GREMSY

PIXY F

USER MANUAL

Version 1.0 | December 1, 2018

REVISION HISTORY

REVISION	DATE	DESCRIPTION
1.0	December 1, 2018	User Manual

LEGEND

NOTE — Notes are used to highlight special operating conditions or steps of a procedure.

WARNING — Warnings are used to highlight procedures which, if not strictly observed, may result in personal injury or loss of life.

TIPS — Tips.

CONTENTS

GETTING STARTED

INTRODUCTION

PIXY F is a 3-axis gimbal in a PIXY line gimbal optimized for FLIR DUO PRO R in terms of weight, small form factor. Moreover, PIXY F features ease of use and Hyper quick release with integrated HDMI, a variety of I/O interfaces and ability to start up in 2 seconds.

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FEATURES

HYPER QUICK RELEASE WITH INTERGRATED HDMI

New mechanical and electrical integration quick release features high-speed connectors allow for HDMI transmission and other I/O interface. A variety of ports on QR allow quickly interface with multiple devices such as 3rd party flight controller, remote control, auxiliary I/O.

PLUG & PLAY

No balancing nor tuning is required. Ability to start up in 2 seconds enable the gimbal to be ready in any time critical mission.

HEATED & TEMPERATURE CONTROLLED IMU

Heated and temperature controlled IMU sensor allows reliable performance even in extreme weather. Temperature is maintained within 0.2 degrees Celsius accuracy.

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HIGH PERFORMANCE GIMBAL CONTROLLER

Advanced gimbal controller designed and made by Gremsy based on a 32 bit high performance ARM microprocessor providing fast response and accurate calculation. Sensor data and motors correction are updated as fast as 2000 times per second to enable incredibly smooth footage.

CLEAN DESIGN - INTERNAL WIRING

No exterior wires, more solid. This clean design helps the PIXY F overcome wind resistance with ease to bring out the best video quality while staying agile.

BUILT FOR AERIAL WORK

Light weight and small form factor, PIXY F could be mounted to various flying platforms and enable longer flight time.

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SPECIFICATIONS

Product Name	Pixy F
System Type	3-Axis Digital Gyro-Stabilized
Weight	0.81 lbs / 370 g
Camera	Flir Duo Pro R
Construction	All Aluminum
Input Voltage UBEC	14 – 52V
Input Voltage Gimbal	12V / 5A
Working Current	Static Current 400mA @12V
	Dynamic Current 800mA @12V
	Locked Motor Current Max 3.5A @12V
Connection	USB, CAN, UART
OS Platform Supported	Windows / Mac
Single Operator	Follow Mode / LB2
Dual Operator	SBUS / Spektrum / PPM / LB2
Pan Range	+/- 330 degree
Tilt Range	- 45 degree / +135 degree
Roll Range	- 90 degree / +45 degree

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PIXY F I/O CONNECTORS

HYPER QUICK RELEASE CONNECTORS & PINOUTS

■ **POWER**: 12V input . Connect the stable 12V output from the provided UBEC to this connector .
The UBEC allows 14V-52V input range and output 12V/5A

Connector type: SM02B-SFKH-TF

■ **COM1/CAN**: COM1 is a serial protocol (UART) port which is used to interface with computer via USB. CAN is to interface with DJI Flight controller.

Connector type: SM06B-GHS-TB(LF)(SN)

■ **COM2/COM3**: COM2/COM3 are serial protocol (UART) port, these port are internally connected to COM2/COM3 port on the gimbal controller. COM2 is to interface with Pixhawk via Mavlink protocol or other modules that use serial protocol (UART). COM3 is reserved for future use.

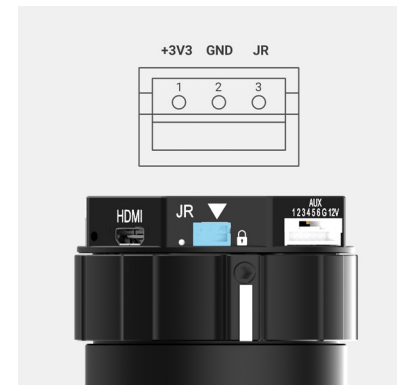**Connector type**: SM06B-GHS-TB(LF)(SN)

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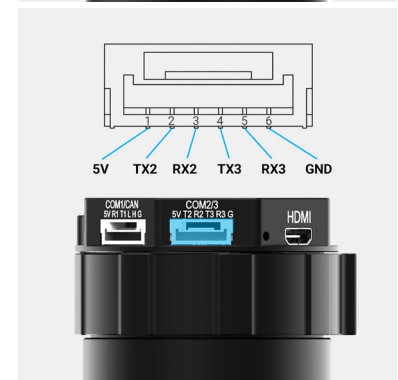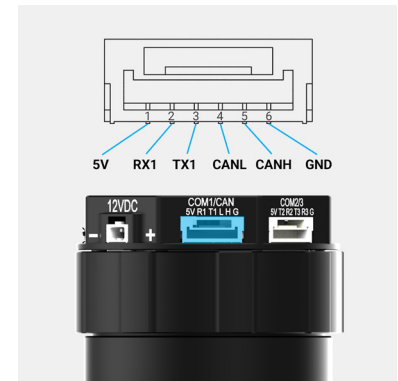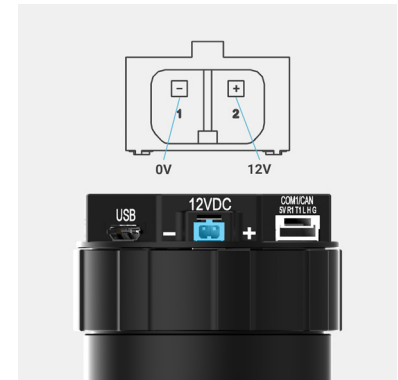
◼ **SBUS/PPM**: To interface with SBUS/PPM receiver. This port is internally connected to SBUS/PPM port on the gimbal controller.
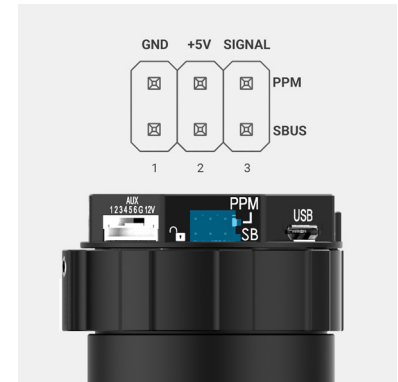
◼ **JR**: To interface with JR/SPEKTRUM satellite receiver.

Connector type: JST S3B-ZR

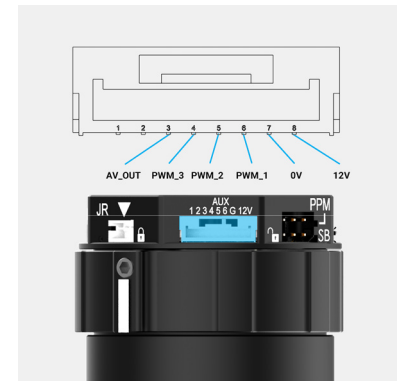◼ **AUX**: Provide 12V output (1A max) to power camera and accessories .
S1, S2, S3, S4, S5, S6 (0.25A max) together with 12V output are used for interfacing with Flir Duo Pro R camera and internally connected with 10 pin JST connector on the camera side.

⚠ **WARNING** Do not apply power to AUX port at pin 7 and 8, doing so may damage the electronics of the gimbal

Connector type: GHR-08V-S

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USB: To interface with computer or upgrade firmware.

Connector type: Micro USB type B

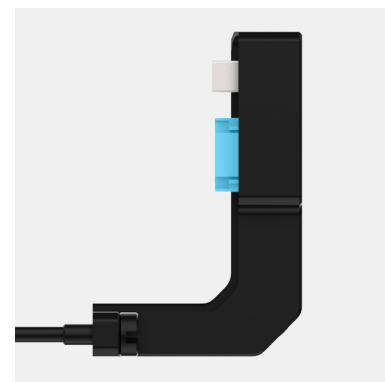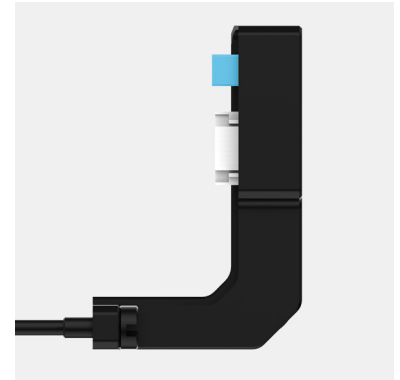**HDMI:** to output video from the camera

Connector type: HDMI micro

CAMERA INTERFACES

Accessory cable: This cable allows camera interfacing which is internally connected to AUX port on the QR.

Connector type: JST GHR-10V-S

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■ **HDMI Micro:** This cable allows HDMI video output from the camera to the HDMI Micro connector on the QR.

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WHAT'S IN THE BOX
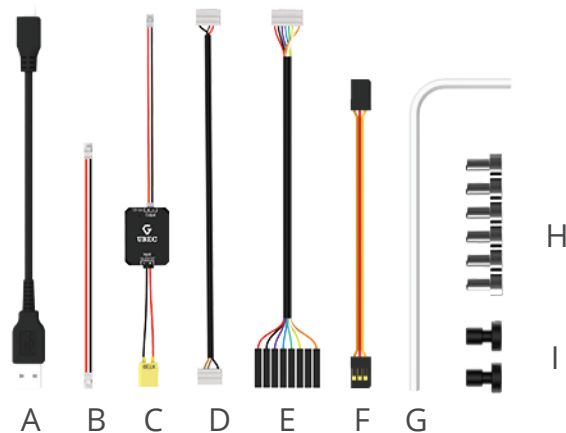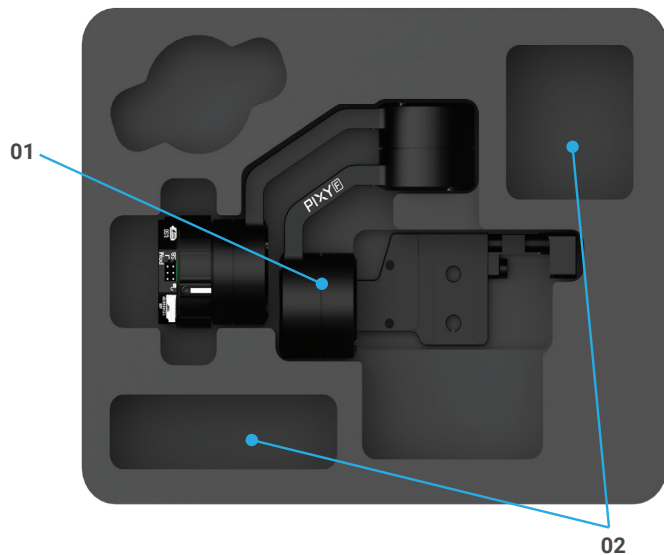
1. PIXY F GIMBAL

2. PIXY F ACCESSORIES

A. Micro USB Cable	x1	F. SBUS Cable	x1
B. 12V Power Cable (Backup)	x1	G. Allen key	x1
C. UBEC	x1	H. M2.5x5	x6
D. Cable For Pixhawk	x1	I. Camera Screws	x2
E. AUXILIARY Cable 8-pin	x1		

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HYPER QUICK RELEASE

MOUNTING HYPER QUICK RELEASE

■ Using 4xM2.5 to mount the top part onto the frame or damping isolator.

■ Pay attention to the arrow on the hyper quick release which indicates the home position or forward position of the gimbal

■ Connect the UBEC cable to the Hyper QR
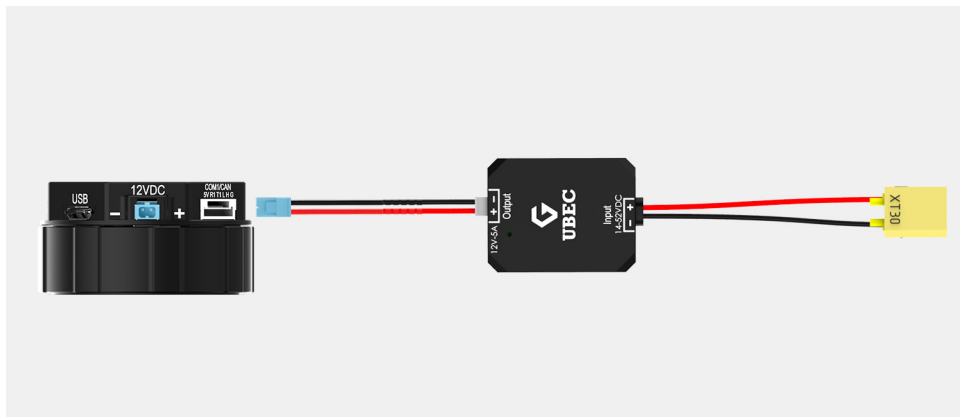
CONNECT

■ **STEP 1:** The marks on the top part and bottom part must be aligned. The mark on the ring should be aligned with the unlocked icon as shown in the first picture.

■ **STEP 2:** Keep everything aligned and attach the bottom part to the top part.

■ **STEP 3:** Rotate the ring clockwise until the mark on the ring aligned with the locked icon.

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DISCONNECT

■ **STEP 1:** Rotate the ring counterclockwise.

■ **STEP 2:** When the mark on the ring aligned with the unlock icon, the PIXY F can be detached from the top part of the Hyper Quick Release.

MOUNTING THE CAMERA FLIR DUO PRO R
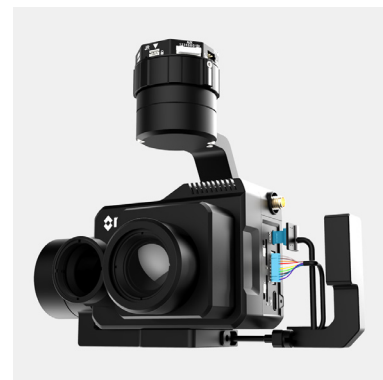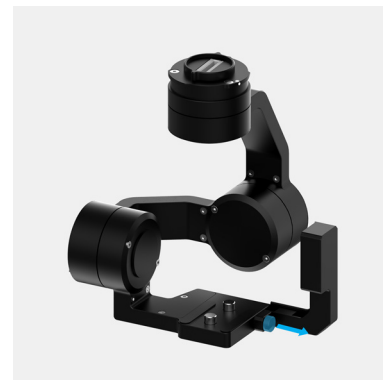
MOUNTING THE CAMERA

■ Loosen the screw on the side of tilt crossbar. Place the camera on the tilt crossbar

■ Using 2 provided camera screws to secure the camera

■ Once the camera is installed, connect the HDMI cable and Accessory cable to the HDMI connector and Accessory port on the side of the camera.

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■ Tighten the screw on the side of tilt crossbar

POWERING UP THE PIXY F

After connecting to the power supply, the gimbal will perform series of alignments, self tests, which last about 2 seconds and will determine the status of the gimbal, indicated by the Status LED color. During this time, don't touch the gimbal or camera.

> **NOTE** Always start the gimbal with a balanced camera set up otherwise after initialization the controller will return an error followed by a red color indicator.

STEP 1

Make sure the Hyper Quick Release is mounted to the drone and its power port is already connected to the power supply correctly. Next, let's mount the gimbal to the Hyper Quick Release, it will be automatically powered up.

STEP 2

Wait about 2 seconds, do not touch the gimbal or camera.

STEP 3

If the status LED is blinking green, the gimbal is ready for use. By default, the gimbal is in Follow mode if the motors are turned ON by the Function Button.

> **NOTE** If the status LED is solid red, something is wrong with the gimbal and motors can not start. Connect to the software/apps to check details of the error message.

Read "**LED STATUS INDICATOR**" in next section for more information.

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STATUS LED INDICATOR

STATE	LED STATUS		DESCRIPTION
01		Blink	Low Battery
02		Solid	System Error (Motor or IMU)
03		Blink	Calibrating
04		Solid	System Boot
05		Blink	System Ready
06		Blink	Lock Mode
07		Solid	Follow Mode
08		Blink	Remote with Lock Mode
09		Solid	Remote with Follow Mode

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OPERATION MODES

PIXY F HAS 2 OPERATION MODES

■ **LOCK MODE:** is a stabilization mode where the camera maintains orientation independently of the rest of the gimbal and the orientation can be changed by an external control signal from remote control.

■ **FOLLOW MODE:** in this mode, the camera will mimic the operator's movement and allows one person to control camera tilt and pan without using an external device like a remote control.

PIXY F SUPPORTS

■ **SINGLE OPERATOR:** using FOLLOW mode.

■ **DUAL OPERATOR:** a second operator can use a Remote Controller (SBUS, SPEKTRUM, PPM) to control gimbal's movement.

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WORKING OPERATION

PIXY F has 2 working operations: **Normal** and **Inverted.**

After powering up the gimbal , it will automatically detect if the gimbal is in inverted operation or normal operation based on pan motor position.

! **TIPS**   During working, switching to other working operation made easy by changing pan motor position, the gimbal will automatically detect new type of working operation.

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SWITHING BETWEEN MODES

■ Using mode channel on remote control

POSITIONS	MODES
Hight	Follow Mode
Motors	ON
Middle	Lock Mode
Motors	ON
Low	Motors OFF
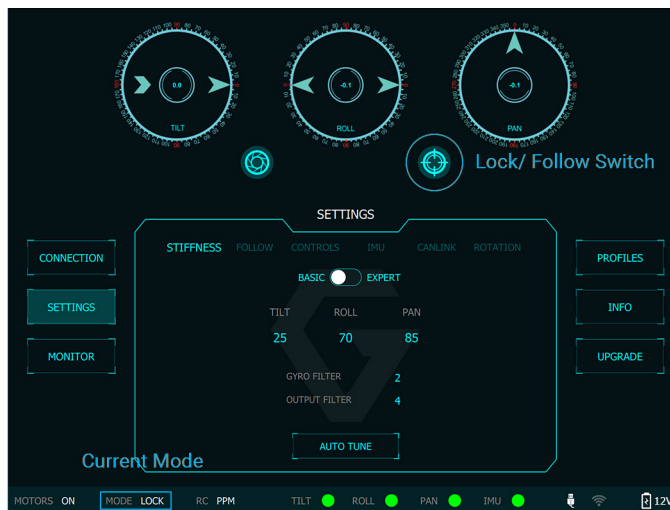
■ Using software

> If there is a remote control signal, changing modes or turning motors on/off by other methods such as using the function button or software will not take effect because the remote control signal has the highest priority and override the command.
>
> **NOTE**

INSTALLING SOFWARE

Desktop software

Download at:
www.gremsy.com -> Support -> Product Support -> Pixy F

■ USING USB CONNECTION

NOTE

Make sure the Silab USB driver is already installed. The driver can be found at:

www.gremsy.com -> Support -> Product Support -> Pixy F

STEPS TO CONNECT

1 - Power ON the PIXY F.

2 - Connect USB cable from gimbal controller to Mac/PC.

3 - Run the gTuneDesktop software.

4 - On Connection Tab, select the Serial option.

5 - Select the correct COM port in the list.

6 - Click on the "Connect" button.
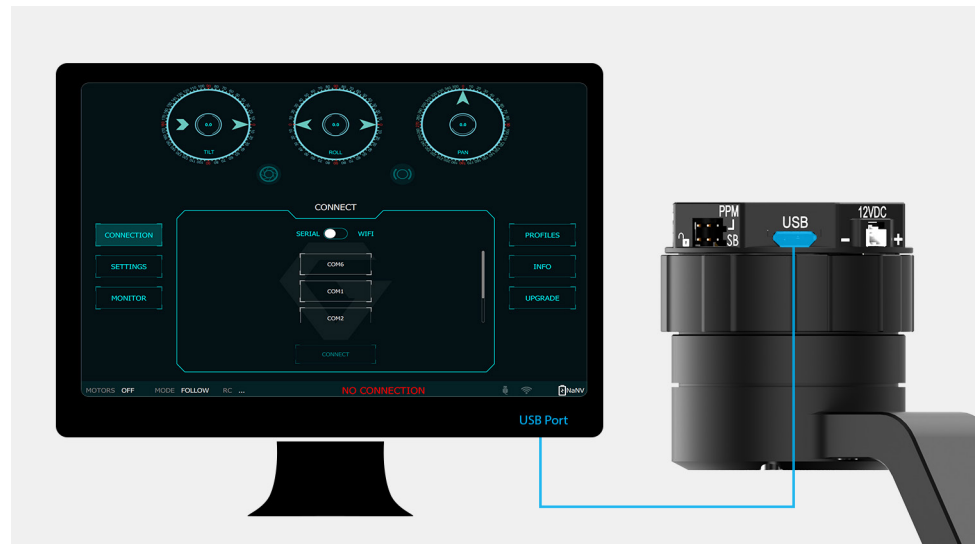
FOLLOW MODE SETTINGS

The most widely used mode of single operation is Follow mode where the gimbal operator controls to pan and tilt of the camera. The camera movement will mimic the user's input from the top-mount while the footage remains stable. The follow mode can be configured to be either very linear and robotic, or smooth and cinematic.

Follow mode settings is available for Tilt axis and Pan axis.

SPEED

Defines how fast camera will follow the movement.

SMOOTH

Smooth out the camera movement by adjusting this parameter. The higher the value is the smoother camera moves but at the expense of more delay in following the movements.

WINDOW

When the movement is out of the window zone, the camera starts to move. Within the window zone, the camera maintains its direction.

TILT LOCK

If this option is selected, the tilt axis will maintain its angle and only be controlled by remote control.

ROTATION LIMIT

Travel of Tilt and Roll axis can be limited using UP LIMIT and DOWN LIMIT. The Pan axis keeps the ability to pan 360 degrees itself.

UP LIMIT

Set the up limit for Tilt or Roll axis (in 1 degree unit). The default values are -90 for Tilt and -45 for Roll.

DOWN LIMIT

Set the down limit for Tilt or Roll axis (in 1 degree unit). The default values are 90 for Tilt and 45 for Roll.

WINDOW

Set the Roll offset (in 0.1 degree unit) is only applicable when there is no remote control signal since remote control will override the roll angle. This is useful to fine trim the horizon. The default value is 0.
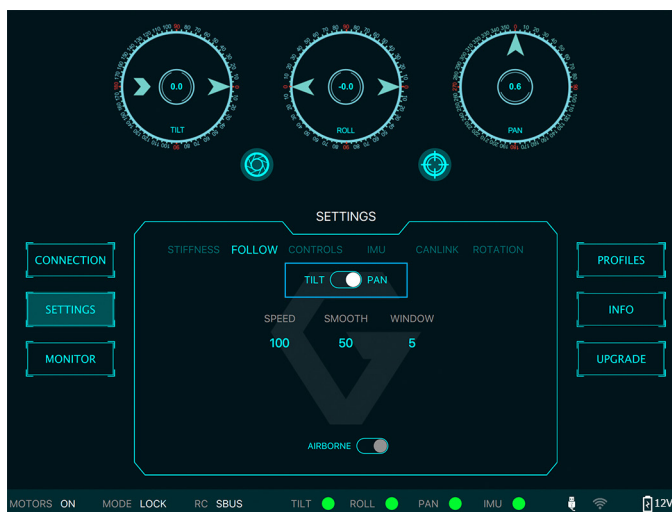
IMU SENSOR

The IMU sensor used in the PIXY F is a combination of a high precision 3 axis gyroscope sensor and a 3 axis accelerometer sensor.

IMU board is being heated where the temperature inside is controlled around 50°C with 0.2°C accuracy. Thanks to this feature, gyro calibration is no longer required in most situations.

The PIXY F controller has a special algorithm to provide attitude estimation based on input data from the IMU sensor. This attitude estimation helps the controller to command motor output to compensate for camera movement.
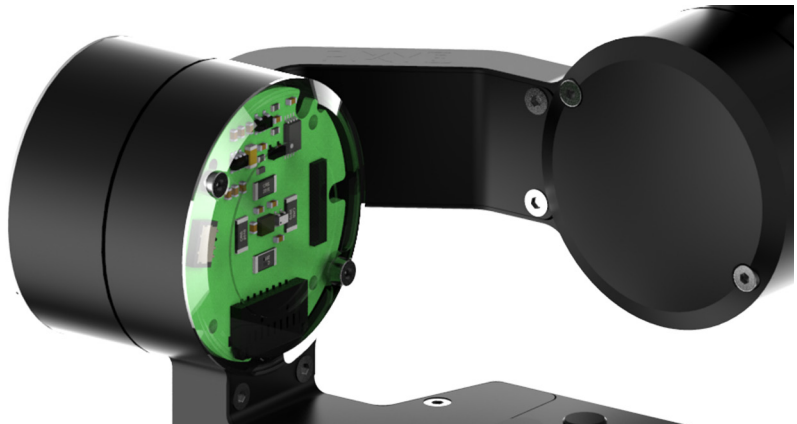
GYPRO CALIBRATION

Thanks to temperature controlled and heated IMU, gyro calibration is not necessary as the gyro was calibrated at the factory and the temperature inside IMU remains constant around 50 degrees. However, if you notice drift during operation in extreme weather (below -20C or above 50C) please re-calibrate the gyro.

- **CALIB AT STARTUP:** this feature is not available on the PIXY F

NOTE

After Gyro Calibration, Gyro Offset X, Y, Z will change to a new value depending on the temperature.

ACCELEROMETTER CALIBRATION

⚠️
WARNING

Do not use this function, please contact Gremsy Support Engineers. Accelerometer sensor was calibrated properly at the factory to achieve accurate horizon level with special and precise equipment. Users do not need to do this unless it's required for troubleshooting.

REMOTE CONTROL

PIXY F supports SBUS , SPEKTRUM and PPM receivers. There are some parameters to be aware of before assigning channels to the receiver.

■ **SMOOTH:** increasing this number will smooth out the movement of the corresponding axis but will also cause a delay.

■ **SPEED MODE:** when speed mode is selected, the speed of the corresponding axis will depend on how far the stick position is from the neutral position. It is recommended that TILT and PAN channels should be set to speed mode.

■ **ANGLE MODE:** when angle mode is selected, the corresponding axis will move to the angle set by current stick/knob position. It's recommended ROLL channel should be set to angle mode.

SBUS/PPM
SETTINGS

RECEIVER CONNECTION

SBUS/PPM port is located on the Hyper Quick Release and the gimbal controller. PPM port is located in the Roll housing.

⚠️ **WARNING** The receiver must be connected to correct wires order. The SBUS/PPM port has 5V output to power the receiver, please do not use external power supply to power the receiver at the same time. Doing so may damage the electronic inside the gimbal.

There are 6 channels to assign: MODE, TILT, ROLL, PAN, TILT SPEED, PAN SPEED

Assign MODE channel first then follow the order above because MODE channel is used to change operating modes of the gimbal and should be assigned to a 3-position switch as follows:

- **Switch at high position**: FOLLOW MODE , MOTORS ON
- **Switch at middle position**: LOCK MODE , MOTORS ON
- **Switch at low position**: MOTORS OFF

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CHANNEL SETTING

TILT and PAN channel should be in speed mode and ROLL channel in angle mode.

TILT SPEED or PAN SPEED could be assigned to the same channel and should be assigned to throttle stick, dial, or other non-centering control on the transmitter.

Below is an example of channel assignment to the Futaba T8FG.

	CHANNEL	CONTROL	NOTE
MODE	5	SC	3 positions switch
TILT	2	J2	Speed mode
ROLL	4	T4	Angle mode
PAN	1	J1	Speed mode
TILT SPEED	3	J3	
PAN SPEED	6	RD	

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JR/SPEKTRUM SETTINGS

JR/SPECKTRUM SATELLITE RECEIVER CONNECTION

Connect satellite receiver to the JR port on the hyper quick release as shown in the picture. Make sure satellite receiver is already bound to the transmitter (RED led is solid).
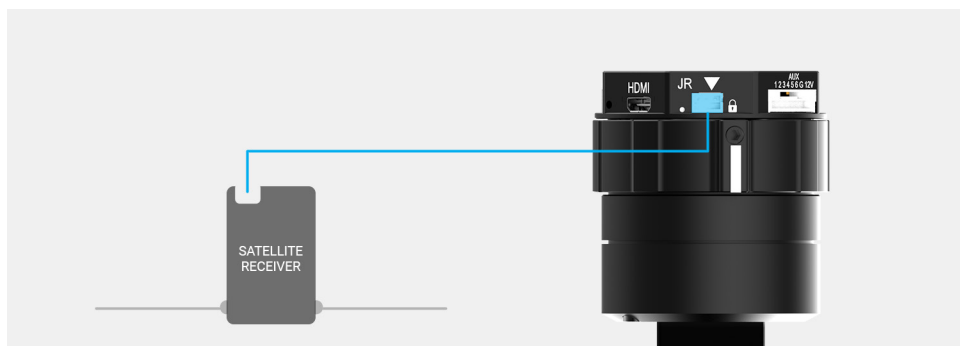
CHANNEL SETTING

Choose 10 bit or 11 bit type resolution on the software and assign proper channels as per SBUS settings.

UPGRADING FIRMWARE

Only USB connection allows upgrading firmware. Refer to Section "01. GETTING STARTED" for USB connection.

Make sure Silab USB driver is already installed. The driver can be found at:

NOTE

www.gremsy.com -> supports -> product support

HOW TO UPGRADE

01 - Power on the PIXY F.

02 - Connect USB cable from PIXY F controller to Mac/PC.

03 - Run the gTune Desktop software.

04 - In the software, select "Serial" option on "connection" tab.

05 - Select the port in the list.

06 - Click on the "Connect" button.

07 - Go to "Upgrade" tab.

08 - "Browse" to firmware file from your computer.

09 - Make sure the RF receiver (if available) is already removed.

10 - Click "Upgrade" button. The process will take about 2 minutes. When the firmware is upgraded successfully, the PIXY F will be restarted automatically.

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TROUBLESHOOTING

Only USB connection allows upgrading firmware. Refer to Section "01. GETTING STARTED" for USB connection.

NOTE Make sure Silab USB driver is already installed. The driver can be found at:
www.gremsy.com -> supports -> product support

PROBLEM	POSSIBLE CAUSES	SOLUTION
Status LED is blinking red	Low battery	Recharge battery
Status LED is solid red during startup	Camera is not balanced well or not installed	Check camera balancing
	IMU cable is loose	Check in software for IMU sensor error, re-seat IMU sensor connector
	Tilt motor cable or encoder cable is loose	Check in software for Tilt error, re-seat tilt motor connector and encoder connector
	Roll motor cable or encoder cable is loose	Check in software for Roll error, re-connect roll motor connector and encoder cable
	Pan motor cable or encoder cable is loose	Check in software for Pan error, re-connect pan motor connector and encoder cable
Status LED is solid red during operation	IMU sensor cable is loose	Re-seat IMU sensor connector
Status LED is solid white after start up	Excessive gyro drift	Re-calibrate

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