ALEXA Mini LF

Software Update Package 7.2

USER MANUAL

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Imprint

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2 Disclaimer

Before using the products, be sure to read and understood all respective instructions.

The products are available for commercial customers only.

For product specification changes since this manual was published, refer to the latest publications of ARRI data sheets or data books, etc., for the most up-to-date specifications. Not all products and/or types are available in every country. Please check with an ARRI sales representative for availability and additional information.

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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 General Safety Guidelines / 一般安全事项

- ► Always follow these guidelines to ensure against injury to yourself or others and damage to the system or other objects.
- ► 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.
- ► Assembly and operation should only be carried out by trained staff familiar with the system.
- ► Only use the tools, materials and procedures recommended in this document. For the correct use of other equipment, see the manufacturer's instructions.
- ► Do not subject the system to severe shocks.
- ► 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 point the Viewfinder eyepiece into direct sunlight, very bright light sources or high energy light sources (e.g. laser beams). This may cause permanent damage to the viewfinder display and optical elements.
- ► 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.

- ► 务必遵循这些指南，避免自己或他人受伤，或是损坏系统或其它物品。
- ► 这些安全信息是产品具体操作指南之外的补充内容，必须严格遵循，避免安全事故。
- ► 操作或安装这套系统之前，阅读并理解所有的安全与操作指南。
- ► 妥善保存所有的安全与操作说明书以供日后参考。
- ► 操作或安装这套系统之前，留意所有的系统警示和安全与操作指引。遵循所有的安装和操作指示。
- ► 组装和操作本系统只能由训练有素、熟悉这套系统的人员进行。
- ► 只能使用本文档建议使用的工具、材料和工序。正确使用其它设备，请参阅相应厂牌的说明书。
- ► 不要剧烈摇晃、撞击本系统。
- ► 不要将摄影机的影像传感器直接对着阳光、非常明亮的光源或高能光源（比如激光），这样做可能会永久损坏影像传感器。
- ► 不要将取景器目镜直接对着阳光、非常明亮的光源或高能光源（比如激光），这样做可能会永久损坏取景器的显示与光学部件。
- ► 机身没有安装镜头时，应该立刻装上镜头卡口保护盖，避免影像传感器的盖板玻璃受污染。

3.2 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。

ADVICE

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

注意

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。

3.3 Vital Precautions / 重要安全事项

⚠ WARNING

Risk of electric shock or fire!

Short-circuits may entail injury or equipment damage.

Usage of unsuitable accessories or non-approved parts of third party manufacturers may damage the system.

Do not repair any part of the system. Repairs must only be carried out by authorized ARRI service centres.

Do not remove or deactivate any safety measures from the system (incl. warning stickers or paint-marked screws).

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.

Unplug the system from the power outlet before opening any part of the system or before making any changes to the system, especially when changing lens mounts.

Do not operate the system in areas with humidity above operating levels or expose it to water or moisture.

Use only accessories recommended by ARRI. The use of accesories not recommended by ARRI is at your own risk. Please observe the relevant safety guidelines.

Risk of injury and damage!

Do not place the system on an unstable trolley or 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.

Assembly and operation should only be carried out by trained staff familiar with the system. Always place the camera on proper support devices. Safely attach it as described in the instructions. Always secure the system against tipping over / falling.

⚠ 警告

触电或起火的风险！

短路可能导致人身伤害或设备损坏。

使用不适合的附件或未经认证的第三方品牌零部件可能损坏本系统。

不要试图自行修复这套系统的任何部分，维修工作只能由ARRI授权的服务中心完成。

不要拆除或禁用这套系统上的任何安全措施（包括警示标签或漆印螺丝。

只能使用说明书中指明的电源供电。

移除电源插头时，应握住插头用力而不是拉扯电缆。

开启系统的任何部分或更改设备配置前，尤其是更换镜头卡口前，将摄影机电源完全断开。

不要在超过正常工作湿度水平的地方使用本系统或将其曝露在高度潮湿的环境。 只能使用ARRI建议的附件，使用非ARRI建议附件的风险自行承担。请参考相关安全事项。

受伤或损坏的风险！

不要将这套系统放置在不稳定的拖车/推车、灯架、三脚架、支架、桌面或任何不稳定的承载设备上。有坠落导致严重人身伤害和系统及其它物件损坏的风险。

组装和操作本系统只能由训练有素、熟悉这套系统的人员进行。始终使用适合的承载设备，按照本指南的说明安全固定摄影机。严格预防系统倾倒或坠落。

⚠ 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.

Hot surfaces! Risk of injury and damage!

During extended operation, high data rates and/or operation at high ambient temperatures, the camera's surface, the area around the fan outlet and the recording media can get hot. Direct sunlight can result in camera housing temperatures above 60 °C (140 °F).

Never cover, obstruct or block the fan in- or outlets while the camera is powered. At ambient temperatures above 25 °C (77 °F), protect the camera from direct sunlight.

Be careful when removing the recording media. Wear protective gloves if necessary.

Crushing hazard!

Attachment of accessories like e.g. lenses, electronic and mechanical accessories poses a crushing hazard for fingers and/or hands.

When installing ARRI accessories or recommended third-party accessories (like e.g. lenses, mechanical accesories, electronic accessories) pay attention to the risk of crushing and always use the correct tools.

Risk of tripping over connected cables!

Always properly secure cables connected to the camera.

⚠ 小心

凝露有触电和起火的风险！

温度或湿度剧烈变动时，摄影机的影像传感器和电气组件可能出现凝露。

为了避免人身伤害或设备损坏，出现凝露现象时绝对不能使用摄影机。

高温有受伤或损坏的风险！

长时间运行、大数据量读写和/或处于高温环境中，摄影机机身表面、风扇散热口以及存储器舱会发烫。直射阳光可能导致机身表面温度上升到60°C（140°F）以上。

开启摄影机后，绝对不要遮盖、堵塞或阻挡机身进出风口。在环境温度高于25°C（77°F）时避免阳光直射摄影机。

取出存储器时要小心烫伤，如有必要请戴手套防护。

挤压伤害！

安装镜头、电子和机械附件等设备时要小心手指和/或其它肢体被挤压受伤的风险。

安装ARRI附件或官方建议的第三方附件（例如镜头、电子附件、机械附件）时务必小心挤压风险，始终使用正确的工具。

被线材绊倒的风险！

务必整理好摄影机连接的所有线材。

3.4 Cleaning / 清洁

- ► Avoid touching optical surfaces.
- ► Avoid wiping optical surfaces without air blow dusting first. If particles or optical surfaces are electrostatically charged, it may improve dusting efficiency to use deionized air.
- ► Avoid compressed air from cans: the chances of liquid propellants within the can being expelled in liquid droplets against the glass, thereby leaving contaminants are quite great. If using compressed air, use it only in a clean environment to avoid aerosols being pulled into the air stream and propelled onto the surface. Always use oil-free compressed air with less than 2 ATM of pressure and equipped with particle filter.
- ► Use manual air blowers and clean antistatic brushes.
- ► Do not use any strong or aggressive cleaning detergents like Methanol, Acetone, Benzine or acids.
- ► When cleaning the system, do not moisten connectors.
- ► 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. Do not clean a lens brush with your fingers.
- ► 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.

- ► 避免接触光学表面。
- ► 利用气流吹落灰尘之前，避免擦拭光学表面。假如灰尘颗粒或光学表面带有静电，利用去离子气流有助提高除尘效率。
- ► 避免使用压缩空气罐除尘：因为空气罐中的液体推进剂很有可能以液滴的形式喷向盖板玻璃，留下严重的污染物。如果使用压缩空气，只能在清洁的环境中使用它，以免将气溶胶吸入气流并吹到光学表面上。始终使用压力小于2 ATM且装有颗粒过滤器的无油压缩空气。
- ► 使用手动气吹和干净的抗静电刷。
- ► 不要使用任何强效或腐蚀性的清洁剂，例如甲醇、丙酮、苯或酸。
- ► 清洁系统时不要让各接口接触到液体。
- ► 只能使用镜头刷或干净的镜头布清洁镜头的镜片。如有顽固的灰尘或油渍，可用纯酒精湿润镜头布后擦拭。使用后的脏镜头布必须丢弃。不要用你的手指去清洁镜头刷。
- ► 假如影像传感器的盖板玻璃沾染了顽固的灰尘或油渍，只能使用专用的光学清洁套件非常小心地清洁。如果无法清除干净，应将摄影机送到ARRI服务中心进行处理。

3.5 Storage and Transport / 存放与运输

- ► Always store and transport the camera in a suitable case.
- ► Do not store the camera in places where it may be subject to extreme temperatures, direct sunlight, high humidity, severe vibration, dust or strong magnetic fields.
- ► Do not subject the system to severe shocks.
- ► When moving the camera from a cool to a warm location or when the camera is used in a damp environment, condensation may form inside the camera, on the sensor, and on internal or external electrical connections. Operating the camera while condensation is present may result in damage to the equipment. Condensation on the optical components may have a visible effect on the output images. To reduce the risk of condensation, find a warmer storage location. After moving the camera from cool to warm environment, wait for some time for the system to warm up to the ambient temperature to avoid condensation.
- ► Keep the protective cap on the lens mount when no lens is attached to the camera.

- ► 始终使用适配的收纳箱存放和运输摄影机。
- ► 不要将摄影机存放在可能出现极端温度、阳光直射、高湿度、剧烈震动、脏污或强磁场的环境中。
- ► 不要剧烈摇晃、撞击本系统。
- ► 从低温移至温暖的环境，或在潮湿的环境中使用摄影机，机身内部影像传感器表面、内外电气接口都可能出现凝露，此时继续使用摄影机可能导致设备损坏。光学路径出现的凝露可能反映在输出画面上。为了减少凝露风险，应选择温暖的存放环境。从低温移至温暖环境时，先等候一段时间让摄影机恢复常温，避免凝露。
- ► 机身没有安装镜头时，不要摘除摄影机上的镜头卡口保护盖。

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 "Shutter", page 56.

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。其程度取决对横摇/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 100 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 and dimensional drawings.

ADVICE

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.

Additional Information

For useful information in addition to this user manual please have a look at the ARRI Learn & Help section on the ARRI website.

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 body
- Lens mount according to order
- USB memory stick incl. user manual
- Tool kit ALEXA Mini
- White Radio Antenna
- WiFi Antenna
- Original packaging incl. drying agent

ADVICE

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, ARRI LPL Mount (LBUS) and ARRI PL-to-LPL 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, as well as large format and Super 35 recording formats, 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.

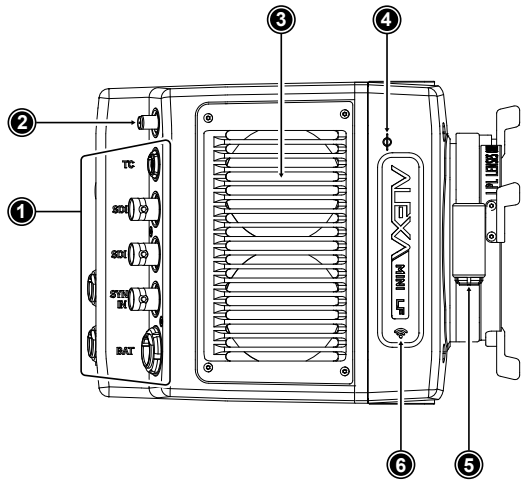
A crucial element of the system is the LPL lens mount, with dimensions optimized for large format sensors. A wider diameter and shorter flange focal depth allow the ARRI Signature Primes and all future large format lenses to be small and lightweight with a fast T-stop and pleasing bokeh, a combination 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 100 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.

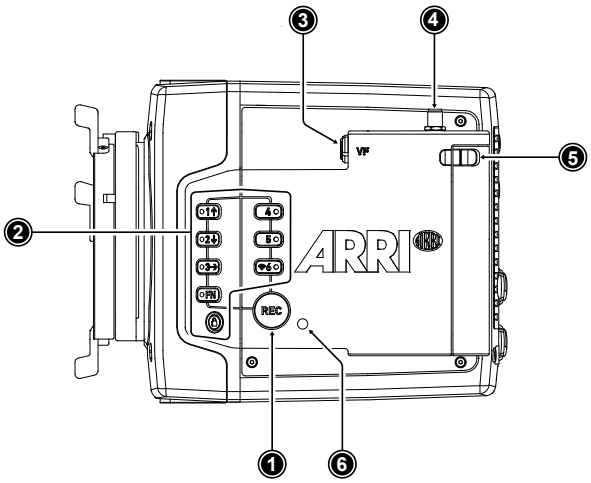
8 Camera Layout

Camera Right



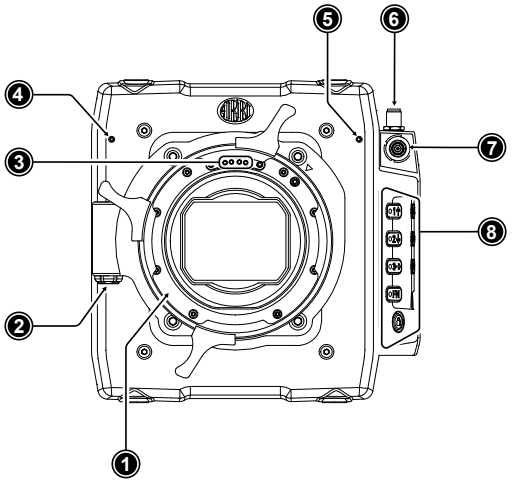
1 Rear Connectors
2 Radio Antenna Connector
3 Fan Intake
4 Sensor Plane Marking
5 LBUS Connector (on Lens Mount)
6 Integrated WiFi Antenna

Camera Left



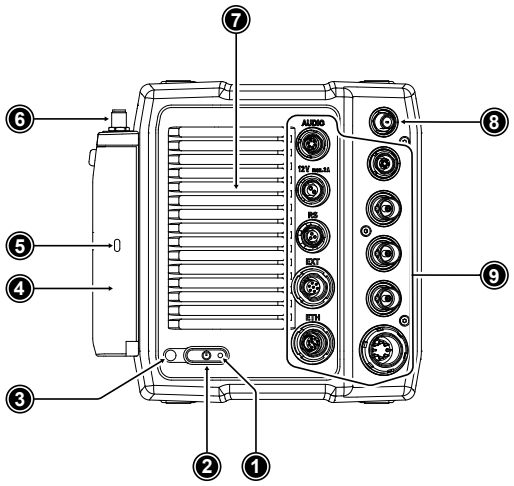
1 Record Button
2 Camera Buttons
3 VF Viewfinder Connector
4 WiFi Antenna Connector
5 Media Door Release
6 Camera Status LED

Camera Front



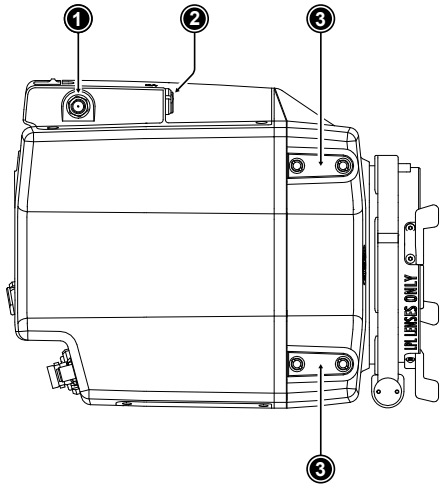
1 ARRI LPL Mount (LBUS)
2 LBUS Connector (on Lens Mount)
3 Lens Mount Contacts
4 Built-in Microphone (right)
5 Built-in Microphone (left)
6 WiFi Antenna Connector
7 VF Viewfinder Connector
8 Camera Buttons

Camera Rear



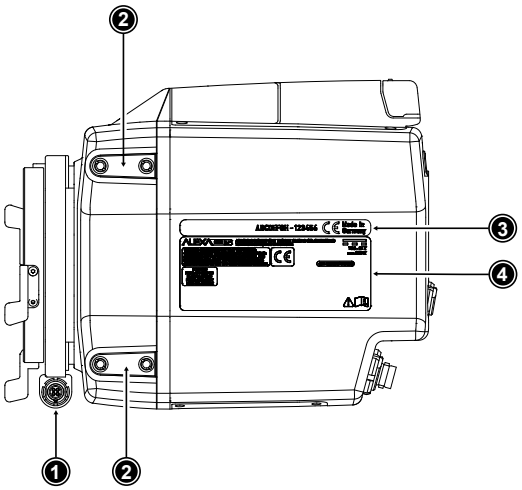
1 Boot Status LED
2 *POWER* Button
3 Camera Status LED
4 Media Door
5 Media Status LED Window
6 WiFi Antenna Connector
7 Fan Outlet
8 White Radio Antenna Connector
9 Rear Connectors

Camera Top



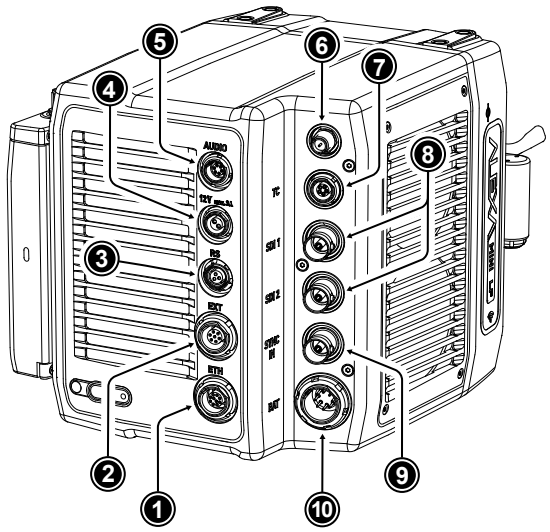
1 WiFi Antenna Connector
2 VF Viewfinder Connector
3 Attachment Points for Mechanical Accessories

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 & SDI 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. The SDI BNC connectors output SDI signals (legal range) in

- 1920 x 1080 (422 1.5G, 422 3G, 444 3G) (SDI 1 & SDI 2)
- 3840 x 2160 (422 6G) (SDI 2 only)

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)

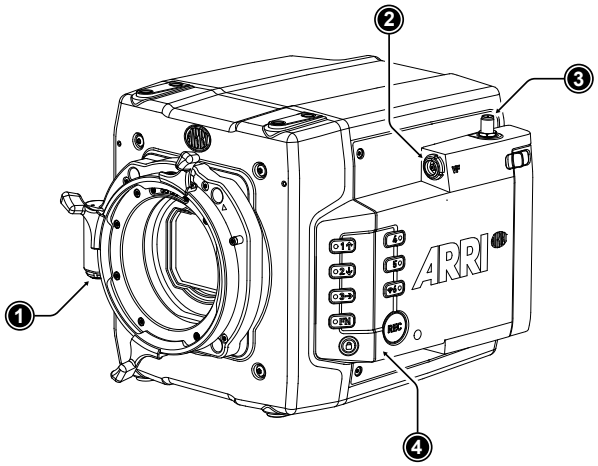
The BAT connector is the main power input of the ALEXA Mini LF and accepts an input voltage range from 11.0 to 34.0 V DC. You can use power cables KC50-S (K2.75007.0) or KC50-SP-S (K2.0001275) or one of the various on-board adapter plates for V-Mount and Gold Mount batteries to supply the camera with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

ADVICE

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 138.

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, supports hot plugging and supports cable lengths of up to 10 m (33 ft). The VF connector comes without a key, so the viewfinder cables plug in regardless of their orientation.

WiFi Antenna Connector (RP-SMA)

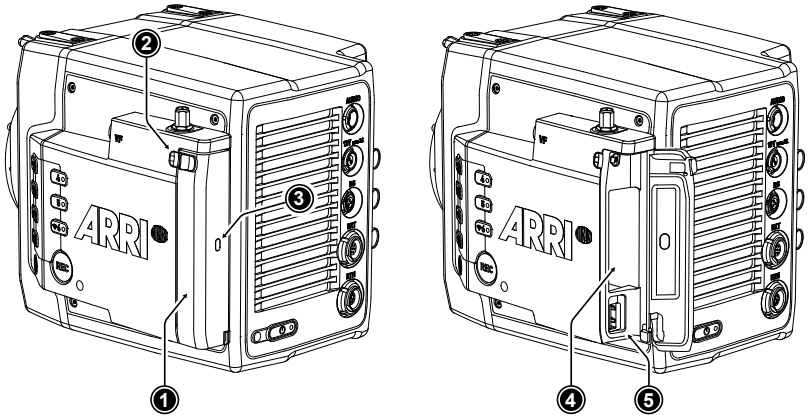
Besides the built-in WiFi antenna behind the camera label on the right side, the ALEXA MINI LF is equipped with a second WiFi antenna connector above the media bay on the camera left side. Both internal and external WiFi antenna work together, and if needed, the external antenna output can be disabled 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 121 and "Function Button FN", page 49.

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

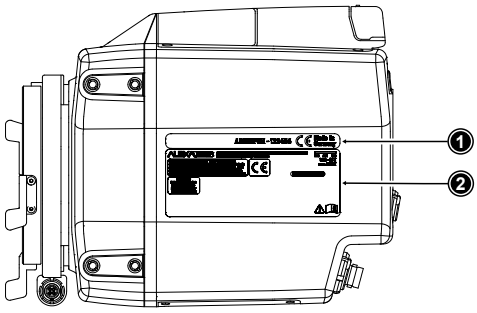
The ALEXA Mini LF records clips onto Codex Compact Drives, using the media bay on the camera left side. A small window (3) in the media bay door shows the LED of the Compact Drive. To access the media slot, slide the media bay door release (2) towards the camera back so that the spring-loaded door jumps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

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" and "User Storage Handling", page 50.

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:

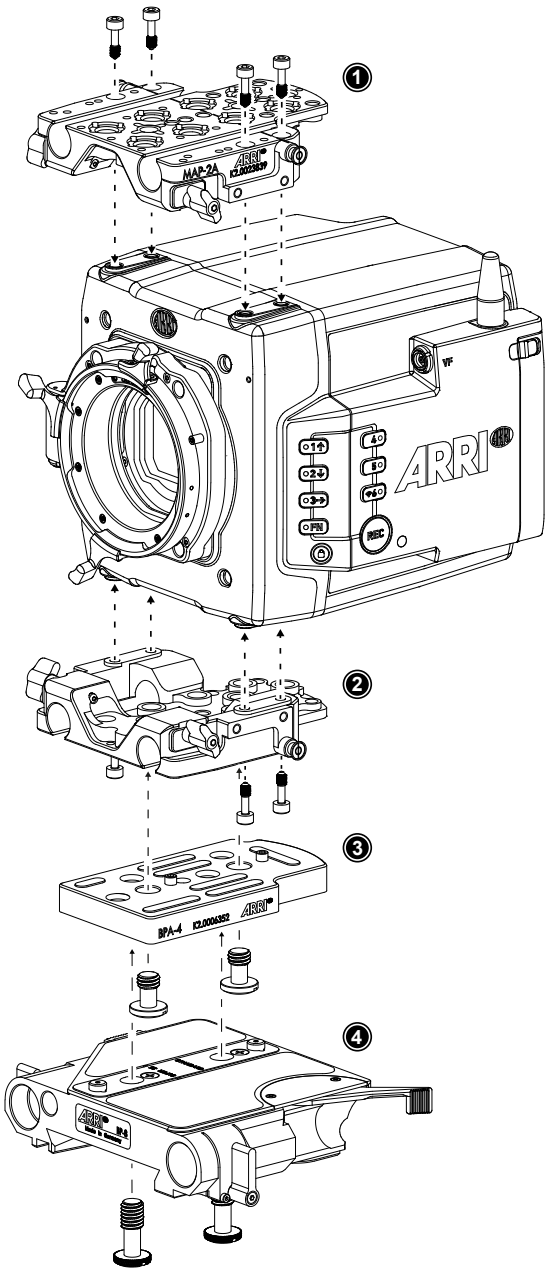
Mini Adapter Plate MAP-2A (K2.0023839)	The MAP-2A is a base plate for 15 mm lightweight support and features an improved rod clamping mechanism as well as multiple 1/4-20 and 3/8-16 mounting points. It fits to the top and bottom of the ALEXA Mini / Mini LF.
Bridge Plate Adapter BPA-4 (K2.0006352)	This 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



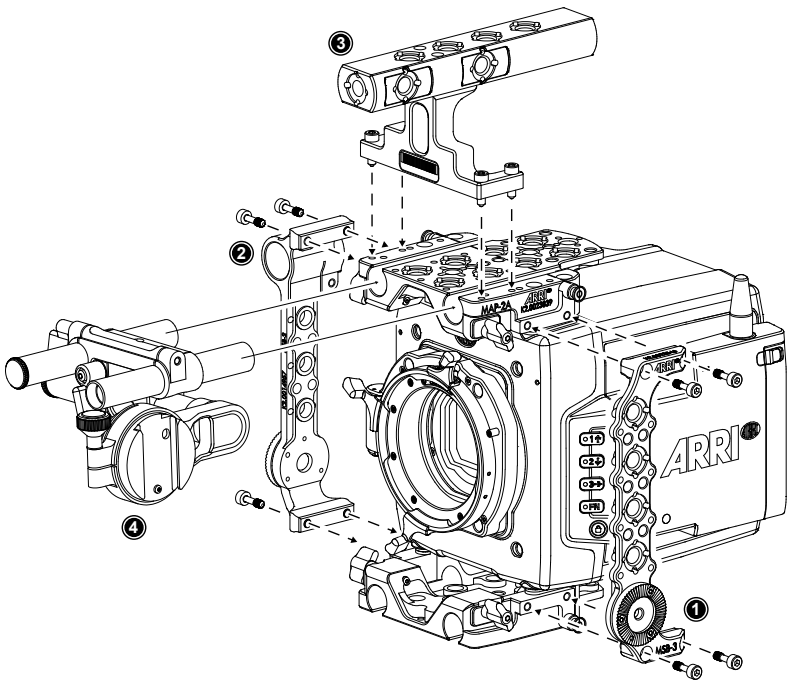
► Using a 3.0 mm Allen key, fasten the Mini Adapter Plate MAP-2 or MAP-2A (1) to the camera top attachment points with the four 3.0 mm hex screws. Tighten them crosswise.

► 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



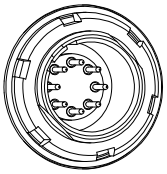
- ► Using a 3.0 mm Allen key, fasten the Mini Side Bracket MSB-3 (1) to the camera's left side. The MSB-3 is attached with two 3.0 mm hex screws each to the dedicated mounting points of the top and the bottom Mini Adapter Plates MAP-2A.
- ► Identical to the MSB-3 on the camera left side, fasten the MSB-2 (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.

⚠ CAUTION

When installing ARRI accessories or third-party accessories (like e.g. lenses, mechanical accesories, electronic accessories) pay attention to the risk of crushing and always use the correct tools.

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.

ADVICE

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

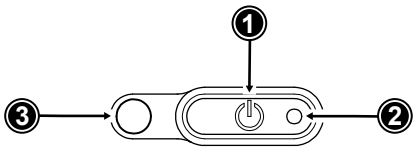
In order to process the increased pixel count while still maintaining ALEXA image quality, the ALEXA Mini LF draws between 69 W and 89 W while recording, with MVF-2 connected, but no further accessories attached. 69 W have been measured while recording MXF/ARRIRAW in recording resolution LF 16:9 UHD 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.

ADVICE

- 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.

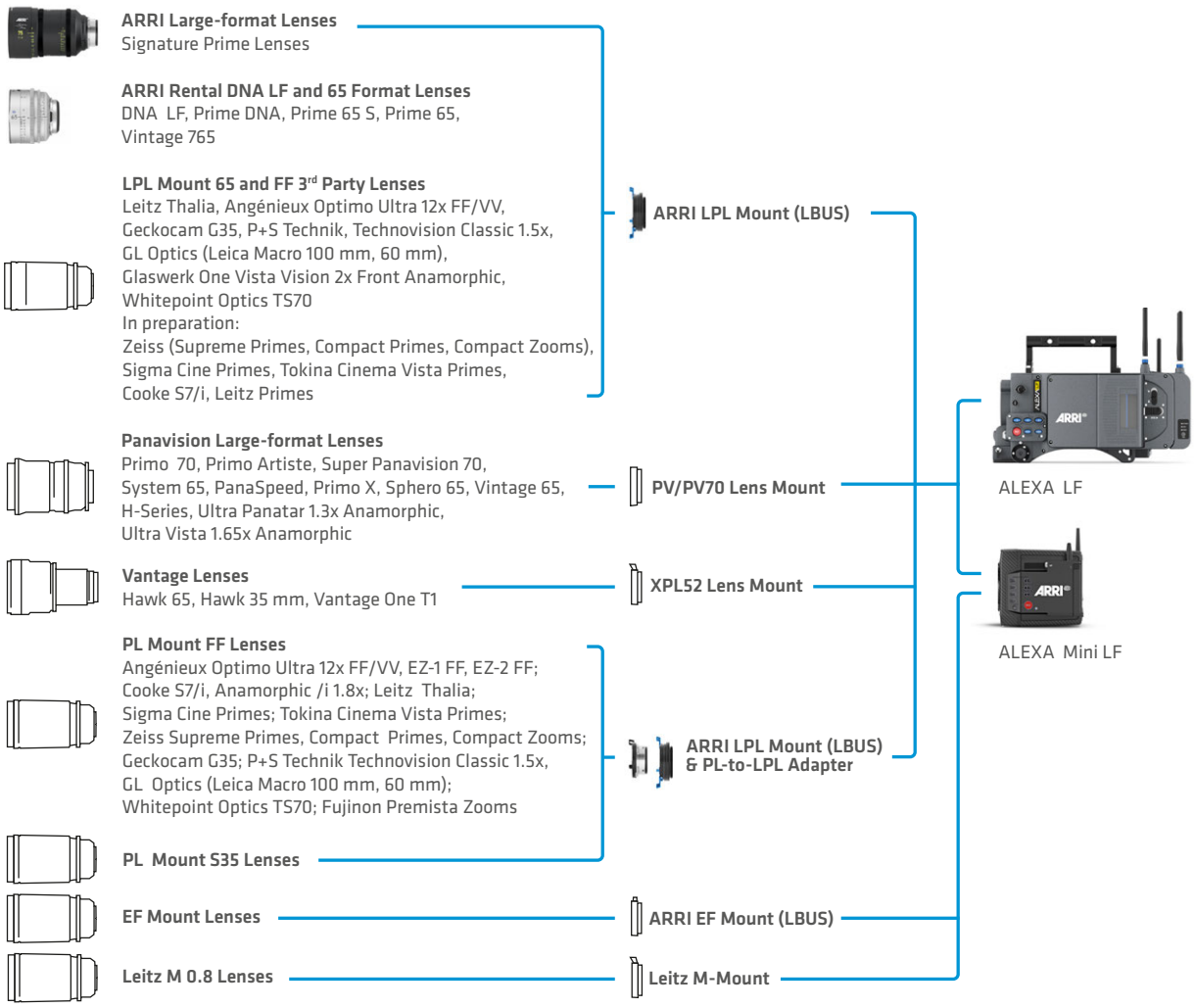
On the flip-out monitor of the MVF-2 as well as in the viewfinder and the SDI outputs, a countdown appears while you press and hold the power button. On reaching zero, the camera switches off.

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 ARRI LPL Mount (LBUS) and PL-to-LPL Adapter

ARRI LPL Mount (LBUS)

The ARRI 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.

ADVICE

The ALEXA Mini LF has the same interface between the camera and the lens mount as the ALEXA Mini and AMIRA. Therefore, physically, all lens mounts that fit on ALEXA Mini or AMIRA will also fit on ALEXA Mini LF. However, some of these lens mounts make little sense on the ALEXA Mini LF because they will show strong vignetting. The Titanium PL LDS mount with LBUS (K2.0003216) from the ALEXA Mini was designed for Super 35 only, we recommend against using this lens mount on the ALEXA Mini LF.

11.2 ARRI EF Mount (LBUS)

With the ARRI EF Mount (LBUS) (K2.0019965) the camera supports a wide range of EF lenses from Canon, Sigma, Zeiss and other manufacturers. The camera supports electronically controlling the iris and focus of these lenses through the camera user interface or accessories like the ARRI Master Grips. Furthermore, the EF lens mount powers the built-in image stabilizers of EF lenses.



EF Iris Control

The camera offers to control the iris via the auto iris feature or manually via user buttons, the camera menu or with the ARRI Master Grips.

For more information please see "EF Lens Iris Adjustment", page 58 and "List of User Button Functions", page 122.

ADVICE

The EF lens mount (K2.0001103) for AMIRA and ALEXA Mini is mechanically compatible with the ALEXA Mini LF, but vignetting may be visible on the ALEXA Mini LF when using large format EF mount lenses. Please note, that the amount of vignetting is based on the optical lens design, the focal length and the aperture, and therefore, we cannot provide information as to which lens will vignette how much. If you want to find out how much a given lens vignettes when using the EF lens mount for AMIRA and ALEXA Mini, we recommend shooting a test.

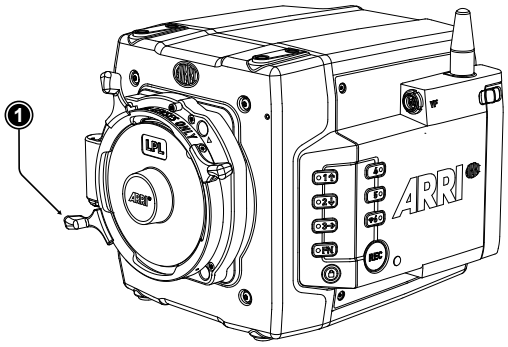
11.3 Changing a Lens

ARRI LPL Mount (LBUS), PL-to-LPL Adapter and PL Mount Lenses

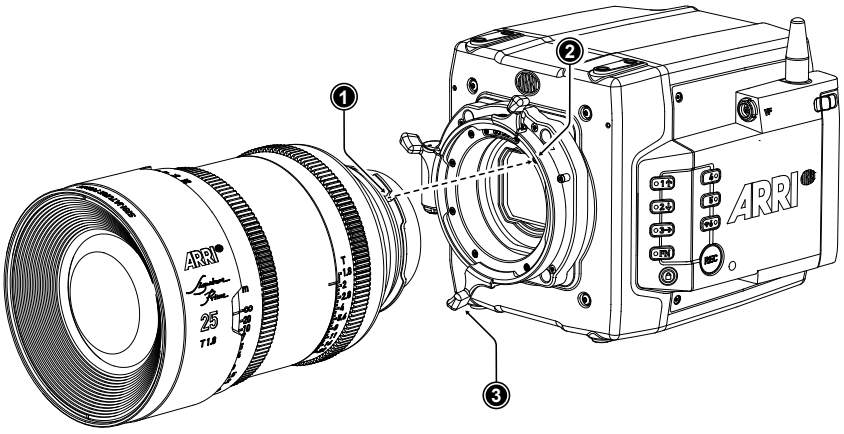
Lens change on the LPL mount, the PL mount as well as the PL-to-LPL Adapter works the same way. An LDS lens must be mounted with the LDS contacts in the 12:00 position to enable the LDS functions. Take care not to damage the LDS contacts on the lens and the camera when mounting or unmounting a lens or 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. When removing a lens seure the lens with your hand when turning the bayonet ring.
2. Remove the lens port cap or lens.



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.

ADVICE

Dust particles may settle on the sensor cover glass during a lens change!

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.

Changing 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.

After changing lenses, always perform a dust check to make sure no dust has settled on the sensor cover glass.

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.

Damage to Lens mount or camera!

Never exceed the maximum lens mount depth.

Do not short-circuit the LDS contacts.

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.

⚠ CAUTION

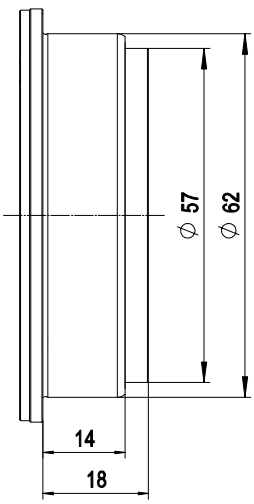
When installing ARRI accessories or third-party accessories (like e.g. lenses, mechanical accesories, electronic accessories) pay attention to the risk of crushing and always use the correct tools.

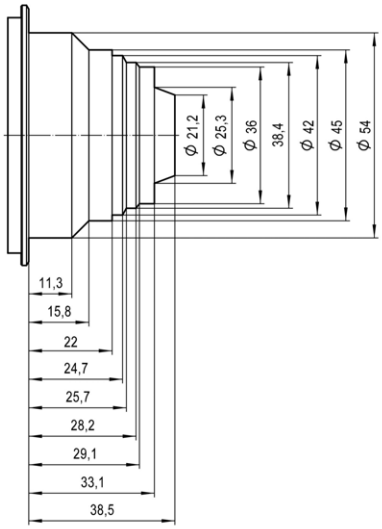
Lens Support

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.

11.4 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 (left: LPL mount lenses, right: PL mount lenses):





ADVICE

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.

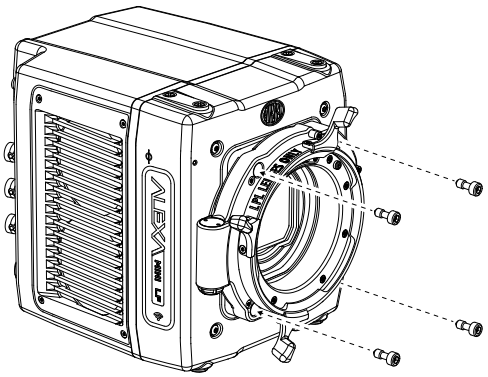
11.5 Changing the Lens Mount

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

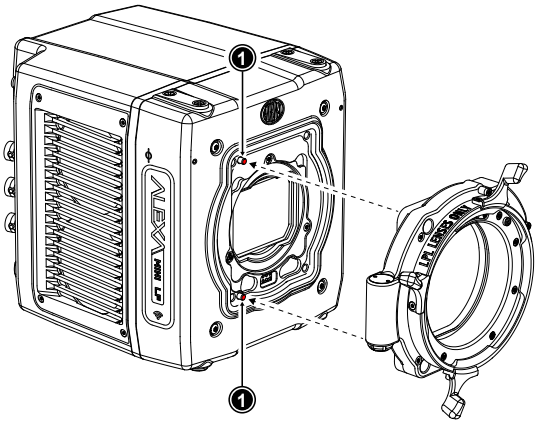
- 3.0 mm Allen key
- Camera switched off and power source disconnected
- Lens removed and properly stored
- Make sure to protect all optical surfaces when changing a lens mount

Removing a Lens Mount (here: ARRI LPL Mount (LBUS))

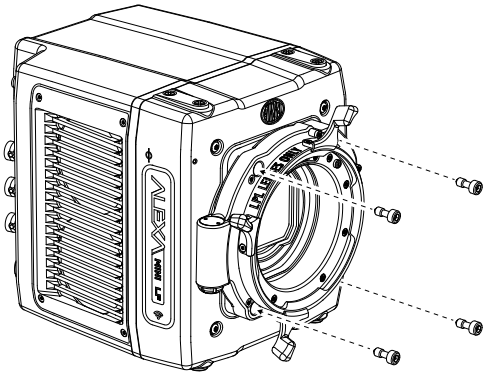


1. Switch off the camera.
2. Crosswise, loosen all four lens mount screws with a 3.0 mm Allen key.
3. Carefully remove the lens mount.
4. Store the lens mount in a case for dust protection and install a different lens mount.

Installing a Lens Mount (here: ARRI LPL Mount (LBUS))



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.

ADVICE

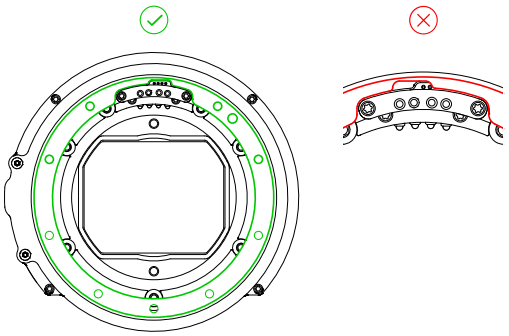
After each lens mount change, always check the flange focal depth of the camera.

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.

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

High voltage! Risk of electric shock and fire!

Short circuits may entail lethal injury and damage!

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

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

Protect sensor and electrical system: Always store the camera with a lens mount properly installed and capped. Immediately replace lens mount after removal. Change lens mounts in a dust-free environment only.

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 recommended tool.

11.6 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 85.

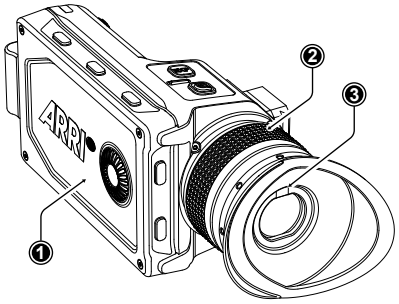
Lens Data in Metadata

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

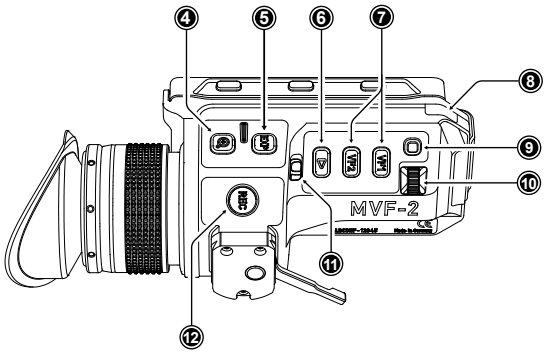
Metadata values include

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

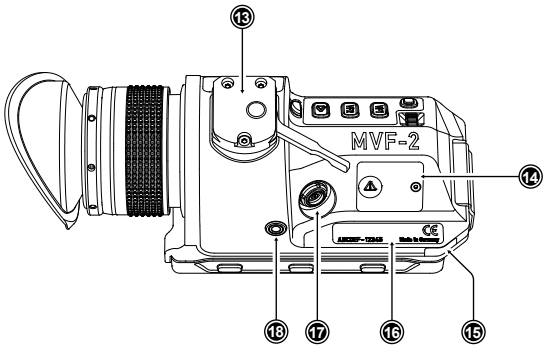
12 MVF-2 Overview



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 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.

ADVICE

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.

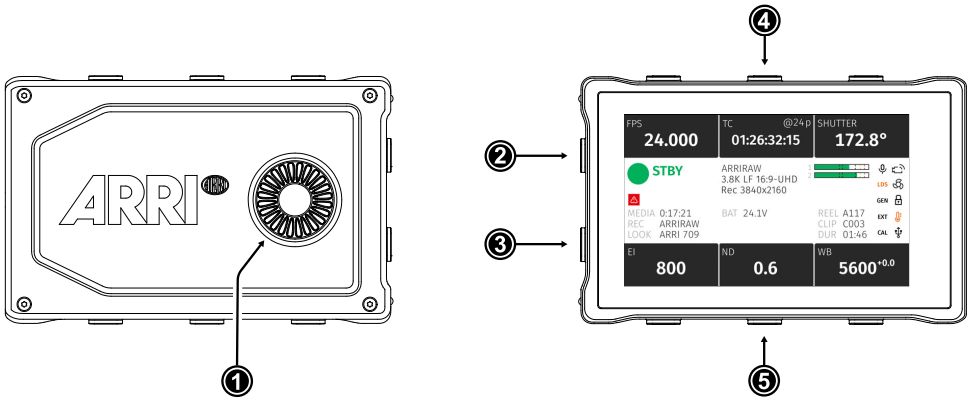
When shooting in hot environments make sure to have the viewfinder mounted on the viewfinder bracket to ensure proper cooling.

If the MVF-2 is used as a remote control without standing support, we recommend to turn off the OLED via *EVF Power* to avoid unnecessary heating up of the device in hot environments.

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.

12.1 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.

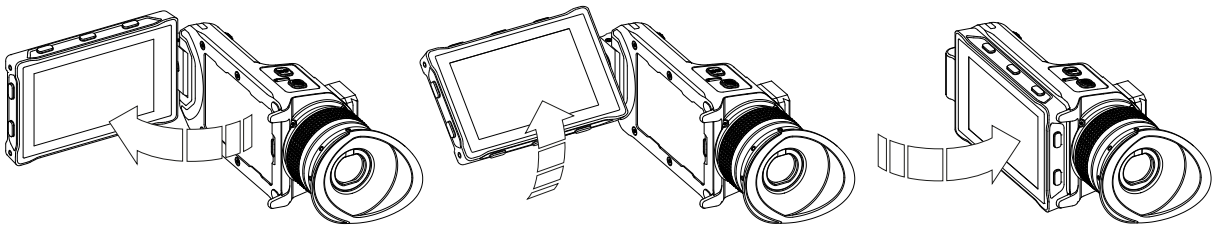
MENU / BACK Button

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.

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).

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.

ADVICE

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

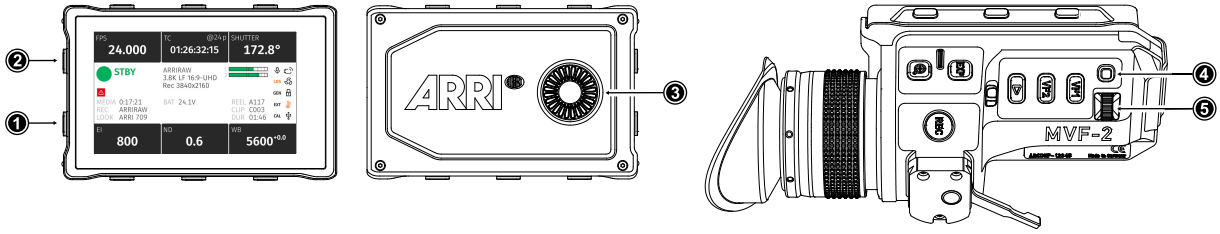
13 Menu Operation

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 131.

The camera 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.

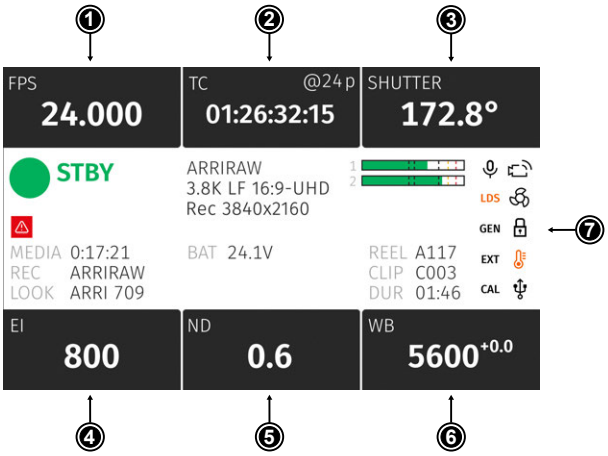
   Entries with a value allow for direct editing. To edit a value press the *JOGWHEEL* center or *SET* button, then rotate the *JOGWHEEL* or *USER WHEEL* to select the desired value. Press the *JOGWHEEL* center or *SET* button to confirm the change or press *CANCEL* to discard.

   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.

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:



1 FPS Sensor Frame Rate Settings
2 TC Timecode Settings
3 SHUTTER Settings
4 EI Exposure Index Settings
5 ND Filter Settings
6 WB White Balance Settings
7 Status Section

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: angle / (360° * 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.

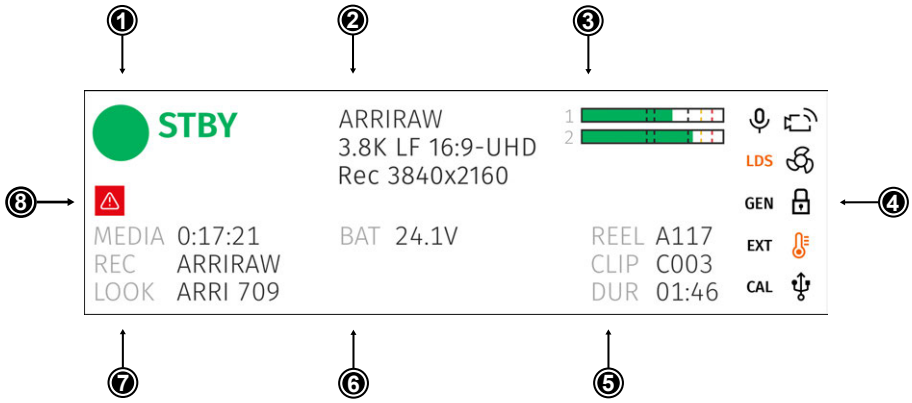
WB (White Balance)

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:



1	Camera Status	**5**	Clip Information
2	Codec & Recording Resolution	**6**	Battery Level
3	Audio Meters	**7**	Media Capacity & Look Setting
4	Status Icons	**8**	Camera Alert Icon



Camera Status

STBY	Standby - ready for recording.
REC	Recording.
PLAY	Camera is in playback mode.
ERASE	Medium erase in progress. Active erasing disables recording.
None	Idle, recording not possible (e.g. no media inserted, media is full).
ERROR	System error occured. See *MENU* > *Alerts* for details.

ARRIRAW
3.8K LF 16:9-UHD
Rec 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 *MENU* > *Info* > *System Info*)



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 *MENU* > *Alerts* for more information.

WRS

Camera white radio is active.

CAL

Lens Motor Icon

Orange	Lens motor calibration required.
Black	Lens motor calibration in progress.

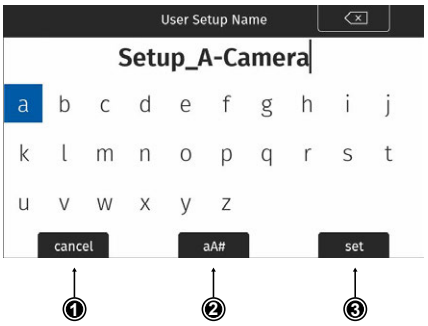
LDS

Indicates an error on the LDS interface.

Alert Icon. Alert is active. See *MENU* > *Alerts* for details.

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 Importing Files

For certain parameters, the camera menu operates with preset 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. Value based lists contain entries that can be edited directly in the camera (e.g. Shutter and White Balance presets) while file based lists contain files that are installed on the camera or were imported from the USB medium (e.g. Looks and Frame Lines)

Following parameters work with value based lists:

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

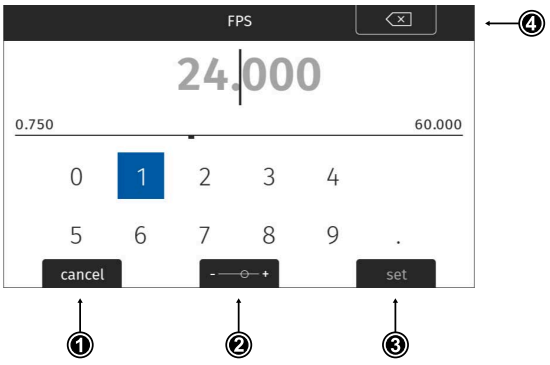
Following parameters work with file based lists:

- *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 jogwheel 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.

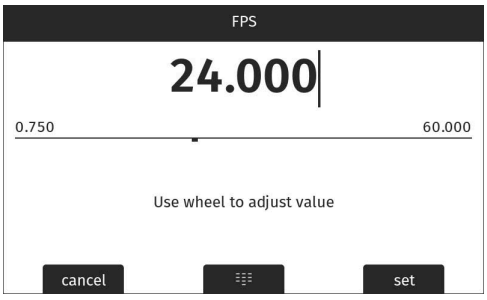
► Select e.g. *HOME > FPS > ADD*.



► Press the *MODE* button (2) to switch between the numeric keyboard and the jogwheel mode.

► The numeric keyboard offers to directly enter a value. Use the MVF-2 jogwheel to select and confirm digits.

► The *CLEAR* button (4) deletes the digit to the left of the cursor. Press and hold the button to clear the entire value.



► The jogwheel mode allows to fine adjust values. Rotate the MVF-2 jogwheel to fine tune the value.

► Press the *MODE* button (2) to if you need to switch back to the numeric keyboard.

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

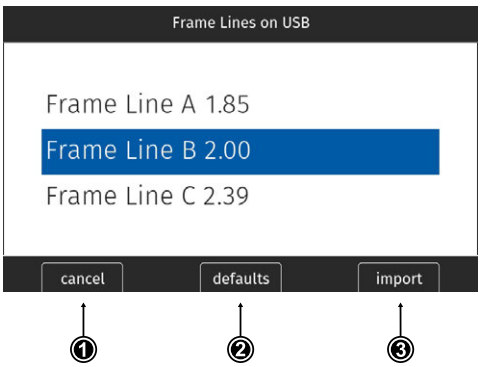
Info: the *SET* button will be grayed out and the value displayed in red if the entered value is out of range.

Importing Files

For looks, frame lines, user setups and lens tables the camera offers the option to import files from the USB medium as well as from a factory default presets. To import files from a USB medium into the camera, the USB medium needs to be prepared with a certain folder structure, see chapter "User

Storage Handling", page 50 for more information. The maximum file name length allowed is 64 characters including the file extension. Files with a name exceeding 64 characters cannot be displayed in camera lists. Special characters <, >, :, ", /,\, | and * in file names are displayed and replaced with a "?" in the camera menu.

► Select e.g. *MENU* > *Monitoring* > *Frame Lines* > *Frame Line* > *ADD*.



► Select a frame line file to import from the *USB* list or select *DEFAULTS* (2) to select a frame line file from the factory defaults list.

► Press the *IMPORT* button (3) or the jog-wheel to add the selected frame line to the frame lines list, or the *CANCEL* button (1) to exit.

Deleting List Entries

► Select e.g. *HOME* > *FPS*.

► Scroll to the entry to be deleted.

► Press the *DELETE* button.

The selected entry is marked for delete.

► Press the *DELETE* button again to delete the selected entry or rotate the jogwheel to cancel.

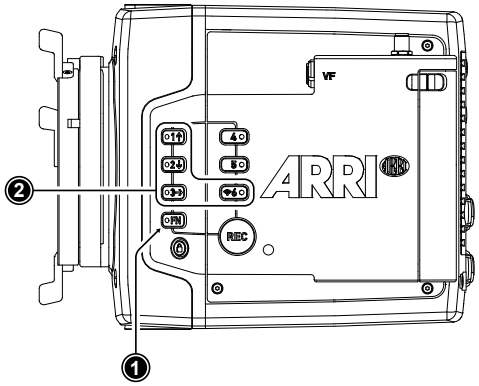
Maximum Entries per List

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	FPS, Shutter	User Setups	White Balance	Looks	LDA	Frame Lines
Max. Entries	16	20	32	50	200	256

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:

<table>
<tr><th>Function Button & Camera Button</th><th>Function</th></tr>
<tr><td>FN + 1</td><td>Toggles the overlay menu in the viewfinder and the SDI outputs. In the overlay menu, the camera buttons control the following functions:
<table>
<tr><th>Camera Button</th><th>Function</th></tr>
<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>
</table>
For more information, see .</td></tr>
<tr><td>FN + 2</td><td>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.</td></tr>
<tr><td>FN + 3</td><td>Starts/stops playback from the recording medium. During playback, the camera buttons control the following functions:
<table>
<tr><th>Camera Button</th><th>Function</th></tr>
<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>
</table></td></tr>
<tr><td>FN + 6</td><td>Toggles WiFi on/off.
When pressing (just) the FN button, the status LED of button 6 reflects the current WiFi status (LED on = WiFi enabled).</td></tr>
</table>

► 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 32 formatted USB memory sticks using one partition within a Master Boot Record (MBR) partition table and a maximum capacity of 256 GB. 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 needing to unload 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:

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

System Info

The system info provides detailed information about the camera:

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

Maximum FPS Info

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

Sensor FPS	Maximum sensor FPS with the current recording resolution.
Codec FPS	Maximum sensor FPS with the camera's current codec setting.
Media FPS	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:

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

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

Network Info

The network info screen shows Ethernet and WiFi related information:

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

Lens Info

The lens info screen shows information on the attached lens:

Lens Type	Type of lens (LDS, Cooke, ENG, EF...)
Model	Lens model name according to manufacturer.
Serial No.	Serial number of lens.
Extender	Name of extender (if used).
Focal Length	(Current) focal length of lens in mm.
Focus	Current focus distance of lens.
Iris	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 ARRI camera service to analyze potential problems. In normal circumstances, logfile export is not required.

Export Logfiles combines the camera logfiles, HW Info file, current user setup and other diagnostic files into a .zip archive and stores the archive in the ARRI/A-MINI-LF/LOG folder.

Privacy sensitive information such as WiFi password and look files are not exported.

Export Update Logfiles

Similar to regular logfiles, update logfiles help camera service to analyze problems that occured 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.

Changing the project frame rate will automatically 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 79.

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 79.

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 93.

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:

Shutter Angle	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.
Exposure Time	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).

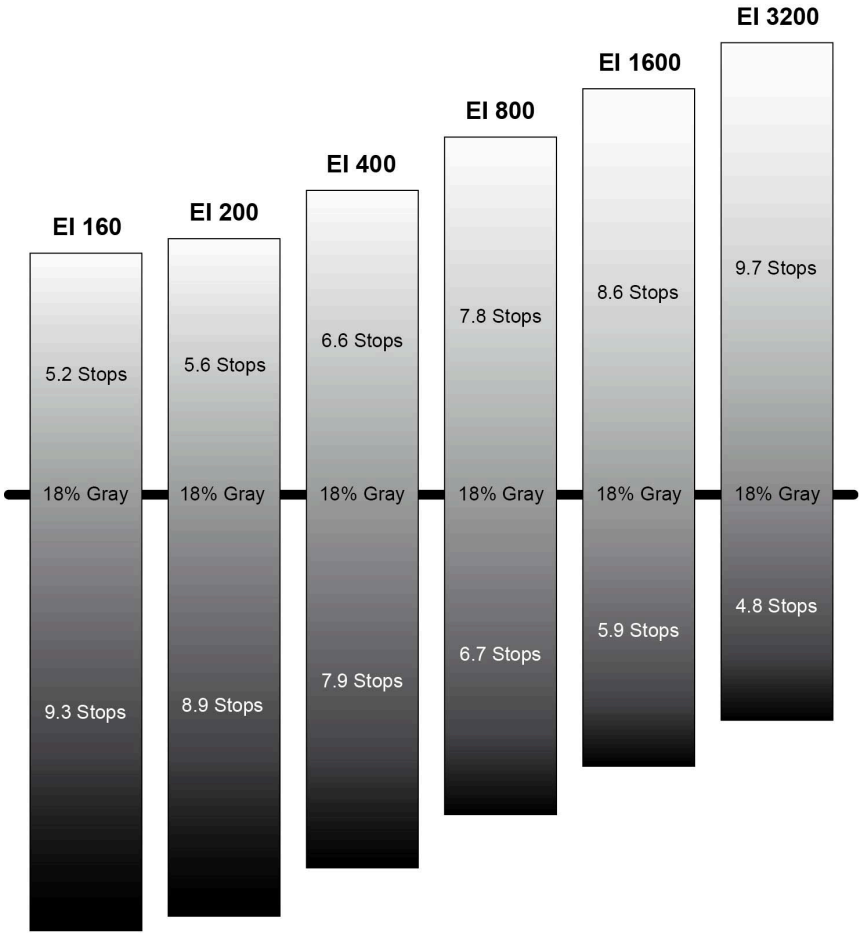
2. Set the desired shutter unit.

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.

ADVICE

When changing the EI setting, short temporary artefacts may appear on the image outputs resulting from the change.

When changing the EI setting during recording, one or more frames on the recorded material may show artifacts resulting from the change.

14.4.1 EF Lens Iris Adjustment

1. Select *HOME* > *EI* > *Iris*.

   A screen showing the current iris value is displayed.

2. Turn the jogwheel up or down to open or close the iris. Press the jogwheel to toggle between full stops and substops.

   Note: Sub-stop precision depends on the lens type and is automatically set by the camera.

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.

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".

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 121.

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: 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.

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.

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.

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* > *Options* > *Timecode*

   to set the timecode manually.
2. Select *HOME* > *TC* > *Options* > *Reset Timecode*

   to reset the timecode to 00:00:00:00.
3. Select *HOME* > *TC* > *Options* > *Set Timecode to Time*

   to set the timecode to the camera system time.

Note: You can edit timecode in preset mode only.

Timecode Run Mode

1. Select *HOME* > *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:

Regen	Depending on the timecode run mode, regen behaves differently: Run mode rec run: 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. Run mode free run: 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.
Preset	The camera uses its internal counter.

Jam Sync 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.

Note: 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.

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:

LTC In timecode is continuously read from the TC connector.

Media timecode from the last clip of the active recording card by continuing seamlessly from the last active value.

EXT when camera is set to EXT sensor slave or EXT settings slave)

Timecode Count Mode

Sets the preference for how timecode is counted with non-integer project rates (29.97p, 59.94p)

Note: The setting Count Mode is only accessible when the project rate is set to a non-integer frame rate.

► Select *HOME* > *TC* > *Options* > *Count Mode*.

You have the following options:

Non-Dropframe Timecode increases with every frame without compensation, resulting in a 1,001 count for 1,000 frames.

Dropframe Timecode values are dropped with a defined pattern (frame counts 00 and 01 of every minute, except every 10th minute) to re-adjust for the drift. A semicolon between timecode seconds and frames indicates an active dropframe timecode.

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.

ADVICE

The camera's internal battery will keep the timecode and timecode tuning values for about 5 minutes after the power source was disconnected.

15 Look Settings

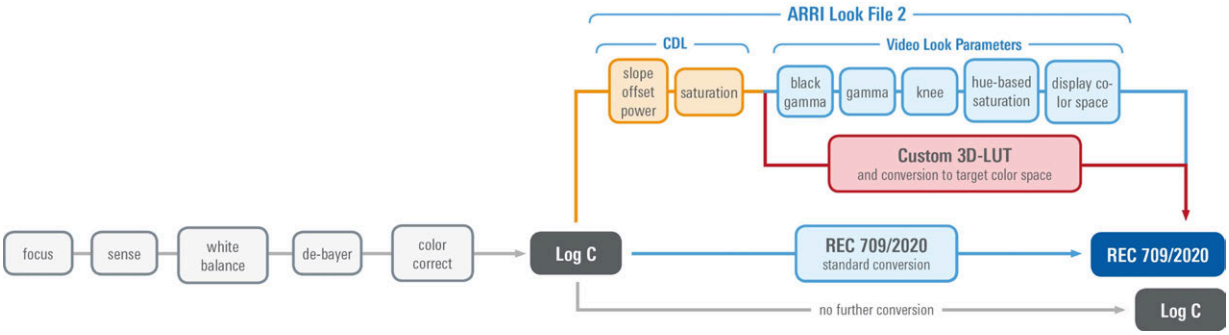
ARRI Look File 2

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 alternations 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
ARRI 709	Renders the video image according to the ITU.R-BT709 standard, for most accurate color reproduction on standard broadcast monitors.
ALEXA Classic 709	Matches the color reproduction of ALEXA Mini LF to the ARRI ALEXA.
ARRI 2100 HLG 1K 200	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^2. In this case, the image will look the same as when the PQ look is used with a PQ monitor.
ARRI 2100 PQ 1K 200	HDR look file. Renders an image for a PQ (SMPTE 2084, ITU-R BT.2100) monitor. The maximum luminance is 1000 cd/m^2, 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^2.
Commercial	Renders the image brighter for smoother skin tones.
Landscape	Applies a steeper contrast curve to the image.
LCC 709	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.
TV-neutral	An ARRI 709 like look, which is more saturated in colors with slightly lower blacks.
TV-warm	Same as TV neutral, just with a slightly warmer look overall.
Vibrant	Boosts color saturation except for red and yellow (skin tone protection).

Setting the Look

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

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

Log C (C is for Cineon; The original Cineon log encoding is based on the density of color film negative) encoded images can be identified by their flat and desaturated nature. Whites and blacks are not extended to their maximum values.

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.

To correctly display Log C material on an HD or UHD monitor (Rec 709/Rec 2020) or in a digital projection (P3), it needs to be tone-mapped and transformed into the target color space. This image conversion can be performed using a 3D Look Up Table (3D LUT).

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:

Log C	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).
Look	Select to apply the look set in *MENU > Look > Look* to the output path. Applies a video display processing to camera images. The default *ARRI 709* look complies with the ITU.R-BT709 standard for display on standard broadcast monitors.
ALEXA Classic 709	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 Medium

⚠ CAUTION

Hot Surfaces on Recording Media



During extended operation, high data rates and/or operation at high ambient temperatures, the recording media in the camera can get hot to the touch and can cause pain or even burns if held for too long directly after removal.

- Do not handle the recording media for longer than three seconds and remove it quickly but carefully.
- Consider to wear protective gloves when removing the recording media or allow it to cool down beforehand.
- Do not put any labels or adhesive tape on the recording media (especially the side facing the camera body). The recording media must have full contact to the thermal surface inside the camera to ensure proper heat conduction.

ADVICE



Recording Media Damage due to improper Handling

Damage to the Recording Media or Loss of Data.

- Always insert the recording media as described in this document.
- Keep the media door closed to prevent dirt and moisture from entering the camera.
- Do not put any labels or adhesive tape on the recording media. The metal surface is used for cooling. A hot medium can have reduced performance. The plastic surface can easily be broken off when a label is removed.
- Never remove a drive while recording - this may damage the recorded clip.
- If the recording process is interrupted by power loss or drive removal, transfer all the data from the drive and format it before using it again.
- While we do everything we can to assure reliable functioning of different recording media 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.

ADVICE

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

Codex Compact Drives

The Codex Compact Drive is designed to support the demands of creative professionals working with the ALEXA Mini LF and the ALEXA 35. It offers robust mechanical protection, efficient cooling and a reliable connector for the integrated, high speed flash memory.

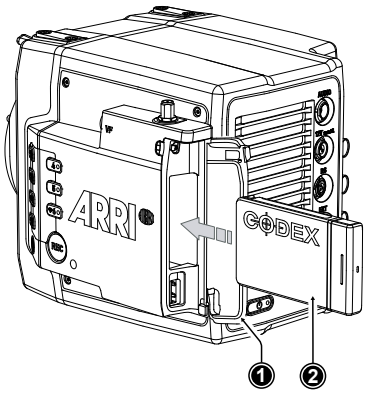
Compact Drives are currently available with 1 TB (960 GB usable) and 2 TB (1920 GB usable) capacity. The 2 TB drive offers about double speed for all ARRIRAW formats on ALEXA 35. There is no advantage other than capacity for the Mini LF. At 24 fps ARRIRAW 4.6K 3:2 Open Gate, the recording time is a little over 25/50 min. At 24 fps Apple ProRes 4444 4K 16:9, the recording time is a little over 90/180 min.

The camera records its data to the ARRI UDF file system which is accessible for operating systems without the need for special software. Depending on performance vs budget requirements, you can choose between a USB-C Reader or a Thunderbolt 3 Dock. Mac users who own a SXR Capture Drive Dock can get a Compact Drive Adapter, which combines high performance with lower pricing.

Recorded material can be accessed directly with the USB-C Codex Compact Drive Reader, the Compact Drive Dock or an SXR Capture Drive Dock when it is equipped with a Compact Drive Adapter.

Compact Drives are specified for a temperature range from 0 °C to 70 °C (32 °F to 158 °F). When inserting the drive with a temperature below 0 °C, the camera will go into an alert state and prevent access to the drive until such time that the media reaches its minimum operational temperature. Once the media is within specified temperature range, the camera will complete loading the media and resume regular operation.

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 drive 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.

Erasing the Recording Medium

ADVICE

When erasing the recording medium, all data is completely erased and cannot be recovered afterwards. Make sure that all data has been copied from the medium before erasing.

Do not disconnect the camera from the power supply or turn it off while erasing.

Do not remove the recording medium while erasing.

Before using a Codex Compact Drive with the camera, it must be erased in the camera to create the required file system. Codex Capture drives are initialized with the UDF file system, which is read only for computers, and 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.

► Select *MENU* > *Media* > *Erase Media*.

► Press *ERASE* to start erasing the drive, or press *CANCEL* to cancel.

or

► Select *Side Display* > *Settings* > *Erase Media*.

► Press *YES* to start erasing the medium, press *NO* to cancel.

Compact Drive LED States

LED State	Media State
Solid Green	Drive is in standby, ready to record and safe to remove.
Solid Red	Read/write access during Playback or Recording. Do not remove the drive. **Info:** As recording is stopped, it takes a few seconds to finalize the recorded clip. During this time, the drive should not be removed.
Blue flashing	Drive is being loaded or unloaded.
Red flashing	Drive error, see *MENU* > *Alerts* for details.
Off	Drive cannot be accessed. Please try reinserting the drive. If the problem persists, check the drive state with Codex Device Manager.

Media Info

► Select *MENU* > *Info* > *Media Info* for additional information on the inserted medium.

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.

ADVICE

Erase Media completely 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 Media* is in progress.

Do not remove the recording media from the recording module while *Erase Media* 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*.

ADVICE

A maximum of 400 clips can be recorded on a drive. When the maximum of 400 clips is reached, the recording media will be declared as full and further recording onto the media 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 Codec

The selection of the recording codec 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 codec 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.

ADVICE

Apple ProRes is a variable bitrate (VBR) codec. Depending on the content of your images the remaining recording time on the recording media can be longer than indicated by the camera.

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:

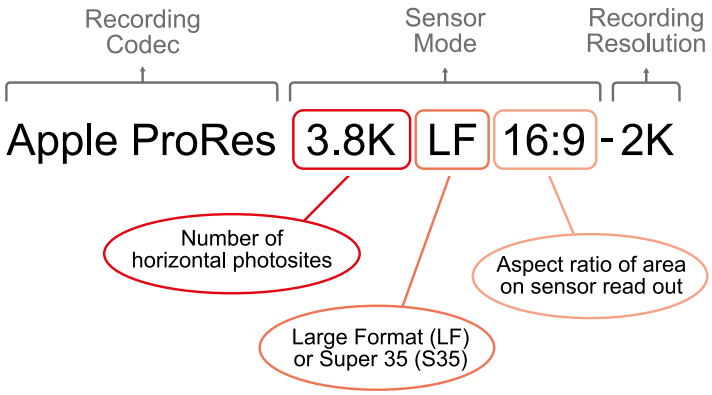
Recording Codec	Color Coding	Bit Rate (VBR, 24fps, 3840x2160)
MXF/Apple ProRes 422 HQ	10bit YCbCr	705 Mbps
MXF/Apple ProRes 4444	12bit YCbCr	1058 Mbps
MXF/Apple ProRes 4444 XQ	12bit YCbCr	1608 Mbps
MXF/ARRIRAW	12bit log	2389 Mbps

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

Recording Resolution Naming Scheme



Recording Codec

The Recording Codec defines the image content encoding. The options are ARRIRAW or Apple ProRes.

Sensor Mode

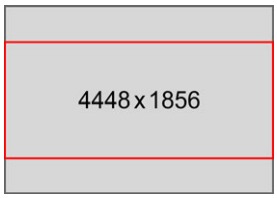
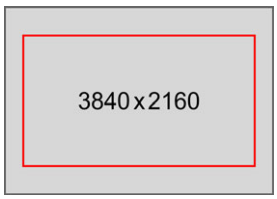
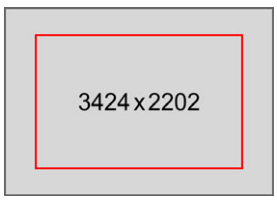
The sensor mode defines the size of the area on the sensor that is read out. This influences the maximum possible frame rate, the maximum data rate and what lenses can be used, as some lenses may not cover a large sensor area. The Sensor Mode part of the name is further divided into three parts:

- First is the number of horizontal photosites used on the sensor in “K” (thousands).
- Second is Large Format “LF” or Super 35 “S35”, provided so a quick choice can be made without memorizing resolution numbers. “LF” in this context is any sensor mode with an area larger than the ALEXA Mini sensor in Open Gate, and “S35” is any sensor mode with an area equal to or smaller than the ALEXA Mini sensor in Open Gate.
- Third is the aspect ratio of the area on the sensor that is being read out.

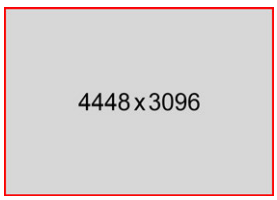
Recording File Container Size

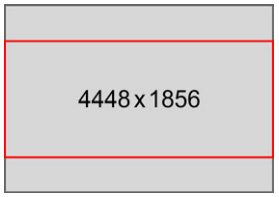
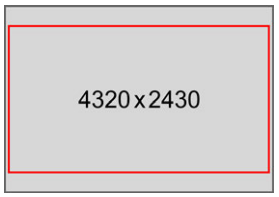
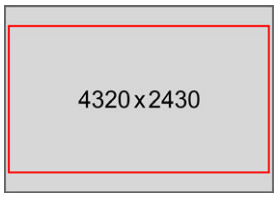
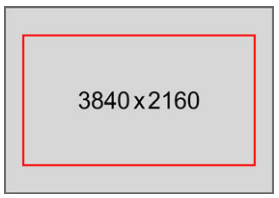
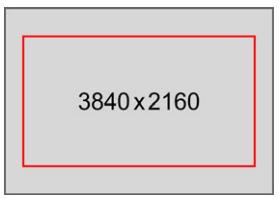
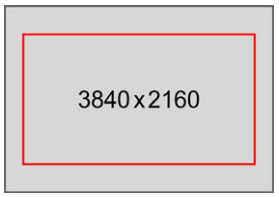
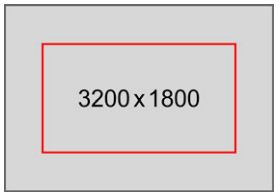
Recording File Container Size shows the resolution of the file that is being recorded in camera. Sometimes, as in *ARRIRAW 3.4K S35 3:2 - 3.4K*, the number of photosites read from the sensor and the number of pixels recorded are the same (here 3.4K), so no in-camera processing has been applied. In other cases, as for instance in *Apple ProRes 3.8K LF 16:9 - 2K* the number of photosites read out from the sensor is larger than the number of pixels recorded into the file. In this case, the in-camera processing has downsampled the 3.4K image from the sensor to a 2K image recorded to reduce the data rate. The aspect ratio of the recorded file is the same as that of the sensor mode and is therefore not noted again.

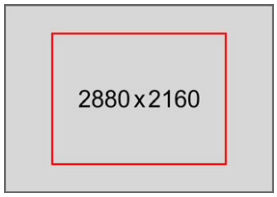
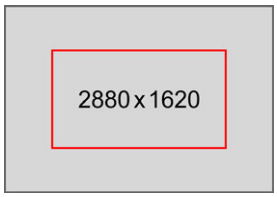
Recording Resolutions ARRIRAW

Recording Resolution	Sensor Active Image Area (dimensions)	Sensor Active Image Area (photosites)	Recording Resolution (Clip)	Recording Frame Rates
4.5K LF 3:2 Open Gate - 4.5K	36.70 x 25.54 mm 1.445 x 1.006"		4448 x 3096	0.75 - 40 fps
4.5K LF 2.39:1 - 4.5K	36.70 x 15.31 mm 1.445 x 0.603"		4448 x 1856	0.75 - 60 fps
3.8K LF 16:9 - UHD	31.68 x 17.82 mm 1.247 x 0.702"		3840 x 2160	0.75 - 60 fps
2.8K LF 1:1 - 2.8K	23.76 x 23.76 mm 0.935 x 0.935"		2880 x 2880	0.75 - 60 fps
3.4K S35 3:2 - 3.4K	28.25 x 18.16 mm 1.112 x 0.714"		3424 x 2202	0.75 - 60 fps

Recording Resolutions Apple ProRes

Recording Resolution	Sensor Active Image Area (dimensions)	Sensor Active Image Area (photosites)	Recording Resolution (Clip)	Recording Frame Rates
4.5K LF 3:2 Open Gate - 4.5K	36.70 x 25.54 mm 1.445 x 1.006"		4480 x 3096 (Clip padding: 16px left and right)	0.75 - 40 fps

4.5K LF 2.39:1 - 4.5K	36.70 x 15.31 mm 1.445 x 0.603"		4480 x 1856 (Clip padding: 16px left and right)	0.75 - 60 fps
4.3K LF 16:9 - UHD	35.64 x 20.05 mm 1.403 x 0.789"		3840 x 2160	0.75 - 40 fps
4.3K LF 16:9 - HD	35.64 x 20.05 mm 1.403 x 0.789"		1920 x 1080	0.75 - 75 fps
3.8K LF 16:9 - UHD	31.68 x 17.82 mm 1.247 x 0.702"		3840 x 2160	0.75 - 60 fps
3.8K LF 16:9 - 2K	31.68 x 17.82 mm 1.247 x 0.702"		2048 x 1152	0.75 - 90 fps
3.8K LF 16:9 - HD	31.68 x 17.82 mm 1.247 x 0.702"		1920 x 1080	0.75 - 90 fps
2.8K LF 1:1 - 2.8K	23.76 x 23.76 mm 0.935 x 0.935"		3072 x 3024 (Clip padding: 96 px left and right, 72 px top and bottom)	0.75 - 60 fps
3.2K S35 16:9 - 3.2K	26.40 x 14.85 mm 1.039 x 0.585"		3200 x 1800	0.75 - 75 fps

2.8K S35 4:3 - 2.8K	23.76 x 17.81 mm 0.935 x 0.701"		2880 x 2160	0.75 - 75 fps
2.8K S35 16:9 - HD	23.76 x 13.36 mm 0.935 x 0.526"		1920 x 1080	0.75 - 100 fps

1. Select *Menu* > *Recording* > *Recording Resolution*.
2. Select the desired recording resolution.

   Note: The available recording resolutions displayed in the list depend on the currently selected Recording Codec.

   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.

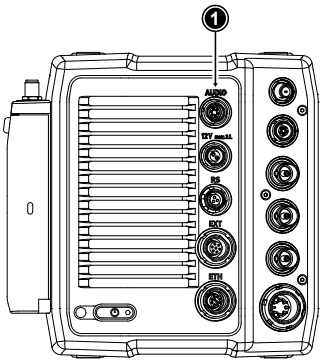
16.5 Audio Recording

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.

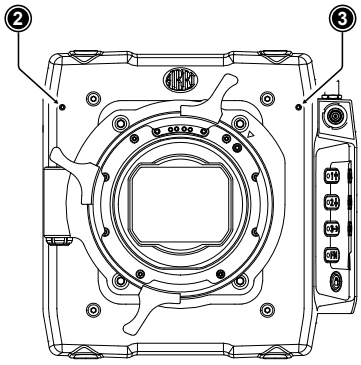
Audio Inputs

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, the SDI streams 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.

Manual (+L)	A limiter prevents the signal from clipping if the input signal level combined with the set gain results in signal levels exceeding -6 dBFS.
Auto	*Auto* matches a 4 dBu input signal to -20 dBFS. This setting leaves enough headroom for recording and avoids audio clipping. When *Auto* 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:

Rec Start Beeper	The camera gives an acoustic indication for start of recording.
Rec Stop Beeper	The camera gives an acoustic indication for stop of recording.
Media Full Beeper	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.
Tally MVF-2	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_210421_RN9O.mxf

The clip name consists of eight parts:

Camera Index (A)	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.
Reel Counter (004)	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.
Clip Index (C)	One character, fixed to C. Main use is to separate the reel counter from the clip counter.
Clip Counter (010)	3 characters, 001-999. Automatically advances each time a clip is recorded.
Date (210421)	Current date, in order YYMMDD, as set in *MENU* > *System* > *System Time + Date*, separated from the other naming components by underscores.
Camera ID Prefix (R)	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.
Camera ID (N9O)	The camera serial number encoded in 3 letters Base36 (0-9, A-Z). N9O translates into decimal serial number 30156.
File name Extension (.mxf)	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.

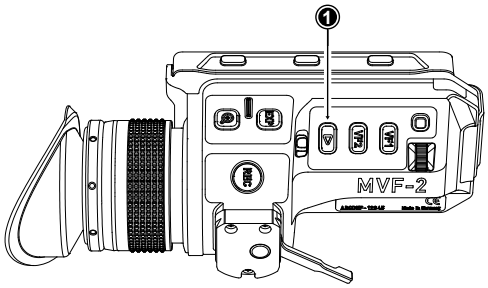
Changing a file or some values inside the ‘MHL’ checksum file results in an error during the checksum verify process. Checksums should always be generated during the offload of the original camera negative and should remain next to the files until the final backup process. We strongly recommend a copy 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
- ► Using apps communicating with the camera through the Camera Access Protocol (CAP)

Starting Playback Using the PLAY Button on MVF-2

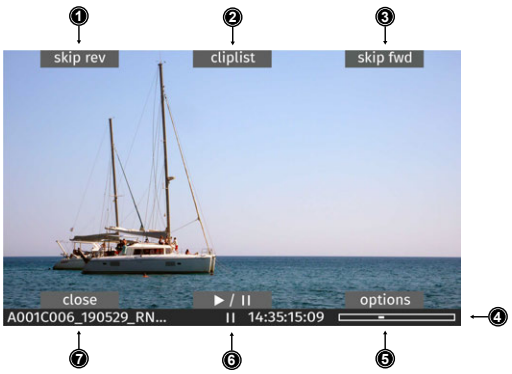


1. Press and hold the *PLAY* button (1) for one second to start playback.

   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

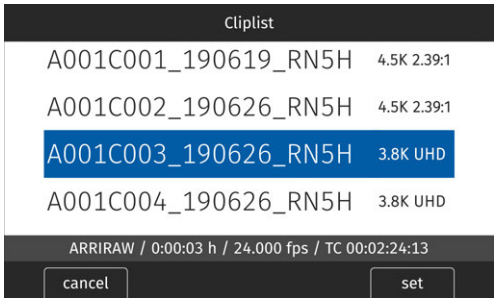
When starting playback, the camera loads the last recorded clip (paused on the first frame). The playback screen offers the following controls:



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

Cliplist

The cliplist lists all clips 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 for preview.



1. Select *PLAY* > *Cliplist*.
2. Select a clip.

   For the selected clip, properties are displayed below the cliplist:

   Codec: Recording codec of clip.

   Duration: Clip duration at playback speed.

   Project rate: Playback frame rate of clip.

   Timecode: Start timecode of the clip.
3. Press *SET* or the *JOGWHEEL* to load the clip for playback.
4. Press *CANCEL* to leave the cliplist and return to the play screen.

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:

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

2. Set the desired play end mode.

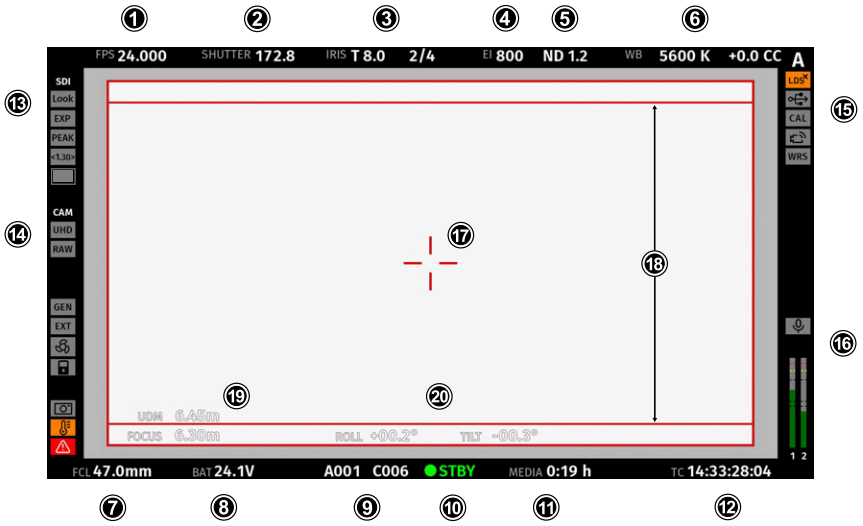
18 Monitoring

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. When using a lens extender, the iris value is displayed in brackets (recalculated value).
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). When using a lens extender, the focal length value is displayed in brackets (recalculated value).
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.

10	Camera Status	STBY	Standby - ready for recording.
		REC	Recording.
		PLAY	Camera is in playback mode.
		ERASE	Medium erase in progress. Active erasing disables recording.
		None	Idle, recording not possible (e.g. no media inserted, media is full).
		ERROR	System error occured. See *MENU* > *Alerts* for details.
11	MEDIA	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.	
12	TC	Shows the current timecode. The TC label turns orange if the sensor frame rate does not match the project rate.	

Left Section

13	EVF / SDI Status	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.
		MAG	When using Magnification, the magnification icons indicate that the output shows less image content than actually recorded.
14	Camera Status	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

15	Camera Index Letter	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.	
16	MIC	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

17	Center Cross	Marks the center of the image to help in framing.
18	Frame Line	Frame line (here: ARRI 1:1.85)
19	UDM	Shows measurements from Ultra Distance Measures.
	Focus	Shows the current focus distance of the lens (if lens data is available). When using a lens extender, the focus distance value is displayed in brackets (recalculated value).

20	HOR	Shows the electronic horizon or numeric roll and tilt values. Note: Export laws dictate that for sensors made up of more than a certain number of photo sites, we cannot record positional information like roll and tilt, lest the camera be classified as military equipment. This rule looks at the total number of photosites on the sensor and does not concern itself with individual recording formats that may record fewer photosites.

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:

Frame Lines	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 "Frame Lines", page 91.
Frame Line Shading	Applies an outside shading to the area between the frame line and the remaining active image area.
Center Mark	Sets the center mark between *Off*, *Dot*, *Small Dot*, *Cross* or *Small Cross*.
Surround Mask	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 (only a single semi transparent option is available for the MVF-2 flip-out monitor).
Status Info	Only for EVF and SDI. Sets camera status overlays between *Off*, *Overlay* (status on the active image), or *Safe* (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:

Info 1	Enables/disables the top and bottom section of the status info.
Info 2	Enables/disables the left and right section of the status info.
Timecode	Enables/disables display of the timecode on the bottom right of the image.
Audio	Enables/disables display of the audio levels located on the lower right side of the image.
Lens Data	Enables/disables iris and focal length readings.
Lens Focus Distance	Sub-option of lens data setting. Enables/disables display of focus distance readings (19), located on the lower left corner of the image.

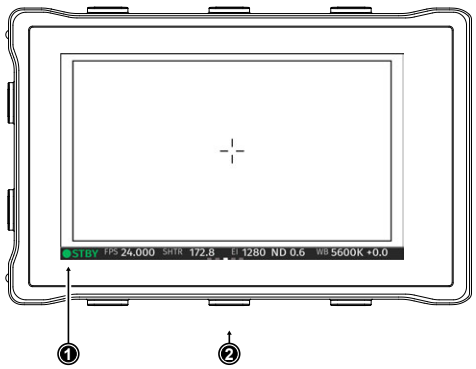
UDM	Sub-option of lens focus distance setting. Enables/disables display of distance readings from the Ultrasonic Distance Measure UDM-1 (in combination with LCUBE CUB-1). Located above the lens focus distance overlay.
Camera Index Letter	Displays the camera index letter in the top right corner of the image. Helps to identify camera image output when shooting with multiple cameras. Note: Only available for SDI.
Electronic Horizon	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 115.
Show Numeric Values	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 display 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.



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.

   Note: Surround View is not available for recording resolutions

   4.5K LF 3:2 Open Gate - 4.5K

   2.8K LF 1:1 - 2.8K

   2.8K S35 4:3 - 2.8K

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* > *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 for EVF and/or SDI
3. Select *MENU* > *Monitoring* > *EVF/Monitor* > *Monitor 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.
Semitrans. Mask	Surround mask is displayed with 50% opacity.

4. Set the preferred surround mask for the MVF-2 Monitor.

Frame Border

The frame border setting helps to visually separate the recorded image area from the status overlays for those recording resolutions that do not support to display surround view (e.g. 4.5K LF 3:2 Open Gate - 4.5K).

1. Select *MENU* > *Monitoring* > *EVF/Monitor* > *Frame Border*.

   Select *MENU* > *Monitoring* > *SDI* > *SDI Processing* > *Frame Border*.

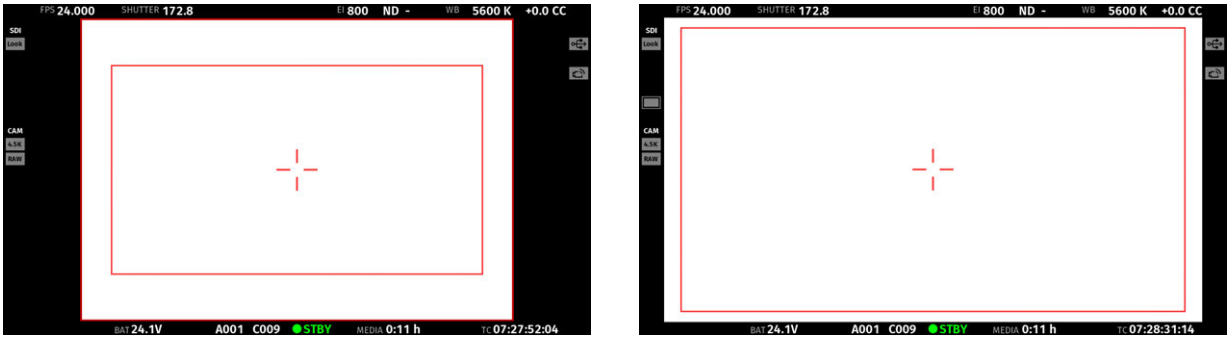
2. Set *Frame Border* on or off.

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.



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%).

The magnification icon on the left side of the status info indicates that the recorded area exceeds the displayed image:



Indicates that the recorded image content horizontally (left and right) extends beyond what is visible on the output.



Indicates that the recorded image content vertically (above and below) extends beyond what is visible on the output.



Indicates that the recorded image content horizontally and vertically extends beyond what is visible on the output.

Setting the Magnification

The camera menu offers the following settings to adjust magnification:

- Select *MENU* > *Monitoring* > *Master Magnification*
  to set the magnification level 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 level of the EVF and the flip-out monitor.

- Select *MENU* > *Monitoring* > *SDI* > *SDI Processing* > *Magnification*
  to set the magnification level of the SDI outputs.

  Note: Magnification can only be applied on the SDI output(s) with SDI image set to *processed*.
  Note: Magnification is not available when using recording formats that record 2K or HD clips.
  Note: Magnification is reset to 100% when the recording resolution is changed.

18.4 Frame Lines

To aid in framing, both the viewfinder and the SDI outputs (if set to processed) 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.

A standard set of frame lines for different aspect ratios is provided in the camera, the availability depends on the selected recording resolution.

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 import a custom frame line from an inserted USB medium.

Note: ALEXA Mini LF features a frame line "ARRI 2.00 Ana 2.0x N" for LF Open Gate 4.5K, marking the 2880x2880 area. This is for the use of 2x anamorphic lenses for a 4K UHD mandate when the intended deliberable has a 2:1 aspect ratio.

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*.

   The following frame line colors are available:

Red	Magenta
Green	Yellow
Blue	Black
Cyan	White

2. Set the desired frame line color.

User Rectangles

To further aid in framing, the camera offers to display two custom user rectangle overlays.

You can configure *width, height* and *offset* (position from left and top of image area) in per mill.

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

   You have the following options:

Off	User Rectangles are not displayed.
Rect 1	Only user rectangle 1 is displayed.
Rect 2	Only user rectangle 2 is displayed.
Rect 1 + 2	User rectangels 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:

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

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

Frame Line Outside Shading

The Frame Line Outside Shading setting applies an outside shading to the area between the frame line and the remaining active image area.

1. Select *MENU* > *Monitoring* > *EVF/Monitor* > *EVF Overlays* > *Frame Line Shading*.

   Select *MENU* > *Monitoring* > *SDI* > *SDI Processing* > *Overlays* > *Frame Line Shading*.

   Following options are available:

Off	Frame line shading is not used.
25%	The area outside the frame line is shaded with 25% opacity.
50%	The area outside the frame line is shaded with 50% opacity.
75%	The area outside the frame line is shaded with 75% opacity.
100%	The area outside the frame line is shaded with 100% opacity.

2. Set the frame line outside shading for EVF and/or SDI.
3. Select MENU > Monitoring > EVF/Monitor > Monitor Overlays > Frame Line Shading.

   Following options are available:

Off	Frame line shading is not used.
50%	The area outside the frame line is shaded with 50% opacity.
100%	The area outside the frame line is shaded with 100% opacity.

4. Set the frame line outside shading for the Monitor.

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*.

Frame Lines Saved in Metadata

The camera records frame lines from the active frame line file into metadata. This metadata is written to all recording formats and is present on all SDI outputs. 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.

ADVICE

Frame lines created for a recording resolution 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 121.

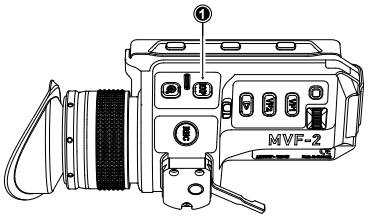
18.6 Exposure Tools

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 121.

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.

ADVICE

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:

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

Peaking	Activates Peaking for the corresponding output.
Peaking Mode	Select between *Color* and *Aperture*. Select color peaking to overlay in-focus areas with a color, and select aperture peaking to enhance object edges only.
Peaking Level	Sets a peaking strength in range from 1 (minimum) to 20 (maximum).
Peaking Offset Shift	Adjusts the threshold for *Color* Peaking to become active, relative to the peaking level. Note: A negative offset shift, in particular with high ASA ratings, can increase the peaking results.
Color	Select the color for *Color* Peaking.

Activation of Peaking

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.

   Additionally *SDI Peaking* can be activated through *MENU* > *Monitoring* > *SDI* > *SDI Processing* > *Peaking*.
3. Press the user button to toggle Peaking on/off
4. Select *MENU* > *Monitoring* > *SDI* > *SDI Processing* > *Peaking*

For more information on user buttons please see "User Buttons", page 121.

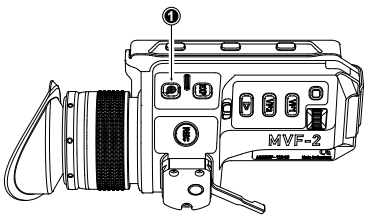
18.7.2 Zoom

The camera supports to zoom into the image e.g. to better judge focus. The camera offers six 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 *JOG-WHEEL* 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 Outputs

SDI Format

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

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
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
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** *(SDI 2 ONLY)*	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.

Note: Clean (non-processed) 422 6G UHD monitoring is only available on the SDI 2 output.

SDI Processing

You can configure the SDI processing elements.

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

Following options are available:

Surround View	Activates or deactivates surround view.
Magnification	Apply magnification to the SDI outputs.
Exposure Tool	Activates or deactivates the exposure tool.
Peaking	Configures peaking for SDI.
Overlays	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 (progessive 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:

Clean	Images are identical to the images that the camera records internally. They do not contain any overlays and do not show any surround view.
Processed	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**
processed	clean
processed	processed
clean	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*.

18.8.1 Preventing Damage to SDI Outputs

Under certain conditions the SDI outputs of cameras can be damaged through a power surge. This can be avoided by connecting power and BNC cables in a particular order and by using shielded power cables and high quality undamaged BNC cables.

Problem Description

Camera SDI outputs can get damaged when an accessory is connected to the SDI output and is powered through an unshielded cable. All cameras, including all ARRI cameras and other SDI devices, can be affected by this.

This is especially critical for cameras with SDI connections capable of SDI 6G or higher (even if set to work at lower bit rates like SDI 1.5G). Cameras with SDI connections capable of SDI 1.5G or SDI 3G can be protected more efficiently without decreasing the SDI signal quality.

This damage to the SDI connection can occur when connecting an unshielded power cable to an accessory that is already connected to the SDI output of the camera. If the plus pin is contacted before the negative pin, the BNC cable will close the current circuit resulting in a fatal damage of the included SDI driver chip which itself is not designed to handle such high currents.

This problem can also occur when disconnecting an unshielded power cable of an accessory that is still connected to the SDI output of the camera with a BNC cable. Damaged or low quality BNC cables are more prone to cause this problem.

This problem can occur with all types of power sources including the camera's accessory power outputs, a power splitting box or an external battery. This problem can also occur when the camera or accessory are in the power on or off state.

ADVICE

Always make sure to plug in the power cable first and then connect the BNC cable. Once power and BNC cables are connected, it is OK to power the camera or accessory on or off.

Always make sure to disconnect the BNC cable first and then disconnect the power cable.

Only use shielded power cables to power accessories that connect to the camera with a BNC cable. When only the plus pin connects on a shielded power cable, the shield will act as the power return and therefore not damage the SDI output.

To further protect the SDI outputs, an SDI isolator can be used. Please note, that SDI isolators can reduce signal quality and/or maximum cable length. D-Tap (also called Power-Tap or P-Tap) connectors are made out of plastic and therefore cannot support a shield. Cables with D-Tap connectors should only be used when the above mentioned cable connection sequence is followed.

18.9 EVF/Monitor Settings

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

Following options are available:

EVF Brightness
Brightness of the EVF is adjustable with values 120, 200 and 300 (Nits). The default value is 120.

EVF Power

Auto
EVF OLED display is activated and deactivated automatically, depending on the MVF proximity sensor state. This is the default setting.

Off
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.

On
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.

ADVICE

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.

EVF Eyepiece Heating
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.

EVF Image Rotation 180°
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.

Monitor Brightness
Adjusts the brightness of the MVF flip-out monitor from 1 (minimum) to 10 (maximum). The default value is 06.

Monitor Flip Mode

Auto
Flips the monitor image automatically depending on the monitor's orientation. This is the default setting.

Normal
Ignores the monitor's orientation sensor and displays the monitor image in normal orientation.

Flipped
Ignores the monitor's orientation sensor and displays the monitor image in flipped orientation (upside down).

18.10 Color Bars

The camera supports to output 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 to switch color bars on or off.

19 Synchronization

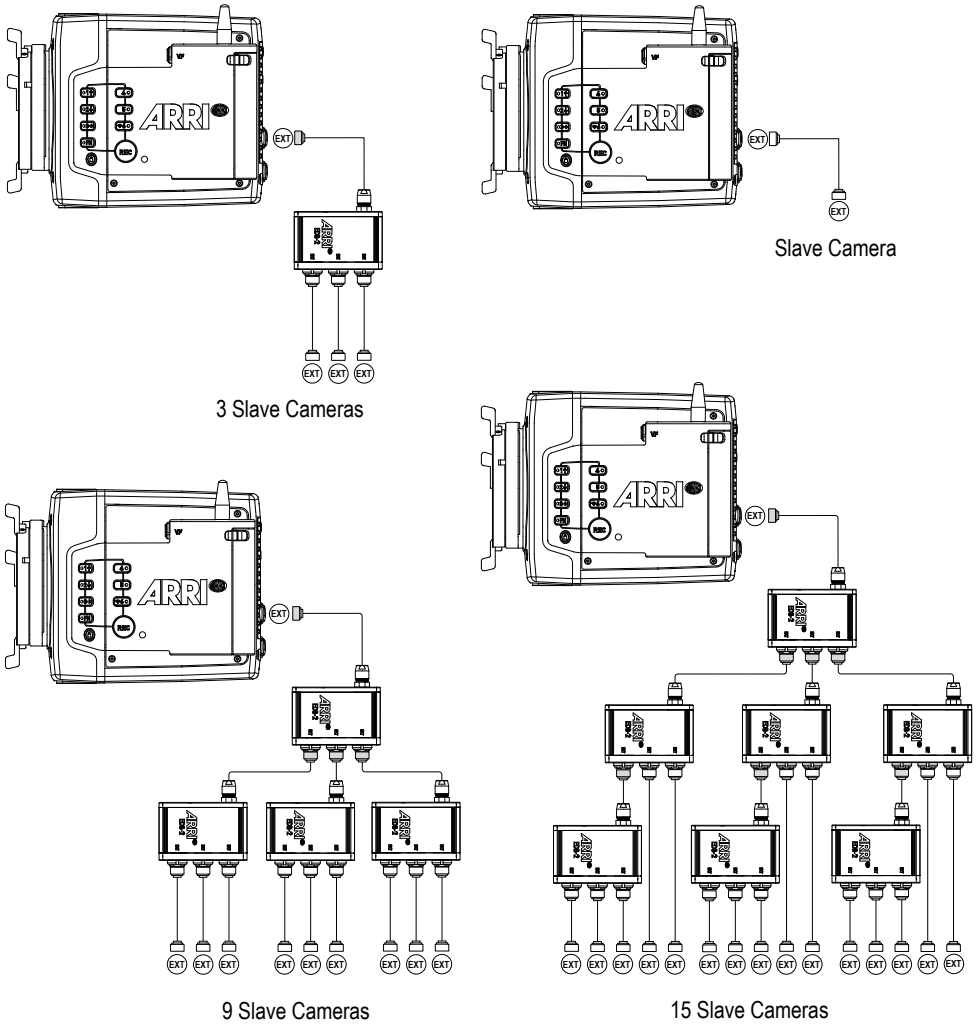
19.1 EXT Sync

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:



ADVICE

- 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 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.

Note: 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:

Off	Mirroring is inactive.
V	The sensor image is vertically mirrored.
H	The sensor image is horizontally mirrored.
V+H	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:

User Pixel Mask Active	Shows whether a User Pixel Mask is currently active in the camera.
Install User Pixel Mask	Select to install a User Pixel Mask from USB memory stick.
Export User Pixel Mask	Select to backup the currently installed User Pixel Mask onto USB memory stick.
Delete User Pixel Mask	Select to uninstall a User Pixel Mask.
Grab Raw Image	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 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.

ADVICE

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.

21.3 Button and Display Settings

► Select *MENU* > *System* > *Buttons + Display*.

Following options are available:

Display Style	Choose between day mode and night mode.
Button Brightness	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:

Rec Low	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).
Low Noise	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:

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

ADVICE

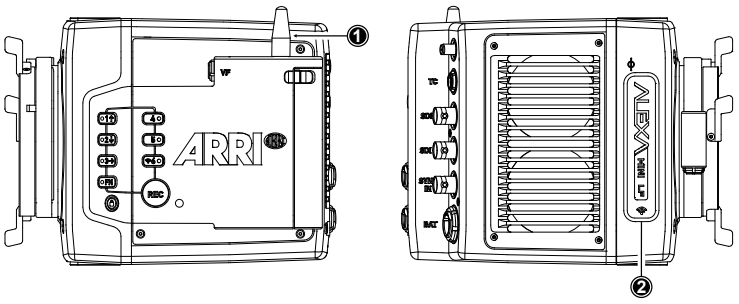
Please note that as soon as an LDA table is activated, the LDS contacts of the lens mount are switched off. There is no need to switch the mount off manually when using LDA.

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*.

External Antenna

► Select *MENU* > *System* > *Network / WiFi* > *External Antenna* to enable or disable WiFi radio for the external antenna.

Note: Wifi External Antenna can only be disabled (or re-enabled) when Wifi Power is off. Once Wifi External Antenna is disabled (or re-enabled) Wifi Power is initially grayed out and can only be activated after about 3 seconds.

WiFi Mode

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

   Following options are available:

Host	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.
Client	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*.
2. Select *Automatic* to have the camera automatically select the WiFi host channel with the best performance, or select a WiFi channel between 1 and 11.

   With the *Automatic* setting, the camera will re-discover the best WiFi host channel every time it is rebooted. Select *Automatic* from the list again to trigger a new scan. The selected channel is displayed in brackets.

   When using WiFi and White Radio simultaneously, and setting the WiFi Host Channel manually, 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	×	×	×	×	✓	✓	✓	✓	×	×	✓	✓	✓	✓
2	×	×	×	×	✓	✓	✓	✓	×	×	×	✓	✓	✓
3	×	×	×	×	✓	✓	✓	✓	×	×	×	×	✓	✓
4	×	×	×	×	✓	✓	✓	✓	×	×	×	×	✓	✓
5	×	×	×	×	×	×	✓	✓	×	×	×	×	✓	✓
6	✓	×	×	×	×	×	✓	✓	×	×	×	×	×	✓
7	✓	✓	×	×	×	×	✓	✓	×	×	×	×	×	×
8	✓	✓	×	×	×	×	×	✓	✓	×	×	×	×	×
9	✓	✓	×	×	×	×	×	×	✓	✓	×	×	×	×
10	✓	✓	✓	×	×	×	×	×	✓	✓	×	×	×	×
11	✓	✓	✓	✓	×	×	×	×	✓	✓	×	×	×	×
	12	13	16	17	20	21	24	25	14	15	18	19	22	23
	ZigBee IEEE 802.15.4 Radio Channel Number													

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”. For security reasons, we recommend that you do not use the default password, but assign your own password.

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* > *WiFi Networks Available*.

   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*.

Note: Connection to networks using WPA encryption is not supported.

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 adress.

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 50.

ADVICE

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.

After a camera update, the Web Remote feature may not be fully functional until the browser cache of your web browser has been cleared. Always use a 'private' or 'incognito' browser window when using the Web Remote to operate the camera and to perform a SUP update. This prevents possible erroneous behavior.

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.

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*.

   A confirmation popup window is displayed.
2. Press *RESET*.

   The camera settings are reset to factory defaults.

   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 ARRI709
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)

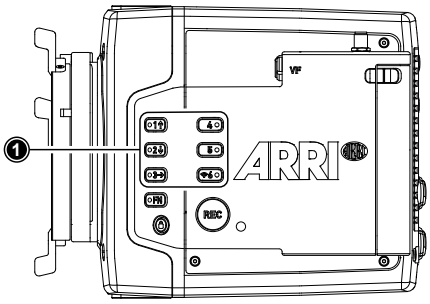
MENU > USER BUTTONS >	User Buttons (all settings)
MENU > SYSTEM > POWER >	Bat In Warning
MENU > SYSTEM > BUTTONS + DISPLAY >	Display Style, Button Brightness
PLAY > OPTIONS >	Play End mode
MENU > RECORDING > REC BEEPER / TALLY >	All Settings

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

23 User Buttons

Camera User Buttons

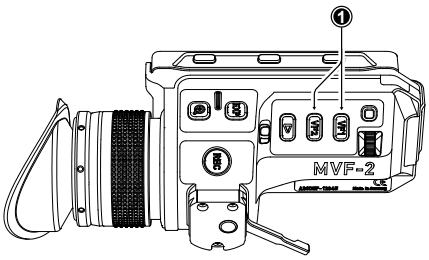
The camera is equipped with six freely assignable user buttons (1). Each button can be customized with individual functions. Once a user button is assigned with a function, press the button to trigger its function. An LED on each user button reflects the functional status. Note: Camera user buttons 7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



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

<table>
<tr><th colspan="2">User Button Functions</th></tr>
<tr><td>SDI Zoom (smart)</td><td>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.</td></tr>
<tr><td>EI Increase</td><td>Selects the next value from the EI (exposure index) list.</td></tr>
<tr><td>EI Decrease</td><td>Selects the previous value from the EI (exposure index) list.</td></tr>
<tr><td>FPS Increase</td><td>Selects the next value from the FPS list.</td></tr>
<tr><td>FPS Decrease</td><td>Selects the previous value from the FPS list.</td></tr>
<tr><td>ND Increase</td><td>Selects the next value from the ND list.</td></tr>
<tr><td>ND Decrease</td><td>Selects the previous value from the ND list.</td></tr>
<tr><td>Shutter Increase</td><td>Selects the next value from the Shutter list.</td></tr>
<tr><td>Shutter Decrease</td><td>Selects the previous value from the Shutter list.</td></tr>
<tr><td>WB Increase</td><td>Selects the next value from the WB list.
Note: User button skips the Auto WB entry of the WB list.</td></tr>
<tr><td>WB Decrease</td><td>Selects the previous value from the WB list.
Note: User button skips the Auto WB entry of the WB list.</td></tr>
<tr><td>Audio Ch1 Increase</td><td>Increases gain of audio channel 1 in 1dB steps.
Note: User button is only functional with channel 1 control set either to Manual or Manual (+L).</td></tr>
<tr><td>Audio Ch1 Decrease</td><td>Decreases gain of audio channel 1 in 1dB steps.
Note: User button is only functional with channel 1 control set either to Manual or Manual (+L).</td></tr>
<tr><td>Audio Ch1+2 Increase</td><td>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 Manual or Manual (+L).</td></tr>
<tr><td>Audio Ch1+2 Decrease</td><td>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 Manual or Manual (+L).</td></tr>
<tr><td>Auto WB</td><td>First press arms auto white balance for one second, second press triggers AWB.</td></tr>
<tr><td>Check Last Clip</td><td>Plays the last five seconds of the last recorded clip.</td></tr>
<tr><td>Color Bars</td><td>Turns color bar on or off. Activation works only during Stby.</td></tr>
<tr><td>Frame Grab</td><td>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:

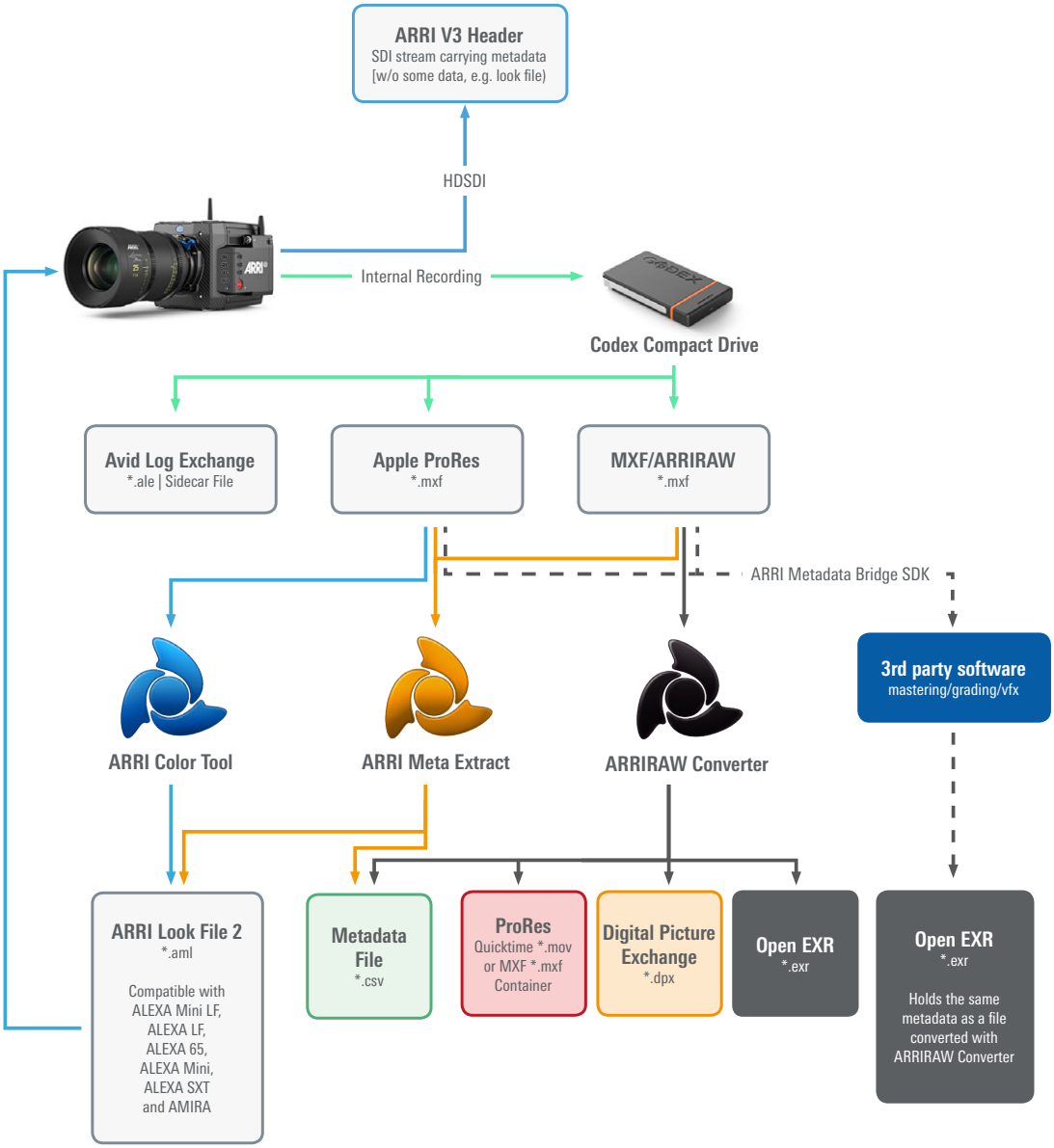
White: Frame grab is stored to USB.
Orange: Frame grab failed.

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):
<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>
</td></tr>
</table>

User Button Functions	
Frame Line Color	Changes the frame line color.
Iris Auto	Only for use with EF lenses. Triggers automatic iris.
Iris Close	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.
Iris Open	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.
Button FN	Behaves identically to FN button on camera body. Note: Only available for GPIO box and Master Grip user buttons.
Button 1 to *Button 3*	Behaves identically to button 1, button 2 or button 3 on camera body. Note: Only available for GPIO box and Master Grip user buttons.
Overlay Menu	Activates or deactivates the overlay menu on MVF-2 EVF, monitor and SDI (when SDI processing is activated).
Playback	Behaves identically to the *PLAY* button on MVF-2.
Record Start/Stop	Behaves identically to the *REC* button.
WiFi Power	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.

ADVICE

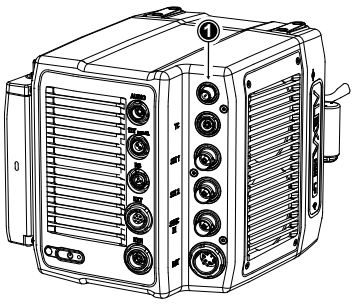
Export laws dictate that for sensors made up of more than a certain number of photo sites, we cannot record positional information like tilt and roll, lest the camera be classified as military equipment. This rule looks at the total number of photosites on the sensor and does not concern itself with individual recording formats that may record fewer photosites. While the photo site count of the Super 35 ALEXA, ALEXA Mini and AMIRA cameras falls below this boundary, the ALEXA LF and ALEXA Mini LF are above it.

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:

Australia	*India*	*South Africa*
Canada	*Israel*	*South Korea*
China	*Japan*	*Taiwan*
Egypt	*New Zealand*	*Thailand*
Europe	*Philippines*	*UAE*
Hong Kong	*Singapore*	*USA*
		World

2. Set the region the white radio is used in.

ADVICE
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.

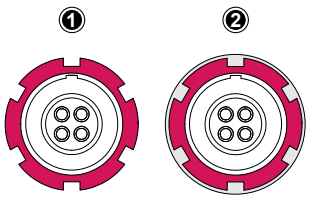
25.2 Lens Motors

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.

ADVICE

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:

Focus/Iris/ Zoom Motor Torque	Set the torque of a lens motor, available values in the range of *1* (lowest) to *4* (highest).
Focus/Iris/Zoom Motor Direction	Available values are *Left* and *Right*. Set direction according to motor position when standing behind the camera.
Focus/Iris/Zoom Motor Teeth Count	Selects the number of teeth of the motor. Available values are *Auto*, *40t*, *50t*, and *60t*. 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.

ADVICE
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

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).

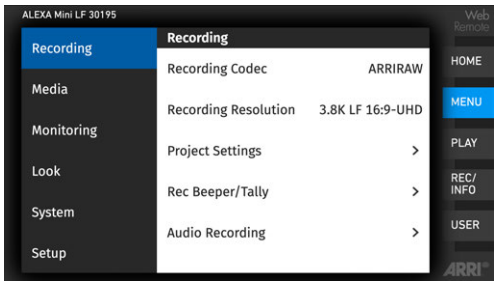
WiFi is enabled per factory default, If WiFi is inactive, enable WiFi via the MVF-2 in *MENU* > *System* > *Network / WiFi* > *WiFi Power*. Without the MVF-2 connected enable WiFi by pressing Function button FN and camera button 6.

The web remote is divided into the following five sections:



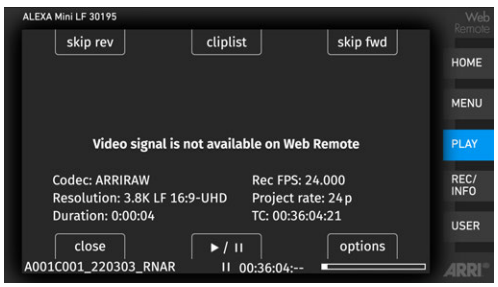
HOME

Shows the same HOME screen as the MVF-2. Click/tap the screen button tabs to enter a screen / trigger a function.



MENU

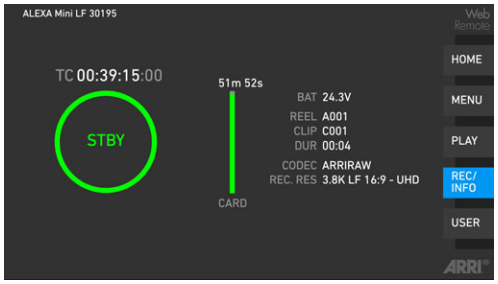
Select MENU to access the camera menu.



PLAY

Starts playback from the recording medium.

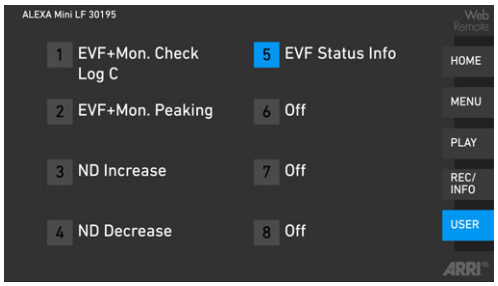
Provides the same controls as the MVF-2, but does not show a video signal.



REC / INFO

Contains information on the main recording parameters, plus a REC button. Click the button to start/stop recording.

Note: Recording 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*.

ADVICE

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):

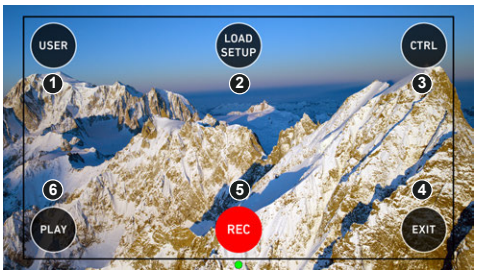
   Connect the Lemo 5-pin plug to the POWER connector of the monitor.

   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.

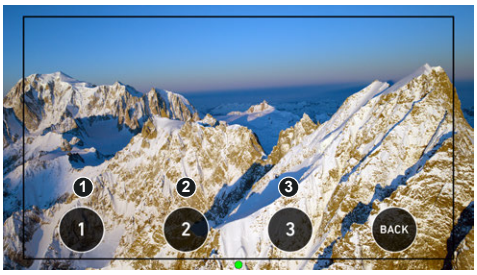
Note: All overlays disappear after a few seconds of inactivity.

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:

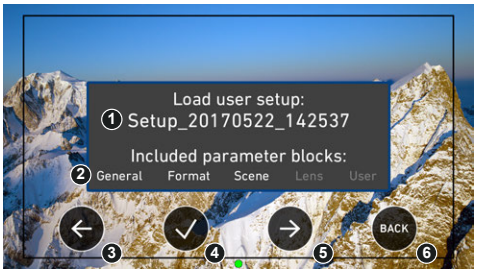


- ► Press the buttons to toggle the assigned user button function.
- ► A gray button indicates an active function.
- ► Return to the main menu by pressing the *BACK* icon.

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.

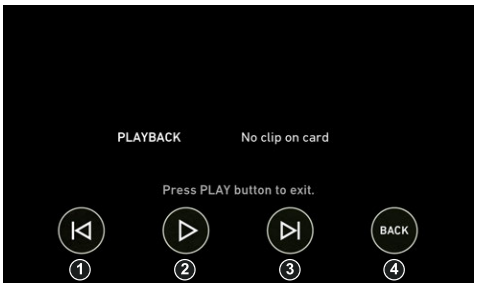
1. Activate the menu by pressing the blue "A" touch icon on the monitor.
2. Press *CTRL* to activate the overlay menu.
   The control screen is displayed:



- ► 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 (3).

28 Appendix

28.1 Companion Tools

ARRI maintains various tools to support your work with the ALEXA Mini LF on- and off-set. In the following overview, some of the tools are highlighted “online only” (green border) the others are available as download for Linux, macOS or Windows.

ARRI Reference Tool

The ARRI Reference Tool (ART) combines the functionality of the ARRIRAW Converter, ARRI Color Tool, and ARRI Meta Extract. It supports all ALEXA 35 recording formats and allows the creation of look files, conversion to SDR and HDR color spaces with looks applied, and export to Apple ProRes, OpenEXR and TIFF files.

The ARRI Reference Tool allows you to process ARRIRAW from ALEXA Mini LF with either the original ARRI color science (LogC3/AWG3) or with the new REVEAL Color Science (LogC4/AWG4), which provides greatly improved image quality as well as compatibility with footage shot on ALEXA 35.

► ARRI Reference Tool

Camera Simulators

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

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

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

LUT Generator

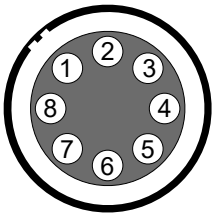
Generally speaking LUTs (Look Up Tables) are used to manipulate image data. The LUT transforms a digital signal to adjust the sensitivity, gamma and provide a color correct monitoring input. Nowadays on-set color correction is not a novelty anymore, nevertheless Look Up Tables are still needed to convert 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

28.2 Connector Pin-Outs

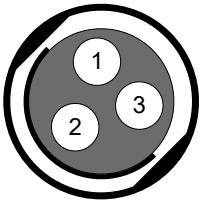
Note: All pin-outs for camera interfaces appear as seen by the user.

BAT (LEMO EEJ.2B.308)



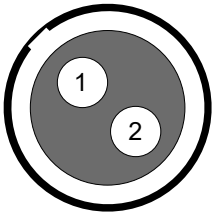
1 Batcom
2 Powergnd
3 Powergnd
4 Powergnd
5 Batcom Gnd
6 Batplus
7 Batplus
8 Batplus

RS (Fischer DPB102A052-130)



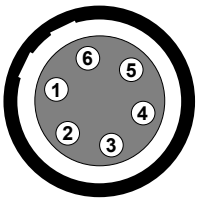
1 GND
2 24 V Aux
3 R/S

12V (LEMO EEG.0B.302.CLN.A365)



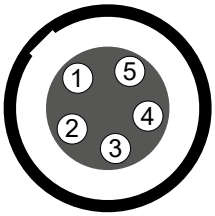
1 GND
2 12 V Aux

AUDIO (LEMO EEA.0B.306.CLN)



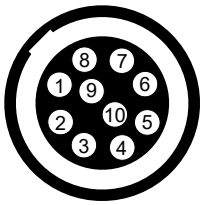
1 GND
2 CH 1 (+)
3 CH 1 (-)
4 CH 2 (+)
5 CH 2 (-)
6 12 V

TC (LEMO EEG.0B.305)



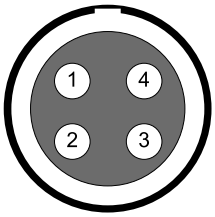
1 GND
2 LTC In
3 Aux
4 Aux
5 LTC Out

ETH (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

LBUS (LEMO EEG.0B.304)



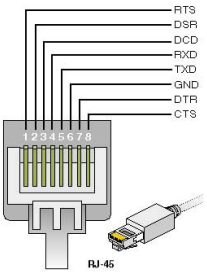
1 GND
2 Can L
3 VBat
4 Can H

EXT (LEMO EEG.1B.307)



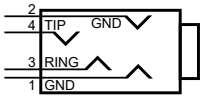
1 Can1 H
2 Can1 L
3 Can2 H
4 Can2 L
5 24 V Aux
6 GND
7 R/S

Ethernet (Computer Side)



RTS brown
DSR white-brown
DCD green
RXD white-blue
TXD blue
GND white-green
DTR orange
CTS white-orange

Headphones Out (on MVF-2)



1 GND
2 GND
3 R Out
4 L Out

Audio Cable K2.0023988

ARRI offers an ALEXA Mini LF / ALEXA 35 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

28.3 Technical Data

Sensor Type	Large Format ARRI ALEV III (A2X) CMOS sensor with Bayer pattern color filter array	
Sensor Size	36.70 x 25.54 mm / 1.444 x 1.005" Ø 44.71 mm / 1.760"	
Photosite Pitch	8.25 µm	
Sensor Frame Rates	0.75 - 100 fps	
Sensor Active Image Area (photosites)	4.5K LF 3:2 Open Gate - 4.5K	4448 x 3096
	4.5K LF 2.39:1 - 4.5K	4448 x 1856
	4.3K LF 16:9 - UHD	4320 x 2430
	4.3K LF 16:9 - HD	4320 x 2430
	3.8K LF 16:9 - UHD	3840 x 2160
	3.8K LF 16:9 - 2K	3840 x 2160
	3.8K LF 16:9 - HD	3840 x 2160
	2.8K LF 1:1 - 2.8K	2880 x 2880
	3.4K S35 3:2 - 3.4K	3424 x 2202
	3.2K S35 16:9 - 3.2K	3200 x 1800
	2.8K S35 4:3 - 2.8K	2880 x 2160
	2.8K S35 16:9 - HD	2880 x 1620
Sensor Active Image Area (dimensions)	4.5K LF 3:2 Open Gate - 4.5K	36.70 x 25.54 mm / 1.445 x 1.006"
	4.5K LF 2.39:1 - 4.5K	36.70 x 15.31 mm / 1.445 x 0.603"
	4.3K LF 16:9 - UHD	35.64 x 20.05 mm / 1.403 x 0.789"
	4.3K LF 16:9 - HD	35.64 x 20.05 mm / 1.403 x 0.789"
	3.8K LF 16:9 - UHD	31.68 x 17.82 mm / 1.247 x 0.702"
	3.8K LF 16:9 - 2K	31.68 x 17.82 mm / 1.247 x 0.702"
	3.8K LF 16:9 - HD	31.68 x 17.82 mm / 1.247 x 0.702"
	2.8K LF 1:1 - 2.8K	23.76 x 23.76 mm / 0.935 x 0.935"
	3.4K S35 3:2 - 3.4K	28.25 x 18.16 mm / 1.112 x 0.714"
	3.2K S35 16:9 - 3.2K	26.40 x 14.85 mm / 1.039 x 0.585"
	2.8K S35 4:3 - 2.8K	23.76 x 17.81 mm / 0.935 x 0.701"
	2.8K S35 16:9 - HD	23.76 x 13.36 mm / 0.935 x 0.526"
Recording File Container Size (pixel)	4.5K LF 3:2 Open Gate - 4.5K (Apple ProRes)	4480 x 3096
	4.5K LF 3:2 Open Gate - 4.5K (ARRIRAW)	4448 x 3096
	4.5K LF 2.39:1 - 4.5K (Apple ProRes)	4480 x 1856
	4.5K LF 2.39:1 - 4.5K (ARRIRAW)	4448 x 1856
	4.3K LF 16:9 - UHD (Apple ProRes)	3840 x 2160
	4.3K LF 16:9 - HD (Apple ProRes)	1920 x 1080
	3.8K LF 16:9 - UHD (Apple ProRes)	3840 x 2160
	3.8K LF 16:9 - 2K (Apple ProRes)	2048 x 1152
	3.8K LF 16:9 - HD (Apple ProRes)	1920 x 1080
	3.8K LF 16:9 - UHD (ARRIRAW)	3840 x 2160
	2.8K LF 1:1 2.8K (ARRIRAW)	2880 x 2880
	2.8K LF 1:1 2.8K (Apple ProRes)	3072 x 3024
	3.4K S35 3:2 - 3.4K (ARRIRAW)	3424 x 2202
	2.8K S35 4:3 - 2.8K (Apple ProRes)	2880 x 2160
	3.2K S35 16:9 - 3.2K (Apple ProRes)	3200 x 1800
	2.8K S35 16:9 - HD (Apple ProRes)	1920 x 1080
Exposure Latitude	14+ stops over the entire sensitivity range from EI 160 to EI 3200 as measured with the ARRI Dynamic Range Test Chart (DRTC-1)	
Exposure Index	Adjustable from EI 160-3200 in 1/3 stops, EI 800 base sensitivity	

Shutter	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

4.5K LF 3:2 Open Gate - 4.5K	0.75 - 40 fps
4.5K LF 2.39:1 - 4.5K	0.75 - 60 fps
4.3K LF 16:9 - UHD	0.75 - 40 fps
4.3K LF 16:9 - HD	0.75 - 75 fps
3.8K LF 16:9 - UHD	0.75 - 60 fps
3.8K LF 16:9 - 2K	0.75 - 90 fps
3.8K LF 16:9 - HD	0.75 - 90 fps
2.8K LF 1:1 - 2.8K	0.75 - 60 fps
3.4K S35 3:2 - 3.4K	0.75 - 60 fps
3.2K S35 16:9 - 3.2K	0.75 - 75 fps
2.8K S35 4:3 - 2.8K	0.75 - 75 fps
2.8K S35 16:9 - HD	0.75 - 100 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 FSND 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, both outputs carry uncompressed video with embedded audio and metadata.

SDI 1:	HD only, Processed or Clean, with or without a look file applied 1.5G 422 HD (SMPTE ST292-1, up to 30 fps, p or psf) 3G 422 HD (SMPTE ST425-1, up to 60 fps, p) 3G 444 HD (SMPTE ST425-3, up to 30 fps, p)
SDI 2:	HD or UHD, Clean only, with or without a look file applied, or SDI 1 clone 1.5G 422 HD (SMPTE ST292-1, up to 30 fps, p or psf) 3G 422 HD (SMPTE ST425-1, up to 60 fps, p) 3G 444 HD (SMPTE ST425-3, up to 30 fps, p) 6G 422 UHD (SMPTE ST2081-10, up to 30 fps, p)

“Clean” is an image without surround view or overlays (status, false color, zebra, framelines, etc.), “Processed” is an image supporting surround view and overlays.

Lens Squeeze Factors	1.00, 1.25, 1.30, 1.50, 1.65, 1.80, 2.00
Exposure and Focus Tools	False Color, Zebra, Zoom, Aperture and Color Peaking
Audio Input	1x LEMO 6pin balanced stereo line in (Line input max. level +24dBu correlating to 0dBFS) Built-in microphones for scratch audio
Audio Output	SDI (embedded) 3.5 mm Headphones out on MVF-2
Audio Recording	4 channel linear PCM (24 bit, 48 kHz)
Remote Control Options	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 axisl, OCU-1 and Master Grip control of lens and user buttons
Interfaces	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)
Wireless Interfaces	Built-in WiFi module (IEEE 802.11b/g) Built-in White Radio for ARRI lens and camera remote control
Lens Mounts	ARRI LPL Mount (LBUS) ARRI PL to LPL adapter ARRI EF Mount (LBUS) Leitz Cine Wetzlar M Mount
Flange Focal Depth	LPL mount: 44 mm With PL to LPL adapter: 52 mm
Power Input	1x LEMO 8pin (11.0 - 34.0 V DC)
Power Consumption	Around 69 W when recording ARRIRAW LF 16:9 UHD at 24 fps with MVF-2 attached
Power Outputs	1x Fischer 3pin 24V RS (3.0 A) 1x LEMO 2pin 12V (1.0 A) 1x LEMO 7pin EXT 24V (1.0 A) 1x LEMO 4pin LBUS 24V (2.0 A, on lens mount) 1x LEMO 6pin AUDIO 12V 1x LEMO 10pin ETH 24 V (0.5 A)
Measurements (HxWxL)	140 x 143 x 188 mm / 5.5 x 5.6 x 7.4" (camera body with LPL lens mount)
Weight	~ 2.7 kg / ~ 5.7 lbs (camera body with LPL lens mount)
Operating Temperature	-20° C to +45° C / -4° F to +113° F @ 95% relative humidity max, non condensing, splash and dust proof through sealed electronics
Storage Temperature	-30° C to +70° C / -22° F to +158° F
Sound Level	< 20 dB(A) at 24fps

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

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
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

- **ALEXA Mini LF**:

本设备型号核准代码为
CMIIT ID: 2020AP8258

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

Registration No.: ETA-SD-20201108443

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.

Japan

Australia & New Zealand

- **ECS Transceiver Module EMIP400:** 020-180030
- **WiFi Module:** 003-170091

- ALEXA Mini LF

Cambodia

Type Approval
TRC Indentifier 0256-2019-niLF

Philippines

No. ESD – 1921399C

Egypt

TAC.24121919782.WIR

South Africa

TA 2019/2202 APPROVED

South Korea

- **ALEXA Mini LF**: Certification No: R-R-ARg-ALEXA_Mini_LF
- **ECS Transceiver Module**: Certification No: R-CRM-ARg-EMIP400
- **WiFi Module**: Certification No: MSIP-CRM-LAI-60-2230C

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

Thailand

Supplier Declaration of Conformity - 55/107 No 2932

Peru

Certificado de Homologación
INFORME # 2858-2019-MTC/29.01.LIM.H
Codigo: TRSS44872.
Emisión 23/10/19.

Taiwan

WiFi module: NCC: CCAF20LP1330T0
ECS transceiver module: NCC: CCAH18LP0660T0

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。 低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

28.5 ARRI Service Contacts

Please see the current list of service partners at
Service contacts

Arnold & Richter Cine Technik GmbH & Co. Betriebs KG
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+49 89 3809 2121
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service@arri.de

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Fr. 09:00 am - 05:00 pm (GMT)
service@arri-ct.com

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service@arri.com

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+1 845 353 1400
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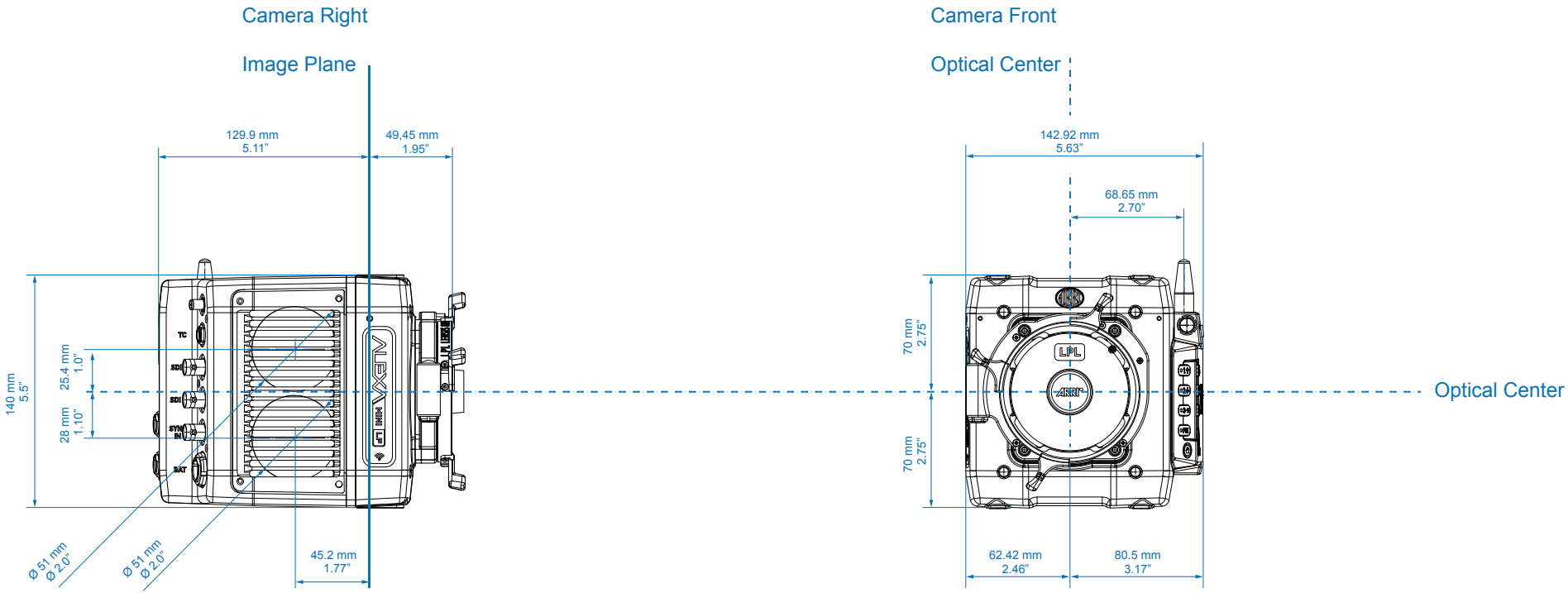
28.6 Dimensional Drawings

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.



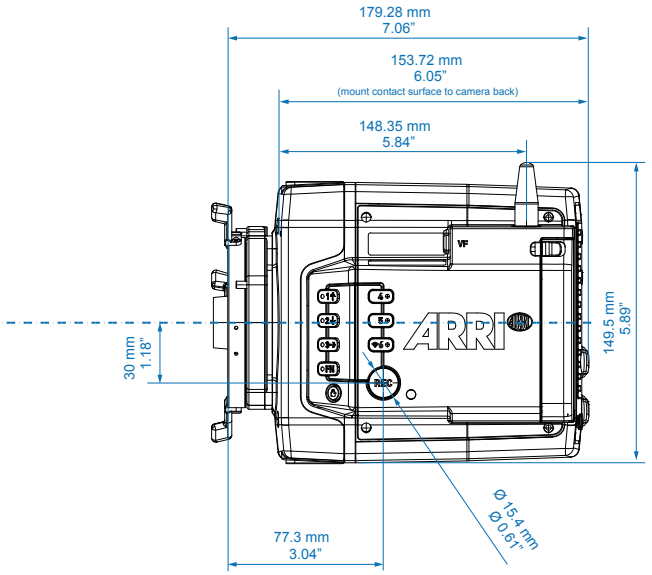
ALEXA Mini LF	Length	Width	Height	Weight
Body + LPL mount MVF-2	188 mm - 7.4”	143 mm - 5.6”	140 mm - 5.5”	~2.6 kg / ~5.7 lbs 800 g

ALEXA Mini LF

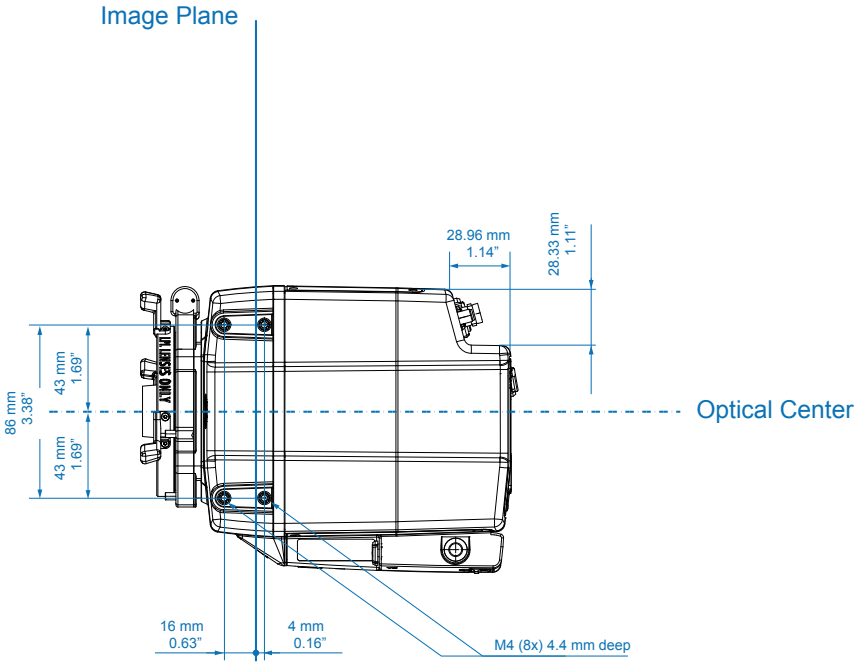
CAMERA DIMENSIONS – **Version 2019-07**

Technical Data are subject to change without notice.

Camera Left



Camera Top



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