

FtpBTR — User Manual



Device: **FtpBTR V2**

Firmware version: see splash screen / <http://IP/update> (currently **v2.1.1**)

Vendor: **M2Boxer.by**

This guide covers installation, wiring, daily use, and configuration of the FtpBTR V2 device.

1. Purpose

FtpBTR is a compact bridge between a CNC machine and part programs on a microSD card. It feeds programs into the control over the selected link (FE1, BTR, or RS-232) while remaining reachable from the shop-floor network.

The unit is aimed at controls that take programs from an external reader or a serial link:

- **Heidenhain** — FE / FE1 ports (`mode=fe1`);
- **Fanuc** — parallel tape reader / BTR (typically Series 6 and compatible, `mode=btr`) and RS-232 load (`mode=rs232`);
- **Sinumerik** and other controls with an RS-232 COM port (INPUT / drip-feed) — via `mode=rs232` when line settings match.

Strengths:

- **Programs on the card** — NC files stay on the microSD next to the machine; the control reads them from the device.
- **Wi-Fi + FTP upload** — join the shop Wi-Fi and copy programs from a PC/laptop to the card over FTP without removing the card each time. Machine and computer share the same file set.
- **Network firmware update** — OTA page in a browser (`http://IP/update`).
- **Display + encoder** — status (SD, Wi-Fi, IP), file browser, and transfer start without a PC.

Operating mode is set in `config.ini` on the card:

Mode ([io] mode)	Purpose
<code>fe1</code>	Heidenhain FE / FE1 (CNC selects files)
<code>btr</code>	Fanuc parallel BTR (tape reader)
<code>rs232</code>	RS-232 file send to the control (Fanuc, Sinumerik, etc.)

One **DB25** connector carries both BTR and RS-232 signals; use the matching cable for your mode.

2. Scope of delivery

- **FtpBTR V2** unit (DB25 connector, microSD slot, display and encoder)
- Mating **DB25** connector with hood (for the cable / adapter to the CNC)

Power, DB25 pinout, and machine wiring — see §§3–5.

3. Power

The device can be powered as follows:

Method	DB25 pins	Notes
+24 V (primary)	14 (+24 V) and GND (1 / 3 / ...)	Normal supply from CNC / 24 V PSU
+5 V	2 (+5 V) and GND	Alternate 5 V logic supply

When the unit is powered from **+24 V**, pin **+5 V (pin 2)** can be used as a **5 V output** to supply a small external load (within the board's current budget).

Observe polarity. After applying power, wait for the ready UI (splash → working screen).

4. Installation and first power-up

1. **Prepare a microSD** card (FAT32). On first boot without `config.ini`, the device creates a default file with comments.
2. **Insert the card** fully.

3. **Apply power** (+24 V on pin 14 or +5 V on pin 2, plus GND).
4. Wait for the FtpBTR splash (~3 s), then the working UI.
5. If needed, **edit `config.ini` on a PC** (section 8), reinsert the card, and **reboot** (power cycle or **Reboot** on the OTA page).
6. Connect the machine cable for your mode (section 5).
7. For PC access: set Wi-Fi in `config.ini` and wait for an IP on the top status line.

You may hot-swap the card; the device remounts it. `config.ini` changes apply only after reboot.

Screenshots — first start



Figure 1. Splash screen at boot

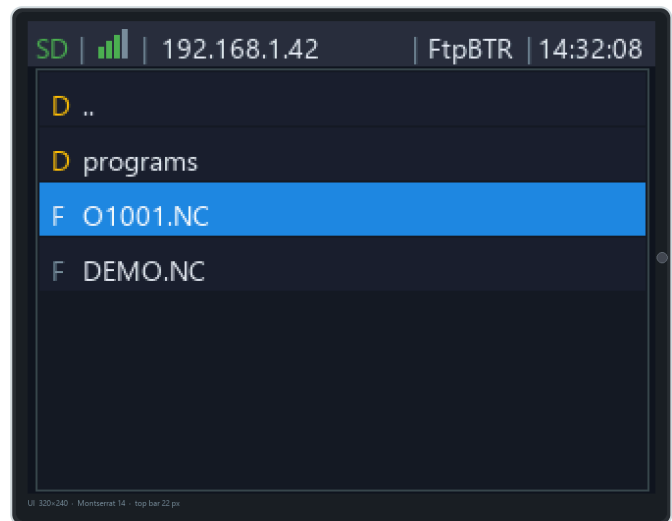


Figure 2. Top status bar (SD, Wi-Fi, IP, hostname, time)

5. Connecting to the machine

The device connector is **DB25** (PCB **J4**), combined BTR + RS-232 (not a standard PC COM/LPT pinout). NC pins are omitted. Power options — see §3.

5.1. DB25 pinout (from schematic)

Row color = function group:

☐ RS-232 ☐ BTR (DATA / SP / RDT) ☐ GND ☐ Power (+5 V / +24 V)

Pin	Signal	Dir*	Signal level	Purpose	FE1	BTR	RS232
1	GND	—	0 V	Ground	●	●	●
2	+5V	—	+5 V	Device supply **or** 5 V output (when powered from 24 V)	○	○	○
3	GND	—	0 V	Ground	●	●	●
5	TX	Out	RS-232 $\pm 5 \dots \pm 15$ V (MAX3232)	Transmit to CNC	●	—	●
9	SPROCKET (_SP)	Out	TTL 5 V	BTR strobe	—	●	—
10	DATA6 (_D6)	Out	TTL 5 V	BTR data bit 6	—	●	—
11	DATA4 (_D4)	Out	TTL 5 V	Bit 4	—	●	—
12	DATA2 (_D2)	Out	TTL 5 V	Bit 2	—	●	—
13	DATA0 (_D0)	Out	TTL 5 V	Bit 0	—	●	—
14	+24V	—	+24 V	Device 24 V supply	●	●	●
15	GND	—	0 V	Ground	○	●	○
16	GND	—	0 V	Ground	○	●	○
18	RX	In	RS-232 $\pm 5 \dots \pm 15$ V (MAX3232)	Receive from CNC	●	—	●
21	RDT (_RDT)	In	TTL 5 V (buffered)	CNC ready	—	●	—
22	DATA7 (_D7)	Out	TTL 5 V	Bit 7 (parity)	—	●	—
23	DATA5 (_D5)	Out	TTL 5 V	Bit 5	—	●	—
24	DATA3 (_D3)	Out	TTL 5 V	Bit 3	—	●	—
25	DATA1 (_D1)	Out	TTL 5 V	Bit 1	—	●	—
SH	GND	—	0 V / shield	Connector shell	●	●	●

* Dir relative to FtpBTR.

● — used in this mode ([io] mode); ○ — present / recommended; — — not required.

FE1 and RS232: TX **5**, RX **18** (shared UART). Flow control is software (XON/XOFF); hardware CTS is not brought out to the connector.

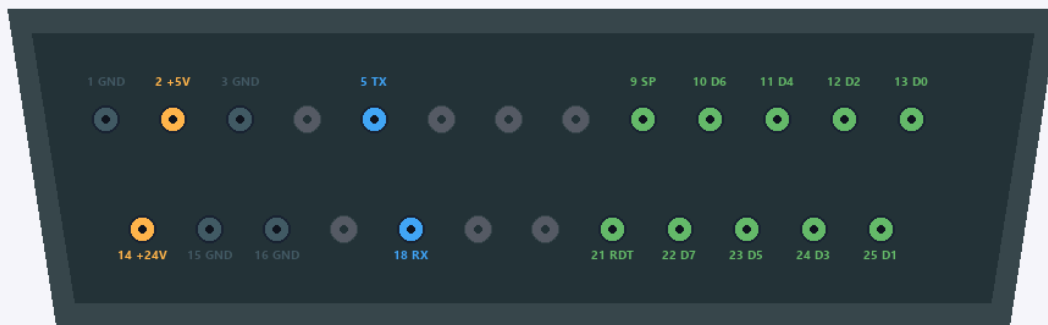
BTR (DATA / SPROCKET / RDT): TTL **5 V**; D0...D6 data, D7 parity. Schematic NC: 4, 6, 7, 8, 17, 19, 20.

FtpBTR · DB25 (J4) — schematic pinout

Power: +24 V (pin 14) or +5 V (pin 2).

When powered from 24 V, the +5 V pin can be used as a 5 V output.

TX=5 RX=18 · unused (NC) pins are not labeled



- RS-232 TX(5)/RX(18) — MAX3232
- BTR — DATA / SPROCKET / RDT (TTL 5 V)
- Power — +5 V (2) / +24 V (14)
- GND

Cable A (BTR): 9–13, 21–25, GND 1/3/15/16

Cable B (RS-232/FE1): TX=5, RX=18, GND; power pin 14 or 2

Shell (SH) = GND

Figure 3. DB25 pinout from schematic J4

5.2. Which cable to use

Cable	Mode	DB25 pins	Machine side
A (BTR)	<code>mode=btr</code>	DATA/SP/RDT: 9–13, 21–25; GND: 1/3/15/16; shell SH; opt. +5V: 2	tape-reader port
B (RS-232)	<code>mode=rs232</code> or <code>fe1</code>	TX 5 , RX 18 , GND 1/3 ; power — pin 14 (+24 V) or 2 (+5 V)	COM / FE port

5.3. Mode quick-start

Heidenhain (`fe1`)

RS-232 cable to FE/FE1. Line is typically **9600 7E1**. The CNC requests directory and files from SD (`nc_dir`).

Fanuc BTR (`btr`)

Cable A to the tape reader. On the display: select file → long press to send. Control in TAPE / drip-feed.

RS-232 (`rs232`)

Cable B to the COM port. `[rs232]` UART settings must match the control.

Examples:

- Fanuc often: `7E2` , `xonxoff=1` , `char_parity=N`

- Sinumerik 3T (ISO, avoid alarm 271): `data_bits=8`, `parity=N`, `stop_bits=2`, `char_parity=ISO`; MD without UART parity

6. Display and encoder

6.1. Top status bar

SD | Wi-Fi | IP | hostname | time

- **SD** — card ready / not ready
- **Wi-Fi** — signal strength
- **IP** — address for FTP and OTA
- **Time** — after NTP sync; otherwise `--:--:--`

6.2. Bottom bar (transfer)

Shown during transfer / in FE1 mode:

mode |  | mm:ss | progress % | #N

Element	Meaning
Mode	FE1 / BTR / RS232
Icon	sending / pause / wait / stop / done / error
mm:ss	active transfer time (frozen while paused)
%	file progress
#N	BTR completed pass count

6.3. Encoder actions

Action	File browser (BTR / RS232)	File view	FE1
Rotate	move in list	scroll lines	scroll log
Short click	open folder / file	back to list or pause/resume while sending	—
Long press	(RS232) create receive stub*	start send ; while paused — abort	—

* Full RS232 punch receive is limited; stub is created under `receive_dir`.

In **FE1** mode the screen shows the link log, not the file browser.

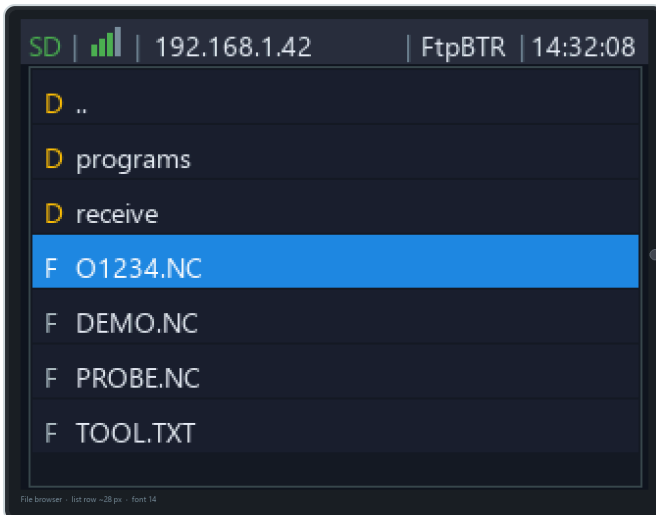


Figure 4. File browser (BTR / RS232)

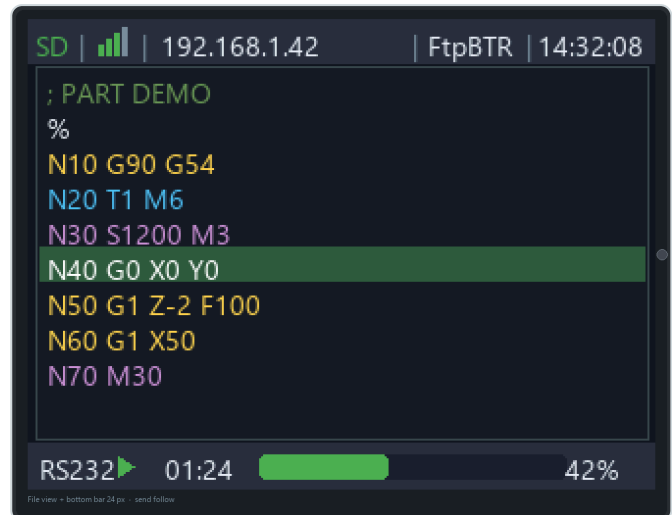


Figure 5. File view with transfer progress



Figure 6. FE1 connection log

7. Files and network

7.1. microSD

- Format: FAT/FAT32.
- Place programs in the root or under `nc_dir` / your folders.
- `config.ini` is hidden in the on-device browser.

7.2. FTP

With Wi-Fi and SD:

- Host: IP from the display; port from config (often **21**)
- User / password: `[ftp]` section
- Copy NC files from a PC — the CNC and the device share the same card

7.3. Firmware update (OTA)

Browser: `http://<IP>/update`

Credentials: same as FTP.

On the page:

- upload `.bin`
- **Reboot** button
- time, uptime, transfer progress

While a CNC transfer is active, **Update and Reboot are blocked**. Do not remove power during flashing.

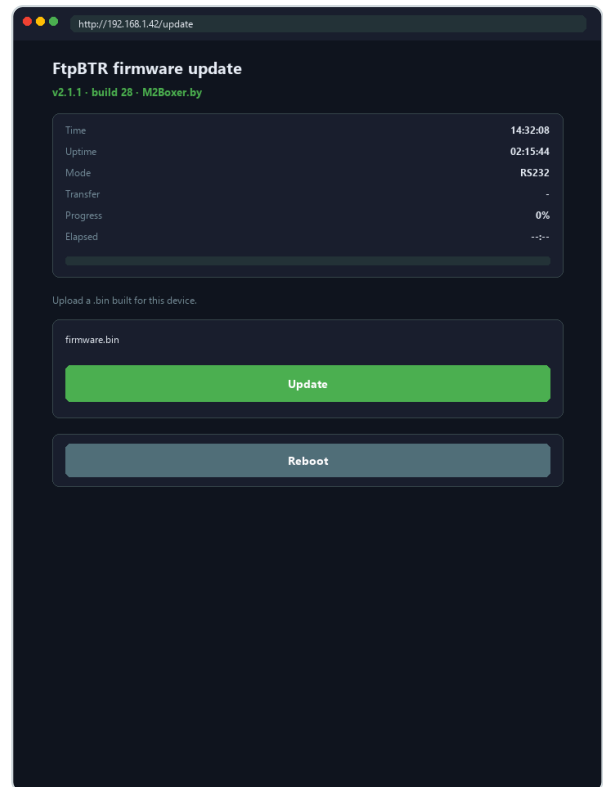


Figure 7. Web OTA page

8. Configuration (`config.ini`)

Path on the card: `/config.ini`.

- Edit on a PC (Notepad / VS Code).
- After saving, reinsert the card and **reboot**.
- If missing, a commented default file is created.
- Legacy `btr.ini` is renamed to `config.ini` at boot.

8.1. Sections

[wifi]

Key	Description
<code>ssid</code>	network name
<code>password</code>	Wi-Fi password

[ftp]

Key	Description
<code>user</code>	FTP and OTA login
<code>password</code>	password
<code>port</code>	usually 21

[network]

Key	Description
<code>dhcp</code>	<code>1</code> = DHCP, <code>0</code> = static IP
<code>hostname</code>	short name (UI + Wi-Fi)
<code>ip</code> , <code>gateway</code> , <code>subnet</code> , <code>dns1</code> , <code>dns2</code>	when <code>dhcp=0</code>

[ntp]

Key	Description
<code>server1</code> , <code>server2</code>	time servers
<code>gmt_offset_sec</code>	UTC offset in seconds (e.g. <code>10800</code> = UTC+3)
<code>daylight_offset_sec</code>	DST (usually <code>0</code> or <code>3600</code>)

[paths]

Key	Description
<code>nc_dir</code>	FE1 file root (often <code>/</code>)
<code>receive_dir</code>	RS232 incoming folder (e.g. <code>/receive</code>)

[io]

Key	Description
<code>mode</code>	<code>fe1</code> <code>btr</code> <code>rs232</code>

[fe1]

Key	Description
<code>baud</code>	baud rate (often 9600)
<code>ack_timeout_ms</code>	ACK wait
<code>max_retries</code>	NAK/timeout retries
<code>uart_log</code>	<code>1</code> = FE1 traffic to Serial

FE1 link in firmware: **7E1**.

[rs232]

Key	Description
<code>baud</code>	baud rate
<code>data_bits</code>	5...8
<code>parity</code>	UART: <code>N</code> / <code>E</code> / <code>O</code>
<code>stop_bits</code>	1 or 2
<code>xonxoff</code>	<code>1</code> = software handshake
<code>char_parity</code>	<code>N</code> / <code>ISO</code> / <code>EIA</code> — character parity in bit7 (see Sinumerik above)

With `char_parity=ISO` or `EIA`, the device forces **8** data bits.

[btr]

Key	Description
<code>data_invert</code>	invert DATA after encode
<code>rdt_active_high</code>	<code>1</code> = RDT HIGH means CNC ready
<code>sprocket_active_high</code>	<code>1</code> = SPROCKET active HIGH; <code>0</code> = FtpBtr V1 (active LOW)
<code>sprocket_us</code>	pulse width, μ s (often ~1000)
<code>data_setup_us</code>	delay after DATA before SPROCKET

BTR byte: D0...D6 = data, D7 = parity (FtpBtr V1 style).

[ui]

Key	Description
<code>gcode_highlight</code>	color G/M/T/comments in file view
<code>send_follow</code>	auto-scroll current line while sending

8.2. Minimal example

```
[wifi]
ssid=SHOP_WIFI
password=*****

[ftp]
user=cnc
password=cnc
port=21

[network]
dhcp=1
hostname=FtpBTR

[io]
mode=rs232

[rs232]
baud=9600
data_bits=8
parity=N
stop_bits=2
xonxoff=1
char_parity=ISO
```

Then reboot.

9. Safety and troubleshooting

Symptom	Check
No SD / "SD not ready"	card seated, FAT32, contacts
No IP	ssid / password , DHCP, AP range
CNC rejects RS232	baud/parity/stop, cable B: TX=5 RX=18 GND; Sinumerik: char_parity=ISO + 8N2
Parity alarm on control	do not mix UART line parity and ISO character parity
BTR stalls	cable A, RDT/SPROCKET polarity in [btr] , TAPE mode on control
Config "did nothing"	reboot after editing config.ini
OTA/Reboot greyed out	CNC transfer in progress — wait or abort

10. Quick checklist

1. Power: **+24 V (pin 14)** or **+5 V (pin 2)** + GND.
2. Card with programs and config.ini .

3. `[io] mode` + cable A (BTR) or B (RS-232 / FE1).
4. RS-232: **TX=5, RX=18**; BTR: DATA/SP/RDT per §5.1.
5. Encoder: select file → long press to send; short press to pause.
6. FTP / OTA — IP from the display, FTP credentials.
7. Settings change — edit `config.ini` + reboot.