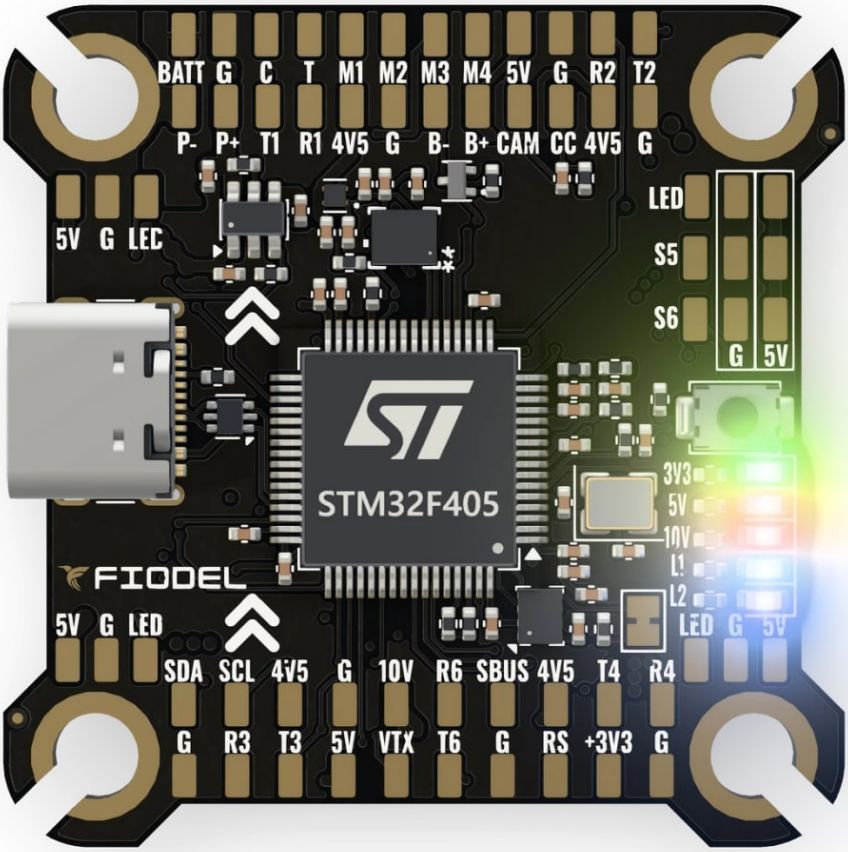
FLIGHT CONTROLLER · FD-FC-F405

Fiodel F405 Flight Controller

STM32F405 flight controller with ICM-42688-P gyro, OSD, blackbox and plug-in sockets for every peripheral.



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Before you start

6S maximum (25.2 V).

Pin 1 of the 4-pin serial sockets supplies 4.5 V, not 5.0 V. Fiodel receivers and GPS modules are designed for it; check other peripherals before plugging them in.

The HD VTX socket (J4) carries 10 V on pin 1. Use it only for a digital video transmitter — never connect it to the Fiodel 2.5W VTX or the Fiodel GPS with a straight 6-pin cable.

The Fiodel 2.5W VTX connects to the analog VTX socket (J7) and is powered from the 10 V rail, whose regulator supplies 1.5 A (15 W).

The Fiodel 4-in-1 ESC connects with its own straight 10-pin cable; Fiodel receivers plug into J8 or J5; the Fiodel GPS uses its Y-cable into J10 and J9.

Mount on M3 rubber grommets with a flange of 6 mm or less.

Wire colours on every Fiodel cable: red = power, black = ground, white = data into the flight controller, green = data out of the flight controller.

In the box

- F405 flight controller
- 2 × 100 mm 4-pin JST-SH to tinned-lead cable (for any serial socket)
- 1 × 100 mm 2-pin JST-SH to tinned-lead cable (I2C)

Overview

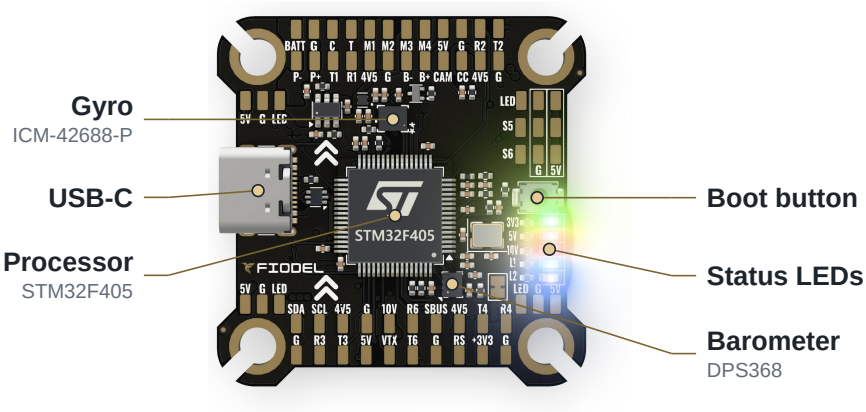
The Fiodel F405 Flight Controller is a 30.5 mm-pattern flight controller for 6S FPV and utility builds. An STM32F405 runs Betaflight; the ICM-42688-P gyro sits on its own low-noise 3.3 V regulator and takes an external clock from the MCU; a DPS368 barometer, an AT7456E analog OSD and 16 MB of blackbox flash are on board.

Two high-quality Texas Instruments buck regulators make a 10 V rail for the video transmitter — 1.5 A, 15 W — and a 5 V rail for everything else. The 10 V rail can be switched from firmware, and a second firmware-controlled switch feeds a 5 V output of up to 2 A for loads such as an action camera. Receiver and GPS sockets are powered from a 4.5 V rail fed by either the 5 V regulator or USB, so they stay alive on the bench with only a USB cable connected.

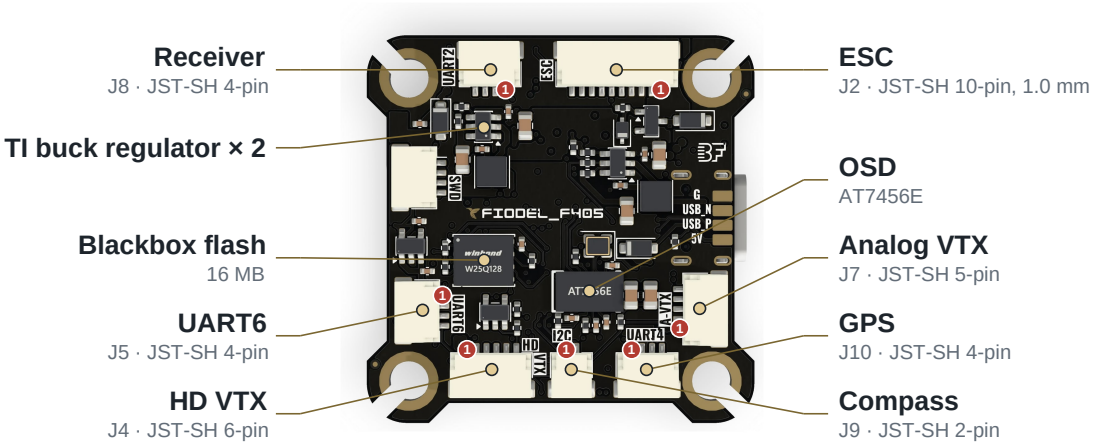
Every peripheral has a JST-SH socket in the Betaflight connector-standard pinout — ESC, receiver, GPS, compass, digital VTX and analog VTX — and every signal is repeated on a labelled solder pad. The board is eight copper layers with two solid ground planes, and the four M3 grommet mounts are plated and grounded.

Layout

TOP SIDE



BOTTOM SIDE



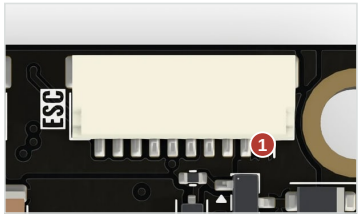
❶ Pin 1 of the socket: the pin tables count from here.

Connections

J2 — ESC JST-SH 10-pin, 1.0 mm

Betaflight 10-pin extended ESC pinout. The flight controller takes its battery supply through this socket.

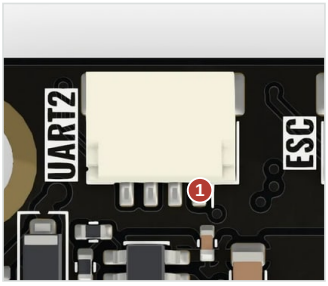
PIN	SIGNAL	DETAIL
1, 2	Battery +	
3, 4	GND	
5	Current	Analog current-sensor input
6	ESC telemetry	UART5 RX
7	Motor 1	
8	Motor 2	
9	Motor 3	
10	Motor 4	



Bottom side · red 1 = pin 1

J8 — Receiver (UART2) JST-SH 4-pin

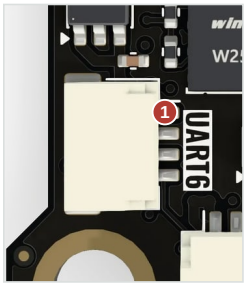
PIN	SIGNAL	DETAIL
1	+4.5 V out	
2	GND	
3	RX2	Flight controller RX <- device TX (PA3)
4	TX2	Flight controller TX -> device RX (PA2)



Bottom side · red 1 = pin 1

J5 — Second serial socket (UART6) JST-SH 4-pin

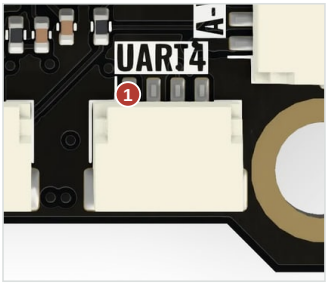
PIN	SIGNAL	DETAIL
1	+4.5 V out	
2	GND	
3	RX6	Flight controller RX <- device TX (PC7)
4	TX6	Flight controller TX -> device RX (PC6)



Bottom side · red 1 = pin 1

J10 — GPS (UART4) JST-SH 4-pin

PIN	SIGNAL	DETAIL
1	+4.5 V out	
2	GND	
3	RX4	Flight controller RX <- device TX (PA1)
4	TX4	Flight controller TX -> device RX (PA0)

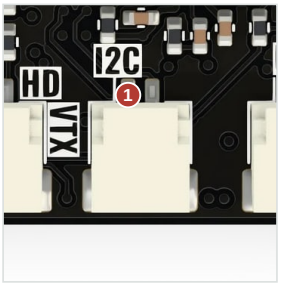


Bottom side · red 1 = pin 1

J9 — Compass (I2C) JST-SH 2-pin

Data only — the compass takes power from the GPS socket.

PIN	SIGNAL	DETAIL
1	SDA	
2	SCL	

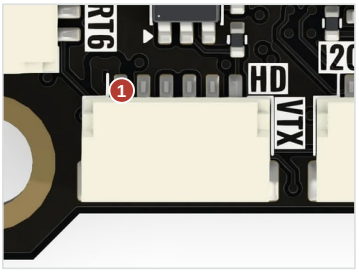


Bottom side · red 1 = pin 1

J4 — HD (digital) VTX JST-SH 6-pin

Connect a digital video transmitter here. Pin 1 carries 10 V.

PIN	SIGNAL	DETAIL
1	+10 V out	
2	GND	
3	TX3	Flight controller TX -> video transmitter RX
4	RX3	Flight controller RX <- video transmitter TX
5	GND	
6	SBUS in	Inverted on board into UART1 RX

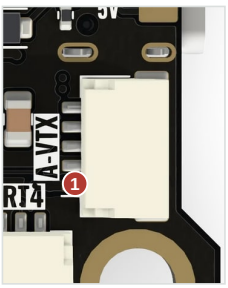


Bottom side · red 1 = pin 1

J7 — Analog VTX JST-SH 5-pin

For transmitters drawing up to about 10 W from the 10 V rail (1 A per contact).

PIN	SIGNAL	DETAIL
1	+10 V out	
2	GND	
3	Video out	From the OSD
4	RX3	
5	TX3	SmartAudio / VTX control



Bottom side · red 1 = pin 1

Pads — Solder pads Labelled pads, top side

Every socket signal is repeated on a pad.

PIN	SIGNAL	DETAIL
BATT · G · C · T · M1–M4	ESC	Battery, ground, current, telemetry, motors 1–4
4V5 · G · R2 · T2	UART2	Receiver
4V5 · G · R6 · T6	UART6	
4V5 · G · R4 · T4 · SDA · SCL	UART4 + I2C	GPS and compass
R1 · T1	UART1	
10V · G · VTX · T3 · R3 · SBUS	Video transmitter	10 V, video out, UART3, SBUS in
5V · G · CAM · CC	Camera	Video in and camera control
5V · G · LED (×4)	LED strip	
5V · G · S5 / S6	Extra outputs	
B+ · B-	Buzzer	
P+ · P-	Switched 5 V output	
RS	RSSI	Analog, 3.3 V maximum

What plugs in where

ESC J2

The Fiodel 4-in-1 ESC comes with a straight 10-pin cable that plugs in here. The flight controller takes its battery supply through this socket too. (Fiodel 4-in-1 ESC)

Receiver J8

Fiodel receivers plug in here, or into the UART6 socket. The ELRS 2.4GHz Receiver comes with the cable, TX and RX already crossed. For another receiver, use one of the two 4-pin tinned-lead cables in the box. (Fiodel ELRS 2.4GHz Receiver, Fiodel Gemini Dual-Band ELRS Receiver)

GPS J10

The Fiodel M10 GPS + Compass comes with a Y-cable: its 4-pin end goes here, its 2-pin end into the compass socket next to it. (Fiodel M10 GPS + Compass)

Compass J9

I2C data for a compass; it takes its power from the GPS socket. The 2-pin tinned-lead cable in the box fits here.

Analog VTX J7

The socket for an analog video transmitter: 10 V, ground, video out and UART3 for SmartAudio. The Fiodel 2.5W VTX connects here and takes its power from the 10 V rail. A transmitter with bare leads solders to the 10V, G, VTX and T3 pads, which carry the same signals. (Fiodel 2.5W VTX)

Digital VTX J4

Connect a digital video transmitter here. Pin 1 carries 10 V: never connect the Fiodel 2.5W VTX or the Fiodel GPS here with a straight 6-pin cable.

Second serial device J5

UART6, on the same 4-pin socket as the receiver's. Pin 1 supplies 4.5 V.

Specifications

PROCESSOR AND SENSORS	
MCU	STMicro STM32F405RGT6, 168 MHz, 1 MB flash
Gyro / accelerometer	TDK ICM-42688-P on SPI, dedicated TPS7A2033 low-noise regulator, external clock from the MCU
Barometer	Infineon DPS368 on I2C (address 0x76, or 0x77 by solder jumper)
OSD	AT7456E analog on-screen display
Blackbox	Winbond W25Q128, 128 Mbit (16 MB) SPI flash
USB	USB-C, with ESD protection
Firmware	Betaflight

POWER	
Battery input	Up to 6S Li-Po (25.2 V), through the ESC socket or the battery pad
Protection	Reverse-polarity P-FET and TVS diode on the battery input
10 V rail	Texas Instruments buck regulator, 1.5 A (15 W), switchable from firmware (video transmitter supply)
5 V rail	Texas Instruments buck regulator
4.5 V rail	Diode-OR of the 5 V rail and USB — feeds the receiver and GPS sockets, so they run from USB alone
Switched 5 V output	TPS22917 2 A load switch on the P+ / P- pads, controlled from firmware (PINIO)

Battery voltage sense	11:1 divider
Current sense input	Analog input from the ESC (the Fiodel 4-in-1 ESC outputs 10 mV/A)

INPUTS AND OUTPUTS

Motor outputs	4 (M1–M4), on the ESC socket and on pads
Extra outputs	2 (S5, S6) on pads with 5 V and ground
UARTs	UART1, 2, 3, 4 and 6, plus a UART5 receive line for ESC telemetry
SBUS	Hardware inverter into UART1 RX, from the HD VTX socket or the SBUS pad
I2C	One bus: barometer, compass socket and SDA / SCL pads
LED strip	Four sets of 5 V / GND / LED pads on one signal
Buzzer	B+ / B- pads with on-board driver
Camera	Video-in pad to the OSD, camera-control pad
RSSI	Analog input pad (3.3 V maximum)
Status LEDs	3.3 V, 5 V and 10 V rail indicators and two firmware status LEDs

BOARD

Size	39 × 39 mm, 4 mm corner radius
Mounting	30.5 × 30.5 mm, four Ø4.0 mm plated and grounded holes for M3 rubber grommets
Construction	8-layer, 1.6 mm, 1 oz copper on every layer, ENIG finish, black solder mask
Layout	Top: MCU, gyro, barometer, flash, USB-C and solder pads. Bottom: regulators, OSD and all sockets

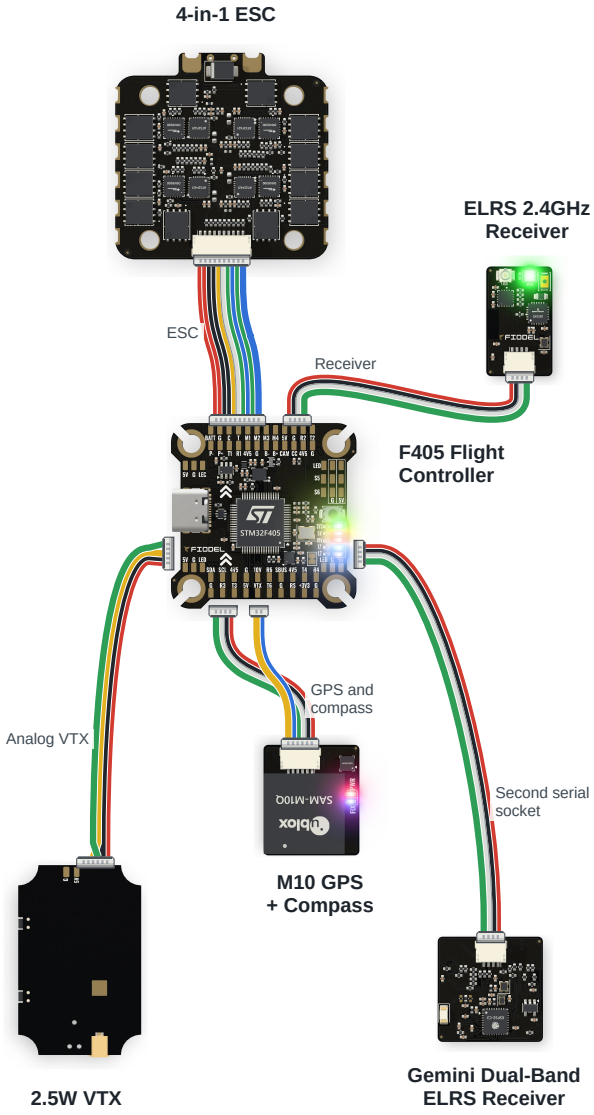
Firmware

Runs	Betaflight
Updating	It is updated over USB-C with Betaflight Configurator; the boot button puts the board in DFU mode.

The board ships with its firmware flashed. The firmware file will be on fiodel.com/products/f405-flight-controller before the first boards ship.

How the range connects

Every Fiodel board plugs into the flight controller with its own cable, every wire on the pin it really joins. The flight controller is drawn from above, its sockets underneath along the edges its cables leave by; every board is at its true size.



ESC	10-pin cable, in the ESC's box
Receiver	4-pin cable, in the receiver's box
Second serial socket	Same plug as the receiver socket
GPS and compass	Y-cable, in the GPS's box: its 4-pin end to GPS, its 2-pin end to Compass
Analog VTX	10 V, ground, video and SmartAudio

Wire colours: red is power, black is ground, white is data into the flight controller, green is data out of it. Yellow and blue are a cable's other lines.

Setup guides

Step by step, on our site:

Wiring the F405 Flight Controller
fiodel.com/guides/wiring-the-f405-flight-controller

First Setup in Betaflight
fiodel.com/guides/first-setup-in-betaflight

Questions

Which firmware does it run?
It ships with Betaflight flashed. Firmware is updated over USB-C; the boot button puts the board in DFU mode.

Can I connect a digital video transmitter?
Yes. The HD socket supplies 10 V and UART3, and its SBUS pin is inverted on the board into UART1 for digital video transmitters that output SBUS.

Do I need the Fiodel ESC?
No. The ESC socket follows the Betaflight 10-pin pinout and the same signals are on solder pads, so any 4-in-1 ESC can be wired.

Warranty and support

- 6-month warranty against manufacturing defects, serviced at our workshop in Gurugram. Terms: fiodel.com/warranty
- Returns within 7 days for wrong, damaged or dead-on-arrival items: fiodel.com/returns
- Questions: WhatsApp or call +91-9891446688, or write to contact@fiodel.com. 9am–6pm, Monday to Saturday.

This manual is made from the product's page: fiodel.com/products/f405-flight-controller always has the latest.