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A **BELDEN** BRAND

DXF-4K

Optical AV Media Extender

Installation Guide

M3033-6203-AA

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www.grassvalley.com

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DXF-4K Installation Guide

Overview

The DXF-4K optical extension kit transmits HDMI video resolutions up to Ultra High Definition 4K video with HDR support to extend the reach of a limited-distance signal medium (HDMI cable) to a much farther distance by using fiber optic cable. For this, it uses a customer supplied OM4¹ multimode fiber (MMF) to extend signal transmission to up to 1000m without any loss of signal integrity. This extension kit consists of a transmitter module and a receiver module, power supplies, HDMI cables, and HDMI cable lock clips. The DXF-4K-DVI kit includes a DVI to HDMI adapter for use with multiviewer models that have a DVI mosaic output.

This installation manual describes how to install and use the DXF-4K optical extension kit.

Model Description

The following DXF-4K extension kit models are available.

Model	Description
DXF-4K	Optical HDMI - HDMI 4K Extension system
DXF-4K-DVI	Optical DVI - HDMI 4K Extension system

See [Unpacking](#), on page 3 for the kit contents.

Application

The supported application is to extend a Grass Valley video equipment's HDMI output to a display with an HDMI input by directly connecting the transmitter to the video source and by connecting the receiver directly to the display. Both the transmitter and receiver must be powered by an external power source such as an unused USB port or by a supplied wall plug power supply.

1. NOTE: OM1, OM2, and OM3 fiber types are not supported.

The following figure shows the typical connections for DXF-4K kit.

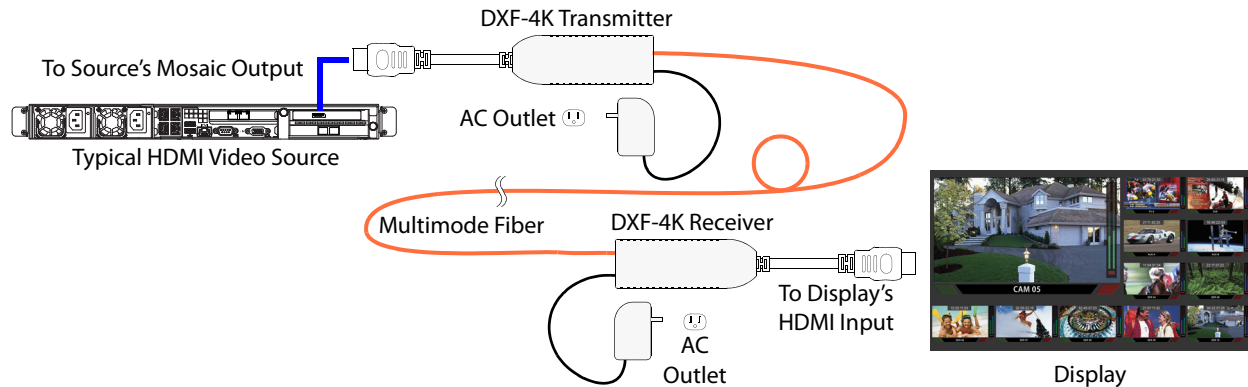


Fig. 1-1: Typical DXF-4K kit application

Using the DXF-4K with non-HDMI Multiviewer Outputs

Certain Grass Valley multiviewers do not have HDMI mosaic outputs. However, the DXF-4K optical extension system may still be used with the multiviewer by using a supported adapter supplied by Grass Valley.

Supported Adapters

The following adapters have been tested with this solution.

- Display Port to HDMI adapter (sold with Kaleido-IP multiviewers)
- Quad link SDI to HDMI 2.0 converter (sold with 4K multiviewers)
- DVI to HDMI adapter, for use with a KXO-DUAL card, for example (sold as part of the DXF-4K-DVI Kit)

The following figure shows the typical connections for DXF-4K-DVI kit or when a DXF-4K kit is used with a supported adapter.

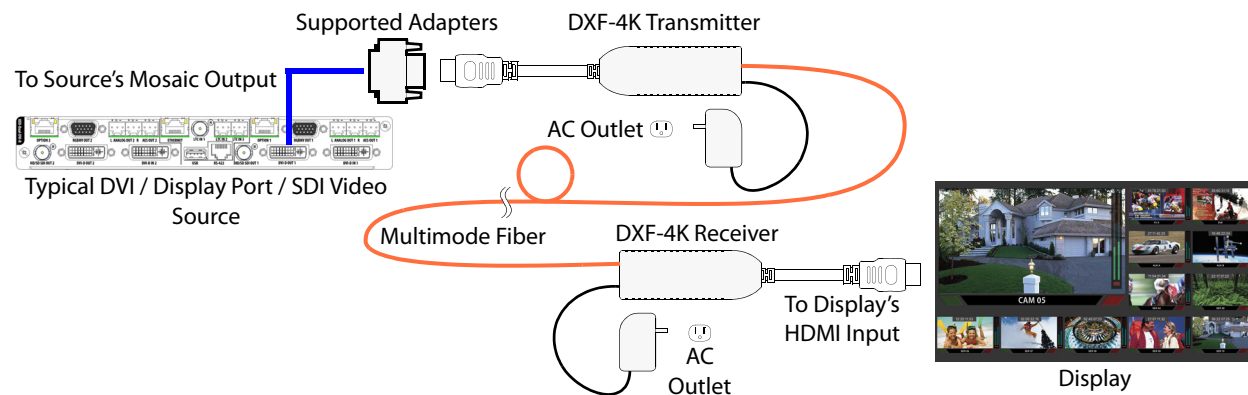


Fig. 1-2: Using a DXF-4K with a supported adapter

Unsupported Applications

Using this kit with the following equipment has not been tested:

- Use with any non-Grass Valley video adapter such as a USB to HDMI adapter
- Use with HDMI extension cables
- Use with USB cables other than the ones supplied in this kit
- Use with power supply adapters other than the ones supplied in this kit
- Use with a DVI to HDMI adapter other than the one supplied in the DXF-4K-DVI kit

Unpacking

Unpack the DXF-4K / DXF-4K-DVI kit. The kit should contain the following items. If anything is missing, contact your distributor or Grass Valley (see [Grass Valley Technical Support](#), on page 12). Items that are shown below with a part number are available as Field Replacement Units (FRUs) for maintenance purposes.

Supplied Quantity	Description (FRU part number)	Supplied with this Optical Extension Kit	
		DXF-4K	DXF-4K-DVI
1	DXF-4K transmitter (DXF-4K-TX)	●	●
1	DXF-4K receiver (DXF-4K-RX)	●	●
2	Wall plug universal AC power supply to female USB A Each power supply includes four plug adapters for UK, US, AU, and EU (PSU-AC-USB)	●	●
2	USB cable, male USB A to male micro-USB B (CBL-USB-A-MICRO-6)	●	●
2	HDMI cable lock clip	●	●
1	Male DVI to female HDMI adapter (ADAPTER-DVI-HDMI)		●

Optical Extender Overview

The physical dimensions of the DXF-4K are the same for both the transmitter and the receiver. The following diagram shows the DXF-4K's physical dimensions, the electrical connections, and the location of the status indicator.

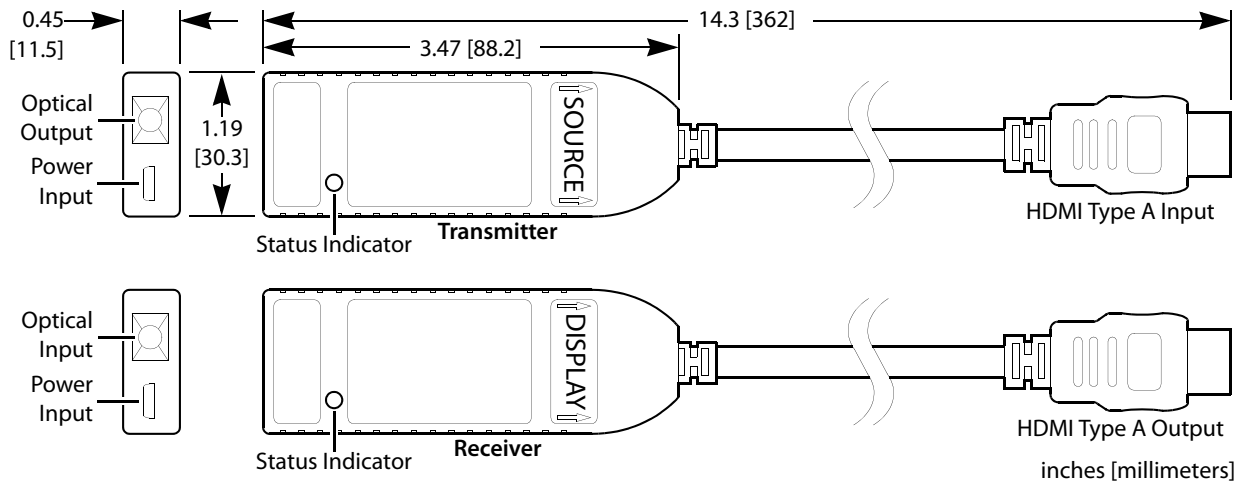


Fig. 1-3: DXF-4K Overview

The included wall plug universal power supply is supplied with four plug adapters for UK, US, AU, and EU.



Fig. 1-4: Universal Power Supply

CAUTION

Risk of electrocution: Always attach the plug adapter to the universal power supply first, before connecting the plug adapter to an electrical socket.

Status Indicator Interpretation

Both the transmitter and receiver have a status indicator.

Status Indicator Color	Interpretation
Off	Module has no power.
Red – Steady/Flashing	Module has detected an open fiber connection and has disabled the lasers for user protection.
Yellow	Fiber detected but link initialization failed. See Troubleshooting , on page 8.
Green – Flashing	Link functional with no HDCP video.
Green – Steady	Link functional with HDCP 1.x video.
Blue	Link functional with HDCP 2.x video.
Pink/Purple – Steady/Flashing	Fiber connection is open and lasers have been disabled. Boot loader is connected.

Fiber Optic Handling

Never assume a fiber is dark. Never look directly into the end of a fiber cable. All employees in the area must wear laser safety glasses with side shields.

Installing connectors on a fiber requires special handling procedures. Read and follow the fiber and connector manufacturer's instructions.

Protect fiber cable ends and optical ports on equipment from dust and dirt.

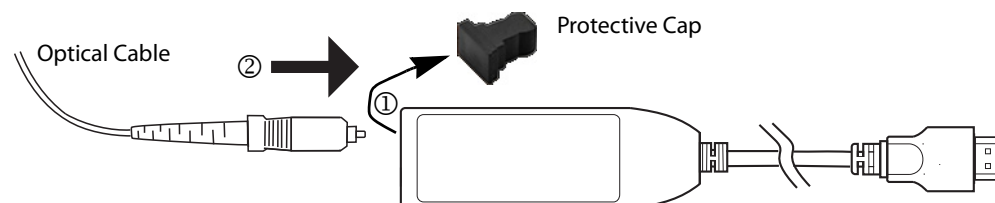
- When a fiber cable is disconnected, fit a protective cap on the end.
- When no fiber cable is connected to an optical port, insert a protective cap.

Store unused protective caps in an airtight container to prevent the transfer of dust to the fiber connectors when used in the future.

Installation

Use field-supplied OM4 Multimode Fiber (MMF) single fiber optical cable fitted with SC connectors with this kit. For an installation overview, see [Application](#), on page 1. Proceed as follows:

- 1 Connect the optical cable to the DXF-4K receiver (RX6F-SH51-03A-BK): first remove the protective cap from the receiver's optical input port and then insert the optical cable connector into the receiver's optical input port.



- 2 Attach the HDMI cable lock sleeve to the receiver's HDMI output cable.



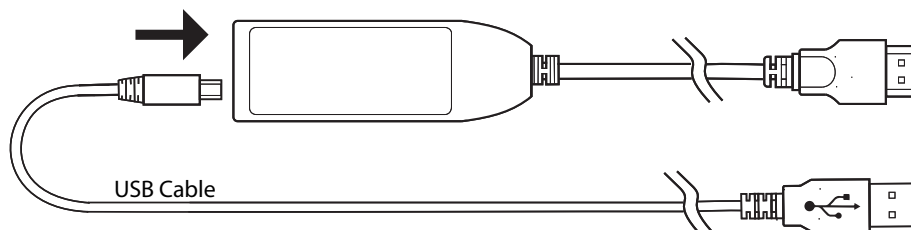
- 3 Using an available surface screw, attach the HDMI cable lock strap to the display (for example, the HDMI cable lock sleeve can be located anywhere along the HDMI cable's length and a VESA mount screw can be used to attach the HDMI cable lock strap to the display).



- 4 Insert the HDMI cable lock strap into the HDMI cable lock sleeve and connect the DXF-4K receiver output plug to the Display's HDMI Input jack.



- 5 Connect the micro-USB B plug of the USB cable to the DXF-4K receiver's power input jack.



- 6 Power the DXF-4K receiver: connect the other end of the USB cable to a USB power source such as an unused USB jack on the display or to the supplied power supply. If used, plug-in the power supply to an outlet (mains).
- 7 Use a field-supplied tie-wrap to bundle up excess cable lengths. Do not fully tighten the tie-wrap in order to not damage the optical cable by crushing or kinking the cable.
- 8 Connect the optical cable to the DXF-4K transmitter (TX6F-SH51-03A-BJK): first remove the protective cap from the transmitter's optical output port and then insert the optical cable connector into the transmitter's optical output port.

- 9 Attach the HDMI cable lock sleeve to the transmitter's HDMI input cable.



- 10 Using an available surface screw, attach the HDMI cable lock strap to the display (for example, use the screw found above most HDMI jacks).



- 11 Insert the HDMI cable lock strap into the HDMI cable lock sleeve.
- 12 Connect the DXF-4K transmitter input plug to the HDMI video source's HDMI output jack or to the adapter's HDMI output jack (see [Supported Adapters](#), on page 2).



- 13 When used, connect the adapter's input plug to the video source's output jack.
- 14 Power the DXF-4K transmitter: it may already be powered by the video source's HDMI connection; see if the transmitter's status indicator is lit (see [Status Indicator Interpretation](#), on page 5). If the transmitter's status indicator is not lit, connect the micro-USB B plug of the USB cable to the DXF-4K transmitter's power input jack and connect the other end of the USB cable to a USB power source such as an unused USB jack on the video source or to the supplied power supply. If used, plug-in the power supply to an outlet (mains).
- 15 Use a field-supplied tie-wrap to attach the optical and USB cables to the rack frame if possible. Do not fully tighten the tie-wrap in order to not damage the optical cable by crushing or kinking the cable.

Configuration and Setup

The DXF-4K transmitter and receiver are ready to be used. They do not require any configuration. See [Status Indicator Interpretation](#), on page 5 to confirm the link's operational status.

Troubleshooting

Following a methodical process of elimination, try the following steps.

- 1 The Status Indicators on both DXF-4K transmitter and receiver show if they are powered and these indicators provide troubleshooting information. See [Status Indicator Interpretation](#), on page 5.
- 2 If transmission stops unexpectedly and the transmitter is powered by the video source's HDMI connection, change the transmitter's power source: connect the micro-USB B plug of the USB cable to the DXF-4K transmitter's power input jack and connect the other end of the USB cable to a USB power source such as an unused USB jack on the video source or to the supplied power supply. If used, plug-in the power supply to an outlet (mains).
- 3 Make sure the fiber connectors are clean, as the problem is often related to dust obstructing the light at the fiber connections.
- 4 Use another fiber connection.
- 5 Swap components of the DXF-4K kit with known working components, one component at a time in a systematic fashion to further isolate the issue. For example, swap the transmitter module, then swap the receiver module, and so on.

Firmware Upgrade

The firmware in the DXF-4K transmitter / receiver can be upgraded in the field. Only one module can be upgraded at a time (transmitter or receiver). The following is required to proceed:

- A Microsoft Windows PC that has:
 - an available USB A port
 - Internet connectivity
- Firmware image files; one for the transmitter module and one for the receiver module
- USB BootLoader firmware upgrade software
- USB cable, male USB A to male micro-USB B

Procedure to Connect to a Module

- 1 Unzip the *USB BootLoader.zip* file.
- 2 Double click the *HIDBootloader vX.X.X.exe* file to launch the *USB BootLoader* firmware upgrade software.
- 3 Disconnect the optical fiber from the module.
- 4 Connect the micro-USB B plug of the USB cable to the DXF-4K receiver's power input jack and connect the other end of the USB cable to an available USB Port on your PC. Note: Only one module may be connected to the PC at a time.
- 5 Wait for USB BootLoader's connection confirmation. The receiver or transmitter module should show solid Pink LED. The USB BootLoader Interface should have one of TX or RX status buttons illuminated at the bottom of its Interface Window.

Procedure to Identify the Module's Current Firmware Version

- 1 With USB BootLoader connected to the receiver or transmitter module (see above), select *Display User ID* in the *Program* menu.
- 2 The USB BootLoader Interface will show the User ID in the Text Window as 4 numbers as follows: **81. 2.1.6**. The last3 numbers in this 4 digit sequence represent the version number. In this case, the version number would be **v2.1.6**.

Procedure to Update the Module's Firmware

- 1 With USB BootLoader connected to the receiver or transmitter module (see [Procedure to Connect to a Module](#), on page 8), click the *File* menu.
- 2 Up to 3 recently loaded files will be displayed in this menu. Select one of these files if desired and skip to step 5. Otherwise...
- 3 Select *Import Firmware Image*. This will cause a standard windows File Selection Window to open.
- 4 Use the File Selection Window to locate and select the Firmware Image file. Note: Please be sure to select RX Firmware for an RX Module and TX Firmware for a TX Module.
- 5 When the new firmware is loaded, the USB BootLoader Interface should display the current (pre-update) module ID and the new module ID (Post Update) in the Text Window. Note: At this point, the Update Firmware has only be loaded in to the USB BootLoader Interface. In a following step, you will still need to program the Module.
- 6 Select *Erase/Program/Verify Device* in the *Program* menu.
- 7 Wait for the module programming operation to complete. This may take a few seconds.
- 8 Verify that *Programming Success* is reported in the Text Window.
- 9 Select *Reset Device* in the *Program* pull down menu.
- 10 Wait for the Reset Operation to complete and for the Module to reconnect to the USB BootLoader Interface.
- 11 Select *Display User ID* in the *Program* menu
- 12 The USB BootLoader Interface will show the User ID in the Text Window as 4 numbers as follows: **81. 2.1.6**. The last3 numbers in this 4 digit sequence represent the version number. In this case, the version number would be **v2.1.6**.

Specifications

DXF-4K Transmitter / Receiver:

- Transmission:
 - HDCP 2.2 and HDCP 1.4 content protection support
 - Full UHD 4K 4:4:4 with HDR, 60 frames per second support
- Operating status:
 - Multicolor LED. See [Status Indicator Interpretation](#), on page 5.
- Fiber:
 - Link bandwidth: 18 Gbps
 - Type: OM4 Multimode fiber (MMF), Single fiber cable (field supplied)

- Connector type: SC
- Maximum fiber length: <1000m.
Maximum fiber length supported depends on quality of the fiber deployed. 1000m based on OM4 having 6000 MHz-km bandwidth and typical coupling and transmitter and receiver optical performance limits.
- HDMI Interfaces:
 - Connector: HDMI type A
 - HDMI 2.x and HDMI 1.x automatic selection based on the video source
 - Consumer Electronics Control (CEC) over HDMI support.
 - The HDMI connection can power the transmitter if the source equipment is capable.
- USB Interface:
 - Powers the receiver from the included power supply or from an unused USB plug on the display
 - Powers the transmitter (when the HDMI connection does not do so) from the included power supply or from an unused USB plug on the video source equipment
 - Permits firmware upgrades
- Electrical
 - Supply Voltage: 4.75 to 5.25 Vdc
 - Transmitter Supply Current: 400mA
 - Receiver Supply Current: 250mA
- Environmental
 - Weight: 0.15lb (65g)
 - Dimensions: See [Optical Extender Overview](#), on page 4.
 - Operating Temperature Range: 32 to 122°F [0 to 50°C]
 - Storage temperature range: -40 to 185°F (-40 to 85°C)
 - User safety: when an open fiber condition is detected, the lasers are turned off.
- Compliance
 - FCC Part 15 Class B for Susceptibility, Radiated and Conducted
 - CE for Susceptibility, Radiated and Conducted
 - Optical Fiber Communication System Class 1 Eye Safety per IEC 60825-1
 - IEC 60825-1:2014-05 Ed. 3.0
 - FDA CDRH

Power Supply:

- Wall plug universal power supply
 - Electrical
 - Input: 90 to 264 VAC, 47 to 63 Hz
 - Environmental
 - Each power supply includes four plug adapters for UK, US, AU, and EU
 - Weight (body only): 0.17lb (80g)

- Dimensions (nominal, plugged in to a socket):
 - W 1.45 [37.0] × L 2.16 [55.1] × H 1.96" [49.9mm] UK
 - W 1.45 [37.0] × L 2.16 [55.1] × H 1.93" [48.9mm] US
 - W 1.45 [37.0] × L 2.16 [55.1] × H 2.11" [53.7mm] AU
 - W 1.45 [37.0] × L 2.16 [55.1] × H 2.60" [65.9mm] EU
- Operating temperature range: 32 to 140°F (0 to 60°C)
- Storage temperature range: -40 to 185°F (-40 to 85°C)
- Operating humidity range: 5 to 95% relative humidity, non-condensing
- Safety approvals:
 - CB Report (IEC60950-1)
 - UL (UL/cUL60950-1, approved as limited power source (LPS))
 - TUV (EN60950-1)

USB Cable:

- Length: 6 foot (1.8M) cable
- Connectors: male USB A to male micro-USB B



Grass Valley Technical Support

For technical assistance, contact our international support center, at 1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the Contact Us section of Grass Valley's website (www.grassvalley.com).

An online form for e-mail contact is also available from the website.

Corporate Head Office

Grass Valley
3499 Douglas-B.-Floreani
St-Laurent, Quebec H4S 2C6
Canada
Telephone: +1 514 333 1772
Fax: +1 514 333 9828
www.grassvalley.com