

HF/50MHz TRANSCEIVER

FX-4CR

bg2fx.com



Operation manual

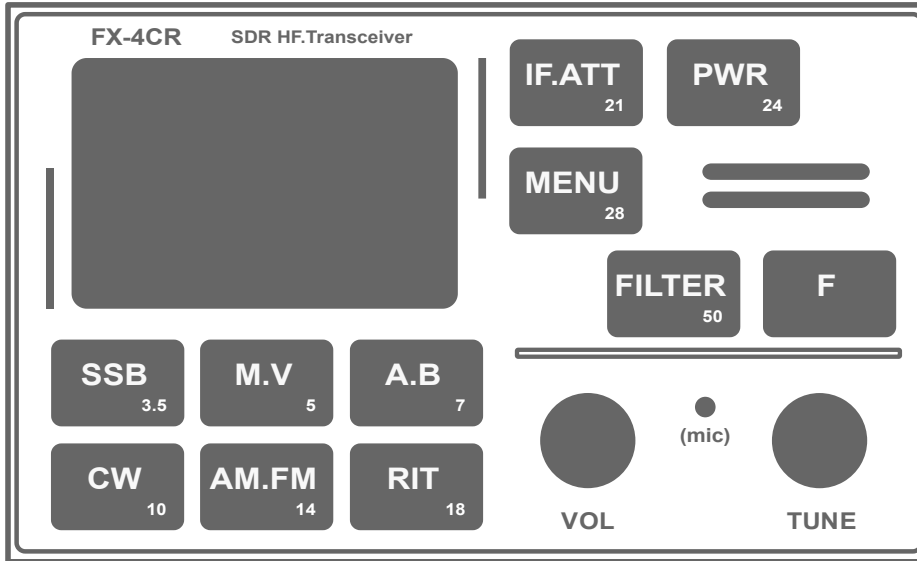
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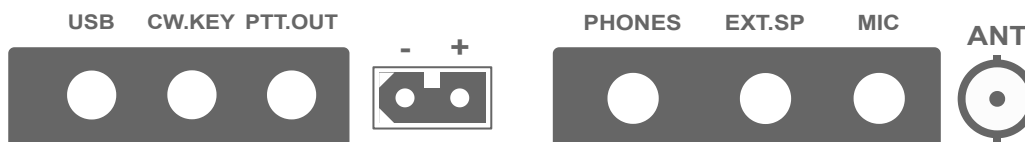
1 - Specifications

Transmission:	3.5 MHz - 54 MHz (<i>amateur radio frequencies</i>)
Reception:	3.5 MHz - 54 MHz
Operating modes:	USB, LSB, CW, AM, FM
Frequency steps:	10 Hz, 100 Hz, 1 kHz, 5 kHz, 10 kHz, 100 kHz
Receiving sensitivity:	-121 dBm (<i>0,20 μV</i>)
Filter bandwidth:	<ul style="list-style-type: none"> SSB: 1,5 kHz, 1,8 kHz, 2,1 kHz, 2,4 kHz, 2,7 kHz, 3,0 kHz CW : 50 Hz, 100 Hz, 200 Hz, 300 Hz, 500 Hz, 800 Hz AM : 6 kHz, 9 kHz FM : 5 kHz, 10 kHz
Power range:	0,1 - 20 W continuously adjustable (<i>54 MHz/5 W</i>)
Frequency stability:	+/- 0.5 PPM
Spurious emission:	-43 dB (<i>Second and third harmonic</i>)
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:	<ul style="list-style-type: none"> Receive: ~ 210 mA (<i>DC - 13.8 V</i>) Transmit: ~ 3.3 - 4.0 A (<i>20 W</i>)
Operating temperature:	-20 °C, +40 °C
Overall size:	length: 107 mm, width: 65 mm, height: 43 mm
Radio weight:	0,46kg
Functional characteristics:	<ul style="list-style-type: none"> 2.0" TFT display screen SDR receiver circuit design (<i>24 kHz digital intermediate frequency</i>) Spectrum display and waterfall plot Adjustable DSP noise reduction Dual VFO operation VFO-A and VFO-B with split operation mode Build-in microphone 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:	<ul style="list-style-type: none"> Transceiver Hand microphone Power cable with spare fuses USB data cable Instruction manual Box Carrying Case

2 - Panel description



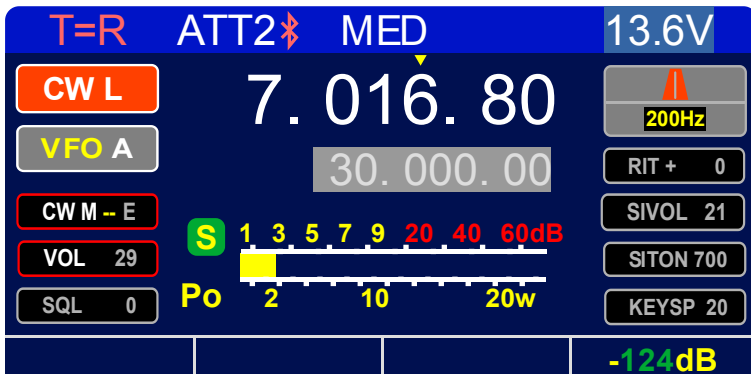
IF.ATT	Press to switch attenuator between NONE, ATT1, ATT2 Press and hold to adjust the AGC setting.
PWR	Press to power on. Press and hold to power off. Press and then rotate VOL to adjust the transmit power.
MENU	Press and hold to enter the menu.
FILTER	Press to change the filter bandwidth.
F	Press to enter band selection mode. Press and hold to lock the keypad.
SSB	Press to switch to SSB mode. Press to select LSB or USB. Press and hold in SSB mode to turn Noise Reduction ON or OFF. Press and hold in CW mode to select the upper or lower carrier.
M.V	Temporarily unavailable. <i>(This function will be restored later by a firmware update)</i>
A.B	Press to switch between VFO A and VFO B. Press and hold to enter Split mode.
CW	Press to enter CW (<i>lambic electronic Keyer or Straight key</i>). Press and hold to reverse the dit and dah paddles.
AM.FM	Press to switch to AM and FM mode. Press and hold to activate wideband receive mode (<i>RX only</i>).
RIT	Press to turn RIT ON or OFF. Can be set as PTT when you want to use the internal microphone.
VOL	Turn to adjust the volume. Press and then turn to adjust the squelsh. In SSB mode adjusts mic gain and DSP. In CW mode adjusts the speed, volume and pitch of the CW monitor.
TUNE	Turn to adjust the frequency. Press or press and turn to adjust the tuning step.



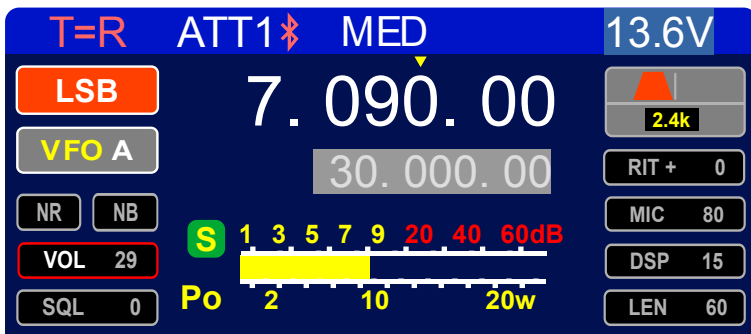
USB	USB connector	PHONES	Earphone connector
CW.KEY	Keyer connector	EXT.SP	loudspeaker connector

PTT.OUT	PTT control output connector	MIC	Handheld microphone connector
- +	Power XT60 type connector	ANT	Antenna BNC type connector

3 - Display



CW mode



LSB mode



USB DIGITAL mode



AM RX only

T=R T≠R RX	Normal, Split or RX only
ATT	Receive attenuator
Bluetooth connection icon	Bluetooth connection
SLOW MED FAST	AGC speed
DIG	Digital mode (no sound)
13.6V	Supply voltage
7.016.80	VFO A
30.000.00	VFO B
-124dB	Current RSSI
CW L	Current mode
VFO A	Current VFO
200Hz	Filter bandwidth
S Po	S-meter or Pwr indicator
2.7 W	Current power output
SWR 1.3	Current SWR
CW M - E	Electronic or straight key
VOL 29	Volume
SQL 0	Squelch
RIT + 0	Offset frequency
SIVOL 21	CW monitor volume
SITON 700	CW monitor pitch
KEYSP 20	Auto keyer speed
NR NB	Noise reduction, noise blanker
MIC 80	Microphone Gain
DSP 15	Depth digital noise reduction
LEN 60	Noise reduction network length

4 - Keypad function

Each button or knob has several functions

- Press: just hit it
- Press and hold: press and hold more than one second
- Turn: turn right or left to change values
- Press then turn: hold down the knob and turn right or left to change the values

Note

When a setting is selected it's appear highlighted with red contour.

To exit a setting, it is necessary to press button or knob again. If no action is taken, the transceiver will automatically exit the setting after a few seconds.

5 - Basic operation

5.1 - Switching power (ON or OFF)

Press **PWR** to power on.

Press and hold **PWR** to power off.

5.2 - Volume adjustment (VOL)

Turn **VOL** to adjust the audio volume. *(The volume setting ranges from 0 to 99).*

5.3 - Squelch (VOL)

Press and hold **VOL** until SQL is highlighted, then turn **VOL** to adjust the squelch.

Press and hold **VOL** again to exit the squelch setting.

5.4 - Frequency selection (TUNE)

Turn **TUNE** to adjust the frequency.

Press **TUNE** to cycle through the tuning step of 10 Hz, 100 Hz, 1 kHz, 5 kHz, 10 kHz or 100 kHz, or press then turn **TUNE** to select the tuning step.

5.5 - Band selection (BS)

Press **F** to enter the band selection menu.

Select a band by pressing the button containing the band name in the lower right corner, or turn **TUNE**

Press **F** again to exit the band selection menu.

5.6 - Mode selection (SSB)

Press **SSB** to select SSB mode.

Press **SSB** to switch between *(LSB)*, *(DIG_L)*, *(USB)* and *(DIG_U)*.

Use *(DIG_L)* and *(DIG_U)* modes for digital mode operation.

(In DIG_U and DIG_L the speaker is muted and the filter is set to 3.0 kHz).

5.7 - Mode selection (CW)

Press **CW** to select CW mode.

Press **CW** to switch between the lambic electronic keyer *(CW A)* and the straight key *(CW M)*.

In *(CW A)* press and hold **CW** to reverse the dit and dah paddles.

Press and hold **SSB** to select the higher or lower carrier. *(Which can be useful to avoid interference on nearby frequencies).*

Press then turn **VOL** to adjust keyer speed KEYS, press again to adjust monitor frequency SITON, and press again to adjust monitor volume SIVOL.

5.8 - Mode selection (AM.FM)

Press **AM.FM** to select *(AM)* and *(FM)* mode.

Press **AM.FM** to switch between *(AM)* and *(FM)*.

5.9 - VFO A.B and SPLIT (A.B)

In VFO mode press **A.B** to toggle between VFO A and VFO B.

Press and hold **A.B** until *(T≠R)* appears to enter split mode.

Press and hold **A.B** until *(T=R)* appears to exit split mode.

(In split mode, while transmitting, the main frequency display shows the transmit frequency and the sub frequency display shows the receive frequency. Cross-band operation is possible in split mode).

5.10 - Offset frequency (RIT)

Press **RIT** to turn (RIT) ON or OFF. (RIT) will be highlighted when active.
 Press **TUNE** to adjust the reception offset.
 Press **TUNE** to select the frequency step.
 (See MENU RIT_PTT to define function)

5.11 - Automatic Gain Control (AGC)

Press and hold **IF.ATT** to switch AGC between SLOW, MED, FAST. (SLOW, MED, FAST) appears on top of the screen.

5.12 - Attenuator (ATT)

Press **IF.ATT** to switch attenuator between NONE, ATT1, ATT2. (ATT1, ATT2) appears when active.
 (For ATT1, the incoming signal power is reduced by 15dB and for ATT2 it's reduced by 35dB)

5.13 - Bandwidth (FILTER)

Press **FILTER** to toggle between filter bandwidth options in each mode.

- BLU: 1,5 kHz, 1,8 kHz, 2,1 kHz, 2,4 kHz, 2,7 kHz, 3,0 kHz
- CW : 50 Hz, 100 Hz, 200 Hz, 300 Hz, 500 Hz, 800 Hz
- FM : 5 kHz, 10 kHz
- AM : 6 kHz, 9 kHz

5.14 - DSP noise reduction (NR)

Press and hold **SSB** to turn noise reduction ON or OFF. (NR) will be highlighted when active.
 Press and hold **VOL** until DSP is highlighted, then turn **VOL** to adjust DSP strength.
 (The DSP may be unstable in some scenarios. If the noise reduction system freezes, reset it by turning the device OFF and ON, then turning the (DSP) back on).

5.15 - Impulse noise blanker (NB)

Press and hold **M.V** to turn Noise Blanker ON or OFF. (NB) will be highlighted when active.

5.16 - Microphone Gain (MG)

Press **VOL** to enter microphone setting, then turn **VOL** to adjust the microphone gain.
 Press **VOL** again to exit the microphone setting.

5.17 - Transmit power (PWR)

Press **PWR** to enter power setting, then turn **VOL** to adjust the power.
 Press **PWR** again to exit the power setting.
 (The power setting ranges from 0.1 to 20 W, 54 MHz/5 W).

5.18 - Receive mode only (RX)

Press and hold **AM.FM** until (RX) appears in the upper left corner of the screen.
 Press and hold **AM.FM** until (T=R) appears to return to transceiver mode.

5.19 - Key lock (LOCK)

Press and hold **F** until LOCK is displayed at the top of the screen.
 Press and hold **F** until LOCK disappears.

5.20 - Menu (MENU)

Press and hold **MENU** to enter the menu.
 Press and hold **MENU** again to exit the menu.
 Turn **VOL** or press **MENU** to scroll through menu options, then turn **TUNE** to change the value of the selected menu item.

6 - Menu setting

			(Note the values here before any changes) →	Notes
0	MENU	Changes the automatic menu exit delay.		
1	IF 1	The intermediate frequency of the device is 24.000 kHz. The IF setting ranges from 20.000 kHz to 28.000 kHz (Can effectively avoid some interference in the intermediate frequency part).		
2	CW_DELAY	Adjusts the delay between CW transmit and receive after input (by * 10mS, 10=100mS).		
3	AGC_SPEED	Selects the time constant for the Automatic Gain Control circuit: 0. Slow 1. Medium 2. Fast		
4	BLUETOOTH	Wireless Bluetooth. (name: FX-4CR) 0. OFF 1. ON		
5	RIT_PTT	The RIT can be used as PTT when you want to use internal microphone. 0. OFF (RIT as RIT) 1. ON (RIT as PTT)		
6	ENCODE_FREQ	The tuning step automatically changes, depending on the TUNE rotating speed. 0. current step * 1 1. current step * 2 2. current step * 3 3. current step * 4 4. current step * 5 5. current step * 6		
7	TX_FILTER	TX Filter Bandwidth: 0. 1.5kHz 1. 1.8kHz 2. 2.1kHz 3. 2.4kHz 4. 2.7kHz 5. 3.0kHz		

7 - Data communication

7.1 - USB and Bluetooth Cat control

- When you connect bluetooth with FT8CN (an Android based FT8 software) the transceiver appear as 'FX-4CR'. On FT8CN settings set Rig to FX-4CR or TS-590 and Control, refer to FT8CN (For detailed settings).
- When you connect the transceiver to the computer with the supplied USB cable, one COM port and one AUDIO port are recognized on the computer.
On digital mode software set Rig to Kenwood TS-590S, Baud Rate to 115200 and PTT to RTS.

7.2 - Digital mode operation

- Connect the USB cable to the transceiver and the computer and turn on the transceiver.
- Verify that the computer detects the USB cable.
- Set digital mode by pressing **SSB** until DIG_U appear at the top of the screen.
(The speaker should be muted and the filter will be set to 3.0 kHz).
- Set the Volume to 3 by turning **VOL**
- Set the computer audio output volume to 50%.
- Open the digital mode software and adjust the settings.

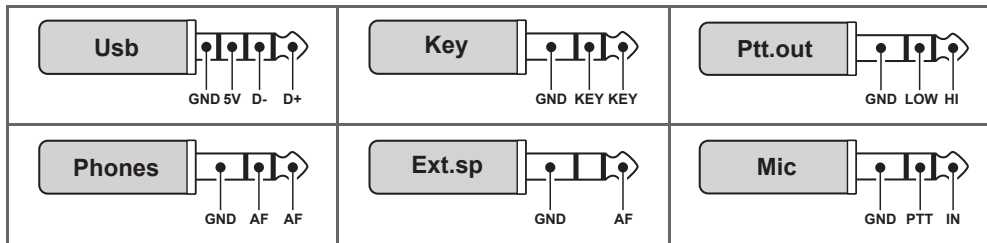
7.2.1 - Setup for WSJT-X

1. Go to File -> Settings -> Radio
2. Select TS-590S for RIG. Select the COM port for the USB connection. Choose RTS mode for PTT and test PTT.
3. Select USB audio sources for input and output under Sound Card settings.
4. Monitor WSJT-X cascade to verify FT8 signals are visible.
5. Check received audio power using dB meter at bottom to left of the WSJT-X main screen.
6. Adjust **VOL** until it reads about 60 dB.
7. Select a free frequency on the band and start transmitting.
8. Monitor the power meter during transmission.
9. Adjust the mic gain to achieve output power close to the power setting selected in the power menu.

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 power.
 - CW mode uses less than 10W of power.
 - FT8 power usage is limited to 5W.

8 - Connectors



Ptt.out, LOW: low level when transmit, HI: high level when transmit.
 (LOW and HI are the complement to adapt with different PA, TTL level)

9 - Firmware update

Important

- Plug the USB cable on the FX-4CR side first, and then plug the computer side.
- Unplug the USB cable on the computer side, and unplug the USB cable on the FX-4CR side, in the reverse order as the first time.
- Be sure to follow the entire sequence closely to avoid damage to your computer.

On the transceiver

1. Start by connecting computer and transceiver in respect of procedure.
2. Press and hold **F** first, then press **PWR** and then release **F** and **KEEP HOLDING PWR** (remember not to let go during the entire download process !)
3. After the download is completed, let go **PWR**

On the computer

1. The latest BG2FX firmware: <https://bg2fx.com/downloads>
2. The STM32Cube programming software: <https://www.st.com/en/development-tools/stm32cubeprog.html>
3. Install and run STM32Cube.
4. Select USB from the top right menu of the STM32 Cube application.
5. Click on Connect.
6. Click Download and select the latest firmware file: (Example: FX-4CR_Firmware_V2023.x.xx.hex)
7. Click Start Schedule and wait for the schedule to complete.
8. Once programming is complete, click Disconnect.

Thank you for your support and purchase

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