

Fiber module digital 80km

User manual



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1. Product overview



Fig.1. Transceiver for optic fiber module digital (80km)



Fig.2. Receiver for fiber module digital (80km)

The Pilotix Fiber Module Digital 80km is a professional-grade fiber-optic video transmission solution for UAV / drone applications. The kit consists of two units:

- Transceiver (TX) — mounted on the drone (sky side). Captures video from the 4K camera, encodes it and transmits it over a single optical fiber, while simultaneously passing flight-control (CRSF/SBUS) and OSD data.
- Receiver (RX) — operated at the ground station. Receives the fiber signal, decodes it and outputs HD video via HDMI to a monitor or FPV goggles, and forwards control signals to a remote controller or flight controller.

Together they replace three separate transmission systems (video, control, and data) with a single fiber cable, eliminating electromagnetic interference (EMI) entirely and supporting transmission distances up to 80 km.

2. Transceiver — TX Unit (Sky Side)

The TX unit is a compact, lightweight module designed for installation on multirotor drones, fixed-wing aircraft, or other UAV platforms. It integrates a high-resolution 4K camera and handles all encoding, compression, and fiber transmission.

Port Description

- SH1.0 6P (Camera) — connects to the integrated 4K camera via the supplied cable
- FC Interface — CRSF protocol data link to the flight controller (bidirectional)
- Power In — DC 7.4–50 V; compatible with drone battery rails or XT60 source
- Fiber LC/SC Port — single-mode fiber output; connect to the matching port on the RX unit
- Expansion Port — reserved for future accessories: infrared camera, wireless image module (under development)

Mounting

- Standard 30.5 mm pitch (M3 tapped holes × 4) — compatible with most FC stacks and drone frames
- Camera mount: 19 mm universal mount, M2 fixing holes
- Recommended installation: secure the TX unit on the drone with all four M3 screws; route the camera cable clear of propeller wash
- Ensure adequate airflow around the unit for heat dissipation (power consumption: 3.2 W)

3. Receiver — RX Unit (Ground Side)

The RX unit is the ground-station decoder. It receives the encoded video and control data from the optical fiber, decodes the video stream, and outputs it via HDMI to a monitor or FPV goggles. A built-in TF card slot allows direct recording of the received video. The unit is powered by two hot-swappable NP-F batteries providing up to 20 hours of continuous operation, or by an external XT60 supply.

Port Description

- Fiber LC/SC Port — connects to the TX unit via single-mode fiber cable
- HDMI Output — full-resolution video output to monitor, FPV goggles, or capture card
- TF Card Slot — insert a microSD card (not included) for on-board video recording; short-press the Record button to start/pause
- USB Port — expand wireless modules or use for firmware updates
- NP-F Battery Interface × 2 — hot-swappable; two NP-F990 (7.4 V / 6000 mAh) batteries supported simultaneously
- XT60 Power Input — external DC power supply (7.4–50.4 V); also supports transmitter power supply
- RJ45 Port — custom interface: CRSF/SBUS pass-through, external power (charging mode 3)
- FC Interface — connects to a ground-station flight controller or relay unit
- Power Switch — rocker switch; press to power on/off
- Record Button — short press: start/pause recording to TF card

LED Indicators

RX LED Indicator Reference

Category	Item	Specification
LED	Power	Solid green — unit powered on normally
LED	Fiber Link	Solid green — fiber connection active and locked
LED	Video	Blinking — video stream received and decoded
LED	Control Signal	Solid green — CRSF/SBUS control data being received

4. Installation & Setup

Step-by-Step Setup

Step 1 — Prepare the optical fiber

- Source a single-mode fiber cable (LC/SC connectors) of the required length for your mission
- Inspect both connector ferrules for dust or damage; clean with optical-grade wipes if necessary
- Do not bend the fiber below its minimum bend radius (~30 mm for standard SM fiber)

Step 2 — Mount the TX unit on the drone

- Align the four M3 mounting holes with the 30.5 mm stack pattern on the drone frame
- Secure with M3 screws; do not overtighten.
- Mount the 4K camera using the 19 mm universal mount and M2 screws; adjust tilt angle as required
- Connect the camera cable (SH1.0 6P) to the TX camera port

Step 3 — Connect the flight controller

- Connect the GH1.25 8P FC cable from the TX FC Interface to the flight controller's UART port
- In the flight controller configuration (Betaflight / INAV / ArduPilot), enable CRSF on the assigned UART
- Enable MSP OSD if overlay of flight telemetry is required

Step 4 — Connect the fiber

- Plug one end of the optical fiber into the TX Fiber LC/SC port and the other end into the RX Fiber LC/SC port
- Ensure connectors are fully seated; a partially inserted connector will cause a weak or absent signal

Note: Always insert/remove fiber connectors with the power OFF on both units.

Step 5 — Power up the TX unit

- Connect the drone battery or external power supply to the TX power input (DC 7.4–50.4 V)
- The TX unit will initialize automatically; Power and Status LEDs will illuminate

Step 6 — Power up the RX unit

- Insert NP-F batteries into both battery slots, or connect an XT60 supply
- Press the Power Switch to turn on the RX unit
- The Fiber Link LED should illuminate green within a few seconds if fiber is correctly connected

Step 7 — Connect the display and verify

- Connect the HDMI cable from the RX HDMI output to your monitor or FPV goggles
- Live video should appear on the display; the Video LED will blink

- Verify OSD data (altitude, speed, battery, etc.) is overlaid on the image if configured
- Check that Control Signal LED is solid green, confirming CRSF/SBUS is live

Video Recording

- Insert a microSD (TF) card into the RX TF card slot before powering on
- Once powered, short-press the Record button to begin recording; press again to pause
- Video is saved in the codec selected during configuration (H.264 or H.265)

Note: Use a Class 10 / U3 microSD card rated for continuous write speeds ≥ 30 MB/s for reliable 4K recording.

5. Troubleshooting

Troubleshooting Guide

Category	Item	Specification
No video on display	Fiber not connected	Check fiber cable at both LC/SC ports; ensure connectors are fully seated
No video on display	TX not powered	Verify drone battery is connected and TX Power LED is on
No video on display	HDMI cable fault	Try a different HDMI cable or port on the monitor
Fiber Link LED off	Fiber damaged or dirty	Inspect fiber for bends, cracks, or dirty connectors; clean with optical wipe
High latency / stuttering	Bitrate too high	Reduce video bitrate in configuration; 1080p@90fps at 10–15 Mbps is recommended
No OSD overlay	MSP not enabled on FC	Enable MSP OSD on the UART connected to the TX FC interface
No control signal	FC cable not connected	Check GH1.25 8P cable; verify CRSF is enabled on the correct FC UART
RX not powering on	Batteries depleted	Replace or recharge NP-F batteries; or connect XT60 external supply
Recording not starting	No TF card / incompatible	Insert a Class 10 / U3 microSD card; re-format to exFAT if required
Image noise / artifacts	EMI on drone power rail	Add ferrite choke on TX power leads; keep fiber away from ESC cables

6. Safety & Compliance

- Do not operate the TX unit with the fiber port uncovered — the laser emitter (1310/1550 nm) can cause permanent eye damage
- Never look directly into the fiber cable connector end while the TX is powered
- Ensure the TX unit is properly secured to the aircraft before flight; a loose unit may dislodge and cause injury or property damage
- The RX ground unit generates heat during operation; ensure adequate ventilation
- Dispose of NP-F lithium batteries according to local recycling regulations
- The expansion port interface is NOT functional in the current hardware revision (v1.2); do not attempt to connect external devices

7. Technical Notes

Video Codec & Resolution

The system supports both H.264 and H.265 encoding, configurable via the OSD or companion app. H.265 provides approximately 40% better compression at equivalent quality, enabling longer recording times and lower bitrates over the fiber. For latency-critical applications, use H.264 at the minimum bitrate that satisfies image quality requirements.

Fiber Selection

Always use single-mode fiber (SMF, ITU-T G.652D or equivalent). Multi-mode fiber (MMF) is not supported. For mission distances under 20 km, standard PC-polished LC/APC or LC/UPC connectors are acceptable. For 40–80 km distances, use APC (angled) polished connectors to minimize back-reflection.

Power Budgeting

Total system power consumption at typical operating conditions: TX 3.2 W + RX \leq 4.2 W = \leq 7.4 W. If powering the TX from the drone battery rail, account for this draw in your flight endurance calculation.

Firmware Updates

Firmware updates for both the TX and RX units are distributed via the USB interface on the RX unit. Follow the update procedure in the companion software application. Do not interrupt power during a firmware update.

Contacts:

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