

# ALEXA Mini LF

## Software Update Package 7.3

USER MANUAL

October 9, 2023



# 1 Disclaimer

Before using the products, be sure to read and understand 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.

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

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

ARRI or its subsidiaries expressly exclude any liability, warranty, demand or other obligation for any claim, representation, or cause, or action, or whatsoever, express or implied, whether in contract or tort, including negligence, or incorporated in terms and conditions, whether by statute, law or otherwise. In no event shall ARRI or its subsidiaries be liable for or have a remedy for recovery of any special, direct, indirect, incidental, or consequential damages, including, but not limited to lost profits, lost savings, lost revenues or economic loss of any kind or for any claim by third party, downtime, good will, damage to or replacement of equipment or property, any cost or recovering of any material or goods associated with the assembly or use of our products, or any other damages or injury of the persons and so on or under any other legal theory.

Neither ARRI nor its subsidiaries assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of ARRI products or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property right of ARRI or others.

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

In the case one or all of the foregoing clauses are not allowed by applicable law, the fullest extent permissible clauses by applicable law are validated.

# Imprint

© 2023 Arnold & Richter Cine Technik GmbH & Co. Betriebs KG. All rights reserved.

The system contains proprietary information of Arnold & Richter Cine Technik GmbH & Co. Betriebs KG; it is provided under a license agreement containing restrictions on use and disclosure and protected by copyright law. Reverse engineering of the software is prohibited.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of Arnold & Richter Cine Technik GmbH & Co. Betriebs KG.

Due to continued product development the information in this document may change without notice. The information and intellectual property contained herein is confidential between ARRI and the client and remains the exclusive property of ARRI. If you find any problems in the documentation, please report them to us in writing. ARRI does not warrant that this document is flawless.

ARRI, ALEXA Mini LF and ARRIRAW are trademarks or registered trademarks of Arnold & Richter Cine Technik GmbH & Co. Betriebs KG. All other brands or products mentioned are trademarks or registered trademarks of their respective holders and should be treated as such.



Apple ProRes 422 HQ, Apple ProRes 4444, Apple ProRes 4444 XQ, and the ProRes logo are trademarks or registered trademarks of Apple Computer, Inc., used under license therefrom.

Original version.

## For Further Assistance

Arnold & Richter Cine Technik GmbH & Co. Betriebs KG  
Herbert-Beyer-Strasse 10  
D-80807 Munich  
Germany

E-mail: [service@arri.com](mailto:service@arri.com)  
[www.arri.com/en/technical-service](http://www.arri.com/en/technical-service)

## 2 Contents

<b>1</b>	<b>Disclaimer.....</b>	<b>2</b>
<b>2</b>	<b>Contents.....</b>	<b>4</b>
<b>3</b>	<b>About this Document.....</b>	<b>7</b>
<b>4</b>	<b>About this Product.....</b>	<b>8</b>
4.1	Intended Use.....	8
4.2	Product Identification.....	8
4.3	Technical Data.....	9
4.4	Scope of Delivery and Warranty.....	11
4.5	Declarations of Conformity.....	11
<b>5</b>	<b>Safety Instructions.....</b>	<b>16</b>
5.1	Safety Conventions and Product Labels.....	16
5.2	General Safety Instructions.....	17
<b>6</b>	<b>Camera Body Overview.....</b>	<b>21</b>
6.1	Camera Rear Connectors.....	23
6.2	Camera Left and Front Connectors.....	25
6.3	Media Bay.....	26
<b>7</b>	<b>Multi Viewfinder MVF-2 Overview.....</b>	<b>27</b>
<b>8</b>	<b>Camera Control Monitor CCM-1 Overview.....</b>	<b>31</b>
<b>9</b>	<b>Camera Support.....</b>	<b>33</b>
<b>10</b>	<b>Power Supply.....</b>	<b>36</b>
<b>11</b>	<b>Lens Mounts.....</b>	<b>38</b>
11.1	Changing the Lens Mount.....	40
<b>12</b>	<b>Menu Operation.....</b>	<b>42</b>
12.1	HOME Screen.....	42
12.2	Working with Settings/Lists and Importing Files.....	45
12.3	On-screen Keyboard.....	47
12.4	Function Button FN.....	47
12.5	Overlay Menu.....	48
12.6	User Storage.....	49
12.7	Info Screens.....	50
<b>13</b>	<b>Status Information and Overlays.....</b>	<b>52</b>
<b>14</b>	<b>Main Parameters.....</b>	<b>56</b>
14.1	Project Settings.....	56
14.2	Sensor Frame Rate.....	58



14.3	Shutter.....	58
14.4	Exposure Index.....	59
14.5	ND Filter.....	60
14.6	White Balance.....	60
14.7	Timecode.....	60
<b>15</b>	<b>Look Settings.....</b>	<b>64</b>
15.1	Processing and Color Spaces.....	66
15.2	Noise Reduction.....	67
<b>16</b>	<b>Recording.....</b>	<b>69</b>
16.1	Recording Medium.....	69
16.2	Recording Codec.....	72
16.3	Recording Resolution.....	73
16.4	Starting Recording.....	77
16.5	File Naming Scheme.....	77
16.6	Audio Recording.....	78
16.7	Rec Beeper and Tally.....	80
<b>17</b>	<b>Playback.....</b>	<b>81</b>
<b>18</b>	<b>Monitoring.....</b>	<b>83</b>
18.1	Surround View.....	83
18.2	Magnification.....	84
18.3	Frame Lines.....	85
18.4	Exposure Tools.....	87
18.4.1	False Color.....	87
18.4.2	Zebra.....	89
18.5	Peaking.....	90
18.6	Zoom.....	91
18.7	SDI Settings.....	92
18.8	Preventing Damage to SDI Outputs.....	93
18.9	EVF and Flip-out Monitor Settings.....	95
18.10	SDI Color Bars.....	96
<b>19</b>	<b>User Buttons.....</b>	<b>97</b>
<b>20</b>	<b>Synchronization.....</b>	<b>101</b>
20.1	EXT Sync.....	102
<b>21</b>	<b>Sensor Settings.....</b>	<b>106</b>
21.1	Mirroring the Sensor Image.....	106
21.2	User Pixel Masking.....	106
<b>22</b>	<b>System Settings.....</b>	<b>108</b>
22.1	Language Setting.....	108

22.2	System Time and Date.....	108
22.3	Button and Display Settings.....	108
22.4	Fan Settings.....	108
22.5	Battery Warning.....	109
22.6	Reset of Electronic Horizon.....	109
22.7	Update.....	110
22.7.1	Update of Camera Software.....	110
22.7.2	Update of Camera Components.....	110
22.7.3	Update of LBUS Devices.....	111
<b>23</b>	<b>User Setups.....</b>	<b>112</b>
23.1	User Setup Parameter Blocks.....	113
<b>24</b>	<b>Network.....</b>	<b>114</b>
24.1	WiFi Settings.....	114
24.2	Ethernet Settings.....	116
<b>25</b>	<b>Metadata.....</b>	<b>117</b>
<b>26</b>	<b>Lens &amp; Electronic Control System (ECS).....</b>	<b>119</b>
26.1	Changing a Lens.....	119
26.2	Lens Data.....	120
26.3	Lens Data Archive.....	121
26.4	White Radio Configuration.....	122
26.5	Lens Motors.....	125
26.6	EF Lens Iris Adjustment.....	126
26.7	Enable Lens Mount.....	126
<b>27</b>	<b>Remote Control.....</b>	<b>127</b>
27.1	Web Remote.....	127
27.2	Camera Access Protocol (CAP).....	128
27.3	Camera Companion App.....	129
27.4	Hand Units Hi-5 and WCU-4.....	129
<b>28</b>	<b>Transvideo Starlite HD5-ARRI Monitor.....</b>	<b>130</b>
<b>29</b>	<b>Appendix.....</b>	<b>132</b>
29.1	Sensor Related Information / 有关影像传感器的信息.....	132
29.2	Companion Tools.....	134
29.3	Connector Pin-Outs.....	136
29.4	Cleaning Instructions.....	138
29.5	Repair.....	139
29.6	Disposal.....	139
29.7	ARRI Service Contacts.....	139

### 3 About this Document

This user manual is aimed at everyone involved in using the system and provides directions on how to operate it safely and as intended.

To ensure safe and correct use, all users need to read the ALEXA Mini LF User Manual before using the system for the first time. It contains detailed information on how to use the system safely.

This user manual is an essential part of the product and should be easily accessible and in proximity to the equipment so that users can use it as a reference anytime.

Keep the user manual and all other instructions belonging to the system in a safe place for future reference and possible subsequent owners.

#### Document Revision History

Document ID: D45 10004716

Version	Release	Date
6.0	K10155	July 15, 2019
6.0.15	K10213	September 10, 2019
6.0.22	K10436	September 17, 2020
7.0	K10627	April 20, 2021
7.1	K10738	August 4, 2021
7.2	K11156	February 15, 2023
7.3	K11332	October 9, 2023

#### 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 "AUDIO connector".

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

Menu paths are written in italic typeface, with menu and home in capital letters, for example "*MENU > Recording > Sensor Mode*".

"EVF" refers to the OLED eyepiece of the MVF-2 viewfinder.

"Monitor" refers to the flip-out monitor of the MVF-2 viewfinder.

"VF" refers to the viewfinder connector VF. When settings refer to VF, they affect the EVF and the flip-out monitor.

"Monitoring outputs" refers to EVF, flip-out monitor, SDI 1 and SDI 2.

"Status Info" refers collectively to the Status Info of EVF, SDI 1 and SDI 2.

#### Strengthen Your Knowledge and Get Trained

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

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

## 4 About this Product

### 4.1 Intended Use

#### ATTENTION

All versions of the product are intended exclusively for professional use and may only be used by skilled personnel. Every user should read and understand the operating instructions and the user manual. Use the product only for the purpose described in this document. Always follow the instructions and system requirements for all equipment involved.

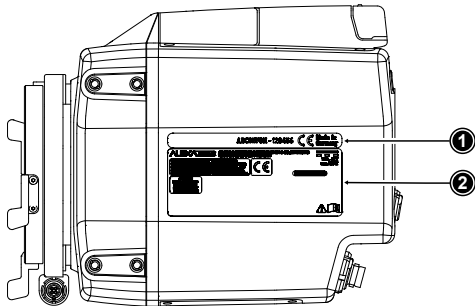
The ALEXA Mini LF is a large format digital camera solely and exclusively for recording images at various resolutions suitable for a variety of distribution formats:

- Open Gate 4.6K, 16:9 4.6K, 4K, UHD, 2K and HD recording resolutions
- ARRIRAW and Apple ProRes codecs
- LogC4 or ARRIRAW encoding
- Codex Compact Drive recording
- Up to 120 fps

Only use the ALEXA Mini LF as described in the operation manual and user manual. Any other use is considered improper and can result in personal injury and/or property damage. ARRI assumes no liability for damages or changes that are caused by improper use.

The entire product may not be changed or converted.

### 4.2 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.

## 4.3 Technical Data

<b>Sensor Type</b>	Large Format ARRI ALEV III (A2X) CMOS sensor with Bayer pattern color filter array			
<b>Sensor Photosites and Size</b>	4448 x 3096 36.70 x 25.54 mm / 1.444 x 1.005" Ø 44.71 mm / 1.760"			
<b>Sensor Frame Rates</b>	0.75 - 100 fps			
<b>Project Frame Rates</b>	23.976, 24, 25, 29.97, 30, 47.952, 48, 50, 59.94, 60 fps			
<b>Weight</b>	~ 2.7 kg / ~ 5.7 lbs (camera body with LPL lens mount)			
<b>Photosite Pitch</b>	8.25 µm			
<b>Recording Resolutions</b>	<b>Active Image Area (Dimensions)</b>	<b>Active Image Area (Photosites)</b>	<b>Recording Resolution (Pixel)</b>	<b>Max. fps</b>
4.5K LF 3:2 Open Gate	36.70 x 25.54 mm 1.445 x 1.006"	4448 x 3096	4.5K (4448 x 3096)	40 fps (ARRIRAW)
			4.5K (4480 x 3096)	40 fps (ProRes)
4.5K LF 2.39:1	36.70 x 15.31 mm 1.445 x 0.603"	4448 x 1856	4.5K (4448 x 1856)	60 fps (ARRIRAW)
			4.5K (4480 x 1856)	60 fps (ProRes)
4.3K LF 16:9	35.64 x 20.05 mm 1.403 x 0.789"	4320 x 2430	UHD (3840 x 2160)	40 fps (ProRes)
			HD (1920 x 1080)	75 fps (ProRes)
3.8K LF 16:9	31.68 x 17.82 mm 1.247 x 0.702"	3840 x 2160	UHD (3840 x 2160)	60 fps (ARRIRAW) 60 fps (ProRes)
			2K (2048 x 1152)	90 fps (ProRes)
			HD (1920 x 1080)	90 fps (ProRes)
2.8K LF 1:1	23.76 x 23.76 mm 0.935 x 0.935"	2880 x 2880	2.8K (2880 x 2880)	60 fps (ARRIRAW)
			2.8K (3072 x 3024)	60 fps (ProRes)
3.4K S35 3:2	28.25 x 18.16 mm 1.112 x 0.714"	3424 x 2202	3.4K (3424 x 2202)	60 fps (ARRIRAW)
3.2K S35 16:9	26.40 x 14.85 mm 1.039 x 0.585"	3200 x 1800	3.2K (3200 x 1800)	75 fps (ProRes)
2.8K S35 4:3	23.76 x 17.81 mm 0.935 x 0.701"	2880 x 2160	2.8K (2880 x 2160)	75 fps (ProRes)
2.8K S35 16:9	23.76 x 13.36 mm 0.935 x 0.526"	2880 x 1620	HD (1920 x 1080)	100 fps (ProRes)
<b>Exposure Index</b>	Adjustable from EI 160-3200 in 1/3 stops, EI 800 base sensitivity			
<b>Dynamic Range</b>	14+ stops over the entire sensitivity range from EI 160 to EI 3200 as measured with the ARRI Dynamic Range Test Chart (DRTC-1)			
<b>Shutter</b>	Electronic shutter, 5.0° - 356° or 1s - 1/8000s			
<b>Recording Codecs</b>	MXF/ARRIRAW MXF/Apple ProRes 4444 XQ MXF/Apple ProRes 4444 MXF/Apple ProRes 422 HQ			
<b>Recording Media</b>	Codex Compact Drive 1TB (CA08-1024), Codex Compact Drive 2TB (CB16-2048)			
<b>Recording Modes</b>	Standard real-time recording			
<b>Viewfinder Type</b>	Multi Viewfinder MVF-2 with OLED viewfinder display (1920 x 1080) and 4" LCD flip-out touchscreen monitor (800 x 480)			
<b>Viewfinder Diopter</b>	Adjustable from -5 to +5 diopters			
<b>Color Output</b>	Rec 709, Rec 2020, LogC3			

<b>Look Control</b>	Custom color look (through ARRI Look File ALF4 or ARRI Look Library)
<b>White Balance</b>	Manual and auto white balance, adjustable from 2000K to 11000K Color correction adjustable from -16 to +16 CC (1 CC corresponds to 035 Kodak CC values or 1/8 Rosco values)
<b>Filters</b>	Four position built-in motorized ND filter: Clear, 0.6, 1.2, 1.8 Fixed optical low pass, UV, IR filter
<b>Lens Squeeze Factors</b>	1.00, 1.25, 1.30, 1.50, 1.65, 1.80, 2.00
<b>Exposure and Focus Tools</b>	False Color, Zebra, Zoom, Aperture and Color Peaking
<b>Audio Recording</b>	4 channel linear PCM (24 bit, 48 kHz)
<b>Image Outputs</b>	1x VF custom CoaXPress connectors for MVF-2 viewfinder / Camera Control Monitor CCM-1 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.
<b>Interfaces</b>	1x TC (LEMO 5-pin) for timecode In/Out 1x ETH (LEMO 10-pin) for remote control and service 1x SYNC IN (BNC) for Genlock synchronization 1x EXT (LEMO 7-pin), multi purpose accessory interface w. RS pin and 24V power output 1x LBUS (LEMO 4-pin) for lens motors, daisy chainable (on lens mount) 1x USB 2.0 for user setups, look files etc
<b>Audio Inputs</b>	1x AUDIO (LEMO 6-pin) for balanced stereo line in (line input max. level +24 dBu correlating to 0 dBFS) Two built-in microphones for scratch audio
<b>Audio Outputs</b>	1x 3.5 mm stereo headphone connector (on MVF-2) 2x SDI (embedded audio)
<b>Power Inputs</b>	1x BAT (LEMO 8-pin) 11.0 - 34.0 V DC
<b>Power Outputs</b>	1x RS (Fischer 3-pin) for 24 V accessory power out, start/stop and shutter pulse 1x 12 V (LEMO 2-pin) for 12 V accessory power out 1x LBUS (LEMO 4-pin) for lens motors & 24 V power out (on lens mount) 1x AUDIO (LEMO 6-pin) for balanced stereo line in and 12 V accessory power out 1x ETH (LEMO 10-pin) for remote control, service and 24 V accessory power out
<b>Remote Control Options</b>	Camera Companion App ARRI Electronic Control System (ECS) Web-based remote control from phones, tablets and laptops via WiFi & Ethernet Camera Access Protocol (CAP) via WiFi & Ethernet GPIO interface for integration with custom control interfaces
<b>Wireless Interfaces</b>	Built-in WiFi module (IEEE 802.11b/g) Built-in White Radio for ARRI ECS lens and camera remote control
<b>Lens Mounts &amp; Adapters</b>	ARRI LPL Mount (LBUS) ARRI PL-to-LPL Adapter ARRI EF Mount (LBUS) Leitz M Mount for ARRI
<b>Flange Focal Depth</b>	LPL Mount: 44 mm PL-to-LPL Adapter: 52 mm
<b>Power Consumption</b>	~ 69 W when recording ARRIRAW LF 16:9 UHD at 24 fps with MVF-2 attached
<b>Measurements (HxWxL)</b>	140 x 143 x 188 mm / 5.5 x 5.6 x 7.4" (camera body with LPL lens mount)

<b>Operating Temperature</b>	-20° C to +45° C / -4° F to +113° F @ 0-95% RH
<b>Storage Temperature</b>	-30° C to +70° C / -22° F to +158° F
<b>Sound Level</b>	< 20 dB(A) at 24 fps

## 4.4 Scope of Delivery and Warranty

ATTENTION
<p>The packaging consists of recyclable materials. For the sake of the environment, dispose the packaging material at a suitable disposal site.</p> <p>Always store, ship and dispose according to local regulations. ARRI is not liable for consequences from inadequate storage, shipment or disposal.</p> <p>For scope of warranty, please ask your local ARRI service partner. ARRI is not liable for consequences from inadequate shipment, improper use or use of third-party products.</p>

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

### K1.0024074 ALEXA Mini LF Camera Body

A complete delivery includes:

- ALEXA Mini LF camera body
- Lens mount cover
- White Radio Antenna
- WiFi Antenna
- 3.0 mm Allen key
- USB memory stick incl. user manual

## 4.5 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, EN 62368-1:2014 + AC:2015-05 + AC:2015-11;  
2014/35/EU: EN 62311:2008

Following Art. 3.1 b, EN 301 489-1 V2.1.1  
2014/30/EU: EN 301 489-17 V3.1.1  
EN 55032:2015  
EN 55035:2017

Art. 3.2 EN 300 328 V2.1.1

Essential Requirements regarding No 2:  
EN 50581:2012

To evaluate the respective information, we used:

[http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/index\\_en.htm](http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/index_en.htm)

Year of affixed CE-marking: 2019

### APPENDIX I - List of Primes

Item	Model Name
1	ARRI Signature Primes with Lens Data System 2 with focal length 18-280 mm
2	PL-to-LPL Adapter + ARRI Lenses with Lens Data System 1

### APPENDIX II - List of Antennas

Item	Manufacturer	Model Name	Gain (dBi)	Radiation Pattern	Type	Connector
For ECS White Radio RF Module EMIP400s:						
1	Nearson	S131AM-2450S	2.0	Omni-directional	Dipole	Reverse SMA

Item	Manufacturer	Model Name	Gain (dBi)	Radiation Pattern	Type	Connector
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

## Japan



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

## Australia & New Zealand



- ALEXA Mini LF

## Cambodia



Type Approval  
TRC Identifier 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

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.

**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。

## 5 Safety Instructions

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. Always follow the instructions in this and all documents supplied with the device to avoid injury to yourself or others and damage to the system or other objects.

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.

### 5.1 Safety Conventions and Product Labels

#### Structure of Safety and Warning Messages

These instructions use safety instructions, warning symbols and signal words to draw your attention to different levels of risk:

⚠ WARNING
<p><b>WARNING</b> indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.</p> <p>► Always follow the recommended measures to avoid this hazardous situation.</p>
⚠ CAUTION
<p><b>CAUTION</b> indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.</p> <p>► Always follow the recommended measures to avoid this hazardous situation.</p>
ADVICE
<p><b>ADVICE</b> signifies a potentially hazardous situation which can result in damage to property.</p> <p>► Always follow the recommended measures to avoid this hazardous situation.</p>
ATTENTION
<p>Not relevant to safety, <b>ATTENTION</b> provides additional information to clarify or simplify a procedure.</p>

#### Warning Symbols and Product Labels



General warning sign



Warning of electrical voltage



Warning of hot surfaces



Warning of hand injuries



Warning of the risk of crushing



Warning of obstacles on the ground



Please read all instructions carefully before using the product for the first time.



Direct Current symbol found on electronics requiring or producing DC power

## 5.2 General Safety Instructions

### ⚠ WARNING



#### Operation of the Camera System in Case of Obvious Damage

Risk of electric shock and fire hazard caused by short circuit.

- ▶ Do not use the system if electrical lines or housing are visibly damaged.
- ▶ 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 operate the system in areas with humidity above operating levels or expose it to water or moisture.
- ▶ Do not get the system wet.
- ▶ Do not lay cables over sharp edges (e.g. sheet metal, profile or other cut edges). Damaged cables can cause electric shock, short circuit or fire.
- ▶ Do not remove or deactivate any safety measures from the system (incl. warning stickers or paint marked screws).
- ▶ Repairs may only be carried out by authorized ARRI service partners.

### ⚠ WARNING



#### Falling System Parts

If the system is inadequately built up or assembled, it can fall down and cause serious injuries and damage to the system or property.

- ▶ Installation and operation may only be carried out by trained personnel who are familiar with the system. Observe accident prevention regulations.
- ▶ Do not place the camera system on an unstable trolley or hand truck, stand, tripod, bracket, table or any other unstable support device.
- ▶ Always place the camera on dedicated support devices.
- ▶ Secure the camera system and its accessories against falling and tipping over. Observe the general and local safety regulations.
- ▶ When using the camera system on camera cranes, a suitable safety rope must be used.

### ⚠ WARNING



#### Positioning the Camera System on an Inclined or Unsafe Plane

Risk of injury caused by the camera system tipping over.

- ▶ Observe the accident prevention regulations.
- ▶ Put the camera system on level and stable ground
- ▶ Do not place the system on an unstable trolley or hand truck, stand, tripod, bracket, table or any other unstable support device.
- ▶ Always place the camera on dedicated support devices.
- ▶ Use only accessories approved by ARRI. The use of accessories not approved by ARRI is at your own risk. Please observe all relevant safety guidelines

**⚠ WARNING****Overloading the Camera System by Persons or Objects**

Risk of injury caused by the camera system tipping over.

- ▶ Do not lean on the camera system.
- ▶ Do not place any unauthorized objects on the camera system.
- ▶ Do not hang any unauthorized objects on the camera system.
- ▶ Use only accessories approved by ARRI. The use of accessories not approved by ARRI is at your own risk. Please observe all relevant safety guidelines

**⚠ WARNING****Changing the Lens Mount while the Camera is Powered**

Risk of electric shock and permanent damage to the camera and lens mount.

- ▶ Always switch off the camera and disconnect all power supplies before changing the lens mount.

**⚠ CAUTION****Using the Camera or Camera Accessories in a Humid Environment and with Condensation**

When moving the camera and the camera accessories 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 bears risk of electric shock and/or fire caused by a short circuit.

- ▶ Never operate the camera and camera accessories when condensation occurs.
- ▶ After moving the camera and camera accessories from a cool to a warm environment, wait for some time for the system to warm up.
- ▶ To reduce the risk of condensation, find a warmer storage location.

**⚠ CAUTION****Hot Surfaces on Camera Body and Camera Accessories**

During extended operation, high data rates and/or operation at high ambient temperatures, the camera's surface and the area around the fan outlet 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.
- ▶ Do not place the camera system near any heat sources during operation.
- ▶ At ambient temperatures above 25° C (77° F), protect the camera and camera accessories from direct sunlight.



**⚠ 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 to ensure proper heat conduction.

**⚠ CAUTION****Rotating Lens Motor**

Risk of crushing fingers and capturing and unraveling long hair, jewelry and/or clothing.

- ▶ Make sure that the lens motor is properly attached to the lens.
- ▶ Do not touch the lens motor gears while they are moving.
- ▶ Keep hair and loose clothing away from the motor gear teeth.
- ▶ Keep cables connected to the camera away from the motor gear teeth.

**⚠ CAUTION****Connected Cable on the Floor**

Risk of injury caused by tripping, falling or slipping over connected cables.

- ▶ Always properly secure cables connected to the camera and camera accessories.
- ▶ Install cables in a way that they cannot be tripped over.
- ▶ If necessary, use a cable duct or secure the cables with adhesive tape.
- ▶ Disconnect the cables from the camera and camera accessories before moving.

**⚠ CAUTION****Unhealthy Posture or Excessive Physical Exertion During Camera Operation**

Using the camera in shoulder mode, on portable stabilizer systems, etc., as well carrying for transport in general bears risk of permanent long term physical damage.

- ▶ Ensure an ergonomic posture when operating and carrying the camera.

**ADVICE****High Energy Light Sources**

Permanent damage to the camera sensor and/or the viewfinder display.

- ▶ Do not point the camera sensor into direct sunlight, very bright light sources or high energy light sources (e.g. laser beams).
- ▶ Do not point the viewfinder eyepiece into direct sunlight, very bright light sources or high energy light sources (e.g. laser beams).

## ADVICE

**Open Lens Mount**

When no lens or lens cap is attached to the camera, dirt and dust particles may enter the camera and settle on the sensor cover glass. Particles on the sensor cover glass can later be visible in the recordings made by the camera.

- ▶ Place the protective cap on the lens mount, when no lens is attached to the camera
- ▶ Contact ARRI Service to inspect the camera if undefined spots appear in the image.

## ADVICE

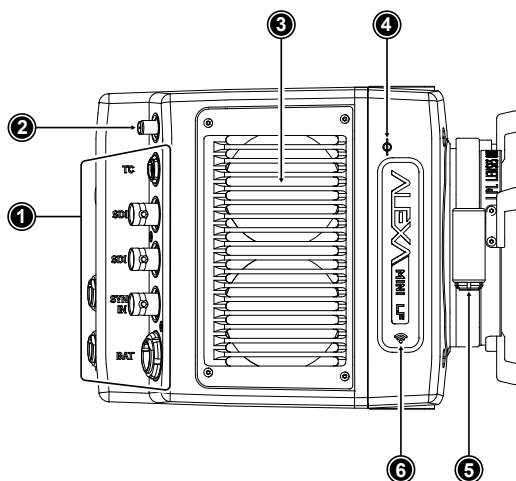
**Connection of Onboard Monitor**

Damage to the SDI driver chip caused by power surge.

- ▶ Always make sure to plug in the power cable first and then connect the BNC cable. As soon as the power and BNC cables are connected, you can switch the camera or the accessories 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.

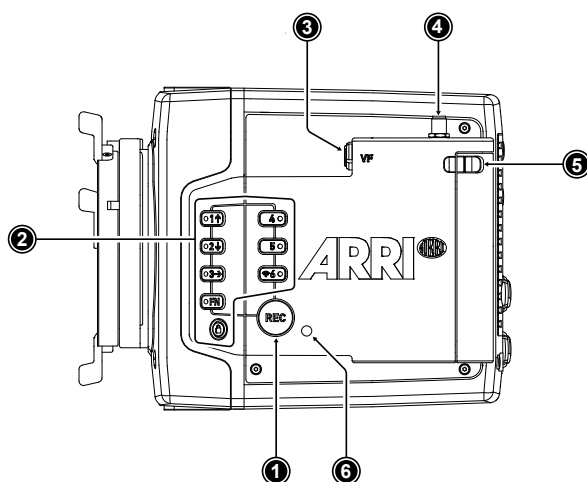
## 6 Camera Body Overview

### Camera Right



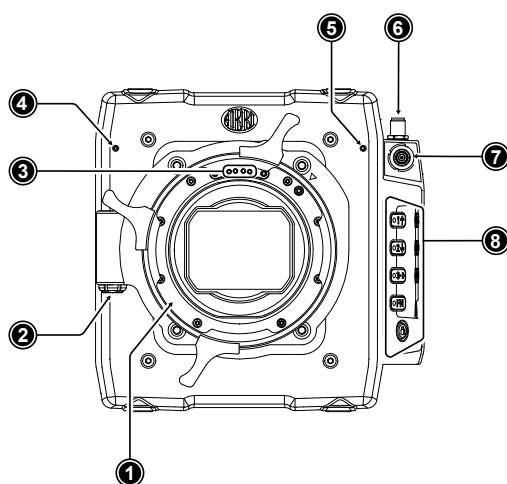
- 1 Rear Connectors
- 2 Radio Antenna Connector
- 3 Fan Intake
- 4 Sensor Plane Marking
- 5 LBUS Connector (on Lens Mount)
- 6 Integrated WiFi Antenna

### Camera Left



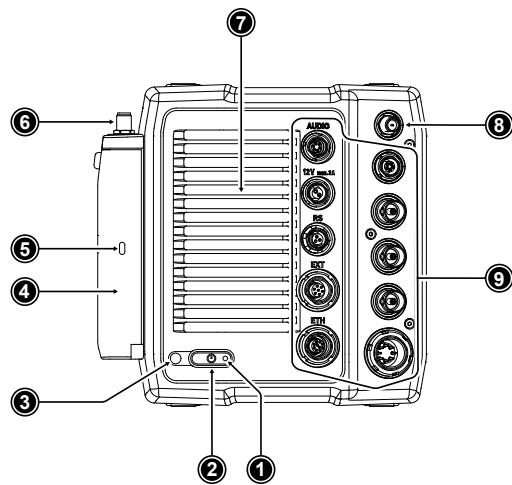
- 1 Record Button
- 2 Camera Buttons
- 3 VF Viewfinder Connector
- 4 WiFi Antenna Connector
- 5 Media Door Release
- 6 Camera Status LED

### Camera Front



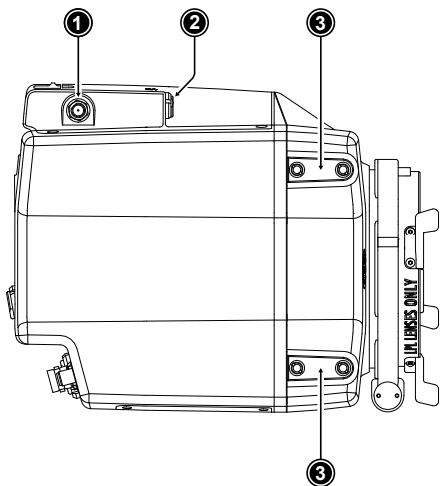
- 1 ARRI LPL Mount (LBUS)
- 2 LBUS Connector (on Lens Mount)
- 3 Lens Mount Contacts
- 4 Built-in Microphone (right)
- 5 Built-in Microphone (left)
- 6 WiFi Antenna Connector
- 7 VF Viewfinder Connector
- 8 Camera Buttons

Camera Rear



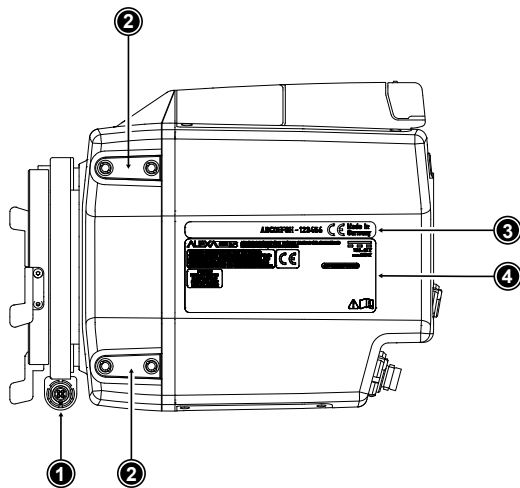
- 1 Boot Status LED
- 2 *POWER* Button
- 3 Camera Status LED
- 4 Media Door
- 5 Media Status LED Window
- 6 WiFi Antenna Connector
- 7 Fan Outlet
- 8 White Radio Antenna Connector
- 9 Rear Connectors

Camera Top



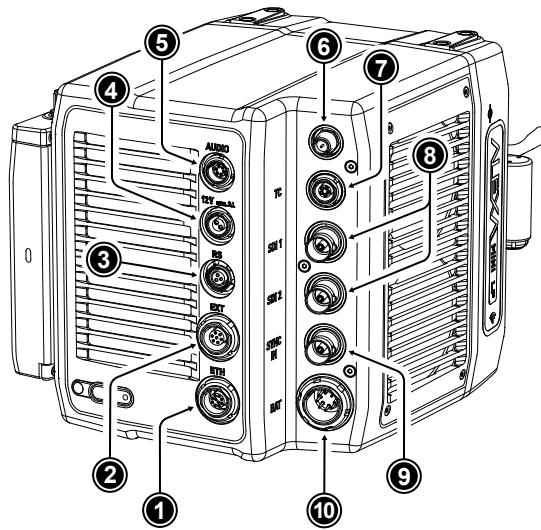
- 1 WiFi Antenna Connector
- 2 VF Viewfinder Connector
- 3 Attachment Points for Mechanical Accessories

Camera Bottom



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

## 6.1 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.

**Info:** 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.

**Info:** 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)

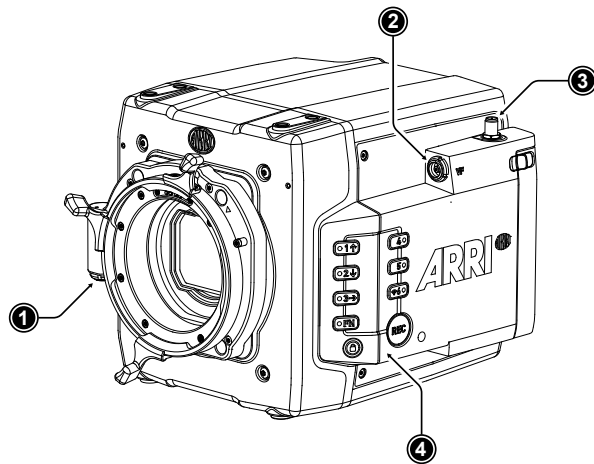
The BAT connector is the main power input of the ALEXA Mini LF and accepts an input voltage range from 11.0 to 34.0 V DC. You can use power cables KC50-S (K2.75007.0) or KC50-SP-S (K2.0001275) or one of the various on-board adapter plates for V-Mount and Gold Mount batteries to supply the camera with 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 136.

## 6.2 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 and the Camera Control Monitor CCM-1 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.

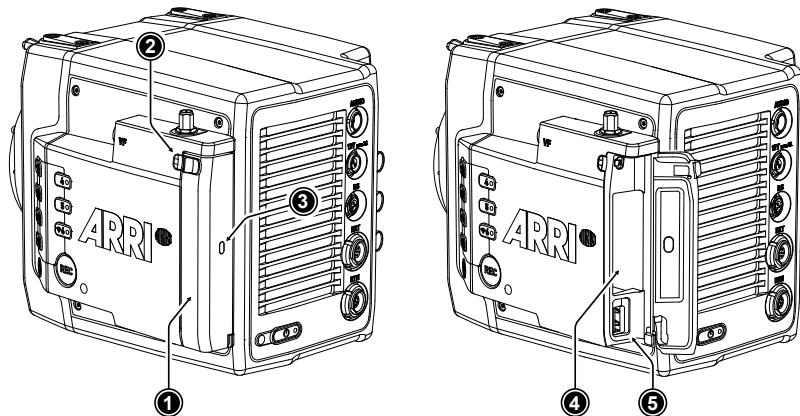
**Info:** Do not leave the antenna connector open during operation or transport. The radio module inside could be damaged by electrostatic discharge on the open connector. Use the originally supplied antenna only.

### 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.



## 6.3 Media Bay



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

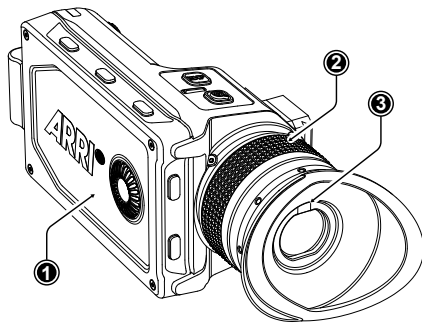
### Recording Media Slot

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.

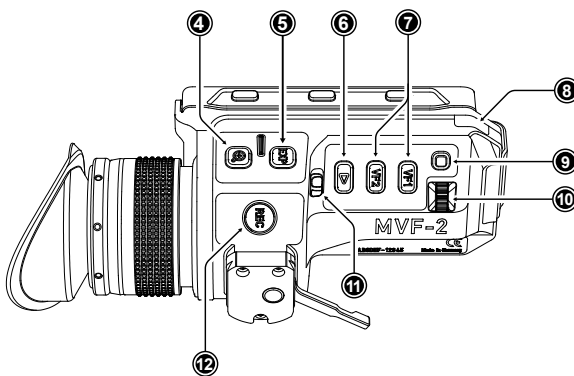
### USB Connector

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.

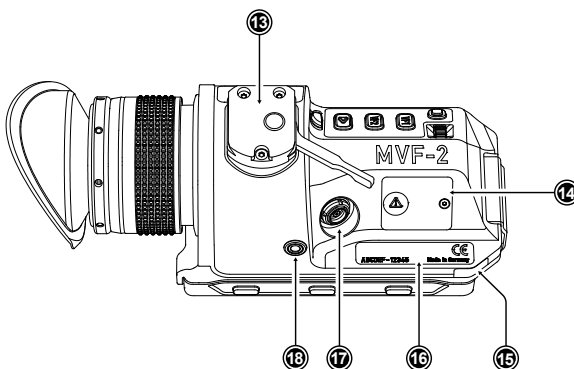
## 7 Multi Viewfinder MVF-2 Overview



- 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

### EVF OLED Display

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

### Diopter Adjustment

With the camera switched on and while 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 labeled 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 display 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 display.

**ADVICE****Permanent Activation of the Viewfinder OLED Display**

Permanent activation can cause irreversible burn-ins on the viewfinder OLED display.

- ▶ Do not cover the viewfinder proximity sensor. When covered, the viewfinder OLED display will be switched on permanently.
- ▶ If you need to cover the viewfinder, disable the viewfinder OLED display 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 viewfinder is used as a remote control without standing support, turn off the viewfinder OLED display using the EVF Power setting.

**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 Button**

The *EXP* button (5) activates and deactivates the exposure tool (either false color or zebra) for the EVF and the flip-out monitor.

**ZOOM Button**

Pressing the *ZOOM* button (4) activates the zoom feature on EVF and the flip-out monitor for a temporary zoom-in to quickly check focus. The magnification ratio is 1:1, or one sensor photosite to one display pixel.

**PLAY Button**

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

**VF 1 and VF 2 User Buttons**

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

**SET Button and User Wheel**

The *SET* button and the user wheel (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 the touchscreen and all MVF-2 buttons. A dedicated lock icon is displayed on the HOME screen as well as in the Status Info of the EVF.

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

## Viewfinder Connector (CoaXPress)

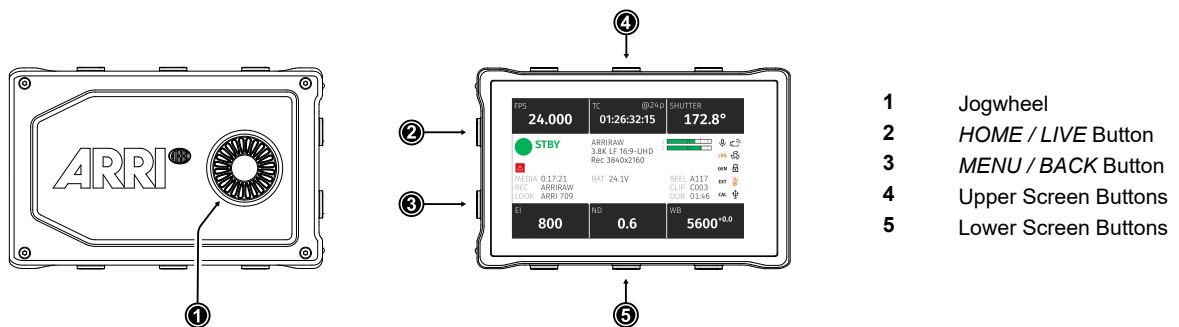
The ALEXA Mini LF uses an industrial CoaXPress interface to connect the MVF-2 viewfinder or the Camera Control Monitor CCM-1 with the camera. The interface transmits power, video and control data and supports cable lengths of up to 10 m (33 ft). The VF connector comes without a key, so the VF cables 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.

## Flip-out Touchscreen Monitor

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



## 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.

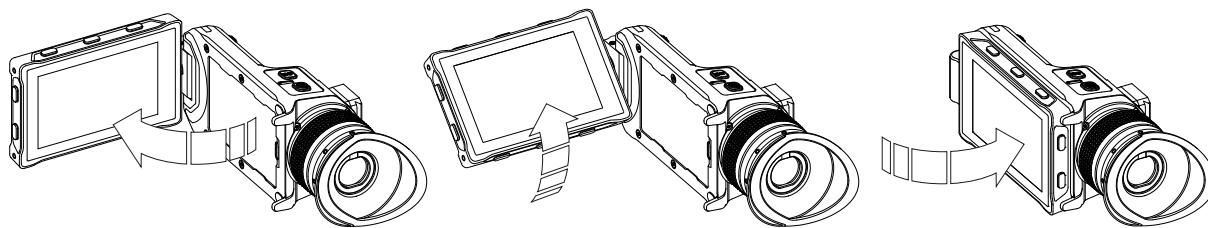
## MENU / BACK Button

Pressing the MENU / BACK button (3) while in 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.

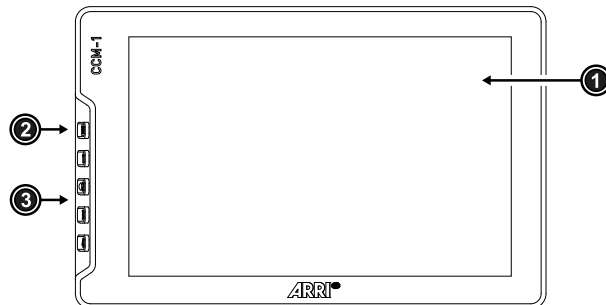
## Viewfinder Cables

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

ID No.	Length	Description
K2.0042857	0.5m (1.5 ft)	Standard cable with right angle connector
K2.0023944	2.0 m (6.5 ft)	The medium length for remote use (straight connector)
K2.0023945	10.0 m (33 ft)	The longest possible length for remote use (straight connector)

## 8 Camera Control Monitor CCM-1 Overview

The Camera Control Monitor CCM-1 is a 7" on board monitor that provides full camera control and menu access for the ALEXA Mini LF and the ALEXA 35.



### Front

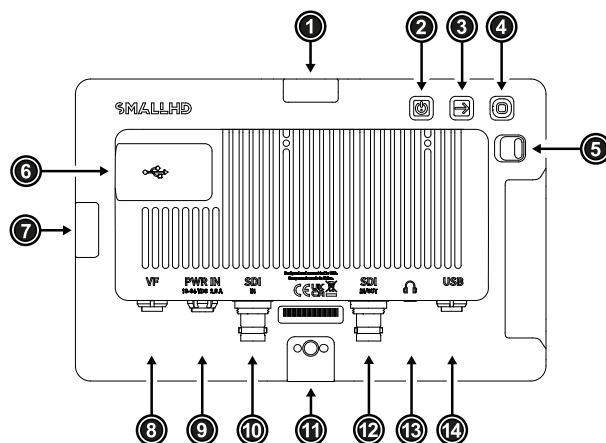
- 1 Display
- 2 *MENU* Button
- 3 User Buttons

### Display

The display (1) is a 7" 1920x1200 IPS LCD touchscreen with a maximum screen luminance of 1300 nits and an active screen size of 95 x 142 mm / 3.72" x 5.95".

### *MENU* Button and User Buttons

The *MENU* button (2) provides access to the camera menu, which is identical to that of the MVF-2. The four user buttons (3) can be assigned camera-specific functions as well as smallHD monitor functions.



### Rear

- 1 Mounting Point
- 2 *POWER* Button
- 3 *BACK* Button
- 4 Joystick
- 5 *LOCK* Slider
- 6 USB-C Slot
- 7 Mounting Point
- 8 VF Connector
- 9 PWR In Connector
- 10 SDI IN Connector
- 11 Mounting Points
- 12 SDI IN/OUT Connector
- 13 Headphones Connector
- 14 USB Connector

### Mounting Points

The monitor has four ARRI Pin-Lock 1/4" mounting points (top (1), right (7), bottom & rear (11)), to attach the monitor to the camera or e.g. a rig.

### *POWER* Button

The monitor can be switched on and off via the *POWER* button (2).

**Joystick and BACK Button**

The joystick (4) and the *BACK* button (3) are used for menu navigation and provide an alternative control option in environments where the touchscreen is difficult to use.

**LOCK Slider**

The *LOCK* Slider (5) locks all monitor controls including the touchscreen to prevent unintended triggering of functions.

**USB-C Slot**

The USB-C slot (6) accepts the same USB-C stick as the ALEXA 35, which can remain plugged in under a weatherproof cover during operation. Via the USB-C stick, firmware updates can be imported, and frame grabs, or 3D-LUTs stored.

**VF Connector (CoaXPress)**

The VF connector (8) is used to connect the CCM-1 to the camera. The interface transmits power, video and control data and supports cable lengths of up to 10 m (33 ft). If the CCM-1 is operated at a brightness of 100 nits, it can solely be powered via this interface. If higher brightness levels are required, the monitor must additionally be powered via the PWR In connector. The VF connector comes without a key, so the VF cables plug in regardless of their orientation.

**PWR In Connector (3-pin Fischer)**

The monitor can be supplied with additional power via the PWR In connector (9), which is required if the monitor is operated with a brightness above 100 nits, or when the monitor is used on third party cameras. The PWR In connector accepts input voltages from 10 – 34 V DC.

**SDI IN (BNC)**

When the MVF-2 and CCM-1 are used in parallel on an ALEXA Mini LF, or when the monitor is used with third party cameras, the CCM-1 receives the camera image via the SDI In connector (10). The SDI In connector accepts 1.5G and 3G SDI signals according to SMPTE ST 292-1:2012 and SMPTE ST 425-1:2014.

**SDI IN/OUT (BNC)**

As an input, the SDI IN/OUT connector (12) offers the same features as the SDI IN input, and both inputs can be used in parallel. As an output, it outputs the signal that is present at the SDI In connector.

**Headphones Out**

The headphone output (13) is a 3.5 mm jack that outputs all audio channels (same as the headphone output of the MVF-2).

**USB Connector (5-pin LEMO)**

When MVF-2 and CCM-1 are used in parallel on an ALEXA Mini LF, the CCM-1 can control the camera via the USB connector instead of the VF connector.



## 9 Camera Support

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

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

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

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

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

Bridge Plate Adapter BPA-4  
(K2.0006352)

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

Bridge Plate BP-8  
(K2.0031436)

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

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

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

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

Center Camera Handle CCH-2  
(K2.73002.0)

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

Mini Viewfinder Bracket MVB-1  
(K2.0006140)

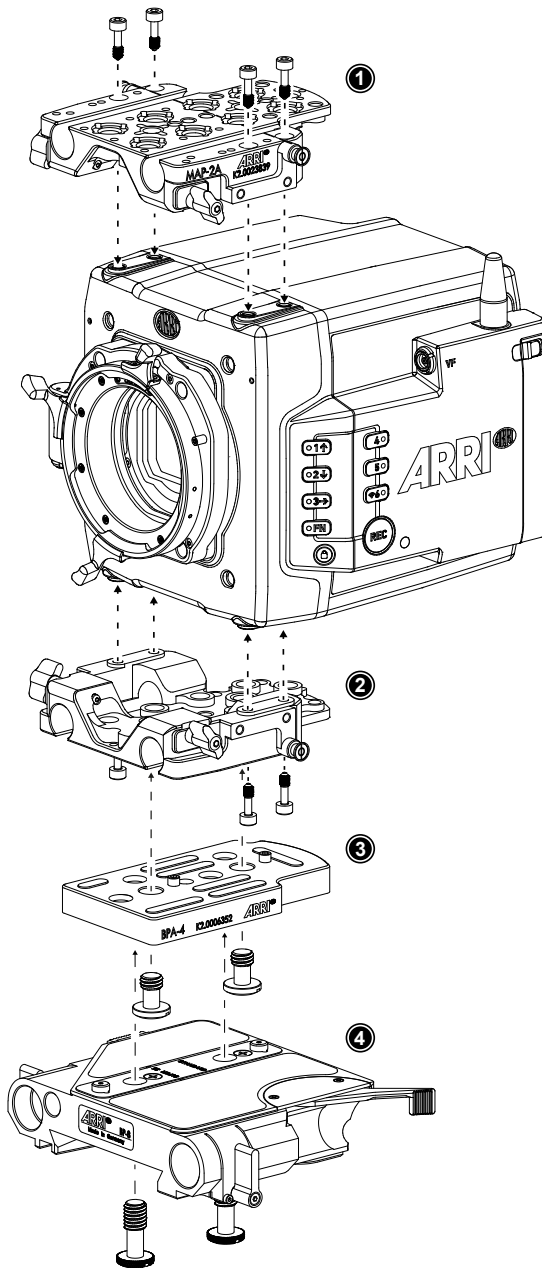
The MVB-1 allows the MVF-1 and MVF-2 viewfinders to attach to ALEXA Mini / Mini LF via 15 mm LWS rods and viewfinder mount. Requires the Mini Adapter Plate MAP-2A or other 15 mm rod support.

### Required Tools

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

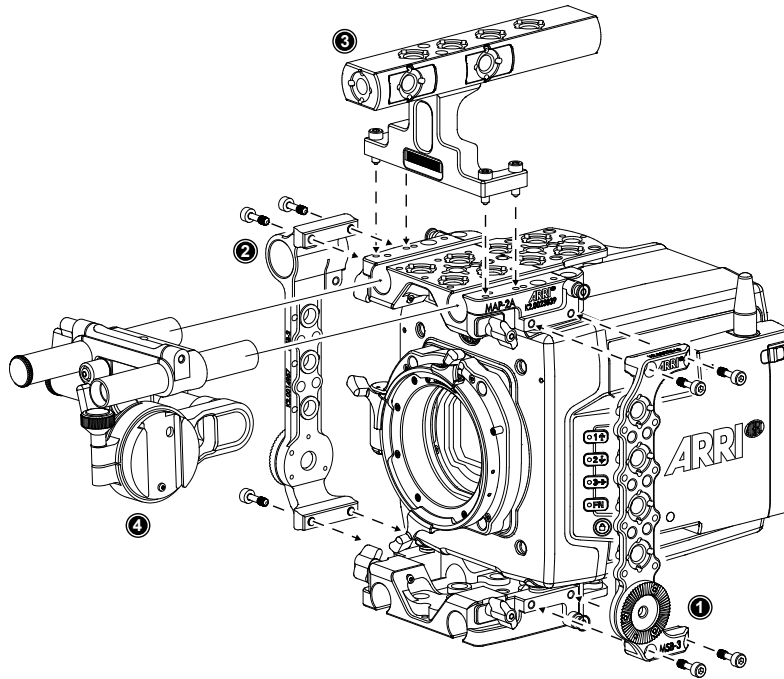
To avoid damage while assembling and retrofitting, always place the camera on a padded, firm, flat and level surface.

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



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

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



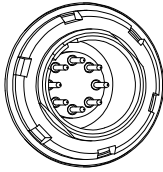
- ▶ Using a 3.0 mm Allen key, fasten the Mini Side Bracket MSB-3 (1) to the camera's left side. The MSB-3 is attached with two 3.0 mm hex screws each to the dedicated mounting points of the top and the bottom Mini Adapter Plates MAP-2A.
- ▶ Identical to the MSB-3 on the camera left side, fasten the MSB-2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

### **⚠ CAUTION**

When installing ARRI accessories or third-party accessories (like e.g. lenses, mechanical accessories, 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

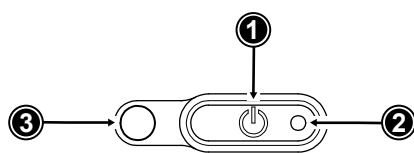
In order to process the increased pixel count while still maintaining ALEXA image quality, the ALEXA Mini LF draws between 69 W and 89 W while recording, with MVF-2 connected, but no further accessories attached. 69 W have been measured while recording MXF/ARRIRAW in recording resolution LF 16:9 UHD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

- ▶ Operate the system using only the type of power source indicated in this document.
- ▶ Always unplug the power cable by gripping the power plug, not the cable.
- ▶ Do not supply power outside the specified voltage range.
- ▶ Always keep the PWR connector accessible so that the cable can be unplugged quickly in case of emergency.
- ▶ Do not use power cables longer than 4m.
- ▶ Always properly secure cables connected to the camera to avoid pinching or tripping.

**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.

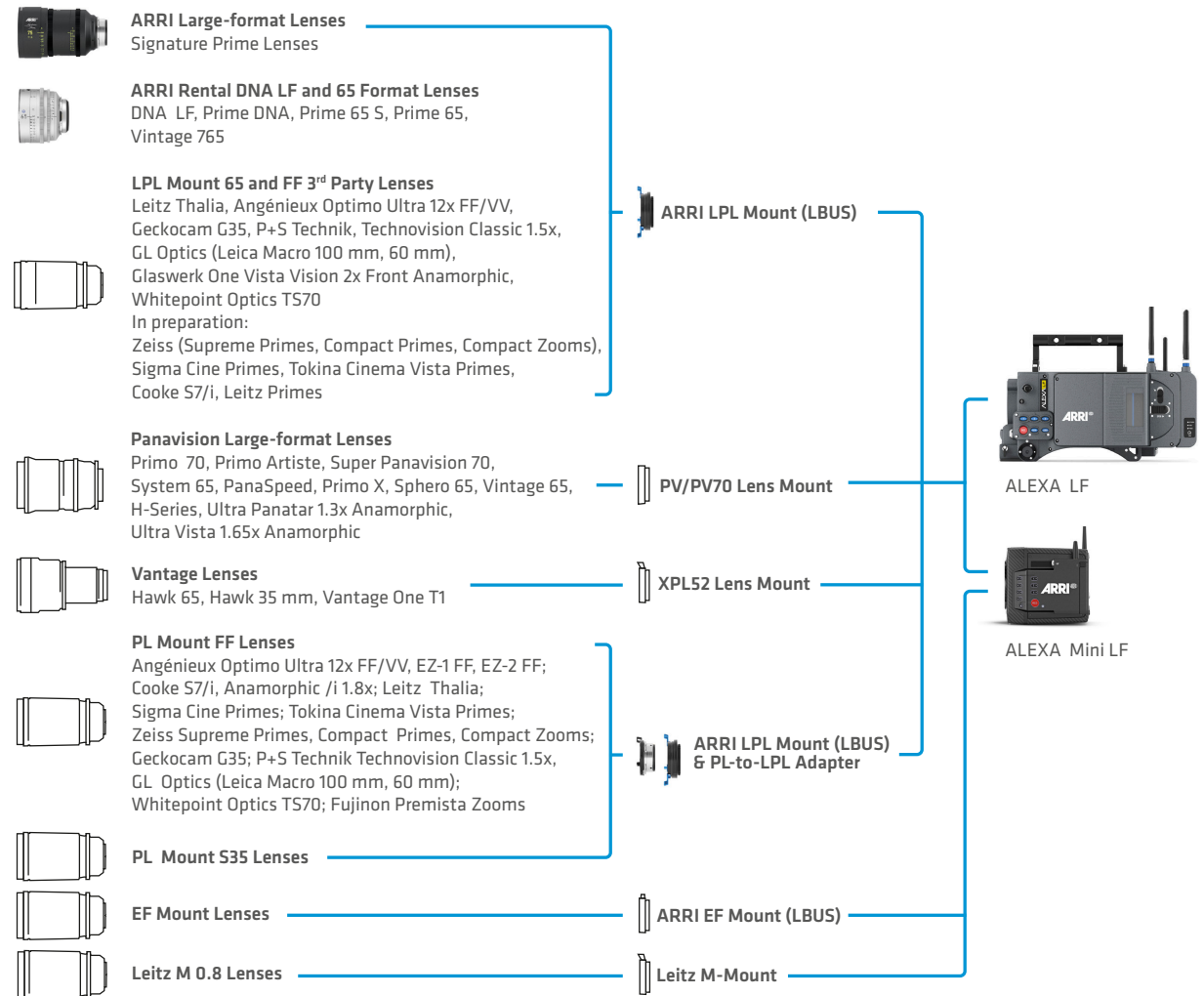
On the flip-out monitor of the MVF-2 as well as in the viewfinder and the SDI outputs, a countdown appears while you press and hold the power button. On reaching zero, the camera switches off.

**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

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



**ARRI LPL Mount (LBUS) K2.0018983**

A lens mount specifically designed for large format and/or full frame lenses with an LPL (Large Positive Lock) mount. Compatible with ARRI LDS-2 and Cooke /i. Can be equipped with the PL-to-LPL Adapter to accept PL mount lenses. Includes an LBUS connector for cforce-type lens motors. 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 K2.0016936**

An adapter that can be used to attach PL mount lenses to a camera with an LPL mount. Compatible with ARRI LDS-1 and Cooke /i. The 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.

**EF Mount (LBUS) K2.0019965**

An EF lens mount with an LBUS connector optimized for the increased dynamic range of the ALEXA 35 sensor. Reduced internal reflection properties ensure that the full contrast of the image from the lens reaches the sensor. This EF Mount (LBUS) has a wide light baffle that illuminates both Super 35 and large format sensor areas. Allows control of the electronic iris in many EF lenses through the camera menu and ARRI ECS devices. Also allows the use of the electronic Image Stabilization found in some EF lenses.

## 11.1 Changing the Lens Mount

### ⚠ WARNING



#### Changing the Lens Mount while the Camera is Powered

Risk of electric shock and permanent damage to the camera and/or the lens mount.

- ▶ Always switch off the camera and disconnect all power supplies before changing the lens mount.

### ADVICE



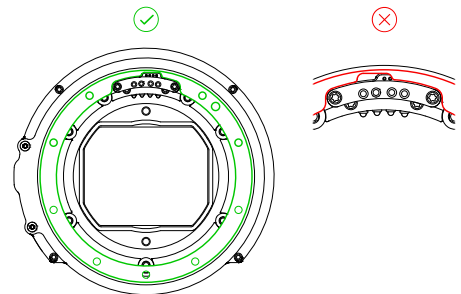
#### Dust particles on the sensor cover glass may affect the recorded image!

When no lens or lens cap is attached to the camera, dirt and dust particles may enter the camera and settle on the sensor cover glass. Particles on the sensor cover glass can later be visible in the recordings made by the camera.

- ▶ Changing lenses or lens mounts should be done in a dry and dust-free environment. If this is not possible, take extra care that no particles enter the camera while the lens or the lens mount is off.
- ▶ After removal of a lens, perform a dust check to make sure no particles have settled on the sensor cover glass..
- ▶ When no lens is attached to the camera, use the lens port cap to prevent dust from entering the lens cavity.
- ▶ Always store the camera with a capped lens mount or camera front cover installed.
- ▶ Make sure to protect all optical surfaces when changing a lens or lens mount.

### ADVICE

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).

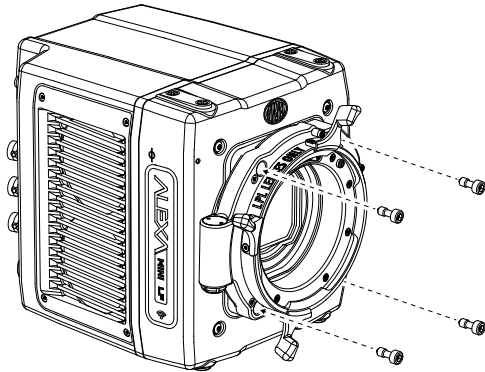




## Removing a Lens Mount (here: LPL Mount)

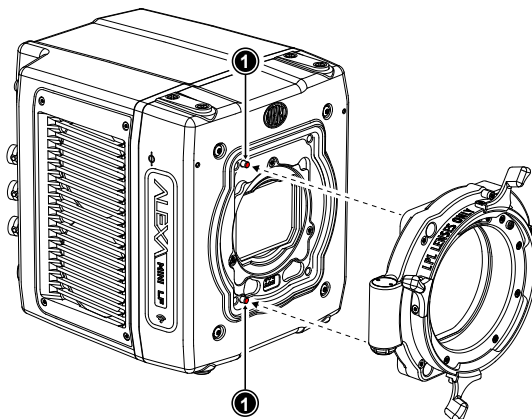
### Required Tools and Precautions

- 3.0 mm Allen key
- Camera switched off and power source disconnected
- Lens removed and properly stored

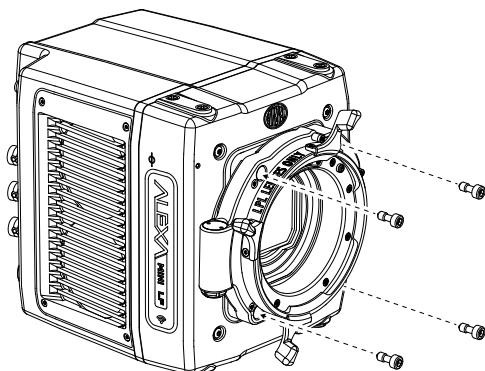


- ▶ Switch off the camera and unplug power supply.
- ▶ Crosswise, loosen all four lens mount screws with a 3.0 mm Allen key.
- ▶ Carefully remove the lens mount.
- ▶ Store the lens mount in a case for dust protection and install a different lens mount.

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



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

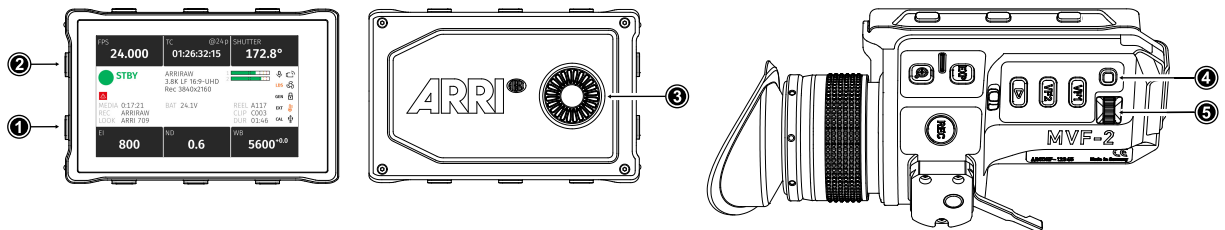


- ▶ Crosswise, hand-tighten all four lens mount screws with a 3.0 mm Allen key.

## 12 Menu Operation

The camera settings are divided into 11 submenus:

- Recording
- Media
- Monitoring
- Image
- System
- Setup
- User Buttons
- Metadata
- Lens & ECS
- Info
- Alerts



- ▶ While the HOME screen is displayed, press the *HOME / LIVE* button (2) or swipe to the right to display the live view.
- ▶ While the HOME screen is displayed, press the *MENU / BACK* button (1) or swipe to the left to access the camera menu.

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 sub menu. To navigate to a sub menu 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.

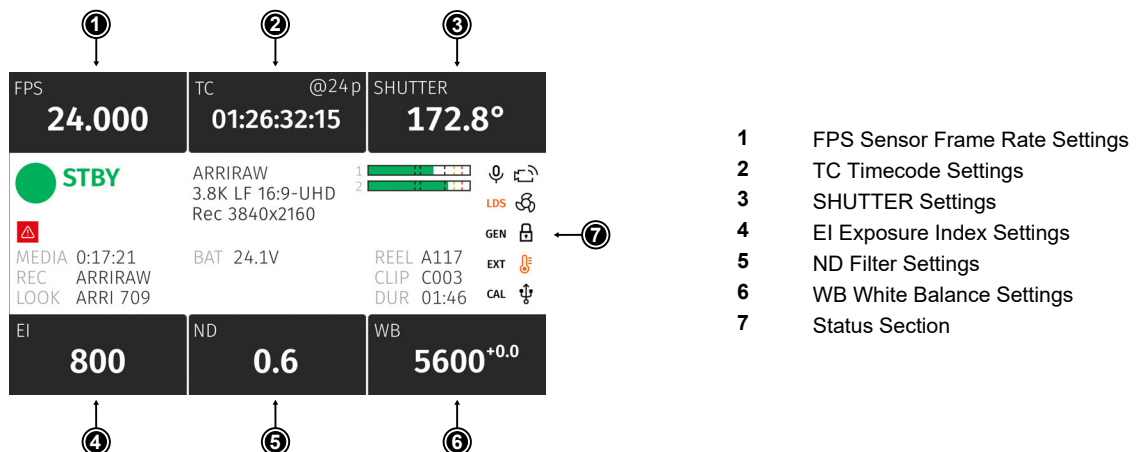
To leave the menu press the *HOME / LIVE* button (2) or swipe to the right.

The jogwheel and the user wheel + *SET* button provide identical functionality.

For the remainder of this manual, whenever the term jogwheel is used, it refers to the jogwheel and the user wheel. Whenever "press the jogwheel" is used, it refers to the jogwheel center and the *SET* button.

### 12.1 HOME Screen

The HOME screen shows the most important camera settings and gives quick access to changing them through the screen buttons.



## FPS (Sensor Frame Rate)

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

## 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 exists. 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. The shutter unit can be set to display either shutter angle (5.0° to 356.0°) or exposure time (1 second to 1/8000 seconds). The maximum shutter angle is limited by the resulting exposure time (1 second max.). Shutter angle and sensor frame rate determine exposure time of the sensor in seconds by the following equation:  $\text{exposure time} = \text{shutter angle} / (360 \times \text{FPS})$ .

## 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 built in FSND (Full Spectrum Neutral Density) filter stage. Press the screen button to change the ND filter.

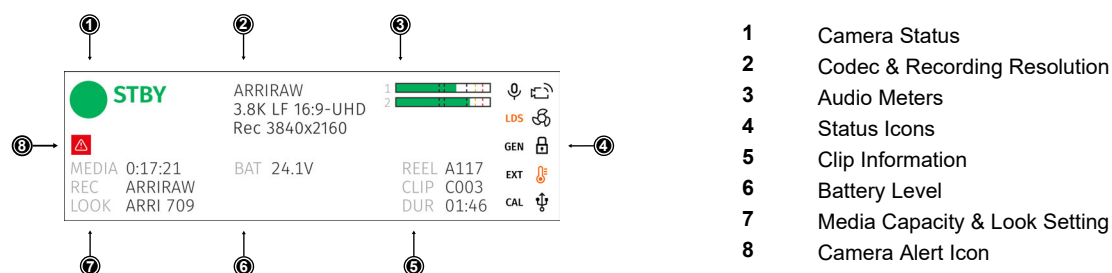
## WB (White Balance)

The WB label shows the current white balance and tint. Press the screen button to set the 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 camera 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 2000 to 11000 Kelvin (here: 5600) 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:



## Status Section

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



### Camera Status

STBY	Standby - ready for recording.
PREREC	Prerecording.
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 occurred. See <i>MENU &gt; Alerts</i> 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 when audio recording is enabled. When audio recording is disabled, a crossed out speaker icon is displayed. Black markers are shown at signal levels -20, -18, -9 dBFS. The yellow marker at -5 dBFS and the red marker at -2 dBFS indicate a signal close to clipping.

REEL A117  
CLIP C003  
DUR 01:46

### Clip Information

Displays the current reel name, the current clip number and the duration of the current clip (while recording) or of the last recorded clip (during standby).

BAT 24.1V

### Battery Level

Current battery voltage level.

MEDIA 0:17:21  
REC ARRIRAW  
LOOK ARRI 709

### Media Capacity & Recording and Look Settings

Displays the remaining capacity of the recording medium, the active recording processing (ARRIRAW or Log C ) and the active look file.

## Status Icons:



The microphone icon indicates that the internal microphones are active.

EXT

EXT Sync Icon. The black icon indicates active EXT Sync. The icon turns orange in case of a configuration mismatch.



WiFi is active and in client mode. The camera is connected to a network.



WiFi is active and in client mode. The camera is not connected to a network.



WiFi is active and in host mode.

WRS

The ARRI ECS White Radio is active and uses the displayed channel number.



Touch Lock Icon. The touchscreen functionality of the MVF-2 filp-out monitor is disabled.



MVF-2 Lock Icon. MVF-2 buttons and touch-screen are locked.



Camera Lock Icon. Camera buttons are locked.



The Frame Grab icon indicates active frame grabbing. The icon turns orange if frame grabbing failed (e.g. no USB medium is inserted).

GEN

The Genlock icon indicates that the camera is synchronized to a Genlock or timecode signal. The icon turns orange when the source signal is missing or is not usable.



The MVF-2 eyepiece heater is on. The icon turns gray when the heater is not heating (eyepiece temperature is > 15 °C (59 ° F)).

CAL

The CAL icon indicates that a lens motor calibration is required. The icon turns black when calibration is in progress and expires when calibration has finished.

LDS<sup>x</sup>

Indicates that the LDS interface is disabled.



The USB icon indicates a connected USB medium. The icon turns gray when the medium is read only, and orange if the medium is not usable.



The fan icon indicates that the camera needs to increase the fan speed above 20 dB noise emission level. The icon turns orange when the fan speed exceeds 20 dB.



The temperature icon indicates that the camera temperature is increased. The icon turns red when the camera temperature is out of range.



Indicates an active alert state. See *MENU > Alerts* for detailed information.

## 12.2 Working with Settings/Lists and Importing Files

For certain settings, 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).

Settings with value based lists:

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

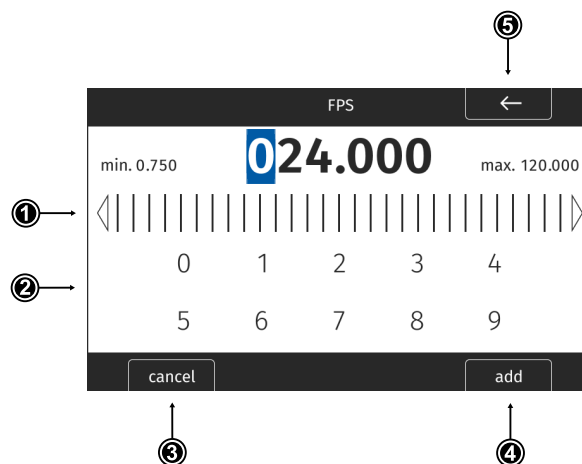
Settings with file based lists:

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

### Adding Entries to Value based Lists

The camera offers two input methods for adding entries to a list or changing settings. The numeric keypad is for entering a value directly, while the slider is for fine-tuning a value (e.g. for fine-tuning the shutter when filming monitors). This setting screen is used not only when values are to be added to a list, but also for most of the menu settings.

- Select e.g. *HOME > FPS > ADD*.



#### Operation via Jogwheel

- Rotate the jogwheel to change the value of the first digit. Then press the jogwheel to move to the next digit and adjust. The blue cursor indicates the selected digit.
- Press the *BACK* button (5) to reselect the previous digit.
- Press the *ADD* button (4) to add the new value to the list, or the *CANCEL* button (3) to discard and exit.

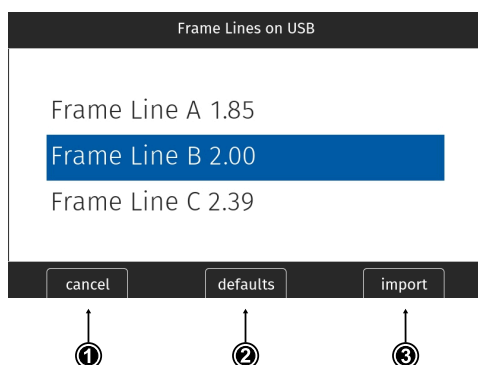
#### Operation via Touchscreen

- Use the touch slider (1) to change the value of the first digit. Then press on the slider or the value to move to the next digit and adjust. The blue cursor indicates the selected digit.
- or
- Use the numeric keypad to enter a value directly.
- Press the *BACK* label (5) to reselect the previous digit.
- Press the *ADD* label (4) to add the new value to the list, or the *CANCEL* button (3) to discard and exit.

## 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](#)", page 49 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
<b>Max. Entries</b>	16	20	32	50	200	256

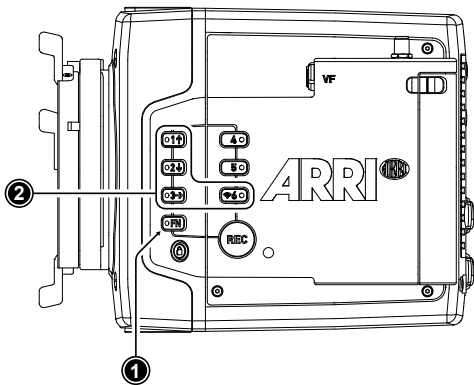
### 12.3 On-screen Keyboard

When working with textual parameters on the camera, an on-screen keyboard serves to enter text. You need to use the keyboard, for example, to enter the name when saving a user setup.



- ▶ Use the jogwheel to select and enter characters.
- ▶ The *CLEAR* button (4) deletes the digit to the left of the cursor. Press and hold the button to clear the entire value.
- ▶ The *aA#* button (2) toggles between lower case, upper case and numeric text entry.
- ▶ Press the *SET* button (3) to save the file, or the *CANCEL* button (1) to exit.

### 12.4 Function Button FN



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

#### Camera Buttons to Access Common Camera Functions

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

Following camera functions can be accessed:

Function Button & Camera Button	Function								
FN + 1	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>	Camera Button	Function	1	Select backward	2	Select forward	3	Access / Confirm
	Camera Button	Function							
	1	Select backward							
	2	Select forward							
3	Access / Confirm								
For more information, see <a href="#">"Overlay Menu", page 48</a> .									
FN + 2	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.								

Function Button & Camera Button	Function								
<b>FN + 3</b>	<p>Starts/stops playback from the recording medium. During playback, the camera buttons control the following functions:</p> <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>	Camera Button	Function	1	Skip backward	2	Skip forward	3	Play / Pause
Camera Button	Function								
1	Skip backward								
2	Skip forward								
3	Play / Pause								
<b>FN + 6</b>	<p>Toggles WiFi on/off.</p> <p>When pressing (just) the <i>FN</i> button, the status LED of button 6 reflects the current WiFi status (LED on = WiFi enabled).</p>								

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

## 12.5 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

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

### Activation and Control Using a User Button

- ▶ Assign a [user button](#) to “Overlay Menu”.
- ▶ Activate the overlay menu by pressing the user button.
- ▶ Select a parameter with the *JOGWHEEL* of the MVF-2.



- ▶ Start editing the parameter by pressing the *JOGWHEEL*.
- ▶ Change the value of the parameter with the *JOGWHEEL*.
- ▶ Confirm the new value by pressing the *JOGWHEEL*.
- ▶ If required, repeat steps 3-6 for other parameters.
- ▶ Exit the overlay menu by pressing the user button.

## 12.6 User Storage

The camera saves data such as user setups and frame grabs to a USB memory stick. Firmware, frame lines and look files can be loaded onto the camera using the memory stick.

The camera only supports FAT 32 formatted 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.

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.

### Prepare Folder Structure

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.

- ▶ Open the media door and insert the USB medium.
- ▶ Select *MENU > Media > Prepare USB Medium* to create the folder structure on the USB medium:

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
ARRI/ECS		For LBUS device update installation



The USB icon on the HOME screen and in the Status Info indicates a connected medium. A gray icon indicates that the medium is read only. An orange icon is displayed if the medium is not supported.

### USB Info

- ▶ Select *MENU > Info > USB Info* for additional information on the USB medium.

## 12.7 Info Screens

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

- Select *MENU > Info*.

The *Info* sub menu contains the following lists:

### Version Info

<i>Software</i>	The camera software version.
<i>Revision</i>	Revision of camera software version.
<i>FPGA</i>	Firmware version of active FPGA.
<i>MVF-2 Software</i>	Software version of MVF-2.
<i>Lens Mount Software</i>	Software version of lens mount.

### System Info

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

### Media Info

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

### USB Info

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

**Info:** The number entries consist of two numbers, the number of files on the USB medium and the number of files recognizable by the camera.

### Network Info

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

## Lens Info

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

## User Button Info

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

## EXT Sync Info

The [EXT Sync](#) info screen shows the system status of all cameras in the EXT sync setup. It lists the serial number, the camera ID prefix, the battery voltage and the status of the host and the client 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 revisions.

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 on the USB medium. Privacy sensitive information such as WiFi password and look files are not exported.

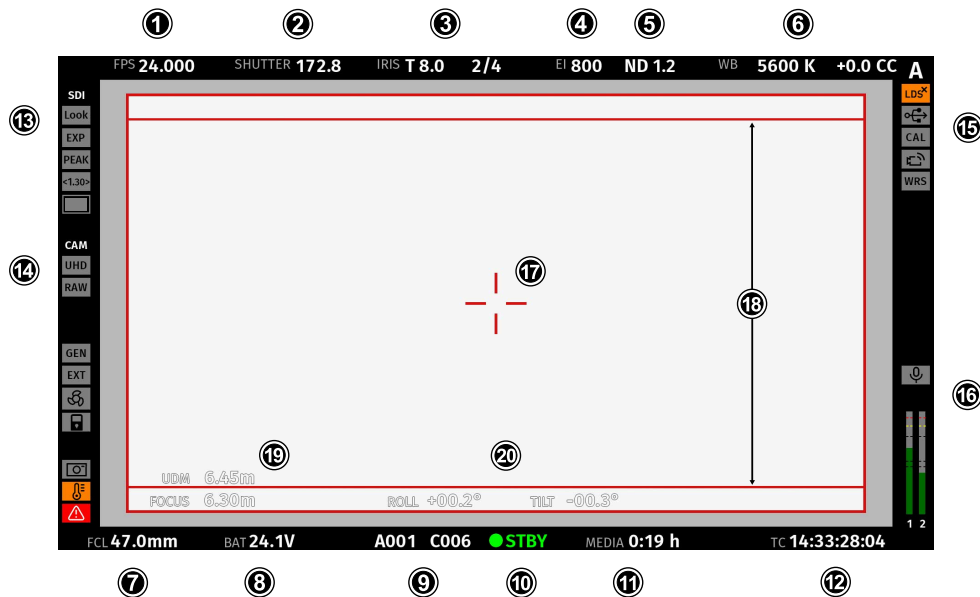
## Export Update Logfiles

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

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

## 13 Status Information and Overlays

The camera displays camera status information on the EVF and the SDI outputs. At the top and bottom of the screen, the camera displays status information in text form. The top status bar displays the current settings 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 side of the screen, icons provide information about the current status of the camera. Furthermore, additional overlays such as lens data and an electronic horizon can be displayed.



### Status Info Top

- 1 Display of the set sensor frame rate. The FPS label turns orange if the sensor frame rate does not match the project rate.
- 2 Display of the set shutter (shutter angle or exposure time).
- 3 Display of the lens iris, including fractions of a stop (if lens data is available).  
When using a lens extender, the iris value is displayed in brackets (recalculated value).
- 4 Display of the set exposure index.
- 5 Display of the set ND filter. The value is blinking while the filter changes.
- 6 Display of the set white balance.

### Status Info Bottom







- 7 Display of the 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 Displays the active power source (onboard battery (BAT) or power in (PWR)) and its supply level. If the level reaches the configured warning threshold, the value starts flashing orange.
- 9 Display of the current reel and clip number.
- 10 Display of the camera status:
 

STBY	Standby - ready for recording.
PREREC	Prerecording.
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 occurred. See <i>MENU &gt; Alerts</i> for details.












- 11 Display of the remaining capacity of the recording media at current sensor frame rate and codec, in real time. When media capacity is less than two minutes, capacity values starts flashing orange.
- 12 Display of the current timecode. The TC label turns orange if the sensor frame rate does not match the project rate.

### Status Info Left









#### 13 EVF / SDI 1 / SDI 2 Status

 	Output processing icons. Shows the current processing for the respective output .
	Exposure tool icon. Indicates that False Color is active on the respective output.
	Peaking Icon. Indicates that Peaking is active on the respective output.
	Anamorphic Desqueeze icon. Indicates that Anamorphic Desqueeze is active and which lens squeeze factor is applied.
	Magnification icons. Indicate that the output shows less image content than actually recorded.


#### 14 Camera Status

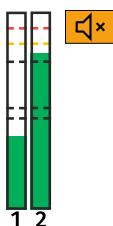
	Shows the current Recording Resolution (4.5K, 4.3K, UHD...).
 	Shows the current recording processing (RAW for ARRIRAW, or LOG (LogC4) for Apple ProRes).
 	Genlock icon. Indicates that the camera is synchronized to a Genlock or timecode signal. The icon turns orange when the sync signal is missing or is not usable.
 	The fan icon indicates that the camera needs to increase the fan speed above 20 dB. The icon turns orange when the fan speed exceeds 20 dB.
	Camera lock Icon. Indicates that the camera body controls are locked.
 	Temperature warning icon. Indicates that the camera temperature is increased.
	Alert Icon. Indicates an active alert state. Alerts require the user's immediate attention and persist until resolved. See <i>MENU &gt; Alerts</i> for further information.

### Status Info Right

- 15  Indicates that the lens mount data interface has been disabled manually (e.g when custom lens tables are used).
-  USB icon. Indicates connected USB medium.
-   Calibration icon. Indicates that lens motor calibration is required.  
The icon turns gray when calibration is in progress and expires when calibration has finished.
-   WiFi Icon. Indicates that WiFi is active (host mode, client mode.)  
The client mode icon turns orange if the camera is not connected to a network.
-  White Radio icon. Indicates that White Radio is active.
-  Frame Grab icon. Indicates frame grabbing.  
The icon turns orange if frame grabbing failed (e.g. no USB medium is inserted).

#### 16 Audio Section

	Internal microphone icon. Indicates that internal microphones are active.
---	---



Audio meters. Indicate audio recording. Displays the current level of the audio channels.

If audio recording is not possible (e.g. sensor fps != project frame rate), an orange speaker icon is displayed instead of the meters.

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.

## Overlays

- 17 Center marker, marks the center of the image to help in framing.
- 18 Frame line (here: ARRI 1:1.85)
- 19 The focus distance overlay displays the current focus distance (if lens data is available).  
The distance measure overlay displays readings from distance measurement devices.
- 20 Electronic Horizon overlay. Can be set to display numeric roll and tilt values.

## Application of Status Info on Monitoring Outputs

- ▶ Select *MENU > Monitoring > VF > EVF Overlays > Status Info* to configure application of status information for the EVF.
- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Overlays > Status Info* to configure application of status information for the SDI outputs.

Following options are available:

<b>Off</b>	Status information is not displayed.
<b>Overlay</b>	Status information is displayed and overlaid on the captured image.
<b>Safe</b>	Status information is displayed around the captured image.



User Buttons *VF Status Info* and *SDI Status Info* support to quickly set the Status Info on the respective output.

## Configuration of Status Info Components

- ▶ Select *MENU > Monitoring > VF > EVF Overlays > Status Components* to configure the status components for the EVF.
- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Overlays > Status Components* to configure the status components for the SDI outputs.

Following options are available:

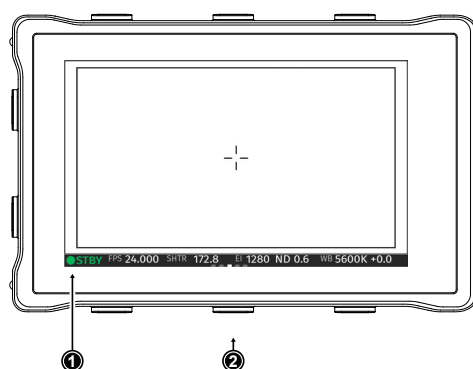
<b>Info 1</b>	Enables/disables the left section of the status info.
<b>Info 2</b>	Enables/disables the right section of the status info.
<b>Timecode</b>	Enables/disables display of the timecode.
<b>Audio</b>	Enables/disables display of the audio levels.
<b>Lens Data</b>	Enables/disables iris (3) and focal length (7) overlays.
<b>Lens Focus Distance</b>	Enables/disables focus distance overlay (19).
<b>Distance Measure</b>	Enables/disables status overlay of distance readings from a distance measure (19).
<b>Camera Index Letter</b>	Displays the Camera Index Letter in the top right corner of the image (SDI only). Helps to identify camera image output when shooting with multiple cameras.
<b>Electronic Horizon</b>	Displays a horizon overlay (20) representing the roll and tilt of the camera measured by the camera's position sensor. This sensor can be <a href="#">"reset"</a> if it appears to have an offset.

**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.

**Flip-out Monitor Status Bar**

The flip-out monitor of the MVF-2 shows a slightly different status information than the EVF and the SDI outputs. When set to display the camera live image, a status bar is displayed below the image. The flip-out monitor status bar is separated into five pages:

*Lens Data**Recording**Main Parameters**Audio and Timecode**Status Icons*

- Use the left and right lower screen buttons to change the status bar (1) content. The center lower screen button (2) returns to display the main parameters.

## 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 determines how many frames the timecode counts per second, and also determines the frame rate at which clips are played back.

Changing the project frame rate will automatically change the sensor frame rate and the SDI frame rates to the same frame rate. It is still possible to have different frame rates for these settings by changing the sensor frame rate or the SDI frame rates individually.

- 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

#### Next Reel Count

The next reel count sets the reel number assigned to the next new recording medium. The camera will automatically increment the reel number each time a new recording medium is inserted, erased and recorded on. If a previously used media is reloaded in the camera (comparable to a short end of a film roll), it will keep its reel number and the camera will increment the reel count. If the media 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 media. It is possible, but usually not necessary, to manually change the next reel number.

- Select *MENU > Recording > Project Settings > Next Reel Count*.
- Set the desired next reel count between 001 and 999.

#### 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 77](#).

- Select *MENU > Recording > Project Settings > Camera Index*.
- 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).

- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Overlays > Status Components > Camera Index Letter* to display the camera index letter in the SDI status info.
- ▶ Select *MENU > Recording > Project Settings > Camera Index Color*. to 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 77](#).

- ▶ Select *MENU > Recording > Project Settings > Camera ID Prefix*.
- ▶ 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 the monitoring outputs when using anamorphic lenses. 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 lens squeeze factor.

Following options 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



Anamorphic desqueeze and the set factor are indicated through the desqueeze icon displayed in the Status Info (here: 2.00).

To better judge focus or to analyse the image without Anamorphic Desqueeze in general, you can temporarily deactivate Anamorphic Desqueeze on the monitoring outputs. This only affects the preview on the monitoring outputs and has no influence on the clip metadata.

- ▶ Select *MENU > Monitoring > VF > Anamorphic Desqueeze* to enable preview of anamorphic desqueeze on the EVF and Monitor.
- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Anamorphic Desqueeze* to enable preview of anamorphic desqueeze on the SDI outputs.



User Buttons *VF Desqueeze* and *SDI Desqueeze* support to quickly enable/disable Anamorphic Desqueeze on the respective output.

## 14.2 Sensor Frame Rate

The sensor frame rate determines the amount of frames generated by the sensor in one second. For sync sound recording, the sensor frame rate matches the project speed. If you record a clip at a higher sensor frame rate than the project rate, a slow motion effect occurs during playback. Recording at a lower sensor frame rate results in a time lapse effect.

- ▶ Select *HOME* > *FPS* to set the sensor frame rate.
- ▶ Select a preset from the list or [add](#) a custom frame rate.



User Buttons *FPS Increase / Decrease* support to quickly change between FPS presets.

## 14.3 Shutter

The electronic shutter of the camera can be adjusted from 5° - 356° shutter angle or 1 to 1/8000 seconds (depending on the set frame rate). The preferred shutter unit can be set by the user.

- ▶ Select *MENU* > *System* > *Shutter Unit*.

Following options are available:

<b>Shutter Angle</b>	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.
<b>Exposure Time</b>	Shows the effective sensor exposure time. With varying frame rates, it remains identical. <b>Info:</b> 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.

- ▶ Select *HOME* > *SHUTTER* to adjust the shutter.
- ▶ Select a preset from the list or [add](#) a custom shutter value to the list.



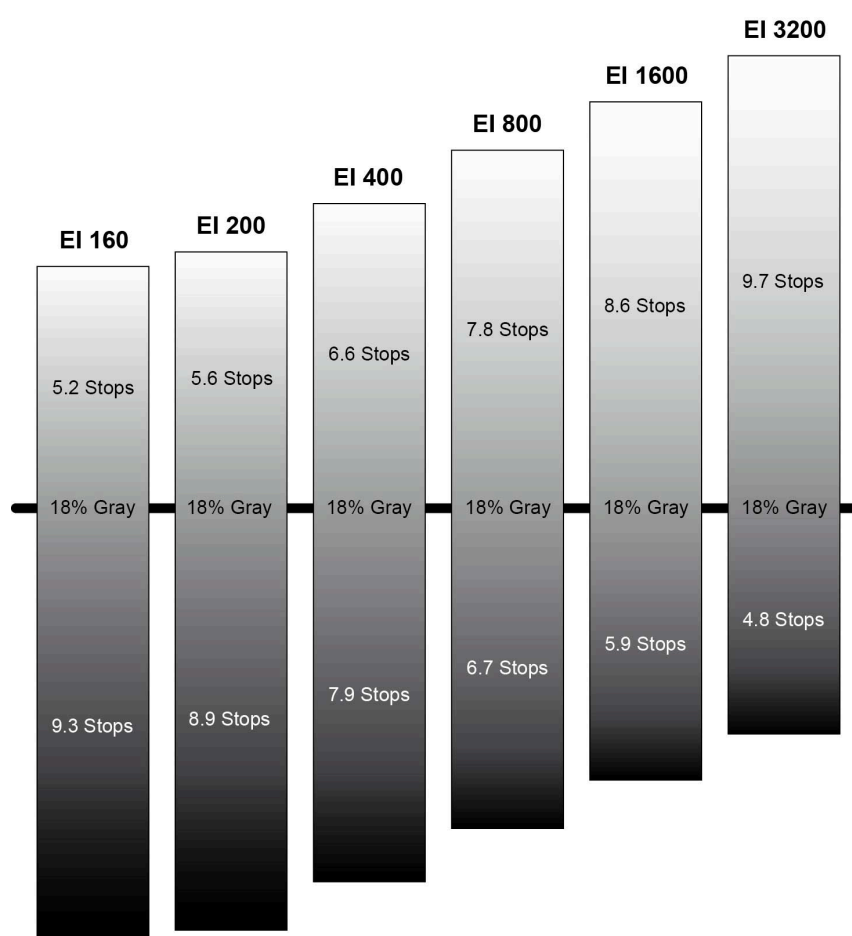
User Buttons *Shutter Increase / Decrease* support to quickly change between shutter presets.

**Info:** The camera sensor is optimized for exposure times shorter than 1/24 s and image artifacts like individual overexposed pixels may 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

- Select *HOME* > *EI* to set the exposure index.

Following options are available:

160	200	250	320	400
500	640	800	1000	1280
1600	2000	2560	3200	



User Buttons *EI Increase* and *EI Decrease* support to quickly change the exposure index.

## ADVICE

When changing the exposure index, short temporary artifacts 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.

## 14.5 ND Filter

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 light attenuation over the whole spectrum. This prevents artifacts from infrared wavelengths and the need for additional IR filters.

- Select *HOME* > *ND* to set the ND filter.



User Buttons *ND Increase* / *Decrease* support to quickly change the 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.

- Select *HOME* > *WB* to set the white balance.
- Select a preset from the list or [add](#) a custom white balance.



User Buttons *WB Increase* / *Decrease* support to quickly change between white balance pre-sets.

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 the first entry in the WB list.

- Select *HOME* > *WB* and press *Auto WB*.  
The monitoring outputs display an overlay indicating the area used for white balance calculation.
  - Press the *Auto WB* button again within one second to execute automatic white balance.  
The calculated white balance is set and stored as the first entry in the white balance list.
- Info:** Under- or overexposed images may cause the automatic white balance to fail. Always trigger automatic white balance with properly exposed images.



User Button *Auto WB* supports to quickly execute an auto white balance.

## 14.7 Timecode

Timecode ensures that each frame of recorded material can be identified with a unique value and synchronized with the appropriate media, such as audio or the second camera in a multicamera application. In conjunction with other metadata, such as reel names, all recorded media retains its unique identity.

## Timecode Run Mode

**Rec Run** timecode is often used on single camera productions that are either MOS or use a dumb slate to synchronize picture and sound. Rec Run timecode guarantees continuous timecode on all recorded data. The timecode increments only during recording, by one frame for each image generated by the sensor. Rec Run timecode also works with over- and undercranking.

**Free Run** timecode is often used on multi camera productions with sync sound, picture/sound timecode match and allows for easy syncing in post.

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 *Regen* (regenerate). 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 uses its internal clock to avoid potential timecode jumps, which can occur due to connection problems such as a faulty timecode cable for example.

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

Following options are available:

<b>Rec Run</b>	Timecode increases during recording only. The timecode value increases with every frame generated by the sensor while recording.
<b>Free Run</b>	Timecode increases with every new frame generated by the sensor, independently from recording.

Free Run timecode is only possible if the sensor frame rate matches the project rate. 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. When you set the sensor frame rate back to equal the project frame rate, the timecode will recall the previous free run timecode.

## Timecode Mode

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

You have the following options:

<b>Regen</b>	Based on the timecode run mode, the camera determines the timecode source automatically when set to <i>Regen</i> .  If the Run Mode is set to <i>Free Run</i> , the camera regenerates timecode from the timecode connector. The timecode source must be connected to the camera permanently. Upon disconnection or loss of signal, the camera continues counting on its own, but will indicate the missing signal. When the signal is reconnected, the camera uses the value of the external signal again.  If Run Mode is set to <i>Rec Run</i> , the camera regenerates timecode from the last clip of the recording medium by continuing seamlessly from the last active value.
<b>Preset</b>	The camera uses its internal counter.

**Jam Sync**

The camera samples the timecode from the timecode connector 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 Info is blinking. Jamming has finished when the timecode display stops flashing, now the timecode source can be disconnected.

**Info:** Jam-sync is not available when Timecode Run Mode is set to Rec Run.

**Info:** 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 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:

<b>LTC In</b>	Timecode is continuously read from the TC connector.
<b>Media</b>	Timecode from the last clip of the active recording card by continuing seamlessly from the last active value.
<b>EXT</b>	Timecode is inherited from EXT host camera (when camera is set to EXT sensor client or EXT settings client)

**Setting the Timecode Manually**

- Select *HOME > TC > Options > Timecode* to edit the timecode.

**Info:** Timecode can not be set manually when the timecode mode is set to either *Regen* or *Jam Sync*.

**Timecode Count Mode**

The Count Mode sets the preference for how timecode is counted when using non-integer project rates (29.97p, 59.94p).

- Select *HOME > TC > Options > Count Mode* to set the count mode.

Following options are available:

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

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

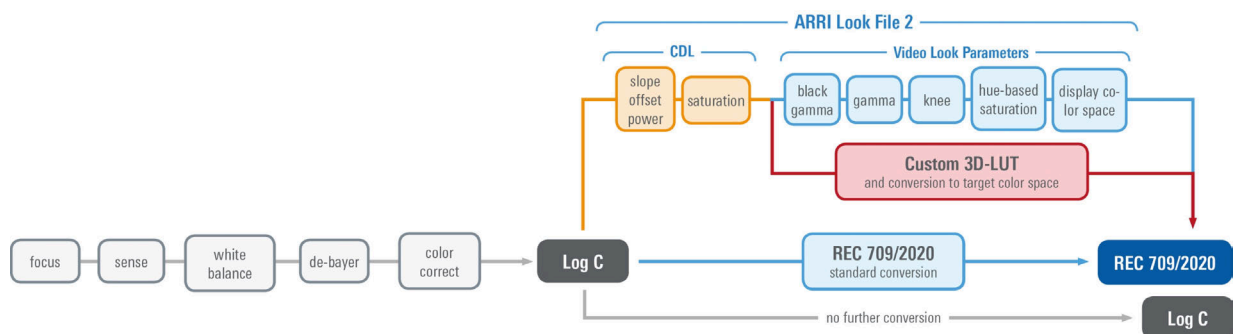
## ARRI Look File 2

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 [Technical Downloads](#) 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
<b>ARRI 709</b>	Renders the video image according to the ITU-R-BT709 standard, for most accurate color reproduction on standard broadcast monitors.
<b>ALEXA Classic 709</b>	Matches the color reproduction of ALEXA Mini LF to the ARRI ALEXA.
<b>ARRI 2100 HLG 1K 200</b>	HDR look file. Renders an image for a HLG (Hybrid Log Gamma, ITU-R BT.2100) monitor. It is assumed that the monitor has maximum luminance of 1000 cd/m <sup>2</sup> . In this case, the image will look the same as when the PQ look is used with a PQ monitor.
<b>ARRI 2100 PQ 1K 200</b>	HDR look file. Renders an image for a PQ (SMPTE 2084, ITU-R BT.2100) monitor. The maximum luminance is 1000 cd/m <sup>2</sup> , which is a PQ level of 75%. The diffuse scene white (2.5 stops above the gray card) will appear with a luminance of 200 cd/m <sup>2</sup> .
<b>Commercial</b>	Renders the image brighter for smoother skin tones.
<b>Landscape</b>	Applies a steeper contrast curve to the image.
<b>LCC 709</b>	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.
<b>TV-neutral</b>	An ARRI 709 like look, which is more saturated in colors with slightly lower blacks.
<b>TV-warm</b>	Same as TV neutral, just with a slightly warmer look overall.
<b>Vibrant</b>	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.

- ▶ Select *MENU > Image > Look*.
- ▶ Select and set a look from the list or [import](#) a custom look.

## Playback and ARRI Look File 2 files

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

### LogC3

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).

### VF and SDI Processing

- ▶ Select *MENU > Image > Look Configuration > VF Processing* to set the processing for the EVF and the Monitor.
- ▶ Select *MENU > Image > Look Configuration > SDI 1 Processing* to set the processing for the SDI 1 output.
- ▶ Select *MENU > Image > Look Configuration > SDI 2 Processing* to set the processing for the SDI 2 output.

Following options are available:

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



The applied processing is indicated by the processing icon in the status information of the respective output.



User Buttons *VF Check Log C* and *SDI Check Log C* support to temporarily switch processing to LogC.

## Configuration of SDI Color Space

- ▶ Select *MENU > Image > Look Configuration > SDI 1 Color Space* to set the color space for the SDI 1 output.
- ▶ Select *MENU > Image > Look Configuration > SDI 2 Color Space* to set the color space for the SDI 2 output.

Following options are available:

### **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.

## 15.2 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 [Technical Downloads](#) section on the ARRI website.

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

**Info:** 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.

## 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.

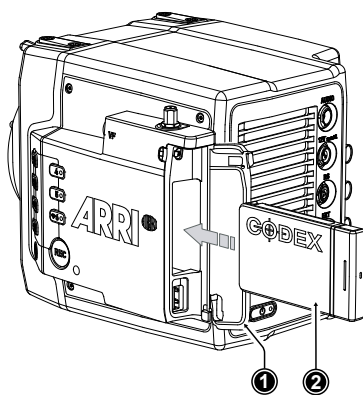
Compact Drives are currently available with 1 TB (960 GB usable) and 2 TB (1920 GB usable) capacity. The 2 TB drive offers about double speed for all ARRIRAW formats on ALEXA 35. There is no advantage other than capacity for the ALEXA Mini LF. At 24 fps ARRIRAW 4.6K 3:2 Open Gate, the recording time 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



- ▶ To access the media slot, slide the media door release towards the camera back so that the spring loaded door (1) jumps open.
- ▶ 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.
- ▶ 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.

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

### Erasing the Recording Medium

#### ADVICE

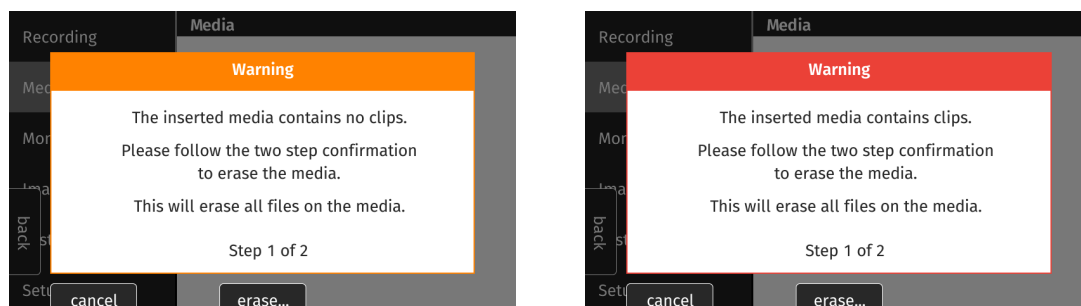
When erasing the recording medium, all data is completely erased and cannot be recovered afterwards. Make sure that all data has been copied from the medium before erasing.

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*.



The camera informs you whether there are clips on the medium (red dialogue) or not (orange dialogue). This information only refers to clips that were recorded with an ALEXA 35 or an ALEXA Mini LF, but not to other files that the user has saved on the medium.

- Press *ERASE* twice to start erasing the medium, or press *CANCEL* 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. <b>Info:</b> 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 <i>MENU &gt; Alerts</i> 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.

## 16.2 Recording Codec

### 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, video and metadata 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.

### ARRIRAW

ARRIRAW data delivers unencrypted, uncompressed and uncompromised image quality. It offers the highest achievable resolution, the camera's natural color response and 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 ARRI Imaging SDK only, which is implemented in the ARRI Reference Tool (ART) and most of the major post production tools for dailies processing and mastering.

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 the ARRI Reference Tool, 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. Note that during the download from the Compact Drive to a computer or afterwards it is possible to reduce the size of ARRIRAW files by up to 40% using Codex High Density Encoding (HDE) technology with the ARRIRAW HDE Transcoder app.

### 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.

**Info:** Apple ProRes is a variable bit rate (VBR) codec. Depending on the content of your images the remaining recording time on the recording media can be shorter or longer than indicated by the camera.

- Select *Menu > Recording > Recording Codec* to set the desired recording codec.

Following options are available:

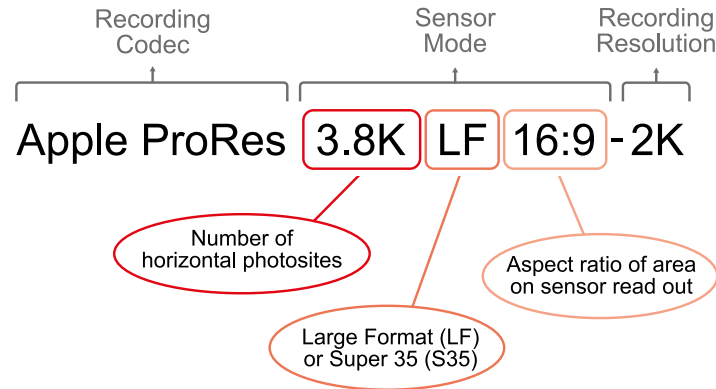
<b>Apple ProRes 422 HQ</b>	10bit YCbCr	Use for high quality TV production. Suitable for creative color correction.
<b>Apple ProRes 4444</b>	12-bit LogC4 YCbCr	Use for high quality TV and cinema production. Very suitable for creative color correction and visual effects work such as pulling mattes.
<b>Apple ProRes 4444 XQ</b>	12-bit LogC4 YCbCr	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.
<b>ARRIRAW</b>	12bit log	Use for cinema production, visual effects and high quality TV. It is the best format for creative color correction, visual effects work and archiving.

**Info:** Changing between ARRIRAW and Apple ProRes may require a camera reboot.



## 16.3 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

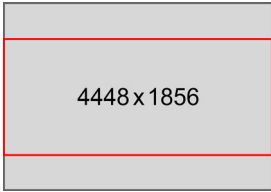
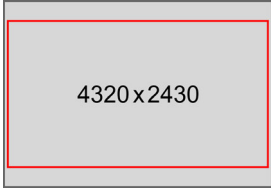
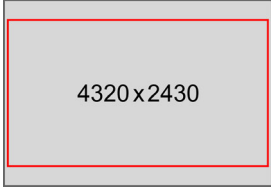
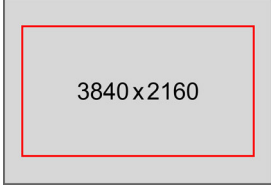
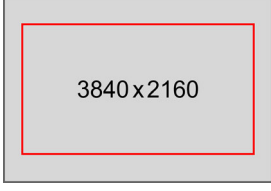
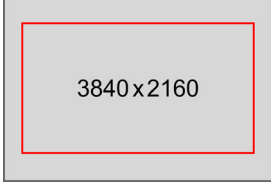
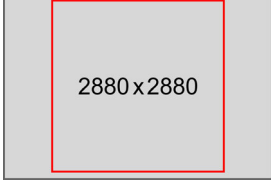

Recording File Container Size shows the resolution of the file that is being recorded in camera. Sometimes, as in *ARRIRAW 3.4K S35 3:2 - 3.4K*, the number of photosites read from the sensor and the number of pixels recorded are the same (here 3.4K), so no in-camera processing has been applied. In other 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	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	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	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	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	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"	4448 x 3096	4480 x 3096 (Clip padding: 16px left and right)	0.75 - 40 fps

<b>4.5K LF 2.39:1 - 4.5K</b>	36.70 x 15.31 mm 1.445 x 0.603"		4480 x 1856 (Clip padding: 16px left and right)	0.75 - 60 fps
<b>4.3K LF 16:9 - UHD</b>	35.64 x 20.05 mm 1.403 x 0.789"		3840 x 2160	0.75 - 48 fps
<b>4.3K LF 16:9 - HD</b>	35.64 x 20.05 mm 1.403 x 0.789"		1920 x 1080	0.75 - 75 fps
<b>3.8K LF 16:9 - UHD</b>	31.68 x 17.82 mm 1.247 x 0.702"		3840 x 2160	0.75 - 60 fps
<b>3.8K LF 16:9 - 2K</b>	31.68 x 17.82 mm 1.247 x 0.702"		2048 x 1152	0.75 - 90 fps
<b>3.8K LF 16:9 - HD</b>	31.68 x 17.82 mm 1.247 x 0.702"		1920 x 1080	0.75 - 90 fps
<b>2.8K LF 1:1 - 2.8K</b>	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
<b>3.2K S35 16:9 - 3.2K</b>	26.40 x 14.85 mm 1.039 x 0.585"		3200 x 1800	0.75 - 75 fps

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

- Select *Menu > Recording > Recording Resolution*.
- Select the desired recording resolution.

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

**Info:** Changing between recording resolutions may require a software reload. 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.

## 16.4 Starting Recording

The camera supports various ways to start and stop recording. Recording can be started and stopped by

- The *REC* button on the camera body, the MVF-2 and ARRI hand units such as the WCU-4 and Hi-5
- The Camera Companion App
- The Remote Switch RS-4, connected to the camera's RS connector
- Through WiFi / Ethernet, using the Web Remote or applications communicating via CAP (Camera Access Protocol)



User button *Record Start/Stop* supports to start and stop recording.

User buttons can be assigned to e.g. the ARRI Master Grips, the Operator Control Unit OCU-1 and the General Purpose I/O Box

Starting recording returns the MVF-2 to the HOME screen and disables access to sensor fps, timecode, shutter, playback and most menu settings.

## 16.5 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:

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

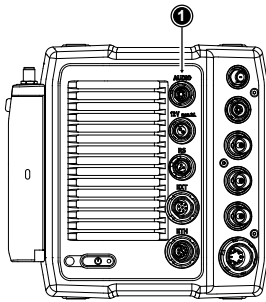
The reel counter should be set to 001 at the beginning of a shoot. The camera will then automatically advance the reel number each time a new recording medium is loaded into the camera, formatted and recorded on. If a previously recorded medium is reloaded in the camera (comparable to a short end of 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.

## 16.6 Audio Recording

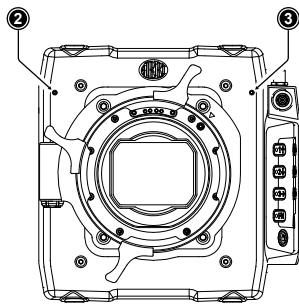
The camera supports to record up to 4 channels of linear PCM audio (24 bit, 48 kHz).

### 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.

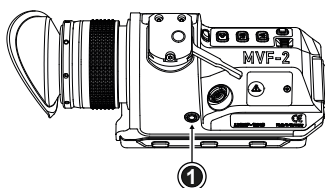
Signals connected to the AUDIO connector are recorded to audio channels 1 and 2.



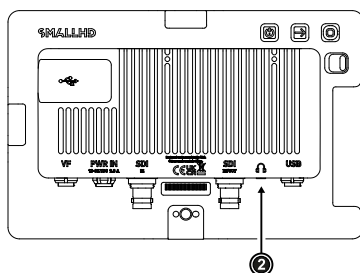
The dual gain built-in microphones (2=right mic, 3=left mic) are located at the camera front and can be used to record a scratch audio track. The audio signal from these microphones is recorded to audio channels 3 (left mic) and 4 (right mic) of the recorded clips. Per factory default, the built-in microphones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

### Audio Outputs

Active audio channels are embedded with a 1 to 1 channel mapping in the SDI stream and also output via the headphone output of the MVF-2.



The headphones out (1) on the MVF-2 is a 3.5 mm TRS connector (headphone jack) which outputs all four audio channels with a maximum power of 2.5 dBm. The camera's headphone routing allows configuring which channels are output on the connector.



The headphones out (2) on the CCM-1 is a 3.5 mm TRS connector (headphone jack) which outputs all four audio channels with a maximum power of 2.5 dBm. The camera's headphone routing allows configuring which channels are output on the connector.

## Activation of Audio Recording

- Select *MENU > Recording > Audio Recording > Audio Recording* to enable/disable audio recording. Enabled audio recording is indicated through the audio meters displayed on the HOME screen as well as in the Status Info. The meters show the current level of the channel signal in dBFS. Audio recording is temporarily disabled if the frame rate of the sensor does not match the frame rate of the project.

## Setting the Channel Control

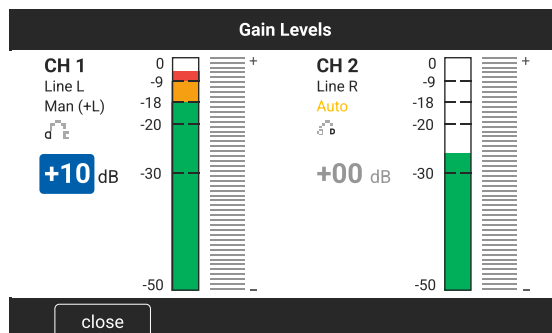
- Select *MENU > Recording > Audio Recording > Channel 1/2 Control*

Following options are available:

<b>Manual Gain</b>	Allows the user to manually adjust the gain of the input signal on the channel to reach a desired level.
<b>Manual Gain + Limiter</b>	A limiter prevents the signal from clipping if the input signal level combined with the set gain results in signal levels exceeding -6 dBFS.
<b>Auto Gain</b>	Matches a 0 dBu input signal to -6 dBFS. This setting leaves enough headroom for recording and avoids audio clipping. Audio levels can not be adjusted by the user.

## Gain Adjustment

- Select *MENU > Recording > Audio Recording > Gain Levels*



- Rotate the jogwheel or use the touch slider to set the gain of the first channel. Then press the jog wheel to move to the next channel or tap a channel to select it. The blue cursor indicates the selected channel.
- Press *CLOSE* to save the changes and exit the screen.

**Info:** Gain adjustment is not available for channels which use Auto Gain control.

## 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

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

## Reference Tone

A 1 kHz sine reference tone can be output on the SDI outputs and the headphone outputs of MVF-2. If a recording is started during this time, the test tone is also recorded in all active audio channels of the clip.

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

Following options are available:

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

**Info:** The reference tone can only be activated when audio recording is enabled.



User Buttons *Audio Ch1 Increase / Decrease* and *Audio Ch 1+2 Increase / Decrease* support to quickly adjust gain of channels 1 and 2.

## 16.7 Rec Beeper and Tally

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

Following options are available:

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

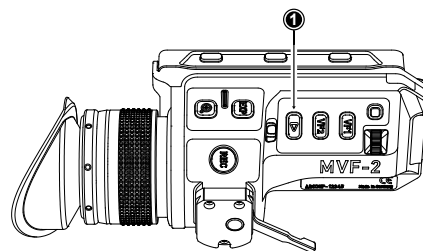


## 17 Playback

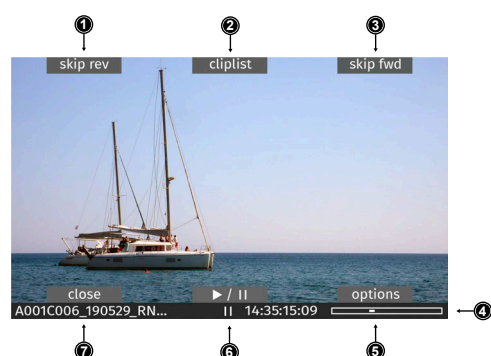
In-camera playback plays back the clips on the recording media at their project frame rate and is output to EVF, Monitor, SDI 1 and SDI 2. Playback can be controlled from a variety of locations such as the MVF-2, the Web Remote, the Camera Companion App or hand units such as the Hi5.

### Playback Control via MVF-2

- ▶ Press and hold the *PLAY* button (1) of the MVF-2 for one second to start playback.
- ▶ Toggle between play and pause by briefly pressing the *PLAY* button.
- ▶ To exit playback press and hold the *PLAY* button for one second.



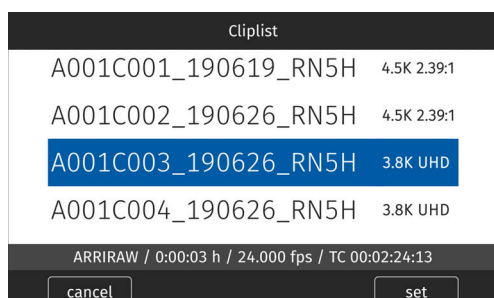
The playback screen of the MVF-2 offers the following controls:



- |   |                     |  |
|---|---------------------|--|
| 1 | <i>Skip reverse</i> | Loads the previous clip from the cliplist.   |
| 2 | <i>Cliplist</i>     | Select another clip for playback from a list of all clips on the recording medium. |
| 3 | <i>Skip forward</i> | Loads the next clip from the cliplist.   |
| 4 | <i>Status Bar</i>   | Shows clip name, timecode and playback progress bar of the selected clip.          |
| 5 | <i>Options</i>      | Allows setting the clip end action.  |
| 6 | <i>Play/pause</i>   | Toggles between play and pause.  |
| 7 | <i>Close</i>        | Exits playback.  |

Play/pause can also be toggled by pressing the *PLAY* button on the MVF-2 or by pressing the jogwheel. While playback is paused, rotate the jogwheel to scroll through the clip frame by frame. During playback, you can use the jogwheel to increase or decrease the playback speed by up to 512x forward or backward.

The cliplist lists all clips contained on the recording medium:



- ▶ Start Playback and select CLIPLIST
- ▶ Rotate the jogwheel to select a clip:  
The first frame of the selected clip is displayed on all monitoring outputs for preview. The clip's properties are displayed in the status bar on the bottom.
- ▶ Press the jogwheel or the *SET* button to play the clip, press *CANCEL* to return to the playback screen.

**Info:** 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.

The Play End Mode defines the behavior when playback reaches the end of a clip.

- Select *PLAY > Options*.

Following options are available:

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



User Button *Playback* supports to start and exit playback.

User Button *Check Last Clip* plays the last five seconds of the last recorded clip.

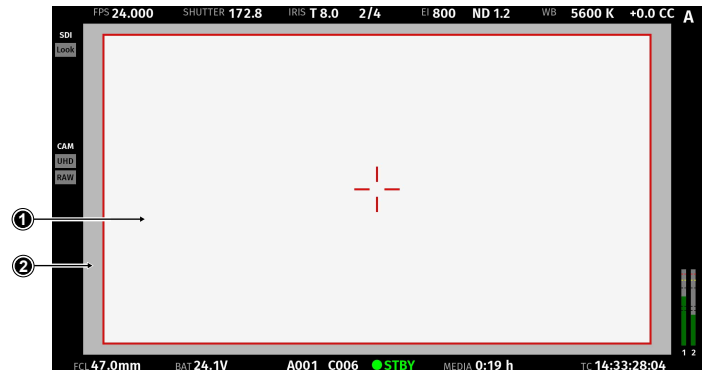
#### ATTENTION

Playback does not apply the look file that is stored in the clip metadata. Instead, the currently set look file is used during playback.

# 18 Monitoring

## 18.1 Surround View

Surround View displays additional pixels outside the captured image area (1), allowing the operator to see outside the captured image and keep unwanted objects, such as microphone booms, out of the shot. The Surround View area (2) is separated from the captured image area by the Surround Mask (here: 75% Mask). To view only the captured image, Surround View can be switched off.



- ▶ Select *MENU > Monitoring > VF > Surround View* to enable or disable surround view on EVF and Monitor.
- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Surround View* to enable or disable surround view on the SDI outputs.

**Info:** Surround View is not available for recording resolutions *4.5K LF 3:2 Open Gate - 4.5K, 2.8K LF 1:1 - 2.8K* and *2.8K S35 4:3 - 2.8K*.



User Buttons *VF Surround View* and *SDI Surround View* support to quickly set the surround view of the respective output.

### Surround Mask

The Surround Mask helps to visually separate the Surround View area from the captured image area.

- ▶ Select *MENU > Monitoring > VF > EVF Surround Mask* to configure Surround Mask for the EVF.
- ▶ Select *MENU > Monitoring > VF > Monitor Surround Mask* to configure Surround Mask for the Monitor.
- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Surround Mask* to configure Surround Mask for the SDI outputs.

Following options are available:

<b>Black Line</b>	Surround View area is separated from the captured image by a black line.
<b>Colored Line</b>	Surround View area is separated from the captured image by a colored line (same color as frame lines).
<b>25% Mask</b>	Surround View area is separated from the captured image by a mask with 25% opacity.
<b>50% Mask</b>	Surround View area is separated from the captured image by a mask with 50% opacity.
<b>75% Mask</b>	Surround View area is separated from the captured image by a mask with 75% opacity.
<b>100% Mask</b>	Surround View area is separated from the captured image by a mask with 100% opacity.

**Info:** *Monitor Surround Mask* does not support *25% Mask* and *75% Mask*.

## 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).

- ▶ Select *MENU > Monitoring > VF > Frame Border* to configure Frame Border for the EVF.
- Select *MENU > Monitoring > SDI > SDI Processing > Frame Border* to configure Frame Border for the SDI outputs.

## 18.2 Magnification




When shooting with frame lines or aspect ratios that only use a cropped area of a sensor mode the actual image content defined by the frame line might not be displayed large enough. The magnification setting gives the user access to a variable 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 VF and the SDI outputs, individually or globally.



Two screen shots from an ALEXA 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%).

- ▶ Select *MENU > Monitoring > Master Magnification* to set the magnification level for the VF outputs and the SDI outputs simultaneously.
- 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 > VF > Magnification* to set the magnification level for the EVF and the Monitor.
- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Magnification* to set the magnification level for the SDI outputs.

The magnification icon on the left side of the Status Info indicates where the recorded area exceeds the displayed image:

-  Indication that the recorded image content horizontally (left and right) extends beyond what is visible on the output.
-  Indication that the recorded image content vertically (above and below) extends beyond what is visible on the output.
-  Indication that the recorded image content horizontally and vertically extends beyond what is visible on the output.

**Info:**

Magnification can only be applied on the SDI output(s) with *SDI Image* set to *Processed*.

Magnification is not available when using 2K or HD Recording Resolutions.

Magnification is reset to 100% when Recording Resolution is changed.

## 18.3 Frame Lines

To aid in framing, the camera offers to display frame lines overlaid over the live 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 opacity). 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 online [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 sensor mode.

### Setting the Frame Line

- ▶ Select *MENU > Monitoring > Frame Lines > Frame Line*.
- ▶ Select a frame line from the list or [add](#) a custom frame line from an inserted USB medium or the defaults list.

**Info:** Frame lines can be only loaded if their aspect ratio matches the aspect ratio of the set recording resolution.

### Setting the Center Mark

As already common for ground glasses for film cameras, the camera offers to display a center mark on each monitoring output.

- ▶ Select *MENU > Monitoring > VF > EVF Overlays > Center Mark* to configure the center mark for the EVF.
- ▶ Select *MENU > Monitoring > VF > Monitor Overlays > Center Mark* to configure the center mark for the Monitor.
- ▶ Select *MENU > Monitoring > SDI > SDI Processing > Overlays* to configure the center mark for the SDI outputs.

Following options are available:

<b>Off</b>	Center mark is switched off.
<b>Dot</b>	Center mark is displayed as a dot.
<b>Dot Small</b>	Center mark is displayed as a small dot.
<b>Cross</b>	Center mark is displayed as a cross.
<b>Cross Small</b>	Center mark is displayed as a small cross.

### Application of Frame Lines and Center Mark on Monitoring Outputs

For each monitoring output the camera offers to enable/disable display of frame lines and center mark.

- ▶ Select *MENU > Monitoring > VF > EVF Overlays > Frame Lines* to toggle display of frame lines and center mark on the EVF.
- ▶ Select *MENU > Monitoring > VF > Monitor Overlays > Frame Lines* to toggle display of frame lines and center mark on the Monitor.

- Select *MENU > Monitoring > SDI > SDI Processing > Overlays > Frame Lines* to toggle display of frame lines and center mark on the SDI outputs.



User Buttons *VF Frame Lines* and *SDI Frame Lines* support to quickly enable/disable display of frame lines for the corresponding output.

### Frame Line Color

The Frame Line Color setting defines the color of the frame line(s), the Center Mark, the User Rectangle(s) and the Surround Mask (if Surround Mask is set to *Colored Line*).

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

Following options are available:

**Red      Green      Blue      Cyan      Magenta      Yellow      Black      White**

### Frame Line Opacity

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

- Select *MENU > Monitoring > Frame Lines > Frame Line Opacity*
- Set the frame line opacity in a range from **1** (the lowest opacity) to **4** (the highest opacity).

### Outside Shading

The Outside Shading setting applies shading to the area between the frame line(s) and the remaining captured image area and can be set independently for each image output. When changing the Outside Shading of an output, the output's Surround Mask is adapted accordingly.

- Select *MENU > Monitoring > Frame Lines > Outside Shading*.

Following options are available:

<b><i>EVF Outside Shading</i></b>	Set the outside shading for the EVF (Off, 25%, 50%, 75%, 100%).
<b><i>Monitor Outside Shading</i></b>	Set the outside shading for the Monitor (Off, 50%, 100%).
<b><i>SDI Outside Shading</i></b>	Set the outside shading for the SDI outputs (Off, 25%, 50%, 75%, 100%).

### User Rectangles

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

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

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

Following options are available:

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

- Select *MENU > Monitoring > Frame Lines > User Rectangles > User Rectangle 1* or *User Rectangle 2*.

Following options are available:

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

### Frame Lines in Metadata

The camera stores the frame lines of the active frame line file in the clip metadata and also makes them available in the SDI stream. Thus, the camera's original frame lines are made available in post production for editing, color correction or compositing tools and can be displayed as an overlay in the respective image viewer.

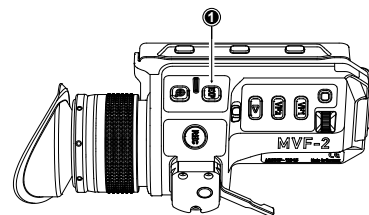
## 18.4 Exposure Tools

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 *VF Exposure Tool* (for EVF and Monitor)
- ▶ a user button assigned with *SDI Exposure Tool* (for the SDI outputs)

### 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

- ▶ Assign a user button with *VF Exposure Tool* to be used for activation of the exposure tool on EVF and Monitor.
- ▶ Assign a user button with *SDI Exposure Tool* to be used for activation of the exposure tool on the SDI outputs.
- ▶ Press the user button to toggle the exposure tool on/off.

### 18.4.1 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 > VF Exposure Tool* and select *False Color* to use False Color as exposure tool for EVF and Monitor.
- Select *MENU > Monitoring > Exposure Tools > SDI Exposure 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.



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

### Zebra Setup

- ▶ Select *MENU > Monitoring > Exposure Tools > Zebra Setup*.

Following options are available:

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

- ▶ Adjust the Zebra settings to your preference.

**Info:** *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.

## 18.5 Peaking

Peaking highlights in-focus areas for better focus control.

### Peaking Mode

- ▶ Select *MENU > Monitoring > Peaking > VF Peaking Mode* to set the preferred peaking mode for EVF and Monitor.
- ▶ Select *MENU > Monitoring > Peaking > SDI Peaking Mode* to set the preferred peaking mode for the SDI outputs.

Following options are available:

<b>Color</b>	Color peaking overlays in-focus areas with a selected color.
<b>Aperture</b>	Aperture peaking enhances object edges only.

### Peaking Level

- ▶ Select *MENU > Monitoring > Peaking > VF Peaking Level* to set the peaking strength for EVF and Monitor.
- ▶ Select *MENU > Monitoring > Peaking > SDI Peaking Level* to set the peaking strength for the SDI outputs.
- ▶ Set the peaking level from **1** (the minimum strength) to **20** (the maximum strength).

### Offset Shift

The peaking offset shift sets the threshold for Color Peaking to become active, relative to the peaking level.

- ▶ Select *MENU > Monitoring > Peaking > VF Peaking Offset Shift* to set the peaking offset for EVF and Monitor.
- ▶ Select *MENU > Monitoring > Peaking > SDI Peaking Offset Shift* to set the peaking offset for the SDI outputs.
- ▶ Set the offset shift from **-5** (the minimum) to **+5** (the maximum).

### Color

Select the color for Color Peaking.

- ▶ Select *MENU > Monitoring > Peaking > VF Peaking Color* to set the color for color peaking on EVF and Monitor.
- ▶ Select *MENU > Monitoring > Peaking > SDI Peaking Color* to set the color for color peaking on the SDI outputs.

Following options are available:

<b>Red</b>	<b>Cyan</b>	<b>White</b>
<b>Green</b>	<b>Magenta</b>	
<b>Blue</b>	<b>Yellow</b>	

### Activation of Peaking



User Buttons *VF Peaking* and *SDI Peaking* support to quickly enable/disable peaking on the respective output.



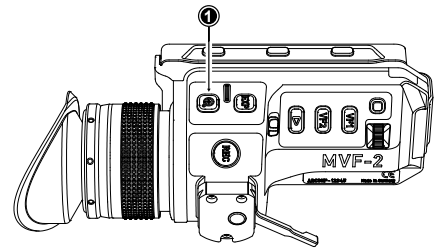
Active peaking is indicated through the peaking icon displayed in the Status Info of the respective output.

## 18.6 Zoom

The camera supports to zoom into the image e.g. to better judge focus. Zoom is essentially a shortcut to quickly achieve maximum Magnification. The camera offers six zoom positions: center, top left, top center, top right, bottom right and bottom left. While Zoom is activated, the zoom position can be changed by using the jogwheel, the soft buttons on the MVF-2 (if the Monitor is flipped out and set to display the live image) or through user buttons. Active Zoom is indicated by an orange frame around the image. Frame lines and anamorphic desqueeze are temporarily deactivated while Zoom is active.

- ▶ Press the **ZOOM** button to activate/deactivate Zoom on EVF and Monitor.
- ▶ To change the Zoom position, rotate either the jog-wheel or the user wheel.

**Info:** 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.



User Button *VF Zoom* supports to quickly enable/disable zoom for EVF and Monitor.

### 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:

- ▶ Select *MENU > User Buttons* and assign *SDI Zoom* to the desired button.  
The user button activates/deactivates Zoom on the SDI outputs.
- ▶ Select *MENU > User Buttons* and assign *SDI Zoom Position* to the desired button.  
While Zoom is activated, the user button changes the Zoom position on the SDI outputs.
- ▶ Select *MENU > User Buttons* and assign *SDI Zoom (Smart)* to the desired button.  
The user button activates Zoom on the first button press, further button presses change the zoom position and a button long press deactivates Zoom.

**Info:** Zoom is not available when using 2K or HD recording resolutions.

**Info:** Zoom always refers to the entire image area of the set sensor mode and does not take into account any set Magnification.

## 18.7 SDI Settings

### SDI Image

The setting for the SDI image determines whether the SDI image is output as a clean feed or including status information and status overlays.

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

Following options are available:

<b>Clean</b>	Image is output as a clean feed. Neither status overlays, frame lines nor surround view are displayed. Magnification is not supported.
<b>Processed</b>	Image may include status information and overlays.

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

SDI 1	SDI 2
processed	clean
processed	processed
clean	clean

### SDI 2 Clone

SDI 2 can be configured to be 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*.

### 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.

- ▶ Select *MENU > Monitoring > SDI > SDI 1 Format* to set the format of the SDI 1 output.
- ▶ Select *MENU > Monitoring > SDI > SDI 2 Format* to set the format of the SDI 2 output.

Following options are available:

<b>422 1.5G HD</b>	Images are output according to SMPTE 292M. Available frame rates are 23.976p/psf, 24p/psf, 25p/psf, 29.97p/psf and 30p/psf p (progressive) transmits images line by line starting at the top left pixel. psf (progressive segmented frame) splits progressive images into fields (odd lines and even lines) and transmits these (all odd before all even) line by line.
<b>422 3G HD</b>	Images are output according to SMPTE ST 424:2012 Available frame rates are 48p, 50p, 59.94p and 60p
<b>444 3G HD</b>	Images are output according to SMPTE ST 424:2012 Available frame rates are 23.976p, 24p, 25p, 29.97p and 30p

**422 6G UHD**

Images are output according to SMPTE ST 2081-10:2015

Available frame rates are 23.976p, 24p, 25p, 29.97p and 30p

Available for SDI 2 only and not available when using LF 16:9 HD or LF 16:9 2K recording resolution.

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

**SDI Frame Rate**

The SDI frame rate determines the number of images that are output per second on the SDI output(s). It should be set equal to the sensor frame rate. If the frame rate is lower than the sensor frame rate, frame drops will occur. If it is higher, duplicate images will be output. The available SDI frame rates depend on the selected SDI format.

- ▶ Select *MENU > Monitoring > SDI > SDI 1 Frame Rate* to set the frame rate of the SDI 1 output.
- ▶ Select *MENU > Monitoring > SDI > SDI 2 Frame Rate* to set the frame rate of the SDI 2 output.

**SDI 3G Level**

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

- ▶ Select *MENU > Monitoring > SDI > SDI 1 3G Level* to set the 3G level for the SDI 1 output.
- ▶ Select *MENU > Monitoring > SDI > SDI 2 3G Level* to set the 3G level for the SDI 2 output.

## 18.8 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 switched off.

**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 and Flip-out Monitor Settings

### EVF Brightness

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

- Select *MENU > Monitoring > VF > Settings > EVF Brightness* to set the brightness of the viewfinder OLED between **120**, **200** or **300**.

### EVF Power

- Select *MENU > Monitoring > VF > Settings > EVF Power*

Following Options are available:

<b>Auto</b>	EVF display is activated and deactivated automatically, depending on the MVF-2 proximity sensor state. This is the default setting.
<b>Off</b>	Deactivates the EVF display permanently so that it remains switched off even when the proximity sensor is covered e.g. by a rain cover.
<b>On</b>	Use this setting to override the MVF-2 proximity sensor and to constantly enable the EVF 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 EVF 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 viewfinder is equipped with a built-in eyepiece heater to prevent fogging of the eyepiece when shooting in cold environments. The eyepiece heater 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.

- Select *MENU > Monitoring > VF > Settings > EVF Eyepiece Heating* to enable/disable EVF eyepiece heating.



Active eyepiece heating is indicated through an icon displayed on the HOME screen. The icon is displayed gray if eyepiece heating is inactive.

### EVF Image Rotation 180°

When mounting the MVF-2 on the right side of the camera, the EVF image can be rotated by 180° for correct orientation.

- Select *MENU > Monitoring > VF > Settings > EVF Image Rotation 180°* to enable/disable the rotation.

### Monitor Brightness

- Select *MENU > Monitoring > VF > Settings > Monitor Brightness*

to adjust the brightness of the MVF-2 flip-out monitor from **1** (the minimum brightness) to **10** (the maximum brightness).

### Monitor Flip Mode

- Select *MENU > Monitoring > VF > Settings > Monitor Flip Mode*

Following options are available:

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



User Button *Flip Monitor* supports to quickly set the Monitor flip mode.

## 18.10 SDI 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 ALF4 look file. These are SDR color bars, set the SDI color space to either Rec 709 (SDR) or Rec 2020 (SDR) for correct display.

- Select *MENU > Monitoring > SDI Color Bars* to switch color bars on or off.

**Info:** Color bars are switched off when recording is started.

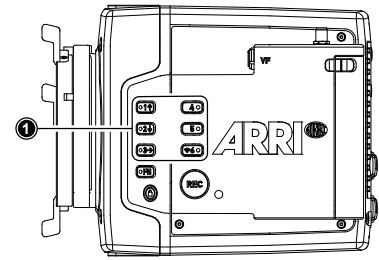


User Button *SDI Color Bars* supports to quickly enable/disable color bars on the SDI outputs.

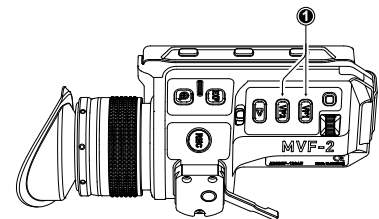


## 19 User Buttons

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.



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



### ► Select *MENU > User Buttons >*

#### *Camera User Buttons*

to assign the camera user buttons (1-8).

**Info:** Camera user buttons 7 and 8 can only be triggered using the [Web Remote](#).

#### *MVF-2 User Buttons*

to assign the MVF-2 user buttons (VF 1 & VF 2).

#### *Monitor User Buttons*

to assign the user buttons on the CCM-1 (1-4).

#### *Hand Unit User Buttons*

to assign the user buttons of HI-5 and WCU-4 (1-6).

#### *LBUS Device User Buttons*

to assign the user buttons of ECS devices like the ARRI Master Grips and the OCU-1 (1-12).

#### *GPIO User Buttons*

to assign the user buttons of the GPIO Box (1-14).

#### *Lens RET*

to assign the RET button of an ENG lens servo.

Following user button functions are available:

<b>Off</b>	Disables the user button.
<b>VF Status Info</b>	Toggles display of EVF status info between <i>Safe</i> , <i>Off</i> and <i>Overlay</i> .
<b>VF Check Log C</b>	Temporarily set EVF/Monitor processing to Log C. Supports smart behaviour.
<b>VF Desqueeze</b>	Toggles anamorphic desqueeze on EVF and Monitor on/off.
<b>VF Exposure Tool</b>	Switches the exposure tool on or off on EVF and Monitor. Supports smart behavior.
<b>VF Frame Lines</b>	Switches frame lines on or off on EVF and Monitor. Supports smart behavior.
<b>VF Peaking</b>	Switches peaking on or off on EVF and Monitor. Supports smart behavior.
<b>VF Surround View</b>	Switches surround view on or off on EVF and Monitor. Supports smart behavior.
<b>VF Zebra/FC</b>	Toggles the exposure tool for EVF and Monitor between Zebra and False Color.
<b>VF Zoom</b>	Switches the viewfinder zoom function on or off. Supports smart behavior.

<b>Flip Monitor</b>	Toggles the Monitor between normal and flipped mode. To return to automatic operation, press and hold the user button for two seconds.
<b>SDI Check Log C</b>	Temporarily set SDI processing to Log C. Supports smart behaviour.
<b>SDI Desqueeze</b>	Toggles anamorphic desqueeze on the SDI outputs on/off.
<b>SDI Exposure Tool</b>	Switches the exposure tool on or off on the SDI outputs. Supports smart behavior.
<b>SDI Frame Lines</b>	Switches frame lines on or off on the SDI outputs. Supports smart behavior.
<b>SDI Peaking</b>	Switches peaking on or off on the SDI outputs. Supports smart behavior.
<b>SDI Status info</b>	Toggles SDI status info between <i>Safe</i> , <i>Overlay</i> and <i>Off</i>
<b>SDI Surround View</b>	Switches surround view on the SDI outputs on or off. Supports smart behavior.
<b>SDI Zebra/FC</b>	Toggles the exposure tool for the SDI outputs between Zebra and False Color.
<b>SDI Zoom</b>	Switches the SDI zoom function on or off. Supports smart behavior.
<b>SDI Zoom Position</b>	Toggles the SDI zoom position.
<b>SDI Zoom (smart)</b>	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.
<b>SDI Color Bars</b>	Turns color bar on or off. Activation works only during Stby.
<b>EI Increase</b>	Selects the next value from the EI (exposure index) list.
<b>EI Decrease</b>	Selects the previous value from the EI (exposure index) list.
<b>FPS Increase</b>	Selects the next value from the FPS list.
<b>FPS Decrease</b>	Selects the previous value from the FPS list.
<b>ND Increase</b>	Selects the next value from the ND list.
<b>ND Decrease</b>	Selects the previous value from the ND list.
<b>Shutter Increase</b>	Selects the next value from the Shutter list.
<b>Shutter Decrease</b>	Selects the previous value from the Shutter list.
<b>WB Increase</b>	Selects the next value from the WB list. <b>Info:</b> User button skips the Auto WB entry of the WB list.
<b>WB Decrease</b>	Selects the previous value from the WB list. <b>Info:</b> User button skips the Auto WB entry of the WB list.
<b>Button FN</b>	Behaves identically to FN button on camera body. <b>Info:</b> Only available for GPIO box and Master Grip user buttons.
<b>Button 1 to Button 3</b>	Behaves identically to button 1, button 2 or button 3 on camera body. <b>Info:</b> Only available for GPIO box and Master Grip user buttons.
<b>Audio Ch1 Increase</b>	Increases gain of audio channel 1 in 1dB steps. <b>Info:</b> User button is only functional with channel 1 control set either to <i>Manual</i> or <i>Manual (+L)</i> .

<b>Audio Ch1 Decrease</b>	Decreases gain of audio channel 1 in 1dB steps. <b>Info:</b> User button is only functional with channel 1 control set either to <i>Manual</i> or <i>Manual (+L)</i> .
<b>Audio Ch1+2 Increase</b>	Increases gain of audio channels 1+2 simultaneously in 1dB steps. <b>Info:</b> User button is only functional with channel 1 and channel 2 control set either to <i>Manual</i> or <i>Manual (+L)</i> .
<b>Audio Ch1+2 Decrease</b>	Decreases gain of audio channels 1+2 simultaneously in 1dB steps. <b>Info:</b> User button is only functional with channel 1 and channel 2 control set either to <i>Manual</i> or <i>Manual (+L)</i> .
<b>Auto WB</b>	First press arms auto white balance for one second, second press triggers AWB.
<b>Check Last Clip</b>	Plays the last five seconds of the last recorded clip.
<b>Frame Grab</b>	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.

**Info:** 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):

Recording Resolution	Grab Resolution (SDI=HD)	Grab Resolution (SDI=UHD)
LF Open Gate 4.5K	1547 x 1076	3094 x 2153
LF 2.39:1	1906 x 795	3812 x 1590
LF 16:9 UHD/HD/2K	1920 x 1080	3840 x 2160

<b>Frame Line Color</b>	Changes the frame line color.
<b>Overlay Menu</b>	Activates or deactivates the overlay menu on MVF-2 EVF, monitor and SDI (when SDI processing is activated).
<b>Playback</b>	Behaves identically to the <i>PLAY</i> button on MVF-2.
<b>Record Start/Stop</b>	Behaves identically to the <i>REC</i> button.
<b>WiFi Power</b>	Toggles WiFi power On and Off.
<b>Iris Auto</b>	Only for use with EF lenses. Triggers automatic iris.
<b>Iris Close</b>	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.
<b>Iris Open</b>	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.

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.


## 20 Synchronization


The camera's sensor and SDI outputs can be synchronized to either a genlock signal (a tri-level HD signal or an analog black burst signal) present at the BNC SYNC IN connector or a timecode signal present at the 5-pin LEMO TC connector. The camera's sensor needs to run at equal or double the frame rate of the reference signal to establish synchronization.

- Select *MENU > System > Sensor > Genlock Sync*.

Following options are available:

<b>Off</b>	Synchronization is not enabled.
<b>Sync In</b>	The camera will synchronize to a tri-level or black burst signal present at the SYNC IN connector.
<b>Timecode</b>	The camera will synchronize to timecode present at the TC connector.

 Active synchronization is indicated by the Genlock icon on the HOME screen and in the Status Info. The icon turns orange when the camera cannot synchronize to the reference signal or when no signal is present. See *MENU > Alerts* for detailed information.



**Info:** Simultaneous use of the timecode mode *Jam-sync* and *Genlock Sync* is not supported.

### Sync Shift

The Sync Shift setting can be used to apply an offset to the reference signal at the input. The minimum step size is 52 ns and the maximum correction is +/- 20 ms, depending on the sensor frame rate.

- Select *MENU > System > Sensor > Sync Shift* to adjust the sync shift.

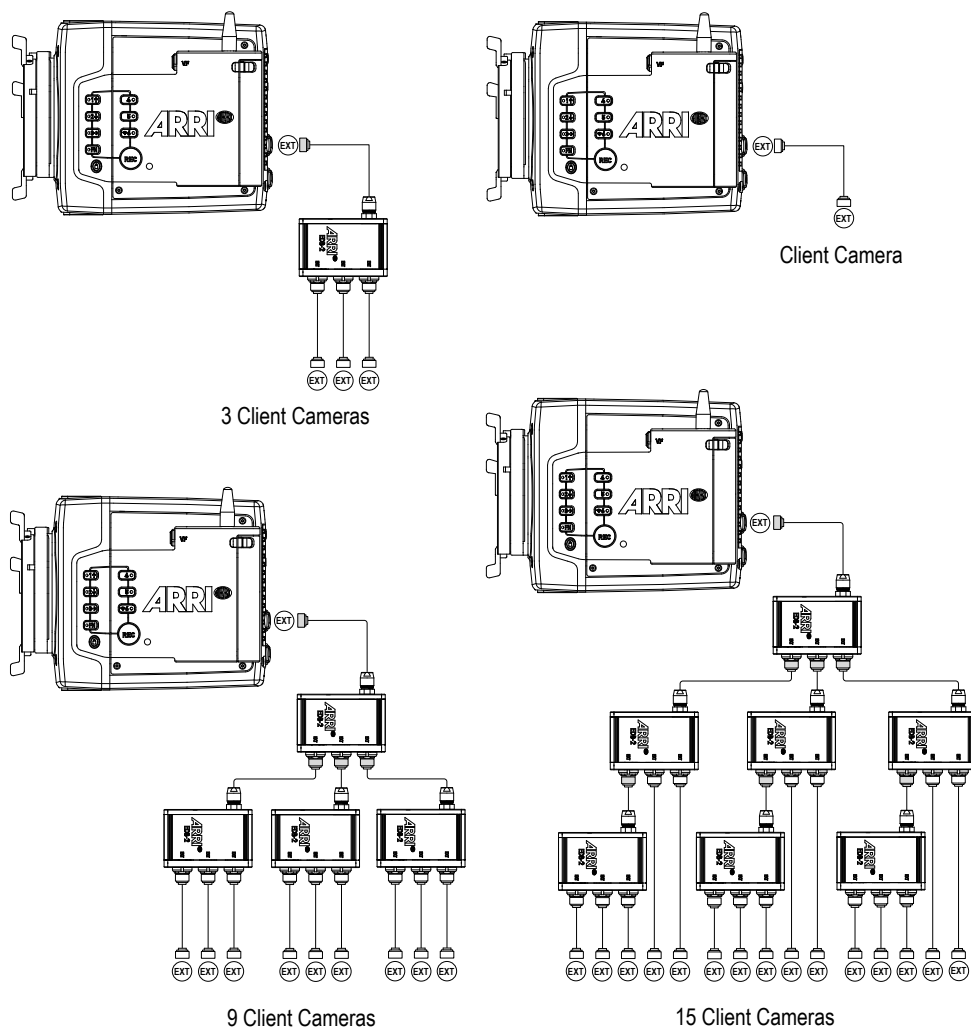
## 20.1 EXT Sync

Up to 16 ALEXA Mini LF cameras can be synchronized for various applications requiring sensor synchronization. One camera is set as the host camera and the other cameras function as client 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 host 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 host camera and the other camera(s) as client camera(s). A client camera can be a sensor client (only sensor synchronized) or a settings client (sensor and settings synchronized).

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

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

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

Following options are available:

<b>Off</b>	EXT Sync is disabled.	
<b>EXT Host</b>	Configures the camera as host. The camera has control over one or more client cameras. The sensors of all client cameras will be synchronized to this camera's sensor. All client cameras will inherit the timecode from this camera.  The host camera can be supplied with external timecode and can be synchronized to an external genlock source.	
<b>EXT Sensor Client</b>	Configures the camera as a sensor client. The sensor is synchronized with the host camera. The SDI outputs of the client camera are synchronized with the host camera. The client camera inherits the timecode from the host camera. Recording starts and stops simultaneously on all cameras.	
<b>EXT Settings Client</b>	Configure the camera as a settings client. The sensor is synchronized with the host camera. The SDI outputs of the client camera are synchronized with the host camera. The client camera inherits the timecode from the host camera. Recording starts and stops simultaneously on all cameras. To ensure an identical clip naming, the client camera inherits the camera ID from the host camera. Settings synchronized parameters include:	
	Project Rate	Next Reel Count
	Sensor Fps	Lens Squeeze Factor
	Shutter and Shutter Unit	EVF Processing
	Exposure Index	EVF Exposure Tool
	White Balance*	EVF Peaking
	ND Filter	EVF Overlays
	Recording Codec	SDI Processing
	Recording Resolution	SDI Format
	Active Look	SDI Color Space
		SDI Frame Rate
		SDI Exposure Tool
		SDI Peaking
		SDI Overlays
		Exposure Tool Settings
		Frame Line Settings
		Focus Unit
		Noise Reduction
		EF Iris Value

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

**Info:** Configure all client cameras first and host camera last.

**Info:** Parameters can only be changed from the host camera.

- On the host camera in an EXT sync cluster, you need to define the amount of cameras used in the cluster. The host camera monitors the connection to each client camera.

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

- ▶ When using settings client, 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 host camera the camera ID prefix “A”)

### Media Status with EXT Sync

The host 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 host camera.

EXT	0:20:02
REC	ARRIRAW
LOOK	ARRI 709

### EXT Sync Info Screen

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

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

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

**Info:** 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 recording media of all cameras in the cluster:

- ▶ On the host camera, select *MENU > Media > Erase EXT Sync Media*.  
A confirmation screen is displayed.
- ▶ Press *ERASE*.  
A progress bar indicates the progress of the host camera (only).
- ▶ After erasing has finished, press any button to return to the menu.

### EXT Sync Clip Naming

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

When working in EXT sync mode and using settings sync, the client cameras inherit the camera ID of the host 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*.

**Info:** The host 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 host 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

**Info:** Do not mix sensor and settings clients as this will cause inconsistencies in clip naming.

## 21 Sensor Settings

### 21.1 Mirroring the Sensor Image

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

- Select *MENU > Image > Mirror Image*.

Following options are available:

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

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

### 21.2 User Pixel Masking

All sensors exhibit a certain number of defect pixels, and ARRI cameras have three mechanisms to catch and correct them: one is a static pixel correction based on a pixel mask created during manufacturing. The second 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 the third, User Pixel masking, is available. User pixel masks can be created using the ARRI Reference Tool (ART).

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 production using the ARRI Reference Tool or any third party software that has implemented the User Pixel Mask feature through the ARRI Image 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.

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

<i>Install User Pixel Mask</i>	Select to install a User Pixel Mask from USB memory stick.
<i>Export User Pixel Mask</i>	Select to back up the currently installed User Pixel Mask onto USB memory stick.
<i>Delete User Pixel Mask</i>	Select to uninstall a User Pixel Mask.
<i>Grab Raw Image</i>	Stores an ARRIRAW frame grab on the USB memory stick.

#### User Pixel Mask Generation

- Insert a USB memory stick into camera.
- 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.
- Import the ARRIRAW frame grab into the ARRI Reference Tool.

- ▶ Use the ARRI Reference Tool 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.

Please refer to the ARRI Reference Tool user manual for further information.

- ▶ Save the User Pixel Mask to the USB memory stick in folder ARRI/A-MINI-LF/SENSOR.
- ▶ Insert the USB memory stick into the camera.
- ▶ Select *MENU > System > Sensor > User Pixel Masking > Install User Pixel Mask* to load the mask into the camera.
- ▶ 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 therefore becomes active on all outputs.
- ▶ 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.com](mailto:service@arri.com) 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.

## 22 System Settings

### 22.1 Language Setting

- ▶ Select *MENU > System > Language* to set the system language between **English** and **Chinese** (simplified).

### 22.2 System Time and Date

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

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

### 22.3 Button and Display Settings

#### Display Style

- ▶ Select *MENU > System > Buttons + Display > Display Style* to set the display style between **Day** or **Night**.

#### Button Brightness

- ▶ Select *MENU > System > Buttons + Display > Button Brightness* to set the brightness of camera and MVF-2 buttons from **0** (off) to **4** (the highest brightness).

#### MVF-2 Touch

- ▶ Select *MENU > System > Buttons + Display > MVF-2 Touch* to enable / disable the touchscreen functionality on the MVF-2.



The touch lock icon on the HOME screen indicates that the touchscreen functionality is switched off.

### 22.4 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.

**Info:** Ideal in an environment warmer than 30 °C (86 °F).

#### **Low Noise**

Minimizes fan noise during standby and recording.

**Info:** With data rates above 100 MB/s (due to fps/codec setting), the fan speed automatically increases to prevent the recording media from overheating.

## 22.5 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.

## 22.6 Reset of Electronic Horizon

- ▶ Select *MENU > System > Reset Electronic Horizon*.
- ▶ Place the camera on a level surface and press *RESET*.

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

## 22.7 Update

### ADVICE

Use a fully charged battery or a mains power supply to avoid power loss during updates.  
Do not switch off the camera or unplug power during update processes.  
Do not disconnect or remove components that are being updated.

### 22.7.1 Update of Camera Software

The camera software is updated using a USB memory stick. The Software Update Package (SUP) will update the camera along with the MVF-2 and the lens mount – provided they are connected to the camera. Before updating the camera, create the required folder structure on a USB memory stick. For more information, see "[User Storage](#)".

#### Software Update Package Download

- ▶ Download the software update package (SUP) from the [Software and Firmware Updates for Cameras](#) section of our website.
- ▶ Double-click on the downloaded file (\*.zip) to unpack it:

Update file (*.SUP)	Update key (*.lic)	Release notes
---------------------	--------------------	---------------

- ▶ Carefully read the release notes.
- ▶ Copy the update file (\*.SUP) to the ARRI/A-MINI-LF/SUP folder on the USB stick.
- ▶ Copy the update key (\*.lic) to the ARRI/A-MINI-LF/LICENSES folder on the USB stick.

#### Camera Update

- ▶ Connect the USB memory stick to the camera.
- ▶ If inserted, remove the recording media from the camera.
- ▶ Select *MENU > Setup > Factory Reset* to perform a factory reset.
- ▶ Select *MENU > System > Update > Update Camera*.
- ▶ Select the required update file and press *CONFIRM* to start the update.
- ▶ Check the MVF-2 monitor for the update progress.

Wait for the update process to finish. The update procedure takes about ten minutes.

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

**Info:** After an update, the timezone and daylight saving time settings of the camera are reset. Please set them accordingly.

### 22.7.2 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 software.

- ▶ Select *MENU > System > Update*.

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

- ▶ Select *Update MVF-2* to update the MVF-2 or  
Select *Update Lens Mount* to update the lens mount.
- ▶ Press *CONFIRM* to start the update.

### 22.7.3 Update of LBUS Devices

LBUS devices such as cforce mini motors, cforce Plus motors, ARRI Master Grips, ARRI Operator Control Unit OCU-1 and ARRI LCUBE can be updated by the camera. The update requires an update file which can be downloaded from the ARRI website.

- ▶ Download the update file for the desired device from the [Software Updates ECS](#) section of our website.
- ▶ Copy the update file onto a USB memory stick in folder ARRI/ECS/. Connect the memory stick to the camera.
- ▶ Connect the LBUS device to the LBUS connector of the lens mount.
- ▶ Select *MENU > System > Update > Update LBUS Devices*.

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

- ▶ Select the LBUS device you want to update and press *UPDATE*.
- ▶ Press *CONFIRM* to start the update. Cancel with *BACK*.

## 23 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 to the USB medium.

- ▶ 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.

- ▶ 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 with following options:

<b>General</b>	Groups the general camera configuration and basic project settings.
<b>Format</b>	Saves set codec, sensor mode and recording resolution.
<b>Scene</b>	Saves scene related parameters such as Shutter and Exposure Index.
<b>Lens</b>	Saves active lens table setting to quickly change between lens configurations.
<b>User</b>	Stores all parameters for camera personalization (overlays etc.)

- ▶ Select one or more options and press *CONFIRM*.

### Loading a User Setup

- ▶ 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.

- ▶ Select a user setup from the list and press *LOAD*.

A pop up window with the parameter blocks of this user setup is displayed.

- ▶ Press *CONFIRM*.

The camera loads the selected user setup and shows a result message. The pop up 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.

- ▶ Select *MENU > Setup > Factory Reset*.

- ▶ Press *RESET*.

The camera settings are reset to factory defaults.

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



## 23.1 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.

Project Rate	Installed Look Files	Sensor FPS Presets	SDI 1&2 Format
Audio (All Settings)	Installed Frame Line Files	Shutter Presets	SDI 1&2 Frame Rate
Timecode (All Settings)	CAP Settings	WB Presets	SDI 1&2 Image
Metadata (All Settings)	Mirror Image	ECS Radio Power	SDI 1&2 3G Level
Genlock Sync	Fan Mode	ECS Radio Channel	
Sync Shift			

### Format

Allows for easy switching between recording formats.

Recording Codec	Recording Resolution	Active Frame Line
-----------------	----------------------	-------------------

### Scene

Allows you to change quickly between different shooting situations.

Sensor FPS	Exposure Index	ND Filter	EF Iris Value
Shutter	White Balance	Active Look	

### Lens

Allows you to change quickly between different lens setups.

Lens Squeeze Factor	Lens Tables Installed	Lens motors direction	Lens motors teeth count
Active Lens Table	Lens Table Favorites	Lens motors torque	Focus Unit

### User

Stores all parameters for camera personalization.

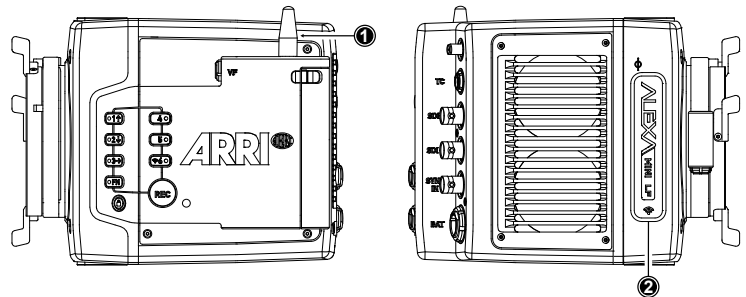
SDIProcessing (all settings)	User Buttons (all settings)	PWR Warning	EVF Overlays (all settings)
VF Surround View & Mask	Peaking (all settings)	Display Style	Monitor Overlays (all settings)
	Play End mode	Button Brightness	VF Settings (all, except <i>EVF Power</i> )
	Rec Beeper / Tally		

**Info:** Network settings are not stored in the user setup.

## 24 Network

A network connection can be used to remotely control the camera. The camera's Web Remote, the Camera Companion App or other applications communicating with the camera via the Camera Access Protocol (CAP) can be connected to the camera via Ethernet or WiFi.

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).



The Ethernet connector is located on the right side of the camera. Use the ALEXA ETH/RJ45 (3.0m/9.8ft) KC 153-S (K2.72021.0) cable to connect the camera to a computer or network.

### ADVICE



#### Electrostatic Discharge on Open Connector.

The WiFi module might be damaged by electrostatic discharge when leaving the connector without antenna attached.

- ▶ Do not leave the antenna connectors open during operation or transport.
- ▶ Use only the type of antenna originally supplied.

## 24.1 WiFi Settings

### WiFi Power

- ▶ Select *MENU* > *System* > *Network / WiFi* > *WiFi Power* to enable/disable WiFi.

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.

**Info:** 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

The WiFi module of the camera 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.

- ▶ Select *MENU* > *System* > *Network / WiFi* > *WiFi Mode*.

The WiFi mode can only be changed while WiFi power is disabled.

Following options are available:

**Host** The camera acts as an WiFi access point. The SSID of the camera is “Mini-LF-xxxxx”.  
(xxxxx 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.

Icons on the HOME screen and the Status Info indicate the WiFi status:



Host mode is enabled.



Client mode is enabled, connection to a network has been established.



Client mode is enabled, camera is not connected to a network.

### WiFi Password (Host Mode)

The camera requires a password when connecting to it via WiFi. The default password is “arriarri”.

- Select *MENU* > *System* > *Network / WiFi* > *WiFi Host Password* to set the WiFi password. The WiFi password must be between 8 and 32 characters long.

### WiFi Host Channel

- Select *MENU* > *System* > *Network / WiFi* > *WiFi Host Channel*.
- 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 rediscover the best WiFi host channel each time the camera is booted or WiFi is turned on. Select *Automatic* from the list again to trigger a new scan.

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

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

ZigBee IEEE 802.15.4 Radio Channel Number

### Connect to a Network (Client Mode)

- Select *MENU* > *System* > *Network / WiFi* > *WiFi Network* and select the desired network from the list.

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

- Enter the password and press *CONNECT*.

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

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

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

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

- ▶ Select *MENU* > *System* > *Network / WiFi* > *WiFi Network* > *SCAN QR*.
- ▶ 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.
- ▶ Press *CONNECT*.

**Info:** QR Code scanning is not available with the Camera Control Monitor CCM-1.

### Disconnect from Network (Client Mode)

- ▶ Select *MENU* > *System* > *Network / WiFi* > *WiFi Network*.
- ▶ Press *DISCONNECT*.

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

## 24.2 Ethernet Settings

### LAN IP Mode

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

Following options are available:

<b>Static</b>	Select for manually entering an IP address and subnet mask.
<b>DHCP</b>	Select to let the camera accept a dynamically assigned IP address from an DHCP server.

### LAN Static IP

- ▶ Select *MENU* > *System* > *Network / WiFi* > *LAN Static IP* to set the desired LAN Static IP address.

### LAN Static Subnet

- ▶ Select *MENU* > *System* > *Network / WiFi* > *LAN Static Subnet* to set the desired LAN Static subnet.

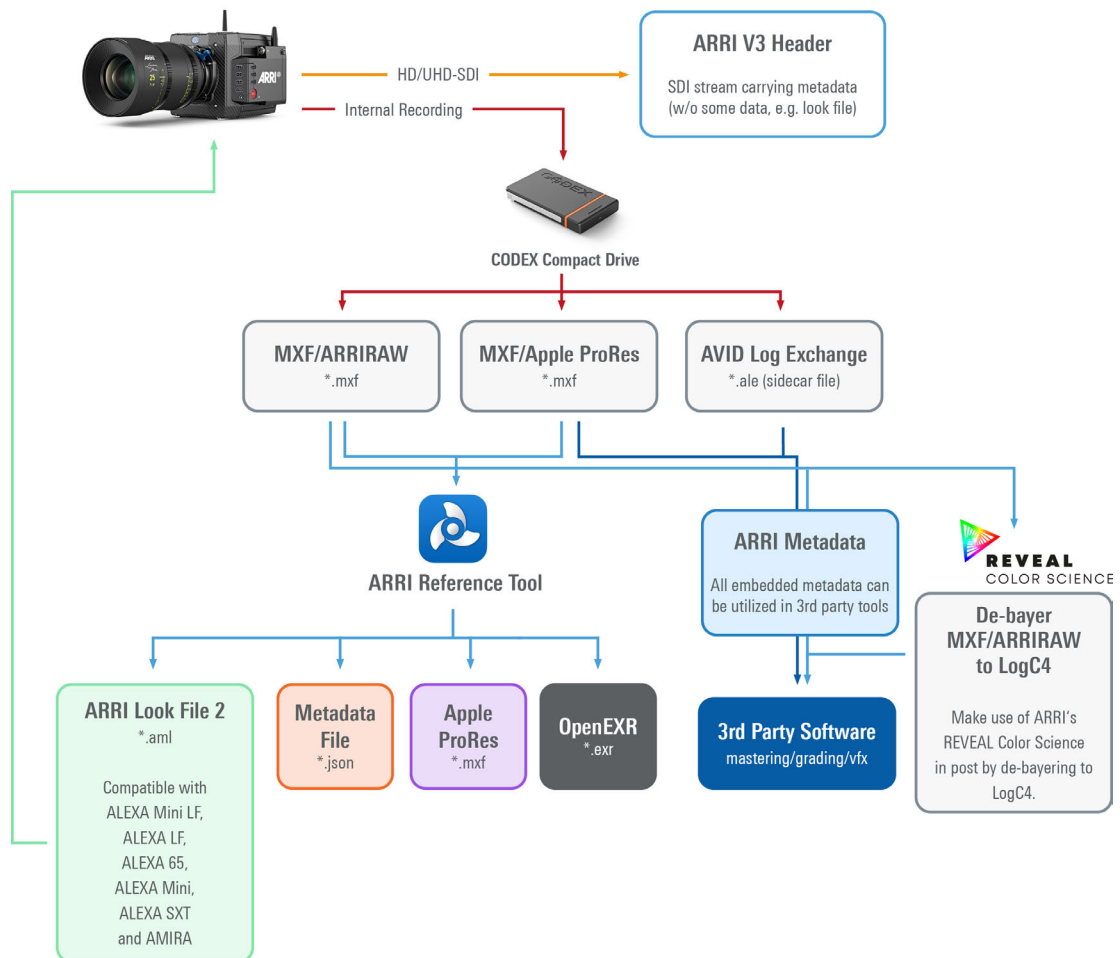
### LAN Static Gateway

- ▶ Select *MENU* > *System* > *Network / WiFi* > *LAN Static Gateway* to set the desired LAN Static gateway.

## 25 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. Metadata can be accessed, visualized and exported directly in the ARRI Reference Tool.

For more information about ARRI camera metadata, please refer to the ARRI Metadata White Paper, available in the [Technical Downloads](#) section on the ARRI website.



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.

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.

### Production Metadata in Camera Menu

- Select **MENU > Metadata >** to enter production metadata.

**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.

## 26 Lens & Electronic Control System (ECS)

### 26.1 Changing a Lens

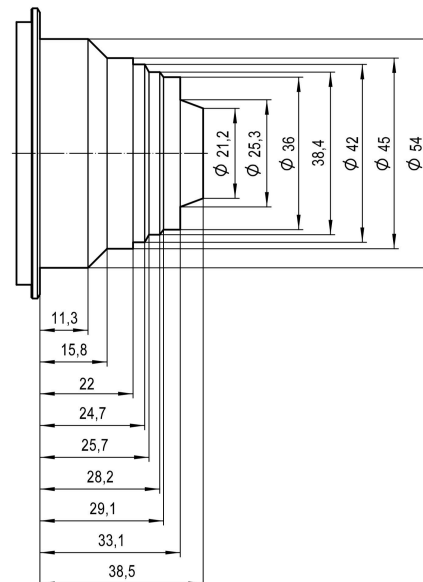
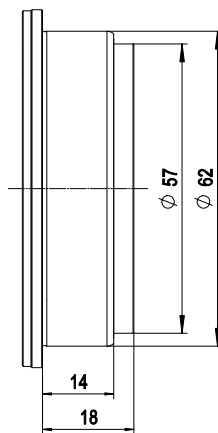
#### ADVICE



#### **Risk of damage and injury when using lenses exceeding the supported entry depth!**

LPL mount lenses with more than **18.00 mm** entry depth and PL mount lenses with more than **38.50 mm** entry depth might damage the camera's internal filters. Shards from broken filter glass might cause injury.

- ▶ Do not use LPL mount lenses with more than 30.00 mm18.00 mm entry depth.
- ▶ Do not use PL mount lenses with more than 38.50 mm entry depth.
- ▶ Use only lenses that do not exceed the following dimensions (left: LPL mount lenses, right: PL mount lenses):



- ▶ To ensure maximum allowable lens mounting depth always have your camera and lenses shimmed correctly.

#### ADVICE



#### **Dust particles on the sensor cover glass may affect the recorded image!**

When no lens or lens cap is attached to the camera, dirt and dust particles may enter the camera and settle on the sensor cover glass. Particles on the sensor cover glass can later be visible in the recordings made by the camera.

- ▶ Changing lenses or lens mounts should be done in a dry and dust free environment. If this is not possible, take extra care that no particles enters the camera while the lens or the lens mount is off.
- ▶ After removal of a lens, perform a dust check to make sure no particles have settled on the sensor cover glass.
- ▶ Place the protective cap on the lens mount, when no lens is attached to the camera.
- ▶ Always store the camera with a capped lens mount or camera front cover installed.
- ▶ Make sure to protect all optical surfaces when changing a lens or lens mount.

## ADVICE

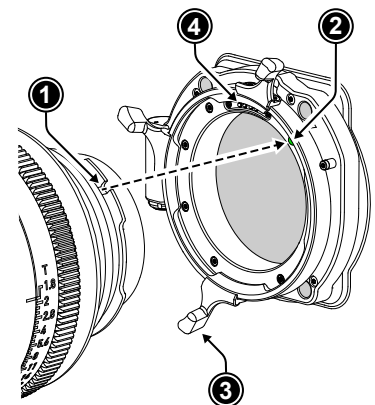
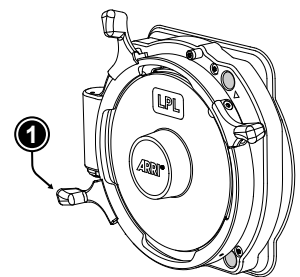
**Heavy Lenses may affect the flange focal depth!**

Using lenses above 3 kg / 6.6 lbs without a proper lens support can put stress on the lens mount and affect the flange focal depth.

- ▶ Always use a suitable lens support for lenses weighing more than 3 kg / 6.6 lbs.

Lens change on the LPL mount, the PL mounts as well as the PL-to-LPL Adapter works the same way. The description below shows an LPL mount.

- ▶ When removing a lens, hold the lens securely.
- ▶ Turn the bayonet ring (1) anticlockwise until it stops.
- ▶ Gently remove the lens / lens port cap from the lens mount.
- ▶ Carefully insert the lens into the lens mount. 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.
- ▶ When attaching an LDS lens, make sure it is oriented so that the LDS contacts of the lens and lens mount (4) meet (12:00 position). Do not touch the LDS contacts.
- ▶ Carefully press the lens flange flat onto the lens mount.
- ▶ Turn the bayonet ring (3) clockwise until the lens is locked securely.



## 26.2 Lens Data

### ARRI Lens Data System (LDS)

The Lens Data System (LDS) allows ARRI cameras and accessories to identify connected lenses and exchange dynamic lens data reflecting the current lens settings. It works with cine lenses using ARRI LDS or LDS-2 technology, lenses using Cooke /i technology and even cine lenses without lens data capabilities. LDS also offers basic support for most B4 or PL ENG lenses and Canon photo lenses when used with the appropriate mount. Available lens information can be displayed live on lens control units like the Hi-5 or WCU-4, in the camera's viewfinder and on the monitoring outputs. It is sent with very low latency via Ethernet for use in mixed reality/virtual production environments and embedded as ancillary data in the SDI output. Post production benefits from frame accurate dynamic (per frame) and static (per clip) lens data in all original camera files.

### Lenses with ARRI LDS Technology

Most ARRI lenses following the ARRI/Zeiss Ultra Prime LDS have built-in LDS functionality. This offers basic lens information and accurate lens tables for the Focus, Iris, and Zoom axis (if applicable). LDS lenses have integrated encoders for each axis and therefore deliver lens metadata even if the lens is adjusted manually. LDS-2 is the latest generation of the lens data system. It was introduced with the LPL mount and ARRI Signature Prime and Signature Zoom lenses. LDS-2 offers more bandwidth,



higher precision and faster communication. LDS-2 requires no calibration turn to the end stops of each lens ring to deliver data. LDS-2 is prepared for future applications and is being licensed to other lens and camera manufacturers.

### Lenses with Cooke /i Technology

Many lenses, camera and lens control system manufacturers rely on /i Technology, which has been designed and developed by Cooke Optics as an open lens metadata protocol. Every ALEXA camera with an LDS capable lens mount, including the original ALEXA “Classic”, supports basic /i Technology. Please note that some older Cooke lenses may be running on outdated firmware. This is likely to cause incompatibilities with the LDS. Please contact Cooke Optics directly for more information about checking the lens firmware version and available updates.

### Lenses without Lens Data Capabilities

To get the FIZ information for a lens without lens data capabilities, the LDS can derive the lens ring positions based on end-to-end calibrated lens motor positions and a lens file that is used as a look up table. These files are available from the Lens Data Archive (LDA), a local library of lens files, which can also be extended by the user. The LDA exists in ARRI cameras or accessories like the UMC-4, RIA-1, or cforce mini RF or in the ECS sync app for iOS.

To create a new lens file, you need a camera, lens motors, a HI-5 or WCU-4 wireless lens control unit and the lens. First, the motors are calibrated to the end stops of their lens rings. Then, axis by axis, the lens control is used to drive the lens to each marking on the lens barrel and to set markers for the corresponding motor (encoder) position. Finally, the lens file can be stored by e.g. model, focal length and optionally lens serial number. Programming a lens file takes a while, but is time well spent, as it can be shared between LDAs and therefore only needs to be done once.

### ARRI Lens Data Mount

Certain non-LDS lenses can be retrofit with an ARRI Lens Data Mount (LDM-2), which is programmed with the lens file. Using a Lens Data Mount instead of the LDA is more practical where one lens may be used on many cameras, such as a camera rental operation. It also saves time in production as the LDS automatically uses the file when the lens is attached.

The LDM-2 is available for Angénieux Optimo 24-290, Angénieux 17-102, Angénieux 25-250, Cooke 25-250, Cooke 18-100 and Zeiss Apo Tessar 300.

### 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. For further information please see ["Configuration of Status Info Components"](#).

The camera can be configured to display either metric or imperial readings:

- Select *MENU > Lens & ECS > Focus Unit* to set the desired focus unit.

Following options are available:

<b>Lens Default</b>	Focus unit is displayed according to the markings on the lens (requires LDS or Cooke /i lens).
<b>Imperial</b>	Focus unit is displayed in Feet.
<b>Metric</b>	Focus unit is displayed in Meter.

## 26.3 Lens Data Archive

The Lens Data Archive (LDA) is an archive that contains lens tables. In combination with the lens motor(s) these lens tables provide lens data for lenses without a lens data interface. The lens tables set the raw motor encoder values in correlation to the actual lens scales. Once you choose the right lens table from the Lens Data Archive and calibrate your lens motors, you get the same type of lens data as an LDS lens would deliver. You can create your own lens tables for any given lens with the HI-5 or WCU-4 hand units and save them internally, externally to a memory stick, or in an iOS device with the ECS Sync App. Lens tables can then be transferred wirelessly from the hand units to the camera.

### Adding Lens Tables from the USB Medium

- ▶ Select *MENU > Lens & ECS > Lens Data > Lens Tables Installed > ADD*.
- ▶ Press *IMPORT* to import lens tables from a USB medium or *DEFAULTS* to select a lens table from the internal lens tables default list.
- ▶ Select the desired lens table from the list and press *IMPORT*.

The lens table is imported to the camera's Lens Tables Installed list.

- ▶ 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 lens model. The scale class of an individual lens is engraved on the lens barrel. If required: select the corresponding scale class from the list.

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.



As soon as an LDA table is activated, the LDS contacts of the lens mount are switched off, indicated through the LDS icon on the HOME screen and in the Status Info.

### 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

- ▶ Select *MENU > Lens & ECS > Lens Data > Lens Tables Installed* and select and set a lens table for use.
- ▶ Select *MENU > Lens & ECS > Lens Table > Add to Favorites* to add the lens table to the favorites list.

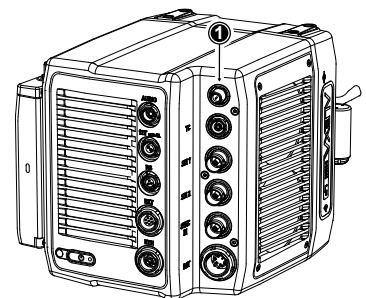
#### Select a Lens Table from the Favorites List

- ▶ Select *MENU > Lens & ECS > Lens Data > Lens Table Favorites* and select and set a lens table from the list.

## 26.4 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.



### ADVICE



#### Electrostatic Discharge on Open Connector.

The White Radio module might be damaged by electrostatic discharge when leaving the connector without antenna attached.

- ▶ Do not leave the antenna connectors open during operation or transport.
- ▶ Use only the type of antenna originally supplied.

## Radio Power and Radio Channel

- Select *MENU > Lens & ECS > Radio > Power* to enable white radio.
- Select *MENU > Lens & ECS > Radio > Channel* to select the white radio channel.

Following options are available:

Channel	Frequency	ZigBee IEEE 802.15.4 Channel	Channel	Frequency	ZigBee IEEE 802.15.4 Channel
0	2.410 GHz	12	7	2.475 GHz	25
1	2.415 GHz	13	8	2.420 GHz	14
2	2.430 GHz	16	9	2.425 GHz	15
3	2.435 GHz	17	10	2.440 GHz	18
4	2.450 GHz	20	11	2.445 GHz	19
5	2.455 GHz	21	12	2.460 GHz	22
6	2.470 GHz	24	13	2.465 GHz	23



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.

To connect a hand unit to the camera set the hand unit's radio channel to the same value. Make sure that each camera on set uses its own white radio channel. It is not supported that one hand unit connects to two cameras in parallel.

**Info:** 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.

- *MENU > Lens & ECS > Radio > Status* shows the current status of the white radio module:

<b>Off</b>	White Radio is disabled.
<b>Init</b>	White Radio is initializing
<b>Ready</b>	White radio is initialized and ready to be used.
<b>Blocked</b>	Selected White Radio channel is already used by another camera on set.

- *MENU > Lens & 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.

## Region Setting

The wireless region setting specifies the region the white radio can be used in compliance with local regulations.

- Select *MENU > Lens & ECS > Radio > Wireless Region Setting* to set the region.

The following options are available:

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

- Select *World* if your specific region is not listed.

**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.

## 26.5 Lens Motors

The camera supports the use of cforce mini, cforce plus and cforce mini RF lens motors. Lens motors are connected to the LBUS connector of the lens mount and can be daisy chained. For more information about lens motors, please download the lens motor user manuals from the [Lens Motors](#) section of the ARRI website.

### Motor Calibration

#### ⚠ CAUTION



#### Rotating Lens Motor

Risk of crushing fingers and capturing and unraveling long hair, jewelry and/or clothing.

- ▶ Make sure that the lens motor is properly attached to the lens.
- ▶ Do not touch the lens motor gears while they are moving.
- ▶ Keep hair and loose clothing away from the motor gear teeth.
- ▶ Keep cables connected to the camera away from the motor gear teeth.
- ▶ Do not trigger a calibration unless all connected motors are attached to the lens.

After a lens motor has been connected to the camera, it must first be calibrated before it can be used.



The camera indicates the calibration request by displaying an orange CAL icon on the HOME screen as well as in the Status Info. The icon turns gray once calibration is in progress, and expires when calibration has finished.



- ▶ Select *MENU > Lens & ECS > Calibrate All Motors* to start calibration of all connected lens motors. Alternatively, motor calibration can be triggered via the hand unit or the motor itself.

### Motor Torque

- ▶ Select *MENU > Lens & ECS > LBUS Lens Motor Configuration Focus / Iris / Zoom Motor Torque* to set the torque of a lens motor in the range of **1** (the lowest torque) to **4** (the highest torque).

### Motor Direction

- ▶ Select *MENU > Lens & ECS > LBUS Lens Motor Configuration Focus / Iris / Zoom Motor Direction* to set the motor direction between **Left** and **Right**.

Use *Left* if a lens motor is to the left of the lens, use *Right* if it is to the right.

### Teeth Count

The motor teeth count setting is only active when an 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. The number of teeth can be read on the gear wheel of the motor.

- ▶ Select *MENU > Lens & ECS > LBUS Lens Motor Configuration Focus / Iris / Zoom Motor Teeth Count* to set the teeth count.

Following options are available:

<b>Auto</b>	The camera determines the teeth count during motor calibration.
<b>40t</b>	The motor is equipped with a 40 tooth gear.
<b>50t</b>	The motor is equipped with a 50 tooth gear.
<b>60t</b>	The motor is equipped with a 60 tooth gear.

## 26.6 EF Lens Iris Adjustment

When using EF Mount and EF lenses, the aperture of the lens can be controlled from the camera menu. This option is only available when the camera is equipped with an EF Mount. Furthermore, the iris of EF lenses can be controlled using the ARRI Master Grips or the Operator Control Unit OCU-1.

- ▶ Select *HOME > EI > Iris*.
- ▶ Rotate the jogwheel to open or close the iris of the EF lens. Press the jogwheel to toggle between full stops and sub stops.

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



User Buttons *EF Close Iris* and *EF Open Iris* support to quickly adjust the iris of an EF lens.

## 26.7 Enable Lens Mount

You can disable the LDS contacts of the lens mount. Usually this is not necessary, but it can be helpful when e.g. lenses with faulty lens data are used. Please note that as soon as an LDA lens table is activated, the LDS contacts of the lens mount are switched off automatically. There is no need to switch the mount off manually when using LDA lens tables.

- ▶ Select *MENU > Lens & ECS > Enable Lens Mount* to enable/disable the lens mount contacts of the lens mount.



A disabled lens mount is indicated through the LDS icon on the HOME screen as well as in the Status Info.

## 27 Remote Control

### 27.1 Web Remote

The camera can be remotely controlled via WiFi or Ethernet using the camera's Web Remote feature.

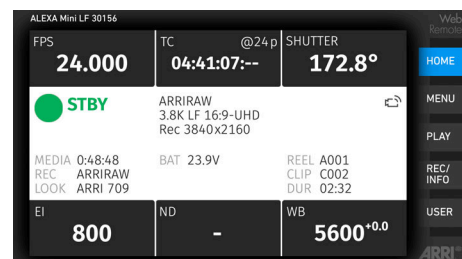
- ▶ Connect the camera to your computer via WiFi or Ethernet.
- ▶ Open a web browser and enter the URL `http://mini-LF-xxxxx.local` (replace xxxxx with the camera's 5-digit serial number).

To use the Web Remote 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 in *MENU > Info > Network Info*.

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.

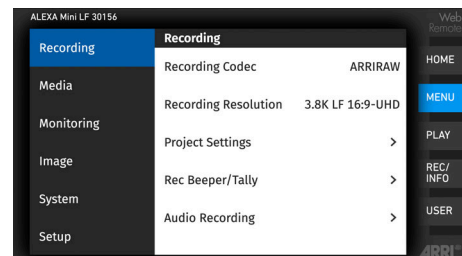
#### HOME

Shows the camera HOME screen (as on MVF-2) with access to the main parameters.



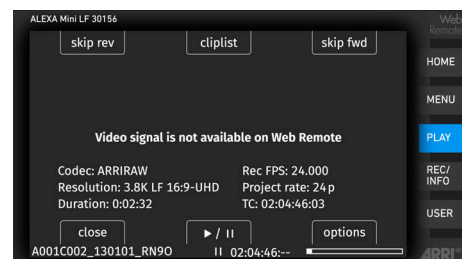
#### MENU

Access to the camera menu.



#### PLAY

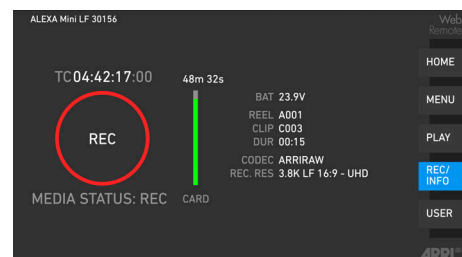
Starts playback from the recording medium. Provides the same controls as the MVF-2, but does not show a video signal.



#### REC / INFO

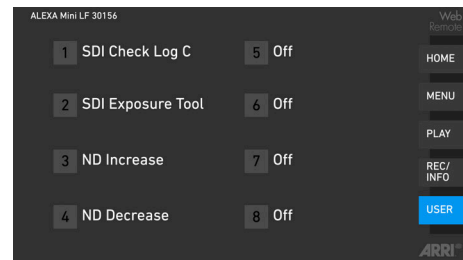
Contains information on the main recording parameters, plus a *REC* button. Click the big circle icon to start/stop recording.

**Info:** Rec status and timecode may respond slightly delayed depending on the network's speed.



**USER**

Shows configuration of the camera user buttons and allows you to trigger them. Press the number icons to trigger the user buttons.

**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.

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.

## 27.2 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. 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 [Technical Downloads](#) section on the ARRI website.

**Activation of CAP Server**

- ▶ Select *MENU > System > Camera Access Protocol (CAP) > Enable CAP Server* to switch remote access to the camera via the Camera Access Protocol on or off.

**CAP Server Password**

- ▶ Select *MENU > System > Camera Access Protocol (CAP) > Cap Server Password*.
- ▶ 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.

**ADVICE**

The Camera Control Monitor CCM-1 communicates with the camera using the CAP protocol. As soon as it is attached CAP Server will be switched to 'ON' automatically. For security reason we recommend modifying the CAP Server password when using the CCM-1. You are not required to enter the password on the CCM-1 as long as the connection is using the VF-Cable.



## 27.3 Camera Companion App

The Camera Companion App offers remote control of one or multiple cameras, as well as customization of the app's user interface. It focuses on the functions that are most frequently used during production. The app uses the Camera Access Protocol (CAP) via the camera's internal WiFi radio or the ETH interface. The app is available for download from the Apple App Store and can be used on iPhone, iPad, M1 and M2 Mac computers and the Apple watch.

## 27.4 Hand Units Hi-5 and WCU-4

The ARRI hand units Hi-5 and WCU-4 support to control basic settings of the camera. The following settings can be accessed through the hand units:

Rec start/stop	White Balance	False Color
Full Playback Control	ND Filter	Frame Lines
Sensor Frame Rate	Peaking	User Buttons
Shutter Angle	Surround View	User Setups
Exposure Index	Status Info	

## 28 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

- 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](#).

- Connect the power cable (Lemo 5-pin to Lemo 6-pin):

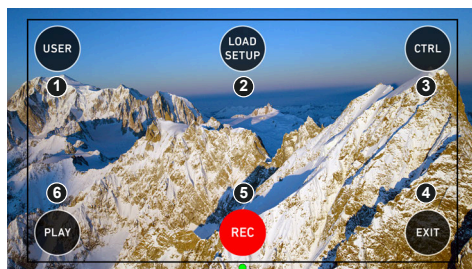
Connect the Lemo 5-pin plug to the POWER connector of the monitor.

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.

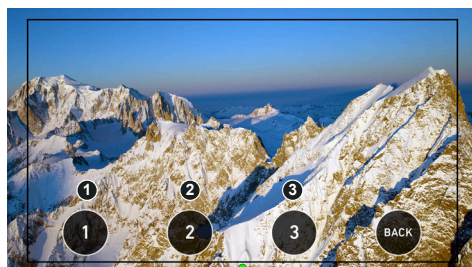
**Info:** All overlays disappear after a few seconds of inactivity.

### User Button Menu

In the user button menu, the same functions are available as with the camera user buttons (1) to (3).

- Activate the menu by pressing the blue "A" touch icon on the monitor.
- Press *USER* to access the user button menu.

The user screen is displayed:



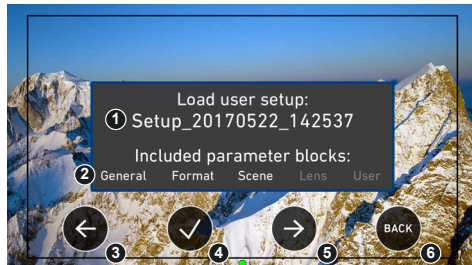
- Press the buttons to toggle the assigned user button function.
- A gray button indicates an active function.
- Return to the main menu by pressing the *BACK* icon.

## User Setup Menu

In the load user setup menu, you can load user setup files that have been stored on the camera.

- ▶ Activate the menu by pressing the blue “A” touch icon on the monitor.
- ▶ 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](#).

- ▶ Activate the menu by pressing the blue “A” touch icon on the monitor.
- ▶ Press *CTRL* to activate the overlay menu.

The control screen is displayed:

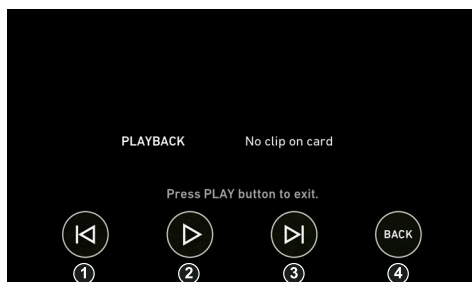


- ▶ Select a parameter by pressing the touch icon (1) or (3) to move the selection rectangle left or right.
- ▶ Select the parameter by pressing the touch icon (2).
- ▶ Edit the parameter by pressing the touch icons (1) or (3).
- ▶ End editing by pressing the touch icon (2).
- ▶ Exit the control menu by pressing the *BACK* (4) icon.

## Playback Menu

- ▶ Activate the menu by pressing the blue “A” touch icon on the monitor.
- ▶ Press *PLAY* to start playback.

The playback screen is displayed:



- ▶ Play or pause a clip by pressing the *PLAY* touch icon (2).
- ▶ Skip to previous or to next clip by pressing the *Skip previous* (1) or *Skip next* (3) touch icons.
- ▶ While playback is running, press *Fast backward* (1) or *Fast forward* (3) to decrease or increase playback speed.
- ▶ Exit playback and return to the main menu by pressing the *BACK* touch icon (4).

## 29 Appendix

### 29.1 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.

#### 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。在极其偶然的的情况下，画面左右两部分的边界线可能会被观察到。

## 29.2 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 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. 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**

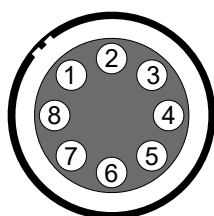
Generally speaking LUTs (Look Up Tables) are used to manipulate image data. The LUT transforms a digital signal to adjust the sensitivity, gamma and provide a color correct monitoring input. Nowadays on-set color correction is not a novelty anymore, nevertheless Look Up Tables are still needed to convert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

## 29.3 Connector Pin-Outs

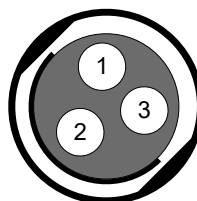
**Info:** All pin-outs for camera interfaces appear as seen by the user.

**BAT** (LEMO EEJ.2B.308)



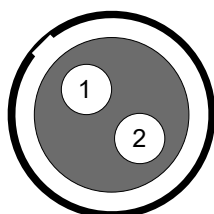
- 1 Batcom
- 2 Powergnd
- 3 Powergnd
- 4 Powergnd
- 5 Batcom Gnd
- 6 Batplus
- 7 Batplus
- 8 Batplus

**RS** (Fischer DPB102A052-130)



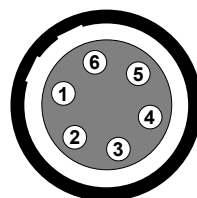
- 1 GND
- 2 24 V Aux
- 3 R/S

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



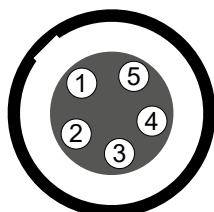
- 1 GND
- 2 12 V Aux

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



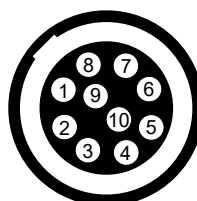
- 1 GND
- 2 CH 1 (+)
- 3 CH 1 (-)
- 4 CH 2 (+)
- 5 CH 2 (-)
- 6 12 V

**TC** (LEMO EEG.0B.305)



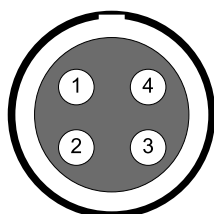
- 1 GND
- 2 LTC In
- 3 Aux
- 4 Aux
- 5 LTC Out

**ETH** (LEMO EEG.1B.310)



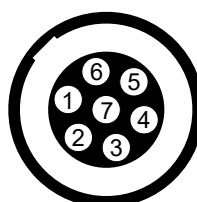
- 1 MX-1P CTS (white-orange)
- 2 MX-1N DTR (orange)
- 3 MX-2P GND (white-green)
- 4 MX-2N DCD (green)
- 5 MX-3P TXD (blue)
- 6 MX-3N RXD (white-blue)
- 7 MX-4P DSR (white-brown)
- 8 MX-4N RTS (brown)
- 9 GND
- 10 Proprietary - do not use

**LBUS** (LEMO EEG.0B.304)



- 1 GND
- 2 Can L
- 3 VBat
- 4 Can H

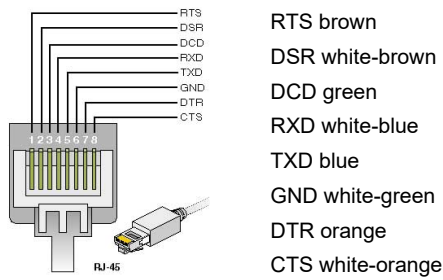
**EXT** (LEMO EEG.1B.307)



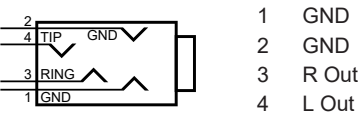
- 1 Can1 H
- 2 Can1 L
- 3 Can2 H
- 4 Can2 L
- 5 24 V Aux
- 6 GND
- 7 R/S



Ethernet (Computer Side)



Headphones Out (on MVF-2)



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

## 29.4 Cleaning Instructions

### ADVICE



#### Improper Cleaning Procedure

Risk of damage of surfaces.

- ▶ Only use the cleaning agents specified in this chapter.
- ▶ Do not use any strong or aggressive cleaning detergents like Methanol, Acetone, Benzine or acids. These chemicals may dissolve the paint on the camera body, damage highly polished surfaces and damage the optical coating of lenses.
- ▶ Do not moisten connectors when cleaning the camera.
- ▶ During cleaning of the camera, always make sure that the protective cap is on the lens mount.
- ▶ Avoid touching optical surfaces.
- ▶ Avoid wiping dry optical surfaces with a dry cloth, especially if the surfaces are not clean.
- ▶ Avoid wiping optical surfaces without air blow dusting first. If particles on optical surfaces are electrostatically charged, it may improve dusting efficiency to use deionized air.
- ▶ Compressed air should not be used on the camera body and electronic accessories.

### ATTENTION

Refer to the lens manufacturer's instructions for cleaning lenses.

#### Recommended Cleaning Agents

- Water
- Glass Cleaner
- Isopropyl Alcohol

#### Cleaning Information Camera Body

Area	Cleaning Procedure
Camera body	Clean the camera body, mechanical and electronic accessories with a soft, lint free cleaning cloth and some water or glass cleaner. Only when really necessary, e.g. to remove residues of camera tape, isopropyl alcohol should be used.
Narrow spaces and gaps	Use a manual air blower, cotton swabs or a soft brush to remove dust particles from narrow spaces and gaps.
Ventilation channel	Clean the ventilation channel using a vacuum cleaner at low level.

#### Cleaning Information Sensor Cover Glass

If the sensor cover glass has been contaminated by particles or smear, 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.

## 29.5 Repair

### ⚠ WARNING



#### Repairs carried out by Untrained Personnel

Risk of electric shock and fire caused by short circuit.

- Do not try to repair the device yourself. Repairs may only be carried out by authorized ARRI service partners.

For repairs and maintenance work on the camera system, please contact ["ARRI Service"](#).

## 29.6 Disposal

### ATTENTION

The product can be returned to the manufacturer.

When disposing of accessories, please observe the relevant manufacturer's instructions.



This product falls within the scope of Directive 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of June 4, 2012 on waste electrical and electronic equipment (WEEE II).

Accordingly, this product must not be disposed of with household waste. There are the respective country-specific disposal rules that must be observed.

## 29.7 ARRI Service Contacts

Please see the current list of service partners at [Service contacts](#)



**Arnold & Richter Cine Technik  
GmbH & Co. Betriebs KG**  
Herbert-Bayer-Str. 10  
80807 Munich  
Germany  
+49 89 3809 2121  
Business hours:  
Mo. - Fr. 09:00 am - 05:00 pm (CET)  
[service@arri.de](mailto:service@arri.de)

**ARRI CT Limited / London**  
2 Highbridge, Oxford Road  
UB8 1LX Uxbridge  
United Kingdom  
+44 1895 457 000  
Business hours:  
Mo. - Thu. 09:00 am - 05:30 pm (GMT)  
Fr. 09:00 am - 05:30 pm (GMT)  
[service@arri-ct.com](mailto:service@arri-ct.com)

**ARRI Inc. / West Coast**

3700 Vanowen Street  
CA 91505 Burbank  
USA  
+1 818 841 7070  
Business hours:  
Mo. - Fr. 09:00 am - 05:00 pm (PT)  
service@arri.com

**ARRI Canada Limited**

1200 Aerowood Drive, Unit 29  
ON L4W 2S7 Mississauga  
Canada  
+1 416 255 3335  
Business hours:  
Mo. - Fr. 08:30 am - 05:00 pm (EDT)  
service@arri.com

**ARRI Asia Pte. Ltd.**

164 Kallang Way, #03-01  
349248 Singapore  
Singapore  
+65 6230 9488  
Business hours:  
Mo. - Fr. 9:00 am - 06:00 pm (CST)  
service@arri.asia

**ARRI Hong Kong Limited**

41/F One Kowloon, 1 Wang  
Yuen Street Kowloon Bay  
Hong Kong  
China  
+852 2537 4266  
Business hours:  
Mo. - Fr. 09:00 am - 06:00 pm (CST)  
service@arri.asia

**ARRI Japan Kabushiki Kaisha**

Service  
Haneda Innovation City Zone K210, 1-1-4  
Hanedakuko, Ota-Ku  
144-0011 Tokyo  
Japan  
+81 3 6635 3750  
Business hours:  
Mo. - Fr. 10:00 am - 06:00 pm (JST)  
info@arri.jp

**ARRI Inc. / East Coast**

617 Route 303  
NY 10913 Blauvelt  
USA  
+1 845 353 1400  
Business hours:  
Mo. - Fr. 08:00 am - 05:30 pm (EST)  
service@arri.com

**ARRI Australia Pty Ltd**

Suite 2, 12B Julius Ave  
NSW 2113 North Ryde  
Australia  
+61 2 9855 4305  
Business hours:  
Mo. - Fr. 08:00 am - 05:00 pm (AEST)  
service@arri.com.au

**ARRI China (Beijing) Co. Ltd.**

Chaowai SOHO Tower C, 6/F, 0628/0656  
Chaowai Dajie Yi 6  
Beijing  
China  
+86 10 5900 9680  
Business hours:  
Mo. - Fr. 09:00 am - 06:00 pm (CST)  
service@arri.cn

**ARRI Korea Limited**

Kolon Digital Tower 1(#1505-06), 25  
Seongsuil-ro 4 gil, Seongdong-gu  
04781 Seoul  
Korea  
+82 (0)70 4419 6401  
Business hours:  
Mo. - Fr. 9:00 am - 06:00 pm (KST)  
service@arri.kr

**ARRI Brasil Ltda**

Avenida Ibirapuera 2907 – Cj. 421, Indianópolis  
04029-200 São Paulo  
Brazil  
+55 1150419450  
Business hours:  
Mo. - Fr. 09:00 am - 05:30 pm (BRT)  
arribrasil@arri.com

**CINEOM Broadcast DMCC.**

Unit No. 2109, Jumeirah Bay Tower X2 Cluster X  
Jumeirah Lakes Towers  
P.O Box 414659  
Dubai, UAE  
+971 (0) 45570477  
Business hours:  
Sa. - Th. 10:00 am- 06:00 pm  
arriservice.me@cineom.com

**CINEOM Broadcast India Pvt. Ltd.**

C-4, Goldline Business Centre  
Link Rd. Malad West  
400 064 Mumbai  
India  
+91 (0)22 42 10 9000  
Business hours:  
Mo. - Sat. 10:00 am - 06:00 pm (IST)  
arrisupportindia@cineom.com

**LINKA İthalat İhracat ve Dış Tic.**

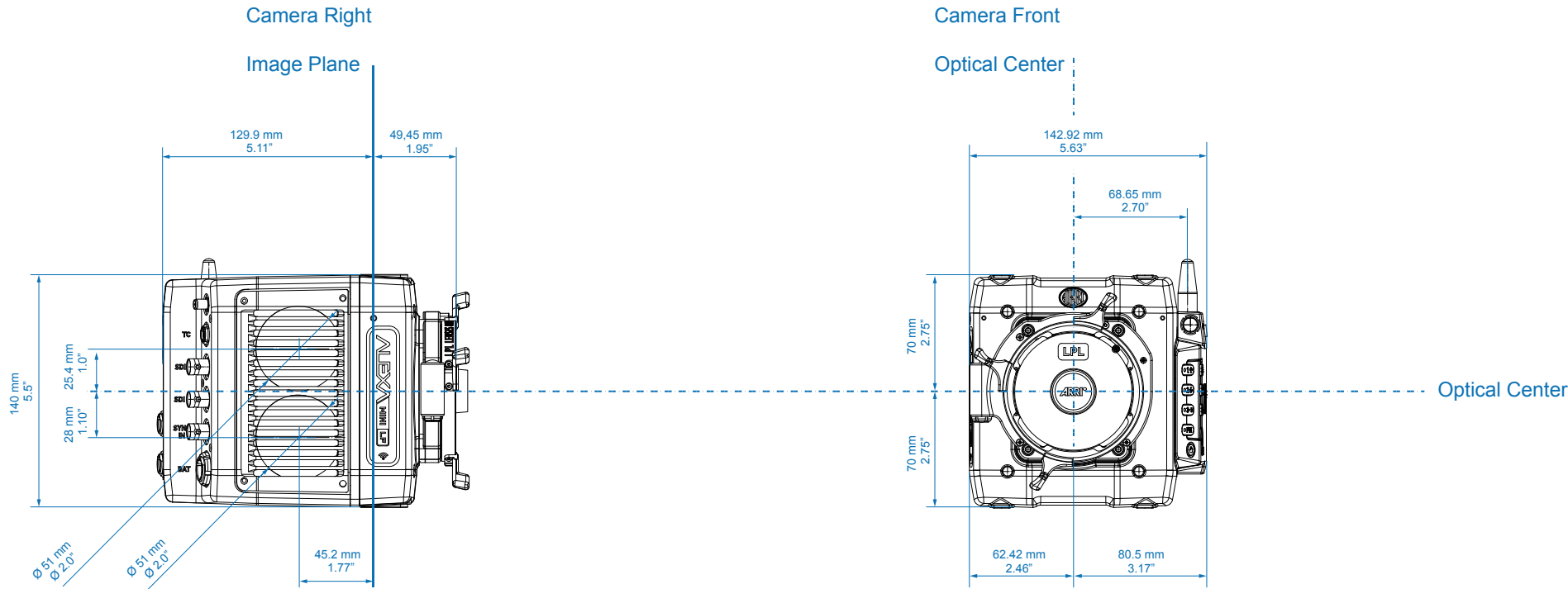
Distributor  
Halide Edip Adıvar Mah. Darülaceze Cad.  
No:3 Akın Plaza Kat:5 95-96  
34381 Şişli, İstanbul  
Turkey  
+90 2123584520  
Business hours:  
Mo. - Fr. 09:00 am - 06:00 pm (EET)  
service@linkgroup.com.tr

# ALEXA Mini LF



CAMERA DIMENSIONS – Version 2019-07

Technical Data are subject to change without notice.



## ALEXA Mini LF

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

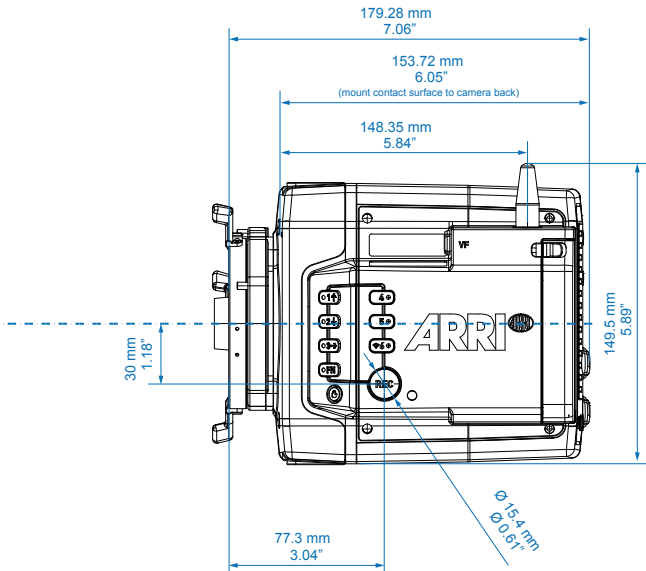
# ALEXA Mini LF



CAMERA DIMENSIONS – Version 2019-07

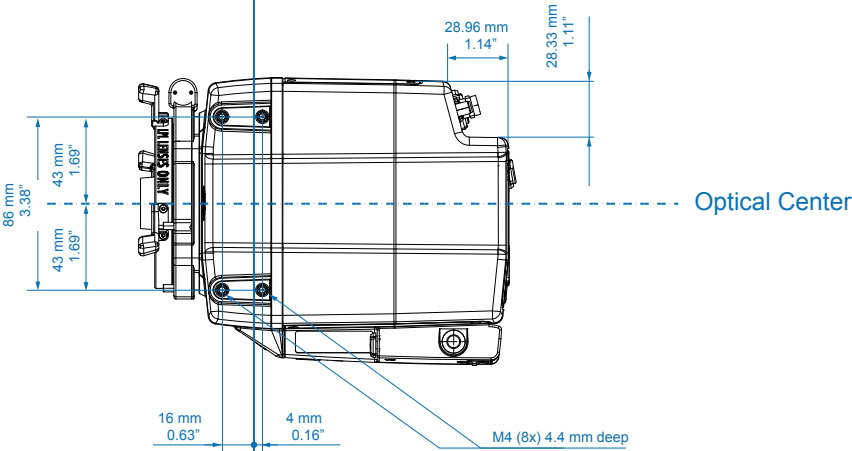
Technical Data are subject to change without notice.

Camera Left



Camera Top

Image Plane



## ALEXA Mini LF

Body + LPL mount  
MVF-2

Length                      Width                      Height                      Weight

188 mm - 7.4"                      143 mm - 5.6"                      140 mm - 5.5"                      ~2.6 kg / ~5.7 lbs  
800 g

ALEXA MINI LF