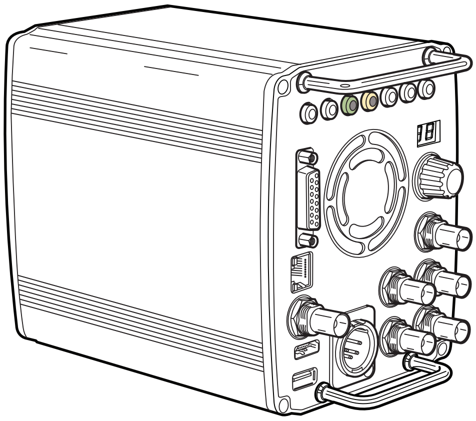
User's Guide

September 2019 v1.0



LDX C85N

Compact Camera

Declaration of Conformity

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

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

following the provisions of:

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

FCC CLASS A Statement

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

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

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

Copyright

Trademarks

Grass Valley, LDX Series and derivatives are trademarks of Belden Inc. or Grass Valley Canada. 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

Table of contents

Chapter 1 – Introduction

Chapter 2 – Installation

Chapter 3 – Setup

Chapter 4 – Operating instructions

Chapter 5 – Video setup

Chapter 6 – Camera menu reference

Chapter 7 – Maintenance

Chapter 8 – Connectors

Chapter 9 – Specifications

Recycling

Visit www.grassvalley.com for recycling information.

Packing for return

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

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

Important information

Read these instructions carefully and retain them for future reference. 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

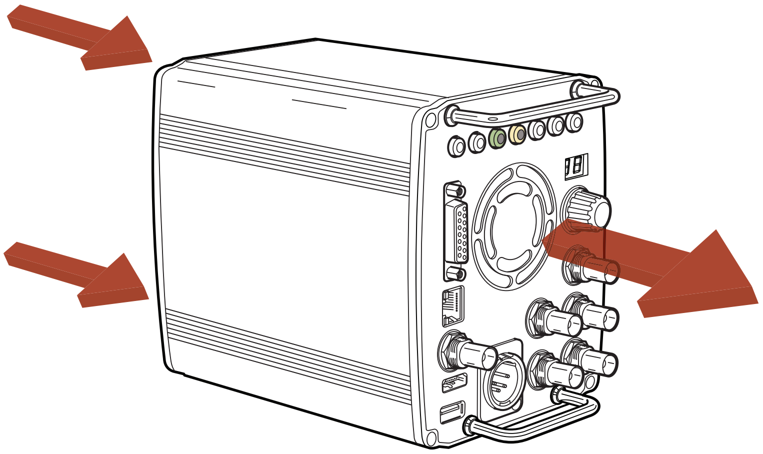
⚠ To prevent fire or shock hazard, do not expose the unit to rain or moisture. If the unit is in a wet or damp environment, a rain cover must be used to protect it for personal safety reasons.

⚠ 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 at the tront and back of the camera housing.



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 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.

Chapter 1

Introduction

1.1 Welcome

The LDX C85N is a high-end live production compact camera which uses Grass Valley's latest Xensium^{HAWK} CMOS imager. The camera contains optics, imagers and full digital image processing electronics. All signals for remote controlling, viewing and connecting are available right at the back panel of the camera.

1.1.1 About this guide

The purpose of this guide is to present a detailed description of how to operate an LDX C85N compact camera head. 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 LDX C85N Series Xensium^{HAWK} imagers

The LDX C85N compact camera is based on the Grass Valley **native** 4K Xensium^{HAWK} CMOS imager that supports full native 4K resolution. The imager offers a unique pixel technology called DPM^{Ultra} (Dynamic Pixel Management).

The camera delivers **native** 4K resolution (3840x2160) at either 50 or 59.94 Hz frame rate.

1.2.2 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 C85N 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.

1.3 Key features

- Native 4K acquisition with Xensium^{HAWK} imagers with DPM^{Ultra}:
  - Frame Transfer (FT) technology ensures no smear
  - Increased sensitivity
  - Improved digital noise reduction
  - Native 4K UHD 3840x2160 acquisition
  - No sensitivity to short light flashes
- Supports an extended color gamut following the REC 2020 standard.
- Licensed option for Extended Dynamic Range operation (XDR): HDR with full 15 F-stops or >800% of regular cameras.
- TrueTexture^{TM}: texture is preserved throughout all processing parameters.
- 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.
- Advanced secondary color corrector with 6 sets for color hue, saturation and luminance adjustment.
- Compatible with Grass Valley's C2IP control systems
- 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

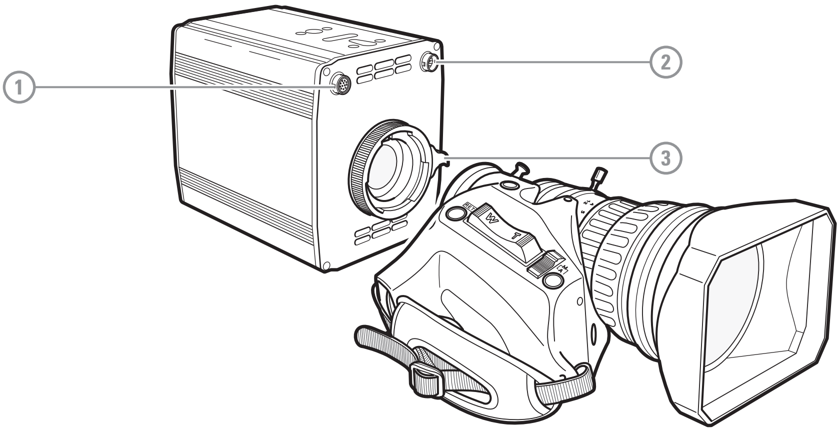
Chapter 2

Installation

2.1 Mounting a lens

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

1. Ensure that the lens locking ring 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 [3] clockwise until the lens locks firmly in place.
5. Connect the lens cable to the lens connector [1] on the front of the camera.
   - If an analog remote controlled (or teleconference) lens is used, connect the lens remote control cable to the lens connector [2].

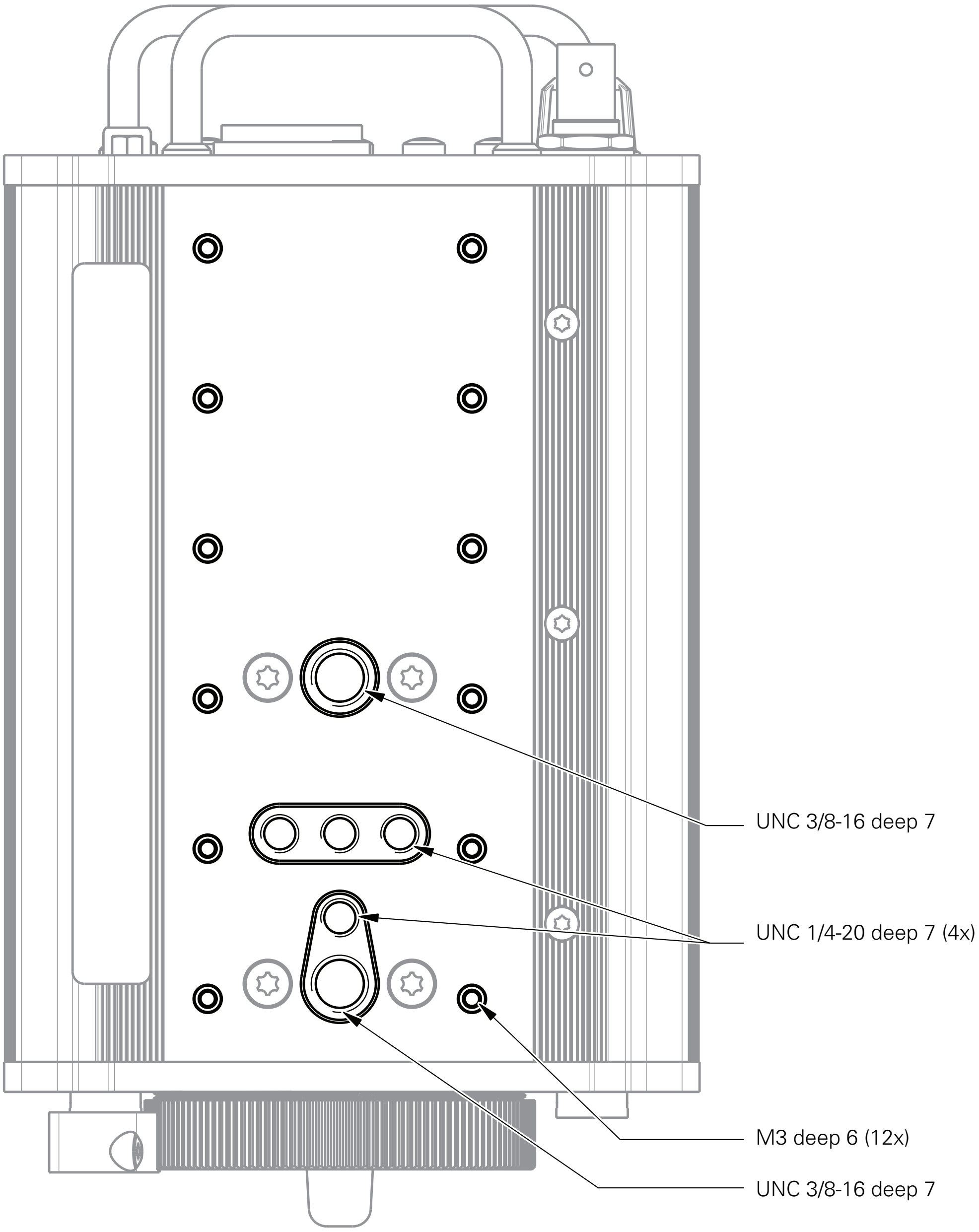


Caution
Do not attach a lens weighing more than 5 kg (11 lbs) to the camera.

After a lens is mounted to the camera for the first time, 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.

2.2 Mounting the camera

The camera housing has several mounting holes to attach a wedge plate or tripod adapter plate. The mounting holes are located at the top and bottom.



Chapter 3

Setup

3.1 Connecting power

Attach a lens and any other accessories to the camera. Connect a power supply to the XLR-4 DC input power connector at the back panel of the camera. Once power is connected, the camera starts up, indicated by the indicator LEDs lighting up on the back panel. After a short while the camera is operational.

☞ Note

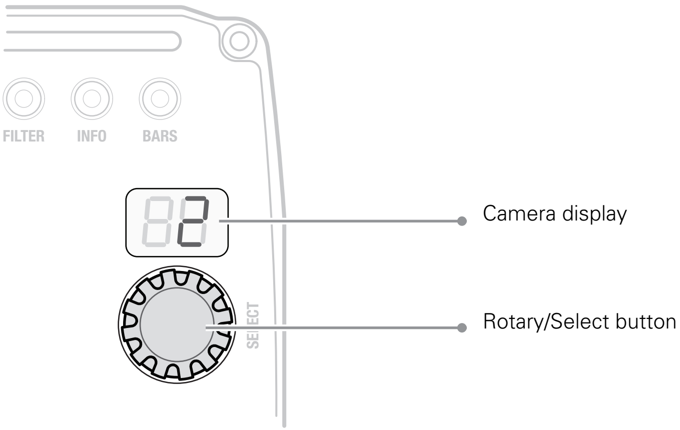
The camera does not have a power switch, by default power is on. However, power can be switched off by connecting pin 4 of the Auxiliary connector to ground. Refer to “BNC Video connectors” on page 86.

☞ Note

It is recommended to use the Grass Valley 120 W Power supply for LDX Compact Series (order number 8926 465 00120) to power the camera.

3.2 Setting the camera number

The camera number is the unique identification of the camera in the C2IP (camera control) network. It is used to assign the camera to a control panel such as the OCP 400. The control panel must be set to the same number to connect to the camera.



Press and hold the **rotary/select** button for a few seconds until the camera display starts flashing. Turn the **rotary/select** button to select the camera number from 1 to 99. Press the **rotary/select** button again to confirm the new settings.

3.3 Viewing

The HDMI video outputs can be used for viewing the camera video signal, *including superimposed text information* such as the camera menu, markers and indicators. Connect a compatible video monitor to view the camera video signal.

Chapter 4

Operating instructions

4.1 Controlling the camera

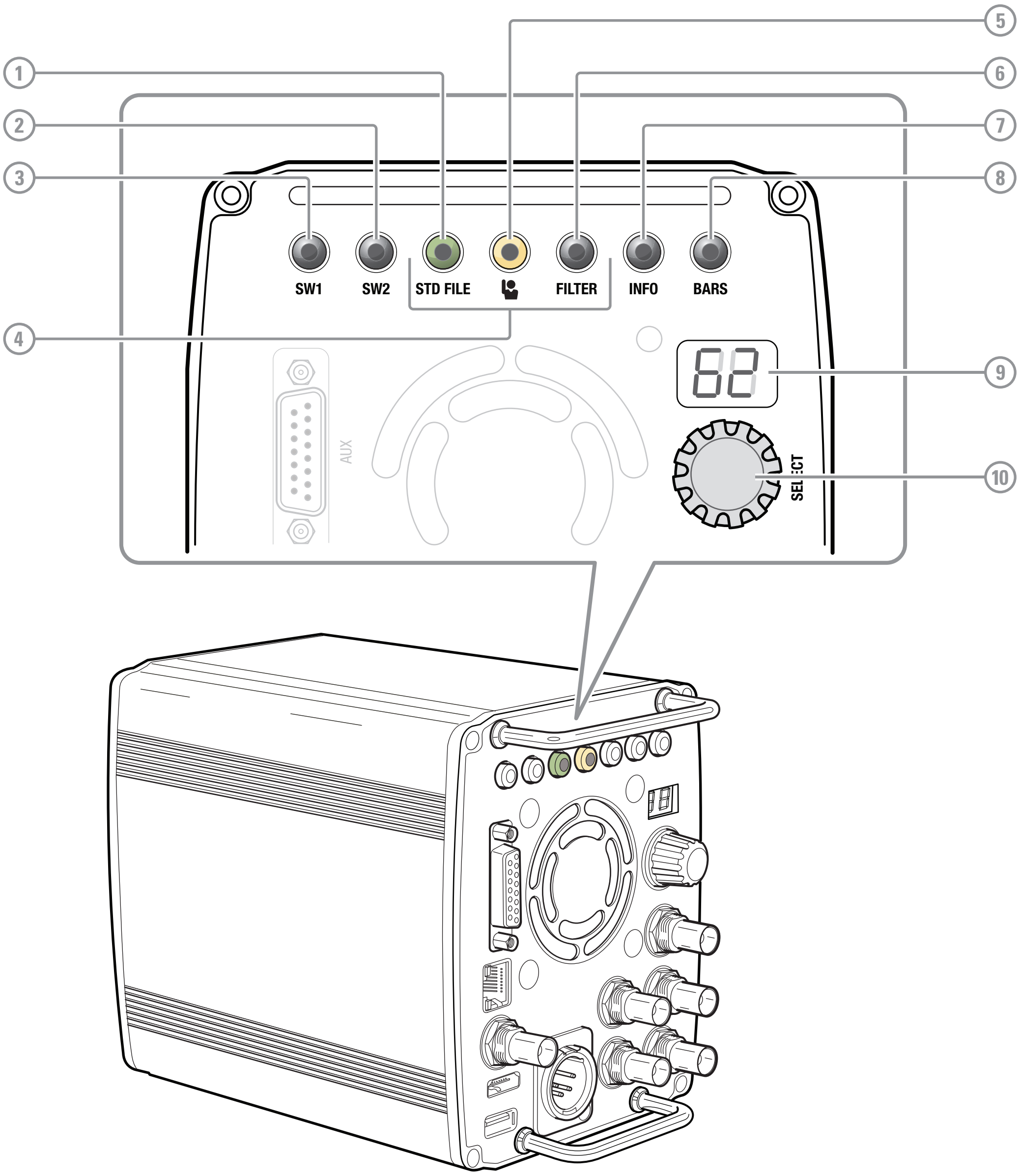
There are several ways to operate the camera:

- Using an Operational Control Panel (OCP 400) connected to the C2IP network: this is the default method of operation;
- Using the operational switches on the camera;
- Using the camera menu to select functions;
- Additionally, using a Master Control Panel (MCP 450) connected to the C2IP network;

☞ **Note**

If you cannot access some camera functions or you wish to restrict access, refer to "Access and security" on page 30.

4.2 Location of controls



[1] STD FILE (green) button

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

[2] User button (SW2)

Can be assigned to Call, Auto White Balance, Extended Iris, Focus Assist, Menu Back or Menu Select.

[3] User button (SW1)

Can be assigned to Call, Extended Iris, Focus Assist, Menu Back or Menu Select.

[4] On Air indicators

The built-in LEDs of the buttons on the control panel show the On Air status of the camera. You can select from 1 to 7 LEDs to use for On Air Status.

[5] PickMe button

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

[6] Filter selection button

Press to select the optical filters (ND or Effects)

[7] Info button

Press and hold to view information on the viewing channel.

[8] BARS button

Switches the color bar(s) on or off.

[9] Camera display

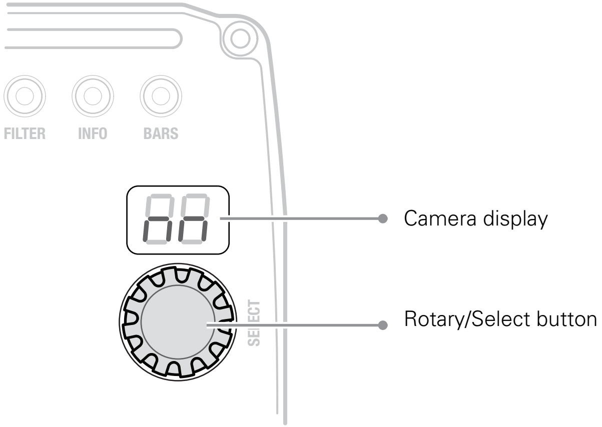
Shows camera number, optical filter selection or menu status.

[10] Rotary/Select button

Used to navigate the camera menu and to select the camera number.

4.3 Using the camera menu

The camera menu can be viewed on the HDMI viewing output and navigated by means of the **rotary/select** button which is located at camera's back panel:



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.

4.3.1 Entering the camera menu

Press the **rotary/select** button after the camera is switched on. The message `MENU OFF` appears on the viewing channel. Press the **rotary/select** button again while this text is showing, the `MAIN` menu appears.

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


  Diagnostics       >>
```

The `MAIN` menu screen shows five items. The name of the menu is shown below these. More items are hidden but become visible when you scroll down using the **rotary/select** button. The cursor shows your position in the menu. The **rotary/select** button moves the cursor up and down.

4.3.2 Finding your way

Use the **rotary/select** button to move the cursor through the menu items. If a double arrow (>>) is visible, then pressing the **rotary/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.

The `TOP` and `PREVIOUS` items are not immediately visible but are located above the first item. Use the **rotary/select** button 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/select** button.

```
  TOP
  PREVIOUS

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


  Video Mode        720p50
  Sensitivity       Nom
```

4.3.3 Leaving the camera menu

If you are deep within the menu structure, the best way of leaving the menu is:

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

When you press the **rotary/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 returning to the `MAIN` menu and selecting `MENU OFF`.

4.3.4 Making value changes

To find out where you have to go to change a function, consult the "Camera menu reference" on page 57 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 **rotary/select** button places the cursor in a list menu indicating the value currently selected. Use the **rotary/select** button 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 **rotary/select** button places the cursor in front of the value and the **rotary/select** button is used to change the analog value. Press the **rotary/select** button to return the cursor to the function list.

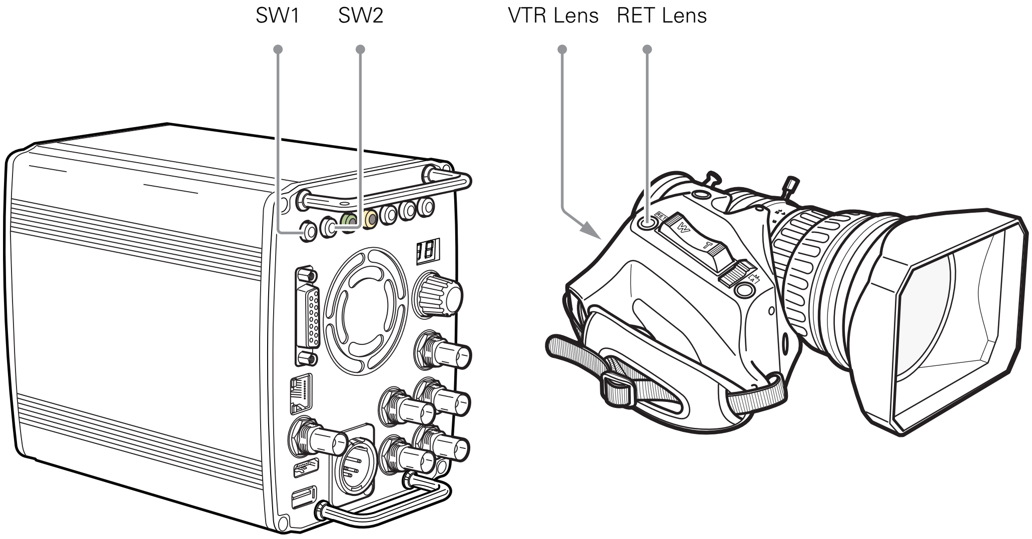
4.3.5 Undoing changes

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

4.4 User buttons

The camera has two assignable user buttons on the back panel (SW1 and SW2). The operation of the RET and the VTR button on the lens can also be assigned.

The assignment and mode (momentary or alternating) of these buttons are set in the `OPERATOR TOOLBOX > USER BUTTONS` menu.



User button SW1 can be assigned to:

- Send Call signal (Call) - default
- Auto White Balance (AWhite)
- Extended Iris (EIris)
- Focus Assist (FocAst)
- Menu Back (Back)
- Menu Select (Select)
- ND+ (ND Filter Up)

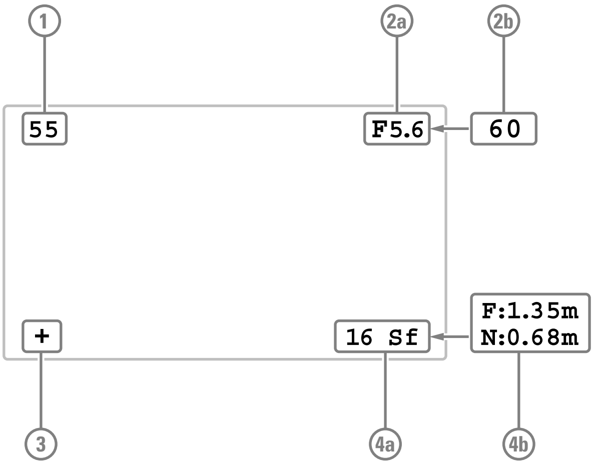
User button SW2 can be assigned to:

- Send Call signal (Call)
- Extended Iris (EIris) - default
- Focus Assist (FocAst)
- Menu Back (Back)
- Menu Select (Select)
- ND- (ND Filterwheel Down)

4.5 On screen information

4.5.1 Indicators

Navigate to the `OPERATOR TOOLBOX > INDICATORS` menu and select the on screen indicators you want to display on the viewing output. 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.

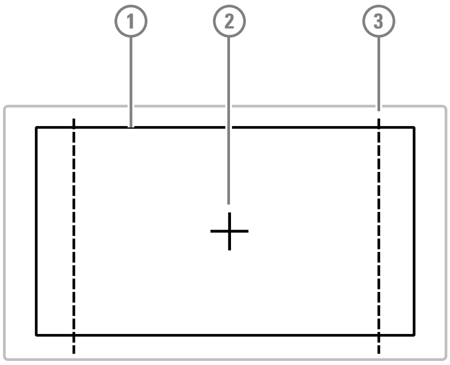
[1)] Must be supported by the lens.

☞ **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.

4.5.2 Marker indicators

Navigate to the `OPERATOR TOOLBOX` > `INDICATORS` menu and select the marker indicators you want to display on the viewing output. 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.

4.5.3 Focus assist

The focus assist function can be switched on or off in the `OPERATOR TOOLBOX` menu. This function adds a motion effect to objects in sharp focus.

4.6 Lens operation

4.6.1 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.

4.6.2 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 on the viewing output. 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 on the viewing output.

☞ **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**.

4.6.3 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.

4.6.4 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 back panel 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.

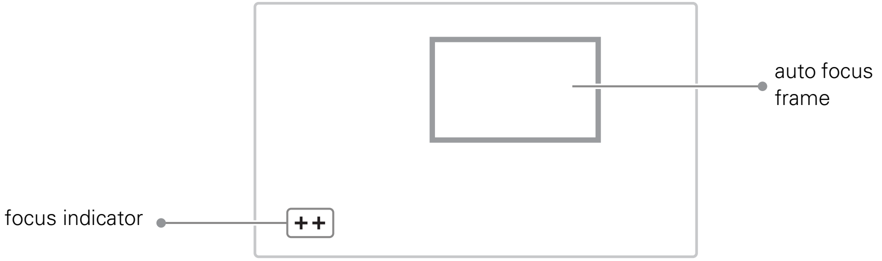
Settings for the Extended Iris function can be changed in the `PRODUCTION SETUP` > `EXPOSURE` > `EXTENDED IRIS` menu.

✎ **Tip**

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

4.6.5 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 viewing output 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 viewing output 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.

4.6.6 Lens indicators on the viewing output

The zoom indicator in the viewing output 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.

4.6.7 Communication

PickMe button

Press the yellow PickMe button on the back panel of the camera 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, the Grass Valley 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).

Call

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

4.7 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 operation of the camera (viewing and control parameters). Lens files contain lens related settings.

The tables in "Camera menu reference" on page 57 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.

4.7.1 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.

4.7.2 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.

4.7.3 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.

4.7.4 Standard files

By default, the green **Std File** button on the back panel 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.

4.8 Access and security

4.8.1 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.

4.8.2 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).

4.8.3 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.

4.8.4 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 57 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 back panel 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.

5.1.2 Video mode

Depending on the LDX camera 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 Sensitivity mode

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

OCP Press the **SETUP MENU** button and enter the `CAM` menu. Select `SENSMODE` and select the mode you want to use for your production.

CAM In the camera menu, navigate to the `PRODUCTION SETUP` > `SENSITIVITY` item and select the sensitivity mode.

The following sensitivity modes are available:

- High Quality mode (“HiQ”) - for studio locations and other environments with very good lighting conditions. This mode provides superior quality pictures with very low noise.
- Nominal mode (“Nom”) - for general purpose situations with variable lighting conditions. This mode provides very good pictures with low noise.
- High Sensitivity mode (“HiSens”) - for situations with poor lighting conditions. This mode results in acceptable quality pictures.

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

	High Quality mode	**Nominal mode**	**High Sensitivity mode1)**
Basic sensitivity1)	typ. F8 @ 2000 lux	typ. F12 @ 2000 lux	max. F17 @ 2000 lux
Video gain range	-3 .. +12 dB	-3 .. +12 dB	-3 .. +18 dB
Signal-to-noise ratio	64 dB	60 dB	54 dB
Texture representation	Excellent	Very good	Fair
PowerCurves exposure input range	up to 300%	up to 800%	up to 800%
Exposure time range	down to 1/200 s	down to 1/200 s	100 Hz/120 Hz to Nom.

1) Actual basic sensitivity depends on selected video mode/frame rate.

5.1.4 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, press the **Bars** button on back panel for switch on the standard color bar. Press it again to switch on the sawtooth signal. The button lights green. Press again to switch off all test signals.

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.

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

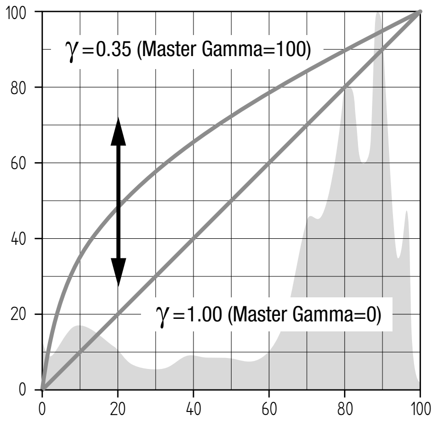
Note

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 High Dynamic Range

5.4.1 Enabling HDR mode

Note

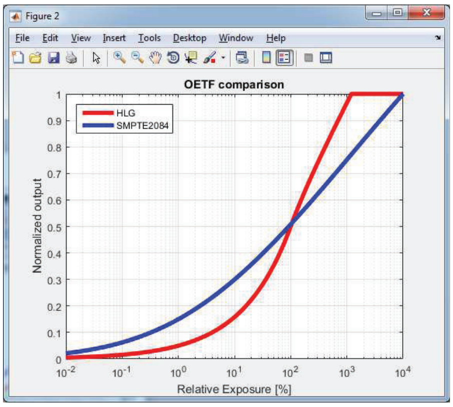
To use HDR mode the XDR eLicense needs to be installed.

CAM In the camera menu, navigate to the `PRODUCTION SETUP` menu and switch the `XDR` to On.

5.4.2 Selecting the EOTF curve

The camera supports two different OETF (Opto-Electronic Transfer) curves:

- SMPTE 2084 (also known as PQ "Perceptual Quantizer")
- HLG (Hybrid Log Gamma)



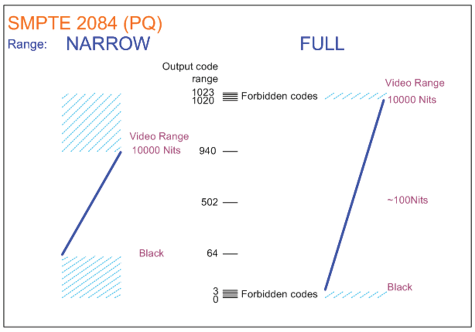
CAM In the camera menu, navigate to the `PRODUCTION SETUP` > `LEVELS` > `HDR` > `HDR STANDARD` item and select the OETF curve you want to use.

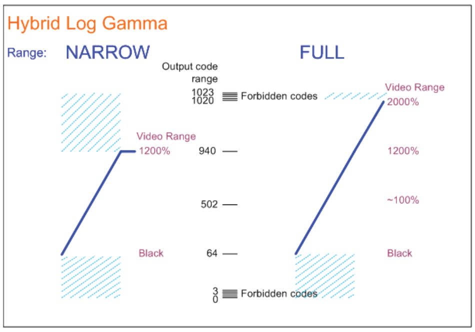
5.4.3 Setting HDR Gain

CAM In the camera menu, navigate to the `PRODUCTION SETUP` > `LEVELS` > `GAIN` menu and use the `HDR GAIN` function to set a gain between -18 dB and +18dB.

5.4.4 Selecting HDR output range

According to the HDR standard, an output level mapping range must be selected: Narrow or Full.





CAM Navigate to the `PRODUCTION SETUP` > `LEVELS` > `HDR` > `HDR RANGE` item and select Narrow or Full.

Note

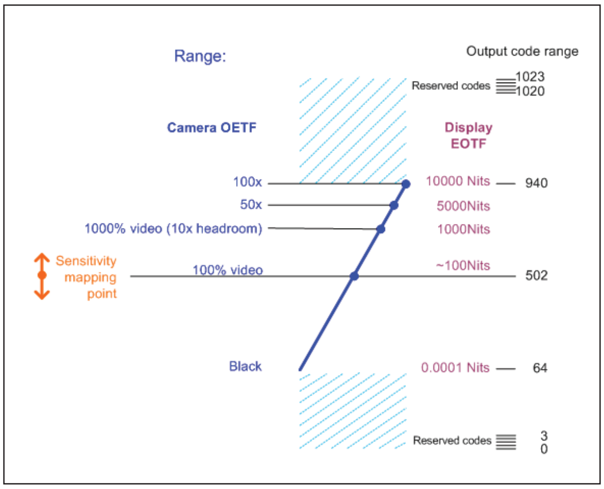
In most HDR broadcast situations, the Narrow range is used.

5.4.5 Setting sensitivity mapping point

The camera’s **sensitivity** is defined as 100% output level (in SDR mode) with an illumination of 2000 lux, 90% scene reflectance and a certain lens opening (f-number).

- This point must be mapped somewhere on the HDR output.

The camera’s **headroom** is defined as the amount of overexposure the system can handle. In SDR this can be made visible with a knee whereas in HDR it is mapped on the output curve using the selected OETF: SMPTE 2084/PQ curve or the HLG curve.



The camera’s sensitivity can be mapped to either the SMPTE 2084/PQ or the HLG curve. The Sensitivity Mapping point can vary between 50% to 500%.

CAM

In the camera menu, navigate to the `PRODUCTION SETUP` > `LEVELS` > `GAIN` > `HDR MAP POINT` item and set the Sensitivity Mapping point.

Guidelines

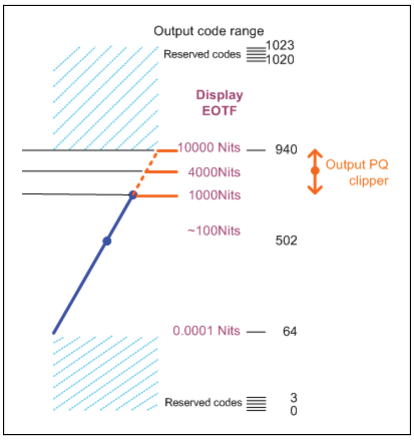
- Sensitivity can be mapped to the OETF “midcode” to have a practical starting point.
- For low contrast scenes a higher point should be selected to get more details in the shadow areas.
- For high contrast scenes a lower point can be selected to allow for higher contrast in the scene.

5.4.6 Output limiter control

For SMPTE 2084/PQ EOTF curve

CAM

In the camera menu, navigate to the `PRODUCTION SETUP` > `LEVELS` > `HDR` > `HDR CLIPLEVEL` item and set the HDR cliplevel between 500 and 10000 Nits.

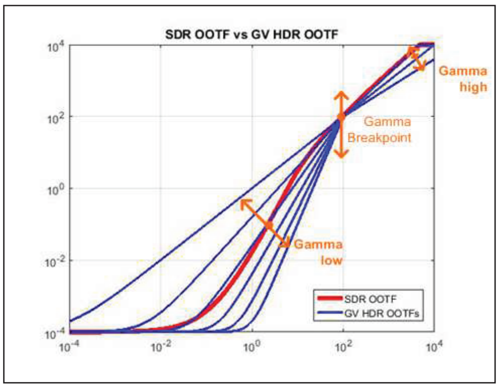


For HLG EOTF curve

For this standard, the HDR output is already limited to 1200% (when HDR Range = Narrow), or to 2000% (when HDR Range = Full).

5.4.7 Gamma control

For artistic purposes, the gamma curve can be changed. In the diagram below, the red line indicates the SDR OOTF (Opto-Optical transfer function) curve. This results in a gamma of 1.2 .. 1.4. The blue curves are the HDR curves:



CAM Navigate to the `PRODUCTION SETUP` > `LEVELS` > `HDR` > `HDR GAMMA LOW` item and set the lower gamma curve (the part of the curve below the HDR Gamma Breakpoint) between 0.8 and 3.5.

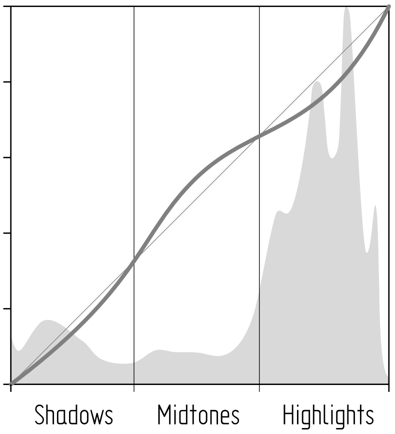
CAM Navigate to the `PRODUCTION SETUP` > `LEVELS` > `HDR` > `HDR GAMMA HIGH` item and set the higher gamma curve (the part of the curve above the HDR Gamma Breakpoint) between 0.4 and 2.0

CAM Navigate to the `PRODUCTION SETUP` > `LEVELS` > `HDR` > `HDR GAMMA BRKPNT` item and set the gamma breakpoint between 50% and 500%.

5.5 Contrast

5.5.1 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.

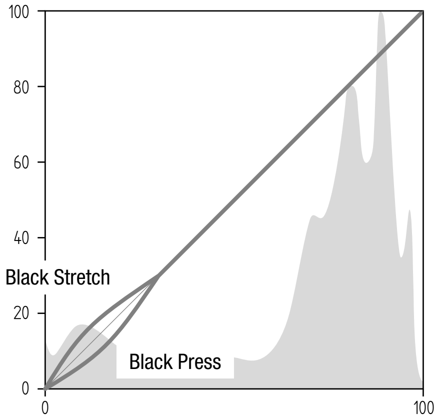
Values below 50 decrease luminance levels while values above 50 increase levels.

Note

Contrast adjustment is always applied after Gamma.

5.5.2 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.

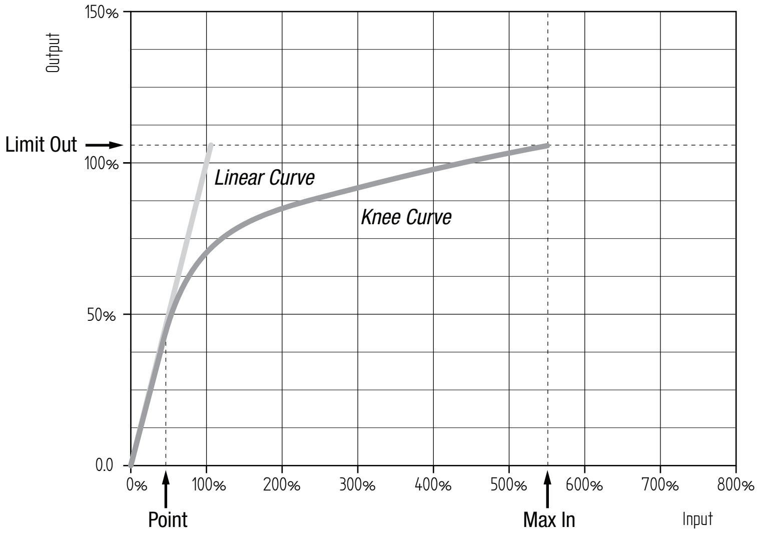
☞ **Note**

Black Stretch is applied independently from Gamma.

5.6 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.

5.6.1 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 109%): the highest video level that is produced at the video output.
- Kn Max In/Max In (150% to 800%): the maximum allowed video input level.

Tip

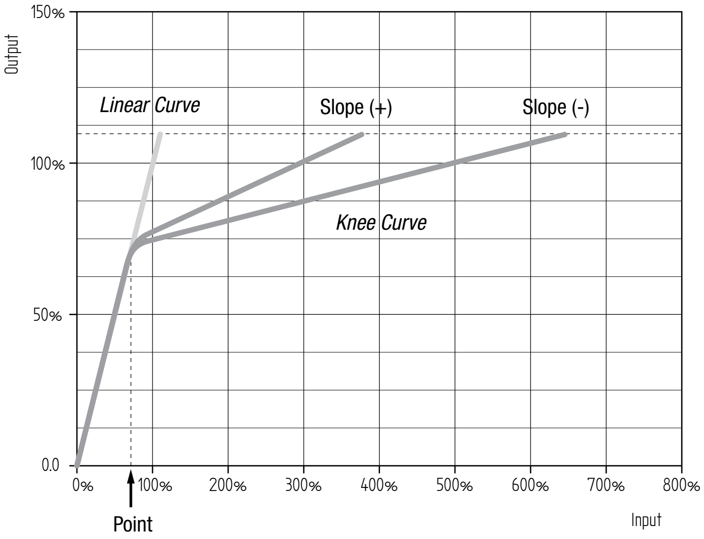
Use the `KN FADE/FADE LEVEL` item in the Knee menu to fade between the set up Knee curve (fade level = 0) and the linear curve (fade level = 99).

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 go to the `CREATIVE CONTROL` > `LEVELS` > `KNEE` > `ADVANCED` > `KNEE MODE` and select Compat.

5.6.2 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

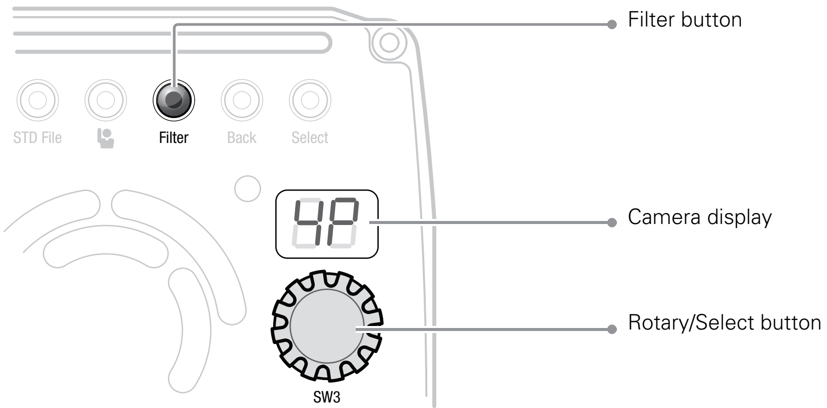
The following parameters in the Knee menu can be used to set up variable Knee in Compatibility mode:

- 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.

5.7 Selecting 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 Press the **Filter** button on the back panel of the camera. The camera display shows the current Effects filter; alternating “EF” and the Effects filter selection. Turn the **rotary/select** button to change the Effects filter:

“CL”: Clear - no filter is placed in the optical path

“4”: ND1/4 - 2 stops light reduction neutral density (ND) filter

“16”: ND1/16 - 4 stops light reduction neutral density (ND) filter

“64”: ND1/64 - 6 stops light reduction neutral density (ND) filter

or push the **Filter** button again to show the current Neutral Density filter. The camera display shows “Nd” and the ND filter selection. Turn the **rotary/select** button to change the ND filter:

“CL”: Clear - no filter is placed in the optical path

“4P”: Star 4P - Four Point Star filter

“SF”: Sft Fcs - Soft Focus filter

“CP”: Capped - lens is closed

Note

The camera does not need color optical filters to be able to white balance correctly. The range of the auto-white balance is so wide (from 2500 K to 20000 K) that there is never any need to use color filters to obtain the correct white balance.

5.8 Exposure

5.8.1 Exposure time

An exposure time of 1/200 s can be 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 TIM` function. Select the exposure time you want to use.

Value	Function
Nom.	nominal setting
Var	Variable exposure time
1/200 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)

5.8.2 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.

5.8.3 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 on the viewing output. 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.

5.8.4 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 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. The exposure time returns to its previous non-variable setting.

5.8.5 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` menu and switch `LED WALL FILTER` on.

5.9 Color

5.9.1 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).

5.9.2 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.

5.9.3 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.

5.9.4 Selecting color temperature

OCP Press the **COLOR** button and select the color temperatur using the `COL TEMP` function. 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:

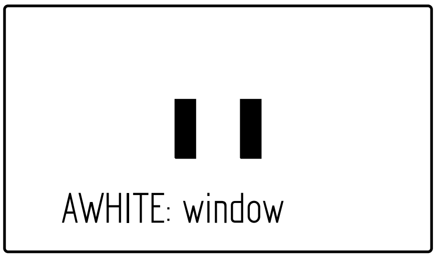
- AWC - Auto White Continuous measurement (from 2500 K to 20000 K)

5.9.5 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, 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.
2. Press the **WHITE BALANCE** button (SW1) — the button lights.

   The following appears on the viewing output:



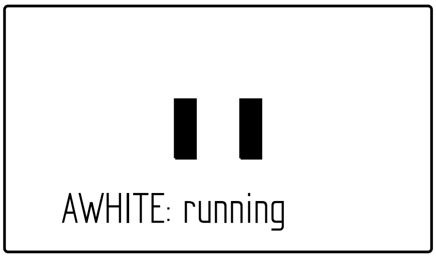
AWHITE: window

Note

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

---

3. Point the camera so that the reference white surface is between the two small black boxes.
4. Press the **WHITE BALANCE** button again — the button flashes.
5. A message indicating that the process is running appears:



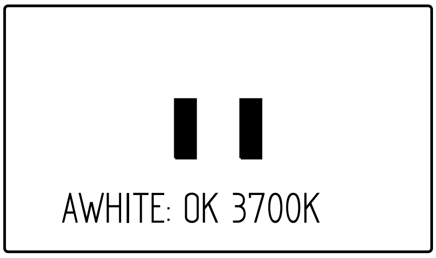
AWHITE: running

Note

If there is insufficient light, the "light level too low" message appears on the viewing output.

---

6. When the process is completed (within a few seconds) the OK message and the measured color temperature appears on the viewing output. On the OCP 400 the button light is switched off.



AWHITE: OK 3700K

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 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.

5.9.6 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

5.9.7 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.

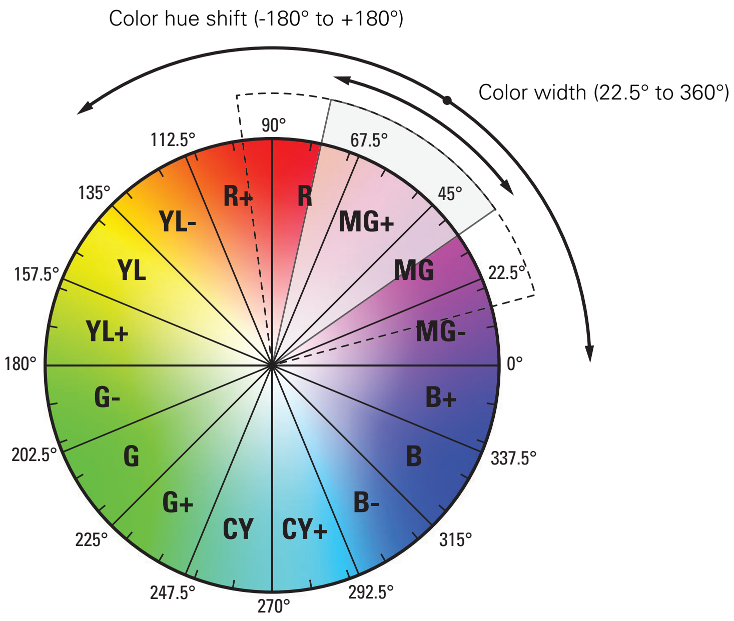
The Color Protect function restores luminance levels without affecting color oversaturation.It prevents non-dominant colors from decreasing below black level so much of the details in the picture are still maintained. If a dominant color saturates, Color Protect gradually decreases its influence in the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

5.9.8 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 version, 2 or 6 color areas can be set up and corrected at the same time.



OCP

Setup using the OCP 400

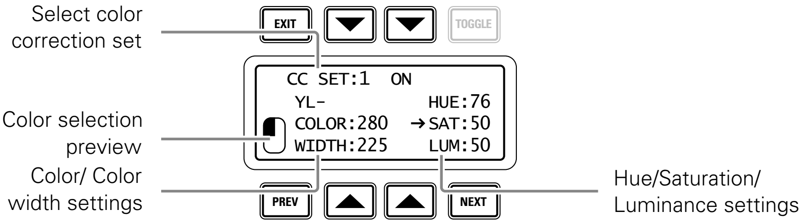
Follow these steps to set up the color corrector on the OCP 400:

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.

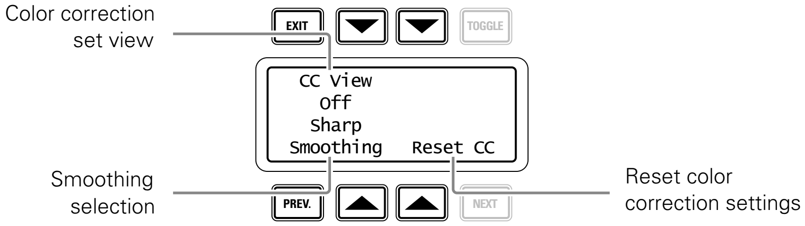
4. Adjust `HUE`, `SATURATION` an `LUMINANCE` of the selected color range. Select the parameter with the navigation button and change its value with the rotary control.


Select color correction set
Color selection preview
Color/ Color width settings
Hue/Saturation/ Luminance settings
EXIT
TOGGLE
PREV
NEXT

```
  CC SET:1  ON
  YL-            HUE:76
  COLOR:280   →SAT:50
  WIDTH:225     LUM:50
```

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.



```
  CC View
    Off
   Sharp
 Smoothing   Reset CC
```

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.

5.10 Sharpness

5.10.1 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.

5.10.2 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.

5.10.3 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)

5.10.4 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.

5.10.5 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` > `DETAILEQUALIZER` 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.

5.10.6 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.

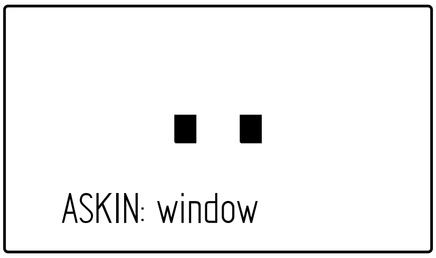
Skin detail is mainly used to *reduce* the level of Detail in a person's skin tone to produce a more attractive picture. Decreasing the Detail level of a person's skin softens the skin tones only. But the Skin Detail function is not limited to a particular color and so can also be used to achieve various 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

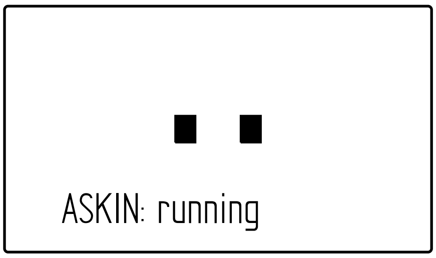
Carry out the Auto Skin Detail procedure as follows:

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:



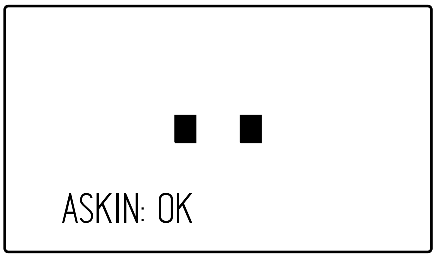
ASKIN: window

4. Now point the two small black boxes at the intended surface (generally a face).
5. Press the **select** button again to start the measurement procedure (the iris is automatically set to *auto* by the camera). The process running message appears:



ASKIN: running

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



ASKIN: OK

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

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 channel 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 HDR	Off, On	Off	User 2	Oper	Switches the signal on the HD/MON Video Out connector to HDR (off = SDR) Note: only available when XDR eLicense is installed.
VF Monitoring	YCrCb, Y, R, G, B, -G, R-G, B-G	YCrCb	User 2	Oper	Selects type of signal to view in the monitoring channel.

Menu item	Values	Default	Level	File	Description
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').
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	10	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	30	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.
Focus Assist					
Focus Assist	Off, On	Off	User 0	Oper	Adds a crawling effect in the focused areas in the viewfinder to assist focussing.
Effect	Fine, Medium, Coarse	Medium	User 0	Oper	Selects type of crawling effect
Gain	Low, Medium, High	High	User 0	Oper	
Zoom Follow	Off, On	Off	User 0	Oper	
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 if the camera menu is permanently On or disappears 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 camera menu.
Intercom					
Prod Vol Ctrl	Prod, Master	Prod	User 3	Oper	Selects if the Prod volume control (upper rotary at the back panel) controls Prod channel volume only (Prod) or overall (Master) intercom volume.
Cam Sidetone	75	0..99	User 3	Oper	Sets the intercom sidetone level (audio feedback from mic to headset) of 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.

Menu item	Values	Default	Level	File	Description
SW1 Mode	Mom, Alt	Mom	User 0	Oper	Selects switching mode for SW2: momentary or alternating (toggle).
SW2	EIris, 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 or alternating (toggle).
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 switch mode for Ret A: momentary 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 switch mode for Ret B: momentary or alternating (toggle).
Eng Mode	Mom, Alt	Mom	User 1	Oper	Selects switching mode for Eng button: momentary or alternating (toggle).
PickMe Mode	Mom, Alt	Mom	User 1	Oper	Selects switching mode for PickMe button: momentary or alternating.
LED Brightness	High, Low	High	User 0	Oper	Selects brightness level for indicators in the control panel of the camera.
LED Brightness	0..99	7	User 0	Oper	Selects brightness level for indicators in the control panel of the camera.
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 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 or alternating (toggle).
RET2	Zoom, EXT2	EXT2	User 1	Oper	Assigns a function to the RET Lens button.
RET2 Mode	Mom, Alt	Mom	User 1	Oper	Selects switching mode for the RET Lens button: momentary or alternating (toggle).
Handgrip Left	Prod, Eng	Prod	User 1	Oper	Selects intercom channel to use with the left button under the handgrip.
Zoom Settings					
Zoom/Focus	Loc, Rem	Loc	User 0	—	Selects local or remote control of the Zoom/ Focus function.
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					
File Select	Standard, OCam1, OCam2...	OCam1	User 1	—	Selects a standard, camera or USB Operator File for recall.

Menu item	Values	Default	Level	File	Description
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 channel.

6.3 Production Setup menu

Menu item	Values	Default	Level	File	Description
Levels					
Gain					
Master Gain	-18.0 dB .. 18.0 dB	0 dB	User 2	—	Sets master video gain in 0.10 dB steps.
HDR Gain	-18.0 dB .. 18.0 dB	0 dB	User 2	—	Sets HDR video gain in 0.10 dB steps. Note: only available when XDR eLicense is installed.
HDR Map Point	50%..500%	100%	User 2	—	Sets HDR Mapping point. Note: only available when XDR eLicense is installed.
Gain Presets					
Gain -	-18 dB.. 30 dB	-3 dB	User 2	Oper	Selects gain value for - preset.
Gain +	-18 dB.. 30 dB	3 dB	User 2	Oper	Selects gain value for + preset.
Gain ++	-18 dB.. 30 dB	6 dB	User 2	Oper	Selects gain value for ++ preset.
Gain +++	-18 dB.. 30 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.
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.
HDR					
HDR Standard	SMPTE2084, HLG	SMPTE 2084	User 3	Scene	Selects the HDR standard (= EOTF curve): SMPTE 2084 (PQ) curve or HLG (Hybrid Log Gamma) curve.

Menu item	Values	Default	Level	File	Description
HDR Range	Narrow, Full	Narrow	User 3	Scene	Sets HDR Output range. Note: only available when XDR eLicense is installed.
HDR Gamma Low	0.8..3.5	1.2	User 3	Scene	Sets HDR Gamma low range (below HDR Gamma Breakpoint). Note: only available when XDR eLicense is installed.
HDR Gamma High	0.4..2	1.0	User 3	Scene	Sets HDR Gamma high range (above HDR Gamma Breakpoint). Note: only available when XDR eLicense is installed.
HDR Gamma BrkPnt	50%..500%	100%	User 3	Scene	Sets HDR Gamma Breakpoint. Note: only available when XDR eLicense is installed.
HDR Cliplevel	500 N..10000 N	10000 N	User 3	Scene	Sets HDR Cliplevel in Nits (only when HDR Standard = SMPTE2084) Note: only available when XDR eLicense is installed.
Gamma					
Curve	BBC04, BBC05, BBC06, ARD, ITU709, RAI, 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.
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					
Peak					

Menu item	Values	Default	Level	File	Description
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	—	
Average					
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	1/200	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.
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, Var	Off	User 1	—	Selects exposure time.
Var Exp Time	50 ... 200	—	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					

Menu item	Values	Default	Level	File	Description
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					
Saturation	0..200%	100%	User 0	Scene	Sets color saturation level. 0% = fully desaturated (black/white), 100% = normal saturation, 200% = maximum saturation.
HDR Saturation	0..200%	100%	User 0	Scene	Sets HDR color saturation level. 0% = fully desaturated (black/white), 100% = normal saturation, 200% = maximum saturation. Note: only available when XDR eLicense is installed.
Color Gamut					
Color Gamut	REC709, REC2020	REC709	User 2	Scene	Selects Color Gamut to be used: REC709 = default color gamut REC2020 = extended color gamut Note: only available when XDR eLicense is installed.
HDR ColorGamut	REC709, REC2020, LMS	REC2020	User 2	Scene	Selects Color Gamut to be used in HDR mode: REC709 = default color gamut REC2020 = extended color gamut LMS = LMS color space (LMS = Long, Medium and Short wavelengths) Note: only available when XDR eLicense is installed.
Matrix					

Menu item	Values	Default	Level	File	Description
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 = for vivid color reproduction (advised to combine with M/G setting); Var1 = variable setting 1; Var2 = variable setting 2.
Mat/Gam Seq	G/M, M/G	M/G	Service	Scene	Selects the sequence 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)
HDR Mat/Gam Seq	G/M, M/G	M/G	Service	Scene	
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.

Menu item	Values	Default	Level	File	Description
Store	Exec, ...	Exec	User 2	—	Stores the current operator settings in the selected operator file.
Recll 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	4K/50, 4K/59	4K/50	User 3	—	Selects video mode.
Sensitivity	HiQ, Nom, HiSens	Nom	User 3	—	Selects sensitivity mode: HiQ = High quality Nom = Nominal HiSens = High sensitivity
XDR	Off, On	Off	User 3	—	Switches HDR mode on or off. Note: only available when the XDR eLicense is installed.
Video Mode	1080i59, 720p59, 1080i50 ...	1080i59	User 3	—	Selects video mode. Available video modes depending on camera version.

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	150%..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 channel.
Set	1,2,3,4,5,6	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	30	User 3	Scene	Level Dependency: sets the Detail reduction level for shadow areas.
Noise Slicer	0..99	10	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 channel.
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 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.
Reset	Exec > Busy	Exec	User 0	—	Select to reset lens aberration data

Menu item	Values	Default	Level	File	Description
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.
Cam Mic Gain	0dB, 40dB	40dB	User 1	Oper	Selects Gain of camera Operator’s intercom microphone.

Menu item	Values	Default	Level	File	Description
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 the camera operator's ear muff(s) for the production channel.
Cam Eng	Off, Left, Right, Both	Both	User 1	Oper	Selects the camera operator's ear muff(s) for the engineering channel.
Cam Prog	Off, Left, Right, Both	Both	User 1	Oper	Selects the camera operator's ear muff(s) for the program channel.
Cam Tracker	Off, Left, Right, Both	Both	User 1	Oper	Selects the camera operator's ear muff(s) for the tracker channel.
Cam Tracker lvl	0..99	50	User 1	Oper	Sets tracker signal level in the camera operator's headphones.
Tracker					
Tracker Mic To	Off, Cam, Eng, Prod, All	Off	User 1	Oper	Selects the tracker mic routing.
Tracker Mic Gain	0dB, 40dB	40dB	User 1	Oper	Selects gain of camera Tracker's intercom 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 microphone sidetone for tracker's headphone.
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.
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 3	—	Switches the Tally Lock function on or off. When Tally Lock is on, some camera controls are locked when the camera is On Air.

Menu item	Values	Default	Level	File	Description
Tally Source	GPIO, Ethernet, Serial	Ethernet	User 0	Oper	Selects the input source for the Tally status.
Tally Nr Of Leds	1,3,5,7	3	User 0	Oper	
Tally Red Level	0..99	50	User 0	Oper	
CAWB Settings					
CAWB Speed	1..40	4	Service	—	Sets the speed for the Continuous Auto White Balance procedure.
CAWB Gain	1..40	10	Service	—	Sets the gain value for the Continuous 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.
Serial Control					
RSxx2 Select					
Rx Signal					
PCI ID	0..8	1	User 0	—	Selects ID for external PC operation.
Signals					
Compact BNCs					
BNC B I/O	Input, Output	Output	User 3	—	Selects function (input or output signal) for the BNC B connector: Output: BNC B carries the Main Video out signal Input: BNC B is used for the External video input.
BNC E signal	Mon, HD	Mon	User 3	—	
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					
Time Left	0..65535	0	User 2	—	Shows time left in seconds for 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, XtremeSpeed	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.
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	<list>	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					

Menu item	Values	Default	Level	File	Description
Select Type	<list>	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					
C2IP Panels	0..99	0	User 2	—	Shows number of C2IP control panels that are connected to the camera.
Camera Connects	0..1	0	User 2	—	Shows number of Camera Connect devices that are connected to the camera.
Locking					
Reference In	Unknown, <list of video modes>	Unkno	User 2	—	Shows detected video mode of the reference input signal applied to the Ref In input.
Gen Lock	Yes, No, Invalid	No	User 2	—	Shows current Gen Lock status.
Ethernet					
MAC-Address			User 2	—	Shows camera’s Ethernet MAC address
Link state	Connected,Disconn	Disconn	User 2	—	Shows camera’s Ethernet Link status
Link type	Unknown, 10Mb/Half, 10Mb/Full, 100Mb/Half, 100Mb/Full, Negotiate	Unknown	User 2	—	Shows camera’s Ethernet Link type (speed)
Configuration					
Camera					
Type	Invalid, LDX C80, LDX C82, LDX C85 ..	Invalid	User 2	—	
PID	<text>		User 2	—	
Alias	<text>		User 2	—	
Device ID	<text>		User 2	—	
Number	0..99	0	User 2	—	
Number	0..99	1	User 2	—	
Package Info					
Camera Package					
Package	Ok, Not Ok	Ok	User 2	—	Shows Package status
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

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		Service	—	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		Service	—	Shows current status of the Black Calibration process.
Calibr Temp	37 C, Act	37 C	Service	—	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	Service	—	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 Black Calibration

Black Calibration is an automated procedure that improves the image quality by re-mapping the level of black for each pixel to keep a consistent sensitivity throughout the entire image.

In general, the Black Calibration procedure should be performed after a package update when it is indicated by a message (“Black Calibration needed”) in the viewfinder.

- In some cases, it may take about a minute before this message appears.

1. Switch on the camera.

Note

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

---

2. In the camera menu, go to the `SERVICE` > `CALIBRATIONS` > `BLACK CALIBR` menu and select the calibration temperature using the `CALIBR TEMP` item. There are two options: **37 C** (default) or **Act** (actual) temperature.
3. Go to the `BLACK CAL` item and select it. The camera starts to warm up or cool down, depending on the ambient temperature and the selected calibration temperature. The lens is capped automatically and lens iris is closed during the calibration process.
   - Actual (current) temperature can be monitored using the `ACT TEMP` item.
4. When the camera reaches the selected calibration temperature, the Black Calibration process starts. It takes about one minute to complete.
   - During the process, you can monitor Black Calibration using the `STATUS` item.
5. When the process is finished, the camera can be used normally.

Tip

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

7.3 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.

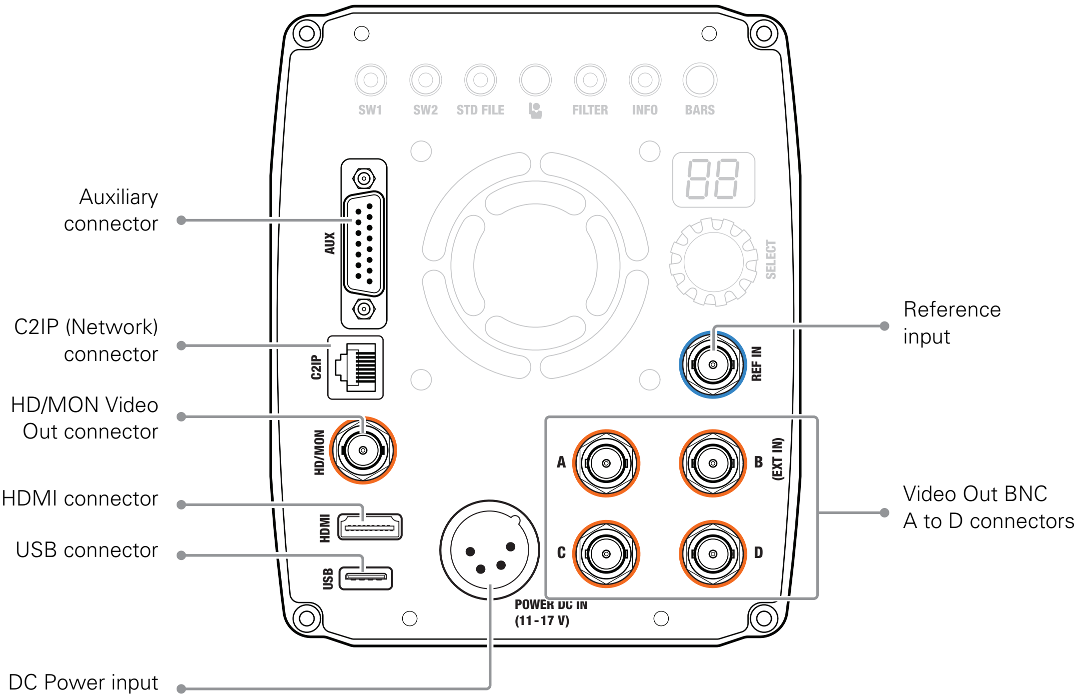
---

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.

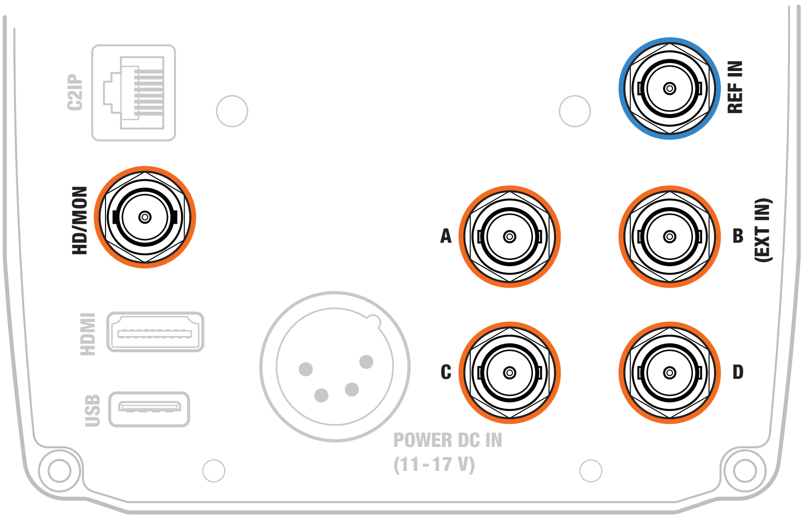
Chapter 8

Connectors

8.1 Connector locations



8.1.1 BNC Video connectors



For 4K video modes in SDR

Connector	Name	Signal
— A —	*Link 1*	BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); 2SI Link 1 in SDR
— B — (EXT IN)	*Link 2*	BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); 2SI Link 2 in SDR
— C —	*Link 3*	BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); 2SI Link 3 in SDR
— D —	*Link 4*	BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); 2SI Link 4 in SDR
HD/MON	*VF*	Monitoring video output or 3G-SDI (3 Gb/s) in1080p video mode in SDR or HDR.1) 2)

1) Go to the `OPERATOR TOOLBOX` > `VF HDR` item to select SDR or HDR for the HD/MON video output (SDR is the default setting). For this feature the XDR eLicense is needed.

2) Go to the `CONFIGURATION` > `SIGNALS` > `COMPACT BNCS` > `BNC E SIGNAL` item and select **HD** for 1080p main video output and select **Mon** for Monitoring video output.

For 4K video modes in HDR

Note

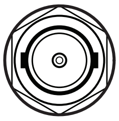
For this feature the XDR eLicense is needed.

Connector	Name	Signal
— A —	*Link 1*	BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); 2SI Link 1 in HDR
— B — (EXT IN)	*Link 2*	BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); 2SI Link 2 in HDR
— C —	*Link 3*	BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); 2SI Link 3 in HDR
— D —	*Link 4*	BNC, 0.8 Vpp, 75 Ω, 3G-SDI (3 Gb/s); 2SI Link 4 in HDR
HD/MON	*VF*	Monitoring video output or 3G-SDI (3 Gb/s) in1080p video mode in SDR or HDR.1) 2)

[1] Go to the `OPERATOR TOOLBOX` > `VF HDR` item to select SDR or HDR for the HD/MON video output (SDR is the default setting).

[2] Go to the `CONFIGURATION` > `SIGNALS` > `COMPACT BNCS` > `BNC E SIGNAL` item and select **HD** for 1080p main video output and select **Mon** for Monitoring video output.

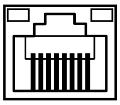
8.1.2 Reference input (REF IN) connector



BNC connector

This connector is used to genlock the camera to a HD tri-level reference input signal. It also accepts an analog Black Burst (BB) reference signal.

8.1.3 C2IP (Network) connector



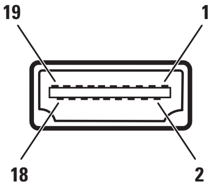
8-pin standard RJ-45 ethernet connector

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)

8.1.4 HDMI connector

This connectors always delivers the Monitoring Video output signal.

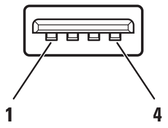


19-pin HDMI connector

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

8.1.5 USB connector

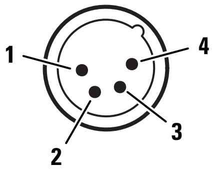


USB host connector

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

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

8.1.6 DC Power input connector

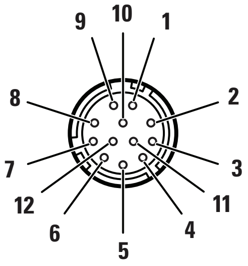


XLR 4-pin male connector

Pin	Description
1	GND
2	Not connected
3	Not connected
4	+11 to +17 VDC (max. 5 A)

Caution
The input voltage must not exceed 17 V.

8.1.7 Lens interface connector 1



12-pin female connector

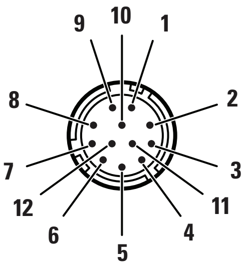
Pin	Description
1	External video on/off
2	VTR trigger switch
3	+13 VDC Return
4	Momentary iris
5	Iris control
6	+13 VDC (max 1.1 A) [1)]
7	Iris follow
8	Lens servo
9	Range Extender
10	Zoom follow
11	RxD / Focus follow[2)]
12	TxD

[1)] When 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 viewing output.
[2)] Focus Follow is not available for all lens types.

Manufacturer code: Hirose HR10A-10R-12S

8.1.8 Lens interface connector 2

For connecting analog remote controlled (or teleconference style) lenses. Connect the main lens cable to Lens interface connector 1 and the separate remote control cable to this connector.



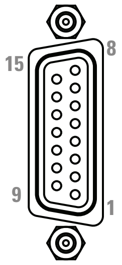
12-pin male connector

Pin	Description
1	Focus position (+7.5V= Position) > to lens
2	Zoom position (+7.5V= Position) > to lens
3	GND
4	Iris Local (0V) / Camera (open) signal > to lens
5	Iris control (Close 7.5V / Open 2.5V) > to lens
6	+13 VDC > to cam (not connected)

Pin	Description
7	Signal common (+5.0V) > to cam
8	Focus control (Far 7.5V/ Near 2.5V) > to lens
9	Zoom control (Tele 7.5V/Wide 2.5V) > to lens
10	Iris Position(+7.5V = Position) > to lens
11	COM + Voltage (+7.5V) > to cam
12	COM + Voltage (+2.5V) > to cam

Manufacturer code: Hirose HR10A-10R-12P

8.1.9 Auxiliary connector (AUX)

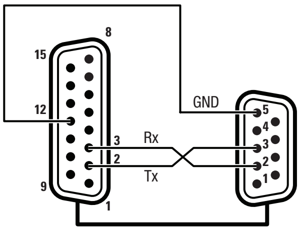


D-sub 15-pin female connector

Pin	Description
1	Tally contact (dry contact between pin 1 and 9)
2	RS-422/RS-232 Tx
3	RS-422/RS-232 Rx
4	Power ON (Open = On, GND = Off)
5	Power +12 VDC (max 0.5 A)
6	<Menu Up> contact (GND = Up)
7	Tally input (Open = Off, GND = Tally on)

Pin	Description
8	Not connected
9	Tally Contact Return
10	RS-422/RS-232 Tx Return
11	RS-422/RS-232 Rx Return
12	GND
13	<Menu Select> contact (GND = Select)
14	<Menu Down> contact (GND = Down)
15	GND

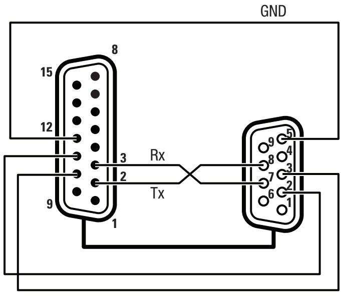
example of RS-232 wiring:



Auxiliary (D-sub 15-pin female connector)

RS-232 (D-sub 9-pin male connector)

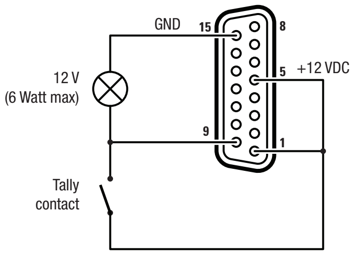
example of RS-422 wiring:



Auxiliary (D-sub 15-pin female connector)

RS-422 (D-sub 9-pin female connector)

Tally wiring:



Auxiliary (D-sub 15-pin female connector)

Chapter 9

Specifications

9.1 Specifications for LDX C85N camera head

9.1.1 General

Power consumption (approx.)	45 W
Power Requirements	15 V DC
Operating temperatures	-20 °C to +45 °C (-4 °F to 113 °F)
Weight	2.5 kg (5.5 lbs)
Dimensions (Width x Depth x Height)	113 x 156 x 140 mm (4.45 x 6.14 x 5.51 in)
Water protection	Compliant to IPX0

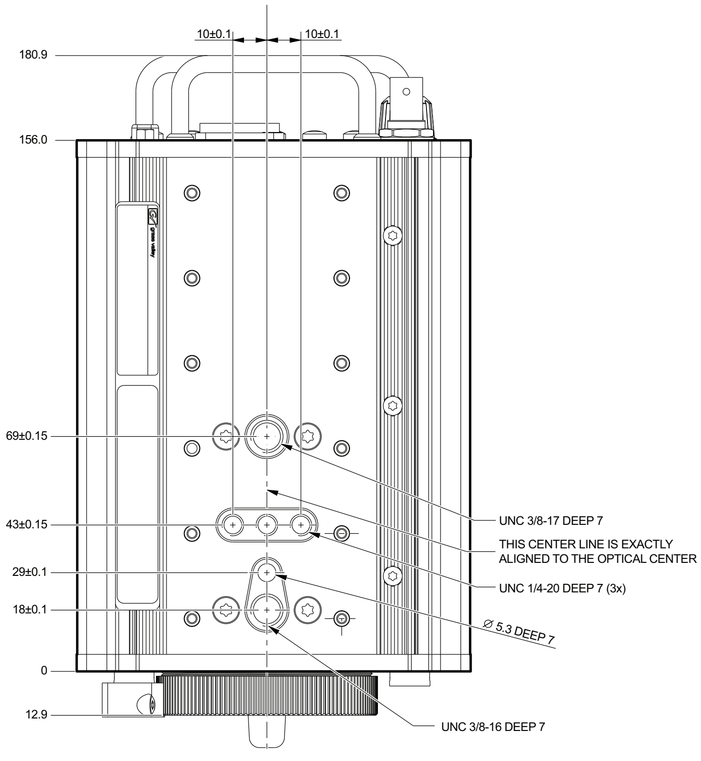
9.1.2 Camera

Pickup Device	3x 2/3” Xensium^{HAWK} CMOS imager
Picture elements	3840 (H) x 2160 (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 1/200 s

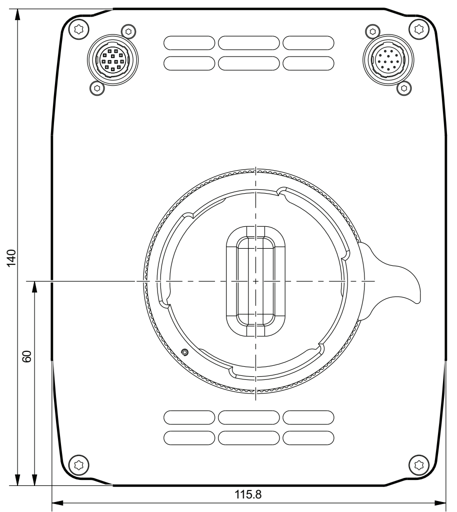
9.1.3 Signals and connectivity

USB connector	USB 2.0
Ethernet	RJ-45 type 10Base-T, 100Base-TX compliant with IEEE-802.3 (edition 2000)
Lens connectors	12-pin Hirose + 12-pin Hirose for Zoom/Focus interconnection
Viewing output (HDMI)	HDMI
— A —	BNC connector 1.0 Vpp; 75 Ω
— B —	BNC connector 1.0 Vpp; 75 Ω
— C —	BNC connector 1.0 Vpp; 75 Ω
— D —	BNC connector 1.0 Vpp; 75 Ω
HD/MON	BNC connector 1.0 Vpp; 75 Ω
Reference input (REF IN)	BNC connector 1.0 Vpp; 75 Ω
Auxiliary	15-pins D-sub data connector with serial control connection, remote control lines and tally control.
DC power input	12 VDC (11 to 17 VDC), XLR-4 male

9.2 Dimensions



BOTTOM HOLE PATTERN VIEW
(TOP AND BOTTOM HOLE
PATTERNS ARE IDENTICAL)



FRONT VIEW