

# ALEXA Mini LF

## Software Update Package 6.0

USER MANUAL

September 10, 2019



# Imprint

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Original version.

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## 2 Disclaimer

Before using the products described in this manual be sure to read and understand all respective instruction.

The ARRI ALEXA Mini LF is only available to commercial customers. The customer grants by utilization that the ARRI ALEXA Mini LF or other components of the system are deployed for commercial use. Otherwise the customer has the obligation to contact ARRI preceding the utilization.

While ARRI endeavors to enhance the quality, reliability and safety of their products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risk of damage to property or injury (including death) to persons arising from defects in the products, customers must incorporate sufficient safety measures in their work with the system and have to heed the stated canonic use.

ARRI or its subsidiaries do not assume any responsibility for incurred losses due to improper handling or configuration of the camera or other system components, due to sensor contamination, occurrence of dead or defective pixels, defective signal connections or incompatibilities with third party recording devices.

ARRI assumes no responsibility for any errors that may appear in this document. The information is subject to change without notice.

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### 3 For Your Safety / 为了您的安全

Before use, please ensure that all users read, understand and follow the instructions in this document fully. 使用前，请确保所有的用户都已经阅读、理解，并遵循本文档内的操作说明。

#### 3.1 Risk Levels and Alert Symbols / 危险级别和警示标志

Safety warnings, safety alert symbols, and signal words in these instructions indicate different risk levels:

本文档内的安全警告、安全警示标志和标识词语指示不同的危险级别：

##### ⚠ DANGER!

**DANGER** indicates an imminent hazardous situation which, if not avoided, **will result in** death or serious injury.

##### ⚠ 危险

危险表示危急、有危害的情景，若不防范，则会导致死亡或严重的伤害。

##### ⚠ WARNING!

**WARNING** indicates a potentially hazardous situation which, if not avoided, **may result in** death or serious injury.

##### ⚠ 警告

警告表示有潜在危害的情景，若不防范，则可能会导致死亡或严重的伤害。

##### ⚠ CAUTION!

**CAUTION** indicates a potentially hazardous situation which, if not avoided, **may result in** minor or moderate injury.

##### ⚠ 小心

小心表示有潜在危害的情景，若不防范，则可能会导致中等或较轻的伤害。

##### NOTICE

**NOTICE** explains practices not related to physical injury. No safety alert symbol appears with this signal word.

##### 提示

注意表示此行为不会导致人身伤害。因此此标识词语中不含警告标志。

**Note:** Provides additional information to clarify or simplify a procedure.

注：注意中会提供用于解释或简化工作的额外信息。



## 3.2 Vital Precautions / 重要安全措施

### ⚠ DANGER!

#### **High voltage! Risk of electric shock and fire!**

Short-circuits may entail lethal damage!

Before use, read and follow all valid instructions.

Use solely and exclusively as described in the instructions.

Never open. Never insert objects.

For operation, always use a power source as indicated in the instructions.

Always unplug the power cable by gripping the power plug, not the cable.

Never try to repair. All repair work should be done by a qualified ARRI Service Center.

Never remove or deactivate any safety equipment (incl. warning stickers or paint-marked screws).

Always protect from moisture, cold, heat, dirt, vibration, shock, or aggressive substances.

Never cover any fan openings.

### ⚠ 危险

#### **高电压！有触电或起火风险！**

短路将引起致命危险。

使用之前，请仔细阅读所有未过期的使用说明，并严格遵循。

切勿打开机身。切勿插入任何物体。

操作时，请务必使用说明中指出的电源。

断开电源时请握住电源插头，而不是电线。

切勿尝试自行维修。所有的维修工作必须由具备资质的ARRI 维修中心进行。

切勿移除或毁坏任何安全设施（例如警告贴纸或涂漆标示的螺丝）。

务必避免潮湿、寒冷、炎热、多尘、震动、冲击或严酷的使用环境。

切勿覆盖任何风扇开口。

**▲ CAUTION!****Condensation! Risk of electric shock and fire!**

Condensation may form on the sensor and electrical connections when exposing the camera to sudden changes of temperature or humidity!

To avoid injury and damage, never operate the camera when condensation occurs.

**▲ 小心****冷凝！有触电或火灾风险！**

当将摄影机暴露于温度或湿度迅速变化的环境中时，影像传感器和电子部件连接处可能会产生冷凝。为了您的安全。

为了避免受伤或设备损坏，在冷凝发生时切勿操作摄影机。

**▲ CAUTION!****Heavy weight! Risk of injury and damage!**

If placed on an unstable surface, the camera can fall and cause serious harm!

Always place the camera on proper support devices. Safely attach it as described in the instructions.

**▲ 小心****设备重量较大！有受伤或设备损坏风险！**

若安置于不稳定的位置，则摄影机可能会掉落，并造成严重的伤害。

务必将摄影机安装于适当的支撑设备上。请按照说明中所描述的方法来安全地安装摄影机。

### 3.3 Safety Guidelines

#### General Safety Guidelines

- ▶ Always follow these guidelines to ensure against injury to yourself or others and damage to the system or other objects.
- ▶ Assembly and initial operation should be carried out only by staff familiar with the system.
- ▶ This safety information is in addition to the product specific operating instructions in general and must be strictly observed for safety reasons.
- ▶ Read and understand all safety and operating instructions before you operate or install the system.
- ▶ Retain all safety and operating instructions for future reference.
- ▶ Heed all warnings on the system and in the safety and operating instructions before you operate or install the system. Follow all installation and operating instructions.
- ▶ Do not use accessories or attachments that are not recommended by ARRI, as they may cause hazards and invalidate the warranty.
- ▶ Do not attempt to repair any part of the system! Repairs must only be carried out by authorized ARRI Service Centers.
- ▶ Only use the tools, materials and procedures recommended in this document. For the correct use of other equipment, see the manufacturer's instructions.

### Specific Safety Guidelines

- ▶ Do not remove any safety measures from the system.
- ▶ Do not operate the system in areas with humidity above operating levels or expose it to water or moisture.
- ▶ Do not subject the system to severe shocks.
- ▶ Do not cover the camera fan openings.
- ▶ During extended operation, high data rates and/or operation at high ambient temperatures, the camera's surfaces and especially the area around the fan outlet can get hot. Use caution and never cover, obstruct or block the fan inlet or outlet while the camera is powered.
- ▶ Direct sunlight can result in camera housing temperatures above 60 °C (140 °F). At ambient temperatures above 25 °C (77 °F), protect the camera from direct sunlight.
- ▶ Do not point the camera sensor into direct sunlight, very bright light sources or high energy light sources (e.g. laser beams). This may cause permanent damage to the camera image sensor.
- ▶ Do not place the system on an unstable trolley/hand truck, stand, tripod, bracket, table or any other unstable support device. The system may fall, causing serious personal injury and damage to the system or other objects.
- ▶ Never insert objects of any kind into any part of the system if not clearly qualified for the task in the manual, as objects may touch dangerous voltage points or short out parts. This could cause fire or electrical shock.
- ▶ Do not remove any stickers or paint marked screws.
- ▶ When no lens is attached to the camera, immediately place the protective cap on the lens mount to avoid contamination of the sensor cover glass.
- ▶ If the sensor cover glass has been contaminated by solid dirt or grease, special optical cleaning kits should be used for dirt removal under very high care. If the contamination cannot be removed, the camera should be taken to an ARRI service center for cleaning.
- ▶ Clean optical lens surfaces only with a lens brush or a clean lens cloth. In cases of solid dirt or grease, moisten a lens cloth with pure alcohol. Discard contaminated lens cloth after use. Never attempt to clean a lens brush with your fingers.
- ▶ Do not use solvents for cleaning.
- ▶ Never use Acetone to clean optical surfaces.
- ▶ The use of Methanol to clean optical surfaces is not recommended.
- ▶ Never use cans with compressed air to blow off dust. This can severely damage optical elements.

## 4 Sensor Related Information / 有关影像传感器的信息

### Single Frame Spots of Various Shape – also known as “Digital Dust” or “White Flecks”

Natural and/or artificial radiation may cause a “false exposure” on the image sensor. The shape of these spots may vary from dots to lines or other, sometimes irregular shapes. These spots occur in random locations of the image, last only for a single frame and are more visible in dark images. This is a principle issue of all image sensors and not a malfunction.

### 单帧画面出现斑点，可能是多种形状——也被称为“数字尘埃”或“白斑”

自然和/或人工的辐射可能会引起影像传感器的非正常曝光。这些斑点的形状可能是点状、线状或其他不规则形状。

这些点可能会随机出现在画面的任何地方，仅持续一帧，并在画面暗部更易显现。这是影像传感器的工作原理导致的，并非故障。

### Flicker

Some light sources (i.e. discharge tubes or LEDs) may cause an interference with sensor exposure. This may result in image flickering or “bands” of different brightness moving up or down the image. Please note that at higher frame rates (100 fps in 50Hz countries, 120 fps in 60Hz countries) even tungsten light may flicker. A short recording and playback will show this flicker.

For information on how to reduce flicker when filming a monitor please see Setting a Shutter Value.

### 频闪

有些光源（例如灯管或LED灯）可能会引起对影像传感器曝光的干扰。这会导致画面频闪，或者在画面里不同亮度、上下运动的条纹。

请注意在某些高帧率下（在50Hz国家拍摄100 fps，在60Hz国家拍摄120 fps），甚至钨丝灯也会发生频闪。拍摄并回放一个短视频可以检查这种频闪。

### Rolling Shutter

Due to the rolling shutter design principle of the sensor the following effects can be observed in certain situations:

- Skewed/slanted vertical lines: fast panning or fast-moving objects may result in vertical structures to appear “skewed/slanted”. The intensity of the effect depends on the relative speed of panning/object.
- Partial exposure: very short light effects (i.e. a photographer’s flash or strobe light) may result in the upper part of the image showing the light effect whereas the lower part does not or vice versa.

### 滚动快门

由于影像传感器的滚动快门工作原理，某些特定场合下会出现以下现象：

- 歪曲/倾斜的垂直线条：快速横摇或快速移动的物体会导致垂直线条呈现出“歪曲/倾斜”的状态。其程度取决于横摇/物体运动的相对速度。
- 不完整曝光：非常短的灯光效果（例如照相机闪光灯或频闪灯）会导致仅有画面的上半部分被照明而下半部分未被照明，反之亦然。

### "Black Sun"

Very bright lights (i.e. the sun, or a photographer’s flash) may result in a black/magenta spot. Note: pointing the camera directly into the sun may damage the sensor.

### “黑太阳”

非常明亮的光源（例如太阳，或照相机闪光灯）可能会成为黑色/洋红色的斑点。注意：将摄影机直接对准太阳可能会损坏影像传感器。

### Stuck Pixels at Long Exposure Times

At longer exposure times (longer than the standard 1/50th of a second), stuck pixels may become visible in darker image areas. The longer the exposure time the more pixels will be affected. When using exposure times longer than 1/24th of a second, carefully check your image whether the quality meets your requirements.

### 长曝光时间的驻留像素

在曝光时间较长时（比常规的1/50秒更长），画面中较暗的区域可能会出现驻留像素。

曝光时间越长，这些像素会变得越多。当曝光时间长于1/24秒时，请仔细检查画面是否符合您的要求。

### Stitching with ALEXA Mini LF

The ALEXA Mini LF sensor consists of a large sensor structure that is created by exposing two Super 35 sensor structures side by side onto a silicon wafer. This process is, somewhat misleadingly, called “stitching”. As is common with stitched large format sensors in our industry, in rare situations it is possible to notice the boundary between the left and right image halves.

### ALEXA Mini LF 的画面接合

ALEXA Mini LF的影像传感器采用了大型传感器的结构，即在一块硅晶圆上并排连续曝光两个Super35尺寸的传感器。这种处理方式叫做“接合”，尽管该名称可能会导致误解。

在我们的行业中，接合是大型传感器常见的组成方式。在极其偶然的的情况下，画面左右两部分的边界线可能会被观察到。

## 5 Audience and Intended Use

The ALEXA Mini LF is a large format digital camera solely and exclusively for recording images at various resolutions suitable for a variety of distribution formats:

- Apple ProRes 422 HQ, Apple ProRes 4444, Apple ProRes 4444 XQ and ARRIRAW codec
- Rec 709 and Rec 2020 encoding (through use of look files), Log C or ARRIRAW encoding
- Codex Compact Drive recording
- Up to 90 fps with full image quality
- Large format CMOS sensor
- MVF-2 with OLED eyepiece and flip-out monitor for both live view and user interface access
- Small and lightweight built for high mobility and special applications

### How To Use This Manual

All directions are given from a camera operator's point of view. For example, camera right side refers to the right side of the camera when standing behind the camera and operating it in a normal fashion.

Connectors are written in all capital letters, for example SDI 1.

Menu paths are written in italic typeface, with menu and home in capital letters, for example *MENU* > *Recording* or *HOME* > *FPS*.

Buttons are written in italic typeface capital letters, for example *PLAY* button.

The appendix at the back of the manual contains useful reference material including ALEXA Mini LF technical data, connector pin-out diagrams, alert message explanations and dimensional drawings.

### NOTICE

The product is solely and exclusively available for commercial costumers and shall be used by skilled personnel only. Every user should be trained according to ARRI guidelines.

Use the product only for the purpose described in this document. Always follow the valid instructions and system requirements for all equipment involved.

### Strengthen Your Knowledge and Get Trained

The ARRI Academy courses provide unrivalled insights into the full possibilities of working with ARRI camera systems, lenses, lights and accessories.

To learn more, please visit <http://arri.com/academy>.

## 6 Scope of Delivery and Warranty

### Delivery

On delivery, please check if package and content are intact. Never accept a damaged/incomplete delivery. A complete delivery includes:

- ALEXA Mini LF camera
- Lens mount according to order
- White Radio Antenna
- WiFi Antenna
- USB memory stick
- 3.0 mm Allen key
- Original packaging incl. drying agent

### NOTICE

Product and packaging contain recyclable materials. Always store, ship and dispose according to local regulations.

ARRI is not liable for consequences from inadequate storage, shipment or disposal.

ARRI offers an increasing variety of product bundles and additional accessories.

For details, please consult our website or your local ARRI Service Partner.

### Warranty

For scope of warranty, please ask your local ARRI Service Partner. ARRI is not liable for consequences from inadequate shipment, improper use or third-party products.

## 7 Introduction to the ALEXA Mini LF

The ALEXA Mini LF (Large Format) camera is part of a complete large-format system that meets and exceeds modern production requirements. Based around a large-format 4.5K version of the ALEXA Mini sensor, the system comprises the ALEXA LF camera, ALEXA Mini LF camera, ARRI Signature Prime lenses, LPL lens mount and PL adapter. These system elements have been designed to take the fullest advantage of the enlarged sensor, while also offering maximum compatibility with existing lenses, accessories and workflows.

Featuring a sensor slightly larger than full frame, ALEXA Mini LF records native 4.5K with ARRI's best overall image quality. This allows filmmakers to explore an immersive large-format aesthetic while retaining the sensor's proven suitability for HDR and WCG workflows. Versatile recording formats, including efficient ProRes and uncompressed ARRIRAW up to 60 fps, provide unprecedented creative freedom.

ALEXA LF and ALEXA Mini LF have the biggest sensor area of any cinema camera on the market, second only to ARRI Rental's ALEXA 65. Maintaining the ALEXA family's optimal pixel size for highest overall image quality results in a 4448 x 3096 picture, which can be recorded in full using the LF Open Gate recording resolution. An LF 16:9 sensor mode maximizes lens options while meeting 4K deliverable standards, and an LF 2.39:1 recording resolution offers a cinematic widescreen image. All recording resolutions offer true 800 ASA sensitivity as well as reduced noise, providing the perfect canvas for modern, subtle lighting techniques.

A crucial element of the system is the LPL lens mount, with dimensions optimized for large format sensors. A wider diameter and shorter flange focal depth allow the ARRI Signature Primes and all future large format lenses to be small and lightweight with a fast T-stop and pleasing bokeh, a combination of features that would not be possible within the confines of the PL lens mount. The LPL mount is also available for other ARRI cameras such as the ALEXA Mini, ALEXA SXT or AMIRA so the ARRI Signature Primes can be used for large format and Super 35. In addition, the LPL mount is being licensed to other lens and camera manufacturers, creating a new universal standard.

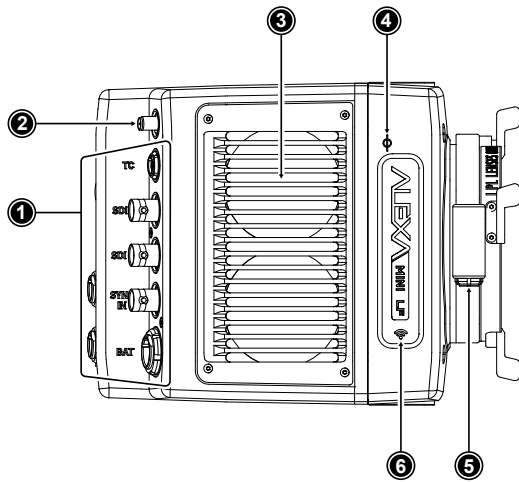
Although camera, lens mount and lenses are new, compatibility with existing PL mount lenses and ALEXA Mini accessories is a cornerstone of the system's design. A PL-to-LPL adapter offers full backwards compatibility with all PL mount lenses, be they Super 35 or full frame. The PL-to-LPL adapter clips securely into the LPL lens mount without tools, so crews can rapidly switch between PL and LPL lenses on set, offering an unlimited lens choice to the cinematographer. Since the ALEXA Mini LF is based on the proven, robust ALEXA Mini camera design, most existing ALEXA Mini accessories will work right out of the box.

ALEXA Mini LF offers the same proven, versatile workflows as other ALEXA cameras. Recording at various resolutions is possible in uncompressed, unencrypted ARRIRAW up to 60 fps or in fast, efficient Apple ProRes up to 90 fps. Lens metadata can be recorded from LDS-1, LDS-2 or Cooke /i capable lenses. Existing ARRI Look Files (ALF-2) can be used with ALEXA Mini LF and the entire range of ARRI workflow software tools has been reworked to support ALEXA large-format images.



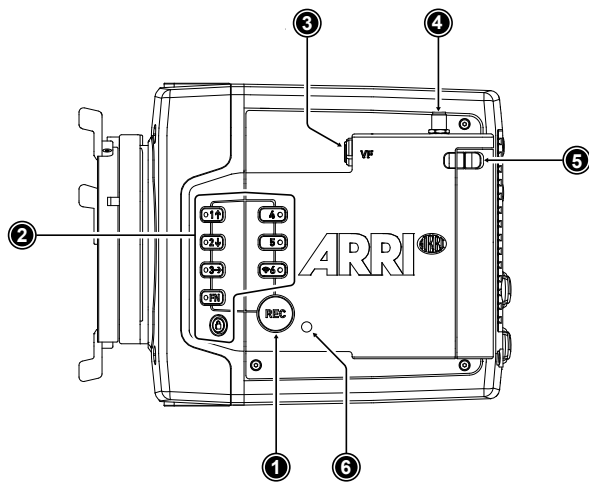
# 8 Camera Layout

## Camera Right



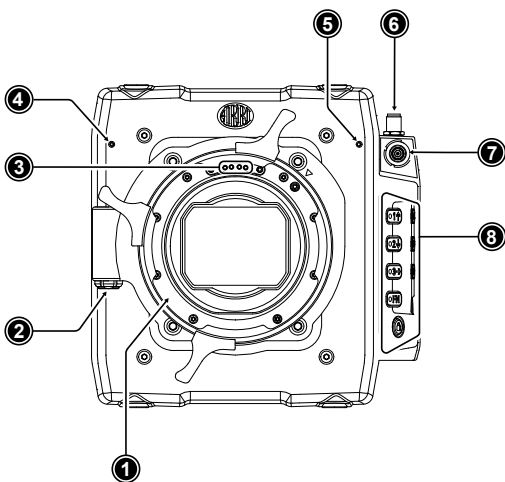
- 1 Rear Connectors
- 2 Radio Antenna Connector
- 3 Fan Intake
- 4 Sensor Plane Marking
- 5 LBUS Connector (on Lens Mount)
- 6 Integrated WiFi Antenna

## Camera Left



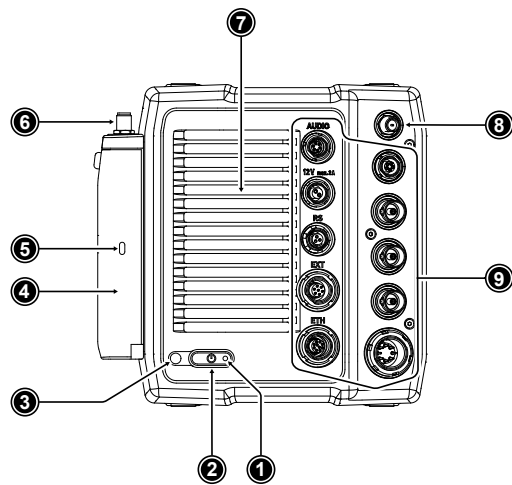
- 1 Record Button
- 2 Camera Buttons
- 3 VF Viewfinder Connector
- 4 WiFi Antenna Connector
- 5 Media Door Release
- 6 Camera Status LED

## Camera Front



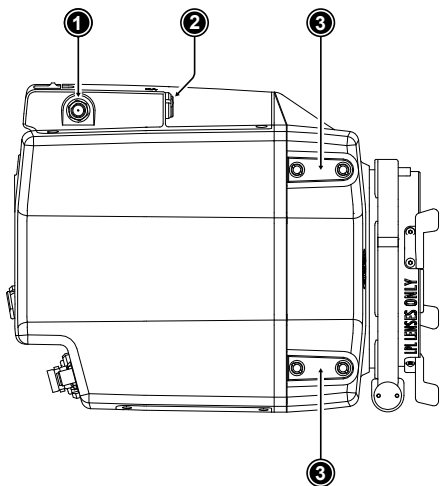
- 1 LPL Lens Mount
- 2 LBUS Connector (on Lens Mount)
- 3 Lens Mount Contacts
- 4 Built-in Microphone (right)
- 5 Built-in Microphone (left)
- 6 WiFi Antenna Connector
- 7 VF Viewfinder Connector
- 8 Camera Buttons

Camera Rear



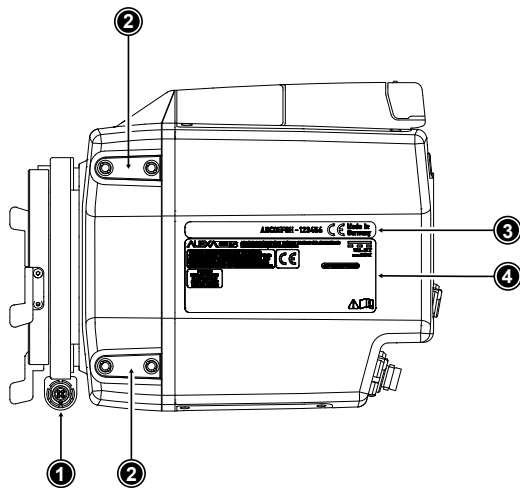
- 1 Boot Status LED
- 2 *POWER* Button
- 3 Camera Status LED
- 4 Media Door
- 5 Media Status LED Window
- 6 WiFi Antenna Connector
- 7 Fan Outlet
- 8 White Radio Antenna Connector
- 9 Rear Connectors

Camera Top



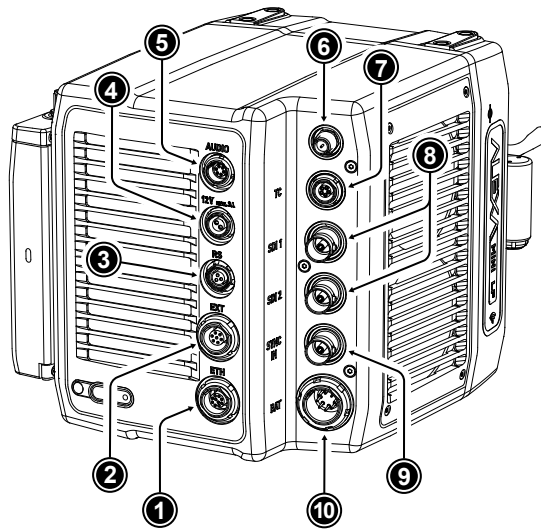
- 1 WiFi Antenna Connector
- 2 VF Viewfinder Connector
- 3 Attachment Points for Mechanical Accessories

Camera Bottom



- 1 LBUS Connector (on Lens Mount)
- 2 Attachment Points for Mechanical Accessories
- 3 Camera ID Label
- 4 Certification Label

## 8.1 Camera Rear Connectors



- 1 ETH Connector
- 2 EXT Connector
- 3 RS Connector
- 4 12V Connector
- 5 AUDIO Connector
- 6 White Radio Antenna Connector
- 7 TC Connector
- 8 SDI Outputs
- 9 SYNC IN Connector
- 10 BAT Connector

### ETH (10-pin LEMO)

The Ethernet connector is used for camera remote control and service purposes. It supplies regulated 24 V with a current of 0.5 A. Use the ALEXA Ethernet Cable KC 153-S (K2.72021.0) to connect the camera to a standard RJ-45 Ethernet port.

Note: The ALEXA Remote Control Unit RCU-4 cannot be used with the Ethernet connector of the ALEXA Mini LF.

### EXT (7-pin LEMO)

The EXT connector is a multi-pin accessory connector for camera synchronization and communication with various accessories, carrying two CAN buses and supplying regulated 24 V accessory power with a current of 1.0 A. With external adapter EXT-RS (K2.0006170), RS functionality (remote start/stop) is supported.

### RS (3-pin Fischer)

The RS connector outputs regulated 24 V accessory power and can supply external devices with a load of up to 3.0 A. Besides powering accessories, the RS connector also carries a shutter pulse signal and can be used to send a remote start/stop signal to the camera.

### 12V (2-pin LEMO)

The 12 V output with a 2-pin LEMO connector supplies accessories with regulated 12 V with a current of 1.0 A.

### AUDIO (6-pin LEMO)

The audio connector is a 2-channel +24 dBu line level audio input with an additional regulated 12 V power output with a current of 0.5 A. Use the ALEXA Mini LF Audio connector with cable (K2.0023988) to connect audio sources.

### White Radio Antenna Connector (Female RP-SMA)

White radio allows for wireless lens control, lens data communication and remote control of basic camera functions using the wireless hand units of the ARRI Electronic Control System.

Note: Do not leave the antenna connector open during operation or transport. The radio module inside could be damaged by electrostatic discharge on the open connector. Use the originally supplied antenna only.

### **TC (5-pin LEMO)**

The TC connector is a 5-pin LEMO socket. It accepts and distributes LTC (Longitudinal Timecode) signals. It can be used to

- jam-sync the camera timecode to a timecode generator or another camera
- transmit the camera timecode to a timecode generator or another camera

### **SDI 1&2 (BNC)**

Besides the viewfinder output, SDI 1&2 are the main monitoring outputs of the camera. The camera menu offers various settings to configure the outputs such as surround view, status information or frame lines. Both SDI BNC connectors output SDI signals in

- 1920 x 1080 (422 1.5G, 422 3G, 444 3G)
- 3840 x 2160 (422 6G)

according to SMPTE standards 292M, ST 424:2012 and ST 2081.

### **SYNC IN (BNC)**

A BNC socket for reference signal input, the SYNC IN connector accepts analog Black Burst signals and Tri-Level HD signals.

### **BAT (8-pin LEMO)**

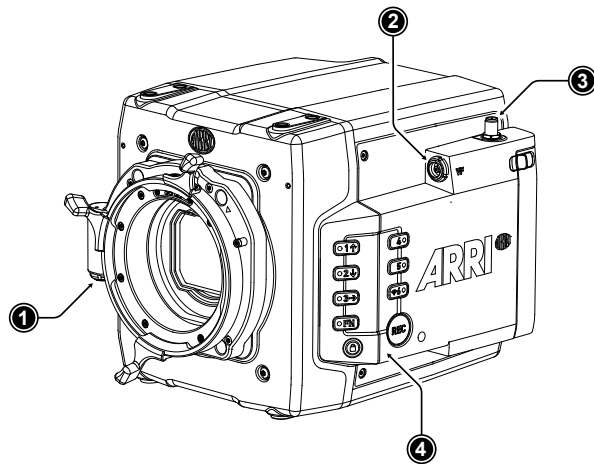
The BAT connector is the main power input of the ALEXA Mini LF and accepts an input voltage range from 11.0 to 34.0 V DC. You can use power cables KC50-S (K2.75007.0) or KC50-SP-S (K2.0001275) or one of the various on-board adapter plates for V-Mount and Gold Mount batteries to supply the camera with power.

#### **NOTICE**

Connecting or disconnecting devices or cables while recording can disturb the image/audio signal due to static electricity.

For information about connector pin outs please see "Connector Pin-Outs", page 124.

## 8.2 Camera Left and Front Connectors



- 1 LBUS Connector (on Lens Mount)
- 2 VF Viewfinder Connector
- 3 WiFi Antenna Connector
- 4 Camera Buttons

### LBUS Connector (4-pin LEMO, on LPL Lens Mount)

The LBUS connector is used to connect daisy-chainable LBUS devices of the ECS Electronic Control System (lens motors, ARRI Master Grips, ARRI OCU-1 and ARRI LCUBE CUB-1) to the camera and supplies regulated 24 V with a current of 2.0 A max.

### VF Viewfinder Connector (CoaXPress)

The ALEXA Mini LF uses an industrial CoaXPress interface to connect the MVF-2 viewfinder with the camera. The interface transmits power, video and control data and supports cable lengths of up to 10 m (33 ft). The VF connector comes without a key, so the VF cables plug in regardless of their orientation and support hot plugging of the viewfinder.

### WiFi Antenna Connector (RP-SMA)

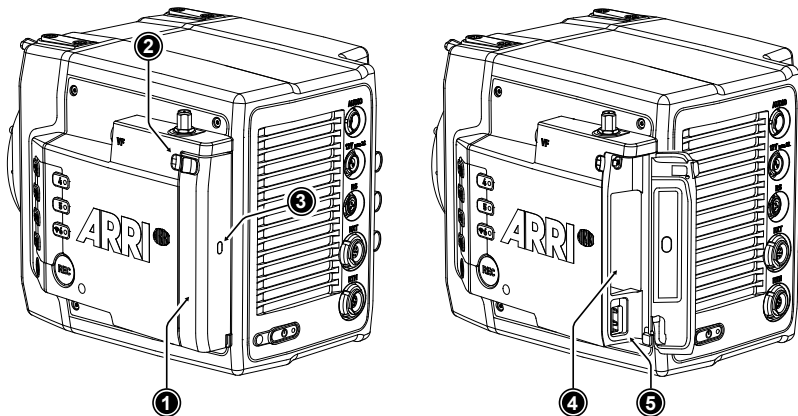
Besides the built-in WiFi antenna behind the camera label on the right side, the ALEXA MINI LF is equipped with a second WiFi antenna connector above the media bay on the camera left side. Both internal and external WiFi antenna work together, and if needed, the external antenna output can be disabled in the camera menu.

**Note:** Do not leave the antenna connector open during operation or transport. The radio module inside could be damaged by electrostatic discharge on the open connector. Use the originally supplied antenna only.

### Camera Buttons

Besides the *REC* and *LOCK* button, the camera is equipped with six freely assignable user buttons plus a *FN* function button for quick access to frequently used functions. All buttons (except for the *LOCK* button) have an adjustable background illumination. For further information please see "User Buttons", page 107 and "Function Button FN", page 46.

## 8.3 Media Bay



- |   |                            |   |                      |
|---|----------------------------|---|----------------------|
| 1 | Media Bay Door             | 4 | Recording Media Slot |
| 2 | Media Bay Door Release     | 5 | USB Connector        |
| 3 | Recording Media LED Window |   |                      |

### Recording Media Slot

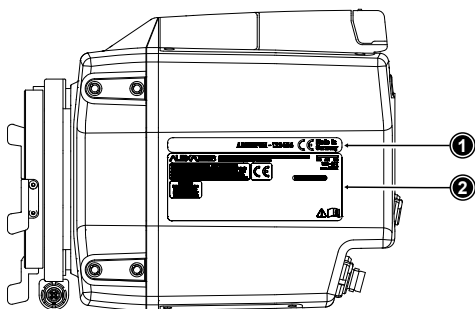
The ALEXA Mini LF records clips onto Codex Compact Drives, using the media bay on the camera left side. A small window (3) in the media bay door shows the LED of the Compact Drive. To access the media slot, slide the media bay door release (2) towards the camera back so that the spring-loaded door jumps open. For more information please see "Recording Media Handling", page 63.

### USB Connector

The camera saves data such as user setups, frame grabs and system logs to USB 2.0 memory sticks with FAT file system. Software updates, additional frame lines and ARRI look files are loaded onto the camera from the USB memory stick. The USB connector can also be used to charge USB devices and supplies 5.0 V with a maximum current of 0.5 A.

For more information please see "Working with Lists and Import of Files", page 44 and "User Storage Handling", page 47.

## 8.4 Product Identification



The camera serial number (1) and the FCC/CE conformity label (2) are located on the bottom of the camera.

The serial number consists of the last 5 digits of the product number K1.0024074-XXXXX.

## 9 Camera Support

This chapter provides information on how to attach commonly used accessories to the camera.

ARRI offers a wide range of mechanical accessories, please see our [Configuration Overviews](#) for more information.

Mechanical accessories are attached to the M4 mounting points located on the front top and bottom of the camera. This chapter describes how to mount the most important mechanical accessories:

Mini Adapter Plate MAP-2A  
(K2.0023839)

The MAP-2A is a base plate for 15 mm lightweight support and features an improved rod clamping mechanism as well as multiple 1/4-20 and 3/8-16 mounting points. It fits to the top and bottom of the ALEXA Mini / Mini LF.

Bridge Plate Adapter BPA-4  
(K2.0006352)

This spacer allows standard bridge plates to be mounted to the Mini Adapter Plate MAP-2 / MAP-2A. The BPA-4 also features centered 3/8 inch and 1/4 inch threads for standard tripod plates. Fits ALEXA Mini / Mini LF.

Bridge Plate BP-8  
(K2.0031436)

The BP-8 helps to optimize camera rig balance when combined with the range of ARRI bottom plates. It brings compatibility with studio 19 mm rod systems to an increasing number of ARRI and third party cameras.

Mini Side Brackets  
MSB-2 and MSB-3  
(K2.0014957, K2.0023546)

The Mini Side Bracket MSB-2 offers support for lens motor in configurations that require lightweight base plates with no rod support, such as lightweight stabilizer systems or drones. Suits ALEXA Mini, and also ALEXA Mini LF on camera right.

The MSB-3 is a side bracket designed around the media bay of the ALEXA Mini LF and the new viewfinder connector on the camera left.

Center Camera Handle CCH-2  
(K2.73002.0)

The Center Camera Handle CCH-2 offers numerous mounting points in the industry standard 3/8-16 and 1/4-20 inch thread sizes.

Mini Viewfinder Bracket MVB-1  
(K2.0006140)

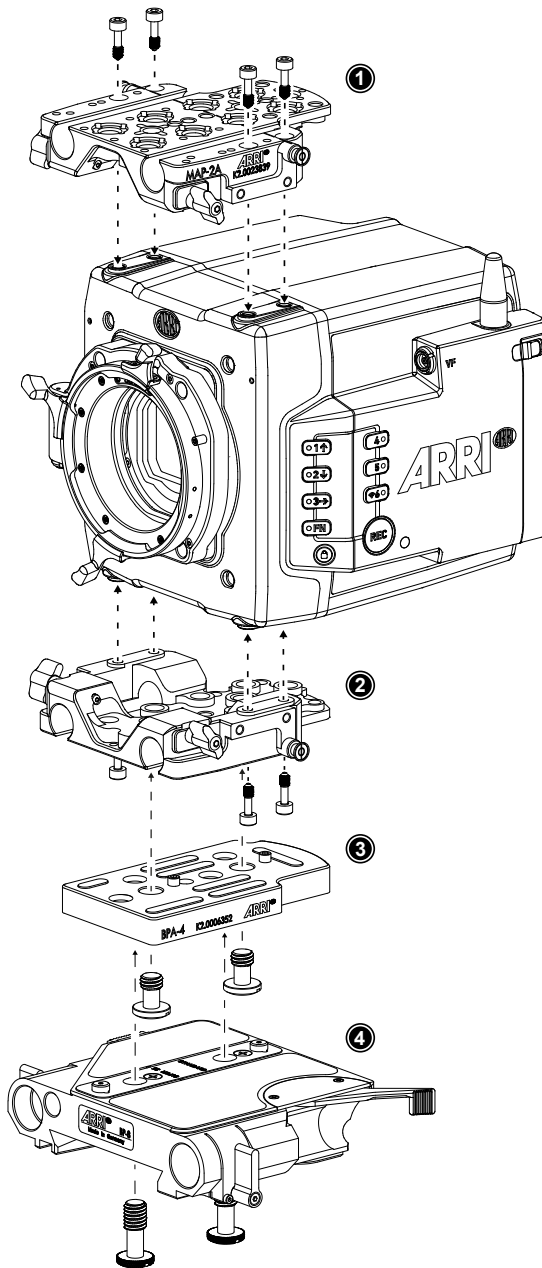
The MVB-1 allows the MVF-1 and MVF-2 viewfinders to attach to ALEXA Mini / Mini LF via 15 mm LWS rods and viewfinder mount. Requires the Mini Adapter Plate MAP-2A or other 15 mm rod support.

### Required Tools

- 3.0 mm Allen key
- 8-10 mm (5/16") flathead long shaft screwdriver

To avoid damage while assembling and retrofitting, always place the camera on a padded, firm, flat and level surface.

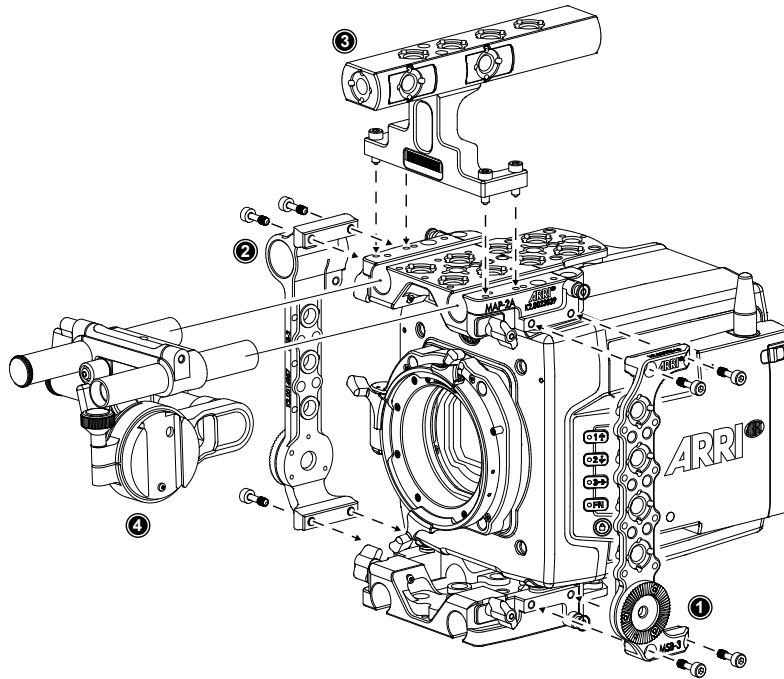
## Mounting MAP-2A, BPA-4 and BP-8



- Using a 3.0 mm Allen key, fasten the Mini Adapter Plate MAP-2 or MAP-2A (1) to the camera top attachment points with the four 3.0 mm hex screws. Tighten them cross-wise.
- Fasten another MAP-2 (2) to the bottom attachment points.
- Using a flathead screwdriver, fasten the Bridge Plate Adapter BPA-4 (3) to the bottom of MAP-2 (2) with two screws. Two register pins will assure a perfect fitting.
- Using a flathead screwdriver, fasten the Bridge Plate BP-8 (4) to the BPA-4 with two screws. Two register pins will assure a perfect fitting.



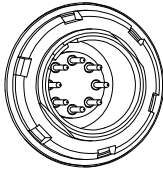
## Mounting MSBs, CCH-2 and MVB-1



- ▶ Using a 3.0 mm Allen key, fasten the Mini Side Bracket MSB-3 (1) to the camera's left side. The MSB-3 is attached with two 3.0 mm hex screws each to the dedicated mounting points of the top and the bottom Mini Adapter Plates MAP-2A.
- ▶ Identical to the MSB-3 on the camera left side, fasten the MSB-2 (2) with four 3.0 mm hex screws to the camera's right side.
- ▶ Fasten the Center Camera Handle CCH-2 (3) to the top MAP-2A with four 3.0 mm hex screws.
- ▶ Open the clamps on the top MAP-2A and attach the MVB-1 (4) 15 mm LWS rods to the top MAP-2A.

## 10 Power Supply

### BAT IN



The ALEXA Mini LF accepts an input voltage range from 11.0 to 34.0 V DC. The camera can be solely powered through the 8-pin LEMO BAT connector located at the back of the camera. You can use the KC50-S (K2.75007.0) or KC50-SP-S (K2.0001275) power cable or one of the various on-board adapter plates for V-Mount and Gold Mount batteries to supply the camera with power.

#### NOTICE

Power solutions from ARRI (K2.0014530, K2.0014531, K2.0014532, K2.0014533) can be used safely up to a total current of 10 A (e.g. 144 W total at 14.4 V, including camera and powered accessories). For use cases demanding more than 10 A, alternative solutions such as block batteries or the B-Mount Power Splitting Box should be considered.

### Accessory Power

#### 24 V

The total available power on the 24V ACC converter is just below 100 W to be compliant with DIN EN 62368 PS2 (limited power source annex Q, table Q.1, single fault tolerant). The camera's 24V ACC converter power is shared by

- RS Connector
- EXT Connector
- LBUS Connector (on lens mount)
- ETH Connector

Typically, the 24V ACC converter delivers a permanent current of 3.0 A at 14.0 V camera supply voltage and ambient temperatures of 25° Celsius / 77° Fahrenheit.

If the camera supply voltage is low, typically below 14.0 V (the camera is designed for Li-Ion based batteries that deliver about 14V until discharged to about 10-15%) the boost converter is current limited and the power on the 24V ACC converter is limited furthermore. Reason here is, that maximum current draw from the entire camera should not exceed 20A under all conditions since no on-board batteries can deliver higher currents.

#### 12 V

The 12V ACC converter power is shared by

- 12V Connector
- AUDIO Connector

and outputs 12 V with a max. current of 2 A. If the camera supply voltage is below 13.5 V, the 12 V ACC converter power output is reduced by approx. 1,5 V.

### Power Consumption

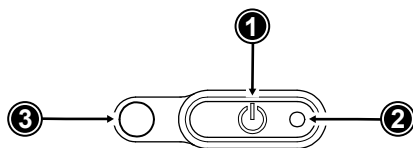
In order to process the increased pixel count while still maintaining ALEXA image quality, the ALEXA Mini LF draws between 69 W and 89 W while recording, with MVF-2 connected, but no further accessories attached. 69 W have been measured while recording MXF/ARRIRAW in recording resolution LF 16:9 UHD at 24 fps. 89 W have been measured while recording MXF/Apple ProRes in recording resolution LF 16:9 2K at 90 fps. Electronic accessories will increase power draw based on the accessories' draw.

**NOTICE**

- Always keep the BAT connector accessible so that the cable can be unplugged quickly in case of emergency. Do not use power cables longer than 4m.
- Operate the system using only the type of power source indicated in the manual. Unplug the power cable by gripping the power plug, not the cable.
- Do not supply power outside the specified voltage range.

**Switching On and Off**

The *POWER* button is located at the lower left on the back of the camera. The power button's background light is illuminated when the power on the BAT connector is in the valid range.



- 1 *POWER* Button with background illumination
- 2 Boot Status LED
- 3 Camera Status LED

**Switching On the Camera**

The background illumination indicates if a supply with sufficient power is connected.

- Press the *POWER* button (1).

The camera starts booting. While the camera is booting up, the boot status LED (2) is flashing blue. As soon as the camera has finished the boot process, the boot status LED turns to solid blue. During the boot process, the ARRI logo is shown in the flip-out monitor of the MVF-2 (if connected).

**Switching Off the Camera**

- Press and hold the *POWER* button (1) until the camera has switched off and the boot status LED (2) turns off.

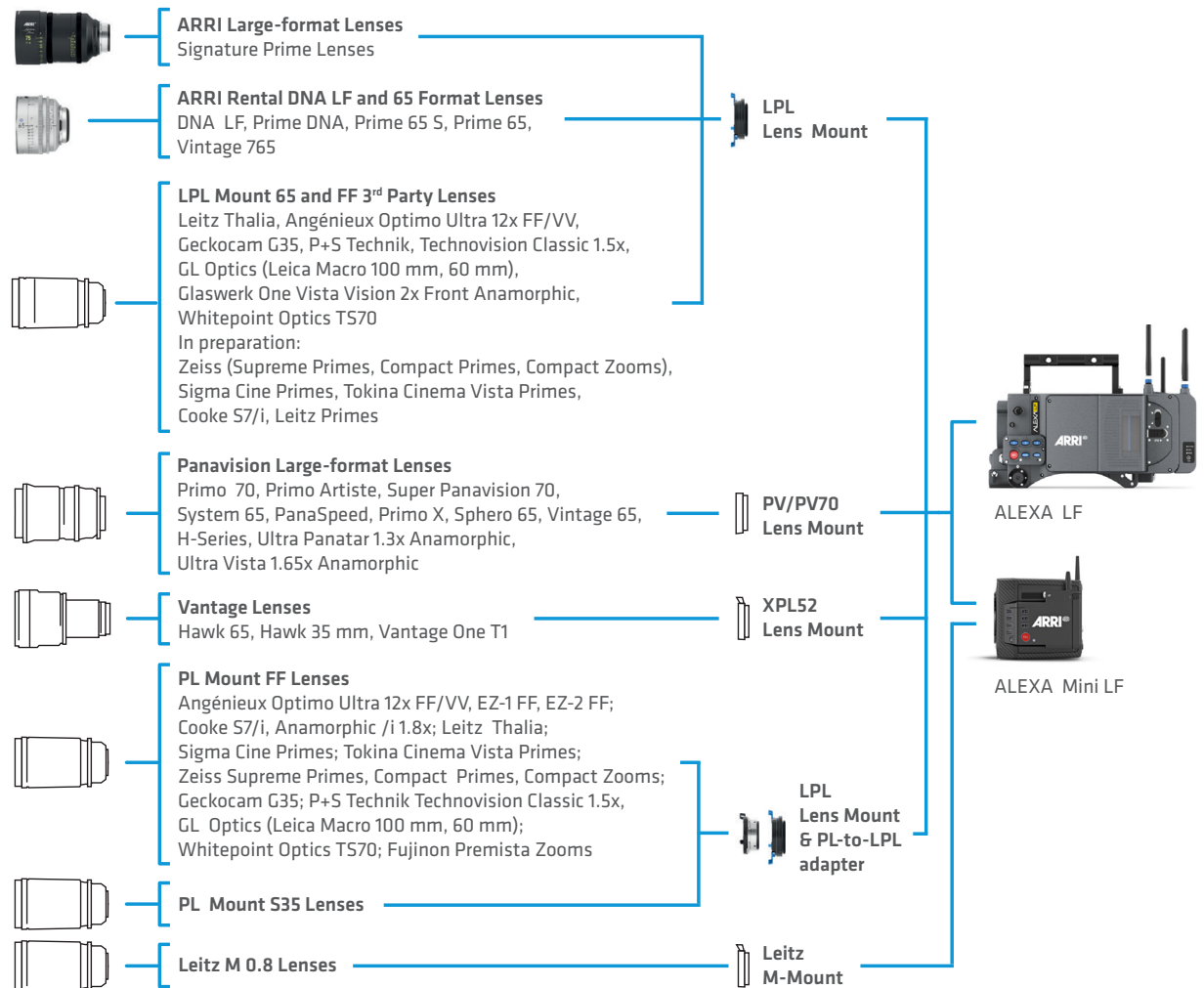
On the flip-out monitor of the MVF-2 as well as in the viewfinder and the SDI outputs, a countdown appears while you press and hold the power button. On reaching zero, the camera switches off.

**Automatic Boot-up on Power**

If the power supply is interrupted with the camera switched on, the camera will automatically repower and boot-up on reconnection.

# 11 Lens Mounts and Lens Handling

The ALEXA Mini LF is equipped with a universal lens mount base for interchangeable lens mounts allowing the use of various lenses.



## 11.1 LPL Mount and PL-to-LPL Adapter

### LPL Mount with LBUS Connector

The ALEXA Mini LF LPL (Large Positive Lock) lens mount with LBUS connector fits ALEXA Mini LF, ALEXA Mini and AMIRA, it supports LDS-1, LDS-2 and Cooke/i and is compatible to the ARRI ECS LBUS devices such as the ARRI Master Grips, cforce lens motors and OCU-1 (Operator Control Unit). In comparison to the PL mount, The LPL mount has a wider diameter (62 mm vs. 54 mm) and a shorter flange focal distance (44 mm vs. 52 mm).



### PL-to-LPL Adapter

The PL-to-LPL adapter offers backwards compatibility with all PL mount lenses, be they Super 35 or full frame. The adapter attaches securely to the LPL lens mount without tools, allowing crews to rapidly switch between PL and LPL lenses on set. The PL-to-LPL Adapter can be mounted either so that the LDS contacts are in the 12:00 position for ARRI lenses, or so that the LDS contacts are in the 3:00 position for Cooke lenses. In both positions the adapter supports LDS-1 and Cooke /i.



The three most common uses of Super 35 PL lenses on the ALEXA Mini LF are:

- 1 Using an image expander.
- 2 Cropping the Super 35 area in post.
- 3 Using the large illumination circle of Ultra Primes, Master Primes or Ultra Wide Zoom (UWZ).

Some anamorphic lenses have their lens data connectors in the 3:00 position. In this case, use a 1.5 mm hex key to reposition the orientation pin of the PL to LPL adapter so that the lens can be mounted correctly.

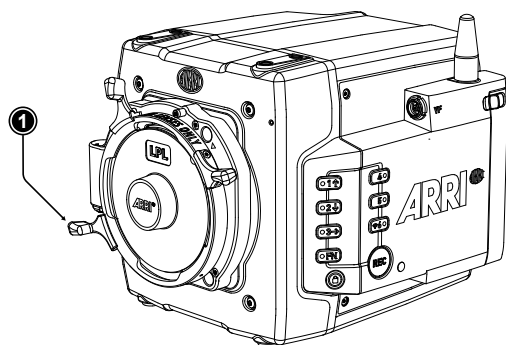
## 11.2 Changing a Lens

### LPL Mount, PL-to-LPL Adapter and PL Mount Lenses

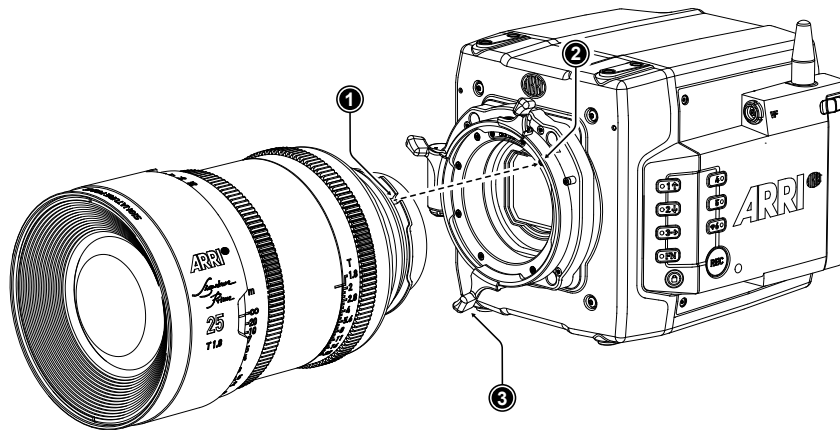
Lens change on the LPL mount, the PL mount as well as the PL-to-LPL Adapter works the same way. An LDS lens must be mounted with the LDS contacts in the 12:00 position to enable the LDS functions. Take care not to damage the LDS contacts on the lens and the camera when mounting or unmounting a lens or lens port cover. Any LDS-2 mount and any LDS-2 lens always have the contacts in the 12:00 position. The description below shows the ALEXA Mini LF with an LPL mount attached. When no lens is attached to the camera, use the lens port cap to prevent dust from entering the lens cavity.

### Removing a Lens or the Lens Mount Cap

1. Turn the bayonet ring (1) anticlockwise until it stops.
2. Remove the lens port cap.



## Attaching a Lens



1. Carefully insert the lens into the lens port. Align the notch in the lens flange (1) with the index pin on the lens mount (2), keeping the lens rotated into a position where the lens markings are visible from either side of the camera.
2. Press the lens flange flat onto the lens mount.
3. Turn the bayonet ring (3) clockwise until the lens is locked securely.
4. Ensure that the lens is properly mounted.

### NOTICE

- Changing camera lenses should be done in a dry and dust-free environment. If this is not possible, take extra care that no dust enters the camera while the lens is off.
- When changing lenses, always perform a dust check to make sure no dust has settled on the sensor cover glass. The sophisticated design principle of the camera's optical module delivers outstanding images with a cinematic look and feel, but also makes the imager sensitive to contamination. Dust particles that have settled on the sensor cover glass during a lens change may become visible as dark spots in the output image, similar to lint leaving marks on exposed film. The degree of this effect depends on the aperture of the lens.
- When no lens is attached to the camera, immediately place the protective cap on the lens mount to avoid contamination of the sensor cover glass.
- Heavy lenses (above 3 kg / 6.6 lbs) require additional lens support. Using a lens support guarantees that the weight of the lens will not influence the flange focal depth and reduces stress on the lens mount.
- Do not short-circuit the LDS contacts.
- Never exceed the maximum lens mount depth.
- Have every lens properly shimmed as prescribed by the manufacturer.

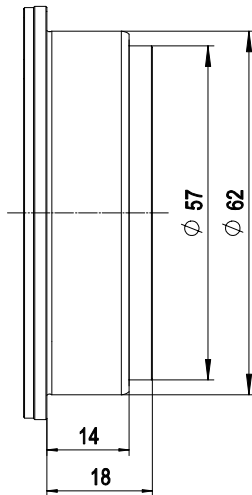
## Lens Support

To support a lens use 15 mm or 19 mm studio rods and an appropriate lens bridge. 15 mm rods require a bridge plate with 15 mm studio rod support, such as a BP-3 / BP-9 + MAP-2, while 19 mm studio rods require a bridge plate with 19 mm studio rod support, such as a BP-12 or BP-5 / BP-8 + BPA-4. Mount the Lens Support LS-10 for 15 mm rods by pushing it onto the rods from the front. Mount the Lens Support LS-9 for 19 mm studio rods by clipping it on the rods from the top. Slide the bridge into position on the rods directly under the lens support ring on the lens, and fix it in place by tightening the lever on its side. Align and tighten the center screw in the lens support ring, adjusting the height of the center screw with the lever on the back of the lens bridge.

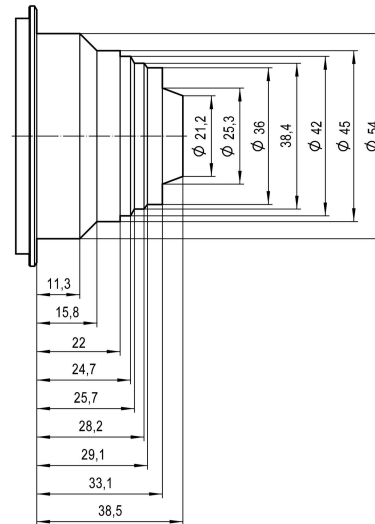
## 11.3 Maximum Lens Mounting Depth

To avoid damage or injury when using LPL mount lenses or PL mount lenses (with PL adapter on LPL mount), use only lenses that do not exceed the following dimensions:

LPL mount lenses:



PL mount lenses:



### NOTICE

- Risk of damage and injury from improper lenses!
- To ensure maximum allowable lens mounting depth, and to avoid damage or injury, always have your camera shimmed correctly.
- LPL mount lenses with more than 18.00 mm mounting depth and PL mount lenses with more than 38.50 mm mounting depth might damage internal filters and the camera. Shards from broken filter glass might cause injury. Always check the lens mounting depth before mounting or changing a lens.

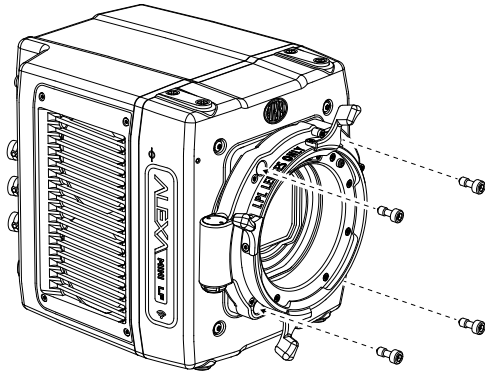
## 11.4 Changing the Lens Mount

The ALEXA Mini LF is equipped with a universal lens mount base that uses the same camera to lens mount interface as used on the ALEXA Mini and AMIRA, so all lens mounts that fit on ALEXA Mini and AMIRA will physically also fit on the ALEXA Mini LF. However, since most of those lens mounts have been designed for a Super 35 sensor, they will show vignetting in larger format.

### Required Tools and Precautions

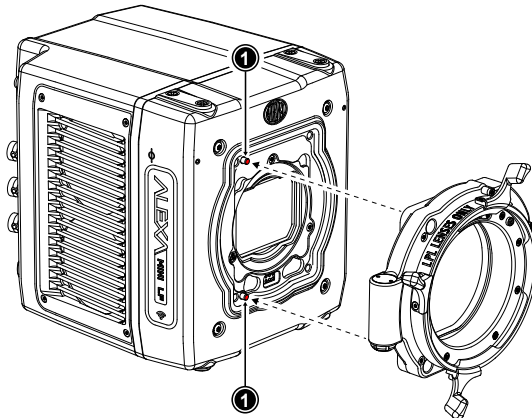
- 3.0 mm Allen key
- Camera switched off and power source disconnected
- Lens removed and properly stored
- Make sure to protect all optical surfaces when changing a lens mount

### Removing a Lens Mount (here: LPL Mount)

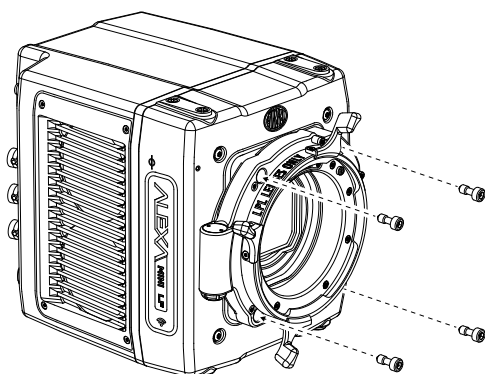


1. Switch off the camera.
2. Crosswise, loosen all four lens mount screws with a 3.0 mm Allen key.
3. Carefully remove the lens mount.
4. Store the lens mount in a case for dust protection and install a different lens mount.

### Installing a Lens Mount (here: LPL Mount)



1. Switch off the camera.
2. Properly align the lens mount with the two guiding pins (1) on the camera's universal lens mount base.



3. Crosswise, hand-tighten all four lens mount screws with a 3.0 mm Allen key.

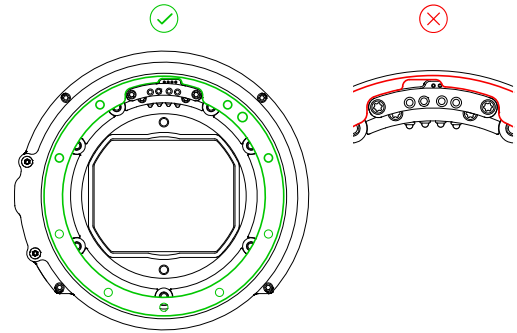
### NOTICE

After each lens mount change, always check the flange focal depth of the camera.  
 Have the flange focal depth always corrected by properly skilled personnel.  
 Flange focal depth correction requires special tools and training that meet ARRI guidelines.  
 For all flange focal depth issues, contact a qualified ARRI Service Center.



**NOTICE**

When adjusting the flange focal depth on the LPL mount make sure to insert the shims in the correct orientation. Inserting the shims in the incorrect orientation (flipped) may result in a short circuit on the LDS print, compromising LDS functionality (lens detection and lens data).

**⚠ WARNING!****Condensation! Risk of electric shock and damage!**

Humidity may ingress due to misinstalled lens mounts!

When installing a lens mount, always align and attach properly; never apply force.

Hand-tighten all screws crosswise before final tightening.

Always tighten crosswise with the prescribed tool.

**⚠ WARNING!****High voltage! Risk of electric shock and fire!**

Short circuits may entail lethal injury and damage!

Before each lens mount change, always switch off the camera and disconnect all power sources.

Changing the lens mount while the camera is powered may permanently damage the camera and lens mount.

Protect sensor and electrical system: Always store the camera with a lens mount properly installed and capped.

Immediately replace each lens mount after removal.

Change lens mounts in a dust-free environment only.

## 11.5 Lens Data

### ARRI Lens Data System (LDS)

ARRI's Lens Data System (LDS) comprises a range of products generating highly accurate lens metadata for use on set and in post. LDS describes digital lens settings. Lenses with LDS functionality deliver information about its current settings (focus distance, iris, focal length) to the camera; the camera interprets these values and transmits the information to its recording module and optionally to any further accessories connected to the camera such as a Wireless Compact Unit WCU-4 or ARRI Master Grips. Lens data is displayed in the viewfinder and as overlays on the SDI outputs, and all lens data will be embedded in the recorded files as well as the SDI stream.

LDS-2 is the next evolution of ARRI's Lens Data System for ARRI's Electronic Control System and a new generation of lenses. LDS-2 delivers more accurate and faster lens data. Compared to LDS-1 it eliminates the need for initial calibration through absolute encoders which cuts time on set when changing lenses. The new system uses a 8.7x faster interface that enables lens manufacturers to send more data to the camera than before. LDS-2 extends the possibilities of lens data and is being licensed to other lens and camera manufacturers.

For more information about the Lens Data System, please visit our [Lens Data System FAQs](#) web page.

## ARRI Lens Data Archive (LDA)

Lenses without LDS can be integrated into the system via the Lens Data Archive (LDA). By mapping a lens, all information about the lens, its scales, name, and serial number can be transferred into a lens archive. When using the lens the next time all that has to be done is to load the lens file for that lens from the Lens Data Archive and calibrate the motors. It takes about 5 minutes to map a lens: after attaching the lens and connecting and calibrating motors (or Lens Data Encoders) on each axis of the lens, the mapping can be done with the Wireless Compact Unit (WCU-4). These lens files can be loaded to the camera.

## Cooke /i

The LPL mount also offers basic Cooke /i support for direct lens metadata capture through the LDS contacts. The cameras can store a subset of /i lens data (focus distance and iris settings) as dynamic camera metadata. The basic /i compatibility has been tested and approved by Cooke Optics Limited. For support and questions about /i Technology, please contact Cooke Optics directly.

The camera supports the Cooke /i protocol for lenses running firmware versions according to the following table.

Lens type	FW version
S4 /i Prime lens (10-bit)	0.29 or higher
S4 /i Prime lens (12 bit)	0.39 or higher
S4 /i Zoom lens (10 bit)	1.29 or higher
S4 /i Zoom lens (12 bit)	1.39 or higher

The firmware version can be retrieved from the lens with the *Cooke Viewer Lens Display* program. For detailed information, please contact Cooke Optics directly.

## Lens Data Display in Camera

Lens data can be displayed as camera status overlays in the viewfinder and the SDI outputs. Single overlays for focus distance, iris and focal length are displayed. The camera can be set to display either metric or imperial readings for the focus distance overlay. For further information please see page 76.

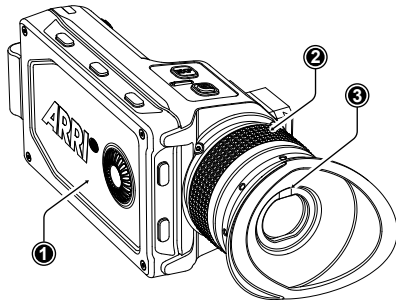
## Lens Data in Metadata

Lens data is dynamically written to the metadata of MXF/Apple ProRes and MXF/ARRIRAW files and is output in the SDI stream.

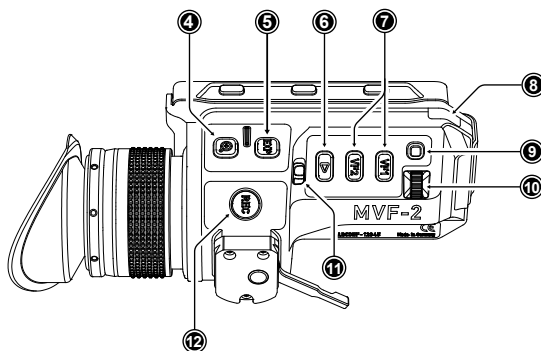
Metadata values include

- Lens Model
- Lens Serial Number
- Lens Distance Unit
- Lens Focus Distance
- Lens Focal Length
- Lens Iris

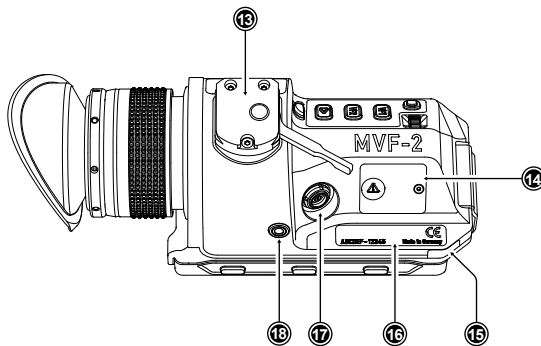
## 12 Multi Viewfinder MVF-2



- 1 Flip-out Monitor
- 2 Diopter Adjustment
- 3 Proximity Sensor



- 4 ZOOM Button
- 5 EXP Button
- 6 PLAY Button
- 7 VF 1&2 User Buttons
- 8 Top Tally Light
- 9 SET Button
- 10 User Wheel
- 11 LOCK Switch
- 12 REC Button



- 13 Dove Tail
- 14 Service Cover
- 15 Bottom Tally Light
- 16 Product Label
- 17 Viewfinder Connector
- 18 Headphones Out

### OLED Display

The MVF-2 is equipped with a high contrast, temperature controlled 1920 x 1080 OLED display.

### Flip-out Monitor

The 4" flip-out monitor (1) with up-and-down tilt function can display the camera live image or the main user interface, providing full access to camera functions and menus. See the next chapter for more information.

### Diopter Adjustment

With the camera switched on and looking into the viewfinder, twist the ring (2) left or right to adapt the viewfinder image to your visual acuity. With the help of the scale labelled from 1 to 9 you can easily remember your adjustment when different people are using the viewfinder. The diopter adjustment can compensate from -5 to +5 diopters.

### **Proximity Sensor**

This infrared sensor (3) automatically deactivates the MVF-2's internal OLED panel when you withdraw your eye to prevent burn-ins on the panel and activates it again as soon as you approach the eyepiece. Do not permanently cover the sensor as this might cause irreversible burn-in on the OLED panel.

### **Built-in Eyepiece Heater**

The MVF-2 is equipped with a built-in eyepiece heater to prevent fogging of the eyepiece when shooting in cold environments. The eyepiece heater can be activated in the camera menu and only becomes active when the eyepiece has a temperature of 15 °C (59 °F) or below. In extremely cold environments please use the Heated Eyecup HE-7.

### **EXP (Exposure Tool Button)**

The *EXP* button (4) activates and deactivates the exposure tool (either false color or zebra) for the viewfinder and the flip-out monitor.

### **ZOOM Button**

Pressing the *ZOOM* button (5) activates the viewfinder zoom feature for a temporary 2.25x zoom-in to quickly check focus. The magnification ratio is 1:1, or one sensor pixel to one viewfinder display pixel.

### **PLAY Button**

Press and hold the *PLAY* button (6) for two seconds to start in-camera playback from the recording media.

### **VF1 and VF2 User Buttons**

The MVF-2 has two user buttons, *VF1* and *VF2* (7). You can assign a frequently used function to each button.

### **User Wheel and SET Button**

The user wheel and the *SET* button (9, 10) provide the same functionality as the *JOGWHEEL* on the flip-out monitor (see next chapter) and can be used for menu navigation and adjustment when the flip-out monitor is used with the display visible in the folded-in position.

### **LOCK Switch**

The *LOCK* switch (11) locks all MVF-2 buttons. A dedicated lock icon is displayed on the HOME screen as well as in the viewfinder.

### **REC Button**

The *REC* button (12) starts and stops recording to the recording media. With no recording media inserted, the button is inactive.

### **Product Label**

The product label (1) shows the MVF-2 serial number. The serial number consists of the last 5 digits of the product number K1.0024074 - XXXXX.

### **Viewfinder Connector**

The ALEXA Mini LF uses an industrial CoaXPress interface to connect the MVF-2 viewfinder with the camera. The interface transmits power, video and control data and supports cable lengths of up to 10 m (33 ft). The VF connector comes without a key, so the VF cables plug in regardless of their orientation and support hot plugging of the viewfinder.

## Headphones Out

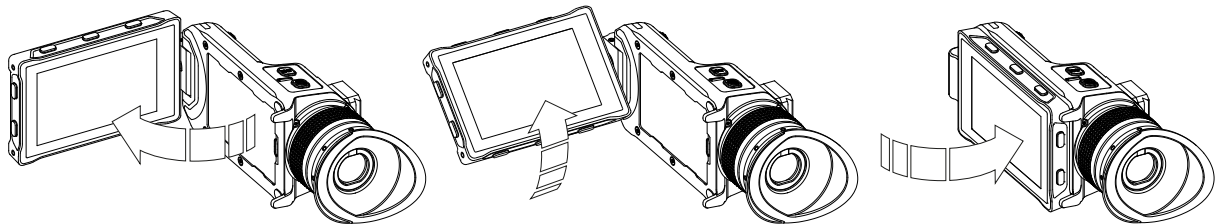
The headphones out (18) is a 3.5 mm TRS connector (headphone jack), which outputs all four audio channels with a maximum power of 2.5 dBm.

### NOTICE

- Constantly covering the proximity sensor of the MVF-2 can cause an irreversible burn-in on the viewfinder OLED display. If you need to cover the viewfinder, please disable the EVF OLED first using the EVF power setting: *MENU > Monitoring > EVF/MONITOR > Settings > EVF Power*
- The Heated Eyecup HE-6 is not compatible with the MVF-2 viewfinder. When using the Heated Eyecup HE-6, the proximity sensor that activates the OLED display will always be covered. In this state, the OLED display will not switch off when not in use, this can cause an irreversible burn-in on the OLED display. Please use the Heated Eyecup HE-7 instead. This is compatible with the MVF-2 viewfinder.
- When shooting in hot environments make sure to have the viewfinder mounted on the viewfinder bracket to ensure proper cooling.

## 12.1 Flip-out Monitor

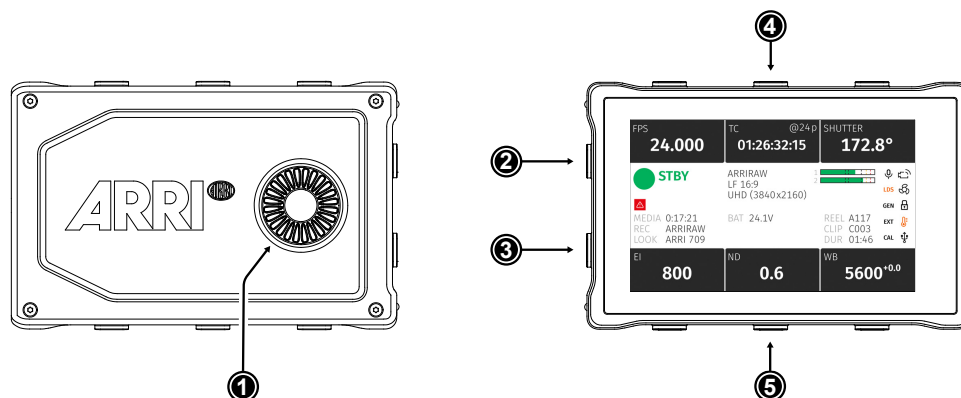
### Adjusting the Flip-out Monitor



Fold out, swivel and fold in the monitor to put the display visible in the folded-in position. The image on the monitor automatically adjusts its orientation, or can be set to the desired orientation in the camera menu).

### Flip-out Monitor

The 4" flip-out monitor with up-and-down tilt function can display the camera live image or the main user interface (HOME screen and camera menu).



1 JOGWHEEL

2 HOME / LIVE Button  
3 MENU / BACK Button  
4 Upper Screen Buttons  
5 Lower Screen Buttons

**JOGWHEEL**

The *JOGWHEEL* (1) is used to

- ▶ scroll or navigate through lists and menus
- ▶ change values (by scrolling up or down)
- ▶ access and confirm settings (by pressing the *JOGWHEEL* center)

**HOME / LIVE Button**

The *HOME / LIVE* button (2) toggles to display either the HOME screen (shown in the image above) or the camera live view.

**MENU / BACK Button**

Pressing the *MENU / BACK* button (3) while on the HOME screen or in camera live view opens the camera menu. While in the camera menu, it serves as a *BACK* button.

**Screen Buttons**

The MVF-2 flip-out monitor has six screen buttons, three above (4) and three below (5) the screen. Their function depends on the screen content and is labeled directly below or above each button. Unlabeled buttons do not have a function for that screen. A grayed-out label indicates that the function is currently not available.

**12.2 MVF-2 Cables**

The Multi Viewfinder MVF-2 is connected to the camera using an industrial CoaXPress cable. The cable center pin and shield transport power, video, audio and data and the interface allows for hot-plugging the viewfinder. Since the VF connector has no key, the viewfinder cable can be plugged in in any orientation.

**NOTICE**

When attaching a new viewfinder to the camera for the first time, it may take around 2 minutes until the viewfinder OLED calibration is fully loaded and activated.

**Viewfinder Cables**

MVF-2 viewfinder cables are available in the following lengths:

ID No.	Length	Suggested Use
K2.0023915	0.35 m (1.15 ft)	For use of MVF-2 on camera left side in handheld mode
K2.0023943	0.5 m (1.5 ft)	For use of MVF-2 with VEB-1 or VEB-3, for use on camera right side
K2.0023944	2.0 m (6.5 ft)	The medium length for remote use
K2.0023945	10.0 m (33 ft)	The longest possible length for remote use

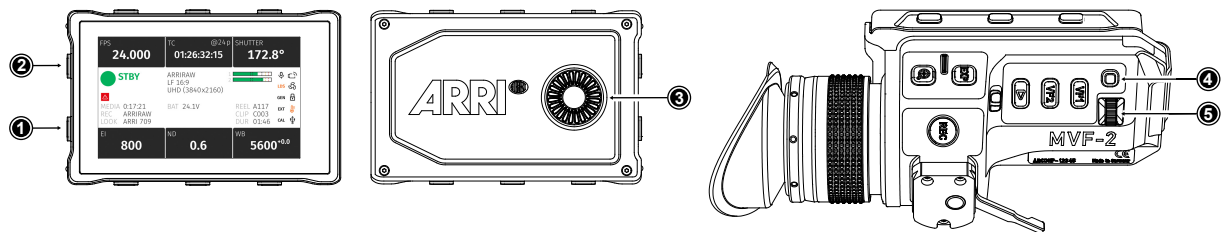
## 13 Menu Operation

The camera menu has a tree structure and the name of the current submenu is displayed across the top of every screen. To access the menu, press the *MENU / BACK* button on the MVF-2 or connect to the camera via WiFi or Ethernet and open the "web remote", page 117.

The ALEXA Mini LF menu consists of 11 submenus:

- Recording
- Media
- Monitoring
- Look
- System
- Setup
- User Buttons
- Metadata
- ECS (Electronic Control System)
- Info
- Alerts

### Basic Menu Operation



1. Press the *MENU / BACK* button (1) on the MVF-2 to access the camera menu.
2. Rotate the *JOGWHEEL* (3) or the *USER WHEEL* (5) to scroll up or down to select the desired menu entry:

Entries with a ">" at the end navigate to a submenu. To navigate to a submenu press the *JOGWHEEL* center or the *SET* button (4). To return to a higher menu level press the *MENU / BACK* button.

Entries with a value allow for direct editing. To edit a value press the *JOGWHEEL* center or *SET* button, then rotate the *JOGWHEEL* or *USER WHEEL* to select the desired value. Press the *JOGWHEEL* center or *SET* button to confirm the change or press *CANCEL* to discard.

Entries with a check box allow for direct activation/deactivation. Press the *JOGWHEEL* center or *SET* button to activate/deactivate the setting.

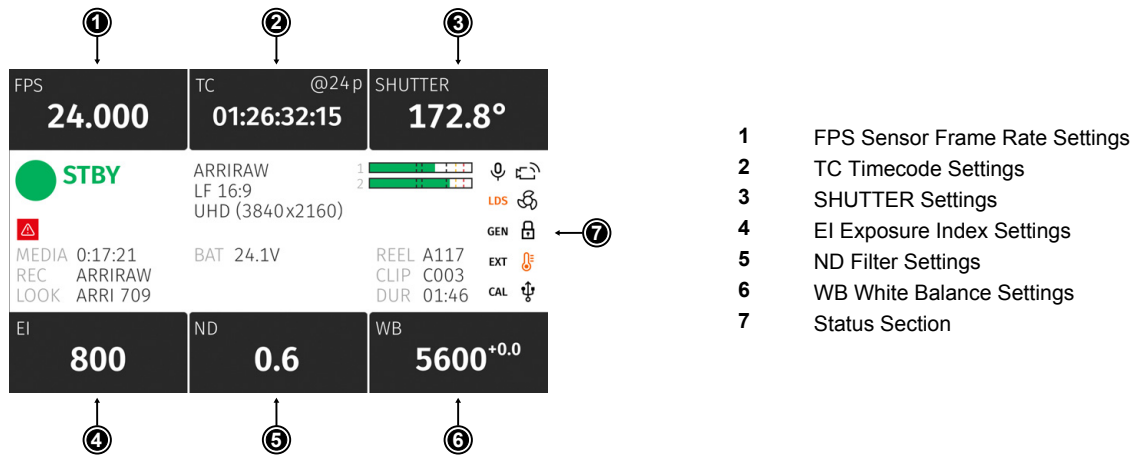
3. To leave the menu press the *HOME / LIVE* button (2).

The *JOGWHEEL* and the *USER WHEEL* + *SET* button provide identical functionality.

For the remainder of this manual, whenever the term *JOGWHEEL* is used, it refers to the *JOGWHEEL* and the *USER WHEEL*. Whenever "press the *JOGWHEEL*" is used, it refers to the *JOGWHEEL* center and the *SET* button.

## 13.1 HOME Screen

The HOME screen is the ALEXA Mini LF default screen. It shows the most important camera parameters and gives quick access to changing them through the screen buttons:



### FPS (Sensor Frame Rate)

The FPS label shows the current sensor frame rate in frames per second. Press the FPS screen button to adjust the sensor frame rate. The FPS label turns orange if the sensor fps does not match the project fps rate.

Note: The maximum frame rate that can be set is dependent on the recording resolution and the codec.

### TC (Timecode)

The TC label shows the current timecode value and project rate. Press the TC screen button to access the timecode settings. The TC label turns orange if a timecode misconfiguration persists, press the TC screen button for more information.

### SHUTTER

The SHUTTER label shows the current shutter angle or exposure time. Press the screen button to set the shutter of the sensor. Shutter angle and sensor FPS determine exposure time of the sensor in seconds by the following equation:  $\text{angle} / (360^\circ * \text{FPS})$ . The shutter unit can be set to display either shutter angle (5.0° to 356.0°) or exposure time (1 s to 1/8000 s). The maximum shutter angle is limited by the resulting exposure time (1 s max.).

### EI (Exposure Index)

Shows the current exposure index. Base sensitivity for the ALEXA Mini LF is 800 ASA. Press the screen button to adjust the exposure index in a range from 160 to 3200 ASA.

### ND Filter

The ND label shows the current ND filter value of the in-camera FSND (Full Spectrum Neutral Density) filter stage. Press the screen button to change the ND filter.

### WB (White Balance)

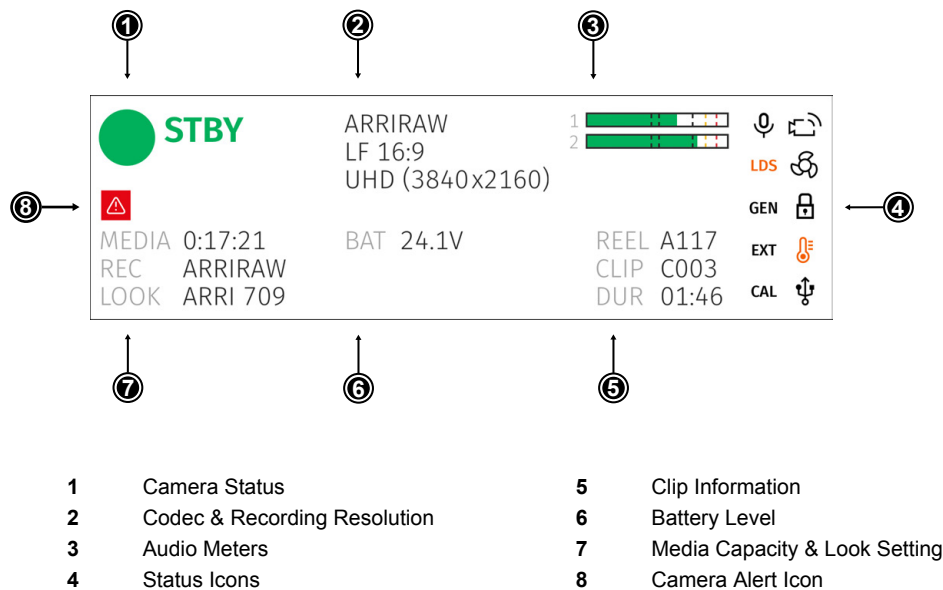
The WB label shows the current white balance and tint. Press the screen button to set the camera's white balance. This is the color temperature of the light source that the camera is currently adjusted for. In addition to the red/blue correction of the white balance, the ALEXA Mini LF can also compensate for a green/magenta tint. This value, called CC (color compensation), is shown as an exponent of the WB value. Positive values are marked with a "+" and negative values with a "-".



White balance can be adjusted from 2,000 to 11,000 Kelvin (here: 5,600) in steps of 10 K for red/blue correction. Color compensation for green/magenta tints can be adjusted in a range from -16.0 to +16.0. Positive or negative CC color compensation values then appear as an exponent of the WB value (here: +0.0).

## Status Section

The status section on the home screen shows key data about recording, power supply, remaining media capacity and more:



## Camera Status

STBY	Standby - ready for recording.
REC	Recording.
PLAY	Camera is in play mode.
ERASE	Erasing the recording media. Active erasing disables recording.
None	Idle, recording not possible (e.g. no media inserted, media is full).

ARRIRAW  
LF 16:9  
UHD (3840x2160)

### Codec & Recording Resolution

Currently active codec and recording resolution.



## Audio Meters

The audio meters are only displayed if audio recording is enabled and show the current level of audio channels 1 & 2. If audio recording is disabled, a crossed out speaker icon is displayed.

Black markers are shown at signal levels -20, -18, -9 dBFS for reference test tone. The yellow marker at -5 dBFS and the red marker at -2 dBFS indicate a signal close to clipping. A red frame around the meter indicates a clipping at the A/D stage.

REEL A117  
CLIP C003  
DUR 01:46

### Clip Information

REEL	Current reel (camera index letter and reel number)
CLIP	Name of current clip of current reel.
DUR	Duration of currently recorded clip (during REC) or last recorded clip (during STBY).

BAT 24.1V

### Battery Level

Current battery voltage level.

MEDIA 0:17:21  
REC ARRIRAW  
LOOK ARRI 709

Media Capacity & Look Settings

MEDIA	Remaining capacity of the recording media, at current FPS and codec combination, in real time. When media capacity is below 2 minutes, capacity values start flashing.
REC	Active recording processing (ARRIRAW or Log C)
LOOK	Active Look

Status Icons



WiFi Icon. WiFi is enabled and the WiFi mode is set to *Host*



WiFi Icon. WiFi mode *Client* is enabled and the camera is connected to a network.



WiFi Icon. WiFi mode *Client* is enabled but the camera is not connected to a network.



Sensor Temperature Icon

Black	Sensor temperature warning
Orange	Sensor temperature error
Red	System temperature error (see <i>MENU &gt; Info &gt; System Info</i> )



Fan Speed Icon

Black	Fan speed about to increase above 20 dB.
Orange	Fan speed is higher than 20 dB.



USB Icon

Black	USB medium ready.
Gray	USB medium is read only.
Orange	USB medium is not usable.



Frame Grab Icon

Black	Frame grab is active.
Orange	Frame grab failed.



Camera Lock Icon. Camera buttons are locked.






MVF-2 Lock Icon. MVF-2 buttons are locked.



Audio Icon. Audio recording is enabled.



Audio Icon. Audio recording is disabled.

	Audio Icon. Internal microphones are enabled.
	MVF-2 eyepiece heater is active.  Black Eyepiece heater is active. Gray Eyepiece heater is not heating (eyepiece temperature is > 15 °C (59 ° F)).
GEN	Genlock Icon  Black Camera is synchronized to genlock source. Orange Camera is not synchronized to genlock source (signal not present or unusable).
EXT	EXT Sync Icon  Black EXT sync active. Orange Mismatch in EXT Sync configuration. See <i>MENU &gt; Alerts</i> for more information.
WRS	Camera white radio is active.
CAL	Lens Motor Icon  Orange Lens motor calibration required. Black Lens motor calibration in progress.
LDS	Indicates an error on the LDS interface.
	Alert Icon. Alert is active. See <i>MENU &gt; Alerts</i> for more information.

## 13.2 Using the On-screen Keyboard

When working with textual parameters on the camera, an on-screen keyboard allows entering text. You can use the keyboard, for example, to enter the name of a user setup.



- ▶ Use the *JOGWHEEL* to select and confirm characters.
- ▶ Use the *CLEAR* button (top right) to delete the character to the left of the cursor. Push the button and hold it to clear the entire text.
- ▶ The *aA#* button (2) toggles between lower case, upper case and numeric text entry.
- ▶ Press the *SET* button (3) to save the entry.
- ▶ Press the *CANCEL* button (1) to discard the entry and exit.

## 13.3 Working with Lists and Import of Files

For certain parameters, the camera menu operates with lists that come with a default content and that can be adjusted to the user's preference. You can *ADD* values to and *DELETE* values from these lists, so that only project relevant values are displayed. Some lists contain values that can be edited directly in the camera (value-based lists) while other lists consist of files that can be imported from or exported to the USB medium (file-based lists).

Following parameters work with value-based lists:

- *HOME > FPS*
- *HOME > SHUTTER*
- *HOME > WB*

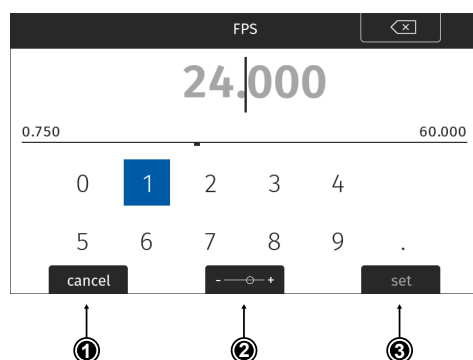
Following parameters work with file-based lists:

- *MENU > Look > Look*
- *MENU > Monitoring > Frame Lines > Frame Line*
- *MENU > Setups > User Setups Installed*
- *MENU > ECS > Lens Data > Lens Tables Installed*

### Adding Entries to Value-based Lists

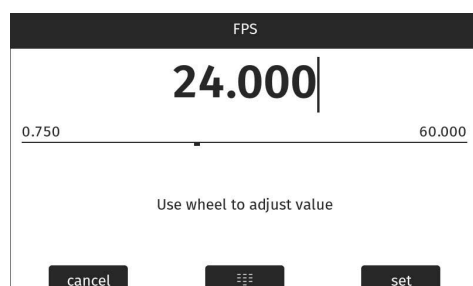
The camera offers two methods of input when adding entries to a list. The numeric keyboard is intended to be used for direct input of a value while the dial mode is intended to be used for fine tuning a value (for example to fine adjust the shutter when filming monitors). The minimum and maximum possible values are shown in the middle of the screen above the horizontal line.

1. Select *HOME > FPS > ADD*.
2. Use the numeric keyboard to directly enter a value. As a guide, the currently set value is displayed in the background:



- Use the *JOGWHEEL* to select and confirm digits. The *CLEAR* button (top right) deletes the digit to the left of the cursor. Pushing the button longer clears the entire value.

3. For fine adjustment of values press the *MODE* button (2) to use the dial mode:



- Rotate the *JOGWHEEL* to fine tune the current value. Press the *MODE* button (2) again if you want to switch back to the numeric keyboard.

4. Press the *SET* button (3) to add the new value to the list, or the *CANCEL* button (1) to exit.

Note: the SET button will be grayed out and the value displayed in red if the entered value is out of range.

## Working with File Based Lists

For looks, frame lines, user setups and lens tables the camera offers to import files from the USB medium as well as from a default list. To import files from a USB medium into the camera, the USB medium needs to be prepared with a certain folder structure, see "User Storage Handling", page 47 for more information. Files are imported from these USB folders:

File Type	Corresponding USB Folder
Look Files	ARRI/A-MINI-LF/LOOKFILES
Frame Lines	ARRI/A-MINI-LF/FRAMELINES
User Setups	ARRI/A-MINI-LF/SETUPS
Lens Data Archive (LDA)	ARRI/A-MINI-LF/LDA

Note: The maximum file name length of user files is 64 characters including the file extension. User files with a name exceeding 64 characters cannot be displayed in camera lists. The instructions below use the import of frame lines as an example.

### Import Files from USB

1. Insert the USB medium into the camera.
2. Select *MENU > Monitoring > Frame Lines > Frame Line > ADD*.
3. Select the desired frame line file from the USB list.
4. Press the *IMPORT* button or the *JOGWHEEL* to add the frame line to the frame lines list.

### Import Files from Defaults

1. Select *MENU > Monitoring > Frame Lines > Frame Line > ADD*.
2. Select *DEFAULTS*.
3. Select the desired frame line file from the defaults list.
4. Press the *IMPORT* button or the *JOGWHEEL* to add the frame line to the frame lines list.

### Deleting List Entries

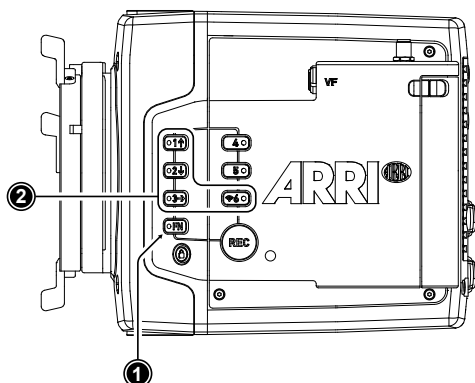
1. Select *HOME > FPS*.
2. Scroll to the entry to be deleted.
3. Press the *DELETE* button.  
The selected entry is marked for delete.
4. Press the *DELETE* button again to delete the selected entry or rotate the *JOGWHEEL* to cancel.

### Maximum Entries per List

All lists have a maximum number of entries they can hold. Whenever a list is full, the *ADD* button is grayed out and a message is shown. You need to delete entries from the list first in order to add new ones. The following table lists the maximum number of entries for each type of list:

List	Maximum no. of Entries
FPS	16
SHUTTER	16
WB	16
Looks	50
Frame Lines	100
User Setups	20
LDA	200

## 13.4 Function Button FN



The camera's left side is equipped with the function button *FN* (1) and six camera buttons of which four are labelled with additional icons (2). These four buttons can act as regular user buttons or in combination with the *FN* button access common camera functions.

### Camera Buttons to Access Common Camera Functions

By default, the camera buttons function as user buttons. In combination with the *FN* button they offer shortcuts to common camera functions.

Following camera functions can be accessed:

Function Button & Camera Button	Function								
<b><i>FN</i> + 1</b>	<p>Toggles the overlay menu in the viewfinder and the SDI outputs. In the overlay menu, the camera buttons control the following functions:</p> <table border="1"> <thead> <tr> <th>Camera Button</th><th>Function</th></tr> </thead> <tbody> <tr> <td>1</td><td>Select backward</td></tr> <tr> <td>2</td><td>Select forward</td></tr> <tr> <td>3</td><td>Access / Confirm</td></tr> </tbody> </table> <p>For more information, see "Overlay Menu", page 77.</p>	Camera Button	Function	1	Select backward	2	Select forward	3	Access / Confirm
Camera Button	Function								
1	Select backward								
2	Select forward								
3	Access / Confirm								
<b><i>FN</i> + 2</b>	<p>Prepares recording media erase and shows a message on MVF, flip-out monitor and SDI outputs. To confirm the erase, press camera button 3 twice. Any other button can be pressed to cancel the action. After the erase has finished, press any button to clear the status message.</p>								
<b><i>FN</i> + 3</b>	<p>Starts/stops playback from the recording medium. During playback, the camera buttons control the following functions:</p> <table border="1"> <thead> <tr> <th>Camera Button</th><th>Function</th></tr> </thead> <tbody> <tr> <td>1</td><td>Skip backward</td></tr> <tr> <td>2</td><td>Skip forward</td></tr> <tr> <td>3</td><td>Play / Pause</td></tr> </tbody> </table>	Camera Button	Function	1	Skip backward	2	Skip forward	3	Play / Pause
Camera Button	Function								
1	Skip backward								
2	Skip forward								
3	Play / Pause								
<b><i>FN</i> + 6</b>	<p>Toggles WiFi on/off.</p> <p>When pressing (just) the <i>FN</i> button, the status LED of button 6 reflects the current WiFi status (LED on = WiFi enabled).</p>								

- Press and hold the *FN* button (1), then press a camera button (2) to access the function. You can also press the *FN* button twice within 0.5 seconds to bring the camera buttons into *FN* selection mode for two seconds. During these two seconds the *FN* button status LED is lit (indicating active *FN* selection mode) and pressing a camera button will access the function behind it.

## 13.5 User Storage Handling

The ALEXA Mini LF saves data such as user setups, frame grabs and system logs to a USB memory stick. Firmware, additional frame lines and ARRI Look File 2 files can be loaded onto the camera using the USB memory stick.

The camera only supports FAT formatted USB memory sticks with MBR partition table and with a maximum capacity of 16GB. A special folder structure is used in order to work with the camera. This folder structure can be prepared in camera and the folder preparation will not alter existing folders and files on the USB medium.

The USB slot is located at the back of the camera below the recording media slot. To access the USB slot, open the media door.

### User Storage Status on HOME screen and in Camera Menu

The USB icon in the status section on the HOME screen of the user interface reflects the USB medium status:



Black: usable  
Gray: read only  
Orange: not usable

### Prepare User Storage for Use

The camera can only load files from a correctly prepared USB medium with the required folder structure. Preparing the folder structure on the USB medium within the camera will not alter existing folders and files on the USB medium.

1. Open the media door and insert the USB medium.
2. Select *MENU > Media > Prepare USB Medium*.
3. Press *CONFIRM* to prepare the folder structure.

The USB memory stick is now ready for use with the camera.

The required folder structure for use in the camera is listed below, and can also be created manually on a computer:

ARRI/A-MINI-LF/	FRAMELINES	for frame line imports to camera
	GRABS	for grabbed still frames
	LDA	for lens tables imports/exports
	LICENSES	for license file installation
	LOG	for exported camera and update logfiles
	LOOKFILES	for look file imports/exports
	SETUPS	for imports/exports of user setup files
	SUP	for update file installation
	SENSOR	for import/export of User Pixel Mask files and export of frame grabs for User Pixel Mask creation

### Remove User Storage

You can remove the USB medium from the camera without unmounting it.

## 13.6 Info Screens

The INFO screens provide detailed information about the current state of the camera system.

- Select *MENU > Info*.

The INFO list contains the following entries.

- Version Info
- System Info
- Maximum FPS Info
- Media Info
- USB Info
- Network Info
- Lens Info
- User Button Info
- EXT Sync Info
- Export HW Info File
- Export Logfiles
- Export Update Logfiles

### Version Info

The version info screen displays the software versions of the camera and connected components:

<i>Software</i>	The camera software version.
<i>Revision</i>	Revision of camera software version.
<i>FPGA</i>	Firmware version of active FPGA (indicated by number in brackets).
<i>MVF-2 Software</i>	Software version of MVF-2 (only shown if connected).
<i>Lens Mount Software</i>	Software version of lens mount.

### System Info

The system info provides detailed information about the camera:

<i>Time + Date</i>	Current system time and date of the camera.
<i>Camera Serial No.</i>	Serial number of camera.
<i>Operating Hours</i>	Total operational time of the camera in hours:minutes.
<i>Sensor Temperature</i>	Current temperature of image sensor.
<i>Sensor Temp. State</i>	Rates the sensor temperature according to OK, warning, or error.
<i>Camera Temp. State</i>	Rates the camera temperature according to OK, warning, or error.

### Maximum FPS Info

This screen gives detailed information about the maximum sensor frame rate:

<i>Sensor FPS</i>	Maximum sensor FPS with the current recording resolution.
<i>Codec FPS</i>	Maximum sensor FPS with the camera's current codec setting.
<i>Media FPS</i>	Maximum sensor FPS supported by the inserted recording media with the current recording codec and camera's resolution setting.

### Media Info

This screen shows information on the recording media:

<i>Status</i>	Status of the recording media.
<i>Model</i>	Name/model of the recording media.
<i>SN#</i>	Serial number of the recording media.
<i>FW Version</i>	Firmware version of the recording media.
<i>Size</i>	Total storage size of the recording media.
<i>Clip Count</i>	Amount of clips on the recording media.



## USB Info

This screen shows information on the USB storage. The number entries consist of two numbers, the number of files on the USB medium and the number of files recognizable by the camera.

<i>Status</i>	Status of USB medium.
<i>Storage Free/Total</i>	Free and total available storage on USB medium in megabyte.
<i>Frame Line Files</i>	Number of frame line files on USB medium.
<i>License Files</i>	Number of license files on USB medium.
<i>Look Files</i>	Number of look files on USB medium.
<i>Setup Files</i>	Number of user setup files on USB medium.
<i>SUP Files</i>	Number of SUP (software update package) files on USB medium.
<i>LDA Files</i>	Number of LDA (Lens Data Archive) files on USB medium.

## Network Info

The network info screen shows Ethernet and WiFi related information:

<i>WiFi Network</i>	Name of connected network (client mode).
<i>WiFi IP</i>	IP address of the camera via WiFi.
<i>LAN IP</i>	IP address of the camera via Ethernet.
<i>Web Remote</i>	URL address of camera remote control website.

## Lens Info

The lens info screen shows information on the attached lens:

<i>Lens Type</i>	Type of lens (LDS, Cooke, ENG, EF...)
<i>Model</i>	Lens model name according to manufacturer.
<i>Serial No.</i>	Serial number of lens.
<i>Focal Length</i>	(Current) focal length of lens in mm.
<i>Focus</i>	Current focus distance of lens.
<i>Iris</i>	Current iris value of lens.

## User Button Info

The user button info screen lists the functions assigned to the User Buttons of the camera body and the MVF-2 .

## EXT Sync Info

The EXT Sync info screen shows the system status of all cameras in the EXT sync setup. It lists the serial number, the camera ID prefix, the battery voltage and the status of the master and the slave camera(s) in the setup.

## Export HW Info File

HW (HardWare) info files are required to generate licenses in the ARRI License Shop or may be requested by camera service to get detailed information on the camera's hardware and components. The HW Info file will be exported to the USB medium in the ARRI/A-MINI-LF/LICENSES folder.

## Export Logfiles

Logfiles help camera service to analyze potential problems. In normal circumstances, logfile export is not required.

Logfiles will be exported to the USB medium in the ARRI/A-MINI-LF/LOG folder.

### Export Update Logfiles

Similar to regular logfiles, update logfiles help camera service to analyze problems that occurred during the update process. In normal circumstances, exporting update logfiles is not required.

Update logfiles will be exported to the USB medium in the ARRI/A-MINI-LF/LOG folder.

## 13.7 Alerts Screen

Alert messages communicate critical system states to the user. They require immediate attention and remain active until the state returns to normal.



A red exclamation mark, visible on the home screen, the flip-out monitor and the EVF and SDI status overlays indicates active alert messages.

- Select *MENU > Alerts* to read the alert message.

## 14 Main Parameters

The following chapter lists the most important parameters of the camera.

### 14.1 Project Settings

The project settings menu contains settings that should be configured at the beginning of each project and can be found at *MENU > Recording > Project Settings*.

#### Project Rate

The project rate sets the timecode timebase and the playback frame rate. The timecode timebase determines how many frames the timecode counts per second. The playback frame rate determines the frame rate at which clips will be played back.

Select to set the timecode timebase and the playback frame rate. The timecode timebase determines how many frames the time code counts per second. The playback frame rate determines the frame rate that clips will be played back at. Changing the project frame rate will automatically also change the sensor frame rate and the SDI frame rates to the same value. It is still possible to have different frame rates for these settings by changing the sensor frame rate or the any of the SDI frame rates individually.

1. Select *MENU > Recording > Project Settings > Project Rate*.

The following project rates are available:

Project Rate	Scan Format	Sensor Real-time Recording
23.976p	Progressive	23.976 fps
24p	Progressive	24 fps
25p	Progressive	25 fps
29.97p	Progressive	29.97 fps
30p	Progressive	30 fps
48p	Progressive	48 fps
50p	Progressive	50 fps
59.94p	Progressive	59.94 fps
60p	Progressive	60 fps

2. Set the desired project rate.

Changing the project rate will match sensor and SDI fps setting to the project rate. A pop up window will inform you about this.

#### Next Reel Count

The next reel count sets the reel number assigned to the next new media used for internal recording. A new media is either a blank media or a media with reels of other ALEXA Mini LF cameras. The camera automatically advances the reel number every time new media is formatted on the camera. The reel number is reflected in clip names and is displayed on the home screen.

1. Select *MENU > Recording > Project Settings > Next Reel Count*.
2. Set the desired next reel count.

#### Camera Index

Give each camera a unique camera index so that you can identify the individual camera unit (A, B, C etc.) in clip and reel names. For more information please see "File Naming Scheme", page 70.

1. Select *MENU > Recording > Project Settings > Camera Index*.
2. Set the camera index in the range from A to Z.

### Camera Index Color

Set the color of the camera index letter displayed in the status info of the SDI outputs (e.g. to match it to the color coding of your cameras).

1. Select *MENU > Monitoring > SDI > SDI Processing > Overlays > Status Components > Camera Index Letter* to display the camera index letter in the SDI status info.
2. Select *MENU > Recording > Project Settings > Camera Index Color*.
3. Set the camera index color.

### Camera ID Prefix

You can define the first character of the Camera ID. The Camera ID is a Base36 representation of the camera serial number and part of each clip's name. It allows you to match each clip to a specific camera. You set the camera ID prefix individually on each camera. For more information please see "File Naming Scheme", page 70.

1. Select *MENU > Recording > Project Settings > Camera ID Prefix*.
2. Set the camera ID prefix in the range from A to Z.

### Lens Squeeze Factor

The lens squeeze factor determines the factor that is used for anamorphic desqueeze on EVF/Monitor and SDI. This value is also written into the metadata of the clip and allows video players and editing software to automatically desqueeze clips that have been shot with anamorphic lenses.

1. Select *MENU > Recording > Project Settings > Lens Squeeze Factor*.

The following lens squeeze factors are available:

Factor	Usage
1.00	for all spherical lenses
1.25	e.g. Ultra Panavision 70 Lenses
1.30	e.g. Vantage Hawk Lenses
1.50	e.g. P+S Technovision, Iscorama, Kowa
1.65	e.g. Panavision Ultra Vista Anamorphic lenses
1.80	e.g. Cooke Anamorphic/i Full Frame Plus lenses
2.00	for classic 2x squeeze CinemaScope S35 lenses

2. Set the desired lens squeeze factor.

The selected lens squeeze factor is automatically applied to EVF/Monitor and the SDI outputs.

For more information please see "Anamorphic Desqueeze", page 81.

## 14.2 Sensor Frame Rate

### Setting the Sensor Frame Rate

1. Select *HOME > FPS*.  
The sensor FPS list is displayed.
2. Select a frame rate from the FPS list or add and select a custom frame rate.  
The sensor fps list is displayed.
3. Using the jogwheel, scroll to the desired value/entry.
4. Press the jogwheel to set the new value.

## 14.3 Shutter

### Changing the Shutter

1. Select *HOME > SHUTTER*.  
The shutter list is displayed.
2. Select a shutter value from the list or *ADD* a custom shutter value to the list.
3. Set the desired shutter value.

### Adjusting the Shutter for Filming a Monitor

1. Set the shutter unit to *Shutter Angle*.
2. Go to *HOME > SHUTTER > ADD*.
3. Select the third digit (single degrees).
4. Adjust the shutter value until the monitor image flickers the least.
5. Select the fourth digit (sub-degrees).
6. Fine-adjust the shutter value until there is no more flicker visible.
7. Press SET to add the shutter value to the list.

### Shutter Unit

The camera offers to set the shutter unit.

1. Select *MENU > System > Shutter Unit*.

Two options are available:

<i>Shutter Angle</i>	Converts exposure time into the angle of a virtual rotating mirror shutter as in film cameras. A fixed angle creates varying exposure times with varying frame rates. You can set angles from 5.0 to 356.0 degrees.
<i>Exposure Time</i>	Shows the effective sensor exposure time. With varying frame rates, it remains identical and can be set from 1/1 to 1/8000 seconds.  Note: Maximum exposure time with a given frame rate is 1/fps, with a limit of 1/1 seconds. When the selected exposure time is no longer possible because you changed the frame rate, the camera uses the longest exposure time possible. For example, if you configured 1/25 s at 25 fps and you change the sensor fps to 50, the camera will use 1/50 s.  For a constant exposure time over a range of used frame rates, set it to 1/(highest used frame rate).

2. Set the desired shutter unit.

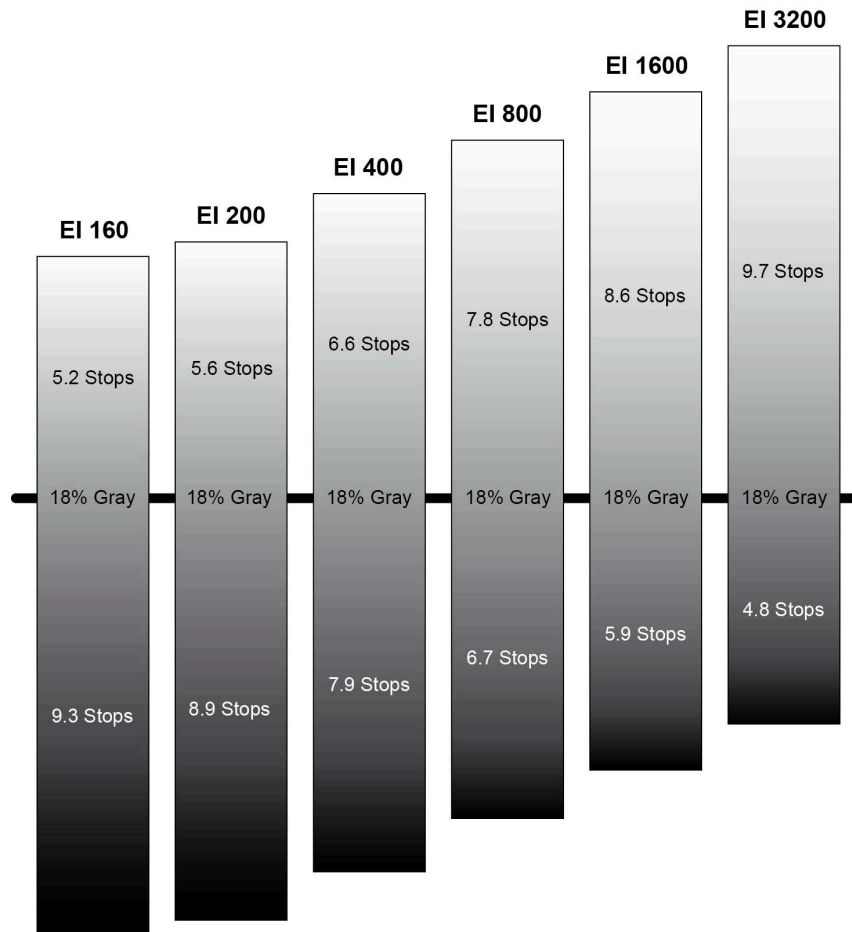
**Note:** The camera sensor is optimized for exposure times shorter than 1/24 s and image artifacts like individual overexposed pixels can appear when using longer exposure times.

## 14.4 Exposure Index

The Exposure Index (EI) is the applied sensitivity of the camera. The ALEXA Mini LF has a base sensitivity of 800 ASA. This means that the dynamic range is almost evenly distributed above and below neutral gray with low noise in the shadows and clean, smooth clipping behavior in the highlights. Due to its high dynamic range, the camera's sensitivity can be set from 160 to 3200 ASA in steps of 1/3 stops while maintaining high image quality.

Applying the exposure indexes at the extremes of the range will nonetheless have an influence on the images. At low exposure indexes, such as 160 ASA, the dynamic range below neutral gray increases, reducing noise even further. At the same time, the dynamic range above neutral gray is slightly

reduced. Highlight clipping itself is not influenced by this, but the shoulder of the gamma curve will get slightly steeper, reducing the smoothness of the change from almost overexposed to overexposed. At high exposure indexes, such as 1600 ASA, the images behave in the opposite way. Noise is increased, which makes it important to judge shadow detail, while there will be even more headroom in the highlights.



### Setting the Exposure Index

1. Select *HOME* > *EI*.
2. Set the desired exposure index.

## 14.5 ND Filter

### Internal FSND Filters

The ALEXA Mini LF has a built-in motorized and sealed filter stage for Full Spectrum Neutral Density filters (FSND) with densities of 0.6, 1.2 and 1.8 (and an optical clear filter). In comparison to IRND filters, which have an uneven spectral behavior, or to an ordinary ND filter, which opens up at about 675 nm, the FSND filters offer a true, even reduction over the whole spectrum. This prevents artifacts from infrared wavelengths and the need for additional IR filters.

ALEXA Mini LF uses FSND (Full Spectrum Neutral Density) filters, which are linear across the full spectrum of the camera sensor. This prevents artifacts from infrared wavelengths and the need for additional IR filters.

## Selecting the ND Filter

The currently set ND filter value is displayed on the HOME screen and in the status info of the viewfinder and the SDI outputs. The camera offers various ways to adjust the ND filter:

- ▶ ND Filter screen
- ▶ Camera user buttons
- ▶ WCU-4 user buttons
- ▶ ARRI Master Grips and Operator Control Unit OCU-1 user buttons
- ▶ Web remote
- ▶ Applications communicating with the camera through the Camera Access Protocol (CAP).

Selection in camera menu

1. Select *HOME > EI > ND*.

Following settings are available:

*ND - (Clear)*

*ND 0.6*

*ND 1.2*

*ND 1.8*

2. Set the desired ND filter.

## 14.6 White Balance

White Balance (WB) is the color balance of the camera that should be matched to the color temperature of the light in use. White balance is a red-blue adjustment of the image. To adjust the green-magenta balance, use the color compensation (CC) adjustment. For example, a fluorescent source will have peaks in its spectrum that cannot be corrected with red-blue white balance alone. The CC shift can correct these peaks up to a full green or full magenta gel. One step of CC shift is equal to 035 Kodak CC values or 1/8 Rosco values.

There are three methods for setting the white balance:

- ▶ White balance presets
- ▶ Custom white balance
- ▶ Automatic white balance

### Preset and Custom White Balance

1. Select *HOME > WB*.

The WB list is displayed, offering the following default values:

3200 K +0.0 CC

4300 K +0.0 CC

5600 K +0.0 CC

7000 K +0.0 CC

2. Select a value from the list or ADD and select a custom white balance.

For information on how to add entries to a list please see "Working with Lists and Import of Files", page 44.

## Automatic White Balance

Automatic white balance calculates the white balance based on the camera's live image and overwrites the active white balance value. The result is stored as first entry in the WB list. Automatic white balance can be triggered through a dedicated button in the white balance screen or through a user button assigned with *Auto WB*. For information on how to assign functions to user buttons please see "User Buttons", page 107.

1. Select HOME > WB.
2. Press *Auto WB*.

The EVF and the SDI outs display an image overlay showing the center area used for white balance calculation.

3. Press the *Auto WB* button again within one second to execute automatic white balance.

The calculated white balance is set and stored as first entry in the white balance list.

Note: Under- or overexposed images may cause the automatic white balance to fail. Always trigger automatic white balance with properly exposed images.

## 14.7 Timecode

Timecode ensures that every image of recorded footage can be identified with a unique value and synced with corresponding media, such as sound or the second camera in a 3D application. When used with other metadata, such as reel names, all recorded media retains its unique identity.

The following are two ways of using timecode on a production:

### Free Run Timecode, Time of Day

- |               |  |
|---------------|--|
| Use:          | This format is often used on multi camera productions with sync-sound, i. e. the sensor frame rate matches the project rate, sound and image timecode match and allow for easy syncing in post.  |
| Setup:        | <p>The sound department acts as the timecode master, and generates timecode which uses the time of day as a value, and a time base matching the project frame rate. Twenty-four hours of time will translate into twenty-four hours of timecode. Timecode is fed to the camera via the TC connector. The project fps setting must match both the sensor frame rate and the time base of the external timecode signal.</p> <p>The camera can be set to timecode mode jam sync, in which it samples the timecode value once from the timecode connector and then continues counting based on its own high precision crystal clock. The timecode source can be disconnected from the camera after jamming in jam sync mode. This mode ensures stable timecode with an offset of less than one frame for each eight hours, after which the camera has to be re-jammed.</p> <p>Alternatively, the camera can be set to timecode mode regenerate (regen). In regen mode, the camera uses the timecode value of the external timecode source. This ensures correct timecode for an infinite duration, but the timecode source must remain connected to the camera. Please note that while recording the camera ignores external timecode and is using its internal clock to avoid potential timecode jumps, which can occur due to connection problems such as a faulty timecode cable for example.</p> |
| Variations:   | If shooting starts close to midnight, the timecode may be started with an offset time of day to prevent a rollover at midnight.  |
| Restrictions: | Free run timecode is only possible, if the camera is running at sync-sound speed. If the camera is over- or undercranking, the timecode frame rate will no longer match the sensor frame rate, and timecode values would either be duplicated or dropped. To prevent this, the camera will automatically switch to run mode rec run when the sensor frame rate is changed.   |



## Rec Run Timecode

- Use:** Rec run timecode is often used on single camera productions that are either MOS or use a dumb slate to sync picture and sound. Record run timecode guarantees continuous timecode on all recorded data. Record run timecode also works with over- and undercranking.
- Setup:** The timecode run mode must be set to rec run, the mode to regenerate. Timecode counts up only during recording, by one frame for each image generated by the sensor. The timecode counts at the project frame rate set on the camera. Normally, the timecode hour value advances by one hour for each new reel, using only hours 01-20 for reel 1-20, and then restarting at hour 01 for reel 21.
- Variations:** Rec run timecode might be used for off-speed work on productions that use external timecode sources for all sync sound.
- Restrictions:** None

## Setting the Timecode Manually

1. Select *HOME > TC > EDIT*.
2. You have the following options:
  - For TC = 00:00:00:00: Press *RESET*.
  - For TC = current system time: Press *SET TO TIME*.

Via jogwheel, you can change each value. Scroll up or down to increase or decrease the value. Press the jogwheel to select the next digit pair.

3. Press *DONE* to save the changes. Cancel with *BACK*.

**Note:** *EDIT* is available only when timecode is in preset mode.

**Note:** You can edit timecode in preset mode only.

## Timecode Run Mode

1. Select *HOME SCREEN > TC > Options > Run Mode*.

You have the following options:

**Rec Run** Timecode increases during recording only. The timecode value increases with every frame generated by the sensor while recording.

**Free Run** Timecode increases with every new frame generated by the sensor, independently from recording.

**Note:** Free run is only possible if the sensor fps equals the project fps (i.e. shooting sync speed). Otherwise, the camera temporarily switches to rec run. The free run timecode continues to count in the background.

When you set the sensor frame rate back to equal the project frame rate, the timecode will synchronize itself to the free run timecode again.

If you synchronized your camera to an external signal while it was in free run, you can shoot offspeed shots in rec run timecode and return to sync speed afterwards. The camera will return to free run timecode and seamlessly reconnect to the previously synchronized timecode.

## Timecode Mode

- Select *HOME > TC > Options > Mode*.

You have the following options:

<i>Regen</i>	<p>Depending on the timecode run mode, regen behaves differently:</p> <p>Run mode <i>rec run</i>: The camera determines the timecode of the last frame of the last recorded clip and increments it by one for the next clip. This ensures consecutive timecodes for a sequence of clips.</p> <p>Run mode <i>free run</i>: The timecode source should be connected to the camera permanently. The camera continuously reads the timecode signal at the timecode connector as long as it is present. Upon disconnection or loss of signal, the camera continues counting on its own, but will indicate the missing signal through an orange exclamation mark on the TC button on the home screen. When the external signal is reconnected, the camera uses the value of the external signal again. Regen mode will disable manual editing of the timecode.</p>
<i>Preset</i>	The camera uses its internal counter.
<i>Jam Sync</i>	<p>The camera samples the timecode value and simultaneously tunes its internal timecode clock to match the clock of the timecode source. During this procedure, the timecode display on the home screen, on the timecode menu screen as well as on the status overlays is flashing. Jamming has finished when the timecode display stops flashing, then the timecode source can be disconnected. The camera continues counting based on its own high precision crystal clock now. This mode ensures stable timecode with a drift of less than one frame over eight hours, after which the camera has to be re-jammed.</p> <p><b>Note:</b> Due to the tuning mechanism, jamming the camera might take up to 30 seconds and a timeout is issued if tuning could not be completed after 60 seconds.</p>

## Regen Source

Based on the timecode run mode, the camera determines the timecode regen (regenerate) source automatically. If the run mode is set to *Free run*, it regenerates timecode from the timecode input connector. If set to *Rec run*, it regenerates timecode from the last clip of the recording media by continuing seamlessly from the last active value.

- View *HOME > TC > Options > Regen Source*.

The regen source is displayed. The following settings are possible:

<i>LTC In</i>	timecode is continuously read from the TC connector.
<i>Media</i>	timecode from the last clip of the active recording card by continuing seamlessly from the last active value.
<i>EXT</i>	when camera is set to EXT sensor slave or EXT settings slave)

## Timecode Offset

You can apply an offset to LTC input signals to compensate for timecode offsets in external devices.

1. Select *HOME > TC > Options > TC Offset*.
2. Adjust the timecode offset in the range of -20 to +20 frames.

### NOTICE

The camera's internal battery will keep the timecode and timecode tuning values for about 10 minutes after the power source was disconnected.

# 15 Look Settings

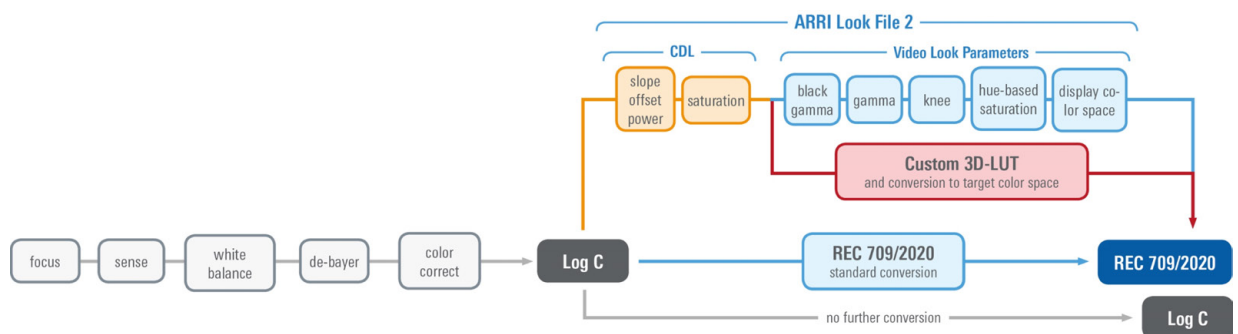
## ARRI Look File 2

ARRI Look File 2 files are a way for the user to alter the parameters the camera uses when converting the sensor image data to a video color space. This can be described as applying a custom "look" to the different image output paths. With the ALEXA Mini LF the ARRI Look File 2 files can be applied to the monitoring paths and is included in the clip as metadata only (nondestructive workflow).

The ARRI Look File 2 can influence an image, respectively a shot or scene. For a good overview of the color controls, follow the image path of the camera in the scheme below: In the first step the sensor data is balanced for the light source's color temperature (white balance). This ensures a neutral representation of the R, G, and B values of objects. In the second step, a Log C image is created. The Log C transform is controlled by the exposure index (EI), which is (like the white balance) not part of the look. All following alterations to the color are based on a Log C image which is also the result if the whole look mechanism is bypassed.

Inside an ALF-2 file, various combinations are possible:

- Color Decision List (CDL) only
- CDL and Video Look Parameters
- CDL and 3D LUT
- 3D LUT only (e.g. conversion to REC 709 or custom LUT)



A look file can be created in the [ARRI Color Tool](#) as a completely new look, using a 3D LUT created in a grading session or you can edit the look live on set using a live-grading application like Filmlight Prelight or Pomfort Livegrade. For a more detailed look at a specific live-grade workflow, please visit the manufacturer website.

These tools connect to the camera's look controls via the Camera Access Protocol (CAP). The current look is recorded as metadata with the push of the record-button and rewritten with its latest values when the recording is stopped, and the file closed. This guarantees to have the latest "starting look" if a power-out interrupts the recording and to keep the subtle changes done during the take.

After recording, backup and data transfer the look can be extracted from the clip's file header using the ARRI Color Tool again. This way the look can travel to post production as an ARRI Look File 2 or as a 3D LUT.

For more information about the ARRI Look File 2, please refer to the ARRI Look File 2 white papers, available in the [White Papers](#) section on the ARRI website.

## Camera Default Look Files

The ALEXA Mini LF comes with several pre-installed ARRI Look File 2 files:

Look	Description
<i>ARRI 709</i>	Renders the video image according to the ITU-R-BT709 standard, for most accurate color reproduction on standard broadcast monitors.
<i>ALEXA Classic 709</i>	Matches the color reproduction of ALEXA Mini to the ARRI ALEXA.
<i>ARRI 2100 HLG 1K 200</i>	HDR look file. Renders an image for a HLG (Hybrid Log Gamma, ITU-R BT.2100) monitor. It is assumed that the monitor has maximum luminance of 1000 cd/m <sup>2</sup> . In this case, the image will look the same as when the PQ look is used with a PQ monitor.
<i>ARRI 2100 PQ 1K 200</i>	HDR look file. Renders an image for a PQ (SMPTE 2084, ITU-R BT.2100) monitor. The maximum luminance is 1000 cd/m <sup>2</sup> , which is a PQ level of 75%. The diffuse scene white (2.5 stops above the gray card) will appear with a luminance of 200 cd/m <sup>2</sup> .
<i>Commercial</i>	Renders the image brighter for smoother skin tones.
<i>Landscape</i>	Applies a steeper contrast curve to the image.
<i>LCC 709</i>	Low Contrast Curve look that contains a custom tone map curve that creates a video image with lower contrast compared to the standard REC 709 output. As a result, the image holds as much dynamic range information as possible, without using Log C encoding.
<i>TV-neutral</i>	An ARRI 709 like look, which is more saturated in colors with slightly lower blacks.
<i>TV-warm</i>	Same as TV neutral, just with a slightly warmer look overall.
<i>Vibrant</i>	Boosts color saturation except for red and yellow (skin tone protection).

## Setting the Look

You can choose to use just go with REC 709 look, use another a pre-installed look or import custom looks into the camera. Additional ARRI Look File 2 files can be added to the camera from the USB medium. The ARRI Look File 2 files must be copied into the ARRI/A-MINI-LF/LOOKFILES folder on the USB medium.

1. Select *MENU > Look > Look*.
2. Select and set a look from the list or import and set a custom look.  
The selected look will be included in the metadata of recorded clips.
3. Apply the look to the desired image outputs, see next chapter for more information.

## Playback and ARRI Look File 2 files

During playback, the camera makes a distinction between clips recorded in ARRIRAW, Log C, or Look processing. When a clip recorded in ARRIRAW or Log C is played back and an output is configured for Look processing, the look will be applied to this output. Please note that this is the currently enabled ARRI Look File 2, as the camera does not take into account which ARRI Look File 2 was active when the clip was recorded. It is the responsibility of the user to make sure the correct ARRI Look File 2 is applied during playback. When a clip recorded with Look processing is played back, no ARRI Look File 2 will be applied by the camera during playback. For the duration of that clip, ARRI Look File 2 files will be disabled.

## 15.1 Processing and Color Spaces

### Log C

The Log C curve is a logarithmic encoding of the scene, meaning that the relation between exposure measured in stops and the signal is constant over a wide range. Each stop of exposure increases the signal by the same amount. The overall shape of the Log C curve is similar to the exposure curves of film negatives. Because of fundamental differences between a sensor and negative film, however, the color characteristics remain different.

Log C actually is a set of curves for different EI values/ASA ratings. Each curve maps the sensor signal, corresponding to 18% gray scene luminance, to a code value of 400 in a 10 bit signal. A 10 bit signal offers a total code value range of 0 to 1023. The maximum value of the Log C curve depends on the set EI value. The reason is quite simple: When the lens is stopped down, by one stop for example and the EI setting is increased from, say, 800 to 1600, the sensor will capture one stop more highlight information. Since the Log C output represents scene exposure values, the maximum value increases.

### Configuration of EVF/Mon. and SDI Processing

#### 1. Select

*MENU > Look > EVF/Mon. Processing.*

*MENU > Look > SDI 1 Processing.*

*MENU > Look > SDI 2 Processing.*

Following processing options are available:

<b>Log C</b>	Based on the Cineon format for output to film print or digital intermediate, this logarithmic processing requires color grading in postproduction. On standard broadcast monitors, Log C images appear flat and desaturated. Proper display, dailies and editing proxies require a conversion look-up table (LUT).
<b>Look</b>	Select to apply the look set in <i>MENU &gt; Look &gt; Look</i> to the output path. Applies a video display processing to camera images. The default <i>ARRI 709</i> look complies with the ITU.R-BT709 standard for display on standard broadcast monitors.
<b>ALEXA Classic 709</b>	Creates a Rec 709 equivalent image in the same way that it is processed in the ALEXA Classic product line. This setting may be used when the selected Look file alters the image too drastically, but a Log C image would be too flat for monitoring.

#### 2. Select the desired processing for each output.

The currently set processing is displayed in the status info of EVF/Mon. and SDI outs.

### Configuration of SDI Color Space

#### 1. Select

*MENU > Look > SDI 1 Color Space.*

*MENU > Look > SDI 2 Color Space.*

The color space options for the SDI outputs are:

*REC 709* Material recorded in Rec 709 (short for ITU Recommendation BT.709) has a display specific encoding. The purpose of a display specific encoding is to immediately provide a visually correct representation of the camera material, when it is screened on a certain display device. This is achieved by mapping the actual contrast range of the scene into the contrast range that a display device can reproduce. Examples of display specific encodings are Rec 709 for HDTV screens or DCI P3 for Digital Cinema Projectors. On the downside, a display specific encoding puts some limits on the options for a colorist.

*REC 2020* Rec 2020 is a wider color space than Rec 709, which is the current industry standard for HD. Rec 2020 promises more brilliant images, though only new display technology is able to show these. Traditional Rec 709 displays (like TVs or ordinary computer displays) can not display Rec 2020.

While Rec 709 is the encoding color space for HDTV, Rec 2020 is the encoding color space for UHD. The primary colors lie on the spectral locus and it is thus possible to have more saturated colors in images. It does not mean, however, that all colors look more saturated. When properly converted, Rec 709 images will look exactly the same when displayed on a Rec 2020 display. Rec 2020 is an encoding standard. A TV or display may not support the full gamut. Nevertheless, it will correctly display the colors within its physical gamut. To get the “Premium” logo of the UHD Alliance, for example, a TV needs to support a minimum of 90% of the P3 gamut.

2. Select the desired color space.

## 16 Recording

### 16.1 Recording Media Handling

#### About Codex Compact Drives

Compact Drives have been specifically designed for the small form factor of the ALEXA Mini LF, using new flash technology in a miniaturized casing. The drives offer data rates of up to 8 Gbps and support all image and recording formats of the camera. The full recording capacity is available for both ARRIRAW and Apple ProRes recording.

The Codex Compact Drive (CA08-1024) is a high performance solid-state drive with 1 TB (960 GB usable) capacity in a compact, rugged aluminum casing. Transfer speed up to 8 Gbps. Recording capacity at 24fps: ARRIRAW approx. 32min 4.5K OG, Apple ProRes 4444 approx. 52 min 16:9 4K UHD.

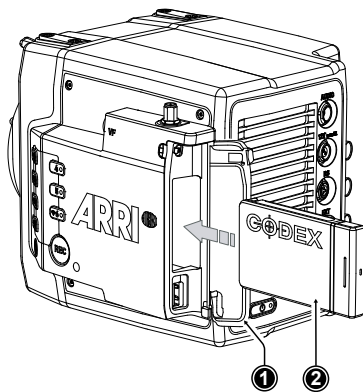
Recorded material can be accessed directly with the USB-C Codex Compact Drive reader on macOS or Windows at up to 1 GB/s. Mac users can benefit from up to 2.7x faster file transfers using Thunderbolt 3 Codex SXR Capture Drive™ Docks with a Codex Compact Drive™ adapter.

Using Codex Device Manager, a simple free macOS menu bar application, Codex media is available directly on the macOS Desktop and in Finder. Recorded files can be copied with various data wrangling applications or directly in the Finder/Explorer.

Compact Drives are specified for a temperature range from 0° Celsius to 70° Celsius (32° Fahrenheit to 158° Fahrenheit). When working in environments with ambient temperatures below 0° Celsius, ensure that the drives have a temperature of at least 0° Celsius when starting a recording to ensure proper operation.

Do not put any labels or adhesive tape on the Compact Drive (the side facing the camera body). The Compact Drive must have full contact to the camera body to ensure proper heat conduction.

#### Inserting the Codex Compact Drive



1. To access the media slot, slide the media door release towards the camera back so that the spring loaded door (1) jumps open.
2. With the contact pins first and the Codex label side facing out (away from the camera body), gently insert the drive (2) until it locks.
3. Gently close the media door. Do not force the door closed if the drive is not fully inserted. Do not force the drive into the slot in wrong orientation - the contacts could be damaged.

#### Removing the Codex Compact Drive

Compact Drives do not have to be unmounted prior to removal, they can be removed whenever the media LED shows solid green.

1. Slide the media door release towards the camera back so that the spring loaded door jumps open.
2. Grab the drive with your thumb and index finger and gently pull it out the media slot.

## Explanation of Drive LED States

Codex Compact Drives have an LED that signals the media's state to the user:

LED State	Media State
Solid green	Media is in standby and ready to record. Mounted, idle & ready, buffers flushed, safe to remove.
Solid red	Media is being accessed (read/write). Recording or Playback (should stay red until buffers are flushed at the end of recording). <b>DO NOT REMOVE MEDIA!</b>
Blue flashing	Drive is being mounted or unmounted.
Red flashing	Load failure. Media error, see camera menu for details.
Off	Media is inactive Media is unreadable (e.g. wrong file system).

### NOTICE

- Avoid damage to the contacts of both camera and card. Always insert drives as described in this document.
- Keep the door closed to prevent dirt and moisture from entering the camera.
- Compact Drives are specified for a temperature range from 0° Celsius to 70° Celsius (32° Fahrenheit to 158° Fahrenheit). When working in environments with ambient temperatures below 0° Celsius, ensure that Compact Drives have a temperature of at least 0° Celsius when starting a recording to ensure proper operation.
- While we do everything we can to assure reliable functioning of different recording medias such as Codex Compact Drives, and while the mean time before failure (mtbf) for drives is excellent, a failure that results in loss of data may occur at any time. Therefore, you are obliged to implement and maintain at any time adequate and necessary data security measures and back up drive content as soon as possible. ARRI assumes or accepts no liability or responsibility for data loss or data corruption, or any other damages, loss or harm due to malfunction of recording drives.
- If the recording process is interrupted by power loss or media removal, transfer all the data from the media and format it before using it again.
- Never remove a drive while recording - this may damage the recorded clip.

### ⚠ CAUTION!

It is possible that Compact Drives will get hot to the touch during extended operation and can cause pain or even burns if held for too long. It is advisable to handle the drive for no more than three seconds, and to remove the drive quickly but carefully. Allow it to cool before further handling and consider wearing protective gloves.

## 16.1.1 Erase of Recording Media

Before using a Codex Compact Drive with ALEXA Mini LF, you need to erase it in-camera to create the required file system. Capture Drives are initialized with the UDF file system which is read-only for computers. Drives can be erased in the camera menu or by using camera button 2 in combination with the Function Button FN.

1. Select **MENU > Media > Erase Media**.  
A confirmation screen is displayed.
2. Press **ERASE** to start erasing the drive, or press **CANCEL** to abort.



**NOTICE**

Erase totally removes all data and data can't be recovered. Make sure to copy all data from the drive before erasing.

Do not remove power or switch off the camera while erase is in progress.

Do not remove the recording media from the recording module while erase is in progress.

### 16.1.2 Remaining Recording Capacity and Media Information

The remaining recording time of the inserted drive at current FPS and codec combination, in real time is displayed on the HOME screen as well as in the status info of EVF/Monitor and the SDI outputs. When drive capacity is less than 2 minutes, capacity values start flashing.

Additional drive information can be found in the Media Info screen.

► Select *MENU > Info > Media Info*.

**NOTICE**

A maximum of 400 clips can be recorded on a drive. When the maximum of 400 clips is reached, the card will be declared as full and further recording onto the card is not possible.

## 16.2 Starting Recording via REC button

The *REC* button is located on the left side of the camera, the MVF-2 features another *REC* button. The camera status LED next to the REC button reflects the camera's status. Recording can only be started with a valid Compact Drive inserted. Starting recording returns the MVF-2 user interface to the home screen and disables the menu access as well as the HOME screen buttons *FPS*, *SHUTTER* and *TC*.

### Other Ways to Start Recording

The camera offers various other ways to start recording:

- Through the LBUS connector, using ARRI Master Grips or the Operator Control Unit OCU-1
- Through the built-in white radio, using Wireless Compact Unit WCU-4 or Single Axis Unit SXU-1
- Through WiFi/LAN, using the web remote or applications communicating via CAP (Camera Access Protocol)
- Through the EXT connector, using the General Purpose I/O Box or a Remote Switch RS-4
- Through the RS connector, using Remote Switch RS-4
- A user button assigned with Record Start/Stop

## 16.3 Recording Format

The selection of the recording format is a crucial decision which needs to be discussed with the production company and post production. While lower bit rate formats offer longer recording times, they might introduce compression artifacts that can limit creative choices. Always test the full workflow pipeline with the preferred recording format before shooting.

### MXF (Material eXchange Format)

Both ARRIRAW and Apple ProRes files are recorded in an MXF (Material eXchange Format) container. An MXF container file can "wrap" different types of video and audio material along with associated metadata. The internal structure of these files is defined by the Operational Patterns (OP). Our cameras create MXF files with OP1a structure, which packages picture, sound and metadata into a single file. This structure is ideal for both camera acquisition and archiving, since audio and video is always kept together and virtually no data gets lost if recording is unexpectedly interrupted. OP1a also is a streaming format, which means that even incomplete files can be repaired and accessed up to the last recorded frame.

## MXF/ARRIRAW

ARRIRAW data delivers unencrypted, uncompressed and uncompromised image quality. It offers the highest achievable resolution, the camera's natural color response and great exposure latitude as uncompressed and unprocessed sensor data. ARRIRAW images have only one channel. A color reconstruction algorithm calculates the missing components of each pixel based on the type and position of the array of colored filters (Bayer pattern) on the camera sensor.

ARRIRAW de-bayering is available through the ARRIRAW SDK or custom processing, which is implemented in most of the major post production tools for dailies processing and mastering.

ARRIRAW is used for cinema production, visual effects and high quality TV. It is the best format for creative color correction and visual effects work.

The camera will automatically calculate a CRC32C checksum for the image data inside each ARRIRAW frame. This checksum is recorded as part of the image header and can be used by software like ARRI Meta Extract, to verify that the ARRIRAW image content has not changed during any copy step. Note that this checksum does not validate the entire file, only the image data itself.

## MXF/Apple ProRes

Recording in Apple ProRes is a cost efficient alternative to shooting ARRIRAW, as it requires less storage space and no further processing in post. The camera supports following Apple ProRes flavors:

MXF/Apple ProRes 422 HQ	Use for high quality TV production. Suitable for creative color correction.
MXF/Apple ProRes 4444	Use for high quality TV and cinema production. Very suitable for creative color correction and visual effects work such as pulling mattes.
MXF/Apple ProRes 4444 XQ	The ideal choice for productions that are shooting for premium image quality, are looking for extreme color grading and want to preserve the superior tonal range of ARRI's Log C signal.

Playback for MXF wrapped Apple ProRes clips has been added to macOS by Apple via their Pro Video Formats 2.1 back in January 2019. MacOS 10.14.3 or later is mandatory for this installer package. Find out more at: <https://support.apple.com/kb/DL1988>

## File Structure

After a Codex Compact Drive was formatted in the camera, it is named ARRI\_UDF until the first clip is recorded. Once a clip has been recorded, the name changes to the camera index letter and current reel number, which can be preset in the *PROJECT* menu. Clips are stored in a folder with the same name as the media.

The ALE file is an Avid Log Exchange file for Media Composer. It contains all static clip metadata, which is also embedded in each recorded clip.

## Selection in Camera Menu

1. Select *Menu > Recording > Recording Codec*

You have the following options:

Recording Codec	Color Coding	Bit Rate (VBR, 24fps, 3840x2160)
MXF/Apple ProRes 422 HQ	10bit YCbCr	705 Mbps
MXF/Apple ProRes 4444	12bit YCbCr	1058 Mbps
MXF/Apple ProRes 4444 XQ	12bit YCbCr	1608 Mbps

Recording Codec	Color Coding	Bit Rate (VBR, 24fps, 3840x2160)
MXF/ARRIRAW	12bit log	2389 Mbps



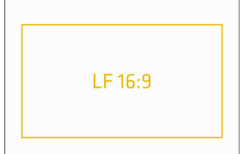
2. Select the desired recording codec.

Note: When the recording codec family is changed, the camera has to perform a partial software reload. A popup window shows the settings that are affected by the reload and that may not be available after the change. After confirming the popup window, the software is reloaded.

## 16.4 Recording Resolution

1. Select *Menu > Recording > Recording Resolution*.

Following options are available:

Recording Resolution	Codec	Sensor Active Image Area (photosites)	Sensor Active Image Area (dimensions)	Recording File Container Size (pixel)
LF Open Gate 4.5K				
	ARRIRAW	4448 x 3096	36.70 x 25.54 mm	4448 x 3096
	Apple ProRes		1.445 x 1.006"	4480 x 3096
LF 2.39:1				
	ARRIRAW	4448 x 1856	36.70 x 15.31 mm	4448 x 1856
	Apple ProRes		1.445 x 0.603"	4480 x 1856
LF 16:9 UHD				
	ARRIRAW	3840 x 2160	31.68 x 17.82 mm	3840 x 2160
	Apple ProRes		1.247 x 0.702"	3840 x 2160
LF 16:9 2K				
	Apple ProRes	3840 x 2160	31.68 x 17.82 mm 1.247 x 0.702"	2048 x 1152
LF 16:9 HD				
	Apple ProRes	3840 x 2160	31.68 x 17.82 mm 1.247 x 0.702"	1920 x 1080

2. Select the desired recording resolution.

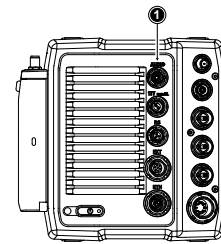
Note: Changing between recording resolutions may require a software reload. Confirm the reload before it is performed. A popup window shows the settings that are affected by the reload and which may not be available in the new mode. After confirming the popup, the software is reloaded.

## 16.5 Audio Recording

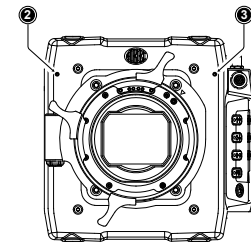
The camera can record 4 channel linear PCM (24 bit, 48 kHz) audio. With audio recording enabled, all four audio channels are embedded in the SDI stream and output on the headphones out of the MVF-2.

### Audio Inputs

The AUDIO connector (1) is located at the back of the camera. It is a 2-channel +24dBu line level audio input with additional 12V power output to supply microphone preamplifiers. Signals connected to the AUDIO connector are recorded to audio channels 1 and 2.



The dual gain built-in microphones (2=right mic, 3=left mic) are located at the camera front and can be used to record a scratch audio track. The audio signal from these microphones is recorded to audio channels 3 (left mic) and 4 (right mic) of the recorded clips. Per factory default, the built-in microphones are disabled.



### Audio Recording

- Select *MENU > Recording > Audio Recording > Audio Recording* to enable/disable audio recording.

Enabled audio recording is indicated through the audio icon displayed on home screen as well as status info of the viewfinder and the SDI outputs:



Audio recording is enabled



Audio recording temporarily disabled, e.g. when the sensor frame rate does not match the project frame rate.

If audio recording is switched off, no audio is recorded internally, HD-SDI contains no audio and the headphones out on the MVF-2 is muted.

### Channel 1/2 Control

1. Select *MENU > Recording > Audio Recording > Channel 1*.

Select *MENU > Recording > Audio Recording > Channel 2*.

Following options are available:

#### *Manual*

*Manual* allows the user to manually apply gain to the input signal on the channel to reach a correct level.

<i>Manual (+L)</i>	A limiter prevents the signal from clipping if the input signal level combined with the set gain results in signal levels exceeding -6 dBFS.
<i>Auto</i>	<i>Auto</i> matches a 4 dBu input signal to -20 dBFS. This setting leaves enough headroom for recording and avoids audio clipping. When <i>Auto</i> is selected, audio levels cannot be adjusted by the user.

2. Set channel 1 and 2 control to your preference.

### Channel 1/2 Gain

1. Select *MENU > Recording > Audio Recording > Ch 1 Gain*  
Select *MENU > Recording > Audio Recording > Ch 2 Gain*
2. Using the *CLICKWHEEL*, adjust the channel gain. The meters show the current level of the channel signal in dBFS. Additionally audio levels are displayed on the HOME screen as well as the status info of the viewfinder and the SDI outputs.

Note: Gain setting is only available when audio recording is enabled and channel control is set to either *Manual* or *Manual (+L)*.

### Internal Microphones

The internal microphones can be used to record a reference track, sometimes also referred to as "scratch track". Some software tools can synchronize the master audio to the image using the reference track. The signal of the internal microphones is recorded to audio channels 3 and 4. The audio recording level of the internal microphones is fixed, with the left microphone (channel 3) using a +18dB higher gain than the right microphone in order to cover a wide range of audio levels.

- Select *MENU > Recording > Audio Recording > Internal Microphones* to activate/deactivate recording of the internal microphones.



The microphone icon in the status info of EVF and the SDI outputs indicates active internal microphones.

### Headphones Volume

1. Select *MENU > Recording > Audio Recording > Headphone Volume*.
2. Adjust the headphones' volume to your preference.

### Test Tone

The camera can output a 1 kHz sine test tone on all recording channels, on headphones out and the SDI outputs.

- Select *MENU > Recording > Audio Recording > Test Tone*.

Following options are available:

- *Off*
- *-9 dBFS*
- *-18 dBFS*
- *-20 dBFS*

Note: Test tone can only be activated when audio recording is enabled.

## 16.6 Rec Beeper and Tally Settings

1. Select *MENU > Recording > Rec Beeper/Tally*.

Following options are available:

<i>Rec Start Beeper</i>	The camera gives an acoustic indication for start of recording.
<i>Rec Stop Beeper</i>	The camera gives an acoustic indication for stop of recording.
<i>Media Full Beeper</i>	The camera gives an acoustic indication for stopping recording due to full card. For better distinction, a different sound pattern than the start/stop beeper is used.
<i>Tally MVF-2</i>	Enables the tally light on the MVF-2.

## 16.7 File Naming Scheme

The ALEXA Mini LF automatically names files as they are created on the recording media. While it is possible to change the file names later on a computer, it is not recommended, as the ALEXA naming scheme has been developed to minimize the risk of duplicate file names.

A typical clip name would look like this: A004C010\_190325\_RN9O.mxf

The clip name consists of eight parts:

<i>Camera Index (A)</i>	One character, A-Z. User assignable, should match the camera unit. For example, the camera index A can be assigned to the A camera, and B to the B camera etc.
<i>Reel Counter (004)</i>	3 characters, 001-999. Automatically assigned to each recording media, automatically advanced by one for each new media. The user can change the counter for the next reel. This should only be done under special circumstances, such as after changing the camera body in the middle of a shoot.
<i>Clip Index (C)</i>	One character, fixed to C. Main use is to separate the reel counter from the clip counter.
<i>Clip Counter (010)</i>	3 characters, 001-999. Automatically advances each time a clip is recorded.
<i>Date (190325)</i>	Current date, in order YYMMDD, as set in Menu > System > System time + date, separated from the other naming components by underscores.
<i>Camera ID Prefix (R)</i>	One character, A-Z. Typical use would be setting one camera's ID prefix to L (for left) and the other's to R (for right) for 3D applications.
<i>Camera ID (N9O)</i>	The camera serial number encoded in 3 letters Base36 (0-9, A-Z). N9O translates into decimal serial number 30156.
<i>File name Extension (.mxf)</i>	All files are written as .mxf files.

The reel counter should be set to 001 at the beginning of a shoot. The camera will then automatically advance the reel number each time a new recording medium is loaded into the camera, formatted and recorded on. If a previously recorded medium is reloaded in the camera (comparable to a short end of a film roll), it will keep its reel number and the camera will continue the reel count. If the medium is loaded in another camera, it keeps its name, but a new folder with the according camera ID and reel number is created in the root folder of the medium. It is possible, but usually not necessary, to manually change the next reel number in the project menu.

## 16.8 Data Handling

Transferring recorded material from the original media should never be done using a simple file copy. There are different software solutions available that will copy a file to one or several destinations and perform a checksum calculation, comparing the material on the original media to the copies, to provide a minimum effort safety check of data integrity. We strongly recommend using copy software and tools with checksum calculation and verification. Checksum files should be calculated and generated as sidecard files at the first copy process.

There are many types of checksums, all with the same purpose: safe and fast copy at the same time.

For example, the 'MHL (Media Hash List)'. It's an XML based file with a fixed structure, which always contains the following information:

- Creator Info
  - Name
  - Username
  - Hostname
  - Tool
  - Start date
  - Finishing date
- hash
  - Path to file
  - File size in bytes
  - Last modification of the file
  - xxhash (calculated)
  - hash date

The 'creator info' is placed at the beginning of every 'MHL' checksum file. The rest of the 'MHL' file contains every single file incl. the xxhash value, which was calculated at the copy & checksum generation process.

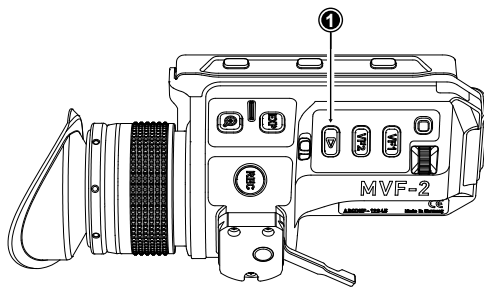
Changing a file or some values inside the 'MHL' checksum file results in an error during the checksum verify process. Checksums should always be generated during the offload of the original camera negative and should remain next to the files until the final backup process. We strongly recommend a copy and checksum workflow from beginning (e.g. On-Set) to end (e.g. final LTO backup).

## 17 Playback

The camera offers various ways to start in-camera playback from the recording medium:

- ▶ Using the **PLAY** button on MVF-2
- ▶ Using user button 3 in combination with the Function Button FN
- ▶ Using a user button assigned with playback
- ▶ Using the Wireless Control Unit WCU-4
- ▶ Using the Web Remote (Beta Version)
- ▶ Using apps communicating with the camera through the Camera Access Protocol (CAP)

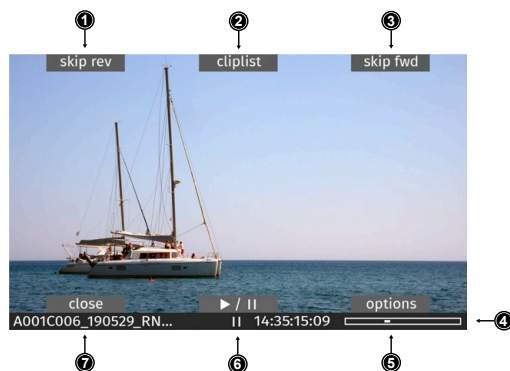
### Starting Playback Using the **PLAY** Button on MVF-2



1. Press and hold the **PLAY** button (1) for one second to start playback.  
The camera goes into playback mode with the last recorded clip paused at start.
2. You may toggle between play and pause by briefly pressing the **PLAY** button again.
3. To exit playback press the **PLAY** button for one second.

### Playback Screen & Controls

When starting playback, the camera loads the last recorded clip (paused on the first frame). The playback screen offers the following controls:

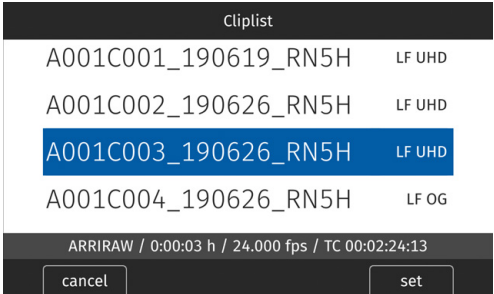


- |   |                   |  |
|---|-------------------|--|
| 1 | <i>skip rev</i>   | Loads the previous clip from the cliplist.   |
| 2 | <i>cliplist</i>   | Select another clip for playback from a list of all clips on the recording medium.   |
| 3 | <i>skip fwd</i>   | Loads the next clip from the cliplist.   |
| 4 | <i>status bar</i> | Shows clip name, timecode and playback progress bar of the selected clip.  |
| 5 | <i>options</i>    | Allows setting the clip end action.  |
| 6 | <i>play/pause</i> | Toggles between play and pause. Play/pause can also be toggled by pressing the <b>PLAY</b> button on the MVF-2 or by pressing the <b>JOGWHEEL</b> . The <b>JOGWHEEL</b> can also be used to shuttle through a clip. While playback is paused, use the <b>JOGWHEEL</b> to shuttle through the clip frame by frame. While playing back, use the <b>JOGWHEEL</b> to increase or decrease the playback speed up to 512x forwards or backwards. |
| 7 | <i>close</i>      | Exits playback.  |



Cliplist

The cliplist lists all clip on the recording medium. For the selected clip, details like resolution, codec, duration and timecode are displayed. When browsing through the cliplist, the first frame of the selected clip is shown on EVF/Monitor and the SDI outputs.



1. Select *PLAY > Cliplist*.
2. Select a clip.
3. Press *SET* or the *JOGWHEEL* to load the clip for playback.
4. Press *CLOSE* to leave the cliplist.

**Note:** Clips may be grayed out if they can not be played back because their recording resolution is not compatible with the currently set recording resolution.

Playback Options

1. Select *PLAY > Options*.

The Play End Mode defines the behavior when playback reaches the end of a clip and offers the following options:

<i>Pause on end</i>	Playback pauses at the end of the clip.
<i>Pause on start</i>	Playback pauses at the beginning of the clip.
<i>Loop</i>	Playback continues from the beginning of the same clip again.
<i>Play next clip</i>	Playback continues with the next clip in the cliplist.
<i>Exit playback</i>	Camera exits playback.

2. Set the desired play end mode.

## 18 Monitoring

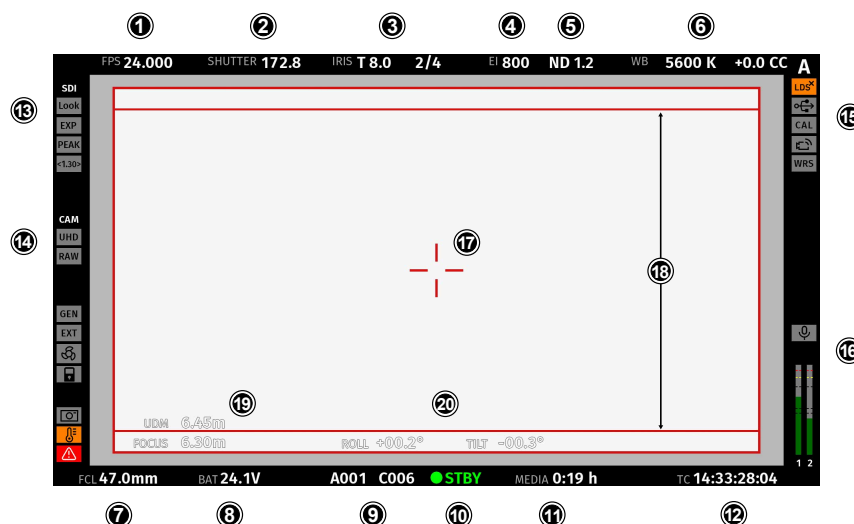
The monitoring submenu covers all settings related to EVF, Monitor and SDI as well as frame lines and other overlays on these outputs.

### 18.1 Status Information and Status Overlays

#### EVF and SDI Status Information

The camera displays camera status information on the MVF-2 and the SDI outputs. At the top and bottom of the screen, the camera displays textual status information. The top status bar consists of sensor FPS, shutter angle, exposure index, ND filter and white balance. The bottom status bar displays information about the battery level, reel and clip, camera status, remaining recording time and timecode.

On the left and right of the screen, icons provide information about the current status of the camera. The icons are organized into groups. The left icon groups display the EVF/SDI configuration as well as the camera configuration. Additionally various other icons are displayed below to indicate certain active parameters. The right side shows the audio meters as well as other icons (described below). Furthermore the user can activate the display of additional camera information such as lens data and electronic horizon.



#### Top Section

- |   |         |   |
|---|---------|---|
| 1 | FPS     | Shows the current sensor frame rate. The FPS label turns orange if the sensor frame rate does not match the project rate. |
| 2 | SHUTTER | Shows the current shutter value (here: shutter angle).  |
| 3 | IRIS    | Shows the current lens IRIS, including sub stops.   |
| 4 | EI      | Shows the current exposure index.   |
| 5 | ND      | Shows the current setting for the ND filter.  |
| 6 | WB      | Shows the current white balance value.  |

#### Bottom Section

- |   |      |   |
|---|------|---|
| 7 | FCL  | Shows the current focal length of the lens (if lens data is available).   |
| 8 | BAT  | Shows the current battery supply level. If the level is below the configured warning level, the value is flashing orange. |
| 9 | CLIP | Shows the current reel and clip number.   |

- |           |              |  |
|-----------|--------------|--|
| <b>10</b> | <b>STATE</b> | Shows the main camera status:  |
|           | STBY         | Ready for recording  |
|           | REC          | Recording  |
|           | PLAY         | Playback   |
|           | ERASE        | Medium erase in progress   |
|           | FULL         | Recording medium full  |
|           | None         | No media inserted  |
|           | ERROR        | Camera error. See <i>MENU &gt; Alerts</i> for more information   |
| <b>11</b> | <b>MEDIA</b> | Shows the remaining capacity of the recording medium at current FPS and codec combination in real time. When medium capacity is less than two minutes, capacity values starts flashing orange. |
| <b>12</b> | <b>TC</b>    | Shows the current timecode. The TC label turns orange if the sensor frame rate does not match the project rate.  |

#### Left Section

- |           |                         |       |  |
|-----------|-------------------------|-------|--|
| <b>13</b> | <b>EVF / SDI Status</b> | Look  | Shows the current EVF/SDI processing (Look, Log C or ALEXA Classic 709).                 |
|           |                         | EXP   | Indicates that the exposure tool is active on the respective output.                     |
|           |                         | PEAK  | Indicates that peaking is active on the respective output.                               |
|           |                         | AD    | Indicates that anamorphic desqueeze is active and which lens squeeze factor is selected. |
| <b>14</b> | <b>Camera Status</b>    | UHD   | Shows the current recording resolution.  |
|           |                         | RAW   | Shows the current recording processing (RAW or Log C).                                   |
|           |                         | GEN   | Indicates that Genlock is activated. If orange: Genlock signal is missing or not usable. |
|           |                         | EXT   | Indicates that EXT sync mode is activated.   |
|           |                         | FAN   | Shows that the camera needs to increase the fan speed to cool the camera properly.       |
|           |                         | LOCK  | Indicates that the camera controls are locked.   |
|           |                         | GRAB  | Frame Grab is active.  |
|           |                         | TEMP  | Indicates that the camera temperature is outside of its optimal range.                   |
|           |                         | ALERT | Indicates an active alert state.   |

#### Right Section

- |           |                            |  |
|-----------|----------------------------|--|
| <b>15</b> | <b>Camera Index Letter</b> | Shows the camera index letter.   |
|           | LDS                        | Shows that the LDS interface has been disabled manually.   |
|           | USB                        | Shows a connected USB medium.  |
|           | CAL                        | Lens motor calibration is in progress. If orange: lens motor calibration is required.  |
|           | WiFi                       | WiFi is active.  |
|           | WRS                        | White Radio is active.   |
| <b>16</b> | <b>MIC</b>                 | Internal microphones are active.   |
|           | Audio Meters               | Shows the current level of camera audio channel signals. If audio recording is currently not possible, an orange speaker icon with a small x is shown. Black markers at signal levels -20, -18, -9 dBFS for reference test tone. Yellow marker at -5 dBFS and red marker at -2 dBFS indicate a signal close to clipping. A red frame around the meter indicates a clipping at the A/D stage. |

#### Other

- |           |                     |   |
|-----------|---------------------|---|
| <b>17</b> | <b>Center Cross</b> | Marks the center of the image to help in framing.                         |
| <b>18</b> | <b>Frame Line</b>   | Frame line (here: ARRI 1:1.85)  |
| <b>19</b> | <b>UDM</b>          | Shows measurements from Ultra Distance Measures.                          |
|           | Focus               | Shows the current focus distance of the lens (if lens data is available). |
| <b>20</b> | <b>HOR</b>          | Shows the electronic horizon or numeric roll and tilt values.             |

## Configuration of Overlays

1. Select *MENU > Monitoring > EVF/Monitor > EVF Overlays*.

Select *MENU > Monitoring > EVF/Monitor > Monitor Overlays*.

Select *MENU > Monitoring > SDI > SDI Processing > SDI Overlays*.

Following settings are available:

<i>Frame Lines</i>	Sets frame lines on or off. Used as a framing reference tool with typically an image frame, a center mark and aspect ratio. For information on setting frame lines, see "Setting frame lines".
<i>Frame Line Shading</i>	Applies an outside shading to the area between the frame line and the remaining active image area.
<i>Center Mark</i>	Sets the center mark between <i>Off</i> , <i>Dot</i> , <i>Small Dot</i> , <i>Cross</i> or <i>Small Cross</i> .
<i>Surround Mask</i>	Select to adjust the surround mask settings. If surround view is set to On, it must be separated from the recorded image area to allow proper framing, either as black line, colored line, or semi transparent with 25, 50, 75 or 100% percent opacity (opacity selection is not available for the MVF-2 flip-out monitor).
<i>Status Info</i>	Only for EVF and SDI. Sets camera status overlays between <i>Off</i> , <i>Overlay</i> (status on the active image), or <i>Safe</i> (status outside the active image).

## Configuration of Status Info Components

1. Select *MENU > Monitoring > EVF/Monitor > EVF Overlays > Status Components*.

Select *MENU > Monitoring > SDI > SDI Processing > Overlays > Status Components*.

2. Following settings are available:

<i>Info 1</i>	Enables/disables the top and bottom section of the status info.
<i>Info 2</i>	Enables/disables the left and right section of the status info.
<i>Timecode</i>	Enables/disables display of the timecode on the bottom right of the image.
<i>Audio</i>	Enables/disables display of the audio levels located on the lower right side of the image.
<i>Lens Data</i>	Enables/disables iris and focal length readings.
<i>Lens Focus Distance</i>	Sub-option of lens data setting. Enables/disables display of focus distance readings (19), located on the lower left corner of the image.
<i>UDM</i>	Sub-option of lens focus distance setting. Enables/disables display of distance readings from the Ultrasonic Distance Measure UDM-1 (in combination with LCUBE CUB-1). Located above the lens focus distance overlay.

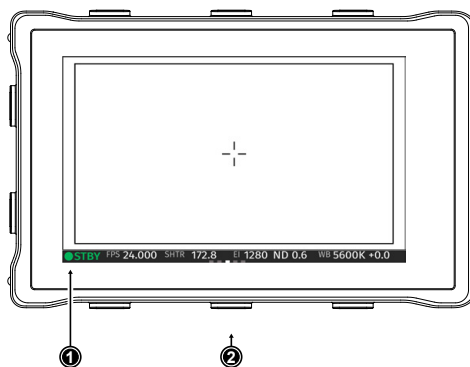
<i>Camera Index Letter</i>	Displays the camera index letter in the top right corner of the image. Helps to identify camera image output when shooting with multiple cameras. Note: Only available for SDI.
<i>Electronic Horizon</i>	Displays an horizon overlay representing the roll and tilt of the camera measured by the camera's position sensor. This sensor can be reset, if it appears to have an offset. For information on resetting the camera's position sensor, see "Reset of Electronic Horizon", page 101.
<i>Show Numeric Values</i>	Sub-option of electronic horizon. Shows the tilt and roll of the camera in degrees as measured by the camera's position sensor (20).

3. Configure the status info components to your preference.

### 18.1.1 Flip-out Monitor Status Bar

The flip-out monitor of the MFV-2 shows slightly different overlays than the EVF and the SDI outputs. When set to display the camera live image, a status bar is displayed below the image. The monitor status bar offers the display of five groups:

- Main camera parameters: FPS, shutter, exposure index, ND filter and white balance (as shown below)
- Audio meters and timecode
- Status icons
- Lens data: Focus distance, iris and focal length
- Recording: media remaining capacity, clip duration, codec and battery level



Use the lower screen buttons (2) to change the status bar (1) content. The lower center screen button returns to the main camera parameters.

### 18.1.2 Overlay Menu

The overlay menu offers quick access to the main camera parameters.

When activated, it is visible in the top section of the image on the MVF monitor and EVF and on any SDI output which has SDI processing activated. The overlay menu is a quick way to change the following camera settings:

- Sensor FPS
- Shutter (Shutter Angle / Exposure Time)
- Exposure Index
- ND filter
- White Balance

Sensor FPS, Shutter and White Balance cannot be changed manually, but in the range of their user predefined lists. ND filter is changed instantly and requires no additional confirmation step.

A white frame marks the selected parameter. A white block indicates active edit mode.

### Activation and Control Using the Camera Buttons

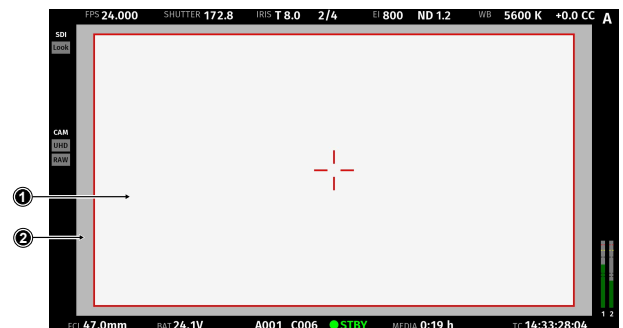
1. Activate the overlay menu by pressing *FN + 1*.
2. Select a parameter with buttons 1 or 2.
3. Start editing the parameter by pressing button 3.
4. Select the new parameter value with buttons 1 or 2.
5. Confirm the new value by pressing button 3.
6. If required, repeat steps 2-5 for other parameters.
7. Exit the overlay menu by pressing *FN + 1*.

### Activation and Control Using a User Button

1. Assign a user button to "Overlay Menu".
2. Activate the overlay menu by pressing the user button.
3. Select a parameter with the *JOGWHEEL* of the MVF-2.
4. Start editing the parameter by pressing the *JOGWHEEL*.
5. Change the value of the parameter with the *JOGWHEEL*.
6. Confirm the new value by pressing the *JOGWHEEL*.
7. If required, repeat steps 3-6 for other parameters.
8. Exit the overlay menu by pressing the user button.

## 18.2 Surround View

Surround View displays additional pixels outside the recorded image area (1), allowing the operator to see outside the recorded image and keep unwanted objects, such as microphone booms, out of the shot. The surround view area (2) can be separated from the recorded image area by setting the surround mask (here: 50% opacity mask). To view only the recorded image, set surround view to off. Note: Surround View is not available for recording resolution LF Open Gate 4.5K.



1. Select *MENU > Monitoring > EVF/Monitor > Surround View*.  
Select *MENU > Monitoring > SDI > SDI processing > Surround View*.
2. Set surround view on or off. Per factory default surround view is enabled.

### Surround Mask

The surround mask setting helps to visually separate the surround view from the recorded image area.

1. Select *MENU > Monitoring > EVF/Monitor > EVF Overlays > Surround Mask*.  
Select *MENU > Monitoring > EVF/Monitor > Monitor Overlays > Surround Mask*.  
Select *MENU > Monitoring > SDI > SDI Processing > SDI Overlays > Surround Mask*.  
Following options are available:

Black Line	Surround mask is separated with a black line.
Colored Line	Surround mask uses the same color as frame lines.
Mask 25%	Surround mask is displayed with 25% opacity.
Mask 50%	Surround mask is displayed with 50% opacity.
Mask 75%	Surround mask is displayed with 75% opacity.
Mask 100%	Surround mask is displayed with 100% opacity.

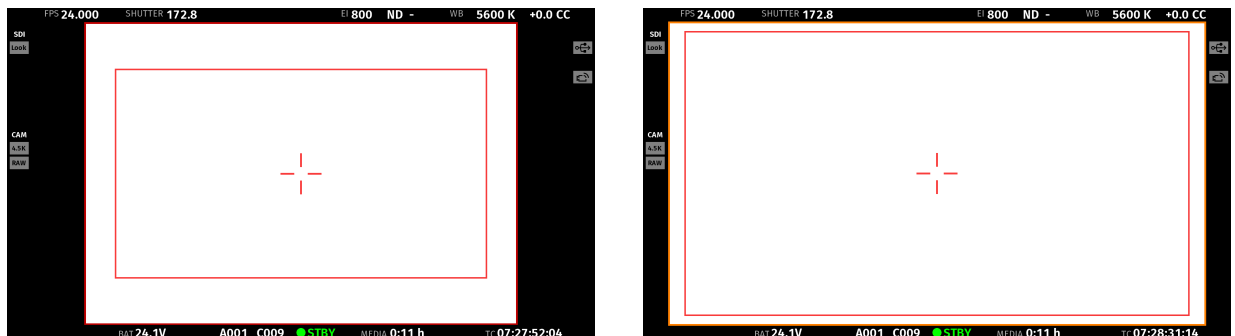
2. Set the preferred surround mask.

## 18.3 Magnification

When shooting with frame lines or aspect ratios that only use a cropped area of a recording resolution the actual image content defined by the frame line might not be displayed large enough.

The magnification setting gives the user access to variably scaling of the monitoring outputs and sets a persistent image magnification, so the area defined by the frame line can be displayed as large as desired.

Magnification can be adjusted in steps of 1% from 100% to 200% for the EVF and the SDI outputs, individually or globally. If less than the recorded area is shown an orange border will be shown at the frame boundaries where the recorded image exceeds what is displayed.



Two screen shots from an ALEXA Mini LF in recording resolution *LF Open Gate 4.5K* with a 1.78 UHD frame line (red rectangle) applied. The left screen shot shows the SDI output without magnification applied. The right screen shot shows the SDI output with magnification applied to enlarge the image (in this example set to 135%). An orange border indicates that the recorded area exceeds the displayed image.

### Setting the Magnification

The camera menu offers the following settings to adjust magnification:

- ▶ Select *MENU > Monitoring > Master Magnification* to set the magnification of the EVF and the SDI outputs simultaneously.  
Note: When individual outputs have been set to different magnification values, the master magnification menu entry shows "-". Changing the master magnification will force the magnification of all outputs to the new value.
- ▶ Select *MENU > Monitoring > EVF/Monitor > Magnification* to set the magnification of the EVF and the flip-out monitor.
- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Magnification* to set the magnification of the SDI outputs.  
Note: Magnification can only be applied with SDI image set to processed.  
Note: Magnification is reset to 100% when the recording resolution is changed.

## 18.4 Frame Lines

To aid in framing, both the MVF-2 and the SDI outs can display frame lines overlaid on the image. Frame lines can be considered electronic versions of ground glass markings in film cameras.

You can configure which frame line the camera should show and how it should be displayed (color and transparency). You can also configure up to two user rectangles which allow you to mark a rectangular area on the image, e.g. for marking an area that you need to keep clear during shooting for later VFX insertion.

Custom frame lines can be created using the [Frame Line & Lens Illumination Tool](#).

### Setting the Frame Line

1. Select *MENU > Monitoring > Frame Lines > Frame Line*.  
A list of installed frame lines is displayed.
2. Select a frame line from the list or add and select a custom frame line.

### Frame Line Color

The frame line color is a global setting and defines the color of the frame line, the center mark, the user rectangle(s) and the surround mask (if mask is set to *Colored Line*).

1. Select *MENU > Monitoring > Frame Lines > Frame Line Color*.

Following frame line colors are available:

Red	Magenta
Green	Yellow
Blue	Black
Cyan	White

2. Set the desired frame line color.

### Frame Line Intensity

You can set the brightness of the frame line, center cross and user rectangles.

1. Select *MENU > Monitoring > Frame Lines > Frame Line Intensity*
2. Set the frame line intensity in a range from 1 to 4.

### User Rectangles

You can configure *width*, *height* and *offset* (i.e. position from left and top screen edge) in per mill. You can also reset all settings.

1. Select *MENU > Monitoring > Frame Lines > User Rectangles*.

You have the following options:

<i>Off</i>	User Rectangles are not displayed.
<i>Rect 1</i>	Only user rectangle 1 is displayed.
<i>Rect 2</i>	Only user rectangle 2 is displayed.
<i>Rect 1 + 2</i>	User rectangles 1 + 2 are displayed.

2. Configure the display of user rectangles.
3. Select *MENU > Monitoring > Frame Lines > User Rectangle 1* or *MENU > Monitoring > Frame Lines > User Rectangle 2*.

You have the following options:



<i>Width</i>	Adjusts the user rectangle width in the range of 0-999.
<i>Height</i>	Adjusts the user rectangle height in the range of 0-999.
<i>Offset Left</i>	Adjusts the horizontal user rectangle offset in the range of 0-1000.
<i>Offset Top</i>	Adjusts the vertical user rectangle offset in the range of 0-1000.
<i>Reset All</i>	Resets all values.

4. Configure the user rectangle according to your needs.
5. To reset the configuration, press *Reset all*.

### Frame Lines Saved in Metadata

The camera records up to six rectangular frame lines from the active frame line files into metadata. This metadata is present in all recording formats and on all HD-SDI outputs. The frame line metadata can be used either for automatic dailies creation or for displaying the frame lines in post.

### Automated Dailies Creation

It is possible to load two frame line files simultaneously into the camera for a total of six frame lines displayed in the viewfinder or on MON OUT. In metadata, the frame lines of the first file will be called frame line 1A, frame line 1B and frame line 1C, while the frame lines of the second file will be called frame line 2A, frame line 2B and frame line 2C. Frame line 1A is automatically the master frame line. The master frame line can be used by dailies creation software to automatically frame the dailies. This feature is expected first on the Codex Vault, but other dailies creation software is expected to follow suite.

### Frame Lines in Post

The frame line metadata makes the original camera frame lines available during post production for editing, color grading or compositing tools and can be displayed as an overlay in the respective image viewer.

#### NOTICE

Frame lines created for a sensor mode other than the currently active are not selectable.

## 18.5 Anamorphic Desqueeze

### Setting the Lens Squeeze Factor

The lens squeeze factor determines the factor that is used for anamorphic desqueeze on EVF/Monitor and SDI. This value is also written into the metadata of the clip and allows video players and editing software to automatically desqueeze clips that have been shot with anamorphic lenses.

- Select *MENU > Recording > Project Settings > Lens Squeeze Factor* and select the appropriate factor.

Anamorphic desqueeze is automatically activated on EVF/Monitor and the SDI outputs.

### Activation of Anamorphic Desqueeze for EVF/Monitor and SDI

With the desqueeze factor defined in the project settings, anamorphic desqueeze can be then enabled and disabled for EVF/Monitor and SDI so that the image is displayed with the correct aspect ratio.

1. You have the following options:
  - Select *MENU > Monitoring > EVF/Monitor > Anamorphic Desqueeze*.
  - Select *MENU > Monitoring > SDI > Anamorphic Desqueeze*.

2. Enable or disable anamorphic desqueeze for the EVF/Monitor and/or SDI outputs.
3. Additionally you can assign "EVF/Mon. Desqueeze" and "SDI Desqueeze" to user buttons to quickly enable and disable anamorphic desqueeze for the corresponding path. For further information on how to assign functions to user buttons please see "User Buttons", page 107.

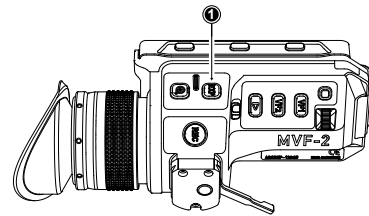
## 18.6 Exposure Tools

The camera offers two exposure tools for evaluation of the image exposure levels, False Color and Zebra. You can select which exposure tool you want to use to evaluate the image exposure. The exposure tool can be activated through

- the *EXP* button on the MVF-2 (for EVF and Monitor)
- a user button assigned with *EVF/Mon. Exp. Tool* (for EVF and Monitor)
- a user button assigned with *SDI Exp. Tool* (for the SDI Outputs)
- the EVF/Mon. and SDI exposure tool entries in the camera menu

### Activation of Exposure Tool with MVF-2

- To activate the exposure tool on both EVF and Monitor, press the EXP button (1) on the MVF-2. Press the EXP button again to deactivate the exposure tool.



### Activation of Exposure Tool with User Buttons

1. Assign a user button with *EVF/Mon. Exp. Tool* to be used for activation of the exposure tool on EVF and Monitor.
2. Assign a user button with *SDI Exp. Tool* to be used for activation of the exposure tool on the SDI outputs.
3. Press the user button to toggle the exposure tool on/off.





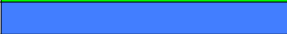
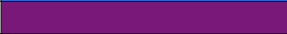
For more information on user buttons please see "User Buttons", page 107.

### Activation of Exposure Tool in Camera Menu

1. Select *MENU > Monitoring > EVF / Mon. > Exposure Tool* to activate the exposure tool on EVF and Monitor.
2. Select *MENU > Monitoring > SDI > SDI Processing > Exposure Tool* to activate the exposure tool on the SDI outputs.

#### 18.6.1 False Color

The false color display is a tool to check for correct exposure. It can be activated on EVF/Monitor and/or the SDI outputs, and takes the respective gamma setting as a basis for calculation. When active, the image is turned into a gray scale image with important luminance ranges shown in signal colors. Note that the false color tool is only suitable for checking exposure and is not an appropriate tool for checking other image parameters or sensor quality. Activating false color replaces luminances with the following colors:

Exposure	Signal Level	Color	
White Clipping	100% - 99%	Red	
Just below white clipping	99% - 97%	Yellow	
One stop over medium gray (Caucasian skin)	56% - 52%	Pink	
18% medium gray	42% - 38%	Green	
Just above black clipping	4.0% - 2.5%	Blue	
Black clipping	2.5% - 0.0%	Purple	

## False Color Configuration

- Select *MENU > Monitoring > Exposure Tools > Select EVF/Mon. Exp. Tool* and select *False Color* to use False Color as exposure tool for EVF and Monitor.
- Select *MENU > Monitoring > Exposure Tools > Select SDI Exp. Tool* and select *False Color* to use False Color as exposure tool for the SDI outputs.

## False Color Mode

The result of activating false color can be varied to either *Monitoring-based* or *Log C-based*. This choice is global and will be valid for all viewing outputs.

**Monitoring-based** When choosing *Monitoring-based* false color and false color is activated (with the EXP button on the viewfinder, for example), false color is calculated based on the video signal of the respective monitoring output. In other words, whatever is seen on the image path is the basis for calculating false color.

If you have a monitor output or the viewfinder configured to show Log C, false color levels will be calculated based on the Log C signal.

If you have a monitor output or the viewfinder configured to LOOK or ALEXA Classic 709, false color levels will be calculated based on the image with the look applied or the ALEXA Classic 709 image respectively.

**Log C-based** When choosing *Log C-based* false color, false color is always calculated based on the Log C image. When false color is activated (with the EXP button on the viewfinder, for example), the respective monitoring output is switched to Log C processing, false color levels are calculated based on the Log C signal and false color is activated. When de-activating false color, the image path is switched back to its previous processing and false color is switched off. This setting makes most sense for projects that record Log C images. While your monitoring image paths can be set to show Rec 709 or a look to provide a preview for all, you will want to know the exposure levels of the signal you are actually recording (Log C) when checking false color. *Log C-based* false color mode is mandatory when using HDR ALF-2 files.

## NOTICE

When a HDR ALF-2 look file is loaded and activated in the camera, false color mode automatically switches to 'Log C-based'. This is because HDR look files do not generate video signals over 75%, which means that overexposure might not be indicated correctly in 'Monitoring-based false color' mode.

When you are using a look file that does not utilize the full signal level range and you activate false color on a monitoring path where Look processing is active, false color will not indicate over- or underexposure. This specifically applies to Rec 2100 PQ Look files, as they level out at a maximum signal level of 75%.

When using look files with extreme color grading, it is possible for 'Monitoring-based' false color to show an inaccurate result.

## 18.6.2 Zebra

In Zebra mode, the camera overlays up to two luminance ranges with diagonal stripes. High zebra ranges above, Mid zebra around the user defined luminance value.

### Zebra Configuration

- ▶ Select *MENU > Monitoring > Exposure Tools > Select EVF/Mon. Exp. Tool* and select *Zebra* to use Zebra as exposure tool for EVF and Monitor.
- ▶ Select *MENU > Monitoring > Exposure Tools > Select SDI Exp. Tool* and select *Zebra* to use Zebra as exposure tool for the SDI outputs.

### Zebra Setup

1. Select *MENU > Monitoring > Exposure Tools > Zebra Setup*.

Following settings are available:

<i>Zebra Mode</i>	Sets the zebra mode to High, Mid, or both.
<i>High Zebra Level</i>	Sets the exposure level (in %) above which high zebra is active.
<i>High Zebra Color</i>	Sets high zebra pattern color.
<i>Mid Zebra Range</i>	Sets the active range (in %) around a mid zebra level.
<i>Mid Zebra Color</i>	Sets the mid zebra pattern color.

2. Adjust the Zebra settings to your preference.

Note: *Zebra* is not available on image paths with processing set to Log C. Please use *False Color* to check the image exposure on image paths with processing set to Log C.

## 18.7 Focus Tools

### 18.7.1 Peaking

Peaking highlights in-focus image areas for better focus judgment. Peaking can be activated through the camera menu or a user button.

#### Peaking Configuration

1. Select *MENU > Monitoring > EVF/Monitor > EVF/Monitor Processing > Peaking* to configure Peaking for EVF and Monitor.
2. Select *MENU > Monitoring > SDI > SDI Processing > Peaking* to configure Peaking for the SDI outputs.
3. The following options are available:

<i>Peaking</i>	Activates Peaking for the corresponding output.
<i>Peaking Mode</i>	Select between <i>Color</i> and <i>Aperture</i> . Select color peaking to overlay in-focus areas with a color, and select aperture peaking to enhance object edges only.
<i>Peaking Level</i>	Sets a peaking strength in range from 1 (minimum) to 20 (maximum).

<i>Peaking Offset Shift</i>	Adjusts the threshold for <i>Color Peaking</i> to become active, relative to the peaking level. Note: A negative offset shift, in particular with high ASA ratings, can increase the peaking results.
<i>Color</i>	Select the color for <i>Color Peaking</i> .

### Activation of Peaking with User Buttons

1. Assign a user button with *EVF/Mon. Peaking* to be used for activation of Peaking on EVF and Monitor.
2. Assign a user button with *SDI Peaking* to be used for activation of Peaking on the SDI outputs.
3. Press the user button to toggle Peaking on/off

For more information on user buttons please see "User Buttons", page 107.

### Activation of Peaking in Camera Menu

1. Select *MENU > Monitoring > EVF / Mon. > Peaking* to activate the exposure tool on EVF and Monitor.
2. Select *MENU > Monitoring > SDI > SDI Processing > Peaking* to activate the exposure tool on the SDI outputs.

## 18.7.2 Zoom

The camera supports to zoom into the image e.g. to better judge focus. The camera offers five zoom positions: center, top left, top center, top right, bottom right, bottom left. While Zoom is activated, the zoom position can be changed by using the *JOGWHEEL* or the soft buttons on the MVF-2, if the monitor is flipped out and set to display the live image. Active Zoom is indicated by an orange frame around the image. Frame lines are deactivated while Zoom is active.

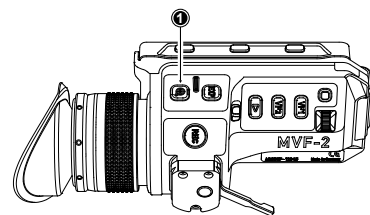
Note: Anamorphic Desqueeze is temporarily disabled while Zoom is active.

### Zoom on EVF/Monitor

The MVF-2 has a dedicated *ZOOM* button (1).

1. Press the *ZOOM* button to activate/deactivate Zoom on EVF and Monitor.
2. To change the Zoom position, rotate either the *JOGWHEEL* or the *USER WHEEL*.

Note: Changing the zoom position using the *JOGWHEEL* or *USER WHEEL* is not supported when the monitor is set to display the HOME screen or the camera menu.



### Zoom on SDI

Zoom on the SDI outputs can only be activated through a user button. The camera offers three SDI Zoom related user button functions:

1. Assign a user button with *SDI Zoom*.  
The *SDI Zoom* user button activates/deactivates Zoom on the SDI outputs.
2. Assign a user button with *SDI Zoom Position*.  
The *SDI Zoom Position* user button changes the Zoom position while SDI Zoom is activated.

3. Assign a user button with *SDI Zoom (Smart)*.

The *SDI Zoom (Smart)* user button activates Zoom on the first button press, further button presses change the zoom position and a button long press deactivates Zoom.

## 18.8 SDI Configuration

### SDI Format

Both SDI BNC connectors output SDI signals in 1920 x 1080 (422 1.5G, 422 3G, 444 3G) 3840 x 2160 (422 6G) according to SMPTE standards 292M, ST 424:2012 and ST 2081.

1. Select *MENU > Monitoring > SDI > SDI 1 Format* or
2. Select *MENU > Monitoring > SDI > SDI 2 Format*.

The following SDI formats are available:

Format	Resolution	Sampling	Fps	SMPTE Standard
422 1.5G HD	1920 x 1080	4:2:2 YCbCr	23.976 p/psf 24 p/psf 25 p/psf 29.97 p/psf 30 p/psf	
422 3G HD	1920 x 1080	4:2:2 YCbCr	48 p** 50 p 59.94 p 60 p	SMPTE ST 292
444 3G HD	1920 x 1080	4:4:4 RGB	23.976 p 24 p 25 p 29.97 p 30 p	
422 6G UHD*	3840 x 2160	4:2:2 YCbCr	23.976 p 24 p 25 p 29.97 p 30 p	

3. Set the desired SDI format.

\* not available for LF 16:9 HD and LF 16:9 2K mode.

\*\*48p may not be supported by some SDI devices, as this is not a defined frame rate according to the SMPTE standard.

### SDI Processing

You can configure the SDI processing elements.

- Select *MENU > Monitoring > SDI > SDI Processing*.

Following options are available:

<i>Surround View</i>	Activates or deactivates surround view.
<i>Magnification</i>	Apply magnification to the SDI outputs.
<i>Exposure Tool</i>	Activates or deactivates the exposure tool.
<i>Peaking</i>	Configures peaking for SDI.
<i>Overlays</i>	Configures the SDI overlays.

### SDI Frame Rate

You can set the frame rate together with the scan format on the SDI output. If the frame rate is lower than the sensor fps, frame drops will occur. If it is higher, duplicate frames will be output. The available frame rates depend on the selected SDI format.

- ▶ Select *MENU > Monitoring > SDI > SDI 1 Frame Rate* or
- ▶ Select *MENU > Monitoring > SDI > SDI 2 Frame Rate* and select the desired frame rate.

Available scan formats are:

p (progressive)	Transmits images line by line starting at the top left pixel.
psf (progressive segmented frame)	Splits progressive images into fields (odd lines and even lines). Transmits these (all odd before all even) line by line.

### SDI 3G Level

For the single link 3G SDI formats, you can choose whether to use 3G level A or B. Refer to the manual of your connected devices to decide which 3G level to choose.

- ▶ Select *MENU > Monitoring > SDI > SDI 1 3G Level* or
- ▶ Select *MENU > Monitoring > SDI > SDI 2 3G Level* and select the desired 3G level.

### SDI Image

The SDI image setting determines how images are output over SDI:

- ▶ Select *MENU > Monitoring > SDI > SDI 1 Image* or
- ▶ Select *MENU > Monitoring > SDI > SDI 2 Image*.

Following options are available:

<i>Clean</i>	Images are identical to the images that the camera records internally. They do not contain any overlays and do not show any surround view.
<i>Processed</i>	Images may contain overlays and show surround view.

SDI 1 and 2 cannot be configured completely independently from each other in reference to the image setting. The SDI 1 setting determines the available options for SDI 2. The following combinations are possible:

SDI 1	SDI 2
clean	clean
clean	processed
processed	clean

If both SDI 1 and 2 are supposed to show processed images, SDI 2 needs to be configured as SDI 1 clone.

SDI 2 Clone

You can set SDI 2 as a clone of SDI 1. SDI 2 will inherit all settings from SDI 1. The configuration options for SDI 2 are grayed out while it is configured as a clone of SDI 1. If you change a value for SDI 1, the same value becomes active for SDI 2 as well.

- Select *MENU > Monitoring > SDI > SDI 2: Clone SDI 1.*

18.9 EVF/Monitor Settings

- Select *MENU > Monitoring > EVF/Monitor > Settings.*

Following options are available:

<i>EVF Brightness</i>		Brightness of the EVF is adjustable with values 120, 200 and 300 (Nits). The default value is 120.
<i>EVF Power</i>	<i>Auto</i>	EVF OLED display is activated and deactivated automatically, depending on the MVF proximity sensor state. This is the default setting.
	<i>Off</i>	Deactivates the EVF OLED display permanently so that it remains switched off even when the proximity sensor is covered e.g. by a rain cover.
	<i>On</i>	Use this setting to override the MVF-2 proximity sensor and to constantly enable the viewfinder display. This setting should be regarded as an emergency setting to be used, for example, when the proximity sensor is faulty and no longer activates the viewfinder display anymore.

NOTICE

Please be aware that when enabled, and used for prolonged periods, this configuration may cause irreversible burn-ins on the EVF OLED. With the setting enabled, the camera will issue a corresponding warning after each boot-up and sensor mode switch.

<i>EVF Eyepiece Heating</i>	The MVF-2 is equipped with a built-in eyepiece heater to prevent fogging of the eyepiece when shooting in cold environments. The eyepiece heater only becomes active when the eyepiece has a temperature of 15° C / 59° F or below. In really cold environments please use the Heated Eyecup HE-7.
<i>EVF Image Rotation 180°</i>	When mounting the MVF-2 on the right side of the camera, the viewfinder image can be rotated by 180° for correct orientation of the image in the viewfinder. This setting only affects the viewfinder image, the SDI outputs are not rotated.
<i>Monitor Brightness</i>	Adjusts the brightness of the MVF flip-out monitor from 1 (minimum) to 10 (maximum). The default value is 06.



<i>Monitor Flip Mode</i>	<i>Auto</i>	Flips the monitor image automatically depending on the monitor's orientation. This is the default setting.
	<i>Normal</i>	Ignores the monitor's orientation sensor and displays the monitor image in normal orientation.
	<i>Flipped</i>	Ignores the monitor's orientation sensor and displays the monitor image in flipped orientation (upside down).

## 18.10 Color Bars

Select to activate SMPTE color bars on the SDI outputs. The color bars are a 10-bit signal according to SMPTE RP 219-2002. Color bars will always bypass the ALF-2 look file. These are SDR color bars. Use only on SDR displays. They will, however, work properly when the camera SDI out color space is set to either Rec. 709 or Rec. 2020.

Note: Color bar is switched off when recording is started.

- Select *MENU > Monitoring > Color Bars* and set the bars on or off.

# 19 Synchronization

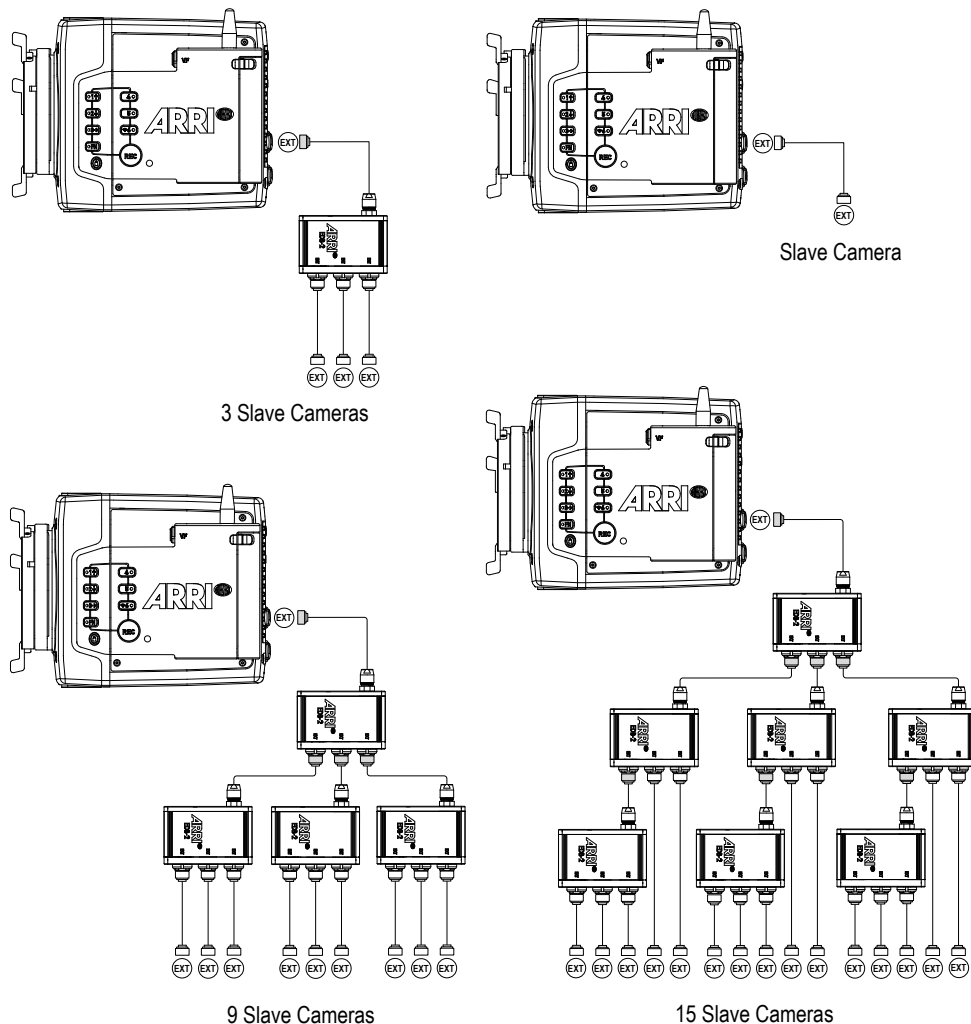
## 19.1 EXT Sync

Up to 16 ALEXA Mini LF cameras can be synchronized for various applications requiring sensor synchronization. One camera is set as the master camera and the other cameras function as slave cameras. Cameras can be connected to each other via the EXT connector, using the MINI-EXT-sync cable (K2.0009051) and the EXT Distribution Box EDB-2 (K2.0013145).

When synchronized,

- Images are captured from each camera's sensor at precisely the same time.
- Recording starts and stops simultaneously on all cameras.
- Recorded clips have identical start and end timecode.
- SDI outputs of all cameras are synchronized.

The following image shows some sample configurations:



### NOTICE

- Synchronizing sensors is possible at sensor frame rates between 20 fps and 90 fps.
- The master camera does not distribute look files or frame line files. If custom look files or frame lines are used, the files need to be imported manually on each camera.

## EXT Sync Mode

One camera is functioning as the master camera and the other camera(s) as slave camera(s). A slave camera can be a sensor slave (only sensor synchronized) or a settings slave (sensor and settings synchronized).

1. Connect the cameras via their EXT connector using the MINI-EXT-sync cable(s) and the EXT Distribution Box EDB-2.

Note: One EDB-2 or more are needed, if the cluster consists of more than two cameras.

2. Select *MENU > System > Sensor > EXT Sync*.

Following options are available:

*Off* EXT Sync is disabled.

*EXT Master* Configures the camera as the master camera. The camera has control over one or more slave cameras. The sensors of all slave cameras will be synchronized to this camera's sensor. All slave cameras will inherit the timecode from this camera.

The master camera can be supplied with external timecode and can be synchronized to an external genlock source.

*EXT Sensor Slave* Configures the camera as a sensor slave. The sensor is synchronized with the master camera. The SDI outputs of the slave camera are synchronized with the master camera. The slave camera inherits the timecode from the master camera. Recording starts and stops simultaneously on all cameras.

*EXT Settings Slave* Configure the camera as a settings slave. The sensor is synchronized with the master camera. The SDI outputs of the slave camera are synchronized with the master camera. The slave camera inherits the timecode from the master camera. Recording starts and stops simultaneously on all cameras. To ensure an identical clip naming, the slave camera inherits the camera ID from the master camera. Settings synchronized parameters include:

Project Rate	Next Reel Count	SDI Frame Rate
Sensor Fps	Lens Squeeze Factor	SDI Exposure Tool
Shutter and Shutter Unit	EVF Processing	SDI Peaking
Exposure Index	EVF Exposure Tool	SDI Overlays
White Balance*	EVF Peaking	Exposure Tool Settings
ND Filter	EVF Overlays	Frame Line Settings
Recording Codec	SDI Processing	Focus Unit
Recording Resolution	SDI Format	Noise Reduction
Active Look	SDI Color Space	EF Iris Value

\* White balance: Whenever it is changed on the master camera, the slave cameras will inherit the new setting. The setting inherited from the master camera can anytime be overridden on slave camera(s) by either setting a new value or by executing auto white balance.

Note: Configure all slave cameras first and master camera last.

Note: Parameters can only be changed from the master camera.

3. On the master camera in an EXT sync cluster, you need to define the amount of cameras used in the cluster. The master camera monitors the connection to each slave camera.

On the master camera, select *MENU > System > Sensor > EXT Sync Camera Count* and set the number of cameras used in your cluster (including the master camera, up to 16 cameras).

4. When using settings slaves, each camera in the setup needs to use an individual camera ID prefix.

Select *MENU > Recording > Project Settings > Camera ID Prefix* and select an individual prefix for each camera (usually giving the master camera the camera ID prefix "A")

## Media Status with EXT Sync

The master camera calculates the overall remaining recording time based on the media with the lowest capacity in the cluster. The overall remaining recording time is displayed prefixed with *EXT* on the home screen and in the status info on the master camera.

EXT	0:20:02
REC	ARRIRAW
LOOK	ARRI 709

## EXT Sync Info Screen

The EXT sync info screen displays the system status of all cameras in the EXT sync cluster. Information on the camera serial numbers, the camera ID prefixes, the battery voltages and the main status of all cameras are shown.

1. Select *MENU > Info > EXT Sync Info* to access the EXT Sync info screen.

Note: The EXT sync info screen lists the cameras sorted after the camera ID prefix.

Note: If one camera in the cluster is not ready to record, the entire cluster will go into idle state. Use the EXT sync info screen to troubleshoot.

## Media Erase in EXT Sync

In EXT sync mode, you can simultaneously erase the cards of all cameras in the cluster:

1. On the master camera, select *MENU > Media > Erase EXT Sync Media*.

A confirmation screen is displayed.

2. Press *ERASE*.

A progress bar indicates the progress of the master camera (only).

3. After erasing has finished, press any button to return to the menu.

## EXT Sync Clip Naming

When working in EXT sync mode and the slave cameras are configured as settings slaves, clip naming is identical to the use of a single camera.

When working in EXT sync mode and using settings sync, the slave cameras inherit the camera ID of the master camera, so clip file names are identical. To distinguish the clip files from several cameras, the Camera ID prefix is used. For this reason, each camera must use an individual camera ID prefix.

- Set the camera ID prefix of each camera in *MENU > Recording > Project Settings > Camera ID Prefix*.

Note: The master camera will issue an alert in case duplicate camera ID prefixes are used within the setup.

Below is a clip name example for a four camera setup, with three clips recorded. The camera ID prefix is marked in red, the master camera ID is marked in blue. It is recommended to use the same camera index (green) on all cameras.

A001_AH8B	A001_CH8B
A001_C001_190705_AH8B	A001_C001_190705_CH8B
A001_C002_190705_AH8B	A001_C002_190705_CH8B
A001_C003_190705_AH8B	A001_C003_190705_CH8B
A001_BH8B	A001_DH8B
A001_C001_190705_BH8B	A001_C001_190705_DH8B
A001_C002_190705_BH8B	A001_C002_190705_DH8B
A001_C003_190705_BH8B	A001_C003_190705_DH8B

Note: Do not mix sensor and settings slaves as this will cause inconsistencies in clip naming.

## 19.2 Genlock Synchronization

The camera's sensor and SDI outputs can be synchronized to a reference sync signal (a tri-level HD signal or an analog black burst signal) using the SYNC IN BNC connector. The camera's sensor needs to run at equal or double the frame rate of the reference signal to establish synchronization.

### Activation of Genlock

1. Connect the genlock source to the cameras SYNC IN connector.
2. Ensure that the camera's sensor frame rate matches (or is double) the genlock source frame rate.
3. Set *MENU > System > Sensor > Genlock Sync* to *SYNC IN*.

**GEN** With Genlock Sync activated, the camera displays a genlock icon on the HOME screen and in the status info of EVF/Monitor and the SDI outputs. The icon turns orange when the camera can not synchronize to the genlock signal or if no signal could be detected. In this case, see *MENU > Alerts* for detailed information.

Note: Simultaneous use of Timecode mode Jam-sync and Genlock is not supported.

### Sync Shift

The Sync Shift option applies an offset to the genlock signal at the input. Minimum step size is 52 ns, maximum possible correction is up to +/- 20 ms (= 384000 steps), depending on the sensor frame rate.

- Select *MENU > System > Sensor > Sync Shift* and apply the needed sync shift.

## 19.3 Timecode Synchronization

The camera's sensor and SDI outputs can be synchronized to a reference timecode signal using the 5-pin TC connector. The camera's sensor needs to run at equal or double the frame rate of the reference signal to establish synchronization.

### Activation of Timecode Synchronization

1. Connect the timecode source to the cameras TC connector.
2. Ensure that the camera's sensor frame rate matches (or is double) the timecode source frame rate.
3. Set *MENU > System > Sensor > Genlock Sync* to *TC IN*.

**GEN** With Genlock Sync activated, the camera displays a genlock icon on the HOME screen and in the status info of EVF/Monitor and the SDI outputs. The icon turns orange when the camera can not synchronize to the genlock signal or if no signal could be detected. In this case, see *MENU > Alerts* for detailed information.

Note: Simultaneous use of Timecode mode Jam-sync and Genlock is not supported.

## 20 Sensor Settings

### 20.1 Noise Reduction

#### ARRI Noise Reduction ANR-1

ARRI Noise Reduction ANR-1 is implemented in most modern ARRI camera models and can be used for monitoring purposes on set, recording to MXF/Apple ProRes files (baked in) or as metadata of MXF/ARRIRAW recordings with full flexibility to change the parameter in postproduction. ARRI Noise Reduction ANR-1 can be helpful in low light situations to reduce noise in the images. While it is commonly available in postproduction tools, two reasons drove us towards creating a new, in-camera ARRI noise reduction: we enable fast, in-camera noise reduction and we provide a noise reduction method that retains the grain texture and natural looks that ARRI customers like.

Using ARRI Noise Reduction ANR-1 enables you to use noise reduction on set in the camera. This can be helpful for low light shots, where an in-camera noise reduction is a very fast solution. Furthermore, ARRI Noise Reduction ANR-1 gives you the possibility to combine the amount of grain with your sharpness and detail settings for the chosen exposure directly on set.

You can store your decision either in the metadata, when recording MXF/ARRIRAW or bake it into Apple ProRes files. In contrast to general postproduction tools, the ARRI Noise Reduction ANR-1 is optimized for the sensor noise characteristics and therefore can achieve a very natural noise reduction without any image blurring. This noise reduction, optimized for the ARRI sensors is available for ARRIRAW recordings by using the ARRIRAW Converter or a post-processing software that incorporates the ARRIRAW SDK. The film grain like texture of ARRI cameras is highly appreciated by cinematographers around the world and therefore ARRI Noise Reduction ANR-1 is moderate and does not affect the grainy structure of the noise. The ARRI Noise Reduction ANR-1 just reduces it, nothing more.

For more information please refer to the ARRI Texture Control White Paper, available in the [White Papers](#) section on the ARRI website.

- Select *MENU > System > Sensor > Noise Reduction* to toggle noise reduction on/off.

While recording MXF/Apple ProRes files, noise reduction will be baked into the footage and therefore MXF/Apple ProRes files cannot be opened and altered in the ARRIRAW Converter (ARC). When recording MXF/ARRIRAW files, the ARRI Noise Reduction ANR-1 is applied for preview (viewfinder and SDI outputs) but not baked into the footage, instead it will be stored in metadata.

### 20.2 Mirroring the Sensor Image

You can mirror the sensor image in horizontal and vertical directions.

- Select *MENU > System > Sensor > Mirror Image*.

You have the following options:

<i>Off</i>	Mirroring is inactive.
<i>V</i>	The sensor image is vertically mirrored.
<i>H</i>	The sensor image is horizontally mirrored.
<i>V+H</i>	The sensor image is vertically and horizontally mirrored (rotated by 180°).

Horizontal mirroring is applied on all output paths and internally recorded material. Vertical mirroring is only applied to output paths; internally recorded material is not rotated, but rotation information is written into metadata. Frame grabs of rotated images will be displayed upside down on a computer.

## 20.3 User Pixel Masking

All sensors exhibit a certain number of defect pixels, and ARRI cameras have two mechanisms to catch and correct them: one is a static pixel correction based on a pixel mask created during manufacturing, and the other is a dynamic pixel correction that continuously evaluates each frame and masks defect pixels that are not caught by the static pixel mask. In very few cases, we have observed some pixels that are not corrected by either method; for those cases User Pixel Masking is available.

User pixel masks can be created with the [ARRIRAW Converter](#) available for macOS, Windows and Ubuntu.

When shooting ARRIRAW, it is not necessary to load the User Pixel Mask into the camera. Instead, it can be applied to the ARRIRAW files in post using the ARRIRAW converter or any third party software that has implemented the User Pixel Mask feature through our ARRIRAW SDK.

The User Pixel Mask will remain intact after a factory reset and after a camera software update. It can be manually removed or overwritten with a new one at any time.

1. Select *MENU > System > Sensor > User Pixel Masking*.

Following options are available:

<i>User Pixel Mask Active</i>	Shows whether a User Pixel Mask is currently active in the camera.
<i>Install User Pixel Mask</i>	Select to install a User Pixel Mask from USB memory stick.
<i>Export User Pixel Mask</i>	Select to backup the currently installed User Pixel Mask onto USB memory stick.
<i>Delete User Pixel Mask</i>	Select to uninstall a User Pixel Mask.
<i>Grab Raw Image</i>	Stores an ARRIRAW frame grab on the USB memory stick.

### User Pixel Mask Generation

1. Insert a USB memory stick into camera.
2. Select *MENU > System > Sensor > User Pixel Masking > Grab Raw Frame* to grab an ARRIRAW frame.  
The ARRIRAW frame grab is stored on the USB memory stick in folder ARRI/A-MINI-LF/SENSOR. Alternatively, you can record a short ARRIRAW sequence and use that material for marking defect pixels.
3. Import the ARRIRAW frame grab into the ARRIRAW Converter.
4. Use the ARRIRAW Converter to mark defect pixels. The marked pixel coordinates are stored in an XML file called the User Pixel Mask. Please note that it is advisable to mark the least number of pixels necessary, as too many marked pixels can be counter productive.
5. Save the User Pixel Mask to the USB memory stick in folder ARRI/A-MINI-LF/SENSOR.
6. Insert the USB memory stick into the camera.
7. Select *MENU > System > Sensor > User Pixel Masking > Install User Pixel Mask* to load the mask into the camera.
8. After a restart of the camera, the marked pixels will be masked using information from surrounding pixels. This masking is applied to the images delivered from the sensor, before any other processing takes place, and thus becomes active on all outputs.
9. Carefully check the end result by visually inspecting the areas where you have marked pixels; if too many pixels are marked too close to each other, or if pixels are marked close to other pixels that are already marked in the static pixel mask, the result could be uncorrectable clusters, which are more visible than the original defect pixels.

As an added service, it is possible to send the User Pixel Mask to ARRI Service at [service@arri.de](mailto:service@arri.de) for verification. We strongly recommend that you take advantage of this free service, as sometimes, clusters are difficult to spot depending on the background. Please note, however, that in the end, it is the responsibility of the person creating the User Pixel Mask to verify that no clusters are formed.

#### **NOTICE**

Please note, that the User Pixel masking feature is only a temporary solution to mask defect pixels. Defect pixels should be dealt with by sensor calibration at an ARRI service department.

A User Pixel Mask is a stopgap solution between when the defect is noticed, and when the camera is recalibrated, to verify the sensor is still functioning within ARRI specifications and to comprehensively assess and permanently and automatically compensate for defect pixels.

If the installed pixel masking map is deleted, the camera will be reset to its old status with all defect pixels.



## 21 System Settings

### 21.1 Language Setting

1. Select *MENU > System > Language*.
2. Set the language to either English or Chinese (simplified).

### 21.2 System Time and Date

- ▶ Select *MENU > System > System Time + Date* to set the system time and date.

Note: *Timezone* and *Daylight Saving Time* do not change time and date settings. They are stored as metadata in the recorded clips.

Note: System Time and Date are reset after a camera software update.

### 21.3 Button and Display Settings

- ▶ Select *MENU > System > Buttons + Display*.

Following options are available:

<i>Display Style</i>	Choose between day mode and night mode.
<i>Button Brightness</i>	Adjust the brightness of camera and MVF buttons from 0 to 4 (0 = off)

### 21.4 Fan Settings

Select to set the fan mode to *Low Noise* for locations with ambient temperatures up to 30°C (86°F). For locations with ambient temperatures higher than 30°C (86°F), set to *Rec Low*. When the fan is set to *Rec Low*, it will run at a high rate when the camera is in Standby, and run at a low rate when the camera is recording.

- ▶ Select *MENU > System > Fan Mode*.

Following options are available:

<i>Rec Low</i>	Increases fan speed during standby to cool the camera. Minimizes fan speed/noise during recording. Note: Ideal in an environment warmer than 30 °C (86 °F).
<i>Low Noise</i>	Minimizes fan noise during standby and recording. Note: With data rates above 100 MB/s (due to fps/codec setting), the fan speed automatically increases to prevent the recording media from overheating.

### 21.5 Battery Warning

You can adjust the voltage level at which a power warning is displayed for the power source connected to the BAT connector. The level can be adjusted to match the battery type used. The default warning value is 13.5 V.

- ▶ Select *MENU > System > Power > BAT In Warning* and set the warning level between 11.0 V and 34.0 V.

When the power source reaches the defined voltage level the battery display on the HOME screen and in the status info of the viewfinder and SDI outputs start flashing.

## 21.6 Lens Mount Settings

You can enable/disable the LDS contacts of the lens mount and set your preferred focus unit.

1. Select *MENU > System > Lens Mount Settings*.

Following settings are available:

<i>Focus Unit</i>	Set the unit for display of the lens focus distance to <i>Lens Default</i> , <i>Metric</i> or <i>Imperial</i> .
<i>Enable Lens Mount</i>	Enable/disable the lens contacts of a PL or EF lens mount.

### NOTICE

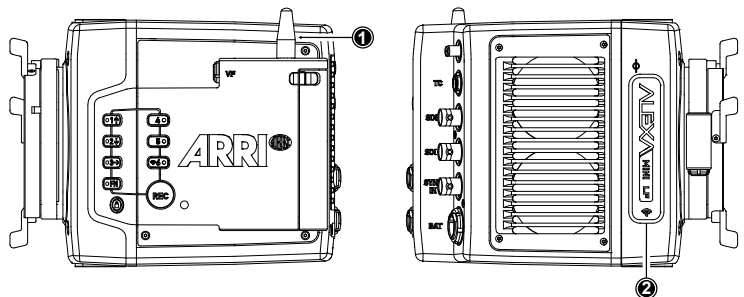
Please note that as soon as an LDA table is activated, the LDS contacts of the lens mount are switched off. There is no need to switch the mount off manually when using LDA.

## 21.7 Network and WiFi Settings

### WiFi Settings

The WiFi module in the ALEXA Mini LF can be configured to act as an access point or in infrastructure (client) mode and opens up a wireless network in the 2.4 GHz band. A WiFi connection can be used to remote control the camera using the camera's web remote or applications communicating with the camera via the Camera Access Protocol (CAP).

The camera is equipped with two WiFi antennas, one external antenna above the media bay (1) and one internal antenna on the right side front (2).



### WiFi Power

- Select *MENU > System > Network / WiFi > WiFi Power* and set WiFi power on or off.

Additionally to the WiFi settings menu, WiFi power can be toggled by using the FN function button or a user button assigned with *WiFi Power*.

### WiFi Mode

1. Select *MENU > System > Network / WiFi > WiFi Mode*.

Following options are available:

<i>Host</i>	The camera acts as an WiFi access point. The SSID of the camera is "Mini-LF-SERIAL#", where SERIAL# is the five digit serial number of the camera.
<i>Client</i>	The camera can connect to a WiFi network and receives it's IP address via DHCP.

2. Set the desired WiFi mode.

Note: the WiFi mode can only be changed while WiFi power is disabled.

## WiFi Host Channel

1. Select *MENU > System > Network / WiFi > WiFi Host Channel*.

When using WiFi and White Radio simultaneously it is important to configure the used channels to avoid interference and guarantee optimal performance. The following table gives an overview of suitable channel configurations:

WiFi Channel	ARRI White Radio Channel Number													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
1	x	x	x	x	✓	✓	✓	✓	x	x	✓	✓	✓	✓
2	x	x	x	x	✓	✓	✓	✓	x	x	x	✓	✓	✓
3	x	x	x	x	✓	✓	✓	✓	x	x	x	x	✓	✓
4	x	x	x	x	✓	✓	✓	✓	x	x	x	x	✓	✓
5	x	x	x	x	x	x	✓	✓	x	x	x	x	✓	✓
6	✓	x	x	x	x	x	✓	✓	x	x	x	x	x	✓
7	✓	✓	x	x	x	x	✓	✓	x	x	x	x	x	x
8	✓	✓	x	x	x	x	x	✓	✓	x	x	x	x	x
9	✓	✓	x	x	x	x	x	x	✓	✓	x	x	x	x
10	✓	✓	✓	x	x	x	x	x	✓	✓	x	x	x	x
11	✓	✓	✓	✓	x	x	x	x	✓	✓	x	x	x	x
	12	13	16	17	20	21	24	25	14	15	18	19	22	23
ZigBee IEEE 802.15.4 Radio Channel Number														

2. Set the desired WiFi channel.

## WiFi Password (Host Mode)

The camera uses WPA-2 encryption. You can only set the WiFi host password if the WiFi mode is set to *Host*. The default password for the network is set to "arriarri".

1. Select *MENU > System > Network / WiFi > WiFi Host Password*.

A screen is displayed to set your password.

2. Enter a password. The WiFi password must be between 8 and 32 characters long.

## Connect to a Network (Client Mode)

You can select a WiFi network, if you have activated the WiFi power and when the WiFi mode is set to *Client*. The camera allows you to join networks with WPA2 encryption or without encryption.

1. Select *MENU > System > Network / WiFi > WiFi Network*.

A list of available WiFi networks is displayed.

2. Select the WiFi network the camera should connect to.

If the selected WiFi network uses encryption, you are prompted to enter the password.

3. Enter the password and press *CONNECT*.

## Connect to a Network using a QR Code (Client Mode)

You can use a QR code to connect to a WiFi network. The WiFi credentials need to be provided in the following format:

WiFi:S:my-ssid;T:[WEP|WPA|WPA2];P:my-password;;

where the italic parts need to be replaced with your network credentials.

1. Select *MENU > System > Network / WiFi > WiFi Network > SCAN QR*.

2. Hold the QR-Code in front of the lens so that it fills the frame and is in focus.

A popup window with QR-Code data is displayed.

3. Press **CONNECT**.

The camera connects with the network. The name of the network is displayed in the *WiFi NETWORKS AVAILABLE* list.

### Disconnect from Network (Client Mode)

1. Select **MENU > System > Network / WiFi > WiFi Network**.
2. Press **DISCONNECT**.

If the network you were connected to is hidden, it will disappear from the network list shortly after.

### WiFi Status Icons on HOME Screen and in Status Info

With WiFi power enabled, the WiFi status is indicated by an icon on the "home screen" and the "status info" of the viewfinder and the SDI outputs:



*Host* mode icon. WiFi power is enabled and WiFi mode is set to *Host*.



*Client* mode icon. WiFi power is enabled and connection to network has been established.



*Client* mode icon. WiFi power is enabled but camera is not connected to a network.

Additional information can be found under **MENU > Info > Network Info**.

### LAN Settings

Use the ALEXA Ethernet cable (KC 153-S, K2.72021.0) to connect the camera to a router or other devices.

#### LAN IP Mode

1. Select **MENU > System > Network / WiFi > LAN IP Mode**.

Following options are available:

*Static*

Select for manually entering an IP address and subnet mask.

*DHCP*

Select to let the camera accept a dynamically assigned IP address from an DHCP server.

2. Set the desired LAN IP mode.

#### LAN Static IP

1. Select **MENU > System > Network / WiFi > LAN Static IP**.
2. Set the desired LAN Static IP address.

#### LAN Static Subnet

1. Select **MENU > System > Network / WiFi > LAN Static Subnet**.
2. Set the desired LAN Static subnet.

## 21.8 Reset of Electronic Horizon

1. Select *MENU > System > Reset Electronic Horizon*.

A screen showing the roll and tilt values is displayed.

2. Place the camera on a level surface and press *RESET*.

Note: A message is displayed if either the roll, the tilt or both values exceed the calibration range and resetting is not possible.

## 21.9 Camera Update

### 21.9.1 Update of Camera Software

The camera software is updated with a USB memory stick. The Software Update Package (SUP) will update the camera along with the Viewfinder MVF-2 and the lens mount – provided they are connected to the camera.

The Software Update Package (SUP) can be found in the [Software and Firmware Updates for Cameras](#) section on the ARRI website. You need to register your camera, along with your camera serial number, to access the SUP download. Existing ALEXA customers with an active account for the download section can use this account, unless otherwise requested.

Before update, create the folder structure on a FAT 32 USB memory stick. For more information, see "Prepare User Storage for Use", page 47.

#### Preconditions

- ▶ ALEXA Mini LF with MVF-2 connected
- ▶ Fully charged camera battery or power supply
- ▶ Computer with internet access and USB interface
- ▶ USB memory stick (FAT 32 file format), prepared with the folder structure for the use with the camera

#### Software Update Package Download

1. Download the software update package (SUP) from [www.arri.com](http://www.arri.com).
2. Double-click on the downloaded file (\*.zip) to unpack it:
  - ▶ Update file (\*.SUP)
  - ▶ Update key (\*.lic)
  - ▶ Release notes
3. Carefully read the release notes.
4. Copy the update file (\*.SUP) to the ARRI/A-MINI-LF/SUP folder on the USB stick.
5. Copy the update key (\*.lic) to the ARRI/A-MINI-LF/LICENSES folder on the USB stick.
6. Safely remove the USB memory stick from the computer.

#### Camera Update

1. Open the media lid and connect the USB memory stick to the camera.
2. If inserted, remove the recording media from the camera.
3. Switch on the camera with a full battery or use a mains power supply.
4. Select *MENU > Setup > Factory Reset* to perform a factory reset.
5. Select *MENU > System > Update > Update Camera*.
6. Select the required update file and press *CONFIRM* to start the update.  
Press *CANCEL* to exit.
7. Check the MVF-2 monitor for the update progress.

8. Wait for the update process to finish and the camera to reboot.

After a successful update and reboot, the camera displays a success message.

Note: After an update, the timezone and daylight saving time settings of the camera are reset. Please set them accordingly. Select *MENU > System > System Time + Date*.

Note: A failed camera update produces a red warning message. However, the previously installed camera software remains intact. Press *CLOSE*, restart the camera and start the update again.

#### NOTICE

Power the camera with a fully charged battery or a power supply to avoid power loss during the update. The update procedure takes about ten minutes.

Never shut down the camera or unplug power during the update process.

After the update, the camera reboots. Never unplug power during reboot. Check the MVF-2 for the update status. A popup message is displayed after the update finished successfully.

## 21.9.2 Update of Camera Components

The camera supports to update the MVF-2 viewfinder and the lens mount. Updating the MVF-2 and the lens mount does not require a dedicated update file. The camera will issue a message if the software version of MVF-2 and/or the lens mount does not match the version required by the currently installed camera SUP. In this case:

1. Select *MENU > System > Update*.

The *Update MVF-2* and *Update Lens Mount* entries show the software version currently installed on the component and the software version required by the currently installed camera SUP.

2. Select *Update MVF-2* to update the MVF-2 or

Select *Update Lens Mount* to update the lens mount.

A confirmation screen is displayed.

3. Press *CONFIRM* to start the update.

The component is updated. A success message is displayed after the update has finished.

## 21.9.3 Update of LBUS Devices

The camera offers to update connected LBUS devices (cforce mini motors, cforce Plus motors, ARRI Master Grips, ARRI Operator Control Unit OCU-1 and ARRI LCUBE)

1. Download the LBUS device update file from the ARRI website.
2. Copy the update file onto a USB memory stick in folder ARRI/ECS/.
3. Connect the LBUS device to the LBUS connector of the lens mount.
4. Select *MENU > System > Update > Update LBUS Devices*.

A list with connected LBUS devices is displayed, showing the software version currently installed on the device and the software version stored on the USB memory stick.

5. Select the LBUS device you want to update and press *UPDATE*.

A confirmation screen is displayed.

6. Press *CONFIRM* to start the update. Cancel with *BACK*.

## 22 User Setups

A user setup is a profile of the current settings on the camera that can be saved on camera and/or to a USB memory stick. User setups can be given custom names, saved to the USB memory stick and loaded onto multiple cameras. Rather than resetting the camera to its factory default settings, a user setup can be used to reset the camera to a user's default settings.

User setups can be used to ensure that cameras on multi-camera shoots have matching settings, or to transfer a show's setup onto daily cameras, to ensure they carry the same shooting specifications.

You can also import user setups into the camera from a USB medium and export user setups to a USB medium.

### Saving a User Setup

You can save the current setup configuration in the camera or on the USB medium.

1. Select *MENU > Setup > User Setups Installed > Save* to save the setup in the camera.  
Select *MENU > Setup > User Setups on USB > Save* to save the setup on the USB medium.
2. Use the onscreen keyboard to enter a name for the user setup and press *SAVE*.  
A screen is displayed to select the setup parameter blocks. You have the following options:
  - *General*
  - *Format*
  - *Scene*
  - *Lens*
  - *User*
3. Select one or more options and press *CONFIRM*.  
The camera stores the user setup.

### Loading a User Setup

You can load user setups stored on the camera or on a USB medium.

In case you are using the ARRI WCU-4 unit, you can trigger the loading of internally stored setups from there.

1. Select *MENU > Setup > User Setups Installed* to load a setup from the camera.  
Select *MENU > Setup > User Setups on USB* to load a setup from the USB medium.
2. Select a user setup from the list and press *LOAD*.  
A popup window with the parameter blocks of this user setup is displayed.
3. Press *CONFIRM*.  
The camera loads the selected user setup and shows a result message. The popup highlights the parameters that you should check in case certain parameters could not be loaded.

### Factory Reset

You can reset the camera to the ARRI factory default values.

1. Select *MENU > Setup > Factory Reset*.  
You are asked to confirm the reset.
2. Press *RESET*.

Note: A factory reset does not delete user setups stored/installed on camera.

## 22.1 User Setup Parameter Blocks

The camera allows you to store a full camera configuration by selecting all parameter blocks, or only parts of the configuration by de-/selecting the desired blocks. The parameter blocks have been chosen to allow for maximum flexibility while keeping coherent sets of parameters and minimizing the amount of potential conflicts by loading partial setups.

### GENERAL

Groups the general camera configuration and basic project settings.

MENU > RECORDING > PROJECT SETTINGS >	Project Rate
HOME > TC > OPTIONS >	Timecode Options (All Settings)
MENU > RECORDING > AUDIO RECORDING >	Audio (All Settings)
MENU > LOOK > LOOK >	Installed Look Files
MENU > LOOK >	SDI 1&2 Color Space
MENU > MONITORING > FRAME LINES > FRAME LINE >	Installed Frame Line Files
HOME > FPS >	Sensor FPS table
HOME > SHUTTER >	Shutter table
HOME > WB >	WB table
MENU > METADATA >	Metadata (All Settings)
MENU > MONITORING > SDI >	SDI 1&2 Format
MENU > MONITORING > SDI >	SDI 1&2 Frame Rate
MENU > MONITORING > SDI >	SDI 1&2 Image
MENU > MONITORING > SDI >	SDI 1&2 3G Level
MENU > MONITORING > SDI >	SDI2: Clone SDI1
MENU > MONITORING > SDI >	Anamorphic Desqueeze
MENU > SYSTEM > SENSOR >	Noise reduction
MENU > SYSTEM > SENSOR >	Mirror Image
MENU > SYSTEM > SENSOR >	EXT Sync
MENU > SYSTEM > SENSOR >	EXT sync camera count
MENU > SYSTEM > SENSOR >	Genlock Sync
MENU > SYSTEM > SENSOR >	Sync Shift
MENU > SYSTEM > SENSOR >	Mirror Image
MENU > SYSTEM >	Fan Mode
MENU > SYSTEM >	CAP Settings
MENU > ECS > RADIO >	ECS Power
MENU > ECS > RADIO >	ECS Radio Channel

### FORMAT

Allows for easy switching between recording formats.

MENU > RECORDING >	Recording Codec
MENU > RECORDING >	recording Resolution



MENU > MONITORING > FRAME LINES >

Active frame line\*

\*if not found in list, load NONE

## SCENE

Allows you to change quickly between different shooting situations.

HOME > FPS

Sensor FPS

HOME > SHUTTER

Shutter

HOME > EI

Exposure Index

HOME > WB

White Balance

HOME > ND

ND Filter

MENU > LOOK

Active Look\*

\*if not found in list,  
then load ARR1709

HOME > EI > IRIS

EF Iris Value

## LENS

Allows you to change quickly between different lens setups.

MENU > RECORDING > PROJECT SETTINGS >

Lens Squeeze Factor

MENU > ECS > LENS DATA >

Active Lens Table

MENU > ECS > LENS DATA >

Lens Tables Installed

MENU > ECS > LENS DATA >

Lens Table Favorites

MENU > ECS > LBUS LENS MOTOR CONFIG >

Focus Lens motor direction, torque + teeth  
count

MENU > ECS > LBUS LENS MOTOR CONFIG >

Iris Lens motor direction, torque + teeth  
count

MENU > ECS > LBUS LENS MOTOR CONFIG >

Zoom Lens motor direction, torque + teeth  
count

MENU > SYSTEM > LENS MOUNT SETTINGS >

Focus Unit

## USER

Stores all parameters for camera personalization.

MENU > LOOK >

EVF/Mon. Processing

MENU > LOOK >

SDI 1 & 2 Processing

MENU > MONITORING > EVF / Monitor >

Surround View

MENU > MONITORING > EVF / Monitor >

Peaking Settings

MENU > MONITORING > EVF / Monitor >

Settings (all, except EVF power)

MENU > MONITORING > EVF / Monitor >

EVF Overlays (all settings)

MENU > MONITORING > EVF / Monitor >

Monitor Overlays (all settings)

MENU > MONITORING > SDI > SDI PROCESSING >

Surround View

MENU > MONITORING > SDI > SDI PROCESSING >

Peaking (all settings)

MENU > MONITORING > SDI > SDI PROCESSING >

Overlays (all settings)

MENU > MONITORING >

Exposure Tools (all settings)

MENU > USER BUTTONS >

User Buttons (all settings)

MENU > SYSTEM > POWER >

Bat In Warning

MENU > SYSTEM > BUTTONS + DISPLAY >

Display Style, Button Brightness

PLAY > OPTIONS >

Play End mode

MENU > RECORDING > REC BEEPER / TALLY >

All Settings

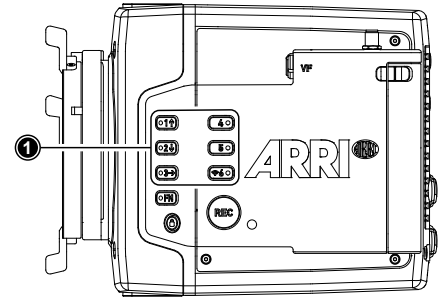
Note: Network settings are not stored in the user setup.

## 23 User Buttons

### Camera User Buttons

The camera is equipped with six freely assignable user buttons (1). Each button can be customized with individual functions. Once a user button is assigned with a function, press the button to trigger its function. An LED on each user button reflects the functional status. Note: Camera user buttons 7 and 8 can only be triggered using the Web Remote (Beta Version).

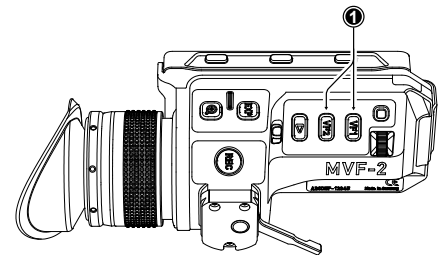
1. Select *MENU > User Buttons > Camera User Buttons*.
2. Select the button you want to customize.
3. Assign the desired function from the list to the button.



### MVF-2 User Buttons

The MVF-2 is equipped with two user buttons, VF1 and VF2 (1). Each button can be customized with individual functions:

1. Select *MENU > User Buttons > Button VF1* or  
select *MENU > User Buttons > Button VF2*.
2. Assign the desired function from the list to the button.



### Additional User Buttons

In addition to camera and MVF-2 user buttons the camera supports to configure the user buttons of electronic accessories such as the Wireless Compact Unit WCU-4, ARRI Master Grips, Operator Control Unit OCU-1 and the GPIO box.

1. Select *MENU > User Buttons*.
2. Select the accessory to configure:

#### *WCU User Buttons*

Up to 6 user buttons can be assigned with functions to be used with the Wireless Compact Unit WCU-4.

#### *LBUS Device User Buttons*

Up to 12 user buttons can be assigned with functions to be used with the ARRI Master Grips and the Operator Control Unit OCU-1.

#### *GPIO User Buttons*

The ARRI GPIO box (GPB-1, K.2.0007642) can be used as an interface to the camera for external user buttons. It connects to the camera via the EXT connector and has a 37-pin D-Sub connector carrying 14 GPI (General purpose input) connections plus 2 outputs (camera power status and camera recording status). For additional information, please refer to the user manual of the GPB-1. Up to 14 user buttons can be assigned for the GPIO box.

3. Select the button you want to customize.
4. Assign the desired function from the list to the button.

## Smart Behavior

Some user button functions support smart behavior. For these, a short press (i.e. less than half a second) toggles the function, while a long press (i.e. longer than half a second) activates the function only temporarily, as long as the user button is pressed. Assume a user button is configured with *EVF Zoom*:

- ▶ Short press of user button: EVF zoom is activated and stays activated. Press again to deactivate.
- ▶ Long press of user button: EVF zoom function is activated while you are pressing the button, release of the button deactivates EVF zoom.

## User Button Info Screen


The camera offers a user button info screen showing the current assignment of the camera user buttons as well as the MVF-2 user buttons.

- ▶ Select *MENU > Info > User Button Info* to view the current user button configuration of camera and MVF-2 user buttons.

## 23.1 List of User Button Functions

Following user button functions are available:

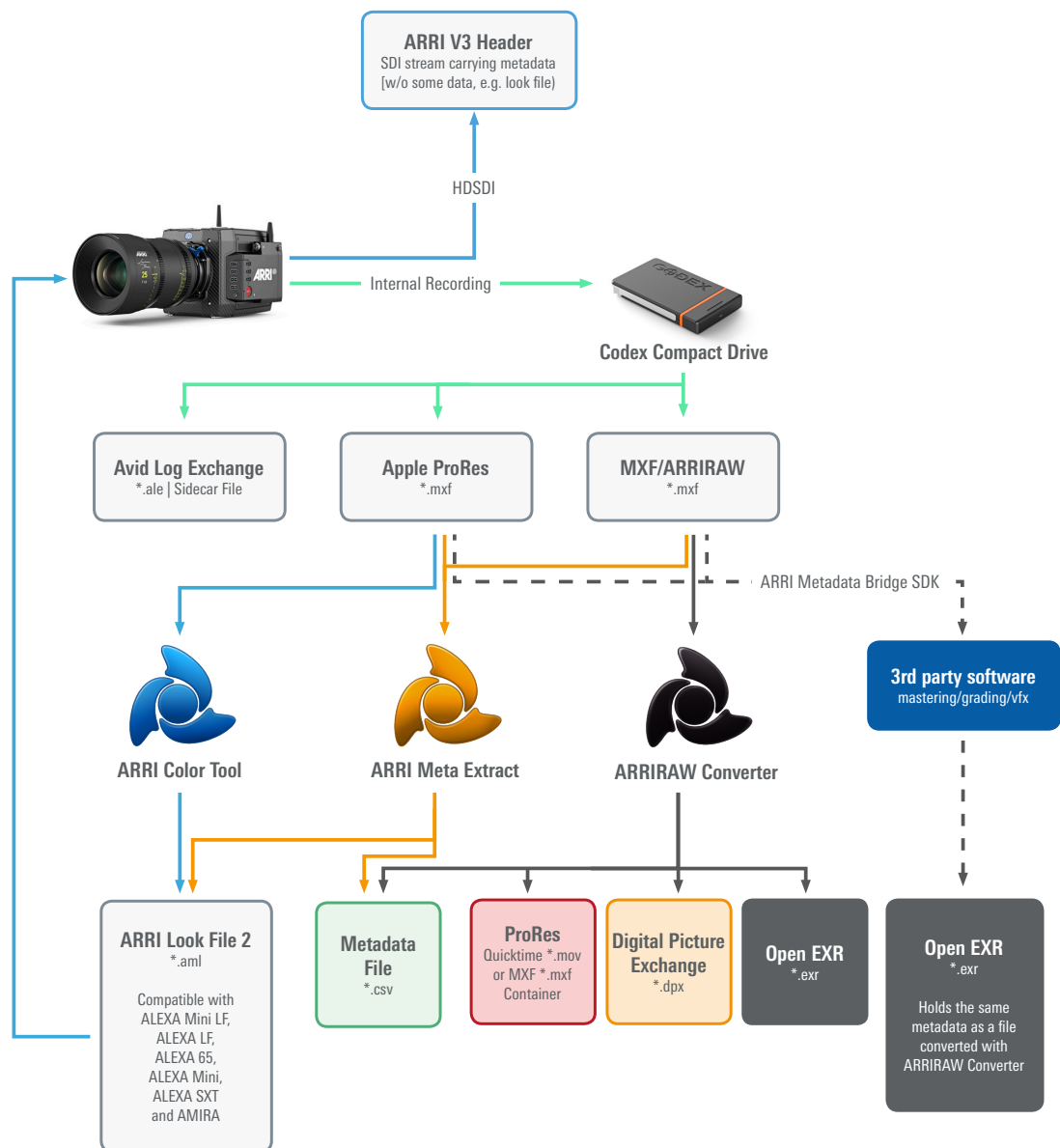
User Button Functions	
<i>Off</i>	Disables the user button.
<i>EVF Status Info</i>	Toggles display of EVF status info between <i>Safe</i> , <i>Off</i> and <i>Overlay</i> .
<i>EVF+Mon. Check Log C</i>	Temporarily set EVF/Monitor processing to Log C. Supports smart behaviour.
<i>EVF+Mon. Desqueeze</i>	Toggles anamorphic desqueeze on EVF and Monitor on/off.
<i>EVF+Mon. Exp. Tool</i>	Switches the exposure tool on or off on EVF and Monitor. Supports smart behavior.
<i>EVF+Mon. Frame Lines</i>	Switches frame lines on or off on EVF and Monitor. Supports smart behavior.
<i>EVF+Mon. Peaking</i>	Switches peaking on or off on EVF and Monitor. Supports smart behavior.
<i>EVF+Mon. Surround</i>	Switches surround view on or off on EVF and Monitor. Supports smart behavior.
<i>EVF+Mon. Zebra/FC</i>	Toggles the exposure tool for EVF and Monitor between Zebra and False Color.
<i>EVF+Mon. Zoom</i>	Switches the viewfinder zoom function on or off. Supports smart behavior.
<i>Flip Monitor</i>	Toggles the Monitor between normal and flipped mode. To return to automatic operation, press and hold the user button for two seconds.
<i>SDI Check Log C</i>	Temporarily set SDI processing to Log C. Supports smart behaviour.
<i>SDI Desqueeze</i>	Toggles anamorphic desqueeze on the SDI outputs on/off.
<i>SDI Exp. Tool</i>	Switches the exposure tool on or off on the SDI outputs. Supports smart behavior.
<i>SDI Frame Lines</i>	Switches frame lines on or off on the SDI outputs. Supports smart behavior.
<i>SDI Peaking</i>	Switches peaking on or off on the SDI outputs. Supports smart behavior.
<i>SDI Status info</i>	Toggles SDI status info between <i>Safe</i> , <i>Overlay</i> and <i>Off</i>
<i>SDI Surround</i>	Switches surround view on the SDI outputs on or off. Supports smart behavior.
<i>SDI Zebra/FC</i>	Toggles the exposure tool for the SDI outputs between Zebra and False Color.
<i>SDI Zoom</i>	Switches the SDI zoom function on or off. Supports smart behavior.
<i>SDI Zoom Position</i>	Toggles the SDI zoom position.

User Button Functions														
SDI Zoom (smart)	Press SDI Zoom to activate the zoom function on the SDI outputs. Further button presses change the Zoom position. A button longpress exits the Zoom function.													
EI Increase	Selects the next value from the EI (exposure index) list.													
EI Decrease	Selects the previous value from the EI (exposure index) list.													
FPS Increase	Selects the next value from the FPS list.													
FPS Decrease	Selects the previous value from the FPS list.													
ND Increase	Selects the next value from the ND list.													
ND Decrease	Selects the previous value from the ND list.													
Shutter Increase	Selects the next value from the Shutter list.													
Shutter Decrease	Selects the previous value from the Shutter list.													
WB Increase	Selects the next value from the WB list. Note: User button skips the Auto WB entry of the WB list.													
WB Decrease	Selects the previous value from the WB list. Note: User button skips the Auto WB entry of the WB list.													
Audio Ch1 Increase	Increases gain of audio channel 1 in 1dB steps. Note: User button is only functional with channel 1 control set either to <i>Manual</i> or <i>Manual (+L)</i> .													
Audio Ch1 Decrease	Decreases gain of audio channel 1 in 1dB steps. Note: User button is only functional with channel 1 control set either to <i>Manual</i> or <i>Manual (+L)</i> .													
Audio Ch1+2 Increase	Increases gain of audio channels 1+2 simultaneously in 1dB steps. Note: User button is only functional with channel 1 and channel 2 control set either to <i>Manual</i> or <i>Manual (+L)</i> .													
Audio Ch1+2 Decrease	Decreases gain of audio channels 1+2 simultaneously in 1dB steps. Note: User button is only functional with channel 1 and channel 2 control set either to <i>Manual</i> or <i>Manual (+L)</i> .													
Auto WB	First press arms auto white balance for one second, second press triggers AWB.													
Check Last Clip	Plays the last five seconds of the last recorded clip.													
Color Bars	Turns color bar on or off. Activation works only during Stby.													
Frame Grab	<div><div>Grabs a Log C still frame in .JPG and .DPX format and saves it to the USB medium in the GRABS directory. Frame grabs can be stored when the camera is in STBY, REC or PLAY. When triggered, the frame grab icon displayed on the home screen as well as the status info of the viewfinder and the SDI outputs reflects the frame grab status:</div><div><div></div><div><div>White:</div><div>Frame grab is stored to USB.</div><div>Orange:</div><div>Frame grab failed.</div></div></div><div><div>Note: Frame grabs are taken from the SDI image path (including SDI settings such as processing, active look and anamorphic desqueeze) but cropped to the active image area (without black borders). The frame grab resolution depends on the SDI format (HD / UHD):</div><table><tr><th>Recording Resolution</th><th>Grab Resolution (SDI = HD)</th><th>Grab Resolution (SDI = UHD)</th></tr><tr><td>LF Open Gate 4.5K</td><td>1547 x 1076</td><td>3094 x 2153</td></tr><tr><td>LF 2.39:1</td><td>1906 x 795</td><td>3812 x 1590</td></tr><tr><td>LF 16:9 UHD/HD/2K</td><td>1920 x 1080</td><td>3840 x 2160</td></tr></table></div></div>		Recording Resolution	Grab Resolution (SDI = HD)	Grab Resolution (SDI = UHD)	LF Open Gate 4.5K	1547 x 1076	3094 x 2153	LF 2.39:1	1906 x 795	3812 x 1590	LF 16:9 UHD/HD/2K	1920 x 1080	3840 x 2160
Recording Resolution	Grab Resolution (SDI = HD)	Grab Resolution (SDI = UHD)												
LF Open Gate 4.5K	1547 x 1076	3094 x 2153												
LF 2.39:1	1906 x 795	3812 x 1590												
LF 16:9 UHD/HD/2K	1920 x 1080	3840 x 2160												

User Button Functions	
<i>Frame Line Color</i>	Changes the frame line color.
<i>Iris Auto</i>	Only for use with EF lenses. Triggers automatic iris.
<i>Iris Close</i>	Only for use with EF lenses. Closes the iris of a lens. Short press closes by 1/x stop (step size depending on lens), long press closes by 1 stop per 0.5 seconds.
<i>Iris Open</i>	Only for use with EF lenses. Opens the iris of a lens. Short press opens by 1/x stop (step size depending on lens), long press opens by 1 stop per 0.5 seconds.
<i>Button FN</i>	Behaves identically to FN button on camera body. Note: Only available for GPIO box and Master Grip user buttons.
<i>Button 1 to Button 3</i>	Behaves identically to button 1, button 2 or button 3 on camera body. Note: Only available for GPIO box and Master Grip user buttons.
<i>Overlay Menu</i>	Activates or deactivates the overlay menu on MVF-2 EVF, monitor and SDI (when SDI processing is activated).
<i>Playback</i>	Behaves identically to the <i>PLAY</i> button on MVF-2.
<i>Record Start/Stop</i>	Behaves identically to the <i>REC</i> button.
<i>WiFi Power</i>	Toggles WiFi power On and Off.

## 24 Metadata

An ARRI camera automatically collects metadata when shooting. This metadata is stored in the header of recorded MXF/Apple ProRes and MXF/ARRIRAW files. The data is also stored in separate Avid Log Exchange ALE files, which keep track of all statics that are recorded on one recording media. Additionally, ARRI cameras can record lens data dynamically frame-by-frame. Static and dynamic metadata can be extracted e.g. from all recording formats by using [ARRI Meta Extract](#), a free ARRI tool.



The most important metadata for post production workflow is the tape name, as it will be one of the primary identifiers used in the EDL. The term tape name is an existing post-production naming convention that is also used for nonlinear media. The terms tape name and reel name may be used interchangeably. The tape name of ALEXA files is limited to 8 letters to match the CMX 3600 EDL standard. It consists of the camera index, reel counter and the camera ID. Based on the previous example, the tape name of the clip would be A004R18T. Even if the user forgets to assign different camera indices to two cameras on the same project, the camera ID metadata guarantees unique tape names.

In post-production, lens data and other metadata can be accessed and visualized directly in the [ARRIRAW Converter](#). [ARRI Meta Extract](#) on the other hand is able to export all metadata, audio as well as look files from any ARRI original camera negative. The third option is the so called ARRI Metadata Bridge (AMB), a software development kit, which can be implemented by 3rd parties to gain direct

access to the embedded metadata in their tools. Through AMB we're closely working with VFX tool manufacturers for years now to enable and enhance their systems to auto-sense e.g. lens data in ARRI original camera negatives and use it to trigger e.g. a de-focus effect.

For more information about ALEXA metadata, please refer to the ALEXA metadata white paper, available in the [White Papers](#) section on the ARRI website.

### Production Metadata in Camera Menu

1. Select *MENU > Metadata*.

Following options are available:

- *Production*
- *Prod. Company*
- *Director*
- *Cinematographer*
- *Camera operator*
- *Location*
- *Scene*
- *Take*
- *User info 1 & 2*

2. Select the metadata field you want to edit.

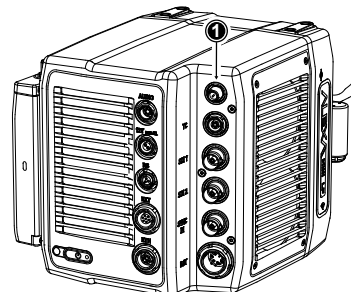


## 25 Electronic Control System (ECS)

### 25.1 White Radio Configuration

The camera contains a radio unit that allows for wireless lens control, lens data communication and remote control of basic camera functions in combination with the ARRI Wireless Compact Unit WCU-4 or ARRI Single Axis Unit SXU-1. The radio system is called white radio. The white radio antenna connector is located at the camera rear (1).

In order to assume a correct wireless operation, please ensure that the white radio antenna is installed correctly on the camera.



#### Radio Power

- ▶ Select *MENU > Electronic Control System (ECS) > Radio > Power* and set white radio power on or off. Per factory default, radio power is disabled.

#### WRS

Active white radio is indicated through the WRS (Wireless Remote System) icon displayed on the HOME screen as well as in the status info of the viewfinder and the SDI outputs.

Additional radio information is displayed in two status entries in the white radio submenu:

- ▶ *MENU > Electronic Control System (ECS) > Radio > Status* shows the current status of the white radio module:
  - *Off* (white radio disabled)
  - *Init* (white radio initializing)
  - *Ready* (white radio initialized and ready to be used)
  - *Blocked* (selected white radio channel is already used by another camera on set)
- ▶ *MENU > Electronic Control System (ECS) > Radio > Connected Devices* displays the amount of hand units connected to the camera. Up to three hand units can connect to one camera in parallel.

#### White Radio Channel

The white radio module offers 14 channels to choose from.

- ▶ Select *MENU > Electronic Control System (ECS) > Radio > Channel* and set the white radio channel:

Channel	Frequency	ZigBee IEEE 802.15.4 Channel
0	2.410 GHz	12
1	2.415 GHz	13
2	2.430 GHz	16
3	2.435 GHz	17
4	2.450 GHz	20
5	2.455 GHz	21
6	2.470 GHz	24

Channel	Frequency	ZigBee IEEE 802.15.4 Channel
7	2.475 GHz	25
8	2.420 GHz	14
9	2.425 GHz	15
10	2.440 GHz	18
11	2.445 GHz	19
12	2.460 GHz	22
13	2.465 GHz	23

Note: Make sure to set the white radio channel accordingly on the hand unit.

Note: Make sure that each camera on set uses its own white radio channel.

Note: It is not supported that one hand unit connects to two cameras in parallel.

Note: When using white radio and WiFi simultaneously it is important to configure the used channels to avoid interference and guarantee optimal performance. See the channel configuration table in the WiFi chapter "WiFi Host Channel" for more information.

## Wireless Region Setting

The wireless region setting specifies the region the white radio can be used in compliance with local regulations.

1. Select *MENU > Electronic Control System (ECS) > Radio > Wireless Region Setting*.

The following options are available:

<i>Australia</i>	<i>India</i>	<i>South Africa</i>
<i>Canada</i>	<i>Israel</i>	<i>South Korea</i>
<i>China</i>	<i>Japan</i>	<i>Taiwan</i>
<i>Egypt</i>	<i>New Zealand</i>	<i>Thailand</i>
<i>Europe</i>	<i>Philippines</i>	<i>UAE</i>
<i>Hong Kong</i>	<i>Singapore</i>	<i>USA</i>
		<i>World</i>

2. Set the region the white radio is used in.

### NOTICE

Please ensure that the region is configured correctly, as it may be illegal to use white radio in a region other than specified in the setting. All settings are compliant to FCC and IC regulations.

## Connect a Hand Unit to the Camera

- Make sure camera and hand unit are set to use the same white radio channel and wireless region.

The hand unit connects automatically to the camera.

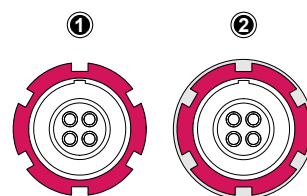
## 25.2 Lens Motors

The ALEXA Mini LF supports the use of cforce mini and cforce plus lens motors. Lens motors are connected to the LBUS connector of the lens mount and can be daisy chained. The motors can be hot plugged, no need to switch off the camera.

When connecting a cforce plus motor to the camera please make sure that the LBUS connector(s) on both motor and lens mount are equipped with a silver washer placed below the red nut (2) of the connector.

If the LBUS connectors on either cforce plus motor or lens mount (or both) miss the silver washer (1), the cforce plus motor needs to be supplied with external power (e.g. D-Tap from a battery adapter plate) in order to ensure proper performance.

Note: cforce mini motors are not affected and can always be powered through the lens mount.



## Motor Calibration

After connecting a lens motor to the camera it must be calibrated.

**CAL** The camera indicates the calibration request by displaying the CAL icon on the home screen as well as in the status info of the viewfinder and the SDI outputs.

- Select *MENU > Electronic Control System (ECS) > Calibrate All Motors* to start calibration of all connected lens motors.

Additionally, motor calibration can be triggered through the hand unit or the motor itself.

#### **NOTICE**

Do not trigger a calibration unless all connected motors are attached to the lens.

### **Lens Motor Configuration**

1. Select *MENU > Electronic Control System (ECS) > LBUS Lens Motor Configuration*.

The following options are available:

<i>Focus/Iris/ Zoom Motor Torque</i>	Set the torque of a lens motor, available values in the range of 1 (lowest) to 4 (highest).
<i>Focus/Iris/Zoom Motor Direction</i>	Available values are <i>Left</i> and <i>Right</i> . Set direction according to motor position when standing behind the camera.
<i>Focus/Iris/Zoom Motor Teeth Count</i>	Selects the number of teeth of the motor. Available values are <i>Auto</i> , <i>40t</i> , <i>50t</i> , and <i>60t</i> .  The motor teeth count setting is only active when a LDA lens table is active and is used to assure correct lens table mappings when using a different motor gear than the one the lens table was initially created with.

You may have to change the direction of the Focus, Iris, and Zoom axis motor depending on the mounting position of the motor (left/right side or top/bottom).

## **25.3 Lens Data**

Lens data can be provided in two different ways, depending on the type of lens:

- **LDS Lenses**  
These lenses contain an integrated electronic interface that sends information about focus, iris and zoom directly to the camera.
- **Non-LDS Lenses**  
These lenses do not have an LDS interface, hence information about focus, iris and zoom need to be gathered from lens motors and translated into sensible values with the help of lens tables. These lens tables are stored in the camera internal Lens Data Archive (LDA).

### **Lens Data Archive (LDA)**

The LDA contains lens tables which offer lens data functionality with non-LDS lenses in connection with lens motors. It is possible to add or delete lens tables from the lens data archive. You can transmit LDA files that are stored on the SD card of the WCU-4 wirelessly to the camera. There is no need to copy the files from the WCU-4 SD card to USB and then to the camera.

When a non-LDS lens is connected, the user can achieve LDS functionality by using the Lens Data Archive. In the LDS screen, a button labeled LDA appears when a non-LDS lens is connected. The LDA screen consists of a user list and a main archive list. The user list should only contain the lenses currently used to achieve quick access to the desired lens tables. The main archive contains a set of lens tables for ARRI/Zeiss High Speeds (also known as Super Speeds), Master Primes and Ultra Primes and can be extended with additional lens tables for any PL-Mount lens.

For information on how to generate a lens table please see the Wireless Compact Unit WCU-4 user manual.

**Note:** It is possible to load a lens table even when an LDS lens is attached. The LDA values calculated from motor positions and lens tables take precedence over the values communicated by the lens itself. This can be necessary, if the lens data from the lens is faulty or imprecise.

#### NOTICE

Please note that as soon as a LDA table is activated, the LDS contacts of the lens mount are switched off. There is no need to switch the mount off manually when using LDA.

### 25.3.1 Adding Lens Tables (LDA)

1. Select *MENU > Electronic Control System (ECS) > Lens Data > Lens Tables Installed > ADD*.
2. Press *IMPORT* to import lens tables from a USB medium or *DEFAULTS* to select a lens table from the internal lens tables default list.
3. Select the desired lens table from the list and press *IMPORT*.  
The lens table is imported to the cameras Lens Tables Installed list.
4. To use the lens table, select the lens table from the Lens Tables Installed list and press *SET*.  
Some lens tables contain different scale classes for the same model. The scale class of an individual lens is engraved on the lens barrel. If required: select the corresponding scale class from the list.

#### Lens Tables Favorites List

Frequently used lens tables can be added to a favorites list. The list shows all lenses that have been added before, including the selected scale class.

#### Add Lens Tables to the Favorites List

1. Select *MENU > Electronic Control System (ECS) > Lens Data > Lens Tables Installed* and select and set a lens table for use.
2. Select *MENU > Electronic Control System (ECS) > Lens Table > Add to Favorites* to add the lens table to the favorites list.

#### Select a Lens Table from the Favorites List

1. Select *MENU > Electronic Control System (ECS) > Lens Data > Lens Table Favorites*.  
A list with favorite lens tables is displayed.
2. Select and set a lens table from the list.

## 26 Remote Control

### 26.1 Wireless Control Unit WCU-4

The WCU-4 is an all-inclusive and yet affordable hand unit offering up to 3-axis lens control. It includes a newly designed, super-smooth focus knob with adjustable friction and backlit, optionally pre-marked focus rings that are well readable in the dark without distracting performers. The whole unit is completely splash proof for ARRI-typical reliability. The slider has its scale on the 3" display, providing clearly readable T-stop numbers and optional on-screen markings. If preferred, the slider can be also set to show zoom scales. With the additional ALEXA Remote license, the WCU-4 shows extended camera status information and allows changing camera parameters from the remote unit.

### 26.2 Web Remote (Beta Version)

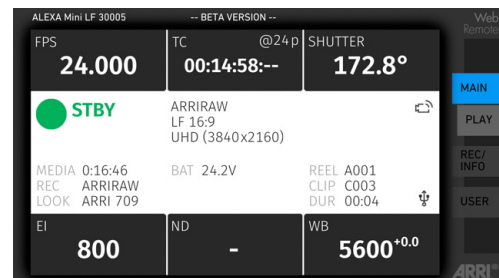
ALEXA Mini LF has a web remote function for full remote control of the camera with a web browser. The web remote requires a connection to the camera via WiFi or Ethernet (with ALEXA Ethernet/RJ-45 Cable KC-153-S, K2.72021.0).

WiFi is enabled per factory default. If WiFi is inactive, enable WiFi via the MVF-2 in *MENU > System > Network / WiFi > WiFi Power*. Without the MVF-2 connected enable WiFi by pressing Function button FN and camera button 6.

The web remote is divided into the following four sections:

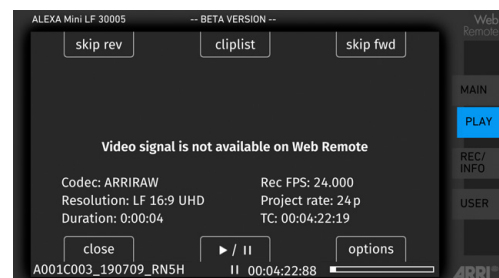
#### MAIN

Shows the same user interface as the MVF-2, except for the live screen. Click/tap the screen button tabs to enter a screen/trigger a function. Slide to the left to access the camera menu.



#### PLAY

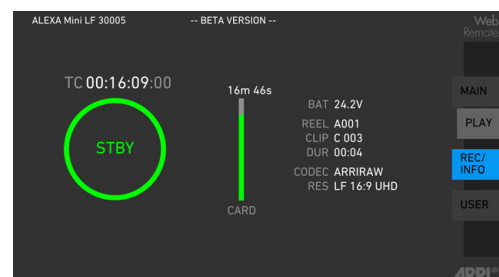
Starts playback from the recording media. Provides the same controls as the MVF-2, but does not show a video signal.



#### REC INFO

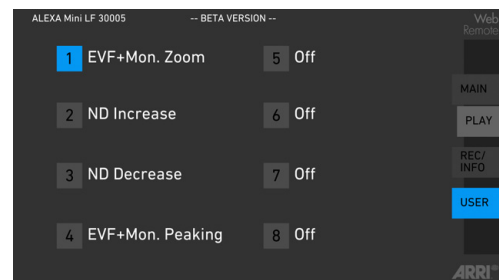
Contains information on the main recording parameters, plus a REC button. Click the big circle icon to start/stop recording.

Note: Rec status and timecode may respond slightly delayed depending on the network's speed.



### USER

Shows configuration of the camera user buttons and allows you to trigger them. Press the number icons to trigger the user buttons.



### Access to Web Remote

- Open a web browser and enter the URL: `http://mini-LF-xxxxx.local` (replace xxxxx with your camera's 5-digit serial number).

To use the web remote function via this URL, the device must support zero-configuration networking (zeroconf), e.g. through Apple Bonjour. Without zeroconf, the web remote can be reached via the network's IP address (WiFi or LAN IP). The WiFi IP is fixed to 192.168.153.1. The LAN IP can be either assigned from a DHCP server or configured manually, and can be checked with an MVF-2 in *MENU > Info > Network Info*.

#### NOTICE

Frequent reloading of the web remote camera interface connected with WiFi indicates a limited WiFi range. Please place the device closer to the camera or connect via Ethernet. You may also consider to use the WiFi client mode which allows connecting the camera to a WiFi network.

## 26.3 Camera Access Protocol (CAP)

The Camera Access Protocol (CAP) is an IP based API used to control and monitor ARRI cameras via a network connection. The protocol incorporates functions to perform color grading, query and set values like exposure index or sensor frame rate, start and stop recording and many more. It is currently available for ALEXA LF, ALEXA Mini LF, ALEXA 65, ALEXA SXT, ALEXA Mini and AMIRA cameras.

Information on the Camera Access Protocol is available through the ARRI partner program free of charge. For more details please see our [ARRI Partner Program](#) and the Camera Access Protocol Feature List in the [White Papers](#) section on the ARRI website.

### Activation of CAP Server

- Select *MENU > System > Camera Access Protocol (CAP)* to switch remote access to the camera via the Camera Access Protocol on or off.

### CAP Server Password

1. Select *MENU > System > Camera Access Protocol (CAP) > Cap Server Password*.
2. Use the on-screen keyboard to enter a password used for Camera Access Protocol connections.

### CAP Client List

The CAP client list shows the name of the currently connected client. The list shows 'NONE' if no client is connected, and 'NO NAME' if the connected client has not transmitted its name.

- Select *MENU > System > Camera Access Protocol (CAP) > CAP Client List* to display the list.

## 27 Transvideo Starlite HD5-ARRI Monitor

The Transvideo Starlite HD5-ARRI monitor (K2.0006960) is a 5" 3G-SDI OLED monitor with an integrated H.264 recorder, a touchscreen and a special ARRI bus interface to communicate with the camera. It allows basic operation of the camera. All overlays required for touch operation are generated by the camera and transferred to the Starlite monitor via HD-SDI. For this reason, monitors daisy-chained to the Starlite will show the overlays as well.

### Connection to Camera

1. Connect the monitor to an SDI output of the camera.

Make sure the SDI image of the output is configured to *Processed*, not *Clean*. For more information, see SDI Image.

2. Connect the power cable (Lemo 5-pin to Lemo 6-pin):

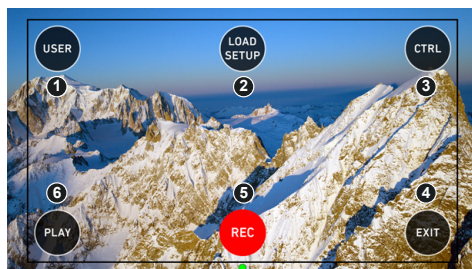
Connect the Lemo 5-pin plug to the POWER connector of the monitor.

Connect the Lemo 6-pin plug to the EXT connector of the camera.

### Main Menu

- Activate the menu by pressing the blue "A" touch icon on the monitor.

The main screen opens up:



- Press *USER* (1) to access the user button menu.
- Press *LOAD SETUP* (2) to load a user setup from the list of installed user setups on the camera.
- Press *CTRL* (3) to activate the overlay menu.
- Press *PLAY* (6) to start playback.
- Press *REC* (5) to start or stop recording.
- Press *EXIT* (4) to exit the ARRI menu and to return to the standard Starlite mode.

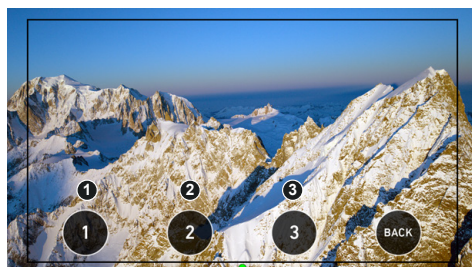
Note: All overlays disappear after a few seconds of inactivity.

### User Button Menu

In the user button menu, the same functions are available as with the camera user buttons (1) to (3).

1. Activate the menu by pressing the blue "A" touch icon on the monitor.
2. Press *USER* to access the user button menu.

The user screen is displayed:



- Press the buttons to toggle the assigned user button function.
- A gray button indicates an active function.
- Return to the main menu by pressing the *BACK* icon.

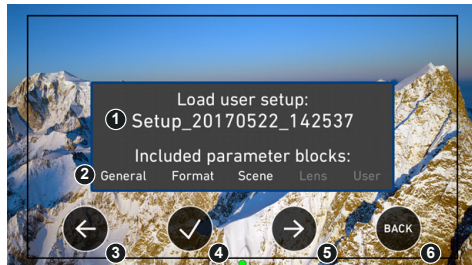


## User Setup Menu

In the load user setup menu, you can load user setup files that have been stored on the camera.

1. Activate the menu by pressing the blue "A" touch icon on the monitor.
2. Press *LOAD SETUP* to load a user setup from the list of installed user setups on the camera.

The user setup screen is displayed:



- Select the user setup file to be loaded (1) with the left (3) and right (5) arrow buttons.
- Confirm the selection of the user setup file by pressing the checkmark (4).
- Cancel user setup loading and return to the main menu by pressing *BACK* (6).

## Control Menu

In the control menu, the main camera parameters can be edited similar to the Overlay Menu.

1. Activate the menu by pressing the blue "A" touch icon on the monitor.
2. Press *CTRL* to activate the overlay menu.

The control screen is displayed:

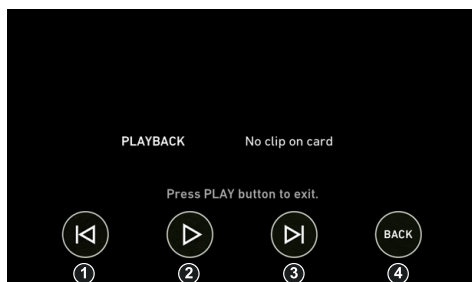


- Select a parameter by pressing the touch icon (1) or (3) to move the selection rectangle left or right.
- Select the parameter by pressing the touch icon (2).
- Edit the parameter by pressing the touch icons (1) or (3).
- End editing by pressing the touch icon (2).
- Exit the control menu by pressing the *BACK* (4) icon.

## Playback Menu

1. Activate the menu by pressing the blue "A" touch icon on the monitor.
2. Press *PLAY* to start playback.

The playback screen is displayed:



- Play or pause a clip by pressing the *PLAY* touch icon (2).
- Skip to previous or to next clip by pressing the *Skip previous* (1) or *Skip next* (3) touch icons.
- While playback is running, press *Fast backward* (1) or *Fast forward* (3) to decrease or increase playback speed.
- Exit playback and return to the main menu by pressing the *BACK* touch icon (4).





## Frame Line & Lens Illumination Tool

The Lens Illumination Tool is an interactive visual guide that shows how different lenses illuminate different sensor modes and target aspect ratios of ARRI ALEXA, ALEXA Mini, ALEXA Mini LF and AMIRA cameras. The LIT is meant as a first step, and as a guide only - we strongly recommend that you shoot your own tests to determine the exact behavior of the lenses you plan to use. Each lens type is designed to cover a certain image circle, within which the manufacturer upholds image quality criteria, including illumination. Lenses still show an image outside of this image circle, but of an undefined image quality. Farther out from the image circle there is a point at which there is no more light, defining the 'illumination circle'. The size of the illumination circle changes based on lens design, focal length, focus setting and iris setting, which is why we have provided tools for playing around with all those parameters. All lenses are brighter, and have a better image quality in the center than in the corners, though light distribution differs vastly between lenses. This guide allows you to take a look at how much illumination there is within a given sensor mode and target aspect ratio. The guide only shows illumination and not any other image quality parameter. It was created by shooting a gray chart with each lens as a rough guide; please note that based on image content your results may vary. For each lens type and focal length, the chart was created by using one particular physical lens (not design data), and we display the serial number of that lens. Based on the manufacturing tolerances and service history of the lenses out there, your results may also vary. The tool accommodates ARRI Signature Primes, the ARRI Ultra Wide Zoom, all ARRI Master Primes (except the 14mm Master Prime), the ARRI Master Macro, all ARRI Ultra Primes, the ARRI Alura Studio and Lightweight Zooms, and the Cooke Mini S4 18, 25, 32 and 40mm. It's also now possible to upload frame lines (created by you, or other users, with the ARRI Frameline Composer) into the LIT. This enables direct comparisons between different lenses within the particular frame lines.

► [Frame Line & Lens Illumination Tool](#)

## Formats and Data Rate Calculator

The ARRI Formats and Data Rate Calculator (FDRC) is an online tool that calculates the record duration and data rates for different camera settings (combinations of camera model, codec, resolution, project rate, sensor speed, recording media, audio on/off). It also gives deeper insight into available recording formats and camera modes. The section "Format Preview" lists the sensor and recording resolution for each recording format as well as a graphical preview for both sensor and recorded clip.

► [Formats & Data Rate Calculator](#)

## LUT Generator

Generally speaking LUTs (Look Up Tables) are used to manipulate image data. The LUT transforms a digital signal to adjust the sensitivity, gamma and provide a color correct monitoring input. Nowadays on-set color correction is not a novelty anymore, nevertheless Look Up Tables are still needed to convert ARRI's Log C to a viewable format (e. g. REC 2020 or REC 709) or an otherwise needed format (conversion to linear space for VFX). Our LUT Generator can create the LUT you need.

► [LUT Generator](#)

## Camera Simulator

The camera simulator is an interactive learning tool to familiarize yourself with the menu navigation of ARRI digital cameras. The main user interface on the viewfinder shows a simulation of the real camera. If you choose „Explorer“ from the top-bar you can explore all bits and pieces around the camera, its connectors as well as the viewfinder. Get started now and learn first hand the simple, straightforward menu system that only the ARRI digital cameras offer.

► [Camera Simulators](#)

## ARRIRAW Converter

The ARRIRAW Converter (ARC) is ARRI's free reference tool for processing MXF/ARRIRAW or ARRIRAW files to render images of optimal quality. It contains ARRI's Software Development Kit (SDK) which is also used in the postproduction tools Adobe, Autodesk, Blackmagic, Colorfront, FilmLight, Filmmaster, Nablet AVID AMA PlugIn, The Foundry, and many others. Use the ARRIRAW Converter to

- Create projects with bins and sequences
- Display ARRIRAW and MXF/ARRIRAW files using individual processing settings
- Apply different looks on the footage
- Display metadata
- Render files to one of the common formats for post-production such as OpenEXR, DPX or QuickTime/ProRes or to transcode MFX/ARRIRAW files into ARRIRAW files

► [ARRIRAW Converter](#)

## ARRI Meta Extract

ARRI's digital cameras can acquire metadata during recording. Metadata not only describes the file itself but can transport other information like details on the camera settings, sensor speed or a look file. These static types of metadata can be combined with dynamic metadata where the values change while shooting – like lens data information from the Lens Data System. The complete metadata information is stored in ALEXA or AMIRA output formats: ARRIRAW, MXF/ARRIRAW, ProRes and DNxHD. Also, the sidecar files \*.ale and \*.xml carry some of that information. ARRI Meta Extract is available as a GUI (graphical user interface) for Mac OS X, Windows x64, Ubuntu or as CMD (command line) application for Mac OS X, Windows x64, Cent OS, Ubuntu and SLES.

► [ARRI Meta Extract](#)

## ARRI Color Tool

ARRI Color Tool is a free utility for creating the new ARRI Look File 2 for ALEXA LF, ALEXA SXT, ALEXA 65, ALEXA Mini, ALEXA Mini LF and AMIRA cameras. You can use the ARRI Color Tool to create a completely new look or modify an existing look based on Log C Apple ProRes clips or Log C \*.dpx grabs from all ARRI cameras. Some 3rd party post processing tools do not support ALF-2 looks natively. ACT allows one to export 3D LUTs in order to be compatible with these tools. ACT is available for Mac OS X and Windows x64.

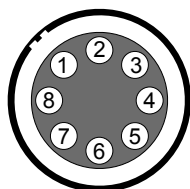
► [ARRI Color Tool](#)

## 28.2 Connector Pin-Outs

**Note:** All pin-outs for camera interfaces appear as seen by the user.

### BAT

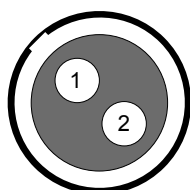
Connector ID: LEMO EEJ.2B.308



- 1 Batcom
- 2 Powergnd
- 3 Powergnd
- 4 Powergnd
- 5 Batcom Gnd
- 6 Batplus
- 7 Batplus
- 8 Batplus

### 12 V

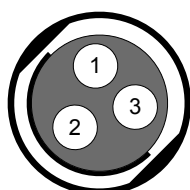
Connector ID: LEMO EEG.0B.302.CLN.A365



- 1 GND
- 2 12 V Aux

### RS

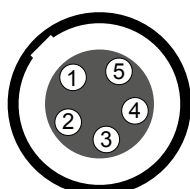
Connector ID: Fischer DPB102A052-130



- 1 GND
- 2 24 V Aux
- 3 R/S

### TC

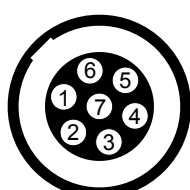
Connector ID: LEMO EEG.0B.305



- 1 GND
- 2 LTC In
- 3 Aux
- 4 Aux
- 5 LTC Out

### EXT

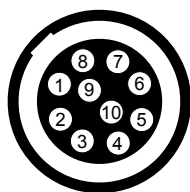
Connector ID: LEMO EEG.1B.307



- 1 Can1 H
- 2 Can1 L
- 3 Can2 H
- 4 Can2 L
- 5 24V Aux
- 6 GND
- 7 R/S

## Ethernet (Camera Side)

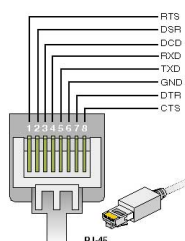
Connector ID: LEMO EEG.1B.310



- 1 MX-1P CTS (white-orange)
- 2 MX-1N DTR (orange)
- 3 MX-2P GND (white-green)
- 4 MX-2N DCD (green)
- 5 MX-3P TXD (blue)
- 6 MX-3N RXD (white-blue)
- 7 MX-4P DSR (white-brown)
- 8 MX-4N RTS (brown)
- 9 GND
- 10 Proprietary - do not use

## Ethernet (PC Side)

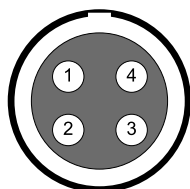
Connector ID: RJ 45



- RTS brown
- DSR white-brown
- DCD green
- RXD white-blue
- TXD blue
- GND white-green
- DTR orange
- CTS white-orange

## LBUS (on Lens Mount)

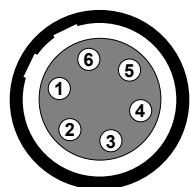
Connector ID: LEMO EEG.0B.304



- 1 GND
- 2 Can L
- 3 VBat
- 4 Can H

## Audio

Connector ID: LEMO EEG.0B.306.CLN



- 1 GND
- 2 CH 1 (+)
- 3 CH 1 (-)
- 4 CH 2 (+)
- 5 CH 2 (-)
- 6 12 V

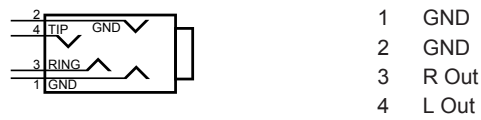
Audio Cable K2.0023988

ARRI offers an ALEXA Mini LF audio cable with a matching connector to create audio adapters. The following table shows the wire assignments of this cable.

Function	Wire
GND	black
CH 1 (+)	blue
CH 1 (-)	brown
CH 2 (+)	yellow
CH 2 (-)	green
12 V	red

Headphone out (on MVF-2)

Connector ID: 3,5 mm TRS jack



## 28.3 Technical Data

<b>Sensor Type</b>	Large Format ARRI ALEV III (A2X) CMOS sensor with Bayer pattern color filter array	
<b>Sensor Size</b>	36.70 x 25.54 mm / 1.444 x 1.005" Ø 44.71 mm / 1.760"	
<b>Photosite Pitch</b>	8.25 µm	
<b>Sensor Frame Rates</b>	0.75 - 90fps	
<b>Sensor Active Image Area (photosites)</b>	LF Open Gate ProRes 4.5K:	4448 x 3096
	LF Open Gate ARRIRAW 4.5K:	4448 x 3096
	LF 16:9 ProRes HD:	3840 x 2160
	LF 16:9 ProRes 2K:	3840 x 2160
	LF 16:9 ProRes UHD:	3840 x 2160
	LF 16:9 ARRIRAW UHD:	3840 x 2160
	LF 2.39:1 ProRes 4.5K:	4448 x 1856
	LF 2.39:1 ARRIRAW 4.5K:	4448 x 1856
<b>Sensor Active Image Area (dimensions)</b>	LF Open Gate ProRes 4.5K:	36.70 x 25.54 mm 1.445 x 1.006"
	LF Open Gate ARRIRAW 4.5K:	36.70 x 25.54 mm 1.445 x 1.006"
	LF 16:9 ProRes HD:	31.68 x 17.82 mm 1.247 x 0.702"
	LF 16:9 ProRes 2K:	31.68 x 17.82 mm 1.247 x 0.702"
	LF 16:9 ProRes UHD:	31.68 x 17.82 mm 1.247 x 0.702"
	LF 16:9 ARRIRAW UHD:	31.68 x 17.82 mm 1.247 x 0.702"
	LF 2.39:1 ProRes 4.5K:	36.70 x 15.31 mm 1.445 x 0.603"
	LF 2.39:1 ARRIRAW 4.5K:	36.70 x 15.31 mm 1.445 x 0.603"
<b>Recording File Container Size (pixel)</b>	LF Open Gate ProRes 4.5K:	4480 x 3096
	LF Open Gate ARRIRAW 4.5K:	4448 x 3096
	LF 16:9 ProRes HD:	1920 x 1080
	LF 16:9 ProRes 2K:	2048 x 1152
	LF 16:9 ProRes UHD:	3840 x 2160
	LF 16:9 ARRIRAW UHD:	3840 x 2160
	LF 2.39:1 ProRes 4.5K:	4480 x 1856
	LF 2.39:1 ARRIRAW 4.5K:	4448 x 1856
<b>Exposure Latitude</b>	14+ stops over the entire sensitivity range from EI 160 to EI 3200 as measured with the ARRI Dynamic Range Test Chart (DRTC-1)	
<b>Exposure Index</b>	Adjustable from EI 160-3200 in 1/3 stops, EI 800 base sensitivity	
<b>Shutter</b>	Electronic shutter, 5.0°- 356° or 1s - 1/8000s	

Recording Formats	MXF/ARRIRAW MXF/Apple ProRes 4444 XQ MXF/Apple ProRes 4444 MXF/Apple ProRes 422 (HQ)																							
Recording Media	Codex Compact Drive™																							
Recording Frame Rates	LF Open Gate ProRes 4.5K: 0.75 - 40 fps LF Open Gate ARRIRAW 4.5K: 0.75 - 40 fps LF 16:9 ProRes HD: 0.75 - 90 fps LF 16:9 ProRes 2K: 0.75 - 90 fps LF 16:9 ProRes UHD: 0.75 - 60 fps LF 16:9 ARRIRAW UHD: 0.75 - 60 fps LF 2.39:1 ProRes 4.5K: 0.75 - 60 fps LF 2.39:1 ARRIRAW 4.5K: 0.75 - 60 fps																							
Recording Modes	Standard real-time recording																							
Viewfinder Type	Multi Viewfinder MVF-2 with 4,0" flip-out monitor and CoaXPress interface																							
Viewfinder Technology	OLED viewfinder display LCD flip-out monitor																							
Viewfinder Resolution (pixel)	1920 x 1080																							
Viewfinder Diopter	Adjustable from -5 to +5 diopters																							
Color Output	Rec 709 Rec 2020 Log C Custom Look (ARRI Look File ALF-2)																							
Look Control	Import of custom 3D LUT ASC CDL parameters (slope, offset, power, saturation)																							
White Balance	Manual and auto white balance, adjustable from 2000K to 11000K in 10K steps Color correction adjustable range from -16 to +16 CC 1 CC corresponds to 035 Kodak CC values or 1/8 Rosco values																							
Filters	Built-in motorized ND filters 0.6, 1.2, 1.8 Fixed optical low pass, UV, IR filter																							
Image Outputs	1x proprietary signal output for MVF-2 viewfinder on VF CoaXPress connector 2x SDI outputs on BNC connectors: <table><tr><td>SDI 1:</td><td>1.5G 422 HD</td><td>(SMPTE ST292-1, up to 30 fps)</td></tr><tr><td></td><td>3G 422 HD</td><td>(SMPTE ST425-1, up to 60 fps)</td></tr><tr><td></td><td>3G 444 HD</td><td>(SMPTE ST425-3, up to 30 fps)</td></tr><tr><td>SDI 2:</td><td>1.5G 422 HD</td><td>(SMPTE ST292-1, up to 30 fps)</td></tr><tr><td></td><td>3G 422 HD</td><td>(SMPTE ST425-1, up to 60 fps)</td></tr><tr><td></td><td>3G 444 HD</td><td>(SMPTE ST425-3, up to 30 fps)</td></tr><tr><td></td><td>6G 422 UHD</td><td>(SMPTE ST2081-10, up to 30 fps)</td></tr></table> Both SDI outputs carry uncompressed video with embedded audio and metadata. SDI1 - HD only, processed or clean, with or without a look file applied SDI2 - HD or UHD, clean only, with or without a look file applied or SDI1 clone “Clean” is an image without any overlays (status, false color, zebra, frame-lines, etc.), “processed” is an image with overlays.			SDI 1:	1.5G 422 HD	(SMPTE ST292-1, up to 30 fps)		3G 422 HD	(SMPTE ST425-1, up to 60 fps)		3G 444 HD	(SMPTE ST425-3, up to 30 fps)	SDI 2:	1.5G 422 HD	(SMPTE ST292-1, up to 30 fps)		3G 422 HD	(SMPTE ST425-1, up to 60 fps)		3G 444 HD	(SMPTE ST425-3, up to 30 fps)		6G 422 UHD	(SMPTE ST2081-10, up to 30 fps)
SDI 1:	1.5G 422 HD	(SMPTE ST292-1, up to 30 fps)																						
	3G 422 HD	(SMPTE ST425-1, up to 60 fps)																						
	3G 444 HD	(SMPTE ST425-3, up to 30 fps)																						
SDI 2:	1.5G 422 HD	(SMPTE ST292-1, up to 30 fps)																						
	3G 422 HD	(SMPTE ST425-1, up to 60 fps)																						
	3G 444 HD	(SMPTE ST425-3, up to 30 fps)																						
	6G 422 UHD	(SMPTE ST2081-10, up to 30 fps)																						
Lens Squeeze Factors	1.00, 1.25, 1.30, 1.50, 1.65, 1.80, 2.00																							



<b>Exposure and Focus Tools</b>	False Color Zebra Zoom Aperture and Color Peaking
<b>Audio Input</b>	1x LEMO 6pin balanced stereo line in (Line input max. level +24dBu correlating to 0dBFS) Built-in microphones for scratch audio
<b>Audio Output</b>	SDI (embedded) 3.5 mm Headphones out on MVF-2
<b>Audio Recording</b>	4 channel linear PCM (24 bit, 48 kHz)
<b>Remote Control Options</b>	MVF-2 viewfinder can act as wired remote control with 10m/33ft cable, web-based remote control from smart phones, tablets and laptops via WiFi & Ethernet, Camera Access Protocol (CAP) via Ethernet & WiFi, GPIO interface for integration with custom control interfaces, WCU-4 hand-unit with control over lens motors and operational parameters via built-in white radio, SXU-1 hand-unit with control over one lens axis, OCU-1 and Master Grip control of lens and user buttons
<b>Interfaces</b>	1x LEMO 5pin LTC Timecode In/Out 1x LEMO 10pin Ethernet for remote control and service 1x BNC SYNC IN 1x LEMO 7pin EXT multi purpose accessory interface w. RS pin and 24V power output 1x LEMO 4pin LBUS (on lens mount) for lens motors, daisy chainable 1x USB 2.0 in media bay (for user setups, look files etc)
<b>Wireless Interfaces</b>	Built-in WiFi module (IEEE 802.11b/g) Built-in White Radio for ARRI lens and camera remote control
<b>Lens Mounts</b>	LPL mount with LBUS connector PL to LPL adapter Leitz Cine Wetzlar M mount
<b>Flange Focal Depth</b>	LPL mount: 44 mm With PL to LPL adapter: 52 mm
<b>Power Input</b>	1x LEMO 8pin (11.0 - 34.0 V DC)
<b>Power Consumption</b>	Around 69 W when recording ARRIRAW LF 16:9 UHD at 24 fps with MVF-2 attached
<b>Power Outputs</b>	1x Fischer 3pin 24V RS 1x LEMO 2pin 12V 1x LEMO 7pin EXT 24V 1x LEMO 4pin LBUS 24V (on lens mount) 1x LEMO 6pin AUDIO 12V 1x LEMO 10pin ETH 24V
<b>Measurements (HxWxL)</b>	140 x 143 x 188 mm / 5.5 x 5.6 x 7.4" (camera body with PL lens mount)
<b>Weight</b>	~ 2.7 kg / ~ 6 lbs (camera body with LPL lens mount)
<b>Operating Temperature</b>	-20° C to +45° C / -4° F to +113° F @ 95% relative humidity max, non condensing, splash and dust proof through sealed electronics
<b>Storage Temperature</b>	-30° C to +70° C / -22° F to +158° F
<b>Sound Level</b>	< 20 dB(A) at 24fps
<b>Software Licenses</b>	-

## 28.4 Declarations of Conformity

### Approval Information

The products offered by ARRI are approved for use in a number of countries. Product-specific information on approval can be found in the respective operating instruction manuals. Import and use in countries other than those mentioned in the respective operating instructions may be subject to legal, regulatory, or official requirements and regulations. Before the products are imported into these countries or used in these countries, compliance with the existing legal, regulatory, and administrative requirements and regulations must be ensured. It is the importer's or the user's responsibility, prior to importation or use, to inform themselves of the applicable legal, regulatory, and administrative requirements and regulations and to ensure compliance with these requirements and regulations, including applying for and obtaining any necessary approvals or registrations.

As far as reasonable and legally possible, ARRI will support requests in relation to such applications by providing technical documents or declarations. As an importer or user, you confirm that you are familiar with and comply with the legal, regulatory, and administrative requirements and regulations that apply in the countries to which you ship or use the products. You further confirm that you will arrange for any necessary registrations, enrollments, or authorizations that are required in such countries.

You release ARRI from all obligations resulting from any legislative, regulatory, or administrative requirements regarding import or use of the products, except in countries where ARRI has obtained a registration or certification. You agree to indemnify, defend, and hold ARRI harmless from any and all claims, damages, losses, liabilities, costs, and expenses (including reasonable fees of attorneys and other professionals) that may arise out of a demand on ARRI in connection with your obligations mentioned above.

### EU Declaration of Conformity

Brand Name: ARRI

Product Description: Digital Camera System

- **ARRI ALEXA MINI LF + Multi Viewfinder MVF-2**  
+ Europe Setting for Software 6.0 or later, Primes following Appendix I, Antenna following Appendix II

The designated products conform to the specifications of the following European directives:

- 1 Directive 2014/53/EU of the European Parliament and the Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment - OJ L 153, 22 May 2014, p. 62–106.
- 2 Directive 2011/65/EU of the European Parliament and the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment - OJ L 174, 1 July 2011, p. 88–110.

The compliance with the requirements of the European Directives was proved by the application of the following standards:

Essential Requirements regarding No 1:

Following Art. 3.1 a, 2014/35/EU:	EN 62368-1:2014 + AC:2015-05 + AC:2015-11; EN 62311:2008
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Following Art. 3.1 b,  
2014/30/EU:

EN 301 489-1 V2.1.1  
EN 301 489-17 V3.1.1  
EN 55032:2015  
EN 55035:2017

Art. 3.2 EN 300 328 V2.1.1

Essential Requirements regarding No 2:  
EN 50581:2012

To evaluate the respective information, we used:

[http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/index\\_en.htm](http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/index_en.htm)

Year of affixed CE-marking: 2019

#### APPENDIX I - List of Primes

Item	Model Name
1	ARRI Signature Primes with Lens Data System 2 with focal length 18-280 mm
2	PL-to-LPL Adapter + ARRI Lenses with Lens Data System 1

#### APPENDIX II - List of Antennas

Item	Manufacturer	Model Name	Gain (dBi)	Radiation Pattern	Type	Connector
For ECS White Radio RF Module EMIP400s:						
1	Nearson	S131AM-2450S	2.0	Omni-directional	Dipole	Reverse SMA
2	Proant	333 (Ex-it 2400 Foldable)	2.0	Omni-directional	Dipole	Reverse SMA
3	Radial/Larsen	R380.500.125	2.0	Omni-directional	Dipole	Reverse SMA
4	Wanshih	WSS002	2.0	Omni-directional	Dipole	Reverse SMA
5	Taoglas	GW26.0151	1.8	Omni-directional	Monopole	Reverse SMA
For WiFi 2.4 GHz RF Module ST60-2230C:						
6	Radial	R380.500.150	0.0	Omni-directional	Monopole	Reverse SMA
7	LAIRD	LSR/001-009	2.0	Omni-directional	Dipole	Reverse SMA

#### FCC Compliance Statement

**Class B Statement:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.
- **WIFI:** FCC ID: SQG-60SIPT
- **ECS transceiver module:** FCC ID: Y7N-EMIP400

### Industry Canada Compliance Statement

Complies with the Canadian ICES-003 Class B specifications.

*Cet appareil numérique de la Classe B est conforme à la norme NMB-003 du Canada.*

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: This device may not cause interference. This device must accept any interference, including interference that may cause undesired operation of the device.

*L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : L'appareil ne doit pas produire de brouillage; L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

- **WIFI:** IC ID: 3147A-602230C
- **ECS transceiver module:** IC ID: 9482A-EMIP400

### China

- **ECS Transceiver Module:** 本设备包含型号核准代码（分别）为：  
CMIIT ID: 2017DJ7863 (M)  
... 的无线电发射模块。
- **WiFi Module:** 本设备包含型号核准代码（分别）为：  
CMIIT ID: 2017AJ7897 (M)  
... 的无线电发射模块。
- **ALEXA Mini LF:** Pending

### Singapore

- Dealer's License No: DA103787  
Registration valid until 31. August 2024 for ALEXA Mini LF  
(EMIP400s & LAIRD ST60-2230C)

Complies with  
IMDA Standards  
DA103787

### India WPC Compliance Statement

- **WiFi:** Pending
- **ECS transceiver module:** ETH-1385/2018/ERLO

## South Korea

Statement for  
2.4 GHz Devices:

"해당무선설비는 운용 중 전파혼신 가능성이 있음"  
Translation for reference only: This radio device has  
the possibility of radio interference.

- **ALEXA Mini LF**: Certification No: R-R-ARg-ALEXA\_Mini\_LF - Pending
- **ECS Transceiver Module**: Certification No: R-CRM-ARg-EMIP400
- **WiFi Module**: Certification No: MSIP-CRM-LAI-60-2230C



## Japan

- **ECS Transceiver Module EMIP400**: 020-180030
- **WiFi Module**: 003-170091



## United Arab Emirates

- Wireless video devices: Dealer No: DA68290/17  
(Registration valid until: 28th August, 2022; brand registration: 5 years)
- ALEXA Mini LF: registered No: ER74494/19

## Australia and New Zealand

- ALEXA Mini LF



R-NZ

## Philippines

Pending



## Egypt

Pending



**South Africa**

Pending

**Taiwan**

Pending

## **28.5 Dimensional Drawings**

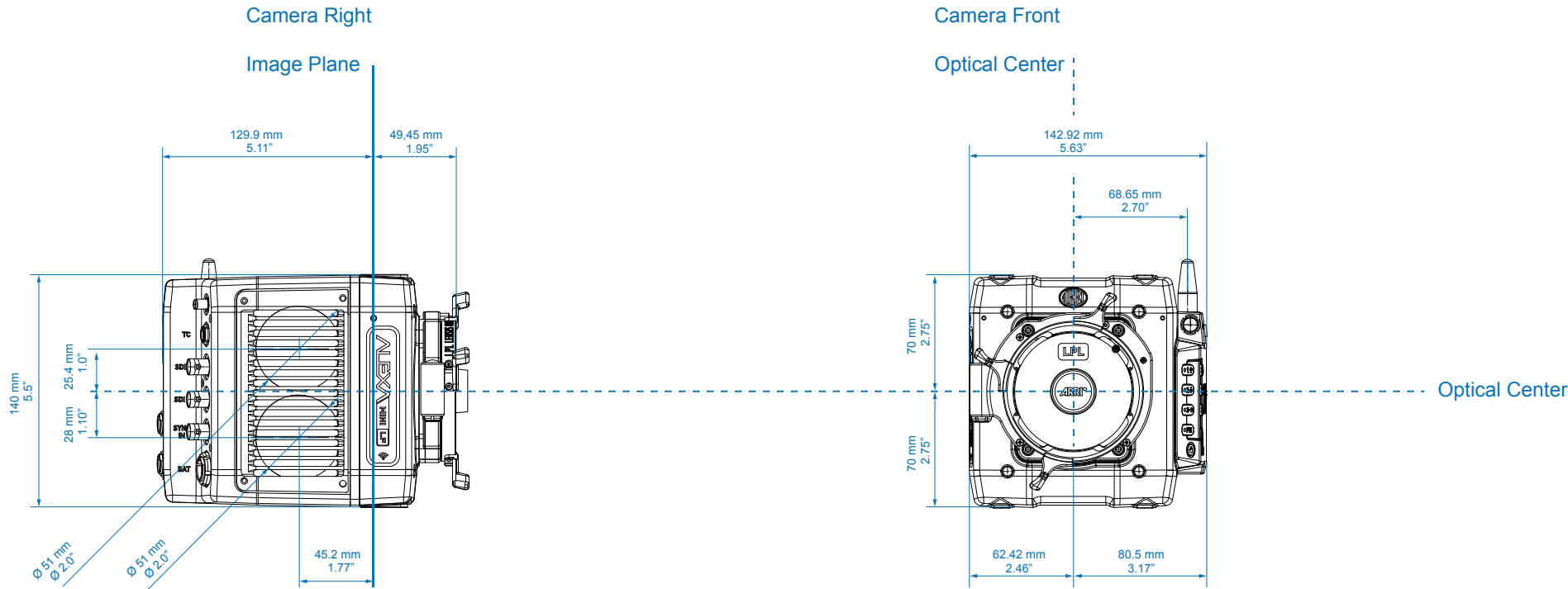
Dimensional drawings are attached at the end of this document. They are also available for download on the ARRI website.

# ALEXA Mini LF



CAMERA DIMENSIONS – Version 2019-07

Technical Data are subject to change without notice.



## ALEXA Mini LF

	Length	Width	Height	Weight
Body + LPL mount MVF-2	188 mm - 7.4"	143 mm - 5.6"	140 mm - 5.5"	~2.6 kg / ~5.7 lbs 800 g

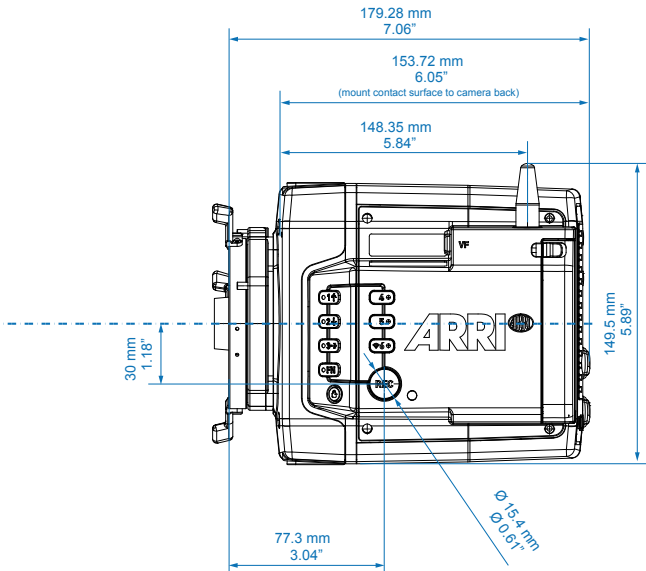
# ALEXA Mini LF



CAMERA DIMENSIONS – Version 2019-07

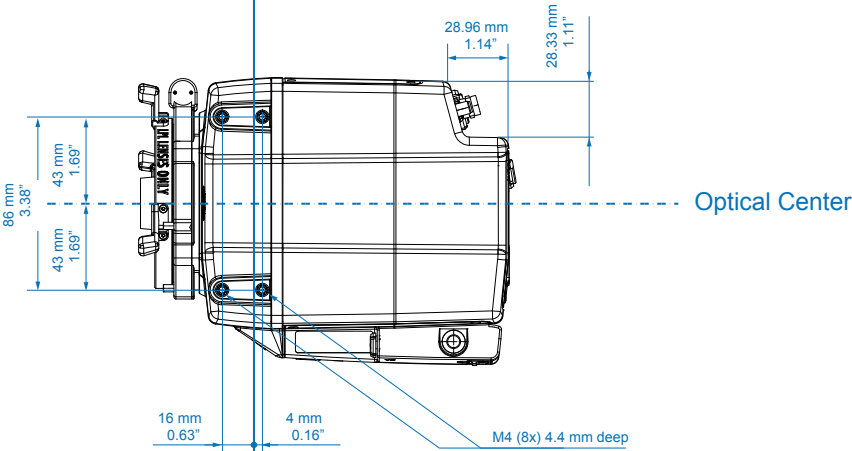
Technical Data are subject to change without notice.

Camera Left



Camera Top

Image Plane



## ALEXA Mini LF

Body + LPL mount  
MVF-2

Length                      Width                      Height                      Weight

188 mm - 7.4"                      143 mm - 5.6"                      140 mm - 5.5"                      ~2.6 kg / ~5.7 lbs  
800 g