



CHANNEL POWER SENSOR  
MODEL 4042

OPERATION MANUAL

# Safety Precautions

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The following are general safety precautions that are not necessarily related to any specific part or procedure, and do not necessarily appear elsewhere in this publication. These precautions must be thoroughly understood and apply to all phases of operation and maintenance.

## **WARNING**

### **Keep Away From Live Circuits**

Operating Personnel must at all times observe general safety precautions. Do not replace components or make adjustments to the inside of the test equipment with the high voltage supply turned on. To avoid casualties, always remove power.

## **WARNING**

### **Shock Hazard**

Do not attempt to remove the RF transmission line while RF power is present.

## **WARNING**

### **Do Not Service Or Adjust Alone**

Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who is capable of rendering aid.

## **WARNING**

### **Safety Earth Ground**

An uninterruptible earth safety ground must be supplied from the main power source to test instruments. Grounding one conductor of a two conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly supplied.

## **WARNING**

### **Resuscitation**

Personnel working with or near high voltages should be familiar with modern methods of resuscitation.

## **WARNING**

### **Remove Power**

Observe general safety precautions. Do not open the instrument with the power applied.

## Safety Symbols

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**WARNING**

Warning notes call attention to a procedure, which if not correctly performed, could result in personal injury.

**CAUTION**

Caution notes call attention to a procedure, which if not correctly performed, could result in damage to the instrument.

**Note:** *Calls attention to supplemental information.*

## Warning Statements

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The following safety warnings appear in the text where there is danger to operating and maintenance personnel, and are repeated here for emphasis.

**WARNING**

Leaking RF energy is a potential health hazard. Never attempt to connect or disconnect equipment from the transmission line while RF power is being applied. Severe burns, electrical shock, or death can occur.

Refer to page 4.

## **Safety Statements**

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### **USAGE**

**ANY USE OF THIS INSTRUMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR THE INSTRUMENT'S SAFETY PROTECTION.**

### **USO**

**EL USO DE ESTE INSTRUMENTO DE MANERA NO ESPECIFICADA POR EL FABRICANTE, PUEDE ANULAR LA PROTECCIÓN DE SEGURIDAD DEL INSTRUMENTO.**

### **BENUTZUNG**

**WIRD DAS GERÄT AUF ANDERE WEISE VERWENDET ALS VOM HERSTELLER BESCHRIEBEN, KANN DIE GERÄTESICHERHEIT BEEINTRÄCHTIGT WERDEN.**

### **UTILISATION**

**TOUTE UTILISATION DE CET INSTRUMENT QUI N'EST PAS EXPLICITEMENT PRÉVUE PAR LE FABRICANT PEUT ENDOMMAGER LE DISPOSITIF DE PROTECTION DE L'INSTRUMENT.**

### **IMPIEGO**

**QUALORA QUESTO STRUMENTO VENISSE UTILIZZATO IN MODO DIVERSO DA COME SPECIFICATO DAL PRODUTTORE LA PROZIONE DI SICUREZZA POTREBBE VENIRNE COMPROMESSA.**

## **SERVICE**

**SERVICING INSTRUCTIONS ARE FOR USE BY SERVICE - TRAINED PERSONNEL ONLY. TO AVOID DANGEROUS ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING UNLESS QUALIFIED TO DO SO.**

## **SERVICIO**

**LAS INSTRUCCIONES DE SERVICIO SON PARA USO EXCLUSIVO DEL PERSONAL DE SERVICIO CAPACITADO. PARA EVITAR EL PELIGRO DE DESCARGAS ELÉCTRICAS, NO REALICE NINGÚN SERVICIO A MENOS QUE ESTÉ CAPACITADO PARA HACERLO.**

## **WARTUNG**

**ANWEISUNGEN FÜR DIE WARTUNG DES GERÄTES GELTEN NUR FÜR GESCHULTES FACHPERSONAL. ZUR VERMEIDUNG GEFÄHRLICHE, ELEKTRISCHE SCHOCKS, SIND WARTUNGSARBEITEN AUSSCHLIEßLICH VON QUALIFIZIERTEM SERVICEPERSONAL DURCHZUFÜHREN.**

## **ENTRETIEN**

**L'EMPLOI DES INSTRUCTIONS D'ENTRETIEN DOIT ÊTRE RÉSERVÉ AU PERSONNEL FORMÉ AUX OPÉRATIONS D'ENTRETIEN. POUR PRÉVENIR UN CHOC ÉLECTRIQUE DANGEREUX, NE PAS EFFECTUER D'ENTRETIEN SI L'ON N'A PAS ÉTÉ QUALIFIÉ POUR CE FAIRE.**

## **ASSISTENZA TECNICA**

**LE ISTRUZIONI RELATIVE ALL'ASSISTENZA SONO PREVISTE ESCLUSIVAMENTE PER IL PERSONALE OPPORTUNAMENTE ADDESTRATO. PER EVITARE PERICOLOSE SCOSSE ELETTRICHE NON EFFETTUARRE ALCUNA RIPARAZIONE A MENO CHE QUALIFICATI A FARLA.**

## About This Manual

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This manual covers the operating and maintenance instructions for the following models:

4042 Series - Channel Power Sensors

## Changes to this Manual

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We have made every effort to ensure this manual is accurate. If you discover any errors, or if you have suggestions for improving this manual, please send your comments to our Solon, Ohio factory. This manual may be periodically updated. When inquiring about updates to this manual refer to the part number and revision on the title page.

## Chapter Layout

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**Introduction** — Describes the features of the 4042 Channel Power Sensor.

**Installation** — Describes how to set up and prepare the 4042 Power Sensor for use.

**Maintenance** — This section provides the specifications for the 4042 Power Sensor as well as a model identification table.

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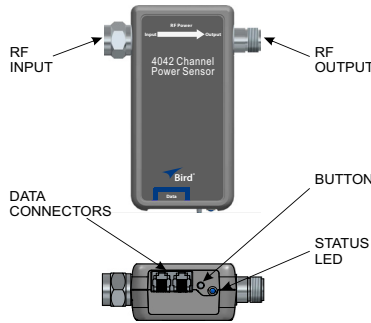
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## Purpose and Function

The Bird 4042 Series Channel Power Sensors are digital power sensors designed for use with the Bird Channel Power Monitor (CPM).

The 4042 Series Channel power sensors are typically used to measure forward and reflected average power on a 50 ohm RF transmission line with maximum 500 watt forward and reflected power levels in a frequency band with an overall range of 100 to 1000 MHz. The 4042 sensor also provides VSWR readings.

*Figure 1 Bird 4042 Series Channel Power Sensor*



<i>Features</i>	
RF Input	N-Type (male) connector (shown), other connector types available, see <a href="#">"Model Identification" on page 8</a>
RF Output	N-Type (female) connector (shown), other connector types available, see <a href="#">"Model Identification" on page 8</a>
Data Connectors	RJ-25 connector provides power and data connection. Only one connector is required, second connector may be used to extend RS-485 bus to additional digital sensors. RJ-25 termination plug must be installed in unused jack.
Button	Not Connected.
Status LED	Solid green: Power applied.

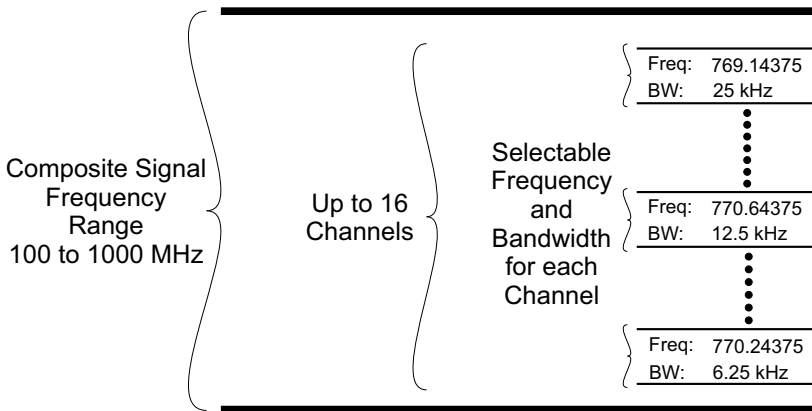


## Channel Sensor Operation

The 4042 Channel Sensor is a unique sensor that is able to measure the forward power, reflected power and VSWR of a SINGLE CHANNEL in the presence of multiple channels at the output of a frequency combiner (see [Figure 3 on page 4](#)).

The sensor can also measure the forward power, reflected power and the VSWR of the composite signal by scanning up to 16 individual channels and summing their power, see [Figure 2](#).

*Figure 2 Channel Sensor Configuration*



Once connected to a CPM and RF Transmission line, the sensor may be programmed to measure power and VSWR for up to 16 frequencies or channels.

The bandwidth of each channel is selectable and may be set to one of the following values:

- 6.25 kHz
- 12.5 kHz
- 25 kHz

The CPM can be setup to provide low power and VSWR alarms for all 16 channels monitored by the 4042 Sensor.

## Data Connection

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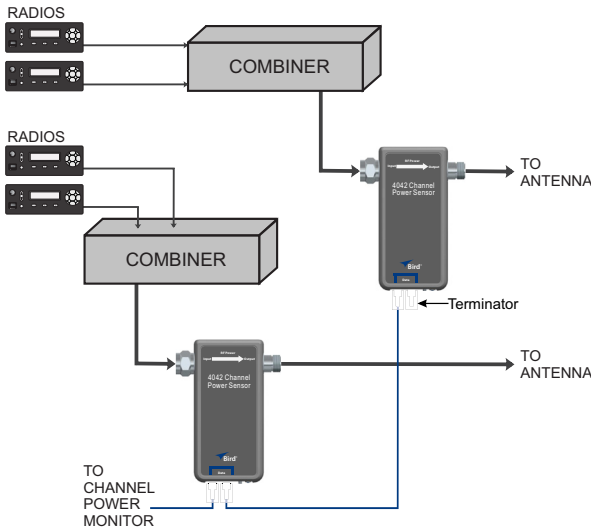
The 4042 Channel Sensor uses an RS-485 serial bus for data transfer to and from a CPM. Each sensor is equipped with two RJ-25 jacks, either jack may be connected to a CPM. The second RJ-25 jack may be used to extend the RS-485 bus to another digital sensor. See [Figure 3 on page 4](#). Multiple digital sensors may be serially connected in this fashion, allowing as many as 16 sensors to be connected to a CPM.

If multiple sensors are to be connected serially, each one is assigned a unique address via the CPM. When each sensor is connected to the CPM, prior to connecting any additional sensors, add sensor in the CPM to assign an address, only then may an additional sensor be connected serially.

A termination plug must be used in the open RJ-25 jack on the rear panel of the CPM or the open RJ-25 jack of the final digital sensor in the chain.

The Bird 4042 Series Channel Power Sensors are designed to be used for continuous power monitoring in multiple Land Mobile Radio (LMR) systems. When used with the Bird CPM the 4042 can provide real-time RF forward and reflected power and VSWR measurements.

*Figure 3 Connection Diagram*



## Power Sensor Installation

### CPM Serial Connection

This procedure is an example of one possible cable configuration, based on the connection diagram in [Figure 3](#).

#### **WARNING**

Leaking RF energy is a potential health hazard. Never attempt to connect or disconnect equipment from the transmission line while RF power is being applied. Severe burns, electrical shock, or death can occur.

1. Disable RF power for transmission lines to be disconnected.
2. Connect combiner's RF output cable to the 4042 RF input.

3. Connect 4042's RF output connector to the antenna cable.
4. Repeat step [1](#) through [3](#) for any additional 4042 power sensors.
5. Install RJ-25 termination plug in unused digital sensor RJ-25 port on the rear panel of the CPM (if available), or in the last sensor installed in the digital sensor chain.
6. Connect a data/power cable from the CPM to 4042 power sensor.

**Note:** *Each digital sensor must have a unique RS-485 Bus address when connected serially to the CPM. Connect the digital sensors one at a time, enroll the sensor using the CPM front panel to provide a unique address, prior to connecting additional sensors.*

7. Configure the sensor via CPM front panel. Refer to the CPM Operation Manual.
8. If additional 4042 power sensors will be connected, connect a data/power cable to the open RJ-25 jack, connect remaining end of cable to additional 4042 sensor.
9. Repeat step [5](#) through [8](#) for any additional 4042 power sensors serially connected to the CPM.

**Note:** *Digital sensors require a terminator plug be installed in the open Digital Sensor RJ-25 port on the rear panel of the CPM (if available), or in the last sensor installed in the digital sensor chain.*

10. If required, install RJ-25 termination plug in unused RJ-25 Jack of last digital sensor in the chain.

There is no user maintenance for the 4042 power sensor.

contact the Bird Service Center in the event the power sensor requires maintenance.

## Customer Service

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Any maintenance or service procedure beyond the scope of those in this chapter should be referred to a qualified service center.

If the unit needs to be returned for any reason, request an Return Material Authorization (RMA) through the Bird Technologies website. All instruments returned must be shipped prepaid and to the attention of the RMA number.

### **Bird Service Center**

30303 Aurora Road  
Cleveland (Solon), Ohio 44139-2794  
Fax: (440) 248-5426  
E-mail: [bsc@birdrf.com](mailto:bsc@birdrf.com)

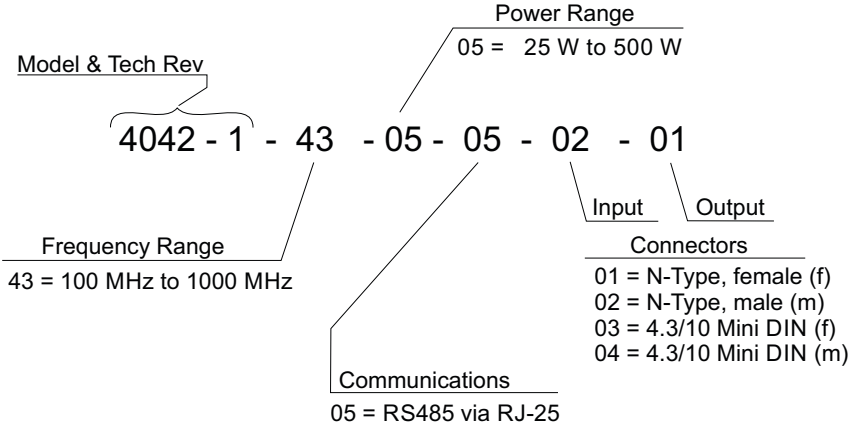
For the location of the Sales Office nearest you, visit our Web site at:

<http://www.birdrf.com>

## Specifications

Specification	Value
Measurement Type	In-Line, Directional RF True Average Power by Channel, or Composite Power (by scanning channels)
Channel Bandwidth	6.25, 12.5, 25 kHz selectable
Frequency Range	100 to 1000 MHz
Forward Power Measurement Range	Single Channel or Composite Forward Average Power  25 W to 500 W
Reflected Power Measurement Range	0.1 W to 50 W Single Channel or Composite Reflected Average Power
RF Connectors Input Output	Type-N (male), Type 4.3-10 (male) Type-N (female), Type 4.3-10 (female)
Impedance	50 Ohms nominal
Insertion Loss (Max.)	0.2 dB
Insertion VSWR (Max.)	1.15
Peak/Average Ratio (Max.)	12 dB
Directivity	25 dB minimum
Measurement Accuracy	± 5% of reading
Data Interfaces	RS-485 Serial Interface
RS-485 Data Interface Connector	RJ-25
Power Supply Requirements DC-RJ-25 Jack (CPM)	7-18 VDC, < 200 mA
Operating Temperature Range	0° C to +50° C (32° F to 122° F)
Storage Temperature Range	-40° C to +80° C (-40° F to 176° F)
Humidity	95% maximum (non-condensing)
Altitude (Max.)	15,000 ft. (4572 m)
Weight (Approx.)	0.6 lb. (0.27 kg)
Dimensions, Nominal Without Connectors	5.2" L x 3.8" W x 1.4" H (132.0 mm x 96.5 mm x 35.5 mm)
Operating Position	Any

## Model Identification







# Limited Warranty

All products manufactured by Seller are warranted to be free from defects in material and workmanship for a period of one (1) year, unless otherwise specified, from date of shipment and to conform to applicable specifications, drawings, blueprints and/or samples. Seller's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by Seller.

If Seller's products are claimed to be defective in material or workmanship or not to conform to specifications, drawings, blueprints and/or samples, Seller shall, upon prompt notice thereof, either examine the products where they are located or issue shipping instructions for return to Seller (transportation-charges prepaid by Buyer). In the event any of our products are proved to be other than as warranted, transportation costs (cheapest way) to and from Seller's plant, will be borne by Seller and reimbursement or credit will be made for amounts so expended by Buyer. Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing within ten (10) days from the date of discovery of the defect.

The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's request and/or to Buyer's specifications. Routine (regularly required) calibration is not covered under this limited warranty. In addition, Seller's warranties do not extend to the failure of tubes, transistors, fuses and batteries, or to other equipment and parts manufactured by others except to the extent of the original manufacturer's warranty to Seller.

The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR SELLER ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.