

Introduction

Congratulations on purchasing the MFJ-854 RF-Current Meter. The MFJ-854 is designed for measuring current distribution on antenna elements and radials, and for checking common-mode current levels on coaxial feedlines and grounds. It also works well for tracking down RFI-causing current on household wiring and cables. Here are some important features we think you'll like:

Wide Range: Measures RF current from as little as 1 mA to 3 Amps in six ranges.

Full HF Coverage: Accurate from 1 MHz to 30 MHz and beyond.

Low Interaction: Sense coil has minimal effect on circuits under test.

Large Cable Capacity: Accepts cables up to approximately 1/2" in diameter.

Accurate: Diode-compensated Op-Amp delivers improved meter linearity.

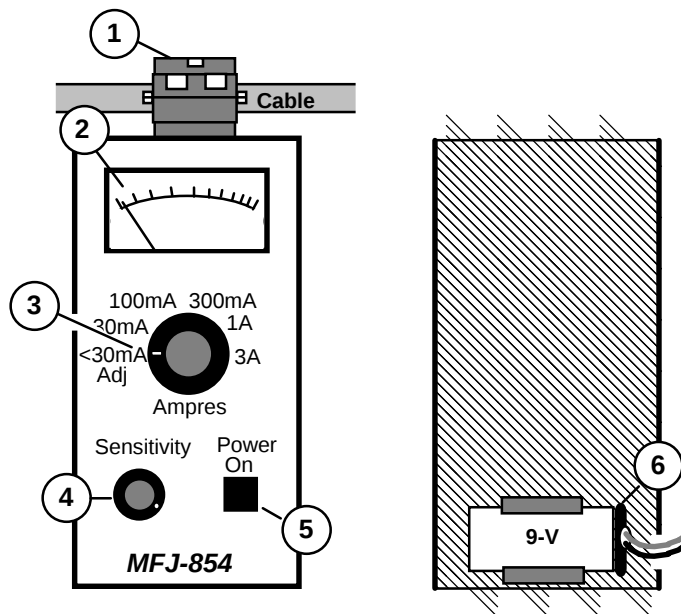
Rugged: Built to last with a sturdy all-aluminum case and G-10 pc board.

Battery Saver: Press-to-test power circuit turns unit off automatically after 15 seconds.

Long Battery Life: Meter draws 3-mA, battery's service life approaches shelf life.

Handheld Size: Weighs 11 ounces, only 2.3" x 1.6" x 6.5" (including sense coil).

Controls and Locations



1. Sense Coil: Clamps onto conductor under test, accepts diameters to around 1/2" .

2. Meter: Calibrated scale indicates readings in mA or Amps.

3. Range: Selects from six measurement ranges.

4. Sensitivity: Works on <30 mA range, adjusts gain for low-level measurements.

5. Power On: Momentary switch applies power, activates 15-second power-off delay.

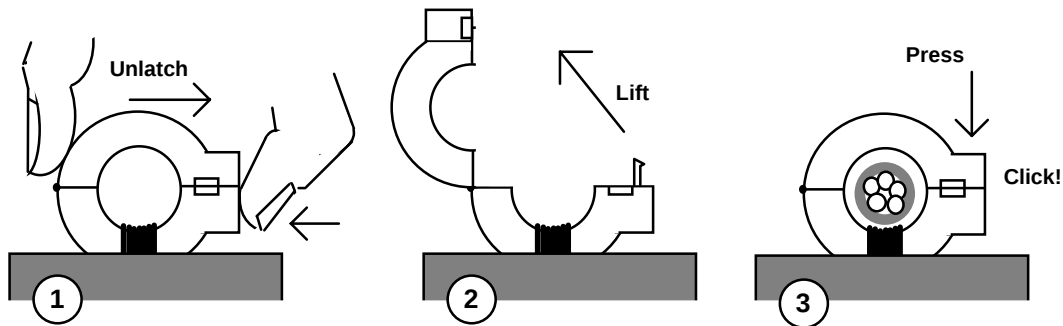
6. Battery Clip: Accepts any standard 9-V flat-pack battery.

Battery Installation and Replacement: Use any fresh 9-volt flat-pack type battery (not supplied). To install, remove screw from each side of case and gently separate two halves. Install 9-volt battery on snap clip, then slip into retainer (see previous drawing). To prevent damage from battery leakage, always remove battery when storing meter for prolonged periods.

Important Note: Always remove the battery when storing your unit for long periods.

Operating Instructions

Using the Sense Coil: The sense coil snaps over wires and cables, as shown below. To unlatch, squeeze the nylon carrier between thumb and forefinger--applying opposing pressure. The coil's top section should move forward slightly. With pressure applied, lift up to open. Position the wire or cable inside the core opening. Close the lid over the cable, pressing down until latch clicks shut.



Meter: The meter is scaled from 0 to 100. On the 100-mA range, readout is direct (100 = 100 mA). On the 1-A range, move the decimal point 2 places to the left (100 = 1.00 A). To convert meter readings made on the 30 mA, 300 mA, and 3-A ranges, multiply accordingly. For example, a reading of 85 on the 300-mA range equals $300 \times .85$, or 255 mA. The chart below will help you estimate readings quickly:

Meter	Range				
	30 mA	100 mA	300 mA	1 A	3 A
10	3	10	30	0.1	0.3
20	6	20	60	0.2	0.6
30	9	30	90	0.3	0.9
40	12	40	120	0.4	1.2
50	15	50	150	0.5	1.5
60	18	60	180	0.6	1.8
70	21	70	210	0.7	2.1
80	24	80	240	0.8	2.4
90	27	90	270	0.9	2.7
100	30	100	300	1.0	3.0

The <30 mA range is uncalibrated and meter readings represent a relative indication only. It is normal, at high sensitivity, to see some residual meter reading (up to 15%).

Range: The *Range* switch selects between five calibrated scales (from 30 mA to 3 Amps). The sixth range is uncalibrated and tied to the unit's *Sensitivity* control. To prevent meter pegging, begin checks on a high range and work down. To estimate unknown current levels, use the formula below (I = Unknown Current in Amps, P = Applied Power in Watts, and R = Load Resistance in Ohms).

$$I = \sqrt{\frac{P}{R}}$$

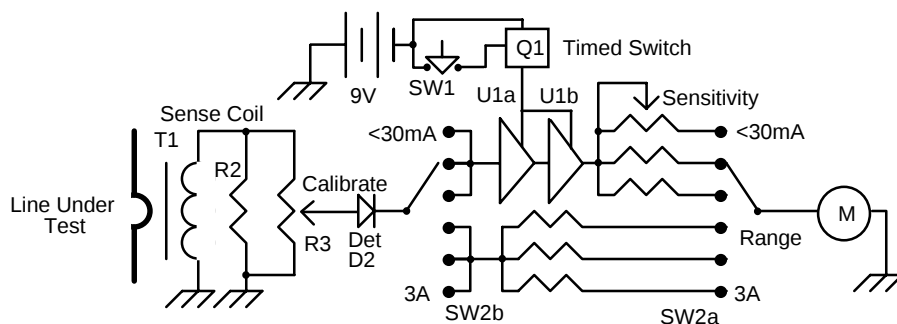
Sensitivity: The *Sensitivity* control varies meter drive when reading weak RF-current levels (below 30 mA). At maximum setting (fully clockwise), RF currents of 1 mA or less will yield a usable meter deflection. This function is especially useful for tracking RFI pickup on household wiring and cables. Note that some residual meter deflection is present with the sensitivity control at maximum. This is normal.

Power Switch: Power is applied via a "press-to-test" momentary contact switch. A built-in hold circuit keeps the unit powered for approximately 15-20 seconds after the switch is released. This feature permits "hands-off" measurement on energized conductors.

RF Hazard--Important Warnings:

- 1. RF-current measurements must be conducted with extreme caution. Physical contact with conductors carrying even moderate RF-energy levels can result in severe RF burns, or injury.***
- 2. Do not touch the metal meter case while measuring current with RF levels exceeding 5 Watts or RF voltages exceeding 50 Volts. Power the meter, then apply RF and make measurement "hands-off" using the 15-second power-down feature.***
- 3. Avoid measuring RF current on conductors where high RF voltages may be present (>500 Volts). Damage to your meter may result.***

Theory of Operation

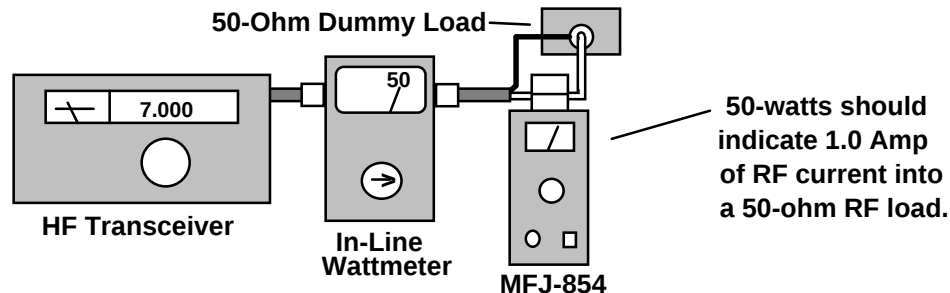


Induction coil T1 samples common-mode current flowing on the conductor under test. The coil winding is resistively terminated at a low value to minimize circuit perturbation and improve frequency linearity. Trimpot R3 adjusts the level of sampled signals, and is used to calibrate the metering circuit against a known reference. Detector D2 drives the meter movement directly through selected current-limiting resistors on the top three ranges. On the lower three ranges, dual op-amp U1 buffers and amplifies detector output prior to metering. Sensitivity control R1 expands the lowest measurement range--extending meter sensitivity to the full gain limit of the amplifier. When SW1 is pressed and released, a RC circuit holds dc-switch Q1 in conduction for approximately 15 seconds to permit hands-off measurement.

Maintenance

In Case of Difficulty: Your meter is inherently trouble-free, but switches, controls, and the meter movement may sustain damage if dropped or exposed to harsh vibration. Also, avoid exposure to rain, snow, extreme heat, or other severe environmental conditions. If you experience a problem, always check battery condition first. If battery replacement fails to resolve the problem, you may contact MFJ Customer Service by phone at 601-323-5869 or reach them via E-mail at mfj@mfjenterprises.com. Be sure to include a complete description of the difficulty.

Calibration Instructions: To check meter calibration, use the test set-up shown below:



Set the meter's *Range* selector to 1-A. For meaningful results, *your wattmeter must be accurate and the 50-ohm load free of significant reactance*. To test, apply a 50-watt CW signal to the load. You should observe a full-scale reading of 1.0-A (100 on the scale). If results vary significantly from this reading, adjust trimpot R3 for the correct indication. Trimpot R3 is located on the unit's pc board below the sense coil.

Important Warning: *Avoid direct physical contact with this device when making measurements with power sources of over 5 Watts. RF burns or permanent injury may result from contact with high RF voltages.*

If your meter is out of calibration and you lack the equipment or skills to perform the calibration procedure, you may return it to the MFJ factory for service (see *In Case of Difficulty*).

Schematic

Parts List