SolidRF

FIBER **DAS 4400**

In-Building Active Fiber Cell Signal Amplifier System

Broadband – Carrier Approved

Installation Guide

Index

System Contents

List of Components

1 × SolidRF Fiber DAS Master Unit (MU) with AC power cable

1 × SolidRF Fiber DAS Remote Unit (RU) with AC power cable

1 × 100 / 250 / 500 / 1,000 ft. fiber-optic trunk line (SC/APC connectors on both ends)

2 × 10 ft. fiber-optic jumper cables (FC/APC-to-SC/APC connectors)

2 × Fiber-optic outdoor protection boxes with SC/APC-to-SC/APC coupler

2 × Wideband outdoor directional antennas (N-female connectors)

1 × Wideband outdoor omni antenna (N-female connector)

4 × Wideband indoor dome antennas (N-female connectors)

6 × 100 ft. 400-type coax cables (N-male connectors)

2 × 2 ft. 400 coax jumper cables (N-male connectors)

3 × N-male terminators

1 × 2-way splitter (N-male connectors)

2 × Lightning surge protectors (N-male to N-female connectors)

Master Unit (MU)

Master Unit (MU)
SRFD44-M

Remote Unit (MU)

Remote Unit (RU)
SRFD44-R

Plenum Simplex Fiber Optic Cable
(Length Options)

Plenum 10ft Fiber Optic Jumper
(2×) (TS370010)

Wide Band Directional Antenna
(2×) (TS220971)

Wide Band Omni Antenna
(TS210471)

Indoor Flat Dome Antenna
(2×) (TS250374)

400 Coax 100ft N-Male Cable
(6×) (TS340100)

400 Coax 2ft N-Male Jumper
(2×) (TS340002)

50-ohm 2-Way Splitter
(TS412001)

Lighting Surge Protector
(TS450001)

Custom configurations (different antennas, cable types, cable lengths, etc.) may be available from your dealer or systems integrator.

System Overview

The **SolidRF Fiber DAS 4400** is an active DAS cellular communications system that enhances voice and data carrier signals for buildings that have poor indoor cellular reception. It improves reception for all major cellular networks and is scalable from 50,000 to 400,000 square feet of indoor space.*

The system's **Master Unit** (MU) and **Remote Units** (RUs) are connected by fiber-optic cable and can be separated by hundreds or thousands of feet with no appreciable signal loss. It makes the **Fiber DAS 4400** an excellent system for use in tall or long buildings, where the outside donor antennas are far from the building area that needs improved cell signal. This provides a low-cost-per-square-foot alternative to single-carrier active DAS installations.

Applications

The **Fiber DAS 4400** is an excellent choice to improve voice and data cellular reception in:

- **Warehouses and distribution centers**

- **Multi-floor office buildings**

- **Below-ground parking garages**

- **Hotels and hospitality**

- **Healthcare facilities**

- **Power plants, dams, and mines**

- **Any in-building areas with poor cell signal**

* Indoor coverage can vary depending on exterior cell signal strength and density of interior walls.

Key Features

Supports all nationwide and regional carriers in the United States, including AT&T, Verizon, T-Mobile, Sprint, U.S. Cellular, and more.

Supports all major Canadian carriers, including Rogers, Telus, BCE, Shaw, and more.

Uses low cost fiber-optic cable to run long distances between the main unit (MU) and remote unit (RU).

Each MU supports up to four RUs, and each RU has four ports for low-loss coax cable to inside broadcast antennas.

RU ports are N-female and support 400-type and half-inch 50-ohm coax cable to the inside broadcast antennas.

MUs and RUs may be rack-mounted or wall-mounted. (Mounting hardware is included with each system.)

Supported Bands
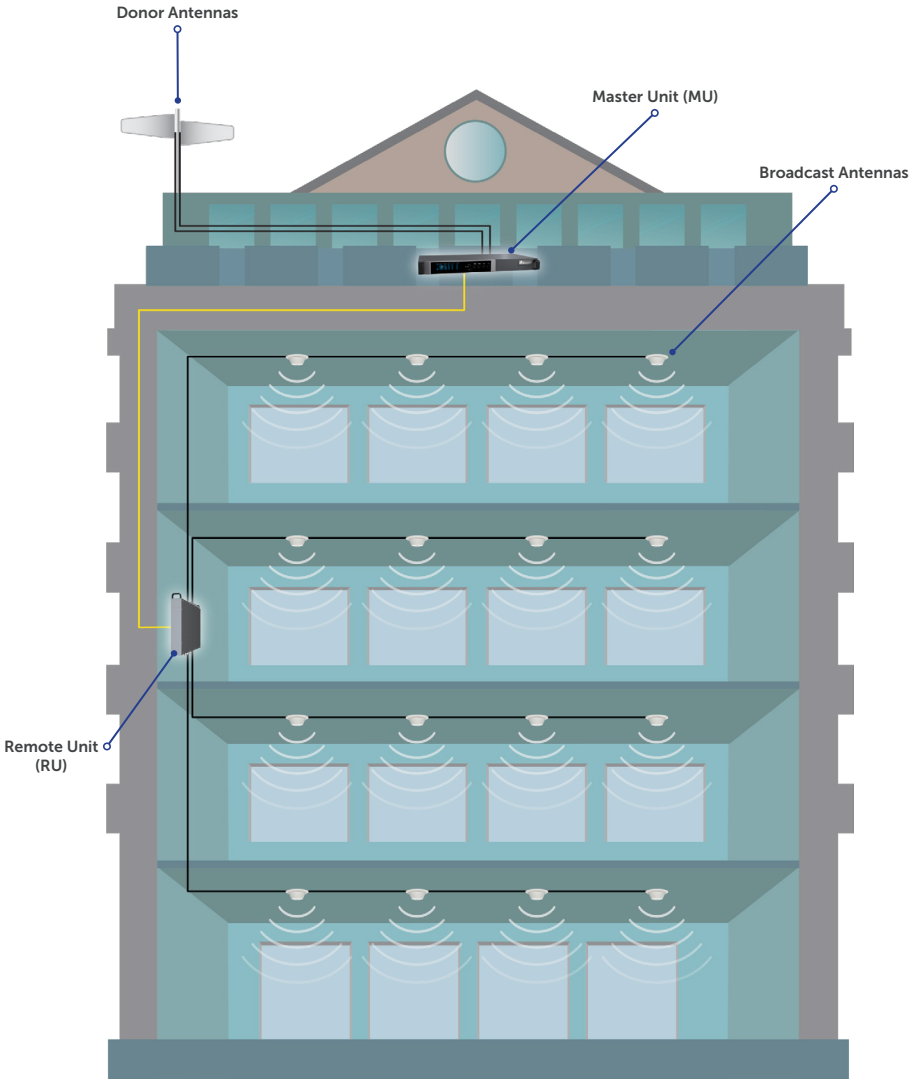
List of Bands Supported

Bands 2 & 25 (PCS)

Band 4 (AWS)
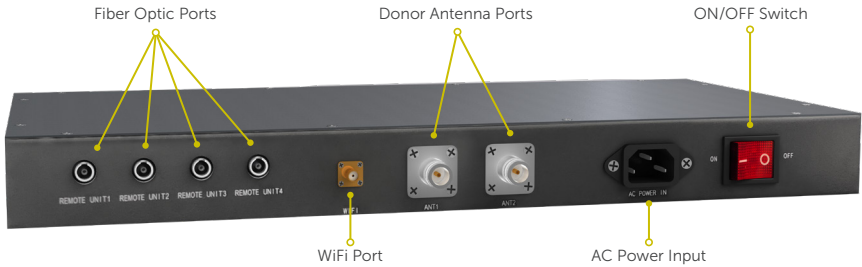
Band 5 (Cellular)

Bands 12 & 17 (L700 LTE)

Band 13 (U700 LTE)

BUILDING DIAGRAM

Donor Antennas

Master Unit (MU)

Broadcast Antennas

Remote Unit (RU)

(*Note: Depending upon the quality and strength of the outside signal, each RU can support up to 16 broadcast antennas.*)

Master Unit (MU)

Fiber Optic Ports   Donor Antenna Ports   ON/OFF Switch

WiFi Port   AC Power Input

- **4 × fiber-optic ports**
- **1 × WiFi port**
- **2 × donor antenna ports**
- **1 × AC power input**
- **1 × on/off power switch**

Fiber Ports. The four FC/APC ports are labeled *Remote Unit 1* through *Remote Unit 4*. These ports connect the **Master Unit** (MU) to the **Remote Units** (RUs) via runs of fiber-optic cable. The cap should be left on any unused ports to protect the sensitive fiber-optic connector.

WiFi Port. This port is not currently used. The manufacturer has installed it for future development.
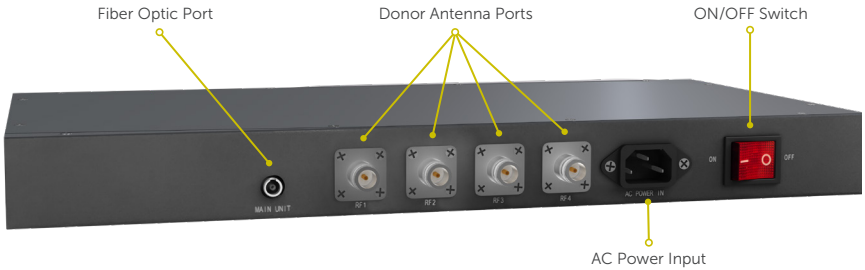
ANT1. Donor antenna port 1 N-female connector for bands 12/17, 2/25, and 5 (L700 LTE, PCS, Cellular).

ANT2. Donor antenna port 2 N-female connector for bands 13 and 4 (U700 LTE, AWS).

AC Power Input. AC power inlet (IEC 320 C14).

On/Off Power Switch. Toggle switch for power on/power off.

Remote Unit (RU)

Fiber Optic Port   Donor Antenna Ports   ON/OFF Switch

AC Power Input

- **1 × fiber-optic ports**
- **4 × broadcast antenna ports**
- **1 × AC power input**
- **1 × on/off power switch**

Fiber Port. The FC/APC port connects the RU to the MU via a run of fiber-optic cable. The cap should be left on this port to protect the sensitive fiber-optic connector until you're ready to connect the fiber cable.

RF Port. The four N-female ports are labeled *RF1* through *RF4*. Each port connects to an indoor broadcast antenna via 50-ohm coax cable. (Cap any unused ports with one of the three terminators included with the RU.)
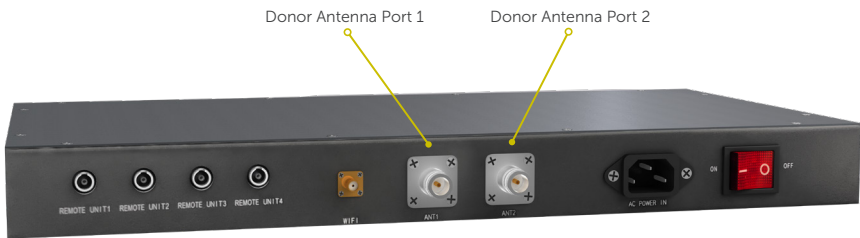
AC Power Input. AC power inlet (IEC 320 C14).

On/Off Power Switch. Toggle switch for power on/power off.

Connection Instructions

Connecting the MU to the Outside Donor Antennas

The **Master Unit** (MU) connects to the outside donor antenna(s) using 50-ohm coax cable.

Donor Antenna Port 1   Donor Antenna Port 2

The MU has two N-female donor antenna ports for two individual donor antennas:

- **Donor Antenna Port 1**: Bands 12/17, 2/25, and 5 (L700 LTE, PCS, Cellular)
- **Donor Antenna Port 2**: Bands 13 and 4 (U700 LTE, AWS)

If you use the directional antennas included with the standard system (see p. 4), each antenna may be tuned to a specific cell tower or both may be tuned to the same tower. Run one coax cable from each antenna to each donor port on the MU. (*See Connection Diagram, Page. 11.*)

If you use the omnidirectional antenna, run one coax cable from the antenna to the MU, then use the two-way splitter and two jumper cables (included) to split the signal to the two donor ports. (*See Connection Diagram, Page. 11.*)

(*Note: To prevent oscillation, the outside donor antennas and inside broadcast antennas should be separated from each other by at least 60 horizontal feet or 30 vertical feet.*)

CONNECTION DIAGRAM

Option A

Option B

MU
SRFD44-M

RU
SRFD44-R

RU
SRFD44-R

RU
SRFD44-R

RU
SRFD44-R
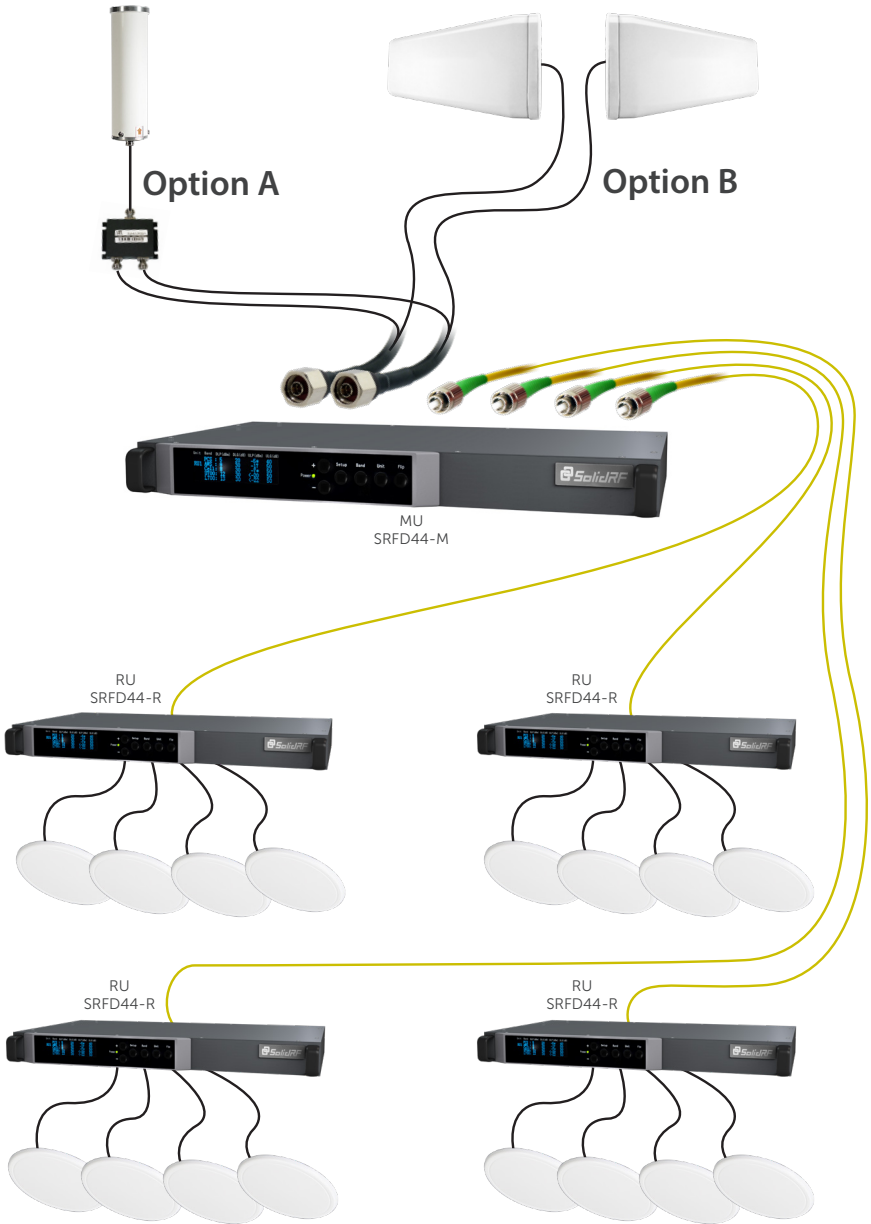
Connecting the MU to the RU

The **Master Unit** (MU) has four FC/APC fiber-optic ports. Each fiber port connects to one **Remote Unit** (RU) via fiber-optic cable. You may connect the MU to one, two, three, or four RUs. (*See Connection Diagram, Page. 11.*) (Protect any unused fiber ports by leaving the plastic caps on them.)

To protect the main fiber-optic trunk line from being kinked or damaged, the **Fiber DAS 4400** system includes two 10-foot jumper cables with connection boxes for working around the MU and RUs.

Connect the MU to an RU in this sequence:

1. Insert the fiber-optic jumper cable's FC/APC connector into the MU's FC/APC fiber-optic port. ***The key on the connector must be top-aligned to match the notch in the MU's port.*** (*See Figure. 1.*) Push and hold the connector in the port, then twist the connector's threaded body until it is hand tight. There should be no in–out "spring" or "play" in a correctly attached connector.

2. Insert the fiber-optic jumper cable's SC/APC connector into the protection box. Snap the connector into one end of the protection box's SC/APC-to-SC/APC coupler. (*See Figure. 2.*)

3. Insert the fiber-optic trunk line's SC/APC connector into the opposite end of the protection box. Snap the connector into the other end of the SC/APC-to-SC/APC coupler.

4. Close the protection box, making sure both fiber-optic cables are threaded snuggly in the gaskets at the exit points. (*See Figure. 3.*)

5. Repeat steps 1–4 with the RU at the other end of the fiber-optic trunk line.

(CONNECTION THE MU TO THE RU cont.)

Port Notch   Connector Key

Figure 1

Figure 2

Figure 3
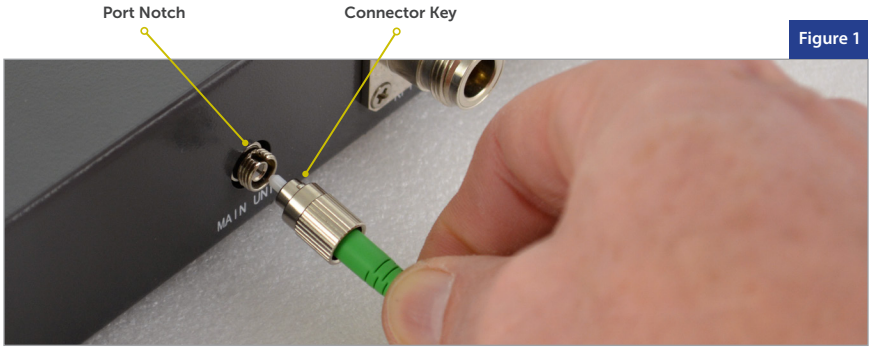
Remote Unit Overview

Connecting the RU to the MU

Up to four **Remote Units** (RUs) connect to a single MU via fiber-optic cable. Each RU has one FC/APC input fiber port.

To complete the connection, see the directions under Connecting the MU to the RU (p. 12).

Connecting the RU to the Inside Broadcast Antenna

Each RU has four N-female ports for indoor broadcast antennas. Run one 50-ohm coax cable from each port to each antenna. The N-male connectors on the cables should be hand-tightened to the ports on the RU and the connectors on the antennas.

Figure 4

Any unused N-female ports on the RU must be capped with a terminator. (Three terminators are included with each RU.) (*See Figure. 4.*)

Using the RU's control display, you can adjust the gain for each band of cellular frequency. Any gain changes are applied equally to all broadcast antennas connected to the RU.

Display & Controls

Display

The display will turn itself off after a period of inactivity. Pressing any button will reactivate the display.

There are six columns on the display: **Unit, Band, DLP (dBm), DLG (dB), ULP (dBm), ULG (dB).** (*See Figure. 5.*)

Unit. This column shows the MU and all RUs attached to it. From the top, the units are:

- **RU1** (Remote Unit 1)
- **RU2** (Remote Unit 2)
- **RU3** (Remote Unit 3)
- **RU4** (Remote Unit 4)
- **MU** (Master Unit)

The unit currently being displayed/adjusted is indicated by a solid background/black text. (In the example above, the MU is currently being displayed.) Any unused RU ports on the MU are dimmed.

(DISPLAY & CONTROLS cont.)

If the Unit column displays **ORX**, there is a fiber connection error. Make certain that the runs of fiber-optic cable between the MU and the affected RU are properly connected, are not damaged, and are the proper connector type.

Band. This column shows the names of bands of cellular frequency. From the top, these bands are: (*See Figure. 5.*)

- **PCS** (bands 2 & 25: 1850–1915 MHz uplink / 1930–1995 MHz downlink)
- **AWS** (band 4: 1710–1755 MHz uplink / 2110–2155 MHz downlink)
- **Cell** (band 5: 824–849 MHz uplink / 869–894 MHz downlink)
- **U700** (band 12 & 17: 699–716 MHz uplink / 729–746 MHz downlink)
- **L700** (band 13: 777–787 MHz uplink / 746–756 MHz downlink)

DLP (dBm). Downlink power for each band, displayed in decibel-milliwatts (dBm).*
DLG (dB). Downlink gain for each band, displayed in decibels (dB).**
ULP (dBm). Uplink power for each band, displayed in decibel-milliwatts (dBm).
ULG (dB). Uplink gain for each band, displayed in decibels (dB).

Controls

+/−. Increases or decreases the gain on the selected MU or RU.
Setup. Activates setup mode for the MU or RU.
Band. Advances control to the next band (PCS ➙AWS➙Cell➙U700➙L700).
Unit. Advances control to the next unit (RU1➙RU2➙RU3➙RU4➙MU)
Flip. Flips the display to be visible for wall-mount or rack-mount installations.
(*See Figure. 5.*)

* A decibel-milliwatt is a unit of electrical power in milliwatts (mW) expressed on a logarithmic decibel scale.
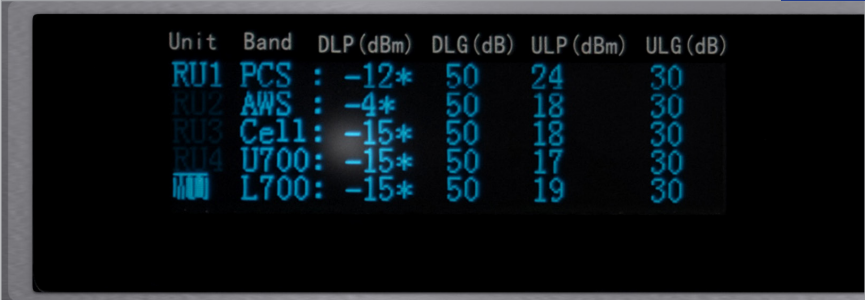
** A decibel is a relative unit of measurement used to express the ratio of one value of power to another on a logarithmic scale.

Manual Setup (Optional)

The **SolidRF Fiber DAS 4400** features Automatic Gain Control (**AGC**). The **AGC** circuits on the MU and RU will apply the appropriate amount of gain to incoming signal— weaker signals will receive more gain and stronger signals will receive less gain.

If a six-spoked asterisk (✶) appears in the **DLP** or **ULP** columns, it indicates that the **AGC** is active for that band: (*See Figure. 6.*)

Because it has AGC, the **Fiber DAS 4400** does not require manual setup. When running at full power, the system will determine the best possible gain to provide.

If you wish to set the gain manually for any of bands, follow these steps:

Configuring Uplink Gain for MUs and RUs

Settings for the MU and all connected RUs may be viewed and configured from the MU.

Settings for each individual RU may be viewed and configured from that RU. (Settings for the MU and other RUs are not available at an individual RU.)

1. Press Setup to put the MU or RU into setup mode.

2. If you are adjusting the MU: Press Unit repeatedly to cycle through the connected RUs and MU in the Unit column until the desired unit is selected. (The figures on the display screen may change as you scroll through the RUs and MU.)

3. Press Band repeatedly to cycle through the bands of cellular frequency until the desired band is selected. The DLG column will be illuminated.

4. Press +/− repeatedly to change the DLG (downlink gain) value of the unit. The maximum downlink gain for an MU is 50 dB; the maximum for an RU is 30 dB.

5. Repeat steps 3 and 4 to configure the gain for other bands on the MU or RU.

Specifications

Model Number	SRFD44-MR
FCC ID	A7V-SR65703001
Connectors	Coax N-Connectors – Fiber Optic (SC/APC), (FC/APC)
Impedance	50 Ohms

	DONOR ANTENNA 1			DONOR ANTENNA 2	
Frequency	LTE Band 12/17	PCS Band 25/2	CELLULAR Band 5	AWS Band 4	LTE Band 13
Uplink	**698–716**	**1850–1915**	**824–849**	**1710–1755**	**776–787**
Downlink	**728–746**	**1930–1995**	**869–894**	**2110–2155**	**746–757**

Output Power	20±3 dBm (Uplink) / 0±3 dBM (Downlink)
Noise Figure	<5 dB
In-band Flatness	<8 dB
Weight	3.5Kg
EIRP	3W
Gain Adjustment	30 dB
Operating Temperature	–5˚C (23˚F) to 60˚C (140˚F)
Dimension (mm)	338mm (13.3") × 230mm (9.05") × 35mm (1.37")
Power Requirements	120V AC 2.5A (6V DC)

Fiber-Optic Cable & Connectors

There are several types of fiber-optic cable and fiber-optic connectors. If you purchase your own cables, please be sure they are compatible with the SolidRF Fiber DAS 4400 system.

O2 Singlemode Fiber-Optic Cable

The Fiber DAS 4400 system uses O2 Singlemode optical fiber to connect the Master Unit to the Remote Unit(s).

- Do not use O1 Singlemode optical fiber, which has a shorter maximum run length.
- Do not use multimode optical fiber, which is designed for local-area networks, not telecom applications.

FC/APC and SC/APC Fiber-Optic Connectors

The Fiber DAS 4400 Master Unit and Remote Units accept only FC/APC fiber-optic connectors. The FC connector is a round, keyed connector with internal threads; it hand-screws onto the ports on the MU and RUs. One end of the fiber-optic jumper cables included with your system has FC/APC connectors.

The fiber-optic jumper cables and long fiber-optic trunkline included with your system have SC/APC connectors. These connect with push-pull couplers that snap together.

The contacts for both connectors are the APC type (angled physical contact). APC connectors are always green.

- Do not use other types of fiber-optic connectors, such as LC or ST.
- Do not use connectors that have other types of contacts, such PC or UPC. (These have blue or black connectors.)

Warranty

3 YEAR WARRANTY

SolidRF signal boosters and kits are warranted for three (3) years against defects in workmanship and/or materials. Warranty cases may be resolved by returning the product directly to your reseller with a dated proof of purchase.

Signal boosters and kits may also be returned directly to SolidRF at the consumer's expense, with a dated proof of purchase and a returned material authorization (RMA) number supplied by SolidRF. SolidRF shall, at its option, either repair or replace the product. SolidRF will pay for delivery of the repaired or replaced product back to the original consumer if located within the continental U.S.

This warranty does not apply to any component or amplifiers determined to have been subjected to misuse, abuse, neglect, or mishandling that alters or damages physical or electronic properties.

Failure to use a surge-protected AC power strip with at least a 1000 Joule rating will void the warranty.

SolidRF components and accessories are warranted for 90 days against defects in workmanship and/or materials. To resolve a warranty case, call **435-634-6800**.

SolidRF

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