



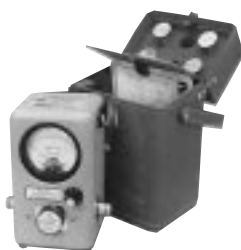
RF POWER METER SELECTION GUIDE

Power Meters For Use With 50-Ohm Cable



PRECISION INSTRUMENTS

Pages 6–8



PORTABLE MODELS

Pages 11–16, 21

CASES Page 24

TEST SETS Page 14



PANEL-MOUNT MODELS

Pages 17–20



ELEMENTS

Pages 25–28



ACCESSORIES, PARTS, AND QC CONNECTORS

Pages 23, 59–61

We've organized the power meters in this catalog into three major groups: wattmeters for use with 50-ohm cable and 7/8" line (pages 6–21), wattmeters for 1 1/8"–6 1/8" rigid transmission lines (pages 29–33) and absorption wattmeters (pages 39–41).

The tables below should help you identify the Bird 50-ohm cable power meter that's best for your application. Then turn to the referenced page for full product descriptions and specifications. You can also contact Bird or any authorized distributor for further assistance.

Broadcast professionals and those needing power meters for rigid transmission lines should see the selection guide on page 29. The absorption wattmeter selection guide is located on page 39.

50-OHM CABLE WATTMETERS – Portable — For Service and Field Use

MODEL (SEE NOTE 1)	SPECIAL FEATURES	POWER (WATTS)	FREQ. (MHz)	ACCURACY	DISPLAY TYPE	SEE PAGE
43*	General purpose portable for 50-ohm AM, FM, CW, SSB.	0.1–10,000	0.45–2700	± 5% FS	Analog	12
4308*	Model 43-style for analog cellular systems.	1.5–50	440–960	± 5% FS	Analog	15
4304A*	Broadband operation. 5 ranges with single element.	5–500	25–1000	± 7% FS	Analog	15
4431*	Similar to Model 43, but with adjustable output RF tap.	0.1–5000	2–1000	± 5% FS	Analog	14
4314B*	PEP & peak-reading for navcom, radar, TV, telemetry, pulsed RF.	0.1–10,000	0.45–2700	± 5% FS	Analog	13
4410-Series*	High sensitivity, dynamic range and accuracy. Multirange elements.	0.002–10,000	0.2–2300	± 5% of rdg	Analog	16
APM-16*	Average-reading meter for analog and digital services.	1–1000	2–2300	4% rdg + 1% FS	Analog	11
4305A*	High-power version of Model 43	50–25,000	0.45–2300	± 5% FS	Analog	14
4391A**	High-speed CW, PEP and Peak pulse for pulsed RF, radar, TV, telemetry.	0.1–10,000	0.45–2700	± 5% FS	Digital	21

Note 1: * = Portable THRULINE® style instrument with internal line section and QC connectors.

** = POWER ANALYST® style instrument with digital display and pushbutton controls.

PANEL-MOUNT – For Control Racks and Permanent Installations

MODEL	SPECIAL FEATURES	POWER (WATTS)	FREQ. (MHz)	ACCURACY	DISPLAY TYPE	SEE PAGE
4527	Dual elements, dual meters and fixed RF tap. For 2-way mobile radio.	0.1–1,000	2–512	± 5% FS	Analog	17
4521	Single meter with single rotatable element (rack-mount Model 43).	0.1–10,000	0.45–2700	± 5% FS	Analog	17
4522	Dual elements with single, switchable meter.	0.1–10,000	0.45–2700	± 5% FS	Analog	17
4526	Dual elements and dual meters for simultaneous fwd and refl readings.	0.1–10,000	0.45–2700	± 5% FS	Analog	17
3128A	Forward and reflected power monitor/alarm; 43-type elements.	0.1–10,000	0.45–2700	± 5% FS	Analog	19
3170A	High-speed, forward and reflected power monitor/alarm; 43-type elements.	0.1–10,000	0.45–2700	± 5% FS	Analog	20
4201-Series	12 or 24 channel, dual meters	0.1–10,000	0.45–2700	± 5% FS	Analog	18

PRECISION INSTRUMENTS – For Laboratories, Research, and Other High-Accuracy Applications

MODEL	SPECIAL FEATURES	POWER (WATTS)	FREQ. (MHz)	ACCURACY	DISPLAY TYPE	SEE PAGE
4420	Direct reading of power, VSWR, return loss. Uses external sensor.	0.1–10,000	0.1–2500	± 3% of rdg.	Analog	7
4421	Direct reading of power, VSWR, return loss. Uses external sensor.	0.1–10,000	0.1–2500	± 3% of rdg.	Digital	6
6085	Calorimeter with separate power sensor. Use with external load.	See Note 2	See Note 2	± 3% of rdg.	Digital	8
6091	Calorimeter. Broadband, high accuracy, self contained.	10–200	DC–2500	± 1.25% of rdg.	Digital	8

Note 2: Model 6085 is used with a separate ECONOLOAD®. Load determines power and frequency range. Typical capability > 10kW.

THRULINE® WATTMETERS DELIVER RF POWER MEASUREMENTS YOU CAN TRUST



The development of the first Bird Model 43 THRULINE® Wattmeter in 1952 heralded a major breakthrough in the search for a solution to quickly and easily measure radio-frequency power. It is difficult



VINTAGE 43 WATTMETER

This well used Model 43 from Bird's first production run still delivers accurate measurements today. It was donated to Bird in 1966 by Justin Dennis.

today to realize that for most of the first half century of radio communications, the most basic parameters of broadcasting could be measured only by tedious and painstaking procedures. While transmit power could be derived via RF voltage measurements or calorimetry, neither procedure could measure reflected power in real-world antenna systems. Slotted-line devices could be used to derive VSWR, but their operation was exacting, time consuming, and often imprecise.

The Model 43 revolutionized power measurement by providing a means to measure FORWARD and REFLECTED power flow in a coaxial transmission line that was both elegant in concept and simple in application.

- Just connect the THRULINE® Wattmeter into the coaxial line, using readily interchangeable RF connectors.
- Insert a precalibrated element into the THRULINE® sample port to define the power and frequency range.
- Rotate the element to the stop to select the direction of power flow to be measured.
- Energize the line and take a reading.

A difficult task became exceptionally simple.

Accurate, dependable and ruggedly built to last. The Model 43 quickly became the preferred method for measuring RF power in coaxial transmission lines and made $\pm 5\%$ of full scale the new standard of accuracy. And the Model 43's rugged construction spawned a legendary reputation for performing under the toughest conditions. While we strongly discourage abuse of this precision instrument, stories abound of Model 43's that survived drops from towers, immersion in floods, falls from moving vehicles and, in at least one instance, the weight of a bulldozer. Our 1995-1996 search for vintage units yielded numerous Model 43's from Bird's initial 1952 product run that were still in regular use. Justin Dennis, the owner of the oldest instrument we located, captured the essence of the Model 43 when he told us "If it says 80 watts, it's 80 watts."

Power meters for every application. Today, Bird offers a wide selection of general and special purpose RF power

meters. The single element Model 4304A and Model 4308 offer a wide-frequency range, multiple power ranges and ± 6 to 7 percent of full-scale accuracy. The industry standard Model 43, with its several variations, still provides the pace setting $\pm 5\%$ of full-scale accuracy. For even more precision, choose from the 4410 Series with their multirange elements and $\pm 5\%$ of reading accuracy. The highest accuracy available today in THRULINE® technology is the digital display 4421 Laboratory Grade Wattmeter, which offers $\pm 3\%$ of reading accuracy, automatically computes VSWR, displays power in either watts or dBm and retains minimum and maximum readings in memory.

Other THRULINE® Power Meters and test sets are available to measure peak envelope power, pulsed RF, avionic and television power levels. Bird also offers a full range of fixed communications site monitoring instruments, from wattmeters for use with up to 6 $\frac{1}{8}$ " broadcast lines to our multifunction WATTCHER® RF Monitors.

State-of-art power meters for PCS and more. Our newest wattmeter, the Advanced Power Measurement Model APM-16, is specially designed for use on today's digitally modulated RF communication systems. The APM-16 combines proven THRULINE® technology with state-of-art circuitry to take average power readings of CDMA, FDMA, GSM, TDMA, and other digital technologies used in today's cellular, PCS, and similar systems.

Whether your next purchase is the new Model APM-16, a WATTCHER® RF Monitor or any Bird product, you can be confident it will perform exactly as you'd expect. Every unit we build today contains the same care and pride that went into our 1952 vintage Model 43s that still give their owners dependable power measurements over 40 years later.



APM-16

The new Model APM-16 accurately measures complex digital as well as analog signals.

FINDING THE RIGHT POWER METER

We've included selection guides in this catalog to help you quickly zero-in on the right wattmeter for your application. Bird's expert staff is ready to assist you.

Product	Page
Meters for 50-ohm cable and $\frac{1}{8}$ " line	9
Meters for $\frac{1}{4}$ " – $\frac{3}{4}$ " line	29
Absorption wattmeters	39

THRULINE® RF DIRECTIONAL WATTMETERS

Model 43, Accessory Guide



Over 250,000
Model 43 wattmeters
have been produced!

THE INDUSTRY STANDARD

MODEL 43

The Model 43 THRULINE® Directional Wattmeter accurately measures forward or reflected power in coaxial transmission lines under any load condition. Each Model 43 consists of a line section, "QC" (Quick Change) connectors and an indication meter housed in a rugged, corrosion-resistant aluminum case.

The line section is a high-precision 50-ohm coaxial air line that inserts between the transmitter and the antenna or load. A socket is provided in each line section for a plug-in element with the desired power rating and frequency range. Line section ends are equipped with "QC"-type connectors.

The Model 43 is supplied with two female "N"-type "QC" connectors. These connectors can be interchanged in the field without affecting instrument calibration.

The instrument's indicating meter is a shock-mounted 30-microampere meter with scales of 25, 50, and 100; permitting full-scale direct-power reading from 100 milliwatts to 10,000 watts.

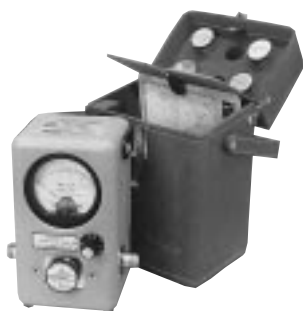
Plug-in elements determine the power rating and the frequency range, and these values are marked on each element. The elements rotate to read both forward and reflected power. There is no need for calibration charts or instrument adjustments. Elements can be purchased at any time and replaced in the field. For added convenience, Model 43 connectors and elements are interchangeable with many other Bird wattmeters.

Remote installation can easily be achieved by removing the Model 43's RF line section and inserting it at any desired point in the line. For best visibility, the meter itself can be relocated using the 32-inch meter cable supplied in the instrument housing. Additional meter cable lengths can be ordered separately.

Power Range: 100 mW to 10 kW using
Bird Plug-in Elements.*
Frequency Range: 450 kHz to 2.7 GHz
(depending on element)
Insertion VSWR: with N Connectors
1.05 max. to 1000 MHz
Accuracy: ±5% of full scale
Connectors: QC Type
(Female N normally supplied)

Finish: Light Gray powder coat
Nominal Size: (includes connectors)
6⁷/₈" H × 5¹/₈" W × 3⁵/₈" D,
(175 mm × 130 mm × 92 mm)
Weight: 3 lbs. (1.4 kg)
Optional Case: See page 24
Elements: Tables 1, 2, 3, 3A, 4, 6
on pages 25 – 26

*Quoted accuracy only when used with other Bird products.



Protect your wattmeter with
a sturdy case. Shown is a CC-1
carrying case with elements
and Model 4410 Series Wattmeter.

ACCESSORIES, OPTIONS AND PARTS

Use the table below to quickly find products to enhance the versatility of your THRULINE® Wattmeter.

Product	Page	Product	Page
Batteries	61	Field-Strength Element	22
Cables, Meter	61	Loads/Terminations	42
Cases	24	Meter Movements	23
Connector Adapter Kits	61	Peak Power Kit for Model 43	13
Elements (required on some models)	25 – 28	QC Connectors	60