ROTORAMA

FTS

Flight Termination System

User Manual

Hardware version: RR-FTS V2.1 · July 2026

Rotorama s.r.o. · www.rotorama.cz · info@rotorama.cz

1. What is the FTS

The FTS (Flight Termination System) is an independent safety switch that disconnects the main battery from the drone's systems. It serves as a flight termination system — a last resort for situations where the flight must be ended immediately (e.g. loss of control of the drone, leaving the permitted area, or a requirement of an operational authorisation in the specific category of drone operations).

The board is wired into the negative (minus) lead between the battery and the drone's electronics. During normal flight the switch is closed and the drone is powered normally. As soon as a termination command arrives, the switch opens and the whole drone loses power — the motors stop immediately.

The FTS works completely independently of the flight controller. It has its own microprocessor and its own receiver input, so it keeps working even if the flight controller freezes or fails.

Main features

- Continuous current **50 A,** peak up to **200 A**[*], power supply **4S–6S LiPo**.
- Integrated 5V/1A power supply for the receiver.
- Automatic receiver protocol detection — **CRSF / S.BUS**.
- Anti-Spark: gradual pre-charge of the drone's capacitors through a resistor — no spark or current spike when connecting the battery.
- Standard 30.5 × 30.5 mm mounting (M4/M3 softmount) — the board fits a common FPV stack.

2. Technical specifications

Parameter	Value
Supply voltage (VIN)	4S–6S LiPo (14–25.2 V)
Switched current	50 A continuous, up to 200 A peak*
On-state resistance	1.3 mΩ
Input signal	CRSF or S.BUS (non-inverted)
Control channel	channel 9 (CH9), 1500 µs threshold — see ch. 6
Receiver output	5V/1A (switching regulator)
Board dimensions	36 × 36 mm
Mounting pattern	30.5 × 30.5 mm, M4 holes

* with steady cooling airflow (in flight)

3. Solder pads

The power pads are large tinned areas; the signal pads form a row of smaller pads. The labels are printed directly on the board and shown in the following figure:

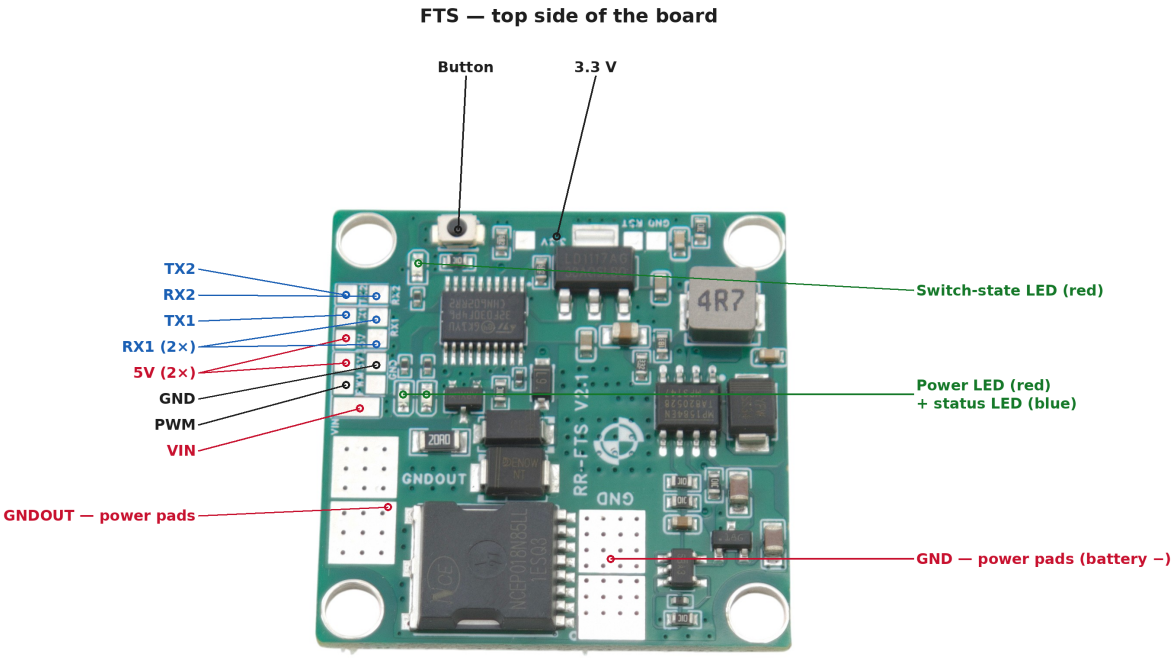

Fig. 1 — Pads and LEDs, top side of the board

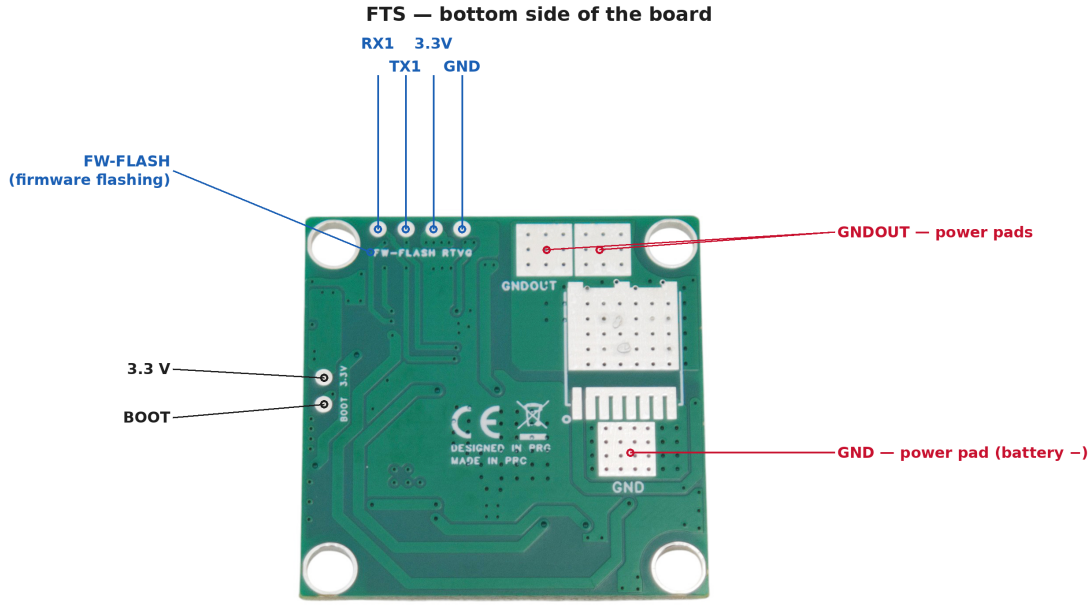

Fig. 2 — Pads, bottom side of the board

Power pads

Pad	Function
GND	Input — negative (−) battery terminal.
GNDOUT	Output — switched negative terminal for the drone's power distribution (PDB / ESC). Connected to GND in flight, disconnected on termination.
VIN	Powers the board's electronics — a thin wire from the positive (+) battery terminal.

Signal pads

Pad	Function
5V	5 V output for powering the receiver.
RX1	Receiver connection (CRSF/S.BUS)
TX1	Receiver connection (CRSF)
RX2 / TX2	Reserved — do not connect.
PWM	Reserved — do not connect.
BOOT	Service pad for firmware flashing (ch. 8).
FW-FLASH (R T V G)	Service connector for firmware flashing on the bottom side of the board: R = RX, T = TX, V = 3.3 V, G = GND (ch. 8).

4. Wiring

4.1 Power wiring

The FTS switches the negative power lead. The positive battery wire goes directly to the drone; the negative wire is interrupted and routed through the FTS board:

1. **Battery (+)** → directly to the drone's power distribution (PDB / 4-in-1 ESC). From this wire, also branch a thinner wire to the **VIN** pad — it powers the FTS electronics.
2. **Battery (−)** → the **GND** pad on the FTS.
3. The **GNDOUT** pad on the FTS → negative input of the drone's power distribution (PDB / 4-in-1 ESC).

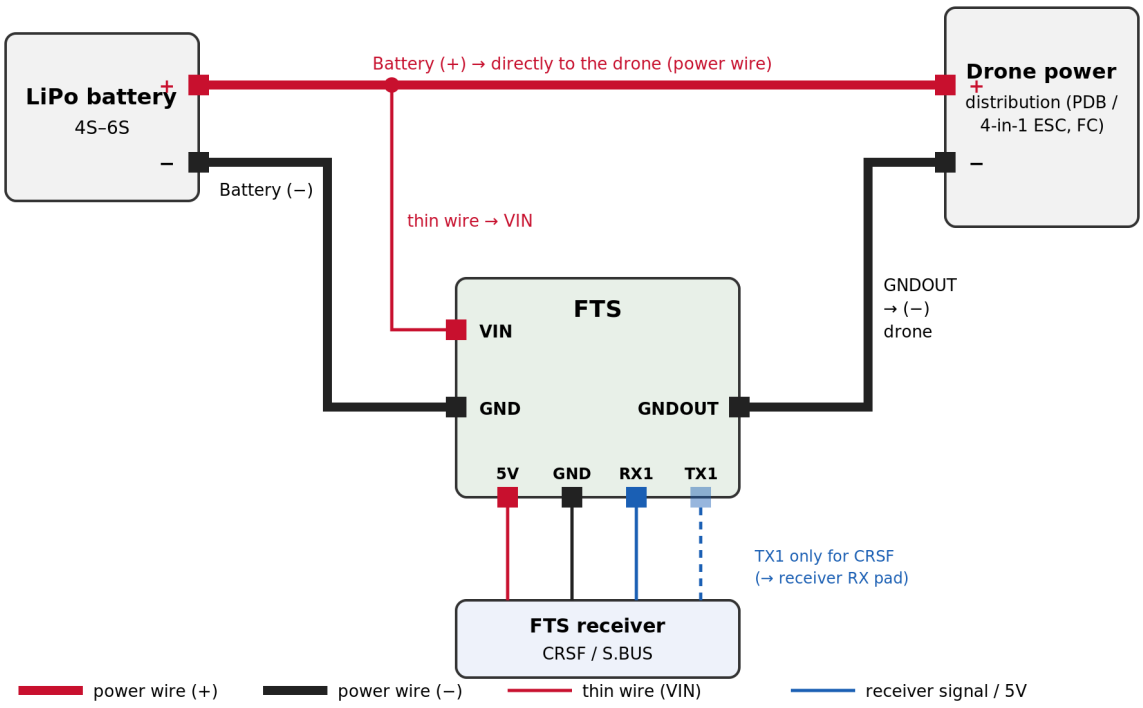

Fig. 3 — Correct FTS wiring

For the power connections (GND, GNDOUT) use wires of the same gauge as the drone's main power leads — at least 12/14 AWG; for setups with continuous draw close to 100 A we recommend 10 AWG. Solder on both sides of the board (the power pads are doubled) and heat the joints thoroughly.

CAUTION — polarity and short circuits

Swapping GND and GNDOUT, or connecting the battery with reversed polarity, can permanently damage both the board and the drone.

Never connect the battery's negative terminal to the drone's frame/distribution by any other path (outside the FTS) — the board could then no longer cut the power. Also beware of unintended connections through cable shielding, the camera, etc.

4.2 Receiver connection

The FTS requires its own dedicated receiver, powered exclusively from the FTS 5V output and not connected to any other electronics of the drone (see the warning below). Two protocols are supported and the board detects the protocol automatically. No external S.BUS inverter is needed — the board handles signal inversion internally. With a CRSF receiver, also connect the TX1 pad (to the receiver's RX pad); with an S.BUS receiver the TX1 pad remains unconnected.

NEVER CONNECT THE FTS TO THE FLIGHT CONTROLLER

The only permitted connection between the FTS and the flight controller (the drone's power distribution) is via the power leads: battery (+) and GNDOUT.

Any other connection — signal, ground or power — is prohibited, because the FTS requires separated grounds. The receiver connected to the FTS must therefore not be connected by any wire to the flight controller or any other electronics of the drone.

Such a connection bridges the switched circuit, effectively disabling the FTS, and will permanently damage it.

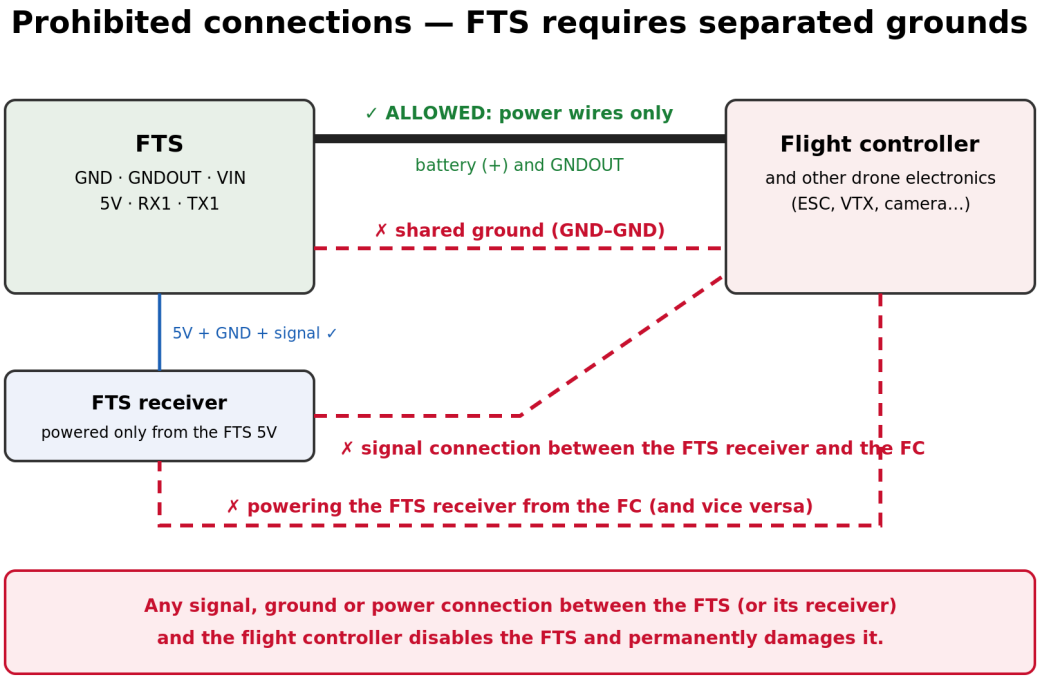

Fig. 4 — Prohibited connections between the FTS and the flight controller

4.3 Transmitter setup

1. On your transmitter, map **channel 9 (CH9)** to a two-position switch.
2. Position **off = low value** (approx. 1000 µs / −100 %): normal flight, drone powered.
3. Position **on = high value** (approx. 2000 µs / +100 %): TERMINATION — drone power is cut.
4. In the receiver failsafe settings, define the channel 9 behaviour on signal loss according to your operational procedure (see ch. 6.3).

5. First power-up and testing

ALWAYS WITHOUT PROPELLERS

Perform all initial checks, termination tests and receiver binding strictly without propellers installed.

1. Check the wiring according to chapter 4 (polarity, GND vs. GNDOUT, receiver).
2. Watch the status LED: **blinking** = searching for receiver signal, **solid** = link established.
3. Termination test: flip the CH9 switch — the whole drone must shut down immediately.
4. Flip the switch back to the OFF position — the drone powers up again.
5. Also test the behaviour with the transmitter switched off (signal-loss simulation) and verify it matches your failsafe settings (ch. 6.3).6. Function description

6.1 Automatic protocol detection

After power-up the FTS detects the incoming control signal (CRSF/S.BUS). If the board has no valid input signal, the blue status LED blinks. Once a valid signal is detected, the status LED turns solid.

6.2 Termination and power restoration

- Channel 9 value **above 1500 µs** → the switch opens, the drone is unpowered (termination).
- Channel 9 value **below 1500 µs** → the switch is closed, the drone is powered.
- Termination is not blocked by anything else — it works whenever the FTS has a valid signal from the receiver.

6.3 Signal-loss behaviour

If the FTS loses the valid receiver signal, it holds the output in its last state — signal loss alone therefore does not trigger termination. The behaviour on signal loss is determined by your receiver's failsafe settings:

- **Failsafe "hold" / "no pulses"**: the FTS holds the last state — the drone stays powered and recovery is up to the flight controller (e.g. RTH). Termination on signal loss is then not possible.
- **Failsafe with a high CH9 value set**: on signal loss the receiver itself sends the termination command — the drone is disconnected after losing the link. Choose this setting if your operational procedure / authorisation requires it.

Always verify the chosen behaviour with a ground test (by switching the transmitter off).

6.4 Button

The button on the board is for convenient bench testing: when the FTS has no receiver signal, each press toggles the output state. As soon as a valid receiver signal is present, the button is ignored and only the transmitter command applies.

6.5 Status LEDs

There are three indicator LEDs on the board. The first, red LED is lit the whole time the FTS is powered (voltage regulator check). The other two LEDs indicate states:

LED and button locations

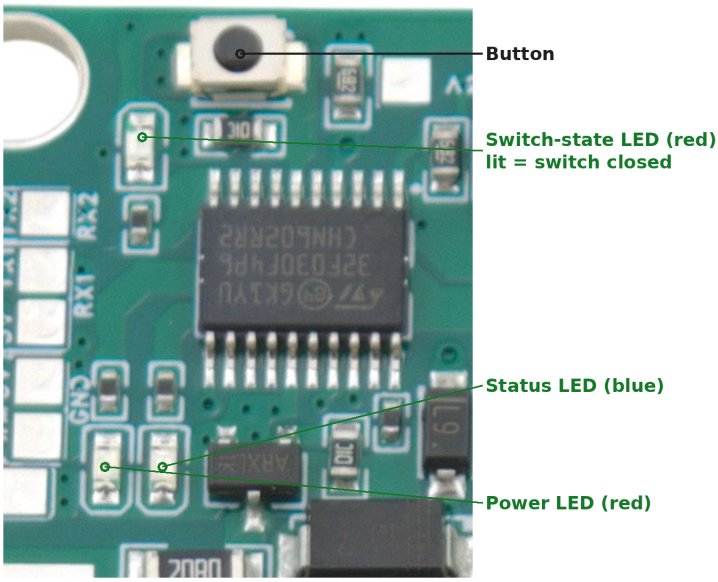

Fig. 5 — LED and button locations

Blue status LED	Meaning
Blinking fast	The FTS is searching for the receiver signal (no valid signal on RX1).
Solid	Protocol detected, receiver link is OK.
Off	The board is not powered — check VIN and GND.
Red status LED	**Meaning**
Solid	The switch is closed (on)
Off	The switch is open (off).

7. Safety warnings

- **Termination means the drone falls.** After the power is cut, the drone falls uncontrolled. Use the command only in situations the system is intended for and in accordance with your operational authorisation.
- Perform all tests **without propellers**.
- Do not exceed 6S (25.2 V) or the maximum peak current of 200 A. The supply voltage must also not drop below 13 V.
- The board is not protected against reverse polarity — check the polarity thoroughly before connecting the battery for the first time.
- Make sure there is no conductive path between the battery's negative lead and the drone other than through the FTS (shielding, carbon frame, camera…) — otherwise termination may not disconnect the drone and the board may get damaged.

8. Changing the control channel (firmware flashing)

The board ships with firmware set to channel 9 (CH9). Firmware versions for other channels and other control-signal levels are available for download on the product page at www.rotorama.com — the channel is changed by flashing the corresponding firmware. The procedure is intended for more experienced users; if unsure, contact us at info@rotorama.com.

What you will need

- A USB-UART adapter with **3.3 V** logic (FTDI, CP2102, CH340 — set to 3.3 V, never 5 V).
- STM32CubeProgrammer (free from ST), or stm32flash.
- The firmware file for the required channel and switching level (rotorama.cz).

Procedure

1. Disconnect the battery and the receiver from the board.
2. Connect the adapter to the service pads **FW-FLASH (R T V G)** on the bottom side of the board: adapter TX → **R**, adapter RX → **T**, adapter 3.3 V → **V**, adapter GND → **G**. Alternatively you can use the receiver pads on the top side of the board. CAUTION! Any other devices must be disconnected during firmware flashing (e.g. the receiver).
3. Activate bootloader mode: bridge the **BOOT** pad with the adjacent **3.3V** pad and power the board on. The processor starts in bootloader mode.
4. In STM32CubeProgrammer select the UART connection, baud rate 115200, connect, and upload the firmware file.
5. Un-bridge BOOT and power-cycle the board. The board boots with the new firmware.
6. Perform the complete test according to chapter 5, including a termination test on the new channel.

9. Troubleshooting

Symptom	Possible cause and solution
Blue LED keeps blinking	The FTS does not see the receiver signal. Check the receiver TX → RX1 connection, the receiver power (5V, GND), and that the receiver is bound to the transmitter.
Drone does not power up after connecting the battery	Check VIN (the thin wire from battery +), the GND and GNDOUT joints, and the CH9 switch position (must be low). The state can be verified with the button, without a receiver.
Termination does not respond to the switch	Verify in the transmitter settings that the switch really controls channel 9 and reaches values above 1500 µs (in the transmitter's channel monitor). The blue LED must be solid.
Drone shuts down by itself	Check the receiver failsafe (ch. 6.3) — on signal loss the receiver may be sending a high CH9 value. Also check the quality of the VIN/GND joints.
Button does not respond	The button works only without a valid RC signal — disconnect the receiver or switch the transmitter off.

10. Support

For questions, firmware requests for a different channel, or warranty claims, contact:

Rotorama s.r.o.

Web: **www.rotorama.com**

E-mail: **info@rotorama.com**

Product information

Designed in the Czech Republic · Made in China.

Placed on the EU market by: **Rotorama s.r.o., Czech Republic** — contact details above.

Warranty and claims

Rights arising from defective performance are governed by the applicable laws of the Czech Republic and the EU (24 months for consumers) and by the terms and conditions available at www.rotorama.cz. The warranty does not cover damage caused by incorrect wiring contrary to this manual (in particular reverse polarity, exceeding the specified limits, or the prohibited connection to the flight controller per ch. 4.2), mechanical damage, or normal wear.

Operating notice

The product is an electronic component intended for installation in an unmanned aircraft. The operator is responsible for meeting the legal requirements for drone operation (operator registration, operating rules under Regulation (EU) 2019/947, and any operational authorisation). The product is not a toy; not intended for children under 14 years.