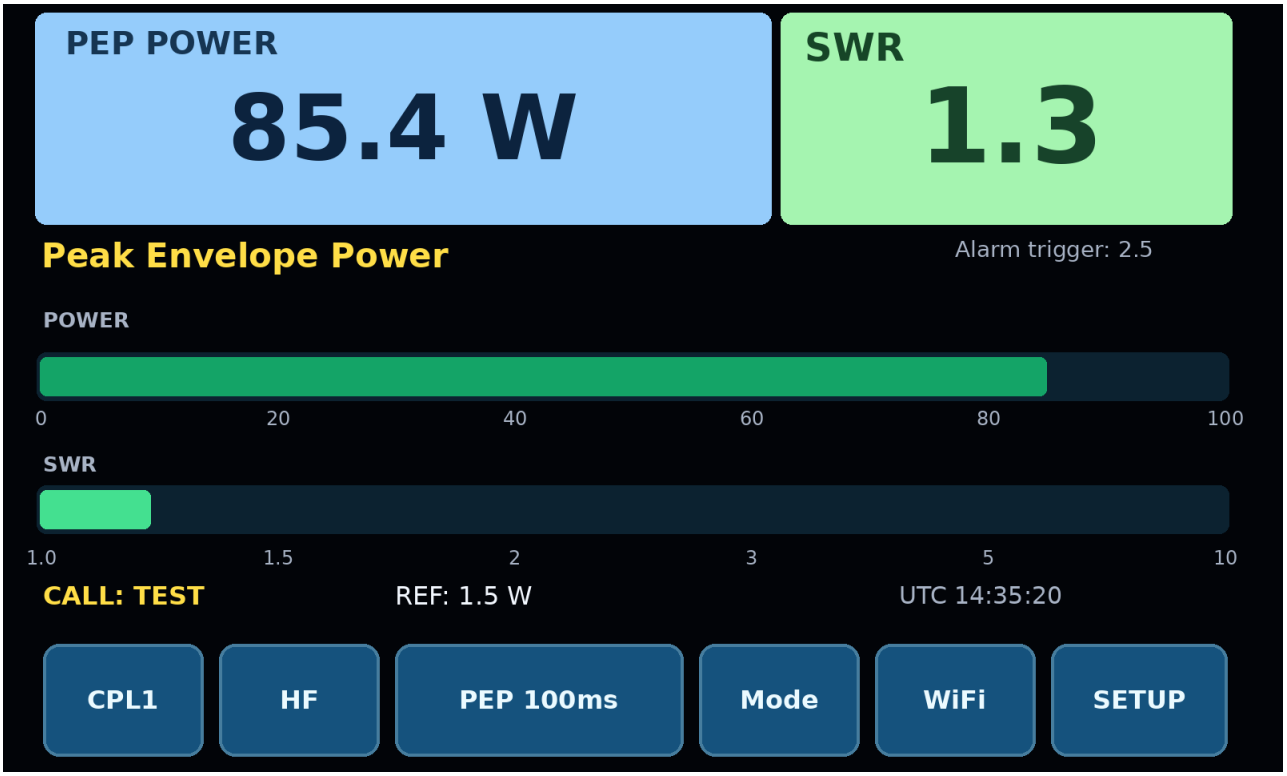
DR-250 Dual

POWER & SWR METER

Illustrated user manual | Touchscreen + Web + USB



800 × 480 touchscreen • representative values • source-based screen illustration

Up to eight calibration sets

Edition 1.0 | 12 November 2026

NOTE The archive contains firmware and browser source, not hardware photographs. LCD images in this manual are carefully reconstructed illustrations, not photographs of a powered-on unit. Browser and desktop images are genuine renders of the included interface with illustrative test values.

01 First use

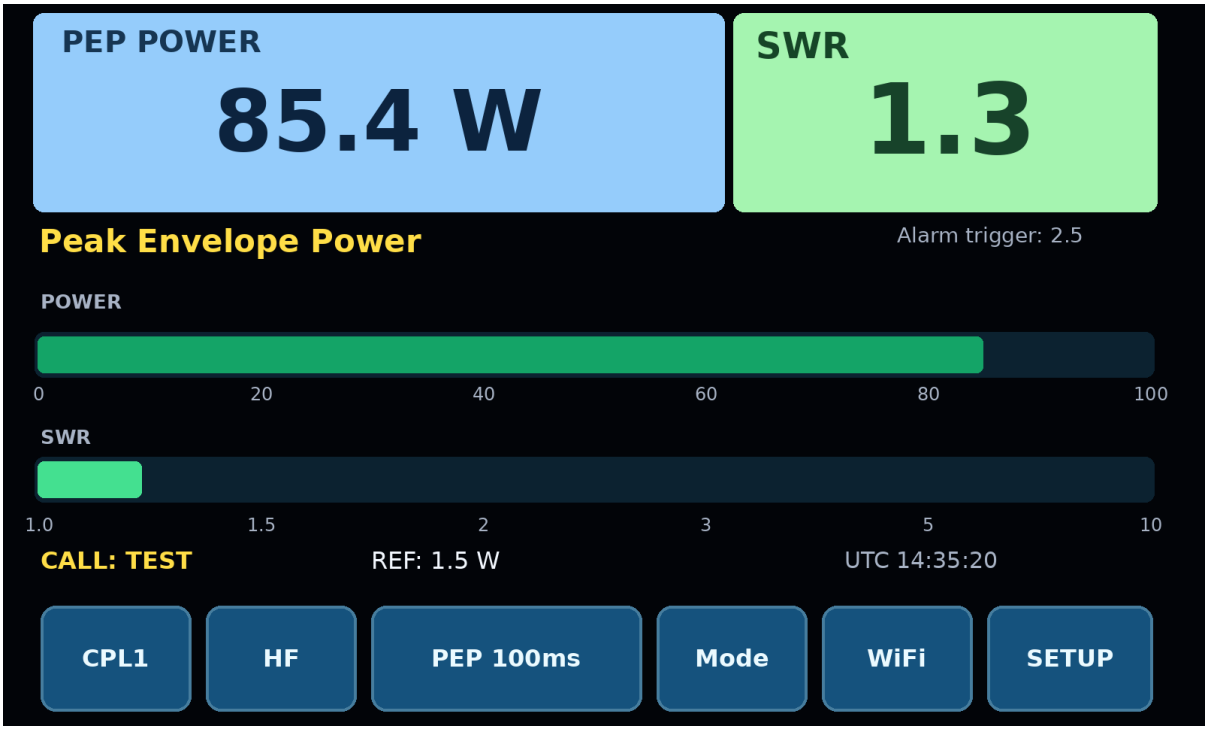
Connect the meter, choose the correct coupler and band, then begin measuring.

Before switching on

- Connect the directional/tandem-match coupler correctly between the RF source and the load or antenna. Respect the ratings of your own coupler and load.
- Use the power supply and connections specified for your assembled LJ-2000M hardware. The firmware archive is not a complete electrical installation guide.
- Do not transmit into an unverified or open load. Keep RF power low while checking installation and calibration.

Quick start

1. Power the meter and allow the touchscreen to start.
2. Tap CPL1 or CPL2 to select the installed coupler.
3. Tap the band button (HF / 6M / 2M / 70cm) until the required band is shown.
4. Apply a small, known RF signal, observe POWER and SWR, and increase power only after the readings appear plausible.
5. Tap MODE to choose the preferred readout, or PEP to change the peak measurement period.

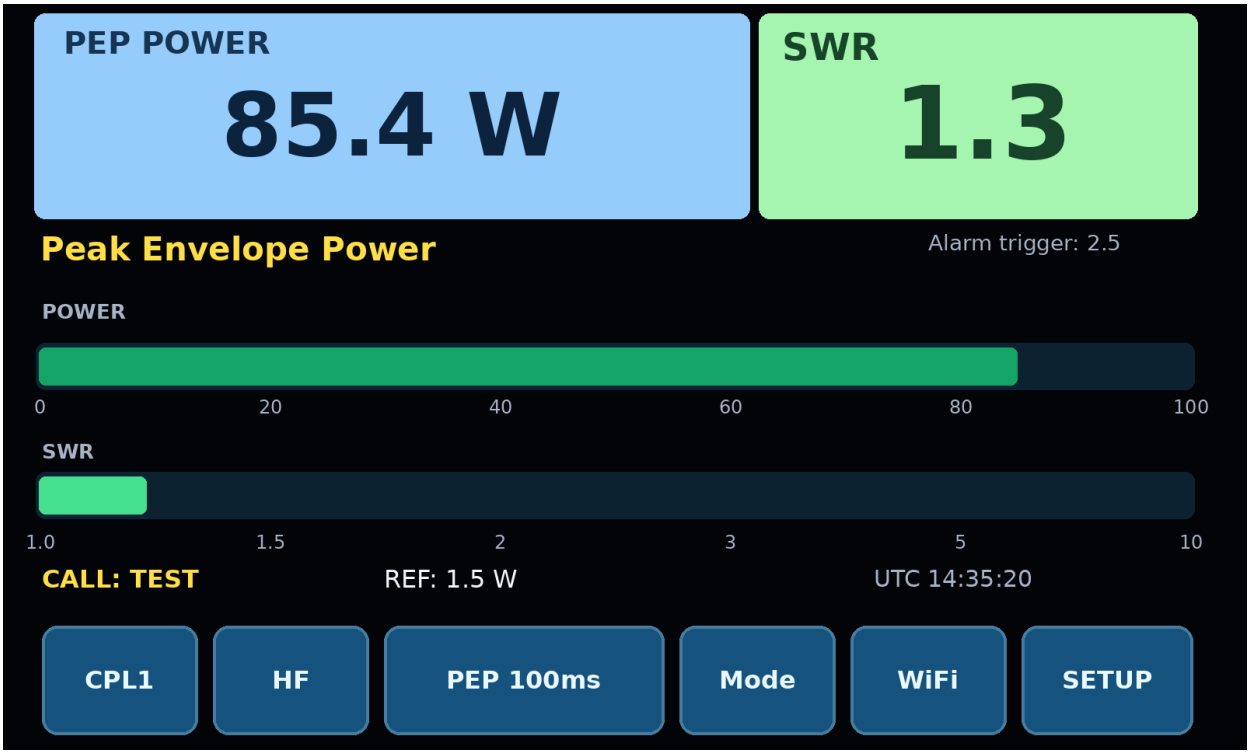


Typical LCD main screen. The numerical readings shown are examples.

IMPORTANT A correct band/coupler setting selects the corresponding stored calibration. Using the wrong one may produce incorrect readings.

02 Main measurement screen

The six large buttons are aligned along the bottom edge of the meter.



Main touchscreen: CPL, BAND, PEP, Mode, WiFi and SETUP.

Control	Function
CPL1 / CPL2	Switch between coupler 1 and coupler 2.
HF / 6M / 2M / 70cm	Cycle through enabled operating bands.
PEP 100ms / 1sec / 2sec	Select the peak-envelope measurement period.
Mode	Cycle between the four available display modes.
WiFi	Open connection information and ESP32 controls, if Wi-Fi is enabled.
SETUP	Open the Configuration Menu.

The top-left area is the main power readout; the top-right area shows SWR. The bar graphs show power and SWR on automatic scales. A red SWR alarm indication means the configured SWR threshold is exceeded while enough power is present.

NOTE Touchscreen controls generally activate when the finger is released. A slide off the button cancels the action.

03 Display modes and readings

Press MODE to select	What you see
1 — Peak Envelope Power	Large PEP power, power/SWR bar graphs and reflected power.
2 — Forward & Reflected	Forward and reflected power bar graphs with SWR.
3 — Power in dBm	Power in dBm, PEP information and bar graphs.
4 — Modulation Scope	A time-based modulation/power trace with related readouts.

Reading the displayed quantities

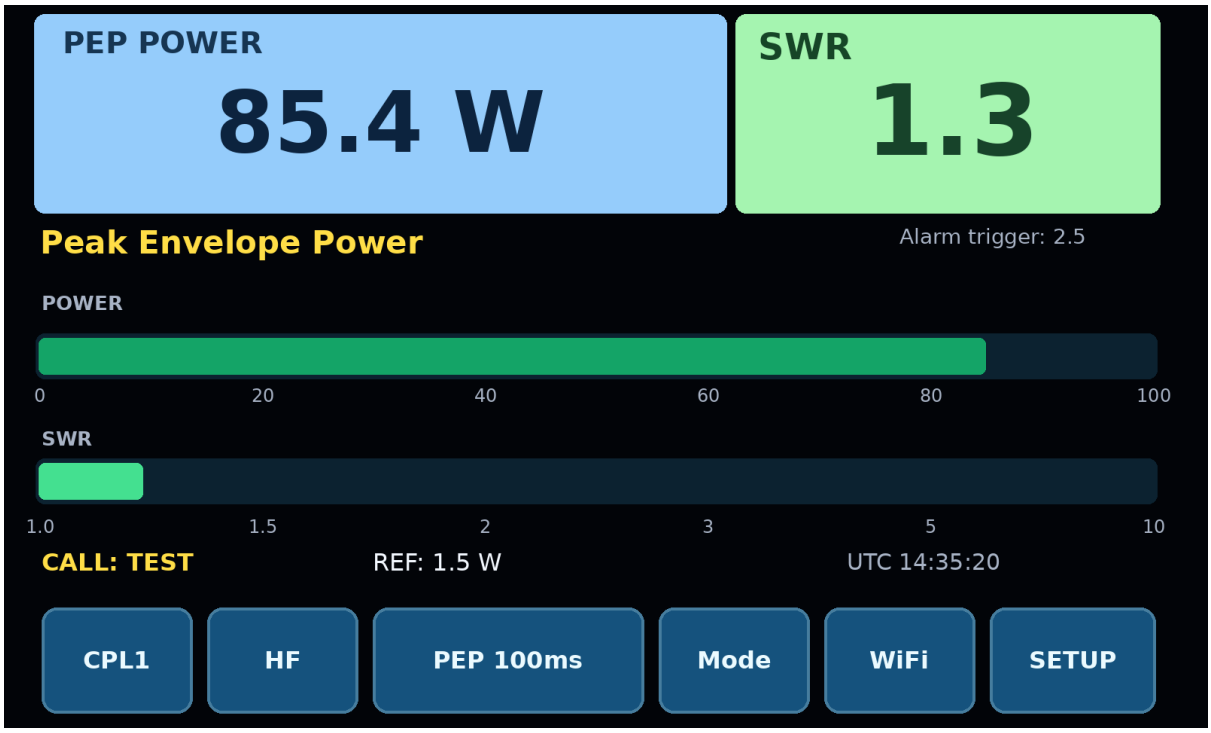
- POWER/PEP: peak-envelope RF power measured over the selected PEP interval.
- SWR: standing-wave ratio, a measure of mismatch between load and transmission line.
- REF: reflected power returned toward the transmitter.
- dBm: logarithmic RF power level, referenced to 1 milliwatt.
- Band, coupler and PEP settings are independent: verify all three before comparing results.

Selecting a PEP interval

Repeatedly tap PEP to cycle through 100 ms, 1 second and 2 seconds. Short intervals respond more quickly; longer intervals can retain slower peaks. The displayed button text confirms the current setting.

If a reading looks incorrect

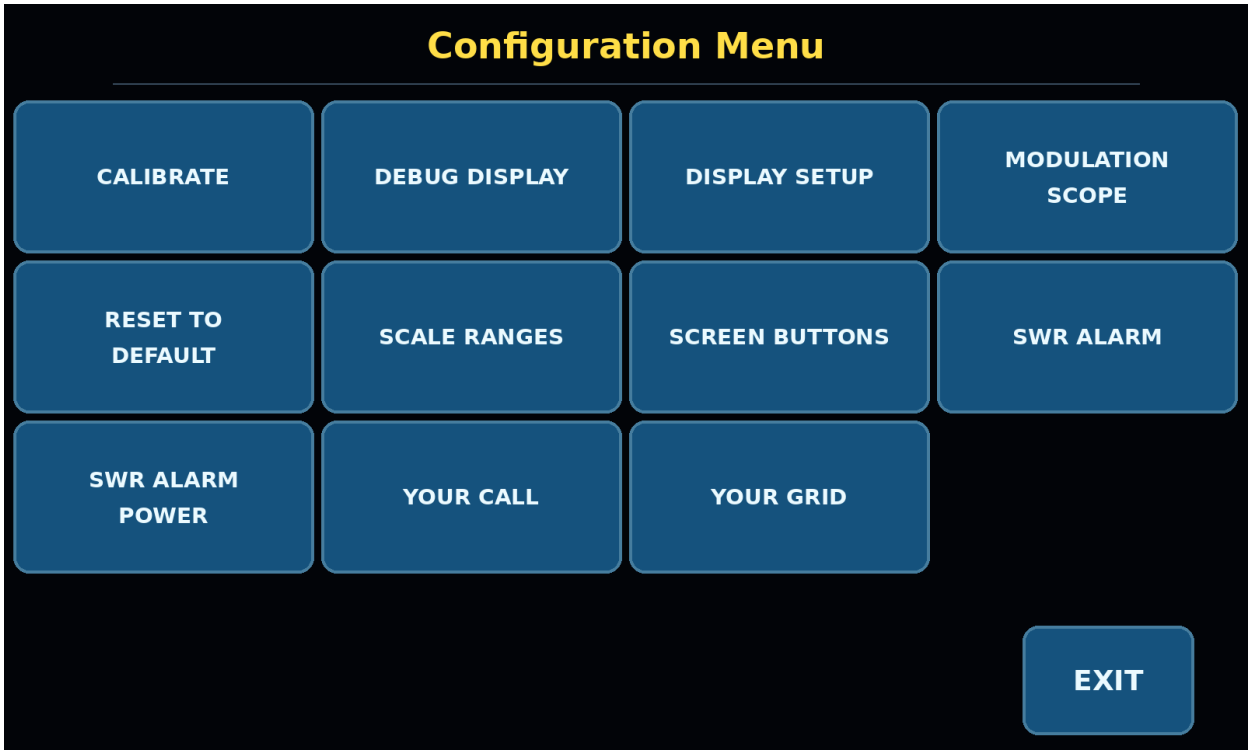
First check the coupler orientation, selected band, selected coupler and calibration. Remember that the displayed SWR depends on the selected alarm settings and on the quality of the forward/reverse measurements.



PEP/SWR view used as a reference for the four display modes.

04 Configuration Menu

Tap SETUP on the main screen.

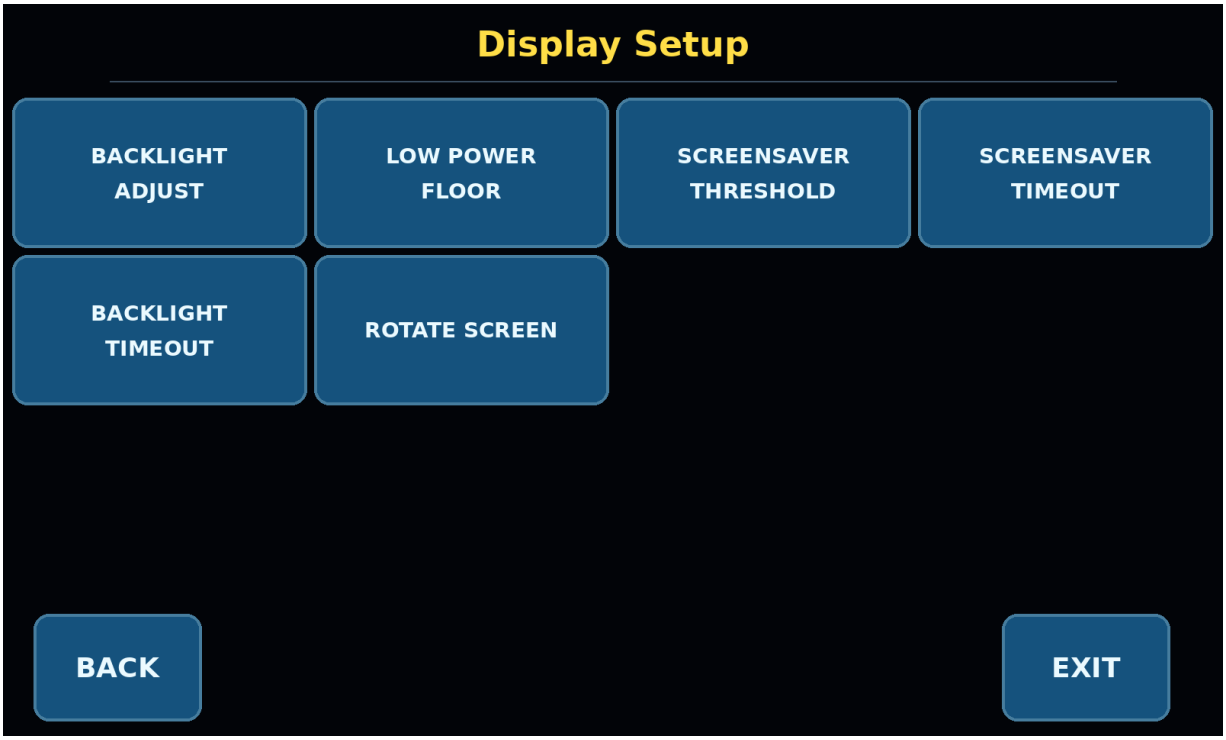


Top-level Configuration Menu, reconstructed from the firmware menu definitions.

Menu	Purpose
CALIBRATE	Store coupler calibration points.
DEBUG DISPLAY	View raw/detailed diagnostic readings.
DISPLAY SETUP	Backlight, screensaver, floor, screen rotation.
MODULATION SCOPE	Choose the modulation scope timebase.
RESET TO DEFAULT	Restore factory defaults (confirmation required).
SCALE RANGES	Change automatic power-bar scale ranges.
SCREEN BUTTONS	Enable/disable the band buttons and WiFi button.
SWR ALARM / SWR ALARM POWER	Configure mismatch alarm threshold and minimum power.
YOUR CALL / YOUR GRID	Edit callsign and grid text using the touch keyboard.

NOTE SAVE stores changes where supported; BACK returns without saving; EXIT leaves setup for the main screen. A submenu may show only BACK and EXIT until a setting is edited.

05 Display Setup



Display Setup: six screen-related options.

Setting	Available values / effect
BACKLIGHT ADJUST	Brightness 1–10.
LOW POWER FLOOR	Off / 1 µW / 10 µW / 100 µW / 1 mW / 10 mW equivalents.
SCREENSAVER THRESHOLD	Off, 1 µW, 10 µW, 100 µW, 1 mW or 10 mW.
SCREENSAVER TIMEOUT	1–60 minutes.
BACKLIGHT TIMEOUT	0–60 minutes; 0 disables the timeout.
ROTATE SCREEN	STANDARD or FLIPPED.

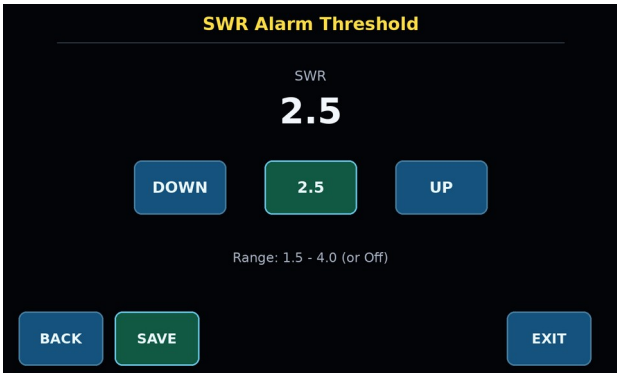
To change a numeric value

Choose the option, then tap DOWN or UP, or tap the displayed value to open the numeric keypad. Confirm with SAVE; BACK discards edits. Brightness changes can preview immediately before being saved.

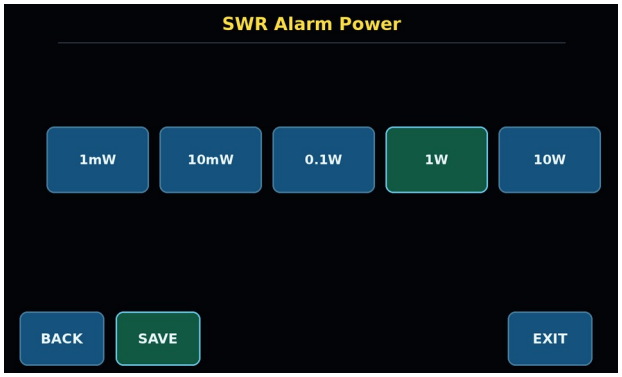
Power floor vs screensaver threshold

The low-power floor controls how very small readings are presented. The screensaver threshold determines when the meter considers incoming RF power low enough to idle; the timeout controls how long it remains idle before the screensaver activates.

06 SWR alarms and front-panel buttons



SWR threshold setting (example 2.5).

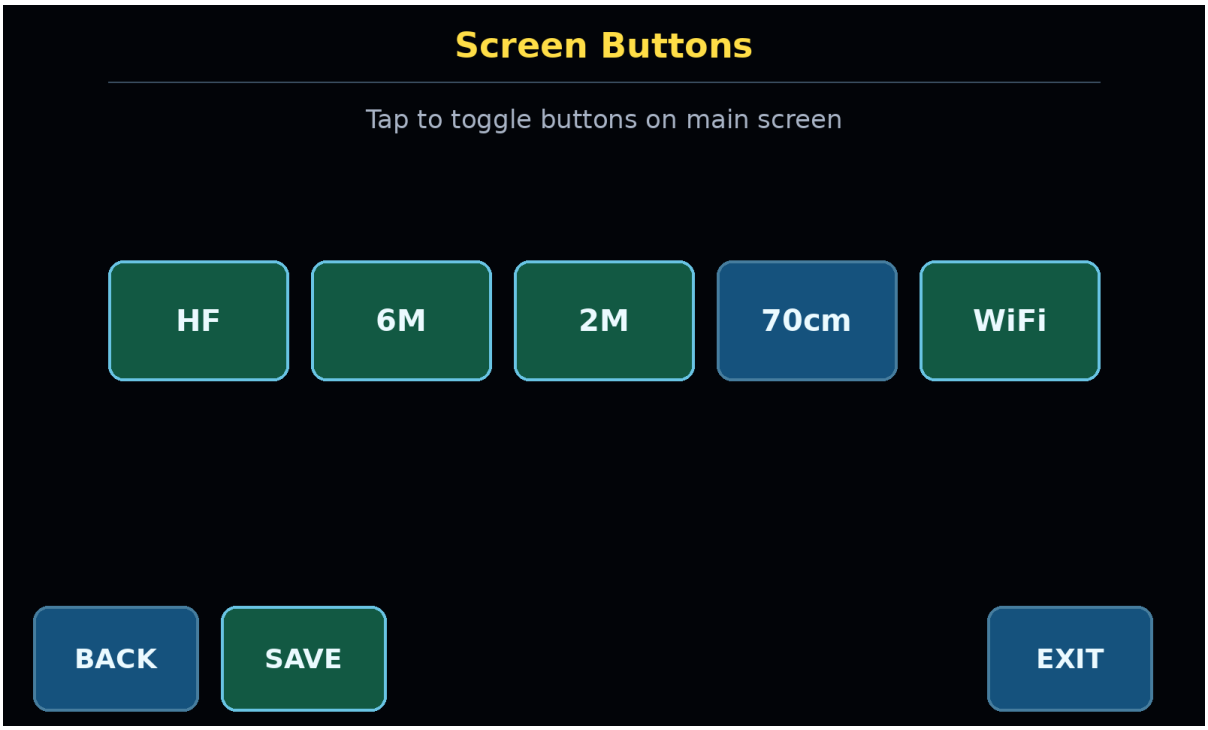


SWR alarm minimum-power setting (example 1 W).

Configure the mismatch alarm

1. Open SETUP → SWR ALARM, select the desired threshold from 1.5 to 4.0, or select Off. Press SAVE.
2. Open SETUP → SWR ALARM POWER and select 1 mW, 10 mW, 0.1 W, 1 W or 10 W. Press SAVE.
3. Apply a safe test signal to verify the alarm behavior. The alarm is intended as an indication, not a substitute for independent transmitter protection.

Show or hide band and Wi-Fi buttons

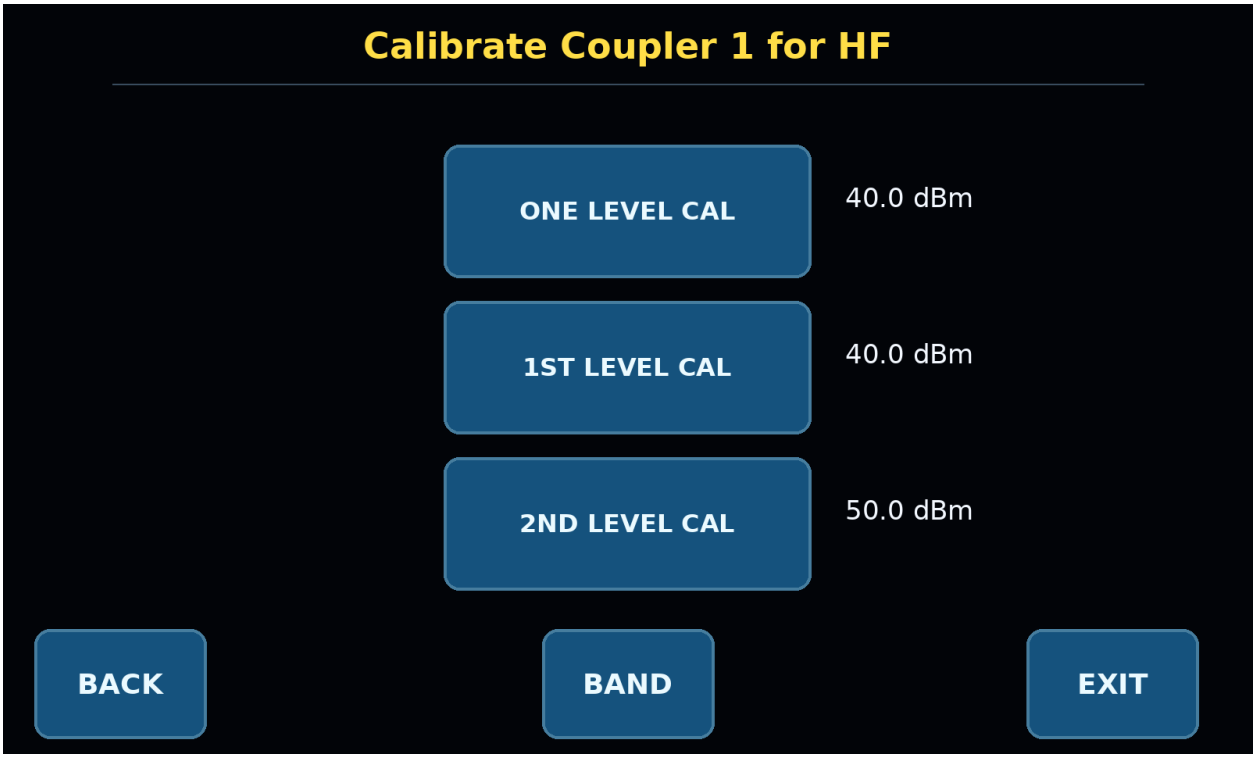


SCREEN BUTTONS: green indicates an enabled selection in this illustration.

Choose SETUP → SCREEN BUTTONS. Tap HF, 6M, 2M, 70cm or WiFi to toggle availability, then press SAVE. The main BAND button cycles through enabled bands; if all are disabled, firmware restores the HF choice.

07 Calibration: choose a coupler

Only calibrate with known, stable RF power and a correctly connected load.



Calibration menu for HF coupler 1; stored dBm values shown as examples.

Understand the eight calibration sets

Band	Coupler 1	Coupler 2
HF	Set 1	Set 2
6 m	Set 3	Set 4
2 m	Set 5	Set 6
70 cm	Set 7	Set 8

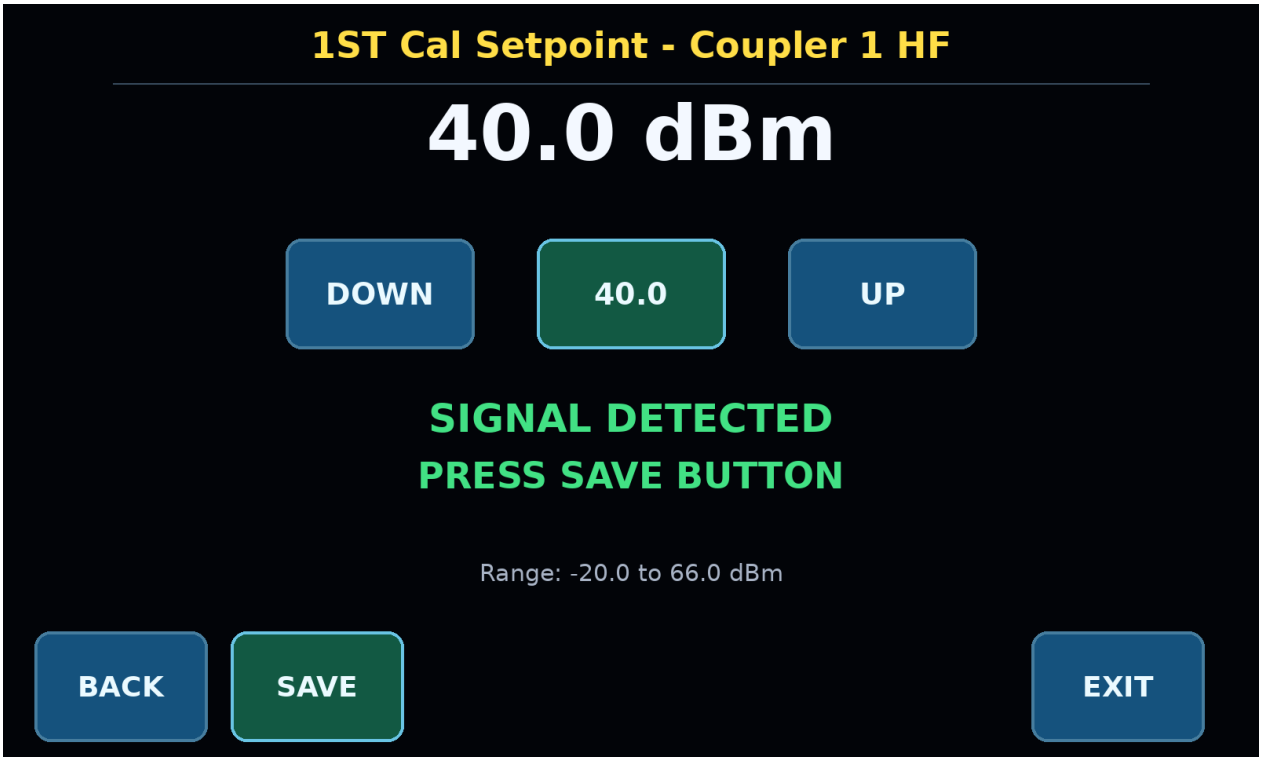
Open SETUP → CALIBRATE. Tap BAND to move through all eight band/coupler combinations. The heading confirms the selected coupler and band. The stored first- and second-level values appear alongside the buttons.

Choose a method

ONE LEVEL CAL uses a single known calibration level and computes the second point from the configured detector slope (30 dB apart). For a more accurate log-amplifier calibration, use 1ST LEVEL CAL followed by 2ND LEVEL CAL with two accurately known RF levels.

IMPORTANT These are stored measurement calibrations, not merely screen-number adjustments. The RF input and directional detector must be operating correctly before saving.

08 Calibration: capture the setpoint



1ST level setpoint. Example reading and healthy forward signal.

1. Choose the correct band/coupler in the previous calibration screen.
2. Apply a known, stable RF power level using a suitable load and measurement reference.
3. Tap ONE LEVEL CAL, 1ST LEVEL CAL or 2ND LEVEL CAL.
4. Tap DOWN/UP or the green numeric value button to enter the reference level in dBm (range −20.0 to +66.0 dBm).
5. Check the live signal message. With an accepted signal, SAVE becomes available; tap SAVE and wait for VALUE STORED.
6. For two-point calibration, change the generator to a distinct second known level and repeat using 2ND LEVEL CAL.

Understand the on-screen signal status

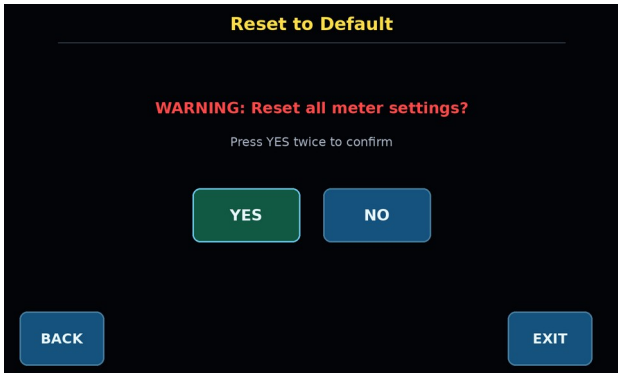
Message	Meaning / action
SIGNAL DETECTED	Forward signal present; SAVE is enabled.
REVERSE DETECTED	Reverse signal present; verify coupler direction and the intended calibration path before saving.
POOR SIGNAL QUALITY	Signal difference insufficient; SAVE remains unavailable.

IMPORTANT The reference level is displayed in dBm. 0 dBm = 1 mW; 30 dBm = 1 W; 40 dBm = 10 W. Ensure the calibration source and coupler are rated for the applied power.

09 Scale ranges and reset



Power bar scaling selection.



Reset confirmation, requiring two YES taps.

Automatic power-bar scale

Choose SETUP → SCALE RANGES and select the first, second or third range value. Change it with DOWN/UP or the numeric keypad. SAVE stores the value. These values control the preferred progression of automatic bar-graph full-scale ranges; change them only if you understand the intended scaling.

Reset to defaults

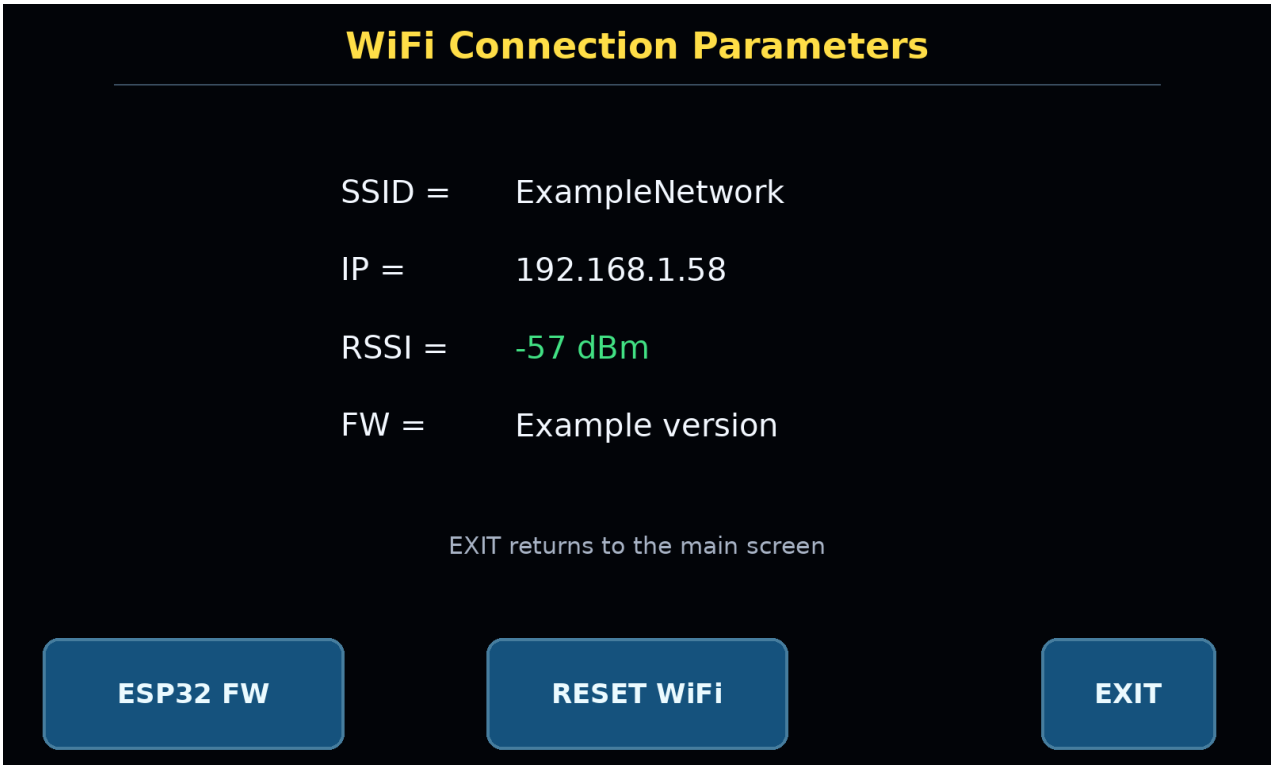
Choose SETUP → RESET TO DEFAULT. The firmware requires pressing YES twice before clearing the saved configuration and rebooting. NO or BACK avoids the reset.

IMPORTANT Before reset or firmware updates, download both the meter configuration and calibration data to a safe location. A factory reset can remove personalized settings and calibration.

Other setup options

MODULATION SCOPE sets the scope interval (40–400 ms or 800 ms). YOUR CALL and YOUR GRID open the touchscreen keyboard. DEBUG DISPLAY is for checking detector and measurement behavior, not normal operating.

10 Wi-Fi connection and meter screen



Device Wi-Fi page. SSID, IP and signal strength are illustrative.

Tap WiFi from the main display when enabled. The page reports the connected SSID, current IP address, RSSI signal level and ESP32 firmware version. EXIT returns to measurement.

Button	Use
RESET WiFi	Reset the Wi-Fi configuration and set up the network again.
ESP32 FW	Enter the bridge/programming flow for ESP32 firmware; requires an external flashing program.
EXIT	Return to the main meter display.

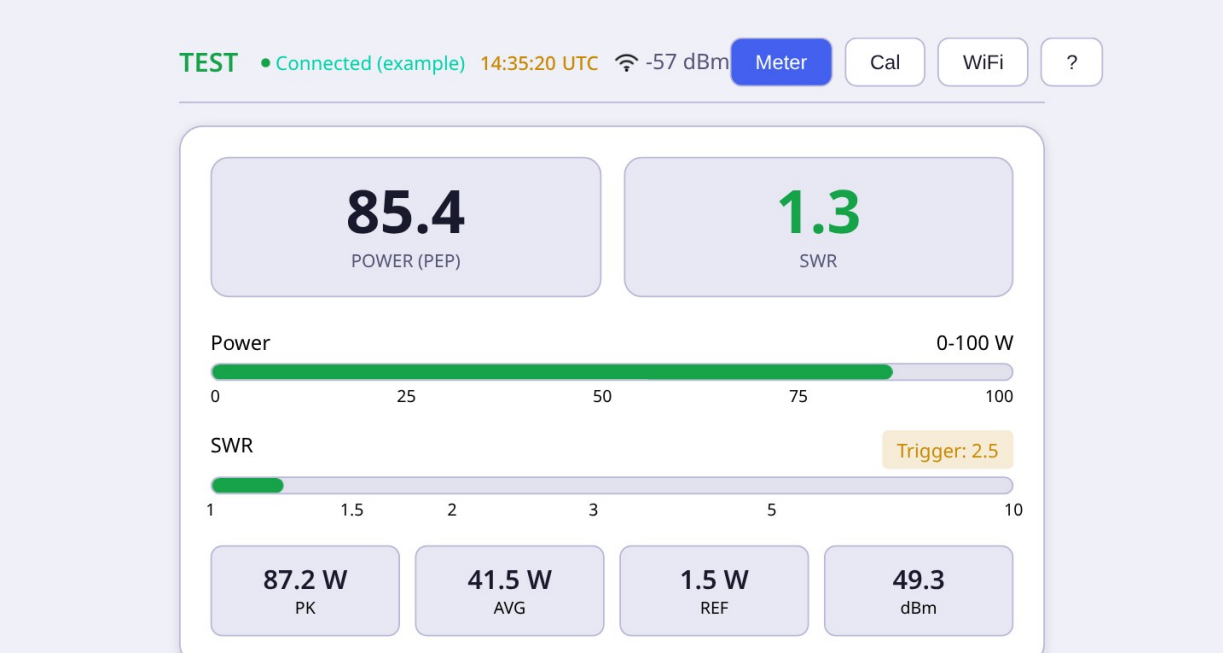
Connecting a browser

1. Use the screen to confirm the meter has a network IP address.
2. On a device on the same local network, try http://powermeter.local (if mDNS is supported).
3. If the hostname is unavailable, enter the IP address shown on the Wi-Fi screen in your browser.

NOTE Updating ESP32 firmware is an advanced operation. Use only a compatible image and preserve configuration backups before starting.

11 Web interface: live meter

The browser interface follows the meter controls and offers additional monitoring options.



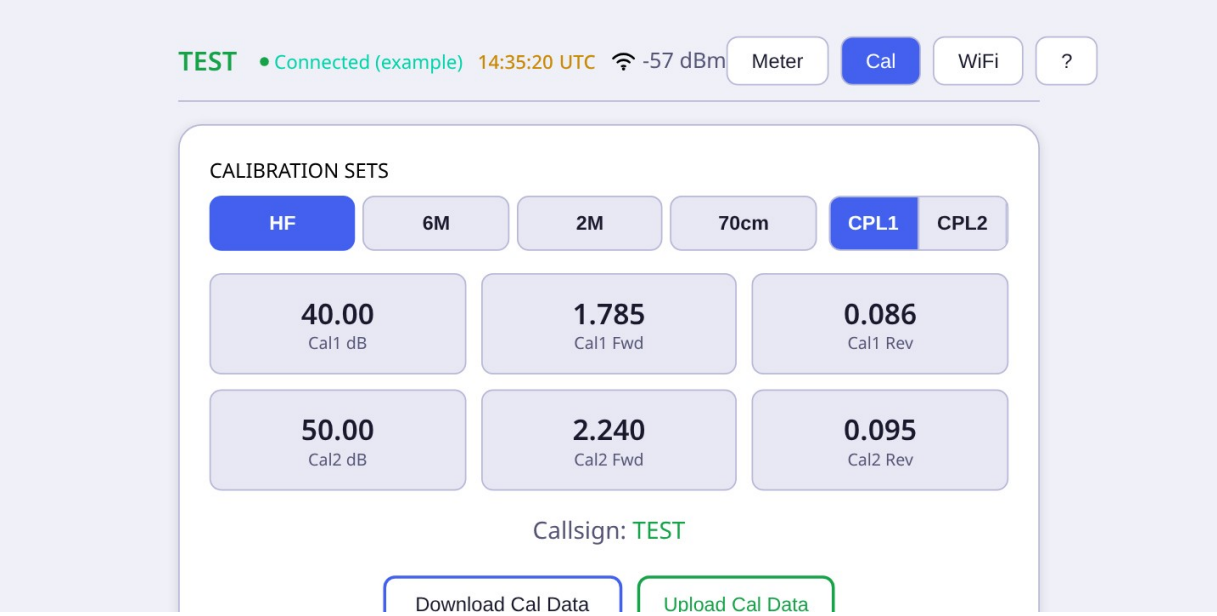
Actual HTML interface rendered from the supplied source; readings are illustrative test data.

What you can do

- Read power, SWR, power-bar scale, peak, average, reflected power and dBm.
- Select HF, 6M, 2M or 70cm directly, and toggle CPL1/CPL2.
- Change the PEP interval (100 ms, 1 s or 2 s).
- Use Peak Hold to retain the highest power peak for the chosen period.
- Switch between dark and light browser themes.
- Use the top navigation: Meter, Cal, WiFi and Help.

Web changes to band, coupler and PEP are sent as commands to the connected meter. Do not assume any browser value is live unless the connection status shows data arriving.

12 Web interface: calibration and backups



Web Cal page, with sample calibration values in the grid.

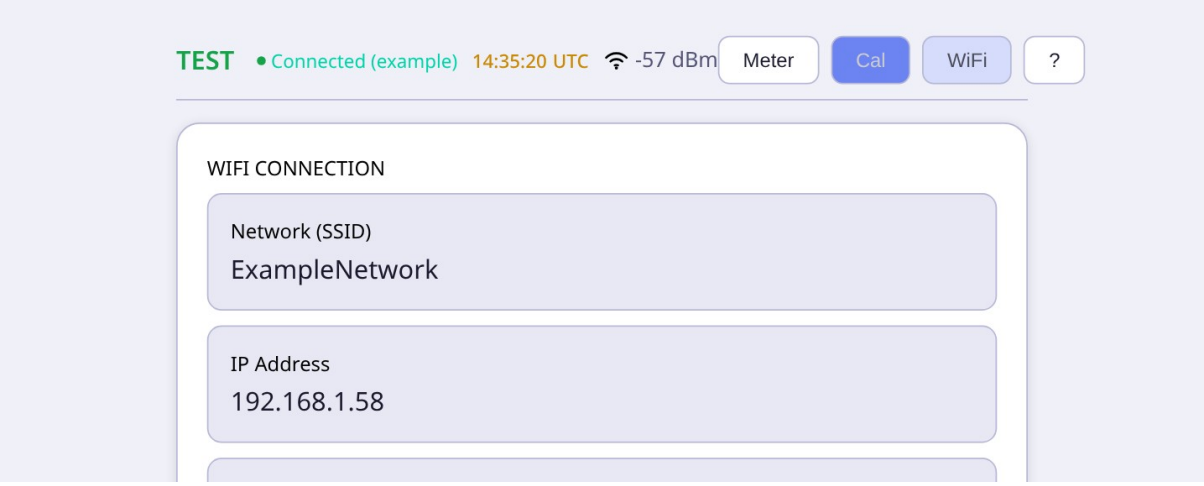
Select a band (HF / 6M / 2M / 70cm), then CPL1 or CPL2 to inspect its calibration data. The six visible quantities are first and second calibration level values and forward/reverse detector values.

Back up before editing

1. Open Cal after the browser has connected to the meter.
2. Select Download Cal Data and save the JSON file to a clearly labeled location.
3. Select Download Config and save the full settings JSON too.
4. Use Upload Cal Data / Upload Config only when restoring a compatible backup; check the current meter afterward.

NOTE Calibration upload and full-config upload are distinct operations. Keep both files, label them with the meter identity and date, and verify RF readings after restoring.

13 Web Wi-Fi and refresh interval



Browser WiFi tab from supplied HTML. Sample network values are not a real connection.

Information shown

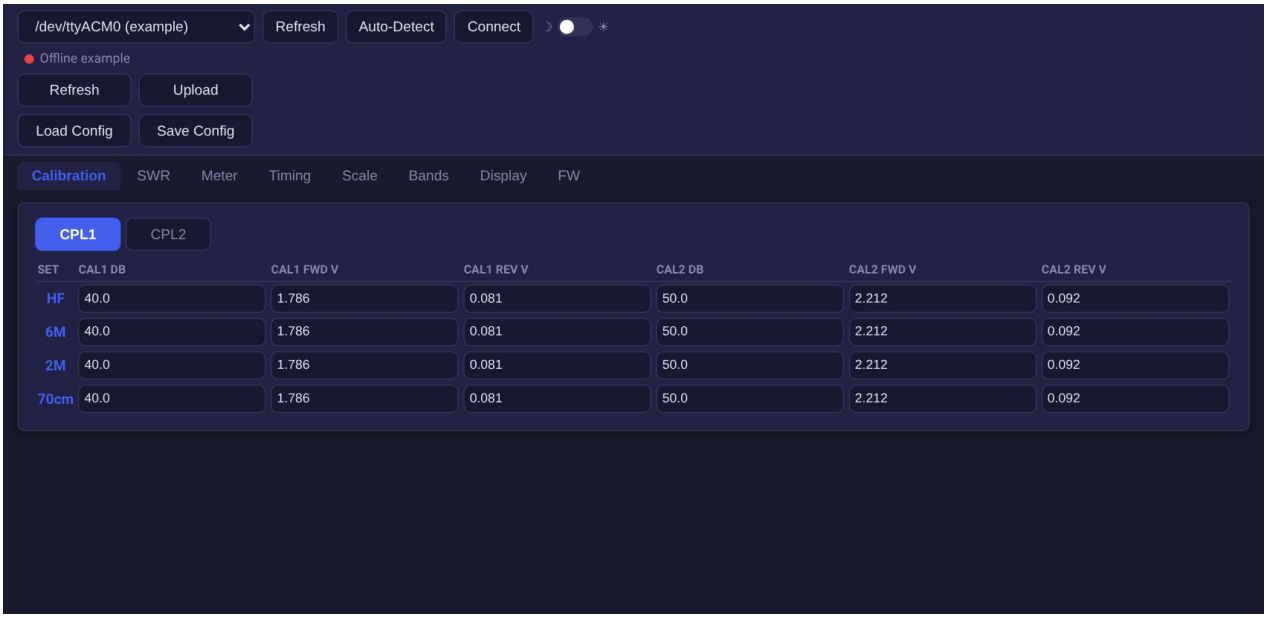
The browser tab shows network name (SSID), device IP address, current received signal strength and the SSE update interval. The interval is how often the live view requests/receives new display frames.

The interface accepts 50–1000 ms; the default shown in the source is 75 ms. Smaller values feel more responsive but generate more updates. If the display appears sluggish on a constrained computer or network, increase the interval, then tap Apply.

Connection notes

- Phone/computer and meter must normally be on the same LAN for direct access.
- mDNS hostnames can fail across VLANs or devices without mDNS; use the IP displayed on the meter.
- Web access and the USB MeterMonitor are alternative paths to similar meter data. Do not confuse the desktop monitor with an independent sensor.

14 USB MeterConfig (desktop tool)



Actual MeterConfig frontend rendered offline; displayed values are illustrative, not read from a meter.

1. Connect the meter USB port to Windows, macOS or Linux.
2. Open MeterConfig and use Auto-Detect, or pick a serial port and tap Connect.
3. Press Refresh to retrieve the current configuration.
4. Use tabs: Calibration, SWR, Meter, Timing, Scale, Bands, Display and FW.
5. Make required edits, then tap Upload to send changed settings to the meter.
6. Use Save Config to store a JSON backup, or Load Config to open a saved file.

The desktop application uses Python with pywebview and pyserial. Only install the necessary dependencies in an isolated environment, and avoid opening the same meter serial port in two tools at once.

IMPORTANT The FW tab is intended for compatible firmware-management operations. Do not flash an image based only on the filename; verify the hardware target first.

15 MeterMonitor and troubleshooting

Serial-based MeterMonitor

MeterMonitor presents a browser-like display using the meter's USB serial connection. From the project directory, a typical invocation is:

python MeterMonitor.py --ui default

Other themes: --ui classic, --ui modern or --ui retro. The tool supports --port for a specific serial interface and --list-ui to show supported themes. Python requirements include pywebview, pyserial and flask.

Troubleshooting guide

Symptom	Check first
No power reading	RF connection, coupler selection, enabled band, calibration and low-power floor.
Unexpectedly high SWR	Antenna/load, feed line, coupler orientation, reverse detection, alarm thresholds.
Unable to SAVE calibration	Stable test signal, forward/reverse quality indication, entered reference dBm.
Display dark / blank	Power input, timeout/backlight settings, display orientation.
Wi-Fi unavailable	WiFi button enabled, ESP32 connected, IP/SSID/RSSI and local network.
Browser not updating	Connection status, mDNS vs IP, SSE interval and network reachability.
USB tool cannot connect	Correct serial port, USB cable, OS permissions, close other serial applications.

Restore safely

If readings are suspicious after a firmware change or configuration upload, restore the last known-good configuration and calibration backups, verify band and coupler, and test with a stable low-power signal before normal operation.

16 Reference and important notes

Hardware and limits

Item	Source-supported information
Controller	Teensy 4.0 or Teensy 4.1.
Display	RA8875, 800 × 480 touchscreen.
Touch	GSL1680 or FT5x06/FT5x16/FT6x06/FT6x36 families.
Detectors	Two AD8307 log amplifiers or diode detectors.
ADC	External AD7991 when enabled in firmware configuration.
Calibration capacity	Eight sets: two couplers × four bands.
Measurement functions	Peak envelope power, forward/reverse power, SWR, dBm and modulation scope.

Important measurement caution

The meter is an RF measurement instrument, not a certified safety interlock. A defective coupler, an incorrect calibration or a loose RF connection can make the displayed power or SWR unreliable. Never use only the screen value to decide whether high RF power is safe.

Source and scope

This manual is based on the supplied LJ-2000M source archive, including README.md, MENU_LEVEL0_MENU_GUIDE.md, CALIBRATION_FLOW.md, menu/measurement source files, and the HTML/Python desktop tools. It describes the code present in that archive and has not been verified on a powered-on LJ-2000M.

Original meter by Loftur E. Jonasson (TF3LJ/VE2LJX); modified by J. G. Holstein and Paul Davis. The supplied firmware identifies GPL version 3 or later. This guide is independent documentation and does not include firmware binaries.

Images in this edition

LCD figures are manually constructed from menu labels, coordinates and display behavior in the source code, so their typography and numerical contents may differ from a real unit. Web and desktop screenshots come from the project's own HTML frontend, displayed locally with sample data. None of the images claims to show a real RF measurement.