Real Freedom

Data Transmitter

Product Manual

Revision A

Manual part number: 20003-1-000

Revision A

This manual contains important information regarding the installation and operation of the Real Freedom Data Transmitter. For safe and reliable operation, installers must ensure that they are familiar with, and fully understand, all instructions contained herein. Broadcast Sports International reserves the right to revise and improve its products as it sees fit. This publication describes the state of this product at the time of publication and may not always reflect the product in the future.

In this manual, the following symbols call your attention to important information:

	CAUTION Indicates that care is required when proceeding to avoid damage to the system.
	NOTE Used to draw your attention to additional important information.
	WARNING Indicates a potentially hazardous situation.

Warranty information

All products are warranted to be free from defects in materials or workmanship for a period of 24 months. If returned within the applicable warranty period, BSI will, at its sole discretion and at no cost to the customer, repair or replace the defective product with another unit of the same or equivalent model. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alterations or repairs.

Contact details and technical support

Real Freedom Team	For product information and help with missing or damaged items.
	Email: EngineeringDepartment@BSINTL.COM
	Tel: +1-410-564-2642
Telephone Support Line	Product technical support is provided via a telephone support line. Trained technicians are available to offer setup and configuration advice and to assist in troubleshooting technical issues.
	Tel: +1-410-564-2642
Return Merchandise Authorization (RMA) Procedure	Problems that cannot be resolved on the telephone may require the device to be returned to BSI for repair. In such cases, the telephone operator will assist the customer in obtaining an RMA.
	Please note that no returns can be accepted without a valid RMA.

Hazard warning labels

The following hazard warning labels are fixed to the Real Freedom Data Transmitter for your information and safety.

	HOT SURFACE The data transmitter becomes hot during operation. It is recommended that you mount the unit in a well-ventilated area where it will not be touched accidentally. Allow the unit to cool before handling.

About this manual

This manual contains safety information and information for installing, configuring, and operating a Real Freedom Data Transmitter.

It applies to the following products:

- IDT-4349-3U: Real Freedom Data Transmitter

Contents

The Real Freedom Data Transmitter is an important component of BSI's Real Freedom wireless camera system which allows you to remotely control up to six Real Freedom Camera Back Transmitters and to provide camera control of most brands of broadcast camera.

Compact and fully weatherproof, the data transmitter simply connects with a single cable to any remote Real Freedom Downconverter within the Real Freedom camera system. This enables the unit to be placed anywhere without deploying additional infrastructure or cable. Once connected, intelligent connectivity notifies the Real Freedom Receiver of the presence of the data transmitter within the network.

All setup and control functionality on the Real Freedom Data Transmitter is accessed from the intuitive interface on the Real Freedom Receiver or remotely via an IP web page. External system wet and dry tally connectivity is accessible on the rear of the Real Freedom Receiver.

The Real Freedom Data Transmitter provides full wireless camera control functionality when paired with the Real Freedom Receiver, allowing RJ45 IP connectivity with operator/remote control panels. Up to six control panels controlling cameras from differing manufacturers may be networked through a single UHF channel.

The Real Freedom Data Transmitter is fully compatible with the BSI Real Freedom Fiber Antenna Extender for long distance remote operation to any receive points in the network.

Configuration examples

Example 1

This example shows a simple configuration with eight downconverters connected to a single receiver.
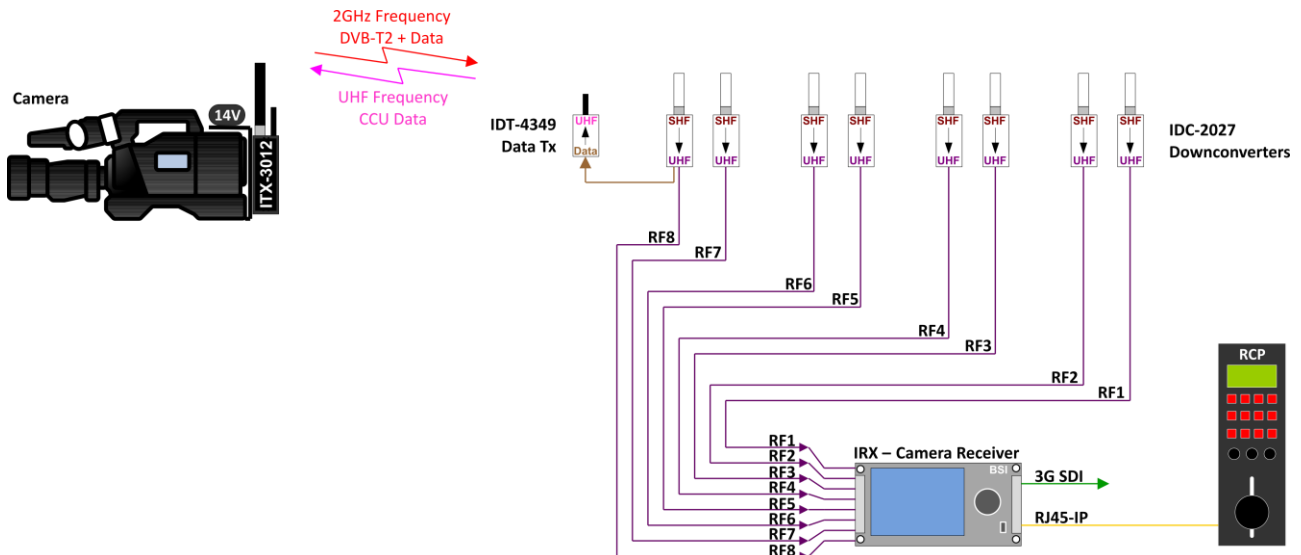
Figure 1: The data transmitter receives camera control data from a Remote Control Panel (RCP) via the Real Freedom Receiver and transmits a GMSK-modulated narrow band UHF signal of between 430 MHz and 490 MHz. For maximum flexibility, plug the data transmitter into any downconverter.

Example 2

This example shows networked camera control of six cameras over one UHF frequency.
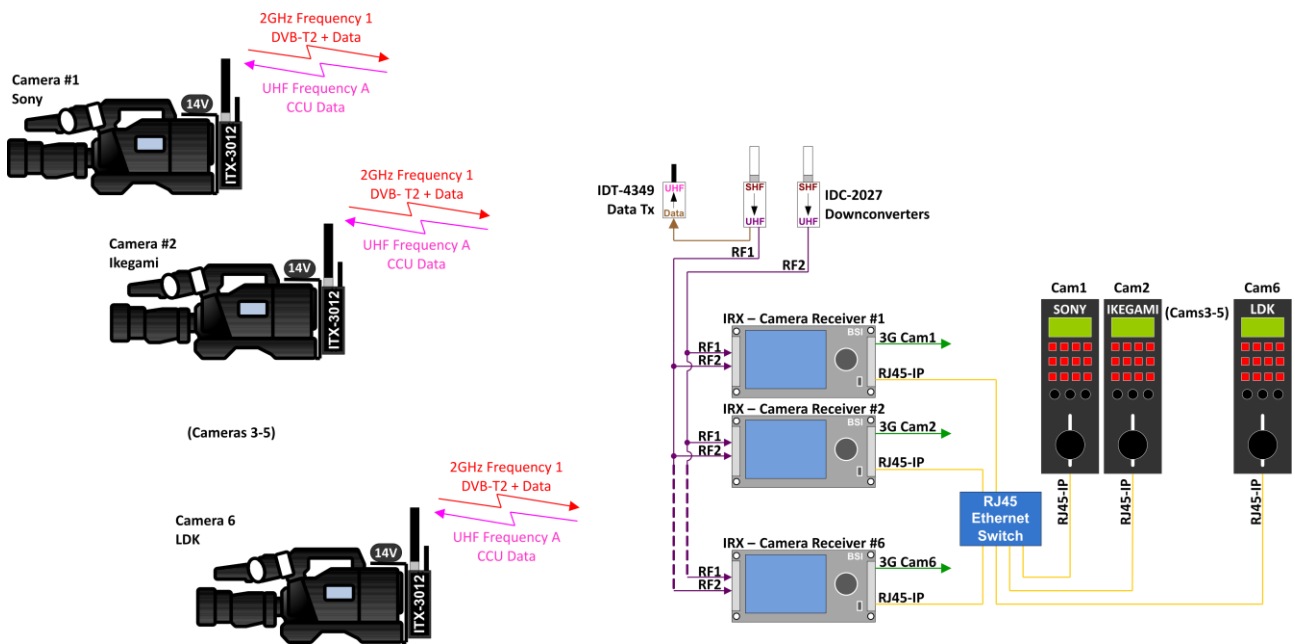

Figure 2: Networked camera control over one UHF channel.

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Installation and configuration

Designed to be compact and fully weatherproof, the Real Freedom Data Transmitter connects to any remote downconverter enabling the unit to be placed almost anywhere.

Overview

The main installation and configuration steps for a Real Freedom Data Transmitter are as follows:

1. Connect an antenna to the data transmitter.

2. Pole or surface mount the data transmitter.

3. Connect the data transmitter to a Real Freedom Downconverter attached to a Real Freedom Receiver or Real Freedom Fiber Remote unit.

4. Set the data transmitter's transmit frequency and output power using the receiver's configuration options.

Preparation

When planning the installation locations for data transmitters, you should take note of the following points:

- In general, you should install data transmitters in an area where they can be accessed easily by support technicians. This area should also be out of reach or inaccessible to anyone that does not need to gain access, such as fans at a sporting event or attendees at a conference.

- Ideally, place the data transmitters so that there is a line of sight from the transmitter to the downconverter, and in a place where nothing will obstruct the path, such as dense metal objects that may cause reflections and multipathing of the signal.

Environmental requirements

The following table summarizes the environmental requirements for the operation and storage of a Real Freedom Data Transmitter.

Table 1: Environmental requirements

Specification	Details
Humidity	95% non-condensing
Operating and storage temperature	14° to 131°F / -10° to +55°C

Power requirements

The following table summarizes the power requirements for a Real Freedom Data Transmitter.

Table 2: Power requirements

Specification	Details
Power	9–36 V DC (via LEMO I/O connector)
Consumption	6.5 W (minimum transmit power), 14 W (maximum transmit power)

Unpack the data transmitter

Unpack the Real Freedom Data Transmitter and refer to the packing list to ensure that all items are included. Report any missing items immediately to the Real Freedom Team.

Inspect the data transmitter for signs of damage. Report any damage to the Real Freedom Team.

Additional items required for installation

To install a Real Freedom Data Transmitter, you will require the following additional items:

- Antenna.

  Either a BSI or third-party antenna with a standard N-type connector. Connect the antenna directly to the transmitter via the antenna port.

- LEMO cable (LEMO 4-pin HGG0K-304-CLLP).

  Use the LEMO cable to connect the data transmitter to a downconverter.

- Real Freedom Downconverter.

  Connect the downconverter to a receiver or fiber remote unit using a coaxial cable with BNC connectors. It is recommended that you use good quality 50 Ohm cable to connect to a receiver or 75 Ohm cable to connect to a fiber remote unit.

Pole mount a data transmitter

The Real Freedom Data Transmitter is supplied with a removable mounting bracket which allows you to mount the unit to a pole for temporary or permanent installation. The mounting bracket can be secured to vertical or horizontal poles of between 1.44 and 2.68 inch (36.5 to 68 mm) in diameter.
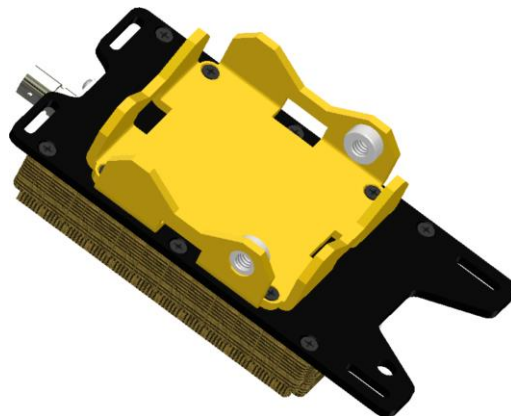
Figure 3: Data transmitter mounting bracket (yellow)

Precautions

You should read these precautions before you pole mount a data transmitter.

- Before attaching a data transmitter to a pole or camera mount, ensure that the pole or mount can support the weight of the data transmitter (0.97 lb. / 0.44 kg), antenna, attached cables, and any other devices that you intend to attach to the pole. This is particularly important if you intend to attach the data transmitter to the end of the pole.

- The data transmitter must be mounted vertically with the antenna port facing up.

- When attaching the mounting bracket to the data transmitter, do not overtighten the screws as it may result in thread damage.

- The data transmitter becomes hot during operation. It is recommended that you mount the unit in a well-ventilated area where it will not be touched accidentally.

Temporary installation

For temporary installation, use cable ties.

1. If not already attached, attach the mounting bracket to the back of the data transmitter using the four screws (M3 x 8) provided.

   Do not overtighten the screws as it may result in thread damage.

2. Pass at least two cable ties through the slots in the mounting bracket and around the pole.

3. Close and tighten the cable ties to secure the data transmitter to the pole.

Permanent installation

For permanent installation, use hose clamps.

1. If not already attached, attach the mounting bracket to the back of the data transmitter using the four screws (M3 x 8) provided.

   Do not overtighten the screws as it may result in thread damage.

2. Pass the hose clamps through the slots in the mounting bracket and around the pole.

3. Tighten the hose clamps to secure the data transmitter to the pole.

Installation using a ¼-20 UNC mount

Mount a data transmitter on a standard Manfrotto lighting stand, camera mount, repro arm, magic arm, clamp, or Dado kit using a ¼-20 camera mount screw.

Figure 4: Data transmitter ¼-20 UNC mounting screws (yellow)

1. If not already attached, attach the mounting bracket to the back of the data transmitter using the four screws (M3 x 8) provided.

   Do not overtighten the screws as it may result in thread damage.

2. Either thread a ¼-20 screw through the screw hole in the mounting bracket into the hole in the mount or screw the data transmitter onto the mounting screw.

3. Tighten to secure the data transmitter.

Surface mount a data transmitter

Depending on the installation type and site, you may wish to mount a data transmitter onto a vertical surface, such as a wall.

1. If attached, remove the mounting bracket from the back of the data transmitter. The bracket is secured with four screws (M3 x 8).

2. Use the data transmitter's back plate as a template and drill four holes into the mounting surface. Insert masonry plugs into the holes, as necessary.

3. Attach the data transmitter using four screws.

4. Check that the data transmitter is vertical and tighten the screws.

Connections

Connect the data transmitter to a downconverter attached to a receiver or fiber remote unit.

> ⚠️ **CAUTION:** To prevent damage, it is recommended that you only use BSI supplied cables and accessories with this product.

Refer to the following drawing which shows the locations of the connectors on the data transmitter.
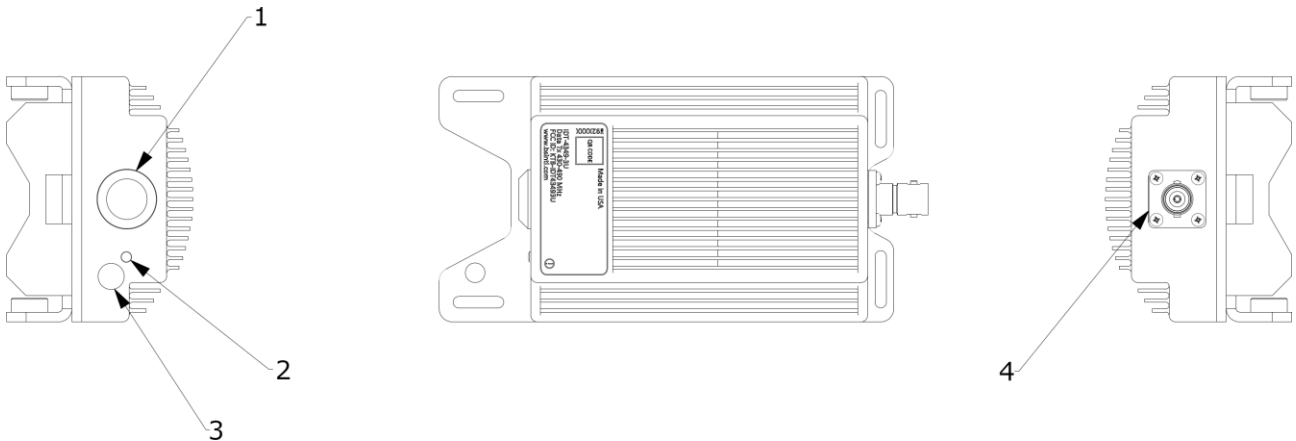
Figure 5: Real Freedom Data Transmitter connectors and other components

Key	Component	Description
1	LEMO connector	Use to connect the data transmitter to a downconverter.
2	Status LED	Indicates the state of the data transmitter.
3	Breather vent	Prevents the formation of condensation inside the data transmitter.
4	N-connector	Use to attach an antenna directly to the data transmitter.

Connect an antenna to the data transmitter

If not already connected, attach the antenna directly to the N-connector on the data transmitter. BSI supply a range of antennas to suit most applications.

> ⚠️ **CAUTION:** Operating the data transmitter without the appropriate antenna fitted may result in damage to the unit.

Connect the data transmitter to a downconverter

Connect a data transmitter to any downconverter in a Real Freedom system via the LEMO power/control connector. A one-meter cable assembly is supplied with the data transmitter for this purpose (CAB-0013-00). This cable is symmetrical and may be installed either way around.

> 📝 **NOTE:** You can connect two data transmitters to a receiver, one to a downconverter in Slot A (RF1-4) and the other to a downconverter in Slot B (RF5-8).

Configure a data transmitter

Once the power is supplied, the Real Freedom Receiver automatically detects the Real Freedom Data Transmitter and configures itself appropriately.

You can control the transmit frequency (430 to 490 MHz) and output power (250 mW to 2 W) from the receiver's **Camera Ctrl** configuration options.

> **NOTE:** Refer to the *Real Freedom Receiver Product Manual* for more information on the data transmitter configuration options. Ensure that you are properly licensed to operate at the selected frequency and output power.

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Operation

Once connected to the system and configured, no further changes are required to the Real Freedom Data Transmitter during the routine operation of the Real Freedom system.

> **NOTE:** There are no controls on the Real Freedom Data Transmitter and as soon as power is supplied via the data cable, the unit starts to operate.

Data transmitter status LED

Use the LED indicator on the data transmitter to help you to determine whether the data transmitter is operating correctly.

Table 3: Data transmitter LED states

Condition	Description
OFF	No DC voltage, the data transmitter is not powered by the downconverter.
RED	Connected and powered but data not enabled.
ALTERNATE RED/GREEN	Alarm/error. Usually due to data packet loss.
GREEN	Transmitting data.

4
Troubleshooting

This chapter provides troubleshooting information for Real Freedom Data Transmitters.

Use this information to help you to solve some of the problems that you may encounter when using a data transmitter in a Real Freedom system.

Status LED issues

Use the information in the following table to help you troubleshoot data transmitter status LED issues.

Table 4: Troubleshooting LED states

Symptom	Possible cause	Actions
Status LED is off.	No DC voltage at the data transmitter.	• Check that the LED on the downconverter is green indicating that it is powered. If not, go to the receiver and check the downconverter and data transmitter configuration options. • Try connecting the data transmitter to a different downconverter. • If still faulty, call Technical Support.
	Faulty LEMO cable.	• Check the LEMO data cable. • Replace the cable with a new or known good cable and recheck the LED. • If still faulty, call Technical Support.
Status LED is red.	No comms data from receiver.	• Check the receiver's settings and confirm that Camera Control is enabled. Refer to the **Receiver Product Manual** for details. • Recheck the LED.
	Faulty LEMO cable.	• Change the LEMO cable. • If still faulty, call Technical Support.

Performance issues

Use the information in the following table to help you troubleshoot performance issues.

Table 5: Troubleshooting performance issues

Symptom	Possible cause	Actions
Poor system performance.	Cable or connector issues.	• Check data transmitter connectors and cables for damage. • Replace any damaged cables. • Clean connectors as required.

Camera control issues

Use the information in the following table to help you troubleshoot camera control issues.

Table 6: Troubleshooting camera control issues

Symptom	Possible cause	Actions
No camera control data transmitted.	Broken antenna or antenna not fitted to the data transmitter.	- Check the status LED is green. - Check the antenna is properly connected to the data transmitter. - Verify that the correct frequency band antenna is connected to the data transmitter. - If still faulty, call Technical Support.

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5
Maintenance

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This chapter describes the maintenance, cleaning, and storage procedures for Real Freedom Data Transmitters.

Routine maintenance procedures

You should perform the following maintenance procedures on a regular basis.

> ⚠️ **WARNING:** The Real Freedom Data Transmitter does not contain user serviceable parts. Warranty is void if the device is opened. Refer servicing to qualified BSI personnel only.

Performance monitoring

It is recommended that you periodically monitor the overall performance of the data transmitter and system. If you experience failure or deterioration in the performance of the system, check cables and adapters, input, and output connectors for damage.

Visual inspection

Depending on operating environments and use, periodically inspect the Real Freedom Data Transmitter for signs of damage, dirt, or corrosion. Check that all markings and warning labels are in good condition.

Cleaning

If necessary, use low-pressure compressed air cleaning to remove small particles and debris from the surface of the data transmitter.

Clean connector surfaces with a cotton swab moistened with a small quantity of alcohol. Use a lint-free cloth to wipe connector surfaces after cleaning.

> ⚠️ **CAUTION:** Do not use abrasive cleaners.

Storage

Allow the Real Freedom Data Transmitter to cool to room temperature before handling. Store data transmitters in a safe location where they are unlikely to be disturbed. If pole or surface mounted, detach the data transmitter before storage.

> ⚠️ **CAUTION:** Do not store transmitters in direct sunlight. Keep transmitters away from other magnets or magnetic fields and maintain at least 3 inches (or 8 cm) between transmitters.

For long-term storage:

1. Disconnect the data transmitter from the Real Freedom Downconverter.

2. Disconnect the antenna from the data transmitter.

3. Cover the connectors with suitable dust covers.

4. Place the data transmitter in protective packaging and store in a cool, dry environment.

Technical drawings and connector pinouts for the Real Freedom Data Transmitter.

Dimensions

The following drawings show the dimensions of the Real Freedom Data Transmitter and the positions of the holes used to pole mount the unit.

Figure 6: Data transmitter top

Figure 7: Data transmitter bottom
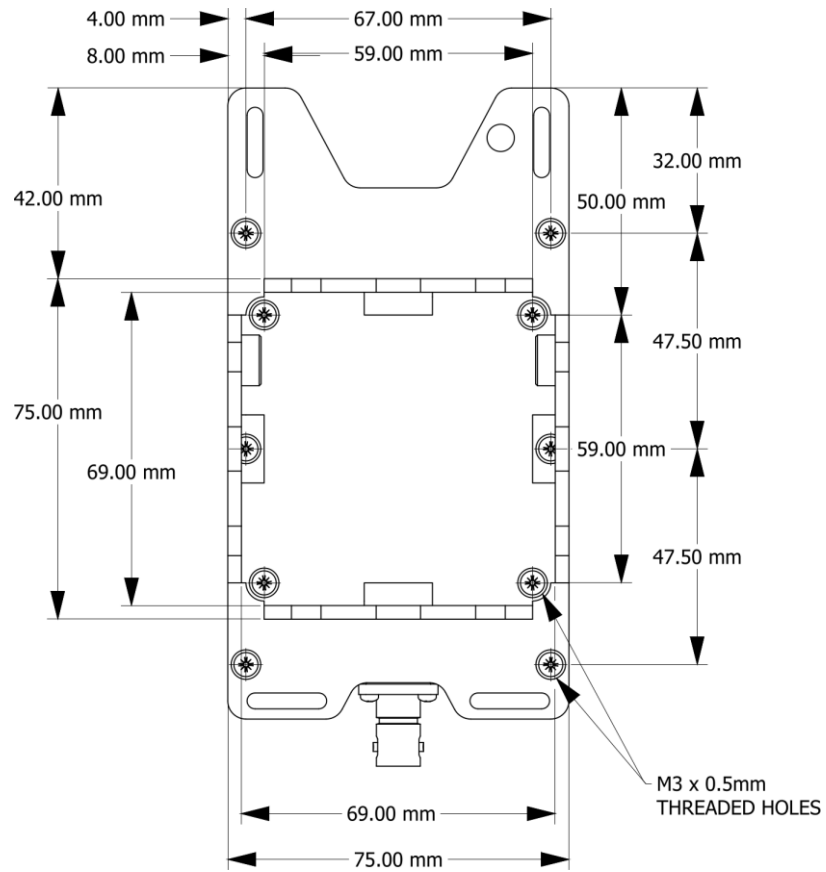

Figure 8: Data transmitter front

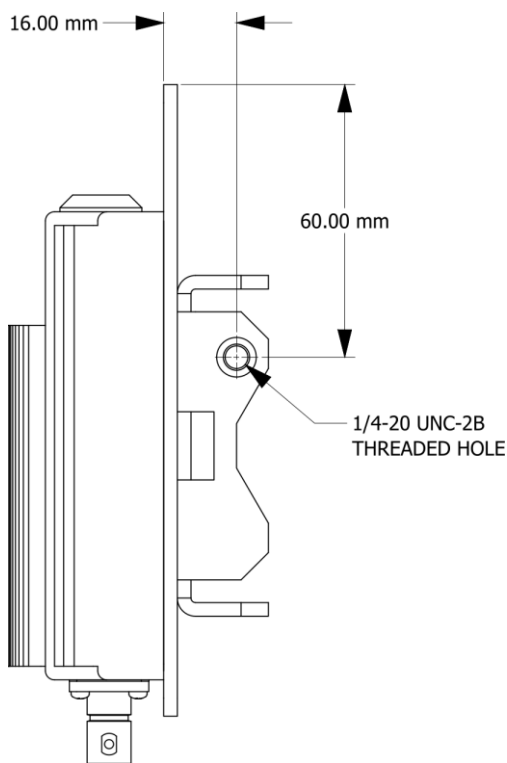*Figure 9: Data transmitter mounting bracket*

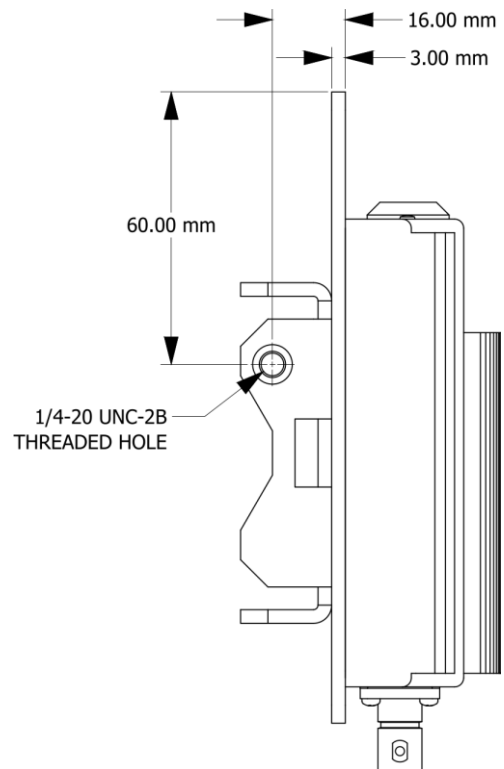*Figure 10: Data transmitter mounting bracket (right side)*

Figure 11: Data transmitter mounting bracket (left side)

Specifications

The following tables contain the specifications for the Real Freedom Data Transmitter.

Compliance

Table 7: Compliance information

Parameter	Specification
FCC	Parts 15 & 90
CE	R&TTE Directive

Environmental

Table 8: Operating and storage specifications

Parameter	Specification
Humidity	95% non-condensing
Ingress	Weatherproof to IP67
Operating/storage temperature	14° to 131°F / -10° to +55°C

Operation

Table 9: Operational specifications

Parameter	Specification
Output power	250 mW to 2 W (selectable from the receiver)
Connector	N (F)
Frequency	430–490 MHz (410–430 MHz optional)
Tuning step	6.25, 10 & 12.5 kHz
Modulation	GMSK
Adjacent Channel Power Ratio (ACPR)	> -60 dBc
Spurious (operating)	> -36 dBm
Spurious (standby)	> -57 dBm

Physical

Table 10: Size, weight and mounting specifications

Parameter	Specification
Size (W x H x D)	2.95 in x 5.47 in x 1.14 in / 75 mm x 139 mm x 29 mm
Weight	0.97 lb. / 0.44 kg
Mounting	Pole clamp with ¼ x 20 fitting

Power and control

Table 11: Power and control parameters

Parameter	Specification
Connector	LEMO 4-pin HGG0K-304-CLLP
Data	From downconverter via LEMO I/O
Power	9–36 V DC via LEMO I/O

Connector pinout assignments

Pinouts for the connectors on the Real Freedom Data Transmitter.

Antenna port

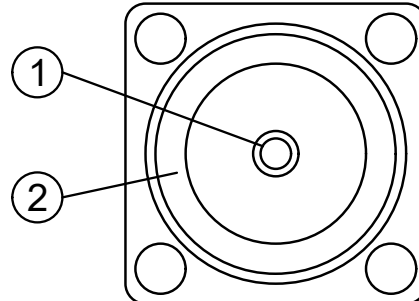Use to attach an antenna directly to the data transmitter.

Connector: N (F) 50 Ohm

Figure 12: Front face of N (F) connector

Pin	Purpose
1	UHF output
2	Ground/Shield

Power and control

Use to connect the data transmitter to a downconverter.

Connector: LEMO HGG0K-304-CLLP
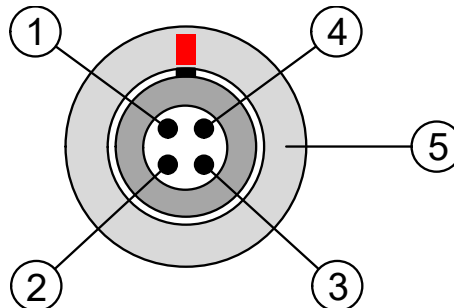

Figure 13: Front face of LEMO power/control connector

Pin	Purpose
1	RS232 receive (to data transmitter)
2	RS232 transmit (from data transmitter)
3	+9 to 36 V DC
4	Ground
5	Shield

Safety and regulatory compliance

Important safety and electromagnetic compatibility information.

Safety notice

It is extremely important to read and understand all safety information and instructions before using a Real Freedom Data Transmitter. Specific warnings and cautions are found throughout this product manual, and you should follow this guidance during the routine use of a Real Freedom Data Transmitter.

Hazard warning labels

The following hazard warning labels are fixed to the Real Freedom Data Transmitter for your information and safety.

HOT SURFACE
The data transmitter becomes hot during operation. It is recommended that you mount the unit in a well-ventilated area where it will not be touched accidentally. Allow the unit to cool before handling.

Electromagnetic compatibility – Class A

Information about the Real Freedom Data Transmitter's electromagnetic compatibility.

Compliance statement (United States)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions, however, set forth in Section 15.5 of the FCC Rules: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by Broadcast Sports International could void the user's authority to operate the equipment.

CE Declaration of Conformity (European Union)

This product meets the requirements of the following directives and carries the CE marking accordingly: 2014/35/EU Low Voltage Directive, 2014/30/EU EMC Directive.

Note that the product may operate on non-harmonized frequency bands and the actual operating frequency may differ between EU Member States.

Disposal and recycling – European Union

This product is required to comply with the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC and 2012/19/EU) and is marked with the following symbol:

This symbol indicates that this product is not to be disposed of with household waste, according to the WEEE Directive and your national law. This product should be handed over to a designated collection point or to an authorized collection site for recycling waste Electrical and Electronic Equipment (EEE).

Improper handling of this type of waste could have a possible negative impact on the environment and human health due to potentially hazardous substance that are generally associated with EEE and products of this type. At the same time, your cooperation in the correct disposal of this product will contribute to the effective usage of natural resources. For more information about recycling this product, please contact BSI.