HF/50MHz TRANSCEIVER

FX-4CR

bg2fx.com

Operation manual

(Firmware Version 2.0 Beta - 24.02.09)

For radios delivered before February 2024.
There has been a hardware evolution.

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1 - Specifications

*** Not yet implemented. Present in future updates

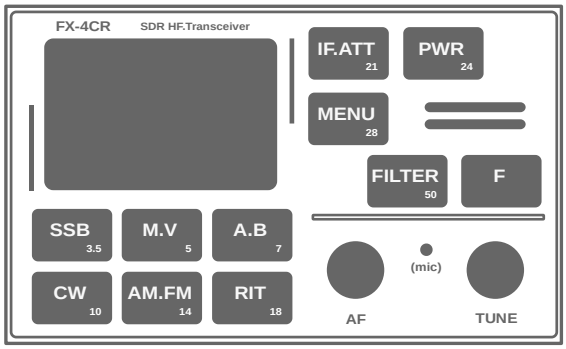
Transmitter:	3.5 MHz - 54 MHz *(amateur radio frequencies)*
Receiver:	3.5 MHz - 54 MHz
Operating modes:	USB, LSB, CW, AM, FM
Frequency steps:	10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz
Receiving sensitivity:	-121 dBm *(0,20 µv)*
Filter bandwidth:	• SSB: 1,6 kHz to 2,9 kHz, steep 100 Hz • CW: 100 Hz to 1 kHz, steep 100 Hz • AM: 3 kHz to 6 kHz, steep 1kHz • FM: 3 kHz to 10 kHz, steep 1kHz
Power range:	100 mW to 1 W, steep 100 mW, 1 W to 20 W , steep 1 W *(54 MHz/5 W)*
Frequency stability:	+- 0.5 PPM
Spurious emission:	-43 dB *(Second and third harmonic)*
Carrier Suppression:	-50 dB
Antenna impedance:	50 Ohms
Microphone impedance:	2,2 kOhms
Audio output power:	1 W
Voltage range:	10 V - 18 V DC *(~ 14 V recommended, keep maximum voltage below 16V for long term operation)*
Power consumption:	• Receive: ~ 210 mA *(DC - 13.8 V)* • Transmit: ~ 3.3 - 4.0 A *(20 W)*
Operating temperature:	-20 °C, +40 °C
Overall height and weight:	• 107 mm L x 65 mm W x 43 mm H, 0.44 Kg • 4.2" L x 2.6" W x 1.7" H, 0.97 Lbs
Radio weight:	0,46kg
Functional characteristics:	• 2.0″ TFT display screen • SDR receiver circuit design *(48 kHz digital intermediate frequency)* • Spectrum display and waterfall plot • Adjustable DSP noise reduction • Dual VFO operation VFO-A and VFO-B *(Split, Rit, Xit)* • Built-in microphone • 60 Memories channels • Bluetooth and USB connection for sound card and serial port • Ultra wide input voltage: 10 V - 18 V • Quick switching among various frequency bands and convenient operation
Included Items:	• Transceiver • Hand microphone • Power cable with spare fuses • USB data cable • Instruction manual • Box Carrying Case

Important

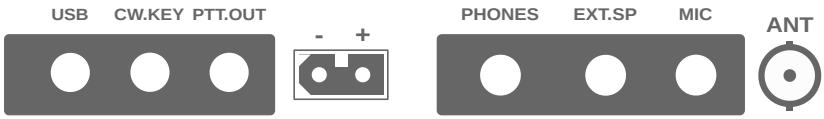
- Monitor SWR and output power when using digital modes, especially when using higher supply voltages.
- Using high powers with high SWR can damage the radio, especially when running high duty cycle digital modes.
  - SSB mode can use 20W.
  - CW mode must use less than 10W *.
  - FT8 power usage is limited to 5W *.

** (depending on the ambient temperature)*

2 - Cheat sheet

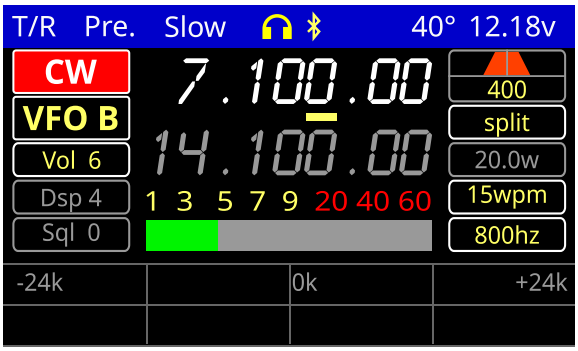


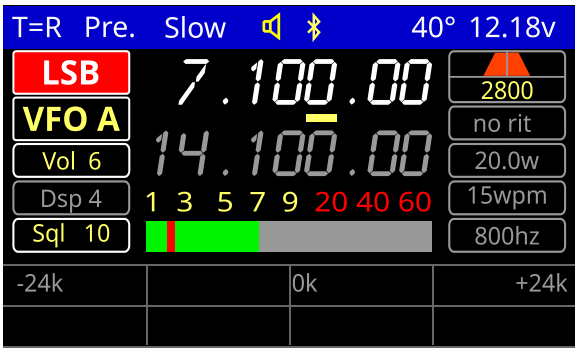
IF.ATT	Press to toggle between preamplifier, none or attenuator: *(Pre., ---, Att.)*. Press and hold to toggle AGC between: *(Slow, Middle or Fast)*.
PWR	Press and hold to power on. Press and hold to power off. Press and then turn AF to adjust the RF output power setting.
MENU	Press to access the menu. Press and hold to toggle between loudspeaker or headphones.
FILTER	Press and then turn AF to adjust the filter bandwidth. Press and hold to turn bluetooth ON or OFF.
F	Press and then press band selection. Press and hold to lock or unlock the keypad.
SSB	Press to switch to SSB mode. Press to toggle LSB, USB, DIG-L or DIG-U. Press and hold in SSB mode to turn Noise Reduction ON or OFF.
M.V	Press to toggle between VFO or MEMORY.
A.B	Press to toggle between VFO A or VFO B. Press and hold to copy current VFO to secondary VFO.
CW	Press to switch to CW mode. Press and hold to turn Noise Blanker ON or OFF.
AM.FM	Press to switch to AM mode. Press to toggle AM or FM.
RIT	Press and hold to toggle between normal mode or one of these modes: Rit, Xit or Split. Press and then turn TUNE to adjust Rit or Xit in ranges from -9990Hz to 9990Hz. *(Can be set as PTT when you want to use the internal microphone).*
AF	Turn to adjust the volume. In SSB or AM/FM mode press and then turn to adjust the squelch. In CW mode press and then turn to adjust speed of electronic keyer.
TUNE	Turn to adjust the frequency. Press and turn to adjust the tuning step. Press and hold to set the frequency to a multiple of the adjustment step.

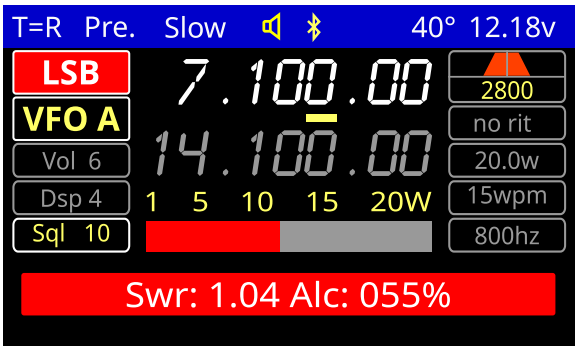


USB	USB connector	PHONES	Headphones connector
CW.KEY	Keyer connector	EXT.SP	Loudspeaker connector
PTT.OUT	PTT control output connector	MIC	Handheld microphone connector
- +	Power XT60 type connector	ANT	Antenna BNC type connector

3 - Display







RX T=R T/R RIT XIT	RX only, Normal, Split, Rit, Xit
Pre. --- Att.	RF front end: +15dB", "0dB", "-20dB
Fast Middle Slow	AGC speed
🎧 🔊	Loudspeaker or headphones
ᛒ	Bluetooth connection
40°	Internal temperature
13.6V	Supply voltage
7.100.00	VFO A
14.100.00	VFO B
400	Filter bandwidth
no rit, rit: 0, xit: 0	Rit, Xit + Offset
no rit, split	Split Vfo-A, Vfo-B
20.0W	Current power output
Dsp 4	Depth digital noise reduction
800Hz	CW pitch
15wpm	CW speed
CW	Current mode
VFO A	Current VFO
Vol 10	Audio volume
Sql 0	Squelch level
Swr: 1.04	Swr meter
Alc: 055%	Modulation percentage

4 - Keypad function

Each button or knob has several functions

- Press: just hit it
- Press and hold: press and hold more than half a second
- Turn: turn right or left to change values

Note

To exit press button or knob again.
If no action is taken, the transceiver will automatically exit the setting after a few seconds *(See Menu-delay)*.

5 - Basic operation

5.1 - IF.ATT

5.1.1 - Attenuator

Press [IF.ATT] to toggle between preamplifier, none or attenuator *(Pre. = +15dB, --- = 0dB, Att. = -20dB).*

5.1.2 - Agc speed

Press and hold [IF.ATT]to toggle between AGC slow, middle or fast.

5.2 - PWR

5.2.1 - Switching power

Press and hold [PWR] to power on.
Press and hold [PWR] to power off.

5.2.2 - Transmit power

Press [PWR] and turn [AF] to set desired RF power.
(The power setting ranges from 0.1 to 20 W, 54 MHz/5 W).

5.3 - MENU

5.3.1 - Enter menu

Press [MENU] to enter the menu.

5.3.2 - Mute speaker

Press and hold [MENU] to turn speaker ON or OFF.
(Connect a headset does the same).

5.4 - FILTER

5.4.1 - Bandwidth

Press [FILTER] to set filter bandwidth and turn [AF] to set desired value:

- SSB: 1,6 kHz to 2,9 kHz, steep 100 Hz
- CW : 100 Hz to 1 kHz, steep 100 Hz
- AM : 3 kHz to 6 kHz, steep 1kHz
- FM : 3 kHz to 10 kHz, steep 1kHz

5.4.2 - Bluetooth

Press and hold [FILTER] to turn bluetooth ON or OFF.

5.5 - F

5.5.1 - Band selection

Button	Band
[SSB]	80m band (3.500 4.000)
[M.V]	60m band (5.260 5.405)
[A.B]	40m band (7.000 7.300)
[CW]	30m (10.100-10.150)
[AM.FM]	20m (14.000-14.350)
[RIT]	17m (18.068-18.168)
[IF.ATT]	15m (21.000-21.450)
[PWR]	12m (24.890-24.980)
[MENU]	10m (28.000-29.700)
[FILTER]	6m (50.000-54.000)

Press [F] to enter the band selection menu
and press [band] button.

*(You must follow the IARU band plans of your region.
It's up to you not to transmit outside).*

5.5.2 - Key lock

Press and hold [F] to lock or unlock keys.
In lock mode the status bar background is red or blue when unlock.

5.6 - SSB

5.6.1 - Mode selection ssb

Press [SSB] to switch SSB mode.
Press [SSB] to toggle between *(LSB)*, *(USB)*, *(DIG-L)* or *(DIG-U)* mode.
(In DIG mode the speaker mute and the audio filter is set to 3.3 kHz).

5.6.2 - DSP noise reduction

Press and hold [SSB] to turn noise reduction ON or OFF.

5.7 - M.V

5.7.1 - VFO or MEMORY mode

Press [M.V] and turn [TUNE] to set VFO or MEMORY in range 1 to 60.
For each VFO or MEMORY the following parameters are recorded:

- Mode
- Frequency
- Step
- Agc
- Power
- Bandwidth
- Attenuator

(The memories behave like so many VFOs. The associated values and settings will be overwritten by your changes).

5.8 - A.B

5.8.1 - Vfo A or B

Press [A.B] to toggle between VFO A or VFO B.

5.8.2 - Copy Vfo

Press and hold [A.B] to copy current VFO to secondary VFO.

5.9 - CW

5.9.1 - Mode selection cw

Press [CW] to switch CW mode.
(Change keyer type in menu).

5.10 - AM.FM

5.10.1 - Mode selection am, fm

Press [AM.FM] to switch AM mode.
Press [AM.FM] to toggle between *(AM)* or *(FM)* mode.

5.11 - RIT

5.11.1 - RIT functions

Assign [RIT] function between Rit, Xit or Split in menu.

5.11.2 - Split and rit operation

Press [RIT] and hold to toggle between normal mode and mode selected.
When Rit or Xit is selected press [RIT] and then turn [TUNE] to adjust in ranges from -9990Hz to 9990Hz.
Press [RIT] to toggle between modes.

- T=R: In normal, mode VFO-A and VFO-B operate separately.
- RIT: In Rit mode, the reception frequency is shifted by the rit value.
- XIT: In Xit mode, the transmission frequency is shifted by the xit value.
- T/R: In split mode, reception is VFO-A while transmission is VFO-B.

5.11.3 - PTT function

Assign [RIT] function to Ptt in menu.
Press [RIT] to transmit whith internal mic.

5.12 - AF

5.12.1 - Volume adjustment

Turn [AF] to adjust the volume. *(The volume setting ranges from 0 to 20).*
There are three independent volume levels:

1. When the sound is sent to the speaker.
2. When the sound is sent to the headphones.
3. When the sound is sent to USB or Bluetooth.

5.12.2 - Squelch adjustment

In SSB or AM/FM mode press [AF] and then turn it to adjust the squelch.

5.12.3 - Electronic keyer speed

In CW mode press [AF] and then turn it to adjust speed of electronic keyer.

5.13 - TUNE

5.13.1 - Frequency selection

Turn TUNE to adjust the frequency.

5.13.2 - Tuning step

Press then turn TUNE right or left to select the tuning step of
10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz.

5.13.3 - Rounded on the frequency step

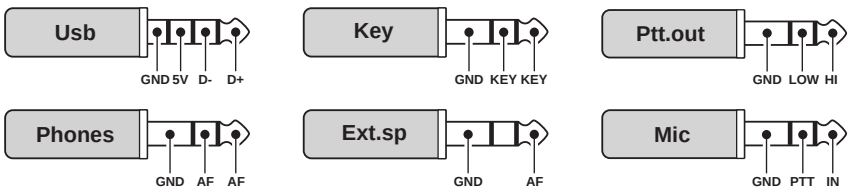
Press and hold TUNE to set the frequency to a multiple of the adjustment step.

6 - Menu setting

Turn< span class="rounded">TUNE to switch between menus.
Turn< span class="rounded">AF to change the values.

Item	Default	Description
Version:	V-2.00 / 12-34-56	Current version of firmware.
Menu-delay:	5s	Changes the menu delay between 2 and 30 seconds.
Rit-key as:	rit	• rit: the reception frequency is shifted by the rit value • xit: the transmission frequency is shifted by the xit value • split: reception is VFO-A while transmission is VFO-B • ptt: key used as ptt
Dsp-noise:	4	Change the value between 1 and 20 to obtain the lowest noise level. *(The result depends on the signal received and varies with the noise).*
MicAlc-Target:	-21db	Change the minimum gain of mic from -22.5 dB to -9 dB step 1.5 dB.
MicAlc-Hold:	682.24ms	Change hold time before gain is decreased from 1.33 ms to 682.24 ms.
Cw-Key:	Straight key	• Iambic regul *(normal paddles)* • Iambic rev *(permuted paddles)* • Straight key *(Dit or Dah)*
Cw-Pitch:	800hz	Changes the sidetone audio pitch from 400 Hz to 1000 Hz step 50 Hz.
Cw-Level:	3	Changes the sidetone audio volume from 0 *(mute)* to 10.
Cw-Delay:	400ms	Change the CW hang time from 50 ms to 1000 ms in 10 ms steps.

7 - Connectors



Ptt.out, LOW: low level on transmit, HI: hight level on transmit.
(LOW and HI options available for different PA input/TTL levels).
(All connectors standard 3.5mm stereo / 3 or 4 poles coaxial plugs).

8 - Data communication

8.1 - CAT via Bluetooth

- For Bluetooth connection with the Android based FT8CN *(an Android based FT8 software)*, set Bluetooth to 'on' in the Menu, and pair transceiver with Android device.
- In the FT8CN app the transceiver should appear as 'FX-4CR'.
- In FT8CN settings set Rig to FX-4CR or TS-590S.
  (For detailed settings refer to the FT8CN app / documentation).

8.2 - Connection with USB cable

- Connect the supplied USB cable to the transceiver and the computer, and turn on the transceiver.
- Transceiver should show in COM port list as well as two audio channels *(USB PnP device)*.
  (Because Windows assigns data to physical USB ports, always try to reuse the working COM port).
- For software, set Rig to Kenwood TS-590S, baudrate to 115200 and PTT to RTS.

8.3 - Setting up digital mode software e.g. WSJT-X

- Launch your digimode software and set the following parameters:
  Rig: Kenwood TS-590S
  Baud-rate: 115200
  Ptt: RTS
  Com: port as noted above
  Audio-tab: “USB PnP device” for both channels
- Digimode frequency setting and PTT/tune should now control the transceiver.
- Adjust settings as follows:
  - Receiver, with antenna connected: adjust AF level via Windows sound control sliders until RX level is roughly mid-scale (50 or 60 dB) in dB meter at the bottom of WSJT-X main screen. Waterfall should now show signals and main screen decoded messages
  - Transmitter, with dummy load connected: Hit “tune” key in digimode software and set power slider (e.g. of WSJT-X) to 100%. Adjust computer audio level controls until power no longer increases. Then reduce level e.g. to -30% from maximum, not exceeding 5W.
- Reconnect antenna. You're set to respond to CQs or send CQ calls yourself on a free sub-channel. For more details refer to the individual software user documentation.

9 - Firmware update

Important

- **Plug** the USB cable on the transceiver side first, and then insert in computer.
- **Unplug** the USB cable from computer, then from transceiver.

On transceiver

1. Start by connecting transceiver and computer in respect of procedure.
2. Press and hold [F] press [PWR] and then release [F] **KEEP HOLDING** [PWR]
   (REMEMBER, not to let go during the entire download process).
   If you let go of the button, you will lose the connection to the STM32Cube Programmer.

On computer

1. Unzip firmware file to a location on your computer.
2. Download and install the STM32Cube Programmer from:
   https://www.st.com/en/development-tools/stm32cubeprog.html
3. Install and run STM32Cube Programmer.
4. Select USB from the top right menu of the STM32Cube Programmer.
5. If you do not see your USB port listed, you might need to hit the **Refresh** button next to the port dropdown.
6. Click on the green **Connect** button.
7. Click the **Open** tab and select the unziped firmware file. *(Example: FX-4CR_2023.xx.xx.hex)*.
8. Click the **Download** button in the STM32Cube Programmer.
9. After the download is completed, let [PWR]
   This will disconnect the transceiver from the STM32Cube Programmer.

Thank you for your support and purchase