ARRI

SUP 4.0

Pocket Guide

ALEXA

ALEXA Pocket Guide – SUP 4.0 July 2011

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ALEXA Overview

Introduction

Welcome to the ALEXA and ALEXA Plus Pocket Guide, which provides key information for preproduction and production on an ALEXA shoot. While this guide contains a lot of technical information, it is important to note that the ALEXA platform has been designed to be easy to use and very user-friendly. The menu system and ergonomic controls are both simple and intuitive, so in many ways the best way to learn ALEXA is to get your hands on the real thing. However, carrying this guide with you and combining it with other resources such as the interactive ALEXA Camera Simulator at arridigital.com will ensure your readiness to take full advantage of the camera's unique and versatile features.

Preparing a Shoot

Be sure to discuss your workflow and choice of gamma and recording format with your postproduction team. To avoid surprises, it is critical to test your chosen settings and the complete workflow before the shoot itself; some of the tasks previously performed by a lab will have to be relocated to other places in the digital workflow.

We highly recommend that you make at least one backup immediately after an on-board SxS PRO card is removed from the camera. Moreover, it is advisable to capitalize on the immediacy of digitally captured material by having someone look at the footage as soon as possible for quality control.

Main Features

Exceptional Image Performance

- Film-like, organic look
  - extended, clean highlights
  - extremely low noise floor
  - natural skin tones
  - excellent color separation
  - cinematic depth of field
- Wide exposure latitude of 14 stops
- EI 800 base sensitivity (EI 160 to EI 3200)
- Sharp, natural images for 2K and HD

Efficient and Versatile Workflows

- Multiple output options
  - ProRes, ARRIRAW and HD-SDI
  - Log C, Rec 709 or DCI P3
  - ARRI Look Files for custom looks
  - audio recording
  - integrated rich metadata
- Apple ProRes
  - on-board file-based recording
  - onto SxS PRO cards
  - all five Apple ProRes codecs
  - same codec as FCP uses: Shoot > Edit
- ARRIRAW
  - best format for 2K deliverables
  - best quality for VFX productions
  - greatest flexibility in post
  - best option for archiving
- HD-SDI
  - integrates into existing HD infrastructures
  - configurable HD-SDI outputs

ARRI Product Quality

- Rugged and reliable
- Simple and safe operation
- Well balanced, ergonomic design
- Carefully considered details
- Precision sync for 3D
- Powerful assistive displays, including
  - surround view
  - false color exposure check
  - peaking focus check
  - compare stored image with live image
  - electronic level
  - RETURN IN video
  - optional anamorphic de-squeeze
- Compatible with existing accessories
- Worldwide ARRI service network

Open, Future-proof Architecture

- Compatibility with industry standards
  - PL mount lenses
  - HD-SDI, ProRes, SxS PRO cards
  - Gold mount or V-lock on-board batteries
  - 12 or 24 V power inputs and outputs
  - support for cmotion cvolution lens control systems
  - support for third party on-board recorders
  - support for ARRIRAW by third party post tools
- Numerous upgrade options
  - upgradable Storage Interface Module
  - upgradable Electronics Interface Module
  - Exchangeable Lens Mount (ELM)
  - easy and powerful free software updates
  - new features through purchase of license

Exposure

Exposure Index

While ALEXA's 14 stops of exposure latitude and unique highlight handling approaches that of film, there is one major difference between the way film and digital cameras behave: with digital cameras, a change in EI will shift how many stops are available above and below 18% grey – each EI step shifts the location of 18% grey. What is special about ALEXA, however, is that its wide exposure latitude which is available at all EI settings, and not just at one EI sensitivity setting.

	EI 160	EI 200	EI 400	EI 800	EI 1600	EI 3200
Above	5.0 Stops	5.3 Stops	6.3 Stops	7.4 Stops	8.4 Stops	9.4 Stops
	18% Gray	18% Gray	18% Gray	18% Gray	18% Gray	18% Gray
Below	9.0 Stops	8.7 Stops	7.7 Stops	6.6 Stops	5.6 Stops	4.6 Stops

As a shortcut, we have come up with the following
method of writing ALEXA's exposure index:

$EI\ 160^{+5.0}_{-9.0}$ $\quad EI\ 200^{+5.3}_{-8.7}$ $\quad EI\ 400^{+6.3}_{-7.7}$ $\quad EI\ 800^{+7.4}_{-6.6}$ $\quad EI\ 1600^{+8.4}_{-5.6}$ $\quad EI\ 3200^{+9.4}_{-4.6}$

Values behind the exposure index are the number of
stops above and below 18% grey. These values are
for Log C. Rec 709 and DCI P3 have 0.5 stops fewer

in the low end at EI 160, 0.4 stops fewer in the low
end at EI 200 and 0.2 stops fewer in the low end at
EI 400. Otherwise they are the same.

False Color Exposure Check

The false color exposure check for the electronic viewfinder and/or MON OUT output measures the camera image, tints certain signal levels in a distinct color and shows the rest as a black and white image. The false color exposure check is based on the color processing set for the respective output signal path. So if you have the viewfinder set to Rec 709, the false color exposure check will be based on the Rec 709 image. If you have the MON OUT at the same time set to Log C, the false color exposure check for MON OUT will be based on Log C.
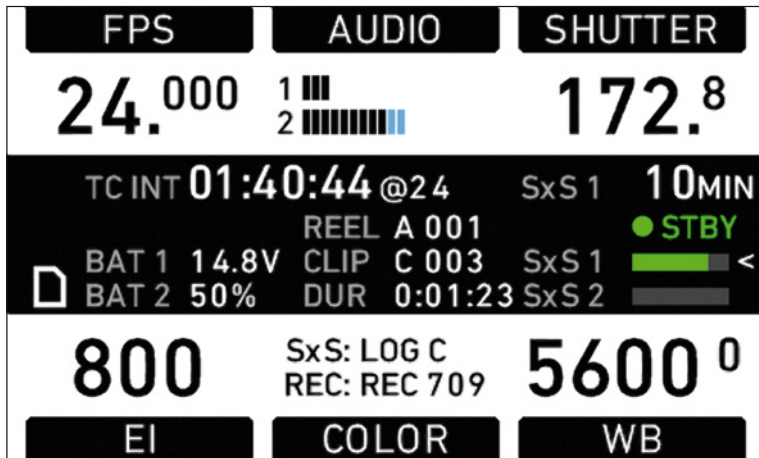
What	Signal Level	Color
White clipping	100% - 99%	red
Just below white clipping	99% - 97%	yellow
One stop over medium gray (Caucasian skin)	56% - 52%	pink
18% medium gray	42% - 38%	green
Just above black clipping	4.0% - 2.5%	blue
Black clipping	2.5% - 0.0%	purple

ND filters with ALEXA

Depending on the subject matter in front of the camera, you can use regular ND filters up to an ND 0.9. Beyond that, we recommend the use of ND filters that also attenuate the far red spectrum or the use of ND filters plus a separate filter that attenuates the far red spectrum. The use of only ND filters beyond ND 0.9 can lead to some black fabrics, especially synthetics, being recorded with a reddish/brown tint. The denser the ND filter in front of the camera, the more important it is to also attenuate the far red spectrum. Filters that reduce the far red spectrum, as well as such filters in combination with ND filters, are available from a number of manufacturers. A single filter that combines an ND and a far red cut off usually yields better results than multiple stacked filters.

Operation

Home Screen

Home Screen Center Bar

| TC | Displays current time code including source (INT=internal or EXT=external source). Frames are not displayed, instead the time base of the time code is shown in small digits. |

| MASTER | Camera is set to Ext sync: MASTER |

| SLAVE | Camera is set to Ext sync: SLAVE |

| ⟳ | Settings sync is active |

| BAT 1 | Voltage level of power source present at BAT connector, or percentage of remaining capacity of attached battery if it transmits this information. |

| BAT 2 | Voltage level of battery attached to top and/or back onboard battery adapter, or percentage of remaining capacity of attached battery if it transmits this information. |

| REEL | Identifies current reel. Consists of camera index and reel counter. |

| CLIP | Identifies current clip. Consists of clip index and clip counter. |

| DUR | Duration of current clip during recording or length of last recorded clip during standby. Shown as h:mm:ss. |

Home Screen Center Bar

CARD section — Displays capacity information of **SxS PRO** cards.

SxS 1 10MIN — Capacity of currently active card in minutes. Calculated for currently set frame rate and codec.
Note: since ProRes is a variable bit rate codec, these are only approximate values.

▬▬▬ — Green capacity bar showing remaining capacity as a percentage. Grey if card slot is empty. Red if card cannot be recorded. Press the INFO button for more info.

< — Marks the active card.

• STBY — The camera is in standby and ready to record.

• REC — The camera is recording.

• ERROR — An error occured. Recording is not possible. Press the INFO button for more info.
If nothing is shown, the camera works properly, but no **SxS PRO** card is present for recording.

Home Screen Icons

Name	Icon	Description	Name	Icon	Description
General Warning		Important information waiting on the info screen. Press the INFO button for more info.	Lock		Camera is locked.
General Error		An error occurred. Press the INFO button for more info.	SD Card		SD Card present. Turns orange when card is accessed.
Temperature Warning		Small sensor temperature offset. Image quality might be affected.	Grab		Stil frame is currently captured to the SD card. A new still frame can only be captured when this is completed.
Temperature Error		Large sensor temperature offset. Image quality might be affected seriously.	Tropical Mode		Sensor is in tropical mode (=40° C sensor temperature)

ALEXA

ALEXA Plus

Buttons & Menu Map – ALEXA & ALEXA Plus

MENU

RECORDING menu

SxS Cards >>
SxS Recording (<u>On</u>/Off)
Codec (ProRes 422 Proxy/ProRes 422 LT/ProRes 422/
ProRes 422 HO/<u>ProRes 4444</u>)
Dual Recording (On/<u>Off</u>)
Quick format SxS Card 1
Quick format SxS Card 2
Erase SxS Card 1
Erase SxS Card 2

REC OUT >>
Framerate (23.976/<u>24</u>/25/29.97/30/48/50/59.94/60fps)
HD-SDI format (<u>422 1.5G SL</u>/DL/3G SL/444 1.5 DL/
ARRIRAW 1.5G DL)
Scan format (<u>psf</u>/p)
Output range (<u>Legal</u>/Extended/Raw)
REC OUT fps sets sensor fps (On/<u>Off</u>)
SDI remote (<u>On</u>/Off)
Vari flag (<u>On</u>/Off)

MONITORING menu

Electronic viewfinder >>
Brightness (1-5)
Rotate image (On/<u>Off</u>)
Smooth mode (On/<u>Off</u>)
Surround view (On/<u>Off</u>)
Frame lines + status info >>
Frame lines (<u>On</u>/Off)
Surround mask (Black line/<u>Color line</u>/Mask 25%/50%/75%)
Center mark (Off/Dot/<u>Cross</u>)
Status info (<u>On</u>/Off)
Electronic level (On/<u>Off</u>)
LDS info (On/<u>Off</u>)
Peaking (Off/On) >>
Peaking (On/<u>Off</u>)
Peaking level (<u>Low</u>/Off)
Zoom position (<u>Centered</u>/Eye level)

MON OUT >>
Framerate (23.976/<u>24</u>/25/29.97/30/48/50/59.94/60fps)
Scanformat (<u>psf</u>/p)
Surround view (On/<u>Off</u>)
Frame lines + status info >>
Frame lines (<u>On</u>/Off)
Surround mask (Black line/<u>Color line</u>/Mask 25%/50%/75%)
Center mark (Off/Dot/<u>Cross</u>)
Status info (<u>On</u>/Off)
Electronic level (On/<u>Off</u>)
LDS info (On/<u>Off</u>)
Peaking (Off/On) >>
Peaking (On/<u>Off</u>)
Peaking level (<u>Low</u>/Off)
False Color (On/<u>Off</u>)

Frame lines >>
Frame line 1 (choose/add/delete; <u>Off</u>)   ↤
Frame line 2 (choose/add/delete; <u>Off</u>)
User rectangles >>
User rectangles (<u>Off</u>/Rect 1/Rect 2/Rect 1+2)
Set rect 1/2 >>
Top, Bottom, Left, Right (0 — 1000), Reset
Color (Red/Green/Blue/Yellow/Black/<u>White</u>)
Intensity (1-<u>4</u>)
RET IN path (EVF, MON OUT, <u>EVF+MON</u>)
Electronic level sensitivity (<u>1x</u>, 2x, 4x, 8x, 16x)

SYSTEM menu

Sensor >>
 Sensor temperature (<u>Standard</u>/Tropical)
Power >>
 BAT1 (Plug) warning (10.0-30.0V; <u>21.0V</u>)
 BAT2 (Onboard) warning (10.0-30.0V; <u>12.0V</u>)
Display + beeper >>
 Display button brightness (1-<u>8</u>)
 Button brightness (<u>Off</u>/Low/Medium/High)
 Run beeper mode (<u>Off</u>/Start/Stop/Start+Stop)
System time + date >>
 set date, time, timezone and daylight saving time
External sync >>
 Eye index (<u>R</u>/L)
 Sensor sync (<u>Off</u>/EXT master/EXT slave)
 HD out phase (+/- 30 clocks; <u>0 clocks</u>)
 Send HD sync trigger >
 Settings sync (<u>Off</u>/ETH master/slave)
Fan >>
 Fan mode (Regular/Rec low)
SD card >>
 Format + prepare SD card
 Prepare SD card
Licensed features >>
 install/delete licenses; save hardware info
Firmware >>
 select update file

PROJECT menu

Project frame rate (23.976/<u>24</u>/25/29.97/30fps)
Camera index (<u>A</u>-Z)
Next reel count (<u>001</u>-999)
Production info >>
 Director
 Cinematographer
 Location
 Production
 User info 1
 User info 2

FRAMEGRABS menu

File format (<u>Jpeg</u>/Tiff/Dpx/Ari)
Compare grab to live image >>
 load grab
 Options   Compare Options >>
           Compare mode (Toggle/<u>Interleave</u>)
           Active on EVF (On/<u>Off</u>)
           Active on MON OUT (On/<u>Off</u>)
Grabbed images inherit REC OUT settings!
Ari only possible, when REC OUT = ARRI RAW

USER SETUPS menu

Save current setup
Load setup
Factory reset

ALEXA SUP 4.0
underlined values
represent the factory reset.

Buttons & Menu Map – ALEXA & ALEXA Plus

HOME

FPS menu

set Sensor Speed (0.75 fps - 60fps; 24fps)
   add/delete value
   SxS Codec (MENU > RECORDING > SxS CARDS)
   SxS Info (INFO > SxS CARDS)
   REC OUT (MENU > RECORDING > REC OUT)
SDI FPS >>
   REC OUT (23.976, 24, 25, 29.97, 30)
   MON OUT (23.976, 24, 25, 29.97, 30)

EI menu

set ExposureIndex (160ASA - 3200ASA; 800ASA)

COLOR menu

set look
   choose/delete/load look from SD
set colorpath
   EVF   (LOOK ON/OFF FOR REC709, DCI P3)
   MON OUT (LOOK ON/OFF FOR REC709, DCI P3)
   SxS
   REC OUT } (LOOK ON/OFF FOR REC709, DCI P3)
Gamma
   Color > Gamma >>
   SxS   (REC709, DCI P3, LOGC)
   REC OUT (REC709, DCI P3, LOGC, ARRIRAW)
   MON OUT (REC709, DCI P3, LOGC)
   EVF   (REC709, LOGC)
LOG C film matrix (On/Off)

ALEXA SUP 4.0 underlined values represent the factory reset.

AUDIO menu

adjust CH1+/- (level +20/-10; <u>unity</u>)
adjust CH2+/- (level +20/-10; <u>unity</u>)
Audio OUT
   set Audio OUT
   Phones Level (+/-)
   Options
     Audio OUT > Options >>
     Left out (<u>CH1</u>, CH2, CH1+2, None)
     Right out (CH1, <u>CH2</u>, CH1+2, None)
     Audio OUT level (<u>Manual</u>, Unity max.)
Options
   Audio IN > Options >>
   Record (On/<u>Off</u>)
   Channel 1/2 level (Manual/<u>Unity</u>)
   Channel 1/2 source (L/R in)
   Soundroll (=Tape) (edit name)

SHUTTER menu

set Shutter Angle (5.0° - 358.0°; <u>172,8°</u>)
   add/delete value
   see calculated exposure time

WB menu

set WhiteBalance (2000K - 11000K, Auto WB);
                <u>5600K</u>; and CC SHIFT)
   add/rename/delete value

Buttons & Menu Map – ALEXA & ALEXA Plus

USER

USER BUTTON ASSIGNMENT screen

set Button 1, 2, 3
None
MON OUT surround
MON OUT gamma
MON OUT frame lines
MON OUT status info
MON OUT false color
MON OUT peaking
Frame lines color
EVF surround
EVF gamma
EVF frame lines
EVF status info
EVF zoom
EVF false color
EVF peaking
Grab still frame
Return in active
Toggle SxS
Check last clip
Circle clip

set Button 4, 5
None
MON OUT surround
MON OUT gamma
MON OUT frame lines
MON OUT status info
MON OUT false color
MON OUT peaking
Return in active
Frame lines color
Toggle SxS
Format Card1
Format Card2

PLAY

SxS PLAYBACK screen

start Playback of last clip (press wheel)
CLIPLIST
LIVE
Options
   PLAY Options >>
   Clip end action (Stop/Pause/Loop)
   Show frame lines (On/Off)
   Status info on MON OUT (On/Off)
STEPSIZE
CIRCLE CLIP

LOCK

BUTTON LOCK

locks HOMESCREEN,
MENU, PLAY, TC and INFO;
also locks the buttons on EVF!

ALEXA SUP 4.0 underlined values represent the factory reset.

INFO

SYSTEM INFORMATION screen

LIVE INFO
  SAVE TO SD ⊕
VERSION
SxS CARDS
SYSTEM
FPS INFO

TC

TIMECODE screen

SET TC (SET TO TIME/RESET/MANUAL)
Options
  Timecode Options >>
  Source (Int TC/Ext LTC)
  Mode (Rec run/Free Run)
  Generator (Regen/Jam Sync)
  User bit source (Internal/LTC in UB)
Userbits (set Userbits)
Project (Menu > Project)

GRAB

FRAMEGRAB screen

save Framegrab to SD Card ⊕

Buttons & Menu Map – ALEXA Plus

WRS

RADIO

STATUS
Channel: 0
Units: 0
On/Off

PLUS CAM > WRS
WRS radio power (On/Off)
WRS radio channel (0-7)

CAM LEVEL

STATUS READOUT FROM SENSORS
Tilt: 0.0°
Roll: 0.0°

CAM LEVEL > CALIBRATE
use to reset your null balance

IRIS CLM

CLM STATUS
*displays TYPE, DIRECTION and
TORQUE(1-4; only CLM-3)*

IRIS CLM
set DIRECTION
set TORQUE
CALIBRATE/CAL. ALL

ZOOM CLM

CLM STATUS
*displays TYPE, DIRECTION and
TORQUE(1-4; only CLM-3)*

ZOOM CLM
set DIRECTION
set TORQUE
CALIBRATE/CAL. ALL

ALEXA SUP 4.0 underlined values represent the factory reset.

LENS DATA

LDS READOUT

Status

LENS DATA
displays FOCAL LENGTH, IRIS,
FOCUS and DoF close/far

LDS OPTIONS

Lens distance unit (Metric, Imperial, <u>Default Unit</u>)
Circle of confusion (0.013/<u>0.025</u>/0.035/0.050mm)
Inverse iris scale (On/<u>Off</u>)
Inverse zoom scale (On/<u>Off</u>)
Inverse focus scale (On/<u>Off</u>)

LDA *available when non-LDS lens in use*
manage lens data for non-LDS lenses

FOCUS CLM

CLM STATUS
displays TYPE, DIRECTION and
TORQUE(1-4; only CLM-3)

FOCUS CLM
set DIRECTION
set TORQUE
CALIBRATE/CAL. ALL

Buttons & Menu Map – Electronic Viewfinder EVF-1

C A M

FPS

set Sensor Speed (0.75 fps - 60fps; <u>24fps</u>)

SHUTTER

set Shutter Angle (5.0° - 358°; <u>172,8°</u>)

EI

set EI value (160 ASA - 3200 ASA; <u>800 ASA</u>)

WB

set WhiteBalance (2000K - 11000K; <u>5600K</u>; and CC SHIFT)

E V F

ALEXA SUP 4.0 underlined values represent the factory reset.

EVF menu

Brightness (0-5)
Rotate Image (On/<u>Off</u>)
Smooth Mode (On/<u>Off</u>)
Surround View (<u>On</u>/Off)
Surround Mask (Black line/<u>Color Line</u>/Mask 25%/50%/75%)
Status Info (<u>On</u>/Off)
Frame Lines (<u>On</u>/Off)
Select Frame Lines 1 (choose from list)
Select Frame Lines 2 (choose from list)
Center Mark (Off/Dot/<u>Cross</u>)
User Rectangles (<u>Off</u>/Rect 1/Rect 2/Rect 1&2)
Edit User Rectangles (only when User Rectangles active)
Frame Lines Color (Red/Green/Blue/Yellow/Black/<u>White</u>)
Frame Lines Intensity (1 - <u>4</u>)

ZOOM　get pixel to pixel view
(toggle mode)

EXP　false color exposure check
(toggle mode)

Output Options

Output Overview

2x REC OUT	**T-Link**	2880 x 1620 ARRIRAW, 12 bit
		1920 x 1080 4:4:4 RGB, 10 bit
	HD-SDI	1920 x 1080 4:2:2 YCbCr, 10 bit
1x MON OUT	**HD-SDI**	1920 x 1080 4:2:2 YCbCr, 10 bit
2x SxS Cards	**QuickTime**	1920 x 1080 ProRes 4444, 12 bit
		1920 x 1080 ProRes 422 (HQ), 10 bit
		1920 x 1080 ProRes 422, 10 bit
		1920 x 1080 ProRes 422 (LT), 10 bit
		1920 x 1080 ProRes 422 (Proxy), 10 bit

ProRes

Codec	Color Coding	Bit Depth	Data rate @ 30 fps	Min. rec. time (32 GB SxS PRO @ 24 fps)	Max. fps**	Application
ProRes 422 (Proxy)	YCbCr	10	45 Mb/s	1 h 23 min	60	On-set monitoring and proxy editing while the master is captured with an external device.
ProRes 422 (LT)	YCbCr	10	102 Mb/s	37 min	60	Same as above when a higher image quality is desired.
ProRes 422	YCbCr	10	147 Mb/s	25 min	60	Basic television applications if images do not require adjustments in postproduction
ProRes 422 (HQ)	YCbCr	10	220 Mb/s	17 min	60	High quality television applications requiring color correction.
ProRes 4444*	RGB	12	330 Mb/s	11 min	40	High quality television or cinema applications requiring color correction and/or compositing.

* Even though the official name of this codec (pronounced "ProRes four by four") contains four fours, ALEXA records three (444).
The fourth four stands for an alpha channel that can be used in post but has no relevancy for image capture in the camera.
** Current limits of the SxS PRO 32 GB card (June 2011)

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ARRIRAW

ARRIRAW is the highest quality recording format when shooting with ALEXA, storing the full 2880 x 1620 pixels of raw, uncompressed and unprocessed 12 bit log Bayer data delivered by the sensor. Any steps that are necessary to create a full color image in a given resolution will be performed in post. This provides ARRIRAW advantages in terms of achievable resolution, postproduction flexibility and archivability.

When shooting for a 2K post workflow, recording ARRIRAW at 2880 x 1620 pixels and down-converting in post to a 2K image shows visibly better resolution than shooting in 1920 x 1080 HD and up-converting to 2K. This resolution difference is even more pronounced when special effects are involved: the ARRIRAW files can be reconstructed to a 2880 x 1620 full color image for special effects, and only be down-converted to 2K after the effects have been applied.

Many processing steps that are irreversibly 'baked-into' the ProRes or HD-SDI image are not applied to the ARRIRAW files. Those processing steps will be performed in post, where there is more time and where they can be reversed at any time by going back to the original ARRIRAW files. Thus ARRIRAW provides more flexibility in post, including the flexibility to apply different vendor's image reconstruction algorithms.

ARRIRAW T-Link Certified Recorders are currently (June 2011) Codex Digital Onboard as well as S.Two OB-1. Please check our website arridigital.com for more certified recorders and ARRIRAW compatible software products.

Gamma: Log C, Rec 709 and DCI P3

Aside from the ARRIRAW output, which contains no color processing, ALEXA can output images with four different color processing methods (commonly called 'gamma') applied. Thus ALEXA can provide the appropriate image format for a wide range of workflows from feature films to television.

- **Log C (film matrix off)** is a Log C signal with a wide gamut color space. This option provides great flexibility in color grading, as it preserves the most color information in the recorded image. However, you should be aware that Log C is an intermediate color format and not designed as a display standard. Viewed on a regular video monitor, Log C image look flat and desaturated. When using Log C images, color grading becomes an obligatory postproduction step and for proper previewing, creation of

dailies or editing proxies it is necessary to use Look Up Tables (LUTs). LUTs for ALEXA images can be downloaded from http://www.arridigital.com/technical/luts. For any further help with LUTs, contact digitalworkflow@arri.de.

- **Log C (film matrix on)** applies a color matrix that makes the resulting image resemble film negative scanned on an ARRISCAN. While this option somewhat reduces the color gamut in contrast to Log C (film matrix off), it provides an easy and fast way for colorists who are used to scanned negative, thus speeding up color grading. It is also a great option when combining ALEXA images with film originated images. The same caveats as for Log C (film matrix off) also apply.

- **Rec 709** is the output format for a traditional television workflow. 'Rec 709' is short for the International Telecommunication Union's ITU-R Recommendation BT.709. Since Rec 709 is the international standard for displaying images on video monitors, Look Up Tables (LUTs) are not necessary to show these images on monitors or to create dailies or editing proxies. Additionally, Rec 709 images can be easily processed by most HD video postproduction gear in real time. While providing somewhat reduced choices in color grading, Rec 709 still maintains ALEXA's wide exposure latitude, cinematic look and natural color rendition and offers the fastest workflow for any HD video-based infrastructure.

- **DCI P3** is suited for DCI P3 (also known as SMPTE 431-2) compliant displays. Those are primarily digital cinema projectors, but an increasing number of LCD displays support DCI P3 as well. DCI P3 has a similar tone mapping to Rec 709 but a wider color gamut that is designed to approximate the color gamut of print film. If you have a DCI P3 compliant monitor on the set or can see a DCI P3 compliant projection, this will give you a good idea what your images will look like in the digital cinema without having to use Look Up Tables.

About Log C

Cineon was a digital compositing system made by Kodak and is also the name of a file format that contains density data from scanned negative film. Density is a logarithmic measure of the opacity of the film. The relation of the density to the film's exposure (measured in logarithmic units) is called the characteristic curve of the film. Each stock has its own characteristic curve, but the overall shape is always the same. For ALEXA and the D-21, ARRI introduced a log encoding that is similar to scanned negative and because of its similarity, called it "Log C". Log C is a transform of camera data; it's similar but not equal to the data you get from a film scan.

Shooting in Log C

When scanned film material is brought into color grading, the colorist uses a preview LUT, so the monitor displays the image as it would appear in a projection from film. Log C material from ALEXA can be graded the same way as scanned footage (using preview LUTs). Shooting in Log C means that this material is the immediate result of cinematography. LUTs are required early in production and for a wide range of applications:

On Location
The live signal from the camera and recorded material that is played back for review has to be converted using a LUT to deliver a visually correct image on a monitor. Technically, we are not talking about a print simulation LUT anymore, but a conversion LUT as it is intended to present the image as if the camera were recording with "what you see is what you get" HD video encoding (Rec 709).

- If Log C material is recorded directly onto SxS cards in an ALEXA, the camera's MON OUT is typically set to Rec 709. This activates a conversion LUT, which is applied on the monitoring output.

- If an external recorder is used with ALEXA, monitoring usually is hooked up to the recorder rather than the camera, to eliminate the risk of defective cables. The conversion therefore is applied on the recorder's monitoring output.
- When an HD playback system is used to record the camera's output in parallel, it could record Log C and play back using a conversion LUT.

Dailies Creation

For dailies and offline edit, the Log C material needs to be delivered in standard Rec 709 video encoding. The camera metadata, embedded in the HD-SDI signal and QuickTime files, lists all information needed to select the appropriate LUT. While current hardware would allow applying LUTs on the fly, most workflows rely on a copy of rendered 'video proxies' with baked-in LUTs. When it is not desired to have matched shots with a first color correction:

- Externally recorded material can be ingested/transferred to postproduction with a LUT applied on the recorder's outputs (file-based as well as signal output).

- Material recorded to SxS cards with an ALEXA can be converted with a LUT directly in the editing tool using a software plugin or outside the editing tool using a standalone converter app.

When it is desired to have matched shots and an optional first color correction to get a preview of the intended look, the ProRes QuickTime clips or e.g. dpx or tiff file sequences are usually brought into a color grading tool which also applies the LUT upon rendering. Converting Log C encoded material to Rec 709 video gets rid of all information that is not required for a "what you see is what you get image". When Rec 709 material is brought back to Log C it therefore does not contain the same amount of information.

Visual Effects

Visual effects often work with linear light encoded material. When Log C material is linearized, all information can be preserved. It is therefore possible to do round-trip conversions from Log C to linear and back to Log C.

Gamma Settings Restrictions

It is possible to choose gamma settings individually for viewfinder (EVF-1), MON OUT, REC OUT and SxS. Please note, however, that there are some restrictions based on an interdependency of the REC OUT and SxS outputs as summarized in the tables below. If you set REC OUT or MON OUT to a gamma setting that would not be permitted, the other output will be switched to the same setting. The MON OUT and the EVF images are independent from each other. However, the EVF-1 image cannot be set to DCI P3.

REC OUT Setting	Possible SxS Setting
Log C	Rec 709, Log C or DCI P3
Rec 709	Rec 709 or Log C
DCI P3	Log C or DCI P3

SxS Setting	Possible REC OUT Setting
Log C	Rec 709, Log C or DCI P3
Rec 709	Rec 709 or Log C
DCI P3	Log C or DCI P3

ARRI Look Files

ARRI Look Files are editable XML files that can apply a customized look to all outputs (EVF-1, MON OUT, REC OUT and/or ProRes) that are set to either Rec 709 or DCI P3.

Various applications are currently under development that can create ARRI Look Files based on still images grabbed by ALEXA. These files can be saved to an SD card and imported into the camera. One look file can be activated at a time and applied to the different image paths individually. It is possible, for instance, to record a clean Log C image onto the SxS PRO card while outputting a Rec 709 image with a look applied on the MON OUT output. As soon as a look file gets applied to any output, the data of the look file is stored in metadata.

Metadata Overview

Metadata is a set of data that describes and gives information about other data. ALEXA can deliver a range of automatic and human-readable data that makes work in post much easier. Exposure index, gamma and white balance information, for example, is essential for creating dailies or color grading. Reel number, project fps, date and time become important when combining images and sound different sources. Frame by frame lens metadata, as recorded by ALEXA Plus when used with an LDS lens or a non-LDS lens in combination with the Lens data Mount or Lens Data Archive, is very useful for VFX work. All metadata listed here can be read from the xml-file that is stored along with the movie clips on the memory card. Starting with SUP4.0 it will be embedded within the clips. A much larger set of metadata, however, is embedded in the HD-SDI and ARRIRAW signal. For more details about included metadata, please contact digitalworkflow@arri.de

Camera Parameter	Description	FCP XML*	QuickTime Atom SUP 3.0/3.1	QuickTime Atom SUP 4.0
Sensor Fps	Frame rate of camera sensor	x		x
Shutter Angle	Shutter angle of camera sensor	x		x
White Balance	White Balance set on camera	x		x
White Balance CC Shift	White Balance Green/Magenta CC Shift set on camera	x		x
Exposure Index	Exposure Index set on camera	x	x	x
SxS Gamma	Gamma set on camera for SxS recording	x	x	x
Camera Model	ARRI ALEXA	x		x
Camera ID	A-Z unit information	x		x
Camera Serial Number	Serial number of camera encoded as Base36 (also used in Reel name)	x		x
Camera SUP	Software update packet installed on camera when clip was recorded	x	x	x
Date	Date of day as set by user when clip was recorded	x		x
Time	Time as set by user in camera at which clip was recorded	x		x
Production Name	Info string as entered by user in camera	x		x
Director Name	Info string as entered by user in camera	x		x
Cinematographer Name	Info string as entered by user in camera	x		x
Location Name	Info string as entered by user in camera	x		x
User Info 1	Info string as entered by user in camera	x		x
User Info 2	Info string as entered by user in camera	x		x
Circle Clip	Info on good take, as set by user in camera	x		
Project Fps	Project framerate=Timebase of Timecode=Playback fps	x		x
FCP UUID	UUID in FCP compatible format	x	x	x
Reel/Tape Name	Name of reel assigned to card	x		x
SxS Serial Number	Serial number of SxS card used for recording	x (SUP 4.0)		x
Sound Reel	Name of sound reel, as set in camera by user	x		x

*Other info in FCP XML: Timecode, duration and camera roll.
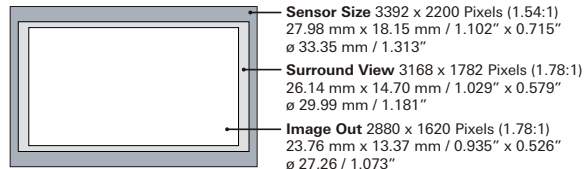Note: All metadata is contained in SDI/ARRIRAW if recorder supports it.

Technical Data

ALEXA

Camera Type   35 format film-style digital camera with integrated shoulder arch and receptacles for 15 mm lightweight rods

Sensor   35 format ALEV III CMOS with Dual Gain Architecture (DGA) and Bayer pattern color filter array. 1.5x oversampling for 1920 x 1080 output. 1.78:1 (16:9) sensor area used for image out.

Sensor Size 3392 x 2200 Pixels (1.54:1)
27.98 mm x 18.15 mm / 1.102″ x 0.715″
ø 33.35 mm / 1.313″

Surround View 3168 x 1782 Pixels (1.78:1)
26.14 mm x 14.70 mm / 1.029″ x 0.579″
ø 29.99 mm / 1.181″

Image Out 2880 x 1620 Pixels (1.78:1)
23.76 mm x 13.37 mm / 0.935″ x 0.526″
ø 27.26 / 1.073″

Frame Rates   ProRes 422 (Proxy), 422 (LT), 422 and 422 (HQ): 0.75 - 60 fps;
ProRes 4444: 0.75 - 40 fps;
HD-SDI: 0.75 - 60 fps;
ARRIRAW: 0.75 - 30 fps; all speeds adjustable with 1/1000 fps precision

Shutter	Electronic rolling shutter, adjustable from 5.0° to 358.0° with 1/10 degree precision
Exposure Latitude	14 stops for all sensitivity settings from EI 160 to EI 3200, as measured with the ARRI Dynamic Range Test Chart (DRTC)
Exposure Index	EI $160^{+5.0}_{-9.0}$ EI $200^{+5.3}_{-8.7}$ EI $400^{+6.3}_{-7.7}$ EI $800^{+7.4}_{-6.6}$ EI $1600^{+8.4}_{-5.6}$ EI $3200^{+9.4}_{-4.6}$
	Values behind the exposure index are the number of stops above and below 18% grey. These values are for Log C. Rec 709 and DCI P3 have 0.5 stops fewer in the low end at EI 160, 0.4 stops fewer in the low end at EI 200 and 0.2 stops fewer in the low end at EI 400. Otherwise they are the same.
White Balance	Separate red/blue and green/magenta balance available through Auto White Balance or manual setting. Red/blue: 2000 to 11000 Kelvin, adjustable in 100 K steps, with presets of 3200 (tungsten), 4300 (fluorescent), 5600 (daylight), 7000 (daylight cool). Green/magenta: -8 to +8 color correction (CC), 1 CC = 035 Kodak CC values or 1/8 Rosco values.

Sound Level	Under 20 dB(A) at ≤ +30° Celsius (≤ +86° Fahrenheit) with lens attached and fan mode set to 'Regular', measured 1 m/3 feet from the image plane. Silent operation at higher temperatures possible with fan mode set to "Rec low'.
Power In	Three inputs: BAT connector, battery adapter back and battery adapter top. All accept 10.5 to 34 V DC. 85 W power draw for camera and EVF-1 in typical use recording to SxS PRO cards, without accessories.
Power Out	12 V connector: limited to 12 V, up to 2.2 A. RS, EXT and ETHERNET: input below 24 V is regulated up to 24 V, above 24 V: input = output voltage. Both RS and EXT connectors combined: up to 2.2 A. ETHERNET: up to 1.2 A. Maximum power draw is also limited by the power source.
Weight	ALEXA camera body + SxS Module: 6.3 Kg/13.8 lbs ALEXA camera body + SxS Module + EVF-1 + Viewfinder Mounting Bracket VMB-1 + viewfinder cable + Center Camera Handle CCH-1: 7.7 Kg/16.9 lbs
Dimensions	Length: 332 mm/12.95", width: 153 mm/6.02", height: 158 mm/6.22"
Environmental	-20° C to +45° C (-4° F to +113° F) @ 95% humidity max, non condensing. Splash and dust proof through sealed electronics. System cooling through radiator/single fan.

| **Lens Mount** | ARRI Exchangeable Lens Mount (ELM); ships with Lens Adapter PL Mount w/o LDS (LA-PL-1), 54 mm stainless steel PL mount, Super 35 centered. |

| **Flange Focal Depth** | 52.00 mm nominal |

| **Viewfinder** | Low latency (≤1 frame delay) electronic color viewfinder ARRI EVF-1 with 1280 x 784 F-LCOS micro display (image: 1280 x 720, status bars: 1280 x 32 above and 1280 x 32 below image) and ARRI LED illumination, both temperature controlled. Image can be flipped for use of viewfinder on camera left or right. Viewfinder Mounting Bracket allows movement of viewfinder forward/backwards, left/right, up/down, 360 degree-rotation and placement on camera left or right. |

| **Assistive Displays** | On EVF-1 and MON OUT: frame lines, surround view, camera status, false color exposure check, peaking focus check, compare stored image with live image, RETURN IN video and optional anamorphic de-squeeze. |

| **Control** | Camera right: main user interface with 3″ transflective 400 x 240 pixel LCD color screen, illuminated buttons and jog wheel. Camera left: operator interface with illuminated buttons and card swap button. EVF-1: viewfinder and basic camera settings, ZOOM button (2.25x pixel to pixel magnification), EXP button (false color exposure check) and jog wheel. |

In-camera Recording	Apple QuickTime/ProRes 4444, 422 (HQ), 422, 422 (LT) or 422 (Proxy) 1080p .mov files with embedded audio, timecode and metadata, recording to SxS PRO cards. ProRes 4444 is RGB 12 bit, all others YCbCr 10 bit; all legal range. Minimum recording times on a 32 GB card at 24 fps: ProRes 4444 - 15 minutes, ProRes 422 (HQ) - 19 minutes.
Recording Outputs	2x REC OUT BNC connectors for uncompressed ARRIRAW or uncompressed HD-SDI video. Both with embedded audio, timecode and metadata. ARRIRAW: 2880 x 1620, 12 bit log signal without white balance or exposure index processing applied. Requires an ARRIRAW T-Link certified recorder.
	HD-SDI video: 1920 x 1080 4:4:4 RGB or 4:2:2 YCbCr; all legal or extended range, with optional HD-SDI record flag. Recording frame rates other than HD standard (23.976, 24, 25, 29.97, 30, 50, 59.94, 60 fps) requires a recorder with Variflag support.
Monitor Output	1x MON OUT BNC connector for uncompressed HD-SDI video: 1920 x 1080, 4:2:2 YCbCr; all legal range.
Color Processing	For EVF-1, ProRes, REC OUT and MON OUT: Log C (film matrix off), Log C (film matrix on), Rec 709 or DCI P3. For Rec 709 and DCI P3 a customized look can be applied with ARRI Look Files.
Synchronization	Master/Slave mode for precision sync of sensor, processing and HD-SDI outputs for 3D applications.

Playback	QuickTime clips can be played back from the SxS PRO cards to the EVF-1, MON OUT and REC OUT outputs. Playback audio is available embedded in the MON OUT and REC OUT signals and on the headphones jack.
Processing	16 bit linear internal image processing
Audio	1x XLR 5 pin AUDIO IN connector for 2 channel, line level balanced audio input, 24 bit/48 kHz A/D conversion, works at 23.976, 24, 25, 29.97 and 30 fps. Audio is recorded uncompressed into the QuickTime/ProRes file and embedded uncompressed in all HD-SDI outputs, including ARRIRAW T-Link. Max of 2.5 dBm output from AUDIO OUT headphones connector.
Connectors	2x slots for SxS PRO cards (SxS) 2x BNC recording out HD-SDI, 1.5G/3G switchable (REC OUT 1 and REC OUT 2) 1x BNC monitoring out HD-SDI 1.5G (MON OUT) 1x XLR 5 pin audio in (AUDIO IN) 1x BNC return signal/sync in HD-SDI 1.5G (RET/SYNC IN) 1x LEMO 16 pin external accessory interface (EXT) 1x Fischer 2 pin 24 V power in (BAT) 2x Fischer 3 pin 24 V remote start and accessory power out (RS) 1x LEMO 2 pin 12 V accessory power out (12 V) 1x LEMO 5 pin timecode in/out (TC)

1x TRS 3.5 mm headphone mini stereo jack out (AUDIO OUT)
1x LEMO custom 16 pin electronic viewfinder (EVF)
1x LEMO 10 pin Ethernet with power (ETHERNET)

SD Card   Stores camera set up files, log files, frame line xml files and captured stills in ARRIRAW (.ari, 12 bit), TIFF (.tif, 16 bit), DPX (.dpx, 10 bit) and JPEG (.jpg, 8 bit) format. Also used for software updates.

Upgrades   The Storage Interface Module (currently available for SxS PRO cards) can be exchanged for future storage modules. The Electronics Interface Module (available as either regular ALEXA or ALEXA Plus versions) can be exchanged for future control electronics. Exchangeable Lens Mount (ELM) allows other lenses beyond PL mount lenses to be used. Simple camera software updates. Licenses available for purchase: Anamorphic de-squeeze.

All technical data based on Software Update Packet (SUP) 4.0. All data subject to change without notice.
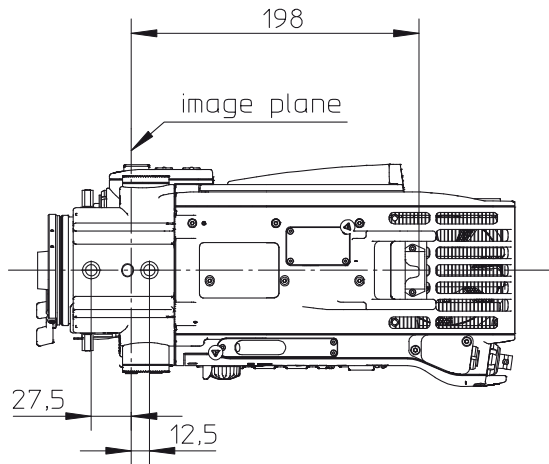
ALEXA Plus

Same as ALEXA, but with built-in support for the ARRI Wireless Remote System, cmotion cvolution lens control system and ARRI Lens Data System (including Lens Data Mount and Lens Data Archive for lenses without built-in LDS). Also has one additional RS, two LCS, one LDD and three lens motor connectors, built-in motion sensors and Quick Switch BNC connectors.

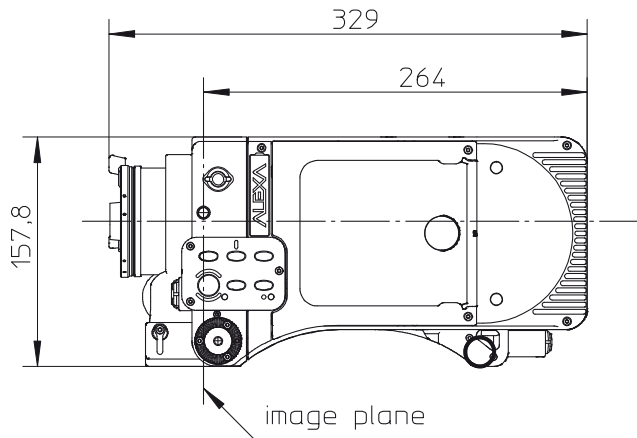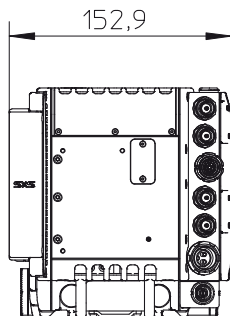|	
Weight	ALEXA Plus camera body + SxS Module: 7.0 Kg/15.4 lbs ALEXA Plus camera body + SxS Module + EVF-1 + Viewfinder Mounting Bracket VMB-2 + viewfinder cable + Center Camera Handle CCH-1: 8.4 Kg/18.5 lbs
Power Out	Same as ALEXA
Dimensions	Length: 332 mm/12.95″, width: 175 mm/6.89″, height: 158 mm/6.22″
Lens Mount	ARRI Exchangeable Lens Mount (ELM); ships with Lens Adapter PL Mount with Lens Data System contacts (LA-PL-2), 54 mm stainless steel PL mount, Super 35 centered
Assistive Displays	On EVF-1 and MON OUT: electronic level.
Synchronization	Automated sync of lens settings for 3D applications in Master/Slave mode.

All technical data based on Software Update Packet (SUP) 4.0. All data subject to change without notice.
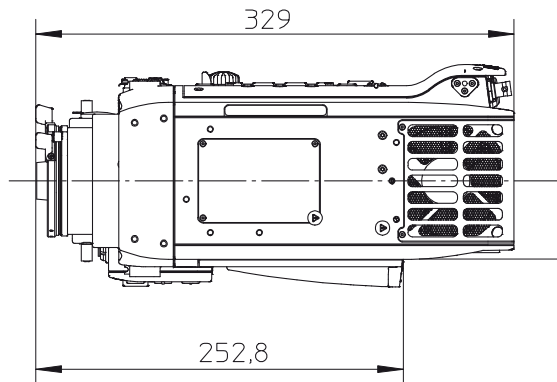
Dimensions

ALEXA

ALEXA

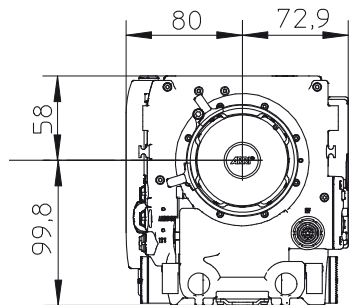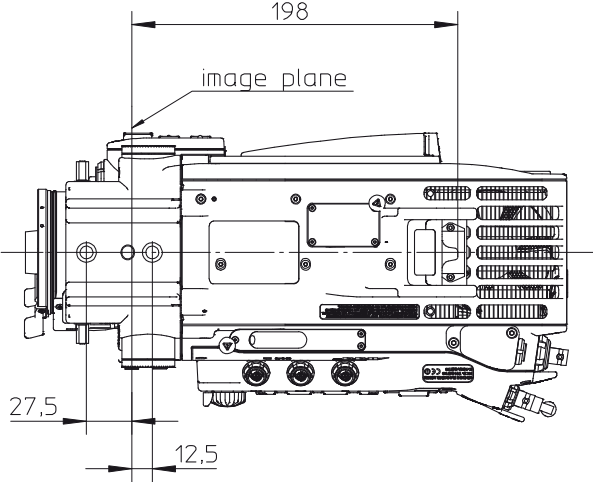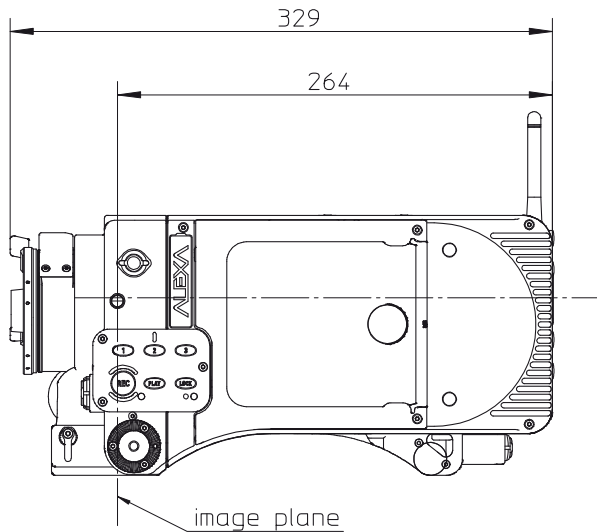152,9

329

264

157,8

image plane
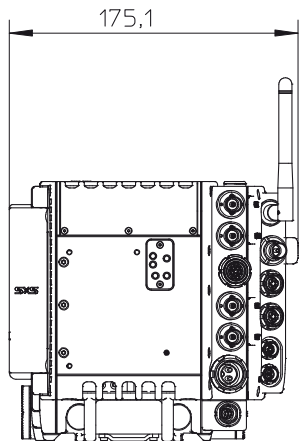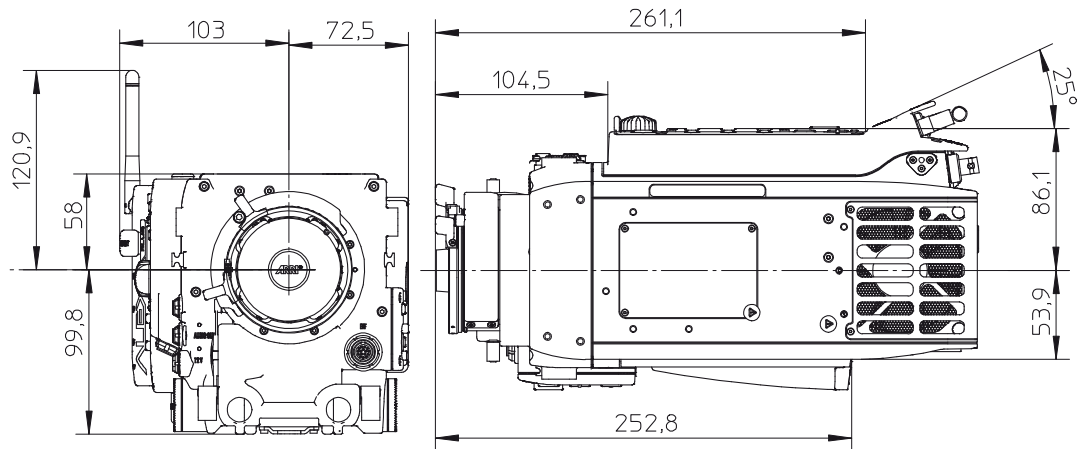
ALEXA

ALEXA Plus

ALEXA Plus

175,1

329

264

image plane

ALEXA Plus

ARRI Lenses

ARRI/ZEISS Master Primes

Name	Lens Mount [1]	Aperture	Close focus [2]	Magnification ratio [3]	Length [4]	Front diameter [5]	Maximum housing diamenter	Weight
Master Prime 12	PL LDS	T1.3 - T22	0.40 m / 16"	1:16.5	197 mm / 7.8"	156 mm / 6.1"	159 mm / 6.3"	2.9 Kg / 6.4 lb
Master Prime 14	PL LDS	T1.3 - T22	0.35 m / 14"	1:11.7	172 mm / 6.8"	114 mm / 4.5"	128 mm / 5"	2.4 Kg / 5.3 lb
Master Prime 16	PL LDS	T1.3 - T22	0.35 m / 14"	1:11.8	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.2 Kg / 4.8 lb
Master Prime 18	PL LDS	T1.3 - T22	0.35 m / 14"	1:11.0	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.2 Kg / 4.8 lb
Master Prime 21	PL LDS	T1.3 - T22	0.35 m / 14"	1:9.5	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.4 Kg / 5.3 lb
Master Prime 25	PL LDS	T1.3 - T22	0.35 m / 14"	1:8.6	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.6 Kg / 5.1 lb
Master Prime 27	PL LDS	T1.3 - T22	0.35 m / 14"	1:7.8	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.2 Kg / 4.8 lb
Master Prime 32	PL LDS	T1.3 - T22	0.35 m / 14"	1:7.1	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.3 Kg / 5.1 lb
Master Prime 35	PL LDS	T1.3 - T22	0.35 m / 14"	1:6.4	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.2 Kg / 4.8 lb
Master Prime 40	PL LDS	T1.3 - T22	0.40 m / 16"	1:7.0	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.3 Kg / 5.1 lb
Master Prime 50	PL LDS	T1.3 - T22	0.50 m / 20"	1:7.0	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.7 Kg / 5.9 lb
Master Prime 65	PL LDS	T1.3 - T22	0.65 m / 2'3"	1:8.2	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.6 Kg / 5.7 lb
Master Prime 75	PL LDS	T1.3 - T22	0.80 m / 2'9"	1:8.9	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.8 Kg / 6.2 lb
Master Prime 100	PL LDS	T1.3 - T22	1.00 m / 3'6"	1:8.9	153 mm / 6"	114 mm / 4.5"	128 mm / 5"	2.9 Kg / 6.4 lb
Master Prime 150	PL LDS	T1.3 - T22	1.50 m / 4'11"	1:10.3	210 mm / 8.3"	134 mm / 5.3"	137 mm / 5.4"	4.0 Kg / 8.8 lb

Angle of view H, V, D			Entrance pupil [6]
Normal 35 [8] ID = 27.20 mm [7]	DIN Super 35 [9] ID = 30.00 mm [7]	ANSI Super 35 [10] ID = 31.14 mm [7]	
83.87° -66.44° - 96.13°	88.85° - 72.70° - 101.97°	90.98° - 74.78° - 104.26°	208,3 mm / 8,2″
76.42° - 59.41° - 88.52°	81.24° - 65.39° - 94.07°	83.44° - 67.49° - 96.33°	189,3 mm / 7,4″
70.07° - 53.79° - 81.76°	74.85° - 59.56° - 87.24°	76.87° - 61.50° - 89.33°	158,8 mm / 6,2″
63.98° - 48.60° - 75.29°	68.56° - 53.97° - 80.52°	70.53° - 55.80° - 82.48°	154,9 mm / 6,1″
55.96° - 42.05° - 66.60°	60.22° - 46.85° - 71.70°	62.07° - 48.50° - 73.66°	149,3 mm / 5,8″
48.12° - 35.79° - 57.97°	52.01° - 40.00° - 62.89°	53.72° - 41.45° - 64.81°	135,9 mm / 5,3″
43.82° - 32.45° - 53.08°	47.45° - 36.31° - 57.80°	49.06° - 37.64° - 59.66°	136,7 mm / 5,4″
38.84° - 28.74° - 47.10°	42.07° - 32.16° - 51.31°	43.51° - 33.35° - 52.98°	128,4 mm / 5,0″
35.04° - 25.82° - 42.64°	38.01° - 28.94° - 46.52°	39.33° - 30.02° - 48.04°	126,9 mm / 4,9″
30.91° - 22.75° - 37.68°	33.55° - 25.51° - 41.15°	34.73° - 26.46° - 42.52°	119,5 mm / 4,7″
25.02° - 18.27° - 30.81°	27.26° - 20.53° - 33.88°	28.26° - 21.32° - 35.13°	136,1 mm / 5,3″
19.27° - 14.06° - 23.72°	20.99° - 15.80° - 26.08°	21.59° - 16.58° - 27.00°	107,3 mm / 4,2″
16.66° - 12.17° - 20.51°	18.15° - 13.67° - 22.56°	18.82° - 14.20° - 23.39°	102,5 mm / 4,0″
12.60° - 9.17° - 15.56°	13.74° - 10.32° - 17.14°	14.25° - 10.72° - 17.79°	57,2 mm / 2,2″
8.53° - 6.22° - 10.53°	9.30° - 6.99° - 11.59°	9.65° - 7.26° - 12.03°	-89,0 mm / -3,5″

Operation Temperature: -20°C to +40°C / -4°F to +104°F
Storage/Transport Temperature: -40C to +70°C / -40°F to +158°F

[1] Positive locking (PL) 54 mm stainless steel lens mount with Lens Data System (LDS) contacts
[2] Close focus is measured from the film/sensor plane
[3] Magnification ratio is the relationship of the size of an object on the film/sensor plane (first number) to the size of that object in real life (second number) at the close focus setting
[4] Lens length is measured from the lens mount to the front of the lens housing
[5] Diameter of the lens/matte box interface
[6] The distance from the entrance pupil to the film/sensor plane. Positive numbers indicate an entrance pupil in front, negative numbers indicate an entrance pupil behind the film/sensor plane. The entrance pupil (often mistakenly called "nodal point") is the center of perspective; moving the camera/lens system around the center of the entrance pupil prevents parallax errors. While largerly irrelevant for live action, this measurement is important for special effects work.
[7] The image diameter (ID) is the diameter of the image circle needed for the respective format. These lenses are designed for the largest ID given here.
[8] Horizontal (H), vertical (V) and diagonal (D) angles of view for a Normal 35 Academy camera aperture (aspect ratio 1.37:1, dimensions 22mm x 16mm / 0.8661" x 0.6299")
[9] Horizontal (H), vertical (V) and diagonal (D) angles of view for a DIN Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24mm x 18mm / 0.944" x 0.7087")
[10] Horizontal (H), vertical (V) and diagonal (D) angles of view for an ANSI Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24.9mm x 18.7mm / 0.980" x 0.7362")

All data subject to change without notice.

ARRI/ZEISS Ultra Primes

Name	Lens Mount [1]	Aperture	Close focus [2]	Length [4]	Front diameter [5]	Weight	Normal 35 [8] ID = 27.20 mm [7]
Ultra Prime 8R	PL	T2.8 to T22	0.35 m / 13.8"	130 mm / 5.1"	134 mm / 5.3"	2.0 Kg / 4.4 lb	107.0°
Ultra Prime 10	PL	T2.1 to T22	0.35 m / 13.8"	143 mm / 5.6"	156 mm / 6.1"	2.9 Kg / 6.4 lb	90.8°
Ultra Prime 12	PL	T2.0 to T22	0.30 m / 11.8"	140 mm / 5.5"	156 mm / 6.1"	2.0 Kg / 4.4 lb	85.2°
Ultra Prime 14	PL	T1.9 to T22	0.22 m / 8.7"	112 mm / 4.4"	114 mm / 4.5"	1.8 Kg / 4.0 lb	75.6°
Ultra Prime 16	PL	T1.9 to T22	0.25 m / 9.8"	94 mm / 3.7"	95 mm / 3.7"	1.2 Kg / 2.6 lb	70.8°
Ultra Prime 20	PL	T1.9 to T22	0.28 m / 11"	91 mm / 3.6"	95 mm / 3.7"	1.2 Kg / 2.6 lb	58.4°
Ultra Prime 24	PL	T1.9 to T22	0.30 m / 11.8"	91 mm / 3.6"	95 mm / 3.7"	1.0 Kg / 2.2 lb	50.2°
Ultra Prime 28	PL	T1.9 to T22	0.28 m / 11"	91 mm / 3.6"	95 mm / 3.7"	1.0 Kg / 2.2 lb	43.2°
Ultra Prime 32	PL	T1.9 to T22	0.35 m / 13.8"	91 mm / 3.6"	95 mm / 3.7"	1.1 Kg / 2.4 lb	38.2°
Ultra Prime 40	PL	T1.9 to T22	0.38 m /15"	91 mm / 3.6"	95 mm / 3.7"	1.0 Kg / 2.2 lb	30.6°
Ultra Prime 50	PL	T1.9 to T22	0.60 m / 23.6"	91 mm / 3.6"	95 mm / 3.7"	1.0 Kg / 2.2 lb	24.0°
Ultra Prime 65	PL	T1.9 to T22	0.65 m / 25.6	91 mm / 3.6"	95 mm / 3.7"	1.1 Kg / 2.4 lb	19.2°
Ultra Prime 85	PL	T1.9 to T22	0.90 m / 35.4"	91 mm / 3.6"	95 mm / 3.7"	1.2 Kg / 2.6 lb	15.2°
Ultra Prime 100	PL	T1.9 to T22	1.00 m / 39.4"	91 mm / 3.6"	95 mm / 3.7"	1.2 Kg / 2.6 lb	12.6°
Ultra Prime 135	PL	T1.9 to T22	1.50 m / 59.1"	119 mm / 4.7"	95 mm / 3.7"	1.6 Kg / 3.5 lb	9.3°
Ultra Prime 180	PL	T1.9 to T22	2.60 m / 102.4"	166 mm / 6.5"	114 mm / 4.5"	2.6 Kg / 5.7 lb	7.0°

Horizontal Angle of View		Entrance pupil [6]
DIN Super 35 [9] ID = 30.00 mm [7]	ANSI Super 35 [10] ID = 31.14 mm [7]	
112.0°	114.0°	155,2 mm / 6,1"
100.2°	102.1°	120,2 mm / 4,7"
90.2°	92.6°	113,4 mm / 4,4"
80.6°	82.6°	91,3 mm / 3,5"
73.0°	75.2°	85,1 mm / 3,3"
62.8°	65.0°	73,3 mm / 2,8"
54.2°	55.8°	67,4 mm / 2,6"
46.8°	48.4°	67,3 mm / 2,6"
41.6°	43.0°	61,1 mm / 2,4"
33.2°	34.7°	59,2 mm / 2,3"
26.2°	27.2°	13,4 mm / 0,5"
21.0°	21.8°	19,0 mm / 0,7"
16.5°	17.1°	3,5 mm / 0,1"
13.7°	13.9°	12,4 mm / 0,4"
10.2°	10.5°	-56,9 mm / -2,2"
7.6°	7.9°	-19,7 mm / -0,7"

Operation Temperature: -20°C to +40°C / -4°F to +104°F
Storage/Transport Temperature: -40C to +70°C / -40°F to +158°F

[1] Positive locking (PL) 54 mm stainless steel lens mount
[2] Close focus is measured from the film/sensor plane
[3] Magnification ratio is the relationship of the size of an object on the film/ sensor plane (first number) to the size of that object in real life (second number) at the close focus setting
[4] Lens length is measured from the lens mount to the front of the lens housing
[5] Diameter of the lens/matte box interface
[6] The distance from the entrance pupil to the film/sensor plane. Positive numbers indicate an entrance pupil in front, negative numbers indicate an ent rance pupil behind the film/sensor plane. The entrance pupil (often mistakenly called "nodal point") is the center of perspective; moving the camera/lens system around the center of the entrance pupil prevents parallax errors. While largerly irrelevant for live action, this measurement is important for special effects work.
[7] The image diameter (ID) is the diameter of the image circle needed for the respective format. These lenses are designed for the largest ID given here.
[8] Horizontal angles of view for a Normal 35 Academy camera aperture (aspect ratio 1.37:1, dimensions 22mm x 16mm / 0.8661" x 0.6299")
[9] Horizontal angles of view for a DIN Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24mm x 18mm / 0.944" x 0.7087")
[10] Horizontal angles of view for an ANSI Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24.9mm x 18.7mm / 0.980" x 0.7362")

All data subject to change without notice.

ARRI/ZEISS LDS Ultra Primes

Name	Lens Mount [1]	Aperture	Close focus [2]	Length [4]	Front diameter [5]	Weight	Normal 35 [8] ID = 27.20 mm [7]
Ultra Prime 12	PL LDS	T2.0 to T22	0.30 m / 11.8"	140 mm / 5.5"	156 mm / 6.1"	2.2 Kg / 4.8 lb	85.2°
Ultra Prime 14	PL LDS	T1.9 to T22	0.22 m / 8.7"	112 mm / 4.4"	114 mm / 4.5"	1.8 Kg / 4.0 lb	75.6°
Ultra Prime 16	PL LDS	T1.9 to T22	0.25 m / 9.8"	94 mm / 3.7"	104 mm / 4.1"	1.5 Kg / 3.3 lb	70.8°
Ultra Prime 20	PL LDS	T1.9 to T22	0.28 m / 11"	91 mm / 3.6"	104 mm / 4.1"	1.5 Kg / 3.3 lb	58.4°
Ultra Prime 24	PL LDS	T1.9 to T22	0.30 m / 11.8"	91 mm / 3.6"	104 mm / 4.1"	1.3 Kg / 2.9 lb	50.2°
Ultra Prime 28	PL LDS	T1.9 to T22	0.28 m / 11"	91 mm / 3.6"	104 mm / 4.1"	1.5 Kg / 3.3 lb	43.2°
Ultra Prime 32	PL LDS	T1.9 to T22	0.35 m / 13.8"	91 mm / 3.6"	104 mm / 4.1"	1.4 Kg / 2.1 lb	38.2°
Ultra Prime 40	PL LDS	T1.9 to T22	0.38 m /15"	91 mm / 3.6"	104 mm / 4.1"	1.4 Kg / 2.1 lb	30.6°
Ultra Prime 50	PL LDS	T1.9 to T22	0.60 m / 23.6"	91 mm / 3.6"	104 mm / 4.1"	1.2 Kg / 2.6 lb	24.0°
Ultra Prime 65	PL LDS	T1.9 to T22	0.65 m / 25.6	91 mm / 3.6"	104 mm / 4.1"	1.4 Kg / 2.1 lb	19.2°
Ultra Prime 85	PL LDS	T1.9 to T22	0.90 m / 35.4"	91 mm / 3.6"	104 mm / 4.1"	1.5 Kg / 3.3 lb	15.2°
Ultra Prime 100	PL LDS	T1.9 to T22	1.00 m / 39.4"	91 mm / 3.6"	104 mm / 4.1"	1.5 Kg / 3.3 lb	12.6°
Ultra Prime 135	PL LDS	T1.9 to T22	1.50 m / 59.1"	119 mm / 4.7"	104 mm / 4.1"	2.0 Kg / 4.4 lb	9.3°
Ultra Prime 180	PL LDS	T1.9 to T22	2.60 m / 102.4"	166 mm / 6.5"	114 mm / 4.5"	2.8 Kg / 6.2 lb	7.0°

Operation Temperature: -20°C to +40°C / -4°F to +104°F
Storage/Transport Temperature: -40C to +70°C / -40°F to +158°F

Horizontal Angle of View		Entrance pupil [6]
DIN Super 35 [9] ID = 30.00 mm [7]	ANSI Super 35 [10] ID = 31.14 mm [7]	
90.2°	92.6°	113,4 mm / 4,4"
80.6°	82.6°	91,3 mm / 3,5"
73.0°	75.2°	85,1 mm / 3,3"
62.8°	65.0°	73,3 mm / 2,8"
54.2°	55.8°	67,4 mm / 2,6"
46.8°	48.4°	67,3 mm / 2,6"
41.6°	43.0°	61,1 mm / 2,4"
33.2°	34.7°	59,2 mm / 2,3"
26.2°	27.2°	13,4 mm / 0,5"
21.0°	21.8°	19,0 mm / 0,7"
16.5°	17.1°	3,5 mm / 0,1"
13.7°	13.9°	12,4 mm / 0,4"
10.2°	10.5°	-56,9 mm / -2,2"
7.6°	7.9°	-19,7 mm / -0,7"

[1] Positive locking (PL) 54 mm stainless steel lens mount with Lens Data System (LDS) contacts
[2] Close focus is measured from the film/sensor plane
[3] Magnification ratio is the relationship of the size of an object on the film/sensor plane to the size of that object in real life (second number) at the close focus setting
[4] Lens length is measured from the lens mount to the front of the lens housing
[5] Diameter of the lens/matte box interface
[6] The distance from the entrance pupil to the film/sensor plane. Positive numbers indicated an entrance pupil in front, negative numbers indicated an ent rance pupil behind the film/sensor plane. The entrance pupil (often mistakenly called "nodal point") is the center of perspective; moving the camera/lens system around the center of the entrance pupil prevents parallax errors. While largerly irrelevant for live action, this measurement is important for special effects work.
[7] The image diameter (ID) is the diameter of the image circle needed for the respective format. These lenses are designed for the largest ID given here.
[8] Horizontal angles of view for a Normal 35 Academy camera aperture (aspect ratio 1.37:1, dimensions 22mm x 16mm / 0.8661" x 0.6299")
[9] Horizontal angles of view for a DIN Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24mm x 18mm / 0.944" x 0.7087")
[10] Horizontal angles of view for an ANSI Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24.9mm x 18.7mm / 0.980" x 0.7362")

All data subject to change without notice.

ARRI/Fujinon Alura Zooms

Name	Lens Mount [1]	Focal Length Wide	Focal Length Long	Focal Length Ratio	Aperture	Close focus [2]	Magnification ratio [3]	Length [4]	Front diameter [5]
ARRI/FUJINON Alura Zoom 18-80	PL	18	80	4.4	T2.6 - T22	0.7 m / 2'4"	1:5.5	285 mm / 11.2"	134 mm / 5.3"
ARRI/FUJINON Alura Zoom 45-250	PL	45	250	5.6	T2.6 - T22	1.2 m / 3'11"	1:4	370 mm / 14.6"	134 mm / 5.3"

Operation Temperature: -10°C to +50°C / +14°F to +122°F
Storage/Transport Temperature: -20C to +60°C / -4°F to +140°F

[1] Positive locking (PL) 54 mm stainless steel lens mount with Lens Data System (LDS) contacts
[2] Close focus is measured from the film/sensor plane
[3] Magnification ratio is the relationship of the size of an object on the film/sensor plane (first number) to the size of that object in real life (second number) at the close focus setting
[4] Lens length is measured from the lens mount to the front of the lens housing

[5] Diameter of the lens/matte box interface
[6] The distance from the entrance pupil to the film/sensor plane. Positive numbers indicated an entrance pupil in front, negative numbers indicated an ent rance pupil behind the film/sensor plane. The entrance pupil (often mistakenly called "nodal point") is the center of perspective; moving the camera/lens system around the center of the entrance pupil prevents parallax errors. While largerly irrelevant for live action, this measurement is important for special effects work.

Maximum housing diameter	Weight	Focal Length	Angle of view H, V, D				Entrance pupil [6]
			Normal 35 [8] ID = 27.20 mm [7]	DIN Super 35 [9] ID = 30.00 mm [7]	Alexa/D-21 HD [9] ID = 27.26 mm [7]	Alexa 2K [10] ID = 29.08 mm [7]	
134 mm / 5.3"	4.7 Kg / 10.4 lb	at 18 mm	62.8° - 48.0° - 74.1°	67.4° - 53.1° - 79.6°	66.8° - 40.7° - 74.3°	70.3° - 43.2° - 77.9°	264.0 mm / 10.4"
		at 50 mm	24.8° - 18.2° - 30.4°	27.0° - 20.4° - 33.4°	26.7° - 15.2° - 30.5°	28.4° - 16.2° - 32.4°	231.6 mm / 9.1"
		at 80 mm	15.6° - 11.4° - 19.3°	17.1° - 12.8° - 21.2°	16.9° - 9.5° - 19.3°	18.0° - 10.2° - 20.6°	213.9 mm / 8.4"
153 mm / 6"	7.5 Kg / 16.5 lb	at 45 mm	27.5° - 20.2° - 33.6°	29.9° - 22.6° - 36.9°	29.6° - 16.9° - 33.7°	31.4° - 18.0° - 35.8°	234.4 mm / 9.6"
		at 150 mm	8.4° - 6.1° - 10.4°	9.1° - 6.9° - 11.4°	9.1° - 5.1° - 10.4°	9.7° - 5.4° - 11.1°	2.0 mm / 0.1"
		at 250 mm	5.0° - 3.7° - 6.2°	5.5° - 4.1° - 6.9°	5.4° - 3.1° - 6.2°	5.8° - 3.3° - 6.7°	-101.5 mm / -4.0"

[7] The image diameter (ID) is the diameter of the image circle needed for the respective format. These lenses are designed for the largest ID given here.

[8] Horizontal (H), vertical (V) and diagonal (D) angles of view for a Normal 35 Academy camera aperture (aspect ratio 1.37:1, dimensions 22 mm x 16 mm / 0.866" x 0.630")

[9] Horizontal (H), vertical (V) and diagonal (D) angles of view for the Alexa/D-21 HD camera aperture (aspect ratio 1.78:1, 2880 x 1620 sensor pixels, dimensions 23.76 mm x 13.37mm / 0.935" x 0.526")

[10] Horizontal (H), vertical (V) and diagonal (D) angles of view for the Alexa 2K camera aperture (aspect ratio 1.78:1, 3072 x 1728 sensor pixels, dimensions 25.34 mm x 14.26 mm / 0.998" x 0.561")

[11] Horizontal (H), vertical (V) and diagonal (D) angles of view for a DIN Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24 mm x 18 mm / 0.944" x 0.709")

All data subject to change without notice.

ARRI/ZEISS Master Macro 100

Name	Lens Mount [1]	Aperture	Close focus [2]	Magnification ratio [3]	Length [4]	Front diameter [5]
Master Macro T2.0/100 mm	PL-LDS	T2.0/T4.3 to T32	0.35 m / 13 3/4"	1:1	202,7 mm / 8"	114 mm / 4.5"

[1] Positive locking 54 mm stainless steel lens mount with Lens Data System (LDS) contacts
[2] Maximum aperture at infinity is T2.0, at close focus T4.3
[3] Close focus is measured from the film/sensor plane
[4] Magnification ratio is the relationship of the size of an object on the film/sensor plane (first number) to the size of that object in real life (second number) at the close focus setting
[5] Lens length is measured from the lens mount to the front of the lens housing

[6] Diameter of the lens/matte box interface. Maximum lens housing diameter for the Master Macro 100 is 138 mm.
[7] Horizontal angle of view for an ANSI Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24.9mm x 18.7mm / 0.980" x 0.7362")
[8] Horizontal angle of view for a DIN Super 35 Silent camera aperture (aspect ratio 1.33:1, dimensions 24mm x 18mm / 0.944" x 0.7087")

Weight	Horizontal Angle of View			Entrance pupil [6]
	Normal 35 [8] ID = 27.20 mm [7]	DIN Super 35 [9] ID = 30.00 mm [7]	ANSI Super 35 [10] ID = 31.14 mm [7]	
2.6 kg / 5.7 lbs	12.42°	13.52°	14.02°	-77,139 mm / -3.0"

[8] Horizontal angle of view for a Normal 35 Academy camera aperture (aspect ratio 1.37:1, dimensions 22mm x 16mm / 0.8661" x 0.6299")

[10] The image diameter (ID) is the diameter of the image circle needed for the respective format. The Master Macro 100 is designed for the largest ID given here (ANSI Super 35).

[11] The distance from the entrance pupil to the film/sensor plane. Positive numbers indicated an entrance pupil in front, negative numbers indicated an entrance pupil behind the film/sensor plane.

The entrance pupil (often mistakenly called „nodal point") is the center of perspective; moving the camera/lens system around the center of the entrance pupil prevents parallax errors.

While largerly irrelevant for live action, this measurement is important for special effects work.
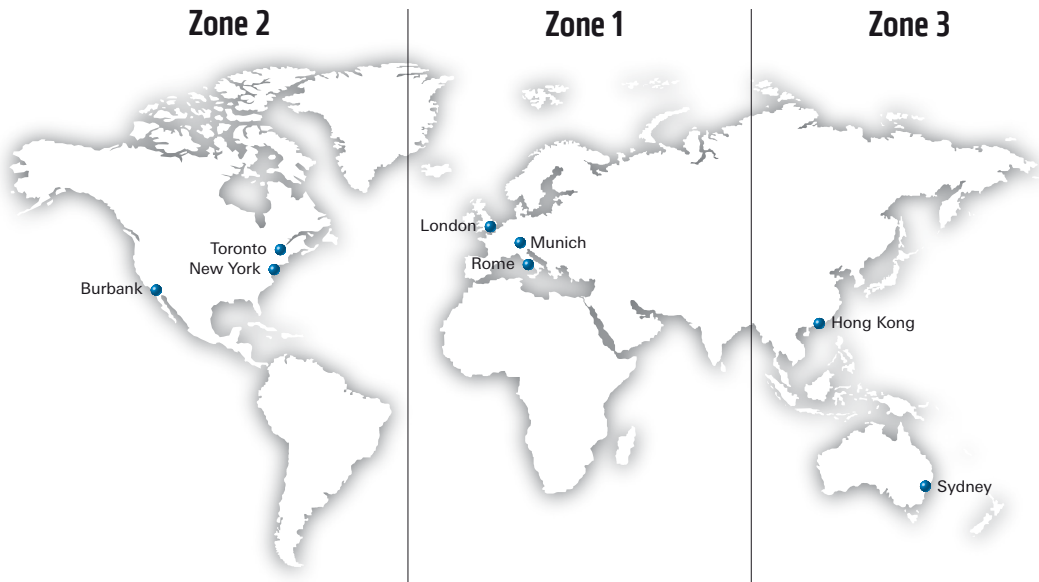
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Resources and Contacts

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1	9:00 – 18:00 Central European Time	**Munich, Germany** Arnold & Richter Cine Technik	service@arri.de	+49 89 3809 2121
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		London, Great Britain ARRI CT Limited	service@arri-ct.com	+44 1895 457 051
2	17:00 – 2:00 Central European Time	**New York, USA** ARRI Inc. East Coast	service@arri.com	+1 877 565 2774
		Toronto, Canada ARRI Canada Limited	service@arri.com	+1 416 255 3335
		Burbank, USA ARRI Inc. West Coast	service@arri.com	+1 877 565 2774
3	1:00 – 10:00 Central European Time	**Sydney, Australia** ARRI Australia Pty Ltd	service@arri.com.au	+61 2 9855 4305
		Hong Kong ARRI Asia Limited	service@arriasia.hk	+852 2537 4266

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Internet Resources

ALEXA Data Sheet	http://www.arri.com/downloads/alexa
Frequently Asked Questions	http://www.arridigital.com/alexa/faq
ALEXA Manual	http://www.arri.com/downloads/alexa
Color Processing White Paper	http://www.arri.com/downloads/alexa
Quantel Digital Fact Book	http://www.arridigital.com/technical/digitalfactbook
Digital Camera Basics	http://www.arridigital.com/creative/camerabasics

Internet Tools

ALEXA Online Simulator	http://www.arridigital.com/technical/simulator
ALEXA Frame Line Composer	http://www.arridigital.com/technical/aflc
ALEXA LUT Generator	http://www.arridigital.com/technical/luts

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