Sonar system and **will not** steer clear of an obstacle, it will always STOP and wait for the pilot to clear the obstacle.
- Pro version has the Sonar system and *RealSense **(RS)** Module*, it performs the same, it STOPS then waits for the pilot to clear the obstacle.
  BUT will steer around an obstacle on its own, when *OBS Avoid* is selected with *Home Mode* [**RTH**] or in *Smart* mode (ie. *Watch Me/Follow Me*).

Sonar System

Sonar & Real Sense

OBS AVOID a 3 position switch located in the Middle of the top right section on the ST16 - Up is Off, Down is On – Middle position is not used as of yet. (same as Off)

When *Obstacle Avoidance is* **ON**, *OBS Avoid* icon on the ST16 will be solid green, *Ready* displayed, and the Typhoon H front motor LEDs (white) will flash.
When you turn on *OBS Avoid* and the function can't be activated, the icon will be yellow and *NOT AVL* will be displayed.

The speed of the aircraft will be limited with *OBS Avoid* ON.

With GPS lock, ***OBS Avoid*** can **be switched on in any mode**, **except** for the condition were the aircraft is descending vertically at low speed **and** landing gear DOWN.

WARNING!

*With the **Landing Gear Down and** OBS Avoid Switch **on**, If an obstacle moves towards the Typhoon H, the aircraft will not avoid it. i.e. pets, children*

It is recommended to turn off *OBS Avoid* when landing..

When an obstacle comes within range, the [Range] meter (at left) will be displayed on the ST16 with distance to the obstacle. You will also hear a sonar ping. The displayed color will change as you get closer and the pinging will be faster.

When the limit (approx. 15ft (5m)) is reached the aircraft will **STOP.** The ST16 will Vibrate, ping Fast, and the meter will turn RED.

Aircraft response with **OBS Avoid OFF** (switch up/mid position)

WARNING!

*Both versions of the aircraft **WILL NOT** **Stop** for an obstacle, with **OBS Avoid OFF.***

Quick NOTE

***Angle & Smart mode** are covered later in more detail. This is a short description of their function with Obstacle Avoidance.*

Smart Mode ON & OBS Avoid OFF:

SMART CIRCLE and **GEO-Fence** will be **active** when *Smart Mode* is **ON.**

With 10 or more satellites the aircraft will be in either *Follow* or *Watch flight* mode (covered later) and *FOLLOW the controller* or in *SMART* mode with less satellites. ***IF you** maneuver the aircraft with the ST16.* **Both versions** of the Typhoon H will **always move in the same direction the RIGHT control stick is moved no matter** which way the front is pointed. *Even if it's spinning.*
Left on stick aircraft moves left, Right on stick aircraft moves right.

Angle Mode ON & OBS Avoid OFF:

Both versions of the Typhoon H will move in the direction the ***Right*** control stick is moved relative to the **front** of the aircraft. ***It's as if you (Pilot) are sitting in the aircraft and flying it – that is how the aircraft will respond to the controls.***

Note

See addendum for more information on Obstacle Avoidance Limitations.

OBS Avoid (cont.)

Aircraft response with **OBS Avoid ON** (switch in down position)

***Smart Mode* ON & OBS Avoid ON:**

SMART CIRCLE and **GEO-Fence** will be **active** when *Smart Mode* is **ON.**

With 10 or more satellites the aircraft will be in either *Follow* or *Watch flight* mode (covered later) and *FOLLOW the controller* or in *SMART* mode with less satellites. ***IF you*** *maneuver the aircraft with the ST16.* **Both versions** of the Typhoon H will always **move in the same direction the Right control stick is moved no matter** which way the front of the aircraft is pointed.

Left on the stick - aircraft moves left, Right on stick - aircraft moves right.

But:
When you maneuver the aircraft with the **Right Stick** it will **first** turn (its front) in the new direction it is being commanded *to see if it's clear* and**:**

- **Sonar** version - if clear, the aircraft will move in the new direction. *If not clear the aircraft will* **STOP** in front of an obstacle and wait for the pilot to take control and clear it.
- **(RS)** version - if clear, the aircraft will move in the new direction. *If not clear the aircraft will* **STOP** in front of an obstacle and wait for the pilot to take control and clear it. If in Smart mode – it will *avoid an obstacle on its own (autopilot).*

***Angle Mode* ON & OBS Avoid ON:**

Both versions of the Typhoon H will move in the direction the ***right*** control stick is moved relative to the **front** of the aircraft. **Both versions** of the Typhoon H will **STOP** in front of an obstacle and wait for the pilot to take control and clear it.

RealSense

RealSense Module

How it Works:
The Typhoon H with Intel® RealSense™ technology builds a 3D model of the world, as it is flying. Using three cameras that act like one (a 1080p HD camera, an infrared camera, and an infrared laser projector) that see like the human eye to sense depth and track motion. Using this 3D model of its environment enables the drone to make intelligent choices about creating routes around obstacles (Autopilot).
Additionally, *RealSense* is capable of remembering its environment, further enhancing the prevention of possible collisions. It is not reactionary – if it avoids an obstacle once, it will remember the location of the obstacle and automatically know to avoid it again.

RealSense has 6GB of memory (which is not erasable manually) so if you fly in the same area all the time the 3D detail will be improved with each flight. If an obstacle is removed that was there previously the aircraft may act as if there is a "phantom obstacle" (from stored info) and avoid it, until its memory is overwritten by adding new information.

To Enable the RealSense Module [i.e. Autopilot for Smart mode***]*** *if installed tap "System Settings", tap "Other Settings", check the box next to "RealSense Installed".*

RealSense can only detect obstacles in front and ***can't*** detect side or rear obstacles.

Caution!!!

Do Not *Fly into the Sunrise/sunset or Bright lights as it will shine into the RealSense Lens/Sensors and it may not detect small objects or cause errors*

GPS/IPS Functionality

Note

Every time you turn on the Typhoon H it will default to having GPS active/on (even if you disabled GPS the last time it was powered on).

WARNING!!

Do NOT attempt to fly near or between tall buildings/obstructions, near or under dense vegetation, or structures and in any location known to have poor *GPS* coverage.
Do NOT disable/turn off *GPS* unless you're able to properly control the Typhoon H in *Angle Mode* without *GPS* or *IPS* assistance and accept **ALL** responsibility and liability for crashes, property damage, injuries, or 'fly aways'.

Minimum Requirements

6 Satellites on ST16 and Typhoon H to start motors
10 Satellites on ST16 for *Follow Me/Watch Me to enable*

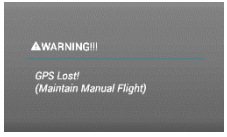
When flying outdoors, the Typhoon H requires 6 SAT's in order to start the motors. In order to get the most SAT's, it's critical that the *GPS* antenna installed on top of the Typhoon H always have a clear view of the sky (100° minimum clearance required). After powering up the Typhoon H wait a few minutes to get the most satellites and stabilized.

Note!!! Note!!!
See Addendum for additional Background on GPS

Getting "*GPS READY*" (GPS LOCK)

Power up the aircraft with the Motors **OFF.** The aircraft will go thru "*Acquire"* (it's getting data from the Satellites found), then uses the best Satellites to calculate position fix/lock before "***READY***" and the coordinate's in ***POS*** are displayed. *The aircraft will also beep twice once it has a GPS lock*. This may take 15 minutes to complete for a new location or if the aircraft has not been used for an extended period of time SO BE PATIENT. The next time will be faster. With Motors **OFF** Battery consumption will be low.

LOSS of GPS



The aircraft will Hover and wait for a command.
ST16 will vibrate and give a Pop-Up Warning

Tap [⮌] button to clear alarm – check telemetry to see if aircraft has "*GPS DISABLE*". If so **SWITCH TO** *Angle Mode*. *Smart Mode*, *OBS Avoid* and *Home Mode* will be unavailable/disabled.

If the Typhoon H loses *GPS lock* or *GPS* has been disabled/turned off the Main LED status Indicator on the aircraft will flash purple and the motor LEDs will flash three times per second then off one second and repeat.

Note:
*If GPS lock is **re-acquired** (after receiving a GPS signal for 5-10 seconds), Smart Mode and Home Mode will work again.*

As you fly higher/lower you will add/lose SAT's due to the geometry of the SAT's. In reviewing a flight log you may find the aircraft lost GPS (for a couple of seconds), but you got no alarm. This is do impart to the aircraft having stored the SAT info (almanac) and picked-up another SAT from this info. Also, if you fly behind a solid object (big sign, a large tree etc.) may drop a SAT for a short time until clear or another SAT is picked-up. Know where and what your flight path will be so any potential problem areas can be avoided or planed/adjust for.

DISABLING GPS

*Do NOT **disable/turn off GPS** unless you accept ALL responsibility and liability for crashes, property damage, injuries, or 'fly aways'.*

If you disable/turn off *GPS*, the Typhoon H **can only** be flown in ***Angle Mode***.

WARNING!!
Smart Mode and Home Mode only work when GPS is active/on.

WARNING!!
*IPS will be **turned off** when GPS is turned off, **DO NOT** turn off GPS when the pilot needs IPS to fly indoors.*

***To Disable GPS** press the Setting Calibration icon, then tap the GPS switch to turn GPS **off or on**.*

Indoor Positioning System (IPS) [(RS) version ONLY)

Sonar

USB Port on Typhoon H
(used with GUI Software)

Camera (for detecting movement)

IPS (**I**ndoor **P**ositioning **S**ystem)
Part of the RealSense Module

IPS comprises two systems the visual (camera) and sonar on the bottom of the *RealSense* Module. This feature fixes the position and altitude of the Typhoon H which allows for indoor flights. **Available in Angle Mode ONLY**

Note
*This Mode (IPS) is **not** selectable – the Typhoon H flight control system will activate this mode if it cannot find **any** GPS Satellites.*

- If the flight control system activates the *IPS* system,
  - The Main LED indicator on the aircraft will be solid purple and you will be able to start the motors, "***IPS***" will be displayed as the *Flight Mode*. At the same time, the aircraft **cannot** be switched to *Smart Mode, Home Mode, Task Mode* or *OBS Avoid **on** as they* are **disabled**

Stay in ***Angle Mode*** **ONLY** when using *IPS* to lock the position of the aircraft, the Typhoon H can also hover at its current altitude automatically.

When flying indoors with *IPS* active, the pilot should be **CAUTIOUS** and **not fly fast**.

Note:
When using *IPS*, make sure the indoor illumination is sufficient.
IPS may not be able to position the aircraft when flying over highly reflective surfaces or over a highly repeated surface texture (such as the same color).

Read the IPS PreCautions discussed at the front of this manual.

Note
See Addendum on how to engage IPS mode manually.

NO-FLY ZONES (NFZ)

It **will not** be possible to start the motors, takeoff or fly the Typhoon H in a 'No-Fly Zone' (within 5 miles (8 km) radius) of most major airports.

Note: *If in a No-Fly Zone the aircraft main LED will blink red and white rapidly (5 times/second)*

Note
See addendum for additional information

STARTING/STOPPING THE MOTORS

*The system must have a minimum of **6 GPS** satellites (or turn off GPS on the ST16) in order to start the motors by pressing the START/STOP button.*

There are **two ways:**

Option 1: *Manual* [standard method] in *Angle Mode*

Press and hold the **RED** *START/STOP* button for 2-3 sec's to start or stop the motors.

Option 2: *Auto* [using "*Takeoff*" on the *TASK* function row]

Tap the *Camera/Task* icon, Press "*Take Off"* for a second on the task row – then slide the icon that appears on the screen. The Typhoon H will start the motors, climb approx. 6 ft. (2m) and hover. Waiting for the pilot to take control.

RATE CONTROL SLIDER

The *Slider* located on the right side (bottom) of the ST16 allows you to set the overall response rate [how fast the aircraft reacts to control inputs] an important control to remember.

Caution!!!

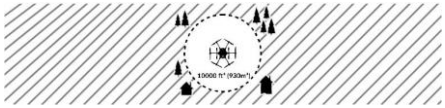
If you leave it in Rabbit position all of the time and you accidently bump a control stick, the aircraft will respond Very Fast and may crash, cause property damage, or personal injury.

Use the *turtle position* for the slowest response rate (required when flying between 5000 – 8000 ft. above Mean Sea Level (MSL), use the *rabbit position* for the fastest response rate (best for experienced pilots and can only be used when flying below 5000 ft. (MSL).
Or use a position in between if you prefer.

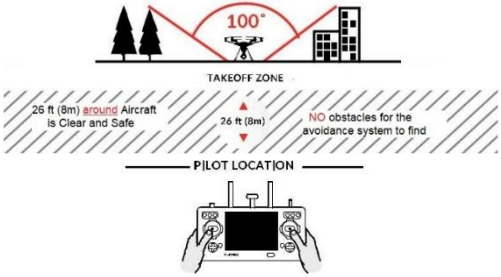
FLYING Overview

PLACEMENT BEFORE TAKEOFF

WARNING: Always operate the Typhoon H in open areas free of people, vehicles, trees and other obstructions. Never fly near or above people/crowds, airports or buildings.



Never attempt to operate the Typhoon H near tall buildings/obstructions that **Do Not** offer a clear view of the sky (a minimum clearance of 100° is recommend).
Be sure to place the Typhoon H on a **level and stable** surface before powering **ON**.



WARNING

Stay Back Approximately 26 ft. (8m) BEHIND the Typhoon H. The Typhoon H Front is to be facing away from you and others at Take-Off.

Note

It is recommended to Take-Off in Angle Mode and Change to Smart Mode if desired.

Take your time learn how the Typhoon H responds to various control inputs while flying. Practice in a Clear OPEN (with **GOOD** line of sight) area until your skills improve.

Note!!

*If at any time during a flight in **Angle Mode** you feel like the Typhoon H is drifting out of/beyond* your control, release both control sticks to centre them:

- *With GPS lock* – The Typhoon H will self-level and hold its altitude.
- *With-out GPS Lock or GPS disabled*, you will have to control the aircraft. With proper calibration of the aircraft, you'll need minor adjustments to maintain flight, which will be mainly dependent on wind and where you have the *Rate Control Slider*. DO NOT over re-act with the control sticks, practice in a large open area to get experience.

With GPS lock. You can also activate *Home Mode,* **R**eturn **T**o **H**ome **[RTH]** – the Typhoon H will fly itself back to Home, lower the Landing Gear, Land and turn off the motors.

HOME Position will be where the controller IS at time of activation!!!!

Caution!!

*The **RESPONSIVENESS** of the aircraft is controlled by the **Rate Control Slider** if left in Rabbit (fast) position all or most of the time – a small bump of a control stick may generate an unwanted aircraft response – So know where you have it and why*
i.e. rabbit not needed in final phase to land (nor desirable).

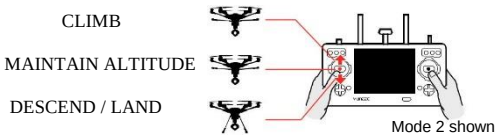
Note!!

When you Stop, Turn or just slow down the Typhoon H will need time and distance to perform the action (just like stopping a car). Keep this in mind when you are flying your aircraft to prevent it from striking an object or crashing. Also remember the Rate Control Slider (speed of your car – i.e. responsiveness of the aircraft) setting.

Caution!!

The control sticks are spring loaded to return to the centre position, just releasing them will cause them to bounce thru the centre position and may give an unwanted response

To take off [Angle mode]: Slowly raise the left stick above the centre position. The Typhoon H will takeoff and climb slowly (or raise the stick further until it does). Allow the stick to slowly return to the centre position when the Typhoon H reaches the desired altitude.

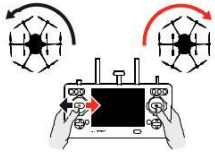


Mode 2 shown

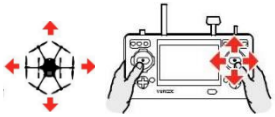
Response with FRONT of Aircraft pointing AWAY from you

***Angle Mode* ON & OBS Avoid OFF:** the Typhoon H will always move in the direction the right control stick is moved relative to the **front** of the aircraft
[it's as if you are sitting in the aircraft and flying it].

The aircraft **WILL NOT Stop** for an obstacle.
Both versions with OBS Avoid OFF.



Moving the left stick right or left the Typhoon H will ***ROTATE*** right or left in-place.


Mode 2 shown

Moving the *right stick right* the Typhoon H will *bank and turn right.*
Moving the *right stick left* the Typhoon H will *bank and turn left.*
Moving the right stick up/down the Typhoon H will lean and move forward or backward. (the '*angle/speed*' of movement is determined by how far you move the stick away from the centre position). Also, where you have the *Rate Control Slider* (Rabbit/Tortoise)

Response with FRONT of Aircraft pointing AT you

***Angle Mode* ON & OBS Avoid OFF:**
Moving the *right stick right* the Typhoon H will *bank and turn left.*
Moving the *right stick left* the Typhoon H will *bank and turn right.*
Pushing the right stick up the Typhoon H will *move towards you*.
Pulling the right stick down the Typhoon H will *move away from you*.
Remember [it's as if you are sitting in the aircraft and flying it]

If **flying near or over water** be sure to stay at least 30 ft. (9m) from the edge with the controller – if the aircraft activates **[RTH]** on its own it will return to home and hover over *Home* position. **But** with a Battery Voltage Low condition or it occurs while hovering, the aircraft will land and may end up in the water.

HOME Position will be where the controller IS at time of activation!!!!

Note: *The above described action will occur if you are by a river, highway or any other hazard scenario and may result in injury, lost or damage to aircraft and/or property.*

LANDING the Typhoon H

There are two ways to land:

Note

Turn off *Obstacle Avoidance when landing.*

Note!!!

- **(RS)** version - With the **Landing Gear UP**, the aircraft will **not** descend lower than 6ft (2 m) from the ground.
- **Sonar** version **DOES NOT** have a downward sonar, So With the **Landing Gear UP** it will hit the ground.
- With the **Landing Gear Down,** *descending* and *OBS Avoid* Switch **on**, if an obstacle moves towards the Typhoon H, the aircraft will not avoid it. i.e. Children, Pets etc.

WARNING!!!

*Always land as soon as possible after the **first** Battery Voltage Low warning (approx. 14.3v).*

1) *Manual:* Maneuver the Typhoon H above the area where you would like to land. Lower the Landing Gear. Turn **OFF** *OBS Avoid*. Lower the left stick below the centre position the Typhoon H will begin to descend (slowly) and land.

Landing Gear Switch

*After the Typhoon H lands, hold the Left stick down/back for 2-3 sec's until the motors slow down **[you may notice the aircraft settle], slowly** release the stick to centre, then press and hold the START/STOP* button 2-3 secs *until the motors stop.*

WARNING!!

*Be sure to set the Home Mode **[RTH]** height under the "Setting Calibration" menu for your flying location environment. (See Home Mode)*

2) *Auto:* Switch to *Home Mode* **[RTH]** and the Typhoon H will fly itself back to the home point, rotate to position the front facing away from the home point, lower the landing gear, land and stop the motors.

Note

*During landing phase of Home Mode **[RTH]** you can fine tune the landing location with the ST16 controls.*

Caution!!

As the aircraft nears the ground refrain from using the controls. or switch to Angle Mode and Land manually.

Land **immediately** after the **Second** Battery Voltage Low warning as indicated by the vibrations and audible alerts from the ST16, also all aircraft Motor LEDs will be flashing rapidly. **Or the aircraft may fall out of the sky.**

If at any time the "***VOLTS***" (Aircraft Battery Voltage) shown on the ST16 is **at or below 14.1V**, return and land the Typhoon H **immediately or *wherever it is,*** if far away, to avoid the aircraft falling out of the sky.

AFTER LANDING

Stop video recording **before** turning off the Typhoon H.

Turn off the Typhoon H **before** turning off the ST16.
Remove the battery from the Typhoon H and allow it to cool to ambient temperature before recharging.

Install Camera Cover.

If the Control Signal (Link) to Controller is lost

Caution!!

The video signal will normally be lost to the ST16 first, so the Pilot should bring the aircraft back in range when video is lost

The Typhoon H will automatically in any flight condition **Stop and Hover**, if the signal is **not** re-established in a pre-determined time**:**

- *With GPS lock*, the aircraft will enter *Home Mode,* when reaching the home position it will hover and wait for pilot action, **except** for low battery – in which case the Typhoon H will also land.

HOME Position will be the controllers Last know position before signal lost!!!!

- *With-out GPS Lock or GPS disabled*, it will continue to Hover where it is until ***Battery Voltage Low*** condition, then the Typhoon H **will land where it is**.

Dual Band Control Redundancy

How it Works:
If Control signal is lost on the 2.4GHz system the Control Signal from the ST16 is re-routed to the 5.8GHz receiver [which is also a transmitter] and video reception maybe poor. Your 5.8GHz antenna now transmits your Control Signal, Video and telemetry to allow you to fly your aircraft back home until 2.4GHz control signal is restored or you land.

Caution:

The Aircraft performance maybe LESS responsive to ST16 Inputs.

If the Typhoon H is Lost or goes Down out of sight:

- **Do Not** Turn off the ST16 – Look at the left column where the aircraft telemetry data is, if present the aircraft is still powered up. **Note/write down the following**:

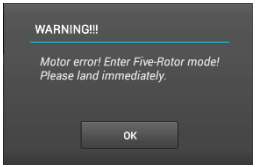
1) **"*POS*"** aircrafts GPS position, can be used on the internet to find its location.
2) **"*ALT*"** aircrafts Altitude (i.e. in a tree or on ground).
3) **"*DIS*"** aircrafts distance from you.

OR long press for about 3 secs to take a screen shot of the current display. And will be stored in the "*Screenshots*" subdir of the ST16.

You could also observe the "*DIS*" setting as you walk towards the last observed location to bring the distance to 0 and the aircraft may be beeping (from alarms).

- **If no** telemetry data is displayed the Typhoon H has no power. You can still recreate the flight from the Flight Data logs stored on the ST16, with programs located on the internet to help find the aircraft.

5 Rotor Mode:



If the Typhoon H should lose a motor or a propeller get damaged the aircraft will switch to this mode to maintain flight (the other 5 motors will compensate for the loss with the opposite motor doing the most work) so you will be able to bring the aircraft back to you and land immediately.

DO NOT fly or continue a flight in this mode or condition.

****WARNING****

*If you start the motors with the props off – **then** use the throttle to speed up the motors the Typhoon H **WILL** go into 5 Rotor Mode [the motors will sound/act as if something is wrong]. **All is OK**. The Typhoon H see's the motors speed up but NO vertical movement or stress on the motor(s) – so it goes into 5 Rotor Mode. **Stop the motors**. Turn off the Typhoon H and Re-Start to Clear Alarm. Install the props and fly as normal.*

If **flying in COLD weather**

Recommend 14° F (-10° C) and above. Acclimatize the aircraft to the weather for at least 30 minutes (same holds true if coming in from the cold). After the Typhoon H is started allow a couple of minutes for the aircraft to warm the internal electronics. Flight time will be reduced do to the cold. For the batteries you can use chemical hand warmers to keep them warm till use.

Note: *Hot weather will affect aircraft performance also.*

Gimbal Controls

Note

The names Gimbal and Camera are often interchanged in documentation just remember the Gimbal moves the Camera. The Camera just takes the pic/video (settings/controls covered Later).

***Pan Mode* switch**

3 position switch, located on the upper left (center) on the ST16 and controls how the *Pan Control* knob with function/operate.

In the **up** position, is ***F**ollow Mode*.
- Moves the Gimbal to 0 degrees – i.e. face the front of the aircraft.
- The *Pan Control* for the Gimbal (Camera) is **disabled**.

[The camera is locked facing the front and as such follows the front of the aircraft's movements.]

In the **middle** position, is ***F**ollow **P**an Controllable Mode*.
- The *Pan Control Knob* is enabled,
- Use the *Pan Control* knob to set the pan position of the Gimbal (Camera), it will stay **fixed** to that position regardless of the aircraft's movements.

In the **down** position, is ***G**lobal Mode*.
- The Gimbal (Camera) will rotated in the direction you turn the *Pan Control knob* [left or right] and **will continue to turn** in that direction.
- The greater the distance from midpoint the faster the Gimbal (Camera) will rotate.
- Has a special use in the CCC task function (covered later).

Note

See Addendum on how to perform Gimbal calibration.

Gimbal Controls (cont.)

Pan Control Knob

A rotary control knob located on the upper left on the ST16. The Gimbal (Camera) will rotated in the direction you turn the *Pan Control knob* [left or right].

Normal position of *Pan Control* is in the Middle, Camera is at 0^{o} degrees (i.e. facing forward on aircraft).

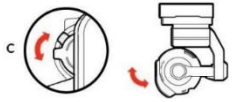
Use the *Pan Control* knob **to set the pan position** of the Gimbal (Camera), or **to set speed of rotation** when *Pan Mode* switch is in the ***G****lobal* position.

***Tilt Mode* switch**

3 position switch, located on the upper left (left) on the ST16 that controls **how** the *Tilt Slider* will function/operate.

In the **up & middle** position, the gimbal is in ***A****ngle Mode*.

Use the *Tilt Slider* (C) to set the tilt of the Gimbal (Camera) to any position between level with horizon and down.



In the **down** position, the Gimbal is in ***V****elocity Mode*. Gimbal **tilt rate** (speed) is controllable and the Gimbal is also able to tilt up an additional 15^{O} (degrees) in this switch position.

Tilt Slider

The *Slider* is located on the left side (bottom) of ST16. It is a rotary control with only partial movement.

Controls the ***GIMBAL*** (Camera) Up or Down movement (like the *Pan Knob* controls left/right).

Normal position of *the Tilt Slider (C*) is Up (Camera is level with horizon).

With *Tilt Mode* switch in ***V****elocity Mode* (Down position) - the camera can be tilted up an additional 15° from the level position and operation is as follows:

- When slider (C) is in the middle position, the velocity rate is 0 camera is level.
- When slider (C) is above the middle position it will start moving up.
- When slider (C) is below the middle position it will start moving down.

The distance slider(C) is from the midpoint the faster the rate of movement.

FLIGHT MODES

The ST16 Ground Station has 3 flight modes which are selected using the *Flight Mode* switch on the top right corner.

ANGLE MODE

When the *Flight Mode* switch is in the middle position, the Typhoon H is in *Angle Mode*, also known as Pilot Mode.

With GPS lock, when both sticks are centered, the Typhoon H will automatically hold its position and maintain a level altitude.

With-out GPS Lock or GPS disabled, you will have to control the aircraft. With proper calibration of the aircraft, you'll need minor adjustments to maintain flight, which will be mainly dependent on wind and where you have the *Rate Control Slider*. DO NOT over re-act with the control sticks, practice in a large open area to get experience.

WARNING!!

If you do not properly control the aircraft in Angle Mode the aircraft may crash, cause property damage, injury or may even "fly away".

Both versions with *OBS Avoid* **OFF WILL NOT Stop** for an obstacle.

Angle (Pilot) Mode is the mode preferred by experienced pilots because with

***Angle Mode* ON & OBS Avoid OFF:**

Both versions of the Typhoon H will move in the direction the **right** control stick is moved relative to the **front** of the aircraft. ***It's as if you (Pilot) are sitting in the aircraft and flying it – that is how the aircraft will respond to the controls.***

So if you move the right stick to the left the Typhoon H will bank and move left – **if** the front of the Typhoon H is **pointing away from you**, **BUT** if the front is **pointing at you** the Typhoon H will bank and move to the right.

***Angle Mode* ON & OBS Avoid ON:**

Both versions of the Typhoon H will move in the direction the right control stick is moved relative to the **front** of the aircraft. **Both versions** of the Typhoon H will **STOP** in front of an obstacle and wait for the pilot to take control to clear it.

Angle Mode (cont.)

The Green Arrow

With GPS Lock, the ST16 screen will display the Green Arrow in *Angle Mode* ***Only***.

The green *Arrow* ***points to where Home is*** in relation to the front of the aircraft. ***NOT*** the direction the aircraft is pointing.

Use the Right Stick, in the direction the arrow is pointing, to bring the aircraft to you [home]. **So:** in the picture above it would be the right stick down.

HOME MODE

Home Mode **only works when the Typhoon H & ST16 have a GPS lock.**

With GPS Lock, *Home Mode* **can be activated at any time and in any Flight Mode**.

When the *Flight Mode* switch is in the down position, the Typhoon H will be in *Home Mode, also called* ***Return To Home [RTH].***

Note!!

Home position will be the ***location of*** *the controller* ***when Return To Home*** *was commanded (or activated by the aircraft itself)* ***NOT*** *where it took off from.*

Setup the Home Mode [RTH] return height *before performing a flight as follows:*
Tap the "Setting Calibration" icon, tap "Home Altitude", move slider to set the return height you desire. Both the Typhoon H and the ST16 will need to be powered up to change.

The default home altitude is 20m (65.6ft). If the home altitude is changed, The new setting ***will be saved as the default home altitude****.*

If *OBS Avoid* is **ON** before or switched **ON** during *Home Mode* ***[RTH].***
The Typhoon H will: Flight speed will be Slower.

- **(RS)** version - avoid obstacles during the flight home.
- **Sonar** version - will **STOP** in front of an obstacle**.**
  You will need to switch to *Angle Mode* to clear an obstacle, then switch back to *Home Mode*.

With *OBS Avoid* **OFF**, **Both versions**, you must be certain there are **no obstacles in the Return flight path** otherwise the aircraft may fly into them.

When *Home Mode* is switched on or activated by the Typhoon H, it will:

1) Rotate to face home - then fly to the home position
2) Above home position rotates to face away from the home position
3) Lower the Landing Gear
4) Automatically land (within 13-26 ft. (4-8m) of home position)
The Pilot can control the aircraft during descent for better positioning.

Caution!!

As the aircraft nears the ground refrain from using the controls.

5) Turn off the motors

This can be very helpful for beginning pilots who aren't quite ready to land the Typhoon H themselves.

This can also be helpful for pilots that have lost orientation during flight.
Simply activate *Home Mode* **[RTH]** and the Typhoon H will automatically move toward the home position - once you've confirmed orientation switch back to *Angle Mode*.

Question??

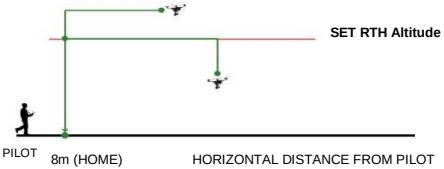
Why does the Typhoon H rotate to face away from the Home position before starting the landing phase?

SAFETY **–** because if you try to adjust the landing point or switch to angle mode during the descent to land manually the control stick movements and the aircraft **will respond as desired** (Left is Left, Forward is Forward [away from you] etc.).

RTH with OBS Avoid OFF (RS version)

1) When the flight height of the aircraft is lower than the set [RTH] Home altitude, it will climb vertically first to the set altitude, fly back, descend and land within 13-26 ft. (4-8m) of the home position.

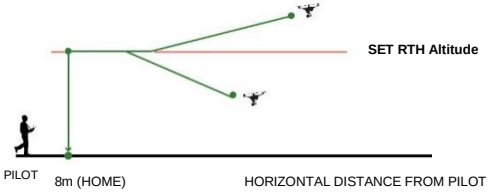
2) When the flight height of the aircraft is higher than the set [RTH] Home altitude, it will fly back at the current height, descend and land within 13-26 ft.(4-8m) of the home position.



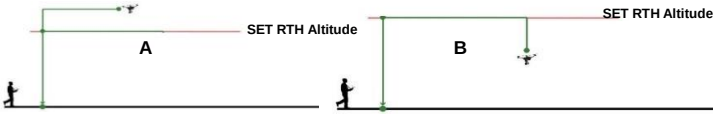
RTH with OBS Avoid ON (RS version)

1) When the flight height of the aircraft is lower than the set [RTH] Home altitude, it will climb to the set Home altitude while flying back, then descend [within 13-26 ft. (4-8m) of the home position] until it lands.

2) When the flight height of the aircraft is higher than the set [RTH] Home altitude, it will descend to the set Home altitude while flying back, then descend [within 13-26 ft. (4-8m) of the home position] until it lands.



RTH Sonar version with OBS Avoid OFF or ON



OBS Avoid OFF

A) When the flight height of the aircraft is higher than the set Home altitude, it will fly back at the current height, descend and land within 13-26 ft.(4-8m) of the home position.

B) When the flight height of the aircraft is lower than the set Home altitude, it will climb vertically first to the set altitude, fly back, descend and land within 13-26 ft. (4-8m) of the home position.

The difference with *OBS Avoid* **ON** is the aircraft will **STOP** in front of an obstacle and wait for the pilot to take control to clear the obstacle and speed will be SLOWER.

SMART MODE

When the *Flight Mode* switch is in the (Up) position the aircraft will be in *Smart Mode* with less than 10 satellites. If 10 or more satellites it will be in *Follow* or *Watch Mode*. *Smart Mode* only works when the ST16 has a GPS lock.

THIS MODE CAN ALSO BE HELPFUL TO PILOTS THAT LOSE ORIENTATION WHILE FLYING IN ANGLE MODE, SWITCH TO SMART MODE MANEUVER THE AIRCART TO REGAIN ORIENTATION THEN BACK TO ANGLE MODE.

WARNING!!!

If you are flying in Smart Mode and the Typhoon H loses GPS it will switch to Angle (Pilot) Mode and will begin to Hover.

SMART CIRCLE is the area, 26 ft. (8 m), the Typhoon H will maintain from the controller, including you when *Smart Mode* is selected. This is NOT changeable.

GEO-Fence is the max distance the aircraft will fly from the controller. Which is set up in the **GUI** program and is **Active** when *Smart* Mode is selected. The default is 300 ft. (91m). You can change this distance in *Yuneec GUI Software*. *See ADDENUM on how*.

When switching to *Smart mode* if the ST16 displays a pop-up *NOT AVAILABLE*, it means the ST16's GPS isn't ready for *Follow/Watch Me* mode and ***Smart*** mode **only** will be displayed as indicated by "*NOT AVAILABLE*" showing in "*Follow/Watch Me*" icon and greyed out when connected to **less than 10 satellites**.

But will lit up *Follow/Watch Me* when the ST16 has acquired 10 satellites and the aircraft's Main LED will be **solid Green and a White blink** will occur every couple of seconds indicating enough satellites for *Follow/Watch Me*.

Follow flight mode *(Follow Me)* is the default mode, if *Watch Me* was not selected earlier. You can switch modes by taping on the [ ] "*Follow/Watch*" icon to switch between *Follow Me or Watch Me* which changes the *flight* mode to *Follow* or *Watch.*

***Smart Mode* ON *& OBS Avoid* OFF:**

Both versions of the aircraft **WILL NOT Stop** for an obstacle with *OBS Avoid* **OFF**

SMART CIRCLE and **GEO-Fence** will be functional when *Smart Mode* is **ON.**

With 10 or more satellites the aircraft will be in either *Follow* or *Watch* flight mode and *FOLLOW the controller* or in *SMART* mode with less satellites.
***IF you** maneuver the aircraft with the ST16.* **Both versions** of the Typhoon H will **always move in the same direction the RIGHT control stick is moved no matter** which way the front is pointed. *Even if it's spinning.*
Left on stick aircraft moves left, Right on stick aircraft moves right.

***Smart Mode* ON *& OBS Avoid* ON:**

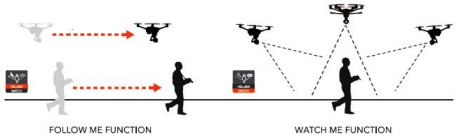
SMART CIRCLE and **GEO-Fence** will be functional when *Smart Mode* is **ON.**

With 10 or more satellites the aircraft will be in either *Follow* or *Watch* flight mode and *FOLLOW the controller* or in *SMART* mode with less satellites.
***IF you** maneuver the aircraft with the ST16.* **Both versions** of the Typhoon H will always **move in the same direction the Right control stick is moved no matter** which way the front of the aircraft is pointed.
Left on stick aircraft moves left, Right on stick aircraft moves right.

But:
When you use the **Right Stick** to maneuver the aircraft it will turn (its front) in the new direction it is being commanded **first** to see if it's clear and**:**

- **Sonar** version - if clear, the aircraft will move in the new direction. *If not clear the aircraft will* **STOP** in front of an obstacle and wait for the pilot to take control to clear it.
- **(RS)** version - if clear, the aircraft will move in the new direction. *If not clear the aircraft will avoid an obstacle on its own (autopilot).*

Additional *SMART MODE* Features



Caution!!
*The distance between the aircraft and the controller (you) will increase as if it is trying to avoid an obstacle – **(RS)** version. Or **Stopped** for an obstacle **Sonar** version.*
So be aware of this so you do not create a fly away condition.

FOLLOW ME: [ ] icon

*The system will **control the aircraft** to **FOLLOW** the controller, you can make **adjustments to the Camera** as you like. The aircraft will **maintain the current height and distance*** – unless with

OBS Avoid **On**
(RS) version will avoid an obstacle.
Sonar version will **STOP** in front of an obstacle.

OBS Avoid **OFF**
You will need to verify the path clear

Gimbal (Camera):
- The system will control the **aircraft to follow** the controller automatically. You can adjust the gimbal as you would like. (i.e. the camera could be looking at something else but the aircraft is following you).

With a better understanding of the Gimbal Controls discussed earlier and Camera Controls (covered later), you can perform many different photo/filming shots as the aircraft is following you.

Aircraft:
- The aircraft will **Follow** as the name implies. You can make adjustments to the aircraft as desired. *But remember the Smart Circle & Geo-Fence.*

WATCH ME: [👁] icon

*The system will **control the aircraft and** also **Keep the Gimbal** (camera) on you* to **keep you in frame** [hence the name ***Watch Me***], while tracking the controller.

Before selecting *Watch Me* - use the Gimbal controls to get you in center frame.
After Selecting *Watch Me* - place the *Tilt Slider* control in the center (mid) position.

With *OBS Avoid* On

(RS) version will avoid obstacles & maintain the **RS** sensors ***facing in the direction of aircraft travel*** so it can find obstacles and autopilot around them.
Sonar version will maintain the sensors ***facing in the direction of aircraft travel*** and will **STOP** in front of an obstacle.

With *OBS Avoid* OFF
You will need to verify the path clear

Camera (Gimbal):

- When *Watch Me is activated* you have ***NO*** control over the Gimbal [i.e. *Pan* or *Tilt*], except some minor adjustments to get you centered in the frame, the system will control the Gimbal (camera).

Aircraft:

- Both versions will maneuver as needed to keep the ***sensors facing in the direction of travel.*** with *OBS Avoid* **On, (RS)** version will avoid an obstacle & **Sonar** version will **STOP** in front of an obstacle. And will keep the camera pointed at you. You can make adjustments to the aircraft as desired. *But remember the Smart Circle & Geo-Fence.*

Review Question: *Why is Home mode **[RTH]** useable again, when/if the Typhoon H regains GPS?*

Ans: – The Typhoon H uses the ST16 GPS coordinates as Home, not it's take off point GPS coordinates.

The ST16 and Typhoon H share GPS info for:
a) *Home* coordinates
b) *Follow Me/Watch Me* modes
c) Smart mode 26 ft. (8 m) safety zone/distance around controller
d) Smart mode GEO-Fence setting/distance (set in the **GUI** program)
e) *Task* modes covered next

***SMART** Mode Review:*

The **aircraft response to the Left control stick** is not affected by *SMART* Mode, aircraft response to the Left stick is as should be.

The **aircraft response to the RIGHT control stick** will be different when *SMART* mode is selected.

HOW you ask???

SMART mode **does not** care HOW the aircraft is facing, positioned, spinning or whatever.

*It will **positively** maneuver the aircraft as described below:*

With OBS Avoid OFF

Both versions of aircraft WILL NOT avoid an obstacle
The right stick pushed forward – the aircraft **will** move away from you.
The right stick pulled back – the aircraft **will** move towards you
The right stick moved left – the aircraft **will** move left.
The right stick moved right – the aircraft **will** move right.

With OBS Avoid ON

The RIGHT control stick action and aircraft response is the same as above.
However the aircraft will **first turn** its front to the new commanded direction to verify it is clear, if not clear **BOTH versions** of aircraft will **STOP.**

BUT when **not** being maneuvered with the control sticks, the **(RS)** version will autopilot around an obstacle, the **sonar** version will **STOP** in front of an obstacle.

With 10 or more satellites the aircraft will be in either *Follow* or *Watch flight* mode and *FOLLOW the controller* or in *SMART* mode with less satellites.

Tap the [🚁👁] icon to switch between *Watch Me/Follow Me*.

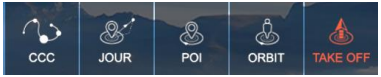
If you are NOT maneuvering the aircraft from the controls – the aircraft will **FOLLOW** the controller in either mode (*Follow/Watch Me*) as described earlier.
BUT if you maneuver the aircraft with the **Right** control stick it will perform as described in ***Smart Mode* ON & OBS Avoid OFF** or as in ***Smart Mode* ON & OBS Avoid ON** [however you have your switches setup].

When **not being maneuvered** by you from the ST16, ***the aircraft will go back to Follow or Watch flight mode of operation again.***

Example: If you hold the right stick to the left or right the aircraft will move in a circle around you at its present height and distance, when you release the right stick it will be back to ***FOLLOW*** or ***WATCH Me*** selection.

And will not come closer than??? – You guessed it 26ft [*Smart Circle*] or fly farther from you than the *GEO-Fence* setting.

TASK MODES



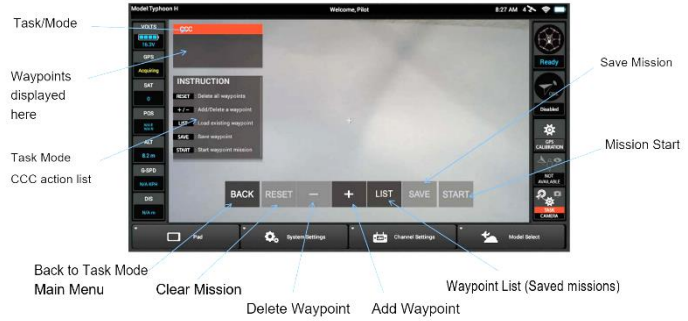
"Advance mode" must be enabled to use ***Task Modes***. Tap "*System Settings*", Tap "*Other Settings*" and Tap the box for "*Advance mode*" to turn it on.

Tap *TASK/CAMERA* icon, a new interface opens displaying the *TASK* functions: CCC (Curve Cable Cam), JOUR (Journey), POI (Point of Interest), ORBIT ME and Take Off.

NOTE

When the aircraft gives the 1ST Battery Voltage level low warning, it will exit TASK mode and the functions for TASK mode will be greyed out.

CCC (***Curve Cable Cam***): allows you to create an invisible route for the Typhoon H to fly along.



Functions:

- Up to 30 waypoints possible on the ST16
- During the mission the ***Left stick controls the direction and speed*** of the Typhoon H along the CCC route
- Waypoints **cannot** be edited
- Last Waypoint **can** be deleted – **NOT** individual waypoints
- The Camera **can be controlled** via the right joystick during the mission
  When the *Pan Mode* switch is set to *Global Mode*.
- Photo or video can be triggered from the ST16
- The mission can be paused at anytime

BACK: Return to the previous display.
RESET: Tap to delete all the points created during the flight.
[+] Tap to add the new waypoint.
[-] Tap to delete the last waypoint created ONLY.
LIST: Tap to see all routes saved. Delete a route by sliding it to the left.
SAVE: Tap to assign a name to the route and SAVE for later recall.
START: Tap, then slide the icon. The Typhoon H will fly to the first waypoint.

To Create a CCC (*Curve Cable Cam*) Mission:

No point can be edited after it is added

In *Angle mode* fly the route you wish to perform, stop at your 1st waypoint.
Set your aircraft position (i.e. height, orientation) and Camera angle.
[If the ***Pan Mode*** switch is set to ***Follow* or *Follow Pan***, the aircraft heading and camera position will be stored for that waypoint. It will store this information for each additional waypoint as it is added.]
Press [+] to add waypoint to **CCC** mission, the upper left display will list it as the next *Point*. (max of 30) The distance between points should be approx. 15 ft (5m).

WARNING!!!

*Verify the flight path is clear of obstacles **with extra room** as the flight path will be a curve type path when performed – Not a straight [point to point] path.*

Note

Entering more waypoints closer together will create a more squared flight path.

Fly to next waypoint and repeat above step. Remember pressing [+] to add a point means you cannot remove the prior waypoint.

At completion of route and waypoint insertion, Press the "*Save"* icon to name and save your mission for later use or Press "*Start*" to run the mission without saving.

To perform a CCC (*Curve Cable Cam*) Task:

Select one from your list or create one and Press *"Start"* icon, then slide the slider to fly your mission. The Typhoon H will fly to the 1st waypoint. Upper left display will highlight Point 1 and each point as it reaches it.

The screen will display EXIT and [⏸]. Tap [⏸] the mission will pause and changes to a [▶]. Tap [▶] the mission will continue. You can exit the mode by tapping the EXIT icon or by switching to a new flight mode.

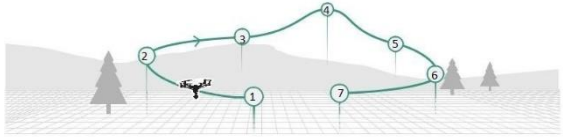
CCC (*Curve Cable Cam*) (cont.)

At First Waypoint: Move throttle FWD (1 to 2 sec's) the Typhoon H will perform the *CCC* route forward. Move of throttle Back (1 to 2 sec's) and the Typhoon H will fly thought the *CCC* route backwards.

After moving the throttle - wait - then more ***QUICK*** *moves of the throttle FWD or Back to increase or decrease speed in increments if you wish.*
DO NOT hold the throttle stick to long or the aircraft will change direction

You can fly your mission forward and backward as many times as you like.

You could PAUSE at a waypoint or anywhere and take a picture or start/stop a movie.

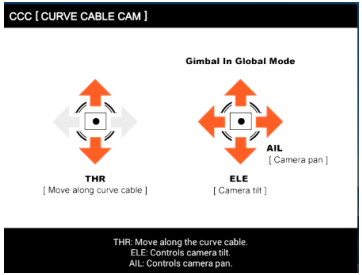


Example: If the pilot sets 7 waypoints as shown, when the aircraft arrives at 1st waypoint, move the throttle Forward, the aircraft will fly the waypoints in order 1 to 7. Move the throttle Back, the aircraft will fly the waypoints in reverse order from 7 to 1).

SPECIAL Control!!

When the ***Pan Mode*** switch is set to ***Global Mode*** (DOWN position)***:***

You can control the aircraft and Camera with the *STICK* controls as shown below**:**



Note!
The ***right stick*** *now Control's the Camera*

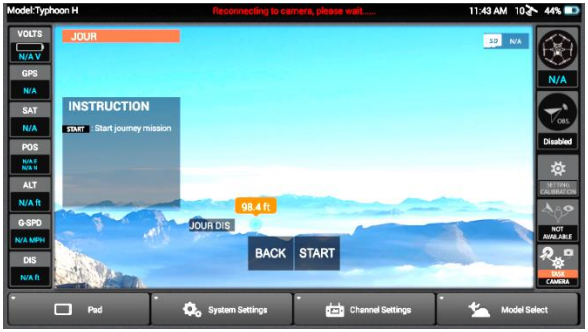
The Typhoon H will fly the mission as you had laid it out.

TAKEOFF Task

If you should select a saved mission that is incorrect for your present location. The Typhoon H will not execute the mission if there is a large GPS difference.
If it appears to be performing the mission, just Press *EXIT* or select a new flight mode and the mission will end.

With GPS LOCK on both the aircraft and the ST16, Press "*Take Off"* for a second on the task row, a pop up will appear, then slide the icon to take off.
The Typhoon H will start the motors climb approx. 6 ft. (2m), hover and wait for the pilot to take control.

JOUR (**Journey function**) enables the Typhoon H to capture the perfect aerial selfie. The Typhoon H will fly up and out to the set distance, take a photo, then return to the 1ST point.



WARNING!!!
Verify the flight path is clear of obstacles.

With the Typhoon H 10 ft. (3m) from you/subject (hovering), adjust the camera tilt so you/subject are in frame.

WARNING!!!
Camera angle determines angle of flight.
*The flight path will be the **reverse** direction to which the camera is facing.*
Verify flight path is Clear!!!!

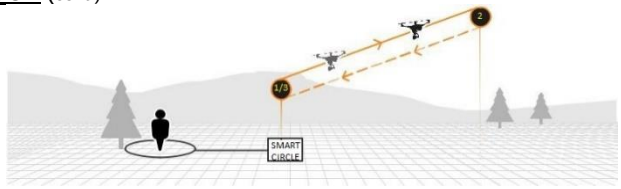
The camera **cannot** be controlled when journey function is activated it will remain at the position it was at when ***START*** is pressed.

BACK: Tap to Return to the previous display.
1ST: Move the *JOUR DIS* slider to desired travel distance.
START: Tap to "*Start*" Journey task. Then slide the icon to perform.

The Typhoon H will rotate 180º to face away from you/subject [keeping the camera on you/subject] fly the set distance take a photo, rotate 180º and return.

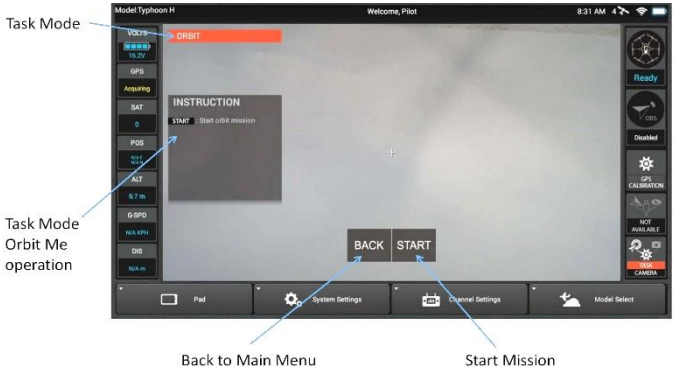
The screen will display EXIT and [⏸]. Tap [⏸] the mission will pause and changes to a [▶]. Tap [▶] the mission will continue. You can exit the mode by tapping the EXIT icon or by switching to a new flight mode.

JOUR (cont.)



Depending on the camera tilt it will take the perfect selfie.
(You may have to re-adjust the camera tilt and repeat the flight)

ORBIT ME Enables the Typhoon H to fly a circular path (orbit) around the pilot (i.e. where the controller is located).



WARNING!!!
Verify the flight path (circle) is clear of obstacles.

Orbit Me (cont.)

BACK: Return to the previous display.
START: Tap *"START"*, the Typhoon H will use its' current distance between it and the controller as the set radius. Then slide the slider.

Caution!!
If the aircraft is too close (26ft. minimum) to the pilot (controller), it will automatically increase the distance, then begin to orbit

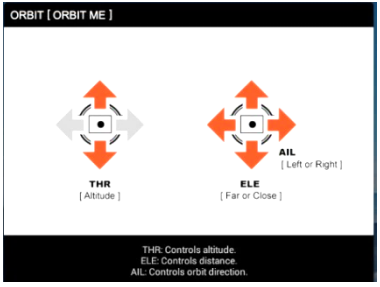
Move the right stick - right or left to change the orbit direction right or left.

The screen will display EXIT and [⏸]. Tap [⏸] the mission will pause and changes to a [▶]. Tap [▶] the mission will continue. You can exit the mode by tapping the EXIT icon or by switching to a new flight mode.

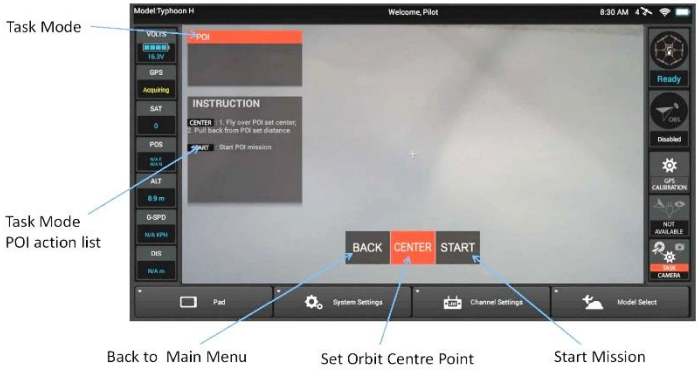
*After moving the throttle - wait - then more **QUICK** moves of the throttle FWD or Back to increase or decrease speed in increments if you wish.*

Tilt of the camera can be adjusted using the *Tilt Control Slider*.
Adjust the camera pan position by using the *Pan Control Knob*.

You can control the aircraft with the *STICK* controls shown below



POI (**Point of Interest**) Similar to *"ORBIT ME"* except it does not orbit the controller but a subject or scene of the pilots' choosing.



WARNING!!!
Verify the flight path (circle) is clear of obstacles.

BACK: Return to the previous display.
CENTRE: Fly to the center of the object/scene you wish to circle.
Then Tap "*CENTER*" to set that position as Center.

NEXT: Fly the Typhoon H to the distance you wish to be from the object or scene.

START: Tap *"START"* - your distance from the object or scene is now set.
You're ready to fly around the POI.

NEXT: Move the right stick -- right or left the aircraft will begin to orbit to the right or left. Also use to change direction of orbit

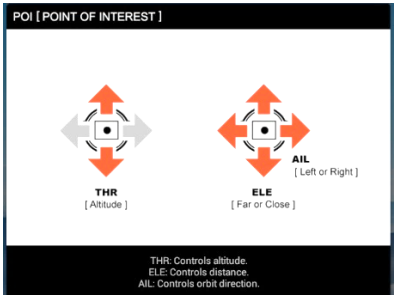
POI (cont.)

*After moving the throttle - wait - then more **QUICK** moves of the throttle FWD or Back to increase or decrease speed in increments if you wish.*

The screen will display EXIT and [⏸]. Tap [⏸] the mission will pause and changes to a [▶]. Tap [▶] the mission will continue. You can exit the mode by tapping the EXIT icon or by switching to a new flight mode.

Adjust the camera pan position by using the *Pan Control Knob*.

You can **control the aircraft** with the *STICK* controls shown below



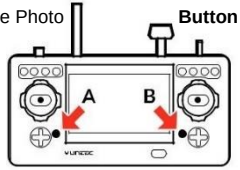
Camera Controls

Note

High Resolution photos/videos are stored on the Camera SD Card.
The ST16 stores Low Resolution photos/videos for review purposes.

Tap to select "*Photo Mode*" or "*Video Mode*"

Button A = Take Photo **Button B** = Start/Stop Recording Video



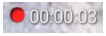
TO TAKE a PHOTO

When entering Photo Mode, video recording is disabled.
Press the button located near the bottom left corner of the ST16. You'll hear an audible 'shutter' sound from the ST16 and the LED indicator on the front of the camera will blink blue then green once.

Photo resolution is set by the video resolution.
If you would like a different resolution when taking photos you will need to change this first in *Video Mode* then switch back to *Photo Mode*.

TO RECORD a VIDEO

When entering Video Mode, photo mode is disabled.
Press the button located near the bottom right corner of the ST16. You'll hear an audible indication the recording has started or stopped.



The display (to the left) will appear at the top of the ST16 screen. showing video record time.

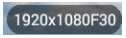
While recording video the LED on the front of the camera will flash blue and green.
ALWAYS **stop** recording video before turning off the Typhoon H to avoid data loss.

Note

If you turned off the Typhoon H before you stopped recording,
re-insert the SD card (if removed) and turn the Typhoon H on again.
On the camera wait until LED turns solid green indicating the video file was recovered.

Play icon Tap to get a list of stored photos/videos on the ST16.

Settings icon Tap to enter the photo/video settings.



This icon shows the current Photo/Video Mode.
(i.e. *Single, Burst, Timelapse, Panorama, Resolution/Frame rate*)

Playback

Tap [ ] icon on the lower right corner to get a list of pictures/videos on the ST16.

You can switch between each by tapping [ ] icon at top of the list.
When viewing a picture or watching a video to use ***full screen view***, double tap the screen in an area without icons. The ST16 will go to Full screen view, Double tap again to go back.
To Delete, slide the picture/video file to the left and tap delete, it will be deleted only from ST16 internal storage. The picture/video stored on the camera SD card will **NOT** change.
ST16 internal storage can store up to 20 pictures and 10 videos (in low resolution) for users to preview. If the limit is exceeded, the oldest photo/video will be overwritten on the ST16 internal storage.

Photo/Video settings

Tap [ ] icon to enter the **settings** screen. **Options are**:

Note

Depending if Video or Photo Mode is selected some of the settings below will be greyed out.

"***Video Setting***" - is the *resolution* (**also used for photo's)** & *frame rate*
"***Audio Switch***" - *on/off* controls the microphones (2) in camera
"***Photo Format***" - select *jpg, dng (raw), dng+jpg*
"***Image Format***" - *Natural, Gorgeous, Raw, Night* are selections
"***Single/Team***" - *Single/Team* tap to change if using more than one Controller or Wizard (team)
"***Reset Camera***" - settings back to defaults – use if you wish to remove your adjustments
"***Video Switch***" - *on/off* - turns off video feed from camera, to turn video back **ON** tap the "*TASK/CAMERA*" icon
"***Format SD Card***" - tap to format SD card in camera only
"***Histogram Switch***" - turns on *histogram* icon which can be moved anywhere on screen
"***Metering Mode***" - *Average, Centre, Spot* use to adjust photo/video exposure (i.e. to balance colors)
"***Photo Mode***" - select from *Single, Burst, Timelapse, Panorama*

Video Setting

The resolution and frame rate for the video is set here, there are 15 settings available to choose from. The resolution you set will also be the resolution for *Photo Mode*.

Video Resolution
Use the 3840x2160 setting in most environments requiring 4K recording at 30p. Use 1920 x 1080 30p when HD (High Definition) is desired.

Flight speed is an important consideration for capturing clear and clean photos. Also, altitude. High speed can incur blurred images, making stitching less clean in post-production.

If you would like a different resolution when taking photos you will need to change this first in *Video Mode* then switch back to *Photo Mode*.

Shutter Button

When selecting ***Burst*** or ***Panorama*** in photo mode, a new button/icon is added to the lower right, above the play button called the '*Shutter*' Button

When you tap ( ) (***Shutter Button)*** the choices are:

for ***Panorama***

a) Select the Panorama you would like to use *Single* or *Double*, then tap 'OK'.
b) Press the ***Photo*** button to start the panorama.

In *Single* layer, the camera will Pan 360° in steps and take 8 photos.
In *Double* layer, the camera will Pan 360° in steps taking 8 photos then tilt the camera down approx.45°, Pan 360° in steps taking 8 photos again and finally take 2 photos in bird-view (straight down).

for ***Burst***

Select the burst number (*3, 5 or 7*) for the number of photos per second you want, then tap OK. Press the *Photo* button to take the *Burst* photos.

Timelapse the camera will take 1 photo every second.

Image Format – if selecting "*Night"* be sure to turn your motor LEDs off under the "*Setting Calibration*" menu when taking a photo or starting a video so their lights will not affect the shot.

Note

The Camera will record video in 5 min. segments, if you turn off the Typhoon H before stopping the recording, the segments will not be joined into one file. To join the segments, re-install the SD card (if removed) and start the Typhoon H again and wait for the CAMERA LED to turn solid Green.

White Balance

Auto - Used when the conditions can vary and the operator doesn't want to manually adjust the settings
Incandescent - Used when operating the camera in an indoor environment
Sunset - Used during limited or fading light to bring out red and orange tones
Sunny - Used in bright daylight, will adjust contrast to turn down brightness
Cloudy - Used in cloudy conditions, will result in a brighter resolution
Fluorescent - Used when operating in indoor environments with fluorescent lighting
Lock - Locks the ability to change the white balance

Metering Mode

Average – Looks at the entire content of the frame and adjusts for best overall exposure. Ideal for large landscapes where the background is not part of the image, while objects in the foreground might be, such as a tall building against the sky. Also called "Matrix" metering.

Centre - Uses the center portion of the frame to set the exposure value. This mode ignores the corners of the frame and focuses on a larger area in the center. Ideal use of centering mode might be when inspecting a communications tower against a bright blue sky, exposure should be set based on the tower, not the sky. This may cause the sky to be over exposed, particularly in backlit scenarios, but will allow for the tower to be properly photographed

Spot - Takes a reading from a specific spot in the frame to adjust the image. Which ***you select by tapping on the ST16 screen for the spot you choose.***
Useful when identifying a small area in an object or shooting against a bright background such as snow or sky. The camera will use the spot to focus and adjust the exposure accordingly. Another example might be when photographing the moon, the moon is very small and very bright. The only point of exposure value would be the moon itself, therefore, spot-metering would be the correct choice for this scenario.

Shutter Speed

Shutter speeds may be manually slowed or slowed in auto-mode through the use of Neutral Density filters. Shutter speeds slower than 1/250 are desired when avoiding rolling shutter affects. Slow shutter speeds generally allow for greater color but can induce motion blur if the aircraft is moving very fast or being buffeted by high winds.

Note

When flying without filters, it is good practice to under expose by .5, providing dynamic range for post-processing of images or video.

In environments where clouds and building shade may cause shifting exposure, allow the camera to auto-white balance for best results.

Left Side Column

What the **W**hite **B**alance setting is set for i.e. *AWB*

What the *ISO* and *EV* (exposure) are set at i.e. *Auto*

WB White Balance Setting

[left column] Tap the choice of lighting in use/using.

"Lock" – locks **White Balance** at its present setting

Auto White Balance – The camera will adjust light parameters automatically when *Auto* is displayed

Tap [Auto] the *Exposure/Shutter speed and ISO menu* (below) will appear there will be a big red button at the top with *Auto* tap the *Auto* to change it to *M*, which means you can adjust the shutter speed and ISO manually.

Slide ISO number Up or Down to select desired ISO.

Some recommend Shutter Settings:

Sun - Mid Day	*1/800*
Sun - Afternoon	*1/640*
Sun Early Morning	*1/500*
Cloudy	*1/400*
Cloudy Dull	*1/320*

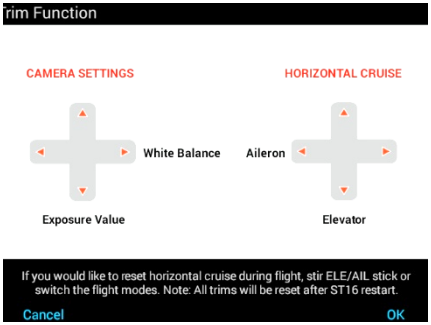
Slide speed number Up or Down to select desired Shutter Speed.

Cruise Control

Also, referred to as the *Trim Function*

When you tap a Trim Button, the instruction below will pop up.
Which allows you to control the Camera and Aircraft using the trim pads**:**

- use the ***Left Trim pad*** to control Camera Exposure & White Balance.
- use the ***Right Trim pad*** to control the aircraft (forward/backward & left/right) ***Speed*** in small increments.
  – the more times you click the pad the faster the action.
- ***Left Control Stick*** can be used to control height and rudder(direction) as normal.
- ***Right Control Stick*** is used to ***EXIT*** *"Cruise Control".*



To EXIT - give the Right Stick a flick or change the *Flight* mode.

The trims will be reset on a restart of the ST16.

Create/Delete/Copy/Import/Export A MODEL

Switch on the ST16, tap "*Model Select*", and if required tap "OK" to accept any pop-up warning/alert.

To Delete a model long press on the model you wish to delete.

To Create:

Step 1) Tap '*New Model'* and select the "*Create Model*", then tap "*Type*" in upper right corner, select "*Typhoon H*".
Step 2) Enter a model name.
Step 3) Tap "*Save*".
Step 4) Select the newly created model.
Step 5) Perform steps to **BIND** to the new aircraft.

To Copy: a model and its settings (to a new aircraft).

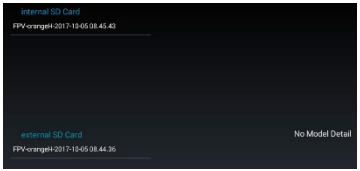
Step 1) Long press the model you wish to copy and tap '*Copy*'.
Step 2) Rename the newly created copy, so not to conflict with original.
Step 3) Perform steps to **BIND** to the new aircraft.

To Export:

Step 1) Press the Model name you wish to Export and a new pop-up will appear with an *Export* button. Tap *Export*, if you have a SD card installed in the ST16, you will have the choice of Internal and External SD Card.
Step 2) Tap the location you wish to save your Model too.

To Import:

Step 1) Press "New Model" and select "Import Model"

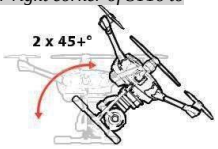


If you have saved a Model to internal storage [or on an external SD Card and installed it in the ST16] a list will appear displaying the available model names.

Step 2) Tap the model name you wish to import or Delete from your saved models.
Step 3) After Import, rename the Model so as not to conflict with other Model names.
Step 4) Perform steps to **BIND** to the new aircraft.

BINDING the Typhoon H and/or the Camera

Step 1) Turn on the ST16 wait until the initialization completes then turn on the aircraft.
Caution: **Verify** *the 2.4Ghz & 5.8Ghz icons are present in upper right corner of ST16 to* ***properly*** *bind to the Typhoon H.*
Note: ***Step 2 not required for binding ONLY the Camera.***



Step 2) Lean the Typhoon H in the forward direction to 45° - **twice** – verify the main LED blinks orange – if not repeat the procedure.

Step 3) Tap the "Refresh" button on the ST16.

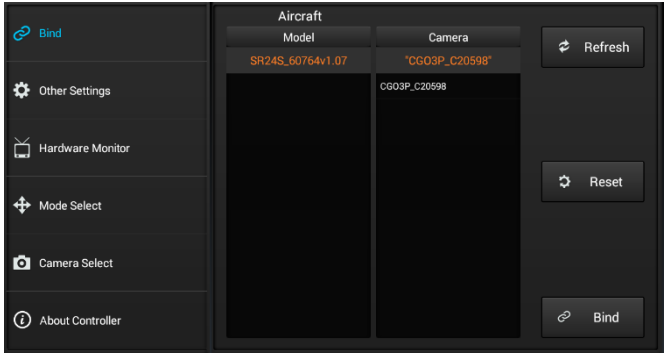
Step 4) Select the "*SR24_XXXXX*" under the "*Aircraft Model*" column to bind the Typhoon H and/or the "*CGO 3P_XXXXX*" under the "*Camera*" column to bind the Camera. Tap the "*BIND*" button, enter the PASSWORD "1234567890" when ask, tap "OK".
MAY TAKE A MINUTE or TWO TO COMPLETE.

Step 5) When you hear two long beeps the Typhoon H Binding was successful.

Step 6) Tap the "*Back*" [⮌] button to return to the main screen.

Telemetry data from the Typhoon H will be displayed on the left side of the ST16 screen and what the camera is viewing will be displayed on screen.

If the Typhoon H is **not** bound correctly – **NO** telemetry data will be displayed.
If the Camera is **not** bound correctly – **NO** current camera view will be displayed.



COMPASS CALIBRATION

READ THIS PROCEDURE THROUGH FIRST BEFORE PREFORMING – AS YOU WILL NEED TO COMPLETE IT IN 1 MINUTE

SPECIAL NOTICE: ***If you are more than 10 to 20 miles from last flight location it is recommended you perform this Calibration***

Caution:

Magnetic fields can be affected by many objects, causing the Typhoon H's sensor to not calibrate correctly. For optimum performance, only calibrate the Typhoon H in open spaces, far away from power lines, metal structures or concrete buildings. Perform the compass calibration procedure at least 11 feet away from the nearest cell phone or other electronic devices to ensure proper calibration.

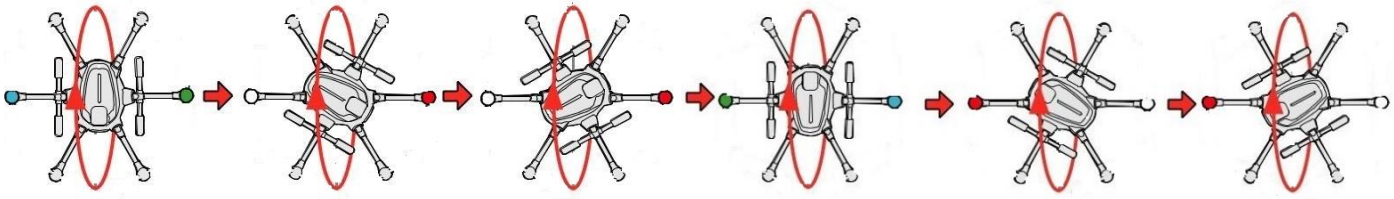
WARNING:

Remove the camera for this procedure to prevent damage to the gimbal and/or you.
Ensure the Propellers are removed.

NOTE: You may need to do this procedure more than once until you get some practice.

Step 1) Power on the ST16 first then the aircraft, make sure they are connected correctly.

Step 2) Tap the "*Settings Calibration*" button, then tap "*Calibration*" and now tap "*Compass*".



Step 3) Facing **NORTH**, Lift the airframe straight & level by the motor arms. When two motors LEDs start to blink hold them in your left and right hand, turn the Typhoon H forward as shown above until the two LEDs turn off.

Step 4) The LEDs on another two motors will start to blink - as illustrated, turn the aircraft to the left, then rotate it forward as shown until the two LEDs turn off.

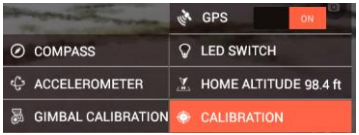
REPEAT STEPs 3 & 4 UNTIL ALL LEDS BLINK AT ONCE INDICATING THE PROCEDURE IS COMPLETE

If the calibration has been successful, all motor LED status indicators will blink continuously, the Main LED Indicator will be solid green and the aircraft will restart, you will recognize this when you hear the raising tone.

If calibration failed, the Main LED Status Indicator will be solid white. You must repeat the calibration process. If the calibration continues to fail, either the site of calibration is unsuitable or the compass is defective.

Refer to your Yuneec service center.

Camera GIMBAL Calibration



NOTE: *The calibration process will take about 2-3 minutes. During the calibration process the gimbal will move around* ***DO NOT*** *touch or move the aircraft.*

Step 1) Place the Typhoon H on a level and stable surface. Switch on the ST16, then the aircraft - wait till the RC and WiFi connect.

Step 2) **Verify** the *TILT mode* and *PAN mode* toggle switches are in the up position. **Verify** the ***CAMERA TILT SLIDER*** and ***PAN CONTROL KNOB*** are in the middle position. Can be verified on Hardware Monitor Screen.

Step 3) Tap the *'Setting Calibration*' button, then tap "*Calibration"* button, now tap "*Gimbal Calibration*" button. The Gimbal will calibrate itself automatically. Wait for the gimbal to face forward and stay still, which means the gimbal calibration is complete.

Step 4) Turn the Typhoon H *off* then *on* again to use the new calibration.

Accelerometer Calibration

WARNING!!

Be sure to perform the accelerometer calibration at least 11 feet away from the nearest cell phone or other electronic devices to ensure proper calibration

NOTE: *You must do the accelerometer calibration in no-wind condition.*

Step 1) Place the Typhoon H on a **level** and stable surface facing **True NORTH**. switch on the ST16 and then the aircraft - wait until the RC and WiFi connect.

Step 2) Verify the *FLIGHT MODE* switch is in the middle (*Angle*) position. tap the *Setting Calibration* button, and choose "*ACCELEROMETER*"

Step 3) During calibration, the main led will blink red, green and blue slowly at first, then blink rapidly. If calibration succeed, the main LED will turn green and the aircraft will restart automatically.
You will recognize this when you hear the raising tone.

If calibration has failed, the Main LED Status Indicator will be solid white, you must repeat the calibration process. If the calibration continues to fail the accelerometer is defective. Contact to your Yuneec service center.

Accelerometer Calibration (Advance users Hovering Method)

Not Required to perform.

WARNING!!

Be sure to perform the accelerometer calibration at least 11 feet away from the nearest cell phone or other electronic devices to ensure proper calibration

Note

You must do the accelerometer calibration in no-wind condition.

IMPORTANT to Know

*You will be flying the Typhoon H without GPS in Angle Mode to perform this calibration – So your skills to hold the aircraft CLOSE to a hover will be needed. Stick inputs by the user (to hold position manually) are "subtracted" by the calibration process so that the result will be a "**stable**" Calibration.*

Step 1) Place the Typhoon H on a level and stable surface. Switch on the ST16 Ground Station, then the aircraft wait till the RC and WiFi connect.

Step 2) Place the Flight Mode switch in *Angle Mode* (middle) position.
Tap the *"Settings Calibration"* button, switch **off** *GPS*.
Now tap *Calibration* and choose '*ACCELEROMETER*'.

Step 3) When the main LED indicator blinks red, green and blue **slowly**,
a) Hold the motor start/stop button to start the motors, the main LED indicator will blink red, green and blue **rapidly**.
b) Push the throttle stick gently above the middle position to takeoff to about 6 ft. (2m).

*Keep the aircraft hovering manually until the main LED indicator blinks red, green and blue **slowly** again.*

Step 4) Land the aircraft, hold the motor start/stop button to stop the motors, the *aircraft will restart automatically*.
You will recognize this when you hear the raising tone.

If calibration has failed, the Main LED Status Indicator will be solid white, you must repeat the calibration process. If the calibration continues to fail the accelerometer is defective. Contact to your Yuneec service center.

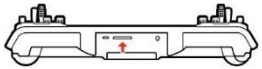
FIRMWARE UPDATE (VIA MicroSD Card)

Note

Ensure battery is fully charged on the ST16 and the Typhoon H before starting the update procedure.

UPDATE the ST16 Ground Station

Step 1) From your computer download the Firmware update. Copy the firmware update file on to the Micro SD card.
Step 2) Put the Micro SD card into the ST16 then turn on the ST16.



Note: ***SD Card contacts must face UP***.

Step 3) Tap *'System Settings'* and if required tap '*OK*' to accept any pop up warnings/alerts.
Step 4) Tap *'About Controller*' and then '*UPDATE*' in the ST16 column, and the update will start.
NOTE: When the update process completes, the ST16 will restart automatically.

Step 5) Remove the micro SD card from the ST16.
Step 6) If the update process did not - restart the ST16 - to work with the new updated firmware.

IF there was a update to the ST16

*You **will** need to **REBIND** the Typhoon H and the Camera to the ST16 to complete the update process.*

UPDATE the TYPHOON H Aircraft

Step 1) Remove the Micro SD card from the ST16.
Step 2) Put the Micro SD card into the Camera, turn on the ST16 then the Typhoon H.
Step 3) Wait for all the connections to complete. Tap *'System Settings*' and if required tap 'OK' to accept any pop-up warnings/alerts.
Step 4) Tap the *'About Controller*' then tap '*UPDATE*' in the Typhoon H column, and the update will complete automatically.
Step 5) **Reset the "*Flight Data*"** on the ST16 **BEFORE** flying the aircraft after the update -- as the files **will** become corrupt with the OLD data if not done.

FIRMWARE UPDATE (VIA OTA)

OTA is **O**ver **t**he **A**ir (wirelessly, i.e. WiFi)

Note

Ensure battery is fully charged on the ST16 and the Typhoon H before starting the update procedure.

UPDATE the ST16 Ground Station

Step 1) Turn on the ST16 then turn on the Typhoon H.
Step 2) Tap "*System Settings*"
If required tap 'OK' to accept any pop-up warnings/alerts.

Step 3) Tap *'About Controller*' and then '*UPDATE*' in the ST16 column.
Follow any on screen pop-ups

Note

ST16 will look for a SD card for any update first. If none will want to go on line WiFi and check web site

Step 4) Select a WiFi connection from the list that pops up and enter its password.
Step 5) If the ST16 finds an update – a "*What's New*" window will pop up describing what the update covers.
Step 6) If you wish to download this update tap "*Download*" or tap "*Cancel*" if not at this time.
Step 7) The ST16 will begin the download – when the download completes it will then perform the update.

Note

When the update process completes, the ST16 will restart automatically.

Step 8) If the update process DID NOT restart the ST16 to work with the new updated firmware. You perform the restart.

IF there was an update to the ST16

*You will need to **REBIND** the Typhoon H and the Camera to the ST16 to complete the update process for these two components.*

UPDATE the TYPHOON H Aircraft

Step 1) Turn on the ST16 - wait - then turn on the Typhoon H.
Step 2) Tap "*System Settings*"
If required tap 'OK' to accept any pop-up warnings/alerts.

Step 3) Tap *'About Controller*' and then '*UPDATE*' icon in the Aircraft column.
Follow any on screen pop-ups
Step 4) Select a WiFi connection from the list that pops up and enter its password.
Step 5) If the ST16 finds an update – a "**What's New**" window will pop up describing what the update covers.
Step 6) If you wish to download this update tap "*Download*" or tap "*Cancel*" if not at this time.
Step 7) The ST16 will begin the download – when the download completes it will then perform the update.

Note: *Follow any on screen directions on restarting the Typhoon H.*

Step 8) If the update process did not restart the ST16 and/or the Typhoon H.
Restart Both so you are working with the new updated firmware.
Step 9) **Reset the "*Flight Data*"** on the ST16 **BEFORE** flying the aircraft after the update -- as the files **will** become corrupt with the OLD data if not done.

How to Reset the "*Flight Data*" on the ST16

Step 1) Tap "*Pad*" If required tap 'OK' to accept any pop-up warnings/alerts.
Step 2) Tap the "six dots in a circle" at the bottom centre
Step 3) Tap "*Setting*", next tap "*Apps*"
Step 4) Scroll left 2 (two) times
Step 5) Scroll down and tap "*Flightmode*"
When "*Flightmode*" opens - tap "***Clear data***"
Step 6) Go back to the *Main Screen*.
If required tap 'OK' to accept any pop-up warnings/alerts.
Step 7) You will need to:
a) Tap "*Model Select*" and select "*Typhoon H*" or you saved model.
b) Tap "*System Settings*", "*Camera Select*", then select the correct camera model.
c) ***Rebind the Typhoon H and Camera.***

Step 8) ***PERFORM ALL CALIBRATIONS*** (i.e. *Compass, Gimbal, Accelerometer*)
Step 9) After completion of Calibrations – Power cycle the ST16 and aircraft to work will new calibrations

ST16 Factory Reset:

Will erase all data, logs, saved models and pic's/videos

Step 1) Tap "*Pad*"
If required tap 'OK' to accept any pop-up warnings/alerts.
Step 2) Tap the "six dots in a circle" at the bottom centre
Step 3) Tap "*Setting"*
Step 4) Tap "*Backup and Reset*".
Select "*Factory Data Reset*"
Select "*Reset Tablet*"
Select "*Erase Everything*"
The ST16 will reboot

Step 5) You will need to:
a) Tap "*Model Select*" and select "*Typhoon H*" or recreate your model.
b) Tap "*System Settings*", "*Camera Select*", then select the correct camera model.
c) ***Rebind the Typhoon H and Camera.***

Step 6) ***PERFORM ALL CALIBRATIONS*** (i.e. *Compass, Gimbal, Accelerometer*)
Step 7) After completion of Calibrations – Power cycle the ST16 and aircraft to work will new calibrations

Binding Two ST16 Ground Stations

Step1) Power on the original and the ***new*** ST16 first, then power on the Typhoon H. Wait a few seconds for the camera to align, aircraft and video link to connect.

Step 2) On the ***new*** ST16**:**
Tap '*New Model'* and select the "*Create Model*", then tap "*Type*" in upper right corner, select "*Typhoon H*".
Enter a model name. Tap "*Save*". Tap [⮌] to go back to Main Screen.

Step 3) On the original **and** ***new*** ST16 tap the camera "***Settings****"* icon, switch from "***Single****"* mode to "***Team****"* mode.

The Typhoon H Main LED Status Indicator will start to blink orange – indicating the aircraft has entered binding mode.

Step 4) On the ***new*** ST16 tap the "***System Settings****"* icon, on top left corner tap "***Bind****"*, tap "***Refresh****"* icon, select the "*SR24_XXXXX*" listed under '***Aircraft Model***' column. Next tap the '***Bind***' button lower right corner.
The ***new*** ST16 will bind to the Typhoon H.

Step 5) When you hear two long beeps, which means the binding was successful. Tap the back button.

If installed, verify *'RealSense Module Installed'* in *'Other Settings'* on the ***new*** ST16.

Note: *After the binding completes, the original ST16 Ground Station will control the camera and the* ***new*** *ST16 will control the aircraft.*

NOTE: *If a camera error occurs, you will need to verify the correct camera type is selected in the "****Camera Select****" section of the "****System Settings****", then return to the main display.*

When you need to switch back to single mode, the steps to follow are:

Step 1: Tap the camera settings icon on the original ST16 and then switch from "***Team****" mode* to "***Single****" mode*.
Step 2: When the Typhoon H Main LED indicator starts to blink orange, the aircraft has entered binding mode.
Step 3: Wait a few seconds, the ST16 will automatically bind to the camera and aircraft. You will hear two beeps from the aircraft when the binding is successful.

Binding a Wizard & a ST16

Step 1) Power on the ST16 first, then power on the Typhoon H. Wait a few seconds for the camera to align and all systems (RC and video) to connect.

Step 2) Tap the settings icon and then change from single mode to team mode.

Step 3) When the Main LED Status Indicator starts to blink orange, the aircraft has entered binding mode.

Step 4) Press and hold the Power Button of the Wizard until the Aircraft Mode LED glows solid blue. **Do not** release the Power Button until hearing two beeps from the aircraft, then release it.

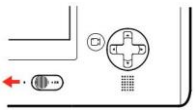
Note: *When the Typhoon H is in team mode (Wizard & ST16), the Wizard must be bound to the aircraft and the ST16 must be bound to the camera.*

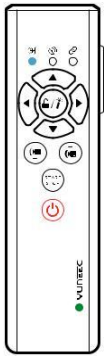
When you need to switch back to single mode, steps are as follows:

Step 1) Tap the settings icon on the ST16 and then switch from team mode to single mode.

Step 2) When the Main LED Status Indicator starts to blink orange, the aircraft has entered binding mode.

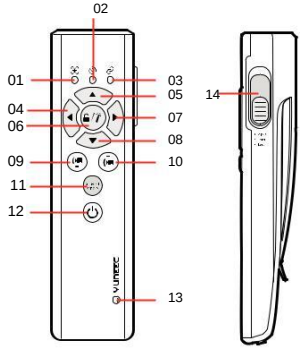
Step 3) Wait for a few seconds, as the control will automatically bind to the camera and copter. You will hear two beeps from the aircraft when the binding is successful.



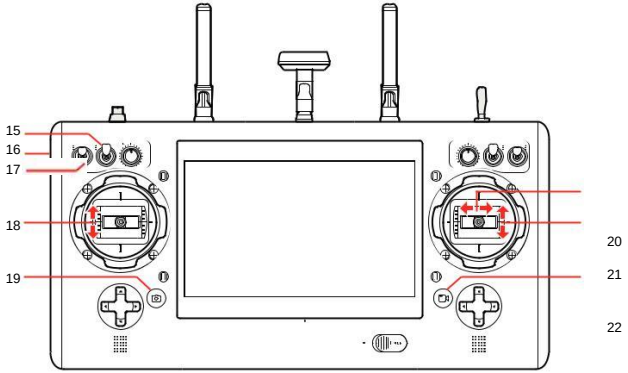


Wizard and Team Mode Controls

FLIGHT CONTROLS (TEAM MODE)



PILOT WIZARD™



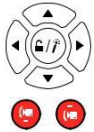
CAMERA OPERATOR ST16

01 Aircraft Mode LED
02 Wizard™ GPS LED
03 Aircraft Status LED
04 Turn / Fly to the Left Side Button
05 Ascend / Forward Button
06 Magic Button
07 Turn / Fly to the Right Side Button
08 Descend / Backward Button
09 Tilt Control Button-down (Disabled in team mode)
10 Tilt Control Button-up (Disabled in team mode)
11 Start / Stop Motors Button
12 Wizard™ Power Button
13 Wizard™ Power LED
14 Smart / Angle / Home Mode Switch
15 Pan Mode :
- Follow (pan can't be controlled)
- Follow Controllable
- Global
16 Gimbal Tilt Slider in Tilt Angle Mode
17 Tilt Mode:
-Angle/Velocity
18 Gimbal Tilt Control in Velocity Mode (Mode 1)
19 Take Still Photo Button
20 Pan Control in Global/
Follow Controllable mode
21 Tilt Control in Velocity (mode 2)
22 Start/Stop Video Recording Button

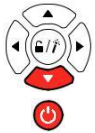
WIZARD BUTTON COMBINATION FUNCTIONS

*All vibrate once when any of the combination function is activated (the Wizard will vibrate twice when turning on the altitude follow function).
*For the last four functions, press the orange marked button first, and then the green one. Release both buttons at the same time after the function is activated.

Turn On/Off altitude follow function
PRESS - Short press
LED - Blink slowly: Turn off



Landing gear up/down
PRESS - Short press

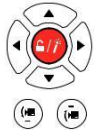


Activate compass calibration
PRESS - Long press
*Turn off WIZARD before pressing this combination buttons.
LED - Solid pink

Turn on Obstacle Avoidance function
-Turn off by default
PRESS - Short press LED - Blink white and the current mode LED

Take still photos
PRESS - Short press

Switch between Watch Me/ Follow Me function
PRESS - Short press
LED Watch Me Follow Me



Activate point-to-fly function
PRESS - Long press
LED - Solid blue

Enter into binding mode
PRESS - Long press
*Turn off WIZARD before pressing this button.
LED - Solid blue

Turn off Obstacle Avoidance function
PRESS - Short press

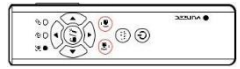
Start/stop video record
PRESS - Short press

LED - Blink-record start (with the wizard GPS locked)

RETACTING THE LANDING GEAR

After the copter takes off, the pilot can retract the landing gear by pressing the two buttons [ ]at the same time. Make sure to press the two buttons at the same time again when landing.

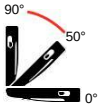
WARNING: Always land as soon as possible after the first low level battery warning, or land immediately after the second level low voltage battery warning by the motor LED indicators flashing rapidly.

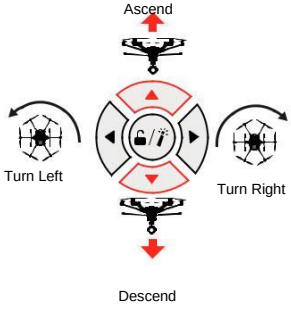


FLIGHT CONTROLS:

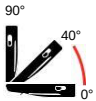
NOTE: The safe distance between the Wizard and the aircraft is 39 ft. (12m). The Wizard when placed at different positions - the Control Buttons function differently to control the Typhoon H.

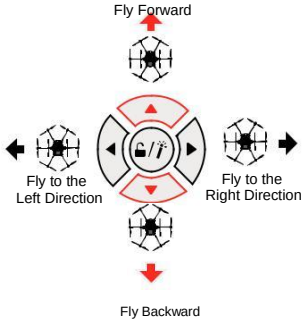
1) When the Typhoon Wizard™ is tilted upward between 50° and 90°, the functions of the Direction Control Buttons are as followed:





2) When the Typhoon Wizard™ is tilted upward between 0° and 40°, the functions of the Direction Control Buttons are as followed:





NOTE: When the aircraft flies to the left or right side, the front of the aircraft doesn't change its direction when the Wizard is tilted upwards between 0° and 40°.

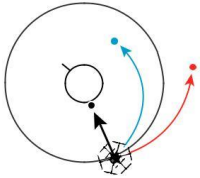
NOTE: Press the [ ] at the same time the *altitude follow* function will be turned On/Off. Press the [ ] at the same time and the *Watch Me/Follow Me* function can be freely switched.

POINT TO FLY FUNCTION

Press and hold the Magic Button on the Typhoon Wizard, and the aircraft will fly in the direction the Wizard is pointed to in the sky.

To ENTER "Point to Fly" Function:

When the aircraft is flying, point the Wizard to a direction, press and hold the Magic Button. Release the Magic Button when Aircraft Mode LED glows solid blue and Wizard vibrates once. Then the aircraft will fly to the direction the Wizard points. The closer the Typhoon Wizard is tilted towards 0° the further the aircraft will fly away from the pilot The closer the Wizard is tilted towards 90°, the closer the aircraft will fly to the pilot (refer to the blue flight track below). When the Wizard is tilted at 90°, the aircraft will fly close to you straightly and stop at a safe distance (refer to the black flight track below).



NOTE: The recommended flying height is 33-66 ft. (10-20 m). The operating distance range of the Typhoon Wizard™ is 33-164 ft. (10-50 m).

To Exit "Point to Fly" Function:

When in the 'Point to Fly' Function, press any Direction Control Button to exit this function. The aircraft will stop moving and automatically hold its position (with a GPS lock) and maintain a level attitude then.

FLIGHT MODES

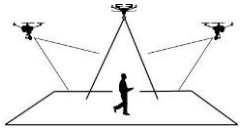
SMART MODE

When the Flight Mode Selection Switch is in the top position, the aircraft will be in the Smart Mode. The Aircraft Mode LED on the Wizard™ will glow solid green.

1) Watch Me Function Under Smart Mode:

Watch Me function enables the camera to keep tracking the Typhoon Wizard™ no matter where and how it moves as the camera can automatically tilt its angle according to the Wizard™. It is "watch me" mode if both the LEDs for Aircraft Mode and Wizard™ GPS are green.

Usually, the default function under the Smart Mode is Watch Me when using the Wizard.



The pilot will always be kept in the frame wherever he/she moves.

NOTE: In the Smart Mode, the geo-fence will keep the aircraft from traveling further than 295 ft. (90 m). The geo-fence is a virtual 'barrier'.

CAUTION: Any operation related to camera exposure setting control needs to be done on mobile APPs or ST16. The APP can be downloaded from Google Play Store or APP Store. You can also use the Wizard™ to take photos or record videos.

NOTE: The 'Point to Fly' Function can only be activated in Smart Mode.

NOTE: In the team mode, the gimbal camera is controlled by the ST16 Ground Station. The gimbal camera is not able to point to the pilot automatically, and the tilt direction can't be controlled, either. If the pilot needs to activate Watch Me function by using the Wizard, he or she can bind the Wizard and the aircraft. Then the ST16 can't bind the gimbal camera in the team mode.

Step 1) Turn off the ST16 Ground Station and Wizard, turn on the aircraft.

Step 2) Lean the aircraft in the forward direction twice (45°), until the Main LED indicator blinks orange rapidly.

Step 3) Press and hold the power button of the Wizard, until the Aircraft Mode LED is solid blue.

Step 4) Release the power button of the Wizard when hearing two beeps.

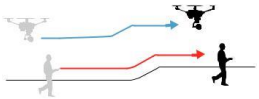
2) Follow Me Function Under Smart Mode:

The Follow Me function allows the aircraft to follow the pilot, adjusting its location to the location of the Typhoon Wizard™. All buttons are controllable in this mode. When in Follow Me, the aircraft will follow the movement of the Typhoon Wizard™ if there is no extra operation on the Typhoon Wizard.

Follow Me function can be switched to by the following steps:

When in Smart Mode, Press the [◀▶] at the same time quickly once, it is "follow me" model if Aircraft Mode LED on the Wizard™ is yellow and Wizard GPS LED is green.

NOTE: Press the [▲▼] buttons at the same time quickly once to turn on the height following function, then the aircraft will change its height according to the pilot.



WARNING: The maximum flight speed of the Typhoon H aircraft is 36.9MPH (16.5m/s). If the movement of the pilot is much faster than 36.9MPH (16.5m/s), the aircraft may fly away.

WARNING: After *OBS Avoid* is turned on, the speed of the aircraft will be limited to 11.2MPH (5m/s). If the pilot moves too fast, the distance between the aircraft and the Wizard might be enlarged.

ANGLE MODE

When the Flight Mode Selection Switch is in the middle position, the aircraft will be in Angle Mode. When Angle Mode is enabled, the Aircraft Mode LED on the Wizard will glow solid purple.
In this mode, the aircraft will move in the direction the Typhoon Wizard™ is controlled relative to the front/nose of the aircraft. The aircraft has no function of Follow Me or Watch Me.
NOTE: In this mode, the 'Point to Fly' Function can't be activated.

NOTE: In Angle Mode, it is not suggested travelling further than 656 ft. (200 m) The Wizard will keep vibrating when the aircraft travels further than 656 ft. (200 m).

HOME MODE

When the Flight Mode Selection Switch is in the bottom position, the aircraft will be in the Home Mode. The Aircraft Mode LED will be solid red. To exit the Home Mode, switch the Mode Switch to Angle/Smart Mode, then the aircraft will stop moving and automatically hold its position (with a GPS lock) and maintain a level attitude then.
In Home Mode (with *OBS Avoid* turned off) the aircraft will fly in a straight line in the direction of the pilots' current location, and automatically land within 13-26 ft. (4-8 m) of the pilot.

NOTE: In this mode, the 'Point to Fly' Function can't be activated.

CAUTION: Don't switch to Home Mode when you are near bodies of water.

NOTE: When Home mode is activated by the Wizard, the aircraft will land slowly automatically. Pilots can hold the Wizard upwards to 90° and long press [▼] to accelerate the landing speed.
NOTE: In Home Mode, the aircraft will avoid the obstacle automatically with realsense turned on when flying back to home point. The speed will be limited.

Wizard Calibration

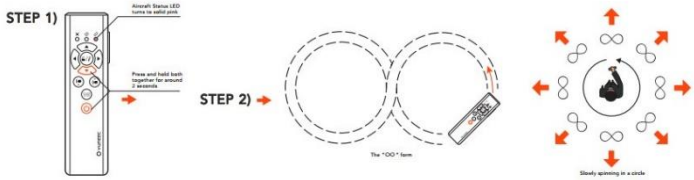
NOTE: This calibration will need to be done in 30 seconds.

Step 1) Press and Hold the Power and Down buttons until the aircraft status LED [upper right LED] is pink.

Step 2) Move the Wizard in a figure 8 pattern (as shown) with the Top of the Wizard always pointing in the direction of motion. Turn a little and repeat 8 times (as shown).

NOTE: The Wizard will turn off when completed successfully.

If the power LED blinks red fast calibration has failed and you will need to redo.



Wizard™ LED STATUS

Aircraft Mode LED

- Smart Mode: LED solid green
- Watch Me Function: LED solid green
- Follow Me Function: LED solid yellow
- Angle Mode: LED solid purple
- Home Mode: LED solid red
- 'Point To Fly' Function Activated: LED solid blue
- Obs. Avoidance On: LED blink white
  Altitude follow function turned off: LED blinking slowly

Wizard™ GPS LED

- GPS Locked: LED solid green.
- Recording video: LED blinking green once every second (with the Wizard GPS locked)

Aircraft Status LED

- The Communication Mal-function Between the Wizard™ and the Aircraft : LED solid red
- GPS Loss of Aircraft: LED off
- Aircraft in No-Fly Zone: LED blinking red, green and blue alternately
- Battery full: LED solid green
- Battery 50%: LED blinking green twice every 2 seconds
- Battery 25%: LED blinking green once every 2 seconds
- Low Voltage Warning of the Aircraft:
  LED blinking red quickly, the Wizard™ vibrating for 2 seconds once continuously

Wizard™ Power LED:

- Powered On: LED solid green
- During Charging: LED solid red
- Charging Completed: Red LED off
  Low Voltage Warning of the Wizard™:
- Battery 50%--- LED blinking green twice every 2 seconds
- Battery 25%--- LED blinking green once every 2 seconds
- Power Cut-off---LED blinking red quickly, the Wizard™ vibrating for 2 seconds once continuously.

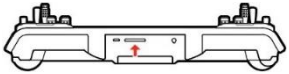
ADDENDUM/ADDITIONAL INFORMATION

Telemetry Data

Typhoon H telemetry is stored in sequentially numbered files on the ST16, with a new file started every time the Typhoon H is powered on and ended when the Typhoon H is powered off.

Note!!

Telemetry data is stored in the metric system ALWAYS even if imperial is select under "*Other Settings*"



NOTE: ***SD Card contacts must face UP***.

How to get your Telemetry (flight log) from the ST16

Install a SD Card in the ST16 ***[Formatted to the FAT32 file system]***

1. Tap "*Pad*" on the ST16 (Bottom left on screen).
2. Tap the *circle with 6 dots* at bottom centre.
3. Tap "*File Manager*".
4. Tap "*Directory*" on top left corner of screen.
5. Tap "*Flight Log*".
6. Tap "Telemetry" folder.
7. Find the "*Telemetry_???????.csv*" file with the **date and time stamp** (??????) of the file you need.
8. Tap the small arrow to the far left. Tap on "Copy" from pop up menu.
9. Tap the  icon in the upper left corner, it should now say "External SD Card" to the right of the icon, and be listing the contents of the SD card.
10. Tap "Paste" on the lower left side of the screen.

Press-toe you just copied the file to your SD Card.

Flight Log: Records flight information i.e. flight mode, in flight alarms/errors & more.
Remote Log: Records the ST16 controls status i.e. stick output/position, switch position etc.

Using your PC

1. Connect a USB cable from ST16 to the PC, a screen will pop up.
   Note the name of the device your PC finds for the ST16 (i.e. anzhen4_mrd7_w).
2. Open that device and go to the "*Flight Log*" folder click on It. Then open the Telemetry folder select the "*Telemetry_???????.csv*" file with the **date and time stamp** (??????) of the file you need.
3. Copy/paste the file where you wish.

NO FLY ZONE

The No-Fly Zone (NFZ) feature prevents flights near commercial airports (within 5 miles). For Safety of commercial airplanes, to meet FAA requirements

These limits can be overridden thru software from Yuneec if you sign a waiver or provide the appropriate License or Certificate (Pt. 107) from the FAA.
Within 1 mile of an airport:

- A hobbyist can fly to a height of approx. 60 ft.
- With a Certificate (Pt 107) this limit is allowed up to 400 AGL
- With a sUAS and a Pilot License the limit is removed.

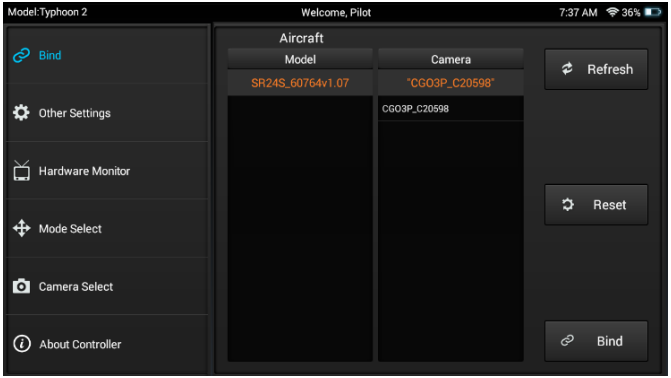
THIS **DOES NOT** RELIEVE A UAV PILOT OF ALL OTHER REQUIREMENTS
i.e. Notifying the appropriate authorities before a flight etc.

How to engage IPS mode manually

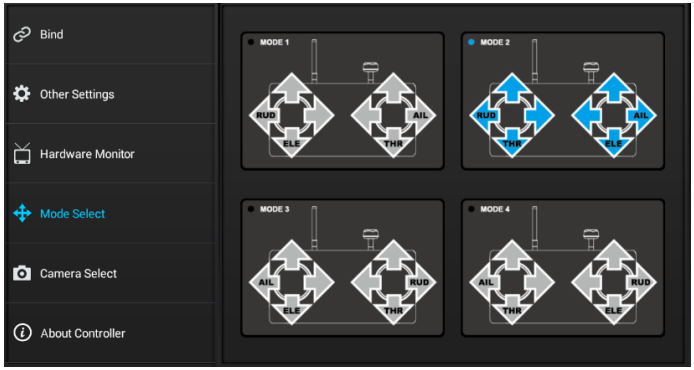
1) Place *OBS Avoid* switch to the middle position
2) Place Flight mode switch to *Angle* mode
3) **HOLD** the Left control stick to the lower left corner
4) Cycle the Flight mode switch several times between *Home* and *Angle* mode until the Typhoon H beeps, then release the Left control stick.

The Typhoon H Main LED should now be solid purple.
The ST16 should be displaying "*IPS*" for the mode.

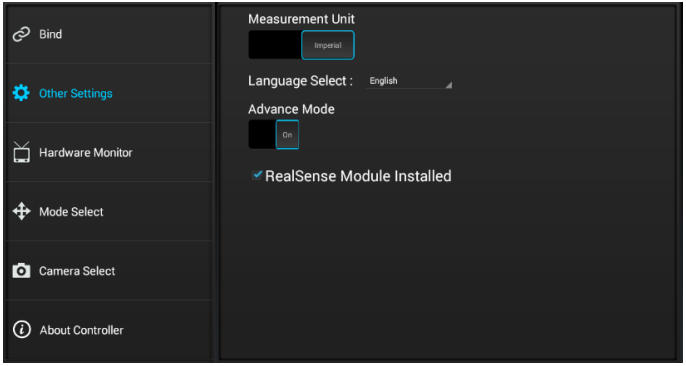
Bind



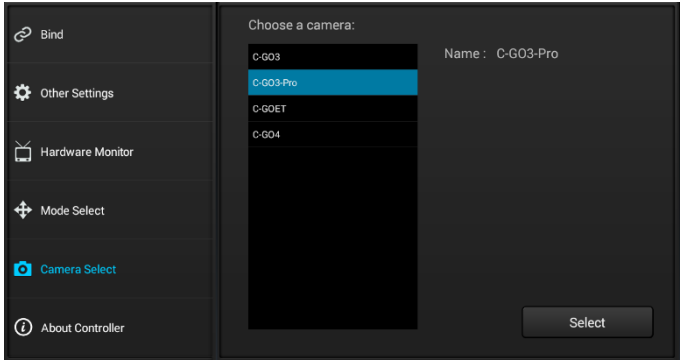
Mode Select



Other Settings

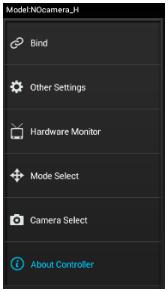


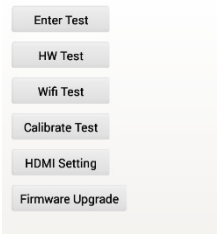
Camera Select



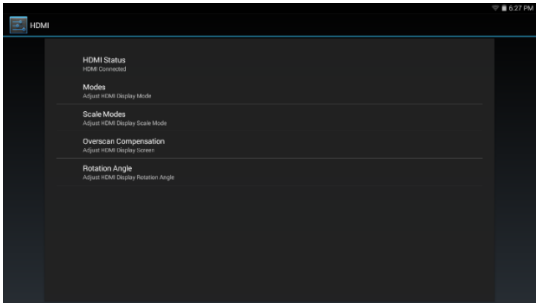
HDMI setup

Tap "*System Setting*", then Tap "*About Controller*" several times rapidly and the below screen [right side] will appear. Now Tap the "*HDMI Setting*"

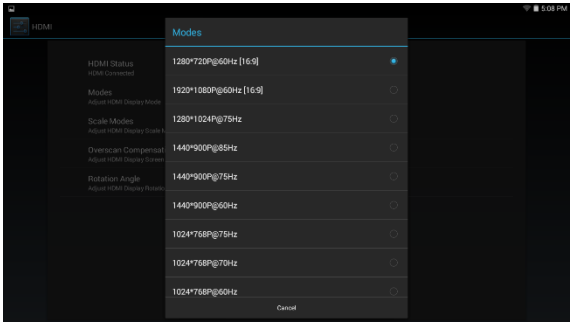




Next, the screen below appears, if NO HDMI is attached, items will be greyed out. And HDMI Status will say "*HDMI Disconnected*".

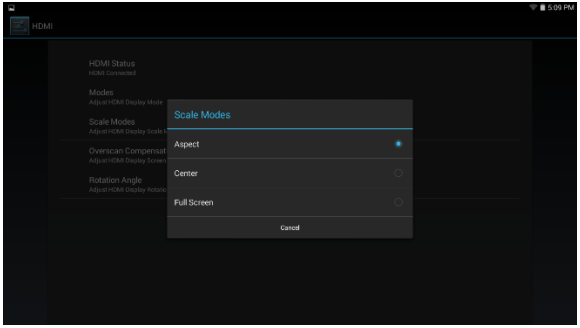


Modes



Select a *ST16 HDMI output mode* to match your monitor/goggles capabilities. Scroll to see more modes. See next page for full list of available modes

Scale Mode



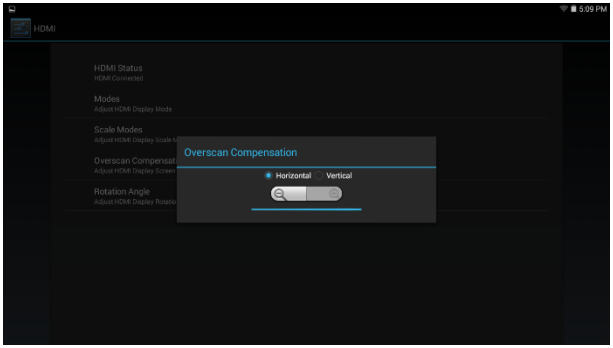
"***Aspect***" means fit ST16 display output to your monitor/goggles while keeping its aspect ratio.

"***Center***" means fit all of the ST16 display to the center of the mode you selected for your monitor/goggles. Also "*Overscan Compensation*" will be greyed out.

"***Full Screen***" the ST16 display is stretched up (or down) to fit the selected mode for your monitor/goggles.

HDMI setup (cont.)

Overscan Compensation

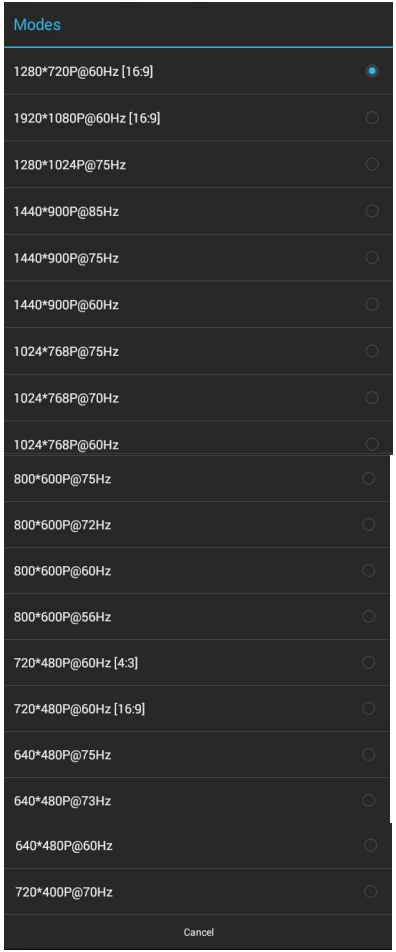


Here you can make some adjustment [tweaks] to the horizontal and vertical size to fit your HDMI device better, to ensure all of the ST16 screen is displayed.
Except if "*Center*" is selected as "*Scan Mode*".

Rotation Angle

Self-explanatory.

Available modes



GUI INSTRUCTIONS

WARNING: *Remove all the propellers before using the GUI.*

FIGURES 1 to 4 on next 4 pages

Step 1) Download the Typhoon H GUI program from our website www.yuneec.com.

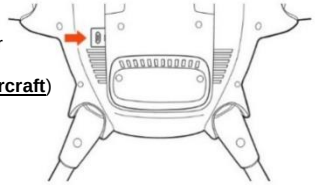
Step 2) Install the file. Then RE-boot your computer.

Step 3) First Double click the  icon on your Desktop. Wait for it to come up.

The TYPHOON H WILL NOT TURN ON IF you plug it in to the computer before you POWER IT UP.

Step 4) Second Switch **off** the ST16 and Typhoon H (if on).

USB Port for GUI (**on bottom of aircraft**)



Step 5) Third Use the **Yuneec supplied micro USB cable** and connect as shown above to the aircraft ONLY. Then Power on the Typhoon H.

Step 6) Fourth Wait until aircraft powers up (approx.15 sec's) then connect the other end of USB cable to the computer. The interface will display the *Sensor Information* [figure 1] automatically and you will see the data on the screen.

Speed Controller *(ESC)* Status and Testing:

Can be used to test a motor or a ESC for proper rotation (after a repair) or as you see fit.

Step 1) [figure 1 upper right] Click the *'Enable Testing*', the Warning pop-up '**I have removed the propellers, and it's safe to enable motor testing**', appears tap '*YES*'.

Step 2) All the motors will turn red in the top right corner on the interface. Move your mouse on the propeller you want to test, then click on it, the motor will spin (for a set time).

Note

If you press and hold, the motor will spin continuously. You can also click the 'ALL TURN' button to spin all the motors at the same time (for a set time).

Settings

The **Geo-fence** and **Height limit** can be changed [figure 2] by adjusting the value in the *'New Value*' column, then write the new value to the flight control by clicking '*Update*' for each item. *ALL values are in meters*.

Geo-fence settings will become active when *SMART* mode is selected.
Height limit will become your new max flight height. (FAA says 400ft max)

Note

Although the data can be changed, we recommend keeping the default settings to follow your country's law.

GPS Information [figure 3] (aircraft needs a Clear View of the Sky)
Check the Signal Strength and the Available Satellites by the graph, with more detailed information below the graph.

Note

The aircraft needs a Clear View of the sky (as described in this manual) to get GOOD data to verify proper performance.

Device Information [figure 4]
Information about the GUI version, Typhoon H firmware version, Vehicle (aircraft) type and ID.

- **Record your Vehicle ID here** _____
  This ID maybe needed by a Yuneec Rep for a service call.

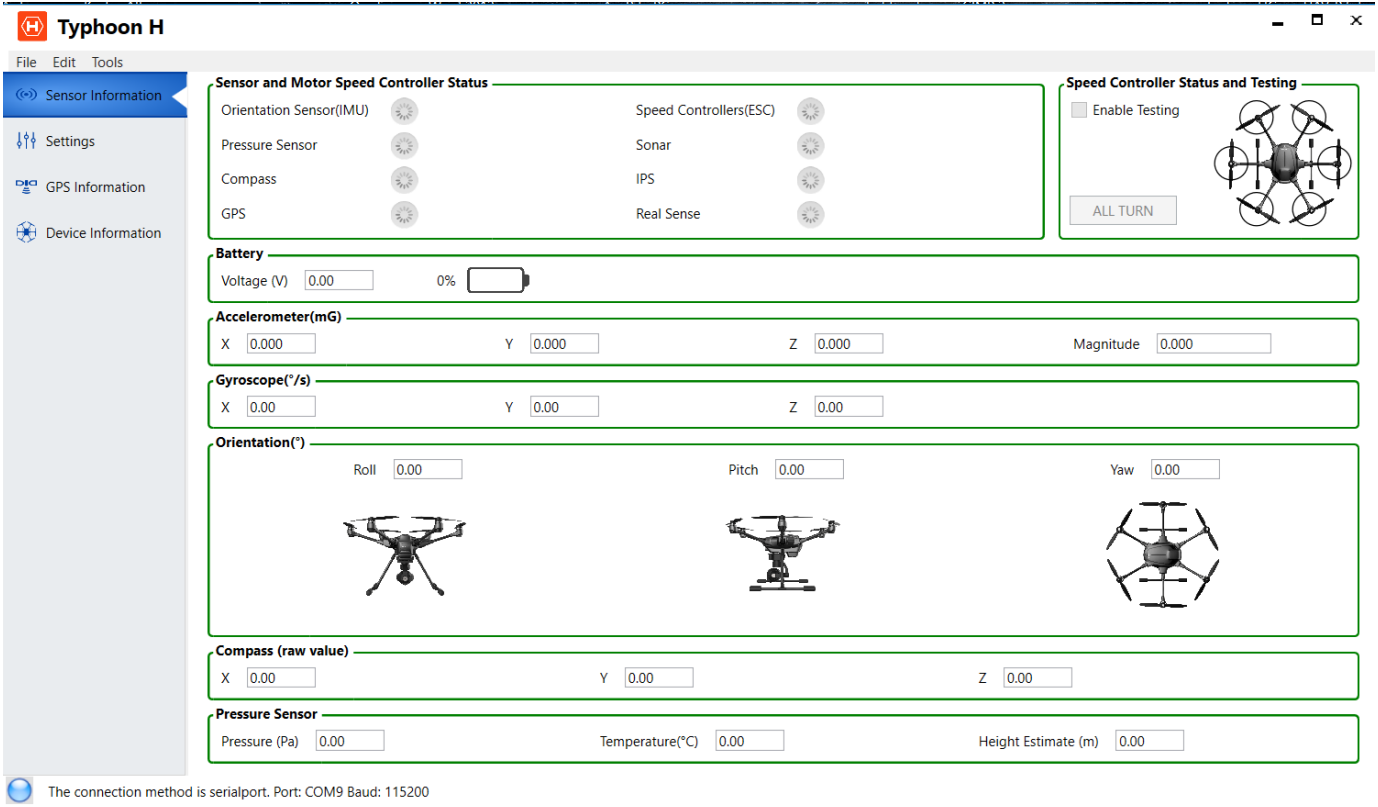


FIGURE 1

Note: *IPS* and *Real Sense* are if you have the ***REALSENSE*** Module installed. These maybe grayed out or in Red if not installed.

If you move the Typhoon H in Orientation (Roll, Pitch, Yaw) the aircraft pic will change position and give the current read-out.

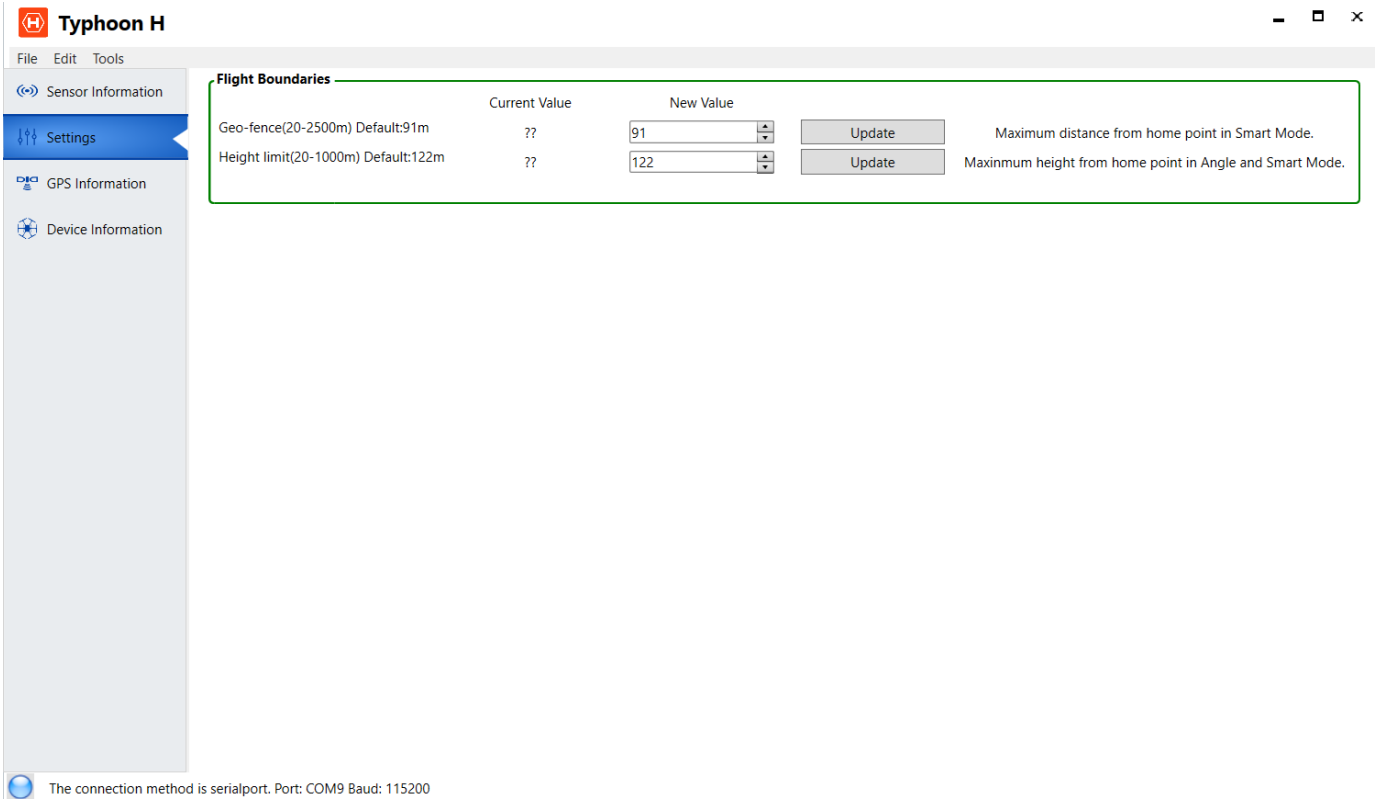

Typhoon H
File
Edit
Tools
Sensor Information
Settings
GPS Information
Device Information
Flight Boundaries
Current Value
New Value
Geo-fence(20-2500m) Default:91m
??
91
Update
Maximum distance from home point in Smart Mode.
Height limit(20-1000m) Default:122m
??
122
Update
Maxinmum height from home point in Angle and Smart Mode.
The connection method is serialport. Port: COM9 Baud: 115200

FIGURE 2


Typhoon H
File
Edit
Tools
Sensor Information
Settings
GPS Information
Device Information
GPS Signal Strength
Used in calculation
Not used
Signal Strength (dB)
Available Satellites (IDs)
Position
Latitude (°)
31.1892900
Longitude (°)
120.9307622
Altitude (m)
0.00
HDOP
0.00
Velocity(m/s)
X
2.00
Y
0.00
Z
0.00
The connection method is serialport. Port: COM9 Baud: 115200

FIGURE 3

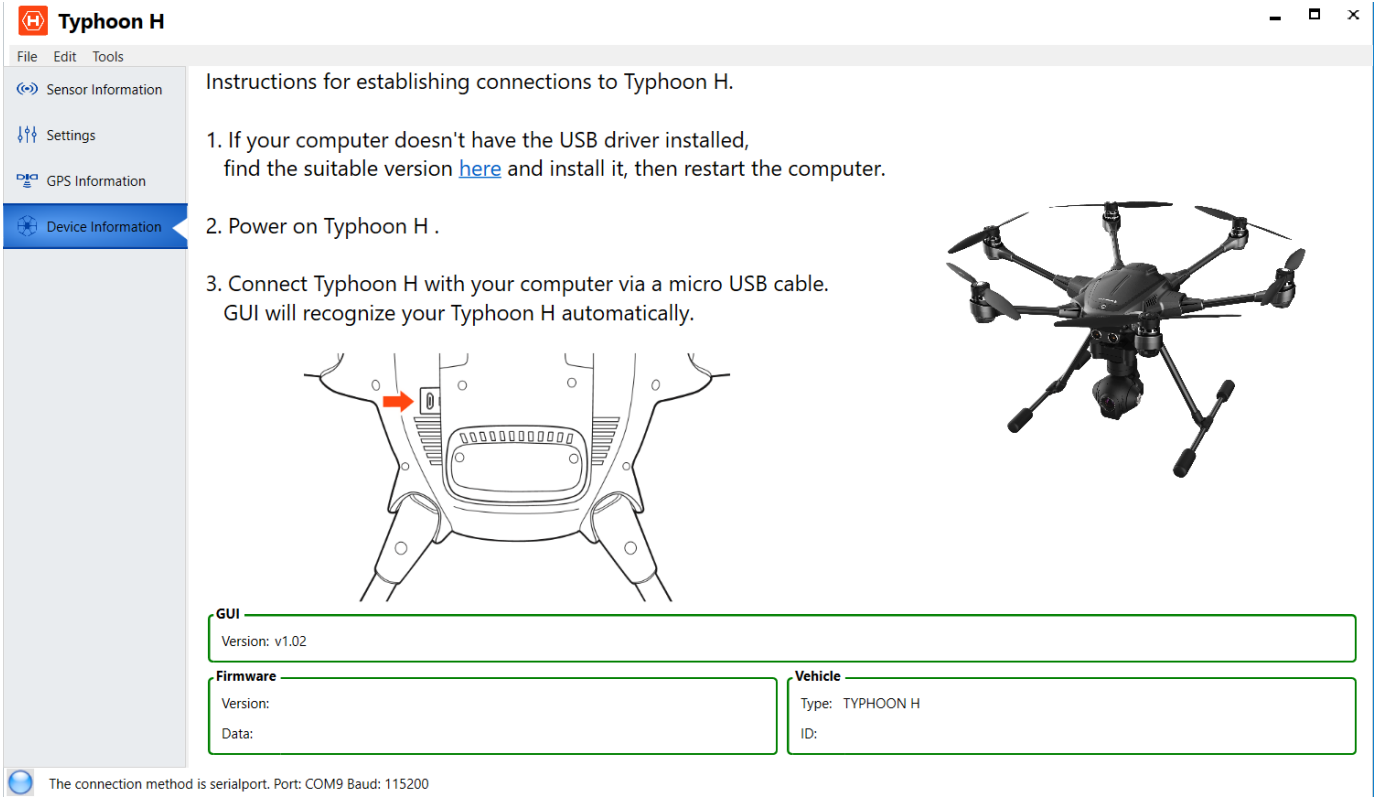

Typhoon H
File Edit Tools
Sensor Information
Settings
GPS Information
Device Information
Instructions for establishing connections to Typhoon H.
1. If your computer doesn't have the USB driver installed,
find the suitable version here and install it, then restart the computer.
2. Power on Typhoon H .
3. Connect Typhoon H with your computer via a micro USB cable.
GUI will recognize your Typhoon H automatically.
GUI
Version: v1.02
Firmware
Version:
Data:
Vehicle
Type: TYPHOON H
ID:
The connection method is serialport. Port: COM9 Baud: 115200

FIGURE 4

How does a GPS receiver work? (A General overview)

The data sent down to earth from each satellite contains a few different pieces of information that allows your GPS receiver to accurately calculate its position and time. The GPS module receives a timestamp from each of the visible satellites, along with data on where in the sky each one is located (among other pieces of data). From this information, the GPS receiver now knows the distance to each satellite in view. **If the GPS receiver's antenna can see at least 4 satellites with good signals, it can accurately calculate its position and time.** This is also called a **lock or a fix**.

GPS Accuracy

GPS Accuracy depends on a number of variables, *most notably signal to noise ratio* (**noisy reception**), *satellite position*, and *obstructions* such as buildings, trees, mountains etc. These factors can create errors in your perceived location. Signal noise usually creates an error from around one to ten meters. Mountains, buildings and other things that *might obstruct* the path between the receiver and the satellite can cause *three times as much error* as signal noise. A GPS receiver must be able to get a lock on 4 satellites to be able to solve for a position. The first lock it gets allows the receiver to obtain the **almanac** information and thus what other satellites it should listen for. Although it is possible to get a position from less than 4 satellites, the margin of error of this position can be rather large. Your most accurate read of your location comes when you have a clear view of the sky away from any obstructions and more than four satellites.

Accuracy - How accurate is GPS? Well, it varies a bit, but you can usually find out where you are, anywhere in the world, within 30 seconds, down to +/– 5 meters. The +/– is there because accuracy can vary between modules, time of day, clarity of reception, etc.

Overall, to get the best accuracy from your GPS, you must have a clear view of the sky.

GPS has some amount of error (~5 meters), and you can see it when not moving. Once the module starts moving, the track is relatively accurate, and the GPS can 'guess' your track. However, between two tall buildings, the accuracy can suffer. Remember, GPS signals are being transmitted from satellites that are not necessarily over your head; some can be close to the horizon. Also, the RF signals can reflect off of buildings/objects and create something called **multi-path interference**. Always keep in mind, **GPS works best with a full view of the sky.**

Antenna - That little GPS module is receiving signals from satellites about 12,000 miles away, not only above your head, but anywhere in the sky. For the best performance, you want a clear path between the antenna and most of the sky. Weather, clouds, snow storms, shouldn't affect the signal, but things like trees, buildings, mountains, the roof over your head, will all create unwanted interference and your GPS accuracy will suffer.

There are many antenna choices, but the most common is the ceramic patch antenna.

This antenna is low profile, inexpensive, and compact, but it has lower reception compared to other types of antennas. This antenna needs to face upwards with a clear view of the sky to get a good signal, i.e. the **gain** of the antenna is greatest when facing up.

Baud Rate - The most common is 9600bps for 1Hz receivers but 57600bps is becoming more common.

Channels - The number of channels that the GPS module runs will affect your time to first fix (TTFF). Since the module doesn't know which satellites are in view, the more frequencies/channels it can check at once, the faster a fix will be found. After the module gets a lock or fix, some modules will shut down the extra channels to save power. If you don't mind waiting a little longer for a lock, 12 or 14 channels will work just fine for tracking.

Gain - The gain is the efficiency of the antenna in any given orientation. This applies to both transmitting antennas and receiving antennas.

Lock or Fix - When a GPS receiver has a lock or fix, there are at least 4 satellites in good view and you can get accurate position and time data from them.

Start-up Times (Hot, Warm, and Cold) - Some GPS modules have a super-capacitor or battery backup to save previous satellite data in volatile memory after a power down. This helps decrease the TTFF on subsequent power-ups. Also, a faster start time translates into less overall power draw.

- Cold Start - If you power down the module for a long period of time and the backup cap dissipates, the data is lost. On the next power up, the GPS will need to download new almanac and ephemeris data.
- Warm Start - Depending on how long your backup power lasts, you can have a warm start, which means some of the almanac and ephemeris data is preserved, but it might take a bit of extra time to acquire a lock.
- Hot Start: A hot start means all of the satellites are up to date and are close to the same positions as they were in the previous power on state. With a hot start the GPS can immediately lock.

TTFF - Time to first fix. The time it takes, after power-on, to accurately compute your position and time using at least 4 satellites. If you are in a location with a bad view of the sky, the TTFF can be very long.

Update Rate - The update rate of a GPS module is how often it calculates and reports its position. The standard for most devices is 1Hz (once per second). UAVs and other fast vehicles may require increased update rates. 5 and even 10Hz update rates are becoming available in low cost modules.

HDOP - Horizontal Dilution of precision is a GPS term used to describe the geometric strength of a satellite configuration on GPS accuracy.
When visible GPS satellites are close together in the sky, the geometry is said to be weak and the HDOP value is high; when far apart, the geometry is strong and the HDOP value is low. Other factors that can increase the effective HDOP are obstructions such as nearby mountains or buildings. The effect of geometry of the satellites on position error is called geometric dilution of precision and it is roughly interpreted as the ratio of position error to range error. The greater the number of satellites, the better the value of HDOP.

Meaning of HDOP Values

DOP Value	Rating	Description
1	Ideal	This is the highest possible confidence level
1-2	Excellent	Positional measurements are considered accurate enough
2-5	Good	The minimum appropriate for making decisions. Could be used to make reliable navigation suggestions.
5-10	Moderate	Could be used for calculations, but the fix quality could be improved. A more open view of the sky is recommended.
10-20	Fair	Low confidence level. Use only to indicate a very rough estimate of the current location.

Typhoon H Flight Check List

Date: _____/_____/_____ Time: _____ Flight #: _____ Location: _____
Aircraft ID: _____
Weather Conditions: _____ Battery# _____

Pre-Flight Prep (before leaving home)

Check

All Batteries FULLY Charged (aircraft, ST16 and spares) ☐
Inspect Typhoon H for any signs of Damage or Missing Parts: ☐
Arms (6) ____ include Locking Clips on aircraft and arm
Motors (6) (clean, securely attached and outer hub moves freely by hand) ____
Landing Gear ____
Lights/Lens ____ Motor (6), Main
Body (no cracks) ____
Antennas ____
Real Sense Module ____ if installed
Propellers (including spares) **DO NOT** install ____
All Aircraft Batteries ____ ***Verify spring latch not broken*** & **springs up strong** ☐
Spare Parts & Accessories (propellers, batteries, Camera filters, etc.) ☐
in good working order and complete
Inspect Camera for any signs of Damage or Missing Parts:
Remove Camera
Lens/Filter Clean ____ If desired remove and install special Filter (i.e. ND8)
Verify camera rubber mounts & Keepers in place and protective cover installed ____
If not installed, install microSD Card ____
Install Camera Cover ____
Install Camera on aircraft verify **LOCKED** into position ____
Sun Shade and ST16 Lanyard complete and in Working Order ☐
ST16 Ground Control Station **install Antennas** - Turn On and check display, Verify proper switch operation
this can be done by going to "*System Settings* ", "*Hardware Monitor* ", check for smooth & proper operation on display ☐
Manuals and other Documentation (i.e. license, etc.)
Verify registration markings on aircraft for proper placement and legibility
If going to a location that is a NFZ (No Fly Zone) Notify and get clearance from Appropriate Authority (i.e.. Near a Airport) ☐
Check FAA web site for any TFR's (Temporary Flight Restrictions) for the location going to or
install and/or Check "B4UFLY" FAA app on your Smart Phone for location going to ☐

On Site Pre-Flight Prep/Set Up Checks

Chec

Select a **level area** to place the Typhoon H with approx. 26 ft. (8m) clearance ☐
this distance will be needed if switching ON "***Smart Mode*** " after takeoff
Check Flight Location for obstructions that may interfere with flight/Typhoon H performance ☐
i.e. trees, buildings, Power Lines, Radio/microwave Towers, people traffic etc.

For the Typhoon H:

Raise Typhoon H Arms and Verify **LOCKED** in Up position ☐
If Location is 20 miles (32km) from last flight a COMPASS Calibration may be needed.
If above check/observation has items which **may affect COMPASS performance** or if **UNSURE** perform Calibration
Refer to manual for correct procedure.
Install propellers in proper location, A on A arm, B on B arm, Verify they are properly attached ☐
by holding the motor and twisting propeller in the proper direction
Place Typhoon H on selected area with **Front Facing away** from you and others **DO NOT** power Up ☐
Remove Camera cover store in secure place ☐
Clean Camera Lens ☐
If installed Verify *RealSense* Lens Clean ☐

For the ST16 Ground Station:

6 or more Satellites are needed to START the motors
Attach Antennas, lanyard and sun shade, **Power on** ST16 **FIRST** ☐
Verify correct model is displayed in upper left corner -- If not correct ☐
To Power on Typhoon H ☐
Inspect then Insert Battery ____ Verify spring latch not broken & **springs up strong**
with palm of hand push the battery (handle down) into the aircraft with medium force so it "CLICKS"
DO NOT move the Typhoon H **after power on as it is acquiring GPS data for its present location**
NOTE: when powering up the Typhoon H observe the Main LED for first 1-2 sec's for Battery Charge Level
if LED is Green = Full Charge, Yellow =1/2 Charge, Red = Battery Low
DO NOT Fly on Yellow or Red
Power up the Typhoon H ☐
Wait then Verify Typhoon H and Camera data link -- Typhoon H telemetry data showing on left side of display ☐
and camera's *present* view being displayed on screen
Set "**Home Mode**" (***RTH***) height from your previous area observations ☐
Tap "*Settings/Calibration* ", "*Home Altitude* ", move *slider* to desired height
Format SD card if desired ☐
Tap "*settings* " icon, scroll to "*Format SD Card* ", Tap to format SD card in Camera
verify correct SD card size - upper right display corner of ST16
Setup Camera as desired (ref pg. 4) Adjust the White Balance and Exposure if desired ☐
Verify ST16 switches , sliders and knobs in PROPER Flight Configuration: ☐
OBS AVOID *(S3)* **OFF** (OFF position) ____ if desired switch **ON** after takeoff and control checks
FLIGHT MODE *switch* (S4) **ANGLE** (MID position) ____ Change mode **After takeoff and Control checks**
LANDING GEAR *switch* (S5) **DOWN** (DOWN position) ____ switch to **UP** (UP position) after takeoff and control checks
CONTROL RATE *slider* (K3) i.e. *turtle/rabbit* full **UP** (rabbit position) ____ for takeoff -- change when in the air
GIMBAL TILT MODE *switch* (S1) **UP** (**A** position) ____
PAN MODE *switch* (S2) **UP** (**F** position) ____ camera will always **F**ace the front of Typhoon H with this setting
PAN CONTROL *knob* (K1) **CENTER** (MID position) ____
GIMBAL TILT *slider* (K2) **UP** position ____ camera should be level with Horizon

Control Checks *(in **ANGLE mode**)*

10 or more satellites on ST16 & Typhoon H will be needed for some flight modes
If new location or Aircraft has not been used for a period of time, you will need to WAIT for GPS Data Collection
with aircraft powered up motors **OFF** [can take upto 15 min - battery power consumption will be low]

SAFETY WARNING!!

Verify and maintain area Clear of People/Pets etc. With Landing Gear Down
Typhoon H will **NOT** Avoid obstacles. (i.e. pets, children etc.)

When SAT's on ST16 and aircraft are **STABLE** — Chec

Taking-off: (2 options)

1) Using stick (manual) **ANGLE mode** ☐
START Motors (Press Red Button on top 1-2 sec's) - Raise left stick until the Typhoon is approx. 10 ft. (3 m) up

2) Using Task Function (auto) [**Note:** Motors must be off to use] ☐
Press "*Task/Camera* " to bring up Task Functions and tap "*TAKEOFF* " then slide slider
Typhoon H will start motors and climb 6 ft. (2m) and Hover - Ready for Pilot to take control

Test Control Sticks to very Typhoon H is responding properly to inputs ☐
IF aircraft response is **improper** **LAND** and **Do Not** fly Correct problem
Test Camera Pan and Tilt ☐
If checks are OK - select new flight mode if desired (i.e. *Smart* , a Task, etc.)
Remember the 26 ft. (8m) rule *if going to Smart Mode* on
"***OBS AVOID*** " **Cannot be activated** until the aircraft is: **10 ft off ground and Landing Gear UP**

Raise Landing Gear ☐
Start Video recording if desired ☐
Change ***Rate Control*** (Turtle/Rabbit) if desired ☐

Landing/Landed

Typhoon H will **not** go lower than 6ft. (2m) with Landing Gear Up

SAFETY WARNING!!

Verify and maintain Landing area Clear of People/Pets etc. With Landing Gear Down and descending
Typhoon H will **NOT** Avoid obstacles. (i.e. pets, children etc.)

IF ***OBS Avoid*** is **OFF** **VERIFY** flight path Clear ☐

Landing: (2 options)

1) Using stick (manual) **ANGLE mode** ☐
Maneuver Typhoon H to Landing Location
Over Location: *OBS Avoid* **OFF** ____
Rotate Typhoon H to **Face Away** from Landing site ____
Lower Landing Gear and Descend ____
When close to landing [i.e. 10ft (3m)] Change ***Rate Control*** to Slow ***(Turtle)***
On ground Landed: **CAUTION:** ***Hold Left Stick Down for 2-3 sec's until the motors slow down you will see/notice the Typhoon H settle down or hear motors slow***
STOP Motors (Press **Red** Button on top of ST16 **2-3 sec's**) ____

2) (RTH) On ***Flight mode switch*** select ***Home mode*** ☐
Typhoon H will: fly to **PRESENT** location of **controller,** Rotate facing away from location, lower landing gear, descend, land and Turn OFF motors.

Verify video recording **Stopped** ☐
Turn **OFF** Typhoon H and **REMOVE** Battery ☐

Camera Set Up

Video mode: — Chec

Press the **Video** icon - then settings icon next to "*TASK/CAMERA* "

"*Video Setting* " select desired resolution and frame rate i.e. 1920x1080F30 ☐
"*Audio Switch* " on/**off** controls the microphones (2) in camera ☐
"*Photo Format* " Greyed out N/A ☐
"*Image Format* " *Natural*, ***Gorgeous*** , *Raw, Night* are selections ☐
"*Single/Team* " Verify **Single** press to change if using more than one controller ("*Team mode*") ☐
"*Reset Camera* " put settings back to defaults ☐
"*Video Switch* " **ON** - *off* turns video feed from camera off ☐
"*Format SD Card* " press to format SD card in camera **only** ☐
"*Histogram Switch* " **OFF** - turns on histogram icon which can be moved anywhere on screen ☐
"*Metering Mode* " ***Average*** , *Center, Spot* are selections - used to adjust video exposure (i.e. balance colors) ☐

Photo mode:

Press the **Camera** icon - then settings icon next to "*TASK/CAMERA* "

"*Video Setting* " this is the resolution used for photo's - if you wish to change you will need to go to *Video mode* to change then switch back to *Photo Mode* ☐
"*Audio Switch* " Greyed out N/A ☐
"*Photo Format* " jpg, dng (raw), **dng+jpg are selections** ☐
"*Image Format* " *Natural*, ***Gorgeous*** , *Raw, Night* are selections ☐
"*Single/Team* " Verify **Single** press to change if using more than one controller ("*Team mode*") ☐
"*Reset Camera* " put settings back to defaults ☐
"*Video Switch* " **ON** - *off* turns video feed from camera off ☐
"*Format SD Card* " press to format SD card in camera **only** ☐
"*Histogram Switch* " **OFF** - turns on histogram icon which can be moved anywhere on screen ☐
"*Metering Mode* " ***Average*** , *Center, Spot* selections - used to adjust video exposure (i.e. Balance colors) ☐
"*Photo Mode* " select from **Single**, Burst, Timelapse, Panorama ☐

The Typhoon H GPS is a U-Bloc "Max M8Q" GPS chip which is a GNSS module.

So, what does this mean?

Some Back Ground:
In the precision world a lot of acronyms are thrown around on a day to day basis. Sometimes we can get confused and misuse these terms. Let's explain some acronyms and how they are used today.

GNSS:
is a term used worldwide and stands for "Global Navigation Satellite System" and refers to the collection of satellite positioning systems that are now operating. Such as the Russian [GLONASS], the European Union's [Galileo] and China's [Beidou]. They provide continuous positioning and timing information globally, under any weather conditions.

GPS:
*"Global Positioning System" was the first **GNSS** system developed by the United States and originally used for military applications. Today it's made accessible to civilians as well. Also, it is a commonly used term for describing a positioning system which can and does cause confusion.*

What's the difference between GNSS and GPS?
*GNSS and GPS work together, but the main difference between GPS and GNSS is that GNSS-compatible equipment can use navigational satellites from other networks besides the GPS system. All GNSS receivers are compatible with GPS, **BUT** GPS receivers are not necessarily compatible with GNSS.*
Both GPS and GNSS consist of three major segments: satellites, ground control stations, and the GNSS or GPS receivers. The exact location of each satellite is known at any given moment. Satellites are continuously sending radio signals toward earth, which are picked up by GNSS or GPS receivers. The ground control stations that monitor the Global Navigation Satellite System continuously track satellites and update the positions of each.

The advantage to having access to multiple satellites is accuracy, redundancy and availability at all times. Though satellite systems don't often fail, if one fails GNSS receivers can pick up signals from other systems. Also if line of sight is obstructed, having access to multiple satellites is also a benefit.

As of 2013, the United States NAVSTAR Global Positioning System (GPS) and the Russian GLONASS are the only fully operational GNSS and accordingly account for the bulk of available equipment.

What makes GLONASS different from GPS?

***GPS:** was originally operated with 24 satellites. Each GPS satellite continuously transmits a microwave radio signal composed of two carriers, three to four codes, and a navigation message. GPS applies the code division multiple access (CDMA) principle, and as such, each GPS satellite emits a different Pseudo Random Noise (PRN) code. However, to keep a military advantage, the U.S. DoD provides two levels of GPS positioning and timing services: The Precise Positioning Service (PPS) for military use **and the Standard Positioning Service (SPS) for everyone**.*

***GLONASS:** is a radio-based satellite navigation system operated by the Russian Aerospace Defense Force. It complements and provides an alternative to GPS and is currently the only other fully-operational alternative navigation system in operation with global coverage and similar precision. Each satellite transmits the same PRN code but at different frequencies.*
Global coverage for each system is generally achieved by a satellite constellation of 20–30 medium Earth orbit (MEO) satellites spread between several orbital planes. The actual systems vary but use orbital inclinations of >50° and orbital periods of roughly twelve hours (at an altitude of about 20,000 kilometers or 12,000 miles).

The key differences between each specific satellite systems:

Parameter	GPS	GLONASS	Galileo	Beidou
First launch	22-Feb-78	12-Oct-82	28-Dec-05	13-Apr-07
FOC	17-Jul-95	18-Jan-96	2012	2013
Services	military	military	commercial	authorized
	civil	civil	open	open/commercial
Number of SV	31	24	27	27
Orbital planes	6	3	3	3
Inclination	55°	64.8°	56°	55°
Semi-major Axis [Km]	26560	25508	29601	27840
Period	11h58m	11h15m	14h05m	12h50m
Coordinate frame	WGS-84	PZ-90	GTRF	CGCS2000
Time system	GPST	UTC (SU)	GST	China UTC
Coding	CDMA	FDMA	CDMA	CDMA
Frequencies [MHz]	L1:1575.42	G1:1602	E1:1575.42	B1-2:1589.74
	L2:1227.60	G2:1246	E5a:1176.45	B-1:1561.1 (E2')
	L5:1176.45	G3:TBD	E5b:1207.14	B2:1207.14 (E5b)
			E6:1278.75	B3:1268.52 (E6)

Receivers:

GNSS receivers determine their position using four factors: longitude, latitude, height and clock error, and any navigation solution provided by a receiver is based on the computation of its distance from a set of satellites.

The transmission of signals is controlled by highly accurate atomic clocks on board the satellites, and as such, receivers can calculate the time for the information from the satellite to reach the receiver. Since the exact satellite positions are known, it then becomes possible for the GNSS receiver to calculate its exact distance from the satellite.

GNSS receivers need at least four satellites to obtain a position and there must be line of sight between the receiver's antenna and the four satellites. The use of more satellites, when available will improve the position solution, but not every receiver will have the ability to make use of additional satellites.

The receiver's ability to, and the way in which it uses additional satellite signals will of course vary depending on the model of the receiver. Receivers also vary in terms of which constellation or constellations they track and how many satellites they track simultaneously. Receivers can be packaged for use in a specific application, such as aviation or agriculture, for example.
What does all this mean? GNSS is the overarching technology that is used worldwide and covers other countries' GPS system equivalents. GPS [the U.S. NavStar system], is commonly used by people today in discussions of globe positioning systems which can and does cause confusion. Today more and more GPS chipset vendors support more than just the GPS [USA] system to allow even better resolution.

In Conclusion:

***GNSS** is an umbrella term that encompasses GPS as well as other nations' satellite systems that achieve essentially the same capability*
Most common users and the general public talk about GPS as a "one-word" meaning to a system/device capable of receiving signals from a number of satellites to determine a position which can causes confusion.
As satellite systems across the globe all have different names. These different systems together are called GNSS: (Global Navigation Satellite System) but only two are "really global which is GPS and Glonass".

GPS is a United States satellite system
GLONASS is a Russian satellite system
BeiDou is a Chinese satellite system
Galileo is a European satellite system

*The Typhoon H is using the u-blox MAX-M8 chipset which is a **Standard Precision GNSS** which can support up to three concurrent GNSSs of the four systems in use.*
So which one did Yuneec use for your location???? Guess!!!

My input:

U-Blox "MAX-M8Q" is used in the Typhoon H from the ones I've seen.

The Max-M8Q has GEO-Fence capabilities when programed by the developer – (which the Typhoon H has) and many more capabilities. The developer of an application (drone system) chooses how to use or not use the chip capabilities.

The thing is how do You get 16 or more SATs – when the US has only approx. 20-30 SATs and some of those are backups (spares) and only approx. 12 or so in each hemisphere visible at one time/location and not all of them are really usable (low on horizon, etc., etc.).

> *So, because you say you have to or need to wait for 16 or more SATs is not really the way to go – to get as many SATs is great – But wait till you get "**READY**" under "**GPS**" for let's say 30 secs' (until its stable) remember motors OFF – the aircraft will use little power.*

*The thing is the more SATs you have overhead (some apps on GPS will give this info) the better. It takes only 4 **GOOD** SATs to get a fix. The other thing is your **location**! I mean what's around you (i.e. buildings, trees, mountains etc.) [You can't fly into a tunnel and say I lost GPS]. It is a RADIO/TV signal of not HIGH POWE*R so it is **BLOCKED by your body or any solid material** i.e. a billboard sign you're flying behind.

KNOW WHERE YOU ARE FLYING.

A NOTE. *I was flying awhile back and was getting COMPASS errors – it was 4 blocks from where I was flying before, no problems. I was confused, well some of the local people told me that some buildings were not fully torn down but only buried not removed* in that problem location, *which caused my magnetic (compass) errors. So I went to fly in other locations, then back to the problem area - same response – lesson learned don't go there again.*

So how did Yuneec set-up the GPS chip for your location and what did they use of its capabilities – Geofence we know they used and most likely what SAT systems are used because of US and Europe versions of software update.

ST16 Controls Calibration

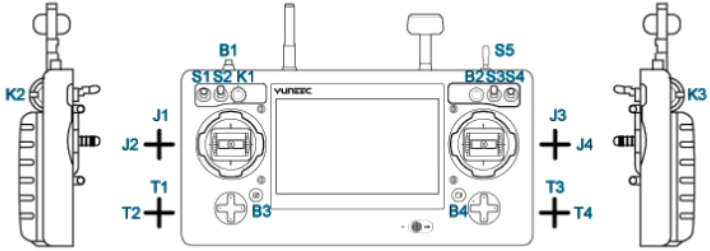


Figure A (Location and Designation)

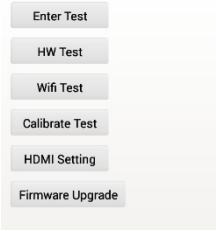


Figure B

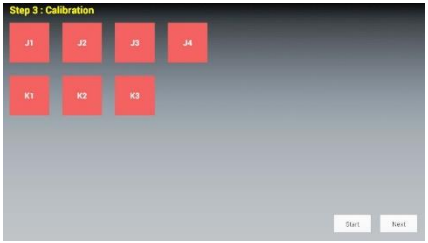


Figure C

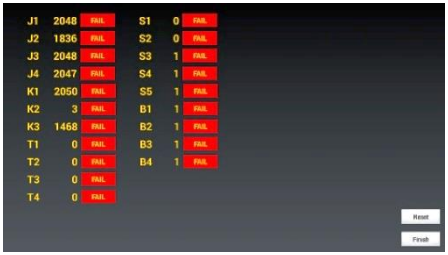


Figure D

FIRST a little background information. You will have to move the sticks all around (don't do it like a crazy animal), this is to verify proper movement of the control. So in step 3 move the stick J1, J2, J3, and J4 all around and to their full positions. T1, T2, T3, and T4 only need to be moved a few places up/down or left/right **then back to 0**.

Step 1):

Note: VERY IMPORTANT

Verify Slider K2 ("Tilt Slider") and Knob K1 ("Pan Knob") are in mid position – this can be done by going to the Hardware Monitor screen (see next pg.) and making sure they are in the middle position.

So the Camera Tilt Slider and Pan Knob Calibrate Correctly

Step 2): To ENTER the Special Tests – Tap "*System Settings*" then TAP on the "*About Controller*" rapidly several times.
Figure B screen will open - Tap "*Calibrate Test*". Figure C screen will appear. When ready tap ***START*** in lower right – then move the items in figure C all around their full range of motion, the icon will turn green when it passes. When all icons are green tap ***NEXT*** on the bottom right. Figure D will appear.

Note

The RED Fail is normal whenever you enter Figure D

Step 3): Figure D will appear and you will need to move each control through their full range of motion/positions, the Red (Fail) will go Green (Pass).

Note

Tilt Slider K2 & Pan Knob K1 move back to mid position.

Step 4): All Fail icons should now be green Pass icons.
Tap *FINISH* in lower right corner. Go back to Main ST16 Screen by taping the back [⮌] arrow several times. If you wish you can tap *Retest* and redo this test.

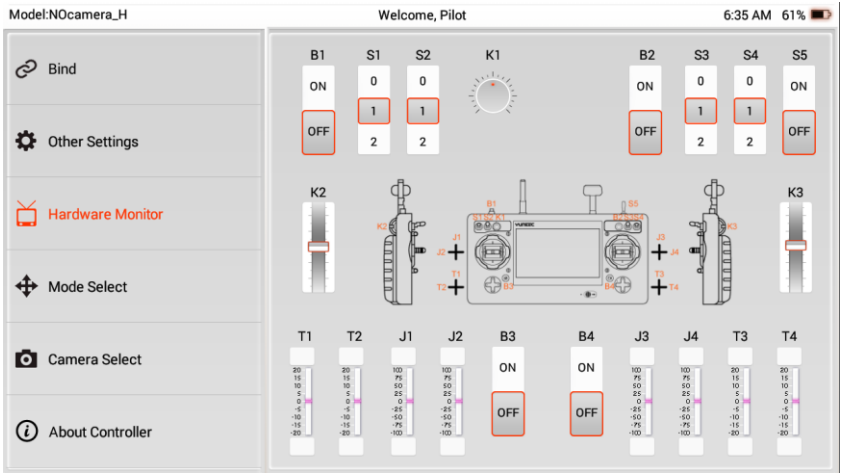
Restart the ST16 and Typhoon H to ensure the **new** Calibration is being used.

HARDWARE Monitor

DO NOT!!!

Enter this screen when you are flying or you will
Lose communication with the aircraft and it may fly away.

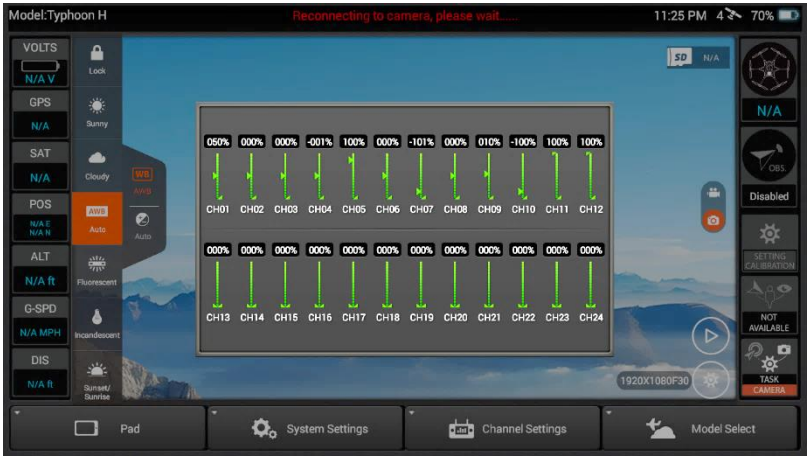
This screen will give you a visual display of the switch, slider, knob, and button position it currently is in. If you move one it will move on this display. This is good way to test if a components movement is correct and the ST16 is recognizing it has been moved or activated.



Tap “*VOLTS*” several times and the below screen appears.

- Moving a Stick, Switch, Slider, Button or Knob will cause the associated Channel (left arrow) to move.

Tap ⟶



Internal View of Landing Gear Motor

(Shown with leg in Down position)

To Test Landing Gear:

1) Remove Props and Camera.
2) Turn on ST16 – wait – then turn on Typhoon H.
3) Turn the Typhoon Upside Down – **DO NOT** hold on to Landing Gear.
4) Cycle the Landing Gear Switch on the ST16 and the Landing Gear will move as commanded (i.e. UP/Down)

   If Not - give the landing gear a slight bump/tap to get them started and cycle several times to loosen up landing gear

   May need to be performed if the aircraft has been stored for a period of time.

TYPHOON H

with Intel® RealSense™ technology

Obstacle Avoidance Limitations

GPS QUALITY: DO NOT FLY CLOSE TO BUILDINGS, OR IN GENERAL CLOSE STRUCTURE THAT MAY OBSTRUCT GPS SIGNALS. AS GOOD INDICATOR: IMAGINE TO SITTING ON THE TYPHOON H – IF LOOKING AROUND (NOT VERTICALLY UP), THE SKY SHOULD ALWAYS BE VISIBLE!

MAX.WIND LOAD 12 MPH (19 KPH)!

FLYING IN THE DARK GENERALLY NOT RECOMMENDED!

WILL NOT WORK WITH SHINY OR TRANSPARENT SURFACES (MIRRORS, GLASS)!

AVOID USING OBSTACLE AVOIDANCE BEFORE SUNRISE OR AFTER SUNSET:
-SUNLIGHT GOES DIRECTLY INTO THE LENS.
-SMALL OBJECTS MAY NOT BE DETECTED.

DECREASED PERFORMANCE WITH LARGE-AREA DARK / NON REFLECTIVE SURFACES!

DO NOT FLY TOWARDS LARGE UN-TEX-TURED SURFACES!

DO NOT PARK THE DRONE CLOSE TO OBSTACLES, CAUSE GPS MAY DRIFT SIDEWAYS!

SWITCH ON OBSTACLE AVOIDANCE IN FREE SPACE ONLY! MINIMUM DISTANCE TO ALL OBJECTS: 5 M!

AVOID FLYING TYPHOON H UNDER SOLID OBSTACLES. THERE SHOULD ALWAYS BE FREE SPACE ABOVE THE TYPHOON H!

MAX. CLIMBING FOLLOW ANGLE BY OBSTACLE AVOIDANCE TURNING ON < 15 DEGREES!

LENSES MAY COLLECT DIRT, ESPECIALLY IN COMBINATION WITH THE LENS-HOOD. REGULARLY CHECK THE LENSES AND CLEAN THEM CAREFULLY!

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TROUBLESHOOTING

ISSUE	POSSIBLE CAUSE	SOLUTION
Typhoon H will not initialize	Typhoon was moved during initialization	Turn the Typhoon H off then back on again and DO not move it during the initialization process
Flight battery will not charge	Poor connection between the Smart Charger and the flight battery	Check to ensure Battery is fully seated in the charger
Typhoon H GPS will not lock	GPS disabled in settings	Enable GPS* in Setting/Calibration Screen
	High Solar activity	Wait for disturbance to subside or disable GPS*
	Typhoon H is indoors	**Do Not Disable GPS if Flying indoors**
	Object(s) blocking clear view of the sky	Ensure GPS antenna has clear view of sky
	A transmitter nearby	Select new location to fly
	Bad Component	Connect your Typhoon H to the GUI to check the system
Typhoon H has reduced precision while flying, it Drifts	Compass out of Calibration	Perform Compass Calibration
	Compass is being exposed to unseen magnetic interference	Select new location to fly
Typhoon H Aircraft Control Lags ST16 input, Not responsive	ST 16 in Team Mode and/or 2.4Ghz signal not present.	Verify 2.4 & 5.8Ghz icon in upper right corner of ST16. Verify ST16 **NOT** in Team Mode. Re-Bind to Aircraft following Binding Procedure.

*** Do Not Disable GPS if Flying indoors, disabling GPS is NOT in General Recommended**

TROUBLESHOOTING

ISSUE	POSSIBLE CAUSE	SOLUTION
Typhoon H Motors won't Start	Flight Mode switch in Home [RTH] position	Place switch in Middle (Angle) Mode
	Typhoon H is in No-Fly Zone.	Move at least 5 miles away from No-Fly Zone. Most major airports are No-Fly Zone areas
	Failed Component	Connect Typhoon H to the GUI to check the system
Typhoon H Flashes orange twice between indications	Compass needs to be calibrated	Refer to Compass Calibration procedure
Typhoon H beeps constantly and motors won't start	5 Motor Mode. Possibly due to obstructed propeller during motor start up	Check that nothing is obstructing any propeller/motor, turn the Typhoon H off then back on again
	ST16 Controls out of Calibration	Perform ST16 Controls Calibration
	Typhoon H not Calibrated	Perform Compass and Accelerometer Calibration
Typhoon H pulses Red and won't start	Component Disconnected or failed	Connect your Typhoon H to the GUI to check the system
Vibration levels **high**, indicated by shaky landing gear when hovering	Damaged propellers/motor or lose motor	Check to ensure propellers are not bent, nicked or damaged Check motor properly secured to mount and not damaged

TROUBLESHOOTING

ISSUE	POSSIBLE CAUSE	SOLUTION
Compass Calibration Warning	Area contents something affecting the compass could be underground, or a unseen transmitter etc.	Move to a new area and see if Warning Clears
	Typhoon H not Calibrated	Perform Compass Calibration procedure
	Bad electronic component	Connect Typhoon H to the GUI to check the system Call Technical Support
Landing Gear Not going UP	Dirty/Stuck Landing Gear Motor	Invert Typhoon H and Verify Landing Gear Operation Cycle several times
Typhoon H will not go above 400ft.	Close to an Airport	Check FAA web site or their B4UFly App.
	Ceiling Set Wrong in GUI	Connect your Typhoon H to the GUI to check setting
NO Telemetry Data Displayed	Wrong Model selected or Aircraft not bound	Verify correct model selected and/or Rebind aircraft to ST16
ST16 Power on LED lit but no startup screen, Fans NOT running	ST16 Battery LOW or Bad	Charge or replace ST16 Battery

TROUBLESHOOTING

ISSUE	POSSIBLE CAUSE	SOLUTION
Camera no power or not functioning	Dirty or Damaged Contacts	Remove camera clean/inspect contacts on Camera and the Typhoon H. Verify contacts properly mate when Camera is attached. Verify NO damage to contacts and spring up/down easily
	Wrong camera Selected/Bond on ST16	Verify proper Camera selected and Bond on ST16
Gimbal/Camera Not Level	Switch/Knob/Slider out of position	Verify Switch/Knob/Sliders in proper Position Use Hardware Monitor to verify position
	Not mounted properly or Broken/loose Mount rail	Remove Camera and inspect mount rails on camera and Typhoon H
	Out of Calibration	Perform Gimbal Calibration
	Broken/Missing Rubber shock on Mount	Inspect and repair/replace Rubber mount
	A Gimbal Control out of Adjustment/Calibration	Perform ST16 Controls Calibration
Camera NOT Facing Front or NOT at 0 position	Pan Knob not at Middle Position	Placed Pan Knob at Middle position and Verify on Hardware Monitor Screen at Middle
	Out of Calibration	Perform Gimbal Calibration
	A Gimbal Control out of Adjustment/Calibration	Perform ST16 Controls Calibration
Camera SD card video jerky/not smooth	Wrong SD card	Use any U3 class microSD card (U3 speed is capable of 4K data rate) from 16GB to 128GB.

CERTIFICATION INFORMATION

FCC STATEMENT

This equipment has been tested and found to comply with the limits for Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment to an outlet on a circuit different from that to which the receiver is connected. This device

complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However,

There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. —Consult the dealer or an experienced radio/TV technician for help.

RF EXPOSURE WARNING

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

IC RADIATION EXPOSURE STATEMENT FOR CANADA

This device complies with Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with IC RSS-102 radiation exposure limit set forth for an uncontrolled environment.

Cet équipement respecte les limites d'exposition aux rayonnements IC définies pour un environnement non contrôlé

Article 12

Without permission, any company, firm or user shall not alter the frequency, increase the power, or change the characteristics and functions of the original design of the certified lower power frequency electric machinery.

Article 14

The application of low power frequency electric machineries shall not affect the navigation safety nor interfere a legal communication, if an interference is found, the service will be suspended until improvement is made and the interference no longer exists.

NCC Warning Statement

Without permission, any company, firm or user shall not alter the frequency, increase the power, or change the characteristics and functions of the original design of the certified lower power frequency electric machinery. The application of low power frequency electric machineries shall not affect the navigation safety nor interfere a legal communication, if an interference is found, the service will be suspended until improvement is made and the interference no longer exists.

CE Warning Statement:

Wi-Fi function of this device is restricted only to indoor use when operating in the 5150-5250MHz frequency range.

CAUTION: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. The module's FCC ID and IC ID are not visible when installed in the host, or If the host is marketed so that end users do not have straight forward commonly used methods for access to remove the module so that the FCC ID and IC ID of the module is visible; then an additional permanent label referring to the enclosed module: Contains Transmitter Module FCC ID: 2ACS5-SR24P; IC: 11554B-SR24P or Contains FCC ID: 2ACS5-SR24P; IC: 11554B-SR24P must be used.

COLLECTION AND PROCESSING OF DATA

Yuneec may collect navigation information such as GPS data to help improve our products.

We may also collect Depth Map information and Infrared Image information from your drone delivered to our service centre for repair and maintenance service or any other service. We may also collect other information such as device information, server log information, etc. We may also collect personal information used in registration if you choose to become a registered user and any other information user provided to Yuneec.

We may also collect information which user send to other users, and the recipients and senders of such information.

We reserve the right to disclose your information if required to do so by law or in the good-faith belief that such disclosure is needed to comply with applicable laws, for example in response to a court order, judicial subpoena, warrant or request from government, or otherwise cooperating with government agencies or law enforcement.

We also reserve the right to disclose your information that we believe in good faith is necessary or appropriate to: (i) protect ourselves or others from fraudulent, unlawful, or abusive activities; (ii) take precautions against potential liability; (iii) protect the security of the Yuneec Apps embedded into or downloaded onto your drone or any associated equipment and services; (iv) protect the legal rights of ourselves or any others.

Any information we collected maybe disclosed or transferred to an acquirer, successor or assignee as part of any potential merger, acquisition, debt financing or other activities that involves transfer of business assets.

We may make the aggregated non-personal information of the users available to third parties for various purposes, including (i) complying with various report obligations; (ii) marketing efforts; (iii) analyzing product safety; (iv) understanding and analyzing our users' interests, habits, usage pattern for certain functionalities, services, content, etc.

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Any information above may change due to software updates. For the latest documents, please check the official website.