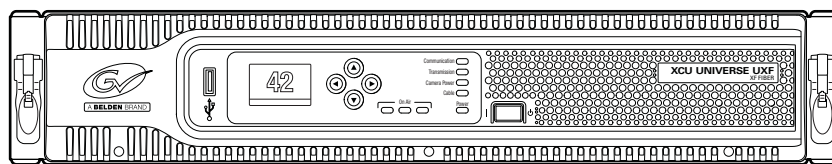


## User's Guide

3923 496 32511 April 2018 v1.3



## XCU UXF Fiber Series

XF Transmission Fiber Base Station

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## Declaration of Conformity

We, Grass Valley Nederland B.V., Bergschot 69, 4817 PA Breda, The Netherlands, declare under our sole responsibility that these products are in compliance with the following standards:

- EN62368-1:2014 + AC:2015 — Safety
- EN55032:2012 + C2:2013 — EMC (Emission)
- EN55103-2:2009 — EMC (Immunity)

following the provisions of:

- a. the Low Voltage directive 2014/35/EU
- b. the EMC directive 2014/30/EU
- c. the RoHS directive 2011/65/EU

## FCC CLASS A Statement

This product generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause interference to radio communications.

It has been tested and found to comply with the limits for a CLASS A digital device pursuant to part 15 of the FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this product in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

## Copyright

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## Trademarks

Grass Valley, LDX Series and derivatives are trademarks or registered trademarks of Grass Valley Canada. Belden Inc., Grass Valley Canada and other parties may also have trademark rights in other terms used herein.

## Website

Visit the Grass Valley public website to download the latest user's guide updates and additional information about your broadcast product:

[www.grassvalley.com](http://www.grassvalley.com)

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## Recycling

Visit [www.grassvalley.com](http://www.grassvalley.com) for recycling information.

## Packing for return

If a unit is being returned to Grass Valley for servicing, try to use the containers and materials of the original packaging. Attach a tag indicating the type of service required, return address, model number, full serial number and the return number which will be supplied by your Grass Valley service centre.

If the original packing is not available or can no longer be used contact your regional Grass Valley service representative to have a return package provided.

# Important information

Read these instructions carefully and retain them for future reference.

During installation and operation of this equipment, local building safety and fire protection standards must be observed.

Whenever it is likely that safe operation is impaired, the apparatus must be made inoperative and secured against any unintended operation. The appropriate servicing authority must then be informed. For example, safety is likely to be impaired if the apparatus fails to perform the intended function or shows visible damage.

Any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

## Cautions and Warnings

Read and comply with the warning and caution notices that appear in the manual.

- Warnings indicate danger that requires correct procedures or practices to prevent death or injury to personnel.
- Cautions indicate procedures or practices that should be followed to prevent damage or destruction to equipment or property.

## Warnings



To prevent fire or shock hazard, do not expose the unit to rain or moisture.



To avoid electrical shock, do not remove covers or panels. Refer servicing to qualified personnel only.



In case of an emergency ensure that power is disconnected.



Use only fuses of the type and rating specified.



Connect the unit only to a power source with the specified voltage rating.



To prevent risk of overheating, ventilate the unit correctly.



For safety reasons the unit must be mounted in a 19-inch rack which has safety covers according to IEC65.

## Fiber-optic transmission units



### Laser safety statement (Europe)

Fiber-optic transmission units are classified as a “CLASS 1 Laser Product” according to EN 60825-1, Safety of Laser products. Class 1 laser products are considered safe and do not result in biological hazard if used according to the instructions.

### Laser safety statement (US)

Fiber-optic transmission units are classified as a “CLASS 1 Laser Product” according to 21CFR 1040.10 of the US Food and Drug Administration (FDA) Center for Devices and Radiological Health.



Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



To ensure proper use of this product, please read this instruction manual carefully and retain for future reference. Should the unit ever require maintenance, contact an authorized service location.

### Fiber-optic cable precautions

Fiber-optic cables and connectors are easily damaged; take the following precautions into account:

- Do not bend the cable beyond the minimum permissible bend range specified for the cable.
- Avoid kinks in the cable.
- Avoid subjecting the cable to a high tension force (even momentarily).
- Do not twist the cable when connecting it to equipment.
- Insert connectors straight and fully into their corresponding sockets.
- In fiber-optic cable systems always put the dust caps on cable and panel connectors immediately after disconnecting a cable. Keep the dust caps clean.



## Cleaning fiber-optic connectors



---

### WARNING

Never clean an optical connector attached to a fiber that is carrying light.

---

Particles of foreign matter on the tip of a ferrule can have a disabling effect on fiber-optic transmission. Fiber-optic connectors need to be cleaned every time they are mated and unmated; it is essential that fiber-optic users develop the necessary discipline to always clean the connectors before they are mated.

Use a commercially available cleaning kit specifically designed for fiber-optic connectors and follow the manufacturer's instructions carefully.

- The connector sections to be cleaned include the tips and sides of ferrules, the interior walls of alignment sleeves, and the interior and exterior of connector shells.
- For plugs, the interior surfaces of alignment sleeves and the tips of ferrules are to be cleaned with a cleaning stick treated with the appropriate fluid. (Cleaning sticks with a slender design are available that allow alignment sleeves to be cleaned without having to detach them.)
- For jacks, it is important to clean both the tips and sides of the completely protruding ferrules.
- Both the male and female connector shells tend to attract dust and metal particles, so it is important to clean both the insides and outsides.
- The fiber end face and ferrule must be absolutely clean before it is inserted into a transmitter or receiver.
- Mate the connector immediately! Do not let the connector lie around and collect dust before mating.
- Air can be used to remove lint or loose dust from the port of a transmitter or receiver to be mated with the connector. Never insert any liquid into the ports.

## Mains lead wiring for UK users


The wires in the mains lead are colored in accordance with the following code:

GREEN and YELLOW- EARTH

BLUE- NEUTRAL

BROWN- LIVE

As the colors of the wires in the mains lead of this apparatus may not correspond with the colored markings identifying the terminals in your plug proceed as follows:

- The wire colored GREEN AND YELLOW must be connected to the terminal on the plug marked with the letter E or by the safety earth symbol  or colored GREEN or GREEN AND YELLOW.
- The wire colored BROWN must be connected to the terminal marked with the letter L or colored RED.
- The wire colored BLUE must be connected to the terminal marked with the letter N or colored BLACK.

Ensure that your equipment is connected correctly - if you are in any doubt consult a qualified electrician.

# Chapter 1

## Introduction

### 1.1 Welcome

Grass Valley's XCU UXF Fiber Series is a heavy duty, multi-standard transmission and power system designed for Grass Valley studio cameras.

#### 1.1.1 About this guide

The purpose of this user's guide is to present a detailed description of how to install and operate the XCU UXF Fiber Series . It provides the information necessary to install, set up and operate the unit in different configurations.

#### 1.1.2 Compatibility

This user's guide describes the functionality of the following software versions:

Component	Version
XCU UXF Fiber Series	Software package v5.0
Camera Connect (part of MCP 450 package)	Application v1.43
Note: Connected camera(s) must have the latest software package installed.	

Make sure that your hardware components are using the listed software versions. Refer to the information below for more details about getting more information and download the latest software.

#### 1.1.3 Related documents

Before proceeding, check the Grass valley website at [www.grassvalley.com](http://www.grassvalley.com) for the latest version of this user's guide and additional information:

- Online versions of documentation; updated versions of user's guides, data sheets, brochures, application notes in pdf-format are available for download.
  - To access some of the information, registration is required.
- Software downloads; camera software updates, release notes and installation instructions are available for download.

## 1.2 Technology

### 1.2.1 XF Fiber transmission

Grass Valley's latest XCU UXF Fiber Series is based on full digital transmission and a proven and robust power system. The XF transmission system consists of a dockable XF Universe Fiber adapter adapter that fits on Grass Valley camera heads and the XCU UXF Fiber Series that takes care of power, signal transport and conversion and connection to the studio or OB van.

The XCU UXF Fiber Series is equipped with a hybrid fiber connector that offers full digital video transmission and remote control of cameras up to a distance of 2,500 m and beyond, using hybrid fiber cables.

The XF Fiber transmission is a propriety IP-routable protocol that supports all different video formats.

### 1.2.2 Media Network

The XCU UXF Fiber Series offers both IP and baseband connectivity through its unique hybrid IP solution. The XCU is used with the XF Universe Fiber camera adapters and offers both IP and baseband connections. The XCU UXF Fiber Series is equipped with SFP+ slots that offer video, audio and timing transmission over IP based (10 G) networks supporting SMPTE 2022-6 and SMPTE 2110-20 transport protocols.

### 1.2.3 Camera control, monitoring and intercom

You can access the XCU menu, which contains all operational settings, from the OCP 400 Operational Control Panel. In addition to the operational menu, the installation and service menus can be accessed directly from the XCU. The XCU is compatible with all existing camera control system (C2IP) components.

An OCP 400 operational control panel can be connected directly to the XCU via an Ethernet cable or via the C2IP Ethernet-based control network.

For monitoring and advanced system configuraton the MCP 450 Master Control PC can be connected. This includes Grass Valley's versatile Camera Connect application that allows for convenient configuration and monitoring of all Media Network and IP infrastructure.

The XCU intercom facilities provide for two-wire or four-wire high quality intercom signals.

### 1.2.4 XCU Front display

The XCU's versatile front panel display and navigation buttons allow for easy access to the XCU menu. This makes quick setup and monitoring possible:

- All settings can be done easily via navigation buttons;
- First diagnose information is directly visible.

Additionally, transmission quality can be continuously monitored before and during operation from the OCP 400 operational control panel and/or the Camera Connect.

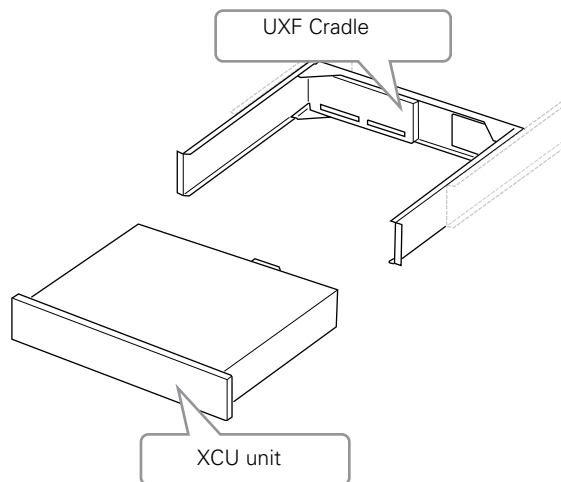
### 1.2.5 Cradle concept

The XCU UXF Fiber Series mounting system is like no other in the world. The unique cradle can be pre-mounted and pre-wired in a 19-inch rack which ensures secure mechanical and electrical connections including all connections to the IP infrastructure. This allows for the XCU to be easily slid in and out whenever needed.

Each XCU UXF Fiber Series comes with one UXF Cradle, but additional cradles may be purchased to extend usability across different environments, allowing you to quickly and easily move XCU UXF Fiber Series between OB vans, studios, or anyplace.

Pre-mounted and pre-wired to eliminate cabling errors, the unique cradle provides on-demand resources for fast paced productions, resulting in less set up time and more on-air time. Compatibility with the LDX Series and many LDK Series cameras extends the cradle's usefulness across all types of productions.

Transmission connectors can easily be exchanged during production and in the field. All other connectors are mounted on a separate connector panel at the back of the cradle. After disconnecting mains power and the transmission cable the XCU can be removed.



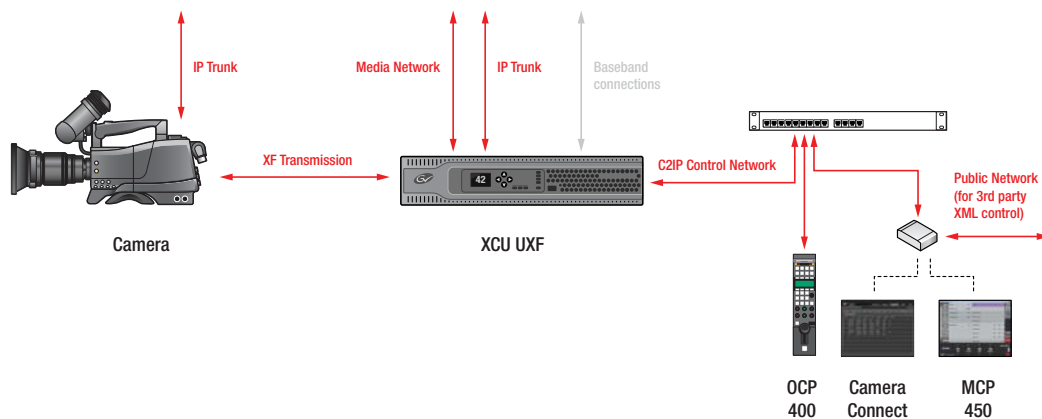
## 1.3 Main features

- Flexible and multiple audio and video connectivity: the XCUs hybrid solution offers both baseband and IP connectivity simultaneously.
- Supports 4K intoPIX TICO<sup>(R)</sup> compression over IP and uncompressed 4K over IP. Note that uncompressed 4K is only available with LDX 86N cameras)
- The unique UXF cradle mounting concept ensures maximum flexibility with minimum set-up time.
- Transports the following digital signals from **camera to XCU**: main video signal, four audio channels (including embedded digital audio), two intercom channels, control, private data and an IP trunk.  
Transports the following digital signals from **XCU to camera**: power, three external HD video inputs, teleprompter signal, three intercom channels, control, private data and an IP trunk.
- Supports all HD/3G/4K video formats: 4K50/59.94, 1080p50/59.94, 1080PsF23.98/24/25/29.97, 1080i50/59.94, 720p50/59.94.

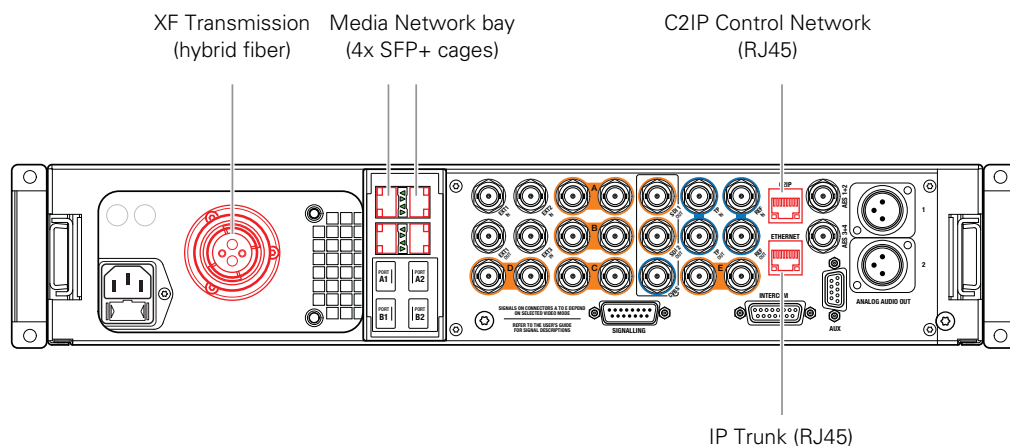
- The Universe version supports HS/XS video formats for ultra slow motion applications: 1080i150/179/300/359, 720p150/179/300/359, 1080p150/179 (HS/XS video signals are only available on the baseband (BNC) outputs).
- Supports video, audio, intercom and timing over the 10 GigE Media Network infrastructure using SFP+ output cages (SFP+ modules are not included).
- Supports discovery and registration (AMWA-NMOS IS-04) signals over C2IP.
- Full camera control via Grass Valley's C2IP Ethernet-based control network.
- Supports general purpose 1 Gb/s IP Trunk connection between camera and XCU.
- Three channel (two-wire or four-wire) intercom system compatible with international standards.
- Built in a compact 2 RU high, robust 19-inch rack with a reliable power unit that has low power consumption, ideal for outside broadcast vans.

## 1.4 Overview of IP connections

The diagram below shows an overview of the different IP connections in a typical Media Network system configuration:



The backpanel of the XCU shows the different IP connections:



# Chapter 2

## Installation

### 2.1 Rack installation

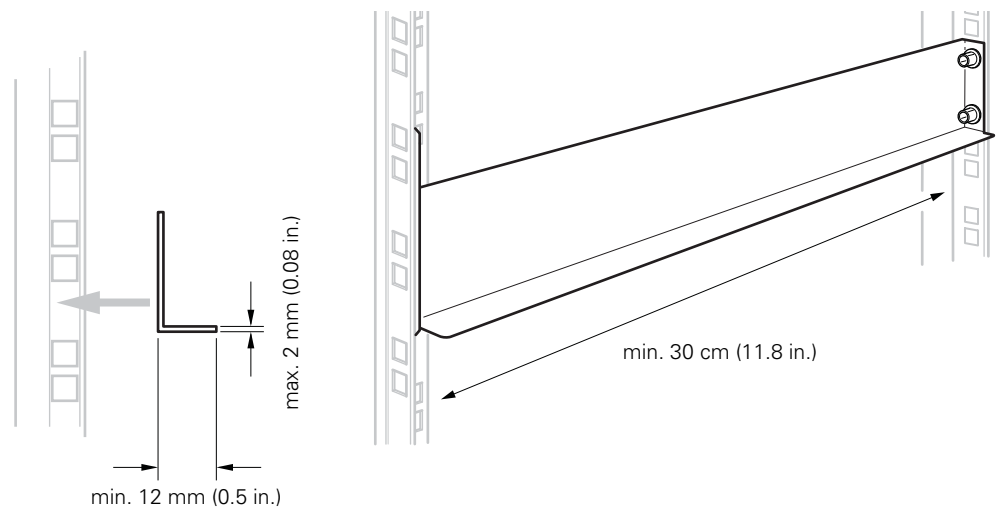
#### 2.1.1 Installing rack mounting rails

The UXF Cradle can be mounted in most standard 19-inch video or IT rack types. The unit needs two rack units (2 RU) of vertical space in the rack.

Install two L-shaped rack mounting rails (not supplied) that match your rack type. Refer to the documentation of your mounting rails or rack for installation instructions.

- Make sure that both front and back end of the rails are attached to the rack. Allow a minimum distance of 30 cm (11.8 in.) between the secured points.
- There should be a blind/untapped area in the front of the vertical rack beam where the locking mechanism of the XCU engages the rack.
- The thickness of the horizontal leg of the L-shaped mounting rails must not exceed 2 mm (0.08 in.) in order to leave enough space for more cradles to be mounted below the unit.

Below is an example of a rack mounting rail installed in a 19-inch rack. Note that your specific situation may be different.



### 2.1.2 Installing the cradle

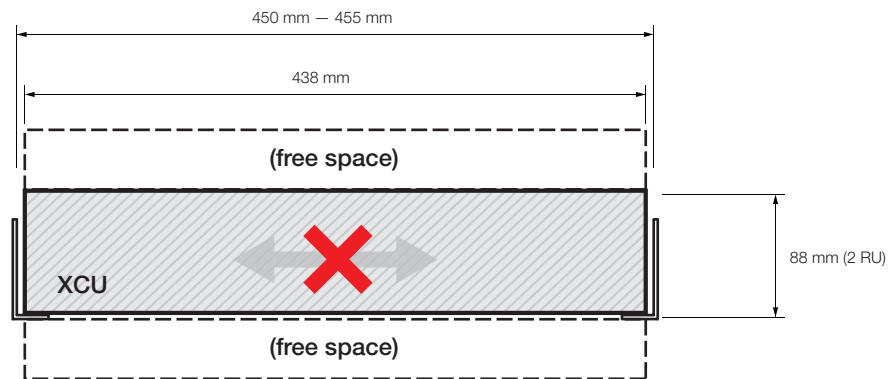
After mounting the rack mounting rails, install the cradle:

1. Slide the cradle into the rack so it is supported by the L-shaped mounting rails.
2. Fix the cradle to the front rack posts using four M6-screws (not supplied with the unit).

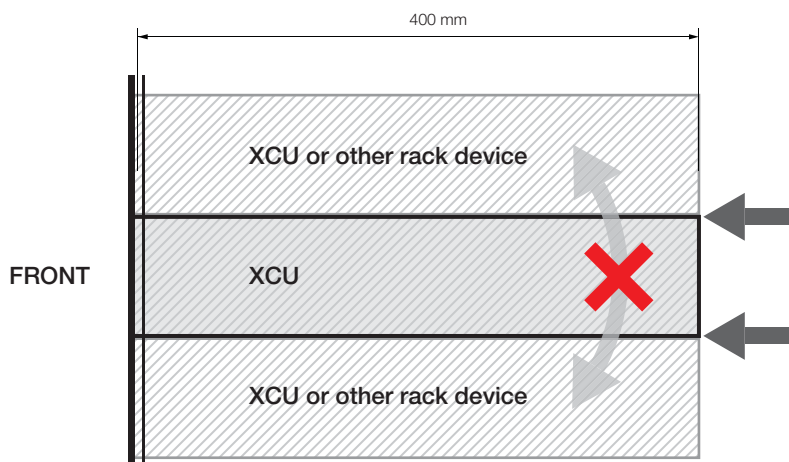
### 2.1.3 Transporting rack mounted XCUs

When transporting rack mounted XCUs in a flightcase make sure to take the following precautions:

- Use proper shock absorbers for the rack to prevent damage during transport.
- To prevent any horizontal movement of the cradle and XCU during transport, make sure there is as little horizontal clearance as possible between the cradle and the mounting rails:



- To prevent any vertical movement of the cradle during transport, lock up the cradle between other units and the vertical rail stands as indicated in the illustration below. Make sure there is enough support at the back of the unit, at a minimum distance of 400 mm from the rack front/





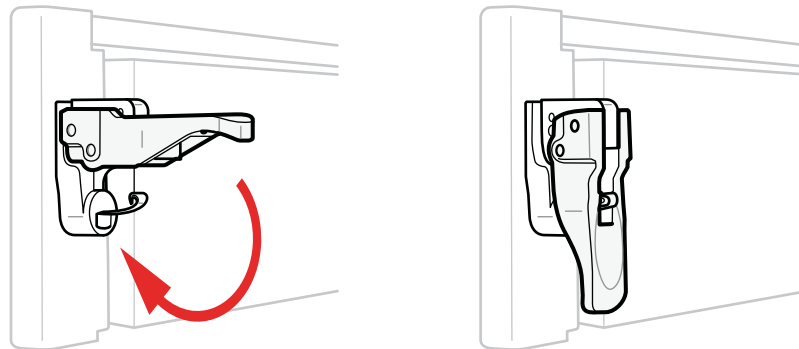
### 2.1.4 Connecting studio cabling

The studio cabling (Media Network, baseband video, control and intercom, studio signalling) can now be connected according to your application and studio configuration. Refer to [“Power and Transmission” on page 88](#) for connectors and signals available on the cradle.

## 2.2 Mounting the XCU

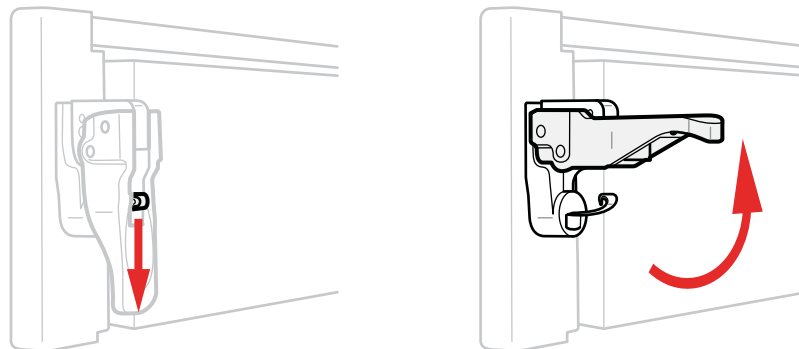
To mount the XCU into the cradle, proceed as follows:

- Place the XCU onto the sliding rails of the cradle, slide the unit into the cradle and push firmly.
- Push down the right and left locking handles until they snap down.



To remove the XCU from the cradle, proceed as follows:

- Hold down the springs inside the locking handles and at the same time swing them open.
- Pull out the XCU from the cradle by pulling the XCU at its sides.



- Now the transmission and mains cables can be connected. Refer to [“Connector back panel” on page 87](#) for connectors and signals available on the XCU.

## 2.3 Connecting the control network

The XCU is connected to the control network switch or router via an Ethernet cable (straight-through, not cross-over) via the C2IP (RJ45) connector. An OCP 400 (Operational Control Panel) and, if required an MCP 450 (Master Control PC), are also connected to the Ethernet network via a hub or router. An OCP 400 can also be connected directly to the XCU using a (cross-over or a straight-through) Ethernet cable.

The IP address and other options for the Ethernet connection can be set up in the XCU menu.



### Note

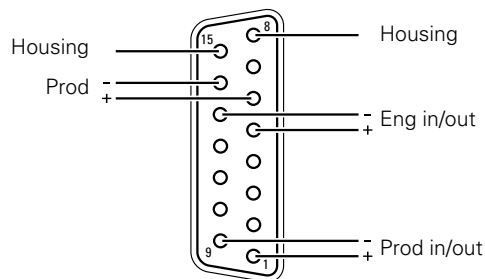
By default, the Ethernet connection is set up for Auto IP configuration.

## 2.4 Connecting analog intercom

Connect the analog studio intercom system to the rear of the XCU (cradle). Both a two and four-wire cabling can be used. In the AUDIO/INTERCOM > INTERCOM > ENG > WIRE MODE menu select the cabling system: 2wire or 4wire.

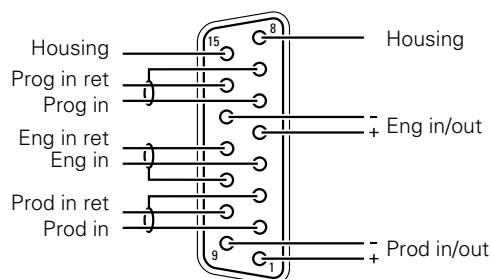
The wiring of the panel connector is shown below for two-wire and four-wire systems.

### Two-wire systems



Signal	Value
Signal level	0 dBu (RMS)
Load impedance	200 $\Omega$
Voltage level	max. 40 VDC

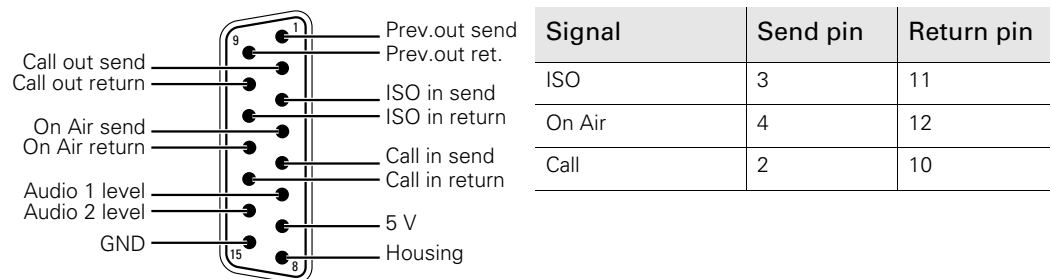
### Four-wire systems



Signal	Value
Output signal level	+6 or 0 dBu (RMS) selectable
Output impedance	max. 50 $\Omega$ symmetrical
Input signal level	+6 or 0 dBu (RMS) selectable
Impedance	min. 9 k $\Omega$ symmetrical

## 2.5 Connecting studio signalling

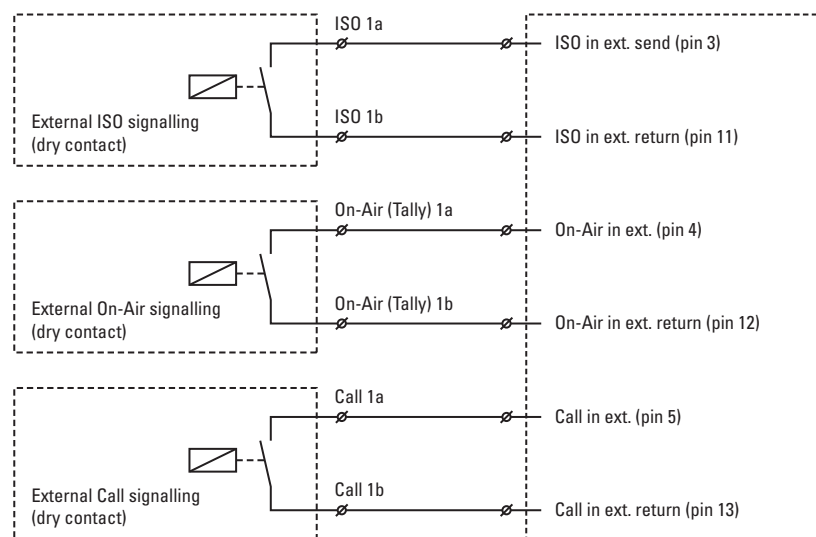
Connect the studio signalling system to the rear of the XCU (cradle). The wiring of the signalling connector is shown below:



There are several connection methods for the ISO (On Air Yellow), On Air and Call signalling functions: **dry contact**, **common ground**, **voltage level** and **open circuit/voltage level**.

A selection in the **INSTALL > SIGNALLING INPUT** menu allows you to make the activity state of the function (Active or Inactive) correspond to a particular input signal. There are two leads for each connection - Send and Return.

### 2.5.1 Dry contact



#### Note

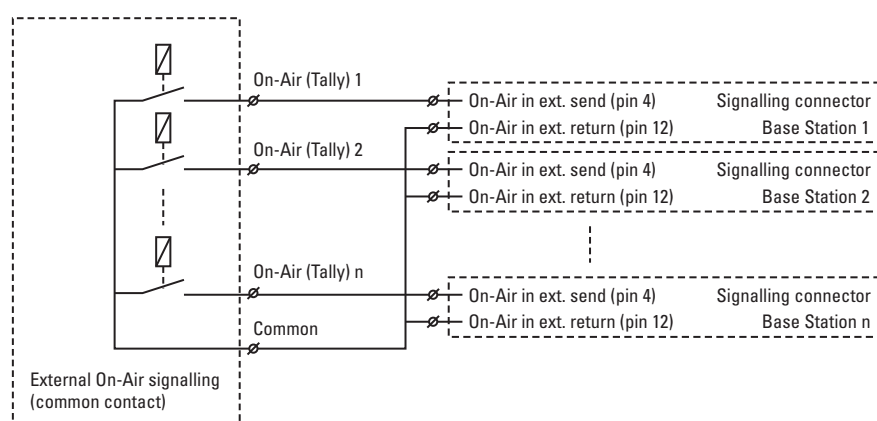
A common return (not ground!) can be used for all three functions (ISO, On Air and Call)

If a contact is closed, the corresponding function is Active or Inactive, depending on the selection in the **INSTALL > SIGNALLING INPUT** menu:

Menu setting	Input is shorted:	Input is open:
LH (low-high)	Function is Active	Function is Inactive
HL (high-low)	Function is Inactive	Function is Active

## 2.5.2 Dry contact with multiple XCUs

This is an example of an On Air signalling with multiple XCUs using a common contact.



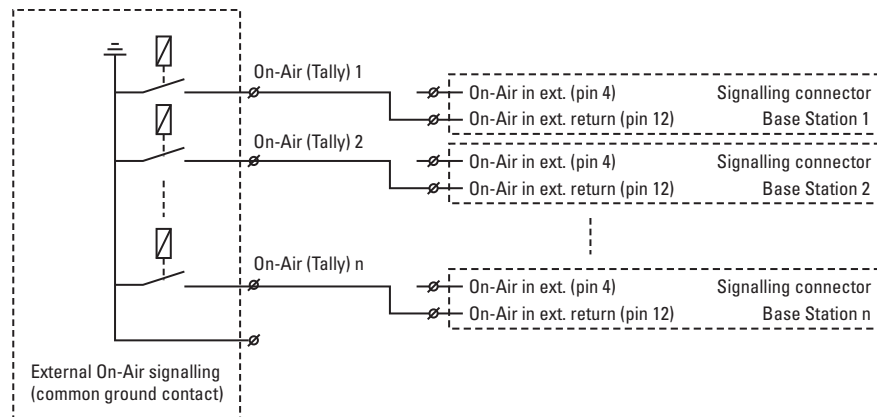
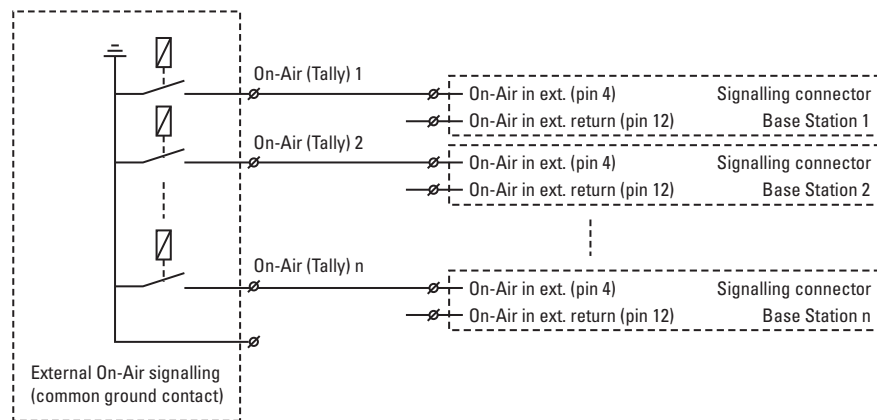
### Note

Use either Send or Return only, but do not mix.

If a contact is closed, the corresponding function is Active or Inactive, depending on the selection in the `INSTALL > SIGNALLING INPUT` menu:

Menu setting	Input is shorted:	Input is open:
LH (low-high)	Function is Active	Function is Inactive
HL (high-low)	Function is Inactive	Function is Active

### 2.5.3 Common ground



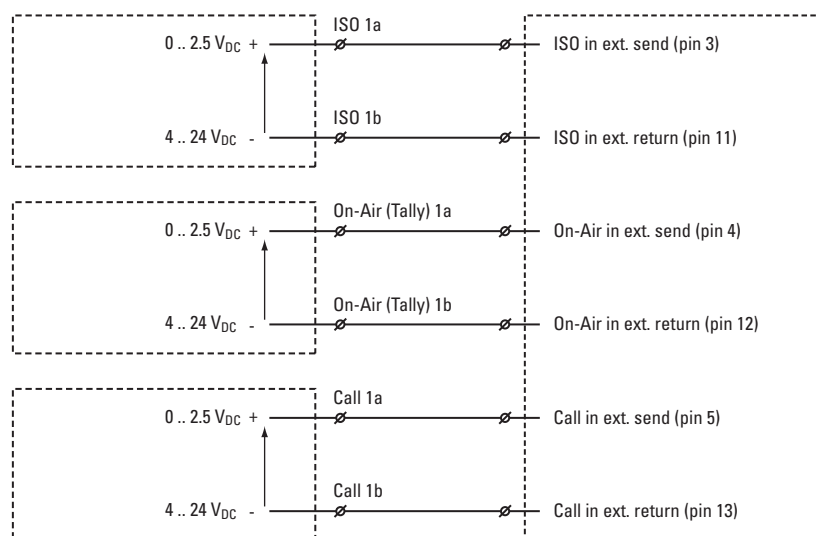
#### Note

Ensure that a reliable ground coupling exists between the control device ground and the XCU UXF Fiber Series ground.

If a contact is closed, the corresponding function is Active or Inactive, depending on the selection in the `INSTALL > SIGNALLING INPUT` menu:

Menu setting	Input is shorted:	Input is open:
LH (low-high)	Function is Active	Function is Inactive
HL (high-low)	Function is Inactive	Function is Active

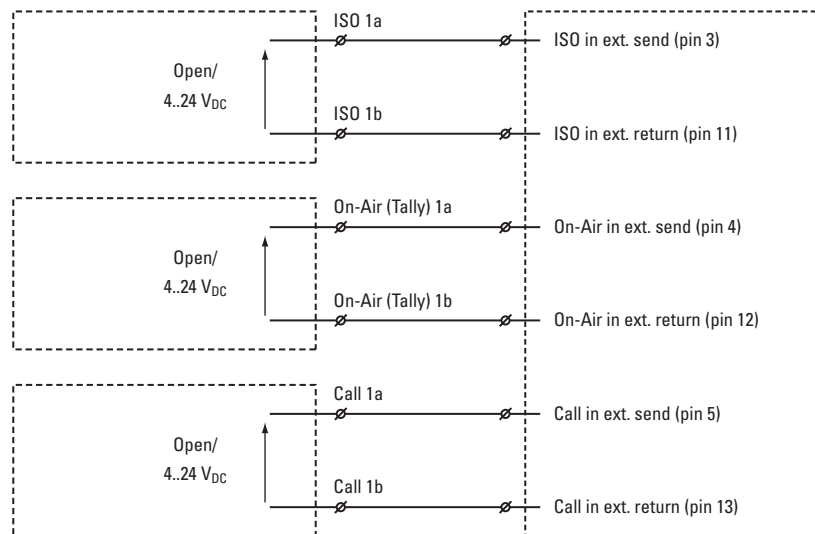
## 2.5.4 Voltage level



Apply a DC voltage to the inputs (respect polarity). If the voltage is low (0 to 2.5 V), the function is Active (or Inactive). If the voltage is high (4 to 24 V) the function is Inactive (or Active). The function state depends on the selection in the `INSTALL > SIGNALLING INPUT` menu:

Menu setting	Input is 0 to 2.5V:	Input is 4 to 24V:
LH (low-high)	Function is Active	Function is Inactive
HL (high-low)	Function is Inactive	Function is Active

### 2.5.5 Open circuit/Voltage level



Leave the circuit open or apply a DC voltage to the inputs (respect polarity). If the circuit is open, the function is Active (or Inactive). If the voltage is high (4 to 24 V) the function is Inactive (or Active).

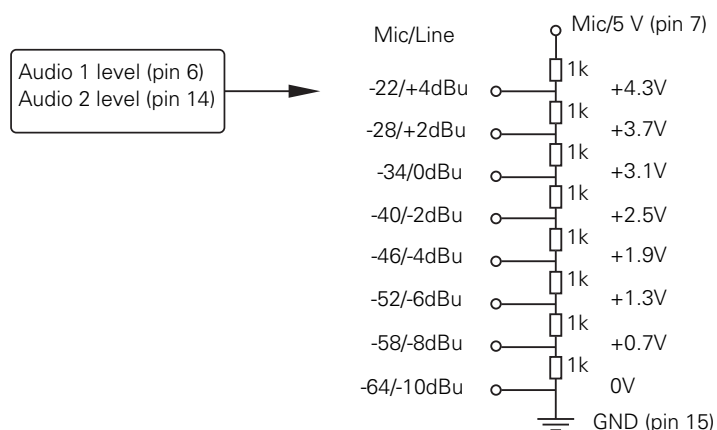
The function state depends on the selection in the **INSTALL > SIGNALLING INPUT** menu:

Menu setting	Input is open:	Input is 4 to 24V:
OH (open-high)	Function is Active	Function is Inactive
HO (high-open)	Function is Inactive	Function is Active

## 2.6 Setting external audio level

The camera audio levels for channel 1 and 2 can be externally controlled by the XCU. In the camera system menu, go to the **INSTALL > AUDIO > AUDIO GAIN MODE** item and select **Ext.**

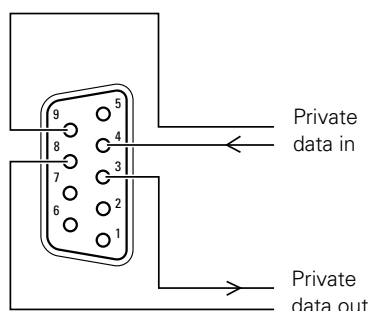
On the OCP 400, push the **SETUP** button and choose the Cam submenu. Use the **NEXT** button to scroll to the **REM AUDIO** menu and select **Rem.** Apply a DC voltage to pins 6 and 14 of the signalling connector to control the levels of audio channels 1 and 2 respectively, as shown in the figure below:



The actual audio level depends on the setting of the switches at the back panel of the camera adapter. The minimum input sensitivity for nominal output level is -64 dBu for microphone levels and -32 dBu for line levels. Input sensitivity can be selected with steps of 6 dB.

## 2.7 Using private data

Private data channels can be used for sending serial data via the transmission cable. For example, electronic scriptboard or character data for a video display unit or pan and tilt data can be transmitted to the camera.



Function	Value
Bitrate	max. 100 kbit/s
Output level (high)	> 4 V
Output level (low)	< 4 V
Output impedance	250 Ω
Input level (high)	> 2 V (max. 12 V)
Input level (low)	< 2 V
Input impedance	> 4.7 kΩ



### Note

Propagation-delay times vary with cable length, especially if a return signal is involved. At max.lengths the total delay is at least 25 μs and can be more than 30 μs depending on the type of cable. The duty cycle difference between input and output is max. 5%.

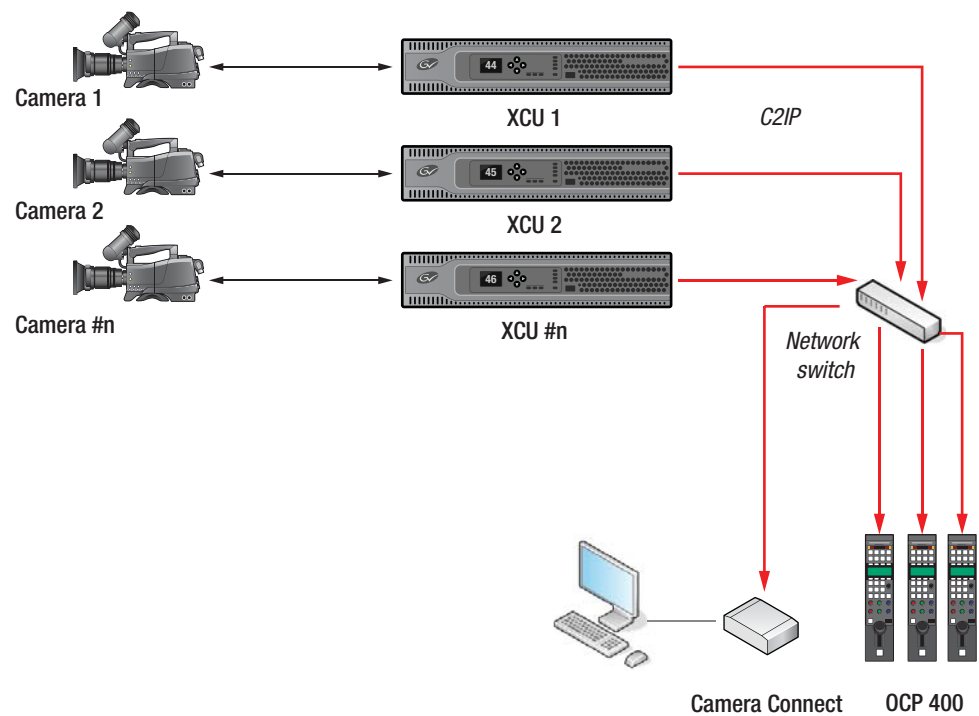


# Chapter 3

## Configuration

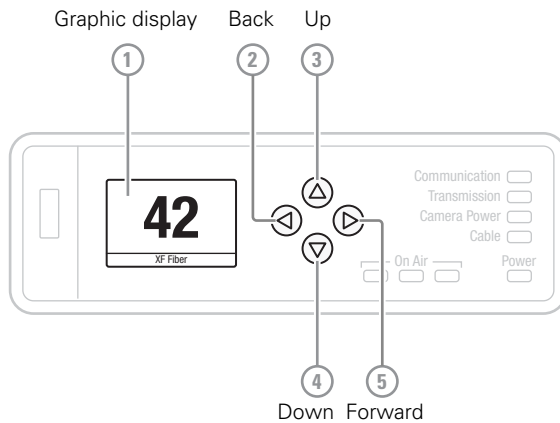
### 3.1 Studio C2IP configuration

Below is a typical basic C2IP (Camera Control) network with multiple camera systems, control panels and a Camera Connect unit.

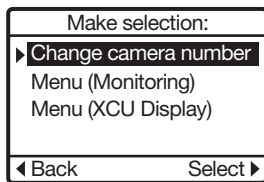


## 3.2 Setting the camera number

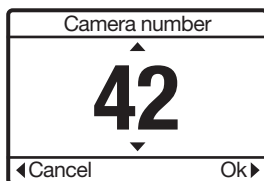
The front navigation panel is used to display and set the camera number, to display operational and diagnostic information and to access and navigate the internal XCU menu.



- Push and hold the Forward button [5] for two seconds until the following selection menu appears:



- Select the **Change camera number** option and push the Forward button. Or push the Back button [2] to return to the main display status.
- Use the Up [3] and Down [4] buttons to select the camera number. Push the Forward button to confirm the settings or push the Back button to cancel the selection.

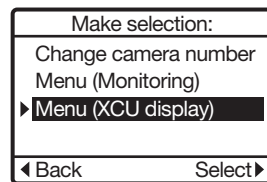


## 3.3 Accessing the XCU menu

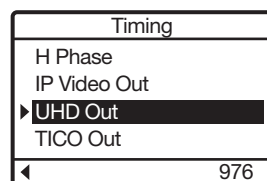
### 3.3.1 Using the front panel and display

The easiest way to operate the XCU menu is by using the front panel and display.

- Push and hold the Forward button [5] for two seconds until the following selection menu appears:

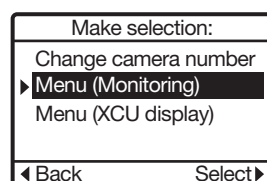


- Select the **Menu (XCU Display)** option and push the Forward button to select. Or push the Back button to return to the main display status.
- The XCU Menu appears. Use the Up, Down buttons to scroll through the menu items, Back to go one level up and Forward to open a submenu or to enter a value when a function is selected. The function value is shown in the bottom right of the display.



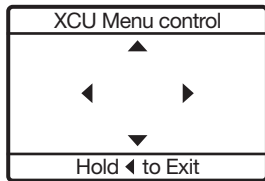
### 3.3.2 Using the front panel and the Monitoring output

- Connect a viewing monitor to the Monitoring output of the XCU.
- Push and hold the Forward button [5] for two seconds until the following selection menu appears:



- Select the **Menu (Monitoring)** option and push the Forward button to select. Or push the Back button to return to the main display status.

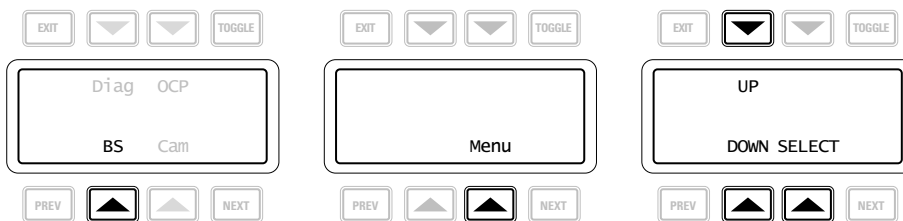
- The navigation pad appears. Use the Up, Down and Forward buttons to navigate the XCU menu. The menu text appears on the Monitoring output(s) of the XCU. Push the Back button to leave the menu.



### 3.3.3 Using the OCP 400 operation control panel

The OCP 400 can be used to access the XCU menu remotely:

- Connect a viewing monitor to the Monitoring output of the XCU.
- Push the **SETUP MENU** button on the OCP 400 to open the setup menu.
- Push the Selection button to choose the BS (= XCU) menu.



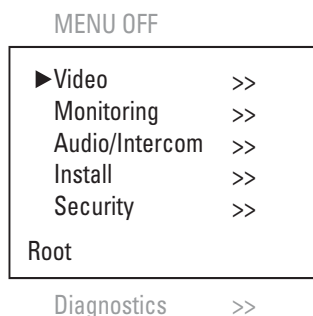
- Push the Selection button enter the menu.
- The menu appears on the Monitoring output of the XCU. Use the appropriate selection buttons to navigate the menu. You can also use the rotary control on the OCP 400 to move up or down through the menu.

## 3.4 Navigating the menu

The XCU menu is used for configuring the unit. As there are a large number of functions and setup options available, it may require some time to become familiar with them all. The menu is available on the Monitoring output or on the XCU front display.

### 3.4.1 Entering the menu

Use the navigation panel on the XCU UXF Fiber Series or the OCP 400 to access the XCU menu. The functions of the XCU are grouped into menus and sub-menus. When accessed, the main menu appears on the monitor outputs:



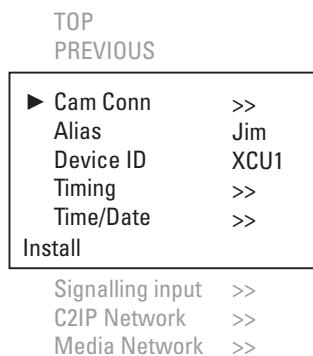
The main menu screen shows five items and the name of the menu (at the bottom). One or more item can be hidden but become visible when you scroll down. A cursor shows your position in the menu. Use the Up and Down buttons to move the cursor up and down.

### 3.4.2 Finding your way

Use the navigation buttons to move the cursor through the menu items. If a double arrow (>>) is visible, then pressing the Select button brings you one level lower in the menu system. Only five items are visible in each menu. Scroll up or down to see more items.

When you first enter a menu (other than the main menu) the cursor is positioned next to the first item. The TOP and PREVIOUS entries are not immediately visible but are located above the first item. Use the control to scroll up to them.

- Select TOP to bring you back to the Main menu.
- Select PREVIOUS to go back to the menu that you were in before the current one.



The System menu above shows the items displayed when you first enter the menu and the other items that are available by scrolling up or down.

### 3.4.3 Leaving the menu

If you are deep within the menu structure, follow these steps to leave:

- If necessary move the cursor to the left column.
- Scroll upwards until the cursor points to TOP (this is the main menu).
- Press the Select button; the cursor now points to the Menu Off item of the Main menu.
- Press the Select button to leave the menu.

This is the recommended way of leaving the system menu. The menu system disappears after a few seconds when you stop navigating. This delay can be set in the MONITORING > MENU.

However, when you enter the menu again you enter at the last position of the cursor and not at the top of main menu. To prevent confusion the next time you enter the system menu, it is advisable to leave the system menu by returning to the main menu (TOP) and selecting MENU OFF.

### 3.4.4 Making changes

To find out where to change a function, consult [“XCU menu reference” on page 63](#) to find out under which menu group or subgroup the function is located. If the cursor points to an item (and there are no double arrows to indicate a sub-menu) then the item pointed to has a value. The value can be:

- a toggle value (only two values, for example Yes or No)
- a list value (more than two values)
- an analog value (variable from 00 to 99)
- or unavailable (—).

If the value is unavailable it cannot be changed. This is indicated by three dashes (—). This can occur, for example, when a function is switched off. The analog values associated with that function are then unavailable. If there are only two values associated with the function, then pressing the Select button toggles between these two values. If a value is displayed next to a function that is one of several possible values, then pressing the Select button places the cursor in a list menu indicating the value currently selected. Use the Up and Down buttons to point to a new value. Press the Select button to return the cursor to the function list. If an analog value is displayed next to a function name, pressing the Select button places the cursor in front of the value and the navigation control is used to change the analog value. Press the Select button to return the cursor to the function list.

### 3.4.5 User levels

There are four user levels: user 0, user 1, user 2 and user 3. The purpose of the user levels is to restrict the set of functions which can be changed by whoever is operating the unit. User level 0 is a special protection level which locks most of the operational controls of the camera. Use this level to ensure that a camera that has been set-up is not tampered with. User level 0 is not normally used for operational purposes as it is too restrictive for normal circumstances. The recommended minimum user level is 1. For full control set the level to 3. When you switch off the power, the access rights that were obtained by the use of the PIN code are disabled and the camera starts at the assigned user level when switched on again.

## 3.5 Setting up intercom

The studio camera systems offer extensive intercom facilities between camera operator (plus tracker) and XCU (studio). To help you set up and operate the intercom system, the following controls are available:

- XCU menu system
- Camera head menu system
- Camera rear panel
- Camera head switches



### Note

When setting up a system it is more convenient to use an OCP 400 or Camera Connect to set your preferences in both the XCU and camera head menus.

Intercom settings are stored in the non-volatile memory of the cradle so they keep tied to the rack position along with the intercom wiring.

### 3.5.1 Studio interface setup

#### Intercom source selection

In the `AUDIO/INTERCOM > INTERCOM` menu, use `SOURCE` to select the source for the intercom system (valid for all channels).

- Analog — intercom channels come from the 15-pin SubD XCU intercom connector at the back panel of the XCU. Refer to [“Intercom connector” on page 102](#).
- Ext1 — intercom channels come from embedded SDI audio of external video input 1 (EXT1).

The AUD2IP and IP2AUD mapping structure below is used for embedding the audio/intercom signals into the ST2022-6 Main video and monitoring stream and for de-embedding of the Ext1 ST2022-6 input stream:

Audio slot:	0	1	2	3	4	5
Lane 1 (AUD2IP)	Audio 1	Audio 2	Audio 3	Audio 4	Intercom 1	Intercom 2
	Audio 1 an	Audio 2 an	Audio 1 AES	Audio 2 AES	Engineering	Engineering
Lane 1 (IP2AUD)	Intercom 1	Spare 1	Audio 1	Audio 2	Intercom 2	Intercom 3
	Program 1	(Program 2)	(AES Ext1)	(AES Ext2)	Production	Production

(Audio slots 6 to 15 are unused)

#### Intercom wire mode

A four-wire or a two-wire studio system can be connected to the XCU. In the `AUDIO/INTERCOM > INTERCOM` menu, use `WIRE MODE` to select the wire mode the Engineering (Eng), Production (Prod) and Program (Prog) channels. By default these values are set to four-wire.

**Isolate**

The isolate function disconnects the XCU intercom from the studio system.

**Levels**

In the four-wire mode the menu gives you a choice of either a 0 dB or a +6 dB signal level for each intercom channel. In the two-wire mode this level is always set to 0 dB.

You can also set sidetone (feedback) volume levels for both Engineering and Production channels in this menu.

## 3.6 Timing

### 3.6.1 Synchronization

To synchronize the XCU apply a valid reference (HD Tri-Level sync or SD Black Burst) signal to the REF IN BNC connector at the back panel.

### 3.6.2 Shifting output signals

All main HD Video, SD and monitoring output signals coming from the XCU are in phase. Still, due to different cable lengths or other delays, the signals from different XCUs can be out of phase when they are connected to a video switcher or router.

This variation in phase can be compensated for in the XCU by using horizontal phase (H-phase) adjustment. Go the **INSTALL > TIMING** menu and adjust the **H-PHASE** item.

The phase shift can be further adjusted in the **INSTALL > TIMING > SHIFT** menu. Use the **PIXELS** and **LINES** items to shift the signals over one or more pixels and one or more lines, respectively. The maximum shift is one frame.

**Note**

Service access is needed to access the Shift Pixel and Lines items.

---



## 3.7 Color bars

For setup and test purposes, the XCU can generate a color bar signal at the main video outputs (baseband connectors and Media Network simultaneously).



### Note

The color bar also appears when no camera is connected and no valid video signal is received (unless the the `INSTALL > NO SIGNAL` item is set to Black).

- To turn on the XCU color bar, go to the `VIDEO > COLOR BAR > COLOR BAR` item and select On.
- The color bar type can be selected with the `VIDEO > COLOR BAR > COLOR BAR TYPE` item. Two HD color bar types are available: Split (default) and Full.



Split bar (according to SMPTE RP215)



Full bar (with grey bars at the sides)

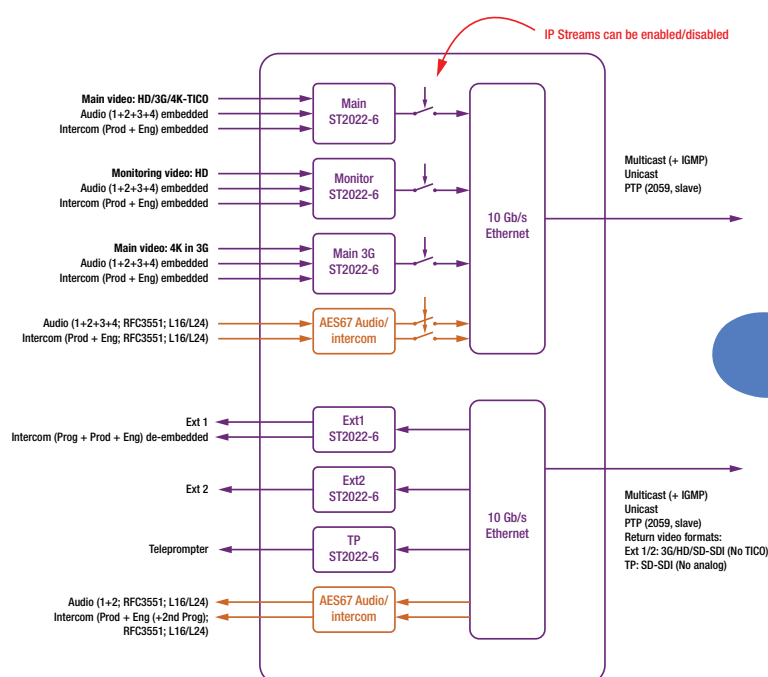


# Chapter 4

## Media Network configuration

### 4.1 Overview of IP streams

Below is an overview diagram of the IP streams in the Media Network. Depending on video mode, protocol settings and signal switches, some streams may be present or not.



## 4.2 Camera Connect

You can use the XCU menu (either via the front panel interface on the XCU or via the OCP 400 BS remote menu) to set up the Media Network but it is more convenient to use Grass Valley's Camera Connect application.



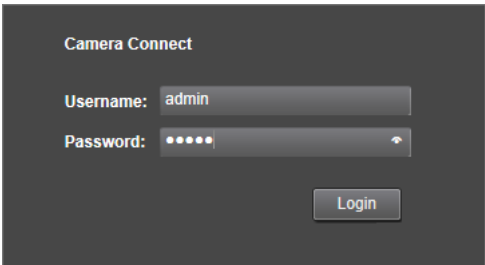
### Note

Camera Connect is a part of the MCP 450 Master Control PC package.

Refer to the MCP 450/Camera Connect documentation for detailed setup and configuration of your camera control network including the MCP 450.

To configure the Media Network follow these steps:

- On the MCP 450, open the browser and access the Camera Connect web interface:



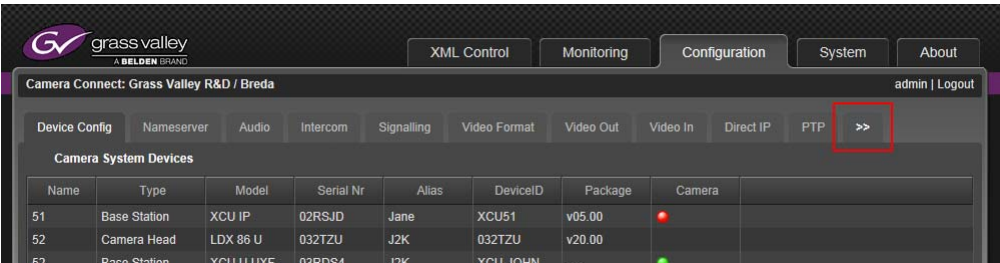
- Enter user name and password. The default login name is *admin* and the password *admin*.
- Click Login. The Camera Connect user interface is shown.



### Note

All user entries in the Camera Connect application are case sensitive.

- Click the **Configuration** tab at the top of the page; a row of sub tabs appears. The following sub tabs are used to configure the Media Network: PTP, IP Media Port A, IP Media Port B, IP Main A, IP Main B, IP MonLive, IP Video In, IP Audio and IP Intercom. Click the double arrows at the right to access more tabs:



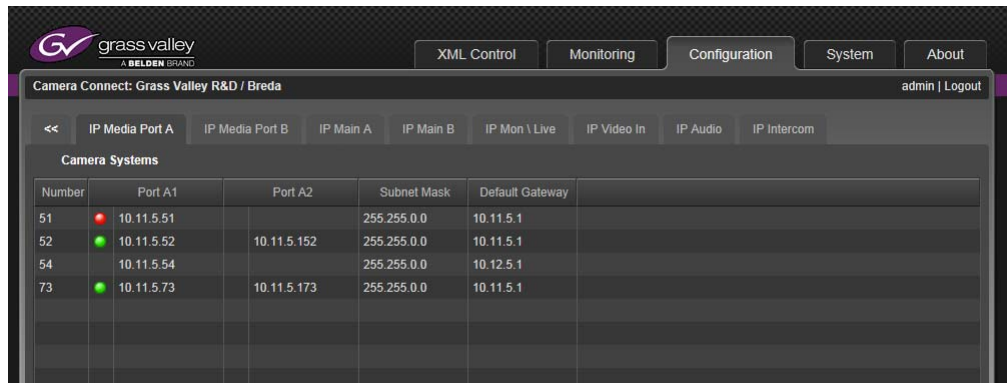
### Note

The IP configuration tabs list only camera systems that are IP enabled.



## 4.3 Media Network setup

### 4.3.1 Media Network local ports setup

The list of camera systems is shown, sorted by camera number. Click the IP Media Port A tab: here you can configure (local) IP addresses, subnet mask and default gateway for Media Port A.



The indicator(s) in front of the IP addresses for port A1 and port A2 show the status of the physical IP network connection:

Off	port is not in use.
	indicates a connection between the port and a 10 G IP device (e.g. a switch)
	no connection

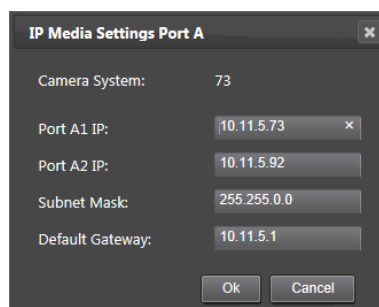


#### Note

A green light does **not** mean that there is a *correct* communication link between XCU and the 10 G IP device.

Refer to the “Media Network bay” on page 89 for the location of the Media Network ports at the back panel of the XCU.

Click the camera system you want to set up. A popup window appears and you can edit the following parameters:



**Port A1 IP** — this is the local IP address of Port A1 in the Media Network. It is recommended to use an IP address in the *10.11.5.xxx* range.

**Port A2 IP** — this is the local IP address of Port A2 in the Media Network. It is recommended to use an IP address in the *10.11.5.xxx* range.

**Subnet mask** — for most situations the subnet mask is set to *255.255.0.0*. This is also the default value.

**Default gateway** — for most situations the default gateway is set to *10.11.5.1*. This is also the default value.



#### Note

Do not use IP address *10.11.5.1* as it is already in use for the default gateway. If you still want to use this address then you must enter a different default gateway.

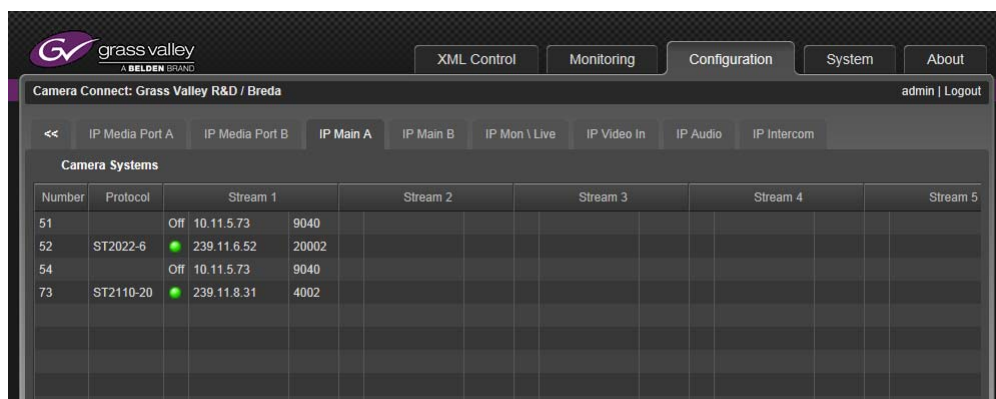
Make sure to set unique IP addresses for each camera system in the Media Network to avoid network conflicts.

### Media Network port B setup

The IP Media Port B tab is identical to the Port A tab and contains all settings for Port B which is used for a secondary stream to operate in IP Redundancy mode. Refer to [“IP Redundancy” on page 53](#) for more information about IP Redundancy.

## 4.3.2 Main video

In the IP Main A tab you can set up IP address and port number for the Main video outgoing stream for the primary Media Network Port. The transport protocol for Main video is also selected in this tab.



Present indicator for Main video (sub) stream:

Off	(Sub) stream is disabled
	(Sub) stream is enabled and stream is active.
	(Sub) stream is enabled but stream is not active.

Normally, Main video is sent as a single IP stream but with uncompressed 4K the signal is split into four (sub)streams. Refer to the [“Main video in 4K uncompressed mode” on page 39](#) for detailed information about configuring a 4K uncompressed Main video stream.

Click the camera system you want to configure. A popup window appears in which you can set the following parameters:

The screenshot shows a configuration window titled "IP Main Video (Port A)". It contains the following fields and options:

- Camera System:** 73
- Main video:**
  - Enabled:** Port A+B (dropdown menu)
  - Protocol:** ST2022-6 (selected), ST2110-20 (available)
- Stream 1 (Port A):**
  - Dest. IP address:** 224.11.8.73
  - Dest. Port:** 4002
- Buttons:** OK, Cancel

### Main Video

**Enabled** — selects whether the Main video is included in the Media Network stream and to which port the stream is sent:

*Port A:* Main video is routed to Port A (default setting).

*Port A+B:* Main video is routed to both Port A and B to enable redundant network operation. Refer to [“IP Redundancy” on page 53](#) for more information about IP Redundancy.

*Off:* Main video is NOT inserted into the Media Network stream (this is also indicated with the indication *off* in front of stream 1).

**Protocol** — this is the transport protocol for Main video. Select either *ST2022-6* ('embedded SDI with audio and ancillary data over IP') or *ST2110-20* ('Video essence over IP').

### Stream 1 (port A):

**Dest. IP address** — the destination IP address to which the stream is sent.

**Dest. Port** — the destination port number for the stream.



#### Note

When the same IP address is used for the Main video, Monitoring video and/or Live video streams, the port numbers for each stream MUST be set to different values.

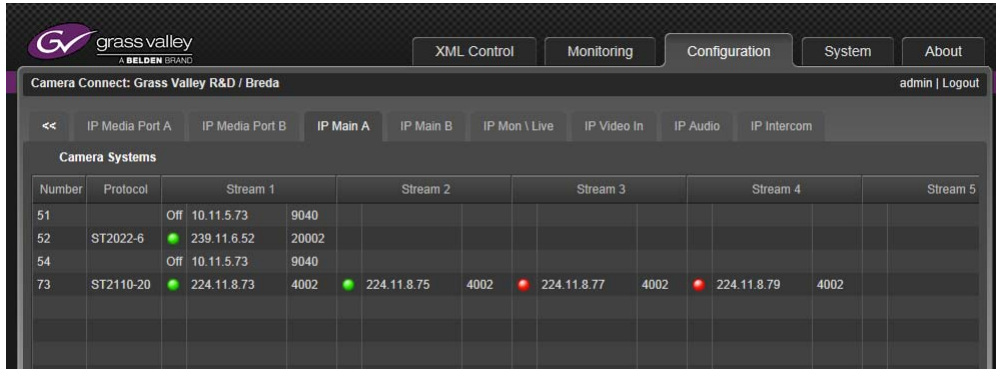
## 4.3.3 Main video in 4K uncompressed mode



#### Note

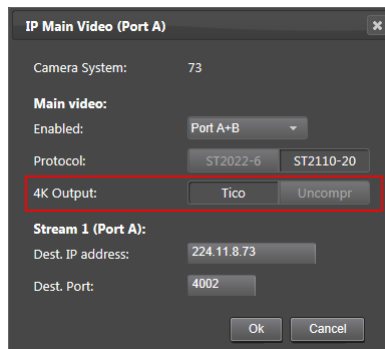
The 4K uncompressed mode is only available in combination with the LDX 86N camera. Also make sure that the camera is running in 4K video mode.

In the IP Main A tab you can set up IP addresses and port numbers for the four (sub)streams of the 4K uncompressed Main video outgoing stream. The transport protocol for Main video is also selected in this tab.



Number	Protocol	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
51	Off	10.11.5.73	9040			
52	ST2022-6	239.11.6.52	20002			
54	Off	10.11.5.73	9040			
73	ST2110-20	224.11.8.73	4002	224.11.8.75	4002	224.11.8.77
						224.11.8.79
						4002

When the window does not display the four (sub)streams as indicated in the example above, the compression mode needs to be set to *Uncompressed* first. To do this, click the camera system you want to configure. A popup windows appears. Set the 4K Output item to *Uncompr* (indicated in red below) and click OK to activate the changes.



**IP Main Video (Port A)**

Camera System: 73

**Main video:**

Enabled: Port A+B

Protocol: ST2022-6 ST2110-20

4K Output: Tico **Uncompr**

**Stream 1 (Port A):**

Dest. IP address: 224.11.8.73

Dest. Port: 4002

Ok Cancel



With the 4K Output compression mode set to *Uncompr*, click the camera system you want to configure. A popup window appears in which you can set the following parameters:

The screenshot shows a configuration window titled "IP Main Video (Port A)". It contains the following fields and options:

- Camera System:** 73
- Main video:**
  - Enabled:** Port A+B (dropdown)
  - Protocol:** ST2022-6, ST2110-20 (radio buttons)
  - 4K Output:** Tico, Uncompr (radio buttons)
  - Stream config:** AutoFillIP (dropdown)
- Stream 1 (Port A):**
  - Dest. IP address: 224.11.8.73
  - Dest. Port: 4002
- Stream 2 (Port A):**
  - Dest. IP address: 224.11.8.75
  - Dest. Port: 4002
- Stream 3 (Port A):**
  - Dest. IP address: 224.11.8.77
  - Dest. Port: 4002
- Stream 4 (Port A):**
  - Dest. IP address: 224.11.8.79
  - Dest. Port: 4002
- Buttons:** Ok, Cancel

### Main Video

**Enabled** — selects whether the Main video is included in the Media Network stream and to which port the stream is sent:

*Port A:* Main video is routed to Port A (default setting).

*Port A+B:* Main video is routed to both Port A and B to enable redundant network operation. Refer to ["IP Redundancy" on page 53](#) for more information about IP Redundancy.

*Off:* Main video is NOT inserted into the Media Network stream (this is also indicated with the indication *off* in front of stream 1).

**Protocol** — this is the transport protocol for IP Main Video. Select either *ST2022-6* ('embedded SDI with audio and ancillary data over IP') or *ST2110-20* ('Video essence over IP').

**4K Output** — in this case *Uncompr* is selected.

**Stream config** — defines how streams 2,3 and 4 are configured, based on settings for stream 1:

*AutofillIP:* the IP addresses for stream 2, 3 and 4 are automatically filled in based on the entered IP address for stream 1. The last digit of the IP address for Stream 1 is increased by 2 for the subsequent streams.

*AutofillPrt:* the port numbers for streams 2, 3 and 4 are filled in based on the port number entered for stream 1. The port number is subsequently raised by 1.

In case of a single destination unicast/multicast address, the port number of the first stream is entered and the port number for the subsequent streams is increased by 1.

**Note**

This is not applicable for receivers with two 10G ports. A single IP destination address causes the Ethernet switch to flood both ports with all four streams. This can only be used for 25G and 40G port receivers.

When *Manual* (default setting) is selected you can enter the IP addresses and port numbers manually for all four (sub)streams.

**For streams 1 to 4**

**IP address** — the destination IP address to which the stream is sent. By default, use four different multicast IP addresses.

**Port** — the destination port number for the stream.

**Note**

When the same IP address for Main Video, Monitoring video and or Live video is used, the port numbers for each stream **MUST** be set to different values.


### 4.3.4 IP Mon\Live tab

The list of camera systems is shown, sorted by camera number. In this tab Monitoring video and/or Live video outputs can be set up.



#### Note

Live video is only present when HDR is enabled and/or when the XCU is running in a 4K video mode.



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Camera Connect: Grass Valley R&D / Breda

admin | Logout

<<

IP Media Port A

IP Media Port B

IP Main A

IP Main B


IP Mon \ Live

IP Video In

IP Audio

IP Intercom

Camera Systems

Number	Monitoring	Monitoring (Port A)		Monitoring (Port B)		Live	Live (Port A)		Live (Port B)					
51		Off	10.11.5.52	20005	Off									
52	ST2110-20		239.11.5.52	20002	Off	10.12.8.36	20012	ST2022-6	Off	10.11.5.12	20009	Off	255.255.255.255	65535
54		Off	224.11.8.80	9040	Off									
73	ST2110-20	Off	239.11.8.74	20007	Off	239.12.9.74	20007	ST2022-6	Off	239.11.8.76	20008	Off	239.12.9.75	20008

Click the camera system you want to set up. The edit popup window appears in which you can edit the following parameters:

**Edit IP Mon Live**

Camera System: 73

**Monitoring:**

Enabled: Off

Protocol: ST2022-6 ST2110-20

**Port A output:**

Dest. IP address: 224.11.5.73

Dest. Port: 9040

**Port B output:**

Dest. IP address: 10.12.5.10

Dest. Port: 20007

**Live video:**

Enabled: Port A

Protocol: ST2022-6 ST2110-20

**Port A output:**

Dest. IP address: 224.11.8.81

Dest. Port: 9040

**Port B output:**

Dest. IP address: 10.12.5.11

Dest. Port: 20008

Ok Cancel

#### Monitoring video

**Enabled** — selects whether the Monitoring video is included in the Media Network stream and to which port the stream is sent:

*Port A:* Monitoring video is routed to Port A (default setting).

*Port A+B:* Monitoring video is routed to both Port A and B to establish a redundant network connection. Refer to “[IP Redundancy](#)” on page 53 for more information about IP Redundancy.

*Off:* Monitoring video is NOT inserted into the Media Network stream (this is also indicated with the indication *off* in front of Stream 1).

**Protocol** — this is the transport protocol for Monitoring video. Select either *ST2022-6* (embedded SDI with audio and ancillary data over IP) or *ST2110-20* (Video essence over IP).

#### Port A output

**Dest. IP address** — the destination IP address for Port A to which Monitoring video is sent.

**Dest. Port** — the destination port number for Port A for Monitoring video.

#### Port B output



#### Note

Port B is only used when redundant operation is enabled.

---

**Dest. IP address** — the destination IP address for port B to which Monitoring video is sent.

**Dest. Port** — the destination port number for Port A for Monitoring video.

#### Live video



#### Note

Live video is only present when HDR is enabled and/or when the XCU is running in a 4K video mode.

---

**Enabled** — selects whether the Live video is included in the Media Network stream and to which port the stream is sent:

*Port A:* Live video is routed to Port A (default setting).

*Port A+B:* Live video is routed to both Port A and B to establish a redundant network connection. Refer to “[IP Redundancy](#)” on page 53 for more information about IP Redundancy.

*Off:* Live video is NOT inserted into the Media Network stream.

**Protocol** — this is the transport protocol for Live video. Select either *ST2022-6* (embedded SDI with audio and ancillary data over IP) or *ST2110-20* (Video essence over IP).

#### Port A output

**Dest. IP address** — the destination IP address for Port A to which Live video is sent.

**Dest. Port** — the destination port number for Port A for Live video.

## Port B output



### Note

Port B is only used when IP Redundancy is in operation.

**Dest. IP address** — the destination IP address for port B to which Live video is sent.

**Dest. Port** — the destination port number for Port B for Live video.

### 4.3.5 IP Video In tab

The list of camera systems is shown, sorted by camera number. In this tab the incoming External 1, External 2 and Teleprompter video inputs can be set up.

Number	Extern 1	Port	Multicast	Extern 2	Port	Multicast	Teleprompter	Port	Multicast
51	ST2022-6	20001	No	ST2022-6	20005	No	ST2022-6	20004	No
52	ST2022-6	20002	No	ST2022-6	20006	No	ST2022-6	20007	No
54	ST2022-6	4002	No	ST2022-6	4100	No	ST2022-6	20006	No
73	ST2110-20	20002	239.11.5.52	ST2110-20	20002	239.11.6.52	ST2022-6	9042	239.26.123.70

The Extern 1, Extern 2 and Teleprompter columns show the present indicator, transport protocol, port number and Multicast IP address for each incoming video stream.

Click the camera system you want to set up. The edit popup window appears in which you can edit the following parameters:

For Extern 1, Extern 2 and Teleprompter:

**Present** — the present indicator can have the following status indications:

<input type="radio"/> no indication	Stream is not present or not available.
<input checked="" type="radio"/> Yes	Stream is present.
<input type="radio"/> Unsupported format	Stream is present but audio has an unsupported format.
<input type="radio"/> No	Stream is not present or an error has occurred.

**Protocol** — this is the expected transport protocol for the incoming video stream. Select either *ST2022-6* or *ST2110-20*;

**Port** — the receiving port number for the video stream.

**Multicast** — Yes or No. Select whether you want to use multicast or not.

**Multicast IP** — the receiving multicast IP address (when Multicast = Yes)




**Tip**

It is recommended to use port numbers in the *1000 .. 49152* range.

### 4.3.6 IP Audio tab

The list of camera systems is shown, sorted by camera number. In this tab the outgoing and incoming IP Audio streams can be set up.



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IP Media Port A

IP Media Port B

IP Main A

IP Main B

IP Mon \ Live

IP Video In

IP Audio

IP Intercom

Camera Systems

Number	Output (Port A)		Output (Port B)		Channels Out	Input	Port	Multicast Src	Channels In
51									
52		239.11.5.152 5004	Off	239.12.5.1 5004	8 1 ms		5002	No	8 3 ms
54									
73		239.11.5.73 4002	Off	10.12.5.10 5001	8 1 ms		5004	239.11.5.152	8 3 ms

The columns show relevant information for both outgoing (on Ports A and B) and incoming streams.

Click the camera system you want to set up. The edit popup window appears in which you can edit the following parameters:

#### AES67 Audio Out

**Enabled** — selects whether AES67 Audio output is included in the Media Network stream and to which Port the stream is sent:

*Port A:* AES67 Audio is routed to Port A (default setting).

*Port A+B:* AES67 Audio is routed to both Port A and B to establish a redundant network connection. Refer to [“IP Redundancy” on page 53](#) for more information about IP Redundancy.

*Off:* AES67 Audio is NOT inserted into the Media Network stream.

**Channels** — Number of audio channels that is inserted into AES67 Audio output. Can be 2,4,6, 8 or 16 channels.

**Packet Time** — Selects packet time of the AES67 Audio packets.

#### Port A output

**Dest. IP address** — the destination IP address for Port A to which AES67 Audio output is sent.

**Dest. Port** — the destination port number for Port A for AES67 Audio output.

#### Port B output



#### Note





Port B is only used when redundant operation is enabled.

**Dest. IP address** — the destination IP address for port B to which AES67 Audio output is sent.

**Dest. Port** — the destination port number for Port B for AES67 Audio output.

#### AES67 Audio In

**Present** — indicates whether an AES67 Audio input is present on the Media Network. It can have the following status indications:

 no indication	Stream is not present or not available.
 Yes	Stream is present.
 Unsupported format	Stream is present but audio has an unsupported format.
 No	Stream is not present or an error has occurred.

**Multicast** — Yes or No. Select whether you want to use multicast or not.

**Multicast IP** — the receiving multicast IP address, when Multicast = Yes.

**Channels** — Number of audio channels that is inserted into AES67 Audio input. Can be 2,4,6, 8 or 16 channels.

**Buffer Size** — Selects buffer size for AES67 Audio input. Can be 0.33 ms, 0.67 ms, 1 ms, 2 ms, 3 ms, 4 ms, 8 ms or 15 ms.




#### Tip

Check the 'Apply settings to all camera systems' box and press OK to apply the (changed) settings in this window to all camera systems (where applicable).



### 4.3.7 IP Intercom tab

The list of camera systems is shown, sorted by camera number. In this tab the incoming and outgoing IP Intercom streams can be set up.



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Monitoring

Configuration

System

About

Camera Connect: Grass Valley R&D / Breda

admin | Logout

<<

IP Media Port A

IP Media Port B

IP Main A

IP Main B


IP Mon \ Live

IP Video In

IP Audio

IP Intercom

Camera Systems

Number	Output (Port A)		Output (Port B)		Channels Out		Input	Port	Multicast Src	Channels In		Prog Src		
51							IP							
52	Off	239.11.5.2	5004	Off	239.12.5.112	65535	8	1 ms	Analog	5002	239.11.5.11	8	3 ms	Intercom
54									Analog					
73	Off	239.11.5.11	5002	Off	10.12.5.11	5002	8	1 ms	 AES67	5004	239.11.5.52	8	3 ms	Audio

Click the camera system you want to set up. The edit popup window appears in which you can edit the following parameters:

**Edit IP Intercom**

Camera System: 73

Source: AES67

Program source: Intercom Audio

**AES67 Intercom Out:**

Enabled: Port A+B

Channels: 8

Packet Time: 1 ms

**Port A output:**

Dest. IP Address: 10.11.5.54

Dest. Port: 5005

**Port B output:**

Dest. IP Address: 10.12.5.34

Dest. Port: 5004

**AES67 Intercom In:**

Present: Yes

Port: 9000

Multicast: No Yes

Multicast IP: 239.0.123.70

Channels: 8

Buffer size: 3 ms

☐ Apply settings to all camera systems

Ok Cancel

**Source** — Selects input source for intercom Eng and Prod channels. Analog = from intercom subD-connector at backpanel of XCU (Cradle); Ext1 = from embedded SDI audio of external video input 1 (EXT1). AES67 = from AES67 Intercom stream on the Media Network.

**Program source**— Intercom or Audio.

### AES67 Intercom Out

**Enabled** — selects whether the AES67 intercom output is included in the Media Network stream and to which port the stream is sent:

*Port A:* AES67 intercom is routed to Port A (default setting).

*Port A+B:* AES67 intercom is routed to both Port A and B to establish a redundant network connection. Refer to [“IP Redundancy” on page 53](#) for more information about IP Redundancy.

*Off:* AES67 intercom is NOT inserted into the Media Network stream (this is also indicated with the indication *off* in front of Stream 1).

**Channels** — Number of audio channels that is inserted into AES67 intercom output. Can be 2,4,6, 8 or 16 channels.

**Packet Time** — Selects packet time of the AES67 intercom output audio packets.

#### Port A output

**Dest. IP address** — the destination IP address for Port A to which AES67 intercom output is sent.

**Dest. Port** — the destination port number for Port A for AES67 intercom output.

#### Port B output



#### Note

Port B is only used when redundant operation is enabled.

---

**Dest. IP address** — the destination IP address for port B to which AES67 intercom output is sent.

**Dest. Port** — the destination port number for Port B for AES67 intercom output.

### AES67 Intercom In

**Present** — indicates whether AES67 intercom input is present on the Media Network.

**Multicast** — Yes or No. Select whether you want to use multicast or not.

**Multicast IP** — the receiving multicast IP address, when Multicast = Yes.

**Channels** — Number of audio channels that is inserted into AES67 intercom input. Can be 2,4,6, 8 or 16 channels.

**Buffer Size** — Selects buffer size for AES67 intercom input. Can be 0.33 ms, 0.67 ms, 1 ms, 2 ms, 3 ms, 4 ms, 8 ms or 15 ms.



#### Tip

Check the ‘Apply settings to all camera systems’ box and press OK to apply the (changed) settings in this window to all camera systems (where applicable).

---

### Channel mapping for audio and intercom

For the audio and intercom audio channel mapping on the Media Network, refer to the table below:

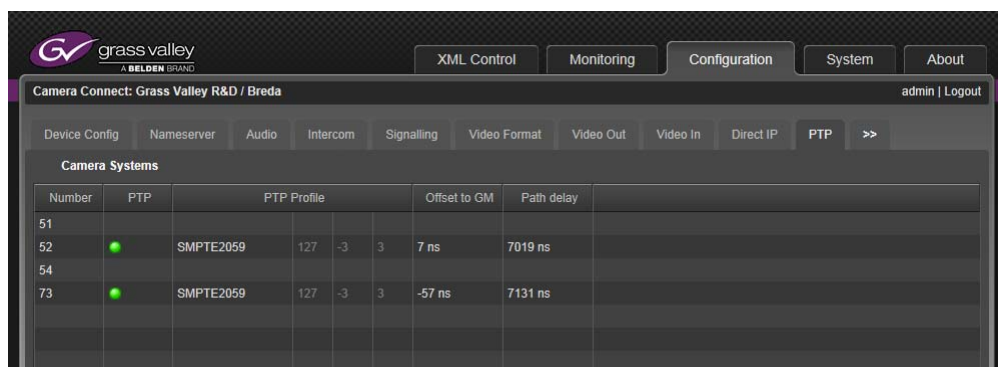
	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5 to 8/16
<b>Output stream</b>					
Audio A1	Camera Audio 1	Camera Audio 2	Camera AES1	Camera AES2	<mute>
Intercom A1	Prog (Program) intercom	(Program spare)	<mute>	<mute>	<mute>
<b>Input stream</b>					
Audio A1	Eng intercom	Prod intercom	Prog (Program) intercom	(Program spare)	<mute>
Intercom A1	Eng intercom	Prod intercom	<mute>	<mute>	<mute>

### 4.3.8 PTP tab

The XCU can be synchronized over the Media Network to a PTP grandmaster clock using the Precision Time Protocol (PTP).

The PTP subtab can be found by clicking the double arrow (<<) at the left. The sub tab is located in the first group of sub tabs.

The list of camera systems is shown, sorted by camera number. In this tab you can set up synchronization to a PTP grandmaster.



Click the camera system you want to set up. The edit popup window appears in which you can edit the following parameters:

**Reference Source** — select the source of the video reference to which the camera system locks. When *RefVideoIn* is selected the camera system locks to the Reference input signal on the BNC REF IN connector (can be HD Tri-Level sync or SD Black Burst), when *PTP* is selected the camera system configured to lock to a PTP grandmaster reference clock on the Media Network.

### PTP

**Status** — shows PTP locking status. The following status indications are possible:

locked	XCU is locked to the PTP grandmaster clock.
calibrating	XCU has found a PTP grandmaster and is calibrating to the grandmaster.
listening	XCU is searching for a PTP grandmaster on the Media Network
disabled	PTP is switched off (for example when Reference Source = RefVideoIn)
off	XCU is not connected to the Media Network.

**Profile** — select the PTP protocol/domain used for locking to the PTP grandmaster; either *SMPTE2059*, *AES67*, *AES-SMPTE* or *User*.

When *User* is selected the parameters *Domain Nr*, *Delay Req Interval* and *Receipt Timeout* must be set. For more information about these parameters, refer to the IEEE1588 PTP (Precision Time Protocol) specification.



### Tip

Check the 'Apply settings to all camera systems' box and press OK to apply the (changed) settings in this window to all camera systems (where applicable).

## 4.4 IP Redundancy

### 4.4.1 Introduction

Redundancy provides an alternative transmission route for video streams in case of a (partial) network failure or when maintenance needs to be carried out on (a part of) the network without interrupting operation.

The XCU supports IP Redundancy for the Media Network. The Media Network bay has two ports (B1 and B2) that are used for redundant media transport over IP networks.

The XCU offers redundant video, audio and intercom outgoing streams from the unit to a redundant media network (primary and secondary network).

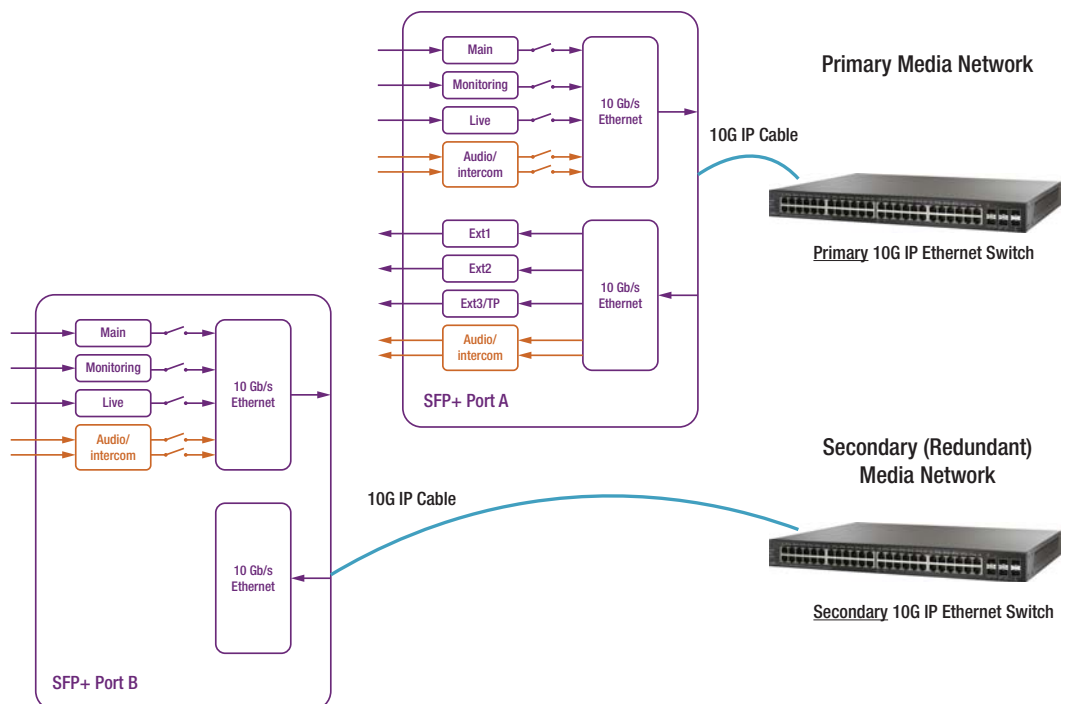
Transmission redundancy is achieved by stream duplication. This means that the RTP (Real Time Protocol) stream is duplicated and only the MAC addresses, IP addresses and UDP port numbers are different for the redundant stream.

Note that the following streams are excluded from redundant operation:

- All incoming streams from the network to the XCU (External video, Teleprompter video and audio/intercom)
- PTP locking
- C2IP and AMWA-NMOS

### 4.4.2 Streams overview

Below is a schematic diagram of the Media Network interface with transmission stream redundancy for video and audio streams.



### 4.4.3 Configuring IP Redundancy

#### Setting up local IP addresses

Set up the local IP and Port address for Ports A and B



#### Note

Make sure that Ports A and B are set up to use separate subnets.

#### Enabling streams

For each of the following outgoing streams, IP Redundancy can be individually enabled or disabled. When enabled, the stream is duplicated on the secondary stream on Port B:

- Main video — click the *IP Main A* tab, click the camera system and set *Enabled* to **Port A+B** or click the *IP Main B* tab, click the camera system and set *Enabled* to **Port A+B**.
- Monitoring video — click the *IP Mon\Live* tab, click the camera system and set *Enabled* to **Port A+B** under *Monitoring video*.
- Live video — click the *IP Mon\Live* tab, click the camera system and set *Enabled* to **Port A+B** under *Live video*.
- AES67 audio — click *IP Audio* tab, click the camera system and set *Enabled* to **Port A+B**.
- Intercom audio — click the *IP Intercom* tab, click the camera system and set *Enabled* to **Port A+B**.

#### Note about PTP locking

IP redundancy for PTP is not available so in case of a network failure of the primary network, a SMPTE 2022-7 (Seamless Protection Switching) compatible receiver will switch seamlessly to the secondary stream of the XCU. However, as PTP locking is only available on the primary network, the XCU loses its PTP connection to the grandmaster.

When the primary network operation is restored the SMPTE 2022-7 receiver would seamlessly switch back to the primary network stream. After a few seconds the XCU locks again to the PTP grand master, causing a short interruption in the primary stream at the receiver.

To prevent this interruption you can use Reference input (HD Tri-Level or SD Black Burst) as the reference source instead of PTP.

### 4.4.4 Media Network diagnostics

Used bitrate can be viewed in the **DIAGNOSTICS > MEDIA NETWORK > OUTGOING STREAMS** menu for all individual ports.

The locked status for each (enabled) primary and/or secondary IP stream can be monitored in the **DIAGNOSTICS > MEDIA NETWORK > OUTGOING STREAMS** menu,. Select the item of the stream (Main video, Live video, Monitoring video, Audio and Intercom) to view its locked status.

### 4.4.5 Incoming audio/intercom

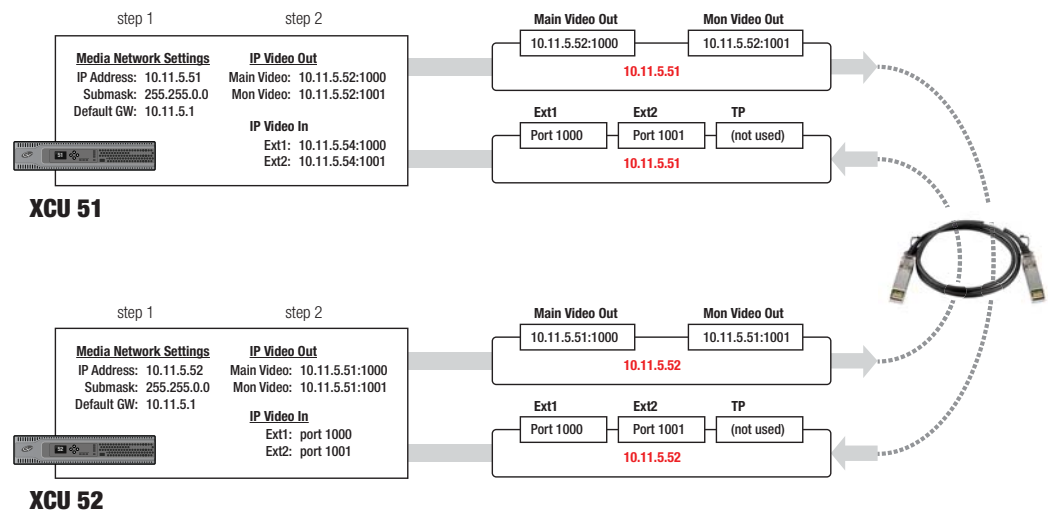
IP Redundancy does not support the reception of redundant audio/intercom (incoming) streams.

**Tip**

A work around for redundancy would be to receive intercom streams from a secondary network by an IP audio interface, embed the intercom in an Ext1 (SMPTE2022-6) stream and send this to the XCU on the primary Media network. This could be feasible if the audio/intercom network is separated from the video network. In this case the intercom input source should be set to "Ext1".

## 4.5 Test example

Below is a simple test configuration to connect two XCUs (cross-linked). All IP settings are in unicast, no network switch is used. For test purposes, short length copper twisted pair cabling can be used.



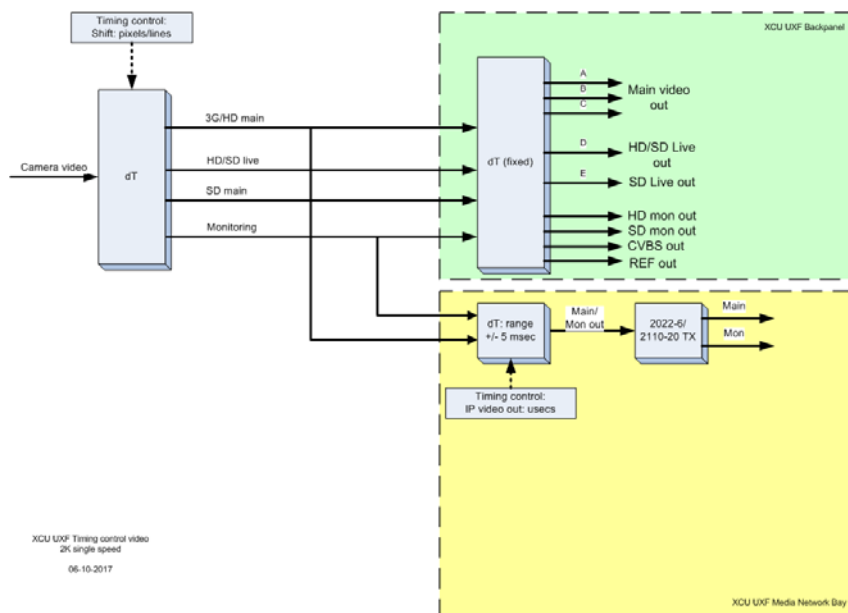
## 4.6 IP Timing

A separate delay is available for the main video signal from the camera to the Media Network to allow the receiver of the stream to align the incoming IP stream to the reference video. A built-in, fixed delay aligns the IP streams roughly to reference input for each frame rate but a custom delay allows to align the received IP stream at the destination node.

Below are schematic diagrams of the timing and delay chains in the XCU for different situations:

### 4.6.1 Timing for 2K single speed video modes

In the XCU menu, go the `INSTALL > TIMING` menu and use the `IP VIDEO OUT` function to set the delay between  $-5000\ \mu\text{s}$  and  $+5000\ \mu\text{s}$ .

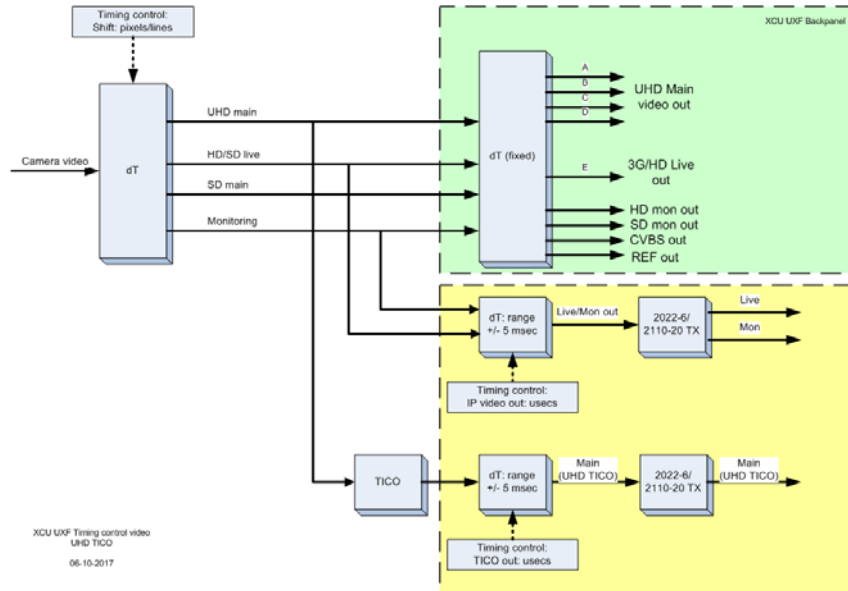


### 4.6.2 Timing for 4K Tico compressed video modes

In the XCU menu, go the `INSTALL > TIMING` menu and use the `IP VIDEO OUT` function to set the delay between  $-5000\ \mu\text{s}$  and  $+5000\ \mu\text{s}$ .



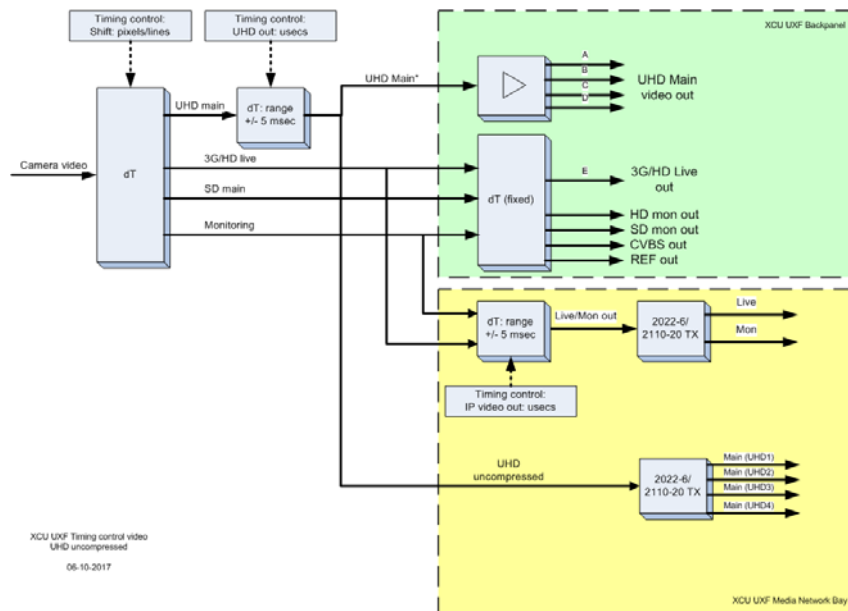
In the XCU menu, go the **INSTALL > TIMING** menu and use the **TICO OUT** function to set the delay between  $-5000\ \mu\text{s}$  and  $+5000\ \mu\text{s}$ .



#### 4.6.3 Timing for 4K uncompressed video modes

In the XCU menu, go the **INSTALL > TIMING** menu and use the **UHD OUT** function to set the delay between  $-5000\ \mu\text{s}$  and  $+5000\ \mu\text{s}$ .

In the XCU menu, go the **INSTALL > TIMING** menu and use the **IP VIDEO OUT** function to set the delay between  $-5000\ \mu\text{s}$  and  $+5000\ \mu\text{s}$ .



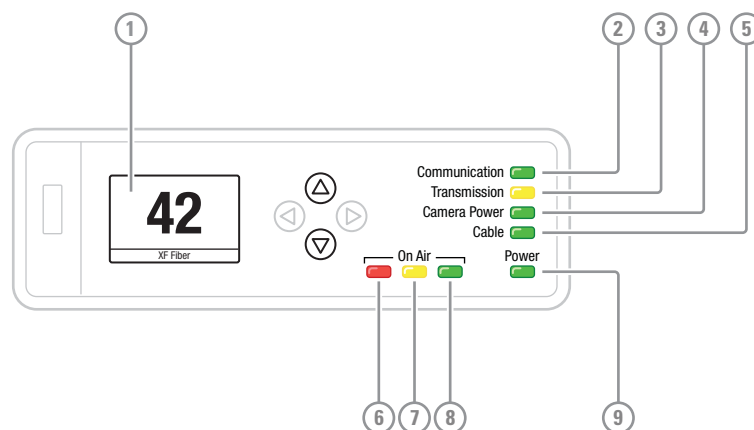


# Chapter 5

## Operation

### 5.1 Front panel indicators

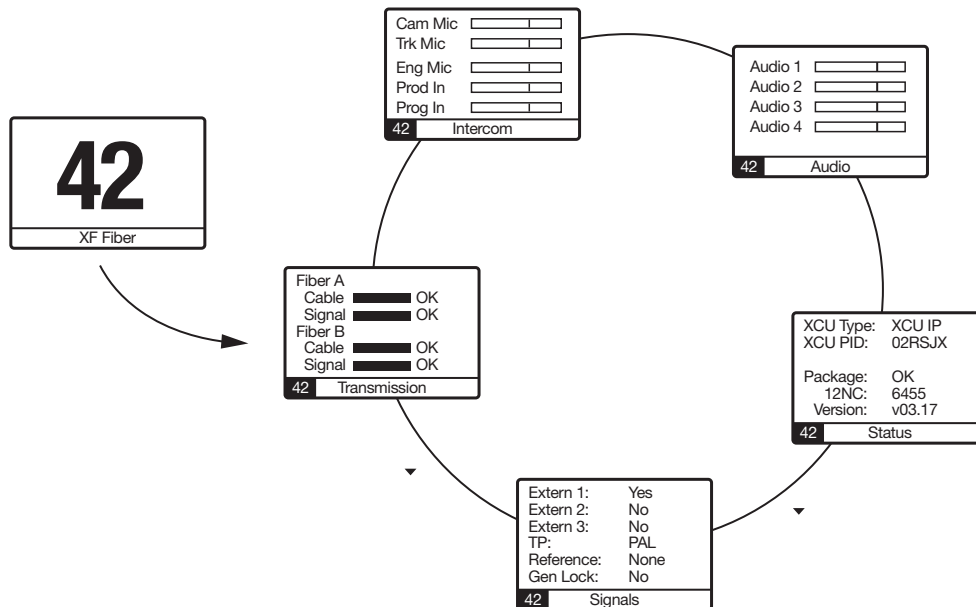
During setup and operation operation and transmission can be monitored on the XCU front panel. A graphical display and several LED indicators provide information about important operational and diagnostic functions.



#### ① Display

In normal operation the display shows the number of the camera connected to the XCU. It can also show configuration and diagnostic information.

Use the up and down buttons next to the display to loop through five different screens of information: Transmission, Signals, Status, Audio and Intercom:



## ② Communication indicator

This green indicator lights when communication between camera and the XCU is established and working correctly. A red light indicates a communication error.

## ③ Transmission indicator

This indicator lights when a working signal transmission is established between the camera and XCU. A correct XF Fiber connection is indicated by a yellow light. A red light indicates a connection error.

## ④ Camera Power indicator

A green light means that the connected camera is powered by the XCU and switched on. A flashing green light indicates that a camera is connected but not switched on. A red light indicates a power supply error (e.g. a power overload).

## ⑤ Cable indicator

This green indicator lights when a transmission cable is correctly connected between the camera and XCU. A flashing red light indicates a missing or interrupted transmission cable. A red light indicates that a cable is connected but there is an error (e.g. a short circuit).



## WARNING

When the temperature in the XCU becomes too high, an *EMERGENCY STOP* occurs. This is indicated by four indicators (Communication, Transmission, Camera Power and Cable) flashing simultaneously red. Switch off the unit and contact your regional Grass Valley service representative.

### ⑥ On Air indicator

The On Air indicator lights when the connected camera is switched On Air.

### ⑦ On Air Yellow indicator (or ISO)

The On Air Yellow indicator lights when the connected camera is switched to On Air Yellow or when the camera is in ISO mode.

### ⑧ On Air Green indicator (or Call)

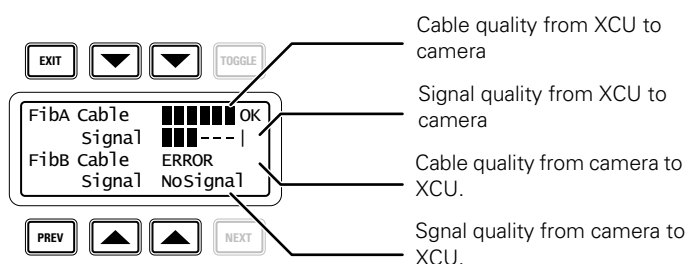
The On Air Green indicator lights when the connected camera is switched to On Air Green or when a Call signal is sent or received.

### ⑨ Power indicator

This green indicator lights when the XCU is switched on. A flashing green indicator means that the unit is shutting down.

## 5.2 Transmission diagnostics on the OCP

With an Operational Control Panel (OCP 400) is connected to the system, transmission can be monitored in the diagnostics page of the panel:



Indication	Description
████████ OK	Cable or signal quality is OK.
████- - -	Cable or signal quality is below optimum, transmission is still in operation. The quality level can vary between 6 (high) and 0 (low) units.
- - - - -	Cable or signal quality is poor. Check cable and connectors for interruptions, broken or dirty optical connections.
ERROR	Cable error. Check cable and connectors for interruptions, broken or dirty optical connections.
NoSignal	No signal is received. Check cable and connectors for interruptions, broken or dirty optical connections.

## 5.3 Messages

Message	Location	Situation	Solution or possible action
"No Cradle"	Front panel display	XCU Unit is not mounted into a cradle. The unit will power up but does not normally operate.	Mount the XCU into the cradle and power up.
[All indicators flash simultaneously red]	Front panel	Emergency stop: temperature in the XCU is too high.	Switch off the unit and contact your regional Grass Valley service representative.
"Dup ??? ip addresses"	Monitoring video	Duplicate IP address or port entered in the IP configuration section of the XCU menu.	Re-enter IP settings

## 5.4 Replacement of fuses

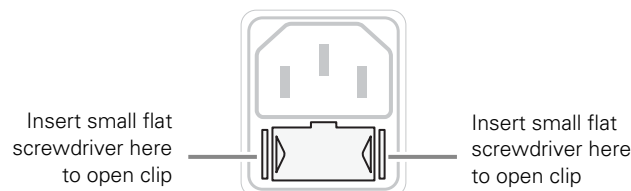


### Caution

Switch off the XCU and disconnect power cables before proceeding.

Use only fuses of the type and rating specified. Always replace both fuses at the same time.

The XCU is equipped with 2x T8AH type 250 V fuses . They are located in the mains entry at the back of the unit. Follow these steps to replace the fuses located in the mains entry:



1. Insert a very small screwdriver into the hole at the left side and then at the right side of the fuseholder to unclip both side of the fuseholder.
2. Extract the fuseholder from the mains entry by pulling of the small clip at the bottom of the fuseholder.
3. Replace both fuses.
4. Insert the fuseholder until it clicks into place.
5. Connect the power supply for the XCU to the IEC connector at the rear.

# Chapter 6

## XCU menu reference

### 6.1 Video menu

Menu item	Settings	Default	Level	Description
<b>Colour Bar</b>				
Colour Bar	Off, On	Off	User 1	Turns color bar on or off (when camera signal is not present)
Bar Type	Split, Full	Split	User 1	Selects color bar type: Split (according to SMPTE RP215), Full
Anylight	Optimal, Good, Fair, Poor, Extreme	Optimal	User 3	When XCU is running HiSpeed or XtremeSpeed video modes, this setting defines how flicker reduction is applied to the camera video signal. Refer to the camera user's guide for a detailed explanation of the settings. Note 1: Only valid for XCU Universe UXF version and in combination with HS/XS capable cameras. Note 2: HiSpeed and XtremeSpeed are only available at the BNC outputs, not on the Media Network.
<b>SD Detail</b>				
Detail	Off, On	Off	User 1	Turns SD Detail on or off
Source	R, G, Y, R+G	Y	User 1	Selects the source for SD Detail signal generation.
Level	0..99	25	User 1	Sets overall SD Detail level: amount of detail added to the SD video signal.
Vertical Lvl	0..99	50	User 1	Sets the level of the vertical component in the SD Detail signal.
Noise Slicer	0..99	10	User 1	Sets the level of the Noise Slicer.
Coarse/Fine	0..99	90	User 1	Sets SD Detail balance between coarse and fine structures (0 = coarse, 99 = fine).
Level Dependence	0..99	30	User 1	Sets the SD Detail reduction level for shadow areas.
Soft Detail	Off, On	Off	User 1	Switches SD Soft Detail on or off. This function reduces the amount of detail added to large transitions.
Soft Detail Lvl	0..99	50	User 1	Sets the maximum limit level of detail for SD Soft Detail.

## 6.2 Monitoring menu

Menu item	Settings	Default	Level	Description
Display	On, Time	Time	User 2	Selects the camera menu to stay permanently On or to disappear after a set Time.
Menu time	3..30	10	User 3	Sets the length of time the menu is displayed when the Display mode is set to Time.

### Statusbar

Camera Number	Off, On	Off	User 1	Switch on to show the camera number in the status bar.
Name	Off, Alias, Dev ID, Head ID	Off	User 1	Switch on and select system Alias, Device ID or Head ID to show in the status bar.
Cable Info	Off, On	Off	User 1	Switch on to show transmission cable information in the status bar.



## 6.3 Audio/Intercom menu

Menu item	Settings	Default	Level	Description
<b>Audio</b>				
Audio1 Level	0dB, 6dB	6dB	User 1	Selects studio attenuation level for Audio input 1
Audio2 Level	0dB, 6dB	6dB	User 1	Selects studio attenuation level for Audio input 2.
<b>Intercom</b>				
Input Source	Analog, Ext1, AES67	Analog	User 1	Selects source for intercom Eng and Prod channels: Analog = from intercom subD-connector at backpanel of XCU (Cradle); Ext1 = from embedded SDI audio of external video input 1 (EXT1) AES67 = from AES67 intercom stream of the Media Network.
Program Source	Intercom, Audio	Intercom	User 1	Selects source for intercom Prog channel: Intercom = from intercom connector at back panel of XCU (cradle); Audio = from embedded audio. (In case of AES67 use program input source from audio or intercom incoming stream)
<b>Isolate</b>				
Isolate	Isolate, System	System	User 1	Isolate = disconnects Program and Production intercom channels from camera head; System = isolate is off
<b>Eng</b>				
Wire Mode	4wire, 2wire	4wire	User 1	Selects wiring mode for Engineering (Eng) intercom channel.
Volt/Cur drive	4wire, 2wire	4wire	Service	<Advanced settings>
2/4 wire	4wire, 2wire	4wire	Service	<Advanced settings>
Level	0dB, 6dB	6dB	User 1	Selects intercom channel attenuation (only available in 4wire mode, in 2wire mode level is always 0 dB).
Side Tone	0..99	50	User 1	Sets side tone (feedback) volume level.
<b>Prod</b>				
Wire Mode	4wire, 2wire	4wire	User 1	Selects wiring mode for Production (Prod) intercom channel.
Volt/Cur drive	4wire, 2wire	4wire	Service	<Advanced settings>
2/4 wire	4wire, 2wire	4wire	Service	<Advanced settings>
Level	0dB, 6dB	6dB	User 1	Selects intercom channel attenuation (only available in 4wire mode, in 2wire mode level is always 0 dB).
Side Tone	0..99	50	User 1	Sets side tone (feedback) volume level.
<b>Prog</b>				
Wire Mode	4wire, 2wire	4wire	User 1	Selects wiring mode for Program intercom channel.
Level	0dB, 6dB	6dB	User 1	Selects intercom Program (Prog) channel attenuation (only available in 4wire mode, in 2wire mode level is always 0 dB).

## 6.4 Install menu

Menu item	Settings	Default	Level	Description
<b>Cam Conn</b>				
ConnectType	Cable, Network	Cable	User 2	Selects the connection type between camera and XCU: Cable = camera and XCU are connected directly by the transmission cable. Network = camera and XCU are connected via the Media Network Note: only available when the "GVLC-XF-Direct-IP" eLicense is installed.
Name	<text>	—	User 2	Sets Network name for XCU Note: only available when the "GVLC-XF-Direct-IP" eLicense is installed.
Number	1..99	1	User 2	Selects logical camera number.
<b>Streams</b>				
BackPanel ExtOut	Off, On	On	Service	Switches off External video output stream to XF-adaptor (use this setting to save bandwidth in Direct IP mode).
Teleprompter	Off, On	On	Service	Switches off Teleprompter video output stream to XF-adaptor (use this setting to save bandwidth in Direct IP mode).
Alias	<text>	—	User 2	Sets Alias for the camera system.
Device ID	<text>	—	User 2	Sets Device ID for the XCU.
<b>Timing</b>				
H Phase	0..99	50	User 0	Sets the horizontal (H) sync phase.
IP Video Out	-5000 .. 5000	0	User 0	Sets timing advance or delay for outgoing video streams on the Media Network in $\mu$ s with respect to reference video.
UHD Out	-5000 .. 5000	0	User 0	Sets timing advance or delay for outgoing UHD video streams in $\mu$ s with respect to reference video.
HS	-5000 .. 5000	0	User 0	Sets timing advance or delay for outgoing HS video streams in $\mu$ s with respect to reference video.
TICO Out	-5000 .. 5000	0	User 0	Sets timing advance or delay for outgoing TICO video streams in $\mu$ s with respect to reference video.
Audio Delay	0..170 ms	0 ms	User 0	Sets delay for outgoing audio signals (both basebands and IP streams) with respect to video.
<b>Shift</b>				
Pixels	0..1920	0	Service	<Advanced settings>
Lines	0..1080	0	Service	<Advanced settings>
<b>Time/Date</b>				
Time	<time>	—	User 2	Shows current time.
Date	<date>	—	User 2	Shows current date.
<b>Change Time</b>				
Hours (24h)	0..23	0	User 2	Sets the value for hours.

Menu item		Settings	Default	Level	Description
	Minutes	0..59	0	User 2	Sets the value for minutes.
	Set time	Exec, ..		User 2	Apply new time settings.
<b>Change Date</b>					
	Day	1..31	1	User 2	Sets the value for day.
	Month	1..12	1	User 2	Sets the value for month.
	Year	2000...2199	2015	User 2	Sets the value for year.
	Set date	Exec, ..		User 2	Apply new date settings.
	Status	NotSet, DataLoss, Error, Ok	NotSet	User 2	Shows status of the internal clock.
	Batt. Status	Ok, Low, Error	OK	User 2	Shows internal battery status
	Battery	0..9999	0	User 2	Shows battery level
<b>Signalling input</b>					
	Onair Source	GPIO, Ethernet	GPIO	User 0	GPIO (General Purpose Input/Output): On Air is controlled by the signalling connector on the XCU; Ethernet: On Air is controlled via the C2IP (Ethernet) network, e.g. by the OCP 400.
	Onair R Inp.	Low/High, High/Low, Open/High, High/Open	Low/High	User 0	Selects switch mode for the Red On Air signalling input.
	Onair Y Inp.	Low/High, High/Low, Open/High, High/Open	Low/High	User 0	Selects switch mode for the Yellow On Air (ISO) signalling input.
	Call Input	Low/High, High/Low, Open/High, High/Open	Low/High	User 0	Selects switch mode for the Call signalling input.
<b>Signalling Outp.</b>					
	Crash2Air	On, Off	Off	User 1	<Advanced settings>
<b>C2IP Network</b>					
<b>IP Settings</b>					
	IP mode	Auto, Manual	Auto	User 0	Selects manual or automatic IP configuration mode for the C2IP (control) network.
	Subnet Mask	0..31	0	User 0	Selects the subnet mask value (when IP mode is set to manual).
<b>IPs</b>					
	BS	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Sets local IP address of the XCU for the C2IP control network (when IP mode is set to manual)
	CAM	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Sets camera head IP address in the C2IP control network (when IP mode is set to manual).
	Def GW	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Selects camera head default gateway IP address in the C2IP control network (when IP mode is set to manual).
	Apply settings	Exec, ....	Exec	User 0	Select Exec to apply the new IP settings.
<b>Nameserver 1</b>					

Menu item		Settings	Default	Level	Description
	Use server	No, Yes	No	User 0	Select Yes to enable Name Server 1 Note: to use the name server feature the Nameserver eLicense must be installed on the Camera Connect
	Status	Off, Unknown, Active, Unavail	Off	User 0	Shows current status of Name Server 1
	IP	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Selects Name Server 1 IP address.
	Apply settings	Exec, ....	Exec	User 0	Select Exec to apply the new IP settings.
<b>Nameserver 2</b>					
	Use server	No, Yes	No	User 0	Select Yes to enable Name Server 2 Note: to use the name server feature the Nameserver eLicense must be installed on the Camera Connect
	Status	Off, Unknown, Active, Unavail	Off	User 0	Shows current status of Name Server 2
	IP	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Selects Name Server 2 IP address.
	Apply settings	Exec, ....	Exec	User 0	Select Exec to apply the new IP settings.
<b>Media Network</b>					
<b>Port A</b>					
<b>Local IP</b>					
	Subnet Mask	0..31	0	User 0	Set local subnet mask for ports A1 and A2
	A1 IP	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Set local IP address for port A1
	A2 IP	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Set local IP address for port A2
	GW IP	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Set local gateway address for ports A1 and A2
<b>Outgoing Streams</b>					
<b>Main Video</b>					
	Protocol	ST2022-6, ST2110-20	ST2022-6	User 0	Set protocol for Main video outgoing stream: ST2022-6: embedded SDI with audio and ancillary data over IP ST2110-20: video essence only over IP
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set the destination IP address of the Main video outgoing stream (or substream 1 when multiple substreams are used.)
	PortNr	0..65535	0	User 0	Set the destination Port number for the Main video outgoing stream (or substream 1 when multiple substreams are used.)
	4K IP Output	Tico, Uncompr	Tico	User 3	When a 4K video mode is selected, this selects the compression mode for the Main video outgoing stream: Tico: TICO compressed; Uncompr: uncompressed. Note that this option is only available when an LDX 86N camera is connected.

Menu item		Settings	Default	Level	Description
	SubStrConf	AutofillIP, AutofillPrt, Manual	Manual	User 0	When the 4K uncompressed compression mode is selected, this selects the method of configuration of the Main video (sub)streams (substreams 2 to 4).
	<b>Stream 2</b>				
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Main video outgoing substream 2 (if present).
	PortNr	0..65535	0	User 0	Set destination Port number for Main video outgoing substream 2 (if present).
	<b>Stream 3</b>				
	destIP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Main video outgoing substream 3 (if present).
	destPortNr	0..65535	0	User 0	Set destination IP address for Main video outgoing substream 3 (if present).
	<b>Stream 4</b>				
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Main video outgoing sub stream 4 (if present).
	PortNr	0..65535	0	User 0	Set destination Port number for Main video outgoing substream 4 (if present).
	<b>Live Video</b>				
					IP configuration of the Live video outgoing stream. Available in XDR mode as switchable HDR/SDR stream and as downsampled 1080p signal in 4K mode. Note: the XDR eLicense needs to be installed on the camera.
	Protocol	ST2022-6, ST2110-20	ST2022-6	User 0	Set protocol for Live video outgoing stream: ST2022-6: SDI signals over IP ST2110-20: video “essence” over IP
	IP				Set destination IP address for Live video outgoing stream.
	PortNr	0...65535	0	User 0	Set destination port number for Live video outgoing stream.
	<b>Monitoring Video</b>				
	Protocol	ST2022-6, ST2110-20	ST2022-6	User 0	Set protocol for Monitoring video outgoing stream: ST2022-6: SDI signals over IP ST2110-20: video “essence” over IP
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Monitoring video.
	PortNr	0...65535	0	User 0	Set destination Port number for Monitoring video.
	<b>Audio</b>				
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Audio stream.
	PortNr	0...65535	0	User 0	Set destination Port number for Audio stream.
	Number of Ch	2,4,6,8,16	8	User 0	Selects number of channels in the Audio stream. Note: the allocation of audio payload to channels is fixed.
	Packet Time	0.125 ms, 0.250 ms, 1 ms	1 ms	User 0	Selects packet time of the AES67 packets. Refer to the AES67 specification.

Menu item	Settings	Default	Level	Description
<b>Intercom</b>				
IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Intercom stream.
PortNr	0..65535	0	User 0	Set destination port number for Intercom stream.
Number of Ch	2,4,6,8,16	8	User 0	Selects number of channels in the Intercom stream. Note: allocation of audio payload to channels is fixed.
Packet Time	0.125 ms, 0.250 ms, 1 ms	1 ms	User 0	Selects packet time of the AES67 packets. Refer to the AES67 specification.
<b>Incoming Streams</b>				
<b>Extern 1</b>				
Protocol	ST2022-6, ST2110-20	ST2022-6	User 0	Selects transport protocol for External 1 stream: ST2022-6: SDI signals over IP ST2110-20: video essence over IP
PortNr	0..65535	0	User 0	Set receiving Port Number for External 1 stream.
Multicast	No, Yes	No	User 0	Select Yes for Multicast IP or No for Unicast IP streaming.
IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Multicast IP address for External 1 stream (when Multicast = Yes)
<b>Extern 2</b>				
Protocol	ST2022-6, ST2110-20	ST2022-6	User 0	Selects transport protocol for External 2 stream: ST2022-6: SDI signals over IP ST2110-20: video essence over IP
PortNr	0..65535	0	User 0	Set receiving Port Number for External 2 stream.
Multicast	No, Yes	No	User 0	Select Yes for Multicast IP or No for Unicast IP streaming.
IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Multicast IP address for External 2 stream (when Multicast = Yes)
<b>Teleprompter</b>				
Protocol	ST2022-6, ST2110-20	ST2022-6	User 0	Selects transport protocol for Teleprompter stream: ST2022-6: SDI signals over IP ST2110-20: video essence over IP
PortNr	0..65535	0	User 0	Set receiving Port Number for Teleprompter stream.
Multicast	No, Yes	No	User 0	Select Yes for Multicast IP or No for Unicast IP streaming.
IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Multicast IP address for Teleprompter stream (when Multicast = Yes)
<b>Audio</b>				
PortNr	0..65535	0	User 0	Set receiving Port Number for Audio stream.
Multicast	No, Yes	No	User 0	Select Yes for Multicast IP or No for Unicast IP streaming.
IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Multicast IP address for Audio stream (when Multicast = Yes)

Menu item		Settings	Default	Level	Description
	Number of ch	2,4,6,8,16	8	User 0	Selects number of channels in the Audio stream. Note: allocation of audio payload to channels is fixed.
	Buffer size	0.33 ms, 0.67 ms, 1 ms, 2 ms, 3 ms, 4 ms, 8 ms, 15 ms	3 ms	User 0	Selects buffer size for the AES67 packets. Refer to the AES67 specification for more information.
	<b>Intercom</b>				
	PortNr	0..65535	0	User 0	Set receiving Port Number for Intercom stream.
	Multicast	No, Yes	No	User 0	Select Yes for Multicast IP or No for Unicast IP streaming.
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Multicast IP address for for Intercom stream (when Multicast = Yes)
	Number of ch	2,4,6,8,16	8	User 0	Selects number of channels in the Intercom stream. Note: allocation of audio payload to channels is fixed.
	Buffer size	0.33 ms, 0.67 ms, 1 ms, 2 ms, 3 ms, 4 ms, 8 ms, 15 ms	3 ms	User 0	Selects buffer size for the AES67 packets. Refer to the AES67 specification for more information.
	<b>Port B</b>				
	<b>Local IP</b>				
	Subnet Mask	0..31	0	User 0	Set local subnet mask for ports B1 and B2
	B1 IP	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Set local IP address for port B1
	B2 IP	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Set local IP address for port B2
	GW IP	[1..250].[0..255].[0..255].[1..254]	n/a	User 0	Set local gateway address for ports B1 and B2
	NOTE: Make sure to				
	<b>Outgoing Streams</b>				
	<b>Main Video</b>				
	SubStrConf	AutofillIP, AutofillPrt, Manual	Manual	User 0	When the 4K uncompressed video mode is selected, this selects the method of configuration of the Main video (sub)streams (streams 2 to 4).
	<b>Stream 1</b>				
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Main video outgoing (sub)stream.
	PortNr	0..65535	0	User 0	Set destination port number for Main video outgoing (sub) stream.
	<b>Stream 2</b>				
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Main video outgoing substream 2 (if present).
	PortNr	0..65535	0	User 0	Set destination port number for Main video outgoing substream 2 (if present).
	<b>Stream 3</b>				
	destIP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set IP address for Main video outgoing stream 3.

Menu item		Settings	Default	Level	Description
	destPortNr	0..65535	0	User 0	Set destination port number for Main video outgoing substream 3 (if present).
	<b>Stream 4</b>				
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Main video outgoing substream 4 (if present).
	PortNr	0..65535	0	User 0	Set destination port number for Main video outgoing substream 4 (if present).
	<b>Live Video</b>				IP configuration of the Live video stream. Available in XDR mode as switchable HDR/SDR stream and as downscaled 1080p signal in 4K mode. Note: the XDR eLicense needs to be installed on the camera.
	Protocol	ST2022-6, ST2110-20	ST2022-6	User 0	Set protocol for Live video outgoing stream: ST2022-6: SDI signals over IP ST2110-20: video “essence” over IP
	IP				Set destination IP address for Live video outgoing stream.
	PortNr	0..65535	0	User 0	Set destination port number for Live video outgoing stream.
	<b>Monitoring Video</b>				
	Protocol	ST2022-6, ST2110-20	ST2022-6	User 0	Set protocol for Monitoring video outgoing stream: ST2022-6: SDI signals over IP ST2110-20: video “essence” over IP
	IP				Set destination IP address for Monitoring video outgoing stream.
	PortNr	0..65535	0	User 0	Set destination port number for Monitoring video outgoing stream.
	<b>Audio</b>				
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Audio stream.
	PortNr	0..65535	0	User 0	Set destination port number for Audio stream.
	Number of Ch	2,4,6,8,16	8	User 0	Selects number of channels in the Audio stream. Note: allocation of audio payload to channels is fixed.
	Packet Time	0.125 ms, 0.250 ms, 1 ms	1 ms	User 0	Selects packet time of the AES67 packets. Refer to the AES67 specification.
	<b>Intercom</b>				
	IP	[1..250].[0..255].[0..255].[1..254]	—	User 0	Set destination IP address for Intercom stream.
	PortNr	0..65535	0	User 0	Set destination port number for Intercom stream.
	Number of Ch	2,4,6,8,16	8	User 0	Selects number of channels in the Intercom stream. Note: allocation of audio payload to channels is fixed.
	Packet Time	0.125 ms, 0.250 ms, 1 ms	1 ms	User 0	Selects packet time of the AES67 packets. Refer to the AES67 specification.
	<b>Stream Enabling</b>				



Menu item		Settings	Default	Level	Description
	Main	Off, Port A, Port A+B	Port A	User 0	Off: Main video is not inserted into the Media Network stream; Port A: Main video is inserted into the Media Network stream on Port A (non-redundant streaming); Port A+B: Main video is inserted into the Media Network stream on both Port A and Port B (redundant streaming).
	Live	Off, Port A, Port A+B	Port A	User 0	Off: Live video is not inserted into the Media Network stream; Port A: Monitoring video is inserted into the Media Network stream on Port A (for non-redundant streaming); Port A+B: Monitoring video is inserted into the Media Network stream on both Port A and Port B (for redundant streaming).
	Monitoring	Off, Port A, Port A+B	Port A	User 0	Off: Monitoring video is not inserted into the Media Network stream; Port A: Monitoring video is inserted into the Media Network stream on Port A (for non-redundant streaming); Port A+B: Monitoring video is inserted into the Media Network stream on both Port A and Port B (for redundant streaming).
	Audio	Off, Port A, Port A+B	Port A	User 0	Off: Audio is not inserted into the Media Network stream; Port A: Audio is inserted into the Media Network stream on Port A (for non-redundant streaming); Port A+B: Audio is inserted into the Media Network stream on both Port A and Port B (for redundant streaming).
	Intercom	Off, Port A, Port A+B	Port A	User 0	Off: Intercom is not inserted into the Media Network stream; Port A: Intercom is inserted into the Media Network stream on Port A (for non-redundant streaming); Port A+B: intercom is inserted into the Media Network stream on both Port A and Port B (for redundant streaming).
	ARPreq to DefGw	Off, On	Off	User 0	Switches ARPreq to DefGw on or off. The Address Resolution Protocol (ARP) is used for mapping a network address to a physical Ethernet address.
	IGMP Version	v2, v3	v2	User 0	Internet Group Management Protocol (IGMP) is used for Multicast IP applications: v2: use the standard version of the IGMP protocol; v3: allows for source specific multicast.
<b>Reference Source</b>					
	Source	RefVideoIn, PTP	RefVideoIn	User 0	Select the source of the video reference to which the camera system locks: RefVideoIn: system locks to the Reference input signal on the BNC Ref in connector (can be HD Tri-Level sync or SD Black Burst) PTP: system locks to the PTP (=Precision Time Protocol) sync on the Media Network.

Menu item		Settings	Default	Level	Description
	PTP Profile	SMPTE2059, AES67, AES-SMPTE, User		User 0	Selects the PTP profile: SMPTE2059: Profile used for synchronization of broadcast media systems; AES67: media profile of AES67; AES67-SMPTE: combination of SMPTE2059 and AES67; User: User defined. Enter PTP Profile settings in the PTP Settings submenu.
	PTP Settings				
	Domain Nr	0..255	0	User 0	When PTP Profile is set to <i>User</i> , this item sets the PTP Domain Number (refer to IEEE 1588 for more information).
	DelayReqInterval	-4..1	-2	User 0	When PTP Profile is set to <i>User</i> , this item sets the PTP DelayRequestInterval (refer to IEEE 1588 for more information).
	ReceiptTimeout	2..10	3	User 0	When PTP Profile is set to <i>User</i> , this item sets the PTP DelayRequestInterval (refer to IEEE 1588 for more information).
AFD					
	Insert	On, Off	Off	Service	<Advanced settings>
	Setting	16:9 (Full), 4:3 (Center)	16:9 (Full)	User 3	Selects the type of AFD (Active Format Description) code to be embedded in the video signal.
Video inputs					
	Pref. EXT1 Src	BNC, IP	IP	User 3	Selects source signal for EXT1 video input: BNC = signal from Baseband BNC connector; IP = signal from Media Network.
	Used Src	BNC, IP	IP	Service	<Advanced settings>
	Pref. EXT2 Src	BNC, IP	IP	User 3	Selects source signal for EXT2 video input: BNC = signal from Baseband BNC connector; IP = signal from Media Network.
	Used Src	BNC, IP	IP	Service	<Advanced settings>
	Pref. TP Src	BNC, IP	IP	User 3	Selects source signal for Teleprompter video input: BNC = signal from Baseband BNC connector; IP = signal from Media Network.
	Used Src	BNC, IP	IP	Service	<Advanced settings>
	No Signal	Col.Bar, Black	Col.Bar	User 3	Selects a video test signal to be output (when no camera is connected): Color Bar or Black video.
	Video Mode	1080i50 ...	1080p59	User 3	Selects a video mode for the XCU test signal when no camera is connected.
	4K Mode	4 Quad, IntLeave	4 Quad	User 3	Selects Quad Link mode when XCU runs in 4K video mode: 4 Quad: (= SDQS) Square Division Quad Split IntLeave: (= 2SI) 2 Sample Interleave
	SDI Live Out	SD, 1080i, 720p, 1080p	SD .. 1080P	User 3	Selects video mode for the <i>Live</i> signal on the — D — connectors when XCU is NOT in 4K video mode. Note that available selections depend on current video mode.
	4K Live Out	1080i, 720p, 1080p	1080i	User 3	Selects video mode for the <i>SDI Out</i> signal on the — E — connectors when XCU is in 4K video mode.

Menu item	Settings	Default	Level	Description
SDI Live Src	SDR, HDR	SDR	User 3	Selects SDR or HDR for the <i>SDI Out</i> signal on the — E — connectors when HDR is enabled on the camera. Note: the XDR eLicense is needed on the camera.
SDI Live Mode	Combined, 1 Phase, 2 Phases, 3 Phases	Combined	User 3	Selects the method of combining the high-speed phases for the <i>Live</i> signal on the — D — connectors when XCU runs in high speed video mode: Combined: all phases (3 or 6) are combined to obtain the highest signal level for live viewing. Note: Some blurring may occur when panning or tilting. 1 Phase: only 1 phase is used to obtain highest sharpness but lower video levels. 2 Phases: two phases are used (only for XS (=6X) video mode) 3 Phases: three phases are used (only for XS (=6X) video mode)
3G Output	Level A, Level B	Level A	User 3	Selects SMPTE 425M Level A or Level B mapping to be used for the <i>Main Video</i> signal when XCU runs in 3G (1080p) video mode. Level A: direct mapping Level B: dual link mapping
2SI Payload ID	2SI	2SI, 3G	User 3	Selects Payload ID for 4K video modes: 2SI = 2 sample interleave 3G = (=SDQS) Square Division Quad Split Note: this is a setting for backward compatibility only.
SD AspectRatio	16:9, 4:3	16:9	User 3	Selects video aspect ratio for SD outputs
HDSDI LensData	Off, On	Off	Service	<Advanced settings>

## 6.5 Security menu

Menu item	Settings	Default	Level	Description
Installed level	User0 .. User3	User 0	User 0	Selects XCU user level. Note: switch the unit off and on to take the changes into effect.
PIN Code	<code>	—	User 2	Enter a PIN code to access Service level
DeviceID Reset	Exec, ...	Exec	Service	Resets DeviceID to its factory value.
Factory Defaults	Exec, ...	Exec	Service	Resets all settings to their factory defaults.
Clear NVRAM	Exec, ...	Exec	Service	Clears Non Volatile RAM

## 6.6 Diagnostics menu

Menu item	Settings	Default	Level	Description
<b>Cable Power</b>				
Camera Power	On, Off	On	User 2	<Advanced settings>
Connector	None, Fiber, Error	None	User 2	<Advanced settings>
Status	Unknown, Open, Power Off, Overload, Short, Cam Off, Cam On, Error	Unknown	User 2	<Advanced settings>
Int.Error	Unknown, VMtest, STtest, CStest, FBtest, Start, Shutdown, nonFlex, Family	Unknown	User 2	<Advanced settings>
<b>Transmission</b>				
Transm. path	XF	XF	User 0	<Advanced settings>
<b>Transm. select</b>				
Priority	Auto, Fiber	Auto	User 0	<Advanced settings>
Transmission	Fiber, XF Fiber	Fiber	User 0	<Advanced settings>
Fiber Detected	Yes, No	No	User 0	<Advanced settings>
Video Detected	No, Yes	No	User 0	<Advanced settings>
<b>Fiber</b>				
<b>Fib A (CAM-&gt;XCU)</b>				
Cable Status	OK, Critic, Error, NoSig, Unknown	NoSig	User 0	<Advanced settings>
Signal Status	OK, Critic, Error, NoSig, Unknown	NoSig	User 0	<Advanced settings>
RX Margin	-100 .. 100	0	User 0	<Advanced settings>
Signal Error cnt	0..65535	50	User 0	<Advanced settings>
<b>Fib B (XCU-&gt;CAM)</b>				
Cable Status	OK, Critic, Error, NoSig, Unknown	NoSig	User 0	<Advanced settings>
Signal Status	OK, Critic, Error, NoSig, Unknown	NoSig	User 0	<Advanced settings>
RX Margin	-100 .. 100	0	User 0	<Advanced settings>
Signal Error cnt	0..65535	50	Service	<Advanced settings>
<b>Ethernet Tunnel</b>				
XCU	Off, 10Mb, 100Mb, 1000Mb	Off	User 0	<Advanced settings>
CAM	Off, On	Off	User 0	<Advanced settings>
Active	No, Yes	No	User 0	<Advanced settings>
<b>F2T Converter (Fiber to Traix Converter) &lt;- only valid when this unit is connected</b>				
Temperature	Ok, Unknown, Critic, Error	Unknown	User 0	<Advanced settings>
FPGA Temp	-128..127	0	Service	<Advanced settings>

Menu item		Settings	Default	Level	Description
	Package	Ok. Not Ok	Not Ok	User 0	<Advanced settings>
	Package 12NC	0..65535	0	User 0	<Advanced settings>
	Package Version	0..65535	0	User 0	<Advanced settings>
<b>Transm. Details</b>					
	<b>Fiber</b>				
	Fiber Locked	Yes, No	No	Service	<Advanced settings>
	<b>-&gt; BS</b>				
	RX Margin	-100..100	0	Service	<Advanced settings>
	Signal Err Count	0..65535	50	Service	<Advanced settings>
	Ethernet Err/sec		0	Service	<Advanced settings>
	EYE value	0..65535	0	Service	<Advanced settings>
	<b>-&gt; CAM</b>				
	RX Margin	-100..100	0	Service	<Advanced settings>
	CRC Error Count	0..65535	50	Service	<Advanced settings>
	RX Margin	-100..100	0	Service	<Advanced settings>
	Signal Err Count	0..65535	50	Service	<Advanced settings>
	Ethernet Err/sec		0	Service	<Advanced settings>
	EYE value	0..65535	0	Service	<Advanced settings>
	<b>&lt;- CAM</b>				
	RX Margin	-100..100	0	Service	<Advanced settings>
	CRC Error Count	0..65535	50	Service	<Advanced settings>
	<b>SFP Module</b>				
	Opt. Module	Unavail, Unknown, EOLP139610, EOLP139620, BI1696-9AD, BI1696-9DA	Unavail	Service	<Advanced settings>
	RX Power	-100..100	0	Service	<Advanced settings>
	TX Power	-100..100	0	Service	<Advanced settings>
	Temp	-128..127	0	Service	<Advanced settings>
	Loss Count	0..65535	0	Service	<Advanced settings>
	<b>Ethernet Load</b>				
	Rx Mb/sec	0..65535	0	Service	<Advanced settings>
	Tx Mb/sec	0..65535	0	Service	<Advanced settings>
	<b>Ethernet Packets</b>				
	valid/sec			Service	<Advanced settings>
	error			Service	<Advanced settings>
	error/sec			Service	<Advanced settings>
	FEC Corr			Service	<Advanced settings>
	FEC Corr/sec			Service	<Advanced settings>
	Reset Errors	Exec, ...	...	Service	<Advanced settings>
	<b>Ethernet Network</b>				

Menu item		Settings	Default	Level	Description
	Status	0..255	0	Service	<Advanced settings>
	IP			Service	<Advanced settings>
	Stream Locked	0..65535	0	Service	<Advanced settings>
	Stream RxBuf_0	0..65535	0	Service	<Advanced settings>
	Stream RxBuf_1	0..65535	0	Service	<Advanced settings>
	Stream RxBuf_2	0..65535	0	Service	<Advanced settings>
	<b>Streams</b>				
	Tx Available			Service	<Advanced settings>
	Tx Not Used			Service	<Advanced settings>
	Rx Requested			Service	<Advanced settings>
	Rx Subscribed			Service	<Advanced settings>
	<b>Ethernet Tunnel</b>				
	MDIO	Ok, Error	Ok	Service	<Advanced settings>
	SGMII	Ok, Error	Ok	Service	<Advanced settings>
	PhySpeed	Off, 10Mb, 100Mb, 1000Mb	Off	Service	<Advanced settings>
	Tunnel Active	No, Yes	No	Service	<Advanced settings>
	XCU	Off, On	Off	Service	<Advanced settings>
	CAM	Off, On	Off	Service	<Advanced settings>
	Rx Packets			Service	<Advanced settings>
	Tx Packets			Service	<Advanced settings>
	Audio mute	Off, On	On	Service	<Advanced settings>
	Video mute	Off, On	On	Service	<Advanced settings>
	<b>Data Error Stats</b>				
	UART Errors	0..65335	0	Service	<Advanced settings>
	Decompr Errors	0..65335	0	Service	<Advanced settings>
	IP Errors	0..65335	0	Service	<Advanced settings>
	TCP Errors	0..65335	0	Service	<Advanced settings>
	TCP Retries	0..65335	0	Service	<Advanced settings>
	Reset Statistics	Off, On	Off	Service	<Advanced settings>
<b>C2IP Network</b>					
	<b>Communication</b>				
	Cam Connected	Yes, No	No	User 2	<Advanced settings>
	C2IP Panels	0..99	0	User 2	<Advanced settings>
	LDK Connect Gw	0..99	0	User 2	<Advanced settings>
	<b>Ethernet</b>				
	MAC-Address 1			User 2	<Advanced settings>
	MAC-Address 2			User 2	<Advanced settings>
	Link state	Connected, Disconn		User 2	<Advanced settings>

Menu item		Settings	Default	Level	Description
	Link type	Unknown, 10Mb/ Half, 10Mb/Full, 100Mb/Half, 100Mb/Full, Negotiate	Unknown	User 2	<Advanced settings>
	<b>Loopback test</b>				
	Loopback test	Off, On	Off	Service	<Advanced settings>
	Data count			Service	<Advanced settings>
	Data errors	0..65535	0	Service	<Advanced settings>
	Data loss	0..65535	0	Service	<Advanced settings>
	<b>Media Network</b>				
	<b>SFP Modules</b>				
	Port A1	Unavail, Present	Unavail	User 1	<Advanced settings>
	Port A2	Unavail, Present	Unavail	User 1	<Advanced settings>
	Port B1	Unavail, Present	Unavail	User 1	<Advanced settings>
	Port B2	Unavail, Present	Unavail	User 1	<Advanced settings>
	<b>SFP Module Info</b>				
	Module	port A1, port A2, port B1, port B2	port A1	User 1	<Advanced settings>
	Type	Unavail, Unknown, Optical, Passive, Active, BNC_12G	Unavail	User 1	<Advanced settings>
	RX Power	-100..100	0	User 1	<Advanced settings>
	TX Power	-100..100	0	User 1	<Advanced settings>
	EYE Value	0..65535	0	User 1	<Advanced settings>
	Voltage	2020..4570	0	User 1	<Advanced settings>
	Current	0..510	0	User 1	<Advanced settings>
	Cable Length	0..500	0	User 1	<Advanced settings>
	Temp	-128..127	0	User 1	<Advanced settings>
	Link	Yes, No	0	User 1	<Advanced settings>
	Loss Count	0..65535	0	User 1	<Advanced settings>
	Name				
	<b>Outgoing Streams</b>				
	Port A1 Mb/s	0..65535	0	User 1	<Advanced settings>
	Port A2 Mb/s	0..65535	0	User 1	<Advanced settings>
	Port B1 Mb/s	0..65535	0	User 1	<Advanced settings>
	Port B2 Mb/s	0..65535	0	User 1	<Advanced settings>
	<b>Main video</b>				
	Stream 1A Locked	Yes, No	No	User 1	<Advanced settings>
	Stream 1B Locked	Yes, No	No	User 1	<Advanced settings>
	Stream 2A Locked	Yes, No	No	User 1	<Advanced settings>
	Stream 2B Locked	Yes, No	No	User 1	<Advanced settings>
	Stream 3A Locked	Yes, No	No	User 1	<Advanced settings>

Menu item		Settings	Default	Level	Description
	Stream 3B Locked	Yes, No	No	User 1	<Advanced settings>
	Stream 4A Locked	Yes, No	No	User 1	<Advanced settings>
	Stream 4B Locked	Yes, No	No	User 1	<Advanced settings>
	<b>Live video</b>				
	Stream A Locked	Yes, No	No	User 1	<Advanced settings>
	Stream B Locked	Yes, No	No	User 1	<Advanced settings>
	<b>Monitoring video</b>				
	Stream A Locked	Yes, No	No	User 1	<Advanced settings>
	Stream B Locked	Yes, No	No	User 1	<Advanced settings>
	<b>Audio</b>				
	Stream A Locked	Yes, No	No	User 1	<Advanced settings>
	Stream B Locked	Yes, No	No	User 1	<Advanced settings>
	<b>Intercom</b>				
	Stream A Locked	Yes, No	No	User 1	<Advanced settings>
	Stream B Locked	Yes, No	No	User 1	<Advanced settings>
	<b>Incoming Streams</b>				
	<b>Port A1</b>				
	Mbit/Sec	0..65535	0	User 1	<Advanced settings>
	<b>Ethernet Packets</b>				
	valid/sec				<Advanced settings>
	error				<Advanced settings>
	error/sec				<Advanced settings>
	<b>Port A2</b>				
	Mbit/Sec	0..65535	0	User 1	<Advanced settings>
	<b>Ethernet Packets</b>				
	valid/sec				<Advanced settings>
	error				<Advanced settings>
	error/sec				<Advanced settings>
	<b>Port B1</b>				
	Mbit/Sec	0..65535	0	User 1	<Advanced settings>
	<b>Ethernet Packets</b>				
	valid/sec				<Advanced settings>
	error				<Advanced settings>
	error/sec				<Advanced settings>
	<b>Port B2</b>				
	Mbit/Sec	0..65535	0	User 1	<Advanced settings>
	<b>Ethernet Packets</b>				
	valid/sec				<Advanced settings>
	error				<Advanced settings>
	error/sec				<Advanced settings>
	<b>Extern 1</b>				



Menu item		Settings	Default	Level	Description
	Locked	Yes, No	No	User 1	<Advanced settings>
	Valid	Yes, No	No	User 1	<Advanced settings>
	Stream	unknown, 2022-6	unknown	User 1	<Advanced settings>
	Pkt Buffer	0..65535	0	User 1	<Advanced settings>
<b>Stream Info</b>					
	Map	0..255	0	User 1	<Advanced settings>
	Frame	unknown, NTSC, PAL, 1080i, 1080p, 1080psf, 720p	unknown	User 1	<Advanced settings>
	FrameRate	unknown, 60, 59.95, 50, 48, 47.95, 30, 29.95, 25, 24, 23.95	unknown	User 1	<Advanced settings>
	Sample	unknown, 422_10, 444_10, 4444_10, 422_12, 444_12, 4444_12, 4224_12	unknown	User 1	<Advanced settings>
<b>Extern 2</b>					
	Locked	Yes, No	No	User 1	<Advanced settings>
	Valid	Yes, No	No	User 1	<Advanced settings>
	Stream	unknown, 2022-6	unknown	User 1	<Advanced settings>
	Pkt Buffer	0..65535	0	User 1	<Advanced settings>
<b>Stream Info</b>					
	Map	0..255	0	User 1	<Advanced settings>
	Frame	unknown, NTSC, PAL, 1080i, 1080p, 1080psf, 720p	unknown	User 1	<Advanced settings>
	FrameRate	unknown, 60, 59.95, 50, 48, 47.95, 30, 29.95, 25, 24, 23.95	unknown	User 1	<Advanced settings>
	Sample	unknown, 422_10, 444_10, 4444_10, 422_12, 444_12, 4444_12, 4224_12	unknown	User 1	<Advanced settings>
<b>TelePrompter</b>					
	Locked	Yes, No	No	User 1	<Advanced settings>
	Valid	Yes, No	No	User 1	<Advanced settings>
	Stream	unknown, 2022-6	unknown	User 1	<Advanced settings>
	Pkt Buffer	0..65535	0	User 1	<Advanced settings>
<b>Stream Info</b>					
	Map	0..255	0	User 1	<Advanced settings>
	Frame	unknown, NTSC, PAL, 1080i, 1080p, 1080psf, 720p	unknown	User 1	<Advanced settings>

Menu item		Settings	Default	Level	Description
	FrameRate	unknown, 60, 59.95, 50, 48, 47.95, 30, 29.95, 25, 24, 23.95	unknown	User 1	<Advanced settings>
	Sample	unknown, 422_10, 444_10, 4444_10, 422_12, 444_12, 4444_12, 4224_12	unknown	User 1	<Advanced settings>
<b>Audio</b>					
	Stream	Yes, No	No	User 1	<Advanced settings>
	Locked	Yes, No	No	User 1	<Advanced settings>
	Min.Buffer	0..65535	0	User 1	<Advanced settings>
	Max.Buffer	0..65535	0	User 1	<Advanced settings>
	Overflow	0..65535	0	User 1	<Advanced settings>
	Underflow	0..65535	0	User 1	<Advanced settings>
	Reset Counters	Exec, ....	...	User 1	<Advanced settings>
<b>Intercom</b>					
	Stream	Yes, No	No	User 1	<Advanced settings>
	Locked	Yes, No	No	User 1	<Advanced settings>
	Min.Buffer	0..65535	0	User 1	<Advanced settings>
	Max.Buffer	0..65535	0	User 1	<Advanced settings>
	Overflow	0..65535	0	User 1	<Advanced settings>
	Underflow	0..65535	0	User 1	<Advanced settings>
	Reset Counters	Exec, ....	...	User 1	<Advanced settings>
<b>PTP</b>					
	Status	Listening, Calibrating, Locked, Off	Listening	User 1	
	Path Delay			User 1	
	Offset to Master			User 1	
<b>GM Info</b>					(Grandmaster Information)
	ID			User 1	IID of the Grandmaster to which the XCU is locked
	IP Addr			User 1	IP address of the Grandmaster to which the XCU is locked
	Prio 1	0..255	0	User 1	
	Prio 2	0..255	0	User 1	
	Class	0..255	0	User 1	
	Accuracy	0..255	0	User 1	
<b>Temperature</b>					
	Warning	None, Transm, Fan, Fan+T, !STOP!, FactKey	None	User 2	<Advanced settings>
<b>Fan</b>					
	Actual	0..6000	0	User 0	<Advanced settings>

Menu item		Settings	Default	Level	Description
	Required	0..6000	3000	User 0	<Advanced settings>
	Temp (C)				
	Power	-128..127	0	User 0	<Advanced settings>
	Generic FPGA0	-128..127	0	User 0	<Advanced settings>
	Generic FPGA1	-128..127	0	User 0	<Advanced settings>
	Transm FPGA	-128..127	0	User 0	<Advanced settings>
	SFP Module	-128..127	0	User 0	<Advanced settings>
	Temp (F)				
	Power	-197..261	0	User 0	<Advanced settings>
	Generic FPGA0	-197..261	0	User 0	<Advanced settings>
	Generic FPGA1	-197..261	0	User 0	<Advanced settings>
	Transm FPGA	-197..261	0	User 0	<Advanced settings>
	SFP Module	-197..261	0	User 0	<Advanced settings>
	Video inputs				
	Extern 1				
	Source	BNC, IP	IP	User 1	<Advanced settings>
	SignalDetect	Yes, No	No	User 1	<Advanced settings>
	Locked	Yes, No	No	User 1	<Advanced settings>
	VideoMode	Unknown, SD, 1080i59 .. 1080pfs29	Unknown	User 1	<Advanced settings>
	Extern 2				
	Source	BNC, IP	IP	User 1	<Advanced settings>
	SignalDetect	Yes, No	No	User 1	<Advanced settings>
	Locked	Yes, No	No	User 1	<Advanced settings>
	VideoMode	Unknown, SD, 1080i59 .. 1080pfs29	Unknown	User 1	<Advanced settings>
	Extern 3				
	SignalDetect	Yes, No	No	User 1	<Advanced settings>
	Locked	Yes, No	No	User 1	<Advanced settings>
	VideoMode	Unknown, SD, 1080i59 .. 1080pfs29	Unknown	User 1	<Advanced settings>
	Teleprompter				
	Source	BNC, IP	IP	User 1	<Advanced settings>
	SignalDetect	Yes, No	No	User 1	<Advanced settings>
	Locked	Yes, No	No	User 1	<Advanced settings>
	VideoMode	Unknown, SD, 1080i59 .. 1080pfs29	Unknown	User 1	<Advanced settings>

Menu item		Settings	Default	Level	Description
	Reference In	Unknown, 1080i59, 1080i50, 720p59, 720p50, 1080p59, 1080p50, 1080i48, PAL, NTSC	Unknown	User 0	<Advanced settings>
	Gen Lock	Yes, No	No	User 0	<Advanced settings>
<b>Audio/Intercom</b>					
	TestTone Cam	Off, Eng, Prod, Prog	Off	Service	<Advanced settings>
	TestTone Analog	Off, Cam, Tracker, Audio 1, Audio 2, AES 3, AES 4	Off	Service	<Advanced settings>
	TestTone IP	Off, Eng, Prod, Audio 1, Audio 2, AES 3, AES 4	Off	Service	<Advanced settings>
	BS Type	Unknown, <range of XCU Types>	Unknown	User 2	<Advanced settings>
	BS Status	Ok, Not Ok	Ok	User 2	<Advanced settings>
	BS PID				
	CAM Type				
<b>Package Info</b>					
	Package	Ok, Not Ok	Ok	User 2	<Advanced settings>
	Package Code	0..65535	0	User 2	<Advanced settings>
	Package Version	0..65535	0	User 2	<Advanced settings>
	Component	Appl SW, GEB FW, GEB Nios, TRB FW, PFB SW, Config SW, Bootloader	Appl SW	User 2	<Advanced settings>
	Valid	Ok, Not Ok, N/A	Not Ok	User 2	<Advanced settings>
	Code	0..65535	0	User 2	<Advanced settings>
	Version	0..65535	0	User 2	<Advanced settings>
<b>PCB Info</b>					
	Board	GEB, UIB, COB, IDB, TRB, PDB, PFB	GEB	User 2	<Advanced settings>
	PID	—	—	User 2	<Advanced settings>
	Code	0..65535	0	User 2	<Advanced settings>
	Status	0..255	0	User 2	<Advanced settings>
<b>Metrics</b>					
	Metrics	??, NoAccess, Recovered, Init, Valid	??	User 2	<Advanced settings>
	Run Hours	0..65535	0	User 2	<Advanced settings>
	Total Run Hours	0..65535	0	User 2	<Advanced settings>
	Power Cycles	0..65535	0	User 2	<Advanced settings>
	Minimum Temp	—	—	User 2	<Advanced settings>

Menu item		Settings	Default	Level	Description
	Maximum Temp	—	—	User 2	<Advanced settings>

## 6.7 Service menu

Menu item		Settings	Default	Level	Description
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### Diag Files

File Selection					
	BS Applog	Yes, No	Yes	Service	<Advanced settings>
	Config Info	Yes, No	Yes	Service	<Advanced settings>
	Settings Info	Yes, No	Yes	Service	<Advanced settings>
	Usage Info	Yes, No	Yes	Service	<Advanced settings>
	Network Info	Yes, No	Yes	Service	<Advanced settings>
	Storage	None, SDcard, USB, SD+USB	None	Service	<Advanced settings>
	Write Files	Exec, ...	—	Service	<Advanced settings>
	Current File	None, Config, Usage, Settings, AppLog	None	Service	<Advanced settings>

### SD Card

	Present	Yes, No	No	Service	<Advanced settings>
	Status	Unknown, Busy..., OK, Error, NonGV, Init...	Unknown	Service	<Advanced settings>
	Format	Exec, ..	—	Service	<Advanced settings>
	Copy to USB	Exec, ..	—	Service	<Advanced settings>
Data Partition					
	Status	Unknown, Busy..., OK, Error, NonGV, Init...	Unknown	Service	<Advanced settings>
	Space Left	<value>	—	Service	<Advanced settings>
	Format	Off, Running	Off	Service	<Advanced settings>

### SD Card

	Present	No, Yes	No	Service	<Advanced settings>
	Space Left	0...65535	0	Service	<Advanced settings>

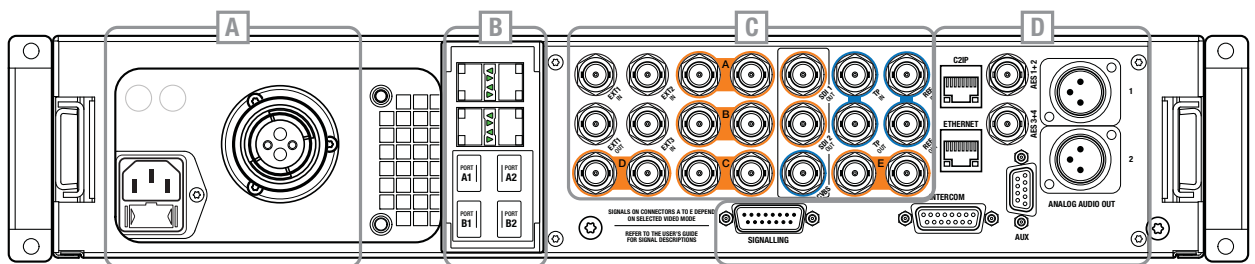


# Chapter 7

## Connectors and signals

### 7.1 Connector back panel

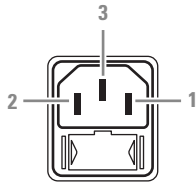
Below is an overview of the different connector areas:



- Area A: Power and Transmission
- Area B: Media Network bay
- Area C: Baseband BNC video connectors
- Area D: Studio connectors

## 7.2 Power and Transmission

### 7.2.1 Mains power connector

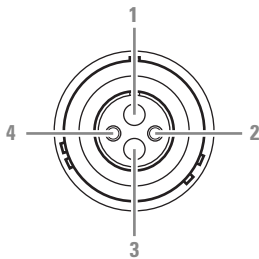


IEC style 3-pin male

Pin	Description
1	Neutral
2	Line
3	Earth

Mains input voltage:  
100 to 240 VAC (auto-sensing)  
Fuses (2x): T8AH / 250 VAC  
Mains frequency:  
50 to 60 Hz (auto-sensing);  
Power consumption: 450 W max.

### 7.2.2 SMPTE hybrid fiber connector



Hybrid Fiber connector

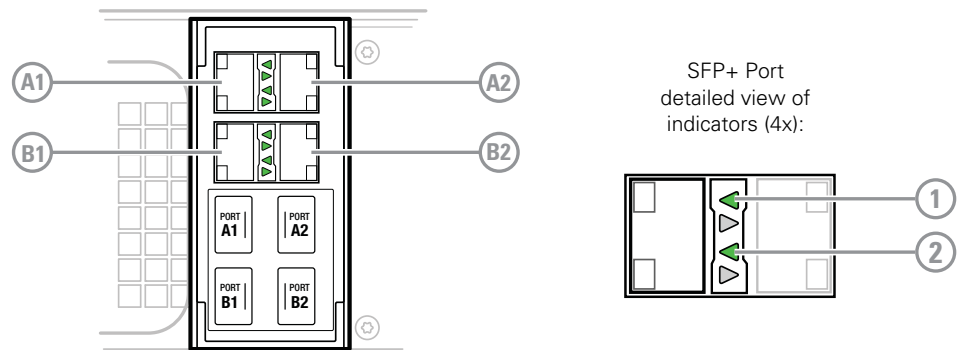
Pin	Description
1	Optic fiber channel A
2	Power supply return
3	Optic fiber channel B
4	Power supply

LEMO hybrid Fiber connector compliant with SMPTE 304M, other SMPTE hybrid fiber connectors available on request.



## 7.3 Media Network bay

### 7.3.1 SFP+ ports layout



Media Port	SFP+ Port	Network	Content
Port A	Port A1	Primary	Media Network stream/substreams
	Port A2	Primary	Media Network stream/substreams (in 4K uncompressed video mode)
Port B	Port B1	Secondary	Redundant Media Network stream/substreams
	Port B2	Secondary	Redundant Media Network stream/substreams (in 4K uncompressed video mode) or: 12G-SDI output stream (via optional convertor unit) (Not available in 4K uncompressed video mode)

#### ① Link indicator

This green LED reflects the status of the physical Ethernet connection between the XCU and the device at the other end of the Ethernet cable (typically a switch). It lights when the following conditions are met:

- both devices are powered up;
- both devices have enabled their Ethernet ports;
- Ethernet cable is wired correctly and inserted securely at both ends and
- both devices agreed on Ethernet settings (baud rate, and full/half duplex).

#### ② Activity indicator

This green indicator flashes continuously when data is being exchanged.



#### Caution

Before you remove or insert an SFP+ module, read the safety information in the “Fiber-optic transmission units” on page 8 of this guide.



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**Caution**

It is recommended that you do not insert or remove an SFP+ module with (fiber-optic) cables attached because of the potential of damaging the cable, the connector, or the optical interfaces inside the SFP+ module. Disconnect all cables before removing or inserting an SFP+ module.

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**Caution**

SFP+ modules use different latching methods to insert and remove the module into and from a port. Refer to the SFP+ manufacturer's information about the proper inserting and removal procedure for your specific type of module.

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## 7.4 Media Network IP streams

### 7.4.1 For 2K, 3G and 4K Tico videomodes

#### Outgoing streams (with redundancy enabled)

	Name	Protocol	Video modes (HDR only with XDR eLicense)					
			4K	1080p	1080i	4K HDR	1080p HDR	1080i HDR
Port A1			4K Tico	1080p	1080i	4K Tico HDR	1080p HDR	1080i HDR
	Main	ST2022-6/ ST2110-20	4K Tico	1080p	1080i	4K Tico HDR	1080p HDR	1080i HDR
	Monitoring	ST2022-6/ ST2110-20	1080i	720p/1080i	1080i	1080i HDR/SDR	1080i HDR/SDR	1080i HDR/SDR
	Live	ST2022-6/ ST2110-20	1080p	n/a	n/a	1080p HDR/SDR	1080p HDR/SDR	1080i HDR/SDR
			Audio format					
	AES67 Audio Out	RFC3551	24 bits PCM (L24)					
	AES67 Intercom Out	RFC3551	24 bits PCM (L24)					
			Control format					
	PTP	ST2059 (IEEE 1588)	UDP					
Port B1 <sup>1)</sup>			4K	1080p	1080i	4K HDR	1080p HDR	1080i HDR
	Main	ST2022-6/ ST2110-20	4K Tico	1080p	1080i	4K Tico HDR	1080p HDR	1080i HDR
	Monitoring	ST2022-6/ ST2110-20	1080i	720p/1080i	1080i	1080i HDR/SDR	1080i HDR/SDR	1080i HDR/SDR
	Live	ST2022-6/ ST2110-20	1080p	n/a	n/a	1080p HDR/SDR	1080p HDR/SDR	1080i HDR/SDR
			Audio format					
	AES67 Audio Out	RFC3551	24 bits PCM (L24)					
	AES67 Intercom Out	RFC3551	24 bits PCM (L24)					
			Control format					
	PTP	n/a	n/a					
Port B2	Main <sup>2)</sup>	ST2082	4K Uncompr	n/a	n/a	4K HDR Uncompr	n/a	n/a

<sup>1)</sup> Duplicate streams (except PTP) of Port A1 with different network IP range and local IP address and/or Port number.

<sup>2)</sup> 12G-SDI output stream is only available via an optional convertor unit.

## Incoming streams

	Name	Protocol	Video modes					
			4K	1080p	1080i	4K HDR	1080p HDR	1080i HDR
Port A1	Ext1	ST2022-6/ ST2110-20	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i
	Ext2	ST2022-6/ ST2110-20	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i
	TP	ST2022-6/ ST2110-20	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i
			Audio format					
	AES67 Audio In	RFC3551	24 bits PCM (L24)					
	AES67 Intercom In	RFC3551	24 bits PCM (L24)					
			Control format					
	PTP	ST2059 (IEEE 1588)	UDP					

**Note**

All ST2022-6 output streams carry embedded audio/intercom signals.

Where 1080i video modes are listed, also 720p are mentioned.

The information in the tables is based on a connected LDX86N camera. Available video modes may differ for other camera models and/or installed licenses.

## 7.4.2 For 4K uncompressed video modes

## Outgoing streams (with redundancy enabled)

	Name	Protocol	Video modes (HDR only with XDR eLicense)					
Port A1			4K	1080p	1080i	4K HDR	1080p HDR	1080i HDR
	Main-A	ST2022-6/ ST2110-20	1080p 2SI	n/a	n/a	1080p 2SI	n/a	n/a
	Main-B	ST2022-6/ ST2110-20	1080p 2SI	n/a	n/a	1080p 2SI	n/a	n/a
	Live	ST2022-6/ ST2110-20	1080p	n/a	n/a	1080p HDR/SDR	n/a	n/a
			Audio format					
	AES67 Audio Out	RFC3551	24 bits PCM (L24)					
	AES67 Intercom Out	RFC3551	24 bits PCM (L24)					
			Control format					
	PTP	ST2059 (IEEE 1588)	UDP					
Port A2	Main-C	ST2022-6/ ST2110-20	1080p 2SI	n/a	n/a	1080p 2SI	n/a	n/a
	Main-D	ST2022-6/ ST2110-20	1080p 2SI	n/a	n/a	1080p 2SI	n/a	n/a
	Monitoring	ST2022-6/ ST2110-20	1080i	n/a	n/a	1080i HDR/SDR	n/a	n/a
Port B1			4K	1080p	1080i	4K HDR	1080p HDR	1080i HDR
	Main-A	ST2022-6/ ST2110-20	1080p 2SI	n/a	n/a	1080p 2SI	n/a	n/a
	Main-B	ST2022-6/ ST2110-20	1080p 2SI	n/a	n/a	1080p 2SI	n/a	n/a
	Live	ST2022-6/ ST2110-20	1080p	n/a	n/a	1080p HDR/SDR	n/a	n/a
			Audio format					
	AES67 Audio Out	RFC3551	24 bits PCM (L24)					
	AES67 Intercom Out	RFC3551	24 bits PCM (L24)					
			Control format					
	PTP	n/a	n/a					

	Name	Protocol	Video modes (HDR only with XDR eLicense)					
Port B2	Main-C	ST2022-6/ ST2110-20	1080p 2SI	n/a	n/a	1080p 2SI	n/a	n/a
	Main-D	ST2022-6/ ST2110-20	1080p 2SI	n/a	n/a	1080p 2SI	n/a	n/a
	Monitoring	ST2022-6/ ST2110-20	1080i	n/a	n/a	1080i HDR/SDR	n/a	n/a

### Incoming streams

	Name	Protocol	Video formats					
Port A1			4K	1080p	1080i	4K HDR	1080p HDR	1080i HDR
	Ext1	ST2022-6/ ST2110-20 <sup>1)</sup>	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i
	Ext2	ST2022-6/ ST2110-20 <sup>1)</sup>	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i
	TP	ST2022-6/ ST2110-20 <sup>1)</sup>	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i	1080p/i; 625/525i
			Audio format					
	AES67 Audio In	RFC3551	24 bits PCM (L24)					
	AES67 Intercom In	RFC3551	24 bits PCM (L24)					
			Control format					
	PTP	ST2059 (IEEE 1588)	UDP					

The Main video IP protocol can be selected in the Camera Connect application in the Configuration > IP Main video tab or in the XCU menu under Media Network > Outgoing Streams > Main Video > Protocol.

The Live video IP protocol can be selected in the Camera Connect application in the Configuration > IP Mon\Live tab or in the XCU menu under Media Network > Outgoing Streams > Live Video > Protocol.

The Monitoring video IP protocol can be selected in the Camera Connect application in the Configuration > IP Mon\Live tab or in the XCU menu under Media Network > Outgoing Streams > Monitoring Video > Protocol.

<sup>1)</sup> Only 1080p/1080i



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**Note**

The 4K uncompressed mode is only available in combination with the LDX 86N camera.

To enable 4K Uncompressed mode, set the 4K IP Output to Uncompr in the Camera Connect application or the XCU menu.

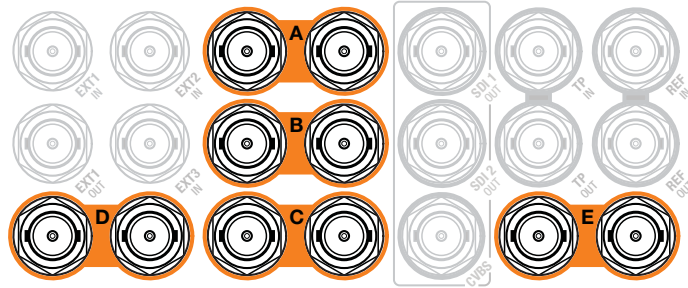
To use HDR video modes the XDR eLicence needs to be installed onto the camera.

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## 7.5 Baseband BNC video connectors

### 7.5.1 Main video outputs

For HD (1080i/720p) video modes



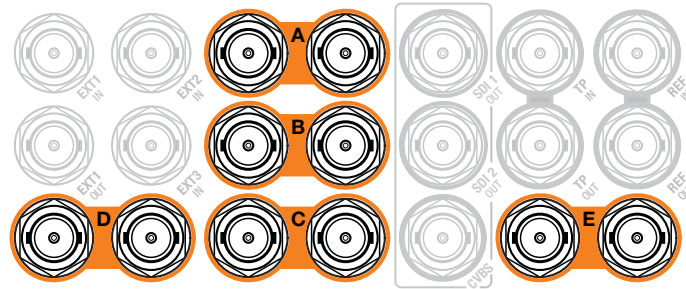
Connector(s)	Signal name	Description
— A —	Main Video	6x BNC, 0.8 Vpp, 75 Ω, HD-SDI (1.5 Gb/s)
— B —	Main Video	
— C —	Main Video	
— D —	HD-Live	2x BNC, 0.8 Vpp, 75 Ω, HD-SDI (1.5 Gb/s) <sup>1)</sup>
— E —	SDI Out	2x BNC, 0.8 Vpp, 75 Ω, SD-SDI (270 Mb/s) <sup>2)</sup>

<sup>1)</sup> In the INSTALL menu, go to the SDI LIVE OUT item to select a video mode for this output: 1080i or 720p.

<sup>2)</sup> In the INSTALL menu, go to the SDI LIVE SRC item to select SDR or HDR for this output when the XCU runs in HDR mode. Note: the connected camera needs to have an XDR eLicense installed.



## For 3G (1080p) video modes



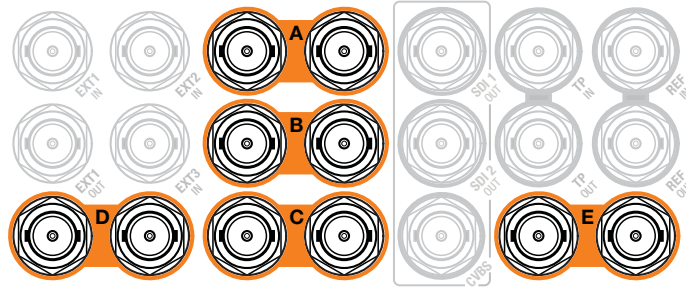
Connector(s)	Signal name	Description
— A —	Main Video	6x BNC, 0.8 Vpp, 75 $\Omega$ , 3G-SDI (3 Gb/s), acc. to SMPTE 424/425M level A or level B (selectable). <sup>1)</sup>
— B —	Main Video	
— C —	Main Video	
— D —	HD-Live	2x BNC, 0.8 Vpp, 75 $\Omega$ , HD-SDI (1.5 Gb/s) <sup>2)</sup>
— E —	SDI Out	2x BNC, 0.8 Vpp, 75 $\Omega$ , SD-SDI (270 Mb/s) <sup>3)</sup>

<sup>1)</sup> In the INSTALL menu, go to the 3G OUTPUT item select Level A (for direct mapping) or Level B (for dual stream mapping).

<sup>2)</sup> In the INSTALL menu, go to the SDI LIVE OUT item to select a video mode for this output: 1080i or 720p.

<sup>3)</sup> In the INSTALL menu, go to the SDI LIVE SRC item to select SDR or HDR for this output when the XCU runs in HDR mode. Note: the connected camera needs to have an XDR eLicense installed.

## For 4K video modes



Connector(s)	Signal name	Description
— A —	<i>Link 1</i>	2x BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); Quad Link 1 (top left frame) or 2SI Link 1. <sup>1)</sup>
— B —	<i>Link 2</i>	2x BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); Quad Link 2 (top right frame) or 2SI Link 2. <sup>1)</sup>
— C —	<i>Link 3</i>	2x BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); Quad Link 3 (bottom left frame) or 2SI Link 3. <sup>1)</sup>
— D —	<i>Link 4</i>	2x BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); Quad Link 4 (bottom right frame) or 2SI Link 4. <sup>1)</sup>
— E —	<i>4K Live Out</i>	2x BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s) or HD-SDI (1.5 Gb/s) in 1080p, 1080i or 720p (selectable) <sup>2) 3)</sup>

<sup>1)</sup> In the **INSTALL** menu, go to the **4K MODE** item to select the 4K Quad Link mode: 4 Quad (= SDQS) for Square Division Quad Split or IntLeave (= 2SI) for 2 Sample Interleave.

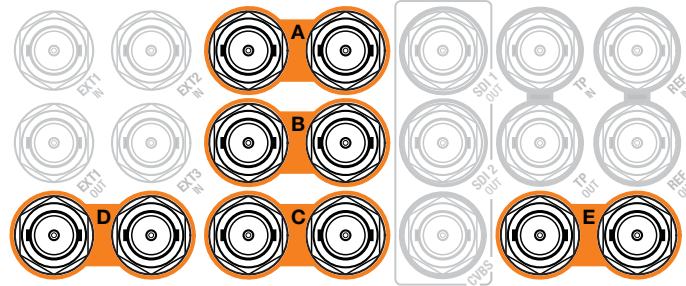
<sup>2)</sup> In the **INSTALL** menu, go to the **4K LIVE OUT** item to select a video mode for this output: 1080p, 1080i or 720p.

<sup>3)</sup> In the **INSTALL** menu, go to the **SDI LIVE SRC** item to select SDR or HDR for this output when the XCU runs in HDR mode. Note: the camera needs to have an XDR eLicense installed.

## For HiSpeed (HS/3X) and XtremeSpeed (XS/6X) video modes

**Note**

Note: only valid for XCU Universe UXF in combination with a HiSpeed/XtremeSpeed capable camera.



Connector(s)	Signal name	Description
— A —	<i>Phase 1 (1+2)</i>	2x BNC 75 Ω, HD-SDI (3 Gb/s) — phase 1 (in HS/3X modes) or phases 1+2 (in XS/6X modes)
— B —	<i>Phase 2 (3+4)</i>	2x BNC 75 Ω, HD-SDI (3 Gb/s) — phase 2 (in HS/3X modes) or phases 3+4 (in XS/6X modes)
— C —	<i>Phase 3 (5+6)</i>	2x BNC 75 Ω, HD-SDI (3 Gb/s) — phase 3 (in HS/3X modes) or phases 5+6 (in XS/6X modes)
— D —	<i>HD-Live</i>	2x BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s) or HD-SDI (1.5 Gb/s) <sup>1) 2)</sup>
— E —	<i>SDI Out</i>	2x BNC, 0.8 Vpp, 75 Ω,, SD-SDI (270 Mb/s)

<sup>1)</sup> In the XCU menu, go to the **INSTALL > SDI LIVE OUT** item to select a video mode for this output. The selection options for this video output depend on the selected main video mode:

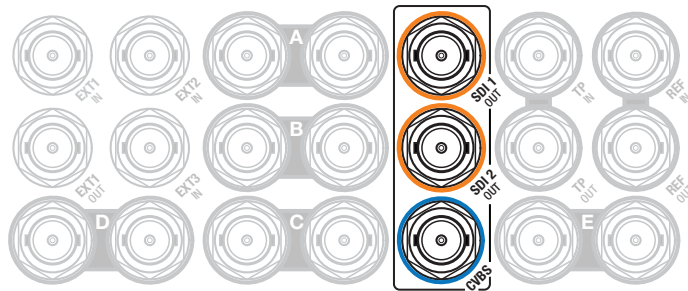
Main video mode	Live
1080i150	1080i50
1080i179	1080i59
720p150	720p50
720p179	720p59
1080p150	1080p50, 1080i50 or 720p50
1080p179	1080p59, 1080i59 or 720p59
1080i300	1080i50 or 720p50
1080i359	1080i59 or 720p59
720p300	720p50
720p359	720p59

<sup>2)</sup> In the XCU menu, go to the **INSTALL > SDI LIVE MODE** item to select how the SDI Live Out signal is generated from the HS or XS signal: Combined, 1 Phase, 2 Phases or 3 Phases.

**Note**

The HiSpeed (HS/3X) and XtremeSpeed (XS/6X) video modes are NOT available as IP streams on the Media Network.

## 7.5.2 Monitoring video outputs

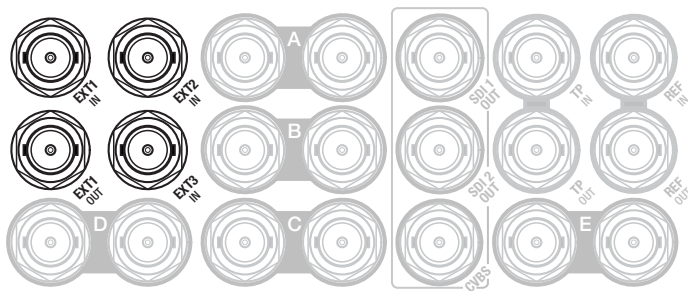


Connector(s)	Signal
SDI 1 OUT	BNC, 0.8 Vpp, 75 $\Omega$ , HD-SDI (1.5 Gb/s) 720p or 1080i Monitoring output signal with menu text and indicators inserted.
SDI 2 OUT	BNC, 0.8 Vpp, 75 $\Omega$ , SD-SDI (270 Mb/s) Monitoring output signal with menu text and indicators inserted.
CVBS	BNC, 1.0 Vpp, 75 $\Omega$ , CVBS analog SD Monitoring output signal with menu text and indicators inserted.

**Note**

The monitoring outputs may have sub-optimal signal quality in 4K video modes. Use these outputs for monitoring purpose only.

## 7.5.3 External video input connectors



Connector(s)	Signal
Ext 1 IN	BNC, 0.8 Vpp, 75 $\Omega$ , HD-SDI (3 Gb/s or 1.5 Gb/s) or SD-SDI
Ext 2 IN	BNC, 0.8 Vpp, 75 $\Omega$ , HD-SDI (3 Gb/s or 1.5 Gb/s) or SD-SDI
Ext 1 OUT	External 1 HD-SDI or SDI loop-through signal. <sup>1)</sup>
Ext 3 IN	BNC, 0.8 Vpp, 75 $\Omega$ , HD-SDI (3 Gb/s or 1.5 Gb/s) or SD-SDI

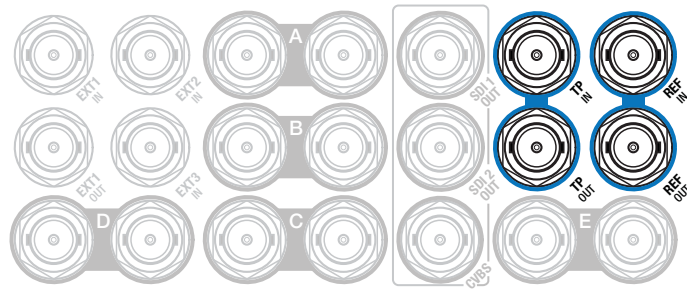
<sup>1)</sup> This output signal is only looped-through when the XCU is mounted in its cradle.



#### Note

Make sure that the applied external video inputs match the temporal frequency (50/59.94 Hz) of the selected camera video mode and that they are in sync with the camera output signal.

### 7.5.4 Teleprompter and Reference connectors



Connector	Signal
TP in	Teleprompter input: BNC, 1.0 Vpp, 75 $\Omega$ , (C)VBS (analog SD)
TP out	Teleprompter loop-through output signal. <sup>1)</sup>
Ref in	Reference input signal: BNC, 1.0 Vpp, 75 $\Omega$ (HD Tri-Level sync or SD Black Burst are accepted)
Ref out	Reference loop-through output signal <sup>1)</sup> or Tri-level sync output from the XCU when no reference video is attached or when the XCU is locked to a PTP grandmaster.

<sup>1)</sup> The output signal is always looped-through even when the XCU is not mounted in its cradle.

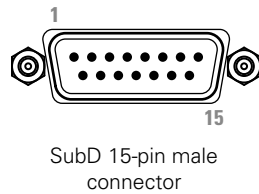


#### Note

The last loop-through output in a chain must be terminated with a 75  $\Omega$  resistor. The maximum number of XCUs/XCU cradles that can be looped through is 6.

## 7.6 Studio connectors

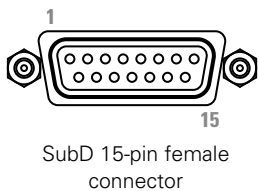
### 7.6.1 Signalling connector



Pin	Description	Pin	Description
1	Preview output ext. (relay contact < 10 $\Omega$ )	8	Housing
2	Call output ext. (relay contact < 10 $\Omega$ )	9	Preview output ext. return
3	ISO input ext. (dry contact)	10	Call output ext. return
4	On Air input ext. (dry contact)	11	ISO input ext. return
5	Call input ext. (dry contact)	12	On Air input ext. return
6	Audio 1 level (analog input voltage from 0 to 5 V)	13	Call input ext. return
7	5 V (Operating Control Panel)	14	Audio 2 level (analog input voltage from 0 to 5 V)
		15	GND

Microphone impedance >200  $\Omega$ ; sensitivity range: -64 to -22 dBm  
Signal at pin 2 of audio input is in phase with signal at pin 2 of the audio output.  
Shield of cable to the pin marked housing.

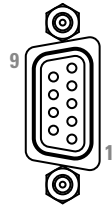
### 7.6.2 Intercom connector



Pin	Description	Pin	Description
1	Prod out (4-wire out, 2-wire in/out)	9	Prod out return (4-wire out, 2-wire in/out)
2	Prod in (4-wire only)	10	Prod in return (4-wire only)
3	Prod in shield (4-wire only)	11	Eng in shield (4-wire only)
4	Eng in (4-wire only)	12	Eng in return (4-wire only)
5	Eng out (4-wire out, 2-wire in/out)	13	Eng out return (4-wire out, 2-wire in/out)
6	Prog in (4-wire only)	14	Prog in return (4-wire only)
7	Prog in shield (4-wire only)	15	Housing
8	Housing		

Shield of cable to the pin marked housing.

### 7.6.3 Auxiliary (AUX) connector



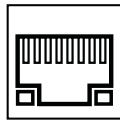
SubD 9-pin female connector

Pin	Description
1	+5 V
2	Private data in 2
3	Private data out 1
4	Private data in 1
5	GND

Pin	Description
6	GND
7	Private data out 2
8	Private data out 1 return
9	Private data in 1 return

Shield of cable directly to the connector housing.

### 7.6.4 C2IP connector (top)

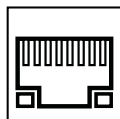


8-pin standard RJ-45 ethernet connector

Pin	Description
1	Transmit data + (TX+ )
2	Transmit data - (TX-)
3	Receive data+ (RX+)
4	no connection
5	no connection
6	Receive data - (RX-)
7	no connection
8	no connection

Ethernet 10Base-T, 100Base-TX compliant with IEEE-802.3 (edition 2000)

### 7.6.5 IP Trunk connector (bottom)



8-pin standard RJ-45 ethernet connector

Pin	Description
1	Transmit data + (TX+ )
2	Transmit data - (TX-)
3	Receive data+ (RX+)
4	TD2+
5	TD2-
6	Receive data - (RX-)
7	TD3+
8	TD3-

Ethernet 10Base-T, 100Base-TX, 1000BASE-T and Gigabit Ethernet compatible.

### 7.6.6 Digital Audio OUT 1+2 connector



BNC connector

BNC connector, 2-channel AES/EBU compliant audio output, 1.0 Vpp, 75  $\Omega$

This connector carries the digitally converted audio channel 1 and 2 from the camera's Mic 1 and Mic 2 connectors.

### 7.6.7 Digital Audio OUT 3+4 connector

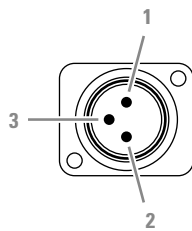


BNC connector

BNC connector, 2-channel AES/EBU compliant audio output, 1.0 Vpp, 75  $\Omega$

This connector carries digital audio channel 3 and 4 from the camera's VF connector (when AES In is selected by the VF connector signal selection switch on the adapter).

### 7.6.8 Analog Audio OUT 1 connector



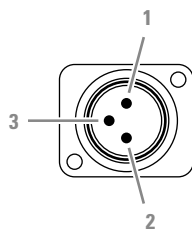
XLR 3-pin male connector

Pin	Description
1	Audio shield
2	Audio output
3	Audio return

Sensitivity range: -64 dBu to -22 dBu

Signal at pin 2 of audio output is in phase with signal at pin 2 of audio input.

### 7.6.9 Analog Audio OUT 2 connector



XLR 3-pin male connector

Pin	Description
1	Audio shield
2	Audio output
3	Audio return

Sensitivity range: -64 dBu to -22 dBu

Signal at pin 2 of audio output is in phase with signal at pin 2 of audio input.



# Chapter 8

## Specifications

### 8.1 Technical specifications

Item	Value
<b>General</b>	
Dimensions (W x H x D)	448 x 86.5 x 533 mm (17.6x 3.4 x 21.0 in) incl. mounting brackets and UXF cradle
Weight (max.)	7.8 kg (17.2 lbs) excl. UXF cradle; 12.5 kg (27.6 lbs) incl. UXF cradle
Operating temperatures	0 to +45 °C (+32 to +113 °F)
Storage temperatures	-20 to +70 °C (-4 to +158 °F)
Operating humidity	max. 90% relative humidity (non condensing)
Shock resistance	max. 10 G (transport)
	max. 2 G (operating)
Altitude	max. 15,420 m (50,000 ft)
<b>Power</b>	
Power requirements	100 to 240 VAC, 50 to 60 Hz
Power consumption	450 W max. fully equipped
Power connection	IEC type, 3-pin male
<b>Transmission (camera connection)</b>	
Transmission connector(s)	LEMO Hybrid Fiber according to SMPTE 304 (other fiber connectors on request)
<b>Video and signal connectors</b>	
Media Network	4x SFP+ connector cages for 10G Ethernet (SFP+ modules not included)
HD-SDI outputs (A, B and C)	4K UHD (2x) or 3G HD-SDI (8x); BNC, 0.8 Vpp, 75 Ω, Quad, Level-A
HD-SDI output (D) (Live/Effect)	2x BNC, 0.8 Vpp, 75 Ω
SD-SDI monitoring output	1x BNC, 0.8 Vpp, 75 Ω, SMPTE 259M ITU-R, BT.601
HD-SDI monitoring output	1x BNC, 0.8 Vpp, 75 Ω, SMPTE 292M, 1080i/720p at 59.94/50 Hz
Composite monitoring output	1x BNC, 0.8 Vpp, 75 Ω, (CVBS text with video, for viewing purposes)
Teleprompter input	1x BNC (+ loop-through output), 1.0 Vpp, 75 Ω

Item	Value
Reference input	1x BNC (+ loop-through output), 1.0 Vpp, 75 $\Omega$ , HD Tri-Level sync or SD Black Burst
External video inputs	3x BNC, 0.8 Vpp, 75 $\Omega$ , HD-SDI or SDI + 1x loop through output
<b>Data connectors</b>	
C2IP camera control Ethernet	Standard Ethernet RJ-45 connector; Ethernet 10Base-T, 100Base-TX, 1000BASE-T and Gigabit Ethernet compatible.
IP Trunk Ethernet	Standard Ethernet RJ-45 connector; Ethernet 10Base-T, 100Base-TX, 1000BASE-T and Gigabit Ethernet compatible.
Signalling in/out	D-sub 15-pin, male; preview, green tally (Call), dry contact; yellow tally (ISO), dry contact; red tally (On Air), dry contact; remote audio level control (-22 to -64 dBu), DC
Auxiliary in/out	D-sub 9-pin, female; private data in/out, 115 kbits/s TTL-levels (RS-232)
<b>Analog audio outputs</b>	
Analog audio outputs	2x XLR-3, 0/+6 dBu ( $\pm 1.5$ dB, max. 18 dBu, 600 $\Omega$ , max. gain 70 dB)
Frequency response	40 Hz to 15 kHz, (+1/-3 dB, 1 kHz, -10 dBu output level)
Distortion	less than 0.5% (100 Hz / 1 kHz, +6 dBu output level, 600 $\Omega$ )
S/N ratio	58 dB (unweighted RMS)
<b>Digital audio outputs</b>	
Audio channel 1+2	2x BNC, digital audio AES/EBU compliant, 48 kHz/24 bits, 1.0 Vpp, 75 $\Omega$
Audio channel 3+4	2x BNC, digital audio AES/EBU compliant, 48 kHz/24 bits, 1.0 Vpp, 75 $\Omega$
<b>Intercom</b>	
Intercom in/out	D-sub 15-pin, female (Prog in, Prod in/out, Eng in/out)
Input	0 or 6 dBu (max. 6dBu or 12 dBu), 9 k $\Omega$
Output	0 or 6 dBu ( $\pm 2$ dB, max 12 dBu), 600 $\Omega$
Frequency response	150 Hz to 6 kHz (1 kHz, -10 dBu output level)
Distortion	less than 2% (1 kHz, +12 dBu output level)

## 8.2 Dimensions

