Calibration *Instructions*

Digital RF Power / SWR Meter

DR-100 Dual · DR-235 Dual
DR-250 Dual · DR-270 Dual

Two-level calibration
step by step, with dummy load

This guide shows how to calibrate your meter with the built-in **two-level calibration**. You calibrate each coupler and band separately: the meter stores the result in a **calibration profile**. Follow the steps in order and read the warnings, especially the one about choosing the correct profile. **DR-100 Dual:** the profiles and the power levels are the same, but it has its own controls (OLED display, encoder and coupler button). Use chapter 4.

WHAT YOU NEED

- A transmitter (TRX) that can deliver **accurate, known RF power levels**, for example 100 W and 10 W.
- A **good 50 Ω dummy load**.
- Coax cables between transmitter, coupler and dummy load. Keep the cable to the dummy load **very short**.
- The coupler you want to calibrate: the internal coupler (CPL1) or the external coupler (CPL2).

BEFORE YOU START

- Connect the dummy load **directly to the Antenna connector** of the coupler, or with a very short cable. This gives the most accurate result.
- Decide which **profile** (coupler and band) you will calibrate. See chapter 1.
- Choose the **two power levels** (high and low) that fit your use. See chapter 2.
- Calibrating the external coupler? Select **CPL2** on the main display first.

▶ The procedure in four stages

STAGE 1
Select the profile
Open the Calibrate menu and choose the coupler and band with B.SEL.

STAGE 2
First level (high power)
Transmit the higher power into the dummy load, then save.

STAGE 3
Second level (low power)
Transmit the lower power into the dummy load, then save.

STAGE 4
Reverse and repeat
Swap the cables on TX and Antenna, repeat both levels, then restore the cables.

! **Select the correct profile.** If you select the wrong profile, you overwrite the calibration stored in it and lose the previous data.

i **Advice.** For the most accurate results, always calibrate with a good dummy load connected directly to the Antenna connector of the coupler, or through a very short cable.

1 Calibration profiles

The meter has **8 calibration profiles**: 4 for the internal coupler (**Coupler 1**) and 4 for the external coupler (**Coupler 2**), each for the bands HF, 6M, 2M and 70cm. Press **B.SEL** at the top right of the display in the Calibrate menu to choose the profile in which this calibration is stored. The number in the table is the position of the profile in the B.SEL sequence:

Band	Coupler 1 (internal)	Coupler 2 (external)
HF	1	2
6M	3	4
2M	5	6
70cm	7	8

When you enter the Calibrate menu, the top of the display shows which band and coupler profile is selected for calibration. Check it before every calibration.

! **Tip 1: pay attention to the profile.** Select the correct profile, otherwise you save the values over a profile that was calibrated before.

i **Tip 2: calibrating the external (2nd) coupler.** First select **CPL2** on the main display. Otherwise the RF is directed to CPL1 (the internal coupler) and calibrating CPL2 is impossible.

2 Choosing the power levels

Calibrate with an **accurate RF power level**. In the menu you select the power in **dBm**, so the dBm value must match the power your transmitter really delivers. Common values:

dBm	Power	dBm	Power
30 dBm	1 W	**50 dBm**	100 W
40 dBm	10 W	**57 dBm**	500 W
47 dBm	50 W	$dBm = 10 \times \log_{10}(watts \times 1000)$	

RECOMMENDED PAIRS (TIP 3)

If you use	1st level (high)	2nd level (low)
Up to 100 W	**100 W = 50 dBm**	**10 W = 40 dBm**
500 W or more gives more accurate readings up to 2 kW	**500 W = 57 dBm**	**50 W = 47 dBm**
VHF / UHF	**50 W = 47 dBm**	**10 W = 40 dBm**

i **Tip 4.** After you select the coupler and band profile, use the **Up** / **Down** arrows to select the RF power in dBm that you are going to use.

3 Step-by-step procedure

STAGE 1 · OPEN THE CALIBRATE MENU AND SELECT THE PROFILE

1. Press the **SETUP** icon to enter the menu.
2. With the **Up** or **Down** arrows select **Calibrate** and press **ENTER**.
3. Press **B.SEL** to select the band and coupler profile you will calibrate. **If you select the wrong profile you overwrite its calibration and lose the previous data.**

STAGE 2 · FIRST LEVEL (THE HIGHER POWER)

4. Select the **1st level (dBm)** option and press **ENTER**.
5. With the arrows select the power you will use, in dBm. In this step you transmit the **higher** power.
6. Transmit (TX) with a **known power**, for example 100 W, into the dummy load.
7. While transmitting, when the display shows **Signal Detected**, press **ENTER** to save the measurement.

STAGE 3 · SECOND LEVEL (THE LOWER POWER)

8. Select the **2nd level (dBm)** option and press **ENTER**.
9. With the arrows select the power you will use, in dBm. In this step you transmit the **lower** power. Transmit it into the dummy load and press **ENTER** to save when **Signal Detected** is shown, as in steps 6 and 7.

STAGE 4 · REVERSE THE CABLES AND REPEAT

10. Now **reverse the coax cables** on the **TX** and **Antenna** connectors and repeat the same procedure as before, using the **same powers** for the 1st and 2nd levels.
11. The screen now shows **Reverse Signal Detected**, because the meter has recognized that the cables are reversed. Do not worry: go ahead.
12. Press **ENTER** to save the measurements again.

FINISH

13. If you made a mistake, do not worry: you can repeat the process from the beginning.
14. When you have finished, **do not forget to reverse the RF cables again**, back to the normal connection, for correct readings.

4 DR-100 Dual: calibration with the encoder

The DR-100 Dual has an **OLED display**, a **rotary encoder** and a **coupler button** instead of a touch screen. The eight profiles (chapter 1) and the power levels (chapter 2) are the same, only the controls are different. Connect the dummy load and the cables as in chapter 5.

CONTROLS USED FOR CALIBRATION

Control	Action
Short coupler press	Select CPL1 or CPL2
Hold coupler (0.8 s)	Band select
Long encoder push	Open the setup menu
Turn / push encoder	Adjust / select and store

CHOOSE A METHOD

- **One-level:** one known level. The firmware derives the second point 30 dB lower, with nominal slopes.
- **Two-level:** two known levels, the higher first. The meter measures the slope. **This guide uses two-level.**

STAGE 1 · SELECT THE PROFILE AND OPEN THE CALIBRATE MENU

1. On a live screen press the coupler button briefly to select **CPL1** (internal) or **CPL2** (external). Hold it for about 0.8 s to open `BAND SELECT`, turn the encoder to **HF**, **6M**, **2M** or **70cm** and push to store.
2. Long-push the encoder to open the setup menu, turn to **Calibrate** and push. Choose **two-level**.
3. Check the label on the calibration screen, for example `HF CPL1`. If it is wrong, leave the menu and select the profile again.

STAGE 2 · FIRST LEVEL (THE HIGHER POWER)

4. Turn the encoder to set the known power in dBm, for example **50.0 dBm** for 100 W. A slow turn changes 0.1 dB, a faster turn 1.0 dB.
5. Transmit (TX) that power into the dummy load. When `FWD` is shown, push the encoder to store.

STAGE 3 · SECOND LEVEL (THE LOWER POWER)

6. Set the lower power, for example **40.0 dBm** for 10 W. Transmit it into the dummy load and push to store when `FWD` is shown.

STAGE 4 · REVERSE THE CABLES AND REPEAT

7. Reverse the coax cables on the TX and Antenna connectors and repeat both levels with the same powers. The display shows `REV`. Then restore the cables.



Calibration screen (illustration)

Select the correct profile first. Storing replaces the data of the band and coupler shown on the screen.

If the display shows `---`, the input is not valid for storage. Check the cables, the power level and the dummy load.

Check your result: *Cal Debug* in the Calibrate menu shows the stored points and slopes of each profile, two pages per profile.

5 Connection diagram

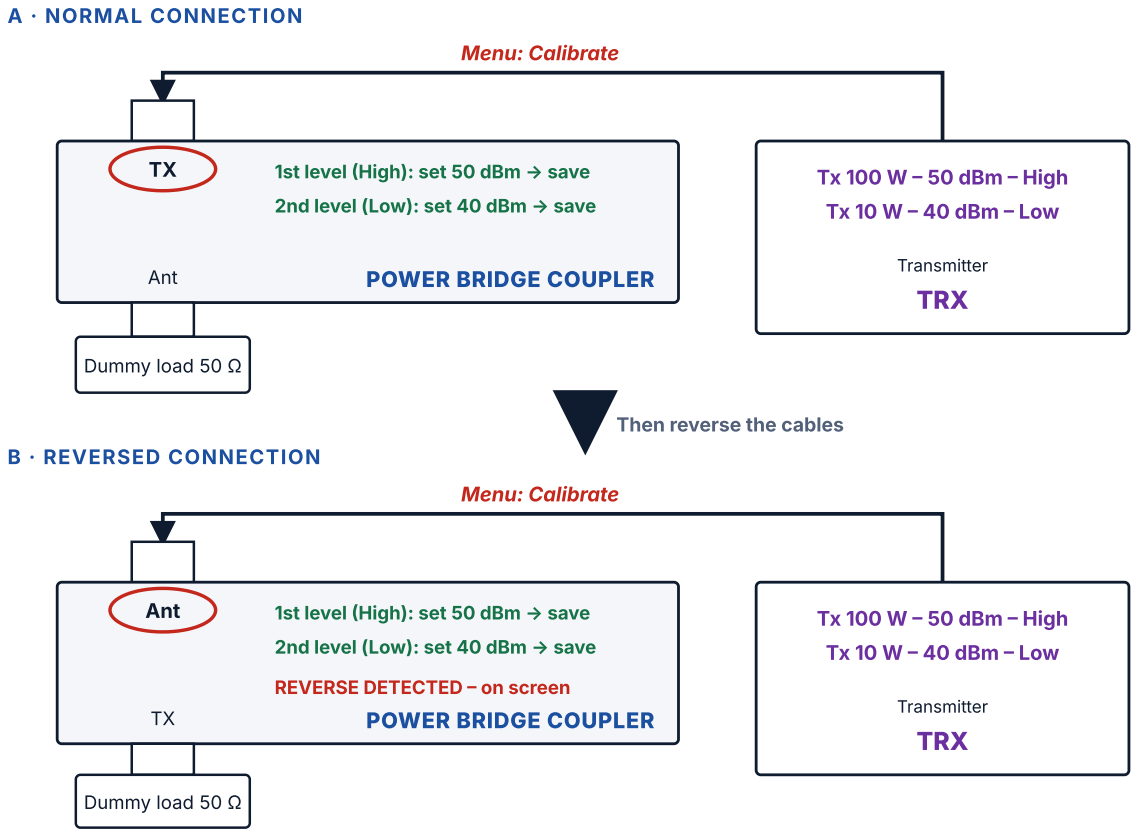


Figure 1. Two-level calibration. The example uses 100 W (50 dBm) for the high level and 10 W (40 dBm) for the low level. The circled connector is the one the transmitter is connected to. In B the cables are reversed and the screen shows **Reverse Detected**.

6 Quick checklist

- ☐ Dummy load on the **Antenna** connector (short cable)
- ☐ **CPL2** selected, if calibrating the external coupler
- ☐ Correct **profile** selected with B.SEL
- ☐ **1st level:** dBm selected, TX, Signal Detected, ENTER
- ☐ **2nd level:** lower power, same method, ENTER
- ☐ Cables **reversed**, both levels repeated, saved
- ☐ Cables **restored** to the normal connection

Tip 5. In the **Config Menu** you can select which screen buttons are shown on the main screen. You can hide or show the band buttons, depending on the configuration of your meter (WiFi, HF, 6M, 2M, 70cm).

Questions or support?

Send a private message in our Facebook group **"Ham Radio Café"** (scan the QR code), or write to **sv1ozcq@gmail.com**.

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73 de **Dimitris SV1OZ / DK1OZ**