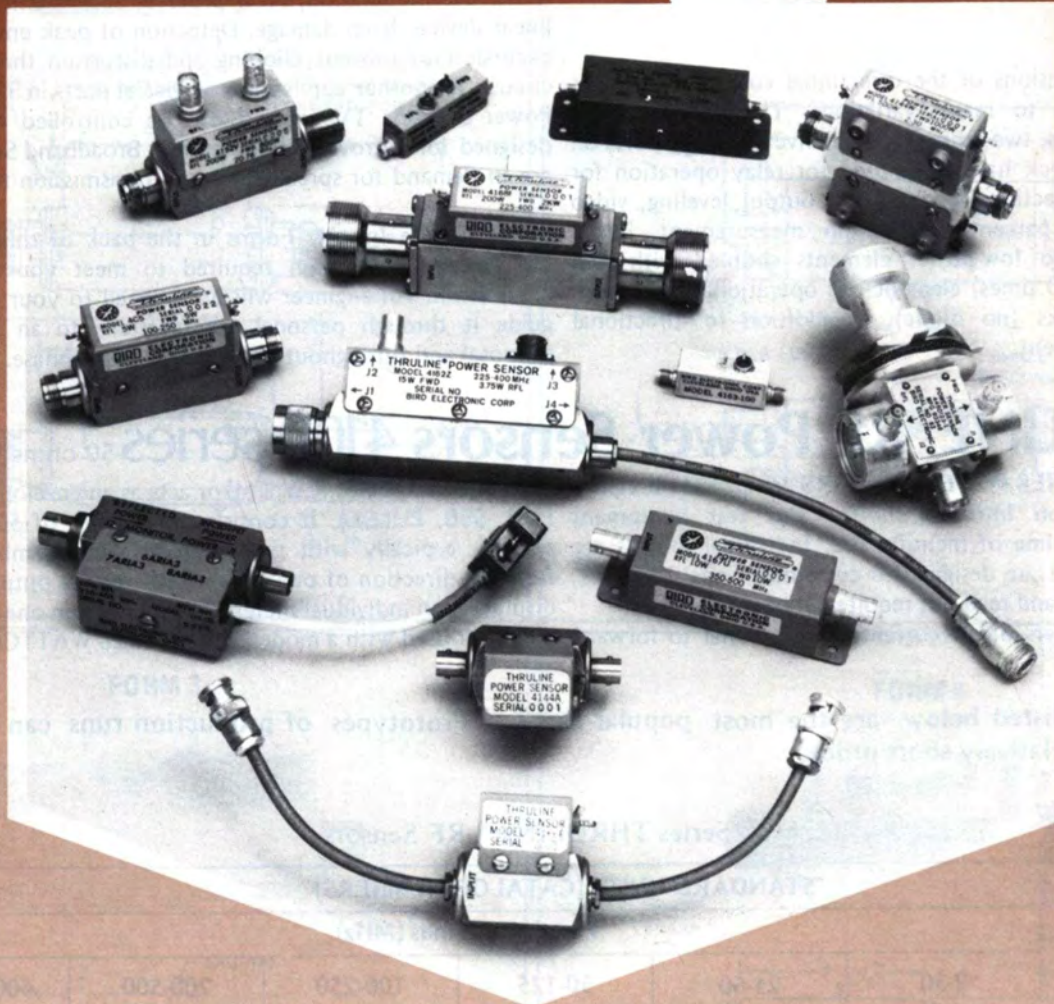
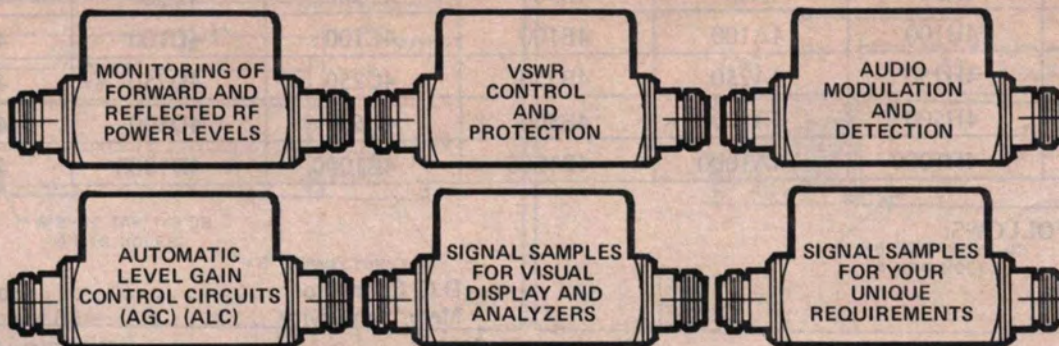


# BRD



## Thruline Power Sensors FOR





# BIRD

## Electronic Corporation

30303 Aurora Road, Cleveland (Solon) Ohio 44139

The THRULINE® RF Power Sensors listed on pages 4-6 represent but a handful of recent examples designed and built by BIRD with decades of experience in fulfilling exacting O.E.M. requirements.

The small dimensions of the directional coupler assemblies lend themselves to many variations. THRULINE Power Sensors with one, two, three, four or five sampling ports on one 50-ohm block have been used for relay operation for transmitter protection, feedback for output leveling, video scope display, percent modulation measurement, initial tuning with two low-power elements coupled with two higher power (10 times) elements for operational indication, frequency checks (no diode), in addition to directional power measurement.

With increasing use of solid state transmitter designs, one of our Sensor's more frequent applications is for Automatic Level Control. Whether due to turn-on overshoot or operational overmodulation, ALC protects equipment, such as a linear device, from damage. Detection of peak envelope AM excursion to prevent clipping and distortion through ALC circuits is another application of special ports in THRULINE Power Sensors. TV exciters can be controlled from ports designed for narrow pulse detection. Broadband Sensors also are in demand for spread spectrum transmission techniques.

Listed on the Inquiry Forms in the back of this catalog is the design information required to meet your particular application. An engineer will be assigned to your inquiry to guide it through personal consultations to an acceptable proposal and throughout the manufacturing phase.

## THRULINE® RF Power Sensors 4100 series 50 ohms nominal

BIRD 4100 SERIES POWER SENSORS are custom designed for incorporation into transmitter and test equipment circuits at the time of manufacture. Individual models are not stocked, but are designed to customers' specific power, frequency range and read-out requirements. The sensor delivers direct currents proportional to forward

and reflected power (CW, FM) or acts as an envelope detector (AM, SSB, PULSE). It consists of a length of 50-ohm line section, typically with two fixed coupler assemblies — one for each direction of power flow. The two dc outputs can be displayed on individual meters, or switched on one two-range meter, or used with a model 3170 or 3128 WATTCHER.

The sensors listed below are the most popular types. Prototypes of production runs can be made available on relatively short order.

### 4100 Series THRULINE® RF Sensors

STANDARD UNITS (CATALOG NUMBERS)						
Power Ranges (Fwd/Refl)	Frequency Bands (MHz)					
	2-30	25-60	50-125	100-250	200-500	400-1000
5/5W		4A5	4B5	4C5	4D5	4E5
10/10	4H10	4A10	4B10	4C10	4D10	4E10
25/10	4H25	4A25	4B25	4C25	4D25	4E25
50/10	4H50	4A50	4B50	4C50	4D50	4E50
100/25	4H100	4A100	4B100	4C100	4D100	4E100
250/50	4H250	4A250	4B250	4C250	4D250	4E250
500/100	4H500	4A500	4B500	4C500	4D500	4E500
1000/250	4H1000	4A1000	4B1000	4C1000	4D1000	4E1000

#### SUPPLIED AS FOLLOWS:

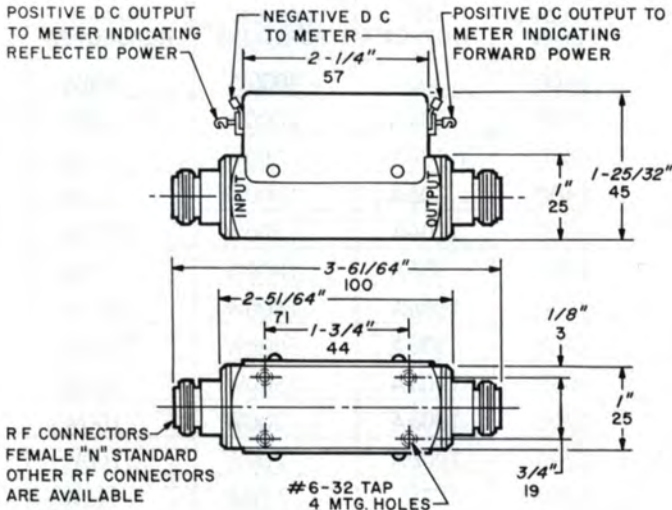
RF Input ..... "N" (F)  
 RF Output ..... "N" (F)

D.C. Connector ..... Solder Lugs  
 Meter Sensitivity ..... 30 Microamperes  
 Resistance 1400 ohms

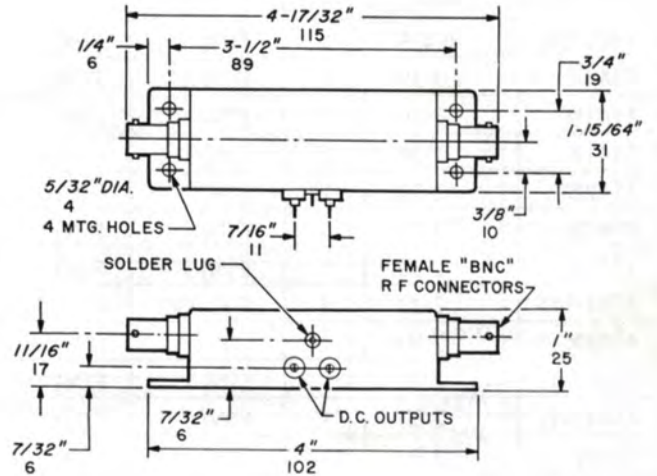
# THRULINE® RF Power Sensors / Technical Data

50 ohms nominal

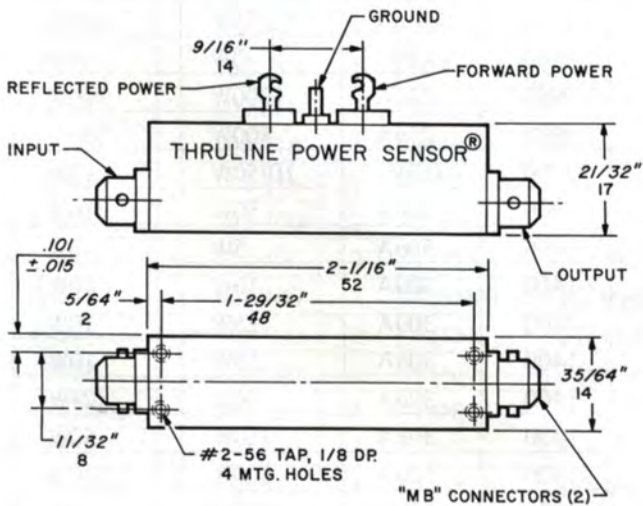
**FORM 1**



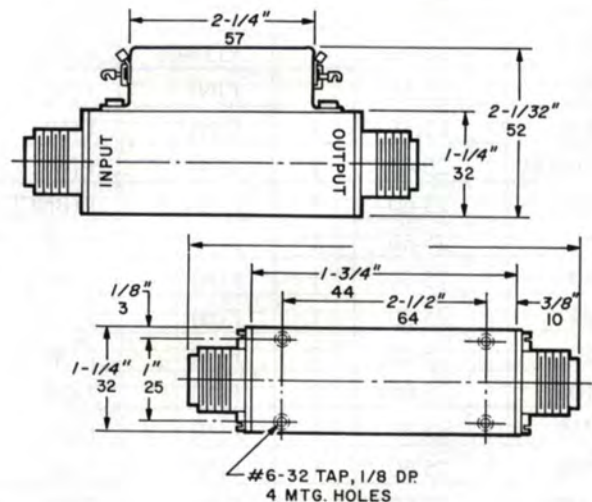
**FORM 2**



**FORM 3**



**FORM 4**



# THRULINE® RF Power Sensors 50 ohms nominal

- C<sub>1</sub> Type RF Input Connector
- C<sub>2</sub> Type RF Output Connector
- C<sub>3</sub> Type DC Output Connector
- FTC Feed Thru Capacitor
- MS MS 3112-E8-4S
- OT Open Terminal
- QC Quick-Change Connectors
- \* Specs available upon request from factory



MODEL	FREQ. BAND MHz	FORM	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	DC LOAD ohms	DC OUTPUT	POWER FORWARD	POWER REFLECTED
4141-100	0.475	1	F(N)	F(N)	FTC	1400	30uA	1000W	100W
4143Z	1.5-30	1	F(HN)	F(HN)	FTC	1400	30uA	2000W	50W
4141N	2-30	1	F(N)	F(N)	MS	1650	50uA	200W	15W
4141X	2-30	1	F(N)	F(N)	FTC	1400	30uA	1000W	250W
4142B	2-30	1	F(N)	F(UHF)	F(BNC)	1000	200uA	1200W	1200W
4142S	2-30	1	F(N)	F(N)	FTC	1400	30uA	1000W	25W
4143K	2-30	1	F(N)	F(N)	FTC	1520	100uA	1500W	1500W
4144-115	2-30	4	F(C) QC	F(C) QC	MS	1400	30uA	5000W	1000W
4144R	2-30	1	OT	OT	FTC	1050	100uA	1500W	250W
4144T-1	2-30	1	F(N)	F(N)	FTC	2200	-100uA	200W	100W
4144T-2	2-30	1	F(N)	F(N)	SPECIAL	2200	-100uA	200W	100W
4145J	2-30	1	F(N)	F(N)	FTC	10000	0.7V	150W	15W
4144-120	2-30	1	F(N)	F(N)	MS	1400	30uA	1000W	250W
4H10	2-30	1	F(N)	F(N)	FTC	1400	30uA	10W	10W
4H25	2-30	1	F(N)	F(N)	FTC	1400	30uA	25W	10W
4H50	2-30	1	F(N)	F(N)	FTC	1400	30uA	50W	10W
4H100	2-30	1	F(N)	F(N)	FTC	1400	30uA	100W	25W
4H250	2-30	1	F(N)	F(N)	FTC	1400	30uA	250W	50W
4H500	2-30	1	F(N)	F(N)	FTC	1400	30uA	500W	100W
4H1000	2-30	1	F(N)	F(N)	FTC	1400	30uA	1000W	250W
4144D	2-30	4	F(HN) QC	OT QC	FTC	1400	30uA	6000W	1000W
4145C	3.5-30	1	OT	F(HN)	FTC	1960	25uA	2500W	250W
4153G	9.9-50.5	1	F(N)	F(N)	FTC	10000	100uA	15/75W	15W
4151R	10-50	1	F(TNC)	F(N)	FTC	2500	-0.3V	10W	10W
4144Y	13,56	1	F(N)	F(N)	FTC	1960	25uA	1000W	100W
4145A	13,56	1	F(N)	F(N)	FTC	1960	25uA	500W	100W
4151-100	20-40	1	F(N)	F(N)	FTC	2500	0.3V	10/50W	10W
4152-X	25-60	1	F(BNC)	F(BNC)	FTC	1400	30uA	50W	10W
4A5	25-60	1	F(N)	F(N)	FTC	1400	30uA	5W	5W
4A10	25-60	1	F(N)	F(N)	FTC	1400	30uA	10W	10W
4A25	25-60	1	F(N)	F(N)	FTC	1400	30uA	25W	10W
4A50	25-60	1	F(N)	F(N)	FTC	1400	30uA	50W	10W
4A100	25-60	1	F(N)	F(N)	FTC	1400	30uA	100W	25W
4A250	25-60	1	F(N)	F(N)	FTC	1400	30uA	250W	50W
4A500	25-60	1	F(N)	F(N)	FTC	1400	30uA	500W	100W
4A1000	25-60	1	F(N)	F(N)	FTC	1400	30uA	1000W	250W
4152H	30-76	3	F(SMB)	F(SMB)	FTC	5000	1V	10W	10W
4152Y	30-76	1	F(BNC)	F(BNC)	FTC	1500	100uA	100W	100W
4153-050	30-76	1	F(N)	F(N)	M.S.	1400	30uA	100W	25W

# THRULINE® RF Power Sensors 50 ohms nominal

- C<sub>1</sub> Type RF Input Connector
- C<sub>2</sub> Type RF Output Connector
- C<sub>3</sub> Type DC Output Connector
- FTC Feed Thru Capacitor
- MS MS 3112-E8-4S
- OT Open Terminal
- QC Quick-Change Connectors
- \* Specs available upon request from factory



MODEL	FREQ. BAND MHz	FORM	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	DC LOAD ohms	DC OUTPUT	POWER FORWARD	POWER REFLECTED
4153H	49.5-202	1	F(N)	F(N)	FTC	10000	100µA	75/15W	15W
4151P	50-200	1	F(TNC)	F(N)	FTC	2500	-0.3V	10W	10W
4B5	50-125	1	F(N)	F(N)	FTC	1400	30µA	5W	5W
4B10	50-125	1	F(N)	F(N)	FTC	1400	30µA	10W	10W
4B25	50-125	1	F(N)	F(N)	FTC	1400	30µA	25W	10W
4B50	50-125	1	F(N)	F(N)	FTC	1400	30µA	50W	10W
4B100	50-125	1	F(N)	F(N)	FTC	1400	30µA	100W	25W
4B250	50-125	1	F(N)	F(N)	FTC	1400	30µA	250W	50W
4B500	50-125	1	F(N)	F(N)	FTC	1400	30µA	500W	100W
4B1000	50-125	1	F(N)	F(N)	FTC	1400	30µA	1000W	250W
4151-070	65-175	1	F(N)	F(N)	FTC	1400	30µA	100W	10W
4167P	100-156	1	F(N)	F(N)	FTC	1400	30µA	10W	5W
4C100SP	100-250	1	F(N)	F(N)	FTC	1400	30µA	100W/100W	25W
4161-050	100-250	1	F(N)	F(N)	FTC	1400	30µA	25W	25W
4161-100	100-200	1	F(N)	F(N)	FTC	4900	50µA	100W	10W
4C5	100-250	1	F(N)	F(N)	FTC	1400	30µA	5W	5W
4C10	100-250	1	F(N)	F(N)	FTC	1400	30µA	10W	10W
4C25	100-250	1	F(N)	F(N)	FTC	1400	30µA	25W	10W
4C50	100-250	1	F(N)	F(N)	FTC	1400	30µA	50W	10W
4C100	100-250	1	F(N)	F(N)	FTC	1400	30µA	100W	25W
4C250	100-250	1	F(N)	F(N)	FTC	1400	30µA	250W	50W
4C500	100-250	1	F(N)	F(N)	FTC	1400	30µA	500W	100W
4165M	100-250	1	F(N)	F(N)	FTC	1400	30µA	500W	500W
4C1000	100-250	1	F(N)	F(N)	FTC	1400	30µA	1000W	250W
4164R	100-250	1	F(N)	F(N)	FTC	1400	30µA	100W	100W
4168R	108-118	1	F(N)	F(N)	FTC	1400	30µA	5W	0.25W
4151D	108-118	1	F(N)	F(N)	FTC	1400	30µA	100W	5W
4162C	108-400	2	F(BNC)	F(BNC)	FTC	*	*	150/50W	-
4162M	108-400	2	F(BNC)	F(BNC)	BPC	2400	*	150/100W	25W
4163Z	108-400	3	F(SMB)	F(SMB)	FTC	2000	100µA	16W	8W
4167Y	116-150	2	F(TNC)	F(TNC)	F(SMC)	5000	-1V	12W	3W
4167Z	116-150	2	F(N)	F(N)	F(SMC)	5000	-1V	60W	15W
4165-050	116-152	1	F(N)	F(N)	MS	1400	30µA	100W	25W
4168-L	150-160	1	F(N)	F(N)	FTC	1225	100µA	500W	50W
4162-180	150-512	1	F(TNC)	F(N)	FTC	2500	-0.3V	10W	10W
4168-150	174-216	1	F(N)	F(N)	2F(BNC)	RF Coupler		400W	400W
4167-E	198-505	1	F(N)	F(N)	FTC	*985	100µA	75/15W	15W
4D100SP	200-500	1	F(N)	F(N)	FTC	1400	30µA	100W/100W	25W
4161-045	200-500	1	M(N)	F(N)	FTC	1400	30µA	10W	10W

# THRULINE® RF Power Sensors 50 ohms nominal

- C<sub>1</sub> Type RF Input Connector
- C<sub>2</sub> Type RF Output Connector
- C<sub>3</sub> Type DC Output Connector
- FTC Feed Thru Capacitor
- MS MS 3112-E8-4S
- OT Open Terminal
- QC Quick-Change Connectors
- \* Specs available upon request from factory



MODEL	FREQ. BAND MHz	FORM	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	DC LOAD ohms	DC OUTPUT	POWER FORWARD	POWER REFLECTED
4162-210	200-500	1	F(BNC)	F(BNC)	FTC	1400	30uA	25W	25W
4162V	200-500	1	F(TNC)	F(N)	FTC	2500	-0.3V	10W	10W
4192-010	200-500	1	F(N)	F(N)	FTC	1400	30uA	50W	50W
4D5	200-500	1	F(N)	F(N)	FTC	1400	30uA	5W	5W
4D10	200-500	1	F(N)	F(N)	FTC	1400	30uA	10W	10W
4D25	200-500	1	F(N)	F(N)	FTC	1400	30uA	25W	10W
4D50	200-500	1	F(N)	F(N)	FTC	1400	30uA	50W	10W
4D100	200-500	1	F(N)	F(N)	FTC	1400	30uA	100W	25W
4D250	200-500	1	F(N)	F(N)	FTC	1400	30uA	250W	50W
4D500	200-500	1	F(N)	F(N)	FTC	1400	30uA	500W	100W
4D1000	200-500	1	F(N)	F(N)	FTC	1400	30uA	1000W	250W
4162D	220-405	1	F(BNC)	F(C)	SPECIAL	5000	100uA	40W	40W
4166-100	225-300	1	F(TNC)	F(TNC)	FTC	2000	1.0V	500W	—
4163D	225-400	3	F(MB)	F(MB)	FTC	5100	1.0V	10W	10W
4163-100	225-400	3	F(SMA)	F(SMA)	FTC	10000	-1.0V	10W	—
4166D	225-400	1	F(BNC)	M(BNC)	FTC	5000	1.0V	100W	25W
4166C	225-400	1	F(C)	F(C)	FTC	5000	1.0V	1000W	250W
4167W	225-400	2	F(TNC)	F(TNC)	SMC	5000	-1.0V	12W	3W
4167X	225-400	2	F(N)	F(N)	SMC	5000	-1.0V	60W	15W
4165N	225-400	1	F(N)	F(N)	F(BNC)	10000	1.0V	70W	—
4168ES	225-400	1	F(SMA)	F(SMA)	FTC	10000	-1.0V	50W	10W
4168F	225-400	4	F(LC) QC	F(LC) QC	FTC	520	200uA	2000W	200W
4169L	225-400	1	F(N)	F(N)	FTC	1000	100uA	1500W	1500W
4169M	225-400	1	F(N)	F(N)	FTC	1000	100uA	150W	150W
4165-060	225-400	1	F(N)	F(N)	FTC	1400	30uA	100W	25W
4165-070	225-400	1	F(N)	F(N)	FTC	1400	30uA	1000W	250W
4E5	400-1000	1	F(N)	F(N)	FTC	1400	30uA	5W	5W
4E10	400-1000	1	F(N)	F(N)	FTC	1400	30uA	10W	10W
4E25	400-1000	1	F(N)	F(N)	FTC	1400	30uA	25W	10W
4E50	400-1000	1	F(N)	F(N)	FTC	1400	30uA	50W	10W
4E100	400-1000	1	F(N)	F(N)	FTC	1400	30uA	100W	25W
4E250	400-1000	1	F(N)	F(N)	FTC	1400	30uA	250W	50W
4E500	400-1000	1	F(N)	F(N)	FTC	1400	30uA	500W	100W
4E1000	400-1000	1	F(N)	F(N)	FTC	1400	30uA	1000W	250W
4167M	470-890	1	F(N)	F(N)	*	RF Coupler		100W	100W
4168-140	470-890	1	F(N)	F(N)	2F(N)	RF Coupler		200W pk	200W pk
4167F	495-1010	1	F(N)	F(N)	FTC	*	100uA	75/15W	15W
4162W	500-1000	1	F(TNC)	F(N)	FTC	1500	100uA	10W	10W
4181G	2500	1	F(N)	F(N)	FTC	1400	30uA	30W	10W
4191A	4400-5000	*	F(N)	F(N)	FTC	1500	100uA	0.25W	0.25W

# **BIRO** Power Sensors

## **THRULINE® RF Power Sensors**

# inquiry form

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_ PHONE \_\_\_\_\_

ADDRESS \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Freq. Range \_\_\_\_\_

Type of Transmission \_\_\_\_\_

% Modulation \_\_\_\_\_

Maximum Incident Power, Avg. \_\_\_\_\_, Peak \_\_\_\_\_

Maximum Termination VSWR \_\_\_\_\_

Operating Temp. Range \_\_\_\_\_ to \_\_\_\_\_

Sensing Ports Required

FWD  DC  RF (at \_\_\_\_\_ dB coupling)  Both

RFL  DC  RF (at \_\_\_\_\_ dB coupling)  Both

Power Level (for maximum dc output)

FWD \_\_\_\_\_ watts,

RFL \_\_\_\_\_ watts,

**SENSOR FUNCTION**

DC Load Data

FWD \_\_\_\_\_  $\mu$ A or Volts \_\_\_\_\_ ohms

RFL \_\_\_\_\_  $\mu$ A or Volts \_\_\_\_\_ ohms

Desired Form Factor \_\_\_\_\_

RF Input Conn. \_\_\_\_\_

RF Output Conn. \_\_\_\_\_

DC Connector \_\_\_\_\_

Check here  if you want a filter and a power sensor combined in a single Sentriline® Filter Coupler.

Application  Commercial  Government  Other

## **THRULINE® RF Power Sensors**

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_ PHONE \_\_\_\_\_

ADDRESS \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Freq. Range \_\_\_\_\_

Type of Transmission \_\_\_\_\_

% Modulation \_\_\_\_\_

Maximum Incident Power, Avg. \_\_\_\_\_, Peak \_\_\_\_\_

Maximum Termination VSWR \_\_\_\_\_

Operating Temp. Range \_\_\_\_\_ to \_\_\_\_\_

Sensing Ports Required

FWD  DC  RF (at \_\_\_\_\_ dB coupling)  Both

RFL  DC  RF (at \_\_\_\_\_ dB coupling)  Both

Power Level (for maximum dc output)

FWD \_\_\_\_\_ watts,

RFL \_\_\_\_\_ watts,

**SENSOR FUNCTION**

DC Load Data

FWD \_\_\_\_\_  $\mu$ A or Volts \_\_\_\_\_ ohms

RFL \_\_\_\_\_  $\mu$ A or Volts \_\_\_\_\_ ohms

Desired Form Factor \_\_\_\_\_

RF Input Conn. \_\_\_\_\_

RF Output Conn. \_\_\_\_\_

DC Connector \_\_\_\_\_

Check here  if you want a filter and a power sensor combined in a single Sentriline® Filter Coupler.

Application  Commercial  Government  Other



# BIRD

## Electronic Corporation

30303 Aurora Rd., Cleveland (Solon), Ohio 44139  
216 • 248-1200 TLX: 706898 Bird Elec UD

WEST: Ojai, CA 805-646-7255

Other Bird Equipment Catalogs Available:

- MOB-CAT – Mobile communications test equipment
- FILTER-CAT – Lists over 200 RF Filters, FC-8
- SENSOR-CAT – Lists over 100 RF power sensors, PS-8
- BROADCAST CAT – Lists all broadcast test equipment

Call (216) 248-1200 for your free copies, or write.

Our Regional Sales Managers are qualified to discuss in detail the technical parameters of your RF sensing requirement.

They are as close as your telephone and will advise and assist you in selecting the most suitable Power Sensor design for your particular application.

Standardization of common parts makes even a very-special sensor design cost effective.

Call the main plant or the Western office listed above for personal attention.

## how to order

The following information is required to completely describe the particular 4100 series Sensor for your application:

1. Frequency range.
2. Number and type of sensing ports (i.e.: dc, envelope or RF output from forward or reflected signals).
3. Full-scale power indication or maximum output signal level.
4. Type of RF connectors for both ends of line section.
5. Type of dc connectors. (Solder lugs standard per drawing.) Also can be furnished with small RF type connectors.
6. Meter: For customer supplied meters, please specify the meter manufacturer, model number, full-scale current sensitivity and dc resistance of the meter. We will then furnish data of RF watts vs. dc current for the preparation of your meter scale.
7. Sample quantity.
8. Production quantity.
9. Delivery.

## specifications

**Frequency Range:** Upper frequency limit: 5000 MHz

**Power Range:** 10-1500 watts at 2-30 MHz, 5-1000 watts for higher frequency ranges

**RF Connectors:** Most common types (series N, C, BNC, HN, UHF)

**DC Output Connectors:** Solder terminals or small RF type connectors (e.g., BNC) (customer to specify type)

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

**Directivity:** 30 dB  
Typical

**Insertion VSWR:** 1.05

**Impedance:** 50 ohm nominal

**Weight:** 10 oz.  
(depending on connector type)

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Then It Was Stolen From...

[www.SteamPoweredRadio.Com](http://www.SteamPoweredRadio.Com)