



DIRECTIONAL POWER SENSOR
MODEL 4043

OPERATION MANUAL

Safety Precautions

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

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

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.

See page 3.

Safety Statements

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

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

4043 Series - Directional Power Sensors

Changes to this Manual

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

Introduction — Describes the features of the 4043 Directional Power Sensor.

Installation — Describes how to set up and prepare the 4043 Power Sensor for use.

Maintenance — This section provides the specifications for the 4043 Power Sensor as well as a model identification table.

TABLE OF CONTENTS

Safety Precautions	i
Safety Symbols	ii
Warning Statements	ii
Safety Statements	iii
About This Manual	v
Changes to this Manual	v
Chapter Layout	v
Chapter 1 Introduction	1
Purpose and Function	1
Chapter 2 Sensor Operation	2
Power Sensor Installation	3
Chapter 3 Maintenance	5
Customer Service	5
Chapter 4 Specifications	6
Model Identification	7
Limited Warranty	8

Purpose and Function

The Bird 4043 Series Directional Power Sensors are digital power sensors. The 4043 Series power sensors are typically used to measure forward and reflected average power on a 50 ohm RF transmission line with a maximum 500 watt forward and maximum 50 watt reflected power levels in a frequency band with an overall range of 118 to 940 MHz. See "[Model Identification](#)" on page 7 for specific frequency ranges and model features. The 4043 sensor also provides a VSWR reading.

Figure 1 4043 Power Sensor



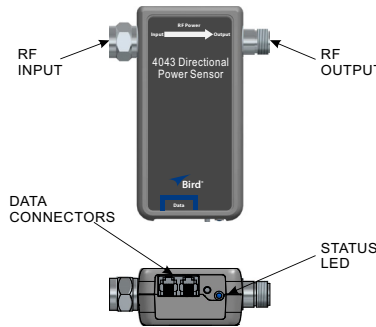
The 4043 Power Sensor uses an RS-485 serial communication bus designed for use with the Bird Channel Power Monitor (CPM) in rack mounted communications systems.

See "[Sensor Operation](#)" on page 2.

The 4043 Sensor’s RS-485 serial bus is designed to transfer data to and from a CPM. The serial bus also serves as the power sensor’s power supply.

Each sensor is equipped with two RJ-25 jacks for serial communications, RF input and output connectors, and a status indicator. See [Figure 2](#).

Figure 2 Bird 4043, RS-485 Serial Communication Power Sensor



<i>Features</i>	
RF Input	N-Type (male) connector (shown), other connector types available, see "Model Identification" on page 7
RF Output	N-Type (female) connector (shown), other connector types available, see "Model Identification" on page 7
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 or in the Open port on the CPM.
Status LED	Solid green: Power applied.

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 3](#). Multiple digital sensors may be serially connected in this fashion, allowing as many as 16 sensors to be connected to a CPM.

If multiple 4043 sensors are to be connected serially, each one is assigned a unique address via the CPM. When each 4043 is connected to the CPM, prior to connecting any additional 4043 sensors, they must be assigned an address by the CPM, 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.

Power Sensor Installation

The Bird 4043 Series Directional Power Sensors are designed to be used for continuous power monitoring of Land Mobile Radio (LMR) systems. The 4043 can provide real-time RF forward and reflected power and VSWR measurements.

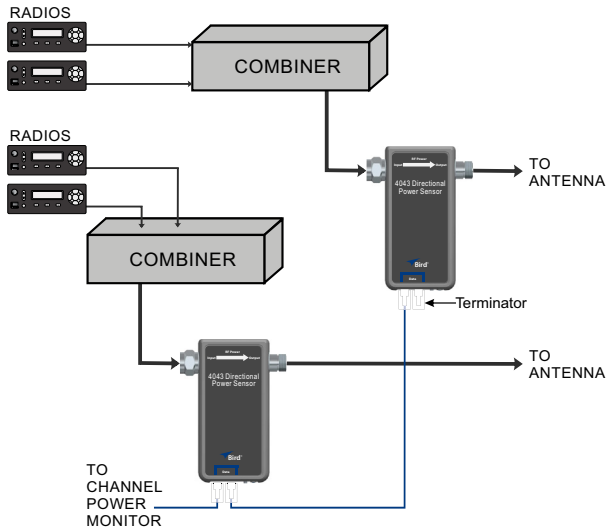
This procedure is an example of one possible cable configuration, based on the connection diagram in [Figure 3](#).

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 4043 RF input.

Figure 3 CPM, RS-485 Serial Connection Diagram



3. Connect 4043's RF output connector to the antenna cable.
4. Repeat step [1](#) through [3](#) for any additional 4043 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 4043 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 4043 power sensors will be connected, connect a data/power cable to the open RJ-25 jack, connect remaining end of cable to additional 4043 sensor.
9. Repeat step [7](#) and [8](#) for any additional 4043 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 4043 power sensor.

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

Customer Service

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

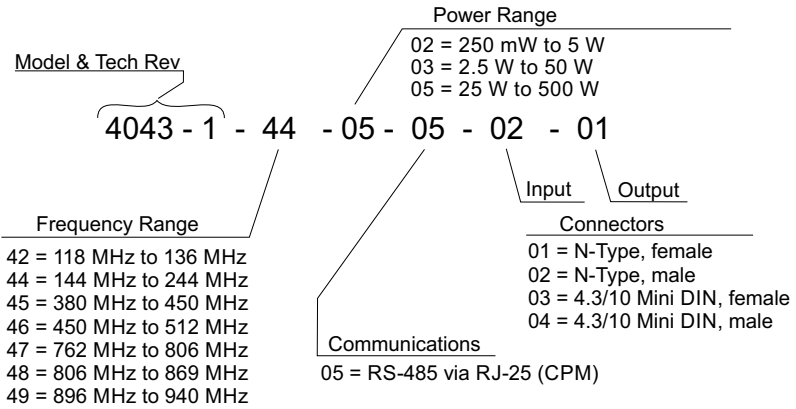
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For the location of the Sales Office nearest you, visit our Web site at:

<http://www.birdrf.com>

Specification	Value
Frequency Range (model dependent)	118 to 940 MHz See " Model Identification " on page 7 for frequency range of each model.
Forward Power Measurement Range	250 mW to 500 W See " Model Identification " on page 7 for power range of each model.
Reflected Power Measurement Range	25 mW to 50 W See " Model Identification " on page 7 for power range of each model.
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 Interface See " Model Identification " on page 7	RS-485 Serial Interface
RS-485 Data Interface Connector	RJ-25
Power Supply Requirements DC-RJ-25 Jack (CPM or External P.S.)	7-18 VDC, < 50 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.)	0.5 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.