

BIRD

Electronic Corporation

A Member of Bird Technologies Group

QUALITY INSTRUMENTS FOR RF POWER MEASUREMENT & MANAGEMENT



1997 CATALOG

BIRD ELECTRONIC CORPORATION

A Letter From Bruce Bird



The Bird Electronic Team, Solon, Ohio Facilities

Dear Valued Customer,

With the introduction of our General Catalog 1997, it is fitting to acknowledge a driving force which has helped establish Bird Electronic Corporation as the leader in RF test equipment for over a half century. That force is our people.

At a time when mass-produced, disposable products abound, it is the skill, dedication, and pride in craftsmanship of our employees which continue to set Bird apart for value, performance, and reliability.

This catalog represents the meticulous efforts of over 240 engineers, technicians, and other professionals world-wide. Their mission is to achieve and assure your total satisfaction through Quality Products, Continuous Improvements, Competitive Costs, and On-time Deliveries.

When founder J. Raymond Bird set our course in 1942, few could have foreseen the coming advances in wireless communication. Now, as we plan for the

year 2000 and beyond, our goal is not only to meet, but to help shape the future. We've created and are a part of Bird Technologies Group, an organization of companies each offering exciting innovations in RF measurement, engineering and manufacturing. And, we've empowered each member of the Bird team to build excellence into every facet of our operation. The results are unique, cost-effective solutions to the special challenges of modern communication technology.

To a large measure, the reward for a job well done is to simply have done it. We at Bird practice this principle daily. Through our products and services, we are committed to helping you do the same.

Sincerely,

Bruce Bird

COO, Bird Electronic Corporation

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FOR YOUR CONVENIENCE

Look for these symbols which identify whether an instrument is used with 50 ohm Cable or Rigid Line RF Systems.



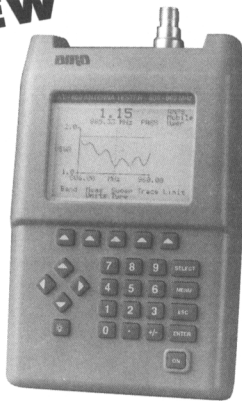
Bird Electronic Corporation maintains an aggressive program of testing products for conformity to applicable electromagnetic and safety standards, including European EEC directives. We are proud to announce that, where applicable, Bird products carry the "CE" mark. A CE-marked product complies with relevant EEC directives and is approved for sale to the European Union.

The continuing phase-in of new EEC directives may periodically affect the status of some products. However, any Bird product offered for sale to the European Union will conform to all EEC directives in effect at the time of shipment. Please consult your local Bird sales office or Bird Electronic Corporation regarding questions about CE compliance of any Bird product.

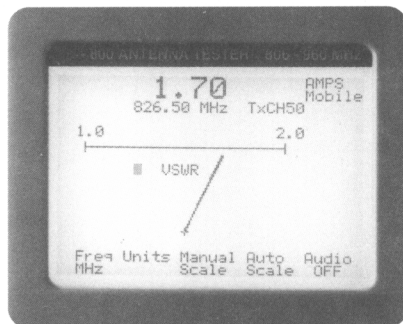
ANTENNA TESTERS

HF, VHF and UHF

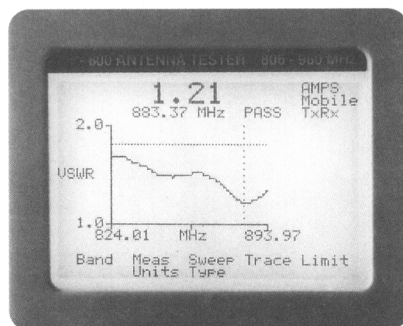
NEW



MODEL AT-800



Single frequency mode
for antenna tuning.



Swept frequency mode
reveals a comprehensive pic-
ture of antenna matching.

MEASURE VSWR, MATCH EFFICIENCY, RETURN LOSS, FIELD STRENGTH

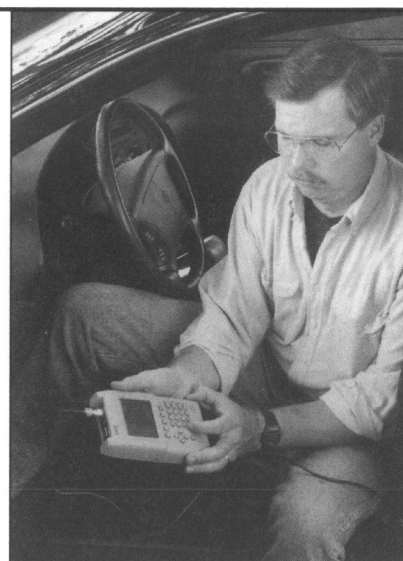
Bird's AT-Series Antenna Testers bring a new dimension to the testing of HF, VHF, and UHF antenna systems. Powerful, yet remarkably easy to use, these instruments can test an entire band in a matter of seconds. And unlike conventional antenna testers, Bird's advanced design provides accurate results regardless of antenna cable length. Menu driven, software-defined keys and digital keypad permit quick selection of operating mode and direct entry of test parameters. A self-contained RF source lets you precisely set the test frequency – no external transmitter is needed. A built-in adaptable antenna jack mates a wide range of standard RF connectors. Plus, its compact size and rechargeable batteries provide for truly portable operation.

- **Swept Frequency Measurements** - Fast scans show VSWR, Match Efficiency or Return Loss across the entire band. A moveable cursor can be used to pinpoint scan frequency and digitally display the corresponding measurement value.
- **Single-Frequency Mode** - Can be used to optimize antenna performance and troubleshoot intermittent problems.
- **Limit Testing** - Quick Pass-Fail indicator compares measurements to user selected limits.
- **Audible Indicator** - Pitch varies with match condition. You can keep your eyes and hands on adjustments and simply listen for the best match.
- **Field Strength Measurements** - Verifies the output of devices such as portable radios and cellular phones.
- **Data Storage** - Saves and recalls up to 12 scans in non-volatile memory for long-term monitoring of antenna performance or degradation.
- **Serial Communication Link** - Optional software uploads data to a personal computer for analysis or storage.
- **Back-lit Liquid Crystal Display** - More rugged than mechanical movements, more versatile than digital displays, and visible in any light. The LCD also produces high-resolution graphics.
- **Portable** - Lightweight, easy-to-carry, rechargeable batteries.
- **Rugged** - Designed to meet the harsh environment requirements of MIL-T-28800.

ANTENNA TESTERS HF, VHF and UHF

MODELS AT-100, AT-400, AT-800

MODEL:	AT-100	AT-400*	AT-800
Frequency Range:	2 - 136 MHz	80 - 520 MHz	806 - 960 MHz
Frequency Resolution:	20 kHz	30 kHz	30 kHz
Frequency Accuracy:	±50 kHz	± 100 kHz	± 100 kHz
Measurement Range:			
VSWR:	1.00 - 99.99	1.00 - 99.99	1.00 - 99.99
Match Efficiency:	0.0 to 100.0%	0.0 to 100.0%	0.0 to 100.0%
Return Loss:	0.0 to -32.0 dB	0.0 to -32.0 dB	0.0 to -32.0 dB
Measurement Speed (Typical):			
Single Frequency:	5 readings/second	5 readings/second	5 readings/second
Swept Frequency:	1 sweep/second	1 sweep/second	1 sweep/second
Pre-programmed Bands:	None	None	AMPS, NADC, GSM, PDC, CT2
Field Strength:			
Range:	0 to 100% (relative)	0 to 100% (relative)	0 to 100% (relative)
Sensitivity:	Full-scale deflection at 8 v/m @ 100 MHz	Full-scale deflection at 0.22 v/m @ 400 MHz	Full-scale deflection at 3m @ 12.6 W ERP
Test Port:			
Impedance:	50 ohm nominal	50 ohm nominal	50 ohm nominal
Connector (Field-changeable):	N (F) included. Others avail.	N (F) included. Others avail.	TNC (F) included. Others avail.
Interface:	Serial (female DB-9 connector)	Serial (female DB-9 connector)	Serial (female DB-9 connector)
Power Requirements:			
Batteries:	Six rechargeable AA (KR-15/51)	Six rechargeable AA (KR-15/51)	Six rechargeable AA (KR-15/51)
External DC:	11 to 16 Vdc	11 to 16 Vdc	11 to 16 Vdc
External AC Adapter:	108 to 132 Vac @ 57 to 63 Hz or 207 to 253 Vac @ 48 to 52 Hz	108 to 132 Vac @ 57 to 63 Hz or 207 to 253 Vac @ 48 to 52 Hz	108 to 132 Vac @ 57 to 63 Hz or 207 to 253 Vac @ 48 to 52 Hz
Operating Temperature:	0° to 50°C (32° to 122°F)	0° to 50°C (32° to 122°F)	0° to 50°C (32° to 122°F)
Storage Temperature:	-41° to 71°C (-40° to 160°F)	-41° to 71°C (-40° to 160°F)	-41° to 71°C (-40° to 160°F)
Size (including connector):	8" H x 4-5/8" W x 1-3/4" D (204 mm x 118 mm x 42 mm)	8" H x 4-5/8" W x 1-3/4" D (204 mm x 118 mm x 42 mm)	8" H x 4-5/8" W x 1-3/4" D (204 mm x 118 mm x 42 mm)
Weight:	1-3/4 lbs. (0.8 kg)	1-3/4 lbs. (0.8 kg)	1-3/4 lbs. (0.8 kg)
Supplied Accessory:	Field strength antenna	Field strength antenna	Field strength antenna
Recommended Accessories:	Carry case (Model 7000A850), Windows® Interface Software (Model 7000A840), Cigarette Lighter Adapter (Model 5A2238-1)	Carry case (7000A850), Windows® Interface Software (7000A840), Cigarette Lighter Adapter (Model 5A2238-1)	Carry case (7000A850), Windows® Interface Software (7000A840), Cigarette Lighter Adapter (Model 5A2238-1)



AT series antenna testers are compact, truly portable and solidly built for go-anywhere service.

* The AT-400 will be available in Spring 1997. Specifications listed are preliminary and subject to change.

Windows® is a registered trademark of Microsoft Corporation.

LABORATORY GRADE INSTRUMENTS

THRULINE® High Accuracy RF Power Meter



MULTI-FUNCTION POWER METER

MODEL 4421

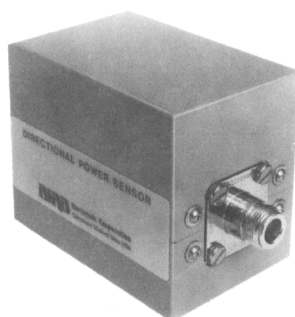
Our Model 4421 power meter is an excellent choice for demanding calibration, process control and scientific applications. It directly measures power with an accuracy of $\pm 3\%$ of reading without calibration charts, external couplers or attenuators. This total accuracy compares favorably with competing products whose stated instrument accuracy can be diminished in actual use by required external components.

The backlit 3-1/2 digit LCD displays forward and reflected power in either watts or dBm, VSWR, return loss in dB and Minimum or Maximum values. Ranging is selectable manual or autoranging. An optional GPIB or RS-232 computer interface can be used with the Model 4421 during AC operation.

Smart Power Sensors (see below) are required for operation. Each covers an extended frequency and power range. The microprocessor based sensors contain non-volatile memory to store calibration data, and can easily be recalibrated in the field.

Power Range: 100 mW to 10 kW FS
Frequency Range: 100 kHz to 2.5 GHz
VSWR Range: 1.0-199.9
Functions: Forward and reflected power in W or dBm, VSWR, return loss in dB and min/max values
Ranging: Selectable manual or autoranging. Power sensor dependent.
Overrange Indication: Audible warning when RF power input exceeds 120% of sensor's maximum power range.
Display: 3-1/2 digit liquid crystal display with annunciator for mode, measurement units, battery condition, programming status, and trend arrows. Switchable backlight.

Operating Power: AC mains or batteries.
 115/230 Vac, 50/60 Hz or 8 nickel cadmium 1.2 V C cells (NEDA type 10014).
Nominal Size: 12-9/32" L x 12-5/32" W x 4-1/4" H (312 mm x 309 mm x 108 mm) with handle extended 15-7/16" L (392 mm)
Weight: 11 lbs. (5 kg.)
Interconnects: 1 meter latch-n-lok coiled cable.
Interfaces: Optional field-installable IEEE-488 or RS-232 serial interface.
 Dimensions: 4-1/2" x 6-1/2" (114 x 165 mm)
Required Product: Order a Smart RF Power Sensor below
Recommended Accessories: Case (page 24)



NEW

SMART POWER SENSORS

4020 SERIES

MODEL	POWER INPUT	FREQUENCY RANGE	VSWR RANGE	MINIMUM DIRECTIVITY	INSERTION LOSS (DB)
4021	300 mW-1000 W (1200 W max.)	1.8 MHz-32 MHz	1.0-2.0	28	<0.05
4022	300 mW-1000 W (1200 W max.)	25 MHz-1000 MHz	1.0-2.0	28	25-512 MHz: <0.05 512-1000 MHz: <0.13
4023	100mW-200W (240 W max.)	900 MHz-2500 MHz	1.0-3.0	20	<0.2
4024	3 W-10 kW (12 kW max.)	1.5 MHz-32 MHz	1.0-2.0	28	<0.05
4025	3 W-10 kW (12 kW max.)	100 kHz-2500 kHz	1.0-2.0	28	<0.05

Circuitry: Microprocessor-based measurement and conversion.
Frequency/Power Coverage: Single power sensor covers specified power and frequency range; no additional plug-in elements required.
Bi-directional Operation: Pick-up of RF power in precision 50.00 ohm line.
Accuracy: $\pm 3\%$ of reading from rated maximum range down to 30% of full scale on the most sensitive range.
Signal Purity: For rated accuracy, no more than 1% AM; harmonics -50 dB or less.
Calibration Technique: Calibration-vs-frequency curve stored in non-volatile memory within

each sensor. Sensor output corrected at frequency of measurement within rated stage.
Sampling Rate: Approximately 2 readings/second.
Ambient Temperature Range: Temperature compensated for rated accuracy from 0°C to 50°C (32°F to 122°F).
Connectors: QC-type. Female N normally supplied; Other coaxial-type connectors available on page 60.
Nominal Size: (includes connectors)
 5-7/32" L x 2-1/2" W x 3-1/4" H (132.5 mm x 64 mm x 83 mm).
Weight: 1 lb. 11 oz. (0.76 kg).



LABORATORY GRADE INSTRUMENTS

THRULINE® High Accuracy Power Meter, Model 4421 Accessories

CALIBRATION KIT

MODEL 4421A500

The 4421A500 calibration kit lets you calibrate and maintain calibration histories of 4020 Series power sensors used with your 4421 power meter. The kit consists of a calibration card (must be installed in your 4421 power meter), calibration key, sensor cable, software for your PC and instruction book. Use the kit with an RF power source, RF low pass filter, RF terminating power standard like the Bird Model 6091 calorimeter and IBM compatible computer fitted with a GPIB card.

Calibration Software: 3-1/2" and 5-1/4" diskettes supplied

Plug-in Card Module:

Logic Level: Meets all IEEE standard 488-1978 specs

Operating Modes: (Switch & Bus Selectable)

Talk Only: Keyboard can command meter to output a measurement to the bus
Addressable: IEEE-488 bus controller command can give power meter a talker of listener address

Connector: Standard IEEE-488 bus type

Temperature Range:

Operational: 0° to 50° C (32° to 122° F)

Storage: -20° to +70° C (-4° to 158° F)

Dimensions: 6-1/2"L x 4-1/2"W x 1"H
(165 mm x 114 mm x 25 mm)

Weight: 1/2 lb. (227 g.)

Power Requirements: AC operation of 4421 meter

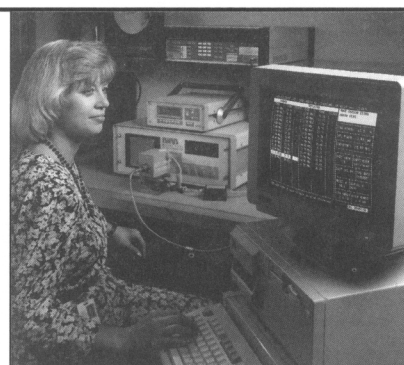
Calibration Key:

Dimensions: 3"L x 2"W x 1-5/8"H
(76 mm x 51 mm x 41 mm)

Weight: 3 oz. (85 g.)

Cable Length: Approx. 3 ft. (1 m)

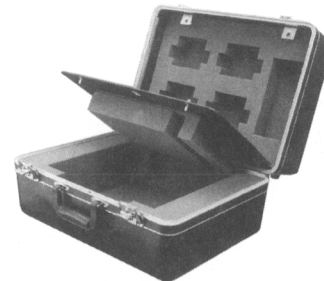
Required Products: 4421 power meter, 4020 Series power sensor, RF power source, RF low pass filter, RF terminating power standard (Bird Model 6091 calorimeter recommended) and IBM compatible computer fitted with a GPIB card.



CARRY CASE FOR 4421

MODEL 4300A215

Protect and easily transport your 4421 power meter and power sensors with this sturdy carrying case. The Model 4300A215 case cradles your wattmeter and up to 4 power sensors in shock absorbing laminated die-cut foam inserts. Another insert holds power cables and miscellaneous accessories. The case features an internal divider panel, strong rigid aluminum frame and durable charcoal color polyurethane shell. A comfortable fold down handle makes it easy to tote your equipment and quick-release latches keep everything secure.



MULTI-FUNCTION POWER METER

MODEL 4420

The Model 4420 analog display power meter offers most of the capabilities of the Model 4421 on the facing page and uses the same power sensors. The major differences are the Model 4420 has only manual ranging, operates only with AC power and cannot be used with the Model 4421A500 calibration kit.



Page 24 contains instrument cases for other Bird wattmeters.

LABORATORY GRADE INSTRUMENTS

High Accuracy Broadband RF Power Calorimeters



Our 6091 and 6085 Absolute Flow RF Calorimeters' microprocessor control saves time and permits stand-alone, automated operation by eliminating the need to constantly null or calibrate the instrument. Each is calibrated to a precision standard with the calibration profile in non-volatile memory. Measurements are automatically corrected prior to display and there's no need for calibration curves. A built-in interface lets you connect either calorimeter to any supported GPIB controller for remote or automated testing. Both units support IEEE-488.



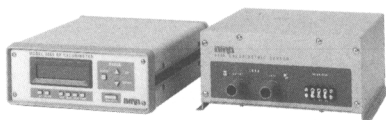
SELF-CONTAINED CALORIMETER

MODELS 6091, 6091P

The self-contained Model 6091 measures 10 to 200 watts at dc to 2.5 GHz with $\pm 1.25\%$ of reading accuracy, and reaches 97% of the final reading in under 1 minute. Measurements are made by connecting the power source to the Model 6091. Sensor circuitry and load are inside the calorimeter for convenient, self-contained operation. The power reading is presented on a 4 digit LED display. The Model 6091P is a panel mount version.

Models: 6091 and 6091P (panel mount)
Power Range: 10 W-200 W (average power independent of wave shape).
Frequency Range: Broadband; low-reflection load remains precisely matched from DC to 2.5 MHz.
Input VSWR: DC to 1 GHz: 1.10 max. (26.4 dB min. return loss). 1 to 2.5 GHz: 1.25 max. (19.18 dB min. return loss).
Accuracy: 10 W-25 W: $\pm 3\%$ of reading. 25 W to 200 W: $\pm 1.25\%$ of reading.
Display/Functions: Large 4 digit, 7-segment LED displays RF power directly in W. The rise in coolant temperature (ΔT) is displayed in $^{\circ}\text{C}$. Coolant flow rate is displayed in liters/minute.
Calibration: Pre-calibrated to precision power standard at factory, with data stored in non-volatile memory.
Response Time: 1 minute max. to reach 97% of final reading.
Sampling Rate: 1 reading/second.
Remote Operation: General Purpose Interface Bus cable supplied, for connecting the 6091 to a GPIB controller. All front panel features are available through the bus.

GPIB Functions Supported: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E1, TE0, and LEO. (IEEE 488 1978)
EMI: EMI compliance per FCC part 15J, Class A.
Coolant: 10 oz. (525 ml.) water-based coolant.
Load: Specially designed 50 ohm precision load resistor assembly.
Input Connector: Female Type N.
Nominal Input Impedance: 50 ohms.
Power: 104 to 132 Vac / 195 to 264 Vac, 47-63 Hz (single phase).
Power Consumption: 45-70 W
Temperature Range: Storage: 50° to 122°F (10° to 50°C)
Operating: 59° to 95°F (15° to 35°C).
Nominal Size: (includes connector end drain)
 Model 6091: 16-1/2" L x 20-15/32" W x 8-17/16" H (419 mm x 520 mm x 210 mm)
 Model 6091P: 16-1/2" L x 20-15/32" W x 8-17/16" H (419 mm x 483 mm x 177 mm)
Weight: Model 6091: 40 lbs. (18.1 kg.)
 Model 6091P: 25 lbs. (11.3 kg.)
Accessories: 6-1/2 ft. (2 meter) GPIB cable, AC power cord.



HIGH POWER CALORIMETER

MODEL 6085

The Model 6085 consists of a digital RF power meter and an RF power sensor that must be used with an ECONOLOAD® or other external water cooled load. The load connects to a sensor box which is digitally linked to the meter. It provides $\pm 3\%$ of reading accuracy and fast stabilization. RS-232 (Model 6085A232) and IEEE-488 (Model 6085A488) Interface Cards are available.

Power/Frequency Range: Function of RF load, flow rate, temperature and coolant
Accuracy: $\pm 3\%$ of reading
Circuitry: Microprocessor based operation with digital display
Display/Functions: 3-1/2 digit LCD displays power in W or dBm, (ΔT) in $^{\circ}\text{C}$, flow in liters/minute, min., max., back light
Over-Range Protection: N/O and N/C interlock on sensor
Ambient Temperature Range: 5°C to 35°C
Cable Length: 5 m standard
Water Flow: 4 to 72 liters/min.
 (actual range determined by RF load)

Stabilization Time: 5 minutes typical
Coolant: Water/glycol
AC Power: 115/230 Vac, 50/60 Hz
Nominal Size: Meter: 12-9/32" L x 12-5/32" W x 4-1/4" H (312 mm x 309 mm x 108 mm);
 Power Sensor: 9-27/32" L x 10-3/32" W x 5-3/64" H (250 mm x 256 mm x 128 mm)
Weight: RF Power Meter: 9 lbs. (4 kg);
 RF Power Sensor: 2 lbs. (1 kg)
Required Product: ECONOLOAD® Load Resistor on pages 49-50, or other water cooled external load

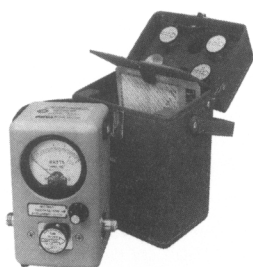


RF POWER METER SELECTION GUIDE

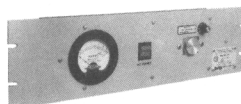
Power Meters For Use With 50 Ohm Cable



**PRECISION
INSTRUMENTS**
Pages 6-8



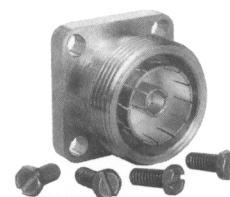
PORTABLE MODELS
Pages 11-16, 21
CASES Page 24
TEST SETS Page 14



**PANEL MOUNT
MODELS**
Pages 17-20



ELEMENTS
Pages 25-28



**ACCESSORIES, PARTS
& QC CONNECTORS**
Pages 23, 59-61

Bird's half century's focus on RF power measurement can deliver a wattmeter that will excel at virtually any application you have. We've organized the power meters in this catalog into three major groups: wattmeters for use with 50 ohm cable (pages 6-21), wattmeters for 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. Once you've used the tables to narrow your search, 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 or anyone who needs a power meter 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*	Broad-band 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 & accuracy. Multi-range elements.	0.002-10,000	0.2-2300	± 5% of rdg	Analog	16
APM-16*	Average-reading meter for analog & digital services.	1-1000	2-2300	4% rdg + 1% FS	Analog	11
4305*	High power version of Model 43	50-25,000	0.45-2300	± 5% FS	Analog	14
4391A**	High-speed CW, PEP & 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 & Permanent Installations

MODEL	SPECIAL FEATURES	POWER (WATTS)	FREQ. (MHz)	ACCURACY	DISPLAY TYPE	SEE PAGE
4527	Dual elements, dual meters & 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 & dual meters for simultaneous fwd & refl readings.	0.1-10,000	0.45-2700	± 5% FS	Analog	17
3128A	Forward & reflected power monitor/alarm; 43-type elements.	0.1-10,000	0.45-2700	± 5% FS	Analog	19
3170A	High-speed, forward & 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, & Other High-Accuracy Applications

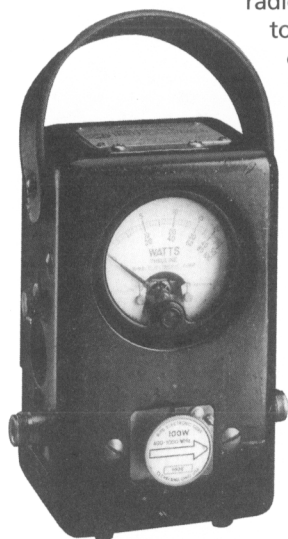
MODEL	SPECIAL FEATURES	POWER (WATTS)	FREQ. (MHz)	ACCURACY	DISPLAY TYPE	SEE PAGE
4420	Direct reading of power, VSWR, return loss. Uses external sensor.	0.1-10,000	0.1-2500	± 3% of rdg.	Analog	7
4421	Direct reading of power, VSWR, return loss. Uses external sensor.	0.1-10,000	0.1-2500	± 3% of rdg.	Digital	6
6085	Calorimeter with separate power sensor. Use with external load.	See Note 2	See Note 2	± 3% of rdg.	Digital	8
6091	Calorimeter. Broad band, 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 1996 by Justin Dennis.

- 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. For less demanding measurements, 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 multi-range 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 6-1/8" broadcast lines to our recently enhanced, multi-function 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 encoded 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 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

With all the models we offer, it can be difficult to select the wattmeter that's best for you application. We've included selection guides in this catalog to help you quickly zero-in on the right model. Bird's expert staff is also happy to assist you.

Product	Page
50 ohm cable models	9
Rigid line models	29
Absorption models	39



THRULINE® RF DIRECTIONAL WATTMETERS Advanced Power Measurement For Digital RF Signals

AVERAGE READING POWER METER

MODEL APM-16

NEW

Bird developed the APM-16 for engineers and technicians who work with today's increasingly common digital RF technology systems. The complex waveforms of many PCS, cellular, and other digitally-encoded services can depart significantly from AM, FM and CW, making power measurement difficult and uncertain. The APM-16 meets the challenge by delivering precise average power readings for virtually any digital or analog system.

New APM series plug-in elements cover 2 through 2300 MHz and 1 through 1000 watts. Read forward or reflected power instantly by simply rotating the element. The shock-mounted meter features a linear, expanded scale with mirror band to improve reading accuracy. Interchangeable QC connectors add to the APM-16's versatility.

The APM-16's high accuracy, broad power/frequency handling, interchangeable connectors and capability to measure digital and analog signals give you an instrument that will handle almost any RF power measurement application.

- Accurately measures complex digital and analog RF signals.
- Ideal for multi-carrier transmission systems.
- Easy-to-use. Operates just like any THRULINE® wattmeter.
- Versatile plug-in elements cover all your present and future needs.
- Ruggedly constructed and truly portable for demanding field use.



Power Range: 1 W to 1000 W
Frequency Range: 2 MHz to 2.3 GHz
Accuracy:
10° to 35° C ±4% reading, ±1% full scale
-20° to 50° C ±6% reading, ±2% full scale
Peak/Avg. Ratio: 10 dB max.
Settling Time: < 1 second
Meter: Shock mounted, linear scale with expanded scales of 25, 50 and 100 for full scale 1 to 1000 W readings.
Mirrored scale includes 5% overrange.
Temp. Ranges: -20° to 50° C operating;
-25° to 65° C storage
Humidity: 95% ±5% max. (non-condensing)
EMC: Complies with 92/31/EEC. Emissions, EN55011; Immunity: EN-50082-2 at 10 V/M.

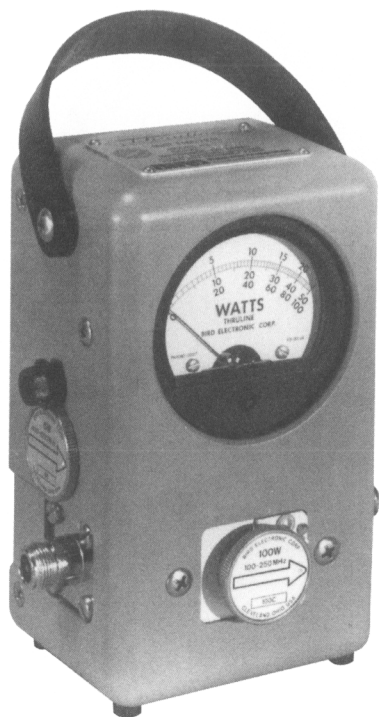
Safety: Complies with EN61010-1
Battery: Internal 9 volt "transistor"
(NEDA No. 1604A) (100 hour life min.)
Connectors: QC Type
(Female N normally supplied)
Finish: Beige baked enamel
Nominal Size: 6-7/8"L x 5-1/8"W x 3-5/8"D
(175 mm x 130 mm x 92 mm)
Weight: 3 lbs. (1.4 kg)
Elements: Special APM Series
Recommended Accessories: Case (page 24),
spare battery (page 61),
extra QC connectors (page 60)

APM ELEMENTS FOR APM-16

POWER RANGE	FREQUENCY BANDS (MHz)									
	2-30	25-60	50-125	100-250	200-500	400-1000	950-1260	1100-1800	1700-2200	2200-2300
1W	—	APM-1A	APM-1B	APM-1C	APM-1D	APM-1E	APM-1J	APM-1K	APM-1L	APM-1M
2.5W	—	APM-2.5A	APM-2.5B	APM-2.5C	APM-2.5D	APM-2.5E	APM-2.5J	APM-2.5K	APM-2.5L	APM-2.5M
5 W	APM-5H	APM-5A	APM-5B	APM-5C	APM-5D	APM-5E	APM-5J	APM-5K	APM-5L	APM-5M
10 W	APM-10H	APM-10A	APM-10B	APM-10C	APM-10D	APM-10E	APM-10J	APM-10K	APM-10L	APM-10M
25 W	APM-25H	APM-25A	APM-25B	APM-25C	APM-25D	APM-25E	APM-25J	APM-25K	APM-25L	APM-25M
50 W	APM-50H	APM-50A	APM-50B	APM-50C	APM-50D	APM-50E	APM-50J	APM-50K	APM-50L	APM-50M
100 W	APM-100H	APM-100A	APM-100B	APM-100C	APM-100D	APM-100E	APM-100J	—	—	—
250 W	APM-250H	APM-250A	APM-250B	APM-250C	APM-250D	APM-250E	APM-250J	—	—	—
500 W	APM-500H	APM-500A	APM-500B	APM-500C	APM-500D	APM-500E	—	—	—	—
1000 W	APM-1000H	APM-1000A	APM-1000B	APM-1000C	APM-1000D	APM-1000E	—	—	—	—

Protect your wattmeter and organize accessories with a sturdy case. See page 24.

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.

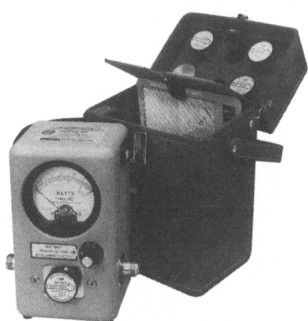
Plug-in elements determine the power rating and the frequency range, and these values are marked on each element. The elements rotate to read both forward and reflected power. There is no need for calibration charts or instrument adjustments. Elements can be purchased at any time and replaced in the 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 in. 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 Navy gray baked enamel (MIL-E-15090)
Nominal Size: (includes connectors) 6-7/8" H x 5-1/8" W x 3-5/8" D (175 mm x 130 mm x 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 & 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 - 48
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



THRULINE® RF DIRECTIONAL WATTMETERS Peak Reading Wattmeter, Peak Kit for Model 43

PEP WATTMETER

MODEL 4314B

Portable peak-reading instrument designed specifically for measurement of air navigational aids and other pulsed RF systems — such as telemetry, radar, television, and command and control — as well as peak envelope power (PEP) measurement of SSB and AM signals. Measures practically any type of 50 ohm coaxial transmission: pulsed, AM, FM, CW.

An improved power system using two internal 9 Volt alkaline transistor batteries enhances portability. An AC power adapter is also supplied.

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 CW, ±8% PEP

Pulse Parameters: (min.) Pulse width 0.4 microsec. (100-2300 MHz), 1.5 microsec. (26-99 MHz) and 15 microsec. (2-25 MHz); repetition rate 30 pps and duty factor 1 x 10⁻⁴ min.

Battery: Two 9 Volt alkaline transistor batteries

Battery Life: 20 hours of operation, typical

AC Power: (using Bird adapter) 120 Vac, 60 Hz or 220 Vac, 60 Hz

Connectors: QC Type (Female N normally supplied)

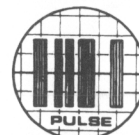
Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: (includes connectors) 6-7/8"H x 5-1/8"W x 3-5/8"D (175 mm x 130 mm x 92 mm)

Weight: 3 lbs. (1.4 kg)

Elements: Tables 1, 2, 3, 3A, 4, 5, 6 on pages 25 - 26

Recommended Accessories: Case (page 24), spare batteries (page 61), extra QC-connectors (page 60).



PEAK POWER RETROFIT KIT

MODEL 4300-400

In 15 minutes, with no soldering, adapt your Model 43 wattmeter to read true peak power output at ±8% of full-scale accuracy. The following specifications are as installed in a Bird Model 43.

Power Range: 100 mW to 10 kW using Bird Plug-in Elements.*

Frequency Range: 450 kHz to 2.7 GHz (depending on element)

Accuracy: CW mode: ±5% full scale
Peak mode: ±8% full scale

Modulation: Normal voice audio; or (Peak Mode) Rectangular pulses

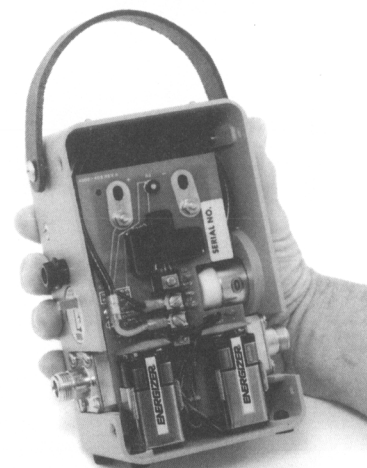
Duty cycle 2% (min)

Repetition rate 100 pps (min)

Pulse width 200 µsec (min)

Battery Life: 48 hours typical

Weight: Adds 1 lb. to Model 43



* Quoted accuracy only when used with other Bird products.

Accurately measure power in digital RF technology systems with our new APM-16 Advanced Power Measurement Wattmeter. See page 11.

THRULINE® RF DIRECTIONAL WATTMETERS High Power, RF Tap



HIGH POWER WATTMETER

MODEL 4305

The Model 4305 provides the $\pm 5\%$ of full scale accuracy of the Model 43, but offers extended power handling to 25 kW.

Power Range: 50 W to 25 kW using Bird Plug-in Elements**

Frequency Range: 450 kHz to 2.3 GHz (depending on element)

Insertion VSWR: with N connectors 1.05 max.

Accuracy: $\pm 5\%$ of full scale

Connectors: QC Type (Female N normally supplied)

Finish: Light Navy gray baked enamel (MIL-E-15090)

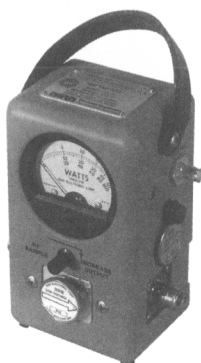
Nominal Size: (includes connectors)

6-13/16" H x 5" W x 4-9/32" D
(173 mm x 127 mm x 109 mm)

Weight: 3-1/4 lbs. (1.5 kg)

Elements: Tables 8, page 27 and 1-5/8" AA, page 37

Recommended Accessories: Case (page 24), extra QC connectors (page 60).



VARIABLE RF TAP

MODEL 4431

The combination Model 4431 THRULINE® Wattmeter provides the advantage of an RF signal sample (for use with counters, oscilloscopes, spectrum analyzers, etc.) at the same time a power measurement is made. Amplitude of the RF sample is readily adjusted by a signal coupling control knob mounted on the front of the wattmeter case. Uses the same plug-in elements as the Model 43 Wattmeter within its frequency and power ratings.

Power and Frequency Range: 5 kW max.

2 to 30 MHz, 1 kW max. 30 to 1000

MHz* using Bird Plug-in Elements**

Insertion VSWR: with N connectors

1.07 max.* to 1000 MHz

Accuracy: $\pm 5\%$ of full scale

Insertion Loss: 0.1 dB max. (2-512 MHz);

0.2 dB max. (512-1000 MHz)*

RF Sample Output: Variable -15 to -70 dB

from BNC (Female) port

Connectors: QC Type (Female N normally supplied)

Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: (includes connectors)

6-7/8" H x 5-1/8" W x 3-5/8" D
(175 mm x 130 mm x 92 mm)

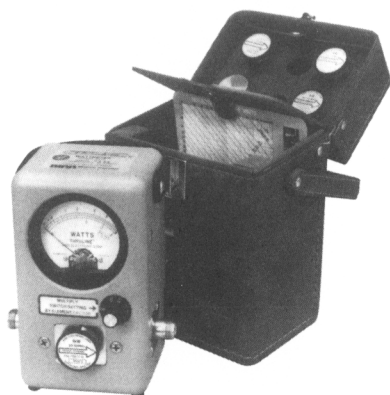
Weight: 3-1/2 lbs. (1.6 kg)

Elements: Tables 1, 2, 3, 3A, 4, 6 on pages 25 - 26 (within power/frequency range limits stated above)

Recommended Accessories: Case (page 24), extra QC connectors (page 60).

* Applies only when coupling is less than 30 dB.

** Quoted accuracy only when used with other Bird products.



CUSTOM TEST SETS

Our wide selection of power meters, elements, cases, loads and other accessories can be combined into a power measurement test set that's perfect for you. Please contact your local sales office to have a test set custom-tailored to your exact requirements.

See page 60 for a wide selection of QC connectors.



THRULINE® RF DIRECTIONAL WATTMETERS Broad-Band, Multi-Range Wattmeters

FIXED 25-1000 MHz, 5-500 WATT ELEMENT MODEL 4304A

The Model 4304A wattmeter is a popular choice of wireless communications professionals. This rugged instrument is ideal for anyone who needs to quickly test multiple power and frequency ranges. The versatile 4304A uses a single, permanently mounted, 25-1000 MHz element to deliver full-scale measurements from 5 to 500 watts. A high quality line section keeps insertion loss to less than 0.10 dB from 25-512 MHz and 0.13 dB from 512-1000 MHz. The resulting full-scale accuracy of ± 6 to 7% (depending on frequency) is ideal for many two-way communications applications.

Performance is stable to 1000 MHz. Insertion VSWR with the supplied UHF female connectors is a maximum of 1.12 at 512-1000 MHz and will not exceed 1.08 VSWR at 25-512 MHz.

Operation is exceptionally easy. Select the power range you want to measure with the 5 position power selector switch. Forward and reflected power are then measured by simply rotating the element. A chart mounted to the back of the instrument used in conjunction with the power measurements lets you easily determine antenna or load VSWR.

Power Ranges: 5, 15, 50, 150, 500 W,
with no scale limitations except power
limited to 150 W from 800-1000 MHz

Frequency Range: 25 MHz to 1.0 GHz

Insertion VSWR: 25-512 MHz, 1.08 max.
(with UHF female conn.) 512-1000 MHz,
1.12 max.

Insertion Loss: 25-512 MHz, 0.10 dB max.
with UHF female conn. 512-1000 MHz
range, 0.15 dB max.

Accuracy: 25-100 MHz, $\pm 7\%$ of full scale,
using correction charts. 100-512 MHz,
 $\pm 6\%$ of full scale, no correction needed.

512-1000 MHz, $\pm 7\%$ of full scale, no
correction needed.

Connectors: QC Type
(Female UHF normally supplied)

Finish: Light Navy gray baked enamel
Nominal Size: 6-7/8" H x 5-1/8" W x 3-5/8" D
(175 mm x 130 mm x 92 mm)

Weight: 3 lbs. (1.36 kg)

Recommended Accessories: Case (page 24),
extra QC-connectors (page 60).



CELLULAR SPECIALIST WATTMETER

MODEL 4308

The Model 4308 was designed to provide easy $\pm 5\%$ full-scale accurate measurements of analog cellular systems and subscriber equipment. If you work with digital cellular, we recommend the APM-16 found on page 11 that handles both digital and analog RF technologies.

With a permanently mounted 440-960 MHz element and four position power selector switch, measuring cellular output power with the Model 4308 is as easy as joining two connectors. A smooth twist of the element lets you measure reflected power to check antenna performance. This instrument is also a good choice for low-to-medium power measurements in the UHF and 800-960 MHz bands.

Power Ranges: 1.5, 5, 15, 50 W, with
no scale limitations

Frequency Range: 440-960 MHz

Insertion VSWR: 1.05 with TNC connectors
(QC type)

Accuracy: $\pm 5\%$ of full scale

Impedance: 50 ohms, nominal

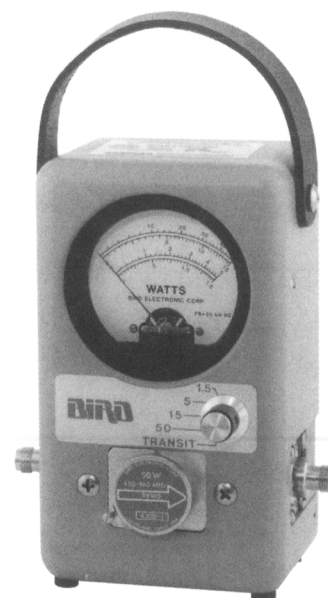
Connectors: QC Type

(Female TNC normally supplied)

Finish: Light Navy gray baked enamel
Nominal Size: 6-7/8" H x 5-1/8" W x 3-5/8" D
(175 mm x 130 mm x 92 mm)

Weight: 3 lbs. (1.36 kg)

Recommended Accessories:
CC-1 case (page 24).



Need to measure complex digital technology signals? See the new APM-16 on page 11.

THRULINE® RF DIRECTIONAL WATTMETERS

Multi-Power Level, Superior Sensitivity



Each **4410 Series** power element has seven overlapping power levels to reduce the number of elements you need.

MULTI-POWER, $\pm 5\%$ READING ACCURACY

4410 SERIES

Our 4410 Series high sensitivity wattmeters are solid choices for field service applications where the greater dynamic range of the plug-in elements substantially reduce the number of elements needed to cover multiple power and frequency ranges. Anyone engaged in laboratory work where high accuracy and power levels as low as 2 milliwatts are required should also consider one of these models.

Each 4410 Series wattmeter plug-in element is capable of reading seven different power ranges covering 0.002* to 10,000 watts. The power ranges of the different elements overlap and include: 0.002-10 W, 0.02-100 W, 0.2-1000 W and 2-10,000 W. All ranges are in frequency bands from 200 kHz to 2300 MHz. Any one of the seven power ranges is selected by a rotary switch located on the front of the wattmeter. Forward and reflected power measurements are accomplished by rotating the element. See Element Tables 9 through 12 on page 27.

Exceptional $\pm 5\%$ of reading accuracy is achieved via a built-in temperature compensation circuit. This stated accuracy applies from 100% of full scale down to 20% of full scale across all seven ranges.

The 4410 Series wattmeters are so rugged and reliable that they are used by the military in the most demanding conditions. Two portable models are available:

Model 4410A powered by a 9 volt alkaline transistor-type battery.

Model 4412 AC powered with rechargeable NiCd battery.

Models: 4410A and 4412

Power Range: 2 mW to 10 W, 20 mW to 100 W, 200 mW to 1 kW or 2 W to 10 kW full scale in one single Plug-in Element. Any Bird Series 4410-Element may be used.

Frequency Range: 200 kHz to 2.3 GHz CW or FM.

Insertion VSWR: with N Connectors 1.25 max. to 2300 MHz

Accuracy: $\pm 5\%$ of reading for any reading above 20% of the Power Range selected for FM or CW signals without AM. This accuracy is maintained for a full 37 dB dynamic range with each 4410 Element (except No. 4410-1 200 kHz-535 kHz which is accurate to $\pm 10\%$ of reading, and 4410-15 1.0-1.8 GHz and 4410-16 1.8-2.3 GHz which are accurate to $\pm 8\%$ of reading.)

Ambient Temperature Range: Elements 4410-1 through -8 and -10 through -16 are temperature-compensated for rated accuracy from 0°C to 50°C (32° to 122°F), and 4410-20 through 27 from 20°C to 30°C (68° to 86°F).

Over-Range Protection: To 120% of nominal full scale (i.e. 12 W, 120 W, 1,200 W, or

12,000 W). No damage or degradation to the unit will result, regardless of the Range Selector Switch position.

Battery Life: Model 4410A: 24 hrs. min. with standard 9 V alkaline "transistor" battery (NEDA No. 1604A supplied). Model 4412: 7 hrs. min. (rechargeable).

AC Power: Models 4412: 105-125/210-250 Vac, 50/60 Hz with integral selector switch

Connectors: QC Type (Female N normally supplied)
Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: (includes connectors) 6-7/8" H x 5-1/8" W x 3-5/8" D (175 mm x 130 mm x 92 mm)

Weight:
Model 4410A: 3 lbs. (1.4 kg).
Model 4412: 3-1/3 lbs. (1.5 kg)

Elements: Tables 9, 9A, 10, 11, 12 on page 27

Recommended Accessories: Case (page 24), spare battery (page 61), extra QC-connectors (page 60).

* On the 10 mW scale

Need even greater accuracy? See our laboratory grade instruments on pages 6-8.



THRULINE® RF DIRECTIONAL WATTMETERS Panel Mount Wattmeters With Line Sections

0.45-2700 MHz

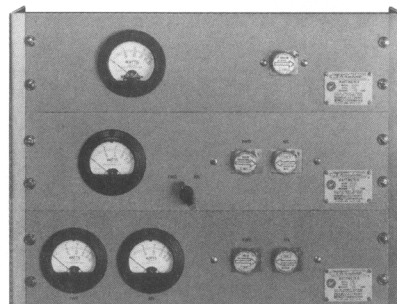
MODELS 4521, 4522 & 4526

Bird's 4500 Series wattmeters are panel mount versions of the time tested Model 43 wattmeter. They will measure power in CW and FM systems that employ 50 ohm cable or 7/8" EIA transmission line. All models include a precise line section and either one or two 3-scale analog meters to give you full scale direct readings from 100 mW to 10 kW. The rack panel fits standard 19 inch equipment racks. Plug-in elements — the same used with the Model 43 — are sold separately. Depending on the element selected, Models 4521, 4522 and 4526 will cover frequencies from 0.45 to 2700 MHz. Measurement accuracy is $\pm 5\%$ of full scale.

The Model 4521 has a single element socket and meter. Forward and reflected power are measured by rotating the element.

The single meter Model 4522 has two element sockets. The second socket permits the use of a more sensitive element to measure reflected power and let you more accurately determine VSWR. A selector switch changes the display between forward and reflected power.

In addition to the sensitivity advantage provided by two element sockets, the dual meter Model 4526 simultaneously displays forward and reflected RF power.



Top to Bottom:

**MODELS
4521, 4522, 4526**

Models: 4521, 4522, 4526

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: $\pm 5\%$ of full scale

Connectors: QC Type

(Female N normally supplied)

Finish: Light Navy gray baked enamel
(MIL-E-15090)

Nominal Size: 19"W x 5-7/32"H x 1-11/16"D
(483 mm x 133 mm x 43 mm)

Weight: 3-1/2 lbs. (1.6 kg)

Elements: Tables 1, 2, 3, 3A, 4, 6
on pages 25 - 26

2-512 MHz WITH SAMPLER PORT

MODEL 4527

The panel mount Model 4527 is tailored for 2-way mobile applications in the 2-512 MHz range. Like the Model 4526 described above, it has dual element sockets and meters. These features let you determine VSWR more precisely via using a more sensitive reflected power element, and simultaneously read forward and reflected power. In addition, an RF sampling output (female BNC) is included. Select elements up to 1000 watts from 2 - 200 MHz and up to 500 watts from 200 - 512 MHz.



MODEL 4527

Power Range: 100 mW to 1 kW using
Bird Plug-in Elements.*

Frequency Range: 2 to 512 MHz
(depending on element)

Insertion VSWR: with N Connectors
1.05 max. to 512 MHz

Accuracy: $\pm 5\%$ of full scale

RF Sample Output: Fixed at -53 dB from
512 to 10 MHz, decreasing to -70 dB
at 2 MHz BNC (Female) port

Connectors: QC Type

(Female N normally supplied)

Finish: Light Navy gray baked enamel
(MIL-E-15090)

Nominal Size: 19"W x 5-7/32"H x 1-11/16"D
(483 mm x 133 mm x 43 mm)

Weight: 3 1/2 lbs. (1.6 kg)

Elements: 2 to 512 MHz models within
Tables 1, 2, 6 on pages 25- 26

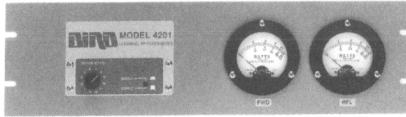
* Quoted accuracy only when used with other Bird products.

Wattmeters for rigid line use are on pages 29-33 and 35.

THRULINE® RF DIRECTIONAL WATTMETERS Multi-Channel Power Meters

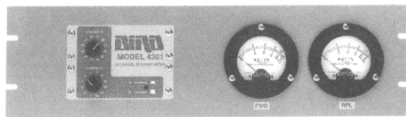


NEW



MODEL 4201A504
12 Channel RF Power Meter

NEW



MODEL 4201A503
24 Channel RF Power Meter

12 & 24 CHANNEL POWER METERS

4201 SERIES

The 4201 Series panel mount wattmeters make it easy to measure RF power in cellular sites and two-way radio base stations that have multiple transmitters. You can monitor up to 24 transmitters by simply turning a channel selector knob on the front panel. Dual meters simultaneously display forward and reflected power at $\pm 5\%$ full scale accuracy.

Power Sensors (see below) or a dual element line section that inserts directly in each 50 ohm transmission line determine frequency and power ranges. Each transmitter requires a power sensor or a line section with two elements.

MODEL	CHANNELS	METER SCALE	EACH TRANSMITTER REQUIRES
4201A501	24	25/50/100 W	Dual Line Section & Elements
4201A502	12	25/50/100 W	Dual Line Section & Elements
4201A503	24	15/30/60 W	Power Sensor
4201A504	12	15/30/60 W	Power Sensor

Models: 4201A501, 4201A502
Power Range: 10 mW to 10 kW using Bird Plug-in Elements*
Frequency Range: 450 kHz to 2.7 GHz (depending on elements)
Accuracy: $\pm 5\%$ of full scale
Meter Scales: FWD and RFL 25, 50, and 100 W
Meter Sensitivity: 30 μ A/1400 Ω
Front Panel Controls: One or two rotary channel selector switches, channel A/B push-button on 24 channel, enable/disable push-button on 12 channel.
Connectors: RCA phono jacks

Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: 19" W x 5-7/32" H x 5" D (483 mm x 133 mm x 127 mm)
Weight:
 4201A501: 3-3/4 lbs. (1.7 kg)
 4201A502: 2-7/8 lbs. (1.3 kg)
Required Products:
 Line Section: 4230-053 or 4522-002-5 on page 23
 Elements: Tables 1, 2, 3, 3A, 4, 6 on pages 25 - 26
 Cables: 10 ft. - 4201A008-1, 15 ft. - 4201A008-2, 25 ft. - 4201A008-3

Models: 4201A503, 4201A504
Power Range: Sensor-dependent
Frequency Range: Sensor-dependent
Accuracy: $\pm 5\%$ of full scale
Meter Scales: FWD and RFL 15, 30, and 60 W
Meter Sensitivity: 30 μ A/1400 Ω
Front Panel Controls: One or two rotary channel selector switches, channel A/B push-button on 24 channel, enable/disable push-button on 12 channel.
Connectors: RCA phono jacks

Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: 19" W x 5-7/32" H x 5" D (483 mm x 133 mm x 127 mm)
Weight:
 4201A503: 3-3/4 lbs. (1.7 kg)
 4201A504: 2-7/8 lbs. (1.3 kg)
Required Products:
 Power Sensor: Order from below
 Cables: 10 ft. - 4201A007-1, 15 ft. - 4201A007-2, 25 ft. - 4201A007-3

* Quoted accuracy only when used with other Bird products.

NEW



POWER SENSORS FOR 4201A503/4201A504

MODEL	FORWARD POWER MAXIMUM	REFLECTED POWER MAXIMUM	FREQUENCY RANGE
4152-220	150 W	15 W	30 - 88 MHz
4163-240	150 W	15 W	118 - 250 MHz
4164-240	150 W	15 W	420 - 512 MHz
4169-300	60 W	6 W	805 - 960 MHz

Insertion VSWR: 1.1 max.
Insertion Loss: 0.2 dB
Directivity: 25 dB min.
Accuracy: $\pm 5\%$ of full scale
Connectors:
 RF Input: Female N
 RF Output: Female N
 DC Outputs: Solder Lugs

Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (includes connectors)
 4-1/2" W x 1-1/4" H x 1" D (114 mm x 32 mm x 25 mm)
Weight: 4.5 oz. (128 grams)

Need to measure complex digital technology signals? See the new APM-16 on page 11.



THRULINE® RF DIRECTIONAL WATTMETERS Wattcher® RF Monitoring System

100 mW - 10 kW WATTCHER®

MODEL 3128A

NEW

The Model 3128A Wattcher® RF monitoring and alarm system can automatically activate a variety of safety and equipment protection measures when it detects an abnormal antenna system load condition. The 3128A Wattcher® provides simultaneous displays of forward and reflected power for 100 mW to 10 kW systems and signals audible and visual alarms if reflected power exceeds the limit you set for more than 50 milliseconds. The instrument's DPDT interlock relay can also be wired to shutdown the transmitter, activate de-icing equipment, signal a remote alarm and initiate other measures to protect your equipment from high VSWR.

All of our Wattcher® models (See other models on pages 20, 32-33) have been re-designed to provide increased performance and user requested features. Some important new Model 3128A features are:

- Mirrored scale meters aid reading and help eliminate parallax.
- Separate push-button reset control and LED indicators added.
- Improved circuitry reduces the chance of false alarms.
- Can be wired for automatic, unattended reset when alarm condition clears.
- Rear connection panel speeds installation or removal.
- Tested and found EMC compliant.



MODEL 3128A

Features a reflected power alarm

Power Range: 100 mW to 10 kW using Bird Plug-in Elements*

Frequency Range: 450 kHz to 2.7 GHz

Accuracy: ±5% of full scale

Meter Scales: FWD and RFL 25, 50, and 100 W

Meter Sensitivity: 30 µA/1400 Ω

Alarms: Front panel buzzer and red LED

Front Panel Controls: Reset push-button, reflected power limit display button, adjust alarm level recessed screw

Rear Panel Features: FWD/RFL DC signal inputs (BNC), DC power/remote reset connector, DPDT interlock relay connector, fail-safe/non-fail-safe selector, alarm buzzer disable, AC line voltage selector, safety fuses and IEC 320 AC receptacle.

Cable: Includes two 25 ft. DC cables

AC Power: 115/230 Vac, 50/60 Hz, @ 0.125A

DC Power: 9 – 16 Vdc @ 1A

Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: 19"W x 5-7/32" H x 3-3/4" D (483 mm x 133 mm x 95 mm)

Weight: 5 lbs. (2.28 kg)

Required Products:

Line Section: 4230-053 or 4522-002-5 from page 23

QC Connectors: Two from page 60

Elements: Two from Tables 1, 2, 3, 3A, 4 or 6 on pages 25-26

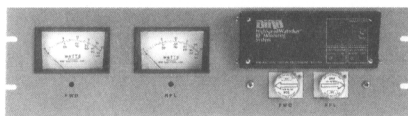
* Quoted accuracy only when used with other Bird products.

Wattchers for 250 - 100,000 watt rigid line systems are found on pages 32-33.

THRULINE®

RF DIRECTIONAL WATTMETERS

High Speed Wattcher® RF Monitoring System



MODEL 3170A

Features 25 microsecond response, forward and reflected power alarms

HIGH SPEED, FWD/RFL ALARM WATTCHER® MODEL 3170A

Our Model 3170A Wattcher® gives you ultra fast response time and a forward power drop-off alarm in addition to the capabilities of the Model 3128A. It also includes a line section complete with two QC-type N (Female) connectors to insert in your coaxial transmission line, and handles power from 100 mW to 10 kW.

This RF monitoring system can protect your transmitting equipment from damage — and loss of air time — when faults cause high standing waves. It can warn a remote operator of: 1) low power due to detuning, component deterioration, or AC line difficulties, and 2) high VSWR due to factors such as antenna icing, transmission line problems, physical accidents and lightning strikes. The solid state Model 3170A:

- Displays a continuous, simultaneous view of VSWR conditions and power output, which can be remoted.
- Provides fast fault response time — 250 times faster than other monitors — for forward and reflected power monitoring.
- Alerts you to forward power drop-off below a set level (e.g. to conform to appropriate FCC requirements).
- Activates audible/visual alarms when reflected power increases.
- Allows remote reset in the event of a false alarm or momentary disturbance which leaves transmission unimpaired.
- Operates from AC or DC.

Power Range: 100 mW to 10 kW using Bird Plug-in Elements*
Frequency Range: 450 kHz to 2.7 GHz
Insertion VSWR: with N connectors 1.05 max. to 1000 MHz, 1.1 max. to 2700 MHz
Accuracy: ±5% of full scale
Meter Scales: FWD and RFL 25, 50, and 100 W
Alarms: Front panel buzzer, "Active" and "Trip" LEDs for forward/reflected
Response Time: 25 microsec. max.
Activate Forward: 73 microsec. to 50 millisec. nominal (adjustable) monitor delay
Front Panel Controls: Reset push-button, adjust FWD/RFL alarm levels screw, element sockets
Rear Panel Features: DC FWD/RFL signal inputs, main and remote meter drive outputs, external 12-16 Vdc supply input, alarm in/out, reset in/out, AC line voltage selector, fuse, IEC 320 AC receptacle.

Inputs/Outputs: TTL compatible +5 V logic. Outputs for remote meter
AC Power: 115/230 Vac, 50/60 Hz, @ 56 mA
DC Power: 12.7 to 16.0 Vdc @ 400 mA max.
Connectors: QC Type (Female N normally supplied)
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: 19" W x 5-7/32" H x 9-5/16" D (483 mm x 133 mm x 237 mm)
Weight: 7 lbs. (3.2 kg)
Required Products: Elements: Two from Tables 1, 2, 3, 3A, 4 or 6 on pages 25-26

* Quoted accuracy only when used with other Bird products.

Wattchers for 250 - 100,000 watt rigid line systems are found on pages 32-33.



THRULINE® RF DIRECTIONAL WATTMETERS Multi-Function RF Power Analyst

RUGGED, PEP RF POWER ANALYST®

MODEL 4391A

The ruggedly built, multi-function Model 4391A RF Power Analyst® features a digital display, microprocessor-based operation, and simplified, push-button control. This wattmeter is well suited to C³, telemetry, two-way communications, avionics and radar, as well as standard radio and television applications.

- Frequency: 0.45 to 2700 MHz. Power: 100 mW to 10 kW with 20% over-range.
- Reads forward and reflected CW or FM power in watts or dBm, Peak Envelope Power of SSB/DSB and symmetrical AM in watts, and peak power for pulses as narrow as 0.8 microseconds.
- Calculates SWR, return loss in dB and % modulation
- Stores peak and null readings to facilitate adjustment of maximum and minimum signal levels.
- Shock-resistant keyboard and range switches. RFI protection. Built-in international power supply/charger.



MODEL 4391A

Model: 4391A

Power Range: 100 mW to 10 kW using Bird Plug-in Elements*

Frequency Range: 450 kHz to 2.7 GHz

Insertion VSWR: with N Connectors 1.05 max. to 1000 MHz

Accuracy: Power Readings: ±5% of full scale CW, ±8% PEP; **VSWR:** ±10% of reading

% Modulation: (CW power 1/3 or more of full scale) ±5% (0-90%), ±10% (90-100%)

Usable Over-range: to 120% of scale (CW, PEP, SWR & Return Loss)

Sampling Rate: 2 to 3 readings per second

Display: 3-1/2 digit, 0.3" LED-strobed

Modulation Frequency: 25 to 10,000 Hz (Audio)

Pulse Parameters: (min.) Pulse width 0.8 microsec. (100-2700 MHz), 1.5 microsec. (26-99 MHz) and 15 microsec. (2-25 MHz);

Repetition Rate 25 PPS, and Duty Factor 1×10^{-4} min.

Return Loss: ±0.3 dB to corresponding SWR value

Battery Life: 8 hours (rechargeable)

AC Power: 100-130/200-260 V, 50/60 Hz, 6 W

Connectors: QC Type (Female N normally supplied)

Finish: Blue vinyl with silver anodized side panels

Nominal Size: (includes connectors) 9-9/16" L x 5-7/32" W x 4-5/16" H (243 mm x 158 x 110 mm)

Weight: 5-3/4 lbs. (2.6 kg)

Elements: Select 2 elements in a 10:1 power ratio from Tables 1, 2, 3, 3A, 4, 5, 6 and 14 on pages 25 - 28.

Recommended Accessories: Case (page 24).



**MODEL 4391A
& 4380A-488**

(Model 4380A-488 IEEE-488 interface unit described below.)

BUS INTERFACE UNITS

MODELS 4380A-488, 4380A-232

Our interface units (IEEE-488 shown above or RS-232) let you remotely control a Power Analyst® Wattmeter's functions. Either interface requires a 15-pin connector on the rear of any Model 4380/4390 Series wattmeter. The connector and internal cabling are installed in a new Model 4391A Power

Analyst, or in older wattmeters having the suffix -832 in the Model number (e.g. Model 4391-832). Any 4380/4390 Series Wattmeter you already own without this connector can be retrofitted at our plant.

IEEE-488 Model: 4380A-488

Output: 3-1/2 digit ASCII format

Logic Levels: Meets all IEEE standards 488-1978 specifications

GPIO Capabilities: Supports AH1, SH1, T5, L4 SR1, RL0, PP0, DC1, DT1, C0 & E1

Environment: Operating temperature range 0°C to +50°C.

Storage temperature range -40°C to +100°C

AC Power: 100-130/200-260 Vac 50/60 Hz

Dimensions & Weight: 5-3/8" L x 3-1/4" W x 10-1/2" H (137 mm x 82 mm x 267 mm); 2 lb. 10 oz. (1.2 kg)

Output Connector: 24-pin IEEE-488 standard connector

Cable Supplied: 20 in. interconnecting cable to Bird RF Power Analyst®

Optional Cables: 3-1/4 ft. (1 m) IEEE-488 bus interface cable, P/N 5-1317-1; 6-1/2 ft. (2 m) IEEE-488 bus interface cable, Bird P/N 5-1317-2; Use of longer bus interface cables is not recommended.

RS-232 Model: 4380A-232

Output: 3-1/2 digit ASCII format

Logic Levels: Meets all EIA standard RS-232C specifications

Environment: Operating temperature range 0°C to +50°C.

Storage temperature range -40°C to +100°C

AC Power: 100-130/200-260 Vac 50/60 Hz

Dimensions & Weight: 5-3/8" L x 3-1/4" W x 10-1/2" H (137 mm x 82 mm x 267 mm); 2 lbs. 10 oz. (1.2 kg)

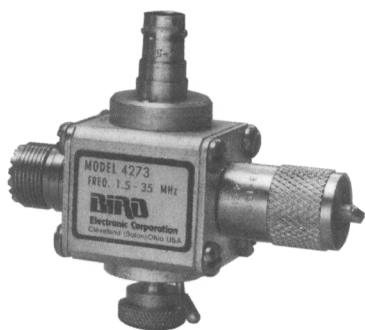
Output Connector: Standard 25-pin subminiature D style RS-232

Cable Supplied: 20 in. interconnecting cable to Bird RF Power Analyst®

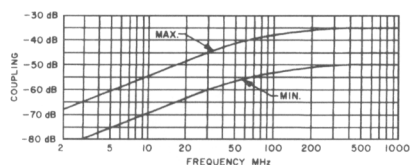
Optional Cables: 5 ft. (1.5 m) RS-232 bus interface cable, Bird P/N 5-1662-1; 10 ft. (3 m) RS-232 bus interface cable, Bird P/N 5-1662-2.

* Quoted accuracy only when used with other Bird products.

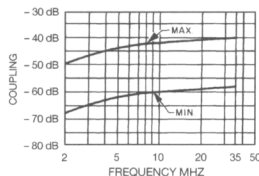
VARIABLE RF SIGNAL SAMPLERS, FIELD STRENGTH METERS



MODEL 4273-030



MODEL 4275



MODEL 4273

RF SIGNAL SAMPLERS

MODELS 4273, 4275

The Model 4273 (1.5 to 35 MHz, 5 kW max.) and Model 4275 (20 to 1000 MHz, 1 kW max.) are "stand alone," wide-range THRULINE® RF coupling probes for spectrum analysis, RF signal observation on a scope, or frequency counting and control. They feature very low VSWR throughout a broad frequency and attenuation range. Insertion loss is a negligible 0.1 dB. Both Models produce an unrectified sample at the BNC port that is adjustable. Once adjusted, the setting can be locked in place. The main power line connectors are Bird QC type.

Power Ratings: Model 4273: 5 kW max;
Model 4275: 1 kW max.

Frequency Range: Model 4273: 1.5 - 35 MHz;
Model 4275: 20 - 1000 MHz

Impedance: 50 ohms nominal

Insertion VSWR: with N connectors

Model 4273: 1.07 max. Model 4275:

1.1 max. 2 to 512 MHz, 1.25 max.

512 to 1000 MHz.

Insertion Loss: Model 4273: 0.1 dB max.

Model 4275: 0.1 dB max. 2 to 512 MHz,
0.2 dB max. 512 to 1000 MHz.

Coupling: Adjustable as shown within ± 3 dB

Ambient Temperature Range: -40°C to +45°C

Connectors: QC type as specified

(no connectors required for 4275-100,
which is a sampler accessory for Bird

instruments already equipped with
QC connectors)

Finish: Bright silver plate

Nominal Size: 2-51/64"L x 2-7/8"W x 1-1/4"D
(71 mm x 73 mm x 32 mm)

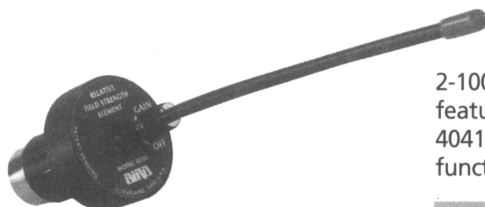
Weight: 10 oz. (280 g)

MODEL/PART NO: QC - CONNECTORS:

4273-020	4275-020	N: Male/Female
4273-025	4275-025	N: Female/Female
4273-030	4275-030	UHF: Male/Female
4273-035	4275-035	UHF: Female/Female
4273	4275	None*
4273-100	4275-100	None Required**

*Choose any two connectors from page 60.

**Accessory sampler for a Bird Instrument. Remove the instrument's QC connector, place on sampler and bolt both with the instrument.



MODEL 4030 ELEMENT



MODEL 4041 METER

FIELD STRENGTH ELEMENT & METER

MODELS 4030, 4041

The modestly priced Model 4030 Relative Field Strength Element expands the capabilities of the Model 43 and other Bird THRULINE® wattmeters with 30 μ A meters by helping you optimize the radiated signal of any transmitter from 2-1000 MHz. It automatically turns on when plugged into the element socket and features a gain control to adjust sensitivity to various field intensities. The Model 4041 Meter is a self-contained, compact instrument that performs exactly the same functions as the 4030 Element.

Model: 4030

Frequency Range: 1 to 1000 MHz

Dynamic Range: 30 dB min.

Typical Sensitivity: Full scale deflection at
8 ft. (2-1/2 m) from a 1 W source broad-
casting at 150 MHz through a quarter
wave antenna

Output Characteristics: Compatible with
30 microampere meter instruments

(Models 43, 43P, 4305, 4314B, 4410, 4430,
4431, 4521, 4522, 4526, 4527)

Battery Life: 100 hours min.

Battery Type: Three 3 V Lithium-Manganese
Dioxide cells (Duracell DL2032 or
equivalent)

Ambient Temp Range: 0°C to +50°C

Weight: (includes batteries) 3 oz.

Model: 4041

Frequency Range: 1 to 1000 MHz

Dynamic Range: 30 dB min.

Typical Sensitivity: Full-scale deflection at
8 ft. (2-1/2 m) from a 1 W source broad-
casting at 150 MHz through a quarter
wave antenna

Battery Life: 200 hours min.

Battery Type: One 9 V alkaline "Transistor"
battery (NEDA No. 1604A)

Ambient Temp Range: 0°C to +50°C

Finish: Black anodized

Nominal Size: (w/o antenna) 4-3/8"L x 2-1/4"W
x 1-15/16"D (111mm x 57mm x 49mm)

Weight: (includes batteries) 10 oz. (283 g)



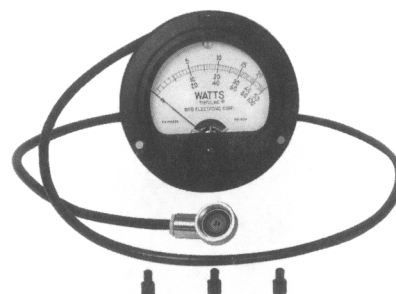
THRULINE® WATTMETER COMPONENTS

Meter Movement & Line Sections for 50 Ohm Cable Wattmeters

METER MOVEMENT

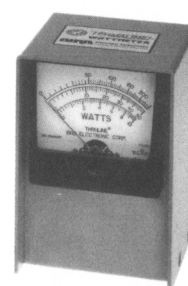
30 μ A

The Model 8-000 and Model 4210A100 meters, when combined with appropriate 7/8" line section, QC connectors, and elements, enable you to assemble custom rack-mount or bench-top wattmeters. The Model 8-000 is the same 3-1/2" diameter unit used in our Model 43. The 4210A100 is 3-1/4" square meter pre-mounted in an aluminum case. Both feature 30 μ A/1400 Ω movements and include a cable with DC connector. Both are used with elements from Tables 1, 2, 3, 3A, 4, 6 and 14.



MODEL 8-000

MODEL	TYPE	CURRENT	SCALES	USE WITH ELEMENT TABLES
8-000	3-1/2" Round Kit w/ Cable	30 μ A/1400 Ω	25/50/100W	1, 2, 3, 3A, 4, 6, and 14
4210A100	3-1/4" Square Meter in Housing	30 μ A/1400 Ω	25/50/100W	1, 2, 3, 3A, 4, 6, and 14



MODEL 4210A100

LINE SECTIONS

CABLE, 7/8" RIGID LINE

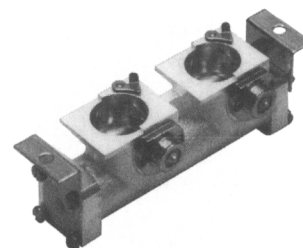
Line sections to use with 50 ohm cable and 7/8" rigid line are listed below. Page 34 contains 1-5/8", 3-1/8", 4-1/16" and 6-1/8" line sections.

Elements for the line sections below are found in Tables 1, 2, 3, 3A, 4, 6 and 14 on pages 25-28. Table 5 on page 27 can also be used with these products.

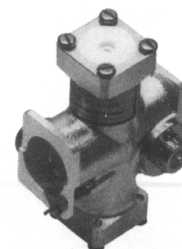
See page 60 for QC-Type connectors.

MODEL	LINE TYPE*	CONNECTOR TYPE	ELEMENT SOCKETS	LENGTH (INCHES)	WEIGHT (LBS.)	USE WITH WATTMETERS
4230-018	Cable	QC-N(F)	1	5-1/2	1-1/3	—
4230-006-1	Cable	QC(not incld.)	1	4	1	—
4230-059	Cable	QC(not incld.)	1 w/bracket	4	1-1/4	—
4230-053	Cable	QC(not incld.)	2	4	1	3128A, 4201A501, 4201A502, 4210A100, 8-000
4522-002-5	Cable	QC(not incld.)	2 panel mt.	6-7/32	1-1/4	3128A, 4201A501, 4201A502, 4210A100, 8-000
4501-000	7/8"	Flg.	1	4	1	—
4502-000	7/8"	Flg.	2	4	1-1/4	3128A, 4201A501, 4201A502, 4210A100, 8-000

* Cable = Use with cable connectors.
7/8" = Use with 7/8" rigid line.



MODEL 4522-002-5



MODEL 4230-053

Pages 25-28 present the full range of Plug-in Elements.

WATTMETER & ACCESSORY CASES



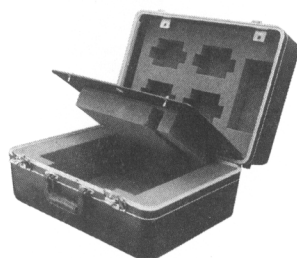
MODEL CC-1



MODEL EC-1



MODEL 4300-085



MODEL 4300A215

CASES

CC, EC, 4300 SERIES

We offer a complete selection of sturdy cases specially designed to protect your THRULINE® Wattmeter and organize elements and accessories. The protection a case provides is particularly important when you're purchasing one of our more sensitive instruments like a 4421 wattmeter. A case is also essential for field applications where you need to carry your wattmeter and numerous accessories.

CC Series cases are crafted from top-grade expanded vinyl that looks and feels like brown leather, but requires none of the care. Brass plated hardware and an embossed Bird seal add to the handsome appearance. The interior of the Models CC-1 and CC-3 features velcro closures and cutouts to secure accessories plus a 43-size wattmeter.

The Model EC-1 element case lets you organize up to 12 Plug-In elements in a die-cut foam insert. The exterior is crafted from high density expanded vinyl, with a tanned brown finish and gold-tone hardware.

Hard sided 4300 Series cases cradle your wattmeter and accessories in shock absorbing laminated die-cut foam inserts. These cases feature fold down handles, quick-release latches, rigid aluminum frame and durable polyurethane shell.

MODEL	CASE HOLDS
CC-1	Portable Thruline® Wattmeter* & 6 elements
CC-2	Mini-Monitor
CC-3	Portable Thruline® Wattmeter*, load & 3 elements
EC-1	12 elements
4300-061	Portable Thruline® Wattmeter*, load, signal sampler, QC connectors & 4 elements
4300-070	Portable Thruline® Wattmeter*, test cable, screw driver, QC connectors & 15 elements
4300-085	4391 Power Analyst®, signal sampler & 4 elements
4300-055	4410 Wattmeter, load, elements & other accessories
4300A215	4421 Wattmeter & power sensors
7000A850	AT-100, AT-400, AT-800 Antenna Testers

* Includes THRULINE® Wattmeter Models: APM-16, 43, 43P, 4304A, 4308, 4314B, 4410A, 4430 and 4431.

See our other wattmeter accessories: Attenuators (pages. 53-57), Batteries (page 61), Connector Adapters & Kits (page 61), Loads (pages. 42-49), Signal Samplers (page 22) and QC & SQC Connectors (pages. 60).



PLUG-IN ELEMENTS

Selection Guides, Standard & Low Power

All Bird Plug-In Elements are manufactured in accordance with meticulous calibration procedures, supported by more than a quarter century history of mean deviation values. This assures adherence to advertised specifications of our current instruments as well as field interchangeability with Bird equipment you might have purchased many years ago. Stated instrument accuracies cannot be guaranteed with components not supplied by Bird.

Pages 25-28 contain the most popular elements for wattmeters used with 50 ohm cable (elements for rigid line use are on pages 36-38). While our large selection lets you almost customize your Bird wattmeter, just one or two elements are sufficient for most applications. Always specify your wattmeter or line section number when ordering elements.

Unless noted otherwise, element tables listed below are found on pages 25-28.



ELEMENT SELECTION GUIDE

WATTMETER MODEL	SELECT ELEMENT FROM TABLE(S)
APM-16	APM Table
3128A	1, 2, 3, 3A, 4, 6, 14*
3170A	1, 2, 3, 3A, 4, 6, 14*
43	1, 2, 3, 3A, 4, 6, 14*
4304A	—
4305	8, 1-5/8AA**
4308	—
4314B	1, 2, 3, 3A, 4, 5, 6, 14*
4391A	1, 2, 3, 3A, 4, 5, 6, 14*
4410A, 4412	9, 10, 11, 12, 14*
4431	1, 2, 3, 3A, 4, 6, 14*
4521, 4522	1, 2, 3, 3A, 4, 6, 14*
4526	1, 2, 3, 3A, 4, 6, 14*
4527	1, 2, 6, 14*
6151	1, 2, 3

* Table 14 describes coupler elements used for RF sampling. The instrument meter does not read when these elements are installed, but simply serves as a line section.

** See page 37 for Table 1-5/8AA

ELEMENT TABLE FREQUENCY & POWER LIMITS

ELEMENT TABLE	MIN PWR (WATTS F.S.)	MAX PWR. (WATTS F.S.)	MIN FREQ (MHz)	MAX FREQ (MHz)	SEE PAGE
APM	1	1000	2	2300	28
1	5	5000	2	1000	25
2	1	2.5	25	1000	25
3	1	250	950	2700	26
3A	0.1	0.5	950	2600	26
4	1000	10,000	0.45	2.5	26
5	500	10,000	2	1260	27
6	0.1	0.5	45	1000	26
8	50	25,000	0.45	2300	27
9	0.01	10	30	1000	27
9A	0.001	1	864	970	27
10	0.1	100	25	2300	27
11	1	1000	2	1000	27
12	10	10,000	0.2	30	27
14	1000	1000	50	1250	28

TABLE 1

STANDARD ELEMENTS

POWER RANGE	FREQUENCY BANDS (MHz)					
	2-30	25-60	50-125	100-250	200-500	400-1000
5 W	—	5A	5B	5C	5D	5E
10 W	—	10A	10B	10C	10D	10E
25 W	—	25A	25B	25C	25D	25E
50 W	50H	50A	50B	50C	50D	50E
100 W	100H	100A	100B	100C	100D	100E
250 W	250H	250A	250B	250C	250D	250E
500 W	500H	500A	500B	500C	500D	500E
1000 W	1000H	1000A	1000B	1000C	1000D	1000E
2500 W	2500H	—	—	—	—	—
5000 W	5000H	—	—	—	—	—

TABLE 2

LOW-POWER ELEMENTS

1.0 WATT	MODEL	2.5 WATTS	MODEL
25-30 MHz	025-1	25-30 MHz	025-2
30-35 MHz	030-1	30-40 MHz	030-2
35-40 MHz	035-1	40-50 MHz	040-2
40-50 MHz	040-1	50-60 MHz	050-2
50-60 MHz	050-1	60-80 MHz	060-2
60-80 MHz	060-1	80-95 MHz	080-2
80-95 MHz	080-1	95-150 MHz	095-2
95-125 MHz	095-1	150-250 MHz	150-2
110-160 MHz	110-1	200-300 MHz	200-2
150-250 MHz	150-1	250-450 MHz	250-2
200-300 MHz	200-1	400-850 MHz	400-2
275-450 MHz	275-1	800-1000 MHz	801-2
425-850 MHz	425-1	—	—
800-1000 MHz	801-1	—	—

Elements for wattmeters used with rigid lines are found on pages 36-38.

PLUG-IN ELEMENTS

High Frequency, Low Frequency & Milliwatt



Protect and organize your elements with a case. See page 24.

TABLE 4 **LOW-FREQUENCY ELEMENTS**

POWER RANGE	FREQUENCY BANDS (MHz) 0.45 TO 2.5
1000 W	1000P
2500 W	2500P
5000 W	5000P
10,000 W	10000P

TABLE 3

HIGH-FREQUENCY ELEMENTS. ENTIRE TABLE $\pm 8\%$ FS

POWER RANGE	FREQUENCY BANDS (MHz)							
	950-1260	1100-1800	1700-2200	2200-2300	2300-2400	2400-2500	2500-2600	2600-2700
1 W	1J	1K	1L	1M	431-17	431-20	431-23	431-120
2.5 W	2.5J	2.5K	2.5L	2.5M	431-110	431-107	431-108	431-117
5 W	5J	5K	5L	5M	432-15	432-28	432-2	432-12
10 W	10J	10K	10L	10M	432-125	432-141	432-102	432-104
25 W	25J	25K	25L	25M	433-19	433-20	433-35	433-36
50 W	50J	50K	50L	50M	433-37	433-38	433-163	433-164
100 W	100J	—	—	—	—	—	—	—
250 W	250J	—	—	—	—	—	—	—

TABLE 3A

HIGH FREQUENCY MILLIWATT ELEMENTS

POWER RANGE	FREQUENCY BANDS (MHz)							
	950-1260	1250-1500	1500-1700	1700-2200	2200-2300	2300-2400	2400-2500	2500-2600
100 mW	430-82	430-209	430-210	430-178	430-41	430-211	430-182	430-90
250 mW	430-83	430-236	430-237	430-1	430-238	430-239	430-240	430-241
500 mW	430-84	430-259	430-260	430-95	430-78	430-261	430-159	430-262

TABLE 6

MILLIWATT ELEMENTS

100 mW	MODEL	250 mW	MODEL	500 mW	MODEL
45-50 MHz	430-266	45-50 MHz	430-267	45-54 MHz	430-242
50-60 MHz	430-191	50-60 MHz	430-212	54-60 MHz	430-243
60-66 MHz	430-192	60-66 MHz	430-213	60-66 MHz	430-244
66-72 MHz	430-193	66-72 MHz	430-214	66-72 MHz	430-245
72-76 MHz	430-2	72-76 MHz	430-22	72-76 MHz	430-33
76-82 MHz	430-194	76-82 MHz	430-215	76-88 MHz	430-246
82-88 MHz	430-195	82-88 MHz	430-216	88-108 MHz	430-247
88-97 MHz	430-170	88-108 MHz	430-217	105-120 MHz	430-26
97-108 MHz	430-171	105-120 MHz	430-20	120-136 MHz	430-248
108-136 MHz	430-57	116-126 MHz	430-48	136-150 MHz	430-249
135-175 MHz	430-86	125-136 MHz	430-218	150-170 MHz	430-53
170-190 MHz	430-62	130-150 MHz	430-13	170-190 MHz	430-250
190-210 MHz	430-63	150-180 MHz	430-15	190-216 MHz	430-251
210-216 MHz	430-176	170-190 MHz	430-64	216-240 MHz	430-252
216-230 MHz	430-196	190-210 MHz	430-65	240-290 MHz	430-27
230-240 MHz	430-197	210-220 MHz	430-184	290-340 MHz	430-253
240-250 MHz	430-198	216-230 MHz	430-219	340-360 MHz	430-157
250-260 MHz	430-199	230-240 MHz	430-220	350-400 MHz	430-254
260-270 MHz	430-200	240-250 MHz	430-221	400-450 MHz	430-255
270-280 MHz	430-201	250-260 MHz	430-222	450-500 MHz	430-256
280-290 MHz	430-202	260-270 MHz	430-223	500-600 MHz	430-257
290-300 MHz	430-203	270-280 MHz	430-224	600-800 MHz	430-258
300-320 MHz	430-204	280-290 MHz	430-225	800-1000 MHz	430-265
320-340 MHz	430-205	290-300 MHz	430-226	—	—
340-360 MHz	430-164	300-320 MHz	430-227	—	—
360-380 MHz	430-206	320-340 MHz	430-228	—	—
380-400 MHz	430-207	340-360 MHz	430-229	—	—
400-420 MHz	430-7	360-380 MHz	430-230	—	—
420-450 MHz	430-208	375-400 MHz	430-231	—	—
450-470 MHz	430-8	400-450 MHz	430-232	—	—
470-500 MHz	430-179	450-470 MHz	430-61	—	—
500-600 MHz	430-168	470-500 MHz	430-233	—	—
600-800 MHz	430-169	500-600 MHz	430-234	—	—
800-1000 MHz	430-263	600-800 MHz	430-235	—	—
—	—	800-1000 MHz	430-264	—	—

Elements for wattmeters used with rigid lines are found on pages 36-38.



PLUG-IN ELEMENTS

Pulse Power, 4410 Series

TABLE 5

PULSE POWER ELEMENTS
ENTIRE TABLE $\pm 8\%$ OF FULL SCALE

POWER RANGE	2-30	25-60	FREQUENCY BANDS (MHz)		200-500	400-1000	950-1260
500 W	—	—	—	—	—	—	500J
1000 W	—	—	—	—	—	—	1000J
2500 W	—	2500A	2500B	2500C	2500D	2500E	2500J
5000 W	—	5000A	5000B	5000C	5000D	5000E	5000J
10000 W	10000H	10000A	10000B	10000C	10000D	10000E	10000J

Table 5 Notes:

Elements 500-10,000 watts, 950-1260 MHz, are rated at 100 watts avg.
Elements 2500 watts and higher, 25-1000 MHz, are rated at 1000 watts avg.
Elements 2500A, 2500B, 2500C, 5000A, and 10000H are capable of reading peak and average power.

TABLE 8

PLUG-IN ELEMENTS FOR MODEL 4305*

FREQUENCY (MHz)	POWER	MODEL
.45-2.5	25 kW	25KP7
2-30	10 kW	10KH7
25-60	2500 W	2500A7
25-60	5000 W	5000A7
50-125	2500 W	2500B7
50-125	5000 W	5000B7
100-250	2500 W	2500C7
200-500	2500 W	2500D7
400-1000	2500 W	2500E7
1100-1800	50 W	50K7
1100-1800	100 W	100K7
1700-2200	50 W	50L7
1700-2200	100 W	100L7
2200-2300	50 W	50M7
2200-2300	100 W	100M7

*4305 may also use elements from Table 1-5/8AA on page 37.

TABLE 9

4410 ELEMENTS

FULL-SCALE POWER AND FREQUENCY RANGES 0-10, 30, 100, 300 MILLIWATTS 1, 3, 10 WATTS	
MHz	MODEL
30-50	4410-20
50-88	4410-21
88-108	4410-27
100-152	4410-22
150-250	4410-23
225-400	4410-24
400-800	4410-25
800-900	4410-26
900-1000	4410-28

TABLE 9A

4410 ELEMENTS

FULL-SCALE POWER AND FREQUENCY RANGES 0-1, 3, 10, 30, 100, 300 MILLIWATTS & 1 WATT MHz MODEL ACCURACY		
864-868	4410-38	$\pm 10\%$ of reading accuracy on 100 mW, 300 mW & 1 W, $\pm 5\%$ on all other scales
917-970	4410-29	$\pm 5\%$ 10 mW to 1 W only

TABLE 11

4410 ELEMENTS

FULL-SCALE POWER AND FREQUENCY RANGES 0-1, 3, 10, 30, 100, 300, 1000 WATTS MHz MODEL	
2-30	4410-3
25-80	4410-5
50-200	4410-6
144-520	4410-7
200-1000	4410-8

TABLE 10

4410 ELEMENTS

FULL-SCALE POWER AND FREQUENCY RANGES 0-100, 300 MILLIWATTS 1, 3, 10, 30, 100 WATTS	
MHz	MODEL
25-80	4410-10
50-125	4410-11
100-250	4410-12
200-500	4410-13
400-1000	4410-14
1000-1800	4410-15*
1800-2300	4410-16*

TABLE 12

4410 ELEMENTS

FULL-SCALE POWER AND FREQUENCY RANGES 0-10, 30, 100, 300, 1000, 3000, 10,000 WATTS MHz MODEL	
0.2-0.535	4410-1
0.45-2.5	4410-2
2-30	4410-4

*Accuracy is $\pm 8\%$ of reading

Elements for wattmeters used with rigid lines are found on pages 36-38.

PLUG-IN ELEMENTS

Sampler, Coupler & APM



Variable 4274-050
(lower left) and wide range
4274-025 (upper right)
sampler elements shown
with a standard element.

The 4274 Series sampler elements are non-directional couplers that replace the standard element in your Bird wattmeter for such applications as RF signal observation, spectrum analysis or frequency counting and control where main line power does not exceed 500 W. The Model 4274-025 is a wide range device the provides an unrectified signal at about $-50 \text{ dB} \pm 2 \text{ dB}$ from 25-1000 MHz tapering to -66 dB at 2 MHz. The Model 4274-050 delivers a variable unrectified signal from -35 to -48 dB ($\pm 1 \text{ dB}$) from 100-400 MHz.

NON-DIRECTIONAL SAMPLER ELEMENTS FOR QC-TYPE OR 7/8" EIA LINE

FREQUENCY BAND (MHz)	NOMINAL COUPLING	MAX. MAIN LINE POWER*	MODEL
25-1000	$-50 \text{ dB} \pm 2 \text{ dB}$ (-66 dB @ 2 MHz)	500 W	4274-025
100-400	-35 to -48 dB ($\pm 1 \text{ dB}$) Adjustable	500 W	4274-050

The directional coupler plug-in elements in Table 14 below are used for signal leveling, frequency control, wave-shape monitoring, local oscillator or marker signal injection, etc. They extract a calibrated amount of power from the main line signal flowing in the direction of the arrow. This attenuated signal is NOT rectified (as in the standard measuring elements), but is brought out through a female BNC connector on top of the element. Coupler elements fit the standard sockets, but there are no dc output tabs on the element body since no dc is produced. An added convenience is rotating the element between 0° and 180° varies the amount of coupling like a variable attenuator. Minimum attenuation of the main line signal is the nominal coupling $\pm 1 \text{ dB}$ shown for each unit within the stated frequency band.

TABLE 14 DIRECTIONAL COUPLER ELEMENTS FOR QC-TYPE OR 7/8" EIA LINE

FREQUENCY BAND (MHz)	NOMINAL COUPLING	MAX. MAIN LINE POWER*	MODEL
50-100	-40 dB	1 kW	400-50
75-150	-40 dB	1 kW	400-75
125-250	-40 dB	1 kW	400-125
225-450	-40 dB	1 kW	400-225
400-800	-40 dB	1 kW	400-400
750-1250	-40 dB	1 kW	400-750

*The power rating of the directional couplers cannot exceed the peak and average power ratings of the transmission line.

NEW

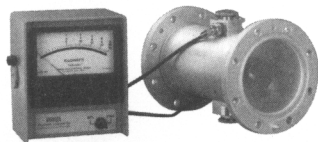
APM ELEMENTS FOR APM-16

POWER RANGE	2-30	25-60	50-125	100-250	FREQUENCY BANDS (MHz)		950-1260	1100-1800	1700-2200	2200-2300
1W	—	APM-1A	APM-1B	APM-1C	APM-1D	APM-1E	APM-1J	APM-1K	APM-1L	APM-1M
2.5W	—	APM-2.5A	APM-2.5B	APM-2.5C	APM-2.5D	APM-2.5E	APM-2.5J	APM-2.5K	APM-2.5L	APM-2.5M
5 W	APM-5H	APM-5A	APM-5B	APM-5C	APM-5D	APM-5E	APM-5J	APM-5K	APM-5L	APM-5M
10 W	APM-10H	APM-10A	APM-10B	APM-10C	APM-10D	APM-10E	APM-10J	APM-10K	APM-10L	APM-10M
25 W	APM-25H	APM-25A	APM-25B	APM-25C	APM-25D	APM-25E	APM-25J	APM-25K	APM-25L	APM-25M
50 W	APM-50H	APM-50A	APM-50B	APM-50C	APM-50D	APM-50E	APM-50J	APM-50K	APM-50L	APM-50M
100 W	APM-100H	APM-100A	APM-100B	APM-100C	APM-100D	APM-100E	APM-100J	—	—	—
250 W	APM-250H	APM-250A	APM-250B	APM-250C	APM-250D	APM-250E	APM-250J	—	—	—
500 W	APM-500H	APM-500A	APM-500B	APM-500C	APM-500D	APM-500E	—	—	—	—
1000 W	APM-1000H	APM-1000A	APM-1000B	APM-1000C	APM-1000D	APM-1000E	—	—	—	—

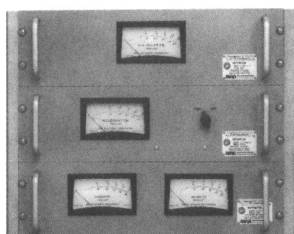


RF POWER METER SELECTION GUIDE

Power Meters For Rigid Line Use



**HIGH-POWER
WATTMETERS** Pages 30-31
LINE SECTIONS Page 34



**PANEL MOUNT
METERS** Page 35



**WATTCHER® RF
MONITORING
SYSTEMS** Pages 32-33



ELEMENTS
Pages 36-38

Bird High-Power Wattmeters measure forward and reflected power in 1-5/8" through 6-1/8" rigid line systems up to 250kW. The 4600A, 4700A, 4800A, and 4900A Series are pre-packaged, semi-portable systems consisting of a line section and meter with attached 10-foot cabling. Selected packages include a dual-element line section and switchable meter unit, permitting convenient forward or reflected power readings at the flip of a switch. For maximum flexibility, you can also assemble a custom system from a 6810-Series portable meter or 3127-Series panel-mount meter (page 35) and an appropriate line section (page 34).

Wattmeter packages, as well as the 3127 and 6810 Series meters, contain 100 μ A movements designed for use with Bird Plug-in Elements from the "A", "B", or "C" tables (pages 37-38). Order elements according to your line section size and the required power and frequency.

The Wattcher® Models on pages 32-33 are designed to protect your equipment from damage caused by high VSWR or abnormal load conditions. These instruments provide visual and audible alarms as well as switching capabilities to shut down a transmitter, turn on de-icing equipment, etc.

The table below will help direct you to a Bird 1-5/8", 3-1/8", 4-1/16", or 6-1/8" High-Power Wattmeter package to fit your needs. Turn to the referenced page for full product descriptions and specifications. You can also contact Bird or any authorized distributor for further assistance.

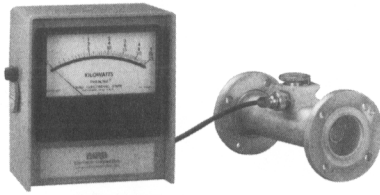
If your applications include 7/8" coaxial systems, please see the wattmeter selection guide on page 9.

HIGH-POWER WATTMETER PACKAGES

LINE SIZE	POWER	FREQ. (MHz)	FULL-SCALE ACCURACY	DISPLAY TYPE	SEE PAGE
1-5/8" EIA	100W - 25kW	2-1000	$\pm 5\%$ FS	Analog	30
3-1/8" EIA	100W - 100kW	2-1000	$\pm 5\%$ FS	Analog	30
4-1/16"	1500W - 80kW	50-1000	$\pm 5\%$ FS	Analog	31
6-1/8" EIA	1000W - 250kW	2-1000	$\pm 5\%$ FS	Analog	31

This catalog contains RF Terminations that will terminate up to 80 kW. See pages 42-52.

THRULINE® RF DIRECTIONAL WATTMETERS 1-5/8" & 3-1/8" WATTMETER PACKAGES



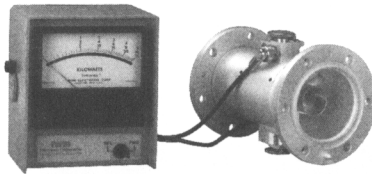
MODEL 4712A shown.
All models on pages 30-31
include meter and line section.

1-5/8" WATTMETER PACKAGES - 50 OHMS NOMINAL

Insertion VSWR: 1.05 max.
Accuracy: $\pm 5\%$ of full scale
Cable/Connectors: Permanently attached
10 foot cable(s) with DC connector(s)
Finish:
Meter: Light Navy gray baked enamel
(MIL-E-15090)
Line Section: Bright silver plated

Nominal Size (Meter): 5-9/16" W x 6-1/2" H
x 3-3/8" D (141 mm x 165 mm x 85 mm)
Weight (Meter): 3 lbs. (1.4 kg)

MODEL NO.	FREQ. RANGE (MHz)	POWER RANGE (kW)	FL/UNFL	NUMBER SOCKETS	SCALE DIVISIONS	ELEMENT TABLE	LINE SECTION LENGTH	LINE SECTION WEIGHT
4712A	2-1000	0.1-25	EIA FI	Single	5/10/25	1-5/8A	6-3/4" (171 mm)	3 lbs. (1.4 kg)
4715-200A	2-1000	0.1-25	EIA FI	Double	5/10/25	1-5/8A	6-3/4" (171 mm)	3-1/4 lbs. (1.48 kg)
4720A	2-1000	0.1-25	Unfl (Rec. 0.438")	Single	5/10/25	1-5/8A	6-3/8" (162 mm)	1-1/4 lbs. (0.6 kg)
4723-200A	2-1000	0.1-25	Unfl (Rec. 0.438")	Double	5/10/25	1-5/8A	6-3/8" (162 mm)	1-1/2 lbs. (0.7 kg)
4712-037A	2-1000	0.3-15	EIA FI	Single	15/30/60	1-5/8B	6-3/4" (171 mm)	3 lbs. (1.4 kg)
4715-300A	2-1000	0.3-15	EIA FI	Double	15/30/60	1-5/8B	6-3/4" (171 mm)	3-1/4 lbs. (1.48 kg)



MODEL 4610-200A

3-1/8" WATTMETER PACKAGES - 50 OHMS NOMINAL

Insertion VSWR: 1.05 max.
Accuracy: $\pm 5\%$ of full scale
Cable/Connectors: Permanently attached
10 foot cable(s) with DC connector(s)
Finish:
Meter: Light Navy gray baked enamel (MIL-E-15090)
Line Section: Bright silver plated

Nominal Size (Meter): 5-9/16" W x 6-1/2" H
x 3-3/8" D (141 mm x 165 mm x 85 mm)
Weight (Meter): 3 lbs. (1.4 kg)

MODEL NO.	FREQ. RANGE (MHz)	POWER RANGE (kW)	FL/UNFL	NUMBER SOCKETS	SCALE DIVISIONS	ELEMENT TABLE	LINE SECTION LENGTH	LINE SECTION WEIGHT
460A	2-1000	0.1-100	EIA FI	Single	5/10/25	3-1/8A	7-1/32" (179 mm)	7 lbs. (3.2 kg)
4610-200A	2-1000	0.1-100	EIA FI	Double	5/10/25	3-1/8A	7-1/32" (179 mm)	7-1/4 lbs. (3.3 kg)
4805A	2-1000	0.1-100	Unfl (Flush)	Single	5/10/25	3-1/8A	6-1/2" (165 mm)	4 lbs. (1.82 kg)
4802-200A	2-1000	0.1-100	Unfl (Flush)	Double	5/10/25	3-1/8A	6-1/2" (165 mm)	4-1/4 lbs. (1.94 kg)
4600-037A	50-1000	0.6-30	EIA FI	Single	15/30/60	3-1/8B	7-1/32" (179 mm)	7 lbs. (3.2 kg)
4610-300A	50-1000	0.6-30	EIA FI	Double	15/30/60	3-1/8B	7-1/32" (179 mm)	7-1/4 lbs. (3.3 kg)
4805-037A	50-1000	0.6-30	Unfl (Flush)	Single	15/30/60	3-1/8B	6-1/2" (165 mm)	4 lbs. (1.82 kg)
4802-300A	50-1000	0.6-30	Unfl (Flush)	Double	15/30/60	3-1/8B	6-1/2" (165 mm)	4-1/4 lbs. (1.94 kg)

Elements for rigid line wattmeter packages are found on pages 36-38.

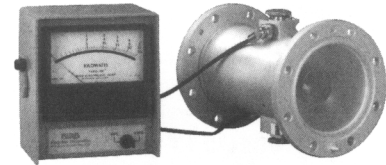


THRULINE® RF DIRECTIONAL WATTMETERS 4-1/16" & 6-1/8" WATTMETER PACKAGES

4-1/16" WATTMETER PACKAGES - 50 OHMS NOMINAL

Insertion VSWR: 1.05 max.
Accuracy: $\pm 5\%$ of full scale
Cable/Connectors: Permanently attached
10 foot cable(s) with DC connector(s)
Finish:
Meter: Light Navy gray baked
enamel (MIL-E-15090)
Line Section: Bright silver plated

Nominal Size (Meter): 5-9/16" W x 6-1/2" H
x 3-3/8" D (141 mm x 165 mm x 85 mm)
Weight (Meter): 3 lbs. (1.4 kg)



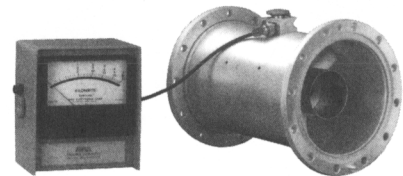
MODEL 4642-200A

MODEL NO.	FREQ. RANGE (MHz)	POWER RANGE (kW)	FL/UNFL	NUMBER SOCKETS	SCALE DIVISIONS	ELEMENT TABLE	LINE SECTION LENGTH	LINE SECTION WEIGHT
4641A	50-1000	2.5-50	EIA FI	Single	5/10/25	4-1/16A	8-3/8" (213 mm)	8-5/8 lbs. (3.9 kg)
4642-200A	50-1000	2.5-50	EIA FI	Double	5/10/25	4-1/16A	8-3/8" (213 mm)	8-7/8 lbs. (4.0 kg)
4843A	50-1000	2.5-50	Unfl (Rec. 0.531")	Single	5/10/25	4-1/16A	7-1/2" (191 mm)	2-5/8 lbs. (1.2 kg)
4844-200A	50-1000	2.5-50	Unfl (Rec. 0.531")	Double	5/10/25	4-1/16A	7-1/2" (191 mm)	2-7/8 lbs. (1.3 kg)
4641-037A	50-1000	3-60	EIA FI	Single	15/30/60	4-1/16B	8-3/8" (213 mm)	8-5/8 lbs. (3.9 kg)
4642-300A	50-1000	3-60	EIA FI	Double	15/30/60	4-1/16B	8-3/8" (213 mm)	8-7/8 lbs. (4.0 kg)
4843-037A	50-1000	3-60	Unfl (Rec. 0.531")	Single	15/30/60	4-1/16B	7-1/2" (191 mm)	2-5/8 lbs. (1.2 kg)
4844-300A	50-1000	3-60	Unfl (Rec. 0.531")	Double	15/30/60	4-1/16B	7-1/2" (191 mm)	2-7/8 lbs. (1.3 kg)
4641-080A	50-1000	8-80	EIA FI	Single	8/80	4-1/16C	8-3/8" (213 mm)	8-5/8 lbs. (3.9 kg)
4843-080A	50-1000	8-80	Unfl (Rec. 0.531")	Single	8/80	4-1/16C	7-1/2" (191 mm)	2-5/8 lbs. (1.2 kg)

6-1/8" WATTMETER PACKAGES - 50 OHMS NOMINAL

Insertion VSWR: 1.05 max.
Accuracy: $\pm 5\%$ of full scale
Cable/Connectors: Permanently attached
10 foot cable(s) with DC connector(s)
Finish:
Meter: Light Navy gray baked
enamel (MIL-E-15090)
Line Section: Bright silver plated

Nominal Size (Meter): 5-9/16" W x 6-1/2" H
x 3-3/8" D (141 mm x 165 mm x 85 mm)
Weight (Meter): 3 lbs. (1.4 kg)



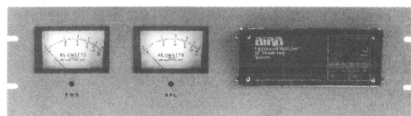
MODEL 4902A

MODEL NO.	FREQ. RANGE (MHz)	POWER RANGE (kW)	FL/UNFL	NUMBER SOCKETS	SCALE DIVISIONS	ELEMENT TABLE	LINE SECTION LENGTH	LINE SECTION WEIGHT
4902A	2-1000	1-250	EIA FI	Single	5/10/25	6-1/8A	10-7/32" (260 mm)	16-3/4 lbs. (7.6 kg)
4905-200A	2-1000	1-250	EIA FI	Double	5/10/25	6-1/8A	10-7/32" (260 mm)	17 lbs. (7.7 kg)
4907A	2-1000	1-250	Unfl (Rec. 0.968")	Single	5/10/25	6-1/8A	9-5/8" (245 mm)	12-1/2 lbs. (5.7 kg)
4909-200A	2-1000	1-250	Unfl (Rec. 0.968")	Double	5/10/25	6-1/8A	9-5/8" (245 mm)	12-3/4 lbs. (5.8 kg)
4902-037A	50-1000	3-60	EIA FI	Single	15/30/60	6-1/8B	10-7/32" (260 mm)	16-3/4 lbs. (7.6 kg)
4905-300A	50-1000	3-60	EIA FI	Double	15/30/60	6-1/8B	10-7/32" (260 mm)	17 lbs. (7.7 kg)
4902-080A	50-1000	8-80	EIA FI	Single	8/80	6-1/8C	10-7/32" (260 mm)	16-3/4 lbs. (7.6 kg)
4907-080A	50-1000	8-80	Unfl (Rec. 0.968")	Single	8/80	6-1/8C	9-5/8" (245 mm)	12-1/2 lbs. (5.7 kg)

Elements for rigid line wattmeter packages are found on pages 36-38.

THRULINE® RF DIRECTIONAL WATTMETERS

High Speed Wattcher® RF Monitoring Systems



MODEL 3171A

Features 25 microsecond response, 5/10/25 kW meter scales, forward and reflected power alarms.

HIGH SPEED, FWD/RFL ALARM WATTCHER® MODEL 3171A

Bird's high speed Wattcher® Systems can protect your transmitting equipment from damage caused by high standing waves and warn you about low transmit power. Our 3171A Series instruments offer ultra fast response time and a forward power drop-off alarm in addition to the reflected power monitor/alarm capabilities of the Wattcher models on the next page. Two models are available: the Model 3171A (100 W - 250 kW) and Model 3171A-020 (300 W - 60 kW).

Both solid state models can warn a remote operator of: 1) low power due to detuning, component deterioration, or AC line difficulties; and 2) high VSWR due to factors such as antenna icing, transmission line problems, physical accidents and lightning strikes. The 3171A Series:

- Displays a continuous, simultaneous view of VSWR conditions and power output, which can be remoted.
- Provides fast fault response time - 250 times faster than other monitors - for forward and reflected power monitoring.
- Alerts you to forward power drop-off below a set level (e.g. to conform to appropriate FCC requirements).
- Activates audible/visual alarms when reflected power increases.
- Allows remote reset in the event of a false alarm or momentary disturbance which leaves transmission unimpaired.
- Operates from AC or DC.

Power Range: 100 W to 250 kW using Bird Plug-in Elements*

Frequency Range: 2 MHz to 1 GHz

Accuracy: ±5% of full scale

Meter Scales:

3171A: FWD and RFL 5/10/25 kW

3171A-020: FWD and RFL 15/30/60 kW

Alarms: Front panel buzzer, "Active" and "Trip" LEDs for forward/reflected

Response Time: 25 microsec. max.

Activate Forward: 73 microsec.

to 50 millise. nominal (adjustable)
Monitor Delay

Front Panel Controls: Reset push-button, adjust FWD/RFL alarm levels screw.

Rear Panel Features: DC FWD/RFL signal inputs, main and remote meter drive outputs, external 12-16 Vdc supply input, alarm in/out, reset in/out, AC line voltage selector, fuse, IEC 320 AC receptacle.

Inputs/Outputs: TTL compatible +5 V logic. Outputs for remote meter

Cable: Includes two 25 ft. DC cables

AC Power: 115/230 V, 50/60 Hz @ 56 mA max.

DC Power: 12.7 to 16.0 V @ 400 mA max.

Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: 19" W x 5-7/32" H x 9-21/64" D (483 mm x 133 mm x 237 mm)

Weight: 5-1/2 lbs. (2.5 kg)

Required Products:

Line Section: 1-5/8", 3-1/8", 4-1/16", or 6-1/8" from page 34

Elements (pages 37-38):

3171A: Two from Tables 1-5/8 AA, 3-1/8 AA, 4-1/16 AA, or 6-1/8 AA.

3171A-020: Two from Tables 1-5/8 BB, 3-1/8 BB, 4-1/16 BB, or 6-1/8 BB.

Cable: If length other than 25 ft. is desired, order two BNC (M) cables from page 61.

* Quoted accuracy only when used with other Bird products.

Wattchers for 0.1 - 10,000 watt cable systems are found on pages 19-20.

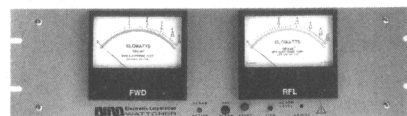


THRULINE® RF DIRECTIONAL WATTMETERS Wattcher® RF Monitoring Systems

100 W - 250 kW WATTCHER®

MODELS 3126A, 3127A

NEW



MODEL 3127A

Features a reflected power alarm for 100 W to 250 kW RF systems.

Bird's Wattcher® RF monitoring and alarm systems can automatically activate a variety of safety and equipment protection measures when they detect an abnormal antenna system load condition. Besides providing simultaneous displays of forward and reflected power, these instruments signal audible and visual alarms if reflected power exceeds the limit you set for more than 50 milliseconds. A DPDT interlock relay can also be wired to shutdown the transmitter, activate de-icing equipment, signal a remote alarm and initiate other measures to protect your equipment from high VSWR.

The Model 3126A monitors power from 300 W to 60 kW. The Model 3127A covers systems that output 100 W to 250 kW of RF power. Both models have been refined since we issued our last catalog to provide increased performance and user requested features. New features include:

- Mirrored scale meters aid reading and help eliminate parallax.
- Separate push-button reset control and LED indicators added.
- Improved circuitry reduces the chance of false alarms.
- Can be wired for automatic, unattended reset when alarm condition clears.
- Rear connection panel speeds installation or removal.
- Tested and found EMC compliant.

Power Range:

3126A: 300 W to 60 kW using Bird Plug-in Elements*
3127A: 100 W to 250 kW using Bird Plug-in Elements*

Frequency Range: 2 MHz to 1 GHz

Accuracy: $\pm 5\%$ of full scale

Meter Scale FWD:

3126A: 15/30/60 kW
3127A: 5/10/25 kW

Meter Scale RFL:

3126A: 1.5/3/6 kW
3127A: 1/2.5/5 kW

Meter Sensitivity: 100 μ A/3000 Ω

Alarms: Front panel buzzer and red LED

Front Panel Controls: Reset push-button, reflected power limit display button, adjust alarm level recessed screw

Rear Panel Features: FWD/RFL DC signal inputs (BNC), DC power/remote reset connector, DPDT interlock relay connector, fail-safe/non-fail-safe selector, alarm buzzer disable, AC line voltage selector, safety fuses and IEC 320 AC receptacle.

Cable: Includes two 25 ft. DC cables

AC Power: 115/230 V, 50/60 Hz, @ 0.125 A

DC Power: 9 to 16 V @ 1A

Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: 19" W x 5-7/32" H x 3-3/4" D (483 mm x 133 mm x 95 mm)

Weight: 5 lbs. (2.28 kg)

Required Products:

Line Section: 1-5/8", 3-1/8", 4-1/16", 6-1/8" from page 34

Elements (pages 37-38):

3126A: Two from Tables 1-5/8 B, 3-1/8 B, 4-1/16 B, or 6-1/8 B

3127A: Two from Tables 1-5/8 A, 3-1/8 A, 4-1/16 A, or 6-1/8 A

Cable: If length other than 25 ft. is desired, order two BNC (M) cables from page 61.

* Quoted accuracy only when used with other Bird products.

Wattchers for 0.1 - 10,000 watt cable systems are found on pages 19-20.

THRULINE® WATTMETER COMPONENTS

Rigid Line Sections



Bird offers 1-5/8", 3-1/8", 4-1/16", and 6-1/8" RF air line sections which, with the appropriate meter and Plug-in Elements, form a complete power measurement system. These precision sections insert in the transmission line, between the transmitter and antenna or load, and are available with flanged, unflanged/flush, or unflanged/recessed connections.

Line sections contain one element socket, or dual opposing sockets. Dual socket models permit forward and reflected readings using just one line section and a switchable meter or dual-meter panel.

Plug-in Elements (pages 36-38) must be ordered according to the desired frequency and power ranges, line section size, and the scales of the meter selected for use with the line section:

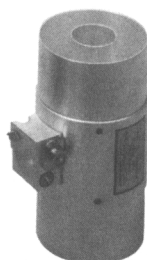
- 5/10/25 Scales: Element Tables 1-5/8A, 3-1/8A, 4-1/16A, 6-1/8A
- 15/30/60 Scales: Element Tables 1-5/8B, 3-1/8B, 4-1/16B, 6-1/8B
- 8/80 Scales: Element Tables 1-5/8C, 3-1/8C, 4-1/16C, 6-1/8C



MODEL 4715-000

1-5/8" RIGID LINE SECTIONS

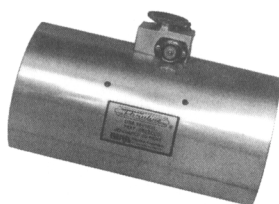
MODEL	LINE SIZE	CONNECTOR TYPE	ELEMENT SOCKETS	LENGTH (INCHES)	WEIGHT (LBS.)
4712-000	1-5/8"	EIA Flg.	1	6.75	3
4715-000	1-5/8"	EIA Flg.	2	6.75	3.25
4720-000	1-5/8"	UnFlg. (Rec. 0.438")	1	6.38	1.25
4723-000	1-5/8"	UnFlg. (Rec. 0.438")	2	6.38	1.5



MODEL 4805-000

3-1/8" RIGID LINE SECTIONS

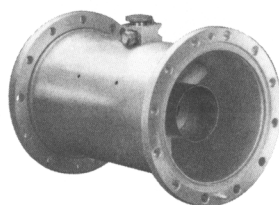
MODEL	LINE SIZE	CONNECTOR TYPE	ELEMENT SOCKETS	LENGTH (INCHES)	WEIGHT (LBS.)
4600-000	3-1/8"	EIA Flg.	1	7.03	7
4610-000	3-1/8"	EIA Flg.	2	7.03	7.25
4801-000	3-1/8"	UnFlg. (Rec. 0.688")	1	6.5	4
4801-100	3-1/8"	UnFlg. (Rec. 0.688")	2	6.5	4.25
4802-000	3-1/8"	UnFlg. (Flush)	2	6.5	4.25
4805-000	3-1/8"	UnFlg. (Flush)	1	6.5	4



MODEL 4843-000

4-1/16" RIGID LINE SECTIONS

MODEL	LINE SIZE	CONNECTOR TYPE	ELEMENT SOCKETS	LENGTH (INCHES)	WEIGHT (LBS.)
4641-000	4-1/16"	EIA Flg.	1	8.38	8.63
4642-000	4-1/16"	EIA Flg.	2	8.38	8.88
4843-000	4-1/16"	UnFlg. (Rec. 0.531")	1	7.5	2.63
4844-000	4-1/16"	UnFlg. (Rec. 0.531")	2	7.5	2.88



MODEL 4902-000

6-1/8" RIGID LINE SECTIONS

MODEL	LINE SIZE	CONNECTOR TYPE	ELEMENT SOCKETS	LENGTH (INCHES)	WEIGHT (LBS.)
4902-000	6-1/8"	EIA Flg.	1	10.22	16.75
4905-000	6-1/8"	EIA Flg.	2	10.22	17
4907-000	6-1/8"	UnFlg. (Rec. 0.968")	1	9.63	12.5
4909-000	6-1/8"	UnFlg. (Rec. 0.968")	2	9.63	12.75

METERS

3127, 6810 SERIES

The 100 μ A meters presented on this page form a complete power measurement system when combined with the appropriate 1-5/8", 3-1/8", 4-1/16" or 6-1/8" rigid line section (page 34) and Plug-in Elements (pages 36-38).

The 3127 Series meters are available in six 19" panel-mount configurations with dual meters, single meter, or single meter with forward/reflected power switch. Scale choices include 15/30/60kW and 5/10/25kW.

The 6810 Series housed meters are offered with a choice of meter scales, with or without a forward/reflected power switch. Scale choices include 15/30/60kW, 5/10/25kW, and 8/80 kW. These are the same meters included in the complete high-power wattmeter packages on pages 30-31.

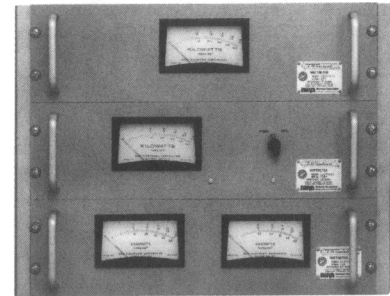
Plug-in Elements must be ordered according to the desired frequency and power ranges, the meter scales, and size of the line section selected for use with the meter:

- 5/10/25 Scales: Element Tables 1-5/8A, 3-1/8A, 4-1/16A, 6-1/8A
- 15/30/60 Scales: Element Tables 1-5/8B, 3-1/8B, 4-1/16B, 6-1/8B
- 8/80 Scales: Element Tables 1-5/8C, 3-1/8C, 4-1/16C, 6-1/8C (6810 Series, only)

DIMENSIONS AND WEIGHT:

- 3127 Series Panel Mount Meters: 19" W x 5-7/32" H x 4-3/8" D (483 mm x 133 mm x 112 mm). Weight: 3 lbs. (1.4 kg)
- 6810 Series Housed Meters: 5-9/16" W x 6-1/2" H x 3-3/8" D (142 mm x 166 mm x 86 mm). Weight: 3 lbs. (1.4 kg)

MODEL	TYPE	SCALES	DC CABLE (FT.)	USES LINE SECTION
3127-035	Single 4-1/2" rectangular on panel	5/10/25 kW	25	Single socket from page 34
3127-040	Dual 4-1/2" rectangular on panel	5/10/25 kW	25	Double socket from page 34
3127-055	Single 4-1/2" rectangular on panel w/fwd. & rfl. switch	5/10/25 kW	25	Double socket from page 34
3127-070	Single 4-1/2" rectangular on panel	15/30/60 kW	25	Single socket from page 34
3127-075	Dual 4-1/2" rectangular on panel	15/30/60 kW	25	Double socket from page 34
3127-080	Single 4-1/2" rectangular on panel w/fwd. & rfl. switch	15/30/60 kW	25	Double socket from page 34
6810-220	4-1/2" rectangular in housing w/fwd. & rfl. switch	5/10/25 kW	10	Double socket from page 34
6810-230	4-1/2" rectangular in housing w/fwd. & rfl. switch	15/30/60 kW	10	Double socket from page 34
6810-250	4-1/2" rectangular in housing w/fwd. & rfl. switch	8/80 kW	10	Double socket from page 34
6810-265	4-1/2" rectangular in housing	8/80 kW	10	Single socket from page 34
6810-307	4-1/2" rectangular in housing	15/30/60 kW	10	Single socket from page 34
6810-309-7	4-1/2" rectangular in housing	5/10/25 kW	10	Single socket from page 34



Top to Bottom:
MODEL 3127-070,
MODEL 3127-055,
MODEL 3127-040



MODEL 6810-220



MODEL 6810-309-7

Elements for rigid line wattmeters are found on pages 36-38

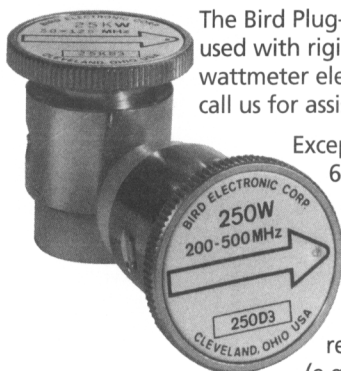
PLUG-IN ELEMENTS

Selection Guides Standard & Low Power



ELEMENT SELECTION GUIDE

WATTMETER* MODEL	SELECT ELEMENT FROM TABLE(S)
3126A	1-5/8 B, 3-1/8 B, 4-1/16 B, 6-1/8 B
3127A	1-5/8 A, 3-1/8 A, 6-1/8 A
3127-035	1-5/8 A, 3-1/8 A, 4-1/16A, 6-1/8 A
3127-040	1-5/8 A, 3-1/8 A, 4-1/16A, 6-1/8 A
3127-055	1-5/8 A, 3-1/8 A, 4-1/16A, 6-1/8 A
3127-070	1-5/8 B, 3-1/8 B, 4-1/16 B, 6-1/8 B
3127-075	1-5/8 B, 3-1/8 B, 4-1/16 B, 6-1/8 B
3127-080	1-5/8 B, 3-1/8 B, 4-1/16 B, 6-1/8 B
3171A	1-5/8 AA, 3-1/8 AA, 4-1/16 A A, 6-1/8 AA
3171-020	1-5/8 BB, 3-1/8 BB, 4-1/16 BB, 6-1/8 BB
4305	8**, 1-5/8AA
4382, 84, 86, 88	1-5/8 A, 3-1/8 A, 6-1/8 A
460A	3-1/8 A
4600-037A	3-1/8 B
4610-200A	3-1/8 A
4610-300A	3-1/8 B
4641A	4-1/16 A
4641-037A	4-1/16 B
4641-080A	4-1/16 C
4642-200A	4-1/16 A
4642-300A	4-1/16 B
4643-080A	4-1/16 C
4712A	1-5/8 A
4712-037A	1-5/8 B
4715-200A	1-5/8 A
4715-300A	1-5/8 B
4720A	1-5/8 A
4723-200A	1-5/8 A
4802-200A	3-1/8 A
4802-300A	3-1/8 B
4805A	3-1/8 A
4805-037A	3-1/8 B
4843A	4-1/16 A
4843-037A	4-1/16 B
4844-200A	4-1/16 A
4844-300A	4-1/16 B
4902A	6-1/8 A
4902-037A	6-1/8 B
4902-080A	6-1/8 C
4905-200A	6-1/8 A
4905-300A	6-1/8 B
4907A	6-1/8 A
4907-080A	6-1/8 C
4909-200A	6-1/8 A



The Bird Plug-In Elements on these pages are for wattmeters used with rigid line sections (See pages 25-28 for 50 ohm cable wattmeter elements). Use the Selection Guide on this page or call us for assistance to find the right element .

Except for directional coupler elements, all 1-5/8" to 6-1/8" rigid line elements must be calibrated with the wattmeter where they will be used to ensure stated accuracy. We highly recommend ordering elements in identical pairs, recording the meter reading of both and storing one in a safe place. This will help you avoid the inconvenience of returning an entire wattmeter for re-calibration (e.g., if an element is dropped.)

Always specify your wattmeter or line section number when ordering elements.

ELEMENT TABLE VS. METER SENSITIVITY & SCALES

ELEMENT TABLE	METER CURRENT	METER SCALE
1-5/8A, 3-1/8A, 4-1/16A, 6-1/8A	100 μ A	5/10/25
1-5/8AA, 3-1/8AA, 4-1/16AA, 6-1/8AA	30 μ A	5/10/25
1-5/8B, 3-1/8B, 4-1/16B, 6-1/8B	100 μ A	15/30/60
1-5/8BB, 3-1/8BB, 4-1/16BB, 6-1/8BB	30 μ A	15/30/60
1-5/8C, 3-1/8C, 4-1/16C, 6-1/8C	100 μ A	80
15, 16, 17*	—	—

TABLE 15 DIRECTIONAL COUPLER ELEMENTS FOR 1-5/8" EIA LINES

FREQUENCY BAND	NOMINAL COUPLING	MAX. MAIN LINE POWER	MODEL
50-100	-50 dB	10 kW	501-50
75-150	-50 dB	10 kW	501-75
125-250	-50 dB	10 kW	501-125
225-450	-50 dB	10 kW	501-225
400-800	-50 dB	5 kW	501-400
750-1250	-50 dB	5 kW	501-750

TABLE 16 DIRECTIONAL COUPLER ELEMENTS FOR 3-1/8" EIA LINES

FREQUENCY BAND	NOMINAL COUPLING	MAX. MAIN LINE POWER	MODEL
25-40	-55 dB	25 kW	553-25
50-100	-55 dB	25 kW	553-50
75-150	-55 dB	25 kW	553-75
125-250	-55 dB	25 kW	553-125
225-450	-55 dB	25 kW	553-225
400-800	-55 dB	15 kW	553-401
750-1250	-55 dB	10 kW	553-750

TABLE 17 DIRECTIONAL COUPLER ELEMENTS FOR 6-1/8" EIA LINES

FREQUENCY BAND	NOMINAL COUPLING	MAX. MAIN LINE POWER	MODEL
50-100	-60 dB	60 kW	606-50
75-150	-60 dB	60 kW	606-75
125-250	-60 dB	60 kW	606-125
225-450	-60 dB	60 kW	606-225
400-870	-60 dB	60 kW	606-400

* In addition to the elements listed, these meters can use Tables 15, 16 & 17 coupler elements for RF sampling. The instrument meter does not read when these elements are installed. Typically, Table 15-17 elements are used with line sections, but also provide RF sampling when used with metered instruments where the meter simply serves as a line section. Directional coupler power ratings cannot exceed the peak and average rating of the transmission line.

** See page 27 for Table 8

ELEMENTS FOR 1-5/8" LINE SECTIONS

TABLE 1-5/8A STANDARD ELEMENTS 100 μ A

POWER RANGE	2-30	25-60	FREQUENCY BANDS (MHz)			
			50-125	100-250	200-500	400-1000
100 W	—	100A1	100B1	100C1	100D1	100E1
250 W	—	250A1	250B1	250C1	250E1	250E1
500 W	—	500A1	500B1	500C1	500D1	500E1
1000 W	—	1000A1	1000B1	1000C1	1000D1	1000E1
2500 W	2500H1	2500A1	2500B1	2500C1	2500D1	2500E1
5000 W	5000H1	5000A1	5000B1	5000C1	5000D1	5000E1
10 kW	10KH1	10KA1	10KB1	10KC1	—	—
25 kW	25KH1	25KA1	25KB1	—	—	—

TABLE 1-5/8AA STANDARD ELEMENTS 30 μ A

POWER RANGE	2-30	25-60	FREQUENCY BANDS (MHz)			
			50-125	100-250	200-500	400-1000
100 W	—	100A12	100B12	100C12	100D12	100E12
250 W	—	250A12	250B12	250C12	250D12	250E12
500 W	500H12	500A12	500B12	500C12	500D12	500E12
1000 W	1000H12	1000A12	1000B12	1000C12	1000D12	1000E12
2500 W	2500H12	2500A12	2500B12	2500C12	2500D12	2500E12
5000 W	5000H12	5000A12	5000B12	5000C12	5000D12	5000E12
10 kW	10KH12	10KA12	10KB12	10KC12	—	—
25 kW	25KH12	25KA12	25KB12	—	—	—

TABLE 1-5/8B STANDARD ELEMENTS 100 μ A

POWER RANGE	2-30	25-60	FREQUENCY BANDS (MHz)		
			50-125	100-250	400-1000
300 W	—	—	300B1	300C1	300E1
600 W	—	—	600B1	600C1	600E1
1500 W	1500H1	—	1500B1	1500C1	1500E1
3000 W	3000H1	3000A1	3000B1	3000C1	3000E1
6000 W	6000H1	—	6000B1	6000C1	6000E1
15 kW	15KH1	—	15KB1	—	—

TABLE 1-5/8BB STANDARD ELEMENTS 30 μ A

POWER RANGE	2-30	FREQUENCY BANDS (MHz)		
		50-125	100-250	400-1000
300 W	300H12	300B12	300C12	300E12
600 W	600H12	600B12	600C12	600E12
1500 W	1500H12	1500B12	1500C12	1500E12
3000 W	3000H12	3000B12	3000C12	3000E12
6000 W	6000H12	6000B12	6000C12	6000E12
15 kW	15KH12	15KB12	—	—

TABLE 1-5/8C STANDARD ELEMENTS 100 μ A

POWER RANGE	25-60	FREQUENCY BANDS (MHz)	
		50-125	100-250
8000 W	8000A1	8000B1	8000C1

ELEMENTS FOR 3-1/8" LINE SECTIONS

TABLE 3-1/8A STANDARD ELEMENTS 100 μ A

POWER RANGE	2-30	25-60	FREQUENCY BANDS (MHz)			
			50-125	100-250	200-500	400-1000
100 W	—	—	100B3	100C3	100D3	100E3
250 W	—	—	250B3	250C3	250D3	250E3
500 W	—	500A3	500B3	500C3	500D3	500E3
1000 W	—	1000A3	1000B3	1000C3	1000D3	1000E3
2500 W	2500H3	2500A3	2500B3	2500C3	2500D3	2500E3
5000 W	5000H3	5000A3	5000B3	5000C3	5000D3	5000E3
10 kW	10KH3	10KA3	10KB3	10KC3	10KD3	10KE3
25 kW	25KH3	25KA3	25KB3	25KC3	25KD3	52KE3
50 kW	50KH3	50KA3	50KB3	50KC3	—	—
100 kW	100KH3	—	—	—	—	—

TABLE 3-1/8AA STANDARD ELEMENTS 30 μ A

POWER RANGE	2-30	25-60	FREQUENCY BANDS (MHz)			
			50-125	100-250	200-500	400-1000
100 W	—	100A32	100B32	100C32	100D32	100E32
250 W	—	250A32	250B32	250C32	250D32	250E32
500 W	500H32	500A32	500B32	500C32	500D32	500E32
1000 W	1000H32	1000A32	1000B32	1000C32	1000D32	1000E32
2500 W	2500H32	2500A32	2500B32	2500C32	2500D32	2500E32
5000 W	5000H32	5000A32	5000B32	5000C32	5000D32	5000E32
10 kW	10KH32	10KA32	10KB32	10KC32	10KD32	10KE32
25 kW	25KH32	25KA32	25KB32	25KC32	25KD32	25KE32
50 kW	50KH32	50KA32	50KB32	50KC32	—	—
100 kW	100KH32	—	—	—	—	—

TABLE 3-1/8B STANDARD ELEMENTS 100 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz)	
		100-250	400-1000
600 W	600B3	600C3	600E3
1500 W	1500B3	1500C3	1500E3
3000 W	3000B3	3000C3	3000E3
6000 W	6000B3	6000C3	6000E3
15 kW	15KB3	15KC3	15KE3
30 kW	30KB3	30KC3	30KE3

TABLE 3-1/8BB STANDARD ELEMENTS 30 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz)	
		100-250	400-1000
600 W	600B32	600C32	600E32
1500 W	1500B32	1500C32	1500E32
3000 W	3000B32	3000C32	3000E32
6000 W	6000B32	6000C32	6000E32
15 kW	15KB32	15KC32	15KE32
30 kW	30KB32	30KC32	30KE32

TABLE 3-1/8C STANDARD ELEMENTS 100 μ A

POWER RANGE	FREQUENCY BANDS (MHz)	
	100-250	
8000 W	8000C3	

Note - transmission line power rating should not be exceeded.

PLUG-IN ELEMENTS For 4-1/16" & 6-1/8" Lines



ELEMENTS FOR 4-1/16" LINE SECTIONS

TABLE 4-1/16A STANDARD ELEMENTS 100 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz) 100-250	400-1000
2500 W	2500B5	2500C5	2500E5
5000 W	5000B5	5000C5	5000E5
10 kW	10KB5	10KC5	10KE5
25 kW	25KB5	25KC5	25KE5
50 kW	50KB5	50KC5	—

TABLE 4-1/16AA STANDARD ELEMENTS 30 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz) 100-250	400-1000
2500 W	2500B52	2500C52	2500E52
5000 W	5000B52	5000C52	5000E52
10 kW	10KB52	10KC52	10K352
25 kW	25KB52	25KC52	25KE52
50 kW	50KB52	50KC52	—

TABLE 4-1/16B STANDARD ELEMENTS 100 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz) 100-250	400-1000
1500 W	1500B5	1500C5	1500E5
3000 W	3000B5	3000C5	3000E5
6000 W	6000B5	6000C5	6000E5
15 kW	15KB5	15KC5	15KE5
30 kW	30KB5	30KC5	30KE5
60 kW	60KB5	60KC5	—

TABLE 4-1/16BB STANDARD ELEMENTS 30 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz) 100-250	400-1000
1500 W	1500B52	1500C52	1500E52
3000 W	3000B52	3000C52	3000E52
6000 W	6000B52	6000C52	6000E52
15 kW	15KB52	15KC52	15KE52
30 kW	30KB52	30KC52	30KE52
60 kW	60KB52	60KC52	—

TABLE 4-1/16C STANDARD ELEMENTS 100 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz) 100-250	400-1000
8000 W	8000B5	8000C5	8000E5
80 kW	80KB5	80KC5	—

ELEMENTS FOR 6-1/8" LINE SECTIONS

TABLE 6-1/8A STANDARD ELEMENTS 100 μ A

POWER RANGE	2-30	25-60	FREQUENCY BANDS (MHz) 50-125	100-250	200-500	400-1000
1000 W	—	1000A6	1000B6	1000C6	1000D6	1000E6
2500 W	—	2500A6	2500B6	2500C6	2500D6	2500E6
5000 W	—	5000A6	5000B6	5000C6	5000D6	5000E6
10 kW	10KH6	10KA6	10KB6	10KC6	10KD6	10KE6
25 kW	25KH6	25KA6	25KB6	25KC6	25KD6	25KE6
50 kW	50KH6	50KA6	50KB6	50KC6	50KD6	50KE6
100 kW	100KH6	100KA6	100KB6	100KC6	—	—
250 kW	250KH6	—	—	—	—	—

TABLE 6-1/8AA STANDARD ELEMENTS 30 μ A

POWER RANGE	2-30	25-60	FREQUENCY BANDS (MHz) 50-125	100-250	200-500	400-1000
250 W	—	250A62	250B62	250C62	250D62	250E62
500 W	—	500A62	500B62	500C62	500D62	500E62
1000 W	1000H62	1000A62	1000B62	1000C62	1000D62	1000E62
2500 W	2500H62	2500A62	2500B62	2500C62	2500D62	2500E62
5000 W	5000H62	5000A62	5000B62	5000C62	5000D62	5000E62
10 kW	10KH62	10KA62	10KB62	10KC62	10KD62	10KE62
25 kW	25KH62	25KA62	25KB62	25KC62	25KD62	25KE62
50 kW	50KH62	50KA62	50KB62	50KC62	50KD62	50KE62
100 kW	100KH62	100KA62	100KB62	100KC62	—	—
250 kW	250KH62	—	—	—	—	—

TABLE 6-1/8B STANDARD ELEMENTS 100 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz) 100-250	400-1000
3000 W	3000B6	3000C6	3000E6
6000 W	6000B6	6000C6	6000E6
15 kW	15KB6	15KC6	15KE6
30 kW	30KB6	30KC6	30KE6
60 kW	60KB6	60KC6	60KE6

TABLE 6-1/8BB STANDARD ELEMENTS 30 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz) 100-250	400-1000
3000 W	3000B62	3000C62	3000E62
6000 W	6000B62	6000C62	6000E62
15 kW	15KB62	15KC62	15KE62
30 kW	30KB62	30KC62	30KE62
60 kW	60KB62	60KC62	60KE62

TABLE 6-1/8C STANDARD ELEMENTS 100 μ A

POWER RANGE	50-125	FREQUENCY BANDS (MHz) 100-250	400-1000
8000 W	8000B6	8000C6	8000E6
80 kW	80KB6	80KC6	80KE6

Note - transmission line power rating should not be exceeded.



TERMALINE® RF ABSORPTION WATTMETERS Selection Guide, 60 Watt

Absorption wattmeters were first produced by Bird in 1948 and we continue to refine these instruments.

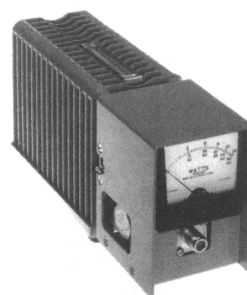
TERMALINE® Absorption Wattmeters give you the convenience of a combination measuring and terminating unit for servicing 50 ohm communications systems and keeping them at peak operation. These instruments consist of a direct-reading meter and load resistor that dissipates RF power during measurement. Their individual frequency coverage is generally wider than that of directional meters.

Power ratings range from the 6100 Series' 150 watts to the 6730 Series' 2500 watts. And these liquid-dielectric wattmeters — like our oil-cooled load resistors — are conservatively rated. Most of the Models have been purchased under U.S., European or Middle East military standards.

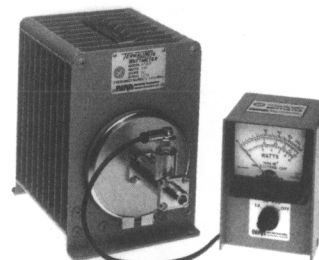
The 6730 Series absorption wattmeters feature a choice of three power ranges selected through a rotary switch. It makes measurement easier and frees one hand for equipment fine tuning or trouble-shooting.

The 6100 Series wattmeters and load sections are joined with Bird latch connectors which permit easy separation. This feature allows use of the resistor as an independent termination with an even lower VSWR and offers a choice of 15 other connector types.

Use the Selection Guide below to quickly find the absorption wattmeter that's best for your needs.



60-150 watts
Pages 39-40



250-2500 watts
Pages 40-41

ABSORPTION WATTMETER SELECTION GUIDE

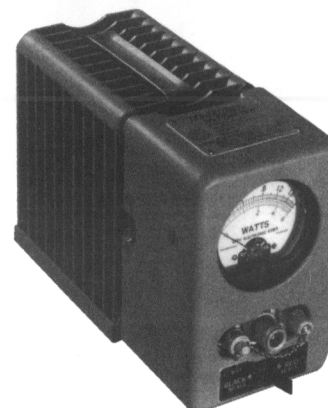
*FULL SCALE POWER RATING	CALIBRATED FREQUENCY RANGE MHz	POWER SCALES IN WATTS																			MODEL	PAGE	
60 W	25-512																					6104	39
100 W	2-2700																					6151	40
150 W	25-1000																					6154	40
150 W	25-512																					6156	40
250 W	25-1000																					6732B	40
500 W	25-1000																					6734B	40
500 W	1.5-35																					6734B-030	40
RATING	RANGE MHz	50	100	120	250	500	600	1000	1200	2500	MODEL	PAGE											
1000 W	25-1000										6736A	41											
1000 W	1.5-35										6736-030A	41											
1200 W	25-1000										6735-300A	41											
2500 W	25-1000										6737A	41											
2500 W	1.5-35										6737-030A	41											

60 WATT

MODEL 6104

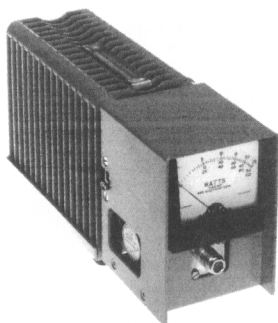
Power Range: 60 W
Power Scales: 2/6/20/60 W
Frequency Range & VSWR:
1.1 max. 25-512 MHz
Accuracy: $\pm 5\%$ of full scale
Connector: Female N
Load Coolant: 0.1 gal (378.5 ml) refined
mineral oil

Finish: Light Navy gray baked enamel
(MIL-E-15090)
Nominal Size: (includes connector)
9-5/8"L x 6-3/8"H x 3-15/16"W
(244 mm x 162 mm x 100 mm)
Weight: 7 lbs. (3.2 kg)
Meter Housing: Can be detached from load
for convenient reading. 3 ft. cable



See our connector adapter kits on page 61.

TERMALINE® **RF ABSORPTION WATTMETERS** **100, 150, 250, 500 Watt**



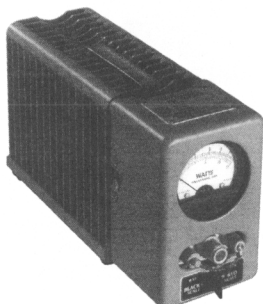
100 WATT

MODEL 6151

Power Rating: Up to 100 W depending on element*
Frequency Range: 2-2700 MHz depending on element*
Power Scales: 1/2.5/5/10/25/50/100 W determined by plug-in element*
VSWR: 1.1 max. dc-1000 MHz, 1.25 min. 1000-2300 MHz
Accuracy: $\pm 5\%$ of full scale to 1 GHz, $\pm 8\%$ to 2.3 GHz

Connector: QC type (Female N normally supplied)
Load Coolant: 1 pint (473 ml) refined mineral oil
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: 12-7/8" L x 6-3/8" H x 3-15/16" W (326 mm 162 mm x 100 mm)
Weight: 8 lbs. (3.6 kg)
Elements: Tables 1, 2, 3 on pages 25-26.

*Select plug-in element(s) to suit your frequency and power range.
 Do not exceed the power rating of the element or 100 W, whichever is less.

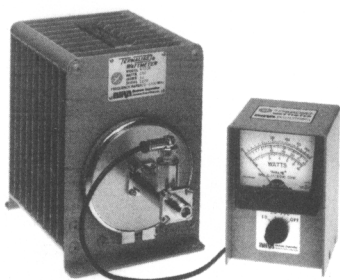


150 WATT

MODELS 6154, 6156

Power Rating: 150 W
Power Scales: 5/15/50/150 W
Frequency Range & VSWR:
 6154: 1.1 max. 25-1000 MHz
 6156: 1.1 max. 25-512 MHz
Accuracy:
 6154: $\pm 5\%$ of full scale 25-512 MHz,
 $\pm 10\%$ of full scale 512-1000 MHz
 6156: $\pm 5\%$ of full scale 25-512 MHz
Connector: Female N

Load Coolant: 0.1 gal (378.5 ml) refined mineral oil
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (includes connector)
 12-5/32" L x 6-3/8" H x 3-15/16" W
 (309 mm x 162 mm x 100 mm)
Weight: 8 lbs. (3.6 kg)
Meter Housing: Separates from load for convenient reading. 3 ft. cable.

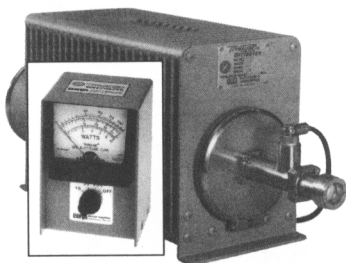


250 WATT

MODEL 6732B

Power Rating: 250 W
Power Scales: 10/50/250 W
Frequency Range & VSWR:
 1.1 max. 25-1000 MHz
Accuracy: $\pm 5\%$ of full scale 25-512 MHz,
 $\pm 10\%$ of full scale 512-1000 MHz
Connector: QC type
 (Female N normally supplied)
Load Coolant: 0.35 gal. (1.3 liters) silicone oil

Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: Load 12-5/8" L x 8-1/2" W x 5-15/16" H (321 mm x 216 mm x 151 mm);
 Meter 5-7/8" H x 3-5/8" W x 3-15/16" D
 (149 mm x 92 mm 100 mm)
Weight: 13 lbs., 11 oz. (6.2 kg)
Meter: Separates from load for convenient reading. 4 ft. cable.



500 WATT

MODELS 6734B, 6734B-030

Power Rating: 500 W
Power Scales: 25/100/500 W
Frequency Range & VSWR:
 6734B: 1.15 max. 25-1000 MHz
 6734B-030: 1.15 max. 1.5-35 MHz
Accuracy:
 6734B: $\pm 5\%$ of full scale, 25-512 MHz,
 $\pm 10\%$ of full scale, 512-1000 MHz
 6734B-030: $\pm 10\%$ of full scale, 1.5-35 MHz
Connector: QC type
 (Female N normally supplied)

Load Coolant: 0.9 gal. (3.4 liters) refined mineral oil
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: Load 19-15/16" L x 8-1/2" H x 5-15/16" W (506 mm x 216 mm x 151 mm);
 Meter 5-7/8" H x 3-5/8" W x 3-15/16" D
 (149 mm x 92 mm 100 mm)
Weight: 23 lbs., 11 oz. (10.6 kg)
Meter: Separates from load for convenient reading. 4 ft. cable.

Bird liquid-dielectric wattmeters have never and are not now manufactured with Poly Chlorinated Biphenyls (PCBs).

TERMALINE® **RF ABSORPTION WATTMETERS** **1000, 1200, 2500 Watt**

1000 WATT

MODELS 6736A, 6736-030A

Power Rating: 1000 W
Power Scales: 50/250/1000 W

Frequency Range & VSWR:

6736A: 1.15 max. 25-1000 MHz

6736-030A: 1.15 max. 1.5-35 MHz

Accuracy:

6736A: ±5% of full scale, 25-512 MHz,

±10% of full scale, 512-1000 MHz

6736-030A: ±10% of full scale, 2-32 MHz

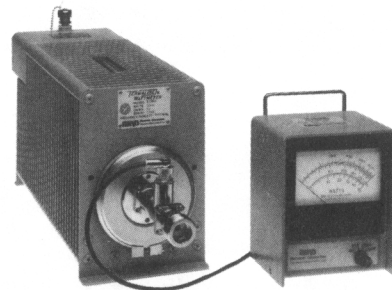
Connector: QC type (Female LC normally supplied and Female N supplied unmounted)

Load Coolant: 1.1 gal. (4.1 liters) silicone oil
Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: Load 21" L x 8-1/2" H x 5-15/16" W (533 mm x 216 mm x 151 mm);
 Meter 5-9/16" H x 6-1/2" W x 3-11/32" D (141 mm x 165 mm x 85 mm)

Weight: 6736A: 30 lbs. (13.5 kg), 6736-030A: 30.5 lbs. (13.7 kg)

Meter: Separates from load for convenient reading. 4 ft. cable.



1200 WATT

MODEL 6735-300A

Power Rating: 1200 W for 1/2 hour, 1000 W continuous

Power Scales: 120/600/1200 W

Frequency Range & VSWR: 1.15 max. 25-1000 MHz

Accuracy: ±5% of full scale 25-512 MHz, ±10% of full scale 512-1000 MHz

Connector: QC type

(Female LC normally supplied, and Female N supplied unmounted)

Load Coolant: 2.9 gal. (11 liters) refined mineral oil

Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: Load 21-1/2" L x 17-3/16" H x 7" W (546 mm x 437 mm x 178 mm);
 Meter 5-9/16" H x 6-1/2" W x 3-11/32" D (141 mm x 165 mm x 85 mm)

Weight: 63 lbs. (28.4 kg)

Meter: Separates from load for convenient reading. 4 ft. cable.



2500 WATT

MODELS 6737A, 6737-030A

Power Rating: 2500 W continuous with water cooling, 200 W without.

Power Scales: 100/500/2500 W

Frequency Range & VSWR:

6737A: 1.15 max. 25-1000 MHz

6737-030A: 1.15 max. 1.5-35 MHz

Accuracy:

6737A: ±5% of full scale, 25-512 MHz

±10% of full scale, 512-1000

6737-030A: ±10% of full scale, 2-32 MHz

Connector: QC type

(Female LC normally supplied)

Load Coolant: 0.9 gal. (3.4 liters) refined mineral oil, water cooled

Water Connections: 3/8" tubing to accept rubber hose

Flow Rate: 1/2 gpm (2 liters/min)

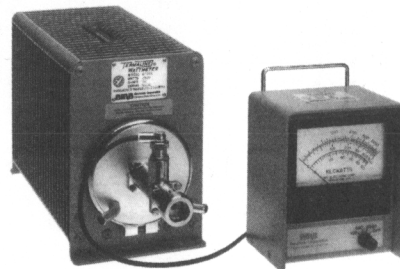
Operating Position: Vertical - connector down above 200 W when water cooled

Finish: Light Navy gray baked enamel (MIL-E-15090)

Nominal Size: Load 20-13/16" L x 8-1/2" H x 5-15/16" W (529 mm x 216 mm x 151 mm);
 Meter 5-9/16" H x 6-1/2" W x 3-11/32" D (141 mm x 165 mm x 85 mm)

Weight: 6737A 33 lbs. (14.9 kg), 6737-030A 33.5 lbs. (15.1 kg)

Meter: Separates from load for convenient reading. 4 ft. cable.



Bird liquid-dielectric wattmeters have never and are not now manufactured with Poly Chlorinated Biphenyls (PCBs).

TERMALINE® RF COAXIAL TERMINATIONS

Product Selection Guide, Model Number Definition & 2 W Dry Load

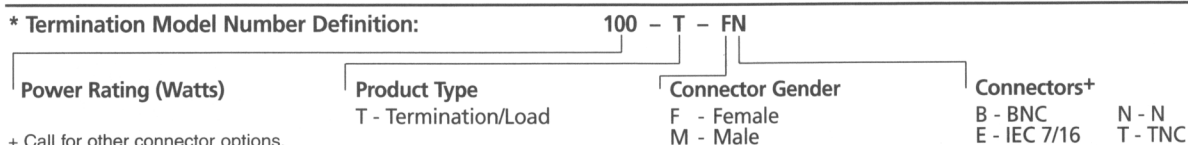
TERMINATION SELECTION GUIDE

POWER RATING (CW)	MODEL/SERIES AND INPUT CONNECTOR CHOICES†	DIELECTRIC MEDIUM	COOLING METHOD	SEE PAGE
2 W	2-T Series BNC (F), BNC (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	42
5 W	5-T Series BNC (F), BNC (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	43
10 W	10-T Series BNC (F), BNC (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	43
25 W	25-T Series BNC (F), BNC (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	43
50 W	50-T Series BNC (F), BNC (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	43
75 W	75-T Series BNC (F), BNC (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	43
100 W	100-T Series BNC (F), BNC (M), IEC 7/16 (F), IEC 7/16 (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	44
100 W	8071-1 SQC SMA(F)	Air	Conduction (needs heatsink)	44
150 W	150-T Series BNC (F), BNC (M), IEC 7/16 (F), IEC 7/16 (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	44
150 W	8135 QC N(F)	Oil	Convection	44
250 W	8141 QC N(F)	Oil	Convection	44
300 W	300-T Series BNC (F), BNC (M), IEC 7/16 (F), IEC 7/16 (M), N(F), N(M), TNC(F), TNC(M)	Air	Convection	45
300 W	8072-1 SQC N(F)	Air	Conduction (needs heatsink)	45
500 W	8201 QC N(F)	Oil	Convection	45
600 W	8401 QC N(F)	Oil	Convection	45
600 W	8431 SQC N(F) 500 W in horizontal position	Air	Convection	45
1 kW	8251 QC LC(F), N(F) unmounted	Oil	Convection	46
1 kW	8833-300 QC LC(F), N(F) unmounted	Oil	Convection	46
1 kW	8710 Series N(F,M); C(F,M); 7/8" EIA Fl.	Air	Water (tap)	48
1.5 kW	8860 Series QC LC(F); 1-5/8" and 3-1/8" Unfl. or EIA Fl.	Oil	Convection	46
2.5 kW	8230 Q LC(F); 200 W without water cooling	Oil	Water (tap)	46
2.5 kW	8890-300 Series QC LC(F); 1-5/8" and 3-1/8" Unfl. or EIA Fl.	Oil	Convection	47
5 kW	8890-300 Series plus BA-300 blower 1-1/4 kW with blower turned off, connectors as above	Oil	Forced Air	47
5 kW	8890-315, -320 Series assembly, connectors as above	Oil	Forced Air	47
5 kW	8720, 8726 1-5/8" EIA Fl., QC LC(F)	Air	Water (tap)	49
5 kW	8921 Series QC LC(F), 1-5/8" EIA Fl., 3-1/8" Unfl. or EIA Fl.	Oil	Convection	48
10 kW	8931-115, -230 Series QC LC(F), 1-5/8" EIA Fl., 3-1/8" Unfl. or EIA Fl.	Oil	Forced Air	48
10 kW	8730 Series 1-5/8" EIA Fl., 3-1/8" Unfl. or EIA Fl.	Air	Water (tap)	49
10 kW	8631-115, -230 1-5/8" EIA Fl., 3-1/8" EIA Fl., 3-1/8" Unfl.	Air	Water/Forced Air	50
10 kW	8578 Series 1-5/8" EIA Fl., 3-1/8" Unfl.	Air	Forced Air	51
15 kW	8578 Series 1-5/8" EIA Fl., 3-1/8" Unfl.	Air	Forced Air	51
20 kW	8745/46 3-1/8" EIA Fl., 3-1/8" Unfl.	Air	Water (tap)	49
25 kW	8572A/73A-115-6, -230-5 3-1/8" EIA Fl., 3-1/8" Unfl.	Air	Forced Air	52
25 kW	8645-115, -230 3-1/8" EIA Fl., 3-1/8" Unfl.	Air	Water/Forced Air	50
30 kW	8755/56 3-1/8" EIA Fl., 3-1/8" Unfl.	Air	Water (tap)	49
40 kW	8765/76 3-1/8" EIA Fl., 3-1/8" Unfl.	Air	Water (tap)	50
50 kW	8775/76 3-1/8" EIA Fl., 3-1/8" Unfl.	Air	Water (tap)	50
50 kW	8655/56-115, -230 3-1/8" EIA Fl., 3-1/8" Unfl.	Air	Water/Forced Air	51
80 kW	8792/93 6-1/8" EIA Fl., 6-1/8" Unfl.	Air	Water (tap)	50

† Where QC quick-change or SQC small quick-change connectors are shown, the type listed is normally supplied when no other is specified.
For other choices, see page 60.

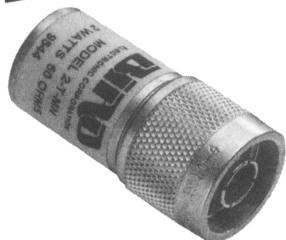
Use this Model Number Definition to specify power range and connector when ordering T-Series dry loads on pages 42-45.

* Termination Model Number Definition:



+ Call for other connector options.

NEW



2 WATT

Power Rating:
 2 W max. @ 40°C
 2.4 W max. @ 25°C
Connectors: BNC, N, TNC (Male or Female)
Frequency Range & VSWR:
 DC to 1 GHz at 1.10:1 max.
 1 GHz to 6 GHz at 1.25:1 max. (N type)
 1 GHz to 4 GHz at 1.25:1 max. (BNC and TNC)

2-T SERIES*

Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C
Operating Position: Any
Coolant: Dry (Convection cooled)
Finish: Silver or Tri-alloy plated
Nominal Size: (with Male N-type connector):
 1.6" L x 0.8" Dia.,
 (40.7 mm L x 20.4 mm Dia.)
Weight: 1.9 oz. (55 g)

TERMALINE® RF COAXIAL TERMINATIONS Dry Loads

5 WATT

5-T SERIES*

Power Rating:

5 W max. @ 40°C
6 W max. @ 25°C

Connectors: BNC, N, TNC (Male or Female)

Frequency Range & VSWR:

DC to 1 GHz at 1.10:1 max.
1 GHz to 6 GHz at 1.25:1 max. (N type)
1 GHz to 4 GHz at 1.25:1 max. (BNC and TNC)

Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C

Operating Position: Any

Coolant: Dry (Convection cooled)

Finish: Silver or Tri-alloy plated

Nominal Size: (with Male N-type connector):

1.6" L x 0.8" Dia.,
(40.7 mm L x 20.4 mm Dia.)

Weight: 1.9 oz. (55 g)

NEW



10 WATT

10-T SERIES*

Power Rating:

10 W max. @ 40°C
12 W max. @ 25°C

Connectors: BNC, N, TNC (Male or Female)

Frequency Range & VSWR:

DC to 1 GHz at 1.10:1 max.
1 GHz to 4 GHz at 1.25:1 max.

Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C

Operating Position: Any

Coolant: Dry (Convection cooled)

Finish: Black anodized.

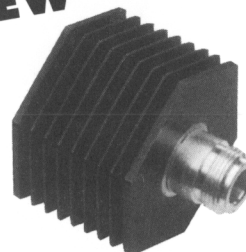
Silver or Tri-alloy plated connector

Nominal Size: (with N-type connector):

2.0" L x 2.0" Dia.,
(50.8 mm L x 50.8 mm Dia.)

Weight: 4.0 oz. (114 g)

NEW



25 WATT

25-T SERIES*

Power Rating:

25 W max. @ 40°C
30 W max. @ 25°C

Connectors: BNC, N, TNC (Male or Female)

Frequency Range & VSWR:

DC to 1 GHz at 1.10:1 max.
1 GHz to 4 GHz at 1.25:1 max.

Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C

Operating Position: Any

Coolant: Dry (Convection cooled)

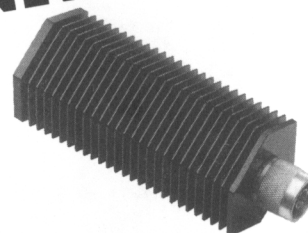
Finish: Black anodized. Silver or Tri-alloy plated connector

Nominal Size: (with N-type connector):

4.7" L x 2.0" Dia., (119.4 mm L x 50.8 mm Dia.)

Weight: 8.2 oz. (233 g)

NEW



50 WATT

50-T SERIES*

Power Rating:

50 W max. @ 40°C
60 W max. @ 25°C

Connectors: BNC, N, TNC

Frequency Range & VSWR:

DC to 1 GHz at 1.10:1 max.
1 GHz to 4 GHz at 1.25:1 max.

Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C

Operating Position: Any

Coolant: Dry (Convection cooled)

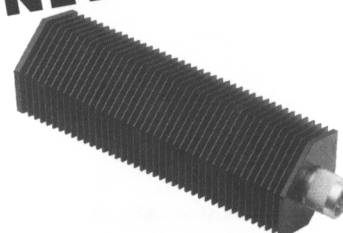
Finish: Black anodized. Silver or Tri-alloy plated connector

Nominal Size: (with N-type connector):

6.7" L x 2.3" Dia., (170.2 mm L x 58.5 mm Dia.)

Weight: 15.0 oz. (426 g)

NEW



75 WATT

75-T SERIES*

Power Rating:

75 W max. @ 40°C
90 W max. @ 25°C

Connectors: BNC, N, TNC, IEC 7/16
(Male or Female)

Frequency Range & VSWR:

DC to 1 GHz at 1.10:1 max.
1 GHz to 2.4 GHz at 1.25:1 max.

Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C

Operating Position: Vertical

Coolant: Dry (Convection cooled)

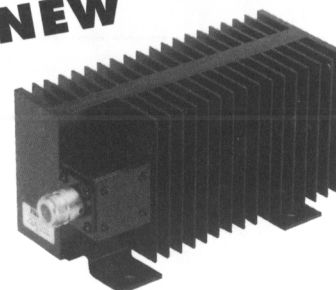
Finish: Black semi-gloss paint per federal standard 595. Silver or Tri-alloy plated connector

Nominal Size: (with N-type connector):

3.4" H x 2.6" W x 6.8" D,
(86.4 mm H x 66.1 mm W x 172.8 mm D)

Weight: 2 lbs. (0.91 kg)

NEW

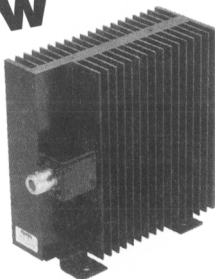


* See page 42 for a Model Number Definition that instructs you how to order the correct part.

TERMALINE® RF COAXIAL TERMINATIONS

Dry & Oil Dielectric Loads

NEW



100 WATT

100-T SERIES*

Power Rating: 100 W max. @ 40°C
120 W max. @ 25°C
Connectors: BNC, IEC 7/16, N, TNC
(Male or Female)
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 2.4 GHz at 1.25:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C

Operating Position: Vertical
Coolant: Dry (Convection cooled)
Finish: Black semi-gloss paint per federal standard 595. Silver or Tri-alloy plated connector
Nominal Size: (with N-type connector):
6.4" H x 2.6" W x 6.8" D,
(162.6 mm x 66.1 mm x 172.8 mm)
Weight: 3.6 lbs. (1.64 kg)



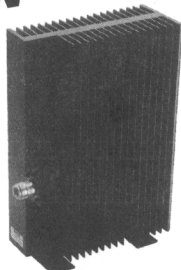
100 WATT

MODEL 8071-1

Power Rating: 100 W continuous when attached to suitable heat sink
Connector: SMA Female normally supplied
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 2 GHz at 1.20:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +45°C

Heat Sink Required: 100 Sq. Inch Plate x 1/8" or equivalent (650 cm² x 3 mm)
Operating Position: Any
Cooling: Dry (conduction cooled)
Finish: Black semi-gloss enamel
Nominal Size: (with SMA connector):
1-25/32" L x 1" W x 33/64" H
(46 mm x 25 mm x 13 mm)
Weight: 1.25 oz. (35 g)

NEW

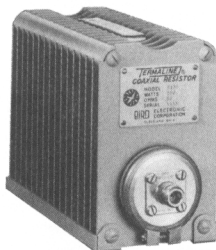


150 WATT

150-T SERIES*

Power Rating: 150 W max @ 40°C
180 W max @ 25°C
Connectors: N, TNC, BNC, IEC 7/16
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 2.4 GHz at 1.25:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C
Operating Position: Vertical

Cooling: Dry (convection cooled)
Finish: Black semi-gloss paint per federal standard 595. Silver or Tri-alloy plated connector
Nominal Size: (with N-type connector):
11.9" H x 2.6" W x 6.8" D
(302 mm x 66 mm x 173 mm)
Weight: 6.0 lbs. (2.73 kg.)

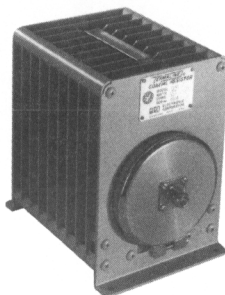


150 WATT

MODEL 8135

Power Rating: 150 W continuous
Frequency Range & VSWR:
DC to 1 GHz at 1.1 max.
1 to 2.5 GHz at 1.2 max.
2.5 to 4 GHz at 1.3 max.
Ambient Temperature Range: -40°C to +45°C
Connector: QC type
(Female N normally supplied)

Load Coolant: 0.1 gal. (380 ml) refined mineral oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (includes connectors)
9-1/2" L x 6-11/32" H x 3-15/16" W
(241 mm 161 mm x 100 mm)
Weight: 6 lbs. (2.7 kg)



250 WATT

MODEL 8141

Power Rating: 250 W continuous
Frequency Range & VSWR:
DC to 1 GHz at 1.1 max.
1 to 1.8 GHz at 1.2 max.
1.8 to 2.5 GHz at 1.3 max.
Ambient Temperature Range: -40°C to +45°C
Connector: QC type
(Female N normally supplied)
Load Coolant: 0.35 gal. (1.3 liters) silicone oil

Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (includes connectors)
9-9/16" L x 8-1/2" H x 5-15/16" W
(243 mm 216 mm x 151 mm)
Weight: 10 lbs. (4.5 kg)

* See page 42 for a Model Number Definition that instructs you how to order the correct part.

TERMALINE® **RF COAXIAL TERMINATIONS** Dry & Oil Dielectric Loads

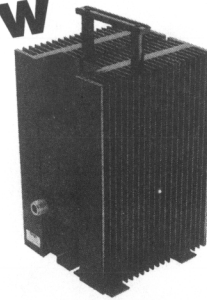
300 WATT

300-T SERIES*

Power Rating: 300 W max @ 40°C
 360 W max @ 25°C
Connectors: N, TNC, BNC, IEC 7/16
Frequency Range & VSWR:
 DC to 1 GHz at 1.10:1 max.
 1 GHz to 2.4 GHz at 1.25:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C
Operating Position: Vertical

Cooling: Dry (convection cooled)
Finish: Black semi-gloss paint per federal standard 595. Silver or Tri-alloy plated connector
Nominal Size: (with N-type connector):
 10.9"H x 5.4"W x 6.8"D
 (276.9 mm x 137.2 mm x 172.8 mm)
Weight: 11.5 lbs. (5.23 kg.)

NEW

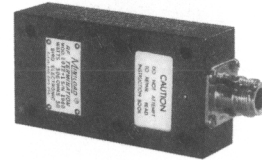


300 WATT

MODEL 8072-1

Power Rating: 300 W continuous when attached to suitable heat sink
Connector Types Available: SQC Type (N Female normally supplied)
Frequency Range & VSWR:
 DC to 800 MHz at 1.10:1 max.
 800 to 1500 MHz at 1.20:1 max.
 1500 to 2500 MHz at 1.30:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +45°C

Heat Sink Required: 800 Sq. Inch Plate x 1/8" or equivalent (5200 cm² x 3 mm)
Operating Position: Any
Cooling: Dry (conduction cooled)
Finish: Black semi-gloss enamel
 Silver-plated connectors
Nominal Size: (with N-type connector):
 4-25/64"L x 2"W x 1-1/32" H
 (110 mm x 51 mm x 26 mm)
Weight: 12 oz. (340 g.)

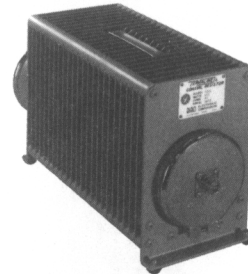


500 WATT

MODEL 8201

Power Rating: 500 W continuous
Frequency Range & VSWR:
 DC to 1 GHz at 1.1 max.
 1 to 2.5 GHz at 1.25 max.
Ambient Temperature Range: -40°C to +45°C
Connector: QC type
 (Female N normally supplied)
Load Coolant: 0.9 gal. (3.42 liters) refined mineral oil

Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (includes connectors)
 16-13/16"L x 8-1/2"H x 5-15/16"W
 (427 mm x 216 mm x 151 mm)
Weight: 21 lbs. (9.5 kg)

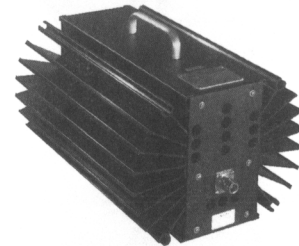


600 WATT (DRY)

MODEL 8431

Power Rating:
 600 W continuous, vertical
 500 W continuous, horizontal
Connectors: SQC Type
 (Female N normally supplied)
Frequency Range & VSWR:
 DC to 1 GHz at 1.10:1 max.
 1 GHz to 2.5 GHz at 1.25:1 max.
Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +45°C
Operating Position: Horizontal or vertical
Coolant: Dry (Convection cooled)
Finish: Black semi-gloss enamel.
Nominal Size: (with N-type connector):
 9-5/16" H x 8-1/2" W x 13-5/16" D,
 (235 mm H x 216 mm W x 336 mm D)
Weight: 13 lbs (5.91 kg.)

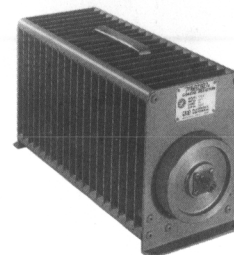


600 WATT

MODEL 8401

Power Rating: 600 W continuous
Frequency Range & VSWR:
 DC to 1 GHz at 1.1 max.
 1 to 2.8 GHz at 1.2 max.
 2.8 to 3 GHz at 1.3 max.
Ambient Temperature Range: -40°C to +45°C
Connector: QC type
 (Female N normally supplied)
Load Coolant: 0.7 gal. (2.65 liters) refined mineral oil

Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (with connectors)
 9-5/16" H x 8-1/2"W x 13-5/16"D
 (427 mm x 216 mm x 151 mm)
Weight: 20 lbs. (9.1 kg)



* See page 42 for a Model Number Definition that instructs you how to order the correct part.

Bird liquid-dielectric load resistors have never been and are not now manufactured with Poly Chlorinated Biphenyls (PCBs).

TERMALINE®

RF COAXIAL TERMINATIONS

Oil Dielectric, Convection & Water Cooled

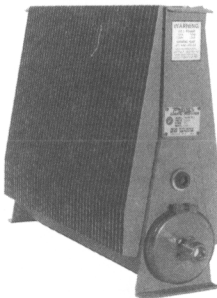


1 kW

MODEL 8251

Power Rating: 1000 W continuous
Frequency Range & VSWR:
 DC to 1 GHz at 1.1 max.
 1 to 2 GHz at 1.25 max.
 2 to 2.4 GHz at 1.3 max.
Ambient Temperature Range: -40°C to +45°C
Connector: QC type
 (Female LC normally supplied and
 Female N supplied unmounted)

Load Coolant: 1.1 gal. (4.1 liters) silicon oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel
 (MIL-E-15090)
Nominal Size: (includes connectors)
 17-29/32" L x 8-1/2" H x 5-15/16" W
 (455 mm x 216 mm x 151 mm)
Weight: 25 lbs., 8 oz. (11.5 kg)

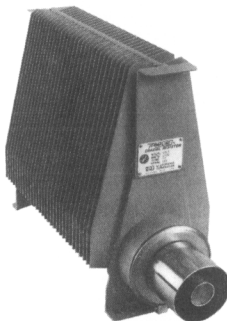


1 kW

MODEL 8833-300

Power Rating: 1000 W continuous
Frequency Range & VSWR:
 DC to 1 GHz at 1.1 max.
 1 to 2.5 GHz at 1.25 max.
Ambient Temperature Range: -40°C to +45°C
Connector: QC type
 (Female LC normally supplied) Female
 N supplied unmounted

Load Coolant: 2.9 gal. (11 liters) refined
 mineral oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel
 (MIL-E-15090)
Nominal Size: (with connectors)
 23-1/8" L x 17-3/16" H x 7-1/8" W
 (587 mm x 437 mm x 181 mm)
Weight: 54 lbs., 10 oz. (24.8 kg)

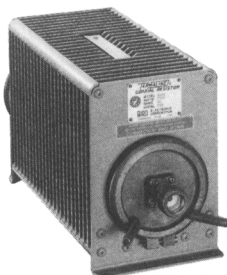


1.5 kW

MODEL 8860 SERIES

Power Rating: 1500 W continuous
Frequency Range & VSWR:
 DC to 1 GHz at 1.1 max.
 1 to 2.0 GHz at 1.25 max.
Ambient Temperature Range: -40°C to +45°C
Load Coolant: 1.5 gal. (5.68 liters) silicone oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel
 (MIL-E-15090)
Nominal Size: 7-1/2" W x 13-1/8" H
 (184 mm x 333 mm)

MODEL	CONNECTOR	OVERALL LENGTH	WEIGHT
8860	QC-LC(F)	17-1/8" (445 mm)	30 lbs. (13.6 kg)
8861	1-5/8" Unfl	17-7/8" (454 mm)	31 lbs. (14.1 kg)
8862	1-5/8" EIA Fl	17-1/8" (445 mm)	31 lbs. (14.1 kg)
8863	3-1/8" Unfl	18-5/8" (473 mm)	32 lbs. (14.5 kg)
8864	3-1/8" EIA Fl	19-1/2" (495 mm)	32 lbs. (14.5 kg)



2.5 kW (WATER-COOLED)

MODEL 8230

Power Rating: 2500 W continuous with
 water cooling, 200 W without water in
 vertical position; 500 W without water
 in horizontal
Frequency Range & VSWR:
 DC to 1 GHz at 1.1 max.
 1 to 2.5 GHz at 1.25 max.
Ambient Temperature Range: -40°C to +45°C
Water Temperature Range: +8°C to +80°C
Water Flow Rate: 1/2 gal./minute
 (2 liters/minute) min.

Connector: QC type
 (Female LC normally supplied)
Load Coolant: 0.9 gal. (3.4 liters) refined
 mineral oil
Operating Position: Vertical, connector
 down (when water cooled)
Finish: Light Navy gray baked enamel
 (MIL-E-15090)
Nominal Size: (with connectors)
 17-23/32" L x 8-1/2" H x 5-15/16" W
 (450 mm x 216 mm x 151 mm)
Weight: 27 lbs. (12 kg)

Bird liquid-dielectric load resistors have never been and are not now manufactured with Poly Chlorinated Biphenyls (PCBs).

TERMALINE® RF COAXIAL TERMINATIONS Oil Dielectric Loads

2.5 kW & 5 kW

8890 SERIES

The 8890 Series is rated at 2.5 kW with convection cooling or 5 kW with the BA-300 forced air cooling option. Both configurations can be ordered with an optional Overload Thermoswitch (P/N 8890-008) or with two thermoswitches for "standby service" as a reject load for dual transmitter systems.

With dual thermoswitches, one normally open switch closes to activate the blower when power is applied to the load and coolant temperature rises, as when one transmitter fails. The second normally closed switch, is an over-temperature interlock safety switch. For completely assembled and wired dual thermoswitch units, order 8890/91/92/95/97/98-315 for 115 Vac, 50/60 Hz units, or 8890/91/92/95/97/98-320 for 230 Vac, 50/60 Hz units.



MODEL 8890-300 (left)
MODEL 8891-300 (right)
with BA-300-115

2.5 kW

8890-300 SERIES

Power Rating: 2500 W continuous
Frequency Range & VSWR:
DC to 1 GHz at 1.1 max.
1 to 2 GHz at 1.25 max.
2 to 2.4 GHz at 1.3 max.
Impedance: 50 ohms nominal
(8896-300 51.5 ohms nominal)
Ambient Temperature Range: -40°C to +45°C
Load Coolant: 2.9 gal. (11 liters) silicon oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel
(MIL-E-15090)
Nominal Size: 7"W x 17-3/16"H
(178 mm x 547 mm). See table for length.

MODEL	CONNECTOR	RECESS (IN.)	OVERALL LENGTH	WEIGHT
8890-300	QC-LC(F)	—	23-1/8" (587 mm)	57 lbs. (26 kg)
8892-300	1-5/8" EIA Fl	0.625	23-1/8" (587 mm)	58 lbs. (26 kg)
8895-300	1-5/8" Unfl	0.438	22-3/16" (564 mm)	58 lbs. (26 kg)
8891-300	3-1/8" EIA Fl	0.922	25-1/8" (638 mm)	59 lbs. (27 kg)
8896-300 (51.5 Ω)	3-1/8" Unfl	0.0	24-5/32" (626 mm)	59 lbs. (27 kg)
8897-300	3-1/8" Unfl	0.0	24-5/32" (626 mm)	59 lbs. (27 kg)
8898-300	3-1/8" Unfl	0.688	24-5/32" (636 mm)	59 lbs. (27 kg)

NOTE: Overload thermoswitch P/N 8890-008 is optional. Free assembly when ordered as a package.

5 kW

8890-300 SERIES WITH BA-300-115, -230

Power Rating: 5000 W continuous with blower on, 1250 W with blower off
Frequency Range & VSWR:
DC to 1 GHz at 1.1 max.
1 to 2 GHz at 1.25 max.
2 to 2.4 GHz at 1.3 max.
Impedance: 50 ohms nominal
(8896-300 51.5 ohms nominal)
Ambient Temperature Range: -40°C to +45°C
Load Coolant: 2.9 gal. (11 liters) silicone oil with forced air cooling
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: 7-3/8"W x 22-11/16"H (187 mm x 560 mm). See table for length.

Blower AC Power:
Model BA-300-115: 115 Vac, 50/60 Hz, 0.6 A
Model BA-300-230: 230 Vac, 50/60 Hz, 0.3 A

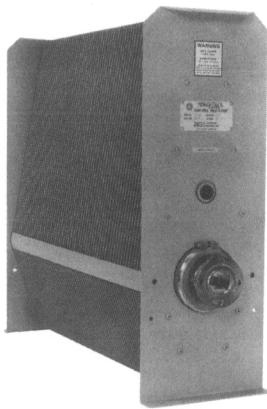
MODEL	CONNECTOR	RECESS (IN.)	OVERALL LENGTH	WEIGHT
8890-300 with BA-300***	QC-LC(F)	—	23-1/8" (587 mm)	70 lbs. (32 kg)
8892-300 with BA-300***	1-5/8" EIA Fl	0.625	23-1/8" (587 mm)	72 lbs. (33 kg)
8895-300 with BA-300***	1-5/8" Unfl	0.438	22-3/16" (564 mm)	72 lbs. (33 kg)
8891-300 with BA-300***	3-1/8" EIA Fl	0.922	25-1/8" (638 mm)	73 lbs. (33 kg)
8896-300 with BA-300***	3-1/8" Unfl	0.0	24-5/32" (614 mm)	73 lbs. (33 kg)
8897-300 with BA-300***	3-1/8" Unfl	0.0	24-5/32" (614 mm)	73 lbs. (33 kg)
8898-300 with BA-300***	3-1/8" Unfl	0.688	24-5/32" (614 mm)	73 lbs. (33 kg)

NOTE: Overload thermoswitch P/N 8890-008 is optional. Free assembly when ordered as a package.

*** Specify -115 for 115 Vac Blower or -230 for 230 Vac blower.

Bird liquid-dielectric load resistors have never been and are not now manufactured with Poly Chlorinated Biphenyls (PCBs).

TERMALINE® RF COAXIAL TERMINATIONS Oil Dielectric, Direct Water-Cooled Loads



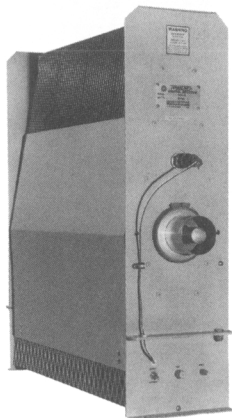
5 kW OIL DIELECTRIC

8921 SERIES

Power Rating: 5000 W continuous
Frequency Range & VSWR:
 DC to 1 GHz at 1.1 max.
Ambient Temperature Range: -40°C to +45°C
Load Coolant: 6-2/3 gals. (25.3 liters) silicone oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: 9-1/2"W x 25-13/16"H (241 mm x 656 mm). See table for length.

MODEL	CONNECTOR	OVERALL LENGTH	WEIGHT
8921	QC-LC(F)	30-27/32" (783 mm)	119 lbs. (54 kg)
8922	1-5/8" EIA Fl	30-27/32" (783 mm)	121 lbs. (55 kg)
8926	3-1/8" EIA Fl	32-3/4" (832 mm)	126.5 lbs. (57 kg)
8927	3-1/8" Unfl	31-7/8" (809 mm)	126 lbs. (57 kg)

NOTE: An 8890-008 over-temperature interlock safety switch is included.



10 kW OIL DIELECTRIC

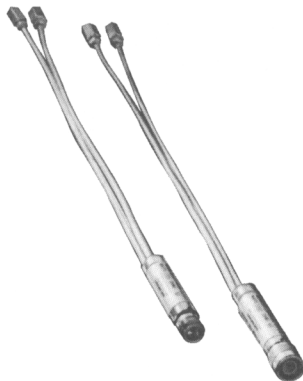
8931-115, -230 SERIES

Power Rating: 10 kW continuous
Frequency Range & VSWR:
 DC to 400 MHz at 1.15 max.
 400 MHz to 1 GHz at 1.20 max.
Ambient Temperature Range: -40°C to +45°C
Load Coolant: 6-2/3 gal. (25.3 liters) silicone oil with forced air cooling
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: 9-1/2"W x 33-5/16"H (241 mm x 821 mm). See table for length.

MODEL	CONNECTOR	OVERALL LENGTH	WEIGHT
8931-***	QC-LC(F)	30-7/32" (768 mm)	135 lbs. (61 kg)
8932-***	1-5/8" EIA Fl	30-7/32" (768 mm)	137 lbs. (62 kg)
8936-***	3-1/8" EIA Fl	32-1/8" (816 mm)	142.5 lbs. (64.8 kg)
8937-***	3-1/8" Unfl	31-1/4" (793 mm)	142 lbs. (64.5 kg)

NOTE: Both an 8892-333 blower control switch and an 8890-017 over-temperature interlock safety switch are included.

*** AC power 115 or 230 Vac, 50/60 Hz (add suffix -115 or -230 to Model number)



MODEL 8711 (LEFT)
MODEL 8710 (RIGHT)

1 kW DIRECT WATER COOLED

8710 SERIES

Power Rating: 1000 W continuous
Frequency Range & VSWR:
 DC to 1 GHz at 1.10 max.
 1 to 3 GHz at 1.3 max.
 3 to 3.5 GHz at 1.35 max.
Water Temperature Range: +8°C to +80°C
Water Flow Rate: 1 to 3 quarts/minute (1 to 3 liters/minute)
Connectors: Waterlines 1/8" FPT
 Model 8710F (N Female)
 Model 8710M (N Male)
 Model 8711F (C Female)
 Model 8711M (C Male)
 Model 8713 7/8" EIA Flg.

Load Coolant: Potable water
Operating Position: Any
Finish: Silver plated
Nominal Size: (excl. 18" waterlines)
 3-21/32" x 11/16" dia. (93 mm x 17 mm)
Weight: Models 8710, 8711 5 oz. (142 g),
 Model 8713 14 oz. (397 g)

Bird liquid-dielectric load resistors have never been and are not now manufactured with Poly Chlorinated Biphenyls (PCBs).

TERMALINE® **RF COAXIAL TERMINATIONS** **Direct Water-Cooled Loads**

5 kW DIRECT WATER COOLED

MODELS 8720, 8726

Power Rating: 5 kW continuous

Frequency Range & VSWR:

Model 8720: DC to 500 MHz 1.1 max.,

500 to 900 MHz 1.15 max.,

900 to 2000 MHz 1.25 max.

Model 8726: DC to 500 MHz 1.1 max.,

500 to 2000 MHz 1.25 max.

Water Temperature Range: +5°C to +80°C

Water Flow Rate: 1 to 4 gals./minute

(4 to 15 liters/minute)

Connectors: Waterlines 1/2" FPT (8720) or 3/4" hose (8726)

Model 8720 1-5/8" EIA Flg.

Model 8726 QC type

(Female LC normally supplied)

Load Coolant: Potable water

Operating Position: Any

Finish: Bright nickel plated

Nominal Size: (excl. 8" waterlines)

Model 8720 8-1/32 x 1-5/8" dia.

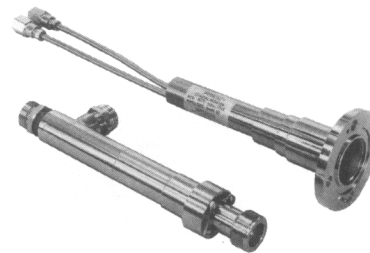
(204 mm x 41 mm). Input Flg. 3-1/2" dia.

Model 8726 8-7/8" x 1-5/8" dia.

(225 x 41 mm)

Weight: Model 8720: 2 lbs. (900 g)

Model 8726: 2-1/2 lbs. (1.1 kg)



MODEL 8720 (TOP)

MODEL 8726 (BOTTOM)

10 kW ECONOLOAD®

MODELS 8730A, 8731, 8738A

Power Rating: 10 kW continuous

Frequency Range & VSWR: 1.1 max. 1 kHz to 1 GHz (DC for continuity checks)

Water Temperature Range: +5°C to +60°C

Water Flow Rate: 4 to 6 gals./minute

(15.1 to 22.7 liters/minute)

Connectors: Waterlines 1/2" FPT or 3/4" hose

Model 8730A 1-5/8" EIA Flg.

Model 8731 3-1/8" EIA Flg.

Model 8738A 3-1/8" Unflg. (Flush)

Load Coolant: Potable water

Operating Position: Any

Finish: Black semi-gloss enamel

Nominal Size: 14-3/4" x 2-3/4" dia.

(375 mm x 70 mm). Input Flg. dia.

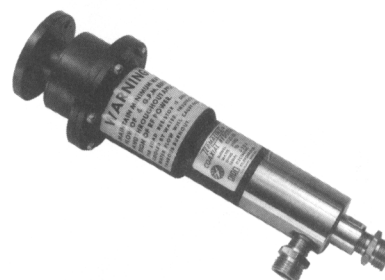
Model 8730 3-1/2" (89 mm),

Model 8731 5-3/16" (132 mm)

Weight: Model 8730 7 lbs. 14 oz. (3.6 kg),

Model 8731 6 lbs. 10 oz. (3 kg),

8738 6 lbs. (2.8 kg)



20 kW ECONOLOAD®

MODELS 8745, 8746

Power Rating: 20 kW continuous

Frequency Range & VSWR: 1.1 max. 1 kHz to 900 MHz (DC for continuity checks)

Water Temperature Range: +5°C to +60°C

Water Flow Rate: 6 to 8 gals./minute

(22.7 to 30.3 liters/minute)

Connector: Waterlines 1/2" FPT or 3/4" hose

Model 8745 3-1/8" EIA Flg.

Model 8746 3-1/8" Unflg. (Flush)

Load Coolant: Potable water

Operating Position: Any

Finish: Black semi-gloss enamel

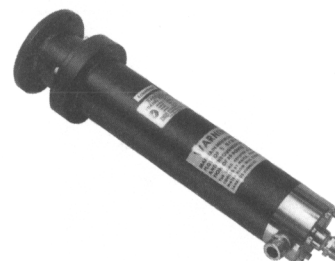
Nominal Size: 19-1/2" x 3-1/2" dia.

(495 mm x 90 mm), Input Flg.

5-3/16" dia. (132 mm)

Weight: Model 8745 15 lbs. 13 oz. (7.2 kg),

Model 8746 15 lbs. 5 oz. (7.0 kg)



30 kW ECONOLOAD®

MODELS 8755, 8756

Power Rating: 30 kW continuous

Frequency Range & VSWR: 1.1 max. 1 kHz to 900 MHz (DC for continuity checks)

Water Temperature Range: +5°C to +60°C

Water Flow Rate: 7 to 9 gals./minute

(26.5 to 34.1 liters/minute)

Connectors: Waterlines 1/2" FPT or 3/4" hose

Model 8755 3-1/8" EIA Flg.

Model 8756 3-1/8" Unfl. (Flush)

Load Coolant: Potable water

Operating Position: Any

Finish: Black semi-gloss enamel

Nominal Size: 19-1/2" x 3-1/2" dia.

(495 mm x 90 mm), Input Flg.

5-3/16" dia. (132 mm)

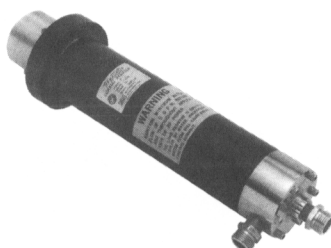
Weight: Model 8755 15 lbs. 13 oz. (7.2 kg),

Model 8756 15 lbs. 5 oz. (7.0 kg)



See page 52 for load accessories such as coupling kits, dollies, etc.

TERMALINE® **RF COAXIAL TERMINATIONS** **Direct Water-Cooled Loads, Moduload® Systems**

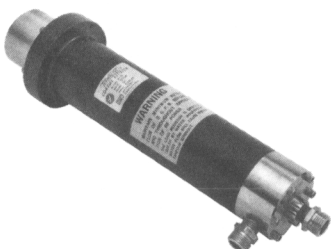


40 kW ECONOLOAD®

MODELS 8765, 8766

Power Rating: 40 kW continuous
Frequency Range & VSWR: 1.1 max. 1 kHz to 900 MHz (DC for continuity checks)
Water Temperature Range: +5°C to +60°C
Water Flow Rate: 8 to 10 gals./minute (30.3 to 37.9 liters/minute)
Connectors: Waterlines 1/2" FPT or 3/4" hose
 Model 8765 3-1/8" EIA Flg
 Model 8766 3-1/8" Unfl (Flush)

Load Coolant: Potable water
Operating Position: Any
Finish: Black semi-gloss enamel
Nominal Size: 19-1/2" x 3-1/2" dia. (495 mm x 90 mm), Input Flg. 5-13/16" dia. (132 mm)
Weight: Model 8765 15 lbs. 13 oz. (7.2 kg), Model 8766 15 lbs. 5 oz. (7.0 kg)



50 kW ECONOLOAD®

MODELS 8775, 8776

Power Rating: 50 kW continuous
Frequency Range & VSWR: 1.1 max. 1 kHz to 900 MHz (DC for continuity checks)
Water Temperature Range: +5°C to +60°C
Water Flow Rate: 9 to 11 gals./minute (34.1 to 41.7 liters/minute)
Connectors: Waterlines 1/2" FPT or 3/4" hose
 Model 8775 3-1/8" EIA Fl
 Model 8776 3-1/8" Unfl (Flush)

Load Coolant: Potable water
Operating Position: Any
Finish: Black semi-gloss enamel
Nominal Size: 19-1/2" x 3-1/2" dia. (495 mm x 90 mm), Input Flg. 5-3/16" dia. (132 mm)
Weight: Model 8775 15 lbs. 13 oz. (7.2 kg), Model 8776 15 lbs. 5 oz. (7.0 kg)

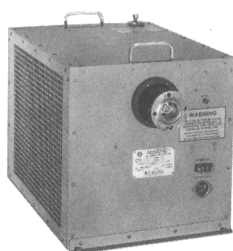


80 kW ECONOLOAD®

MODEL 8792

Power Rating: 80 kW continuous
Frequency Range & VSWR: 1.15 max. 1 kHz to 800 MHz (DC for continuity checks)
Water Temperature Range: +5°C to +60°C
Water Flow Rate: 9 GPM (34.1 LPM) @ 60°C
Connector: 6-1/8" EIA Flg
Load Coolant: Potable water
Operating Position: Any

Finish: Black semi-gloss enamel
Nominal Size: 34" x 5" dia. (864 mm x 127 mm), Input Flg. 8-1/8" dia. (206 mm) add approximately 1-1/4" (32 mm) to length for rear water fitting
Weight: 30 lbs. 10 oz. (14 kg)

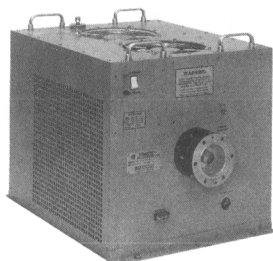


10 kW MODULOAD®

MODELS 8631-115, 8631-230

Power Rating: 10 kW continuous
Frequency Range & VSWR: 1.1 max. 1 kHz to 1000 MHz (dc for continuity checks)
Ambient Temperature Range: Coolant 100% Water, @ ≤10 kW: +5°C to +45°C
 Coolant 35% Ethylene Glycol, 65% Water, @ ≤10 kW: -20°C to +35°C
Connector: 8635: 1-5/8" EIA Flg
 8631: 3-1/8" EIA Flg 8638: 3-1/8" Unfl
Load Coolant: 10 pts. (4.75 liters) 100% water or 65% water/35% industrial Ethylene Glycol. With forced air cooling

Operation Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (excluding connectors) 22-1/8" L x 15-15/16" W x 15-13/16" D (562 mm x 405 mm x 402 mm)
Weight: 110 lbs. (50 kg)
AC Power:
 8631-115: 9-1/2 amps @ 115V 60Hz
 8631-230: 4-3/4 amps @ 230V 50Hz
Optional Dolly: P/N 6771-011



25 kW MODULOAD®

MODELS 8645-115, 8645-230

Power Rating: 25 kW continuous
Frequency Range & VSWR: 1.1 max. 1 kHz to 900 MHz (dc for continuity checks)
Ambient Temperature Range: Coolant 100% Water, @ ≤25 kW: +5°C to +30°C;
 Coolant 100% Water, @ <20 kW: +5°C to +45°C; Coolant 35% Ethylene Glycol, 65% Water, @ ≤25 kW: -20°C to +25°C;
 Coolant 35% Ethylene Glycol, 65% Water, @ <20 kW: -20°C to +35°C
Connector: 8645: 3-1/8" EIA Flg 8646: 3-1/8" Unfl
Load Coolant: 9 qts. (8.5 liters) 100% water or 65% water/35% industrial Ethylene Glycol. With forced air cooling

Operation Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (excluding connectors) 25-15/16" L x 19-5/32" W x 19-9/16" D (659 mm x 487 mm x 497 mm)
Weight: 155 lbs. (70 kg)
AC Power:
 8645-115: 11 amps @ 115V 60Hz
 8645-230: 5-1/2 amps @ 230V 50Hz
Optional Dolly: P/N 6771-011

TERMALINE®

RF COAXIAL TERMINATIONS

Moduload® Systems and Dry, Forced Air Loads

50 kW

MODULOAD® MODELS 8655-115, 8655-230, 8656-115, 8656-230

Power Rating: 50 kW continuous
Frequency Range & VSWR: 1.1 max. 1 kHz to 900 MHz (dc for continuity checks)
Ambient Temperature Range: Coolant 100% Water, @ ≥40 kW: +5°C to +30°C;
 Coolant 100% Water, @ <40 kW: +5°C to +45°C; Coolant 35% Ethylene Glycol, 65% Water, @ ≥40 kW: -20°C to +25°C;
 Coolant 35% Ethylene Glycol, 65% Water, @ <40 kW: -20°C to +35°C
Connector: 8655: 3-1/8" EIA FI
 8656: 3-1/8" Unfl (Flush)
Load Coolant: 17 qts. (16.1 liters) 100% water or 65% water/35% industrial ethylene glycol. With forced air cooling

Operation Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (excluding connectors)
 46-1/2"L x 19-5/32"W x 19-9/16"D
 (659 mm x 487 mm x 497 mm)
Weight: 275 lbs. (125 kg)
AC Power:
 8655-115, 8656-115: 14 amps @ 115 V 60 Hz
 8655-230, 8656-230: 7 amps @ 230 V 50 Hz
Optional Dolly: Model 6772-011 on page 52



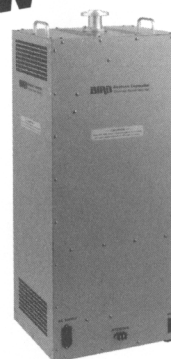
10 kW DRY, FORCED AIR LOAD

MODEL 8578A100

Power Rating:
 Model 8578A100: 10 kW continuous
Frequency Range & VSWR:
 1.15:1, dc to 108 MHz
Ambient Temperature Range: -40°C to +40°C
Connector: 1-5/8" EIA Flanged (Swivel)
 3-1/8" Unflanged option
Load Coolant: Dry (forced air)
Resistors: Tubular type, parallel connection, 50 ohms nominal
Operation Position: Any (except blockage of air inlets and exhaust)

Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (including connectors)
 39-7/32"H x 16-15/32"W x 13-7/16"D
 (996 mm x 418 mm x 341 mm)
Weight: 70 lbs. (31.8 kg)
AC Power:
 115/230 Vac, 50/60 Hz 8.6 amps @ 115 Vac

NEW



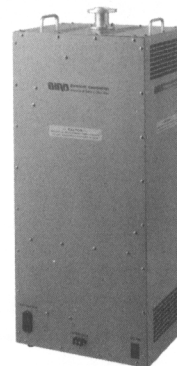
15 kW DRY, FORCED AIR LOAD

MODEL 8578A150

Power Rating:
 Model 8578A150: 15 kW continuous
Frequency Range & VSWR:
 1.15:1, dc to 108 MHz
Ambient Temperature Range: -40°C to +40°C
Connector: 1-5/8" EIA Flanged (Swivel)
 3-1/8" Unflanged option
Load Coolant: Dry (forced air)
Resistors: Tubular type, parallel connection, 50 ohms nominal
Operation Position: Any (except blockage of air inlets and exhaust)

Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (including connectors)
 39-7/32"H x 16-15/32"W x 13-7/16"D
 (996 mm x 418 mm x 341 mm)
Weight: 70 lbs. (31.8 kg)
AC Power:
 115/230 Vac, 50/60 Hz 8.6 amps @ 115 Vac

NEW



See page 52 for load accessories such as coupling kits, dollies, etc.

TERMALINE® RF COAXIAL TERMINATIONS

25 kW Dry, Forced Air Load and Termination Accessories

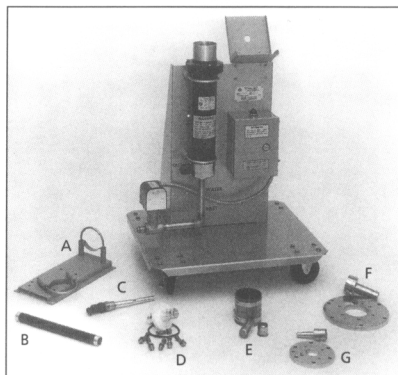


25 kW DRY, FORCED AIR LOADS

Power Rating: 25 kW continuous
Frequency Range & VSWR: 1.1 max. dc to 110 MHz
Ambient Temperature Range: -40°C to +45°C
Connector:
8572A: 3-1/8" EIA FI
8573A: 3-1/8" Unfl (Flush)
Load Coolant: Dry, Forced air cooled
Resistors: 20 tubular type, series/parallel
Operating Position: Any

MODELS 8572A/ 73A-115-6, -230-5

Finish: Light Navy gray baked enamel (MIL-E-15090) and black semi-gloss enamel
Nominal Size: (includes connectors)
70-3/4" H x 16-1/4" W x 16-1/4" D
(1797 mm x 413 mm x 413 mm)
Weight: 118 lbs. (54 kg)
AC Power: 115 V 60 Hz add suffix -115-6,
230 V 50 Hz add -230-5 to Model
Number. Uses 1150 W
Optional Hot Air Duct: Model 8572-078



- A 6770-125
- B 8755-027-4
- C 8890-008
- D 4600-020
- E 5-289
- F 4902-025
- G 4600-025

COOLANTS

MODEL	DESCRIPTION	VOLUME/PKG.
5-030-3	Refined Mineral Oil	1 Gallon Can
5-1070-2	DC-200 Silicone	1 Gallon Can
5-1134-3	Ethylene Glycol, Industrial Grade	1 Gallon Can

DOLLIES

MODEL	DESCRIPTION
6771-011	For 10 & 25 kW Moduload®
6772-011	For 50 kW Moduload®
****-677-1	For Econoload®, 115 Vac
****-677-2	For Econoload®, 230 Vac

**** Add -677-1 or -677-2 to any Econoload® Model No. (10 kW to 80 kW) to get it mounted on a dolly with a control box, water flow switch and bracket (for an optional wattmeter).
8776-677-1 shown. -1 = 115 Vac 50/60 Hz, -2 = 230 Vac 50/60 Hz.

FLANGE-TO-FLANGE ADAPTERS

MODEL	DESCRIPTION
4600-025	3-1/8" FI to 1-5/8" EIA FI 50 ohms
4712-015	1-5/8" FI to 7/8" EIA FI 50 ohms
4902-025	3-1/8" FI to 6-1/8" EIA FI 50 ohms
7500-076	DC Connector Plug

REPLACEMENT RESISTORS

MODEL	FOR	POWER
8730-031-1	8731 Econoloads	10 kW
8738A072	8730A/8738A Econoloads	10 kW
8755-029-2	8745/8746 Econoloads	20 kW
8755-027-3	8755/8756 Econoloads	30 kW
8755-027-4	8765/8766 Econoloads	40 kW
8755-027-5	8775/8776 Econoloads	50 kW
8792-010-2 one reqd.	Econoloads	60 kW
8792-010-1 one reqd.	8792 Econoloads	80 kW
5A2388	8578A100 Forced Air Load	10 kW
5A2393	8578A150 Forced Air Load	15 kW
8572-021	8572 Forced Air Loads	25 kW

COUPLING KITS

MODEL	LINE TYPE	OHMS
4240-220	7/8" FI	50
4712-020	1-5/8" FI	50
4600-020	3-1/8" FI	50
5-289	3-1/8" Unfl	51.5*
5-726	3-1/8" Unfl	50
4902-020	6-1/8" FI	50
5-1322	6-1/8" Unfl	50

* 51.5 ohm with adapter to 50 ohm

WATER COOLED LOAD ACCESSORIES

MODEL	PRODUCT	POWER
6770-120	Wall Mounting Bracket	10 kW
6770-130	Wall Mounting Bracket	80 kW
6770-125	Wall Mounting Bracket	20 kW, 30 kW
6770-125	Wall Mounting Bracket	40 kW, 50 kW
5-898-6	Water Flow Switch	10 kW
5-898-2	Water Flow Switch	20 kW
5-898-3	Water Flow Switch	30 kW
5-898-4	Water Flow Switch	40 kW, 50 kW
5-898-7	Water Flow Switch	80 kW
8750-115	Control Box Assembly	115 Vac, 50/60 Hz
8750-230	Control Box Assembly	230 Vac, 50/60 Hz

THERMOSWITCHES FOR AIR COOLED LOADS

MODEL	FUNCTION	TEMP. SET POINT	USE WITH
8630-013	Over Temp. Interlock	Opens @ 86°C	8630 Series
8640-066	Over Temp. Interlock	Opens @ 77°C	8640/8650 Series
8890-008	Over Temp. Interlock	Opens @ 236°C	8890/8920 Series
8892-333	Blower	Closes @ 60°C	8930 Series
8890-017	Over Temp. Interlock	Opens @ 226°C	8930 Series
8896-012	Automatic	Closes @ 100°C	8A-300-115, -230

TENULINE® RF COAXIAL ATTENUATORS

Product Selection Guide, 2 Watt SMA Attenuator

This catalog presents a wide selection of our new bi-directional TENULINE® Attenuators that handle power from 2 to 300 watts and give you an expanded choice of attenuation value and connector options. These new dry models and our established oil cooled models now span 2 watts/ 1 dB to 4000 watts/30 dB. Intermediate or higher attenuation values can be achieved by linking these devices; for example, adding a 5 watt/10 dB attenuator to the output of a 4000 watts/30 dB attenuator results in a 4000 watts/40 dB Model. Or you can request custom attenuation values

Before Bird's TENULINE® Series in the late 1950s, common tasks like signal analysis and frequency checks required directional couplers that have several drawbacks a well designed attenuator can overcome.

- Directional couplers only maintain a stable coupling factor over a relatively narrow frequency range. Up

to four couplers, versus one Bird high power attenuator, are needed to cover 30 to 500 MHz. And the attenuation curve of one resistive device is more uniform than that of four resonant reactive devices.

- A Bird 30 dB high power attenuator is actually a proper transmitter termination with 99.9 percent of the power being dissipated within it. An attenuator is not a recommended load substitute, however, for continuous duty applications.
- You can easily verify the accuracy of a Bird high power attenuator @ 60 Hz or with DC and Wheatstone bridge measurements.

The following Model Number Definition lets you specify your desired connector when ordering the new bi-directional attenuators presented on pages 53-56.

* Attenuator Model Number Definition:

100 - A - GGC - XX

Power Rating (watts)

Product Type
A - Attenuator

Connector Gender
MF - Male/Female
FF - Female/Female

Connectors+
B - BNC
N - N
T - TNC
E - IEC 7/16

Attenuation Value in dB
01 - 1 dB 10 - 10 dB
02 - 2 dB 20 - 20 dB
03 - 3 dB 30 - 30 dB
06 - 6 dB

+ Call for other connector options.

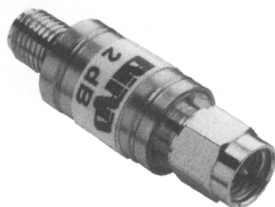
ATTENUATOR SELECTION GUIDE

MODEL	AVERAGE POWER (W)	NOMINAL FREQUENCY RANGE (GHz)	ATTENUATION (dB)**	BI-DIRECTIONAL	MAX. VSWR	DIELECTRIC MEDIUM	CONNECTOR(S)	SEE PAGE
2-A-MFA-XX	2	DC-4	1, 2, 3, 6, 10, 20	Yes	1.25	Air	SMA	53
2-A SERIES	2	DC-4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, N, TNC	54
5-A SERIES	5	DC-4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, N, TNC	54
10-A SERIES	10	DC-4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, N, TNC	54
25-A SERIES	25	DC-4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, N, TNC	54
8341	40	DC-1	3, 6, 10, 20	No	1.25†	Air (Req. Heatsink)	QC-N(F)	54
50-A SERIES	50	DC-4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, N, TNC	55
75-A SERIES	75	DC-4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, N, TNC	55
100-A SERIES	100	DC-4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, N, TNC	55
8343	100	DC-1	3, 6, 10, 20	No	1.25†	Air	QC-N(F)	55
8323	100	DC-0.5	30	No	1.1	Oil	QC-N(F)	56
150-A SERIES	150	DC-2.4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, IEC 7/16, N, TNC	56
8322	200	DC-0.5	30	No	1.1	Oil	QC-N(F)	56
300-A SERIES	300	DC-2.4	1, 2, 3, 6, 10, 20, 30	Yes	1.25	Air	BNC, IEC 7/16, N, TNC	56
8325	500	DC-0.5	30	No	1.1	Oil	QC-N(F)	57
8327-300	1000	DC-0.5	30	No	1.1	Oil	QC-LC(F)	57
8329-300	2000	DC-0.5	30	No	1.1	Oil	QC-LC(F)	57
8329-300 with BA-300	4000	DC-0.5	30	No	1.1	Oil	QC-LC(F)	57

** Other attenuation values are available on special request. † Varies with frequency and attenuation.

Power Factor Formula for Attenuators: $\Delta dB = [(2.0 \times 10^{-6}) (\text{freq. MHz}) (\text{power Watts})]$. i.e. @ 1000 W and 100 MHz, $\Delta dB = 0.2$

NEW



2 WATT BI-DIRECTIONAL, SMA CONNECTOR 2-A-MFA-XX SERIES*

Power Rating: 2 W max. @ 40°C
2.4 W max. @ 25°C

Connectors: SMA (Male and Female)

Frequency Range & VSWR: DC to 1 GHz at 1.10:1 max. 1 GHz to 4 GHz at 1.25:1 max.

Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C

Operating Position: Any

Cooling: Dry (convection cooled)

Finish: Nickel plated

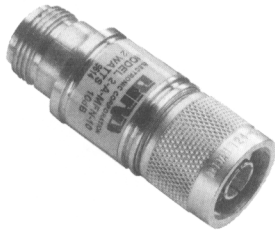
Nominal Size: 1.32" L x 0.42" Dia.,
(33.6 mm x 10.7 mm)

Weight: 0.4 oz. (11.4 g)

dB Atten	ACCURACY		"XX" Value
	DC-1 GHz	Accuracy ± dB 1-4 GHz	
1	0.3	0.5	01
2	0.3	0.5	02
3	0.3	0.5	03
6	0.4	0.6	06
10	0.4	0.8	10
20	0.5	1.0	20

TENULINE® RF COAXIAL ATTENUATORS Dry Dielectric

NEW



2 WATT BI-DIRECTIONAL

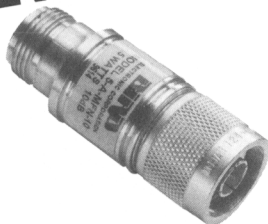
2-A SERIES*

Power Rating: 2 W max. @ 40°C
2.4 W max. @ 25°C
Connectors: N, BNC, TNC (Male or Female)
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 4 GHz at 1.25:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C
Operating Position: Any
Coolant: Dry (convection cooled)
Finish: Silver or Tri-alloy plated, except
Nickel plate for BNC
Nominal Size: (with N-type connectors):
2.2" L x 0.8" Dia., (55.9 mm L x 20.4 mm Dia.)

Weight: 3.1 oz. (88 g)

dB Atten	ACCURACY		"XX" Value
	DC-1 GHz	Accuracy ± dB 1-4 GHz	
1	0.3	0.5	01
2	0.3	0.5	02
3	0.3	0.5	03
6	0.4	0.6	06
10	0.4	0.8	10
20	0.5	1.0	20
30	0.8	1.3	30

NEW



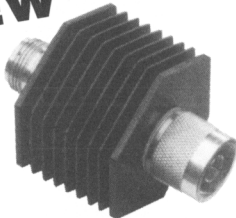
5 WATT BI-DIRECTIONAL

5-A SERIES*

Power Rating: 5 W max. @ 40°C
6 W max. @ 25°C
Connectors: N, BNC, TNC (Male or Female)
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 4 GHz at 1.25:1 max.
Accuracy: Same as 2-A Series above.
Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C
Operating Position: Any
Coolant: Dry (convection cooled)
Finish: Silver or Tri-alloy plated, except
Nickel plate for BNC
Nominal Size: (with N-type connectors):
2.2" L x 0.8" Dia., (55.9 mm L x 20.4 mm Dia.)
Weight: 3.1 oz. (88 g)

NEW



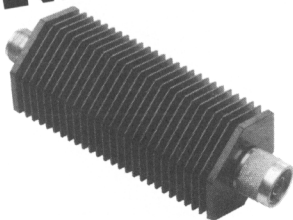
10 WATT BI-DIRECTIONAL

10-A SERIES*

Power Rating: 10 W max. @ 40°C
12 W max. @ 25°C
Connectors: N, BNC, TNC (Male or Female)
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 4 GHz at 1.25:1 max.
Accuracy: Same as 2-A Series above.
Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C
Operating Position: Any
Coolant: Dry (convection cooled)
Finish: Black anodized. Silver or Tri-alloy
plated connectors
Nominal Size: (with N-type connectors):
2.6" L x 2" Dia., (66.1 mm L x 50.8 mm Dia.)
Weight: 5.1 oz. (145 g)

NEW



25 WATT BI-DIRECTIONAL

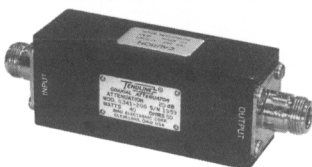
25-A SERIES*

Power Rating: 25 W max. @ 40°C
30 W max. @ 25°C
Connectors: N, BNC, TNC (Male or Female)
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 4 GHz at 1.25:1 max.
Accuracy: Same as 2-A Series above.
Impedance: 50 ohms, nominal

Ambient Temperature Range: -40°C to +40°C
Operating Position: Any
Coolant: Dry (convection cooled)
Finish: Black anodized. Silver or Tri-alloy
plated connectors
Nominal Size: (with N-type connectors):
5.3" L x 2" Dia., (134.7 mm L x 50.8 mm Dia.)
Weight: 10.6 oz. (300 g)

40 WATT

8341 SERIES



Power Rating: 40 W continuous when
bolted to a heat sink
Connectors: QC type
(Female N normally supplied)
Frequency Range & Output VSWR:
DC to 1 GHz @ 1.25:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +45°C
Heat Sink Required: Aluminum panel
1/8" x 400 sq. in. (3 mm x 1/4 sq. m),
or equivalent
Coolant: Dry (conduction cooled)
Finish: Black semi-gloss enamel

Nominal Size: (includes connectors)
3, 6, 20 dB 5-3/16" L (132 mm),
10 dB 4-11/16" L (119 mm) x 1-5/8" x
1-1/4" (41 mm x 32 mm)
Weight: 12-1/2 to 15 oz. (350 to 420 g)

Model	dB Atten	ACCURACY	
		Accuracy ± dB & VSWR DC-0.5 GHz	0.5 - 1 GHz
8341-030	3	0.5 dB, 1.20	0.75 dB, 1.25
8341-060	6	0.5 dB, 1.20	0.75 dB, 1.25
8341-100	10	0.5 dB, 1.20	0.75 dB, 1.25
8341-200	20	0.5 dB, 1.20	0.75 dB, 1.25

*See page 53 for a Model Number Definition that instructs you how to order the correct part.

TENULINE® RF COAXIAL ATTENUATORS Dry Dielectric

50 WATT BI-DIRECTIONAL

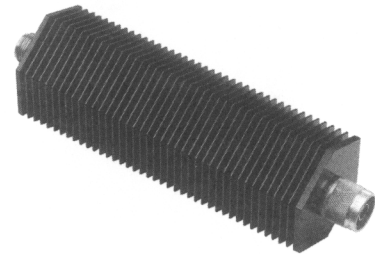
50-A SERIES*

Power Rating: 50 W max. @ 40°C
60 W max. @ 25°C
Connectors: N, BNC, TNC
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 2.4 GHz at 1.25:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C
Operating Position: Any
Coolant: Dry (convection cooled)
Finish: Black Anodized.
Silver or Tri-alloy plated connectors
Nominal Size: (with N-type connectors):
7.3" L x 2.3" Dia.,
(185.5 mm L x 58.5 mm Dia.)

Weight: 1.0 lbs. (0.45 kg)

ACCURACY			
dB Atten	DC-1 GHz	Accuracy ± dB 1-2.4 GHz	"XX" Value
1	0.3	0.5	01
2	0.3	0.5	02
3	0.3	0.5	03
6	0.4	0.6	06
10	0.4	0.8	10
20	0.5	1.0	20
30	0.8	1.3	30

NEW



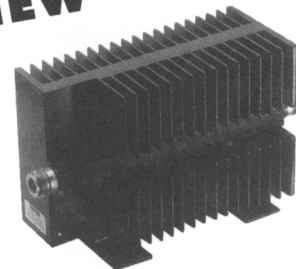
75 WATT BI-DIRECTIONAL

75-A SERIES*

Power Rating: 75 W max. @ 40°C
90 W max. @ 25°C
Connectors: N, BNC, TNC
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 2.4 GHz at 1.25:1 max.
Accuracy: Same as 50-A Series above.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C

Operating Position: Vertical
Coolant: Dry (convection cooled)
Finish: Black semi-gloss paint per federal standard 595. Silver or Tri-alloy plated connectors
Nominal Size: (with N-type connectors):
3.4" H x 2.6" W x 7.2" D,
(86.4 mm H x 66.1 mm W x 82.9 mm D)
Weight: 2.6 lbs. (1.2kg)

NEW



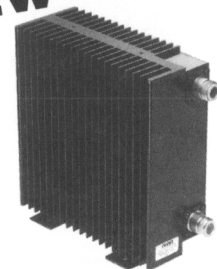
100 WATT BI-DIRECTIONAL

100-A SERIES*

Power Rating: 100 W max. @ 40°C
120 W max. @ 25°C
Connectors: N, BNC, TNC, IEC 7/16
Frequency Range & VSWR:
DC to 1 GHz at 1.10:1 max.
1 GHz to 2.4 GHz at 1.25:1 max.
Accuracy: Same as 50-A Series above.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C

Operating Position: Vertical
Coolant: Dry (convection cooled)
Finish: Black semi-gloss paint per federal standard 595. Silver or Tri-alloy plated connectors
Nominal Size: (with N-type connectors):
6.4" H x 2.6" W x 6.8" D,
(162.6 mm H x 66.1 mm W x 172.8 mm D)
Weight: 4.3 lbs. (1.95 kg)

NEW



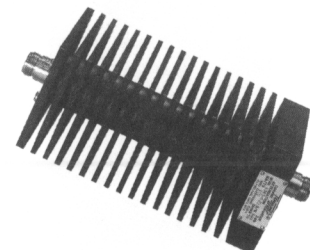
100 WATT

8343 SERIES

Power Range: 100 W continuous
Frequency Range: DC to 1000 MHz
Output: VSWR 1.25
Ambient Temperature Range: -40°C to +45°C
Connectors: QC type
(Female N normally supplied)
Coolant: Dry (convection air cooled)
Finish: Black semi-gloss enamel
Nominal Size: (includes connectors)
7-23/32" x 2-3/4" sq. (196 mm x 70 mm)

Weight: 44 oz. (1.25 g)

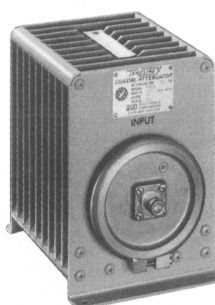
ACCURACY			
Model	dB Atten	Accuracy ± dB & VSWR	
		DC-0.5 GHz	0.5-1 GHz
8343-030	3	0.5 dB, 1.20	0.9 dB, 1.25
8343-060	6	0.5 dB, 1.20	0.9 dB, 1.25
8343-100	10	0.5 dB, 1.15	0.9 dB, 1.20
8343-200	20	0.5 dB, 1.15	0.9 dB, 1.20



*See page 53 for a Model Number Definition that instructs you how to order the correct part.

TENULINE® RF COAXIAL ATTENUATORS

Dry & Oil Dielectric



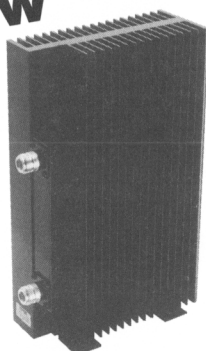
100 WATT

MODEL 8323

Power Rating: 100 W continuous
Frequency Range & VSWR:
 Input 1.1 max. DC to 500 MHz
Attenuation: 30 dB
Accuracy: ± 0.5 dB (± 0.2 dB at 30, 100, 200, 300, 400 and 500 MHz when using calibration data)
Ambient Temperature Range: -40°C to +45°C
Connectors: QC type
 (Female N normally supplied)

Coolant: 0.35 gal. (1.3 liters) refined mineral oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (includes connectors)
 10-11/32" L x 8-1/2" H x 5-15/16" W
 (263 mm x 216 mm x 151 mm)
Weight: 11 lbs. (5 kg)

NEW



150 WATT BI-DIRECTIONAL

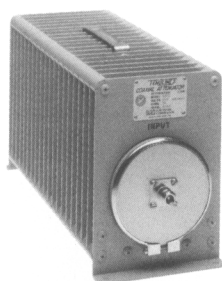
150-A SERIES*

Power Rating: 150 W max. @ 40°C
 180 W max. @ 25°C
Connectors: N, TNC, BNC, IEC 7/16
 (Male or Female)
Frequency Range & VSWR:
 DC to 1 GHz at 1.10:1 max.
 1 GHz to 2.4 GHz at 1.25:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C
Operating Position: Vertical
Cooling: Dry (convection cooled)
Finish: Black semi-gloss paint per federal standard 595. Silver or Tri-alloy plated connectors

Nominal Size: (with N connectors)
 11.9" H x 2.6" W x 6.8" D
 (302 mm x 66 mm x 173 mm)
Weight: 6.5 lb (2.95 kg)

ACCURACY

dB Atten	Accuracy \pm dB DC-1 GHz	Accuracy \pm dB 1-2.4 GHz	"XX" Value
1	0.3	0.5	01
2	0.3	0.5	02
3	0.3	0.5	03
6	0.4	0.6	06
10	0.4	0.8	10
20	0.5	1.0	20
30	0.8	1.3	30



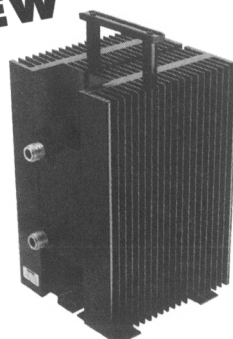
200 WATT

MODEL 8322

Power Rating: 200 W continuous
Frequency Range & VSWR:
 1.1 max. DC to 500 MHz
Attenuation: 30 dB
Accuracy: ± 0.5 dB (± 0.2 dB at 30, 100, 200, 300, 400 and 500 MHz when using calibration data)
Ambient Temperature Range: 40°C to +45°C
Connectors: QC type
 (Female N normally supplied)

Coolant: 0.7 gal. (2.65 liters) refined mineral oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (includes connectors)
 17-1/2" L x 8-1/2" H x 5-15/16" W
 (445 mm x 216 mm x 151 mm)
Weight: 19 lbs. (9 kg)

NEW



300 WATT BI-DIRECTIONAL

300-A SERIES*

Power Rating: 300 W max. @ 40°C
 360 W max. @ 25°C
Connectors: N, TNC, BNC, IEC 7/16
 (Male or Female)
Frequency Range & VSWR:
 DC to 1 GHz at 1.10:1 max.
 1 GHz to 2.4 GHz at 1.25:1 max.
Impedance: 50 ohms, nominal
Ambient Temperature Range: -40°C to +40°C
Operating Position: Vertical
Cooling: Dry (convection cooled)
Finish: Black semi-gloss paint per federal standard 595. Silver or Tri-alloy plated connectors

Nominal Size: (with N connectors)
 10.9" H x 5.4" W x 6.8" D
 (276.9 mm x 137.2 mm x 172.8 mm)
Weight: 12 lb (5.45 kg)

ACCURACY

dB Atten	Accuracy \pm dB DC-1 GHz	Accuracy \pm dB 1-2.4 GHz	"XX" Value
1	0.3	0.5	01
2	0.3	0.5	02
3	0.3	0.5	03
6	0.4	0.6	06
10	0.4	0.8	10
20	0.5	1.0	20
30	0.8	1.3	30

*See page 53 for a Model Number Definition that instructs you how to order the correct part.

Other attenuation values are available on special request.

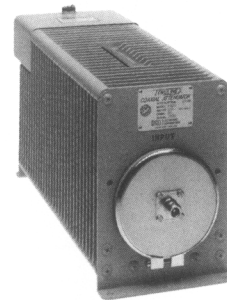
TENULINE® RF COAXIAL ATTENUATORS Oil Cooled Dielectric

500 WATT

MODEL 8325

Power Rating: 500 W continuous
Frequency Range & VSWR:
 Input 1.1 max. DC to 500 MHz
Attenuation: 30 dB
Accuracy: ± 0.5 dB (± 2 dB at 30, 100, 200, 300, 400 and 500 MHz when using calibration data)
Ambient Temperature Range: -40°C to +45°C
Connectors: QC type
 (Female N normally supplied)

Coolant: 0.9 gals. (3.4 liters) refined mineral oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (including connectors)
 17-1/2" L x 8-1/2" H x 5-15/16" W
 (445 mm x 216 mm x 151 mm)
Weight: 25 lbs. (11 kg)

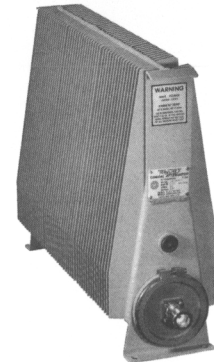


1 kW

MODEL 8327-300

Power Rating: 1000 W continuous
Frequency Range & VSWR:
 Input 1.1 max. DC to 500 MHz
Attenuation: 30 dB
Accuracy: ± 0.5 dB (± 0.2 dB at 30, 100, 200, 300, 400 and 500 MHz when using calibration data)
Ambient Temperature Range: -40°C to +45°C
Connectors: QC type (Female LC input, Female N output normally supplied, extra Female N supplied)

Coolant: 2.9 gals. (11 liters) refined mineral oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (including connectors)
 23-15/32" L x 17-3/16" H x 7-1/8" W
 (596 mm x 437 mm x 181 mm)
Weight: 57 lbs. (26 kg)
Note: Overload thermoswitch P/N 2450-056 is optional



2 kW

MODEL 8329-300

Power Rating: 2000 W continuous
Frequency Range & VSWR:
 Input 1.1 max. DC to 500 MHz
Attenuation: 30 dB
Accuracy: ± 0.5 dB (± 0.2 dB at 30, 100, 200, 300, 400 and 500 MHz when using calibration data)
Ambient Temperature Range: -40°C to +45°C
Connectors: QC type (Female LC input, Female N output normally supplied)

Coolant: 2.9 gals. (11 liters) silicon oil
Operating Position: Horizontal only
Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (including connectors)
 23-15/32" L x 17-3/16" H x 7-1/8" W
 (596 mm x 437 mm x 181 mm)
Weight: 57 lbs. (26 kg)
Note: Overload thermoswitch P/N 8329-028 is optional

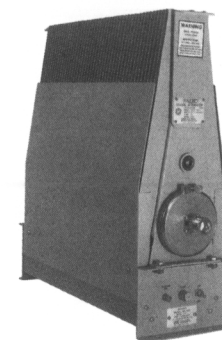


4 kW

MODEL 8329-300 WITH BA-300-115, -230

Power Rating: 4000 W continuous with blower on, 1000 W with blower off
Frequency Range & VSWR:
 Input 1.1 max. DC to 500 MHz
Attenuation: 30 dB
Accuracy: ± 0.5 dB (± 0.2 dB at 30, 100, 200, 300, 400 and 500 MHz when using calibration data)
Ambient Temperature Range: -40°C to +45°C
Connectors: QC type (Female LC input, Female N output normally supplied)
Coolant: 2.9 gals. (11 liters) silicone oil with forced air cooling
Operating Position: Horizontal only

Finish: Light Navy gray baked enamel (MIL-E-15090)
Nominal Size: (including connectors)
 23-15/32" L x 22-1/16" H x 7-1/8" W
 (596 mm x 560 mm x 181 mm)
Weight: 70-1/2 lbs. (32 kg)
Blower AC Power:
 Model BA-300-115: 115 V, 50/60 Hz, 0.6 A
 Model BA-300-230: 230 V, 50/60 Hz, 0.3A
Note: Overload thermoswitch P/N 8329-028 is optional. When ordered as a package, attenuator and blower are factory-assembled at no additional charge.



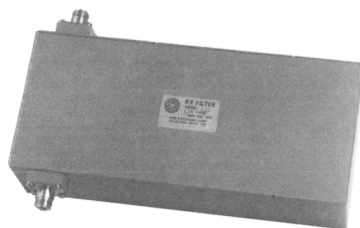
Bird oil cooled attenuators have never been and are not now manufactured with Poly Chlorinated Biphenyls (PCBs).

RF COAXIAL LOW PASS FILTERS

Bird harmonic filters offer efficient rejection of unwanted signals in RF systems operating up to 1000 MHz. These filters can also be used for:

- General laboratory applications
- Calibration labs
- Precision metrology electronic labs
- Medical electronics
- Sputtering generators

The 2-30 MHz filters can handle up to 1500 watts of RF power continuously with only 0.5 dB insertion loss. The 50-1000 MHz filters can handle up to 1000 watts of RF power continuously with only 0.3 dB insertion loss. All of these filters are ideal low pass filters for transmitter combiners. Placed directly after the isolator, they protect the system from intermodulation products by rejecting 2nd, 3rd, and higher harmonics. There is at least 60 dB attenuation of unwanted signals.



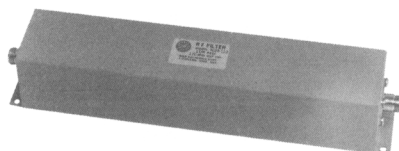
9 SECTION CHEBYSHEV LOW PASS FILTER

Power Rating: 150 W, 750 W, 1.5 kW continuous
Passband: 2-30 MHz
Standard Cut-off Frequencies: 2.5 MHz, 5.0 MHz, 10 MHz, 15 MHz, 20 MHz, 30 MHz
Insertion Loss: 0.5 dB (0.8 dB at 2.5 MHz and 5.0 MHz)
Passband SWR: 1.3 max.
Impedance: 50 ohms
Connectors: QC type (Female N normally supplied)

CUT-OFF FREQUENCY	dB MIN	STOP BAND MHz
2.5 MHz	30 60	3.6 4.9
5.0 MHz	30 60	7.3 10.0
10 MHz	30 60	14.5 19.5
15 MHz	30 60	21.8 29.3
20 MHz	30 60	29.0 39.0
30 MHz	30 60	43.5 58.5

MODEL	POWER RATING	DIMENSIONS
5020-*	150 W	2" H x 2" D x 9" L
5021-*	750 W	2-1/2" H x 2-1/2" D x 12" L
5022-*	1.5 kW	3" H x 5" D x 11-1/2" L

* To order, specify 5020, 5021, or 5022 according to required power handling followed by desired cut-off frequency — e.g. for a 750 W filter with a 5 MHz cut-off frequency order 5021-050. Standard cut-off frequencies are shown above.



13 SECTION CHEBYSHEV LOW PASS FILTER

Power Rating: 100 W, 500 W, 1 kW continuous
Passband: 50-1000 MHz
Standard Cut-off Frequencies: 52 MHz, 76 MHz, 110 MHz, 160 MHz, 225 MHz, 300 MHz, 400 MHz, 500 MHz, 750 MHz, 1000 MHz
Insertion Loss: 0.3 dB except 0.5 dB for 5023-050 to 5023-160
Passband SWR: 1.3
Impedance: 50 ohms
Connectors: QC type (Female N normally supplied)

CUT-OFF FREQUENCY	dB MIN	STOP BAND MHz
52 MHz	30 60	65.0 76.4
76 MHz	30 60	95.0 111.7
110 MHz	30 60	137.5 161.7
160 MHz	30 60	200.0 235.2
225 MHz	30 60	281.3 330.8
300 MHz	30 60	375.0 441.0
400 MHz	30 60	500.0 588.0
500 MHz	30 60	625.0 735.0
750 MHz	30 60	937.5 1102.5
1000 MHz	30 60	1250.0 1470.0

MODEL	POWER RATING	DIMENSIONS
5023-**	100 W	1-1/4" H x 1-1/4" D x 5" L
5024-**	500 W	2" H x 2" D x 9" L
5025-**	1 kW	2-1/2" H x 2-1/2" D x 12" L

** To order, specify 5023, 5024, or 5025 according to required power handling followed by desired cut-off frequency — e.g. for a 500 W filter with a 110 MHz cut-off frequency order 5024-110. Standard cut-off frequencies are shown above.

ACCESSORIES

Selector Switches, Directional Couplers

50 OHM COAXIAL SELECTOR SWITCHES 71, 72, 74 SERIES

The unique, rugged and reliable design of Bird Coaxswitch® Coaxial Selector Switches permits positive contact, low insertion VSWR, and negligible cross talk between channels. The switching mechanism is 4-1/2" of RG-87/U Teflon cable that pulls away from the mating Male N connectors and rotates to the desired switch position. These switches cannot be operated accidentally because operation requires intentionally sequential movement. The knob must be grasped, pulled out, rotated, and pushed in to make contact.

Installation: Bird switches may be panel mounted. All connectors are located on the rear of the housing and are parallel to the shaft of the switch. The connecting cables may be laced together without the use of right-angle adapters.

Useful Frequency Range: DC to 10 GHz
Maximum RF Voltage: 500 volts rms
Attenuation to Unused Channel:
75 dB (cross talk)

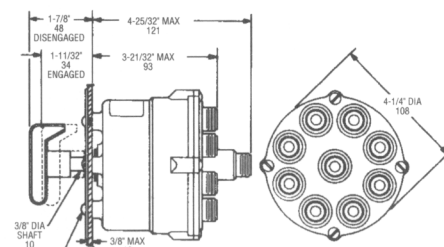
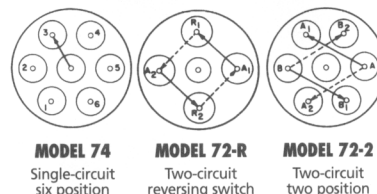
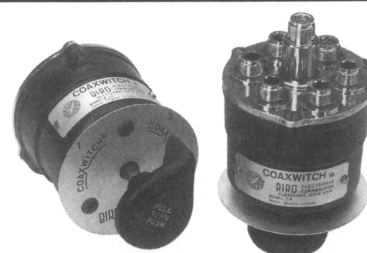
Ambient Temperature Range: -60°C to +65°C
(-76°F to +149°F)
Weight: Varies by model, approx.
2-1/2 lbs. (1.1 kg)

TYPICAL OPERATING VALUES

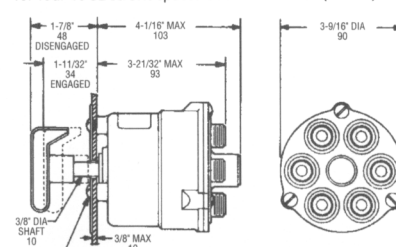
FREQUENCY	VSWR	INSERTION LOSS	MAX. RF POWER RATING @ 65°C
100 MHz	negligible	0.02 dB	850 W
1000 MHz	1.06 max.	0.09 dB	200 W
4000 MHz	1.30 max.	0.22 dB	75 W

SWITCHING CONFIGURATIONS

MODEL	7422	7441	7431	74	718	7181	72-2	72-R
Positions	2	3	4	6	8	10	2	reversing
Coaxial Circuits	1	1	1	1	1	1	2	2



Models 74/72-2 mounting dimensions 7/32" (6 mm) mtg holes for four 10-32 screws spaced at 90° on 1-5/16" (33 mm) radius



Models 72-R mounting dimensions 7/32" (6 mm) mtg holes for three 10-32 screws spaced at 120° on 1-1/4" (32 mm) radius

DIRECTIONAL COUPLERS

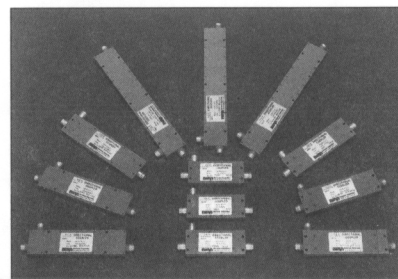
4278 SERIES

The 4278 Series couplers let you sample power flowing in one direction while excluding power flowing in the opposite direction. You can perform VSWR measurements by using two couplers in a series-opposing connection.

Power Range: 200 W CW, 3 kW peak
Frequency Range: 125 MHz to 2 GHz
Insertion Loss: 0.25 dB max.
Impedance: 50 ohms, nominal
Temperature Range: -55°C to +88°C
Connectors: N

Coupling Accuracy: ±1 dB, including variation and deviation from nominal
Finish: Gray paint per MIL-E-15090 Type II CL2
Nominal Size: 1-7/8" W x 3/4" D
(48 mm x 19 mm). See table below for lengths.

MODEL	FREQ. RANGE (MHz)	COUPLING COEFFICIENT	NOMINAL LENGTH	MODEL	FREQ. RANGE (MHz)	COUPLING COEFFICIENT	NOMINAL LENGTH
4278-111-1	125 - 250	10 dB	11-1/2" (293 mm)	4278-311-1	500 - 1000	10 dB	6-4/10" (163 mm)
4278-111-2	125 - 250	20 dB	11-1/2" (293 mm)	4278-311-2	500 - 1000	20 dB	6-4/10" (163 mm)
4278-111-3	125 - 250	30 dB	11-1/2" (293 mm)	4278-311-3	500 - 1000	30 dB	6-4/10" (163 mm)
4278-211-1	250 - 500	10 dB	7-1/2" (191 mm)	4278-411-1	1000 - 2000	10 dB	4-1/2" (115 mm)
4278-211-2	250 - 500	20 dB	7-1/2" (191 mm)	4278-411-2	1000 - 2000	20 dB	4-1/2" (115 mm)
4278-211-3	250 - 500	30 dB	7-1/2" (191 mm)	4278-411-3	1000 - 2000	30 dB	4-1/2" (115 mm)




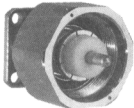
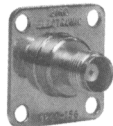
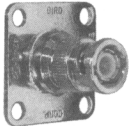
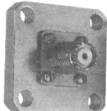
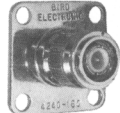
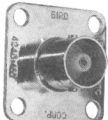
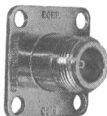
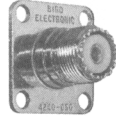
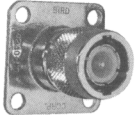
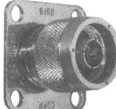
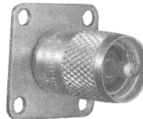
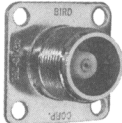
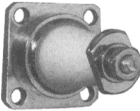
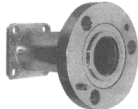
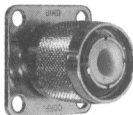
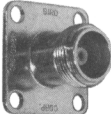
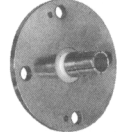
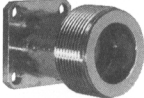
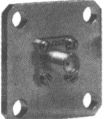
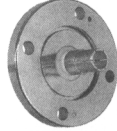
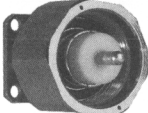

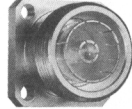
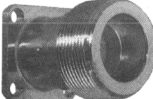
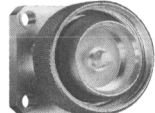
ACCESSORIES

QC-Type (Quick Change), SQC (Small Quick Change) Connectors

Many TERMALINE® load resistors, attenuators and absorption wattmeters, as well as THRULINE® wattmeters, employ our patented QC-type "Quick-Change" RF Connectors. These products may be ordered with the connector(s) most convenient for use with your equipment. Many customers order additional connectors to avoid using performance robbing adapters. QC Connectors are easily changed in the field by removing and replacing four screws. Changing the connector(s) does not affect the electrical characteristics of the QC equipped unit.

SQC Connectors, (used with the 4110 Series, 4304 Wattmeter, 8072-1, 8431 Load Resistors, etc.) are shown below.

DESCRIPTION	PART NUMBER
Female N	4100-014
Male N	4100-015
Female UHF	4100-017
Female TNC	4100-055
Female BNC	4110-014

	BNC (F) 4240-125		LT (M) 4240-012		TNC (F) 4240-156
	BNC (M) 4240-132		Mini-UHF (F) 4240-346		TNC (M) 4240-160
	C (F) 4240-100		N (F) 4240-062		UHF (F) 4240-050
	C (M) 4240-110		N (M) 4240-063		UHF (M) 4240-179
	HN (F) 4240-268		Open Term. #10-32 Nut 4240-080		7/8" EIA 4240-002
	HN (M) 4240-278		SC (F) 4240-090		1-5/8" EIA Fixed 4240-096
	LC (F) 4240-031		SMA (F) 4240-336		1-5/8" EIA Swivel 4240-208
	LC (M) 4240-025		SMA (M) 4240-334		7/16 IEC (Jack) Type 169-4 4240-344
	LT (F) 4240-018				7/16 IEC (Plug) Type 169-4 4240-363

ACCESSORIES

Adapters, Batteries, Cables, Connectors, Coupling Kits

ADAPTER KITS

4240 SERIES

Bird's adapter kits let you assemble compact, precision 50 ohm adapters to meet up to 45 different matching requirements. The adapters offer low VSWR because of precision machining and tight mating tolerances. The N (F)/N (M) combination, for example, is below 1.05 to 1 GHz and below 1.1 to 2.5 GHz. The Model 4240-400 lets you create 30 combinations. The Model 4240-401 can fashion 45 combinations. Both models include enough couplers to assemble 5 complete adapters at the same time.

MODEL 4240-400

	N(F)	N(M)	UHF(F)	UHF(M)	BNC(F)	BNC(M)	TNC(F)
N(F)	x						
N(M)	x	x					
UHF(F)	x	x					
UHF(M)	x	x	x				
BNC(F)	x	x	x	x			
BNC(M)	x	x	x	x	x		
TNC(F)	x	x	x	x	x	x	
TNC(M)	x	x	x	x	x	x	x

MODEL 4240-401

	N(F)	N(M)	BNC(F)	BNC(M)	TNC(F)	TNC(M)	SMA(F)	SMA(M)	UHF(F)
N(F)									
N(M)	x								
BNC(F)	x	x							
BNC(M)	x	x	x						
TNC(F)	x	x	x	x					
TNC(M)	x	x	x	x	x				
SMA(F)	x	x	x	x	x	x			
SMA(M)	x	x	x	x	x	x	x		
UHF(F)	x	x	x	x	x	x	x	x	
UHF(M)	x	x	x	x	x	x	x	x	x

MISCELLANEOUS

MODEL	USE WITH	DESCRIPTION
3610-031	All Element Sockets	Dummy Plug
5-1864	4314B	Power Supply 115 V
5-1940	4314B	Power Supply 230 V
5A2229	AT Series	Power Supply 120 V
5A2226	AT Series	Power Supply 230 V

QC ADAPTERS, CONNECTORS

MODEL	DESCRIPTION
4240-165	QC (F) to QC (F)
4240-180	Copl. (M) to QC (F)
4240-187	3-1/8" Unfl 51.5 ohms to QC (F)
4240-194	3-1/8" Fl to QC (F)
4240-201	7/8" Fl to QC (F)
4240-244	Rt. Angle QC
4240-260	1-5/8" Fl to QC (F)
7500-076	DC conn. plug

WATTMETER BATTERIES

MODEL	USE WITH	VOLTS	TYPE	NOTES
5-1230	4391A	1.25	NiCd	6 Required
5-1587	4412	9	NiCd	—
5-1375	4314B, 4410A, 4041, 4410, APM-16	9	Alkaline	—
5-1475	4030	3	Li-Mn	3 Required



DC CABLE ASSEMBLIES*

RG-58/U cables with a Model 7500-076 DC plug on one end and the connector in the table below on the other end.

MODEL	CONNECTOR	LENGTH	USE WITH GROUP
3170-058-1	BNC (M)	14"	I
3170-058-6	BNC (M)	6'	I
3170-058-2	BNC (M)	15'	I
3170-058-3	BNC (M)	25'	I
3170-058-4	BNC (M)	40'	I
3170-058-5	BNC (M)	50'	I
3170-058-7	BNC (M)	80'	I
3170-058-8	BNC (M)	90'	I
3170-058-9	BNC (M)	100'	I
4220-097-5	Spade Lug	16"	II
4220-097-1	Spade Lug	33"	II
4220-097-22	Spade Lug	48"	II
4220-097-7	Spade Lug	10'	II
4220-097-9	Spade Lug	15'	II
4220-097-10	Spade Lug	25'	II
4220-097-17	Spade Lug	50'	II
4220-097-13	Spade Lug	75'	II
4220-097-16	Spade Lug	100'	II
7500-072-1	DC Plug	39'	III
7500-072-3	DC Plug	5'	III
7500-072-4	DC Plug	10'	III
7500-072-2	DC Plug	25'	III

* WATTMETER GROUPS

Group I: 3171-020, 3171, 3171A-020, 3171A, 3127-055, 3127-080.

Group II: 3127-035, 3127-075, 3127-040, 3127-070.

Group III: 6810-020, 4305, 6810-030, 4909, 4715, 4610, 4723, 4802.

TECHNICAL DATA

THRULINE® principle

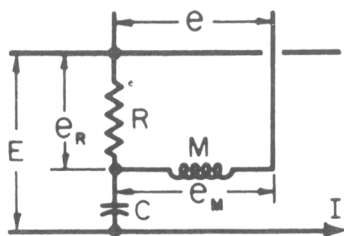


Figure 1

The basic sensing circuit of a THRULINE® plug-in element consists of the mutual inductance M between the loop and the center conductor and the voltage divider C and R . In Fig. 1, E is the voltage between outer and center conductor and I is the current. Elements can be rotated 180° , resulting in either a positive or a negative M (Fig. 2 and 3). The output voltage in this lumped-constant directional coupler is the sum of two samples:

$$e_R \text{ from the division of } E \text{ by } R \text{ and } C, e_R = \frac{RE}{X_C} = RE j\omega C$$

$$(\text{if } R \ll X_C), \text{ and } e_M \text{ by induction } e_M = I j\omega (\pm M).$$

$$\text{The sum } e_R + e_M = j\omega(CRE \pm MI) = e$$

Besides selecting R very much smaller than X_C , the components of the circuit are chosen so that

$$CR = M/Z_o.$$

The output voltage is now

$$e = j\omega(EM/Z_o \pm MI) = j\omega M(E/Z_o \pm I)$$

At any one point on a transmission line, the voltage E is the sum of the forward and reflected voltages $E_f + E_r$, and the current I is $E_f/Z_o - E_r/Z_o$. (Since the reflected wave travels in the opposite direction, $I_r = -E_r/Z_o$).

When the element is pointing toward the load, the output voltage is

$$e \rightarrow = j\omega M(E/Z_o + I) = j\omega M \left\{ \frac{E_f + E_r}{Z_o} + \frac{E_f - E_r}{Z_o} \right\} =$$

$$= \frac{j\omega M}{Z_o} (2E_f)$$

and turning the element toward the source, it becomes ...

$$e \leftarrow = j\omega M(E/Z_o - I) = j\omega M \left\{ \frac{E_f + E_r}{Z_o} - \frac{E_f - E_r}{Z_o} \right\} =$$

$$= \frac{j\omega M}{Z_o} (2E_r)$$

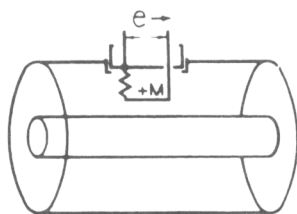


Figure 2

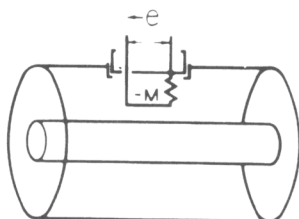


Figure 3

We have now proved what we set out to show, namely that the RF output voltage from the sensing element is directional and proportional to the voltage in the line due to either the forward or the reflected wave. It is also directly proportional to ω , that is to frequency ($\omega = 2\pi f$). In order to make it frequency independent, we terminate e in a capacitive reactance which is inversely proportional to ω . The voltage across this capacitor is rectified, filtered and displayed on a meter calibrated in RF watts.

For additional details on THRULINE® principles, write for "WATT'S NEW FROM BIRD" vol. 2 no. 2.

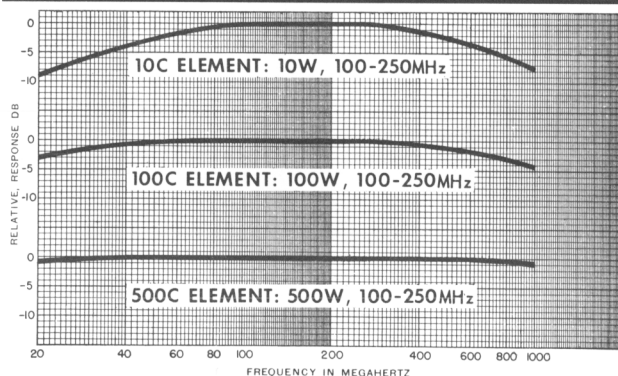


Figure 4

Frequency Response THRULINE® Elements, 100-250 MHz (C-Series)

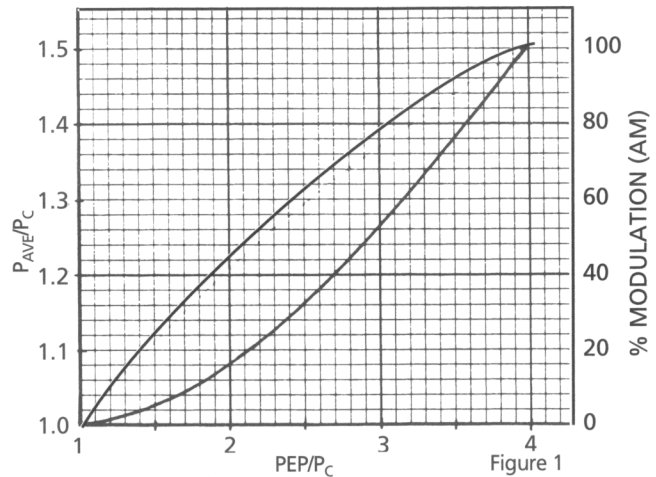
Higher power elements have flatter frequency characteristics than tighter coupled lower-power units. Beyond the stated frequency range, measurement results cannot be predicted.

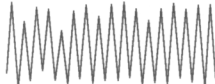

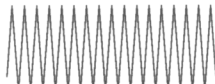

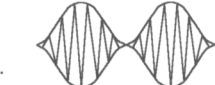
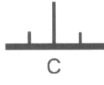


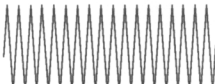
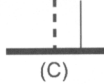
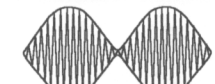
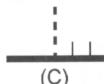
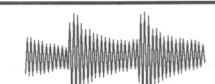
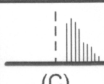
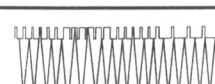



TECHNICAL DATA

Interpreting readings on peak Wattmeters with Multi-carrier, CW, AM, SSB and pulsed signals

In the table below, $Z_o = 50$ ohms, PEP is peak envelope power, and PEV is peak envelope voltage. The PEV of the carrier (or suppressed carrier) C was arbitrarily chosen at 100 volts in all examples, $PEV_{RMS} = \frac{PEV}{1.414}$. To obtain a detailed essay on this subject, write for "WATT'S NEW FROM BIRD" vol. 4, no. 2. For TV black level measurement (table H), refer to vol. 5, no. 3.

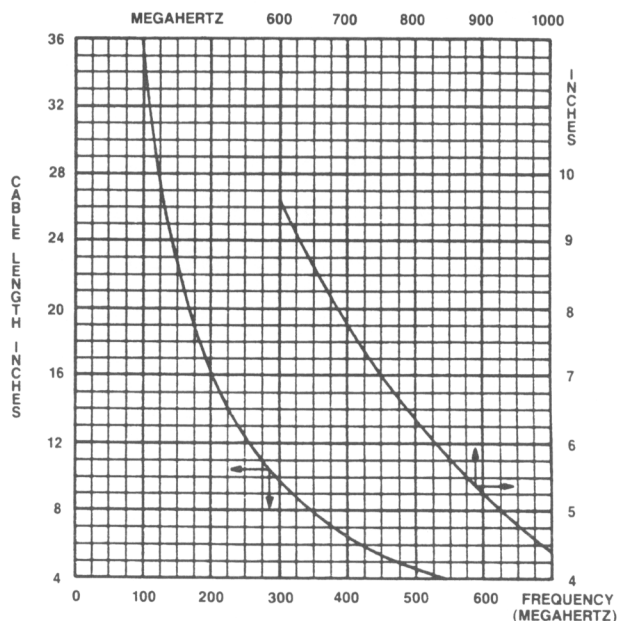
The graph at right shows correlation of peak-envelope-power (PEP), average heating power (P_{AVE}) and % modulation of AM signals for Tables B, C, and D below.



Transmission Type and Scope Pattern	Frequency Spectrum (C=Carrier)	PEV_{RMS} (arbitrary)	$PEP =$ $\frac{PEV_{RMS}^2}{Z_o}$	Average (Heating) Power	Models 4314B, 4391A			Model 43, 4304A, 4308	Model APM- 16
					CW Mode	PEP Mode	%MOD Mode		
Table A Multiple Carriers 		$\frac{400}{\sqrt{2}} V$	1600W	400W	-	1600W	-	-	400W
Table B CW 		$\frac{100}{\sqrt{2}} V$	100W	100W	100W	100W	0%	100W	100W
Table C AM 100% Mod. 		$\frac{200}{\sqrt{2}} V$	400W	150W	100W	400W	100%	100W	150W
Table D AM 73% Mod. 		$\frac{173}{\sqrt{2}} V$	300W	127W	100W	300W	73%	100W	127W
Table E SSB 1 Tone 		$\frac{100}{\sqrt{2}} V$	100W	100W	100W	100W	0%	100W	100W
Table F SSB 2 Tones 		$\frac{100}{\sqrt{2}} V$	100W	50W	25W	100W	100%	40.5W	50W
Table G SSB Voice 		$\frac{100}{\sqrt{2}} V$	100W	-	-	100W	-	-	-
Table H TV Black Level 		$\frac{100}{\sqrt{2}} V$	100W	60.1W	Models 4314B, 4391A only			59.6W	60.1W
Table I Pulse 		$\frac{100}{\sqrt{2}} V$	100W	10 W	-	100W	100%	-	10W

TECHNICAL DATA

Required length of cable to equal 1/2 or 1 wavelength when added to a THRULINE® wattmeter



- 1) Physical cable length shown in inches is measured from end to end of outer conductor of connectors (TNC and N Male connectors), except for cables with UHF or Mini-UHF plugs where the cable length is measured from tip to tip of the center pins.
- 2) Dimensions shown are for solid polyethylene cable (e.g. RG-58C/U, RG-8/U) which has 66% the velocity of propagation relative to air. If so-called "RG-58 type" or "RG-8 type" cables (which often contain foam polyethylene) are used, the dimensions in the graph must be multiplied by that cable's relative velocity (say 79%) divided by 66% (i.e. by a factor of $79\% \div 66\% = 1.2$).

When a Model APM-16, 43, 4431, 4314B or 4391A is used to match a load to a transmitter and a good match is obtained, removing the instrument will not cause any change in the conditions, since a good 50 ohm load can be placed at the end of a 50 ohm transmission line of any length without altering conditions at the transmitter.

What happens when the load is not well matched, like an antenna with a VSWR of 1.5 or 2.0? Since the length of line between a mismatched load and the source transforms the impedance of the load as seen at the source, line length now becomes critical. If the adjustments for maximum power transfer were made with the Model 43 in place, removing it shortens the line by four inches, plus two connectors. This still is no cause for concern at low frequencies where four to five inches is a small fraction of a wavelength. At higher frequencies; e.g., above 100 MHz, power output and frequency of the source may be affected.

It is a principle of transmission line theory that the impedance is identical on either side of 1/2 wavelengths. In order to duplicate the conditions in your transmission line with the above Model wattmeters either in or out of the line, it is only necessary to insert or remove one or more 1/2 wavelengths. This is easily done by making up a length of cable which, when added to the THRULINE®, equals one or more 1/2 wavelengths at the frequency of measurement. If more than one frequency is involved, one cable is needed for each frequency.

TYPICAL PEAK POWER RATINGS

Note: The duty factor should be such that the average power rating of the load is never exceeded.

MODELS	AVG. POWER	PULSE WIDTH (MICROSECONDS)				
		1	10	100	1000	5000
Liquid Dielectric Loads						
8135	150 W	10 kW	8.0 kW	5.75 kW	3.5 kW	2.0 kW
*8135A	150 W	35 kW	26.5 kW	18.2 kW	10 kW	4.0 kW
8201	500 W	200 kW	150 kW	105 kW	57 kW	25 kW
8251	1000 W	200 kW	150 kW	105 kW	57 kW	25 kW
8890 Series	2.5 kW	150 kW	115 kW	80 kW	54 kW	22 kW
8920 Series	5 kW	150 kW	115 kW	80 kW	54 kW	22 kW
8930 Series	10 kW	150 kW	120 kW	85 kW	55 kW	30 kW
Direct Water-Cooled Loads						
8730 Series	10 kW	100 kW	77 kW	56 kW	32 kW	16 kW
8740 Series	20 kW	250 kW	190 kW	135 kW	75 kW	35 kW
8750 Series	30 kW	250 kW	190 kW	135 kW	75 kW	40 kW
8760 Series	40 kW	250 kW	197 kW	145 kW	90 kW	55 kW
8770 Series	50 kW	250 kW	197 kW	145 kW	97 kW	65 kW
8790 Series	80 kW	250 kW	210 kW	170 kW	130 kW	100 kW

*Special high peak power resistor is used.

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OUR MISSION



The Bird Technologies Group designs, manufactures and markets RF components, instruments and systems for 50 ohm applications in the 50 kHz to 2500 MHz range. The Company serves many customer groups and is noted for its Product Innovation, application and design competencies and excellent customer service. The Company is headquartered in Solon, Ohio with subsidiaries located in Florida and New York State.

BTG will grow its business through a balanced plan of maximizing its present manufacturing capacity, initiating new facilities as needed and focusing on well defined acquisitions. These growth plans will be dedicated to serving and expanding the Company's worldwide customer base.

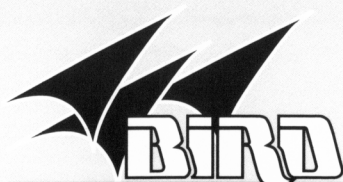
This commitment to increase sales will include developing alliances with a select group of customers who are growing and whose needs match BTG'S strengths and core competencies. These growth plans include a continued dedication to unparalleled customer service in every aspect of the Company's delivery process.

This future vision also includes establishing long term relationships with suppliers while focusing on reducing their number and encouraging this limited supplier base to work closely with the Company's

engineering teams and restrict its active parts list, shorten its delivery cycle time and reduce BTG's delivered costs to its customers.

BTG will concentrate on creating a work environment that: treats all associates fairly and equally, fosters a cooperative spirit in all associate relationships, and strives to empower the work team to freely take risks, participate in self direction and apply an innovative behavior toward delivering Great Performances For Customers. The Company's leadership will dedicate itself to listening to all associates and will provide appropriate support for those items fitting this overall Human Resource vision! It is understood that growth and change require people to learn from mistakes. BTG will strive to develop the talents of all of its employees and encourage creative and innovative approaches in the Company's business endeavors.

Finally, BTG will manage its business as a good Corporate citizen in all communities in which it functions with dedication to obeying all laws, always operating with a keen sense of integrity and moral encouragement. The Company will share its successes, within sound fiscal policy, by maintaining a reasonable charity donation policy.



TECHNOLOGIES GROUP

LOOK INSIDE FOR THESE NEW PRODUCTS...

The name Bird has echoed uncompromising quality throughout the world of RF and microwave communications for over a half-century. Many technicians made their first RF power measurement with a Model 43 THRULINE® Wattmeter and still use this remarkably accurate, reliable and rugged instrument today. But you'll also find many new products throughout this catalog to help you install, repair, maintain and operate RF equipment and systems.

Bird's total commitment to research and development, advanced engineering and quality-driven manufacturing are found in everything from our new Advanced Power Meter to the latest Bi-Directional

Attenuators. And you can confidently purchase any of these state-of-art products with the assurance that it will deliver the performance you expect.

At Bird, *new* never means *unproven*. No Bird design enters production without undergoing extensive field tests, no instrument leaves our plant unless it is exactly right.

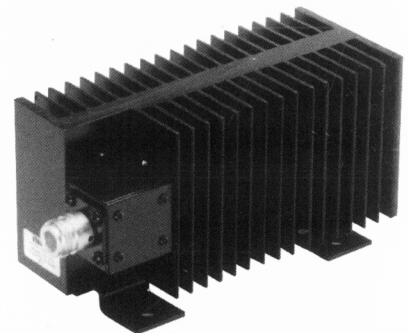
The evolution and advance of RF technology and applications into the next millennium will be mirrored by Bird instruments that will keep you and your business on the cutting-edge. You can count on it.



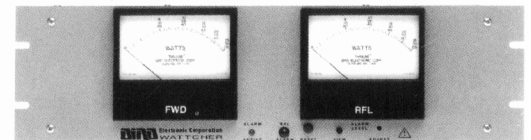
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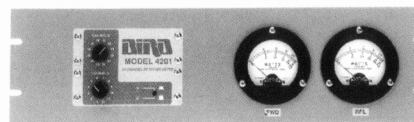
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