



EFIX[®] FL3 External radio

User Guide



Revision 1.0

January 1, 2022

By surveyors , for surveyors

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Preface

Copyright

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Safety Warnings

The Global Positioning System (GPS) is operated by the U.S. Government, which is solely responsible for the accuracy and maintenance of the GPS network. Accuracy can also be affected by poor satellite geometry and obstructions, like buildings and heavy canopy.

1 Introduction

The FL3 is a UHF radio modem based on EFIX's technical expertise and extensive field work experience. With many innovative features, the FL3 provides reliable base-to-rover RTK GNSS corrections over long communication distances.

Commonly used frequency channels can be preset and the output power can be adjusted from 5 to 28 W according to the environmental constraints of the project. The customizable parameter setting function allows operators to easily start the FL3 radio modem by simply pressing the corresponding control buttons.

The FL3 has 3 two-color LED indicators:

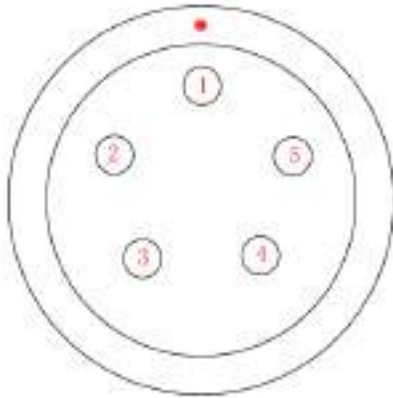
- ① Wireless transceiver indicator: green receiving, red transmitting.
- ② Power indicator: green normal power, red underpowered.
- ③ Bluetooth indicator: red paired in Bluetooth.



And one OLED display and five control buttons

2 Interface

2.1 Pin-Out Information



Pin 1----Power supply, 9-16V DC

Pin 2----Power GND

Pin 3----Serial port data receiving, RXD

Pin 4----Serial port signal ground

Pin 5----Serial port data transmitting, TXD

2.2 RF Interface

50 Ohm, TNC female connector



2.3 Indicator light description

- ① RX/TX → Transceiver indicator: green receiving, red transmitting.
- ② PWR/ALM → Power indicator: green normal power, red underpowered.
- ③ BT → Bluetooth indicator: green not paired and red paired in Bluetooth

2.4 Control keys description



Power ON / OFF

Enter



Up



Down



Left



Right

3 Functions and operation instructions

3.1 Enter and power buttons

- (1) Press and hold the power button for 3 to 5 seconds to turn on the unit, the power indicator light turns green.
- (2) While the power is on, press and hold the power button for 3 seconds to turn off the power, the power indicator light and the display will turn off.
- (3) Menu confirmation function with a short press

3.2 Left and right buttons

With the left and right buttons, you can switch between the function menus.

3.3 Up and down buttons

Within a menu, you can use the up and down buttons to select the corresponding menu item.

3.4 Data transmission instructions

During data transmission, the TX/RX indicator lights red. When receiving data, the TX/RX indicator lights green.

3.5 Bluetooth working status

If the Bluetooth pairing is successful, the BT LED turns red and the Bluetooth icon appears in the device status. When the Bluetooth disconnects, the icon disappears and the BT indicator turns off.

3.6 Radio power on instructions

- (1) If it was accidentally turned off last time, the radio will turn on automatically when it is reconnected to the power supply.
- (2) If it was turned off normally last time, after being connected to the power supply, the Power button must be long pressed for 3 seconds to turn on the radio.
- (3) If the voltage is less than 9.5 V, the red power supply indicator flashes twice per second.
- (4) If the voltage is between 9.5V and 16V, the green power indicator light is always on.

Notes :

- (1) "Accidental" shutdown means shutting down the FL3 without long press on the power button, e.g., disconnecting the power supply to the radio directly.
- (2) "Normal" shutdown refers to powering off the FL3 by a long press of the power button.

4 Functions and operation instructions

4.1 Transmitting/receiving channel and frequency

In this menu bar, you can set the current sending and receiving frequency. Use the Up and Down buttons to select the required frequency, and then press the Enter button to confirm. After selection, the symbol "*" will appear.

4.2 Data protocol

In this menu bar, you can set the current communication protocol, such as protocol EFIX, TT450S and Transparent. Use the Up and Down buttons to select the required communication protocol, and then press the Enter button to confirm. After selection,

the symbol "*" will appear.

Note: After changing the protocol, you need to reselect the link baud rate supported by the current protocol in the "Wireless Link Rate" menu.

4.3 Wireless link rate

In this menu bar, you can set the current communication link baud rate, and different protocols support different types of air baud rates. For example, the protocol Transparent supports 4800 bps and 9600 bps. The EFIX supports 4800 bps, 9600 bps and 19200 bps. Use the Up and Down buttons to select the required air baud rate, and then press the Enter button to confirm. After selection, the symbol "*" will appear.

4.4 Transceiver mode

In this menu bar, you can set the current radio transceiver mode. Currently, four transceiver modes are supported: integrated transceiver, transmitting only, receiving only and radio repeater mode. Use the Up and Down buttons to select the required transceiver mode, and then press the Enter button to confirm. After selection, the symbol "*" will appear.

4.5 Transmitting power

In this menu bar, you can set the current wireless transmitting power level. Currently, a total of 6 levels are supported, namely: 5W, 10W, 15W, 22W, 25W, 28W. Select the needed transmitting power by pressing the Up and Down buttons, and then press the Enter button to confirm. And the symbol "*" will appear after selection.

4.6 Serial port baud rate

In this menu bar, you can set the current serial port communication baud rate.

Currently there are the following baud rates: 9600, 19200, 38400, 57600, 115200. Use the Up and Down buttons to select the required baud rate, and then press the Enter button to confirm. After selection, the symbol "*" will appear.

4.7 Serial port baud rate adaptive

In this menu bar, there are two options: adaptive function switch and trigger enable. The adaptive function switch has memory function. If the switch is turned on, the menu display is ON; if it is turned off, it displays OFF; the adaptive trigger enable does not have the memory function, it is on when device is turned on. Only when the adaptive master switch is turned on, the serial port baud Rate adaptive function can work normally.

If the serial port baud rate adaptation is successful, an adaptive matching success message box will pop up, and the adaptive trigger enable will automatically stop. If the serial port baud rate adaptation is not successful, this function has been running.

4.8 Device status

It displays device model, firmware version, hardware version, serial number information in the information bar.

4.9 Language

Set the language for displaying device fonts, this device supports two languages: Chinese and English.

5 Faults and solutions

Fault description	Cause Analysis	Solution
<p>Unable to power on</p>	<p>(1) The power cable connection is unreliable (external power supply).</p> <p>(2) The positive and negative poles are reversed (external power supply).</p> <p>(3) If the battery is used for power supply, battery runs out.</p>	<p>If you use external power supply, connect the power cable correctly, and its operating voltage is DC9V; for battery power supply, please charge in time; when turning on, please long press the power button for 3-5 seconds.</p>
<p>Unable to read or set parameters</p>	<p>(1) The serial port parameter configuration is incorrect.</p> <p>(2) The current Communication serial port is occupied.</p>	<p>Correctly select the serial port number, serial port baud rate, 8 data bits, 1 stop bit, no parity, no data flow control.</p>
<p>Unable to transmit or receive data</p>	<p>(1) The communication parameter configurations between the transmitting and receiving terminals are inconsistent.</p> <p>(2) The radio does not connect to external antenna.</p>	<p>Configure the communication parameters between the transmitting and receiving terminals to be consistent. If the radio does not connect to external antenna, select a suitable antenna according to the frequency range.</p>

6 Technical specifications

General Specifications		
Frequency Band	410-470MHz	
Work Mode	Transceiver, Transmit only, Receive only, Radio repeater	
Step Value	25KHz, 12.5KHZ	
Modulation	GMSK/4FSK	
Channel Number	Support up to 200 editable channels	
Operating Voltage	9~16V	
Power Consumption (typical value)	Transmit high power(28W)	72W@12V DC
	Transmit high power(25W)	66W@12V DC
	Transmit high power(22W)	60W@12V DC
	Transmit low power(15W)	54W@12V DC
	Transmit low power(10W)	44W@12V DC
	Transmit low power(5W)	35W@12V DC
	Standby	2W@12V DC
Frequency Stability	<±1ppm	
Dust and Water Proof	IP67	
Size(L×W×H)	175(L)×130(W)×86.5(H)mm	

Weight	2kg
Operating Temperature	-40~+65°C
Storage Temperature	-50~+85°C
Antenna Interface	TNC, female connector
Antenna Interface Impedance	50 ohm
Data Interface	LEMO 5pin

Transmitter performance specifications		
RF output power (410-440MHz)	High power above 20W	≥43.0dBm@DC 12V
	Low power above 5W	≥37dBm@DC12V
RF output power (440-470MHz)	High Power (28W)	44.5±0.5dBm @DC 12V
	High Power (25W)	44±0.5dBm @DC 12V
	High Power (22W)	43.4±0.5dBm @DC 12V
	High Power (15W)	42±0.5dBm @DC 12V
	Low Power (10W)	40±1dBm @DC12V
	Low Power (5W)	37±1dBm @DC12V
RF power stability	±1dB	
Adjacent channel power	>50dB	

Receiver performance specifications	
Sensitivity	Better than -114dBm @ BER 10 ⁻³ , 9600bps
Co-channel suppression	>-12dB
Modem	
Air baud rate	4800 bps / 9600 bps / 19200 bps
Serial port baud rate	9600, 19200, 38400, 57600, 115200 bps
Modulation	GMSK / 4FSK
Factory default parameters	
Serial port baud rate	115200 bps
Protocol	EFIX
Air baud rate	9600 bps
RF output power	High Power 22W (43.4 ±0.5 dBm @ DC 12V)
Channel	CH7

<p>Factory default frequency (Unit: MHz)</p>	<p>CH0-455.05 CH1-456.05 CH2-456.55 CH3-457.05 CH4-458.05 CH5-459.05 CH6-460.05 CH7-461.05 CH8-462.05 CH9-462.55 CH10-455.05 CH11-456.15 CH12-456.65 CH13-457.15 CH14-458.15 CH15-459.15 CH16-460.15 CH17-461.15 CH18-462.15 CH19-462.65 CH20-455.15 CH21-456.25 CH22-456.75 CH23-457.25 CH24-458.25 CH25-459.25 CH26-460.25 CH27-461.25 CH28-462.25 CH29-462.75 CH30-455.25 CH31-456.35 CH32-456.85 CH33-457.35 CH34-458.35 CH35-459.35 CH36-460.35 CH37-461.35 CH38-462.35 CH39-462.85 CH40-455.35 CH41-456.45 CH42-456.95 CH43-457.45 CH44-458.45 CH45-459.45 CH46-460.45 CH47-461.45 CH48-462.45 CH49-462.95 CH50-455.45 CH51-415.05 CH52-416.05 CH53-417.05 CH54-418.05 CH55-419.05 CH56-420.05 CH57-421.05 CH58-422.05 CH59-423.05 CH60-410.325 CH61-411.325 CH62-412.325 CH63-413.325 CH64- 414.325 CH65-424.325 CH66-425.325 CH67-426.325 CH68- 427.325 CH69-428.325 CH70-429.325 CH71-435.05 CH72-436.05 CH73-437.05 CH74-438.05 CH75-439.05 CH76-440.05 CH77- 441.05 CH78-442.05 CH79-443.05 CH80-430.325 CH81-431.325 CH82-432.325 CH83-433.325 CH84-434.325 CH85-444.325 CH86- 445.325 CH87-446.325 CH88-447.325 CH89-448.325 CH90- 449.325 CH91-450.325 CH92-450.825 CH93-451.325 CH94- 451.525 CH95-451.825 CH96-452.325 CH97-452.825 CH98- 453.325 CH99-453.525 CH100-453.825 CH101-454.325 CH102- 454.825 CH103-455.325 CH104-455.825 CH105-463.325 CH106- 463.825 CH107-464.325 CH108-464.825 CH109-465.325 CH110- 465.825 CH111-466.325 CH112-466.525 CH113-466.825 CH114- 467.325 CH115-467.825 CH116-468.325 CH117-468.525 CH118- 468.825 CH119-469.325 CH120-469.825</p>
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