Grass Valley
WE LOVE LIVE

LDX 135 / LDX 150

Live production camera

User Guide

www.grassvalley.com

FCC Compliance

In order to comply with FCC/CFR47: Part 15 regulations, it is necessary to use high-quality, triple-screened Media or Monitor cable assemblies with integrated ferrite suppression at both ends.

Patent Information

This product may be protected by one or more patents.

For further information, please visit: www.grassvalley.com/patents/

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Terms and Conditions

Please read the following terms and conditions carefully. By using LDX 135 / LDX 150 Series documentation, you agree to the following terms and conditions.

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Information in this document is subject to change without notice and does not represent a commitment on the part of Grass Valley.

Warranty information is available from the Legal Terms and Conditions section of Grass Valley's website (www.grassvalley.com).

Title	LDX 135 / LDX 150 User Guide
Part Number	13-00126-000 AA
Revision	2023-01-25, 13:19

Important Safety Information

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

Symbols and Their Meanings

Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

Indicates that the user, operator or service technician should refer to the product manuals for important operating, maintenance, or service instructions.

Indicates that static sensitive components are present, which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Canadian Standard Association (CSA) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Intertek Testing Services regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley product means that it complies with all applicable European Union (CE) directives.

The presence of this symbol in or on Grass Valley product means that it complies with safety of laser product applicable standards.

Warnings

A warning indicates a possible hazard to personnel, which may cause injury or death. Observe the following general warnings when using or working on this equipment:

- Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only.
- Do not operate the equipment in wet or damp conditions. If the unit is in a wet or damp environment, a rain cover must be used to protect it for personal safety reasons.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.
- Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.
- Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Have qualified service personnel perform safety checks after any service.

Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

- Products that have no on/off switch, and use an external power supply must be installed in proximity to a main power outlet that is easily accessible.
- Do not operate with suspected equipment failure. If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.
- To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.
- Follow static precautions at all times when handling this equipment. Servicing should be done in a static-free environment.
- Provide proper ventilation. To prevent product overheating, provide equipment ventilation in accordance with the installation instructions. Do not block the hot airflow coming from air outlet(s).

intake   exhaust
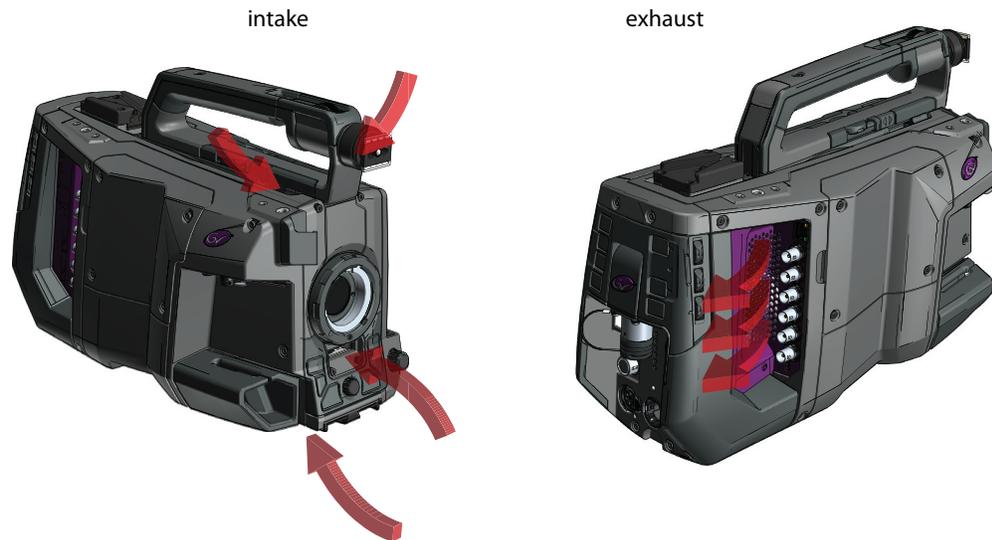
Precautions

To ensure continual high performance from the camera take the following precautions into consideration:

- Avoid damp places. If the environment is wet or damp a rain cover must be used to protect the camera.
- Do not subject the camera to severe shocks or vibration.
- Do not expose the camera to extremes of temperature.
- Do not leave the camera in direct sunlight or close to heating appliances for extended periods.
- Do not allow sunlight to shine into the viewfinder.
- Do not allow laser beams to shine into the lens as this could damage the imagers.
- Avoid extreme highlights as these can cause various kinds of optical reflections.
- Be careful when connecting and disconnecting fiber cables.
- Do not connect Grass Valley camera systems with other manufacturer's camera system parts.
- Make connections swiftly and firmly to avoid false error messages.

Electrostatic Discharge (ESD) Protection

Electrostatic discharge occurs when electronic components are improperly handled and can result in intermittent failure or complete damage adversely affecting an electrical circuit. When you remove and replace any card from a frame always follow ESD-prevention procedures:

- Ensure that the frame is electrically connected to earth ground through the power cord or any other means if available.

- Wear an ESD wrist strap ensuring that it makes good skin contact. Connect the grounding clip to an *unpainted surface* of the chassis frame to safely ground unwanted ESD voltages. If no wrist strap is available, ground yourself by touching the *unpainted* metal part of the chassis.

- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms.

- When temporarily storing a card make sure it is placed in an ESD bag.

- Cards in an earth grounded metal frame or casing do not require any special ESD protection.

Environmental Information

European (CE) WEEE directive.

This symbol on the product(s) means that at the end of life disposal it should not be mixed with general waste.

Visit www.grassvalley.com for recycling information.

Grass Valley believes this environmental information to be correct but cannot guarantee its completeness or accuracy since it is based on data received from sources outside our company. All specifications are subject to change without notice.

If you have questions about Grass Valley environmental and social involvement (WEEE, RoHS, REACH, etc.), please contact us at environment@grassvalley.com.

Laser Safety - Fiber Output SFP and QSFP Modules Warning

LASER SAFETY

The average optical output power does not exceed 0 dBm (1mW) under normal operating conditions. Unused optical outputs should be covered to prevent direct exposure to the laser beam.

Even though the power of these lasers is low, the beam should be treated with caution and common sense because it is intense and concentrated. Laser radiation can cause irreversible and permanent damage of eyesight. Please read the following guidelines carefully:

- Make sure that a fiber is connected to the board's fiber outputs before power is applied. If a fiber cable (e.g. patchcord) is already connected to an output, make sure that the cable's other end is connected, too, before powering up the board.

- **Do not** look in the end of a fiber to see if light is coming out. The laser wavelengths being used are totally invisible to the human eye and can cause permanent damage. Always use optical instrumentation, such as an optical power meter, to verify light output.

Safety and EMC Standards

This equipment complies with the following standards:

Safety Standards

IEC62368-1:2018

Audio/video, information and communication technology equipment: part 1

EN 62368-1:2018

EU national deviations.

EMC Standards

This unit conforms to the relevant Union harmonization legislation and the requirements of the following directive/standards:

RED 2014/53/EU

EMC testing;   EN 301 489-1 V2.2.3, EN 301 489-3 V2.1.1 and EN 301 489-19 V2.1.1.
                EN 62311:2020N

Radio testing;   EN 303 413 v1.1.1 (GPS)

Radio testing;   EN 300 330 v2.1.1 (NFC)

FCC / CFR 47:Part 15 (Class B)

Federal Communications Commission Rules Part 15, Subpart B

Caution to the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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

☞ **Note**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

☞ **Note**

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

⚠ **WARNING**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

grass valley $C\,\epsilon$

EU DECLARATION OF CONFORMITY

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

Manufacturer's Name: Grass Valley Nederland B.V.
Manufacturer's Address: Bergschot 69, 4817PA, Breda, The Netherlands

Trade/Brand Name: Grass Valley
Document Number: LDX150-C01-100
Device Name: LDX 150 **(1-0200200-0000)**
Device Description: LDX 150 broadcast camera

Year CE marking was first affixed to declared product/device: **21**

The product/device of the declaration described above is in conformity with the relevant Union harmonization legislation and the requirements of the following directive/standards:

RED 2014/53/EU

EMC testing;   EN 301 489-1 V2.2.3, EN 301 489-3 V2.1.1 and EN 301 489-19 V2.1.1.
                 EN 62311:2020
Radio testing;   EN 303 413 v1.1.1 (GPS)
Radio testing;   EN 300 330 v2.1.1, (NFC)

Notified body Telefication BV, 0560 performed B+C assessment and issued an EU-type examination certificate RED 202140120/AA/00

Safety;   IEC 62368-1: 2018   Audio/video, information and communication technology equipment: Part 1
                 EN 62368-1: 2018   EU national deviations.

Signed for and on behalf of Grass Valley Nederland B.V.

Julien Renaud

Julien Renaud, Compliance Specialist
Montreal, Quebec, Canada – Issued on October 5, 2021

EMC performance of cables and connectors

Grass Valley products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

SIGNAL/DATA PORTS

For unconnected signal/data ports on the unit, fit shielding covers. For example, fit EMI blanking covers to SFP(+) type ports and fit 75 Ω RF terminators to BNC type ports.

COAXIAL CABLES

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 8281 or BBC type PSF1/2M and Belden 1694A (for 3Gbps).

D-TYPE CONNECTORS

D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having "dimples" which improve the contact between the plug and socket shells, are recommended.

Table of Contents

Introduction

Welcome

Both LDX135 and LDX150 are high-end live production cameras using the Grass Valley's new 2/3-inch UHD imagers. The LDX 135 will only support the single speed video modes where the LDX150 supports all available video modes including high speed.

About this guide

The purpose of this guide is to present a detailed description of how to operate an LDX 135 / LDX 150 camera. It provides the information necessary to use the camera in different configurations and with various attachments.

This guide describes all operating features of the camera so it can be used to its full potential. This guide is so designed that it can be used as an introduction to those who are new to the camera, as a simple procedural guide to those who wish to set-up and start shooting immediately, and as a reference work to be consulted as required during the long life of the camera.

Related documents

Before proceeding, check the Grass Valley website at www.grassvalley.com for the latest version of this user's guide and additional information:

- User's guide updates, data sheets, brochures and application notes.
- Camera software package updates, release notes and installation instructions.

Technology

Work Field

The LDX 135 / LDX 150 is designed for flexibility, with the ability to be used for both dramatic productions and live broadcasts, especially sports. The use of compact broadcast 2/3-inch lenses with a B4-mount gives you the large zoom range, speed and depth of field which is required for demanding live and many dramatic productions.

The LDX135 is designed to be used as a full compatible version of the LDX150 for all the single speed video modes.

Remote production

The LDX 135 / LDX 150 is the best choice for At-Home/REMI (REMote Integration) productions. With the implementation of Grass Valley's NativeIP transmission, the LDX 135 /

LDX 150 is the first studio system camera that is fully IP based. Thanks to NativeIP, the camera connects directly to your IP infrastructure in studio and OB-production environments.

Additionally, the LDX 135 / LDX 150 can also operate in an existing XF transmission workflow using the XCU UXF base station.

Options

The LDX 135 / LDX 150 basic camera functionality supports the XF transmission workflow together with the XCU UXF base station.

The following options are available for the LDX 135 / LDX 150:

- NativeIP — IP based Media Network
- DirectIP+ — DirectIP+ operation
- UHD 1X — UHD 1X single speed video modes
  Note: UHD 1X is a standard available in the LDX 135 (No option required)
- UHD 3X —UHD 3X high speed video modes (LDX 150 only)
- UHD FilmB — UHD filmic broadcast video modes (25 and 29.97 frames/s)
- UHD FilmC — UHD filmic cinema video mode (23.98 frames/s)
- GPS — camera position information

Superior digital processing

The advanced video processing of the camera is done with floating point precision while all major camera functions are processed in the digital domain, including knee, gamma, detail, matrix and color correction.

To make images look their best, the LDX 135 / LDX 150 incorporates TrueTexture™—a unique feature to preserve texture throughout all processing parameters.

Chromatic lens aberration correction (CLASS) offers impressive sharpness improvements on the outer regions of the image by canceling out shifts in color registration. This algorithm works in conjunction with lens data, using industry standard lens interface protocols.

Video contrast adjustment offers unmatched creative control over the luminance levels of the picture: shadows, midtones and highlights can be adjusted individually while natural transitions between the areas are maintained.

Key features

- New camera platform designed for extension into the future
- UHD HDR images at 3X high speed (LDX 150 only)
- Simple, scalable multi-format image capture and distribution
- First camera to employ full IP network connectivity thanks to NativeIP. No separate base station is required for NativeIP. Backward compatibility is still offered with the XCU Universe UXF base station over XF transmission.

- Fastest time to deploy and configure
- Extensive operator training not required
- At-a-glance settings and diagnostics for immediate status recognition
- Software update and reconfiguration of licenses and settings (if required) in less than 7 minutes
- Field-tested rugged and reliable
- Suite of inventory management features
- Quickly align camera configuration to production requirements for superior cost management
- Field-replaceable (Q)SFP modules for different IP configurations

System components and accessories

System components and power supply options:	
XCU Universe UXF	XF Transmission Fiber Base Station
HPE-300	300 W Hybrid Power Extender with single AC mains input
HPE-300-2AC	300 W Hybrid Power Extender with dual AC mains input
LDK 4425	3G Fiber Power Converter unit
SHED-BS	SMPTE Hybrid Elimination Device (Base Station)
Camera Control components:	
CGP 500	Creative Grading Control Panel
CCS-One	Cameras Control Server
CGA	Creative Grading Application (PC tablet required)
Viewfinders:	
EC 2-100	2-inch ocular viewfinder for LDX 100 Series
VF 7-100X	7-inch native HD viewfinder for LDX 100 Series
Camera accessories:	
LDK 5031/10	Tripod Plate
LDK 4475	Reflex SuperXpander

Installation

Installing a (Q)SFP module

The camera is shipped without a (Q)SFP module. Before operating the LDX 135 / LDX 150 make sure that the right (Q)SFP module is installed that suits your transmission configuration. Refer to Appendix E for more information about how to install (or exchange) a (Q)SFP module.

Mounting a lens

To attach a lens to the camera head proceed as follows:

- Ensure that the lens locking ring (1) is in the unlocked position (turned counterclockwise).
- If present, remove the dust protection cap.
- Slot the lens into the lens mount and make sure that lens and camera are accurately aligned.
- Turn the lens locking ring (1) clockwise until the lens locks firmly into place.
- Connect the lens cable (2) to the lens connector at the right side of the camera.
- Use the cable tray (3) to stow the loop of the lens cable.

close
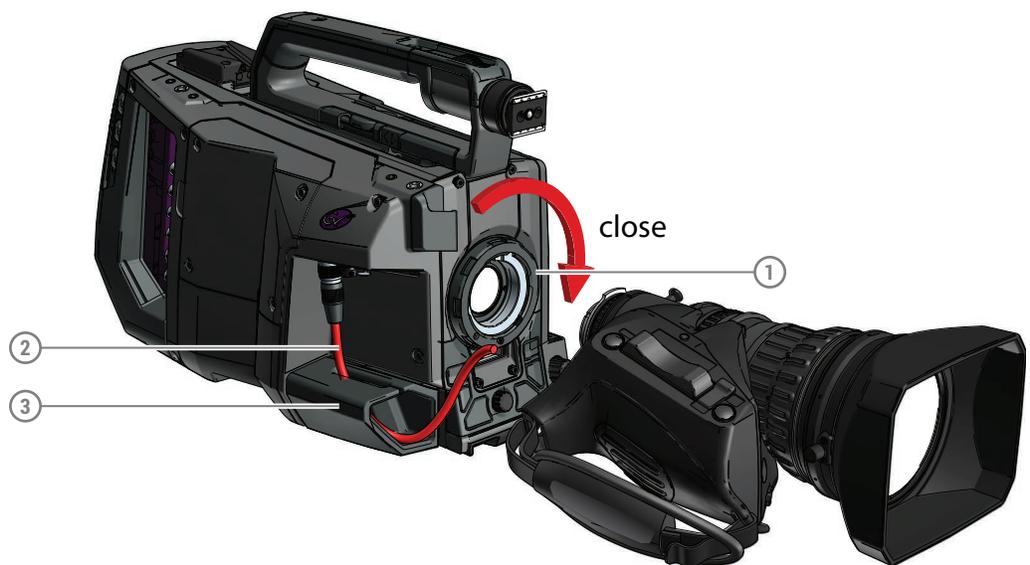
⚠ **Caution**

Do not attach a lens weighing more than 5 kg (11 lbs) to the camera without a proper lens support.

When a new lens is fitted to the camera it may be necessary to carry out some adjustments to optimize its use, for example, back focus or shading. For more information about these adjustments refer to the lens manufacturer's documentation.

☞ **Note**

If you are using a lens with an analog interface, make sure to set the lens interface type to Analog: in the camera menu, go to the **Configuration > Lens > Lens Settings** menu and use the **Lens IF Type**.

Always place the dust protection cap when the lens is not connected to the camera.

EC 2-100 viewfinder

Mounting the viewfinder

To mount the viewfinder on top of the camera proceed as follows:

- Loosen locking ring **(2)** of viewfinder support bracket **(1)** at the front of the camera handgrip. (As seen from the rear of the camera, turning the locking ring counterclockwise moves it towards the handgrip.)
- Push the locking pin **(3)** in and slide the viewfinder onto the viewfinder support bracket **(1)**.
- Tighten the locking ring **(2)** by turning it clockwise (as seen from rear) so that the viewfinder is mounted securely to the support.
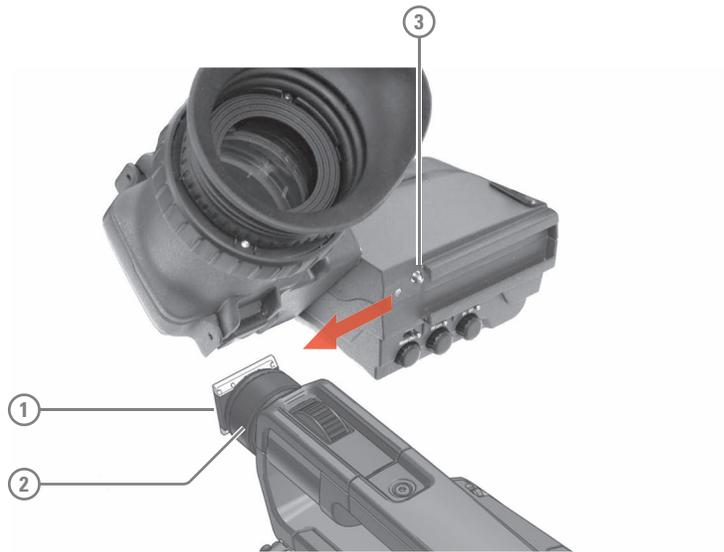
- Connect the viewfinder cable to the viewfinder connector socket **(4)** under the recess at the right side of the camera.
- Guide the cable through the upper cable clip **(4a)** and down along the cable holder **(4b)**.
- Attach the microphone holder **(5)** onto the viewfinder and secure it with the knurled screw **(6)** on top.
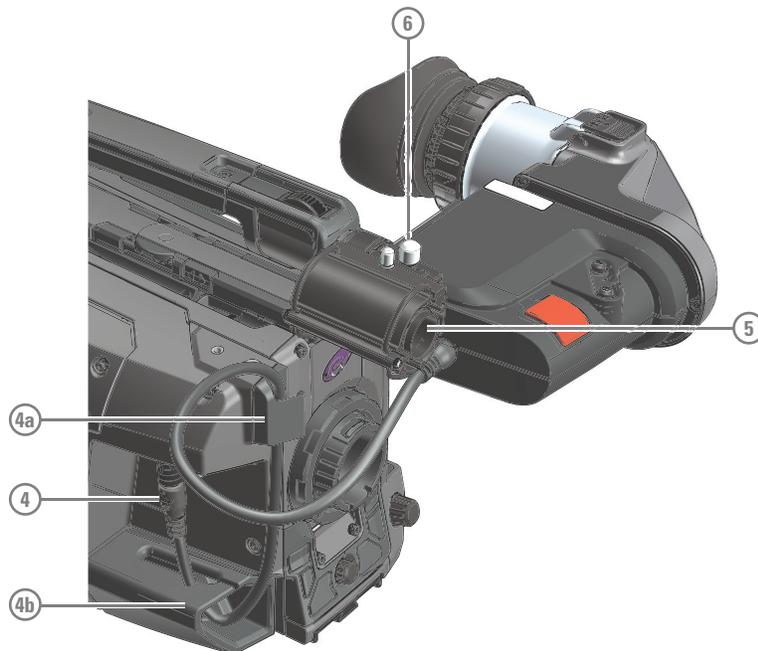
Mounting a microphone

To attach a microphone to the camera proceed as follows:

- Open the microphone holder by unscrewing the knurled screw **(1)** of the microphone support bracket **(2)** on the viewfinder and open the bracket:
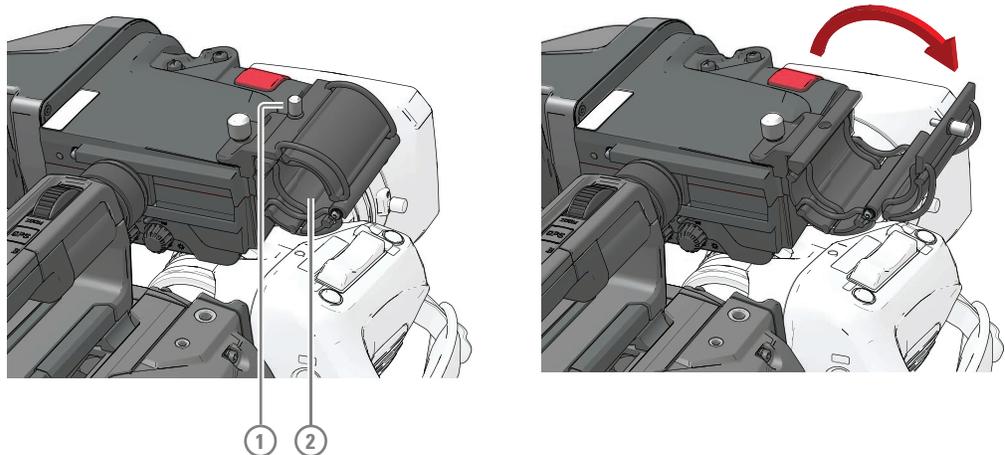
- Slide the microphone into the split tube **(3)** (included with the bracket) until the back end (connector sied) of the microphone becomes visible.

- Place the tube with the microphone into the holder with the split facing upwards. Mount the microphone as straight as possible.
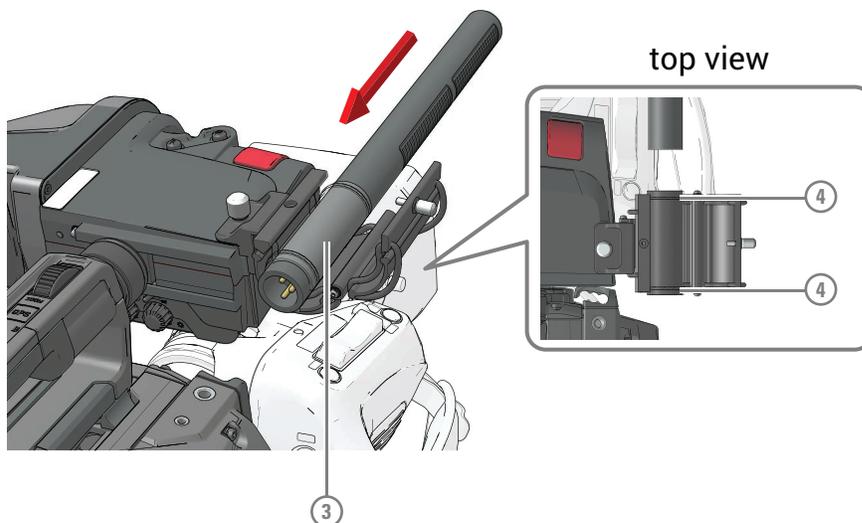
- Ensure that the rubber supports at the back and front of the holder fit into the rims **(4)** around the tube.

- Close the holder and tighten the knurled screw at the top. Do not allow a wind hood (when present) to touch the holder as this reduces the damping effect:
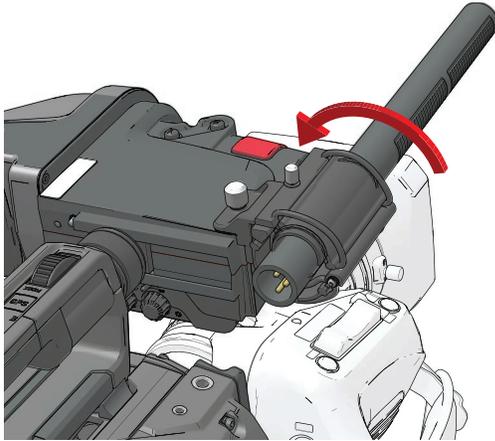
- Connect the microphone cable to the MIC audio XLR connector on the right side of the camera. To avoid mechanical pick-up, do not let the microphone cable touch the holder.

Other microphones with a diameter of 21 mm (0.83 in) can also be used, however, ensure that the sensitivity of the input that match that type of microphone are correctly selected in audio section of the camera **Configuration** menu.

☞ **Note**

When a longer microphone is used, it may not be necessary to place it in the split tube.

Phantom power can be switched on or off for the front microphone socket in the audio section of the camera **Configuration** menu.

Positioning the viewfinder

Horizontally

The horizontal position of the viewfinder can be adjusted as follows to suit your preferences:

- Loosen the locking ring **(1)**. As seen from the rear of the camera, turning the locking ring counterclockwise moves it towards the handgrip.
- Slide the viewfinder horizontally along the rail to the desired position.
- Tighten the locking ring **(1)** again by turning clockwise.
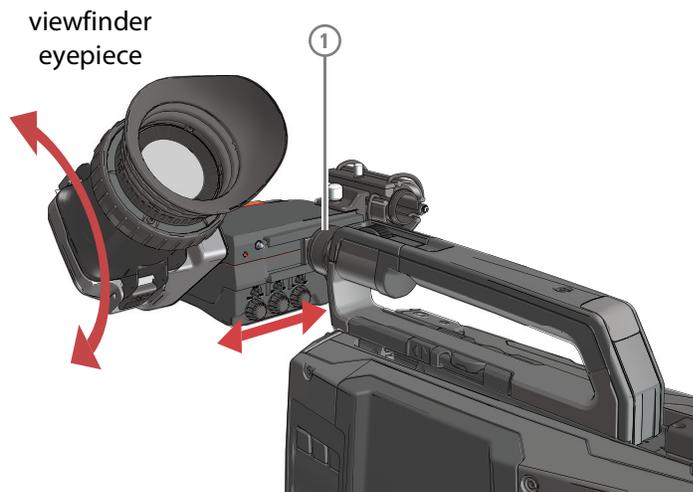
Angular

Hold the viewfinder eyepiece with your hand and rotate it to the desired angle.

Laterally

The viewfinder can be positioned backwards and forwards along the camera axis (lateral):

- Loosen the locking disc **(1)** by turning it counterclockwise using your thumb and index finger.
- Press both sides of the handgrip clip **(2)** using your thumb and index finger and with the lever pressed in, move the handgrip (with viewfinder) back or forth.
- When the desired position is reached release the clip. Note: the rail on the camera body has indents so make sure to place the handgrip is placed at a fixed position.
- Tighten the locking disc **(1)** by turning it clockwise.
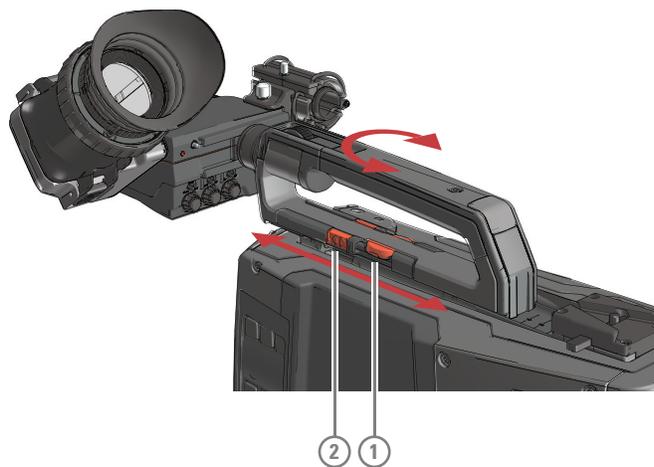
👉 **Note**

Moving the handgrip also changes the weight balance of the camera. Make sure to balance the camera with the lens mounted and the cables attached.

Distance viewing

The viewfinder display can also be viewed from a distance:

- Push down the bottom clip **(4)** below the eyepiece and swing it free of the associated clip. The eyepiece can also be swung downwards; push down the top clip to release the eyepiece and swing it downwards.
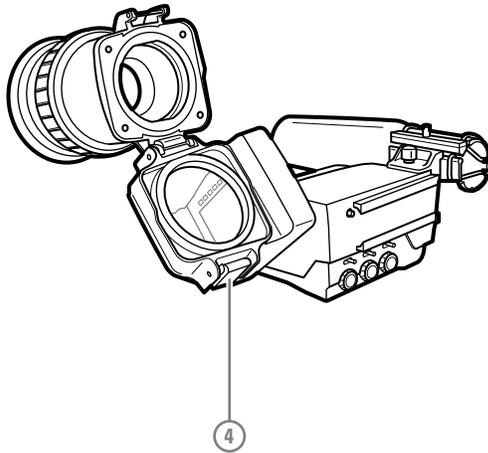
👉 **Note**

Handle the eyepiece with care when folded back—its position is not secured.

LDK 5301/10 Tripod adapter plate

To mount the camera on a tripod, the tripod plate must first be attached to the tripod. Follow the tripod manufacturer's instructions to mount the wedge plate supplied with the tripod and the tripod adapter plate firmly onto the tripod. Attach the camera to the tripod adapter plate as follows:

- Slide the camera horizontally along the tripod adapter plate from back to front ensuring that the front of the camera engages the V-slot (1) at the front of the tripod adapter plate, and that the slot on the bottom of the camera engages the stud (2) at the rear of the tripod adapter plate.
- Firmly push the camera forward until it clicks into place.
- When the camera is mounted firmly, the locking lever (5) swings around fully to the rear of the plate. If the lever does not travel the full distance, you should manually lock it into place.

⚠ **Caution**

Failure to attach the camera to the tripod adapter plate in the correct manner could result in an unsecured camera. Ensure that the rear stud (2) is engaged and that the camera clicks into place.
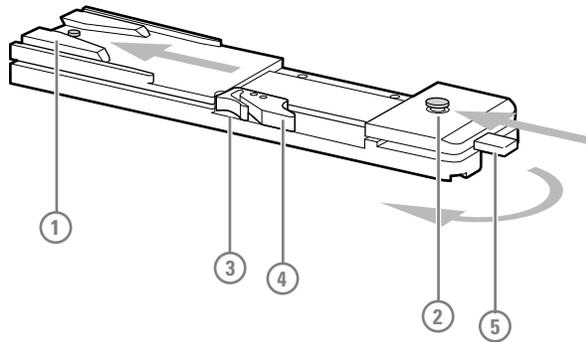
Remove the camera from the tripod as follows:

- Open the locking lever (5) to free the rear stud (2).
- Press and hold the red locking lever (3) against the release handle (4).
- Ensure that you have a firm hold of the camera.
- Pull the release handle (4) forward.
- Move the camera backwards and up.

Adjusting the shoulder pad

To change the position the shoulder pad press and hold the adjustment lever at the bottom left of the camera body, just behind the handgrip. The shoulder pad can now be moved backwards and forwards along the axis of the camera.

✎ **Tip**

Adjust the shoulder pad after all other units (viewfinder, lens, cables) have been mounted to get the best balanced shoulder position.

BOTTOM VIEW

Push lever to
adjust

13
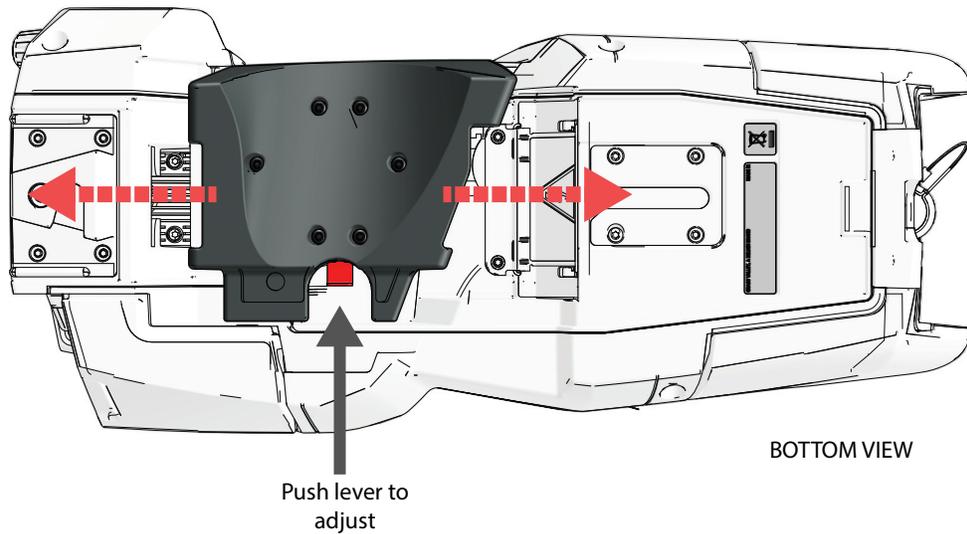
Adjusting the handgrip position

The handgrip position can be adjusted along the axis of the camera body.

- Loosen the locking disc by turning it counterclockwise using your thumb and index finger.
- Press both sides of the handgrip clip using your thumb and index finger and with the lever pressed in, move the handgrip back or forth.
- When the desired position is reached release the clip. Note: the rail on the camera body has indents so make sure to place the handgrip is placed at a fixed position.
- Tighten the locking disc by turning it clockwise.
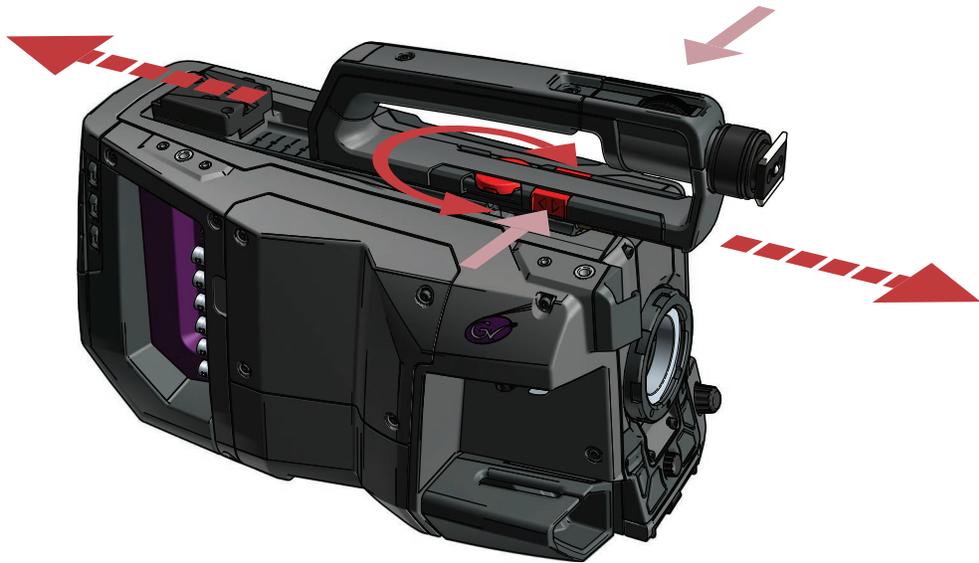
Configuration

Camera system configurations

The LDX 135 / LDX 150 camera can be used in three different camera modes:

- NativeIP mode[1]
- XCU mode (also called cabled mode or XF mode)
- Local mode

To set or change the camera mode, enter the camera menu, go to the **Installation** menu and use the **Camera Mode** function to select IP (for NativeIP mode), XCU (for XCU mode) or Local (for Local mode).

There are multiple options to power the LDX 135 / LDX 150, depending on the selected camera mode and system configuration:

- An HPE-300/HPE-300-2AC Hybrid Fiber Extender
- An XCU UXF (XCU Universe/Enterprise/Xpress UXF)
- A local Power Supply Unit (>300 W)

NativeIP mode

Using a hybrid power extender

Power is supplied by the HPE-300/HPE-300-2AC while optical transmission is put through from the hybrid fiber cable to single mode fiber:

LDX 135 / LDX 150   HPE-300   Network Switch
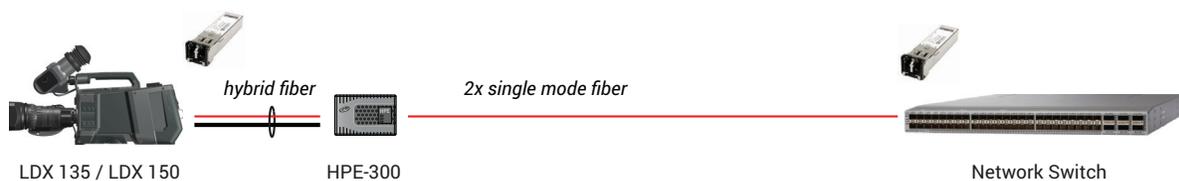
Using a power supply unit and fiber converter

Power is delivered by a power supply unit while optical transmission is put through from the hybrid fiber cable to single mode fiber using a converter:

1.Requires the NativeIP option to be installed.
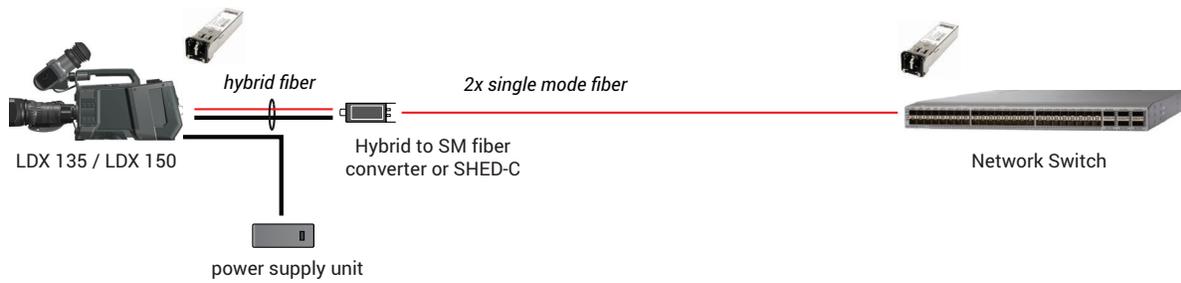
XCU mode

Power is delivered by the XCU through the hybrid fiber cable:

DirectIP/IP+ with hybrid power extender

Power supply solution is similar to the NativeIP configuration.
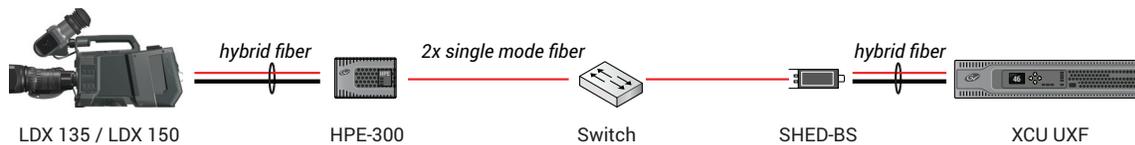
Local mode

Power is delivered by a local power supply unit and all signals are available as local baseband connections on the camera's side and back panels.
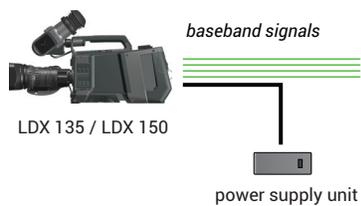
Control network

The LDX 135 / LDX 150 is controlled by the Creative Grading camera control system that uses the C2IP network. There are several methods to connect the camera to the C2IP network:

- in NativeIP mode: use a tagged VLAN for the C2IP network on the IP Media network;
- in XCU mode: connect the C2IP network to the C2IP Ethernet connector on the back panel of the XCU;
- In Local mode: connect the C2IP network directly to the C2IP Ethernet connector on the back panel of the camera.

☞ **Note**

The LDX 135 / LDX 150 can also be controlled by a legacy OCP 400 control panel. Not all options may be available.

Locking

The LDX 135 / LDX 150 can be locked by one of the following reference signals or sources:

- a network clock using PTP (typically a PTP Grandmaster) over the IP Media Network
- a local reference source (a camera or signal generator) using an SDI input, HD Tri-Level or Composite video.
- an XCU via the XF transmission (in XCU camera mode)
- or it can be in FreeRun mode (not locked)

The LDX 135 / LDX 150 can also act as a reference source to synchronize other cameras.

PTP locking

PTP in NativeIP mode

The camera is synchronized (locked) over the IP Media Network to a PTP grandmaster clock using the Precision Time Protocol (PTP).

✎ **Tip**

Many PTP settings and detailed diagnostics on PTP can be monitored in camera menu: go the ***Diagnostics > PTP*** menu to view them.

PTP in XCU mode

The camera is synchronized by the XCU which is connected (over the IP Media Network) to a PTP grandmaster clock using the Precision Time Protocol (PTP).

In the XCU menu, go to the ***Install > Reference Source > Source*** function and select *PTP*.

✎ **Tip**

Many PTP settings and detailed diagnostics on PTP can be monitored in the XCU menu: go to the ***Diagnostics > Media Network > PTP*** menu to view them.

PTP setup

(this section is valid both in NativeIP and XCU mode)

- Status — shows PTP locking status. The following indications are possible:
    - locked XCU is locked to the PTP grandmaster clock.
    - Calibrating — a PTP Grandmaster is found and the camera system is calibrating to the PTP Grandmaster;
    - Listening — system is searching for a PTP Grandmaster on the IP Media Network;
    - Disabled — PTP is switched off;
    - Off — system is not connected to the IP Media Network.
- Profile — select the PTP protocol/domain used for locking to the PTP Grandmaster:
    - SMPTE2059 — used for synchronization of broadcast media systems;
    - AES67 — media profile of AES67;
    - AES-SMPTE — combination of AES67 and SMPTE2059;
    - User — User defined PTP settings. The parameters Domain Nr, Delay Req Interval and Receipt Timeout must be set. For more information about these paramenters, refer to the IEEE1588 PTP (Precision Time Protocol) specification.

Local reference

Camera

The locking source is connected directly to the camera's Reference Input BNC connector (see REF/AES connector, on page 138).

1. Select the reference signal. Go to the ***Configuration > Reference*** function and select one of the following options:
    - <SDI Input> camera locks to an SDI video signal applied to BNC-D. Note: this option is not
    - <PTP> the camera locks to a PTP signal on the IP Network (in NativeIP mode)
    - <TriLvl> (= HD Tri-Level sync): the camera locks to the (expected) TriLvl input on the REF/AES connector
    - <Composite> (SD Black Burst): the camera locks to the (expected) Composite input on the REF/AES connector
    - <FreeRun> not locked (reference signals are ignored)
2. If you selected <SDI Input> or <PTP> as reference signal, the REF/AES BNC connector can be programmed. Go to the ***Configuration > Signals > BNC Ref/AES*** function and select one of the following options:
    - <Ref In> Reference input

- <AES> BNC connector is used as a Digital Audio AES input (this audio source can be selected in the audio section of the camera)
- <TriLvl> HD Tri-Level reference <u>output</u>, can be used as a locking source for a second camera.
- <Composite> Composite (SD Black Burst) reference <u>output</u>, can be used as a locking source for a second camera.

Tip

Locking diagnostics can be monitored in the **Diagnostics > Reference** menu.

XCU

(only valid when camera is in XCU mode)

The locking source is directly connected to the Reference Input BNC connector on the XCU backpanel: it can be either a HD Tri-Level sync or Composite (SD Black Burst) signal.

In the XCU menu, go to the **Install > Reference Source > Source** function and select *RefVideoIn*. The XCU accepts and detects both HD Tri-Level and SD Black Burst reference signals.

Free running

The camera is not locked. Go to the **Configuration > Reference** function and select FreeRun.

Main video workflows

NativeIP mode: 1X speed UHD 2110-20 single raster

59,94Hz

Video Format			Bandwidth (2110-20)
2160p	Main UHD	HDR	11,1
1080p	LIVE 3G	HDR/SDR	2,8
1080i	Live-Aux	HDR/SDR	1,2
			Total 15,1
	25G Capacity ; 60%		
Ext 1			11,1 / 2,8 / 1,2
Ext 2			11,1 / 2,8 / 1,2
Ext 3			11,1 / 2,8 / 1,2

VLAN (tag) ; separate VLAN for C2IP

VLAN (tag) ; separate VLAN for IP Trunk
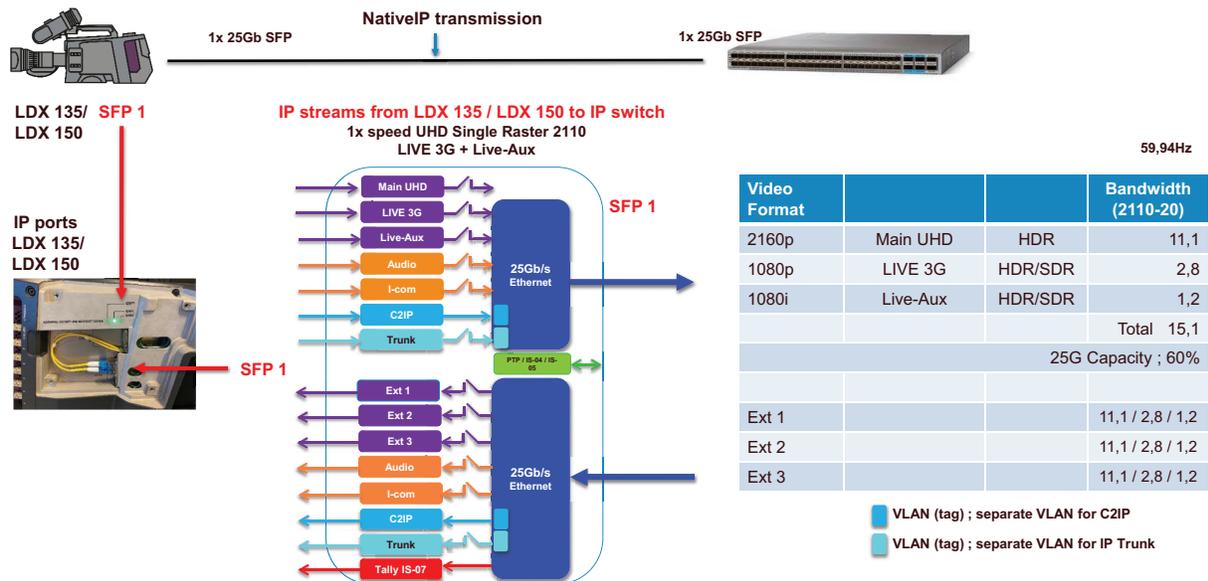
NativeIP mode: redundant 1X speed UHD 2110-20 single raster

59,94Hz

Video Format			Bandwidth (2110-20)
2160p	Main UHD	HDR	11,1
1080p	LIVE 3G	HDR/SDR	2,8
1080i	Live-Aux	HDR/SDR	1,2
			Total 15,1
	25G Capacity ; 60%		
Ext 1			11,1 / 2,8 / 1,2
Ext 2			11,1 / 2,8 / 1,2
Ext 3			11,1 / 2,8 / 1,2

VLAN (tag) ; separate VLAN for C2IP

VLAN (tag) ; separate VLAN for IP Trunk
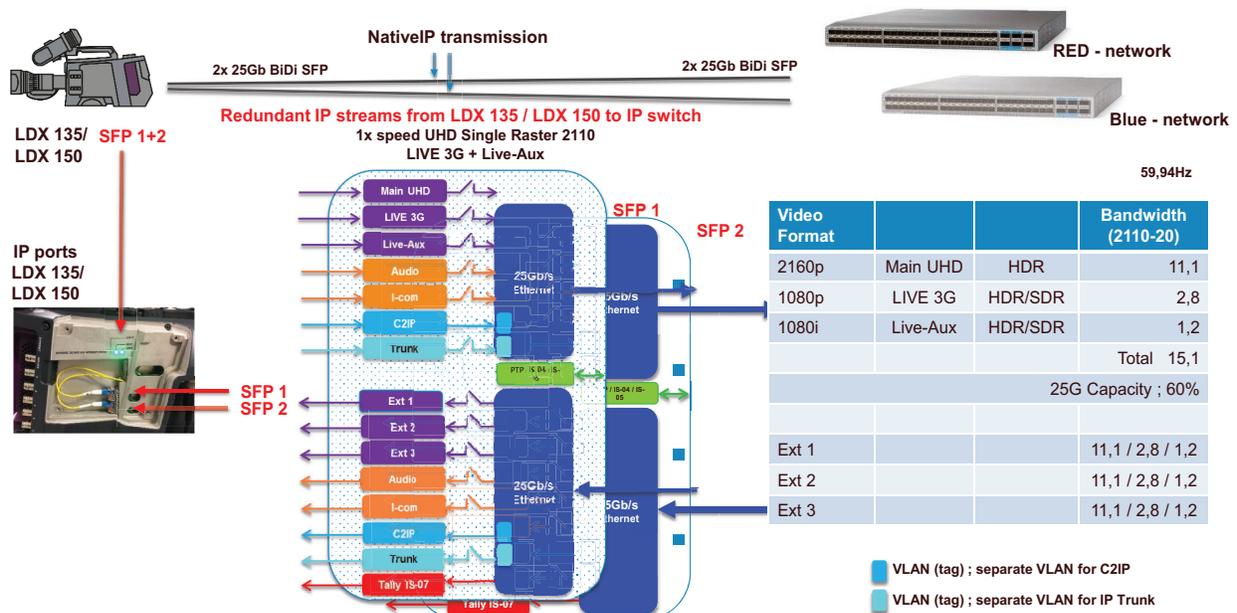
NativeIP mode: 3X speed UHD 2110-20 single raster (LDX 150 only)

NativeIP transmission

1x 100Gb QSFP

1x 100Gb QSFP

LDX 150   QSFP

IP streams from LDX 150 to IP switch
3x speed UHD Single Raster 2110
LIVE UHD + LIVE 3G

IP ports
LDX 150

QSFP

Main1 UHD
Main2 UHD
Main3 UHD
LIVE UHD
LIVE 3G
Audio
I-com
C2IP
Trunk

QSFP

100Gb/s Ethernet

PTP / IS-04 / IS-05

Ext 1
Ext 2
Ext 3
Audio
I-com
C2IP
Trunk
Tally IS-07

100Gb/s Ethernet

59,94Hz

Video Format			Bandwidth (2110-20)
2160p	Main1 UHD	HDR	11,1
2160p	Main 2 UHD	HDR	11,1
2160p	Main 3 UHD	HDR	11,1
2160p	LIVE UHD	HDR	11,1
1080p	LIVE 3G	HDR	2,8
		Total	47,2
		100G Capacity ; 47%	

VLAN (tag) ; separate VLAN for C2IP
VLAN (tag) ; separate VLAN for IP Trunk

XCU mode: 1X speed UHD with XCU Universe UXF or XCU Xpress UXF

XF transmission

XCU Universe UXF
or
XCU Xpress UXF

2x 10Gb SFP

2x 10Gb SFP

A1 + A2

LDX 135/ SFP 1
LDX 150

10Gb SFP
or
10/25Gb Dual-rate SFP

IP ports
LDX 135/
LDX 150

SFP 1

IP streams from XCU to IP switch
1x speed UHD Uncompressed (4x3G)
LIVE + Mon.

Main 4K.1
Main 4K.2
LIVE 3G
Audio
I-com

A1

10Gb/s Ethernet

PTP

Ext 1
Ext 2
Ext 3 / TP
Audio
I-com

10Gb/s Ethernet

Main 4K.3
Main 4K.4
Mon

A2

10Gb/s Ethernet

10Gb/s Ethernet

59,94Hz

Video Format		Bandwidth (2110-20)
1080p (SDQS/2SI)	Main 4K.1	2,8
1080p (SDQS/2SI)	Main 4K.2	2,8
1080p (SDQS/2SI)	Main 4K.3	2,8
1080p (SDQS/2SI)	Main 4K.4	2,8
1080p	LIVE 3G	2,8
1080i	Mon	1,4
	Total	15,4
	2x10G Capacity ; 77%	

NOTE:
LDX 135 / LDX 150 only supported by **XCU Universe XF**
or **XCU Xpress XF**

IP Media setup

Camera Connect

☞ **Note**

Make sure the version of Camera Connect 1.69 or higher.

Camera Connect is Grass Valley's configuration and setup tool for camera systems. The software comes pre-installed on the CCS-One Cameras Control Server and can be accessed through the C2IP network by a web-browser that runs on a PC or tablet computer.

- Make sure you are connected to the C2IP network. Open the web-browser on your device and enter one of the following links:
  - http://10.127.44.32/camconnect
  - http://169.254.0.201/camconnect
- The Camera Connect login window is shown:
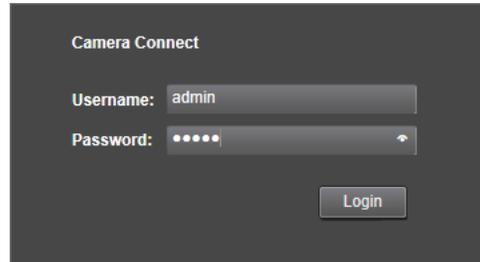
- Enter user name and password. The default login name is *admin* and the password *admin* (these can be changed after login).
- Click or tap Login. The Camera Connect user interface is shown.

☞ **Note**

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

Click the **IP** tab at the top op the page; a row of sub tabs appears. The following sub tabs are used to configure the IP Media Network: Network Ports, NMOS, Main Video, Highspeed Video, Live | Mon, Ext. Video, Audio, Audio Ch., Intercom, Intercom Ch., PTP, Priv. Data, C2IP, Direct IP and Direct IP+.
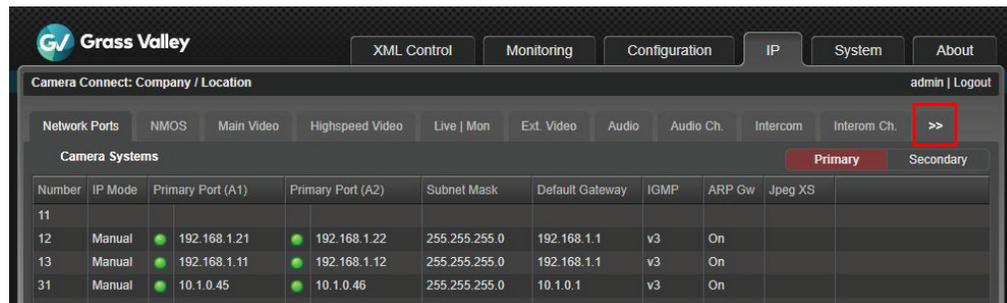
IP Media Network setup

Network ports setup

The list of camera systems is shown, sorted by camera number. Click the **Network Ports** tab: Here you can configure (local) IP addresses, subnet mask and default gateway for Primary Port (A1) and Secondary port (B1). To change the network port selection, select **Primary** [Primary] or **Secondary** [Secondary] on the left upper corner of the Network Ports tab.
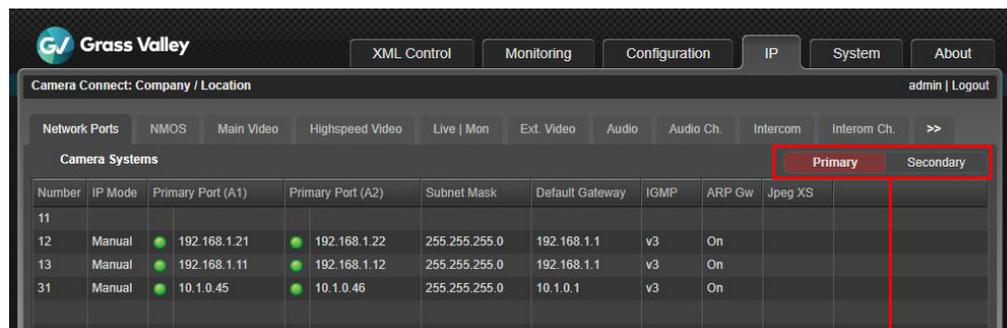
Primary & Secondary Port selection

The indicator(s) in front of the IP addresses show the status of the physical IP network connection:

Off	Port is not in use.
🟢	Indicates a connection between the camera port and an IP switch port. **Note:** Please make sure the SFP modules used in the camera and the IP switch are the same (e.g. 10G / 25G / 100G)
🔴	No connection.
IP Mode	Indicates whether the IP addresses are set manually or via DHCP.

☞ **Note**

A green light does not indicate a *correct* communication link between the camera and the IP switch.

Click the camera system you want to set up. A popup window appears and you can edit the following parameters:
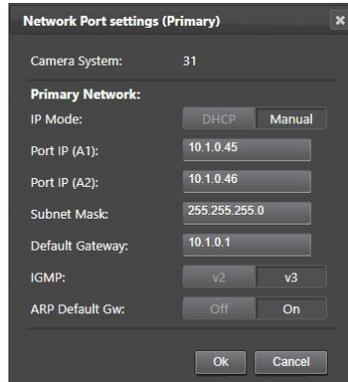
Port IP (A1) — this is the local IP address of Port A1 in the IP Media Network.

Port IP (A1) — this is the local IP address of Port A2 in the IP Media Network.

Subnet mask — depends on how large the media subnet is.

Default gateway — depends on the required network settings.

☞ **Note**

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

NMOS

When using **NMOS** for connection management, there are several options to choose from:
- OFF
- mDNS
- DNS-SD
- Static

The **Conn.Type** column indicates the settings done in the camera(XCU). The interface that is using NMOS can be selected as well; it is either C2IP or Media. IP Address, Port Number, Version and Status are visible when a connection is made with the NMOS server.

The indicator(s) in the Status column show the status of the NMOS server connection:

🟢	Indicates a connection is made with the NMOS server.
🔴	No connection.

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

NMOS

Connection type — indicates the settings done in the camera. Options are; OFF, mDNS, DNS-SD and Static

Interface — NMOS over C2IP connector or via the IP Media Network

Server IP — IP address for NMOS server

Server Port — IP port number for NMOS server

IS-04 Version — NMOS IS-04 protocol version for NMOS server

☞ **Note**

NMOS is applicable for both **Primary** and **Secondary** networks.

Main video

In the **IP Main** tab you can set up IP address and port number for the Main video outgoing stream for the Primary and Secondary IP Media Network Port. The transport standard (protocol) for Main video is also selected in this tab next to the PID (Payload ID). JPEG XS compression can be selected as well for main Video.

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 can be split into four (sub)streams.

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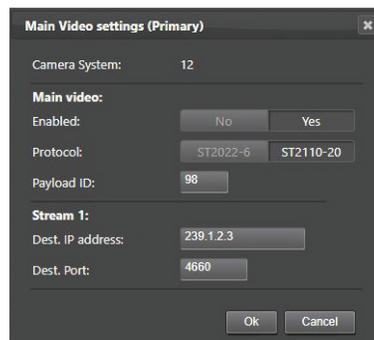
Main Video

Enabled — selects whether the Main video is included in the IP Media Network stream:

Standard — this is the transport standard 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:

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.

Please apply the same settings for the Secondary network.

Main video in 4K uncompressed mode

☞ **Note**

This section is only applicable when the LDX 135 / LDX 150 is connected to a UXF XCU (with IP connectivity enabled).

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 standard for Main video is also selected in this tab.

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.
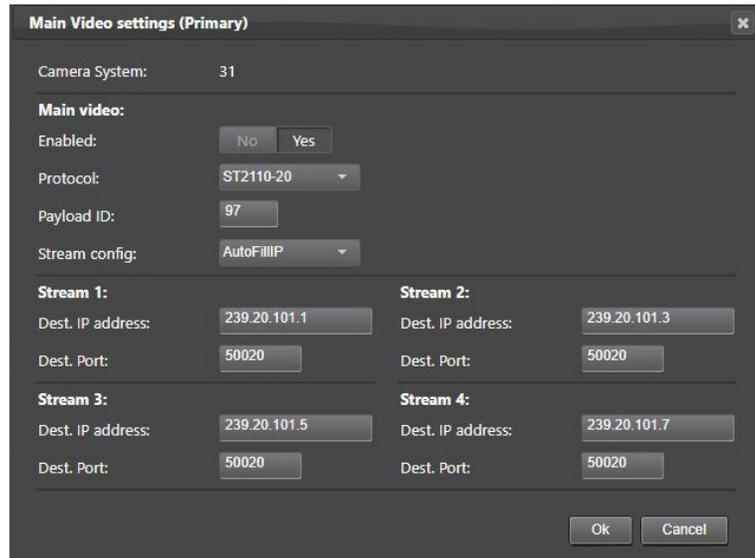
Main Video

Enabled — selects whether the Main video is included in the IP Media Network stream:

- *Yes*: Main video is included in the IP Media Network stream
- *No*: Main video is NOT inserted into the IP Media Network stream (this is also indicated with the indication *off* in front of stream 1).

Protocol — this is the transport standard for IP Main Video. Select either *ST2022-6* ('embedded SDI with audio and ancillary data over IP') or *ST2110-20* ('Video essence over IP').
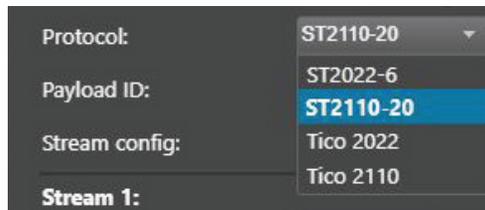
Stream config — defines how streams 2,3, 4 are configured, based on settings for stream 1:
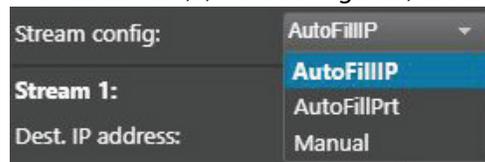
- *AutofillIP*: the IP addresses for stream 2, 3 and 4 are automatically filled in based on the entered IP address for stream 1. The last digit of the IP address for Stream 1 is increased by 2 for the subsequent streams.
- *AutofillPrt*: the port numbers for streams 2, 3 and 4 are filled in based on 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.

Highspeed Video

<<New Chapter Highspeed Video here>>

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 available as a selectable stream. In HD SDR operation the video mode is the same as Main video.
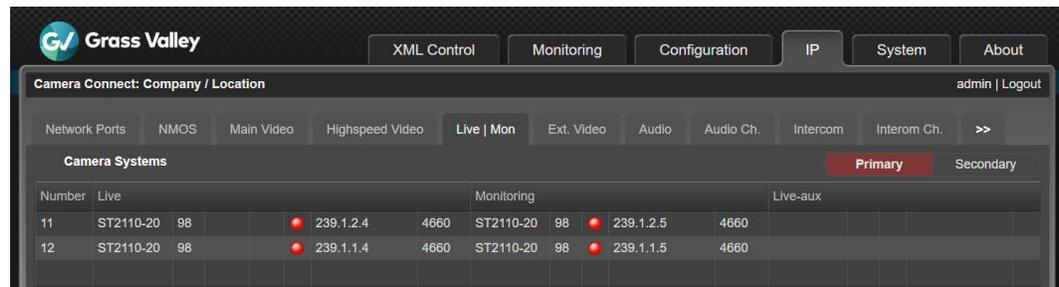
Click the camera system you want to set up. The edit popup window appears in which you can edit the following parameters:
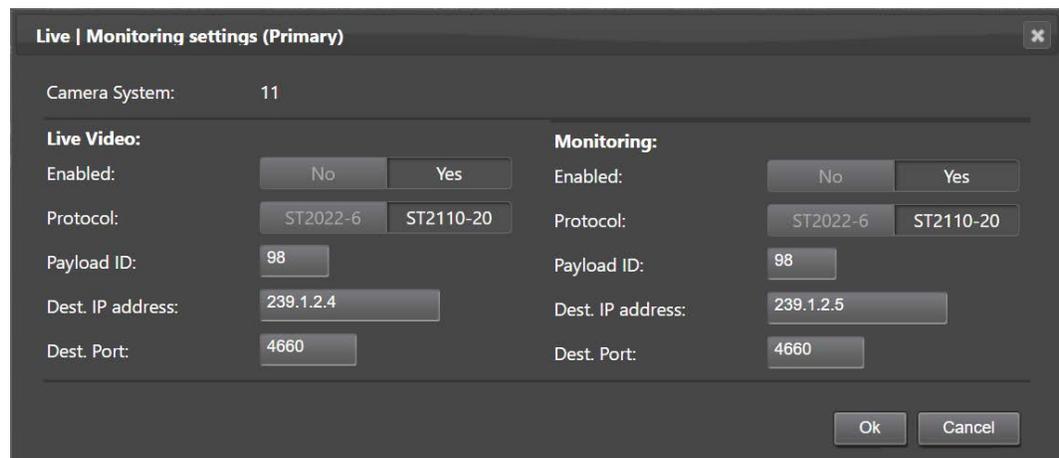
Live video

☞ **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 IP Media Network stream:
- *Yes*: Live video is inserted into the IP Media Network stream.
- *No*: Live video is NOT inserted into the IP Media Network stream.

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

Payload ID — ???

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.

Monitoring

Enabled — selects whether the Monitoring video is included in the IP Media Network stream:

- *Yes*: Monitoring video is inserted into the IP Media Network stream
- *No*: Monitoring video is NOT inserted into the IP Media Network stream (this is also indicated with the indication *off* in front of Stream 1).

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

Payload ID — ???

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.

External Video tab

The list of camera systems is shown, sorted by camera number. In this tab the incoming External 1, External 2 and External 3/Teleprompter video inputs can be set up.

The Extern 1, Extern 2 and Extern 3 / TP columns show the present indicator, transport standard, 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:
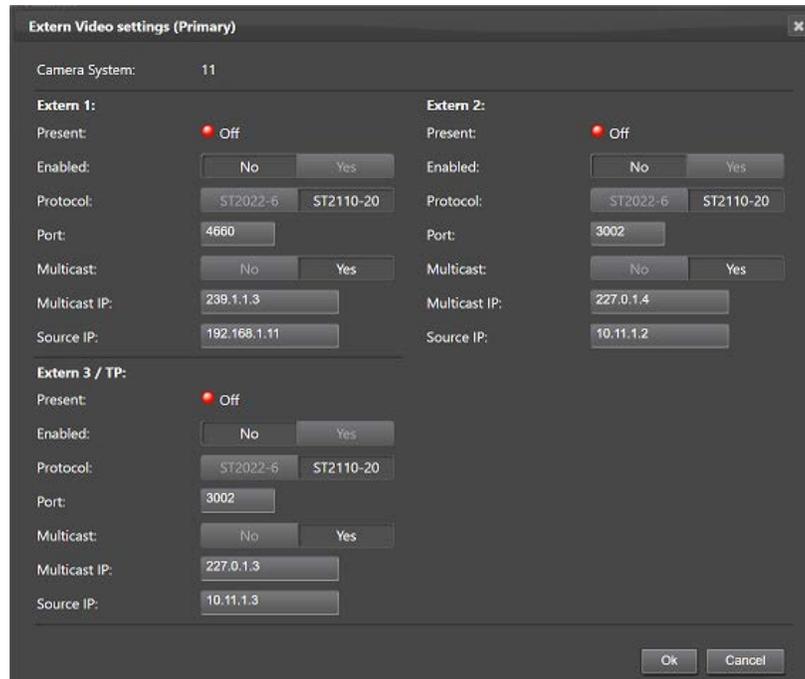
For Extern 1, Extern 2 and Extern 3 / Teleprompter:

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

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

Protocol — this is the expected transport standard 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*)

Source IP — ???

✎ **Tip**

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

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.

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 In

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

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

Enabled — selects whether AES67 Audio input is included in the IP Media Network stream:
- *No*: AES67 Audio is NOT inserted into the IP Media Network stream.
- *Yes*: AES67 Audio is inserted into the IP Media Network stream.

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*.

Source IP — ???

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.

AES67 Audio Out

Enabled — selects whether AES67 Audio output is included in the IP Media Network stream:
- *No*: AES67 Audio is NOT inserted into the IP Media Network stream.
- *Yes*: AES67 Audio is NOT inserted into the IP 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.

✎ **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).

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.

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

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 IP Media Network.

Program source— Intercom or Audio.

AES67 Intercom In

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

Enabled — selects whether the AES67 intercom output is included in the IP Media Network stream:

- *No*: AES67 intercom is NOT inserted into the IP Media Network stream (this is also indicated with the indication *off* in front of Stream 1).
- *Yes*: AES67 intercom is inserted into the IP Media Network stream.

Port — ???

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

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

Source IP — ???

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.

AES67 Intercom Out

Enabled — selects whether the AES67 intercom output is included in the IP Media Network stream:

- *No*: AES67 intercom is NOT inserted into the IP Media Network stream (this is also indicated with the indication *off* in front of Stream 1).
- *Yes*: AES67 intercom is inserted into the IP Media Network stream.

Payload ID — ???

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

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

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

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

✎ **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).

AES67 Channel mapping for audio and intercom

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

	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5 to 8/16
Output stream					
Audio A1	Cam Audio 1	Cam Audio 2	Cam AES1	Cam AES2	(digital silence)
Intercom A1	Eng	Prod	(digital silence)	(digital silence)	(digital silence)
Input stream					

	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5 to 8/16
Audio A1	Prog intercom	Prog spare	(not used)	(not used)	(not used)
Intercom A1	Eng	Prod	Prog intercom	Prog spare	(not used)

PTP tab

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

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

The list of camera systems is shown, sorted by camera number. In this tab you can set up synchronization to a PTP grandmaster.
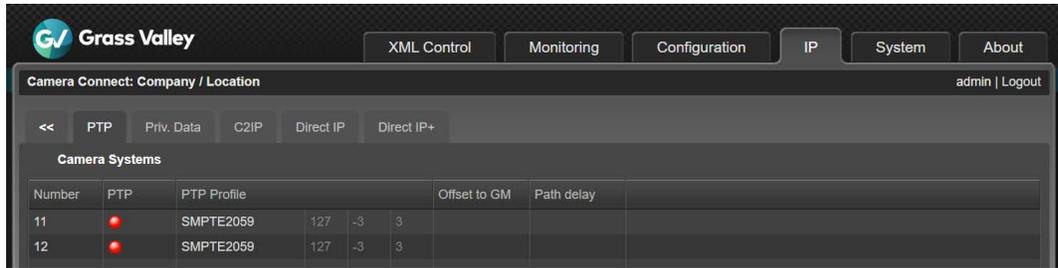
Click the camera system you want to set up. The edit popup window appears in which you can edit the following parameters:
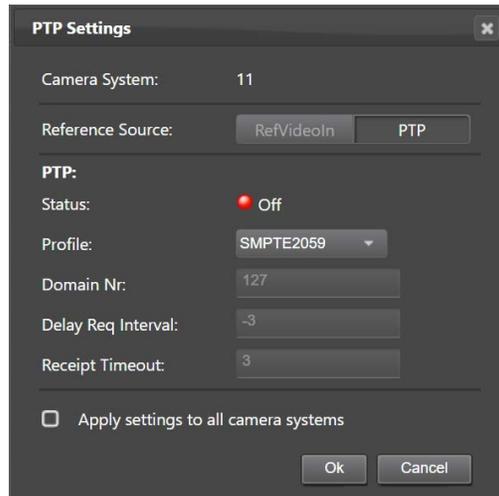
Reference Source — select the source of the video reference to which the camera system locks. When *RefVideoIn* is selected the camera system locks to the Reference input signal on the XCU BNC REF IN connector (can be HD Tri-Level sync or Black Burst), when *PTP* is selected the camera system configured to lock to a PTP grandmaster reference clock on the IP 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 IP Media Network
🔴	disabled	PTP is switched off (for example when Reference Source = RefVideoIn)
🔴	off	XCU is not connected to the IP 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 paramenters, 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).

Operating instructions

Using the camera

Attach a lens, viewfinder, microphone and any other accessories to the camera. Attach the hybrid cable (when used) and other necessary cables to the camera. Refer to the Installation chapter for more details.

Powering the camera

There are several ways of supplying power to the camera, depending on the system configuration:

- by a hybrid power extender such as Grass Valley's HPE-300 or LDK 4425 through the hybrid cable connector (in NativeIP or DirectIP/DirectIP+ modes);
- by an XCU through the hybrid fiber cable and connector (in XCU mode);
- by a DC Power Supply Unit connected directly to the camera (in standalone mode).

The power supply for the camera is normally supplied via the hybrid fiber cable from the base station. The Power On indicator lights when power is supplied and the camera power switch is set to the on position.

When power is supplied via the hybrid fiber cable, an output power socket supplies +12V, 4.0 A maximum for powering accessories. The power overload indicator lights up when maximum power is exceeded.

If excessive current flows into the camera the internal safety circuit shuts off power to all the units. If this happens shut off power and check the units for faults and if necessary take corrective actions before switching on power again.

When an ocular viewfinder is used the BATT indicator in the viewfinder lights if the camera supply voltage is less than 11.5 VDC when using an external power supply.

Switching on

- Switch on power on the power source (HPE-300, LDK 4425, XCU or power supply unit)
- Set the power switch of the camera to the ON **I** position (lower back panel)
- Allow a few moments for the camera to perform a self-test and for the system to establish communications.

To switch the camera to stand-by, set the power switch of the camera to the ⏻ position.

Location of controls and indicators

Camera front panel
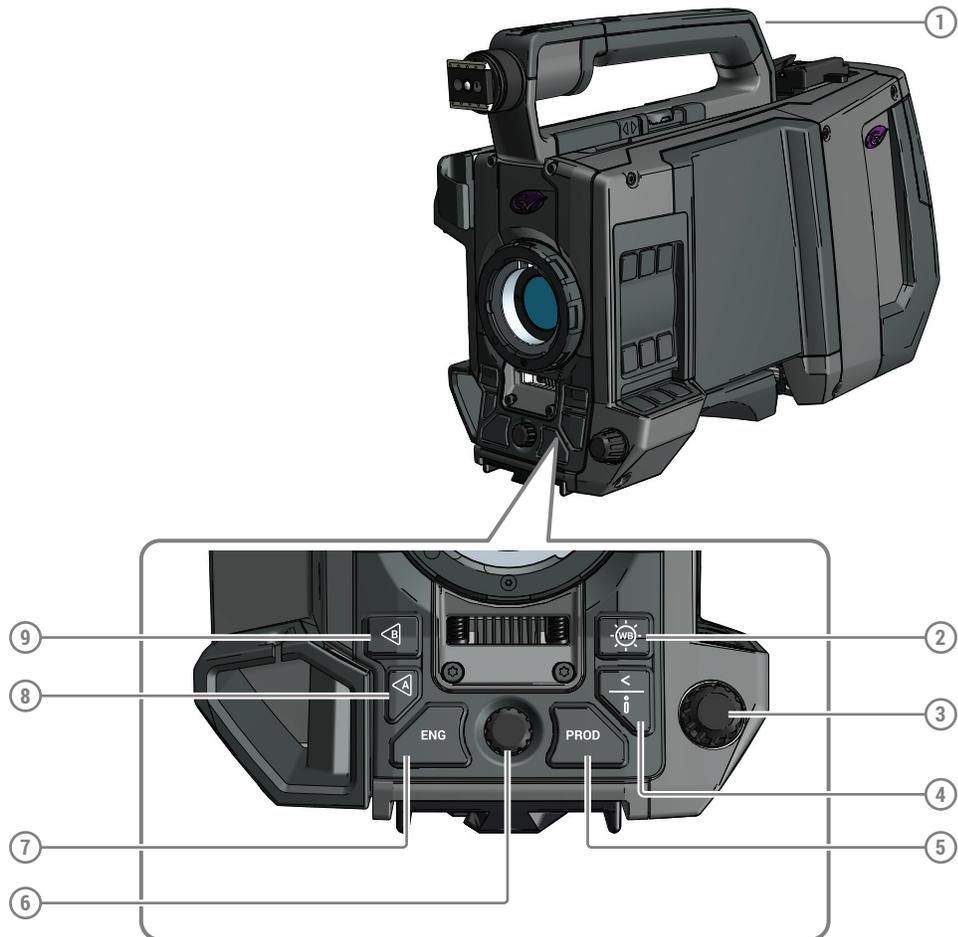
(1) Rear Tally lamp

Lights Red when the camera is On Air.

(2) White Balance button

Press and hold two seconds to start the Auto White Balance procedure.

(3) Menu Rotary and Select

Turn the rotary to navigate the camera menu and push to select items.

(4) Back / Info button

Back: Used when navigating the menu;
Info: Press and hold to view information on the viewfinder screen.

(5) Intercom Prod

This button is used to activate the intercom Production channel ('talk').

(6) Headset volume

Adjusts the overall audio volume of the intercom headset.

(7) Intercom Eng

This button is used to activate the intercom Engineering channel ('talk').

(8) Return A

This button can be assigned to an External/Return Video channel.

(9) Return B

This button can be assigned to an External/Return Video channel.

Camera left panel
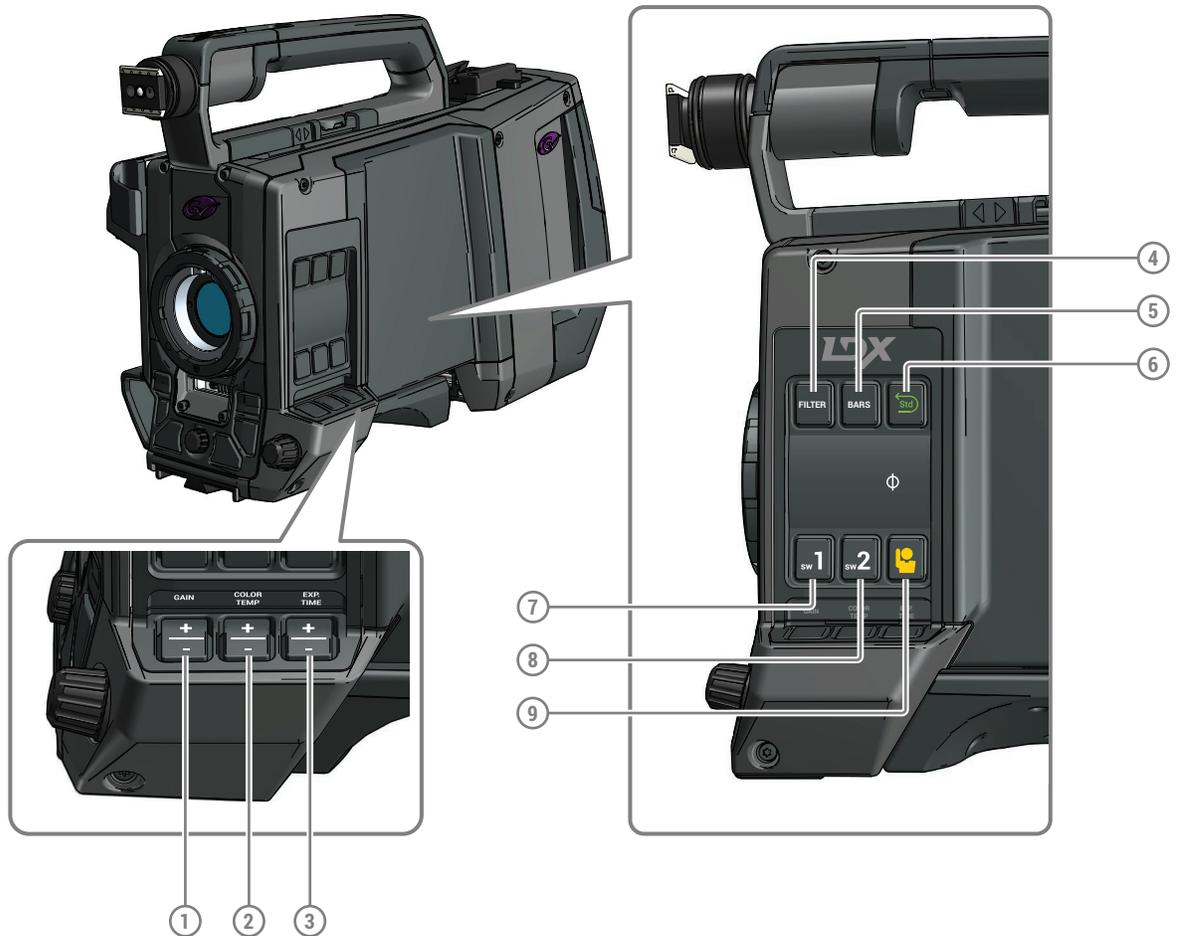
(1) Gain up/down switch

Press plus or minus to select a Gain preset or hold the plus to set a variable gain value.

(2) Color temperature up/down switch

Press plus or minus to select a color temperature preset or hold the plus to vary.

(3) Exposure time up/down switch

Press plus or minus to select an exposure time or hold the plus to set a variable exposure time. Note: exposure can only be changed in single speed video modes.

(4) Filter button

Press to enter the filters selection menu and select neutral density (ND) and/or effects (FX) optical filters.

(5) Bars buttons

Switches the test bars on and off and selects bar type.

(6) Standard Recall (or 'Green button')

Press and hold two seconds to recall standard values for the camera.

(7) User button SW1

Assignable user button SW1.

(8) User button SW2

Assignable user button SW2.

(9) PickMe button

This button can be configured to send an attention signal to the studio.

Camera back panel
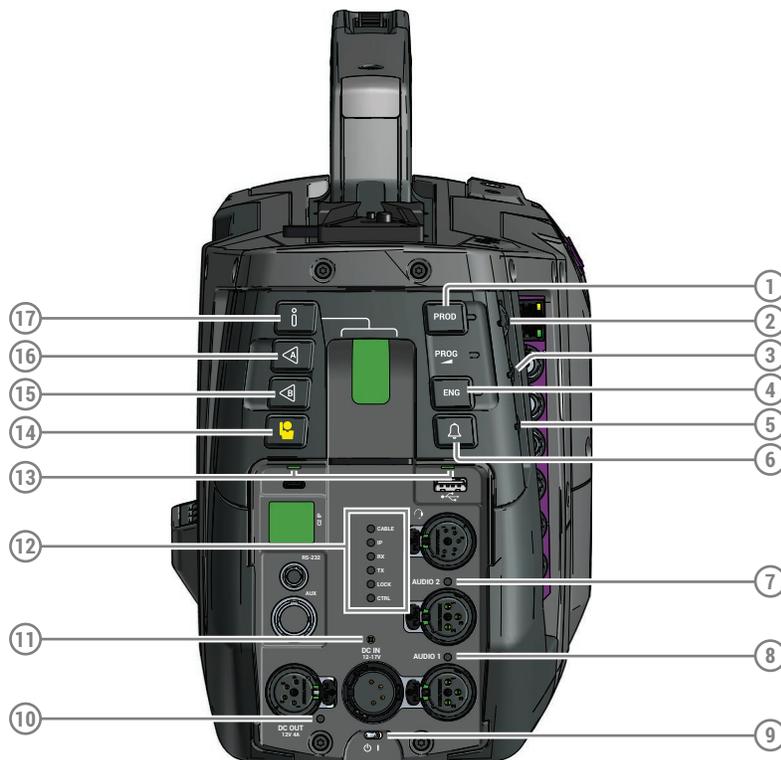
(1) Intercom Prod button
This button is used to activate the intercom Production channel ('talk').

(2) Intercom Prod volume

Headset volume for the intercom Production channel.

(3) Intercom Prog volume

Headset volume for the intercom Program channel.

(4) Intercom Eng button

This button is used to activate the intercom Engineering channel ('talk').

(5) Intercom Eng volume

Headset volume for the intercom Engineering channel.

(6) Call button

Press to send a Call signal to the studio. The Call indicator on the control panel(s) lights.

(7) Audio 1 indicator

This LED lights green when the audio input is set to mic sensitivity level, it lights blue when phantom power is switched on.

Audio indicator is only visible if the Info function is activated with the Info button (17).

(8) Audio 2 indicator

This LED lights green when the audio input is set to mic sensitivity level, it lights blue when phantom power is switched on.

Audio indicator is only visible if the Info function is activated with the Info button (17)

(9) Power switch

Main camera power switch.

(10) Power out indicator

This LED lights green when Power Out is available, it lights red when too much power is drawn from the Power output connector (overload indicator).

(11) Local power indicator

This LED lights green when Local power is present and OK, it lights red when the supplied voltage is lower than 12 VDC or higher than 17 VDC.

(12) IP diagnose indicators

Press and hold the info button at the back panel (17) or front panel to activate the IP diagnose indicators:

Indicator:	Color/Status:	Description:
CABLE	Yellow	Camera runs in XCU mode
	Purple	Camera runs in NativeIP mode
	Orange	Camera runs in DirectIP mode
IP	Off	No (Q)SFP module present
	Red	(Q)SFP module mismatch
	Yellow	(Q)SFP module is present but no network link
	Green	(Q)SFP module is present and the network link is OK
RX	Red	Camera is not receiving IP Media data
	Yellow	Camera is receiving errors
	Green	Incoming IP Media data is valid
TX	Green	Outgoing IP Media data is enabled and delivered
	Red	Outgoing IP Media data is enabled but no ARP messages are received from receiver in unicast mode, or: unicast destination port number does not match the receiver's port number
	Off	Camera is not transmitting data (TX = 0 Mbps)
Lock	Green	Camera is locked
	Yellow	Reference signal present but camera is not locked
	Red	Camera is not locked
CNTRL	Green	Camera control link OK
	Red	Camera control link not valid
	Off	No camera control link

(13) Outside illumination (2x)

Two bright white LEDs illuminate the back panel to help locating connectors.

(14) PickMe button

This button can be configured to send an attention signal to the studio.

(15) Return B

This button can be assigned to an External/Return Video channel.

(16) Return A

This button can be assigned to an External/Return Video channel.

(17) Info button and indicator

Press and hold to view information on the viewfinder screen.
The indicator LED in the button indicates if there is a system error or warning. When the Info

button is pushed once, the first info page with most important camera settings is shown in combination with the IP diagnose indicators.

Press again to show the IP info page with more detailed info about the IP link. The IP diagnose indicators stay active. As long as the info function is active, the audio indicators are also active.

The diagnose page and the IP diagnose indicators extinguish after a few seconds or after the info button is held for more than 1 second. The number of seconds can be programmed in the camera menu.

Controlling the camera

There are several ways to control the camera:

- by using the operational switches on the camera;
- by using the (internal) camera menu to select functions;
- by using the Creative Grading Panel (CGP) and/or the Creative Grading Application (CGA) in the studio;
- by using the Camera Connect software package (for advanced configuration).

☞ **Note**

If you cannot access some camera functions or you wish to restrict access, refer to "Access and security".

Navigating the camera menu

The camera menu can be viewed in the viewfinder, a connected monitor or remotely on the CGA. The camera menu can be navigated by means of the menu (rotary/push) button and back button which are located at the front of the camera:

Menu button
(rotary/push function)

Back button
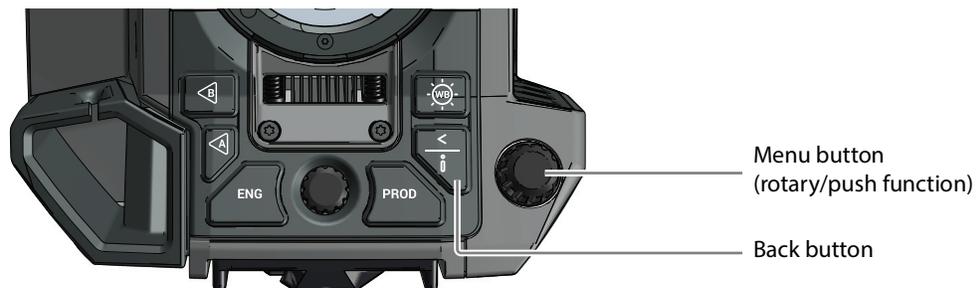
The functions of the camera are grouped into a structure of menus and sub-menus. Each of the menus gives you access to a particular group of functions. Spend some time using the controls and menus to discover the various functions. You will quickly learn to operate the camera intuitively.

☞ **Note**

Some of the menu items may not appear if the user level is not set to 3 or S (Service).

Entering the camera menu

Push the menu button after the camera is switched on, the message **Menu off** appears in the viewfinder. Press the menu button again while this text is showing, the **Main** menu appears in the viewfinder.

```
 ▶ Menu Off          Exec
   Installation menu >>
   Operator Toolbox  >>
   Production Setup  >>
   Creative Control  >>
 Main


   Diagnostics       >>
```
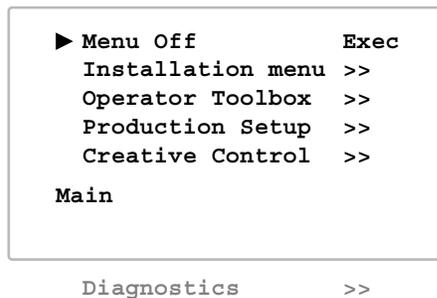
The **Main** menu screen shows five items. The name of the menu is shown below these. More items are hidden but become visible when you scroll down using the menu button. The cursor shows your position in the menu. Turn the menu button to move the cursor up and down.

Finding your way

Turn the menu button 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 any additional items. When you first enter a menu (other than the **Main** menu) the cursor is positioned next to the first item.

Press the back button to go back to the menu that you were in before the current one. The cursor is positioned next to the last menu.

You can also use the **Top** and **Previous** items to navigate. These items are not immediately visible but are located above the first item. Use the rotary 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 **Production Setup** menu, for example, shows the items displayed when you first enter the menu. The other items are available by scrolling up or down with the rotary control.

```
        TOP
        PREVIOUS

     ▶ Levels            >>
       Exposure          >>
       Color             >>
       Image Control     >>
       Files             >>

     Production Setup


       Video Mode        720p50
       Sensitivity       Nom
```
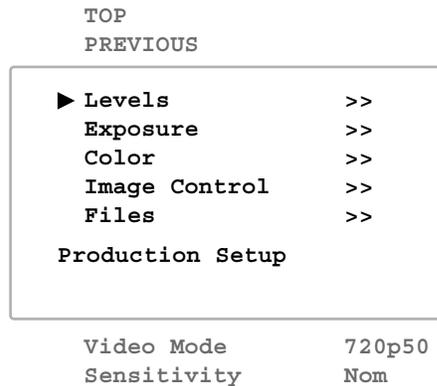
Leaving the camera menu

If you are deep within the menu structure, the recommended way of leaving the menu is to press the back button a number of times until the menu is abandoned. You can also navigate to leave the menu:

- If necessary move the cursor to the left column with the menu or back button.
- Scroll upwards with the rotary control until the cursor points to *Top* (the *Main* menu).
- Press the select button. The cursor now points to the *Menu off* item of the *Main* menu.
- Press the select button again to leave the camera menu.

If you do not use the menu it disappears after a few seconds. This delay can be programmed in the *Operator Toolbox* menu. You can also press and hold the or back button for 2 seconds to make the menu disappear.

When you press the select button again you enter the camera menu at the last position of the cursor and not at the top of *Main* menu.

To prevent confusion the next time you enter the camera menu, it is advisable to leave the menu by using the back button or by returning to the *Main* menu and selecting *Menu Off*.

Making value changes

To find out where you have to go to change a function, consult the camera menu reference to discover under which menu group or sub-group the function you want to change 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. This value can be:

- a toggle value (only two values, like on and off)
- a list value (more than two values)
- an analog value (in most cases variable from 0 to 99)
- 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 rotary control 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, then pressing the select button places the cursor in front of the value and the rotary control is used to change the analog value. Press the select button to return the cursor to the function list.

Undoing changes

If you make changes to the video settings in the camera menu and you decide not to keep them, use the green standard button at the side of the camera to recall a standard set of values for the video parameters.

Assigning user buttons

The camera has three assignable buttons: two on the left side panel (SW1 and SW2) and one under the handgrip. The operation of the RET and the VTR button on the lens can also be assigned. The assignment and switching mode (momentary or alternating) of these buttons can be set in the **Operator Toolbox > User buttons** menu.

Left side and lens buttons

VTR Lens   RET Lens

User button SW1 can be assigned to:

- Intercom Call (Call)
- Switch to Return Video A (Ret A) - default
- Switch to Return Video B (Ret B)
- Production intercom (Prod)
- Engineering intercom (Eng)
- Select (for menu navigation)
- ND+ (ND filter selection up)
- Start Auto White Balance (AW)
- Extended Auto Iris (EIris))
- Focus Assist (FocAst)
- Back (for menu navigation)

User button SW2 can be assigned to:

- Extended Auto Iris (EIris)
- Viewfinder zoom function (Zoom)
- Focus Assist (FocAst)
- Switch to Return Video A (Ret A)
- Switch to Return Video B (Ret B) - default
- Production intercom (Prod)
- Engineering intercom (Eng)
- ND- (ND filter selection down)
- Intercom Call (Call)
- Back (for menu navigation)
- Select (for menu navigation)
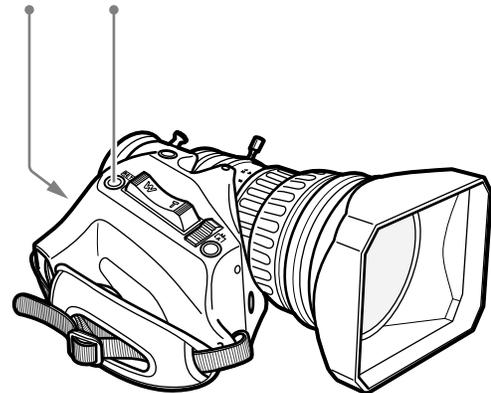
The VTR Lens button can be assigned to:

- Production intercom (Prod) - default
- Engineering intercom (Eng)
- Viewing zoom function (Zoom)
- Switch to Return Video A (Ret A)
- Switch to Return Video B (Ret B)
- VTR
- Info button (Info)

The RET Lens button can be assigned to:

- Switch to Return Video A (Ret A) - default
- Switch to Return Video B (Ret B)
- Viewing zoom function (Zoom)
- Focus Assist (FocAst)

Handgrip button
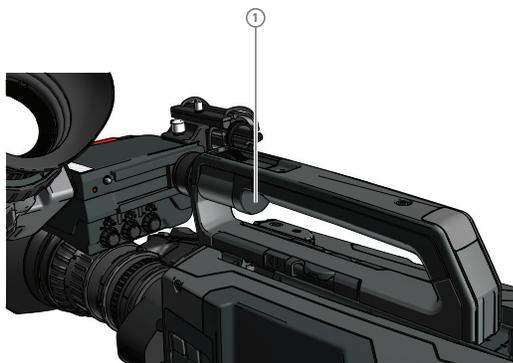
The right handgrip button is assigned to:

- Switch to Return Video A (Ret A) - default
- Switch to Return Video B (Ret B)
- Viewing zoom function (Zoom)
- Focus Assist (FocAst)

The left handgrip button can be assigned to:

- Production intercom (Prod) - default
- Engineering intercom (Eng)

Viewfinder controls

Front
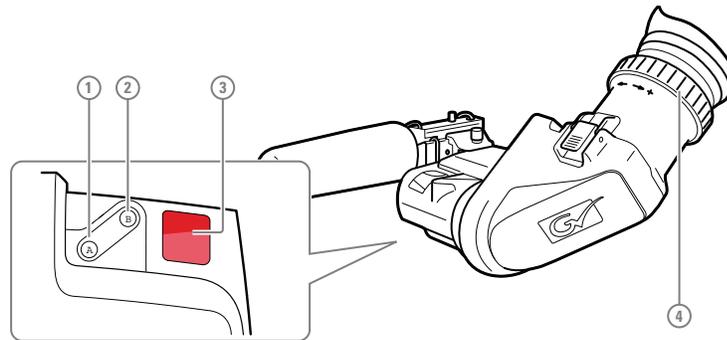
(1) User button (A)

This user button can be assigned in the viewfinder menu.

(2) User button (B)

This user button can be assigned in the viewfinder menu.

(3) Front tally indicator

This indicator (and the one at the rear of the handgrip of the camera) lights to indicate that the camera is On Air.

(4) Diopter adjustment ring

The diopter of the viewfinder can be adjusted to suit your eyesight by turning the diopter adjustment ring. Turn to the right for negative diopter values, turn to the left for positive values.

Back

Set up the viewfinder according to your own preferences; adjust viewing parameters, select markers, message boxes and on-screen display times in the **Operator Toolbox** menu.
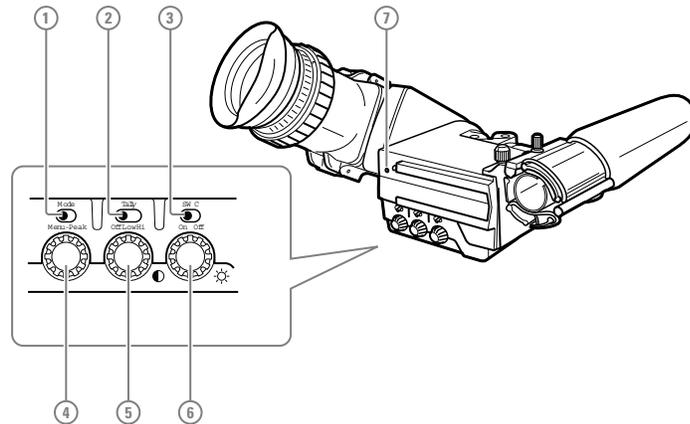
(1) Mode switch

This switch determines the function of the Menu/Peak rotary control below. Set the mode switch to the right (Peak) to use the rotary for peaking control. Set the mode switch to the left (Menu) to use the rotary for menu navigation.

(2) Tally switch

This switch is used to control the tally indicators at the front of the viewfinder and the rear of the camera handgrip. The toggle switch has three settings: Off, Low and Hi.

When the tally switch is set to the Off position, the tally indicators do not light even when the camera is On Air.

(3) User switch C (underscan)

Set this toggle switch to On to see a scaled down (to about 85% of the area) picture in the viewfinder. This allows for a greater viewing distance from the eyepiece. A blue border around the picture and the message "underscan" appear. Set the switch to Off to return to the original picture.

(4) Peaking/Menu control

With the mode switch set to Peak, turn this rotary control to adjust peaking (sharpness) of the viewfinder picture.

With the mode switch set to Menu, push this rotary control to enter the viewfinder menu and rotate to navigate the menu.

(5) Contrast control

Turn this rotary control clockwise to adjust the contrast of the viewfinder picture according to your preferences. The range runs from 0 (low) to 99 (high contrast).

(6) Brightness control

Turn this rotary control clockwise to adjust the brightness of the viewfinder picture according to your preferences. The range runs from 0 (very dark) to 99 (very bright).

(7) Rear tally indicator

This indicator lights to indicate that the camera is On Air. This indicator has the same function as the front tally indicator.

Viewfinder information

Indicators

Navigate to the **Operator Toolbox > Indicators** menu and select the on screen indicators you want to display in the viewfinder screen. The following indicators can be set up:
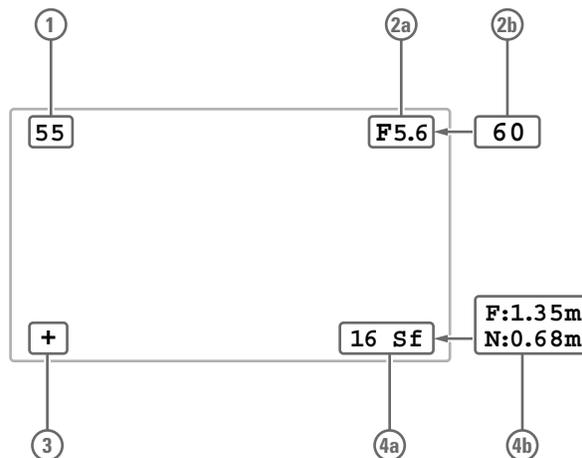
(1) Zoom indicator

Shows the percentage to which the lens has been zoomed out or in, ranging from 0 (wide angle) to 99 (telezoom). It shows 50 if the lens does not support this feature.

(2a) Iris indicator

Shows the iris opening (or F-value) of the lens. Typical range is from F1.4 to F25. The indicator shows 'Closed' when the lens is closed or capped.

(2b) Focus indicator

Shows the percentage of the lens focus distance. Typical range is from 0 (close-up) to 99 (infinity).

(3) Precision Focus indicator

Shows the Precision Focus indicator (if supported by the lens).

(4a) Filter indicator

Shows the selected optical filter(s).

(4b) Depth of Field indicator

Shows Depth of Field (DOF) of the current lens position. F = Far limit in meters, N = near limit in meters. Note: this feature must be supported by the lens.

☞ **Note**

When the Iris indicator (2a) is switched on, the Focus indicator (2b) is automatically switched off and vice versa. When the Filter indicator (4a) is switched on, the Depth of Field indicator (4b) is automatically switched off and vice versa.

On screen marker indicators

Navigate to the **Operator Toolbox > Indicators** menu and select the marker indicators you want to display in the viewfinder screen. The following marker indicators can be set up:
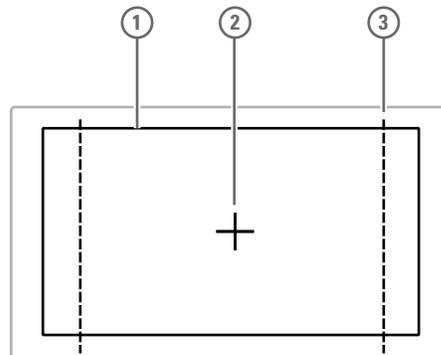
(1) Safe Area

Shows the minimum area that can be seen on a television screen. Different aspect ratios for the safe area can be set in the menu.

(2) Center Cross

Marks the center of the picture.

(3) Marker

A dotted white line or a shaded area that shows the limits of a 4:3, 15:9 or 14:9 picture.

Viewfinder LED indicators
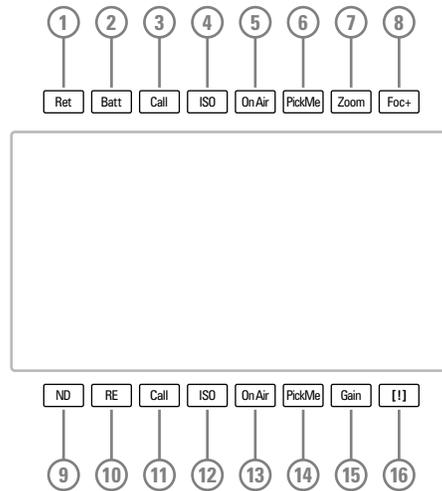
(1) Return video indicator

Lights if one of the return video channels is switched on.

(2) Battery indicator

Lights if the camera supply voltage is less than 11.5 V (when using an external supply).

(3,11)Call indicators (green)

Lights if Call signal or green tally is active.

(4,12) ISO indicators (yellow)

Lights if ISO signal or Yellow On Air is active.

(5,13) On Air indicators (red)

Lights if On Air is active.

(6,14) PickMe indicators (green)

Lights if PickMe is active.

(7) Zoom indicator

Lights when viewfinder zoom is active.

(8) Focus Assistant indicator

Lights when focus assistant is active.

(9) ND Filter indicator

Lights when a Neutral Density (ND) filter is used.

(10) Range Extender indicator

Lights when a Range Extender is enabled.

(15) Gain indicator

Lights when gain is lower than 0 dB or if gain is higher than +3 dB.

(16) Non-standard indicator

The non-standard video settings indicator (!) lights when one or more of the following conditions occur:

- Exposure Time is not set to the nominal value;
- Black Stretch is switched on;
- Extended Iris is switched on;
- AWC (Auto White Continuous or automatic white balance) or FL color temperature is switched on.

Information pages

Press and hold the info button at the front or at the back panel of the camera to view information on the viewfinder screen. The first info page appears in the viewfinder or monitoring channel. Press the info button again to scroll through 4 pages. Release the button and after a few seconds the info page disappears.

Page 1: IP connection page

```
                QSFP    SFP1    SFP2
Present          No      Yes      No
Los                      Ok
Link                     Yes
TX Mb/s                11032
RX Mb/s                 2208

QSFP IP            10.11.5.2
SFP1 IP            10.11.6.2
SFP2 IP            10.12.7.2
```

Page 2: Video and camera modes page

```
VideoMode                   4k/50
CameraMode                     IP
IP mode                       25G
```

Page 3: Basic video settings and buttons page

This info page shows mostly identification and operational information.

```
      ①  ②                              ③
           ┌────────────────────────────────┐
           │ ┌─────────┐   SW1      Call     │
           │ │ CAM 17  │   SW2      Prod     │
           │ │MidfieldC│   HGrip     Eng     │
           │ └─────────┘                     │
           │  1080p59     VTR L  FocAst      │
           │  SI Nom      RET L    Zoom      │
           │  +2.7dB      RET2     Call      │
           │                                 │
           │  ND 1/64                        │
           │  Clear       ULvl    User 1     │
           │              OpFl Standard      │
           │  CTemp 3400K STDOper  Cust      │
           │  Gamma Lin                      │
           │  MBlk 45                        │
           └────────────────────────────────┘
      ④                                    ⑤
```
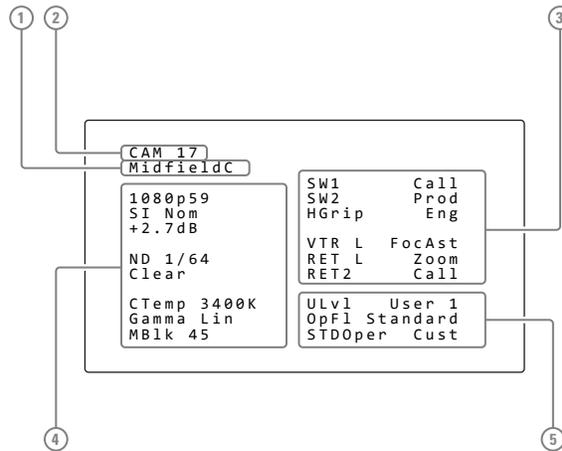
(1) System Alias

Displays the camera System Alias.

(2) Camera number

Displays the camera number.

(3) User button assignments

Displays the assignments for the user buttons on the camera.

(4) Video settings

Displays video mode, master gain, ND filter, FX filter, color temperature, selected Gamma curve and Master Black level

(5) Basic operator settings

Displays the current user level ("ULvl"), the last recalled operator file ("OpFl") and the standard recall file ("STDOper").

Page 4: BNC outputs on the camera

```
RX1 Act    Yes    Bnc-A    Main
RX2 Act    Yes    Bnc-B    Live
RX3 Act    No     Bnc-C    Ext1
Audio Act  No     Bnc-D    Ext2
Icom Act   No     Bnc-E     VF
```

Focus assist

The focus assist function can be switched on or off in the **Operator Toolbox** menu. This function adds a motion effect in the viewfinder to objects in sharp focus. The FOC+ indicator in the viewfinder lights when this function is on.

Viewfinder zoom

The viewfinder zoom function is another feature that helps you focus. This function enlarges the center of the viewfinder image. Choose one of the following buttons and the way it operates (momentary or toggle) to control this function in the **Operator Toolbox** menu:

- The VTR button on the lens,
- The RET switch on a zoom control when a SuperXpander is used.

When the viewfinder zoom function is in use, the viewfinder markers are switched off to improve the clarity of the display. The Zoom indicator in the viewfinder flashes when the viewfinder zoom function is active.

Lens operation

Back focus adjustment

When you fit a lens to the camera you may need to adjust the back focus. Refer to the lens manufacturer's instructions to find out how to do this. The **Lens** menu allows you to choose and, if necessary, adjust other parameters to suit your lens type and your personal preferences.

CLASS

The Chromatic Lens Aberration and Sharpness Solution (CLASS) compensates for chromatic aberration by using lens data. Most major lens manufacturers support this feature.

Make sure that the lens interface is set to Digital in the **Configuration > Lens > Lens Settings > Lens IF Type** menu.

When a lens is attached to the camera for the first time, the camera reads the lens data at startup. This is done only once and may take some time to finish. Reading the lens data is a background process and does not influence normal camera operation.

Some lenses also require a manual calibration of the lens ring positions. If this is the case, a message ("CLASS: Turn lens rings") is briefly shown in the viewfinder. Turn both zoom and focus ring all the way from one end to the other.

After startup when CLASS is active, a message ("CLASS: Active") is shown in the viewfinder.

In the (very rare) occasion that lens aberration data becomes corrupted, a reset of the lens data can be forced:
Go to the **Configuration > Lens > Lens Settings > CLASS > Reset CLASS Data** menu and select Start.

Auto Iris

When the amount of light in the scene varies (for example when shooting outdoors) the Auto Iris function can be switches on to automatically and continuously measure light levels and adjust Iris for optimal exposure.

When your lens has an Auto Iris switch, make sure it is set to the on position.

To switch Auto Iris on, go to the **Production Setup > Exposure > Iris > Auto Iris** menu and set the **Auto IRIS** function to On.

The default settings for Auto Iris are suitable for most situations but some situations may require different settings.

Setting the Auto Iris measurement area

The user level must be set to Service to access this function.

Select the Auto Iris measurement area using the **Area** function in the **Auto IRIS** menu. The following areas can be selected:
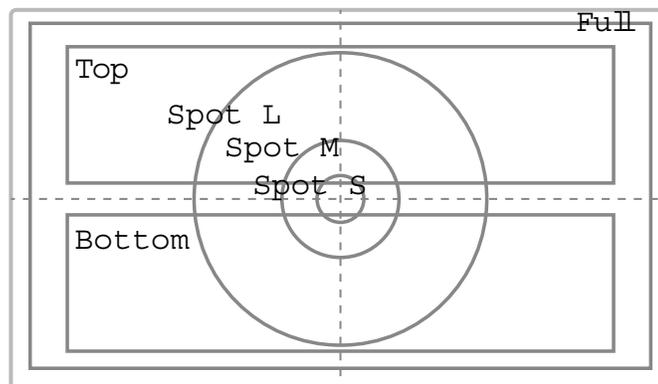
- **Top**—covers the top half of the screen, or 50% of the total surface. This is the default setting.
- **Spot S**—small center spot, covers 5%.
- **Spot M**—medium center spot covers 10%.
- **Spot L**—large center spot, covers 25%.
- **Full**—full screen measurement, covers 100%.
- **Bottom**—covers the lower half of the screen, or 50% of the total surface.
- **Custom**—a customer defined measurement area.

When **Area** is set to Custom, a customer defined area can be defined under the **Custom Area** sub menu by entering top, bottom, left and right parameters for two separate measurement areas: one for Peak and one for Average values. Auto Iris combines the readings from these two areas and uses the outcome to control the Iris opening.
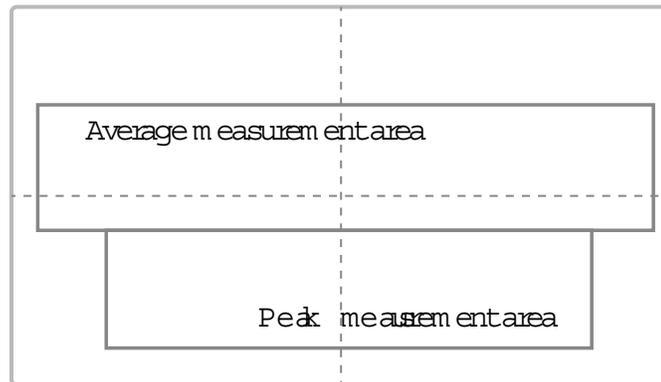
Changing Auto Iris advanced settings

☞ **Note**

The user level must be set to 3 to access this function.

- **Peak/Average**—the Auto Iris function measures both the average light level and the peak light level of the image and combines these two readings to control Iris. Use the Peak/Average function to shift between more Peak mode (lower values) or more Average mode (higher values). The default value is 64 which is slightly more Average than Peak measurement.
- **Auto Iris Setpoint**—sets the target exposure level for Auto Iris. The default value is 35—higher levels give higher Iris value and thus a brighter picture.
- **Momentary Iris Setpoint**—sets the target exposure level for Momentary Iris (not a relevant setting for Auto Iris)
- **Auto Iris Gain**—sets the speed at which the Auto Iris reacts to changing lighting conditions. 5 = slow (default), 10 = fast.

Extended Iris

The Extended Iris function automatically adjusts the video signal level by adjusting the iris opening, the gain level and the exposure time to suit the ambient lighting conditions.

☞ **Note**

Make sure that the SW2 button is assigned to EIris (Extended Iris) in the **Operator Toolbox > User Buttons > SW2** menu.

To switch on the Extended Iris function use the assignable button SW2 at the left-front side of the camera. When this button is pressed once, the current value of the Extended Iris function is displayed. Press the button twice in quick succession to toggle between on and off.

When Extended Iris is on, the non-standard indicator in the viewfinder lights, and gain and exposure controls are blocked. Settings for the Extended Iris function can be changed in the **Production Setup > Exposure > Extended Iris** menu.

✎ **Tip**

You can use Extended Iris to maintain a constant depth of field while shooting.

Precision focus

The camera supports the precision focus feature which is offered by some advanced (digital) lenses. This system automatically focuses the image within a user defined focus frame on the screen. When precision focus is enabled on the lens, the focus frame is superimposed on the viewfinder image. The frame can be moved and resized by the controls on the lens or on the focus handle.
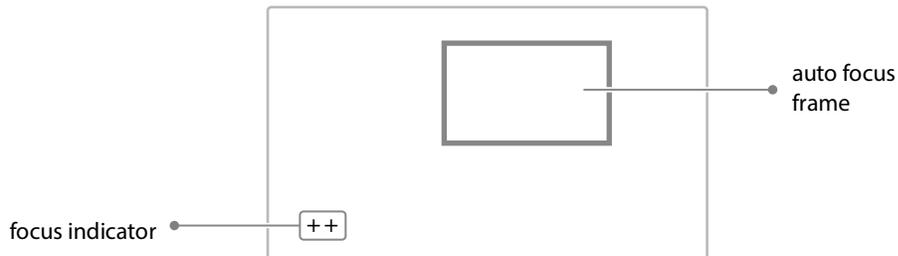
An indicator in the bottom left corner of the viewfinder screen shows the current focus information:

Indication	Focus information
- -	focus is behind
-	focus is behind
0	area is in focus
+	focus is in front
+ +	focus is in front

Refer to the documentation of the lens manufacturer for more information about the precision focus feature.

Lens indicators in the viewfinder

The RE indicator in the viewfinder lights when a lens range extender is selected.

The Iris indicator in the viewfinder shows the value of the iris opening (when enabled in the camera menu).

The zoom indicator in the viewfinder shows the percentage to which the lens has been zoomed out or in, ranging from 0 (wide angle) to 99 (telezoom). It shows 50 if the lens does not support this feature.

The focus indicator shows the percentage of the focus distance range from 0 (close-up) to 99 (infinity). This feature is only available when a digital lens is used.

Connecting audio

Analog audio

Set the gain levels (-22 dB to -64 dB for mic input level or +4 dBu to -10 dBu for line level) for the analog audio channels in the **Audio** section of the **Configuration** menu.

Both a high pass filter (HPF) and auto level control (ALC) are available for each channel and can also be switched on in this menu. Also a delay up to 170 ms can be set.

The channel 1 input socket selection in the **Configuration > Audio** menu and selects either:

- the Mic connector at the front-right (Front) of the camera, or
- the Audio 1 connector at the rear of the camera (Rear)
- as the input for audio channel 1.

☞ **Note**

A phantom power (+48 VDC) for the front mic socket can be set with the **Configuration > Audio > Front Mic > FrontMic Source** function.

Channel 2 audio connector

Channel 1 audio connector
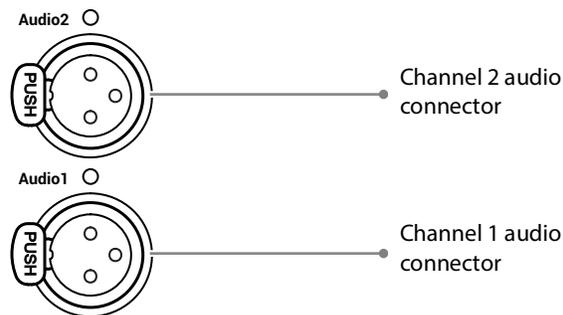
The audio channel 1 and 2 level settings select either a line level input (Line), a microphone level input (Mic) or a microphone level input with phantom power (+48 VDC) for channel 1 and 2 rear connectors (Audio 1 and Audio 2).

The (analog) audio channels are available:

- as audio channels 1 and 2 embedded in the HD-SDI video signal
- on the XCU at the XLR 3 audio output connectors
- on the XCU as converted digital signal at the Digitial Audio OUT 1+2 connector

Audio indicator LED 1 and 2 gives information on the selected audio levels:

- OFF= Line level
- Green = Mic Level
- Blue = Mic Level + phantom power

Audio indicators are active if Info function is active (Info button pushed)

Digital audio

Two digital audio channels are available as AES signal. Set the An VF Out/AES in switch to AES in and connect an AES digital audio source to the An VF Out/AES in connector (top left BNC connector).

Digital audio channels 3 and 4 are available on the digital audio output (3+4) connector on the XCU and as embedded audio channels 3 and 4 in the HD-SDI video signal.

Using intercom

Three intercom channels – production (Prod), program (Prog) and engineering (Eng) – are sent from the XCU to the camera headset. The headset microphone signal is sent back to the XCU. Intercom signals are available at the XCUs intercom connector on the back panel.

To use the intercom system, connect a headset to the XLR5 connector on the back panel of the camera. An additional Tracker headset can be connected to the auxiliary connector.

Selection buttons and volume controls for the intercom channels can be found on the front and the back of the camera.

FRONT

Engineering (Eng) selection button

Main intercom volume control

Production (Prod) selection button

BACK

Production (Prod) channel selection

Engineering (Eng) channel selection

Call button

Production (Prod) channel volume

Program (Prog) channel volume

Engineering (Eng) channel volume
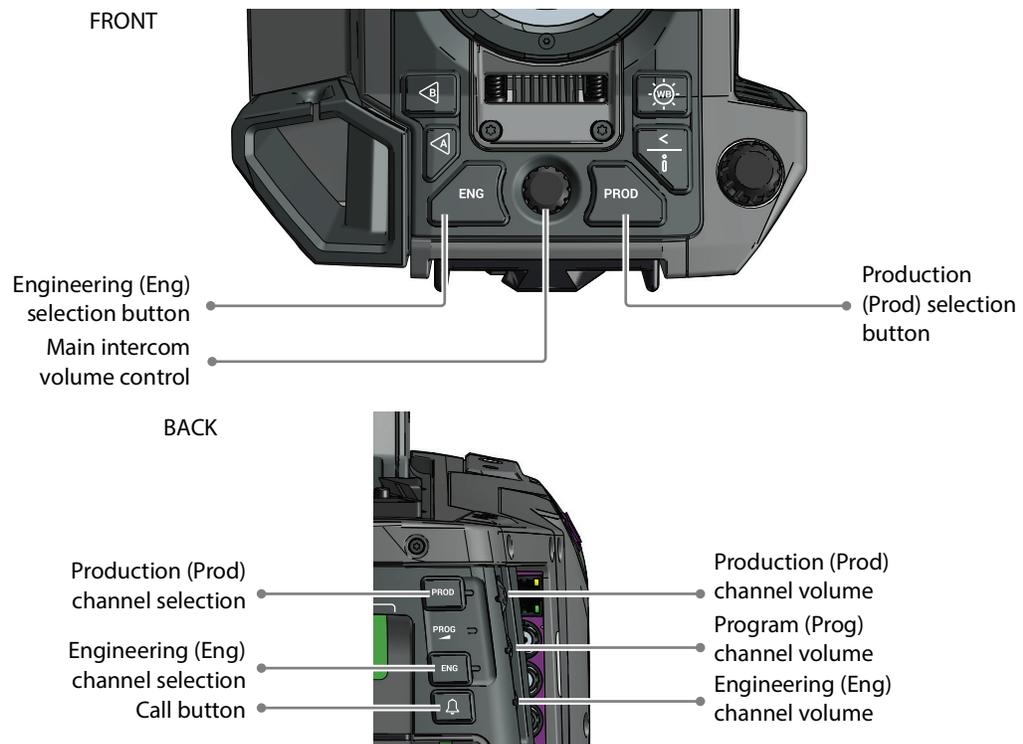
Selecting intercom channels

Push the engineering (Eng) channel selection button to talk to the engineering intercom channel. Push again to switch off the engineering channel.

☞ **Note**

Go to the **Operator Toolbox > User buttons** menu and select the **Eng Mode** function to change the switching mode (momentary or alternating) of the Eng button.

Hold the production (Prod) channel selection button to talk to the production channel. Release to switch off the production channel.

Adjusting intercom volume

Use the rotary controls at the back panel of the camera to adjust the audio volume of the three intercom channels:

Prod—adjusts the volume of the production channel intercom signal.

Prog—adjusts the volume of the program intercom channel signal.

Eng—adjusts the volume of the engineering intercom channel signal.

To adjust the audio volume of the signal from the Tracker headset microphone go to the **Configuration > Intercom** menu and change the **Cam Tracker lvl** item.

Routing signals

By default, all three intercom channels are audible on both muffs (left and right) of the camera headset. The routing of the intercom channels can be changed to personal preference. Go to the **Configuration > Intercom** menu to set up the routing:

- Cam Prod—selects to which ear muff(s) of the camera headset the production intercom channel is routed.
- Cam Eng—selects to which ear muff(s) of the camera headset the engineering intercom channel is routed.
- Cam Prog—selects to which ear muff(s) of the camera headset the program intercom channel is routed.
- Cam Tracker—selects to which ear muff(s) of the camera headset the Tracker's microphone signal is routed (when a Tracker headset is connected).

Intercom microphone gain, 12V bias tee power supply and microphone on/off switches are also available in this menu.

Adjusting sidetone volume

Sidetone levels (this is audio feedback from microphone to ear muffs) for camera and Tracker headsets can be adjusted in the **Operator Toolbox > Intercom** menu:

- Cam Sidetone—adjusts the sidetone level of the camera operator's headset from 0 (muted) to 99 (loudest).

- Tracker Sidetone—adjusts the sidetone level of the Tracker's headset from 0 (muted) to 99 (loudest).

☞ **Note**

Only the sidetone levels for the right side ear muff can be adjusted. The left ear muff always has a fixed sidetone level.

Assigning buttons

The user buttons at the left side panel of the camera (SW1 and SW2), the user button under the handgrip and the VTR button on the lens can also be used to send the intercom signal from the headset to Production or Engineering.

Go to the **Operator Toolbox > User buttons > Buttons** menu to assign user buttons to intercom functions:

- SW1—assigns a function to user button SW1: Call, Ext1, Ext2, Prod, Eng, Select.
- SW2—assigns a function to user button SW2: EIris, Zoom, FocAst, Ext1, Ext2, Prod, Eng.
- VTR Lens—assigns a function to the VTR Lens button: Prod, Eng, Zoom, Ext1, Ext2.
- Handgrip Left—assigns a function to the left side button underneath the camera handgrip: Prod, Eng.
- Eng Mode—selects switching mode for the engineering channel selection button at the back panel of the camera: momentary (push) or alternating (toggle).

Setting up the Tracker headset

Go to the **Configuration > Intercom > Tracker** menu to change settings for the Tracker headset.

Function	Values	Default	Description
Tracker Mic To	Off, Cam, Eng, Prod, All	Off	Selects the Tracker microphone routing.
Tracker Mic Gain	0 dB, 12 dB, 24 dB, 40 dB	40 dB	Selects gain of camera Tracker's intercom microphone.
Tracker Mic Pwr	Off, On	Off	Switches bias tee power (12 VDC) to the Tracker's microphone on or off.
Tracker Mic Src	Eng, Side	Side	Selects Engineering channel or Tracker's microphone sidetone for tracker's headphone.

Call button

Press the Call button on the back panel to send a signal to the camera control panels in the production control room calling for attention.

The indicator in the button lights when a Call signal is sent or received. The Call indicator in the viewfinder also lights.

Communication

Return video channels

FRONT

Return B button

Return A button

BACK

Return A button
Return B button
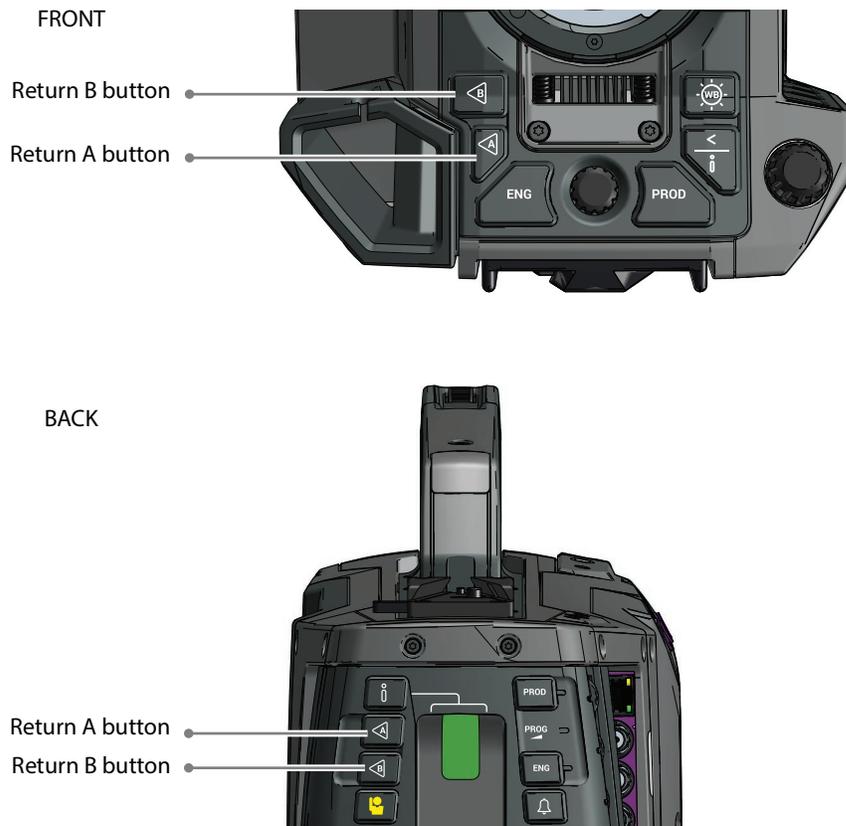
Return A and B buttons can be assigned to one of the three available External video channels or the teleprompter channel in the camera menu. Press and hold to view the assigned video channel in the viewfinder.

Tip

The Return A and B buttons can be programmed as momentary (default) or alternating switches in the **Operator Toolbox > Buttons** menu.

The indicators in the Return A and B buttons light when the video channel the respective button is assigned to, is switched on.

PickMe button

Press the yellow PickMe button on the left side of the camera or on the back panel to send an attention signal directly to the program director. This function can be used when the

camera operator is shooting critical or high priority footage that needs immediate action by the director.

Typically, a Connect Gateway server can be set up to route this signal to the production control room, for example to switch the camera's main video directly to the program channel (On Air).

Other communication

Private data (RS-232 connection)

The 6-pin RS-232 connector on the back panel of the camera allows for a serial two-way private data channel (a 115 kbit/s serial connection) between camera and XCU (only in XCU mode)

Tracker Tally signal

The 20-pin auxiliary connector on the back panel of the camera provides, as well as providing full intercom facilities (Tracker intercom) for the dolly or crane driver, also carries the tally signal and a +12 VDC power supply. This allows an external On Air lamp to be used. For more detail and an application schematic, refer to Auxiliary connector, on page 142.

Managing files

You have access to many different files. The **Configuration > Files** menu is used to recall and store these files. There are four types of files:

- Scene files
- Operator files
- Lens files
- Media files

A scene file contains values related to the picture performance. The operator file contains values related to the setup of the camera (viewfinder and configuration parameters). Lens files contain lens related settings. Media Files contain values related to the IP Media Network such as IP addresses and settings.

The tables in Appendix A indicate the functions that are stored in the scene file, functions that are stored in an operator file and those that are stored in a lens file.

Scene files

Four scene files are stored in the camera itself (SCAM1, SCAM2, SCAM3 and SCAM4) while more scene files can be stored on a USB flash drive. A Standard scene file (preselected as either factory or customer defined) is stored in the camera.

☞ **Note**

The standard Customer Scene file is stored via the **Security** menu, not the **Files** menu. The decision to use the factory defined file or the customer defined file as the standard file is also made in this menu.

The **Files** menu enables the scene files to be stored and recalled using the store and recall entries of the menu system. If the message **NOK** ('Not OK') is displayed, the old values are restored.

☞ **Note**

If the camera is on air and a scene file is recalled, the recalled values do not become active until the camera goes off air.

Operator files

Four operator files are stored in the camera itself (OCAM1,OCAM2, OCAM3 and OCAM4) while more operator files can be stored on aMedia USB flash drive. These files contain information for setting up the non-video configuration of the camera. A Standard operator file (factory or customer defined) is stored in the camera.

☞ **Note**

The standard Customer operator file is stored via the **Security** menu, not the **Files** menu. The decision to use the factory defined file or the customer defined file as the standard file is also made in this menu.

Lens files

Lens files contain settings related to the lens configuration (e.g. white shading). Up to four lens files (LCam1 to LCam4) can be stored in the camera.

Media files

Media files

Standard files

By default, the green Std File button on the left-front side of the camera recalls the standard Scene file. This file contains default parameters for picture performance. A standard Operator file can be recalled via the **Files** menu. This file contains parameters for the set-up of the camera.

Customer standard files

You can define a customer standard file for the standard Scene file and for the standard Operator file. The contents of the customer files for both these standard files is stored via the **Configuration > Security** menu.

The selection of a factory defined or a customer defined file for use as a standard file is also made in this menu. You can only access the functions of the **Security** menu with the PIN code of the camera.

Video setup

Video settings

Standard settings

To make sure that (some of) the camera functions are not set to unusual values, a standard file has been defined that contains the default values for most video functions. The Reference tables, on page 87 list the (default) values that are set when the standard file is recalled.

To recall the standard values for the various video functions, press the STD button on the left side of the camera and hold it for two seconds. The standard values only take effect when the camera is not On Air.

The standard file can be selected as either a factory or a customer standard file. Changing the standard file can only be done in the **Security** menu if a PIN code is used.

Non-standard indicator

The non-standard indicator in the ocular viewfinder lights when one of the following conditions occur (refer to the user's guide of the viewfinder for more details):

- Extended Auto Iris is switched on
- AWC or FL50/FL60 color temperature is selected

Video mode

CGA In the Main video menu, go to **Setup > Video**. Tap the **VideoMode** item to select the video mode you wish to use for your production.

CAM In the camera menu, go to the **Production Setup > Video Mode** item and select the video mode.

Sensitivity mode

To obtain the best results under different lighting conditions, the camera's sensitivity mode can be selected.[1)]

CGA In the Main video menu, go to **Setup > Video**. Tap the **Sensitivity Mode** item and select the sensitivity mode.

CAM In the camera menu, go to the **Production Setup > Sensitivity** item and select the sensitivity mode.

The following sensitivity modes are available:

- **High Quality mode** — for studio locations and other environments with very good lighting conditions. This mode provides superior quality pictures with very low noise.
- **Nominal mode** — for general purpose situations with variable lighting conditions. This mode provides very good pictures with low noise.
- **High Sensitivity mode** —for situations with poor lighting conditions. This mode results in acceptable quality pictures.

The following settings and ranges are in use with the different sensitivity modes:

	High Quality mode	Nominal mode	High Sensitivity mode
Basic sensitivity (@2000 lux): [2]	typ. F8	typ. F11	max. F16
Texture representation:	Excellent	Very good	Fair
Dynamic range:	1 f-stop lower	Maximum	Maximum

[1] Sensitivity mode is not available when a high speed video mode is selected.

[2] Actual basic sensitivity depends on selected video mode/frame rate.

Color bar

The color bar is the standard test signal that is used to set up and check the camera before shooting. When the color bar is selected the following functions are temporarily switched off: Black Stretch, White Limiter, Zebra and the Safe Area and cadre indicators. The lens iris closes automatically when the color bar is switched on.

`CGP` Press the TEST button on the left side of the panel to switch on the color bar. Initially, the standard color bar is switched on and the button lights. Press it again to switch on the sawtooth signal. The button lights orange. Press again to switch off all test signals.

`CAM` Press the BARS button on the left side panel (middle button) to switch on the standard color bar:

Gain

Depending on the available light level it may be necessary to adjust the video gain settings of the camera.

`CGP`   Turn the upper ring on the stick to vary Gain in steps of 0.1 dB.

`CAM`   On the camera, Gain is selected via the GAIN switch on the left side panel of the camera:
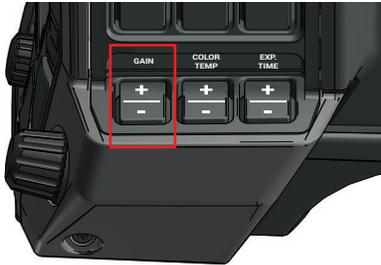
- When the switch (plus or minus) is pressed initially, the current Gain value is displayed in the viewfinder.
- Holding the plus or minus position for a short moment selects one of the five preset Gain settings: -, 0, +, ++ and +++.

The actual value of the Gain in dB is assigned to these presets in the
Production Setup > Levels > Gain > Gain Presets menu.

Gain Preset	Gain (in HiQ and Nom mode)	Gain (in HiSens mode)
-	is always -3 dB	is always -3 dB
0	is always 0 dB	is always 0 dB
+	can be set to +3 or +6 dB	can be set to +3, +6, +9 or +12 dB
++	can be set to +6 or +9 dB	can be set to +6, +9, +12 or +15 dB
+++	can be set to +9 or +12 dB	can be set to +9, +12, +15 or +18 dB
-	is always -3 dB	is always -3 dB

☞ **Note**

When Gain is set to negative values, or values higher than 3 dB, the Gain indicator in the viewfinder lights (only for ocular viewfinder).

The Gain switch can also be used to vary the Gain continuously between its minimum and maximum value.

- Hold the plus or minus position continuously until you see the value in the viewfinder change in steps of 0.1 dB.
- Release the switch when you reached the value you want. This exits the value selection mode.
- Using the switch momentarily again sets the Gain to the nearest preset value.

☞ **Note**

Selecting high Gain levels may introduce noise into the image.

Optical filters

Both a Neutral Density filter (ND) and a Special Effects filter (FX) can be placed in the path of the optical signal to modify the incoming light. These filters can be used, for example, to control depth of field or exposure levels.

Press the FILTER button and select the filter type you want to change: ND or FX. Use the navigation buttons to step through the ND and FX filters.

`CAM` On the camera, press the FILTER button on the left side panel of the camera. The Filters menu is shown in the viewfinder. Use the front menu rotary to navigate to the filter type (ND or FX) and select the filter from the list.

Four Neutral Density (ND) filter positions are available:

- Clear - no filter is placed in the optical path
- ND1/4 - 2 stops light reduction neutral density filter
- ND1/16 - 4 stops light reduction neutral density filter
- ND1/64 - 6 stops light reduction neutral density filter

☞ **Note**

When a Neutral Density filter is selected, the ND indicator in the viewfinder lights (only for ocular viewfinders).

Four Effects (FX) filter positions are available:

- Clear - no filter is placed in the optical path
- Star 4P - 4 Point Star filter
- Sft Fcs - Soft focus filter
- Cap - Lens is capped (closed)

☞ **Note**

The camera does not need color optical filters to be able to white balance correctly. The range of the auto-white balance is so wide that there is never any need to use color filters to obtain the correct white balance.

Exposure

Exposure time

☞ **Note**

Exposure times other than nominal is not available in high speed video modes.

The exposure time value of 1/200 is used to capture fast moving objects so that these can be played back sharply in slow motion.

CAM   On the camera, exposure time is selected by the exposure time switch on the left side panel of the camera:
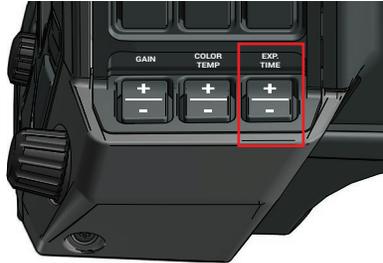
The exposure time switch gives a choice of exposure time settings. If an exposure time other than nominal is selected, the non-standard indicator in the (ocular) viewfinder lights.

☞ **Note**

Decreasing the exposure time lowers the camera's sensitivity proportionally.

- Nom — nominal setting
- Var — enable the exposure time to be varied
- 1/200 — for fast moving objects
- 50 Hz — shooting under 50 Hz lighting (adjustable with lighting correction)
- 60 Hz — shooting under 60 Hz lighting (adjustable with lighting correction)

Lighting correction

The exposure selection also includes lighting control positions which can be used when shooting with lighting that is operating at a different frequency to the camera. There are two positions: 50 Hz and 60 Hz. Each of these positions can be varied further in a range from -10 to +10 Hz. To reduce flicker select the frequency closest to the frequency of the lights and then vary the lighting control in the **Production Setup > Exposure > Lighting** menu to obtain the best result.

V-Shift (vertical acquisition shift)

When shooting monitors with (almost) the same display frequency as the camera's, for example TV sets, a horizontal black bar can be seen in the viewfinder. This phenomenon occurs because the camera is blanking while the monitor is not. The V-shift function shifts the camera blanking to synchronize it with the blanking of the monitor.

CAM   In the camera menu, navigate to the **Production Setup > Exposure > Acq Timing** menu and switch on the **V-Shift** item. Use the **V-Shift time** item to change the time shift until the horizontal bar disappears.

> **✎ Tip**
>
> V-Shift can also be used to remove color shifts that may occur when shooting DLP-type projectors.

LED Wall Filter

When shooting against LED Wall backgrounds that contain high frequencies, interference may occur, resulting in unwanted moire patterns. A special electronic filter is available that can be used to reduce these effects:

CAM   In the camera menu, navigate to the **Production Setup > Exposure** item and switch **Led Wall Filter** on.

Color

Color Temperature

For true color reproduction the ambient lighting conditions must be compensated for by selecting a value for the color temperature. The standard file setting is 3200 K (normally used for tungsten and indoor lighting). Two other reference color temperatures are available: 5600 K (for outdoors, clouded conditions) and 7500 K (for outdoors, clear blue skies).

The memory positions (FL50, FL60, AW1 and AW2) are available to store the results of the auto-white measurement process. The memory positions store measured values using the automatic white balance switch at the front. The FL positions are recommended for shooting with fluorescent light.

A continuous automatic white balance position (AWC) is also available. This function continuously measures the white balance and adjusts it accordingly. It can be used when a constant color balance is required under changing lighting temperatures (sunsets, indoors/outdoors use).

Color Tint

In some cases, color temperature alone is not enough to fully compensate for color cast so an additional tint adjustment is needed. Similar to how color temperature specifies the relative warmth or coolness of an image, tint generally specifies the balance between magenta and green color casts. When combined, color temperature and tint can therefore control and effectively remove virtually any color cast.

Color Filter

In the auto-white positions (FL50, FL60, AW1 and AW2) a color filter can be set up in the **production Setup > Color > Color Temp > Color Filter** menu. This varies the color balance to obtain warmer or colder color effects.

👉 **Note**

The automatic white balance process is performed independent of the color filter. The color filter is not disabled when AWC is on.

Selecting color temperature

`CAM` On the camera, color temperature selected by the color temperature switch on the left side panel of the camera:
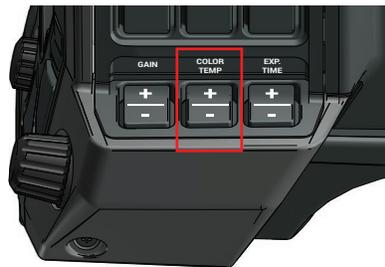
Three preset color temperatures are available:
- 3200 K - for indoor lighting conditions
- 5600 K - for outdoors, clouded conditions
- 7500 K - for outdoors, clear blue skies

and four memory positions:
- FL50 - memory position for 50 Hz fluorescent light (matrix is set to CoolFL and exposure to 50 Hz)
- FL60 - memory position for 60 Hz fluorescent light (matrix is set to CoolFL and exposure to 60 Hz)
- AW1 - Auto White memory position 1
- AW2 - Auto White memory position 2

and one automatic continuous white position:
- AWC - Auto White Continuous measurement (from 2000 K to 21000 K)

👉 **Note**

If AWC is selected, the non-standard indicator in the viewfinder lights (only for ocular viewfinders).

When the switch is first pressed, the viewfinder displays the current value. Select a new value by scrolling up or down through the available values.

The viewfinder also displays the measured color temperature. The range of the auto-white balance is from 2000 K to 21000 K.

Variable color temperature

The color temperature switch on the left-front side of the camera can also be used to vary the color temperature continuously between its minimum and maximum value (2000 K to 21000 K).

1 Press and hold the plus or minus position until you see the value in the viewfinder change.

2 Release the switch when you reach the value you want. This exits the value selection mode.

3 Pressing the plus or minus position again sets the color temperature to the nearest standard value.

Auto White Balance

If the reference color temperatures does not match your lighting conditions carry out the Auto White Balance procedure as follows:

White Balance button   Color Temperature switch
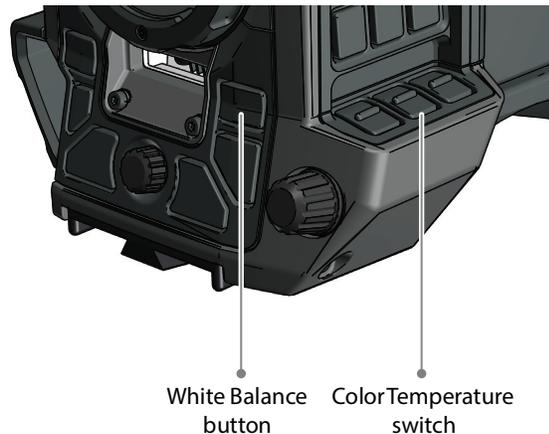
1 On the CGA, go to the **Color menu > Color Temperature** and select one of the memory positions (FL50, FL60, AW1 or AW2) in which to store the measured color temperature value.
On the camera use the color temperature switch to select one of the memory positions (FL50, FL60, AW1 or AW2) in which to store the measured color temperature value.

2 In the Color Temperature menu on the CGA, tap the AUTO WHITE button to start the Auto White balance procedure.
On the camera, press and hold (2 sec) the WHITE BALANCE button on the front panel to start the Auto White Balance procedure.

3 The following appears in the viewfinder:

```
     ▮ ▮
AWHITE: window
```
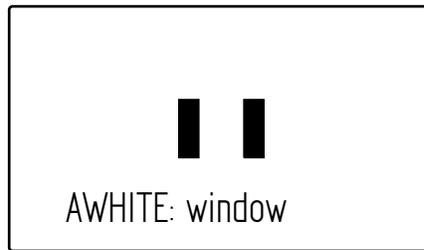
☞ **Note**

If you did not select one of the memory positions FL50, FL60, AW1 or AW2, a message ("Set Color Temp") appears in the viewfinder.

4 Point the camera so that the reference white surface is between the two small black boxes.
5 On the CGA, tap the WHITE BALANCE button again.
   On the camera, press the WHITE BALANCE button on the front panel again to start the measurement procedure.
6 A message indicating that the process is running appears:

```
     ▮ ▮
AWHITE: running
```
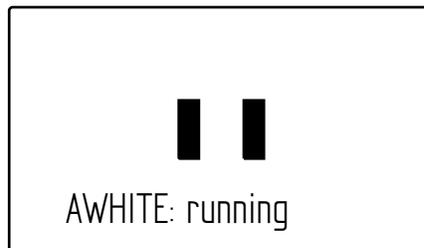
☞ **Note**

If there is insufficient light, the "light level too low" message appears in the viewfinder.

7 When the process is completed (within a few seconds) the OK message and the measured color temperature appears in the viewfinder:

```
     ▮ ▮
AWHITE: OK 3700K
```
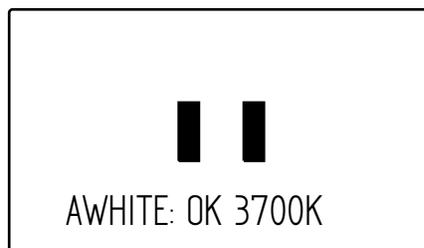
8   The measured color temperature is now stored in the selected memory position and can be recalled as required.

9   If the auto-white measurement has been unsuccessful, an error appears in the WHITE BALANCE button on the CGA.

☞   **Note**

During the auto-white measurement process the iris is set to Auto and 90% and knee is switched off.

Black balance is not necessary because black level is automatically adjusted by the camera's internal video circuits.

Saturation

Adjust the saturation level to increase or decrease color of the picture. Saturation values below 100% decrease colors while values higher than 100% increase colors.

CAM   In the camera menu, navigate to the **production Setup > Color >Saturation** item and adjust the level.

Color Gamut

The camera can operate using two different color gamuts:

CAM   In the camera menu, navigate to the **Production Setup > Color > Color Gamut** item and select REC709 (for default HDTV color gamut) or REC2020 (for extended color gamut). In HDR operation LMS is supported in addition to REC709 and REC2020.

Color Protect

When very bright and saturated colored lights are used, predominant colors may clip. This results in fully saturated areas with no detail. This phenomenon occurs especially in blue and magenta color ranges.

The Color Protect function restores luminance levels without affecting color over-saturation. It prevents non-dominant colors from decreasing below black level so much of the details in the picture are still maintained. If a dominant color saturates, Color Protect gradually decreases its influence in the picture.

CAM   In the camera menu, navigate to the **Production Setup > Color > Color Adjustment > Col Protect** menu and switch on the item **Col Protect**.

Sharpness

Detail

Detail is an image enhancement used to improve picture sharpness perception. The detail function raises the contrast at the dark-to-light and light-to-dark transitions, thus making

edges of objects appear sharper. This process is applied in video post processing within the camera by overshooting the signal at the edges. Detail is applied to both vertical and horizontal picture edges. Detail level refers to the amount of image enhancement, or in other words, the amount of sharpness added to the picture.

`CAM` In the camera menu, navigate to the **Creative Control > Sharpness > Detail** menu and use **Detail Level** to adjust the amount of detail added to the picture.

Advanced options

There are a number of advanced Detail options in the menu that can be used to fine tune the detail function:

- Vertical Detail Level (0 to 99)
- Coarse/Fine adjustment (0 to 99)
- Level Dependency (0 to 99)
- Noise Slicer (0 to 99)

Lens related functions

Aperture Correction follows Iris

The internal Aperture Correction circuit compensates for optical aberration caused by smaller lens apertures. When switched on, the Aperture Correction takes the actual Iris opening into account to achieve better Aperture Correction.

`CAM` In the camera menu, go to the **Creative Control > Sharpness > Detail > Advanced** menu to find the lens related detail functions.

Skin Detail

Skin Detail is set up to select a particular color range. The Detail level within this color range can then be set independently of the rest of the picture.

Skin detail is mainly used to reduce the level of Detail in a person's skin tone to produce a more attractive picture. Decreasing the Detail level of a person's skin softens the skin tones only. But the Skin Detail function is not limited to a particular color and so can also be used to achieve various effects in selected color areas. For example, decrease the detail level of a soccer field to accentuate the players or increase the Skin Detail level to accentuate a rough surface.

The color range to which the Skin Detail level is applied can be selected automatically or manually. Three skin detail ranges (called Skin Gates or Sets) can be independently defined; they can be used at the same time.

Auto Skin Detail

Carry out the Auto Skin Detail procedure as follows:

1 In the camera menu, navigate to the **Creative Control > Sharpness > Skin Detail** and use the Skin Gate item to select 1, 2 or 3. Do not select any of the combined options.

2 Place the cursor in front of the **Auto Skin Dtl** function.

3 Press the select button on the front of the camera. The following appears in the viewfinder:

ASKIN: window
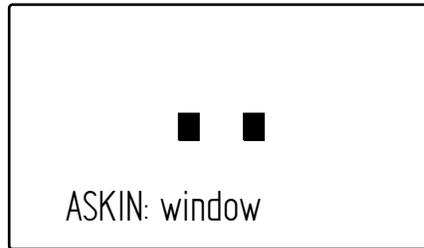
4 Now point the two small black boxes at the intended surface (generally a face).

5 Press the select button again to start the measurement procedure (the iris is automatically set to auto by the camera). The process running message appears:

ASKIN: running

6 When the process is completed (within a few seconds) the OK message appears in the viewfinder:

ASKIN: OK

7 Now adjust the Skin Detail level with the Skin Level item. Decrease the value below 50 to soften the selected area. Increase the value above 50 to add extra detail.

Note

In XS (6X)1080p video modes, the view and the color view do not show the selected color in the B/W picture of the monitoring output.

Image control

Freeze Frame

☞ **Note**

Freeze Frame is not available in high speed video modes.

When switched on, the freeze frame function freezes the current video frame so that many video functions can be set up off line. The following functions are NOT available in freeze frame mode:

- Iris settings
- V-shift
- Variable exposure

☞ **Note**

Changing the video mode and running Auto White Balance is prohibited in Freeze Frame mode.

CAM In the camera menu, navigate to the ***Production Setup > Image Control > Freeze frame*** menu to switch Freeze Frame on or off.

Reverse Scan

☞ **Note**

Reverse Scan is not available in high speed video modes.

When the camera is used at a rotated angle use the reverse scan function to rotate the camera's image to compensate.

CAM In the camera menu, navigate to the ***Production Setup > Image Control > Reverse Scan*** menu to switch reverse scan on or off and to select the scan mode (horizontal, vertical or both).

A

Menu references

Reference tables

All camera functions are grouped into 7 main menus:

- Installation menu—contains camera connection methods and system setup items.
- Operator Toolbox menu—contains the functions that help the operator while shooting such as screen indicators, user buttons assignments and various shooting tools.
- Production Setup menu—contains the functions needed to set up the camera for a production, including scene related video settings.
- Creative Control menu—contains the functions to control the creative aspects of the video signal such as contrast, sharpness and color correction.
- Configuration menu—contains the functions that are used to set up the general configuration of the camera such as intercom, lens settings and interfaces.
- Diagnostics menu—provides information on the current status and of the camera.
- Service menu—contains service items for advanced camera configuration.

The columns in the tables provide reference information about the functions in the camera menu:

- Menu item: camera function, menu or submenu.
- Values: possible values or value range for the listed function (the factory default value for the listed function is indicated in **bold**.)
- Level: the access level from which the function or menu is available. User 0 is the most restricted level while User 3 is the least restrictive. Service (S) is the access level for advanced functions.
- Description: a short description of the function and its values.

Installation menu

Function:	Values:	U:	F:	Description:
Camera Mode	**IP**, **XCU**, Local	0	-	Camera mode: IP = NativeIP mode (only visible when the NativeIP option/license is installed) XCU = XCU mode Local = Local mode
IP Mode	10G, **25G**, 100G	0	-	Ethernet speed for the IP Media network
FEC Mode	**Off**, RS	0	-	Forward Error Correction method: off or RS (= Reed-Solomon)
PTP				
PTP Profile	**SMPTE2059**, AES67, AES-SMPTE, User	0	-	PTP Profile (when Reference = PTP): SMPTE2059: Profile used for synchronization of broadcast media systems AES67: media profile of AES67 AES67-SMPTE: combination of SMPTE2059 +AES67 User: User defined. Enter PTP Profile settings in the PTP Settings submenu (below)
PTP Settings (available when PTP profile = User)				
GM Select	**Auto**, GM 1, GM 2	0	-	PTP Grandmaster selection
Domain Nr	0..255 **(0)**	0	-	PTP Domain Number (refer to IEEE 1588 for more information)
DelayReqInterval	-4..1 **(-3)**	0	-	PTP DelayRequestInterval (refer to IEEE 1588 for more information)
ReceiptTimeout	2..10 **(2)**	0	-	PTP DelayRequestInterval (refer to IEEE 1588 for more information)
Timing				
Main Video	-5000us..5000us **(0 us)**	0	-	
SFP Modules				
Port QSFP				
Mode	DHCP, **Manual**	0	-	Management protocol for QSFP port
IP	[IP addr] **(10.11.5.2)**	0	-	IP address for QSFP port
NM	0..31 **(16)**	0	-	Subnet Mask for QSFP port
GW	[IP addr] **(10.11.5.1)**	0	-	Default Gateway for QSFP port
Port SFP1				
Mode	DHCP, **Manual**	0	-	Management protocol for SFP1 port
IP	[IP addr] **(10.11.6.2)**	0	-	IP address for SFP1 port
NM	0..31 **(16)**	0	-	Subnet Mask for SFP1 port
GW	[IP addr] **(10.11.6.1)**	0	-	Default Gateway for SFP1 port
Port SFP2				

Function:		Values:	U:	F:	Description:
	Mode	DHCP, **Manual**	0	-	Management protocol for SFP2 port
	IP	[IP addr] **(10.11.7.2)**	0	-	IP address for SFP2 port
	NM	0..31 **(16)**	0	-	Subnet Mask for SFP2 port
	GW	[IP addr] **(10.11.7.1)**	0	-	Default Gateway for SFP2 port
Media Interface					
Network Setup					
VLAN					
	C2IP	**Off**, On	0	M	Enable/disable VLAN tagging for C2IP
	C2IP Tag	2..4095 **(2)**	0	M	Assigns a tag to the C2IP (control network) VLAN (when VLAN tagging = On)
	Trunk	**Off**, On	0	M	Enable/disable VLAN tagging for IP Trunk
	Trunk Tag	2..4095 **(3)**	0	M	Assigns a tag to the IP Trunk VLAN (when VLAN tagging = On)
	PrivData	**Off**, On	0	M	Enable/disable VLAN tagging for Private Data
	PrivData Tag	2..4095 **(4)**	0	M	Assigns a tag to the Private Data VLAN (when VLAN tagging = On)
NMOS Control					
	Type	**Off**, Static, DNS-SD, mDNS	0	M	NMOS service type (or switches off NMOS control)
	Interface	**C2IP**, Media	0	M	NMOS over C2IP connector or via the IP Media Network
NMOS server					
	IP	[IP addr] **(192.168.1.2)**	0	M	IP address for NMOS server
	Port	[Port No] **(6000)**	0	M	IP port number for NMOS server
	IS04 ver	**v1.0**, v1.1, v1.2, v1.3	0	M	NMOS IS-04 protocol version for NMOS server
	ARPreq to DefGw	**Off**, On	0	M	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	0	M	Internet Group Management Protocol (IGMP) is used for Multicast IP applications: v2: use the standard version for the IGMP protocol v3: allows for source specific multicast
Private Data					
	Enabled	**No**, Yes	0	M	Enable/disable Private Date
	Dst IP	[IP addr] **(10.11.10.1)**	0	M	Destination IP address for Private Data
	Dst Port	[Port No] **(20015)**	0	M	Destination IP port number for Private Data
	Src Port	[Port No] **(20016)**	0	M	Source IP port number for Private Data
Outgoing Streams					
Main Video					
	Enabled	No, **Yes**	0	M	Enable/disable Main Video

Function:		Values:	U:	F:	Description:
	IP	[IP addr] **(224.11.5.9)**	0	M	IP address for Main Video
	Port	[Port No] **(20009)**	0	M	IP port number for Main Video
	Protocol	ST2022-6, **ST2110-20**	0	-	IP Transport Protocol for Main Video: ST2022-6: Packetized SDI over IP ST2110-20: Video Essence over IP
	Payload ID	96..127 **(96)**	0	M	(SDI) payload ID for Main Video
Live Video					
	Enabled	No, **Yes**	0	M	Enable/disable Live Video
	IP	[IP addr] **(224.11.5.10)**	0	M	IP address for Live Video
	Port	[Port No] **(20010)**	0	M	IP port number for Live Video
	Protocol	ST2022-6, **ST2110-20**	0	M	IP Transport Protocol for Live Video
	Payload ID	96..127 **(96)**	0	M	(SDI) payload ID for Live Video
HighSpeed Video (only in high speed video modes)					
	Enabled	No, **Yes**	0	M	Enable/disable High Speed Video
	Phase 1				
	IP	[IP addr] **(224.11.5.3)**	0	M	IP address for High Speed Video phase 1
	Port	[Port No] **(20003)**	0	M	IP port number for High Speed Video phase 1
	Enabled	**No**, Yes	0	-	Enable/disable High Speed Video phase 1
	Phase 2				
	IP	[IP addr] **(224.11.5.4)**	0	M	IP address for High Speed Video phase 2
	Port	[Port No] **(20004)**	0	M	IP port number for High Speed Video phase 2
	Enabled	**No**, Yes	0	-	Enable/disable High Speed Video phase 2
	Phase 3				
	IP	[IP addr] **(224.11.5.5)**	0	M	IP address for High Speed Video phase 3
	Port	[Port No] **(20005)**	0	M	IP port number for High Speed Video phase 3
	Enabled	**No**, Yes	0	M	Enable/disable High Speed Video phase 3
	Protocol	ST2022-6, **ST2110-20**	0	-	IP Transport Protocol for High Speed Video
	Payload ID	96..127 **(96)**	0	M	(SDI) payload ID for High Speed Video
Audio					
	Enabled	No, **Yes**	0	M	Enable/disable Audio
	IP	[IP addr] **(224.11.5.17)**	0	M	IP address for Audio
	Port	[Port No] **(5001)**	0	M	IP port number for Audio
	Codec	L16, **L24**	S	M	Linear 16 or 24 bits PCM audio codec for Audio
	Packet Time	**0.125 ms**, 0.250 ms, 1 ms	0	M	Packet Time
	PayloadID	96..127 **(97)**	0	M	Payload ID for Audio
	Number of Ch	2, 4, **8**, 16	0	M	Number of audio channels for Audio

Function:		Values:	U:	F:	Description:
Intercom					
	Enabled	No, **Yes**	0	M	Enable/disable Intercom
	IP	<IP address>	0	M	IP address for Intercom
	Port	[Port No] **(5002)**	0	M	IP port number for Intercom
	Codec	L16, **L24**	S	M	Linear 16 or 24 bits PCM audio codec for Intercom
	Packet Time	**0.125 ms**, 0.250 ms, 1 ms	0	M	Packet Time for Intercom
	PayloadID	96..127 **(97)**	0	M	Payload ID for Intercom
	Number of Ch	2, 4, **8**, 16	0	M	Number of audio channels for Intercom
Incoming Streams					
Video RX 1					
	Enabled	**No**, Yes	0	M	Enable/disable Video RX 1
	Multicast	No, **Yes**	0	M	Enable/disable Multicast for Video RX 1
	IP	[IP addr] **(224.11.5.12)**	0	M	IP address for Video RX 1
	Port	[Port No] **(20012)**	0	M	IP port number for Video RX 1
	PayloadID	96..127 **(96)**	0	M	Payload ID for Video RX 1
	Protocol	2022-6, **2110-20**	0	M	IP Transport Protocol for Video RX 1
	Src IP	[IP addr] **(10.11.8.1)**	0	M	Source IP address for Video RX 1
Video RX 2					
	Enabled	**No**, Yes	0	M	Enable/disable Video RX 2
	Multicast	No, **Yes**	0	M	Enable/disable Multicast for Video RX 2
	IP	[IP addr] **(224.11.5.13)**	0	M	IP address for Video RX 2
	Port	[Port No] **(20013)**	0	M	IP port number for Video RX 2
	PayloadID	96..127 **(96)**	0	M	Payload ID for Video RX 2
	Protocol	2022-6, **2110-20**	0	M	IP Transport Protocol for Video RX 2
	Src IP	[IP addr] **(10.11.8.2)**	0	M	Source IP address for Video RX 2
Video RX 3					
	Enabled	**No**, Yes	0	M	Enable/disable Video RX 3
	Active	No, **Yes**	0	M	Enable/disable Multicast for Video RX 3
	IP	[IP addr] **(224.11.5.14)**	0	M	IP address for Video RX 3
	Port	[Port No] **(20014)**	0	M	IP port number for Video RX 3
	PayloadID	96..127 **(96)**	0	M	Payload ID for Video RX 3
	Protocol	2022-6, **2110-20**	0	M	IP Transport Protocol for Video RX 3
	Src IP	[IP addr] **(10.11.8.3)**	0	M	Source IP address for Video RX 3
Audio					
	Enabled	**No**, Yes	0	M	Enable/disable Audio
	Multicast	No, **Yes**	0	M	Enable/disable Multicast for Audio

Function:		Values:	U:	F:	Description:
	IP	[IP addr] **(224.11.5.19)**	0	M	IP address for Audio
	Port	[Port No] **(5003)**	0	M	IP port number for Audio
	Codec	L16, **L24**	S	M	Linear 16 or 24 bits PCM audio codec for Audio
	Packet Time	**0.125 ms**, 0.250 ms, 1 ms	0	M	Packet Time for Audio
	Buffer Size	1,2,4,**8**,16, 32 ms	0	M	Buffer size for Audio
	PayloadID	96..127 **(97)**	0	M	Payload ID for Audio
	Number of Ch	1, 2, **4**, 8, 16	0	M	Number of audio channels for Audio
	Src IP	[IP addr] **(10.11.8.4)**	0	M	Source IP address for Audio
Intercom					
	Enabled	**No**, Yes	0	M	Enable/disable Intercom
	Multicast	No, **Yes**	0	M	Enable/disable Multicast for Intercom
	IP	[IP addr] **(224.11.5.20)**	0	M	IP address for Intercom
	Port	[Port No] **(5004)**	0	M	IP port number for Intercom
	Codec	L16, **L24**	S	M	Linear 16 or 24 bits PCM audio codec for Intercom
	Packet Time	**0.125 ms**, 0.250 ms, 1 ms	0	M	Packet Time for Intercom
	Buffer Size	1,2,**4**,8,16, 32 ms	0	M	Buffer size for Intercom
	PayloadID	96..127 **(97)**	0	M	Payload ID for Intercom
	Number of Ch	2, 4, **8**, 16	0	M	Number of audio channels for Intercom
	Src IP	[IP addr] **(10.11.8.5)**	0	M	Source IP address for Intercom
Redundancy					
Outgoing streams					
	Main IP	[IP addr] **(224.11.6.9)**	0	M	IP address for Main IP
	Port	[Port No] **(20009)**	0	M	IP port number for Main IP
	Ena	**No**, Yes	0	M	Enable/disable Main IP
	Live IP	[IP addr] **(224.11.6.10)**	0	M	IP address for Live Video
	Port	[Port No] **(20010)**	0	M	IP port number for Live Video
	Ena	**No**, Yes	0	M	Enable/disable Live Video
	Ph 1 IP	[IP addr] **(224.11.6.3)**	0	M	IP address for High Speed Video phase 1
	Port	[Port No] **(20003)**	0	M	IP port number for High Speed Video phase 1
	Ena	**No**, Yes	0	-	Enable/disable High Speed Video phase 1
	Ph 2 IP	[IP addr] **(224.11.6.4)**	0	M	IP address for High Speed Video phase 2
	Port	[Port No] **(20004)**	0	M	IP port number for High Speed Video phase 2
	Ena	**No**, Yes	0	-	Enable/disable High Speed Video phase 2
	Ph 3 IP	[IP addr] **(224.11.6.5)**	0	M	IP address for High Speed Video phase 3
	Port	[Port No] **(20005)**	0	M	IP port number for High Speed Video phase 3

Function:		Values:	U:	F:	Description:
	Ena	**No**, Yes	0	-	Enable/disable High Speed Video phase 3
	Audio IP	[IP addr] **(224.11.6.17)**	0	M	IP address for Audio
	Port	[Port No] **(5001)**	0	M	IP port number for Audio
	Ena	**No**, Yes	0	M	Enable/disable Audio
	Icom IP	[IP addr] **(224.11.6.18)**	0	M	IP address for Intercom
	Port	[Port No] **(5002)**	0	M	IP port number for Intercom
	Ena	**No**, Yes	0	M	Enable/disable Intercom
Incoming Streams					
	RX1 IP	[IP addr] **(224.11.6.12)**	0	M	IP address for Video RX 1
	Port	[Port No] **(20012)**	0	M	IP port number for Video RX 1
	Ena	**No**, Yes	0	M	Enable/disable Video RX 1
	Mcast	Yes, **No**	0	M	Enable/disable Multicast for Video RX 1
	Src	[IP addr] **(10.11.9.1)**	0	M	Source IP address for Video RX 1
	RX2 IP	[IP addr] **(224.11.6.12)**	0	M	IP address for Video RX 2
	Port	[Port No] **(20012)**	0	M	IP port number for Video RX 2
	Ena	**No**, Yes	0	M	Enable/disable Video RX 2
	Mcast	Yes, **No**	0	M	Enable/disable Multicast for Video RX 2
	Src	[IP addr] **(10.11.9.1)**	0	M	Source IP address for Video RX 2
	RX3 IP	[IP addr] **(224.11.6.12)**	0	M	IP address for Video RX 3
	Port	[Port No] **(20012)**	0	M	IP port number for Video RX 3
	Ena	**No**, Yes	0	M	Enable/disable Video RX 3
	Mcast	Yes, **No**	0	M	Enable/disable Multicast for Video RX 3
	Src	[IP addr] **(10.11.9.1)**	0	M	Source IP address for Video RX 3
	Audio IP	[IP addr] **(224.11.6.12)**	0	M	IP address for Audio
	Port	[Port No] **(20012)**	0	M	IP port number for Audio
	Ena	**No**, Yes	0	M	Enable/disable Audio
	Mcast	Yes, **No**	0	M	Enable/disable Multicast for Audio
	Icom IP	[IP addr] **(224.11.6.12)**	0	M	IP address for Intercom
	Port	[Port No] **(20012)**	0	M	IP port number for Intercom
	Ena	**No**, Yes	0	M	Enable/disable Intercom
	Mcast	Yes, **No**	0	M	Enable/disable Multicast for Intercom

Operator Toolbox menu

Function:	Values:	U:	F:	Description:
Indicators				
Zoom Indicator	**Off**, On	0	-	Switch Zoom indicator on or off
Iris Indicator	**Off**, On	0	-	Switch Iris indicator on or off
Focus Indicator	**Off**, On	0	-	Switch Focus indicator on or off
Filter Indicator	**Off**, On	0	O	Switch Optical Filter indicator on or off
DOF Indicator	**Off**, On	0	O	Switch Depth of Field (DOF) indicator on or off
Center Cross	**Off**, On	0	O	Switch Center Cross on or off
Safe Area				
Safe Area	**Off**, On	0	O	Switch Safe Area on or off
Safe Area Type	**16:9**, 15:9, 14:9, 4:3	0	O	Aspect ratio of the Safe Area
Marker				
Marker	**Off**, On	0	O	Switch Marker on or off
Marker Type	15:9, 14:9, **4:3**	0	O	Aspect ratio of Marker
Marker Style	**Dot**, Shad, Both	0	O	Marker style: Dot = dotted lines; Shad = shaded areas; Both = dotted lines and shaded areas
Marker Shading	**Shad**, Black	0	O	Marker Shading (when marker style = Shad or Both): Shad = transparent area, Black = black area
Box				
Box 1				
Box	**Off**, On	0	O	Switch Box 1 on or off
Type	**Box**, Line, Full	0	O	Box type
Color	**White**, Red, Green, Blue, Yellow, Magenta, Cyan, Purple	0	O	Box color
Top	0..99 **(25)**	0	O	Top position of the Box
Bottom	0..99 **(75)**	0	O	Bottom position of the Box
Left	0..99 **(25)**	0	O	Left position of the Box
Right	0..99 **(75)**	0	O	Right position of the Box
Box 2				
Box	**Off**, On	0	O	Switch Box 2 on or off
Type	**Box**, Line, Full	0	O	Box type
Color	**White**, Red, Green, Blue, Yellow, Magenta, Cyan, Purple	0	O	Box color
Top	0..99 **(33)**	0	O	Top position of the Box
Bottom	0..99 **(66)**	0	O	Bottom position of the Box

Function:		Values:	U:	F:	Description:
	Left	0..99 **(33)**	0	O	Left position of the Box
	Right	0..99 **(66)**	0	O	Right position of the Box
Zebra					
	Zebra	**Off**, On	0	O	Switch Zebra indication on or off. Zebra is a diagonal line pattern that indicates that the area affected has risen above a preset level of the full scale video exposure value
	Zebra Mode	**Level**, Band	3	O	Zebra mode: Level: Zebra indication appears in areas are brighter than the set level Band: Zebra indication appears in a 2.5% band around the set level
	Zebra Level	0%..117% **(90%)**	3	O	Exposure level at which Zebra pattern is shown. When level is higher than 100% the zebra indicates overexposed areas
	Zebra Contrast	0..99 **(15)**	3	O	Zebra Contrast
	Ind White Lvl	0..99 **(70)**	2	O	White level (= brightness) of the indicators: 0 = very dark; 99 = very bright
Viewfinder					
	OnScreen Tally	**Off**, Top, Bottom	2	O	On Screen Tally (signalling) indicators to be displayed at the top or at the bottom of the viewfinder screen. Select Off to turn the indicators off
	Assignments	**Show**, Hide	2	O	
	Button Leds	Off, **Low**, Medium, High	2	O	Brightness level of the viewfinder menu buttons
Backpanel					
	Info Leds	Low, **High**	2	-	Brightness level of the IP diagnose indicators on the back panel
	Button Illum	0..99 **(75)**	2	-	Brightness level of button illumination
	Outside Illum	**On**, Off	2	-	Switches outside Illumination on or off.
	Level	0..99 **(75)**	2	-	Outside illumination brightness level (when outside Illumination is switched on)
	AutoIris Area	**Off**, On	3	O	Switches AutoIris Area indication on or off
VF Monitoring		**YCrCb,** Y, R, G, B, -G, R-G, B-G	2	O	Type of signal to view in viewfinder
VF HDR Knee					
	HDR Kn Max In	100..10000% **(2000%)**	2	O	
	HDR Kn Point	20%..100% **(70%)**	2	O	
VF Peaking					
	Peaking Lvl	0..99 **(20)**	0	O	Peaking level applied to the viewfinder signal (same control as peaking level rotary on the viewfinder)

Function:		Values:	U:	F:	Description:
	Peaking (Return)	0..99 **(0)**	0	O	Peaking level applied to the Return video signal in the viewfinder (when enabled)
	Fine Lvl	-20..50 **(0)**	0	O	Fine Peaking level
	Color	**White**, Red, Green, Blue, Yellow, Magenta, Cyan, Purple	0	O	Viewfinder Peaking color
VF Detail					
	VF Detail	Off, **On**, Boost	0	O	Enable/disable VF Detail, or adds extra Detail to the viewfinder signal (Boost)
	Super Coarse	**Off**, On	0	O	Enable/disable Super Coarse VF Detail
	Detail Level	0..99 **(50)**	0	O	Detail level for viewfinder signal
	Slicer	0..99 **(10)**	0	O	Noise Slicer level for VF Detail
	Vert Detail Lvl	0..99 **(50)**	3	O	Vertical component of VF Detail level
	Coarse/Fine	0..99 **(90)**	3	O	Detail balance between coarse and fine structures (0 = coarse, 99 = fine)
	Level Dep	0..99 **(30)**	3	O	Level at which VF Detail starts to work
	Soft Detail	Off, **On**	3	O	Enable/disable Soft Detail: this reduces the amount of detail added for large transitions
	Soft Detail Lvl	0..99 **(50)**	3	O	Upper limit level for Soft Detail
VF Mode		**Combined**, 1 Phase, 2 Phases, 3 Phases	2	-	(only for high speed video modes) Method of combining high speed phases for the viewfinder output: Combined: all phases are combined to obtain the highest signal level for live viewing. 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: same as above but with 2 phases. 3 Phases: same as above but with 3 phases. Note: try the setting that suits your situation best.
Menu Settings					
	Rotary Speed	1..10 **(5)**	2	O	Reaction speed of the front rotary button
	Menu Display	On,**Time**	2	O	Camera menu alwasy on or or disappear after a set time
	Menu Time	3..30 **(10)**	2	O	Time (in seconds) the menu is shown when Menu Display is set to Time.
	Menu White Lvl	0..99 **(70)**	2	O	White level (brightness) of the characters of the menu
Info Settings					
	Info Start Page	**1**,2,3,4	2	-	First page shown when info button is initially pressed
	Info Display	On, **Off**	2	-	Time (in seconds) the info page is shown when Info Display is Off.
	Info Time	3..30 **(10)**	2	-	Sets the time (in seconds) the info page is shown.

Function:	Values:	U:	F:	Description:
Intercom				
Prod Vol Ctrl	**Prod**, Master	3	O	Selects if the Prod volume control (upper rotary on the back panel) controls Prod channel volume only (Prod) or overall (Master) intercom volume.
Cam Sidetone	0..99 **(75)**	3	O	Sets the sidetone level (audio feedback from mic to headset) in the camera operator's headset.
Tracker Sidetone	0..99 **(75)**	3	O	Sets the sidetone level (audio feedback from mic to headset) in the tracker's headset.
User Buttons				
Ret A Preset	Off, **Ext1**, Ext2, Ext3, TP	0	O	Selects which signal is shown in the viewfinder when the Ret A button at the front panel is pressed
Ret B Preset	Off, Ext1, **Ext2**, Ext3, TP	0	O	Selects which signal is shown in the viewfinder when the Ret B button at the front panel is pressed
Front Panel				
Eng Mode	**Mom**, Alt	0	O	Switching mode for the Eng button at the front panel of the camera: momentary (push) or alternating (toggle)
Ret A Mode	**Mom**, Alt	0	O	Switching mode for the Ret A button at the front panel of the camera: momentary (push) or alternating (toggle)
Ret B Mode	**Mom**, Alt	0	O	Switching mode for the Ret B button at the front panel of the camera: momentary (push) or alternating (toggle).
Back Panel				
Eng Mode	**Mom**, Alt	0	O	Switching mode for the Eng button at the back panel of the camera: momentary (push) or alternating (toggle).
Ret A Mode	**Mom**, Alt	0	O	Switching mode for the Ret A button at the back panel of the camera: momentary (push) or alternating (toggle).
Ret B Mode	**Mom**, Alt	0	O	Switching mode for the Ret B button at the back panel of the camera: momentary (push) or alternating (toggle).
Side Panel				
SW1	Call, **RetA**, RetB, Prod, Eng, Select, ND +, Awhite, EIris, FocAst, Back	0	O	Assigns a function to user button SW1
SW1 Mode	**Mom**, Alt	0	O	Switching mode for SW1: momentary (push) or alternating (toggle)
SW2	EIris, Zoom, FocAst, RetA, **RetB**, Prod, Eng, ND -, Call, Back, Select	0	O	Assigns a function to user button SW2

Function:		Values:	U:	F:	Description:
	SW2 Mode	**Mom**, Alt	0	O	Switching mode for SW2: momentary (push) or alternating (toggle)
	PickMe Mode	**Mom**, Alt	1	O	Switching mode for PickMe: momentary (push) or alternating (toggle)
Handgrip					
	Handgrip Right	**RetA**, RetB, Zoom, FocAst	1	O	Assigns a function to the right handgrip button.
	Handgrip Left	**Prod**, Eng	1	O	Assigns a function to the left handgrip button.
Lens					
	VTR Lens	**Prod**, Eng , Zoom, RetA, RetB, VTR, Info	1	O	Assigns a function to the VTR Lens button.
	VTR Lens Mode	**Mom**, Alt	1	O	Switching mode for the VTR Lens button: momentary (push) or alternating (toggle).
	RET Lens	**RetA**, RetB, Zoom, FocAst	1	O	Assigns a function to the RET Lens button.
	RET Lens Mode	**Mom**, Alt	1	O	Switching mode for the RET Lens button: momentary (push) or alternating (toggle).
	RET1	**RetA**, RetB	1	O	Assigns a function to the RET 1 Lens button.
	RET2	Zoom, **RetB**	1	O	Assigns a function to the RET 2 Lens button.
	RET2 Mode	**Mom**, Alt	1	O	Switching mode for the RET 2 Lens button: momentary (push) or alternating (toggle).
Viewfinder					
	Btn 1	None, Call, **Box1**, Box2, Mono, Ret A, Ret B, Zoom, Text, Tally	1	O	Assigns a function to button 1 of the VF 7-100 viewfinder.
	Btn 1 Mode	Mom, **Alt**	1	O	Switching mode for button 1: momentary (push) or alternating (toggle)
	Btn 2	None, Call, Box1, Box2, Mono, Ret A, Ret B, Zoom, Text, Tally	1	O	Assigns a function to button 2 of the VF 7-100 viewfinder.
	Btn 2 Mode	Mom, **Alt**	1	O	Switching mode for button 2: momentary (push) or alternating (toggle)
	Btn 3	None, Call, Box1, Box2, Mono, Ret A, Ret B, Zoom, Text, Tally	1	O	Assigns a function to button 3 of the VF 7-100 viewfinder.
	Btn 3 Mode	Mom, **Alt**	1	O	Switching mode for button3: momentary (push) or alternating (toggle)
	Btn A	None, Call, **Box1**, Box2, Mono, Ret A, Ret B, Zoom, Text, Tally	1	O	Assigns a function to button 1 of the EC 2-100 viewfinder.
	Btn A Mode	Mom, **Alt**	1	O	Switching mode for button A: momentary (push) or alternating (toggle)

Function:		Values:	U:	F:	Description:
	Btn B	None, Call, Box1, Box2, Mono, Ret A, Ret B, Zoom, Text, Tally	1	O	Assigns a function to button 1 of the EC 2-100 viewfinder.
	Btn B Mode	Mom, **Alt**	1	O	Switching mode for button B: momentary (push) or alternating (toggle).
	Switch C	None, **UnderScan**	1	O	Set to Underscan to view a scaled down (approx. 85% of the area) picture in the EC 2-100 viewfinder.
SuperXpander					
	SXP F1	**None**, ND, FX, Bars, Prog, Back, Info, Pick Me	1	O	Assigns a function to the F1 user button on the SuperXpander, when present.
	SXP F2	**None**, ND, FX, Bars, Prog, Back, Info, Pick Me	1	O	Assigns a function to the F2 user button on the SuperXpander, when present.
	SXP F3	**None**, ND, FX, Bars, Prog, Back, Info, Pick Me	1	O	Assigns a function to the F3 user button on the SuperXpander, when present.
	PickMe Mode	**Mom**, Alt	1	O	Selects switching mode for the PickMe buttons: momentary (push) or alternating (toggle).
Zoom Settings					
	Handgrip Zoom	Off, **On**	0	O	Enable/disable Zoom control (on top of camera handgrip)
	Zoom Speed	1..10 **(5)**	3	O	Zoom control speed
	Zoom Curve	0..3 **(3)**	3	O	Zoom control response curve: 0 = linear curve 1 = low curve 2 = medium curve 3 = steep curve
	Zoom/Focus	**Local**, Remote	0	-	Local or remote control of the Zoom/ Focus function. Only available when a SuperXpander is present.
Operator Active		Yes, **No**	S	-	

Production Setup

Function:	Values:	U:	F:	Description:
Levels				
Gain				
HDR Gain	-6 dB..18 dB **(0 dB)**	2	S	HDR Gain (in 0.1 dB steps)
HDR Out Lvl	50% .. 66% **(57% for SMPTE2084)** 50% .. 87% **(73% for HLG)**	2	-	HDR Output Level: HDR video level that corresponds with 100% video level in SDR. Note: default values depend on the selected HDR Standard.
Gain Presets				
Gain -	-6 dB..-3 dB **(-3 dB)**	2	O	Gain value for - preset Note: Available preset values depend on the selected sensitivity mode
Gain +	+3 dB..+12 dB **(+3 dB)**	2	O	Gain value for + preset. Note: Available preset values depend on the selected sensitivity mode
Gain ++	+6 dB..15 dB **(+6 dB)**	2	O	Gain value for ++ preset Note: Available preset values depend on the selected sensitivity mode
Gain +++	+9 dB..+18 dB **(+12 dB)**	2	O	Gain value for +++ preset Note: Available preset values depend on the selected sensitivity mode
Black				
Full Black	**Off**, On	3	-	Select to run Full Black calibration. Note: this takes up to 15 seconds to complete
Master Black	0..99 **(50)**	2	S	Master Black level: this is the video level that is considered as pure black
Advanced				
Master Black	0..99 **(50)**	3	S	Master Black level: this is the video level that is considered as pure black.
Black R	0..99 **(50)**	3	S	Black level for Red
Black G	0..99 **(50)**	3	S	Black level for Green
Black B	0..99 **(50)**	3	S	Black level for Blue
HDR				
HDR Standard	**SMPTE2084**, HLG, SLOG3, Lin	3	S	HDR Standard: SMPTE 2084 (or PQ, Perceptual Quantization) or HLG (= Hybrid Log-Gamma), S-Log3 or Lin (Linear)
HDR Range	**Narrow**, Full	3	-	If HDR Standard = SMPTE2084: - Full: the HDR signal is mapped into the full 10-bit range of the digital signal (3 .. 1021) - Narrow: Narrow: the HDR signal is mapped into the code value range between 64 and 940.

Function:		Values:	U:	F:	Description:
	Gamma Low	0.8..3.5 **(1.2)**	3	-	Low Gamma
	Gamma High	0.4..2 **(1.0)**	3	-	High Gamma
	Gamma BrkPnt Low	5% .. 500% **(50%)**	3	S	
	Gamma BrkPnt High	20% .. 1000% **(100%)**	3	S	
	HDR Cliplevel	500 N..10000 N **(10000 N)**	3	S	
Exposure					
Iris					
	Auto Iris				
		Auto Iris	**Off**, On	0	-	Enable/disable Auto Iris
		Area	**Top**, Spot S, Spot M, Spot L, Full, Bottom, Custom	3	-	Measurement area for Auto Iris
		Area Indicator	**Off**, On	3	O	Enable/disable Area Indicator
		Custom Area				
			Peak			
			Top	0..99 **(57)**	3	-	
			Bottom	0..99 **(86)**	3	-	Custom measurement area for Auto Iris Peak measurement, when Area = Custom
			Left	0..99 **(24)**	3	-	
			Right	0..99 **(76)**	3	-	
			Average			
			Top	0..99 **(27)**	3	-	
			Bottom	0..99 **(57)**	3	-	Sets a custom measurement area for Auto Iris Average measurement, when Area = Custom
			Left	0..99 **(5)**	3	-	
			Right	0..99 **(95)**	3	-	
		Peak/Average	0..99 **(64)**	3	S	Sets the Auto Iris measurement balance between peak and average video level.
		Auto Iris SP	0..99 **(35)**	3	S	Sets Auto Iris Setpoint.
		Mom Iris SP	0..99 **(50)**	3	-	Sets Momentary Iris Setpoint.
		Auto Iris Gain	5..10 **(5)**	3	-	Sets Auto Iris Gain.
	Extended Iris				
		Extended Iris	**Off**, On	0	-	Enables/disables Extended Iris
		Area	**Top**, Spot S, Spot M, Spot L, Full, Bottom, Custom	S	-	Selects measurement area for Extended Iris
		Custom Area				
			Peak			

Function:		Values:	U:	F:	Description:
	Top	0..99 **(57)**	S	-	Sets a custom measurement area for Extended Iris Peak measurement, when Area = Custom
	Bottom	0..99 **(86)**	S	-	
	Left	0..99 **(24)**	S	-	
	Right	0..99 **(76)**	S	-	
Average					
	Top	0..99 **(27)**	S	-	Sets a custom measurement area for Extended Iris Average measurement, when Area = Custom
	Bottom	0..99 **(57)**	S	-	
	Left	0..99 **(5)**	S	-	
	Right	0..99 **(95)**	S	-	
Lighting					
	Lighting	Off, **On**	1	S	Enables/disables Lighting function
	Correction	-10 .. **0** .. +10	1	S	Sets the correction to fine-adjust for ambient lighting frequency when exposure time is set to 50 Hz or 60 Hz.
Acq Timing					
	V-Shift	**Off**, On	1	S	Switches V-Shift (acquisition timing shift) on or off.
	V-Shift Time	0..99 **(0)**	1	S	Selects V-Shift (acquisition timing shift) time.
Exp Time (not available for high speed video modes)					
	Exp Time Sel	1/200, 50%, 50 Hz, 60 Hz, **Nom**, Var	1	-	Selects camera exposure time.
	Var Exp Time	50 Hz ..1000 Hz	1	-	Sets variable exposure time when Exp Time Sel = Var in Hz or ms (see below)
	Units	**Hz**, ms	1	-	Selects units to use for variable exposure time
LED Wall filter		**Off**, On	2	S	Switches LED Wall Filter on or off.
HDR to SDR					
Input Ctrl					
	Input Level	50% .. 87% **(57%)**	3	-	
	Input Clipper	**Off**, On	3	-	
	Input Clip Lvl	0% .. 10000% **(10000%)**	3	-	
Map Mode		**SceneRef**, Manual	3	-	
Knee Point		0..100 **(35)**	3	-	
Knee Max In		100..5000 **(1000)**	3	-	
Output Ctrl					
	Wh Limiter	**Off**, On	3	-	
	Wh Limit Lvl	87.7%..109.1% **(105%)**	3	-	
	Color Saturation	0%..200% **(100%)**	3	-	
	SDR Color Gamut	**REC709**, REC2020	3	-	

Function:		Values:	U:	F:	Description:
	OETF	**BT1886**, REC709, SQRT709	3	-	
	Black Lvl	0..99 **(0)**	3	-	
Color					
Color temp					
	Color Filter	-100..100 **(0)**	2	S	Varies the color balance to obtain warmer or cooler effects. Negative values give cooler effects while positive values give warmer effects.
	Color Presets	**3200K**, 5600K, 7500K, FL50, FL60, AW1, AW2, AWC, VAR	2	-	Selects the color preset.
	Color Temp	2000 K..21000 K **(3200 K)**	2	S	Sets the color temperature when Color Preset = VAR
	Tint	-150..150 **(0)**	2	S	Adjusts the color balance along the magenta/green axis. Negative values add more magenta while positive values add more green.
	Advanced				
	Gain R	0..99 **(50)**	2	S	Sets Gain Red level.
	Gain G	0..99 **(50)**	2	S	Sets Gain Green level.
	Gain B	0..99 **(50)**	2	S	Sets Gain Blue level.
	Range	**3dB**, 6dB	2	S	Selects Gain control ('Painting') range.
	x	0.2..0.55 **(0.423)**	3	-	Displays the chromacity x-value. Note: this is only an approximation.
	y	0.2..0.55 **(0.399)**	3	-	Displays the chromacity y-value. Note: this is only an approximation.
Saturation					
	Saturation	0%..200% **(100%)**	2	S	Sets color saturation level. 0% = fully desaturated (black/white), 100% = normal saturation, 200% = maximum saturation.
	HDR Saturation	0%..200% **(100%)**	2	S	Sets HDR color saturation level. 0% = fully desaturated (black/white), 100% = normal saturation, 200% = maximum saturation.
Color gamut					
	SDR Color Gamut	**REC709**, REC2020	2	S	Selects SDR Color Gamut to be used: REC709 = default color gamut REC2020 = extended color gamut
	HDR ColorGamut	REC709, **REC2020**, LMS	2	S	Selects Color Gamut to be used in HDR mode: REC709 = default color gamut REC2020 = extended color gamut LMS = LMS color space (LMS = Long, Medium and Short wavelengths)

Function:	Values:	U:	F:	Description:
Matrix				
Matrix	B/W, 1:1, **XGL**, WCG, Var1, Var2	3	S	Selects a preset for the color matrix: B/W: monochrome picture; 1:1 = matrix is switched off; XGL = for vivid color reproduction (advised to combine with M/G setting); WCG = ??? Var1 = variable setting 1; Var2 = variable setting 2.
Advanced				
G->R	0..99 **(50)**	S	S	Sets Green into Red coefficient (when Matrix is set to variable).
B->R	0..99 **(50)**	S	S	Sets Blue into Red coefficient (when Matrix is set to variable).
R->G	0..99 **(50)**	S	S	Sets Red into Green coefficient (when Matrix is set to variable).
B->G	0..99 **(50)**	S	S	Sets Blue into Green coefficient (when Matrix is set to variable).
R>B	0..99 **(50)**	S	S	Sets Red into Blue coefficient (when Matrix is set to variable).
G->B	0..99 **(50)**	S	S	Sets Green into Blue coefficient (when Matrix is set to variable).
Image Control				
Freeze	**Off**, On	2	-	Switches image freeze on or off. Use to assist off line setup and configuration.
Reverse Scan				
Reverse Scan	**Off**, On	0	S	Switches Reverse Scan on or off.
Mode	**Horiz**, Vert, Both	0	S	Selects Reverse Scan mode: Horiz = the image is flipped horizontally; Vert = the image is flipped vertically; Both = the image is flipped both horizontally and vertically.
Image Shift				
Horizontal	-16..16 **(0)**	0	-	Shifts the image in horizontal direction (in pixels)
Vertical	-4..4 **(0)**	0	-	Shifts the image in vertical direction (in lines)
Video Mode	<list of video modes>	3	-	Current video mode. Available video modes depend on camera model, configuration and installed license.

Function:	Values:	U:	F:	Description:
Sensitivity	**Nom**, HiQ, HiSens	3	S	Sensitivity mode: HiQ = High quality Nom = Nominal HiSens = High sensitivity Note: Sensitivity mode is not available for high speed video modes.

Creative Control

Function:	Values:	U:	F:	Description:
Levels				
Filters				
ND Filter	**Clear**, ND 1/4 , ND 1/16, ND 1/64	2	S	Optical Neutral Density (ND) filter: Clear = No filter; ND 1/4 = 2 stops; ND 1/16 = 4 stops; ND 1/64 = 6 stops neutral.
FX Filter	**Clear**, Cap, Star 4P, Sft Fcs, Cap	2	S	Optical Effects (FX) filter: Clear = No filter; Star 4P = 4 Point Star; Sft Fcs = Soft Focus; Cap = Lens capped.
Flare				
Flare	Off, **On**	S	S	Switches flare correction on or off.
Red	0..99 **(6)**	S	S	Sets flare correction level for Red.
Green	0..99 **(9)**	S	S	Sets flare correction level for Green.
Blue	0..99 **(11)**	S	S	Sets flare correction level for Blue.
Color				
Color Adjustment				
Color Corr				
Col Corr	**Off**, On	3	S	Switches color corrector on or off. All active sets are used when color corrector is on.
Col Corr View	**Off**, On	3	-	Switch on to view the selected color area in the main signal.
VF View	**Off**, On	3	O	Switch on to view the selected color area in the viewfinder.
Set	**1**,2,3,4,5,6	3	-	Selects a color correction set.
Set On/Off	**Off**, On	3	-	Switches the selected color corrector set on or off. Note: when off, settings can not be changed.
Color	0..359.99 **(0)**	3	-	Sets the color area by hue (in steps of 22.5 degrees)
Width	22.5..360 **(0)**	3	-	Sets the color area hue width (in degrees).
Hue	-180..180 **(0)**	3	-	Sets the hue (in degrees) for the selected area.
Sat	0..99 **(0)**	3	-	Sets the saturation level for the selected area.
Luminance	0..99 **(0)**	3	-	Sets the luminance level for the selected area.
Color Name	B+, **MG-**, MG, MG+, R, R+, YL-, YL, YL+, G-, G, G+, CY, CY+, B-, B	3	-	Shows color area name: B: Blue; MG: Magenta; R: Red; YL: Yellow; G: Green; CY: Cyan
Smoothing	Sharp, **Medium**, Smooth	3	S	Selects method for smoothing transitions between affected and nonaffected areas.
Reset	Exec, ...	3	-	Resets the color corrector to its default values. All sets are reset.
Col Protect				

Function:		Values:	U:	F:	Description:
	Col Protect	**Off**, On	3	S	Switches Color Protect on or off
	Col Prot Lvl	0%..150% **(75%)**	3	S	Sets Colors Protect level.
Sharpness					
Detail					
	Detail	Off, **On**	3	S	Switches Detail on or off
	Detail Level	0..99 **(50)**	2	S	Detail level: the amount of Detail added to the video signal.
	Detail Source	R+G, R, G, **Y**	3	S	Selects the video component that is used to generate Detail signal.
	Soft Detail	Off, **On**	3	S	Switches Soft Detail on or off.
	Soft Detail Lvl	0..99 **(50)**	2	S	Sets the level of Soft Detail added to the video signal.
Advanced					
	Vert Detail Lvl	0..99 **(25)**	3	S	Sets the level of the vertical component in the Detail signal.
	Coarse/Fine	0..99 **(90)**	3	S	Sets detail balance between coarse and fine structures in the image (0 = coarse structures are sharpened, 99 = fine structures are sharpened).
	Detail Level	0..99 **(50)**	3	S	Sets (overall) Detail level: the amount of Detail added to the video signal. Note: this is the same function as <Detail Level> above.
	Level Dep	0..99 **(30)**	3	S	Sets the detail reduction level for shadow areas.
	Noise Slicer	0..99 **(10)**	3	S	Sets the level of the noise slicer for Detail.
	Dtl Flw Gain	**Off**, On	3	S	When switched on, Detail level follows Gain level.
	Dtl Flw Zoom	**Off**, On	3	S	When switched on, Detail level follows Zoom factor.
HDR Detail					
	Detail	Off, **On**	3	S	Switches HDR Detail on or off.
	Detail Level	0..99 **(50)**	2	S	Sets the level of detail added to the video signal.
	Detail Source	R+G, R, G, **Y**	3	S	Selects the video component that is used to generate HDR Detail signal.
Advanced					
	Coarse/Fine	0..99 **(50)**	3	S	Sets HDR Detail balance between coarse and fine structures in the image(0 = coarse structures are sharpened, 99 = fine structures are sharpened).
	Detail Level	0..99 **(50)**	3	S	Sets (overall) HDR Detail level: the amount of detail added to the video signal. Note: this is the same function as <Detail Level> above.
	Level Dep	0..99 **(15)**	3	S	Sets the detail reduction level for shadow areas.
4K Detail					
	Detail	Off, **On**	3	-	Switches 4K Detail on or off.
	Detail Level	0..99 **(50)**	2	-	Sets the level of detail added to the video signal.

Function:			Values:	U:	F:	Description:
	Detail Source		R+G, R, G, **Y**	3	-	Selects the video component that is used to generate 4K Detail signal.
	Soft Detail		Off, **On**	3	-	Switches Soft Detail on or off.
	Soft Detail Lvl		0..99 **(50)**	2	-	Sets the level of Soft Detail added to the video signal.
	Advanced					
		Vert Detail Lvl	0..99 **(50)**	3	-	Sets the level of the vertical component in the Detail signal.
		Coarse/Fine	0..99 **(90)**	3	-	Sets detail balance between coarse and fine structures in the image (0 = coarse structures are sharpened, 99 = fine structures are sharpened).
		Detail Level	0..99 **(50)**	3	-	Sets (overall) detail level: the amount of Detail added to the video signal. Note: this is the same function as <Detail Level> above.
		Level Dep	0..99 **(50)**	3	-	Sets the detail reduction level for shadow areas.
		Noise Slicer	0..99 **(10)**	3	-	Sets the level of the noise slicer for Detail.
HD Detail						
	Detail		Off, **On**	3	-	Switches HD Detail on or off.
	Detail Level		0..99 **(35)**	2	-	Sets the level of detail added to the video signal.
	Detail Source		R+G, R, G, **Y**	3	-	Selects the video component that is used to generate HD Detail signal.
	Soft Detail		Off, **On**	3	-	Switches Soft Detail on or off.
	Soft Detail Lvl		0..99 **(50)**	2	-	Sets the level of Soft Detail added to the video signal.
	Advanced					
		Vert Detail Lvl	0..99 **(25)**	3	-	Sets the level of the vertical component in the Detail signal.
		Coarse/Fine	0..99 **(90)**	3	-	Sets detail balance between coarse and fine structures in the image (0 = coarse structures are sharpened, 99 = fine structures are sharpened).
		Detail Level	0..99 **(35)**	3	-	Sets (overall) detail level: the amount of Detail added to the video signal. Note: this is the same function as <Detail Level> above.
		Level Dep	0..99 **(30)**	3	-	Sets the detail reduction level for shadow areas.
		Noise Slicer	0..99 **(10)**	3	-	Sets the level of the noise slicer for Detail.
	Knee Detail		1,**2**,3,4	3	S	Selects level of detail for the compressed signal above the knee point.
Skin Detail						
	Skin Gate		**Off**, 1, 2, 3, 1+2, 1+3, 2+3, 1+2+3	3	S	Switches Skin Detail off or on and selects a Skin Gate. Use Skin Detail to change the detail level within a selected color range.
	Auto Skin Dtl		**Off**, On	2	-	Switches Auto Skin Detail mode on or off.

Function:		Values:	U:	F:	Description:
	VF View	**Off**, On	2	O	Switch on to view the selected Skin Detail area in the viewfinder.
	Skin1 Level	-100..100 **(0)**	2	S	Detail level for Skin Gate 1
	Skin2 Level	-100..100 **(0)**	2	S	Detail level for Skin Gate 2
	Skin3 Level	-100..100 **(0)**	2	S	Detail level for Skin Gate 3
	Follow Zoom	Off, **On**	3	-	Switches Skin Detail Follows zoom factor on or off
	Color Selection				
	Width1 Red	0..99 **(29)**	3	S	Sets width level (Red) for Skin Gate 1.
	Width1 Blue	0..99 **(40)**	3	S	Sets width level (Blue) for Skin Gate 1.
	Color1 Red	0..99 **(37)**	3	S	Sets color level (Red) for Skin Gate 1.
	Color1 Blue	0..99 **(6)**	3	S	Sets color level (Blue) for Skin Gate 1.
	Width2 Red	0..99 **(29)**	3	S	Sets width level (Red) for Skin Gate 2.
	Width2 Blue	0..99 **(40)**	3	S	Sets width level (Blue) for Skin Gate 2.
	Color2 Red	0..99 **(37)**	3	S	Sets color level (Red) for Skin Gate 2
	Color2 Blue	0..99 **(6)**	3	S	Sets color level (Blue) for Skin Gate 2.
	Width3 Red	0..99 **(29)**	3	S	Sets width level (Red) for Skin Gate 3.
	Width3 Blue	0..99 **(40)**	3	S	Sets width level (Blue) for Skin Gate 3.
	Color3 Red	0..99 **(37)**	3	S	Sets color level (Red) for Skin Gate 3.
	Color3 Blue	0..99 **(6)**	3	S	Sets color level (Blue) for Skin Gate 3.

Configuration menu

Function:	Values:	U:	F:	Description:
Security				
Installed level	**User0**, User1, User2, User3	S	-	User access level. Note: switch the camera off and on to take the changes into effect
PIN Code	<nnnn>	S	-	Enter PIN code to access Service level (S).
Customer Files				
Store Cust Scene	Exec, ...	S	-	Stores the current Scene settings to the Customer Scene File.
Cust Scene Attr	R/W, **R**	S	-	Selects the read/write attribute for the selected Customer Scene File: R/W = Read and Write; R = Read only.
Store Cust Oper	Exec, ...	S	-	Stores the current Operator settings to the Customer Operator file.
Green button				
Std Scene File	**Fact**, Cust	S	-	Selects the Scene file to be recalled when the STD File/Green button is pressed: Fact = Factory (default) Scene file Cust = Customer Scene file
Std Oper File	**Fact**, Cust	S	-	Selects the Operator file to be recalled when the STD File/Green button is pressed: Fact = Factory (default) Operator file Cust = Customer Operator file
Scene File	**Yes**, No	S	-	Determines if the Scene file should be recalled when the STD File/Green button is pressed.
Oper File	Yes, **No**	S	-	Determines if the Operator file should be recalled when the STD File/Green button is pressed.
DeviceID Reset	Exec, ...	S	-	Resets DeviceID to factorry value.
Factory Reset	Exec, ...	S	-	Resets ALL camera settings to their factory defaults.
Files				
Scene Files				
Store				
File Select	Standard, SCam1, SCam2, SCam3, SCam4	2	-	Selects a Scene File for storing.
Store	Exec, ...	2	-	Stores the Scene settings in the selected Scene file.
Recall				
File Select	Standard, SCam1, SCam2, SCam3, SCam4	1	-	Selects a Scene File for recall.

Function:		Values:	U:	F:	Description:
	Recall	Exec, ...	1	-	Recalls the selected Scene file to the camera. This overwrites current Scene settings.
Lens FIles					
	Store				
	File Select	LCam1, LCam2, LCam3, LCam4	2	-	Selects a Lens File for storing.
	Store	Exec, ...	2	-	Stores the Lens settings in the selected Scene file.
	Recall				
	File Select	LCam1, LCam2, LCam3, LCam4	1	-	Selects a Lens File for recall.
	Recall	Exec, ...	1	-	Recalls the selected Lens file to the camera. This overwrites current Lens settings.
Media FIles					
	Store				
	File Select	MCam1, MCam2, MCam3, MCam4	S	-	Selects a Media File for storing.
	Store	Exec, ...	S	-	Stores the Media settings in the selected Scene file.
	Recall				
	File Select	MCam1, MCam2, MCam3, MCam4	S	-	Selects a Media File for recall.
	Recall	Exec, ...	S	-	Recalls the selected Media file to the camera. This overwrites current Media settings.
Operator FIles					
	Store				
	File Select	Standard, OCam1, OCam2, OCam3, OCam4	2	-	Selects a Operator File for storing.
	Store	Exec, ...	2	-	Stores the Operator settings in the selected Scene file.
	Recall				
	File Select	Standard, OCam1, OCam2, OCam3, OCam4	1	-	Selects a Operator File for recall.
	Recall	Exec, ...	1	-	Recalls the Operator file to the camera. This overwrites current Operator settings.
File Attributes					
	File Select	None, SCustStd, OCustStd, SCam1, SCam2, SCam3, SCam4, OCam1, OCam2, OCam3, OCam4, LCam1, LCam2, LCam3, LCam4, MCam1, MCam2, MCam3, MCam4	3	-	Selects a file to change its attributes.

Function:		Values:	U:	F:	Description:
	Filename	<file name>	2	-	Displays the selected file name.
	Attribute	**R/W**, R	2	-	Selects the attribute for the selected file: R/W = Read and Write; R = Read only.
USB					
	Name	<text>		-	Displays USB device name.
	Free Space	0 MB..65535 MB **(0 MB)**		-	Displays free space left on USB in Mb.
	No of Files	0..255 **(0)**		-	Displays number of files stored on USB.
	USB Files				
	File Select	**Scene 0**		-	Selects a file on the USB device.
	Delete	Exec, ...		-	Deletes the selected file.
	Filename	<text>		-	Changes name of the selected file.
	Attribute	R/W, **R**		-	Selects the attribute for the selected file: R/W = Read and Write; R = Read only.
Reference		SDI Input, **PTP**, TriLvl, Composite, FreeRun	0	-	Reference signal/source to lock the camera to.
XCU Conn (only when camera is in XCU mode)					
	ConnectType	**Cable**, DirectIP, DirectIP+	2	-	Select Connect Type: Cable (=XCU mode), DirectIP or DirectIP+ Note: the DirectIP+ license is required.
	2ry Stream		3	-	???
	XCU Name	<name>	2	-	In DirectIP/DirectIP+ mode this is the name of the XCU that the camera connects to. Note: the DirectIP+ license is required.
Disable Camera		**Off**, On	0	-	Locks all camera buttons to prevent operational mistakes.
Lens					
Lens Settings					
	Lens Connector	**SXP**, Camera	0	-	Selects the lens connector to be used. Select Camera when a normal lens is used with the SuperXpander (Only when a SuperXpander is present).
	Lens IF Type	Analog, **Digital**	0	-	Selects a digital or analog lens interface.
	Lens IF Status	OK, **Not OK**	0	-	Shows the status of the lens interface (when a digital lens interface is used).
	RE Iris Comp	**Off**, On	0	-	Switches Iris compensation on or off. Use this setting to compensate for Iris level when a range extender (RE) is used.
Lens Corrections					
ARIA					

Function:		Values:	U:	F:	Description:
	ARIA	**Auto**, Off	0	-	Selects ARIA (Automatic Restoration of Illumination Attenuation) mode: Auto = Automatic correction; Off = no correction.
	Status	Active, Lens Unsup, RE Unsup, **I/F NOK**, Off	0	-	Active: ARIA is active; Lens Unsup: Lens does not support ARIA; RE Unsup: Range Extender does not support ARIA; I/F NOK: Lens interface not OK - no lens found; connected or analog lens interface in use; Off: ARIA is switched off.
CLASS					
	CLASS	**Auto**, Off	0	-	Selects CLASS (Chromatic Lens Aberration and Sharpness Solution) mode: Auto = Automatic correction; Off = no correction.
	Reset	**Exec**, busy	0	-	Select to reset lens aberration data
	Status	Active, Init, Waiting, Reading, No Info, Unsup, **I/F NOK**, Off, InitNOK, Error	0	-	Active: CLASS is active; Init: initilization process is started; Waiting: camera waits for manual turning of lens rings; Reading: camera is reading lens abberation data from lens; No Info: lens does not support ; Unsup: CLASS cannot be activated; I/F NOK: Lens interface not OK - no lens found; connected or analog lens interface in use; Off: CLASS is switched off.
	Progress	0%..100% **(0%)**	0	-	Shows progress of the lens CLASS data reading process.
Shading					
	Shading	Off, **On**	S	-	Switches lens shading compensation on or off.
	R Saw H	0..99 **(50)**	S	-	Sawtooth (Horizontal) for Red channel.
	R Par H	0..99 **(50)**	S	-	Parabola (Horizontal) for Red channel.
	R Saw V	0..99 **(50)**	S	-	Sawtooth (Vertical) for Red channel.
	R Par V	0..99 **(50)**	S	-	Parabola (Vertical) for Red channel.
	G Saw H	0..99 **(50)**	S	-	Sawtooth (Horizontal) for Green channel.
	G Par H	0..99 **(50)**	S	-	Parabola (Horizontal) for Green channel.
	G Saw V	0..99 **(50)**	S	-	Sawtooth (Vertical) for Green channel.
	G Par V	0..99 **(50)**	S	-	Parabola (Vertical) for Green channel.
	B Saw H	0..99 **(50)**	S	-	Sawtooth (Horizontal) for Blue channel.
	B Par H	0..99 **(50)**	S	-	Parabola (Horizontal) for Blue channel.
	B Saw V	0..99 **(50)**	S	-	Sawtooth (Vertical) for Blue channel.
	B Par V	0..99 **(50)**	S	-	Parabola (Vertical) for Blue channel.
Pixel Alignment					

Function:		Values:	U:	F:	Description:
	Hor Red	-8..8 **(0)**	S	-	(Advanced setttings)
	Hor Blue	-8..8 **(0)**	S	-	(Advanced setttings)
	Vert Red	-8..8 **(0)**	S	-	(Advanced setttings)
	Vert Blue	-8..8 **(0)**	S	-	(Advanced setttings)
Apt Flw Iris		Off, **On**	3	-	(Advanced setttings)
Remote BackFocus					
Control		**Off**, On	0	-	Switch on to carry out the Remote Back Focus of the lens. note: the lens must support the Remote Back Focus functionality.
Position		0..99	0	-	Stored value of the back focus adjustment (in the lens)
Intercom					
Source Selection					
	Intercom	Ext1, **AES67**		-	Selects source for intercom: Ext1 is audio from the External 1 video signal
	Ext1	**SDI**, IP		-	
	Prog Icom AES67	**Icom**, Audio		-	
	Prog Ext	**Ext1**, AES67		-	
	Prog Mon	**Ext1**, AES67		-	
Cam Mic		Off, **Switch**, Track, Prod	1	-	Selects the camera operator's microphone routing: Off = no routing; Switch = Track = route signal to Tracker channel; Prod = route signal to Production channel.
Cam Mic Level		-22dB, -28dB, -34dB, -40dB, -46dB, -52dB, -58dB, **-64dB**	1	-	Selects Mic level of camera operator's intercom microphone.
Cam Mic Power		Off, On	1	-	Switches bias tee power (12 VDC) to camera operator's intercom microphone on or off.
Cam Prod		Off, Left, Right, **Both**	1	-	Selects to which ear muff(s) of the camera headset the production intercom channel is routed.
Cam Eng		Off, Left, Right, **Both**	1	-	Selects to which ear muff(s) of the camera headset the engineering intercom channel is routed.
Cam Prog		Off, Left, Right, **Both**	1	-	Selects to which ear muff(s) of the camera headset the program intercom channel is routed.
Cam ProgExt		Off, Left, Right, **Both**	1	-	???
Cam ProgExt Lvl		0..99 **(50)**	1	-	???
Cam ProgMon		Off, **On**	1	-	???
Cam ProgMon Lvl		0..99 **(50)**	1	-	???

Function:		Values:	U:	F:	Description:
	Cam Tracker	Off, Left, Right, **Both**	1	-	Selects to which ear muff(s) of the camera headset the Tracker's microphone signal is routed.
	Cam Tracker Lvl	0..99 **(50)**	1	-	Sets Tracker signal level in the camera operator's headset.
	Cam Boost	**Off**, On	1	-	???
Tracker					
	Tracker Mic To	**Off**, Cam, Eng, Prod, All	1	-	Selects the Tracker's headset microphone routing.
	Tracker Mic Lvl	-22dB, -28dB, -34dB, -40dB, -46dB, -52dB, -58dB, **-64dB**	1	-	Selects Mic level of Tracker's headset microphone.
	Tracker Mic Pwr	**Off**, On	1	-	Switches bias tee power (12 VDC) to Tracker's microphone on or off.
	Tracker Prod	Off, Left, Right, **Both**	1	-	Selects to which ear muff(s) of the Tracker headset the production intercom is routed.
	Tracker Eng	Off, Left, Right, **Both**	1	-	Selects to which ear muff(s) of the Tracker headset the engineering intercom is routed.
	Tracker Prog	Off, Left, Right, **Both**	1	-	Selects to which ear muff(s) of the Tracker headset the program intercom is routed.
	Tracker ProgExt	Off, Left, Right, **Both**	1	-	???
	Tracker Cam	Off, Left, Right, **Both**	1	-	Selects to which ear muff(s) of the Tracker headset the camera headset microphone signal is routed.
	Tracker Lvl	0..99 **(75)**	1	-	Sets Tracker headset level.
	Tracker Boost	**Off**, On	1	-	???
Audio					
	Audio Gain Mode	Local, **Extern**	1	-	Loc (= local): audio gain level is controlled by the settings in this menu Extern (= external): audio gain level is (for both channels) controlled by the XCU when the camera mode is XCU.
	Audio Delay	0 ms..170 ms **(0 ms)**	1	-	Sets an audio delay
Front Mic					
	FrontMic Source	Line, **Mic**, Mic48V	1	-	Selects source input sensitivity for the Front Mic: either Line or Mic level or Mic level with phantom power.
	FrontMic Level	-22dB, -28dB, -34dB, -40dB, -46dB, -52dB, -58dB, **-64dB**	1	-	Selects input gain level for Front Mic (when Audio Gain Mode is set to Local).
	FrontMic HPF	**Off**, On	1	-	Switches High Pass Filter for Front Mic input on or off. Use to reduce 50 Hz and 60 Hz hum or low frequency noise.
	FrontMic ALC	Off, **On**	1	-	Switches Auto Level Control for Front Mic on or off.
Audio 1					

Function:		Values:	U:	F:	Description:
	Audio 1 Input	**Front**, Rear	1	-	Selects which connector to use as the input source for Audio channel 1: Front (of camera) or Rear (back panel)
	Audio 1 Source	Line, **Mic**, Mic48V	1	-	Selects source input sensitivity for the Audio 1, either Line or Mic level or Mic level with phantom power.
	Audio 1 Level	-22dB, -28dB, -34dB, -40dB, -46dB, -52dB, -58dB, **-64dB**	1	-	Selects input gain level for Audio channel 1 (when Audio Gain Mode is set to Local). Note: when Audio Gain Mode is set to Extern(al), Audio 1 Level is set by the XCU.
	Audio 1 HPF	**Off**, On	1	-	Switches High Pass Filter for Audio channel 1 on or off. Use to reduce 50 Hz and 60 Hz hum or low frequency noise.
	Audio 1 ALC	Off, **On**	1	-	Switches Auto Level Control for Audio channel 1 on or off.
Audio 2					
	Audio 2 Source	Line, **Mic**, Mic48V	1	-	Selects source input sensitivity for the Audio 2, either Line or Mic level or Mic level with phantom power.
	Audio 2 Level	-22dB, -28dB, -34dB, -40dB, -46dB, -52dB, -58dB, **-64dB**	1	-	Selects input gain level for Audio channel 2 (when Audio Gain Mode is set to Local). Note: when Audio Gain Mode is set to Extern(al), Audio 2 Level is set by the XCU.
	Audio 2 HPF	**Off**, On	1	-	Switches High Pass Filter for Audio channel 2 on or off. Use to reduce 50 Hz and 60 Hz hum or low frequency noise.
	Audio 2 ALC	Off, **On**	1	-	Switches Auto Level Control for Audio channel 2 on or off.
	HDMI Audio	Off, **Audio1+2**, Audio3+4, Cam E&P, Prog 1+2	1	-	Selects which audio channels are assigned to the HDMI audio channels.
TestTone MPB		**Off**, ProgInt, ProgExt, PrgMon1, PrgMon2, Eng, Prod, Ch7, Ch8, Mon1Sdi, Mon2Sdi, Mon1Aes, Mon2Aes, Ch13, Ch14, Ch15, TstTrns, All	S	-	
TestTone Out		**Off**, Audio 1, Audio 2, Audio 3, Audio 4, EngCam, ProdCam, USB1, USB2, Audio 5, Audio 6, MicCam, MicTrck, AudioX, AudioY, PrgMon1, PrgMon2, All	S	-	
Tally					

Function:	Values:	U:	F:	Description:
Source	XCU, **Ethernet**, IS-07, Serial	0	O	Select source for the tally signal.
On Air Lamp	**Enable**, Disable	0	O	Select Enable when the On Air Lamp/Tally light at the front of a large viewfinder should follow the tally signal or select Disable if you never want it to light.
On Air Lamp Lvl	0..99 **(99)**	0	-	Sets brightness level of the On Air Lamp/Tally light at the front of a large viewfinder.
On Air Handgrip	**Switch**, Input, Off	0	-	???
Aux out	Off, **On**	0	-	???
Lock	Off, **On**	3	-	Switches the Tally Lock function on or off. When Tally Lock is on, some camera controls are locked when the camera is On Air.
SDI embedding	**Off**, On	3	-	???
CAWB Settings				
CAWB Speed	1..40 **(4)**	S	-	Sets the speed for the Auto White Balance procedure.
CAWB Gain	1..40 **(10)**	S	-	Sets the gain value for the Auto White Balance procedure.
Network				
Camera Number	1..99 **(1)**	0	-	Selects logical camera number.
IP Settings				
IP Mode	DHCP, **Auto**, Manual	0	-	Selects automatic, manual or DHCP IP mode for C2IP network.
Subnet Mask	0..31 **(0)**	0	-	Selects the subnet mask (when IP mode is set to manual).
IP	<IP address>	0	-	Sets camera IP address in the C2IP network (when IP mode is set to manual).
Def GW	<GW address>	0	-	Selects camera head default gateway IP address in the C2IP network (when IP mode is set to manual).
Apply Settings	Exec, ...	0	-	Select Exec to apply the new IP settings.
Nameserver 1				
Use Server	**No**, Yes	0	-	Select Yes to enable use of the C2IP Name Server 1 Note: Nameserver license must be installed on the Camera Connect.
Status	**Off**, Unknown, Active, Unavail	0	-	Shows currrent status of Name Server 1
IP	<IP address>	0	-	Selects Name Server 1 IP address.
Apply Settings	Exec, ...	0	-	Select Exec to apply the new IP settings
Nameserver 2				
Use Server	**No**, Yes	0	-	Select Yes to enable use of the C2IP Name Server 2 Note: Nameserver license must be installed on the Camera Connect.

Function:		Values:	U:	F:	Description:
	Status	**Off**, Unknown, Active, Unavail	0	-	Status of Nameserver 2
	IP	<IP address>	0	-	IP address for Nameserver 2
	Apply Settings	Exec, ...	0	-	Select Exec to apply the IP settings
PCI ID		0..8 **(1)**	S	-	ID for external PC operation (not used)
Signals					
	Live2K				
	Mode	**1080p**, 1080i	3	-	Video mode for Live2K signal: 1080p or 1080i
	Source	**HDR**, SDR	3	-	Dynamic range setting for Live2K signal: HDR or SDR
	BNC Ref/AES	**Ref In**, Aes In, TriLvl, Composite	0	-	Signal/function of the BNC Ref/AES connector: Ref In = Reference input (can be SDI, TriLvl or Composite); Aes In = AES Digital Audio input; TriLvl = reference output TriLvl; Composite = reference output composite (SD Black Burst)
	BNC Outputs	**Default**, Phases	0	-	In high speed video modes, this selects the BNC Outputs Profile for the signals on BNC-A to BNC-D: default = Live, Live2K are output, Ext and SDI phases = Live Combined plus Phases are output
	BNC-A Preset	**Live4K**, Live2K	0	-	In high speed video modes, and when the BNC Outputs Profile is set to Phases, this selects which Live signal is output on BNC-A.
	BNC-C Preset	Off, Ext1, **Ext2**, Ext3, TP	0	-	External video or TP signal to output on BNC-C. Note: this setting is not available for high speed video modes and when the BNC Outputs Profile is set to Phases.
	BNC-D Preset	Off, Ext1, Ext2, Ext3, **TP**	0	-	External video or TP signal to output on BNC-D. Note: this setting is not available for high speed video modes and when the BNC Outputs Profile is set to Phases.
	HDMI Select	Off, Main, Live, **VF**, Ext1, Ext2, Ext3, Ext1sc, Ext2sc, Ext3sc, BNC-D	0	-	Video signal to output on HDMI connector

Licenses menu

Function:	Values:	U:	F:	Description:
Active Licenses				
UHD 1x	**Unknown**, Not Applicable, ..., ...	2	-	Shows status of the UHD 1x license
Time Left	0 sec..65535 sec **(0 sec)**	2	-	Shows time left in seconds for the UHD 1x license
UHD 3x	**Unknown**, Not Applicable, ..., ...	2	-	Shows status of the UHD 3x license
Time Left	0 sec..65535 sec **(0 sec)**	2	-	Shows time left in seconds for the UHD 3x license
UHD FilmC	**Unknown**, Not Applicable, ..., ...	2	-	Shows status of the UHD FilmC license
Time Left	0 sec..65535 sec **(0 sec)**	2	-	Shows time left in seconds for the UHD FilmC license
UHD FilmB	**Unknown**, Not Applicable, ..., ...	2	-	Shows status of the UHD FilmB license
Time Left	0 sec..65535 sec **(0 sec)**	2	-	Shows time left in seconds for the UHD FilmB license
Native IP	**Unknown**, Not Applicable, ..., ...	2	-	Shows status of the Native IP license
Time Left	0 sec..65535 sec **(0 sec)**	2	-	Shows time left in seconds for the Native IP license
Direct IP+	**Unknown**, Not Applicable, ..., ...	2	-	Shows status of the Direct IP+ license
Time Left	0 sec..65535 sec **(0 sec)**	2	-	Shows time left in seconds for the Direct IP+license
GPS	**Unknown**, Not Applicable, ..., ...	2	-	Shows status of the GPS license
Time Left	0 sec..65535 sec **(0 sec)**	2	-	Shows time left in seconds for the GPS license
Planned Licenses (this section is repeated for each license)				
License Count	0..65535 **(0)**	2	-	Number of licenses currently installed on the camera
Start Date	<date>	2	-	Start date of each planned license.
Start Time	<time>	2	-	Start time of each planned license.
Type	**None**, GPS, NativeIP, UHD, UHD_3X, DirectIP+	2	-	Shows planned license type.
Duration	0..65535 day **(0 day)**	2	-	Duration in days of each planned license
New Licenses				
Time		2	-	
Date		2	-	
Change time				
Hours (24h)	0..23 **(0)**	2	-	
Minutes	0..59 **(0)**	2	-	
Time Zone	UTC-12:00 .. UTC+11:00 **(UTC+01:00)**	2	-	

Function:		Values:	U:	F:	Description:
	Apply Time	**Exec**, ...	2	-	
Change date					
	Days	1..31 **(1)**	2	-	
	Month	1..12 **(1)**	2	-	
	Year	2013..2199 **(2013)**	2	-	
	Apply Date	**Exec**, ...	2	-	
Time&Date OK?		**...**, No, Yes	2		
Find licenses					
	Search Next	**Exec**, ...	2	-	
	Add License	**Exec**, ...	2	-	
	Type	**None**, GPS, NativeIP, UHD 1x, UHD 3x, UHD FilmC, UHD FilmB, DirectIP+	2		
	Start		2	-	
	Time Zone	UTC-12:00 .. UTC+11:00 **(UTC+01:00)**	2	-	
	Duration	0..65535 day **(0 day)**	2	-	
Trial license					
	Select Type	**None**, GPS, NativeIP, UHD, UHD_3X, DirectIP+	2	-	
	Activate	Exec, ...	2	-	
	Time left	0 sec..65535 sec **(0)**	2	-	

Diagnostics menu

Function:	Values:	U:	F:	Description:
C2IP Network				
Communication				
XCU Connected	Yes, No	2	-	Indicates wheter an XCU is connected to the camera (only valid in XCU mode)
C2IP Panels	0..99 **(0)**	2	-	Shows number of C2IP control panels connected to the camera.
Camera Connects	0..99 **(0)**	2	-	Shows number of Camera Connects connected to the camera.
DHCP				
Server	<IP address> **(192.168.1.1)**	2	-	
DNS	<IP address> **(192.168.1.1)**	2	-	
Domain	<IP address>	2	-	
Hostname	<name>	2	-	
Ethernet				
MAC-Address	<00:00:00:FF:FF:FF>	2	-	Shows hardware MAC address of the camera.
Link State	Connected, **Disconn**	2	-	Shows link status of the Ethernet connection.
Link type	**Unknown**, 10Mb/Half, 10Mb/Full, 100Mb/Half, 100Mb/Full, Negotiate	2	-	Show link type (speed) of the Ethernet connection.
Loopback test				
Loopback test	**Off**, On	S	-	
Data count	<nnn>	S	-	
Date errors	<nnn>	S	-	
Data loss	<nnn>	S	-	
Ser Stats (DTCP)				
Packets Recv	<nnn>	S	-	
Packets Sent	<nnn>	S	-	
Frame Errors	<nnn>	S	-	
Checksum Errors	<nnn>	S	-	
Ser Stats (PCI)				
Packets Recv	<nnn>	S	-	
Panel Sent	<nnn>	S	-	
Packets Sent	<nnn>	S	-	
Panel Recv	<nnn>	S	-	

Function:	Values:	U:	F:	Description:
SPI Stats				
Msg Recv	<nnn>	S	-	
HWOvr	<nnn>	S	-	
SWOvr	<nnn>	S	-	
QueueOvr	<nnn>	S	-	
QueueSize	<nnn>	S	-	
Refresh	Exec, ...	S	-	
SFP Modules				
QSFP present	Yes, **No**	1	-	
Type	**Unavail**, Unknown, 100G, 10G, 40G, Act_40G	1	-	
Los	Ok, **NotOk**	1	-	
Link	Yes, **No**	1	-	
TX Mb/s	<nnn>	1	-	
RX Mb/s	<nnn>	1	-	
RX Error	<nnnn>	1	-	
RX Error/sec	<nnnn>	1	-	
FEC Corrected	<nnnn>	1	-	
FEC Ok	<nnnn>	1	-	
SFP1 present	Yes, **No**	1	-	
Type	**Unavail**, Unknown, 100G, 10G, 40G, Act_40G	1	-	
Los	Ok, **NotOk**	1	-	
Link	Yes, **No**	1	-	
Speed	Unsup, 10G, 25G	1	-	
TX Mb/s	<nnn>	1	-	
RX Mb/s	<nnn>	1	-	
RX Error	<nnnn>	1	-	
RX Error/sec	<nnnn>	1	-	
FEC Corrected	<nnnn>	1	-	
FEC Ok	<nnnn>	1	-	
SFP2 present	Yes, **No**	1	-	
Type	**Unavail**, Unknown, 100G, 10G, 40G, Act_40G	1	-	
Los	Ok, **NotOk**	1	-	

Function:	Values:	U:	F:	Description:
Link	Yes, **No**	1	-	
Speed	Unsup, 10G, 25G	1	-	
TX Mb/s	<nnn>	1	-	
RX Mb/s	<nnn>	1	-	
RX Error	<nnnn>	1	-	
RX Error/sec	<nnnn>	1	-	
FEC Corrected	<nnnn>	1	-	
FEC Ok	<nnnn>	1	-	
Details				
Module	**SFP 1**, SFP 2, QSFP	1	-	
Link	Yes, **No**	1	-	
Temp	-128 C..127 C **(0 C)**	1	-	
Voltage	0 mV..5000 mV **(0 mV)**	1	-	
Name:		1	-	
Link	**RX1**, RX2, RX3, RX4	1	-	
TxPower	-100dBm..100dBm **(0 dBm)**	1	-	
RxPower	-100dBm..100dBm **(0 dBm)**	1	-	
Los	Yes, **No**	1	-	
Rx Cdr Lock	Yes, **No**	1	-	
Tx Cdr Lock	Yes, **No**	1	-	
Media Network				
Vlan				
C2IP Packets Rx	<nnnn>	0	-	
C2IP Packets Tx	<nnnn>	0	-	
Trunk Packets Rx	<nnnn>	0	-	
Trunk Packets Tx	<nnnn>	0	-	
Outgoing Streams				
Main video	Unsup, Yes, **No**	0	-	
Live Video	Unsup, Yes, **No**	0	-	
Audio	Unsup, Yes, **No**	0	-	
Intercom	Unsup, Yes, **No**	0	-	
Incoming Streams				
Video RX 1				
Stream Active	Yes, **No**	1	-	
Pkts in Buffer	<nnn>	1	-	

Function:		Values:	U:	F:	Description:
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	-	
Video RX 2					
	Stream Active	Yes, **No**	1	-	
	Pkts in Buffer	\<nnn\>	1	-	
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	-	
Video RX 3					
	Stream Active	Yes, **No**	1	-	
	Pkts in Buffer	\<nnn\>	1	-	
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	-	
Audio					
	Stream Active	Yes, **No**	1	-	
	Profile	Ok, **NotOk**	1	-	
Intercom					
	Stream Active	Yes, **No**	1	-	
	Profile	Ok, **NotOk**	1	-	
Redundancy					
Outgoing Streams					
	Main Video	Unsup, Yes, **No**	0	-	
	Live Video	Unsup, Yes, **No**	0	-	
	Audio	Unsup, Yes, **No**	0	-	
	Intercom	Unsup, Yes, **No**	0	-	
Incoming Streams					
Video RX 1					
	Stream Active	Yes, **No**	1	-	
	Stream Valid	Yes, **No**	1	-	

Function:			Values:	U:	F:	Description:
		Pkts in Buffer	0..99 **(0)**	1	-	
		Video Mode	<list of video modes>	1	-	
	Video RX 2					
		Stream Active	Yes, **No**	1	-	
		Stream Valid	Yes, **No**	1	-	
		Pkts in Buffer	0..99 **(0)**	1	-	
		Video Mode	<list of video modes>	1	-	
	Video RX 3					
		Stream Active	Yes, **No**	1	-	
		Stream Valid	Yes, **No**	1	-	
		Pkts in Buffer	0..99 **(0)**	1	-	
		Video Mode	<list of video modes>	1	-	
	Audio					
		Stream Active	Yes, **No**	1	-	
		Stream Valid	Ok, **NotOK**	1	-	
	Intercom					
		Stream Active	Yes, **No**	1	-	
		Stream Valid	Ok, **NotOK**	1	-	
PTP						
	Status		Listening, Calibrating, Locked, GM-found, **Off**	1	-	
	Path Delay		<nnn>	1	-	
	Offset to Master		-30000..30000 **(0)**	1	-	
	Selected GM		**None**, GM 1, GM 2	1	-	
	GM 1 Info					
		ID	<text>	1	-	ID of the PTP Grandmaster to which the camera is locked
		IP	<IP address>	1	-	IP address of the PTP Grandmaster to which the camera is locked
		Status	Listening, Calibrating, Locked, **Off**	1	-	Locking status of GM1
		Path Delay	<nnn>	1	-	
		Offset to Master	-30000..30000 **(0)**	1	-	
		Prio 1	0..255 **(0)**	1	-	
		Prio 2	0..255 **(0)**	1	-	
		Class	0..255 **(0)**	1	-	
		Accuracy	0..255 **(0)**	1	-	
	GM 2 Info					

Function:		Values:	U:	F:	Description:
	ID	\<text>	1	-	ID of the PTP Grandmaster to which the camera is locked
	IP	\<IP address>	1	-	IP address of the PTP Grandmaster to which the camera is locked
	Status	Listening, Calibrating, Locked, **Off**	1	-	Locking status of GM1
	Path Delay	\<nnn>	1	-	
	Offset to Master	-30000..30000 **(0)**	1	-	
	Prio 1	0..255 **(0)**	1	-	
	Prio 2	0..255 **(0)**	1	-	
	Class	0..255 **(0)**	1	-	
	Accuracy	0..255 **(0)**	1	-	
Nmos Server					
	Priority	0..255 **(0)**	1	-	
	IP	\<IP address>	1	-	
	Port	\<port>	1	-	
TxApplication			S	-	
Private Data		**Off**, Active, NoDest	0	-	
Reference					
	UserSelect	SDI Input, **PTP**, TriLvl, Composite, FreeRun	0	-	Reference signal or source to lock the camera to (note: this is the same function as Configuration > Reference.
	Lock Source	**Unknown**, SDI Input, PTP, TriLvl, Composite, XF, FreeRun	0	-	Source to which the camera is currently locked.
	Lock Standard	**Unknown**, 1080i59, 1080i50, 720p59, 720p50, 1080p59, 1080p50, PAL, NTSC, SD, 4K50, 4K59	0	-	Video mode/standard to which the camera is currently locked.
	Locked	Yes, No, **Invalid**	0	-	Shows whether camera is locked or not.
Video Inputs					
	Extern 1				
	Available	Yes, **No**	1	-	
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	-	
	Extern 2				

Function:		Values:	U:	F:	Description:
	Available	Yes, **No**	1	-	
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	-	
Extern 3					
	Available	Yes, **No**	1	-	
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	-	
BNC-D					
	Available	Yes, **No**	1	-	
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	-	
HDMI					
	Connected	Yes, **No**	0	-	
	VideoMode	**Unknown**, 1080P50, 1080p59, 4K25, 4K29, 4K50, 4K59	0	-	
	SampleFormat	**RGB**, YCrCb	0	-	
	Bits	**8**, 10, 12	0	-	
	HdrMode	**SDR**, PQ, HLG	0	-	
XF Transmission					
	System Locked	**No**, Yes	0	-	
Fiber					
Fib B (XCU->CAM)					
	Cable Status	OK, Critic, Error, **NoSig**	0	-	
	Signal Status	OK, Critic, Error, **NoSig**	0	-	
	RX Margin	-100 dB..100 dB **(0 dB)**	0	-	
	Signal Error Cnt	0..65535 **(50)**	0	-	
Fib A (CAM->XCU)					
	Cable Status	OK, Critic, Error, **NoSig**	0	-	

Function:		Values:	U:	F:	Description:
	Signal Status	OK, Critic, Error, **NoSig**	0	-	
	RX Margin	-100 dB..100 dB **(0 dB)**	0	-	
	Signal Error Cnt	0..65535 **(50)**	0	-	
Ethernet Tunnel					
	CAM	**Off**, 10Mb, 100Mb, 1000Mb	0	-	
	XCU	**Off**, On	0	-	
	Active	**No**, Yes	0	-	
Transm Details					
Fiber					
	Rx Margin		S	-	
	Signal Err Cnt		S	-	
	Ethernet Err/sec		S	-	
	Eye Value		S	-	
Ethernet Load					
	Rx Mb/sec		S	-	
	Tx Mb/sec		S	-	
Ethernet Packets					
	valid/sec		S	-	
	error		S	-	
	error/sec		S	-	
	FEC Corr		S	-	
	FEC Corr/sec		S	-	
Ethernet Network					
	Status		S	-	
	IP RX Info				
	Loc IP		S	-	
	Port_Ch0		S	-	
	IP TX Info				
	IP_Ch0		S	-	
	Port_Ch0		S	-	
	Stream Locked		S	-	
	Stream RxBuf_1		S	-	
	Stream RxBuf_2		S	-	
	Stream RxBuf_3		S	-	
Streams					
	Tx Available		S	-	

Function:		Values:	U:	F:	Description:
	Tx Not Used		S	-	
	Rx Requested		S	-	
	Rx Subscribed		S	-	
Ethernet Tunnel					
	MDIO		S	-	
	SGMII		S	-	
	PhySpeed		S	-	
	Tunnel Active		S	-	
	CAM		S	-	
	XCU		S	-	
	Rx Packets		S	-	
	Tx Packets		S	-	
C2IP Trunk					
	Rx Packets		S	-	
	Tx Packets		S	-	
Audio					
FrontMic Lvl		-127..0 **(-127)**	0	-	
Audio1 Lvl		-127..0 **(-127)**	0	-	
Audio2 Lvl		-127..0 **(-127)**	0	-	
Audio3 Lvl		-127..0 **(-127)**	0	-	
Audio 4 Lvl		-127..0 **(-127)**	0	-	
Configuration					
Camera					
Type				-	
PID				-	
Alias				-	
Device ID				-	
Number				-	
Number				-	
MPB Image				-	
MPB Config				-	
TXB Image				-	
TXB Config				-	
Viewfinder					
Type				-	
XCU					
Type				-	

Function:	Values:	U:	F:	Description:
Lens			-	
Package Info				
Package			-	
Code			-	
Version			-	
Component			-	
Valid			-	
Code			-	
Version			-	
Service Package				
Component	???	2	-	
Code	???	2	-	
Version	???	2	-	
Temperature				
Warning	**None**, Front, Head, Mpb Fpga, Txb Fpga, Fan, Fan+T, !STOP!	2	-	
Fan Mode	Off, **Var**, Manual	2	-	
Fan Profile	Silent+, Silent, **Default**, Cool	2	-	
Manual Speed	3000 rpm..9000 rpm **(6000 rpm)**	2	-	
Fan Speed			-	
Temp (C)				
Camera	-128 C..127 C **(0 C)**	2	-	
MPB FPGA	-128 C..127 C **(0 C)**	2	-	
Sitara	-128 C..127 C **(0 C)**	2	-	
TXB FPGA	-128 C..127 C **(0 C)**	2	-	
Front	-128 C..127 C **(0 C)**	2	-	
Sensor Red	-128 C..127 C **(0 C)**	S	-	
Sensor Green	-128 C..127 C **(0 C)**	S	-	
Sensor Blue	-128 C..127 C **(0 C)**	S	-	
Backpanel	-128 C..127 C **(0 C)**	2	-	
Temp (F)				
Camera	-197 F..261 F **(0 F)**	2	-	
MPB FPGA	-197 F..261 F **(0 F)**	2	-	
Sitara	-197 F..261 F **(0 F)**	2	-	
TXB FPGA	-197 F..261 F **(0 F)**	2	-	

Function:		Values:	U:	F:	Description:
	Front	-197 F..261 F **(0 F)**	2	-	
	Sensor Red	-197 F..261 F **(0 F)**	S	-	
	Sensor Green	-197 F..261 F **(0 F)**	S	-	
	Sensor Blue	-197 F..261 F **(0 F)**	S	-	
	Backpanel	-197 F..261 F **(0 F)**	2	-	
Front					
	PID		2	-	
	Code		2	-	
	Status	0..255 **(0)**	2	-	
	Red Sensor				
	Imager Gain	0 dB..6 dB **(0 dB)**	S	-	
	Green Sensor				
	Imager Gain	0 dB..6 dB **(0 dB)**	S	-	
	Blue Sensor				
	Imager Gain	0 dB..6 dB **(0 dB)**	S	-	
Status					
	PCB Status				
	Board		2	-	
	PID		2	-	
	Code		2	-	
	Rev/Ed		2	-	
	System Status	**Unknown**, OK, Illegal, Illegal	2	-	
	SXP Status				
	SXP SW 12NC		2	-	
	SXP SW Status		2	-	
	SXP Detect	Yes, **No**	S	-	
	SXP Power On	Yes, **No**	S	-	
	SXP SW Version		S	-	
Status					
	State	**??**, NoAccess, Recovered, Init, Valid	S	-	
	Oper.Hours	0..65535 **(0)**	S	-	
	Oper.Hours (SXP)	0..65535 **(0)**	S	-	
	Power Cycles	0..65535 **(0)**	S	-	
	Minimum Temp	-128 C..127 C **(0 C)**	S	-	
	Maximum Temp	-128 C..127 C **(0 C)**	S	-	

Function:	Values:	U:	F:	Description:
High Temp Warn.	0..65535 **(0)**	S	-	

Service menu

Function:	Values:	U:	F:	Description:
Test signals				
Colour bar	**Off**, On	3	-	Enable/disable color bar
Test Signal	**Off**, On	3	-	Enable/disable test signal
Test Select	**SawT**, Step	3	-	Select Sawtooth or Stepped signal
Licenses				
Write Logfile	Exec, Busy	S	-	
Diag Files				
File Selection				
Camera AppLog	No, **Yes**	S	-	Select Yes to include Camera Applog in diagnostics file
Config Info	No, **Yes**	S	-	Select Yes to include Camera Config in diagnostics file
Settings Info	No, **Yes**	S	-	Select Yes to include Settings Info in diagnostics file
Usage Info	No, **Yes**	S	-	Select Yes to include Usage Info in diagnostics file
Network Info	No, **Yes**	S	-	Select Yes to include Network Info in diagnostics file
Storage	**None**, SDcard, USB, SD+USB	S	-	Selec storage space for diagnostics files
Write Files	Exec, Busy, Abort	S	-	Shows writing status
Current File	**None**, Config, Usage, NetWork, Settings, AppLog	S	-	Shows file currently being written to storage space
SD Card				
Present	**Yes**, No	S	-	
Status	**Unknown**, Busy..., OK, Error, NonGV, Init..., Int. Error	S	-	
Format	**Off**, Running	S	-	
Copy to USB	Exec, Busy	S	-	
Data Partition				
Status	**Unknown**, Busy..., OK, Error, NonGV, Init..., Int. Error	S	-	
Space Left	0MB..65535MB	S	-	
Format	**Off**, Running	S	-	Select to format SD Card
USB				
Present	**No**, yes	S	-	
Space Left	0 MB .. 65535 MB	S	-	
Calibrations				

Function:	Values:	U:	F:	Description:
3200K Calibr				
3200K Calibr	**Off**, On	S	-	Select to run 3200K Calibration
3200K Reset	**Fact**, Cust	S	-	Resets 3200K Calibration data
Vref Calibr-				
Vref Calibr	**Off**, Running	S	-	Select to run Vref Calibration
Status	**Unknown**, Ok, Ready, Busy, Error, Abort, Filter Cap	S	-	Shows status of Vref Calibration
Progress	0%..100%	S	-	Progress of Vref Calibration procedure
Black Calibr				
Black Calibr	**Off**, Running	3		Select to run Black Calibration Note: this takes up to 80 seconds to complete
Status	**Unknown**, OK, Error, Fatal Error, Needed, Temp Low, Temp Unst, TimeOut, Temp Range, FullBlRec, Filter Cap, Running, Ready, Failed, Aborted	3		Shows status of the Black Calibration procedure
Progress	0%..100%	3		Progress of Black Calibration procedure
Act Temp	-128 C..127 C	3		Shows actual (current) camera temperature.
White Calibr				
User Calibr	**Off**, Running	S		Select to run User White Calibration
Status	Unknown, Error, Busy, OK, Ready, VidLvl	S		Shows status of White Calibration procedure
Progress	0%..100%	3		Progress of White Calibration procedure
User Clear	Exec, ...	S		Clears User White Calibration data
White Corr	Off, **On**	S		Enable or disable White Correction

Connectors

Right front side

Bottom view

Lens connector   view-finder connector   Front Mic connector
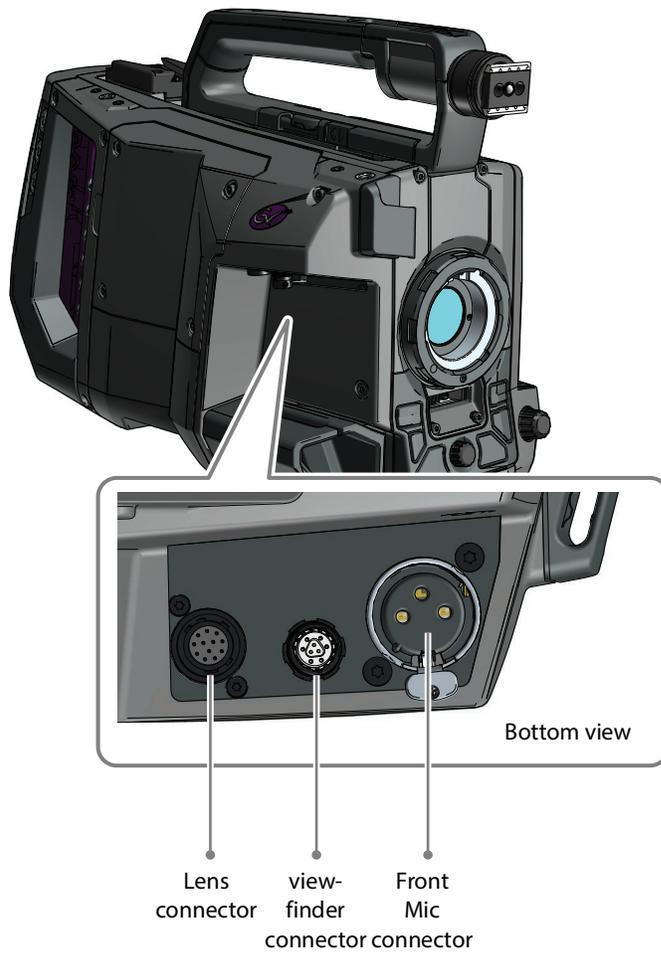
Front microphone connector
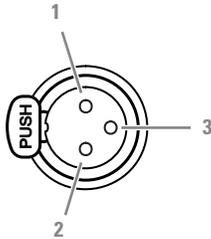
XLR 3-pin female connector
(panel view)

Pin	Description
1	Audio shield
2	Audio In (+)[1]
3	Audio Return (-)

Microphone impedance >200 Ω

Nominal input level is adjustable from -22 dBu to -64 dBu in the camera menu.

Phantom power (+48 V) on this socket can be switched on or off.

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

Lens connector
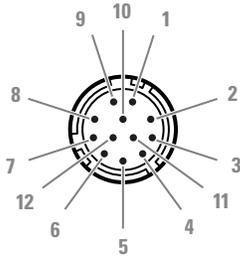
12-pin Hirose male
connector (panel view)

Pin	Description		Pin	Description
1	External video on/off		7	Iris follow
2	VTR trigger switch		8	Lens servo
3	+13 VDC Return		9	Range Extender
4	Momentary iris		10	Zoom follow
5	Iris control		11	RxD / Focus follow [2]
6	+13 VDC (max 1.1 A) [1]		12	TxD

[1] If more than maximum power is drawn from the lens connector, the camera automatically shuts off power to the lens. A message ("Lens Power Error") is shown in the viewfinder.

[2] Focus Follow is not a default function of all lens types.
NOTE: Only connect broadcast ENG/EFP lenses to the lens interface connector.

Viewfinder connector
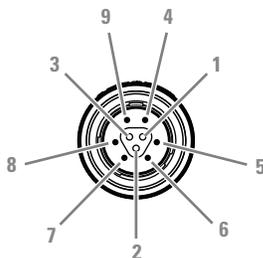
9-pin Fischer
male + female connector
(panel view)

Pin	Description
1	USB - (I^2C control data)
2	Drain (Lane 1+2)
3	USB +(I^2C control data)
4	VF Power +
5	VF video (Lane 1 +)
6	VF video (Lane 1 -)
7	VF video (Lane 2 +)
8	VF video (Lane 2 -)
9	GND

manufacturer code:
Fischer MiniMax Series
MP11ZL08 2007 BK1 Z1AS

Right side connector panel

Ethernet IP/Trunk
REF/AES BNC
BNC A
BNC B
BNC C
BNC D
BNC E
HDMI
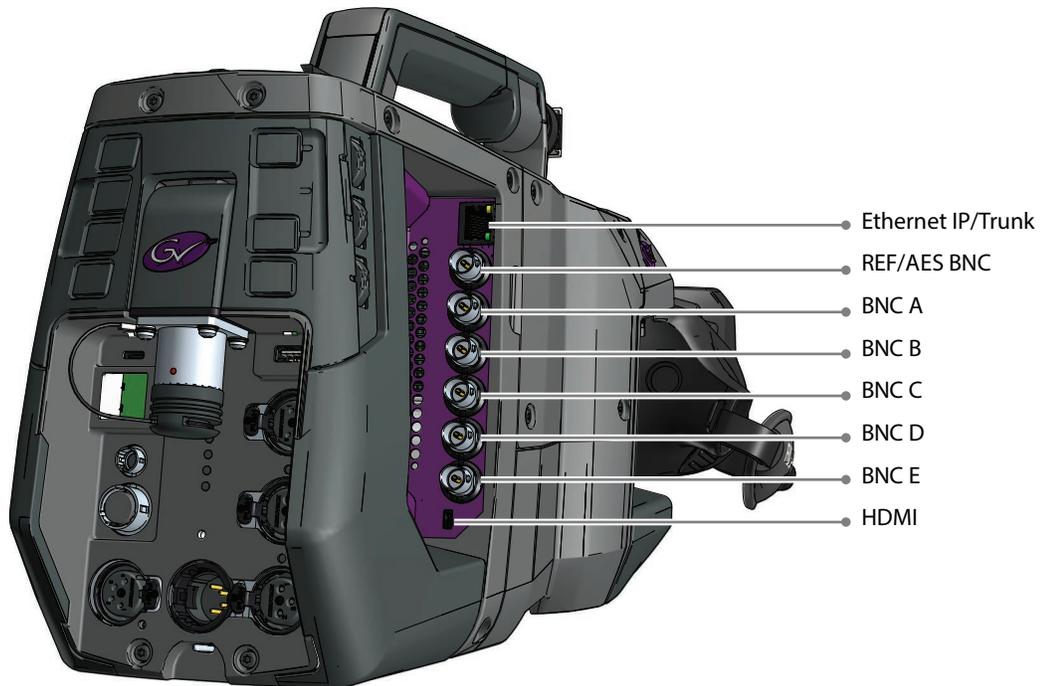
Ethernet Trunk/IP connector

8-pin standard
RJ-45 ethernet
connector
(panel view)

Pin	Description
1	Transmit Data 1+ (TX_D1+)
2	Transmit Data 1- (TX_D1-)
3	Receive Data 2+ (RX_D2+)
4	BI_D3+
5	BI_D3-
6	Receive Data 2- (RX_D2-)
7	BI_D4+
8	BI_D4-

Ethernet 10/100/1000 Base-T compliant with IEEE-802.3 (edition 2000)

REF/AES connector

BNC connector
(panel view)

This connector can be programmed to act as a reference input , reference output or as an AES digital audio input.

Go to the **Configuration > Signals > BNC Ref/AES** setting to change the signals/function for this connector.
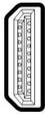
BNC A to E connectors

BNC connector
(panel view)

These BNC connectors can be programmed for different video output signals. Refer to Appendix C for more information about the video signals on these connectors.
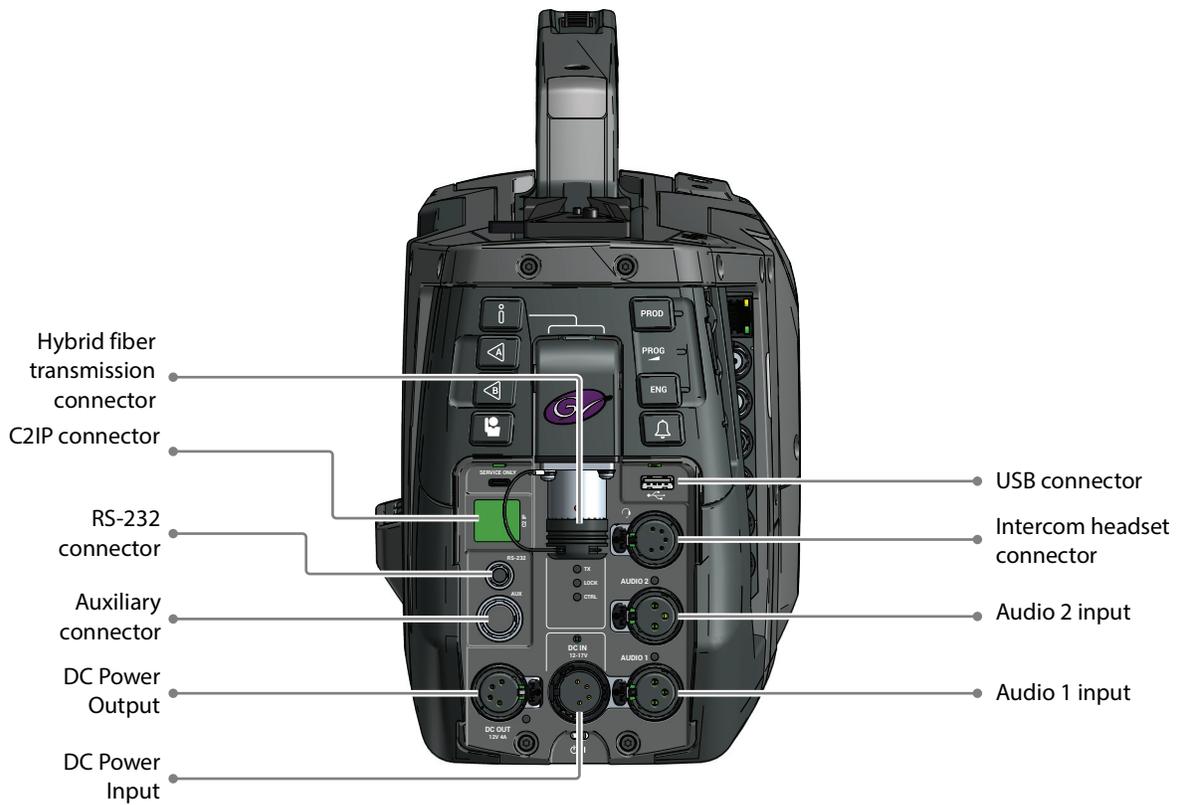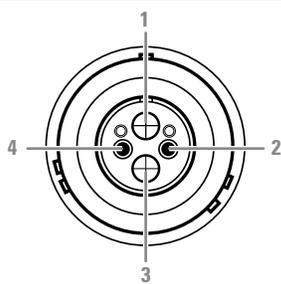
HDMI connector

HDMI (type A)
connector
(panel view)

Pin	Description	Pin	Description
1	TMDS Data 2+	11	TMDS Clock Shield
2	TMDS Data 2 Shield	12	TMDS Clock -
3	TMDS Data 2 -	13	CEC
4	TMDS Data 1+	14	Reserved
5	TMDS Data 1 Shield	15	SCL-HDMI
6	TMDS Data 1 -	16	SDA-HDMI
7	TMDS Data 0 +	17	GND
8	TMDS Data 0 Shield	18	+5V DC Power
9	TMDS Data 0 -	19	Hot Plug Detect
10	TMDS Clock +		

Back panel

Hybrid fiber
transmission
connector

C2IP connector

RS-232
connector

Auxiliary
connector

DC Power
Output

DC Power
Input

USB connector

Intercom headset
connector

Audio 2 input

Audio 1 input

Hybrid fiber transmission connector

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

Manufacturer code: LEMO 3K.93C

LEMO SMPTE304M
Hybrid fiber
connector

USB connector

USB type A
host connector
(panel view)
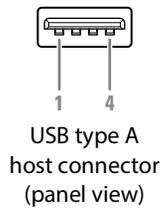
Pin	Description
1	+ 5 VDC
2	Data -
3	Data +
4	GND

USB type A connector (host) compatible
with USB 2.0 standard

Intercom headset connector

XLR 5-pin female
connector
(panel view)
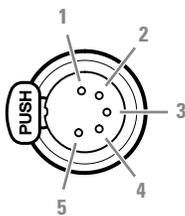
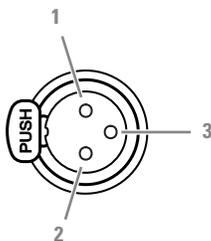| Pin	Description
1	Microphone return
2	Microphone
3	Telephone return
4	Telephone left
5	Telephone right

Microphone level: -64 dBu/-24 dBu
(switchable)
Microphone impedance > 600 Ω
Output level: +6 dBu nominal
Output impedance: < 50 Ω

Audio 1+2 input connectors

XLR 3-pin female
connector
(panel view)

Pin	Description
1	Audio shield
2	Audio In (+)[1]
3	Audio Return (-)

Microphone impedance > 200 Ω
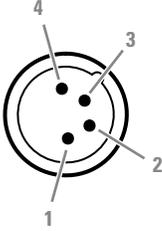Phantom power +48 V switchable
Sensitivity range:
Mic: from -22 dBu to -64 dBu
Line: +4 dBu to -10 dBu

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

DC Power input connector

XLR 4-pin male
connector
(panel view)

Pin	Description	
1	GND	Pins 1 & 2 are bridged
2	GND	
3	+12 to +17 V	Pins 3 & 4 are bridged
4	+12 to +17 V	

CAUTIONS:

Input voltage must not exceed 17 V

Total input current must be <= 16A

Always use all 4 power pins

DC Power output connector
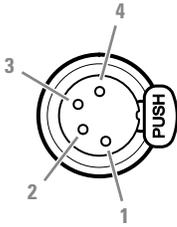
XLR 4-pin female
connector
(panel view)

Pin	Description	
1	GND	Pins 1 & 2 are bridged
2	GND	
3	+13 to +17 V	Pins 3 & 4 are bridged
4	+13 to +17 V	

NOTE: DC Power is not available when the camera is locally powered by the DC Power input connector.

When more than 4 A current is drawn from this connector, the power overload indicator (located next to the connector) lights.

Auxiliary connector
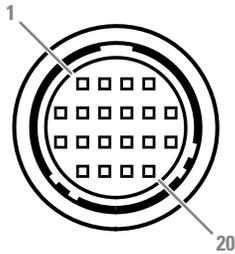
20-pin Hirose
female connector
(panel view)

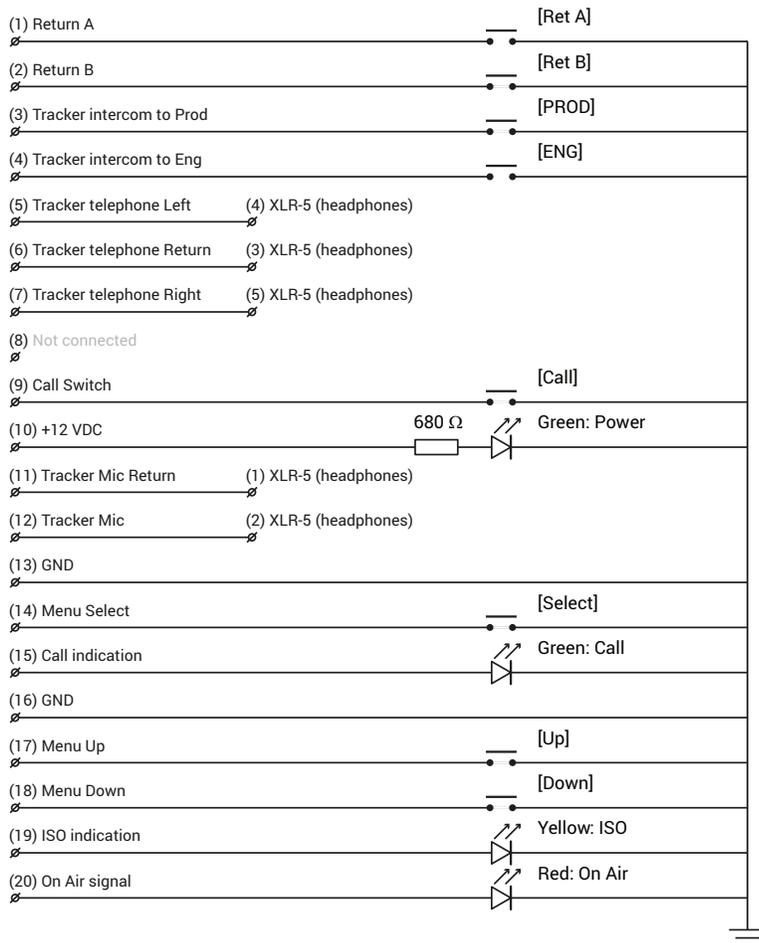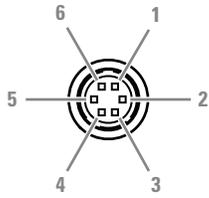| Pin	Description	Pin	Description
1	Return A	11	Tracker Microphone return
2	Return B	12	Tracker Microphone
3	Tracker intercom to Production	13	GND
4	Tracker intercom to ENG	14	Menu select
5	Tracker telephone left	15	Call indication
6	Tracker telephone return	16	GND
7	Tracker telephone right	17	Menu Up
8	not connected	18	Menu Down
9	Call switch	19	ISO indication
10	+12 Volt (max. 100mA)	20	On Air signal

Manufacturer code of the **mating** cable/plug connector: HR10A-13P-20P(C)

Below is an example for the wiring of the auxiliary connector:

(1) Return A — [Ret A]

(2) Return B — [Ret B]

(3) Tracker intercom to Prod — [PROD]

(4) Tracker intercom to Eng — [ENG]

(5) Tracker telephone Left — (4) XLR-5 (headphones)

(6) Tracker telephone Return — (3) XLR-5 (headphones)

(7) Tracker telephone Right — (5) XLR-5 (headphones)

(8) Not connected

(9) Call Switch — [Call]

(10) +12 VDC — 680 Ω — Green: Power

(11) Tracker Mic Return — (1) XLR-5 (headphones)

(12) Tracker Mic — (2) XLR-5 (headphones)

(13) GND

(14) Menu Select — [Select]

(15) Call indication — Green: Call

(16) GND

(17) Menu Up — [Up]

(18) Menu Down — [Down]

(19) ISO indication — Yellow: ISO

(20) On Air signal — Red: On Air

RS-232 connector

6-pin Hirose
female connector
(panel view)

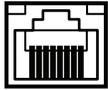| Pin	Description
1	GND
2	TxD1 (serial connection 1)
3	TxD2 (serial connection 2)
4	GND
5	RxD1 (serial connection 1)
6	RxD2 (serial connection 2)

Serial connection 1: can be used for serial (private) data.

Serial connection 2: can be used for camera control or pan and tilt systems.

Signals are at RS-232 levels, 115 kB/s max.

Mating cable/plug connector:
HR10A-7P-6P(C)

C2IP Ethernet connector

8-pin standard
RJ-45 ethernet
connector
(panel view)

Pin	Description
1	Transmit Data 1+ (TX_D1+)
2	Transmit Data 1- (TX_D1-)
3	Receive Data 2+ (RX_D2+)
4	BI_D3+
5	BI_D3-
6	Receive Data 2- (RX_D2-)
7	BI_D4+
8	BI_D4-

Ethernet 10/100/1000 Base-T compliant with IEEE-802.3 (edition 2000)

Video signals

Introduction

The LDX 135 / LDX 150 delivers and accepts many different video signals in the form of IP streams over the IP Media Network and/or as baseband (SDI) signals over BNC connectors. Depending on the camera mode (NativeIP, XCU or Local mode) these signals are available on the IP Media network, or the baseband connector panels on the camera head or the Base Station.

☞ **Note**

One or more options/licenses may be required to operate the camera in the desired mode(s).

Baseband video signals

Baseband signals are available (in all available camera modes) at the BNC connectors panel on the camera. No installed (Q)SFP modules are required.

☞ **Note**

High Speed (3X) video modes are not available when the camera is in XCU mode. (for LDX 150 only)

4K video modes

	4K150/179 (3X) (LDX 150 only)		4K50/59 (1X)
Required option/license:	UHD 3X	UHD 3X	UHD 1X
BNC Outputs profile[1]:	Phases	Default	—

	4K150/179 (3X) (LDX 150 only)		4K50/59 (1X)
BNC-A	*Live4K [2]:* 2160p (12 Gb/s) ST2082, HDR only — this is a combined signal *Live2K [2]:* 1080i (1.5Gb/s) ST292M or 1080p (3Gb/s) ST425-1, HDR or SDR[3]	*Live4K:* 2160p (12 Gb/s) ST2082, HDR only — this is a combined signal	*Live4K:* 2160p (12 Gb/s) ST2082, HDR only
BNC-B	*Phase 1 out:* 2160p (12 Gb/s) ST2082, HDR only	*Live2K:* 1080i (1.5Gb/s) ST292M or 1080p (3Gb/s) ST425-1, HDR or SDR[3]	*Live2K:* 1080i (1.5Gb/s) ST292-M or 1080p (3Gb/s) ST425-1, HDR or SDR[3]
BNC-C	*Phase 2 out:* 2160p (12 Gb/s) ST2082, HDR only	*Ext1, 2 or 3 out[4]:* SD (270 Mb/s) ST259M or 720p/1080i (1.5Gb/s) ST292M or 1080p (3 Gb/s) ST425-1 or 2160p (12 Gb/s) ST2082[5]	*Ext1, 2 or 3 out[4]:* SD (270 Mb/s) ST259M or 720p/1080i (1.5Gb/s) ST292M or 1080p (3 Gb/s) ST425-1 or 2160p (12 Gb/s) ST2082[5]
BNC-D	*Phase 3 out:* 2160p (12 Gb/s) ST2082, HDR only	*Ext1, 2 or 3 out[4]:* SD (270 Mb/s) ST259M or 720p/1080i (1.5Gb/s) ST292M or 1080p (3 Gb/s) ST425-1 or 2160p (12 Gb/s) ST2082[5] *Ext SDI in:* 1080p (3 Gb/s) ST425-1 or 2160p (12 Gb/s) ST2082[6]	*Ext1, 2 or 3 out[4]:* SD (270 Mb/s) ST259M or 720p/1080i (1.5Gb/s) ST292M or 1080p (3 Gb/s) ST425-1 or 2160p (12 Gb/s) ST2082[5] *Ext SDI in:* 1080p (3 Gb/s) ST425-1 or 2160p (12 Gb/s) ST2082[6]
BNC-E	*Viewfinder out:* 1080p (3 Gb/s) ST425-1, SDR only		

1 Go to **Configuration > Signals > BNC Outputs** and select <Default> or <Phases>.

2 Go to **Configuration > Signals > BNC-A Preset** and select <Live4K> or <Live2K>.

3 To select the video mode for the Live2K signal, go to **Configuration > Signals > Live2K > Mode** and select <1080p> or <1080i>.
   To select the dynamic range for the *Live2K* signal, go to **Configuration > Signals > Live2K > Source** and select <HDR> or <SDR>.

4 To select the source for the outputs on these connectors, go to **Configuration > Signals > BNC-C Preset** resp. **BNC-D Preset** and select <Ext 1>, <Ext 2> or <Ext 3>.

5 *Ext 1* and *Ext 2* can be 270 Mb/s, 1.5 Gb/s, 3 Gb/s or 12 Gb/s formats. *Ext 3* can be only be 1.5 Gb/s or 3 Gb/s.

6 When BNC-D is set as SDI input and the applied SDI signal is a 1080p signal, level A/B is detected automatically and level B is converted to level A as input for the internal video router.

4K filmic video modes

Video mode:	4K23	4K25	4K29
Required option/license:	UHD FilmC	UHD FilmB	UHD FilmB
BNC-A	*video out:* 2160p@23.98 (6 Gb/s) ST2081-10:2018+ST2036-1, HDR only	*video out:* 2160p@25 (6 Gb/s) ST2081-10:2018+ST2036-1, HDR only	*video out:* 2160p@29.97 (6 Gb/s) ST2081-10:2018+ST2036-1, HDR only
BNC-B	*Live2K:* 1080p@23.98 (1.5 Gb/s) ST292M+ST274[1], HDR or SDR[2]	*Live2K:* 1080p@25 (1.5 Gb/s) ST292M+ST274[1], HDR or SDR[2]	*Live2K:* 1080p@29.97 (1.5 Gb/s) ST292M+ST274[1], HDR or SDR[2]
BNC-C	*Ext1,2,3 out:* 2160p@59 (not for *Ext3*), 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59	*Ext1,2,3 out:* 2160p@50 (not for *Ext3*), 1080p@50, 1080psF@25 | ST274 Annex A or 1080i@50	*Ext1,2,3 out:* 2160p@59 (not for *Ext3*), 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59
BNC-D	*Ext1,2,3 out:* 2160p@59 (not for *Ext3*), 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59	*Ext1,2,3 out:* 2160p@50 (not for *Ext3*), 1080p@50, 1080psF@25 | ST274 Annex A or 1080i@50	*Ext1,2,3 out:* 2160p@59 (not for *Ext3*), 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59
	Ext SDI in: 2160p@59, 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59	*Ext SDI in:* 2160p@50, 1080p@50, 1080psF@25 | ST274 Annex A or 1080i@50	*Ext SDI in:* 2160p@50, 1080p@50, 1080psF@25 | ST274 Annex A or 1080i@50
BNC-E	*Monitoring out:* 1080p@59 (with 3/2 pull-down), SDR only	*Monitoring out:* 1080p@50 (with 3/2 pull-down), SDR only	*Monitoring out:* 1080p@59 (with 3/2 pull-down), SDR only

1 This signal is progressive video only, not psF.

2 To select the dynamic range for the *Live2K* signal, go to **Configuration > Signals > Live2K > Source** and select <HDR> or <SDR>.

☞ **Note**

External video inputs accept both HDR and SDR.

IP streams in NativeIP mode

These video signals are available as IP streams on the IP Media Network when the LDX 135 / LDX 150 is in NativeIP mode.

☞ **Note**

Make sure that you have installed the correct (Q)SFP modules that allow the selected video mode and required bandwidth. Refer to Appendix E for more information about installing (Q)SFP modules on the camera.

4K video modes

Video mode:	4K150/179 (3X) (LDX 150 only)	4K50/59 (1X)
Required option/license:	NativeIP + UHD 3X	NativeIP + UHD 1X
Required (Q)SFP module:	100G	25G
	Outgoing streams (Cam to IP):	
	4K Phase 1: 2160p (11.1 Gb/s) ST2110-22, HDR only	*4K:* 2160p (11.1 Gb/s) ST2110-22, HDR only
	4K Phase 2: 2160p (11.1 Gb/s) ST2110-22, HDR only	
	4K Phase 3: 2160p (11.1 Gb/s) ST2110-22, HDR only	
	Live4K: 2160p (11.1 Gb/s) ST2110-22, HDR only	
	Live2K: 1080p or 1080i[1] (2.77 Gb/s) ST2110-22, HDR or SDR[2]	*Live2K:* 1080p or 1080i[1] (2.77 Gb/s) ST2110-22 or ST2022-6[3], HDR or SDR[2]
	Incoming streams (IP to Cam):	
	Ext 1: 2160p[4], 1080p or 1080i	
	Ext 2: 2160p[4], 1080p or 1080i	
	Ext 3: 1080p or 1080i	

1 To select the video mode for the *Live2K* signal, go to **Configuration > Signals > Live2K > Mode** and select <1080p> or <1080i>.

2 To select the dynamic range for the *Live2K* signal, go to **Configuration > Signals > Live2K > Source** and select <HDR> or <SDR>.

3 To select the IP transport protocol for *Live2K* video, go to **Installation > Media Interface> Outgoing Streams > Live Video > Protocol** and select <ST2022-6> or <ST2110-22>.

4 Only full raster 4K is accepted — 4K with quadrants is not supported. A workaround for these signals is to use the first 1080p 2SI-quadrant.

4K filmic video modes

Video mode:	4K23	4K25	4K29
Required option/license:	NativeIP + UHD FilmC	NativeIP + UHD FilmB	NativeIP + UHD FilmB
Required (Q)SFP module:	10G, 25G, 100G	10G, 25G, 100G	10G, 25G, 100G
	Outgoing streams (Cam to IP):		
	Main Video: 2160p@23.98 | ST2110-20	*Main Video:* 2160p@25 | ST2110-20	*Main Video:* 2160p@29.97 | ST2110-20
	Live Video: 1080p@23.98 | ST2110-20	*Live Video:* 1080p@25 | ST2110-20	*Live Video:* 1080p@29.97 | ST2110-20
	Incoming streams (IP to Cam):		
	Ext1: 2160p@59, 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59, HDR only	*Ext1:* 2160p@50, 1080p@50, 1080psF@29 | ST274 Annex A or 1080i@50, HDR only	*Ext1:* 2160p@59, 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59, HDR only
	Ext2: 2160p@59, 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59, HDR only	*Ext2:* 2160p@50, 1080p@50, 1080psF@25 | ST274 Annex A or 1080i@50, HDR only	*Ext2:* 2160p@59, 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59, HDR only
	Ext3: 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59, HDR only	*Ext3:* 1080p@50, 1080psF@25 | ST274 Annex A or 1080i@50, HDR only	*Ext3:* 1080p@59, 1080psF@29 | ST274 Annex A or 1080i@59, HDR only

Baseband video signals in XCU mode

In XCU mode, video signals are available as baseband signals at the BNC back panel of the XCU. Refer to the XCU UXF Series user's guide for an overview of available video signals.

☞ **Note**

Make sure that you have installed the correct (Q)SFP modules that allow the selected video mode and required bandwidth. Refer to Appendix E for more information about installing (Q)SFP modules on the camera.

IP streams in XCU mode

In XCU mode, video signals are available as IP streams on the IP Media Network that is connected to the IP Media Bay on the back panel of the XCU. Refer to the XCU UXF Series user's guide for an overview of available video streams.

☞ **Note**

Make sure that you have installed the correct (Q)SFP modules that allow the selected video mode and required bandwidth. Refer to Appendix E for more information about installing (Q)SFP modules on the camera.

Procedures

Licenses

About options

With Grass Valley licenses it is possible to temporarily or permanently add one or more options to your LDX 135 / LDX 150 camera.

Contact your local Grass Valley representative for information about the availability and prices of the different options.

Options can be added to the camera by installing licenses.

Installation procedure

Licenses have the form of a **.lic** file which is a plain text file containing one or more licenses for one or more cameras. In most cases, you obtained the license file as an email or file attachment after purchasing a license from Grass Valley.

Note: It may be necessary to extract the license file(s) from a compressed (zip) archive before proceeding.

Using a USB Flash Drive

Copy the license file to the root directory of a USB Flash Drive and insert the USB Flash drive into the USB connector at the back panel of the camera head.

☞ **Note**

The file system of the USB Flash Drive must be FAT32.

Adding licenses

1. In the camera menu, navigate to the **Licenses > New Licenses** menu.
2. Check the time, date and time zone settings in the **Time** menu. If these settings are correct, set the **Time & Date OK?** item to Yes and continu with step 5.
   - Date, time and time zone need to be set correctly before installing a temporary license. A temporary license uses these settings for its start date reference. Once a temporary license is activated, it will run until it is expired.
   - To confirm the correct setting of time and date, this step must be repeated after each power cycle.

3 If the time, date or time zone settings are incorrect, set the **Time & Date OK?** item to No and set the correct time in the **Change Time** menu and/or the correct date in the **Change Date** menu. After that, set the **Time & Date OK?** item to Yes.

4 Enter the **Find Licenses** menu and select **Search Next** to start searching for licenses on the USB Flash Drive.

   • During the search process **[...]** is shown.

5 When a license is found, select **Add License** to install it.

   • License type, duration and start date (only for temporary licenses) are shown.

   • Up to 5 planned licenses are visible at the same time in the menu. More licenses can be installed; planned licenses show up when they become active.

6 Repeat steps 4 and 5 until all licenses are installed.

7 Finally, check the installed licenses in the **Licenses > Active Licenses** and the **Licenses > Planned Licenses** menus.

NFC Feature

NFC stands for Near Field Communication which allows the camera to communicate with an NFC enabled device like a smartphone. For the LDX 100 Series, Grass Valley created the LDX Scanner, a free of charge application (app) for NFC enabled smartphones, both Android and IOS.

The LDX Scanner app of the smartphone powers the NFC chip in the camera (also when the camera is not powered) and enables two functions;

   • Reading out status information of the camera
   • Add Options/eLicenses to the camera

Reading out status information of the camera

To read out a status information of the camera, proceed as follows;

1 Start the LDX Scanner app on your smartphone, hold the phone close to the NFC symbol on the left side of the camera and select **Scan Camera**.

2 After the phone activated the NFC chip in the camera, a status of the camera will be displayed on the phone that indicates:

   a Camera info
      • Type
      • Type nr
      • Serial nr
   b Package Info
      • Valid
      • Code nr
      • Version
      • Date
      • Updated on
   c Active Licenses
   d NFC Licenses Pending

e Camera Configuration

- Camera Mode
- IP Mode

f C2IP Configuration

- IP mode
- IP Address
- Subnet mask
- VLAN

Add Options/eLicenses to the camera

To add a license, the purchased license needs to be emailed to the NFC enabled smartphone as an attachment. Open the attachment with the LDX Scanner app, then place the smartphone close to the NFC symbol on the right side of the camera and select **Add license** on the smartphone. The LDX Scanner app smartphone will get a confirmation message.

When a perpetual license is added, the camera will automatically activate the license after a power up or reboot. A daily license needs to be manually activated via the Licenses item in the viewfinder menu (because time and date verification is needed).

✎ **Tip**

Websites such as http://time.is/UTC or www.timeanddate.com are a good source to find the correct date and time in a given time zone.

Trial licenses

Trial licenses can be activated at any time; they expire after 3 minutes. You do not need a license file to activate them.

To activate a trial license, navigate to the **Licenses > Trial Licenses** menu and switch on the license you want to use.

Running a trial license is a good way of checking if your camera system is capable of running a specific functionality.

Calibrations

Black Calibration

In high-end broadcast cameras such as Grass Valley's LDX 135 / LDX 150, Black Calibration is an automated procedure that improves the image quality by re-mapping black level for each pixel to keep a consistent sensitivity over the entire image.

The Black Calibration procedure should be applied in the following cases:

- mandatory: when the message "Black Calibration needed" appears in the viewfinder. This may occur (once) after a firmware update that includes an imager update. In some cases, it may take about a minute before this message appears.

- recommended: when the ambient temperature changes by more than 20 °C / 36 °F.

✎ **Tip**

The best results are achieved when camera settings and calibration conditions are similar to the intended shooting situation, for example, shortly before a shooting.

How to apply

To start the Black Calibration procedure proceed as follows:

- Switch on power and camera and wait for the system to become fully operational. To ensure the best black performance, wait until the camera has reached its operational temperature. This may take up to 30 minutes, depending on the ambient temperature.

☞ **Note**

The user level must be set to **Service** to access the Service menu.

Do not change Camera mode, Video mode and do not interrupt reference/locking during the calibration procedure.

- In the camera menu, go to the **Service > Calibrations > Black Calibr** menu and select the calibration temperature using the **Calibr Temp** item. There are two options: **37 C** (default) or **Act** (actual) temperature.
- Go to the **Black Cal** item and select it. The camera starts to warm up or cool down, depending on the ambient temperature and the selected calibration temperature. The lens is capped automatically and lens iris is closed during the calibration process. The Actual (current) temperature can be monitored using the **Act Temp** item.
- When the camera reaches the selected calibration temperature, the Black Calibration process starts. It takes up to 80 seconds to complete. During the process, you can monitor Black Calibration using the **status** item and a progress indication (%) is shown in the viewfinder.
- When the process is finished, the camera can be used normally.

☞ **Note**

It is recommended to carry out Black Calibration when the camera is used under extreme ambient temperature conditions. Make sure to set the **Calibr Temp** item to **Act** before performing the calibration.

The results of the Black Calibration procedure are stored in the camera's internal memory. The new values are used after switching the camera off and on.

Black Calibration affects all video modes within one of the following clusters of video modes: (720p, 1080i and 1080p in single speed), (720p, 1080i and 1080p in 3X speed) and in 4K video modes. The availability of video modes depend on installed licenses.

Full Black

A quicker method to carry out Black Calibration (up to 15 s of running time) is the Full Black procedure. Full Black can be started both from the CGP and the camera system menu:

`CAM` In the camera menu, go to the **Production Setup > Levels > Black** menu. Go to the **Full Black** item and select it to start the calibration.

The Full Black calibration procedure starts and takes approximately 10 to 15 seconds to run.

☞ **Note**

The results of the Full Black procedure are NOT stored in the camera's internal memory: after switching off the camera the results are reset to their default values.

Black Calibration affects all video modes within one of the following clusters of video modes: (1080i and 1080p in single speed), (1080i and 1080p in 3X speed) and in 4K video modes. The availability of video modes depend on installed licenses.

Formatting the SD Card

In some situations it may be necessary to format the camera's internal storage (SD) Card. To format the SD Card, proceed as follows:

- Switch on the camera.

☞ **Note**

The user level must be set to **Service** to access the Service menu.

- In the camera menu, go to the **Service > SD Card > Format** item and select it. The formatting process starts. It takes about one minute to complete.
- During the process, you can monitor the process using the **status** item.
- When the SD Card formatting has finished, the camera can be used normally.

Updating camera software

The basic procedure to update a camera package is as follows:
- Go the Grass Valley to find the latest software package for your camera and download it to your local PC.
- Connect your PC to the C2IP network (make sure you use the correct IP range)
- Run the LDK Scripter tool and connect to the LDX 135 / LDX 150.
- Refer to the (embedded) documentation of the LDK Scripter to follow the update procedure for the camera.

Installation of (Q)SFP modules

(Q)SFP modules configurations

Depending on the workflow the optical connections of the camera need to be properly installed. This is done through internal installation of (Q)SFP modules.

(Q)SFP module configuration:	Workflow:	Camera mode:
none	Local/baseband mode	none
1: 1x 10G SFP (or 10/25G dual-rate SFP)	Legacy XCU modes	XCU
1: 1x 25G SFP	1x Speed UHD	NativeIP
2: 2x 25G BiDi SFP	1x Speed UHD with redundancy	NativeIP
3: 1x 100G QSFP	3x Speed UHD	NativeIP

Changing (Q)SFP modules

To install or exchange an (Q)SFP module proceed as follows:

* Switch off the camera.
* Use a Torx T10 screwdriver to loosen the four captive screws from the right side panel of the camera as indicated below:
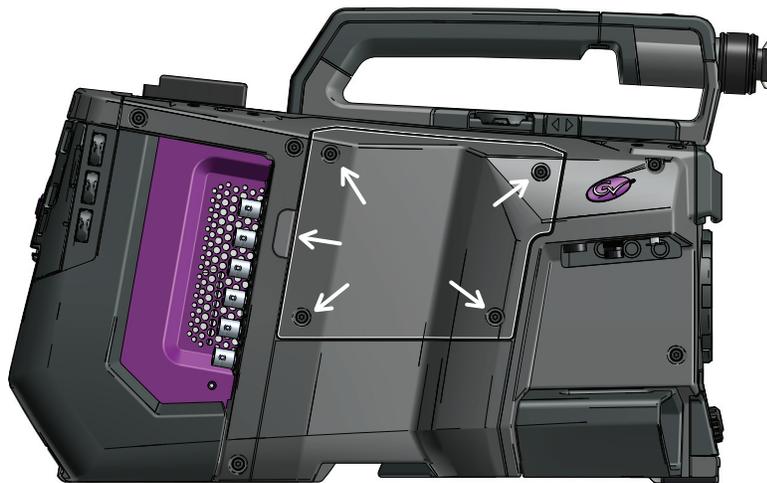
* Lift the panel by using the small recess at the left. Remove the panel. The optic cabling and Q(SFP) module(s) become visible.

🖝 **Note**

The inside of the panel holds the cooling pads for the (Q)SFPs. Make sure that they stay in place and do not get deformed. Keep them free from dirt.

- Remove the LC fiber(s) from the dummy SFP module. Make sure the cable (ferrule) ends keep clean.
- Carefully remove the inserted (Q)SFP module(s) from their case(s). If two SFP modules are inserted, remove them one by one.
- If needed, place the new (Q)SFP module(s) into the suitable cage(s). Unused (Q)SFP modules can be left in their cage, the camera automatically switches off (all) unused modules.
- AFTER placing the (Q)SFP module(s), insert the fiber cables according to the desired configuration in the next section.

⚠️ **Caution**
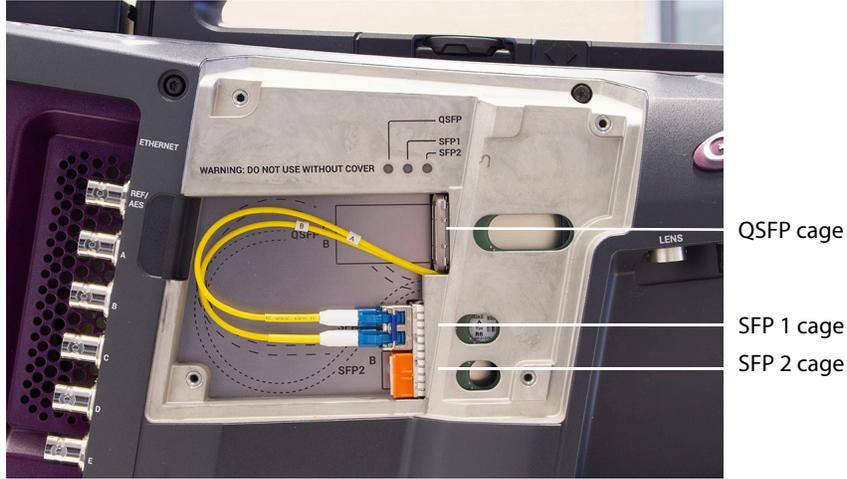
Only use (Q)SFP modules that comply to LASER CLASS 1.

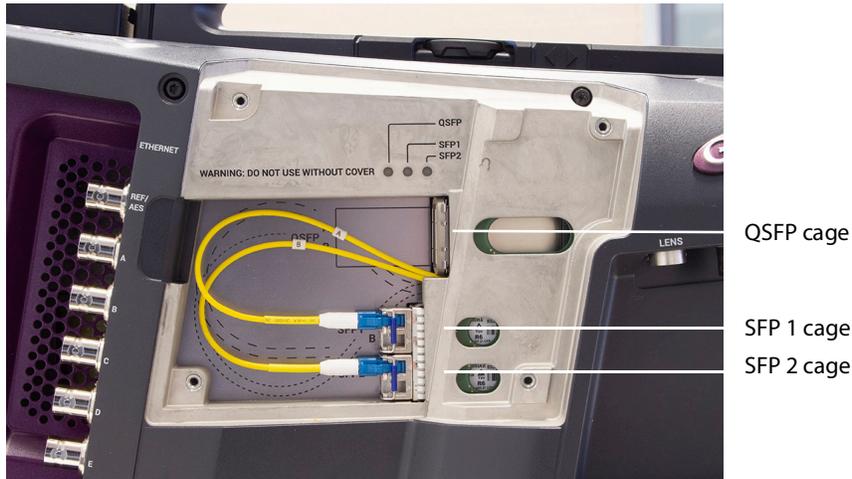## Configuration 1 (1x 25G SFP module)

(also valid for 1x 10G/10G+25G dual-rate SFP module)

- Remove
- Insert fiber **A** into the top LC socket of the SFP module and insert fiber **B** into the bottom LC socket of the SFP module:


Configuration 2 (2x 25G BiDi SFP modules)

Insert fiber **A** into the top LC socket of the SFP module and insert fiber **B** into the top LC socket of the SFP module:

Configuration 3 (1x 100G QSFP module)

- Remove the plastic protection cap from the QSFP module (if present).
- Place the QSFP (without fibers) into the QSFP cage.
- Insert fiber **A** into the top LC socket of the QSFP module and insert fiber **B** into the bottom LC socket of the QSFP module.
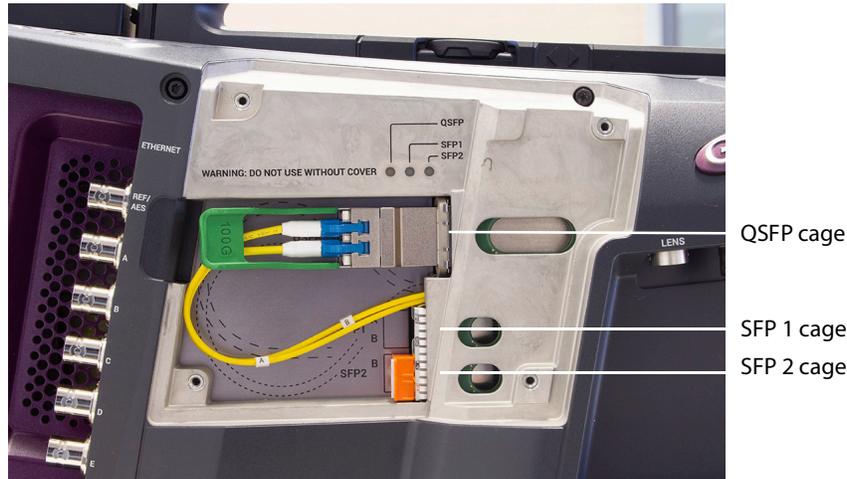
- Reinstall the right side panel and tighten the four captive screws. Make sure that the screws are fixed hand-tight.
- The camera is now ready for operation with the new (Q)SFP configuration.

List of (Q)SFP modules

The following (Q)SFP modules have been released for use with the LDX 135 / LDX 150:

manufacturer part number:	module type:	description:
Eoptolink EOLP-1325G-10-RI	25G/10G SFP SM 10 km 1310 nm	Single-Mode 1310 nm SFP28 Transceiver with DDM and dual CDR
Eoptolink EOLP-1396-10-I	10G SFP SM 10 km 1310 nm	Single-Mode 1310 nm 10GBASE-LW/LR Transceiver with DDM
Eoptolink EOLQ-161HG-10-LI	100G QSFP SM 10 km LR4	Single-Mode 100GBASE-LR4 QSFP28 Transceiver
EOLQ-161HG-02-SI1	100G QSFP SM 2 km CWDM4	Single-Mode CPRI/100GBASE CWDM4 2km QSFP28 Transceiver

☞ **Note**

All listed modules have industrial specifications. Refer to your Grass Valley sales representative for availability and prices.

☞ **Note**

Make sure that the matching ('other end') (Q)SFPs in the IP switch have the same specifications.

General

Temperature range (operating):	Single Speed: -20°C to +45°C High Speed: -20°C to +40°C (LDX 150 only)
Weight:	approx. 5.9 kg (13.3 lbs) including handgrip and shoulderpad
Dimensions (width x depth x height):	166.5 x 397.7 x 252.3 mm (6.56 x 15.66 x 9.93 in)
Power consumption (typ.):	Single speed 100W (Typ) High Speed 150W (Typ) (LDX 150 only)

Camera

|	
Pick-up device:	3x 2/3" UHD imagers
Smear:	no vertical smear
Shutter:	no mechanical shutter
Optical system:	F1.4 prism
Lens mount:	2/3" bayonet (B4 type) lens mount
Optical filters:	First wheel: Clear, 1/4 ND, 1/16 ND, 1/64 ND, *capped*; Second wheel: Clear, 4 point star, Soft focus Fixed: 2.5µ Optical Low Pass filter
Electronic color correction:	3200 K, 5600 K, 7500 K, FL, 2 AWB presets, Variable, Continuous Auto White
Exposure:	Electronic exposure down to 1/1000 s (in single speed operation)

Video

S/N ratio (typ.)	62 dB (in 1080p50/59 video modes), sensitivity mode = Nominal
Sensitivity @2000 lux (typ.)	F11 (in 2160p50 video mode), sensitivity mode = Nominal
Aspect ratio:	16:9

Gain selection:	-6 dB to +18 dB in 3 dB steps (user definable presets) or continuous gain in 0.1 dB steps
Sensitivity modes:	High Quality, Nominal or High Sensitivity

Connectivity

Microphone input (front):	XLR-3 female, balanced, with switchable +48 V phantom power
REF/AES BNC connector:	Reference input,output or AES digital audio
BNC A to E connectors:	Video BNC baseband connectors (1.5G, 3G or 12 G)
Camera control network (C2IP)	RJ-45 Ethernet connector (1 Gb/s)
Ethernet/IP Trunk	RJ-45 Ethernet connector (1 Gb/s)
Lens connector:	12p Hirose connector
Viewfinder connector:	9p Fischer MiniMax connector
Monitoring video:	HDMI (type A) connector
Hybrid Fiber connector:	SMPTE 304M hybrid fiber connector (swiveling)
Mounting holes:	2x ¼" - 20 UNC + 3x M4 threaded holes (camera thread)
Audio inputs (rear):	2x XLR-3 female, balanced, with +48 V phantom power
Intercom:	XLR-5 with Engineering, Production and Program channels
DC Power input:	12 V (12 to 17 V), XLR-4 male <16 A
DC Power output:	13 V, XLR-4 female < 4 A

Dimensions

153.3 mm

252.3 mm

93 mm

5 mm

92.7 mm   74 mm

166.5 mm

379.7 mm
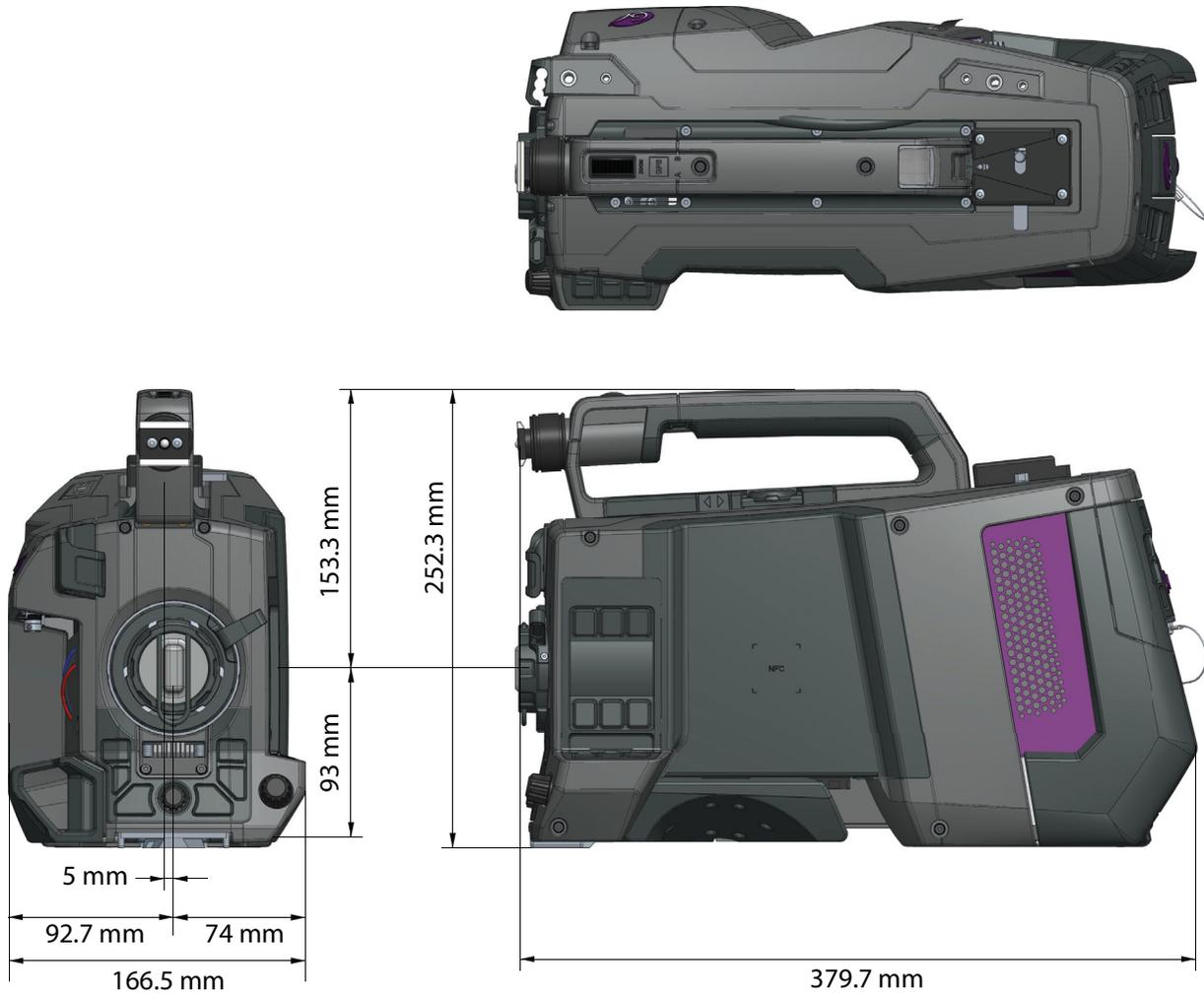
Contact Us

Grass Valley Technical Support

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

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

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

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