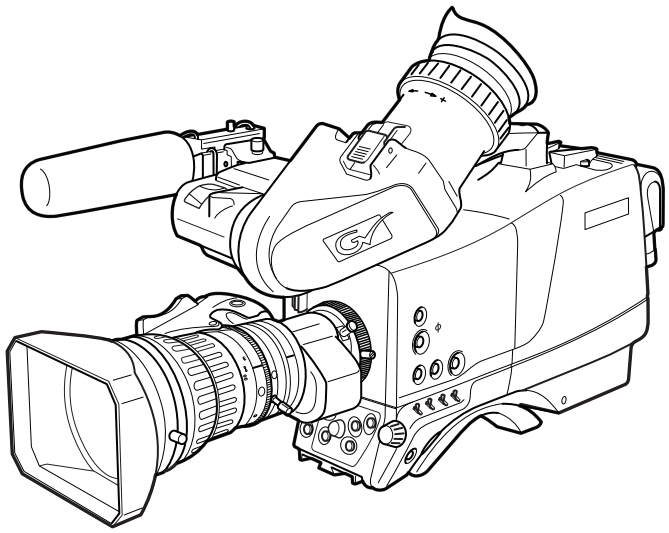
grass valley
A BELDEN BRAND

User's Guide

3922 496 32221 May 2014 v1.0



LDX 86 HS/XS + XF Fiber Adapter

HiSpeed/XtremeSpeed HD camera

Declaration of Conformity

We, Grass Valley Nederland B.V., Kapittelweg 10, 4827 HG Breda, The Netherlands, declare under our sole responsibility that this product is in compliance with the following standards:

- EN60065 : Safety

- EN55103-1: EMC (Emission)

- EN55103-2: EMC (Immunity)

following the provisions of:

a. the Low Voltage directive 2006/95/EC
b. the EMC directive 2004/108/EC

FCC CLASS A Statement

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

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

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

Copyright

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Trademarks

Grass Valley, LDX Series and derivatives are trademarks of Belden Inc. or Grass Valley. All other tradenames referenced are service marks, trademarks, or registered trademarks of their respective companies.

Website

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

www.grassvalley.com

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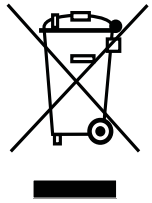
End-of-life product recycling



Grass Valley's innovation and excellence in product design also extends to the programs we've established to manage the recycling of our products. Grass Valley has developed a comprehensive end-of-life product take back program for recycle or disposal of end-of-life products. Our program meets the requirements of the European Union's WEEE Directive and in the United States from the Environmental Protection Agency, individual state or local agencies.

Grass Valley's end-of-life product take back program assures proper disposal by use of Best Available Technology. This program accepts any Grass Valley branded equipment. Upon request, a Certificate of Recycling or a Certificate of Destruction, depending on the ultimate disposition of the product, can be sent to the requester. Grass Valley will be responsible for all costs associated with recycling and disposal, including freight, however you are responsible for the removal of the equipment from your facility and packing the equipment ready for pickup.

For further information on the Grass Valley product take back system please contact Grass Valley at + 800 80 80 20 20 or +33 1 48 25 20 20 from most other countries. In the US and Canada please call 800-547-8949 or 530-478-4148. Ask to be connected to the EH&S Department. In on, information concerning Grass Valley's environmental policy can be found at:

www.grassvalley.com/about/environmental-policy

Important information

Read these instructions carefully and retain them for future reference. Regularly check the Grass Valley website (www.grassvalley.com) for new updates of this and other user's guides.

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

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

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

Cautions and Warnings

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

Warnings indicate danger that requires correct procedures or practices to prevent death or injury to personnel.

Cautions indicate procedures or practices that should be followed to prevent damage or destruction to equipment or property.

Warnings

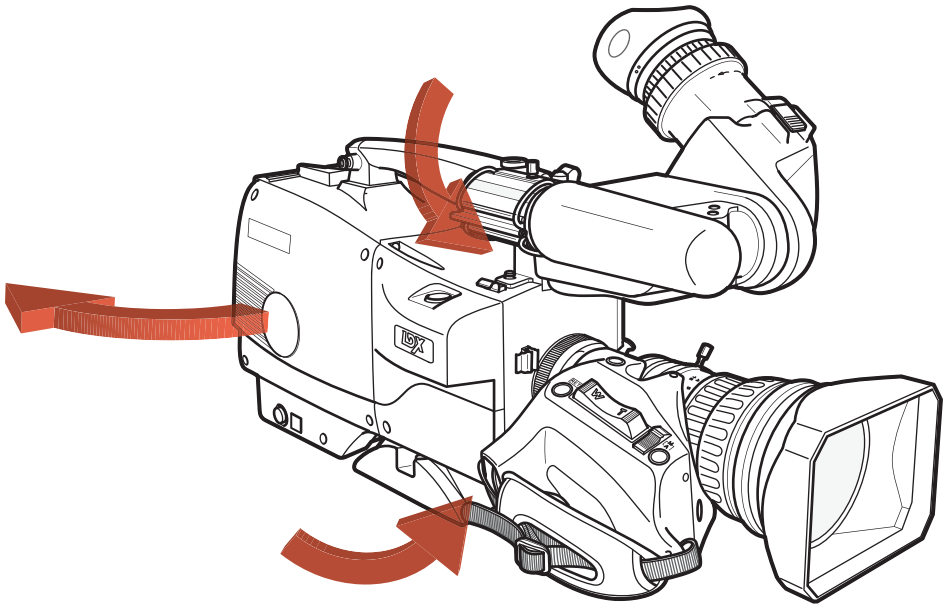
To prevent fire or shock hazard, do not expose the unit to rain or moisture. If the unit is in a wet or damp environment, a rain cover must be used to protect it for personal safety reasons.

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

In case of an emergency ensure that the power is disconnected.

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

To prevent risk of overheating, ventilate the camera correctly. Do not block the hot airflow coming from the outlet on the right side of the camera adapter.



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 unit.
- Do not subject the unit to severe shocks or vibration.
- Do not expose the camera to extremes of temperature.
- Do not leave the unit 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 Triax or 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.

Triax cable systems

Do not allow system earth currents to exceed 1.5 A in the outer shield of the Triax cable or 0.2 A in other cable shields.

To avoid excessive earth currents in a Triax system, galvanically separate the power earth connection of equipment connected to the camera from the camera earth.

It is strictly prohibited to short circuit the inner and outer shields of a Triax cable used to connect a camera to an XCU.

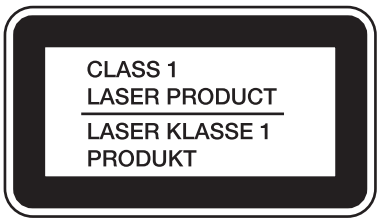
Galvanic separation

Because of the nature of Triax systems, with long distances between camera and its XCU, the risk of earth currents flowing is greater. These earth currents can result in damage to the equipment.

For example, a monitor connected directly to the monitor output of the camera is powered locally. The earthing point of the monitor's power supply can be at a different potential with respect to the earthing point of the XCU. If the power earth of the monitor is also the video earth, then this earth potential is transferred to the camera via the shield of the BNC connector. The difference in earth potential between the camera and the XCU results in an earth current in the Triax system.

To prevent earth currents from flowing in the Triax system, we recommend galvanic separation of earthed equipment connected to the camera. This separation can be achieved by using an isolation transformer between the local power outlet and the equipment connected to the camera. Alternatively, use equipment that has a double insulation and therefore does not require an earth connection.

Fiber-optic transmission units



Laser safety statement (for Europe)

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

Laser safety statement (for US)

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

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

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

Fiber-optic cable precautions

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

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

Cleaning fiber-optic connectors

WARNING
Always switch off power before cleaning the connectors.

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

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

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

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

Chapter 1

Introduction

1.1 Welcome

The LDX 86 HS/XS comprises a range of high-end live production camera heads using Xensium-FT imagers. An LDX 86 HS/XS camera head contains optics, imagers and digital image processing electronics, while the XF Fiber (eXtreme Fast) transmission system can be selected by docking an interchangeable transmission adapter to the camera head. The dockable principle allows the greatest flexibility and cost-effective solutions in multiple applications.

1.1.1 About this guide

The purpose of this guide is to present a detailed description of how to operate an LDX 86 HS/XS camera head equipped with a dockable transmission adapter. 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.

1.1.2 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 updates, release notes and installation instructions.

1.2 Technology

1.2.1 High speed acquisition

The LDX HiSpeed is the newest generation camera for 3X speed applications with improved performance. It is also the first 3X speed camera system to offer an upgrade path to an ultra slow-motion camera system via GV eLicenses.

The LDX XtremeSpeed 6X camera system sets a new standard for ultra slow-motion image acquisition by introducing a workflow with instant time-to-air without a cumbersome double-action memory buffer in the camera—so that not a single moment of the action will be missed or lost.

Both cameras versions offer the highest sensitivity and image performance across all acquisition speeds while the unique AnyLightXtreme flicker reduction assures that no more irritating light flickering occurs in the replays.

Grass Valley LDX HiSpeed and LDX XtremeSpeed cameras are fully integrated with all the LDX Series of cameras, so they share the same camera accessories and use the same camera control system, which also includes the full support of the Connect Gateway for the best possible integration with external control systems.

Fully integrates with Grass Valley K2 Dyno Replay Systems and includes K2 Dyno AnySpeed technology which provides for smooth playback at any speed from 0% to 200%, dramatically expanding the ability to tell a compelling story during replays.

1.2.2 Xensium-FT imagers

The LDX 86 HS/XS camera head uses custom-designed 2/3-inch CMOS Xensium-FT imagers that offer superior performance and ultimate flexibility. Native high-definition video formats 1080p, 1080i and 720p (available video modes are depending on the camera model and version) are produced at the touch of a button.

Progressive frame sampling is the native imaging mode, providing complete frame samples. The entire imager surface is used for image sampling—there are no interline transfer channels which introduce aliasing artifacts.

Xensium-FT imagers have a high dynamic range and high linear sensitivity across all lens apertures. There is no shutter and no vertical smear effect.

1.2.3 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 86 HS/XS cameras incorporate 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.

The Dynamic Detail Equalizer provides more control over image sharpness than ever before. Detail enhancement can be fine-adjusted for each individual tonal range.

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.

The LDX Series provides enhanced colorimetry, color matching, and picture performance. Color temperature and tint are just two of the parameters that can be simultaneously adjusted across multiple cameras.

1.2.4 AnyLightXtreme™ flicker reduction system

All camera operations with high frame rate capturing—such as in super slow-motion and ultra slow-motion applications—face a unique challenge caused by most artificial light sources. In stadiums, sports arenas, and the like, lighting conditions are often not ideal for highspeed acquisition. A visual flicker is perceived as changes in light levels due to the mismatch between the camera scanning frequency and the power frequency of artificial lights.

With the unique AnyLightXtreme feature for the LDX 86 HS/XS cameras, there is compensation for this mismatch that helps to automatically reduce flicker, with several presets for different lighting conditions available in the cameras. The various presets permit the camera to reduce the flickering in the most effective way based on the lighting situation and scanning frequency.

1.2.5 Designed for the operator

The LDX Series offers even more operational excellence. Button layouts as well as control knobs are ergonomically designed to allow the operator to find the right adjustments easily. Full control flexibility is possible thanks to well dimensioned control knobs. With the easily accessible separated info button, operational information can de displayed in the viewfinder instantaneously.

The user-friendliness of LDX cameras has been further improved by using a streamlined camera menu structure that allows operators to access commonly used functions more quickly. The camera menu is arranged around operational, video setup, creative setup and system configuration.

Another imaging innovation is ArtTouch™, an intuitive interface between the operator and hard wired controls, which significantly enhances artistic possibilities during live broadcast. ArtTouch includes smart coupling of video control functions.

1.3 Acquisition formats

Refer to the table below for the acquisition formats:

	LDX SERIES HiSpeed	LDX SERIES XtremeSpeed
GV-eLicense upgrade program:	can be upgraded to LDX XtremeSpeed	
1080i50/59.94 (1X)	—[1)]	—[1)]
720p50/59.94 (1X)	—[1)]	—[1)]
1080p50/59.94 (1X)	—[1)]	—[1)]
720p150/179.82 (3X)	Yes	Yes
1080i150/179.82 (3X)	Yes	Yes
1080p150/179.82 (3X)	—	Yes
1080i300/359.64 (6X)	—	Yes
720p300/359.64 (6X)	—	Yes
1080p300/359.64 (6X)	—	Yes

[1)] A single speed (1X) video signal is available as a Live/Effect (combined) video signal at the XCU monitoring output.

1.4 Key features

- Ultimate flexibility with next-generation Xensium-FT imagers:
  - Frame Transfer (FT) technology ensures no smear
  - Increased sensitivity
  - Improved digital noise reduction
  - TrueTexture™: texture is preserved throughout all processing parameters
- AnyLightXtreme™ high-quality flicker reduction system ensures constant video output levels at high speed frame rates.
- ArtTouch™: Smart coupling between many video functions.
- Perfect picture matching across the complete LDX Series as well as the LDK installed base
- Ergonomically designed camera head with easy access to control buttons, articulated areas and a large rotary control.
- The clever PickMe button places the camera operator in the middle of the action and provides a great help for fast event handling in the field
- Suitability for 3D productions

- Horizontal chromatic lens aberration and sharpness solution (CLASS) compatible with many digital lenses
- Advanced secondary color corrector with 6 sets for color hue, saturation and luminance adjustment.
- Compatible with Grass Valley's C2IP control systems and RefleX SuperXpander.
- Horizontal and vertical chromatic lens aberration and sharpness solution (CLASS) compatible with many digital lenses
- Dynamic Detail Equalizer with an extensive range of parameters
- PowerCurves knee control provides an almost unlimited control over the wide dynamic range of the imaging system
- Depth of field indicator to aid the operator while shooting

1.5 List of accessories

System components	
LDK 4475	Reflex SuperXpander
Viewfinders	
EyeCatcher EC 270	2.7-inch LCD HD color ocular viewfinder
EyeCatcher EC 744	7.4-inch OLED Viewfinder
LDK 5307	7-inch LCD HD color viewfinder
LDK 5309/10	9-inch LCD HD color viewfinder
Accessories	
LDK 5031/10	Tripod plate
LDK 8111/37	Dynamic headset (double muff) with XLR-5 connector
LDK 8111/51	Dynamic headset (single muff) with XLR-5 connector
LDK 6985/30	Universal LDK/LDX Camera script board
LDK 5020/05	Universal transport case
LDK 5020/01	Carrying bag
LDK 5901/00	External power supply unit (100 W)

Chapter 2

Installation

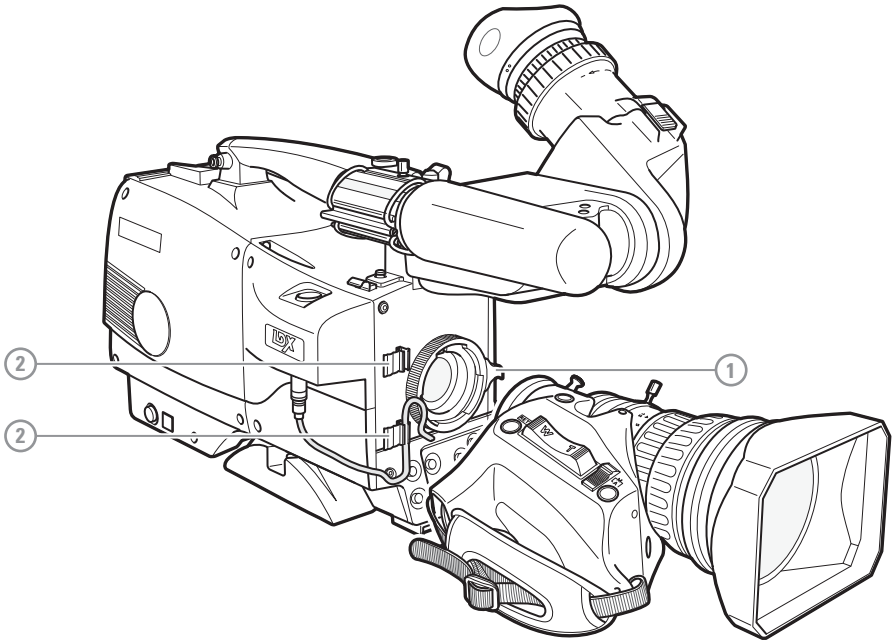
2.1 Mounting a lens

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

1. Ensure that the lens locking ring (1) is in the unlocked position (turned counterclockwise).
2. If present, remove the dust protection cap.
3. Slot the lens into the lens mount.
4. Turn the lens locking ring (1) clockwise until the lens locks firmly in place.
5. Connect the lens cable to the lens connector at the right side of the camera.

Tip

Use the clips (2) on the front of the camera to guide the lens cable along the camera body.



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

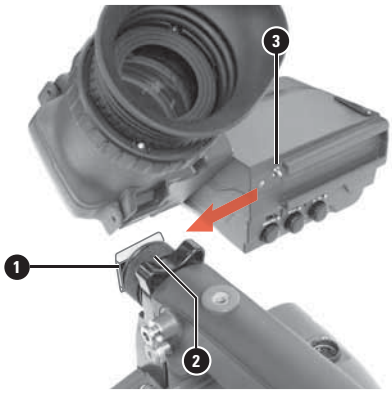
Always mount the dust protection cap when the lens is not connected to the camera.

2.2 EC 270 EyeCatcher viewfinder

2.2.1 Mounting the viewfinder

To mount the viewfinder 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.

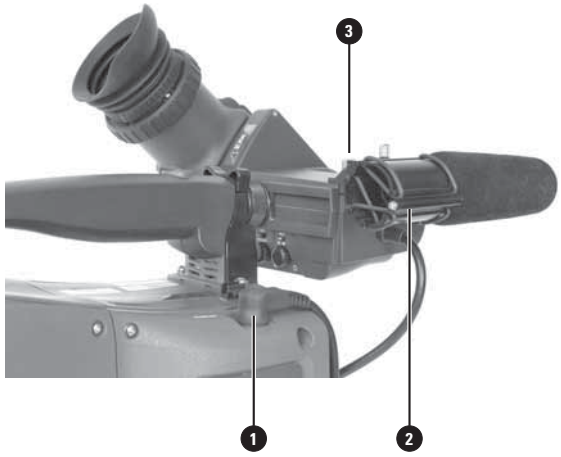


Tip

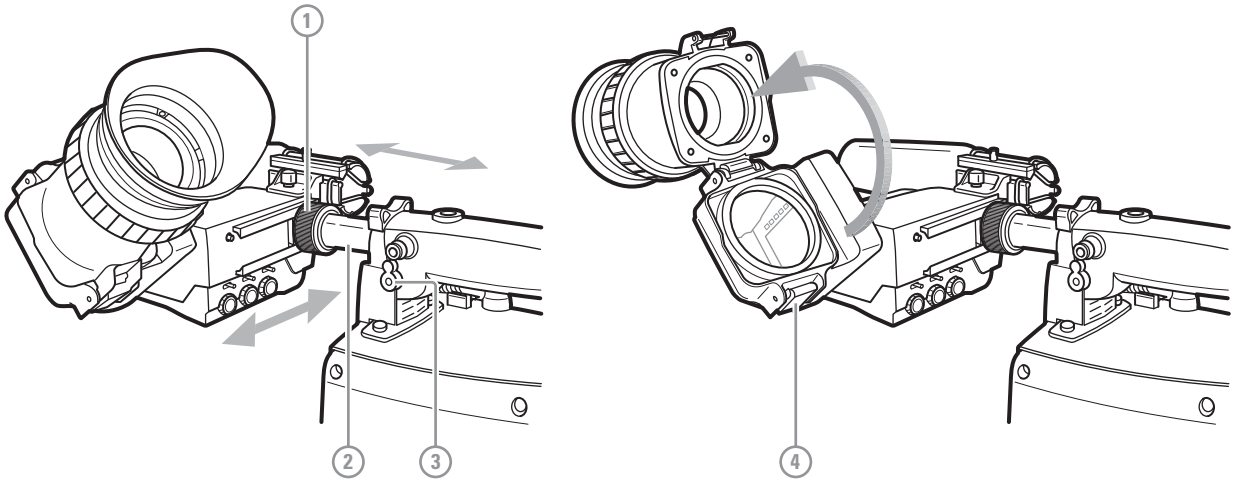
To improve the comfort of the skin contact when using the viewfinder, fit the eye piece cover to the rubber eyepiece. Spare covers are available via your Grass Valley representative.

- Connect the viewfinder cable to the viewfinder socket (1) at the top right of the camera.

- Attach the microphone holder (2) onto the viewfinder and secure it with the knurled screw (3).
- Guide the viewfinder cable along the front of the camera and attach it to one of the cable clips.



2.2.2 Positioning the viewfinder



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

- 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) by turning clockwise.

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

- Loosen the support bracket round bar retaining lever (3).
- Slide the round bar (2) forwards or backwards.
- When the desired position is reached tighten the round bar retaining lever (3) again.

The viewfinder can also be viewed from a distance :

- Press the bottom clip (4) below the eyepiece and swing it free of the associated clip.
- The eyepiece can also be swung downwards; press 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.

2.3 AJ-MC700 Microphone

To attach the optional microphone to the camera proceed as follows:

1. Open the microphone holder by unscrewing the knurled screw (1) of the microphone support bracket (2) on the viewfinder and open.
2. Slide the microphone into the split tube until the microphone shoulder reaches the mark (4) in the tube (about half way in).
3. Place the tube with the microphone into the holder with the split facing upwards. Mount the microphone as straight as possible.
4. Ensure that the rubber supports at the back and front of the holder fit into the rims (6) around the tube.
5. Close the holder and tighten the knurled screw at the top. Don't allow the wind hood to touch the holder as this reduces the damping effect.
6. 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 the camera `CONFIGURATION` menu. When a longer microphone is used, it is not necessary to place it in the split tube. Phantom power is always present on the front microphone socket.

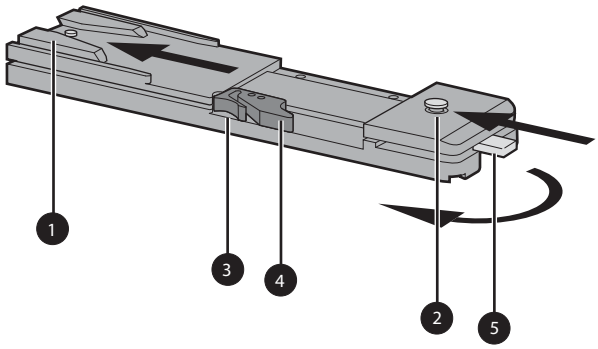
2.4 LDK 5301/10 Tripod adapter plate

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:

1. 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.
2. Firmly push the camera forward until it clicks into place.
3. 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:

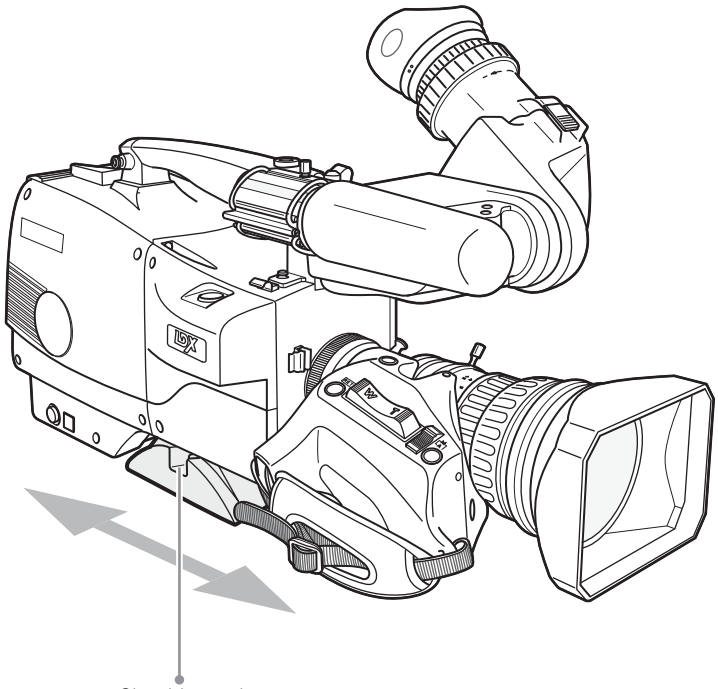
1. Open the locking lever (5) to free the rear stud (2).
2. Press and hold the red locking lever (3) against the release handle (4).
3. Ensure that you have a firm hold of the camera.
4. Pull the release handle (4) forward.
5. Move the camera backwards and up.

2.5 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. The shoulder pad can now be moved backwards and forwards along the axis of the camera.

Tip

Adjust the shoulder pad when all units have been mounted to get the best balanced shoulder position.



2.6 Exchanging the camera adapter

2.6.1 Preparation

- Exchange the adapter in a safe area, preferably indoors. Make sure your working area is clean and dust free.
- Remove all accessories (microphone, viewfinder, lens and cables) before exchanging the camera adapter.
- For the exchange procedure a Torx T20 size screwdriver is needed.

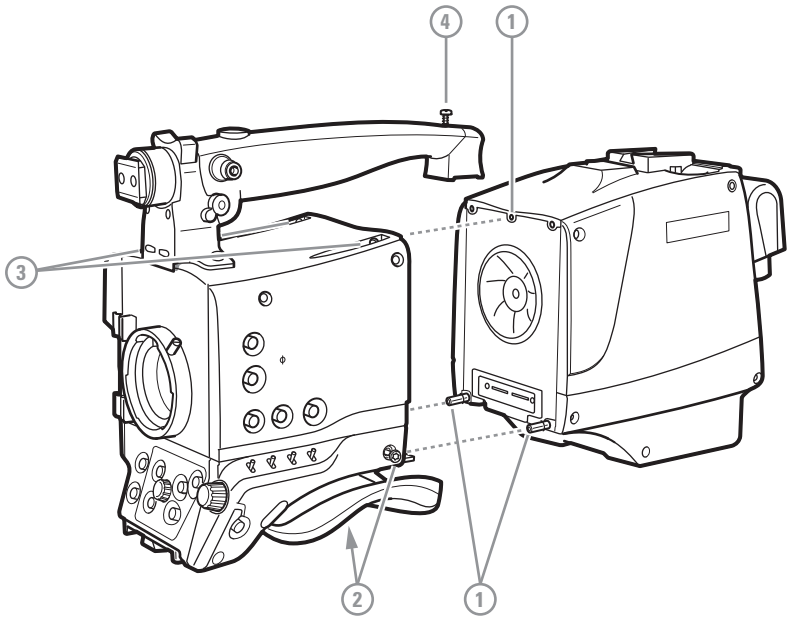
2.6.2 Attaching the adapter

Caution

Be extremely careful with the connectors between the camera head and the adapter. Do not allow the metal guide pins to damage the pins of the docking connector.

Do not touch the uncovered blades of the cooling fan of the adapter.

Follow the indicated steps in the indicated order. Tightening or loosening the screws in the wrong order could result in mechanical damage to the camera and/or the adapter.



To attach the adapter to the camera head proceed as follows:

1. Fit the guide pin at the top rear of the camera head into the corresponding slot of the adapter and at the same time fit the guide pins on either side of the docking connector into the corresponding slots [1] of the camera.
2. Carefully press camera head and adapter together at the bottom and tighten the two screws [2] at both sides of the camera head.

3. Tighten the two screws [3] at the top of the camera head.
4. Tighten the vertical top screw [4] in the handgrip of the camera head.

2.6.3 Detaching the adapter

To detach the adapter from the camera head proceed as follows:

1. Loosen the vertical top screw [4] in the handgrip of the camera head.
2. Loosen the two screws [3] at the top of the camera head.
3. Loosen the two bottom screws [2] at both sides of the camera head.
4. Carefully disconnect the adapter from the camera head.

2.7 LDK 5020/05 Universal Transport Case

Both your camera and its accessories are sensitive equipment, so it is important to protect these against damage when transporting it. To do this, a universal transport case is optionally available for the camera, lens, viewfinder and some accessories.

Turn the EC 270 viewfinder ocular downwards so that it does not protrude above the top of the camera.

Several foam packing inserts are provided to enable different configurations of the camera to be packed securely. These inserts are used to support the rear of the camera. Make sure you use the correct foam inserts for your particular configuration.

Caution

To prevent damage always detach the lens from the camera head before transporting.

2.8 Packing for return

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

If the original packing can no longer be used, the following general instructions should be used for repacking with commercially available materials:

1. Wrap unit in heavy paper or plastic.
2. Use strong shipping container.
3. Use a layer of shock-absorbing material around all sides of the unit to provide firm cushioning and prevent movement inside container.
4. Seal shipping container securely.
5. Mark shipping container FRAGILE to ensure careful handling.

Chapter 3

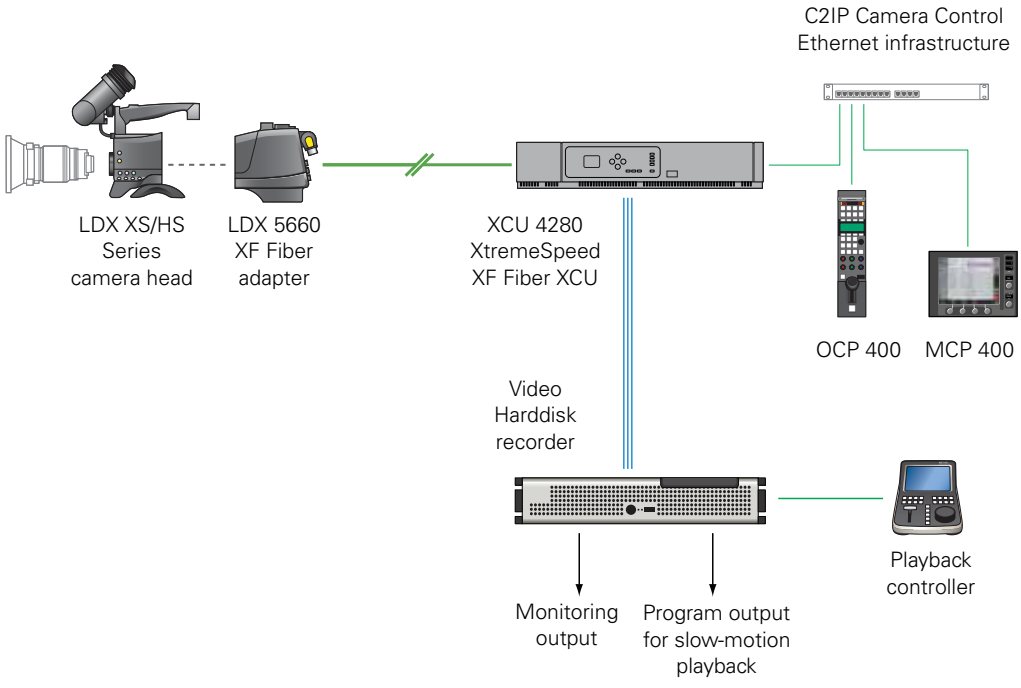
Configurations

3.1 Introduction

To obtain an extreme speed output, the camera must be connected to an XCU 4280 XtremeSpeed XF Fiber XCU. A hybrid XF Fiber connection is used between the camera and the XCU while operational control uses the C2IP network and units. The XtremeSpeed XCU supplies a triple-phase XS HD signal for a recording system.

To control the configuration an OCP 400 operational control panel can be connected via the C2IP camera control network or directly to the Base Station using a cross-over Ethernet cable. Additionally, an MCP 400 master control panel can be connected to the C2IP network.

3.2 XF Fiber Configuration



Chapter 4

Operating instructions

4.1 Using the camera

Attach a lens, viewfinder, microphone and any other accessories to the camera. Attach the Fiber or Triax cables and/or supply the adapter with power.

4.1.1 Powering the camera

The power supply for the camera and its adapter is normally supplied via the Triax or hybrid fiber cable from the XCU. The Power On indicator lights when power is supplied and the camera power switch is set to the on position I.

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

If excessive current flows in the camera or adapter, 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 eyepiece 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 supply.

Tip

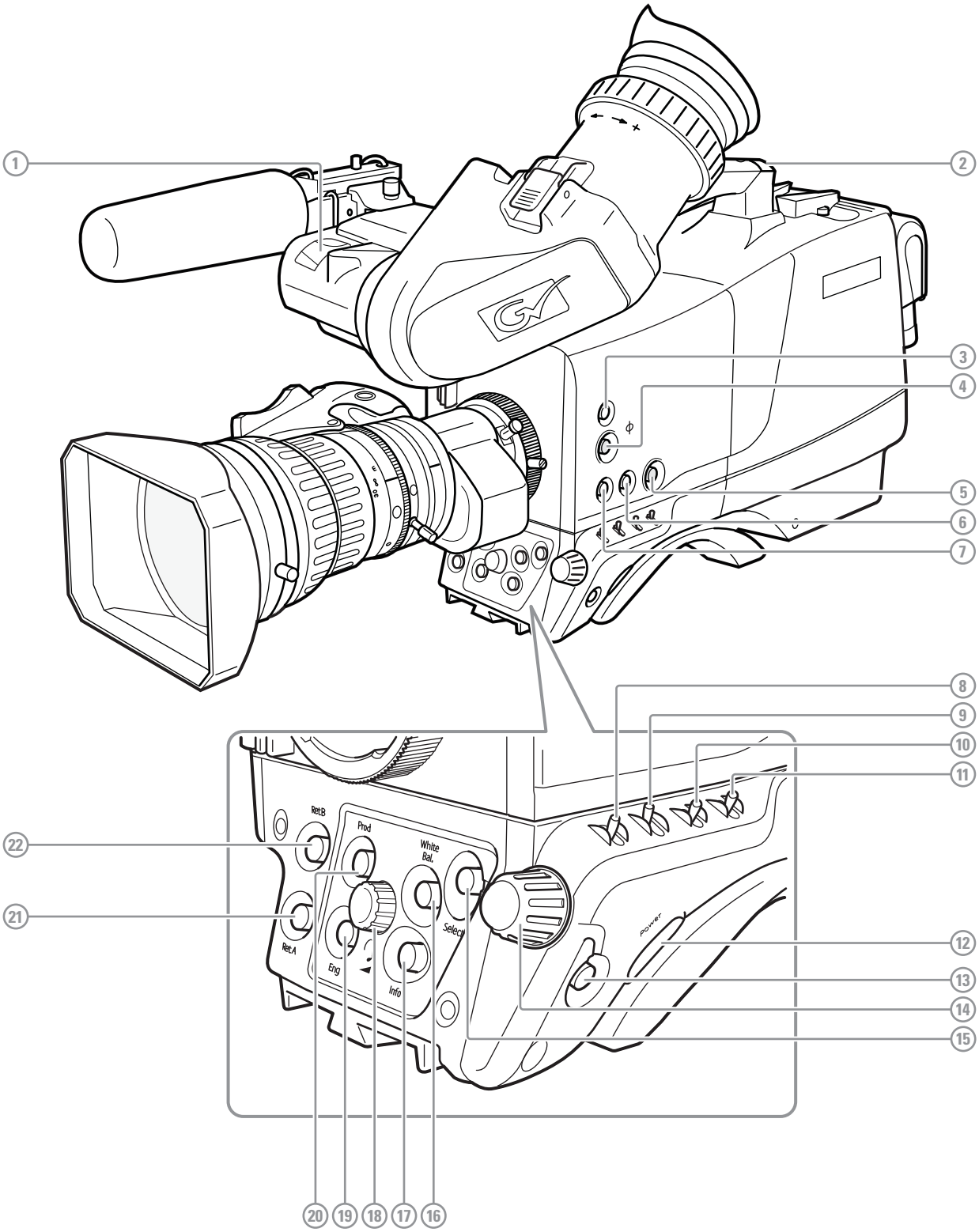
It is also possible to operate the camera without a Triax or hybrid fiber cable by supplying a +12 VDC supply to the DC input socket. DC Output is NOT available in this case.

4.1.2 Switching on

1. On the XCU set the power switch to the on position (I). The green power indicator on the XCU lights.
2. Set the camera power switch of the camera to the on position I.
3. Allow a few moments for the camera to perform a self-test and for the system to establish communications. The startup process can be monitored on the indicator panel of the XCU.

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

4.2 Location of controls (front)



[1] Front Tally lamp

Lights when the camera is On Air.

[2] Rear Tally lamp

Lights when the camera is On Air.

[3] Filters button

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

[4] PickMe button

Press to send an attention signal to the studio back room.

[5] Standard Recall (Green) button

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

[6] User button SW2

Assignable button SW2.

[7] User button SW1

Assignable button SW1.

[8] Gain selection switch

Move up or down to select a Gain preset or hold to set a variable gain value.

[9] Color bar switch

Switches the color bar on or off.

[10] Color temperature switch

Move up or down to select a color temperature preset or hold to vary.

[11] Exposure time switch

Move up or down to select an exposure time or hold to set a variable exposure time.

[12] Power switch

Main camera power switch.

[13] Menu Back button

Used when navigating the camera menu.

[14] Menu Rotary control

Used when navigating the camera menu.

[15] Menu Select button

Used when navigating the camera menu.

[16] White Balance button

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

[17] Info button

Press and hold to view information on the viewfinder screen.

[18] Headset volume control

Adjusts the overall audio volume of the intercom headset.

[19] Intercom Eng button

This button is used to activate the intercom Production channel.

[20] Intercom Prod button

This button is used to activate the intercom Production channel.

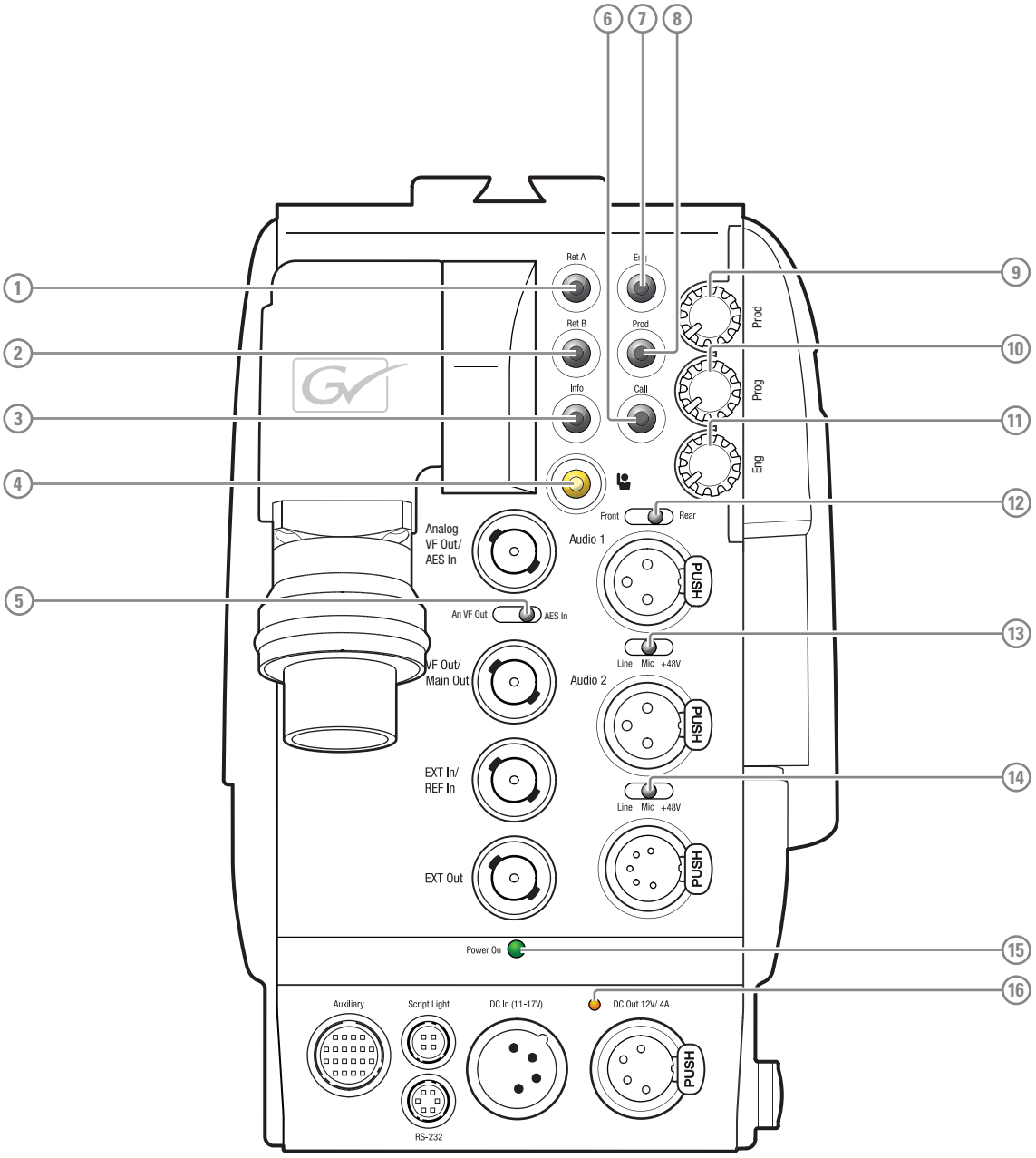
[21] Return A button

This button can be assigned to an External Video channel.

[22] Return B button

This button can be assigned to an External Video channel.

4.3 Location of controls (back panel)



[1] Return A

This button can be assigned to an External Video channel.

[2] Return B

This button can be assigned to an External Video channel.

[3] Info button

Press and hold to view information on the viewfinder screen.

[4] PickMe button

Press to send an attention signal to the studio back room.

[5] An VF Out/AES in switch

Analog VF/AES connector selection switch.

[6] Call button

Call button.

[7] Intercom Eng button

This button is used to activate the intercom Engineering channel.

[8] Intercom Prod button

This button is used to activate the intercom Production channel.

[9] Intercom Prod volume

Intercom headset volume (Production).

[10] Intercom Prog volume

Intercom headset volume (Program).

[11] Intercom Eng volume

Intercom headset volume (Engineering).

[12] Front/Rear switch

Select Audio 1 routing.

[13] Audio 1 switch

Mode selection switch for Audio 1 connector.

[14] Audio 2 switch

Mode selection switch for Audio 2 connector.

[15] Power on indicator

Power on indicator.

[16] Power out overload indicator

Lights orange when too much power is drawn from the DC Ouput connector.

4.4 Controlling the camera

There are several ways to control the camera:

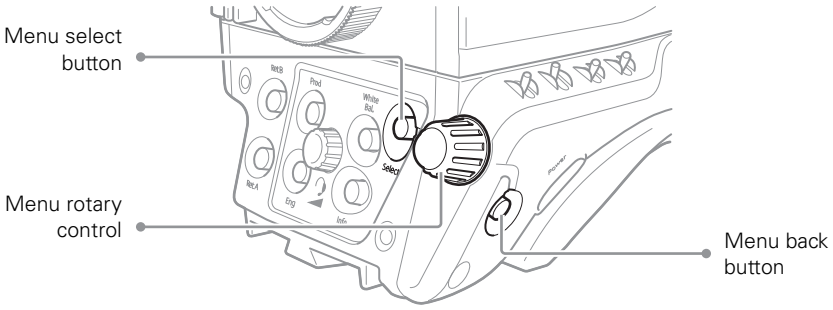
- Using the operational switches on the camera;
- Using the camera menu to select functions;
- Using an Operational Control Panel (OCP 400) connected to the C2IP network or XCU;
  - Refer to the OCP 400 User's Guide for detailed operating instructions for the OCP 400.
- Using a Master Control Panel (MCP 400) connected to the C2IP network or XCU;

☞ **Note**

If you cannot access some camera functions or you wish to restrict access, refer to "Access and security" on page 58.

4.4.1 Navigating the camera menu

The camera menu can be viewed in the viewfinder (or connected monitors) and navigated by means of the **rotary** control and the **select** and **back** buttons which are located at the front and left of the camera:



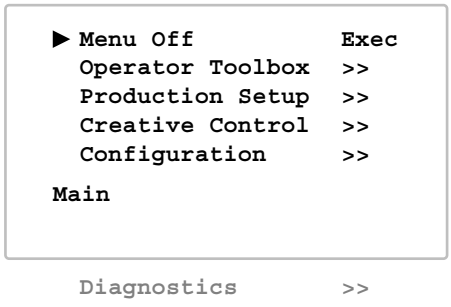
The functions of the camera are grouped into a structure of menus and sub-menus. Each of the menus gives you access to a particular group of functions. Spend some time using the controls and menus to discover the various functions. You will quickly learn to operate the camera intuitively.

☞ **Note**

Some of the menu items may not appear if the user level is not set to 3.

4.4.2 Entering the camera menu

Press the **select** button after the camera is switched on, the message MENU OFF appears in the viewfinder. Press the **select** button again while this text is showing, the MAIN menu appears in the viewfinder.



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 **rotary** control. The cursor shows your position in the menu. The **rotary** control moves the cursor up and down.

4.4.3 Finding your way

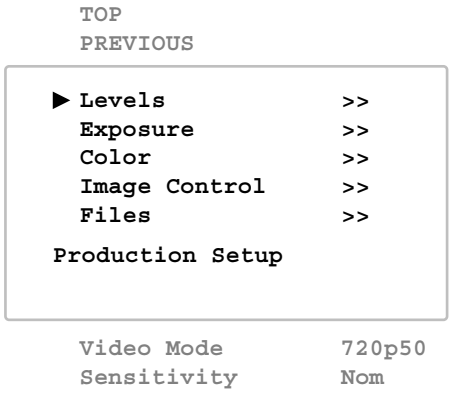
Use the **rotary** control to move the cursor through the menu items. If a double arrow (>>) is visible, then pressing the **select** button brings you one level lower in the menu system. Only five items are visible in each menu. Scroll up or down to see any additional items. When you first enter a menu (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.



4.4.4 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:

1. If necessary move the cursor to the left column with the **select** or **back** button.
2. Scroll upwards with the **rotary** control until the cursor points to `TOP` (the `MAIN` menu).
3. Press the **select** button. The cursor now points to the `MENU OFF` item of the `MAIN` menu.
4. 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.

Tip

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`.

4.4.5 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.

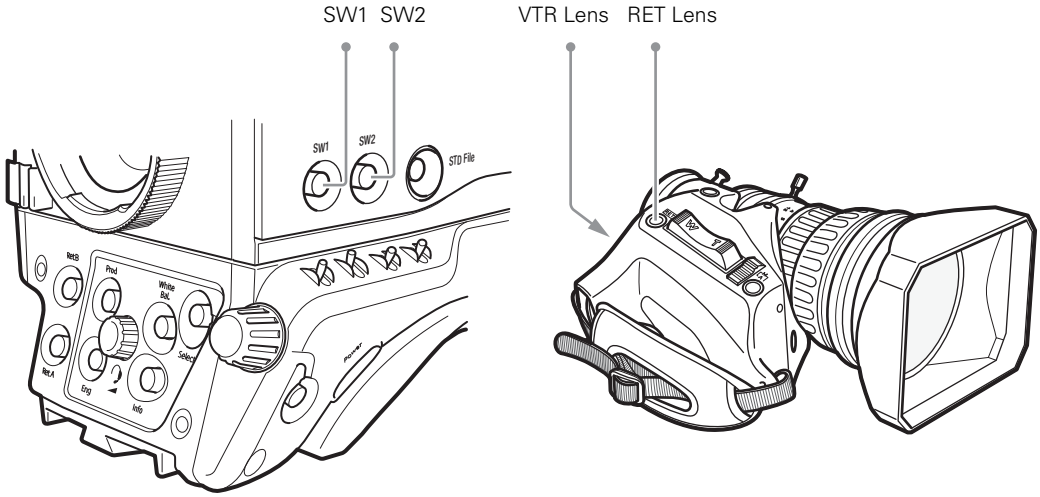
4.4.6 Undoing changes

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.

4.5 Assigning user buttons

The camera head 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 are set in the OPERATOR TOOLBOX > USER BUTTONS menu.

4.5.1 Left side and lens buttons



User button SW1 can be assigned to:

- Intercom Call (Call)
- Switch to external video signal 1 (Ext1)
- Switch to external video signal 2 (Ext2)
- Production intercom (Prod)
- Engineering intercom (Eng)
- Select (for menu navigation)

User button SW2 can be assigned to:

- Extended Iris (EIris)
- Viewfinder zoom function (Zoom)
- Focus Assist (FocAst)
- Switch to external video signal 1 (Ext1)
- Switch to external video signal 2 (Ext2)
- Production intercom (Prod)
- Engineering intercom (Eng)

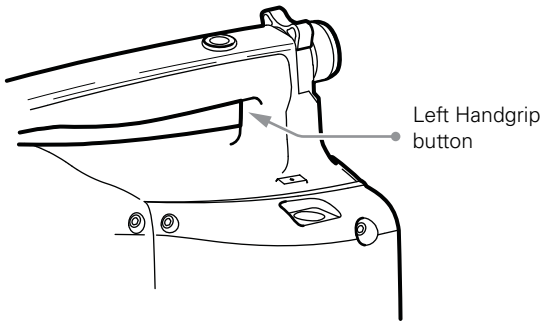
The VTR Lens button can be assigned to:

- Production intercom (Prod)
- Engineering intercom (Eng)
- Viewing zoom function (Zoom)
- Switch to external video signal 1 (Ext1)
- Switch to external video signal 2 (Ext2)

The RET Lens button can be assigned to:

- Switch to external video (Ext) - default
- Switch to external video 1 (Ext1)
- Switch to external video 2 (Ext2)
- Viewing zoom function (Zoom)
- Focus Assist (FocAst)

4.5.2 Handgrip button



The Left Handgrip button can be assigned to:

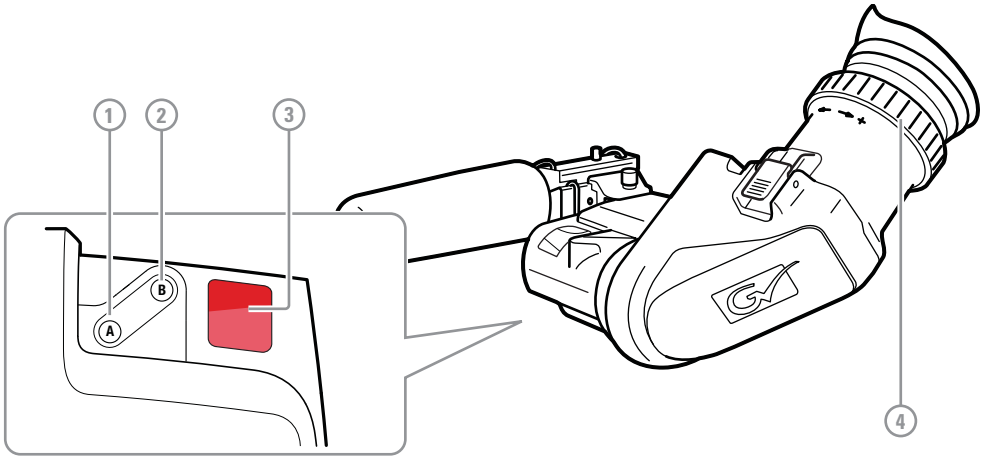
- Production intercom (Prod)
- Engineering intercom (Eng)

The Right Handgrip button is assigned to:

- Switch to external video signal 1 (Ext1)

4.6 Viewfinder controls (EyeCatcher only)

4.6.1 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

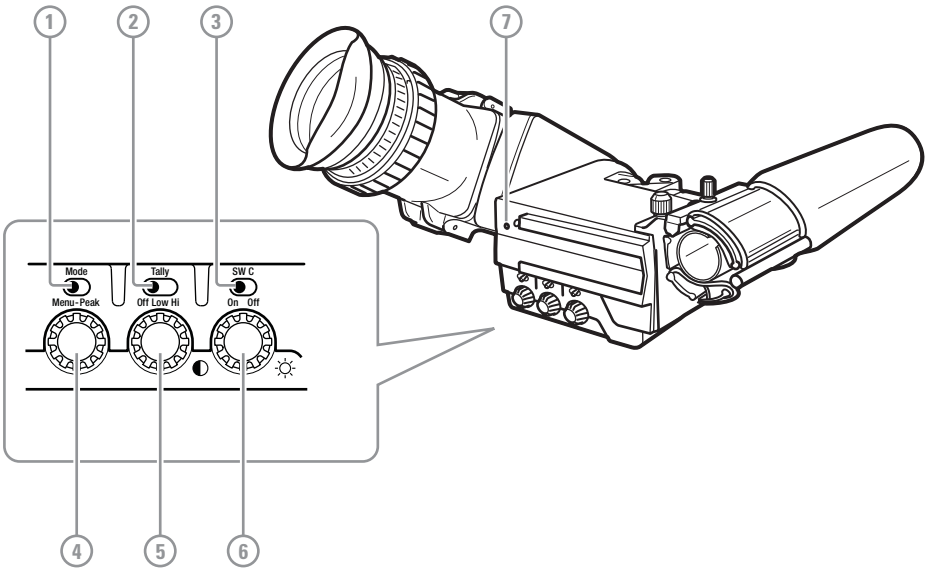
This indicator (and the one at the rear of the handgrip of the camera) lights to indicate that the camera is On Air.

[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.

4.6.2 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 approx. 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).

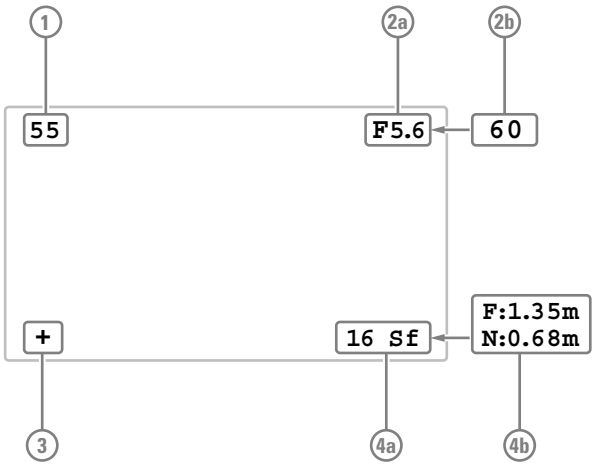
[7] Rear tally indicator

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

4.7 Viewfinder information

4.7.1 Indicators

Navigate to the OPERATOR TOOLBOX > INDICATORS menu and select the on screen indicators you want to display in the viewfinder screen. The following on screen 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[1)]

Shows Depth of Field (DOF) of the current lens position. F = Far limit in meters, N = near limit in meters.

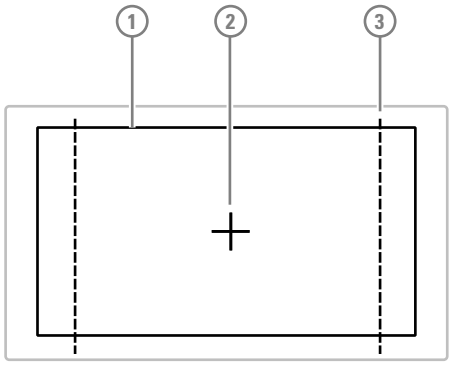
[1)] Must be supported by the lens.

☞ 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.

4.7.2 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.

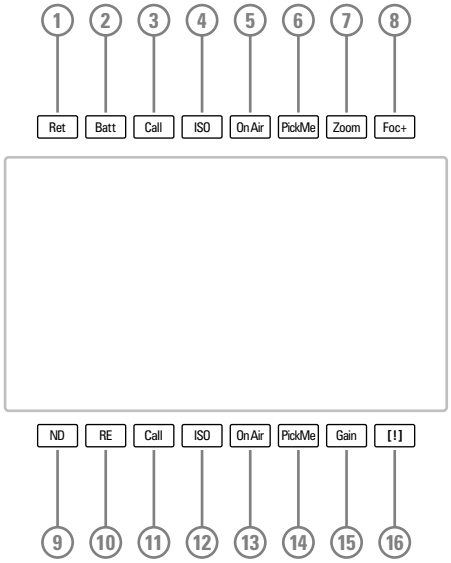
[2] Center Cross

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.

4.7.3 Viewfinder LED indicators (EyeCatcher only)



[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.

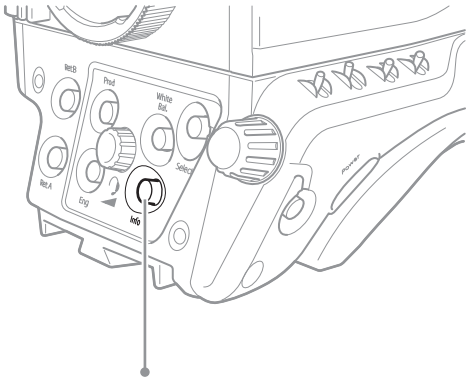
[16] Non-standard [!] indicator

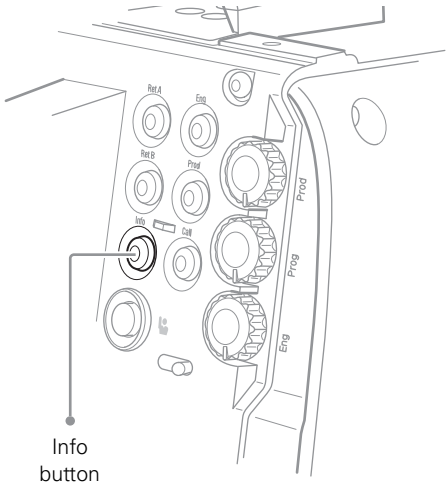
The non-standard video settings indicator (**!**) lights when one or more of the following conditions occur:

- 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.

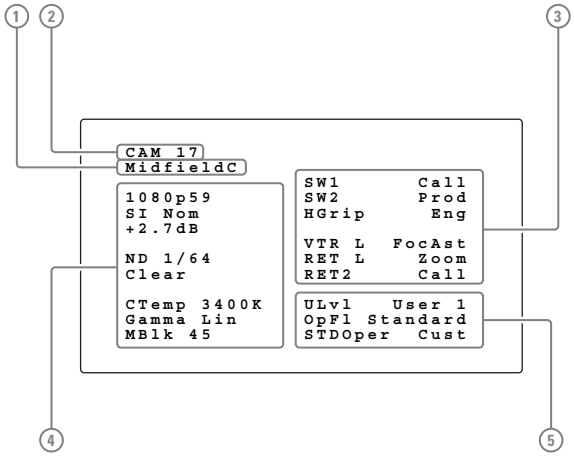
4.7.4 Information screen

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 information screen is superimposed on the video signal in the viewfinder (and other text outputs):



[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").

4.7.5 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.

4.7.6 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.

4.8 Lens operation

4.8.1 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.

4.8.2 CLASS

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

☞ Note

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.

Note

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**.

4.8.3 Auto Iris

If required, switch on the Auto Iris function in the LENS menu. You can also change the settings associated with Auto and Momentary Iris in this menu.

Note

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

4.8.4 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.

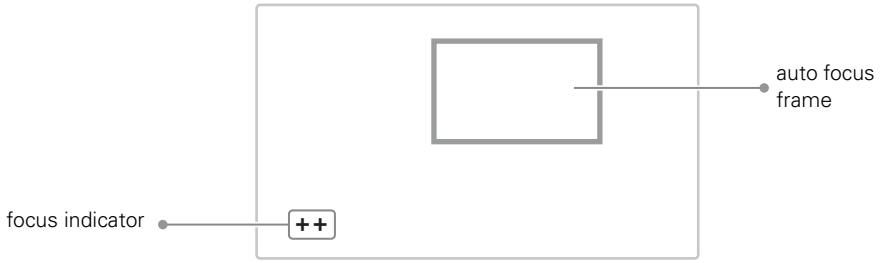
Tip

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

4.8.5 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.

4.8.6 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.

4.9 Connecting audio

4.9.1 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 these channels in the AUDIO section of the CONFIGURATION menu. A high-pass filter for each channel can also be switched on in this menu.

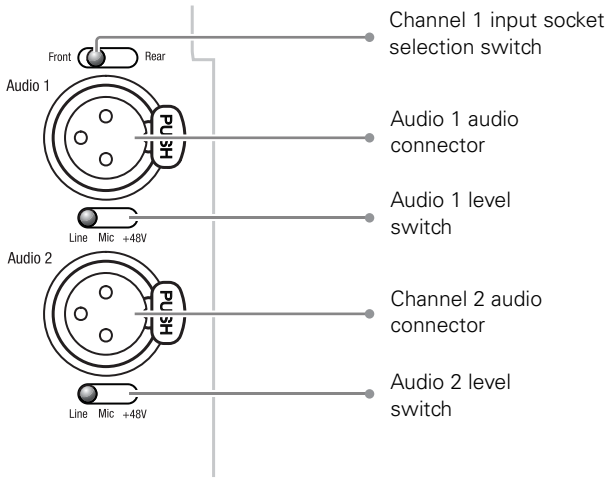
The channel 1 input socket selection switch selects either:

- the Mic connector at the front-right (Front) of the camera, or
- the **Audio 1** connector at the rear of the adapter (Rear)

as the input for audio channel 1.

☞ Note

The front microphone input has a fixed input sensitivity of -40 dB while a phantom power of +48 VDC is always present on the socket.



The audio channel 1 and 2 level switches 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**). Audio channels 1 and 2 are available on the **audio output 1 and 2** connectors (XLR 3) at the XCU.

These (analog) audio channels are also available as converted digital outputs on the **digital audio output (1+2)** BNC connector on the XCU and as audio channels 1 and 2 embedded in the HD-SDI video signal.

4.9.2 Digital audio

Two digital audio channels are available with the 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.

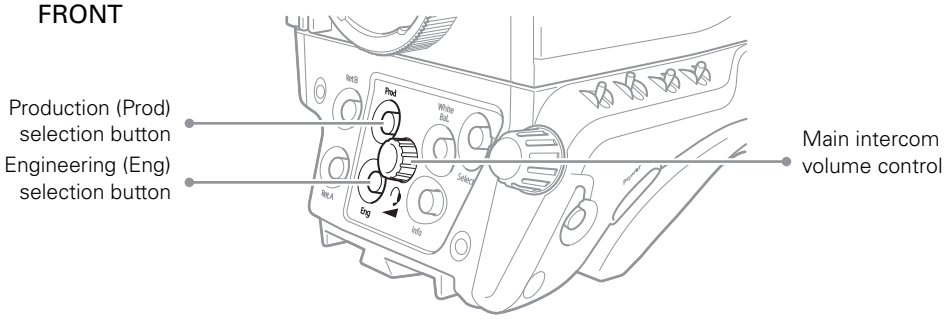
4.10 Using intercom

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 XCU's intercom connector on the back panel.

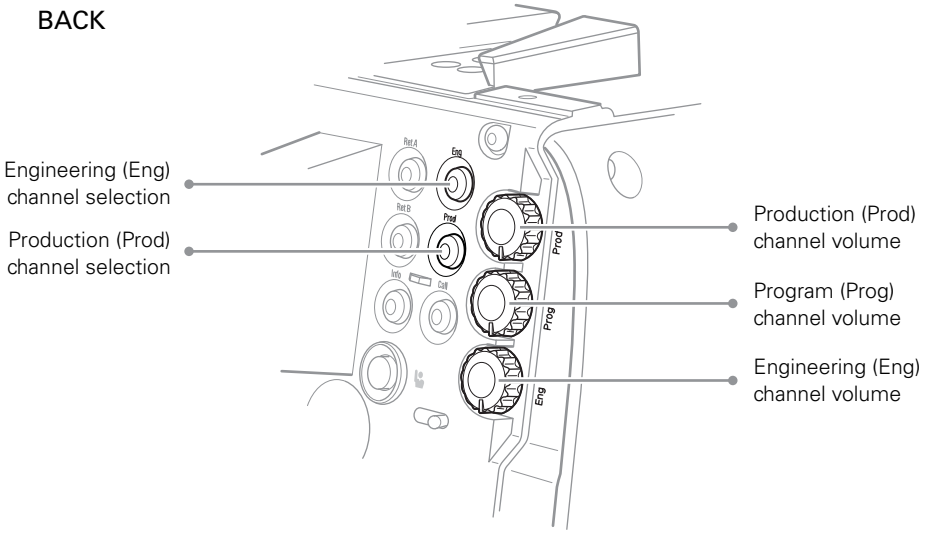
To use the intercom system, connect a headset to the XLR5 connector on the back panel of the camera. An additional Tracker headset can be connected to the auxiliary connector.

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

FRONT



BACK



4.10.1 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.

4.10.2 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.

4.10.3 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.

4.10.4 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.

4.10.5 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).

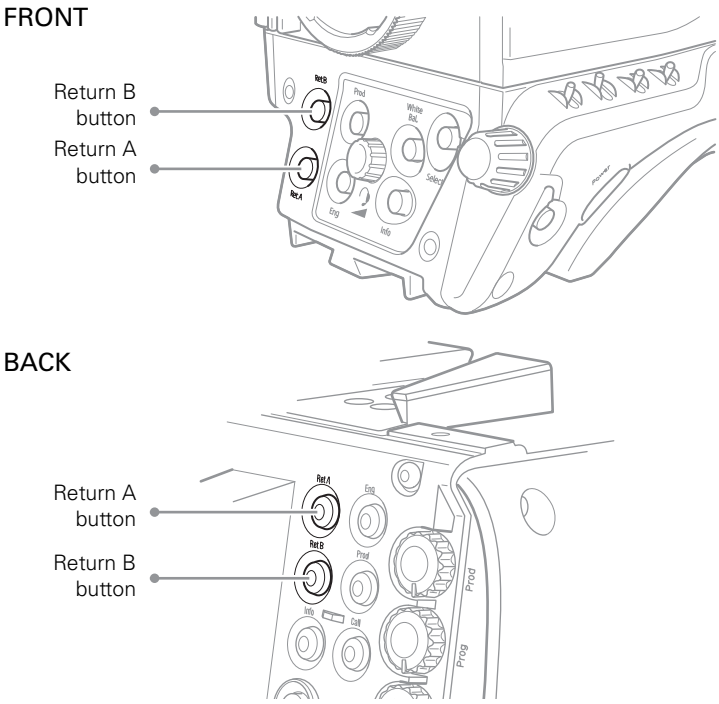
4.10.6 Setting up Tracker headset

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, 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.

4.11 Communication

4.11.1 Return video channels



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

Tip

The Return A and B buttons can be programmed as momentary (default) or alternating switches in the OPERATOR TOOBOX > BUTTONS menu.

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

4.11.2 PickMe button

Press the yellow PickMe button on the left side of the camera head or on the back panel of the adapter 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 routes this signal to the production control room and an automated action is executed, for example switching the camera signal directly to the program channel (On Air).

4.11.3 Call button

Press the Call button on the back panel to send a signal to the operational 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.

4.11.4 Other communication

Private data (RS-232 connection)

The 6-pin RS-232 connector on the back panel of the adapter allows for a serial two-way private data channel (a 100 kbit/s serial connection) between camera and XCU.

Tracker Tally signal

The 20-pin auxiliary connector on the back panel of the adapter provides, as well as providing full intercom facilities 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.

4.12 Managing files

You have access to 15 different files. This number can be extended by using additional scene files stored on a USB flash drive. The Files menu is used to recall and store these files. There are three types of file:

- scene files
- operator files
- lens 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.

The tables in "Camera menu reference" on page 81 and further 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.

4.12.1 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` 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.

4.12.2 Operator files

Four operator files are stored in the camera itself (OCam1,OCam2, OCam3 and OCam4) while more operator files can be stored on a 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.

4.12.3 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.

4.12.4 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.

4.13 Access and security

4.13.1 User level

The user level function in the CONFIGURATION > SECURITY menu restricts access, in varying degrees, to the operational controls of the camera. You can only access the functions of the SECURITY menu by entering the PIN code of the camera.

4.13.2 Selecting the user level

There are four user levels: user 0, user 1, user 2 and user 3. The purpose of the user levels is to restrict the set of functions which can be changed by whoever is using the camera. In this way a more centralized and uniform control can be achieved and the danger of the camera operator accidentally changing critical functions while shooting is reduced.

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

- User 0: Limited operation, no video control, restricted operational control (for example: crane or robotic camera operation).
- User 1: Standard operation, basic video control, full operational control (for example: studio or event camera operation).
- User 2: Stand alone operation, full video control (for example: solo operation, motor bike sports registration).
- User 3: Installation tasks, full video control, full configuration control (for example: camera engineers, testing or rigging up operation).

4.13.3 Disable camera

The disable camera function is a protection function which prevents unauthorised interference with the camera and provides an additional level of security. Setting disable camera to On is similar to using User level 0 to protect the settings of the camera.

4.13.4 Access control

A PIN code is used to access special setup and security features of the camera. The PIN code of the camera can be viewed and changed in the CONFIGURATION > SECURITY menu. The camera's PIN code when it leaves the factory is set to 0000. It is strongly advised that this code be changed by the owner on receipt of the camera. This ensures added protection against unauthorised access to the Security menu.

Chapter 5

Video setup

5.1 Video settings

5.1.1 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 "Camera menu reference" on page 81 lists the values that are set when the standard file is recalled.

To recall the standard values for the various video functions, press the green **STD File** 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 (Ocular viewfinders only)

The non-standard indicator in the viewfinder lights when one of the following conditions occur:

- Exposure time is NOT set to the nominal value;
- Black Stretch is switched on;
- Extended Auto Iris is switched on;
- AWC or FL50/FL60 color temperature is selected.

5.1.2 Video mode

Depending on the LDX camera model and version, several video modes can be selected.

OCP

Press the **SETUP MENU** button and enter the `CAM` menu. Use the `VIDEOMODE` item to choose a video mode and use `SELECT` to switch to the selected video mode.

CAM

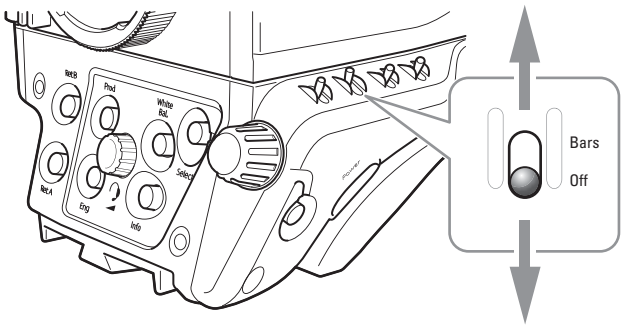
In the camera menu, go to the `PRODUCTION SETUP` > `VIDEO MODE` menu item and select the video mode you wish to use for your production.

5.1.3 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.

OCP Press the BARS button to switch on the color bar. Initially, the standard color bar is switched on and the button will light. Press it again to switch on the sawtooth signal. The button lights orange. Press again to switch off all test signals.

CAM On the camera, use the color bars switch on the left side panel for switch on the standard color bar:

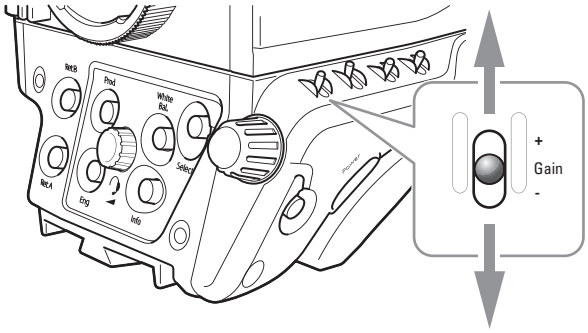


5.2 Gain

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

OCP Press the GAIN button to open the Gain menu. Select GAIN + or GAIN - to select higher or lower gain presets. Press VAR MGAIN to vary gain in steps of 0.1 dB using the rotary control.

CAM On the camera, gain is selected via the gain switch on the left side panel of the camera:



1. When this switch is pressed initially, the current gain value is displayed in the viewfinder.
2. Holding the switch in the up or down 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

☞ Note

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

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

1. Hold the switch continuously in the up or down position until you see the value in the viewfinder change in steps of 0.1 dB.
2. Release the switch when you reached the value you want. This exits the value selection mode.
3. Using the switch momentarily again sets the gain to the nearest preset value.

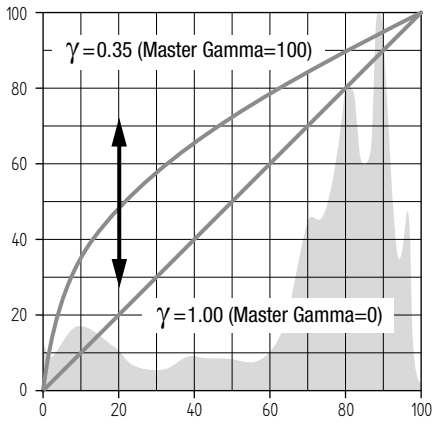
☞ Note

Selecting high gain levels may introduce more noise into the image.

5.3 Gamma

5.3.1 Gamma correction

To compensate for the non-linear response of display devices, a gamma correction is applied to the video signal. The gamma correction adjusts the tonal response of the standard transfer curve.



5.3.2 Gamma curve

The gamma curve defines the distribution of tonal values. The following standard gamma curves are available: ITU709 (default), BBC04, BBC05 and BBC06, ARD, Gamma-J and Gamma-S.

OCP Press the GAMMA button and select GAMMA CRV to select the gamma curve you want to use.

CAM In the camera menu, navigate to the PRODUCTION SETUP > LEVELS > GAMMA > CURVE item and select the gamma curve you want to use.

5.3.3 Gamma presets

The gamma preset selection determines how mid-range tonal values are reproduced. Available gamma presets are:

- Nom (nominal) setting: Master Gamma = 76 (slope = 0.45)
- Lin (linear) setting: Master Gamma = 0 (slope = 1.00)
- Var (variable) setting: Master Gamma is adjustable between 0 (slope = 1.00) and 99 (slope = 0.35).

OCP Press the GAMMA button and use the GAMMA SEL item to select the Gamma preset.

CAM In the camera menu, navigate to the PRODUCTION SETUP > LEVELS > GAMMA > PRESET function and select the Gamma preset from the list.

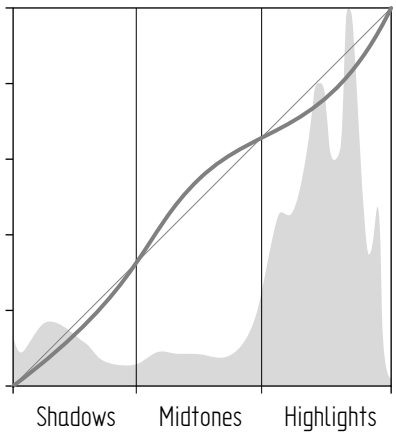
☞ Note

It's also possible to change Gamma for each channel (R,G,B). Changing the slopes of the individual color gamma changes the representation of white in the mid-range tonal values.

5.4 Contrast

5.4.1 Contrast adjustment

To create more or less contrast in the picture, luminance levels can be adjusted independently for three tonal ranges: shadows, midtones and highlights.



OCP Press the GAMMA button, the NEXT button, the NEXT button again and switch on CONTRAST. Select SHADOWS, MIDTONES or HIGHLIGHTS to adjust the luminance level for each range between 0 and 99.

CAM In the camera menu, navigate to the CREATIVE CONTROL > LEVELS > CONTRAST menu and switch CONTRAST on. Use the SHADOWS, MIDTONES or HIGHLIGHTS items to adjust the luminance level for each tonal range between 0 and 99.

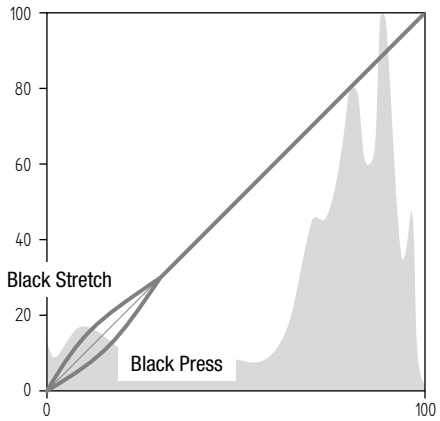
Values below 50 decrease luminance levels while values above 50 increase levels.

☞ Note

Contrast adjustment is always applied after Gamma.

5.4.2 Black Stretch

The Black Stretch function changes the level of tones in the shadow areas of the picture without affecting the rest of the picture.



OCP Press the BLACK button and switch on the BLACK STR item. Use the BLACK LVL item to adjust the Black Stretch level from 0 to 99.

CAM In the camera menu, navigate to the PRODUCTION SETUP > LEVELS > BLACK menu and switch on the BLACK item. Adjust the Black Stretch level from 0 to 99 using the BLACK STR LEVEL function.

Values below 50 are Black Press, values higher than 50 are Black Stretch.

☞ Note

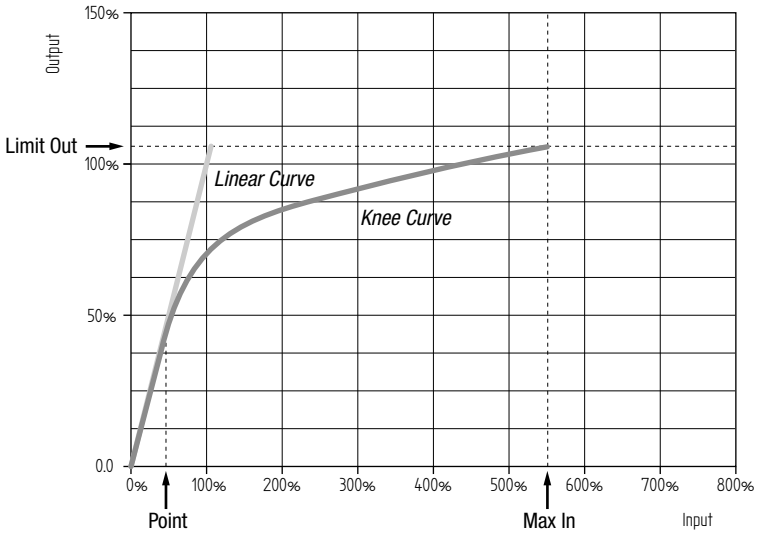
Black Stretch is applied independently from Gamma.

When Black Stretch is switched on the non-standard indicator in the viewfinder lights (only for ocular viewfinders).

5.5 Knee

Knee is a function that compresses the wide dynamic range of the video signal coming from the imager into the more limited video output range.

5.5.1 Knee (in PowerCurves mode)



Knee can be set up as an automatic or variable function. It can also be switched off, which is the default setting.

OCP Press the KNEE button. The KNEE SEL item is shown. Use this item to select Auto, Var or Off.

CAM In the camera menu, navigate to the CREATIVE CONTROL > LEVELS > KNEE > KNEE item and select Auto, Var or Off.

Auto Knee

In Auto Knee, the Knee Point is fixed to 50% and Max In is set to 400%. The Limit Out can still be adjusted between 100% and 118%. The circuitry automatically fades between the fixed Knee curve and the linear curve.

Variable Knee

The following parameters in the Knee menu can be used to set up variable Knee in PowerCurves mode:

- Kn Point/Point (0% to 90%): this is the video input level from which Knee starts compressing.
- Kn OutLim/Limit Out (100% to 118%): the highest video level that is produced at the video output.
- Kn Max In/Max In (100% to 800%): the maximum allowed video input level.

Tip

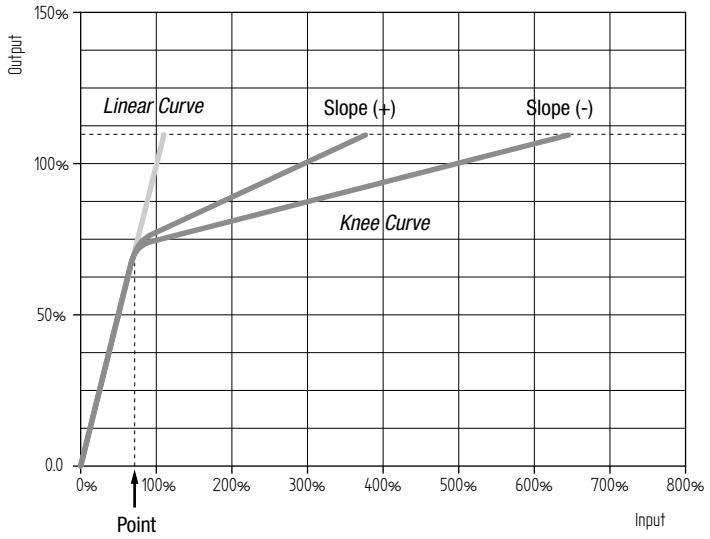
Use the KN FADE/FADE LEVEL item in the Knee menu to fade between the set up Knee curve (fade level = 0) and the linear curve (fade level = 99).

To use Knee in the compatibility mode, follow the steps below and refer to the next chapter for more information.

OCP Press the KNEE button and press the NEXT button until the KNEE MODE item is shown. Use this item to select Compat.

CAM In the camera menu, enter Service user level and navigate to the CREATIVE CONTROL > LEVELS > KNEE > ADVANCED > KNEE MODE and select Compat.

5.5.2 Knee (in Compatibility mode)



Knee can be set up as an automatic or variable function. It can also be switched off, which is the default setting.

OCP Press the KNEE button. The KNEE SEL item is shown. Use this item to select Auto, Var or Off.

CAM In the camera menu, navigate to the CREATIVE CONTROL > LEVELS > KNEE > KNEE item and select Auto, Var or Off.

Auto Knee

In Auto Knee, the Knee Point is fixed while slope automatically adjusted achieve the best possible Knee compression.

Variable Knee

The following parameters in the Knee menu can be used to set up variable Knee in Compatibility mode:

- Kn Point/Point M (0 to 99): this is the video input level from which Knee starts compressing.
- Kn Slope/Slope M (0 to 99): determines how much compression is applied above the Knee point.
- Knee Limit (0 to 99): the maximum allowed video input level.

5.6 Optical filters

Both a Neutral Density filter (ND) and a Special Effects filter (FX)[1)] 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.

OCP Press the FILTERS 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. Navigate to the filter type (ND or FX, when available) 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 filters

☞ Note

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

Three Effects (FX) filter positions are available[1)]:

- Clear - no filter is placed in the optical path
- Star 4P - Four Point Star filter
- Sft Fcs - Soft Focus filter

☞ 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 (from 2500 K to 20000 K) that there is never any need to use color filters to obtain the correct white balance.

5.7 Exposure

5.7.1 Exposure time

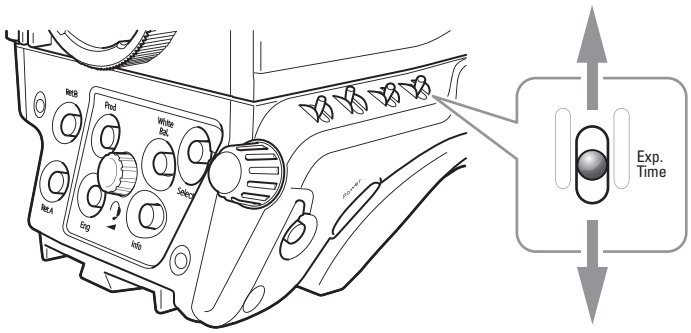
The exposure time values of 1/200 s, 1/500 s and 1/1000 s are used to capture fast moving objects so that these can be played back sharply in slow motion. The value selected depends on the speed of the moving object.

☞ Note

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

OCP Press the EXP. TIME button and select the EXP SEL function. Select the exposure time you want to use.

CAM On the left side panel of the camera the momentary up/down **exposure time** switch gives a choice of exposure time presets.



Value	Function
Nom.	nominal setting
Var	Variable exposure time
1/200 s	for fast moving objects
1/500 s	for fast moving objects
1/1000 s	for fast moving objects
50 Hz	for shooting under 50 Hz lighting (adjustable with Lighting correction)
60 Hz	for shooting under 60 Hz lighting (adjustable with Lighting correction)

☞ Note

If an exposure time other than nominal (Nom.) is selected, the **non-standard** indicator in the viewfinder lights (only for ocular viewfinders).

5.7.2 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.

5.7.3 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.

5.7.4 Variable exposure time

When shooting computer monitors with higher frame rates than the camera's you can use variable exposure to avoid horizontal bars in the picture.

OCP Press the EXP. TIME button and set EXP SEL to Var. Now change the VAR EXP to remove the horizontal bar. You can set the EXP UNITS item on the next page to the preferred read-out: Hz or mSec.

When you are finished shooting the monitor go to the EXP SEL item and switch it back to Nom. The exposure time returns to its previous non-variable setting.

CAM Use the **exposure time** switch on the camera to select variable exposure time. Or, in the camera menu, navigate to the PRODUCTION SETUP > EXPOSURE > EXP TIME menu and set EXP TIME SEL to Var. Now change the VAR EXP TIME to remove the horizontal bar. You can set the UNITS item to the preferred read-out: Hz or mSec.

When you are finished shooting the monitor go to the EXP TIME item and switch it back to Nom or use the **exposure time** switch. The exposure time returns to its previous non-variable setting.

Note

When Variable Exposure is switched on, the **non-standard** indicator in the viewfinder lights (only for ocular viewfinders).

5.7.5 LED Wall Filter

When shooting against LED Wall backgrounds that contain high frequencies, interference may occur, resulting in unwanted moiré 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.

5.8 Color

5.8.1 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).

5.8.2 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.

5.8.3 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.

5.8.4 Selecting color temperature

The up/down **color temperature** switch on the left side of the camera allows a choice between three preset color temperatures:

- 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 2500 K to 20000 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 actual value of a measured color temperature. The range of the auto-white balance is from 2500 K to 20000 K.

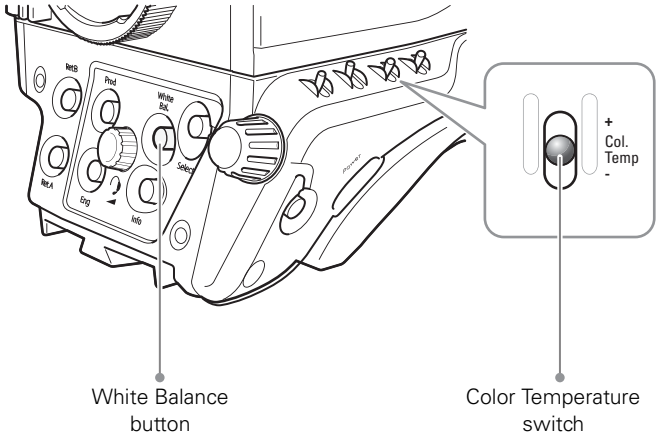
5.8.5 Variable color temperature

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 (2500 K to 20000 K).

1. Hold the switch continuously in the up or down 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. Using the switch momentarily again sets the color temperature to the nearest standard value.

5.8.6 Auto White Balance

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



1. On the OCP 400, press the **COLOR** button to open the color menu. Select **COL.TEMP** 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. On the OCP 400, press the **WHITE BALANCE** button — the button lights.
   On the camera, press the **White Balance** button on the front panel to start the Auto White Balance procedure.
3. The following appears in the viewfinder:

☞ 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 OCP 400, press the **WHITE BALANCE** button again — the button flashes.
   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:

☞ 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. On the OCP 400 the button light is switched off.

The measured color temperature is now stored in the selected memory position and can be recalled as required.

If the auto-white measurement has been unsuccessful, the light in the WHITE BALANCE button on the OCP 400 is orange.

☞ 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.

5.8.7 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.

OCP Press the COLOR button, select the SATURATION item and adjust the level.

CAM In the camera menu, navigate to the PRODUCTION SETUP > COLOR > SATURATION item and adjust the level

5.8.8 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.

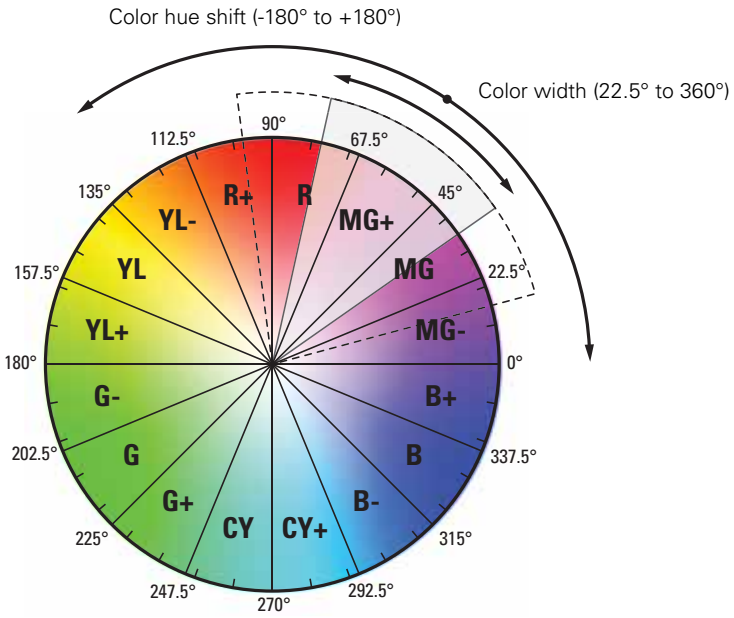
The Color Protect function restores luminance levels without affecting color oversaturation.It prevents non-dominant colors from decreasing below black level so much of the details in the picture are still maintained. If a dominant color saturates, Color Protect gradually decreases its influence in the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

OCP Press the COLOR button and press the NEXT button until the item PROTECT is shown. Switch this item on.

CAM In the camera menu, navigate to the CREATIVE CONTROL > COLOR > COLOR ADJUSTMENT > COL PROTECT menu and switch on the item COL PROTECT.

5.8.9 Secondary color correction

Secondary color correction is used to adjust hue, saturation and luminance of partial areas of the color spectrum of the image. Typical applications include live sports or news productions. Depending on your camera model, 2 or 6 color areas can be set up and corrected at the same time.



OCP

Setup using the OCP 400

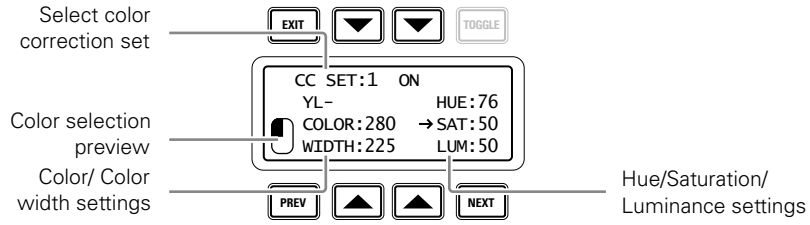
Follow these steps to set up the color corrector on the OCP 400:

1. With the control panel connected to the camera, press the COLOR button on the control panel (in the video parameter section). The color menu is displayed.
2. Use the NEXT button to scroll to the next menu.
3. Switch on the color corrector with the CORRECTOR item at the top left of the screen.

4. Push the navigation button to enter COLCORR (color correction) menu. The color corrector menu is displayed. There are two pages that can be accessed by using the NEXT and PREV buttons.

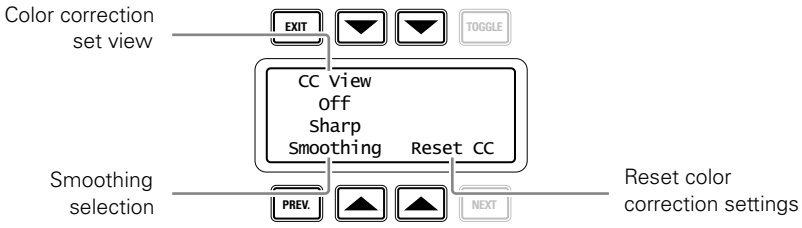
The first page contains the setup items. Use the navigation buttons to scroll through the different setup items.

1. Select a color correction set with the CC SET item at the top left of the screen.
2. Activate the selected set using the top right selection button. When a set is not activated, all items are blocked.
3. Select a color area by changing the COLOR and WIDTH. Select the parameter with the navigation button and change its value with the rotary control. A preview of the color selection is shown on the bottom left of the screen.
4. Adjust HUE, SATURATION an LUMINANCE of the selected color range. Select the parameter with the navigation button and change its value with the rotary control.



Use the NEXT button to go to the second page.

1. Switch the CC VIEW item on the view the color area selection.
2. Select a transition style using the SMOOTHING item.
3. You can reset all color correction sets to their default values with the RESET CC item.
4. Leave this page by pressing the PREV button.



CAM

Setup using the camera menu

Carry out the following steps to set up the color corrector in the camera menu:

1. In the CREATIVE CONTROL > COLOR ADJUSTMENT > COL CORR menu, switch the item COL CORR on.
2. Go to the item SET and select a color correction set.
3. Switch on the item SET ON/OFF to activate the selected set.

4. Select a color area by changing the COLOR and WIDTH items. The color can be selected in steps of 22.5° on the color wheel. The color area width can be enlarged by setting the WIDTH item. The color width can be varied between 22.5° and 360°.
5. To view the selected color area, switch the item COL CORR VIEW on. Make sure to switch it off before going on air.
6. Now make adjustments of the selected color area by changing the HUE (color hue), SAT (color saturation) and LUM (luminance) items.

The transition between the corrected and uncorrected color area can be set to sharp, medium or smooth using the SMOOTHING item.

Tip

You can reset the color corrector by activating the RESET CC item. All color correction sets are reset to their nominal values.

5.9 Sharpness

5.9.1 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.

OCP Press the DETAIL button and use DTL LEVEL to adjust the amount of detail 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.

5.9.2 Texture

Texture adds subtle sharpness to very fine textures (e.g. fabrics, leaves and stone surfaces) in the image.

OCP Press the DETAIL button and use the TEXTURE function to adjust the amount of texture added to the picture.

CAM In the camera menu, navigate to the CREATIVE CONTROL > SHARPNESS > DETAIL menu and use TEXTURE to adjust the amount of Texture detail added to the picture.

Note

Texture can be disabled in the advanced submenu of the camera menu, or in the Detail menu of the OCP.

5.9.3 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)

5.9.4 Lens related functions

Detail follows Gain

By nature, high video gain levels introduce more noise which have a negative effect on Detail processing. When switched on, the Detail follows Gain function decreases Detail for higher gain values.

Detail follows Zoom

Typically, close up shots contain larger and fewer image elements than wide angle shots. Detail enhancement generally produces better results with larger structures so when this function is switched on, the camera lowers the influence of Detail depending on the zoom factor.

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.

OCP Press the DETAIL button and press the NEXT button until the items FLW GAIN and FLW ZOOM are shown. The item APTFLWIRIS can be found by pressing the SETUP button.

CAM In the camera menu, go to the CREATIVE CONTROL > SHARPNESS > DETAIL > ADVANCED menu to find the lens related detail functions.

5.9.5 Detail Equalizer

The detail equalizer allows to set the detail levels for shadows, midtones and highlights individually. In general, shadow areas need less detail enhancement as it increases noise levels.

OCP Press the DETAIL button, the NEXT button and select the DETAIL EQ menu. Switch on the DETAIL EQ item. Now use the SHADOW, MIDTONE or HIGHLIGHT items to adjust the detail level for each tonal range between 0 and 99.

CAM In the camera menu, navigate to the CREATIVE CONTROL > SHARPNESS > DETAIL EQUALIZER menu and switch on the DETAIL EQUALIZER item. Use the SHADOWS, MIDTONES or HIGHLIGHTS items to adjust the detail level for each tonal range between 0 and 99.

Values below 50 decrease detail while values above 50 increase detail.

5.9.6 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.

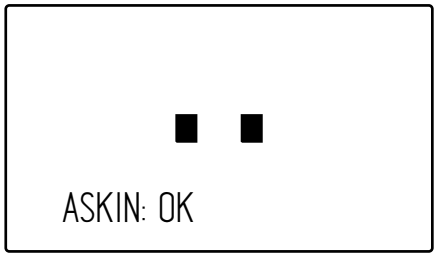
Auto Skin Detail

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 (and not 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:

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:

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



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.

5.10 AnyLightXtreme™

Under artificial light conditions it is recommended to examine the lighting conditions and set the camera's flicker reduction presets accordingly.

OCP Press the EXP. TIME button and use LIGHTING to select the setting you want to use with AnyLightXtreme.

XCU Connect a monitor to the Live Effect (D) output of the XCU and enter the XCU menu. Go to in the VIDEO > ANYLIGHT menu and select the setting you want to use with AnyLightXtreme.

There are six presets to adjust the camera to accommodate different lighting conditions. Switching to Poor results in an almost flicker free picture. In most cases this will be the preset to start with if flicker is visable with the Optimal preset. Fine tune the light accommodation by switching to Poor or Fair presets if other artifacts become noticeable.

- Off (default setting) - Switches off the AnyLightXtreme
- Optimal - For daylight and non-alternating or high-frequency artificial lighted environments. Each field has the same video level and flicker reduction is not necessary.
- Good - For artificial lighting with minor amplitude changes. Examples are environments lighted with incandescent or well balanced three-phase lighting. Use this preset also when daylight and artificial light with alternating effects are combined.
- Fair - For artificial lighting with significant amplitude changes, for example fluorescent lighted environments.
- Poor - For artificial lighting with major amplitude changes. Examples are environments lighted with HMI, MHD, gas discharge lamps or neon light.
- Extreme - Results in a completely flicker free picture but it introduces an increased level of motion blur. Use this setting only in lighting conditions with extreme light amplitudes.

☞ Note

It is not recommended that 50, 100,150 and 300 Hz video modes are used with 60 Hz lighting and similarly, it is not recommended that 60, 120,180 and 360 Hz video modes are used with 50 Hz lighting.

5.11 Image control

5.11.1 Freeze Frame

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 Balace procedure 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.

5.11.2 Reverse Scan

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).

Chapter 6

Camera menu reference

6.1 Reference tables

All camera functions are distributed into 6 main menus:

- 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 table 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.
- Default: the factory default value for the listed function.
- 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 is the access level for advanced functions.
- File: indicates the file type (Operator, Scene or Lens file) in which the function is stored.
- Description: a short description of the function and its values.

6.2 Operator Toolbox menu

Menu item	Values	Default	Level	File	Description
Indicators					
Zoom Indicator	On, Off	Off	User 0	Oper	Switches the Zoom indicator on or off.
Iris Indicator	On, Off	Off	User 0	Oper	Switches the Iris indicator on or off.
Focus Indicator	On, Off	Off	User 0	Oper	Switches the Focus indicator on or off.
Filter Indicator	On, Off	Off	User 0	Oper	Switches Optical Filter indicator on or off.
DOF Indicator	On, Off	Off	User 0	Oper	Switches the (DOF) Depth of Field indicator on or off
Center Cross	On, Off	Off	User 0	Oper	Switches the center cross on or off.
Safe Area					
Safe Area	On, Off	Off	User 0	Oper	Switches the Safe Area on or off.
Safe Area Type	16:9, 5:9, 14:9, 4:3	16:9	User 0	Oper	Selects the aspect ratio of the Safe Area.
Marker					
Marker	On, Off	Off	User 0	Oper	Switches the marker on or off.
Marker Type	15:9, 14:9, 4:3	4:3	User 0	Oper	Selects the aspect ratio of the marker.
Marker Style	Dot, Shad, Both	Dot	User 0	Oper	Selects the style of the marker: Dot = dotted lines; Shad = shaded areas; Both = dotted lines and shaded areas.
Marker Shading	Shad, Black	Shad	User 0	Oper	Selects shading for the marker (when marker style = Shad or Both): Shad = transparent area, Black = black area.
Zebra					
Zebra	On, Off	Off	User 0	Scene	Switches 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	Level	User 3	Oper	Selects 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%	User 3	Oper	Sets the exposure level at which zebra pattern is shown. When level is higher than 100% the zebra indicates overexposed areas.
Zebra Contrast	0..99	15	User 3	Oper	Sets the zebra indication contrast ratio.
Focus Assist	On, Off	Off	User 0	Oper	Adds a crawling effect in the focused areas in the viewfinder to assist focussing.
Ind White Lvl	0..99	70	User 2	Oper	Sets the white (brightness) level of the indicators:0 = very dark; 99 = very bright
AutoIris Area	Off, On	Off	Service	Oper	Switches the AutoIris Area indication on or off.
VF Monitoring	YCrCb, Y, R, G, B, -G, R-G, B-G	YCrCb	User 2	Oper	Selects type of signal to view in viewfinder.
VF Detail					
VF Detail	Off, On, Boost	On	User 0	Oper	Switches detail for viewfinder signal on or off or adds extra detail to the viewfinder signal ('Boost').

Menu item		Values	Default	Level	File	Description
	Super Coarse	On, Off	Off	User 0	Oper	Switches super coarse detail enhancement on or off.
	Detail Level	0..99	50	User 0	Oper	Sets detail level for viewfinder signal.
	Slicer	0..99	20	User 0	Oper	Sets the noise slicer level for VF detail.
	Vert Detail Lvl	0..99	50	User 3	Oper	Sets the level of the vertical component in the detail signal
	Coarse/Fine	0..99	90	User 3	Oper	Sets detail balance between coarse and fine structures (0 = coarse, 99 = fine).
	Level Dep	0..99	20	User 3	Oper	Sets the level where the detail enhancement starts to work.
	Soft Detail	On, Off	On	User 3	Oper	Switches Soft Detail on or off. Reduces the amount of detail added for large transitions.
	Soft Detail Lvl	0..99	50	User 3	Oper	Sets the upper limit level of detail enhancement for soft detail.
Menu Settings						
	Rotary Speed	1..10	5	User 2	Oper	Selects the sensitivity of the menu navigation rotary control.
	Menu Display	On, Time	Time	User 2	Oper	Selects the camera menu to be permanently On or to disappear after a set Time.
	Menu Time	3..30	10	User 2	Oper	Sets the time (in seconds) the menu is displayed when Menu Display is set to Time.
	Menu White Lvl	0..99	70	User 2	Oper	Sets the white level (brightness) of the characters of the menu.
Intercom						
	Cam Sidetone	75	0..99	User 3	Oper	Sets the sidetone level (audio feedback from mic to headset) in the camera operator's headset.
	Tracker Sidetone	75	0..99	User 3	Oper	Sets the sidetone level (audio feedback from mic to headset) in the tracker's headset.
Buttons						
	SW1	Call, EXT1, EXT2, PROD, ENG, Select	EXT1	User 0	Oper	Assigns a function to user button SW1.
	SW1 Mode	Mom, Alt	Mom	User 0	Oper	Selects switching mode for SW2: momentary (push) or alternating (toggle).
	SW2	Elris, Zoom, FocAst, EXT1, EXT2, PROD, ENG	Ext2	User 0	Oper	Assigns a function to user button SW2.
	SW2 Mode	Mom, Alt	Mom	User 0	Oper	Selects switching mode for SW2: momentary (push) or alternating (toggle).
	PickMe Mode	Mom, Alt	Mom	User 1	Oper	Selects switching mode for the PickMe buttons: momentary (push) or alternating (toggle).
	Handgrip Left	Prod, Eng	PROD	User 1	Oper	Assigns an intercom function to the left handgrip button.
	Eng Mode	Mom, Alt	Mom	User 1	Oper	Selects switching mode for the Eng button at the back panel of the camera: momentary (push) or alternating (toggle).
	LED Brightness	High, Low	High	User 0	Oper	Selects brightness level for the LED buttons at the back panel of the camera.

Menu item	Values	Default	Level	File	Description
Ret A/Ext1	EXT1, EXT2	EXT1	User 0	Oper	Assigns an External Video channel to Ret A and Ext1 buttons.
Ret A Mode	Mom, Alt	Mom	User 0	Oper	Selects switching mode for Ret A: momentary (push) or alternating (toggle).
Ret B/Ext2	EXT2, EXT3	EXT2	User 0	Oper	Assigns an External Video channel to Ret B and Ext2 buttons.
Ret B Mode	Mom, Alt	Mom	User 0	Oper	Selects switching mode for Ret B: momentary (push) or alternating (toggle).
VTR Lens	PROD, ENG, Zoom, EXT1, EXT2	PROD	User 1	Oper	Assigns a function to the VTR Lens button.
VTR Lens Mode	Mom, Alt	Mom	User 1	Oper	Selects switching mode for the VTR Lens button: momentary (push) or alternating (toggle).
RET Lens	EXT, Zoom, FocAst	EXT	User 1	Oper	Assigns a function to the RET Lens button.
RET Lens Mode	Mom, Alt	Mom	User 1	Oper	Selects switching mode for the RET Lens button: momentary (push) or alternating (toggle).
RET2	Zoom, EXT2	EXT2	User 1	Oper	Assigns a function to the RET 2 Lens button.
RET2 Mode	Mom, Alt	Mom	User 1	Oper	Selects switching mode for the RET 2 Lens button: momentary (push) or alternating (toggle).
SXP F1	None, ND, FX[1)], Bars, Prog, Back, Info, PickMe	None	User 1	Oper	Assigns a function to the F1 user button on the SuperXpander, when present.
SXP F2	None, ND, FX[1)], Bars, Prog, Back, Info, PickMe	None	User 1	Oper	Assigns a function to the F2 user button on the SuperXpander, when present.
SXP F3	None, ND, FX[1)], Bars, Prog, Back, Info, PickMe	None	User 1	Oper	Assigns a function to the F3 user button on the SuperXpander, when present.
Zoom Settings					
Handgrip Zoom	Off, On	On	User 0	Oper	Switches zoom control (on top of camera handgrip) on or off.
Zoom Speed	1..10	5	User 3	Oper	Sets the zoom control speed.
Zoom Curve	0..3	0	User 3	Oper	Selects the zoom control response curve: 0 = linear curve 1 = low curve 2 = medium curve 3 = steep curve
Zoom/Focus	Loc, Rem	Loc	User 0	—	Selects local or remote control of the Zoom/ Focus function. Only available when a SuperXpander is present.
Files					
Store Oper File					
File Select	Standard, OCam1, OCam2...	OCam1	User 1	—	Selects a standard, camera or USB Operator File for storing.
Store	Exec, ...	Exec	User 1	—	Stores the current operator settings in the selected operator file.
Recll Oper File					

Menu item			Values	Default	Level	File	Description
	File Select		Standard, OCam1, OCam2...	OCam1	User 1	—	Selects a standard, camera or USB Operator File for recall.
	Recall		Exec, ...	Exec	User 1	—	Recalls the selected operator file to the camera. This overwrites current operator settings.
USB							
	Name		<name>	—	User 2	—	Displays USB device name.
	Free Space		# MB	—	User 2	—	Displays free space left on USB in Mbytes.
	No of Files		#	—	User 2	—	Displays number of files stored on USB.
	USB Files						
		File Select	<list of files>	—	User 2	—	Selects a file on the USB device.
		Delete	Exec, ...	Exec	User 2	—	Deletes the selected file.
		Filename	<name>	—	User 2	—	Changes name of the selected file.
		Attribute	R/W, R	R	User 2	—	Selects the attribute for the selected file: R/W = Read and Write; R = Read only.
Notch EXT			Off, On	Off	User 0	—	Switches external notch filter on or off.
EXT AspectRatio			16:9, 4:3	4:3	User 0	—	Selects aspect ratio of external video signal displayed in the viewfinder.

6.3 Production Setup menu

Menu item	Values	Default	Level	File	Description
Levels					
Gain					
Master Gain	-3.00 .. 18.00 dB	0	User 2	—	Sets master video gain in 0.10 dB steps.
Gain Presets					
Gain -	-3 dB	-3 dB	User 2	Oper	Selects gain value for - preset.
Gain +	3 dB, 6 dB, 9 dB, 12 dB	3 dB	User 2	Oper	Selects gain value for + preset.
Gain ++	6 dB, 9 dB, 12 dB, 15 dB	6 dB	User 2	Oper	Selects gain value for ++ preset.
Gain +++	9 dB, 12 dB, 15 dB, 18 dB	12 dB	User 2	Oper	Selects gain value for +++ preset.
Black					
Black Stretch	On, Off	Off	User 3	Scene	Switches Black Stretch on or off.
Black Str Level	0..99	50	User 3	Scene	Sets Black Stretch Level: 0 = few shades of grey; 99 = more shades of grey. Values below 50 are Black Press, values higher than 50 are Black Stretch.
Black Str Type	Press, Stretch	Stretch	User 3	Scene	Selects Black Stretch type. Black Stretch increases the tonal scale in shadow areas and Black Press decreases the tonal scale.
Master Black	0..99	50	User 2	Scene	Sets Master Black level: this is the video level that is considered as pure black.
Advanced					
Master Black	0..99	50	User 3	Scene	Sets Master Black level: this is the video level that is considered as pure black.
Black R	0..99	50	User 3	Scene	Sets Black level for the Red channel.
Black G	0..99	50	User 3	Scene	Sets Black level for the Green channel.
Black B	0..99	50	User 3	Scene	Sets Black level for the Blue channel.
Gamma					
Curve	BBC04, BBC05, BBC06, ARD, ITU709, Gamma-J, Gamma-S	ITU709	User 3	Scene	Selects a standard curve for Gamma correction.
Preset	Nom, Lin, Var	Nom	User 2	Scene	Selects Gamma curve preset: Nom = Nominal curve; (0.45) Lin = Linearised curve; Var= variable (adjustable with Master Gamma setting)
Master Gamma	0..99	76	User 3	Scene	Sets Master Gamma Level.
Gamma R	0..99	76	User 3	Scene	Sets Gamma level for the Red channel.
Gamma G	0..99	76	User 3	Scene	Sets Gamma level for the Green channel.
Gamma B	0..99	76	User 3	Scene	Sets Gamma level for the Blue channel.
White Limiter					
White Limiter	On, Off	On	Service	Scene	Switches White Limiter on or off. Use to limit highlight levels in the video signal.

Menu item	Values	Default	Level	File	Description
Master	87.7% .. 109.1%	105%	Service	Scene	Sets the White Limiter level. This is the luminance level at which clipping occurs.
Exposure					
Iris					
Auto Iris					
Auto Iris	On, Off	Off	User 0	—	Switches Auto Iris on or off.
Area	Top, Spot S, Spot M, Spot L, Full, Bottom, Custom	Top	Service	—	Selects AutoIris Area.
Custom Area					
Area 1					
Top	0..99	57	Service	—	Select a custom area for Auto Iris Peak measurement, when Area = Custom.
Bottom	0..99	86	Service	—	
Left	0..99	24	Service	—	
Right	0..99	76	Service	—	
Area 2					
Top	0..99	27	Service	—	Select a custom area for Auto Iris Average measurement, when Area = Custom.
Bottom	0..99	57	Service	—	
Left	0..99	5	Service	—	
Right	0..99	95	Service	—	
Peak/Average	0..99	64	User 3	Scene	Sets the Auto Iris measurement balance between peak and average video level.
Auto Iris SP	0..99	35	User 3	Scene	Sets Auto Iris Setpoint.
Mom Iris SP	0..99	50	User 3	—	Sets Momentary Iris Setpoint.
Auto Iris Gain	5..10	5	User 3	—	Sets Auto Iris Gain.
Extended Iris					
Extended Iris	On, Off	Off	User 0	—	Switches Extended Iris on or off.
Gain Speed	1..20	5	Service	—	Sets Gain Speed for Extended Iris.
ExpTime Speed	1..20	4	Service	—	Sets Exposure Time Speed for Extended Iris.
Min Iris	F5.6, F8.0, F11.0, F16.0	F16.0	User 3	—	Sets Minimum Iris value for Extended Iris.
Max Iris	F1.4, F2.0, F2.8, F4.0, F5.6	F2.0	User 3	—	Sets Maximum Iris value for Extended Iris.
Min.ExpTime	1/100, 1/200, 1/500	1/500	User 3	—	Sets Minimum Exposure Time for Extended Iris.
Max Gain	0 dB ..15 dB	15 dB	User 3	—	Sets Maximum Gain value for Extended Iris.
Lighting					
Lighting	Off, On	Off	User 1	Scene	Switches Lighting function on or off.
Correction	-10 .. +10	0	User 1	Scene	Sets the exposure 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	Off	User 1	Scene	Switches V-Shift (acquisition timing shift) on or off.

Menu item	Values	Default	Level	File	Description
V-Shift Time	0..99	0	User 1	Scene	Selects V-Shift (acquisition timing shift) time.
Exp Time					
Exp Time Select	50 Hz, 60 Hz,1/200, 1/500, 1/1000, Var	Off	User 1	—	Selects exposure time.
Var Exp Time	50 ... 1000	—	User 1	—	Selects variable exposure time (when Exp Time Select = Var)
Units	ms, Hz	Hz	User 1	—	Selects display units for variable exposure time.
LED Wall Filter	Off, On	Off	User 2	Scene	Switches LED Wall Filter on or off.
Color					
Color Temp					
Color Filter	-100..100	0	User 2	Scene	Varies the color balance to obtain warmer or cooler effects. Negative values give cooler effects while positive values give warmer effects.
Color Temp	2000 K ...20000 K	3200 K	User 2	Scene	Sets the color temperature.
Tint	-150..150	0	User 2	Scene	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	User 2	Scene	Sets Gain Red level.
Gain G	0..99	50	User 2	Scene	Sets Gain Green level.
Gain B	0..99	50	User 2	Scene	Sets Gain Blue level.
Range	3dB, 6dB	3dB	User 2	Scene	Selects Gain control ('Painting') range.
x	0.2 .. 0.55	0.423	User 3	—	Displays the chromacity x-value. Note: this is only an approximation.
y	0.2 .. 0.55	0.399	User 3	—	Displays the chromacity y-value. Note: this is only an approximation.
Saturation	0..200%	100%	User 0	Scene	Sets color saturation level. 0% = fully desaturated (black/white), 100% = normal saturation, 200% = maximum saturation.
Matrix					
Matrix	EBU, Skin, B/W, RAI, BBC, 1:1, CoolFL, XGL, Var1, Var2	XGL	User 2	Scene	Selects a preset for the color matrix: EBU = color matrix according to EBU; Skin = EBU optimised for skin tones; B/W: monochrome picture; RAI: RAI TV optimisation; BBC = BBC optimisation; 1:1 = matrix is switched off; CoolFL= optimised for mixed fluorescent and incandescent lighting; XGL = optimised for Asian skin tones (advised to combine with M/G setting); Var1 = variable setting 1; Var2 = variable setting 2.
Mat/Gam Order	G/M, M/G	M/G	Service	Scene	Selects the order of the matrix and gamma: G/M = gamma before matrix; M/G = matrix before gamma (advised to use when matching with cameras of other manufacturers)

Menu item	Values	Default	Level	File	Description
Advanced					
G->R	0..99	50	Service	Scene	Sets Green into Red coefficient (when Matrix is set to variable).
B->R	0..99	50	Service	Scene	Sets Blue into Red coefficient (when Matrix is set to variable).
R->G	0..99	50	Service	Scene	Sets Red into Green coefficient (when Matrix is set to variable).
B->G	0..99	50	Service	Scene	Sets Blue into Green coefficient (when Matrix is set to variable).
R->B	0..99	50	Service	Scene	Sets Red into Blue coefficient (when Matrix is set to variable).
G->B	0..99	50	Service	Scene	Sets Green into Blue coefficient (when Matrix is set to variable).
Image Control					
Freeze	On, Off	Off	User 2	—	Switches image freeze on or off. Use to assist off line setup and configuration.
Reverse Scan					
Reverse Scan	On, Off	Off	User 0	Scene	Switches Reverse Scan on or off.
Mode	Horiz, Vert, Both	Horiz	User 0	Scene	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	-20..20	0	User 0	—	Shifts the image in horizontal direction (in pixels)
Vertical	-4..4	0	User 0	—	Shifts the image in vertical direction (in lines)
Files					
Store Scene File					
File Select	Standard, SCam1 .. SCam4	SCam1	User 2	—	Selects a standard, camera or USB Scene File for storing.
Store	Exec, ...	Exec	User 2	—	Stores the current operator settings in the selected operator file.
RecII Scene File					
File Select	Standard, SCam1 .. SCam4	SCam1	User 1	—	Selects a standard, camera or USB Operator File for recall.
Recall	Exec, ...	Exec	User 1	—	Recalls the selected operator file to the camera. This overwrites current operator settings.
Attributes					
File Select	<available files>	SCam1	User 2	—	Selects a file to change its attributes.
Filename	<filename>	—	User 2	—	Displays the selected file name.
Attribute	R/W, R	R/W	User 2	—	Selects the attribute for the selected file: R/W = Read and Write; R = Read only.
Video Mode	1080i150, 720p159, 1080i150 ...	1080i150	User 3	—	Selects video mode. Available video modes depending on camera model and license.

6.4 Creative Control menu

Menu item	Values	Default	Level	File	Description
Levels					
Filters					
ND Filter	Clear, ND 1/4 , ND 1/16, ND 1/64	Clear	User 2	Scene	Selects 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, Star 4P, Sft Fcs, Cap	Clear	User 2	Scene	Selects optical Effects (FX) filter: Clear = No filter; Star 4P = 4 Point Star; Sft Fcs = Soft Focus; Cap = Lens capped.
Contrast					
Contrast	On, Off	Off	User 3	Scene	Switches Contrast adjustment on or off.
Shadows	0..99	50	User 3	Scene	Adjusts contrast level in the shadows area.
Midtones	0..99	50	User 3	Scene	Adjusts contrast level in the midtones area.
Highlights	0..99	50	User 3	Scene	Adjusts contrast level in the highlights area.
Knee (in PowerCurves mode)					
Knee	Off, Var, Auto	Off	User 2	Scene	Selects Knee: Auto = automatic ; Var = variable; Off = Knee is switched off.
Knee Type	Y, NAM	Y	User 3	Scene	Selects source signal on which Knee acts: Y = luminance; NAM = Non Additive Mix: level of the highest RGB component.
Point	0%..90%	35%	User 3	Scene	Knee point: this is the video output level where compression begins.
Fade Level	0..99	0	User 3	Scene	Fades between a linear (99) and a Knee (0) compression curve (when Knee = Var).
Limit Out	100%..109%	100%	User 3	Scene	Sets maximum output video level after compression.
Max In	100%..800%	200%	User 3	Scene	Sets maximum input video level.
Saturation	Off, On	Off	User 3	Scene	Switches color saturation above Knee on or off.
Saturation Lvl	0..99	50	User 3	Scene	Sets color saturation level above Knee.
Advanced					
Knee Mode	Compat,PwrCurves	PwrCrves	Service	Scene	Selects Knee Mode: Compatibility or PowerCurves.
Auto Ref	0..99	30	Service	Scene	Sets the reference level for Knee (when Knee = Auto)
Knee (in Compatibility mode)					
Knee	Off, Var, Auto	Off	User 2	Scene	Selects Knee: Auto = Automatic Knee; Var = Variable Knee; Off = Knee is switched off.
Knee Type	Y, NAM	Y	User 3	Scene	Selects source signal on which Knee acts: Y = luminance; NAM = Non Additive Mix (level of the highest RGB component, use this setting for highly saturated pictures).
Slope M	0..99	50	User 3	Scene	Sets the Knee slope (when Knee = Var).
Point M	0..99	60	User 3	Scene	Sets the Knee point (when Knee = Var).
Advanced					

Menu item	Values	Default	Level	File	Description
Knee Mode	Compat, PwrCurves	PwrCrves	Service	Scene	Sets Knee Mode: Compatibility or PowerCurves.
Knee Limit	0..99	99	Service	Scene	Selects the level above which the Knee Limiter is active (when Knee = Var).
Desat	Off, On	Off	User 3	Scene	Switches Desaturation on or off. This desaturates color above Knee to cancel out unwanted color casts.
Desat Level	0..99	50	User 3	Scene	Sets Desaturation level (0=no desaturation, 99 = maximum desaturation)
Auto Point	0..99	30	Service	Scene	Sets the point where compression starts (when Knee = Auto)
Auto Ref	0..99	30	Service	Scene	Sets the reference level for Knee (when Knee = Auto)
Flare					
Flare	Off, On	On	User 3	Scene	Switches flare correction on or off.
Red	0..99	10	User 3	Scene	Sets flare correction for Red.
Green	0..99	15	User 3	Scene	Sets flare correction for Green.
Blue	0..99	25	User 3	Scene	Sets flare correction for Blue.
Color					
Color Adjustment					
Col Corr					
Col Corr	Off, On	Off	User 3	Scene	Switches color corrector on or off. All active sets are used when color corrector is on.
Col Corr View	Off, On	Off	User 3	—	Switch on to view the selected color area in the main signal.
VF View	Off, On	Off	User 3	Oper	Switch on to view the selected color area in the viewfinder.
Set	1,2,3[1],4[1],5[1],6[1]	1	User 3	—	Selects a color correction set.
Set On/Off	Off, On	Off	User 3	—	Switches the selected color corrector set on or off. Note: when off, settings can not be changed.
Color	0..359.99	0	User 3	—	Sets the color area by hue (in steps of 22.5 degrees)
Width	22.50..360	101	User 3	—	Sets the color area hue width (in degrees).
Hue	-180..180	112	User 3	—	Sets the hue (in degrees) for the selected area.
Sat	0..99	0	User 3	—	Sets the saturation level for the selected area.
Luminance	0..99	0	User 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	MG-	User 3	—	Displays color area name: B: Blue; MG: Magenta; R: Red; YL: Yellow; G: Green; CY: Cyan
Smoothing	Sharp, Medium, Smooth	Medium	User 3	—	Selects method for smoothing transitions between affected and nonaffected areas.
Reset	Exec, ..	Exec	User 3	—	Resets the color corrector to its default values. All sets are reset.
Col Protect					

Menu item			Values	Default	Level	File	Description
		Col Protect	Off, On	Off	User 3	Scene	Switches Color Protect on or off.
		Col Protect Lvl	0%..150%	75%	User 3	Scene	Sets Colors Protect level.
Sharpness							
	Detail						
		Detail	Off, On	On	User 3	Scene	Switches Detail function on or off.
		Detail Level	0..99	50	User 2	Scene	Sets Detail level: the amount of Detail added to the video signal.
		Detail Source	R+G, R, G, Y	Y	User 3	Scene	Selects the video component that is used to generate Detail signal.
		Texture	0..99	50	User 3	Scene	Sets Texture Level: adds sharpness to texture surfaces in the image.
		Advanced					
			Vert Detail Lvl	0..99	25	User 3	Scene	Sets the level of the vertical component in the Detail signal.
			Coarse/Fine	0..99	90	User 3	Scene	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	User 3	Scene	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	20	User 3	Scene	Level Dependency: sets the Detail reduction level for shadow areas.
			Noise Slicer	0..99	7	User 3	Scene	Sets the level of the noise slicer for Detail.
			Texture	Enabled, Disabled	Enabled	User 3	Scene	Enables or disables Texture function.
			Dtl Flw Gain	Off, On	Off	User 3	Scene	When switched on, Detail level follows Gain level.
			Dtl Flw Zoom	Off, On	Off	User 3	Scene	When switched on, Detail level follows Zoom factor.
			Apt Flw Iris	Off, On	Off	User 3	Scene	When switched on, Lens Aperture Correction follows Iris value.
	Detail Equalizer						
		Detail Equalizer	On, Off	Off	User 3	Scene	Switches the Detail Equalizer on or off.
		Shadows	0..99	50	User 3	Scene	Sets level of Detail for the shadows area of the image.
		Midtones	0..99	50	User 3	Scene	Sets level of Detail for the Midtones area of the image.
		Highlights	0..99	50	User 3	Scene	Sets level of Detail for the Highlights area of the image.
	Soft Detail (available when Texture is disabled)						
		Soft Detail	Off, On	On	User 2	Scene	Switches Soft Detail on or off. This function reduces the amount of Detail added for large transitions. Note: this function is only available when Texture is disabled.
		Soft Detail Lvl	0..99	50	User 2	Scene	Sets the maximum limit level of Detail for Soft Detail. Note: this function is only available when Texture is disabled.

Menu item	Values	Default	Level	File	Description
Knee Detail	Off, 1, 2, 3, 4	1	User 3	Scene	Selects a level of Detail for the compressed signal above the knee point (or switches it off).
Skin Detail					
Skin Gate	Off, 1, 2, 3, 1+2, 1+3, 2+3, 1+2+3	Off	User 2	Scene	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	Off	User 2	—	Switches Auto Skin Detail mode on or off.
VF View	Off, On	Off	User 2	Oper	Switch on to view the selected Skin Detail area in the viewfinder.
Skin1 Level	0..99	50	User 2	Scene	Sets detail level for Skin Gate 1.
Skin2 Level	0..99	50	User 2	Scene	Sets detail level for Skin Gate 2.
Skin3 Level	0..99	50	User 2	Scene	Sets detail level for Skin Gate 3.
Color Selection					
Width1 Red	0..99	29	User 3	Scene	Sets width level (Red) for Skin Gate 1.
Width1 Blue	0..99	40	User 3	Scene	Sets width level (Blue) for Skin Gate 1.
Color1 Red	0..99	37	User 3	Scene	Sets color level (Red) for Skin Gate 1.
Color1 Blue	0..99	6	User 3	Scene	Sets color level (Blue) for Skin Gate 1.
Width2 Red	0..99	29	User 3	Scene	Sets width level (Red) for Skin Gate 2.
Width2 Blue	0..99	40	User 3	Scene	Sets width level (Blue) for Skin Gate 2.
Color2 Red	0..99	37	User 3	Scene	Sets color level (Red) for Skin Gate 2
Color2 Blue	0..99	6	User 3	Scene	Sets color level (Blue) for Skin Gate 2.
Width3 Red	0..99	29	User 3	Scene	Sets width level (Red) for Skin Gate 3.
Width3 Blue	0..99	40	User 3	Scene	Sets width level (Blue) for Skin Gate 3.
Color3 Red	0..99	37	User 3	Scene	Sets color level (Red) for Skin Gate 3.
Color3 Blue	0..99	6	User 3	Scene	Sets color level (Blue) for Skin Gate 3.

6.5 Configuration menu

Menu item	Values	Default	Level	File	Description
Security					
Installed Level	No Oper, User 0, User 1, User 2, User 3, Service	User 0	Service	—	Selects camera user level. Note: switch the camera off and on to take the changes into effect.
PIN Code	****	0000	Service	—	Enter a PIN code to access Service level
Customer Files					
Store Cust Scene	Exec, ...	Exec	Service	—	Stores the current Scene (video related) settings to the customer Scene file.
Cust Scene Attr	R/W, R	R	Service	—	Selects the read/write attribute for the selected Customer Scene file: R/W = Read and Write; R = Read only.
Store Cust Oper	Exec, ...	Exec	Service	—	Stores the current Operator settings to the Customer Operator file.
Green Button					
Standard Scene File	Fact, Cust	Fact	Service	—	Selects the Scene file to be recalled when the STD File/Green button is pressed: Fact = Factory (default) Scene file; Cust = Customer Scene file;
Standard Oper File	Fact, Cust	Fact	Service	—	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	Yes	Service	—	Determines if the Scene file should be recalled when the STD File/Green button is pressed.
Oper File	Yes, No	No	Service	—	Determines if the Operator file should be recalled when the STD File/Green button is pressed.
Factory Reset	Exec, ...	Exec	Service	—	Resets ALL camera settings to their factory defaults.
Disable camera	On, Off	Off	User 0	—	Locks ALL camera buttons.
Lens					
Lens Settings					
Lens Connector	SXP, Camera	SXP	User 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	Digital	User 0	—	Selects a digital or analog lens interface.
Lens IF Status	OK, NotOK	OK	User 0	—	Shows the status of the lens interface (when a digital lens interface is used).
RE Iris Comp	On, Off	Off	User 0	—	Switches Iris compensation on or off. Use this setting to compensate for Iris level when a range extender (RE) is used.
Lens Corrections					
CLASS					
CLASS	Auto, Off	Auto	User 0	—	Selects CLASS mode: Auto = Automatic correction; Off = no correction.

Menu item	Values	Default	Level	File	Description
Reset	Exec > Busy	Exec	User 0	—	Select to reset lens aberration data
Status	Active,Init, Waiting, Reading, No Info, Unsup, I/F NOK, Off, InitNOK	I/F NOK	User 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 connected or analog lens interface in use; Off: CLASS is switched off.
Progress	0%..100%	—	User 0	—	Shows progress of the lens CLASS data reading process.
Shading					
Shading	On, Off	On	Service	Lens	Switches lens shading compensation on or off.
R Saw H	0..99	50	Service	Lens	Sawtooth (Horizontal) for Red channel.
R Par H	0..99	50	Service	Lens	Parabola (Horizontal) for Red channel.
R Saw V	0..99	50	Service	Lens	Sawtooth (Vertical) for Red channel.
R Par V	0..99	50	Service	Lens	Parabola (Vertical) for Red channel.
G Saw H	0..99	50	Service	Lens	Sawtooth (Horizontal) for Green channel.
G Par H	0..99	50	Service	Lens	Parabola (Horizontal) for Green channel.
G Saw V	0..99	50	Service	Lens	Sawtooth (Vertical) for Green channel.
G Par V	0..99	50	Service	Lens	Parabola (Vertical) for Green channel.
B Saw H	0..99	50	Service	Lens	Sawtooth (Horizontal) for Blue channel.
B Par H	0..99	50	Service	Lens	Parabola (Horizontal) for Blue channel.
B Saw V	0..99	50	Service	Lens	Sawtooth (Vertical) for Blue channel.
B Par V	0..99	50	Service	Lens	Parabola (Vertical) for Blue channel.
Files					
Store Lens File					
File Select	LCam1, LCam2, LCam3, LCam4	LCam1	User 1	—	Selects a Lens File for storing lens settings.
Store	Exec, ...	Exec	User 1	—	Stores the current lens settings in the selected Lens file.
Recall Lens File					
File Select	LCam1, LCam2, LCam3, LCam4	LCam1	User 1	—	Selects a Lens File for recall.
Recall	Exec, ...	Exec	User 1	—	Recalls the Lens file to the camera. This overwrites current lens settings.
Intercom					
Cam Mic	Off, Switch, Track, Prod	Switch	User 1	Oper	Selects the camera operator's microphone routing: Off = no routing; Switch = intercom route depends on switch at the rear of the adapter; Track = route signal to Tracker channel; Prod = route signal to Production channel.

Menu item		Values	Default	Level	File	Description
	Cam Mic Gain	0dB, 40dB	40dB	User 1	Oper	Selects Gain of camera Operator's intercom microphone.
	Cam Mic Power	Off, On	Off	User 1	Oper	Switches bias tee power (12 VDC) to camera operator's intercom microphone on or off.
	Cam Prod	Off, Left, Right, Both	Both	User 1	Oper	Selects to which ear muff(s) of the camera headset the production intercom channel is routed.
	Cam Eng	Off, Left, Right, Both	Both	User 1	Oper	Selects to which ear muff(s) of the camera headset the engineering intercom channel is routed.
	Cam Prog	Off, Left, Right, Both	Both	User 1	Oper	Selects to which ear muff(s) of the camera headset the program intercom channel is routed.
	Cam Tracker	Off, Left, Right, Both	Both	User 1	Oper	Selects to which ear muff(s) of the camera headset the Tracker's microphone signal is routed.
	Cam Tracker lvl	0..99	50	User 1	Oper	Sets Tracker signal level in the camera operator's headset.
	Tracker					
	Tracker Mic To	Off, Cam, Eng, Prod, All	Off	User 1	Oper	Selects the Tracker's headset microphone routing.
	Tracker Mic Gain	0dB, 40dB	40dB	User 1	Oper	Selects gain of Tracker's headset microphone.
	Tracker Mic Pwr	Off, On	Off	User 1	Oper	Switches bias tee power (12 VDC) to Tracker's microphone on or off.
	Tracker Mic Src	Eng, Side	Side	User 1	Oper	Selects engineering intercom or Tracker's sidetone signal for Tracker's headphones.
	Tracker Prod	Off, Left, Right, Both	Both	User 1	Oper	Selects to which ear muff(s) of the Tracker headset the production intercom is routed.
	Tracker Eng	Off, Left, Right, Both	Both	User 1	Oper	Selects to which ear muff(s) of the Tracker headset the engineering intercom is routed.
	Tracker Prog	Off, Left, Right, Both	Both	User 1	Oper	Selects to which ear muff(s) of the Tracker headset the progam intercom is routed.
	Tracker Cam	Off, Left, Right, Both	Both	User 1	Oper	Selects to which ear muff(s) of the Tracker headset the camera headset microphone signal is routed.
	Tracker Lvl	0..99	50	User 1	Oper	Sets Tracker headset level.
Audio						
	Audio Gain Mode	Loc, Ext	Ext	User 1	—	Loc (= local): audio gain level is controlled by the camera settings. Ext (= external): audio gain level is (for both channels) controlled by the XCU.
	Audio 1 Level	-22dB,-28dB,-34dB, -40dB,-46dB,-52dB, -58dB,-64dB or -10 dBu ... +4 dBu	-64dB	User 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 External, Audio 1 Level is set by the XCU.
	Audio 1 HPF	Off, On	Off	User 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.

Menu item	Values	Default	Level	File	Description
Audio 2 Level	-22dB,-28dB,-34dB, -40dB,-46dB,-52dB, -58dB,-64dB or -10 dBu ... +4 dBu	-64dB	User 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 External, Audio 2 Level is set by the XCU.
Audio 2 HPF	Off, On	Off	User 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.
Tally					
On Air Lamp	Enable, Disable	Enable	User 0	Oper	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	User 0	Oper	Sets brightness level of the On Air Lamp/Tally light at the front of a large viewfinder.
On Air Lamp Handgrip	Switch, Input, Off	Switch	User 0	—	
Tally Lock	Off, On	On	User 0	—	Switches the Tally Lock function on or off. When Tally Lock is on, some camera controls are locked when the camera is On Air.
AWB Settings					
AWB Speed	1..40	4	Service	—	Sets the speed for the Auto White Balance procedure.
AWB Gain	1..40	10	Service	—	Sets the gain value for the Auto White Balance procedure.
IP Settings					
IP Mode	Auto, Manual	Auto	User 0	—	Sets IP Configuration Mode to Auto or Manual.
IP Address					
IP Address 1	1..250	169	User 0	—	Sets camera IP Address
IP Address 2	0..255	254	User 0	—	
IP Address 3	0..255	1	User 0	—	
IP Address 4	1..254	220	User 0	—	
IP Netmask					
Subnet Mask 1	0..255	255	User 0	—	Sets IP Subnet Mask
Subnet Mask 2	0..255	255	User 0	—	
Subnet Mask 3	0..255	0	User 0	—	
Subnet Mask 4	0..255	0	User 0	—	
Apply Settings	Exec, ...	Exec	User 0	—	Applies new IP settings.
PCI ID	0..8	1	User 0	—	Selects ID for external PC operation.
Signals					
VF/Main Output	Main, VF-HD, VF-SD, VF-Ext	VF-HD	User 3	—	Selects the output signal on the combined VF/Main Output connector on the adapter back panel.
Extern Output	Ext1, Ext2, Ext3	Ext1	User 3	Oper	Selects the External video signal to route to the EXT Out connector on the adapter.
TP Output	TP, VF	TP	User 3	Oper	Selects the output signal on the TP Out/Analog Ref In connector on the adapter side panel.
H-Phase	0..99	50	User 0	—	Sets main video signals horizontal phase.

6.6 Licenses menu

Menu item	Values	Default	Level	File	Description
Active Licenses					
WorldCam	Unknown, Not Applicable, Not Present, Temporary, Perpetual, Trial, Clock Error	Unknown	User 2	—	Shows status of the WorldCam License, when installed.
Time Left	0..65535	0	User 2	—	Shows time left in seconds for WorldCam License.
Elite	Unknown, Not Applicable, Not Present, Temporary, Perpetual, Trial, Clock Error	Unknown	User 2	—	Shows status of the Elite License, when installed.
Time Left	0..65535	0	User 2	—	Shows time left in seconds for Elite License.
Premiere	Unknown, Not Applicable, Not Present, Temporary, Perpetual, Trial, Clock Error	Unknown	User 2	—	Shows status of the Premiere License, when installed.
Time Left	0..65535	0	User 2	—	Shows time left in seconds for Premiere License.
Planned Licenses					
License Count	0..65535	0	User 2	—	Number of licenses currently installed on the camera.
Start Date	<date>	—	User 2	—	Start date of each planned license.
Start Time	<time>	—	User 2	—	Start time of each planned license.
Type	None, Premiere, Elite, WorldCam	None	User 2	—	Shows planned license type.
Duration	0..65535 days	0 days	User 2	—	Duration in days of each planned license
New Licenses					
Time	<current time>	—	User 2	—	Shows current Time.
Date	<current date>	—	User 2	—	Shows current Date.
Change Time					
Hours (24h)	0..23	0	User 2	—	Select new value for hours.
Minutes	0..59	0	User 2	—	Select new value for minutes.
Time Zone	UTC-12:00 .. UTC+14:00	UTC+1: 00	User 2	—	Select new value for time zone.
Apply Time	Exec, ...	Exec	User 2	—	Execute to apply new time.
Change Date					
Days	1..31	1	User 2	—	Select new value for day.
Months	1..12	1	User 2	—	Select new value for month.
Year	2000..2199	2012	User 2	—	Select new value for year.
Apply Date	Exec, ...	Exec	User 2	—	Execute to apply new date.

Menu item	Values	Default	Level	File	Description
Time&Date OK?	..., No, Yes	...	User 2	—	Confirms time and date before installing licenses.
Find Licenses					
Search Next	Exec, ...	Exec	User 2	—	Execute to search the next license (if existing) on the USB Flash Drive or internal memory.
Add License	Exec, ...	Exec	User 2	—	Execute to add the found license.
Type	None, Premiere, Elite, WorldCam, WCam+El+Pr, WCam+El, WCam+Pr, Elite+Pr	None	User 2	—	Shows the type of the found license(or combination of licenses).
Start	<start time>	—	User 2	—	Shows start time of the found license.
Time Zone	UTC-12:00 .. UTC+14:00	UTC+1: 00	User 2		Shows time zone of the found license.
Status	Unknown, Not Applicable, Not Present, Temporary, Perpetual, Trial, Clock Error	Unknown	User 2	—	Shows the time zone of the found license.
Duration	0..65535 sec	0 sec	User 2	—	Shows the duration of the found license.
Trial License					
Select Type	None, Premiere, Elite, WorldCam	None	User 2	—	Selects License type to use for trial licensing.
Activate	Exec, ...	Exec	User 2	—	Execute to make the selected trial license active (trial licenses are active for 3 minutes).
Time Left	0..240 sec	0 sec	User 2	—	Shows time left after activating a trial license.

6.7 Diagnostics menu

Menu item	Values	Default	Level	File	Description
Communication					
Connections					
BS Connected	Yes, No	—	User 2	—	Indicates if an XCU or Base Station is connected to the camera.
C2IP Panels	0..99	—	User 2	—	Shows number of C2IP control panels that are connected to the camera.
LDK Connect GW	Yes, No	—	User 2	—	Indicates the presence of an LDK Connect Gateway in the camera network.
Ser Stats (DTCP)					(Advanced settings)
Ser Stats (PCI)					(Advanced settings)
SPI Stats					(Advanced settings)
Transmission					
Cable Length	0%..200%	0%	User 0	—	Shows % of cable length used with respect to maximum cable length. Values > 100 indicate that transmission is below specification.
Cable Status	OK, Critic, Error, NoSig	OK	User 0	—	Shows status of the transmission cable: OK = transmission is OK Critic = cable status is critical but transmission will continu. Error = cable quality is too low and transmission is not guaranteed. NoSig = no signal detected
Signal Status	OK, Critic, Error, NoSig	OK	User 0	—	Shows status of the transmission signal: OK = transmission is OK Critic = signal status is critical but transmission will continu. Error = signal quality is too low and transmission is not guaranteed. NoSig = no signal detected
BS->CAM					
Cable Status	OK, Critic, Error, NoSig	NoSig	Service	—	Shows status of the transmission signal:
Signal Status	OK, Critic, Error, NoSig	NoSig	Service	—	Shows status of the transmission signal
RX Margin	-100 dB .. 100 dB	0 dB	Service	—	Shows received optical margin.
CAM -> BS					
Cable Status	OK, Critic, Error, NoSig	NoSig	User 0	—	Shows status of the transmission signal:
Signal Status	OK, Critic, Error, NoSig	NoSig	User 0	—	Shows status of the transmission signal
RX Margin	-100 dB .. 100 dB	0 dB	User 0	—	Shows received optical margin.
Transm Details					
Opt Module	Unknown, FTLF1424P2	Unknown	Service	—	Shows received optical margin.
RX Power (uW)	0...6553.5	0	Service	—	
RX Power (dBm)	-100 .. 100	0	Service	—	
TX Power (uW)	0...6553.5	0	Service	—	

Menu item		Values	Default	Level	File	Description
	TX Power (dBm)	-100 .. 100	0	Service	—	
	Module Temp (C)	-40C .. 125C	0 C	Service	—	
	Module Temp (F)	-40F .. 125F	0 F	Service	—	
	Optical Signal	Ok, Loss	Loss	Service	—	
	RX Locked	No, Yes	No	Service	—	
	Frame Locked	No, Yes	No	Service	—	
	System Locked	No, Yes	No	User 0	—	
	Profile	3G Optimal, HD Optimal, 3G Robot, HD Robot, Unknown	Unknown	Service	—	
	BS->CAM					[Advanced settings]
	Data Error Stats					[Advanced settings]
Ethernet						
	MAC-Address			User 2	—	Shows the camera's MAC address
	Link state	Connected,Disconn	Disconn	User 2	—	
	Link type	Unknown, 10Mb/ Half, 10Mb/Full, 100Mb/Half, 100Mb/Full, Negotiate	Unknown	User 2	—	
Configuration						
	Camera					
	Type	INVALID, LDX80W, LDX80E, LDX80P, LDX80 F	INVALID	User 2	—	
	PID			User 2	—	
	Alias			User 2	—	
	Device ID			User 2	—	
	Number	0..99	0	User 2	—	
	Number	0..99	1	User 2	—	
	Number Default	1..99	18	User 2	—	
	Adapter					
	Type	None, 3GTriax, 3GFiber	None	User 2	—	
	Type Number	Unknown, LDX5419,LDX5421	Unknown	User 2	—	
	Viewfinder					
	Type	None, 2"HD, 5"HD, 7"HD, 8"LCD, 7"LCD, 9"LCD, 2"LCD	None	User 2	—	Displays type of the attached viewfinder.
	Lens			User 2		
Package Info						
	Camera Package					
	Package	Ok, Not Ok	Ok	User 2		Shows Package status

Menu item	Values	Default	Level	File	Description
Package 12NC	0..65535	0	User 2		Shows Package 12NC
Package Version	0..65535	0	User 2		Shows Package Version
Component	RP IC FW, RP IC SW, RP VP FW, RP VP SW, RP DI FWSW, RP BOOT SW, RP CONF SW, RP APP SW, RC FW, SBB FW, SBG FW, SBR FW	RPICFW	User 2		Shows SW/FW Component
SW/FW Valid	Ok, Not Ok	Ok	User 2		Shows SW/FW Valid
SW/FW 12NC	0..65535	0	User 2		Shows SW/FW 12NC
SW/FW Version	0..65535	0	User 2		Shows SW/FW Version
Adapter Package					
Package	Ok, Not Ok	Ok	User 2		Shows Package status
Package 12NC	0..65535	0	User 2		Shows Package 12NC
SW/FW Name		RPICFW	User 2		Shows SW/FW Name
SW/FW 12NC	0..65535	0	User 2		Shows SW/FW 12NC
SW/FW Version	0..65535	0	User 2		Shows SW/FW Version

6.8 Service menu

Menu item	Values	Default	Level	File	Description
Pref Network	Serial, Ethernet	Ethernet	User 3	—	Selects preferred control network.
Test Signals					
Test Signal	Off, On	Off	User 3	—	Switches Test signal on or off.
Test Select	SawT, Step, SawT400, Step400	SawT	User 3	—	Selects which Test signal to use: Sawtooth, Stepped, Sawtooth 400 or Stepped 400.
Info Files					
Write Config	Exec > Busy	Exec	Service	—	(advanced settings)
Write Settings	Exec > Busy	Exec	Service	—	(advanced settings)
Write Usage	Exec > Busy	Exec	Service	—	(advanced settings)
Copy Latest	Exec > Busy	Exec	Service	—	(advanced settings)
Copy All	Exec > Busy	Exec	Service	—	(advanced settings)
Log Files					
Write RP APP	Exec > Busy	Exec	Service	—	(advanced settings)
Copy Latest	Exec > Busy	Exec	Service	—	(advanced settings)
Calibrations					
3200K Calibr					
3200K Calibr	Off, On	Off	Service	—	Select to run the 3200K Calibration.
3200K Reset	Fact, Cust	Fact	Service	—	Selects 3200K Calibration to use the Cust(omer) = measured value, or the Fact(ory) value.
Black Calibr					
Black Cal	Off, Running		User 0	—	Select to run Black Calibration. Note: this takes about a minute to complete.
Status	*Unknown*, OK, Error, Fatal Error, Needed, Temp Low, Temp Unst, TimeOut, Filter Cap, Warming Up, Stabilizing, Running, Ready, Failed, Aborted		User 0	—	Shows current status of the Black Calibration process.
Calibr Temp	37 C, Act	37 C	User 0	—	Selects camera temperature at which Black Calibration is carried out. 37 C = 37 degrees Celsius, Act = actual (current) temperature.
Act Temp	-128 C .. 127 C	0 C	User 0	—	Shows actual (current) camera temperature.
SD Card					
Format (1')	Off, Running	Off	Service	—	Format the internal camera SD Card. Note: this takes about one minute.
Status	Unknown, Running, OK, Error, No Card	Unknown	Service	—	Shows current status of the SD Card Formatting process.

Chapter 7

Maintenance

7.1 Installing eLicenses

7.1.1 About eLicenses

With eLicenses it is possible to temporarily or permanently add one or more extra features to your LDX camera.

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

7.1.2 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 drive into the USB connector on the back panel.
  - The file system of the USB Flash Drive must be FAT32.

Using an FTP connection

- Set up an FTP connection with the camera head using standard FTP client software (e.g. CuteFTP or FileZilla.)
  - The IP address of the camera head can be found in the camera menu in the `CONFIGURATION` > `IP SETTINGS` > `IP ADDRESS` menu.
- OR set up an FTP connection with the camera via the XCU through the C2IP network.

  - The IP address of a camera connected to an XCU can also be found via the C2IP network in the XCU menu in the INSTALL > NETWORK > CAM IP menu.

- Transfer the license file from your local computer to the camera's root directory.

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 (or the camera's root directory when using FTP)
   - 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.

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 will 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.

Tip

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

7.2 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:

1. Switch on the camera.

☞ Note

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

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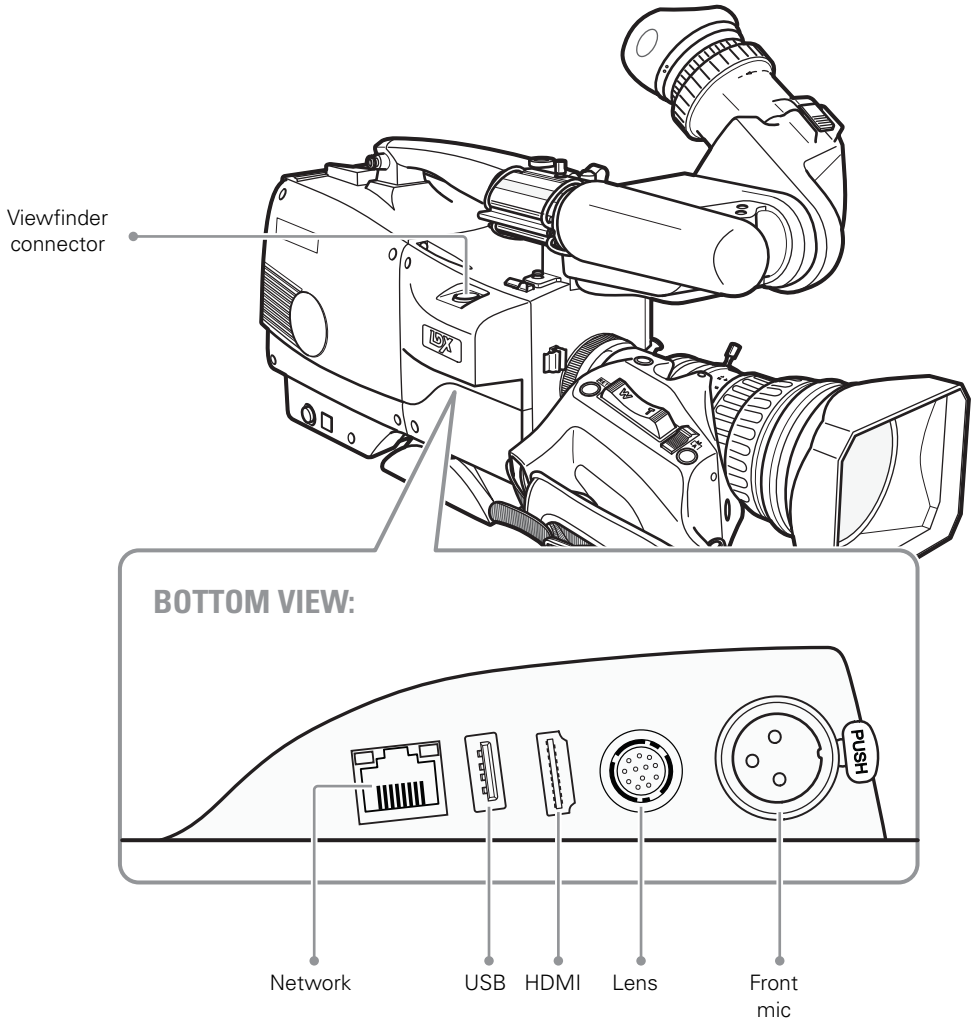
2. In the camera menu, go to the SERVICE > SD CARD > FORMAT item and select it. The formatting process starts. It takes about one minute to complete.
3. During the process, you can monitor the process using the STATUS item.
4. When the SD Card formatting has finished, the camera can be used normally.

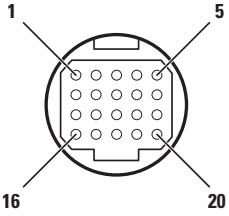
Chapter 8

Connectors

8.1 Camera front



8.1.1 Viewfinder connector

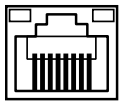


20-pin female VF-connector

Pin	Description
1	Not connected
2	Not connected
3	GND
4	INTN-D
5	VF Ext video
6	Not connected
7	VF video return
8	SDA-D
9	SCL-D
10	VF Ext video return

Pin	Description
11	GND
12	VF video
13	Pb VF return
14	Pr VF return
15	GND
16	+ Batt
17	+ Batt
18	Pb VF
19	+Pr VF
20	Shield

8.1.2 Network connector

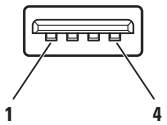


8-pin standard RJ-45 ethernet connector

Pin	Description
1	Transmit data + (TX+)
2	Transmit data - (TX-)
3	Receive data+ (RX+)
4	Not connected
5	Not connected
6	Receive data - (RX-)
7	Not connected
8	Not connected

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

8.1.3 USB connector

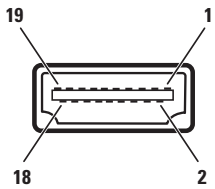


USB host connector

Pin	Description
1	+ 5 VDC
2	Data -
3	Data +
4	GND

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

8.1.4 HDMI connector



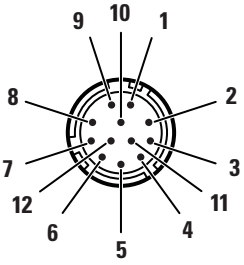
19-pin HDMI connector

Pin	Description
1	TDMS data 2+
2	TDMS data 2 shield
3	TDMS data 2 -
4	TDMS data 1+
5	TDMS data 1 shield
6	TDMS data 1-
7	TDMS data 0+
8	TDMS data 0 shield
9	TDMS data 0-
10	TDMS clock+

Pin	Description
11	TDMS clock shield
12	TDMS clock -
13	CEC
14	Not connected
15	SCL
16	SDA
17	GND
18	+5 VDC power
19	Hot plug detect

NOTE: The VF/Mon connector delivers a viewfinder/monitoring signal.

8.1.5 Lens interface connector



12-pin Hirose male connector

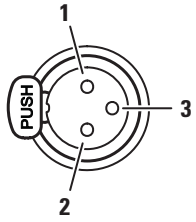
Pin	Description
1	External video on/off
2	VTR trigger switch
3	+13 VDC Return
4	Momentary iris
5	Iris control
6	+13 VDC (max 1.1 A) [1]

Pin	Description
7	Iris follow
8	Lens servo
9	Range Extender
10	Zoom follow
11	RxD / Focus follow[2]
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.

8.1.6 Front Mic connector



XLR 3-pin female connector

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

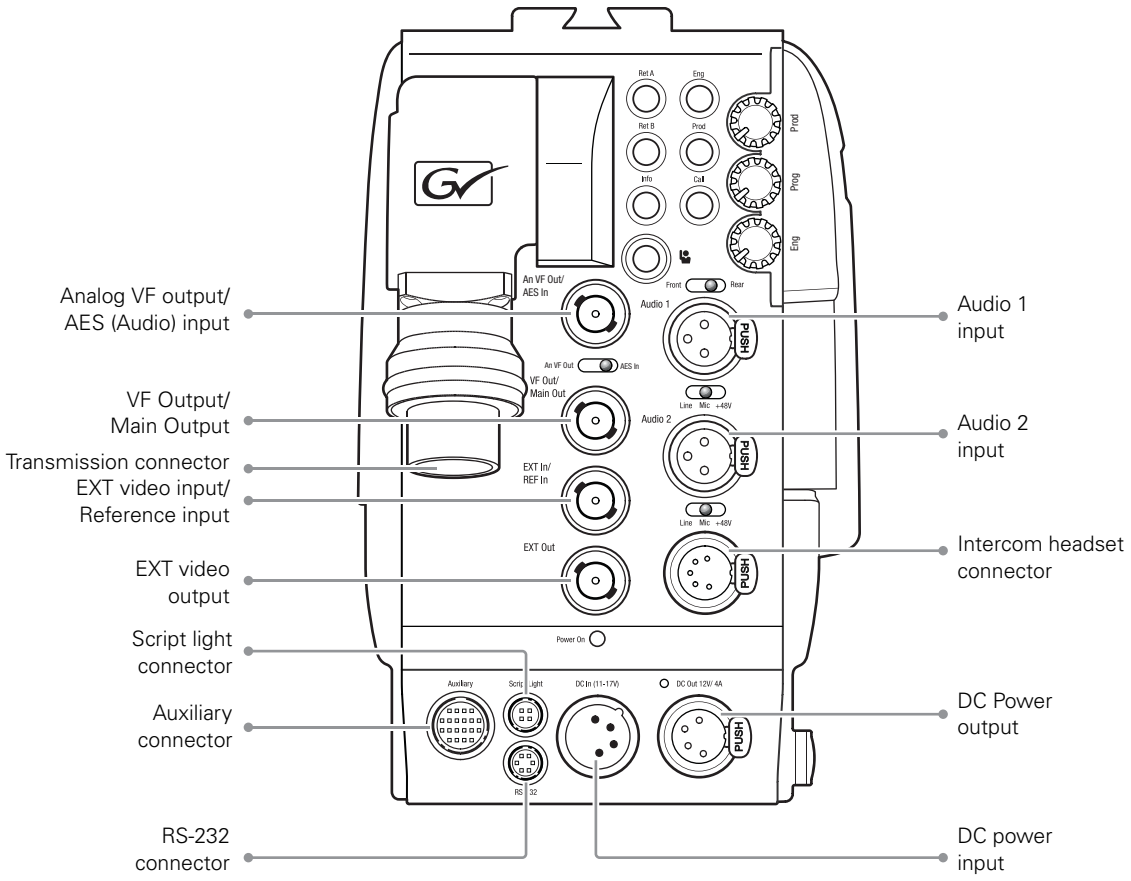
Microphone impedance >200 Ω

Nominal input level -40 dBu

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

8.2 Camera back panel

8.2.1 Back panel



8.2.2 Analog viewfinder output/AES audio input connector

BNC connector

This connector is used as analog viewfinder output or as AES/EBU digital audio input.

8.2.3 Viewfinder output/Main output connector

BNC connector

This connector is used as viewfinder output or Main video output.

8.2.4 Transmission connector

Depending on adapter type and connector type. Various types are available at ordering

8.2.5 Reference input / External video input connector

BNC connector

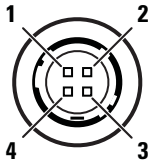
This connector is used to genlock the camera to a 0.6 Vpp HD tri-level reference input signal when in stand alone mode or as an external video input for a second camera.

8.2.6 External video output connector

BNC connector

This connector is used to output the external video signal (HD-SDI 1/5 Gbit/s). The selection for EXT1, EXT2 or EXT3 is set in the camera menu. Default setting is EXT3.

8.2.7 Script light connector



Hirose 4-pin female connector

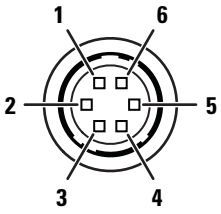
Pin	Description
1	GND
2	On Air signal *)
3	Not connected
4	+12 V (max. 100 mA)

Shield of cable directly to the connector housing.

Manufacturer code: HR10A-7R-4S

*) In parallel with Auxiliary connector pin 20

8.2.8 RS-232 (serial private data) connector



Hirose 6-pin female connector

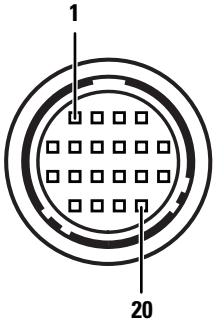
Pin	Description
1	GND
2	TxD1
3	TxD2 (future use)
4	GND
5	RxD1
6	RxD2 (future use)

Used for serial data communication between XCU and adapter (RS-232 levels, 100 kBit/sec max).

Note: the second private data channel is reserved for future use.

Manufacturer code: HR10A-7R-6SB

8.2.9 Auxiliary connector



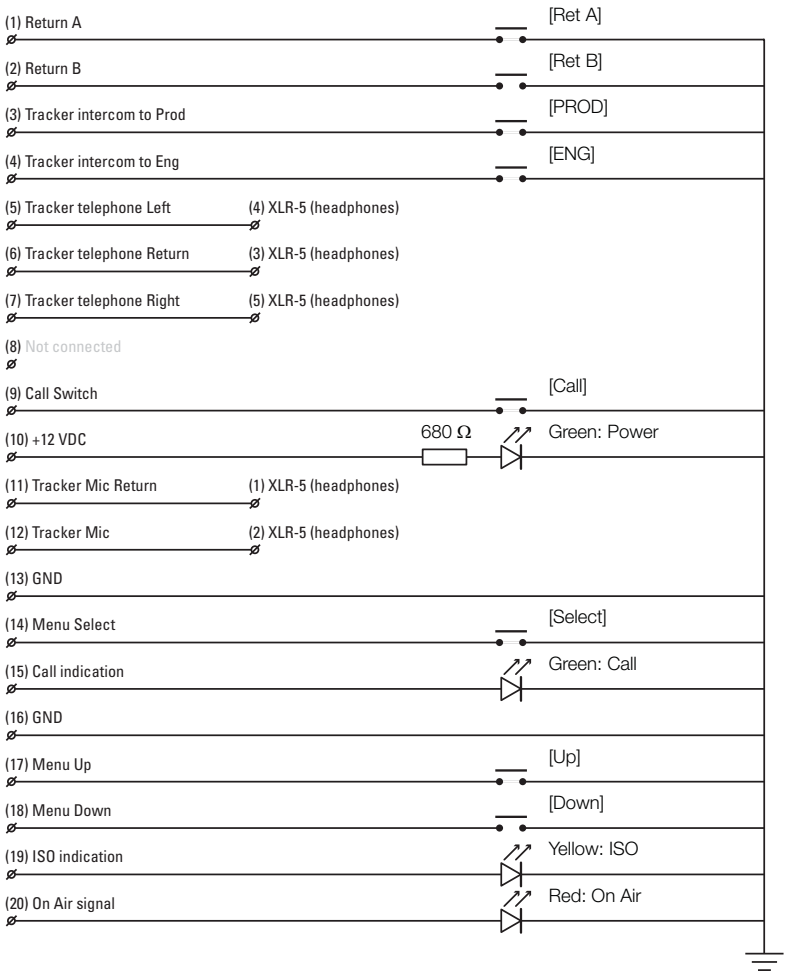
Hirose 20-pin female connector

Pin	Description
1	Return A
2	Return B
3	Tracker intercom to Production
4	Tracker intercom to ENG
5	Tracker telephone left
6	Tracker telephone return
7	Tracker telephone right
8	not connected
9	Call switch
10	+12 Volt (max. 100mA)

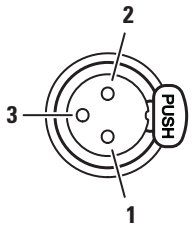
Pin	Description
11	Tracker Microphone return
12	Tracker Microphone
13	GND
14	Menu select
15	Call indication
16	GND
17	Menu up
18	Menu down
19	ISO indication
20	On Air signal

Manufacturer code: HR10A-13P-20S

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



8.2.10 Audio 1 + 2 connectors



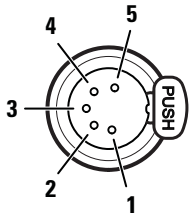
XLR 3-pin female connector

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

Microphone impedance > 200 Ω
Phantom power +48 V switchable
Sensitivity range (microphone):
-64 dBu to -22 dBu
Sensitivity range (line)
+10 dBu to +42 dBu

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

8.2.11 Intercom headset connector



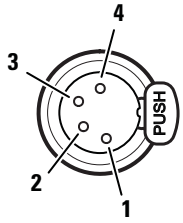
XLR 5-pin female connector

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

8.2.12 DC Power output connector



XLR 4-pin female connector

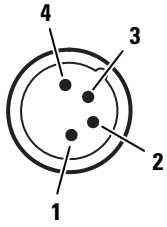
Pin	Description	
1	GND	
2	GND	
3	+13 to +16 V	(4 A max.)
4	+13 to +16 V	

Note: DC Power is not available when the camera is locally powered by the DC Power input connector!

Pins 1 and 2 are bridged, pins 3 and 4 are bridged.

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

8.2.13 DC Power input connector

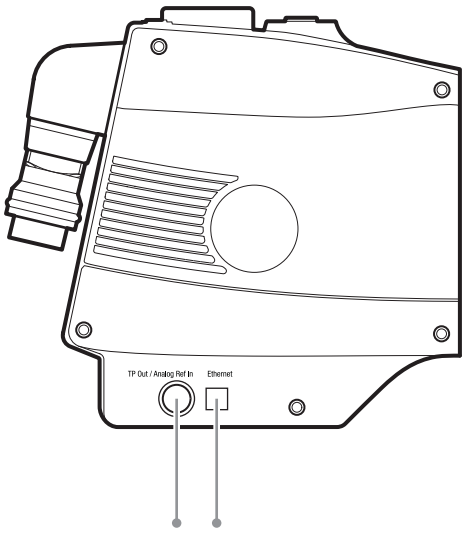


XLR 4-pin male connector

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	

Caution
The input voltage must not exceed 17 V.

8.2.14 Side panel



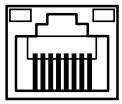
8.2.15 Teleprompter output / Analog viewfinder output / Analog reference input

BNC connector

This connector is used as a teleprompter output (CVBS) or analog viewfinder output (CVBS). Signal selection for this connector is done in the camera menu: Configuration > Signals > TP Output

In stand-alone mode this connector can be used as an analog reference input (3-level sync) to connect a second camera.

8.2.16 Ethernet connector (future use)



8-pin standard RJ-45 ethernet connector

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

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

Chapter 9

Specifications

9.1 Specifications for LDX 86 HS/XS camera head

9.1.1 General

Power consumption (typical)	34 W
Operating temperatures	-20 °C to +45 °C (-4 °F to 113 °F)
Weight	2.1 kg (4.6 lbs) including handgrip and shoulderpad
Dimensions (Width x Depth x Height)	170 x 200 x 180 mm (6.7 x 7.9 x 7.1 in)

9.1.2 Camera

Pickup Device	3x 2/3" Xensium-FT CMOS imagers
Picture elements	1920 (H) x 1080 (V) pixels
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; Second wheel: Clear, 4 point star, soft focus
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

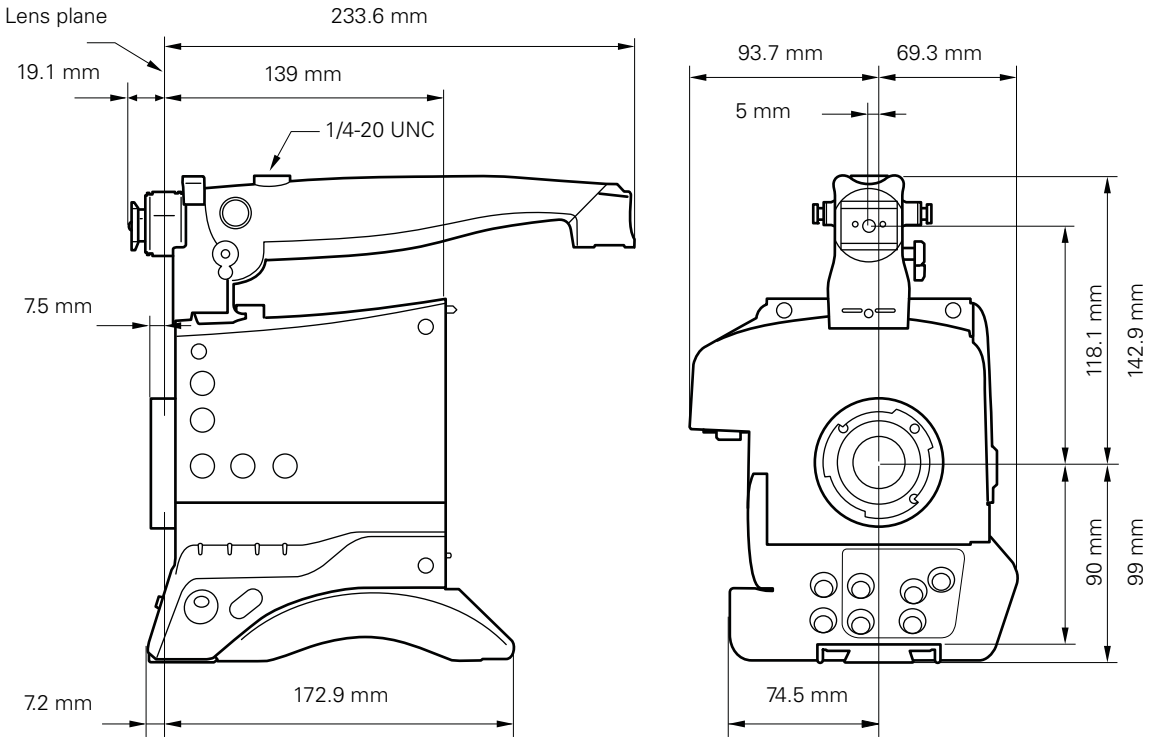
9.1.3 Video modes

Video modes (LDX 86 HS)	1080i179/150 (3X), 720p179/150 (3X)
Video modes (LDX 86 XS)	1080p179/150 (3X), 1080i359/300 (6X), 720p359/300 (6X)
Sensitivity (at 2000 lux)	Typ. F12 (1080i50, 720p50, 1080p50) Typ. F11 (1080i59.94, 720p59.94, 1080p59.94) Typ. F6.9 (1080i150, 720p150, 1080p150) Typ. F6.3 (1080i179.82, 720p179.82, 1080p179.82) Typ. F4.9 (1080i300, 720p300) Typ. F4.5 (1080i359.64, 720p359.64)
S/N ratio	Typ. 60 dB
Aspect ratio	16:9
Modulation depth	Typ. 60% at 800 TV lines (27 MHz) in 1080i59.94/50 and 720p59.94/50
Gain selection	-6 dB to +30 dB in 3 dB steps (user definable presets) or continuous gain

9.1.4 Connectivity

Front microphone	XLR-3 female, balanced, phantom +48 V switchable
USB	USB 2.0
Ethernet	RJ-45
Lens connector	12-pin Hirose
Viewfinder connector	20-pin and HDMI
Top mount screw hole	standard 1/4-20 UNC thread (camera thread)

9.1.5 Dimensions

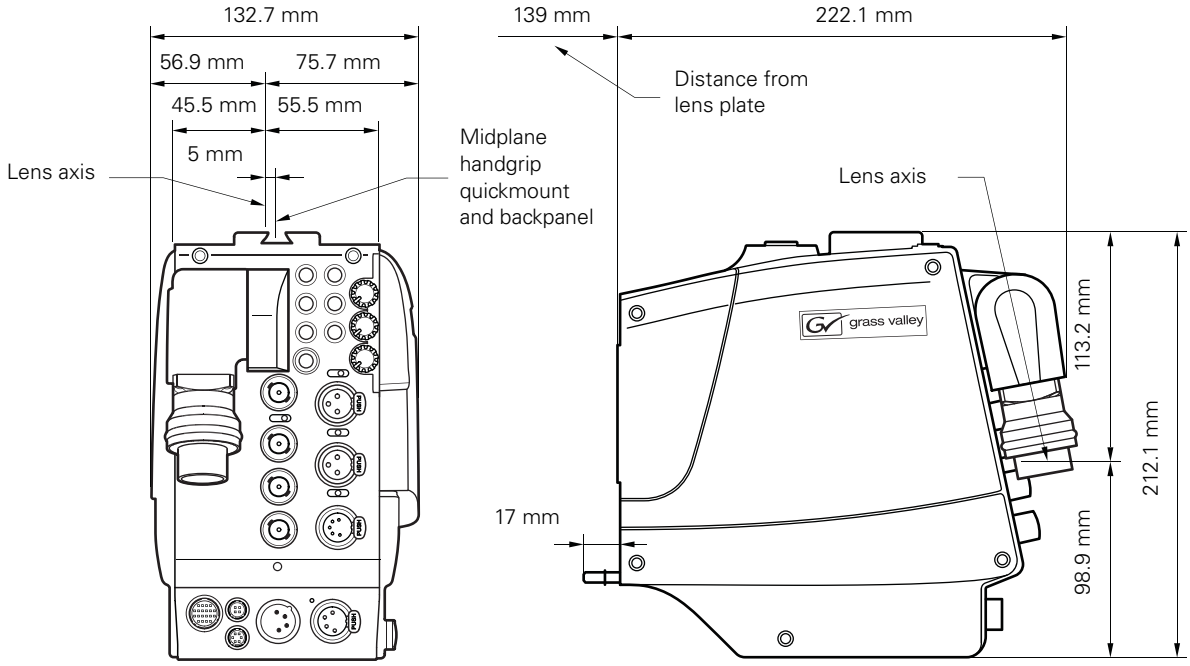


9.2 Specifications for LDX 5660 XF Fiber adapter

Power requirements	Hybrid fiber powered or 12 V (local)
Operating temperatures	-20 to +45° C (-4 to +113° F)
Storage temperatures	-25 to +70° C (-13 to +158° F)
Weight (approx.)	2.15 kg (30.1 lbs)
Dimensions (L x W x H)	222.1 x 132.7 x 212.1 mm (8.7 x 5.2 x 8.4 in) without handgrip
Fiber connector	Swivel hybrid fiber connector
Cable length	3,000 m (10,000 ft) max. using SMPTE 311M hybrid fiber cable
Analog VF output/AES Audio input	BNC connector 1.0 Vpp; 75 Ω
VF output/Main output	BNC connector 1.0 Vpp; 75 Ω
Reference input	BNC connector 0.6 Vpp; 75 Ω HD tri-level reference signal
EXT video output connector	BNC connector 1.0 Vpp; 75 Ω
Teleprompter output/VF output/Analog REF input/	BNC connector 1.0 Vpp; 75 Ω
Auxiliary	20-pins data connector with Tracker intercom, remote control lines and studio signalling.
Rear audio inputs	2x XLR-3, balanced, +48 V phantom power
Intercom	XLR-5 with channels Engineering, Production and Program
DC power input	12 V (11 to 17 V), XLR-4 male

Script light power output	12 V, 100 mA, 4-pin Hirose
DC power output	12 V, 4A, XLR-4

9.3 Dimensions



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