Jon Fauer ASC

March 28, 2019

FILM AND DIGITAL TIMES

Art, Technique and Technology in Motion Picture Production Worldwide

ARRI ALEXA Mini LF Special Report

FILM AND DIGITAL TIMES

Art, Technique and Technology

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Contents: March 28, 2019

ARRI ALEXA Mini LF Camera Report

Special thanks to Marc Shipman-Mueller, Product Manager (above right, with Michael Jonas levitating Mini LF at left) for the countless hours, late night calls, and all his valuable help on this report. Our work together goes back to the Arriflex 535 Book and every camera system that followed. Those were the days when camera reports took a year to write. Now, it's a matter of weeks. Like Hamilton in the musical, "Write day and night like you're running out of time." And great thanks to Johannes Polta for some of the best product renders in the business.

Here's the new little camera from ARRI that shoots big pictures. It's ARRI's latest addition to their large-format camera system. This is what many cinematographers were asking for: Large Format, lighter, smaller, modular.

It's pretty much always followed this way. Arriflex cameras were not just cameras, they have long been part of a system.

As Stephan Schenk explains (on page 6), there usually was a studio style "A" camera accompanied by a hand-holdable, lighter, smaller "B" camera.

When the Arriflex 35BL came out, its lighter, smaller, faster MOS companion was the 35-3. The Arriflex 535 system was rounded out with the 435. Along with ARRICAM came my favorite handheld camera, the shoulder-resting Arriflex 235 whose magazines looked like a school of playful dolphins.

This sets the stage for the camera that comes in the days ahead of NAB, in April 2019. Its design is equally joyful. ARRI ALEXA Mini LF is quintessentially an ALEXA LF stuffed into the body of a Super35 ALEXA Mini. It uses the same size ALEV III (A2X) CMOS sensor (36.70 x 25.54 mm). To picture the engineering involved, imagine unloading the entire contents of your 22-foot long camera truck and squeezing almost everything inside a BMW X3.

The new ALEXA Mini LF is not a "B" camera. It's an entire-alphabet camera. Just as the Super35 ALEXA Mini captured the imaginations of users on all kinds of productions, the new Large Format Mini LF is equally versatile.

Which brings us back to the concept of ARRI's camera system. Camera capabilities can be defined by shooting style.

You might want an all-in-one high-speed ALEXA LF camera, most likely in a studio, that does almost everything without having to add accessories. Or you may need a modular Mini LF, either by design or because it's the only camera body the production can afford. You might choose your camera for flexible, fast-paced production. You may want the camera mounted on a gimbal for one scene, handheld the next, and then in full studio regalia with a spaghetti of cables and accessories surrounding it. In the best of all worlds, you'll have one or more of each Large Format Camera.

Big Picture, Little Camera

ALEXA Mini LF is the newest member of ARRI's Big Picture camera system: ALEXA LF, ALEXA Mini LF, Signature Primes, LPL Lens Mount, LDS-2 lens metadata, and PL-to-LPL Adapter.

Incidentally, "Big Picture" is not a random, cute name. Denny

ALEXA Mini LF

Big Picture, Little Camera

On ARRI's demo film *Café Mila,* Second Unit DP Heiko Knauer with ALEXA Mini LF and ARRI Signature Prime 75mm. First unit cinematography: Tom Faehrman BVK. Photos: Michael Trammer.

Clairmont hated when we said "Super35" because there were so many variations. "Just call it 'Big TV,'" Denny admonished. So, with a salute to Denny, "Big Picture. Little Camera."

The Mini LF shares its photosite design and color science with the ALEXA LF, and for that matter, ALEXA 65 and Super 35 ALEXAs. Other well-known and enviable attributes include extremely high dynamic range, natural skin tones, easy color correction, high sensitivity and clean images for VFX. The camera is ergonomic, rugged and reliable. It is easy to operate. Menus are intuitive. Data wrangling and management in post is fast and efficient.

What's new on ALEXA Mini LF?

ALEXA Mini LF's carbon fiber body plus LPL lens mount weighs a mere 2.6 Kg. How convenient—that's the same size and weight (about 5.7 lb) as the ubiquitous Maß (1-liter beer mug) at Oktoberfest.

The main way to tell the cameras apart is that ALEXA Mini LF has a bulge on the camera left side. This is where the recording media goes. And yes, it records ARRIRAW internally. We'll get to that.

Other new things about the ALEXA Mini LF:

- New, small, tough, affordable Codex Compact Drive 1TB media
- Motorized Large-Format FSND filter slider (Clear, ND 0.6, ND 1.2, ND 1.8)
- 3 extra connectors: 12V 2-pin, 24V RS 3-pin and SYNC IN
- New Multi Viewfinder MVF-2 with large 4" flip-out monitor that displays the image or menu
- Viewfinder works on camera left and right side
- New VF cable using easier, flexible CoaXPress (up to 10m/33ft)
- Viewfinder has a built-in eyepiece lens heater for de-fogging
- Camera works with 12V and 24V batteries (11V to 34V)
- Power draw at 24 fps with viewfinder is similar to ALEXA Mini, which is about 65 W.
- 3 more user buttons on the camera left side (6 total).
- New 6-pin AUDIO connector (2 Ch LINE IN + 12V)
- Recessed TC connector
- Easier access to recording media and Viewfinder connector
- 2 built-in microphones
- One LOCK button each for camera and viewfinder
- Additional external WiFi antenna
- ARRIRAW license included

Large Format sensor

This entire edition of FDTimes is pretty much a paean to Large Format, packed as these pages are with new Large Format products. So we probably don't need to rhapsodize further about the distinguishable aesthetic virtues, although it's difficult to resist. More natural perspective. Backgrounds appear closer but shallower depth of field separates them more than S35. Higher resolution and less noise. Higher sensitivity, higher contrast, smoother images.

For more information: *arri.com/alexaminilf*

Stephan Schenk, Managing Director

Stephan Schenk is Managing Director of ARRI Cine Technik and General Manager of the Camera Systems Business Unit.

JON FAUER: How did the concept of ALEXA Mini LF begin?

STEPHAN SCHENK: ARRI launched the ALEXA 65 in September 2014 and the ALEXA Mini in April 2015. Both developed very successfully over the following years. When we were looking into a Full Format camera, we had 2 options: an ALEXA Mini type camera or an ALEXA 65/SXT type camera. Our engineers looked into the possibilities and we went for the ALEXA LF because we wanted a camera with high-speed capabilities. This was based on customer feedback, especially in commercial productions, who wanted 120 fps and more in full image quality.

Of course, it was already clear even before the launch of ALEXA LF that we would also need a Mini style version. Since February 2018, I have said that our engineers were on it—and they were, successfully, as we know today. And that was a customer demand from day one of the ALEXA LF launch.

What was your mandate in development of the ALEXA Mini LF? In other words, what did you suggest to the designers, product and project managers?

We wanted a camera with the same form factor of the ALEXA Mini. It should record the same types of uncompressed, unencrypted ARRIRAW formats as the ALEXA LF. It should record in-camera, without an additional external unit. But, it was clear from the early evaluations that this would mean a lower maximum frame rate than with ALEXA LF.

The mandate for our teams always has been to not only develop and produce the best camera we can, but also to ensure that it integrates seamlessly into the entire ARRI camera system and that it also works with other products in the industry. The ALEXA Mini LF really is a great addition to the new ARRI large-format camera system that we launched last year.

What will be your marketing and sales strategy? In 2015, we discussed the intended market for ALEXA Mini. Most people said it would be a "B" camera. I remember daring to say it would be an "A" camera as well.

I think the days of a clear "A," "B," and "C" camera philosophy are over. The ALEXA Mini can be the companion camera for ALEXA 65 or SXT. For some, it is the main camera—the one and only camera they have on their production. And for others, it is a handheld, drone or gimbal camera. It really depends on the type of production, the budget or the shooting style of the Cinematographer.

Have shooting styles changed the way cameras are conceived?

The shooting style has changed. We see many more sequences shot handheld these days. This makes smaller cameras more attractive and is one reason for the huge success of the ALEXA Mini. Also, there are new tools like drones and gimbals or the ARRI TRINITY that enable Directors and DPs to tell their stories in different ways. These developments have also led us to come out with a number of accessories made specifically for the ALEXA Mini. Almost all of those now fit on the ALEXA Mini LF.

A tougher question, please. I'm sure you've grappled with not wanting to release this camera too soon. But competition and customer demand maybe demanded it. (What do they say—damned if you do and damned if you don't). So, how do you avoid negative publicity and criticism from rental houses? Another company comes to mind: they were pilloried

ALEXA LF ALEXA Mini LF LPL to PL Adapter Signature Primes

for bringing out a new S35 camera less than one year after launching a 2/3" camera. The ALEXA Mini LF comes a year after ALEXA LF.

We have been very honest and clear about this from day one. Ever since the launch events of ALEXA LF last year, we always got the question, "When is an ALEXA Mini LF coming?" We always replied that we were working on it, but didn't know whether we could even achieve it. And, if we could do it, what would be its capabilities and when would it be ready? As Marc and Michael will tell you, it was quite an engineering challenge to stuff a larger sensor and so many components into something so small.

It turned out that it was possible. Now that we have a number of working Mini LF prototypes, we are going public.

But, there is also a fundamental difference to your disappointed rental house comparison. To me, the ALEXA Mini LF supports the ALEXA LF instead of superseding or replacing it. It is, in fact, similar to ARRI's concept of having the Arriflex 35-3 complement the 35BL. The 435 complements the 535. The Arriflex 235 complements the ARRICAM. We have built many camera systems that consisted of a studio version and a lighter, smaller companion.

Manohla Dargis wrote in the NYTimes, "The industry is often and sometimes laughably called liberal, but its entrenched economic conservatism is often matched by its aesthetic traditionalism." Perhaps this is why Full Format/LF has taken longer to take off than expected?

We made a big leap last year, probably the biggest step since the introduction of the PL-mount about 40 years ago. With the introduction of the ARRI LF camera system, we not only launched a new camera but also a new format, a new set of primes lenses and a new lens mount.

What makes me very confident that it will become more and more popular is the fact that all the cinematographers I have spoken with, who used ALEXA LF, love it and went on to shoot their next project with it again. Just as an example, Greig Fraser captured T*he Mandalorian* Star Wars TV Series with ALEXA LF and is now shooting *Dune* with it. Also, many DPs who captured their projects with ALEXA LF went on to subsequently purchase the camera. I think the reason is that there truly is such a thing as the Large Format look. The LF images are stunning and there is a visible difference.

I hope you have a big enough assembly line to build Large Format cameras, because I see a growing demand for this format.

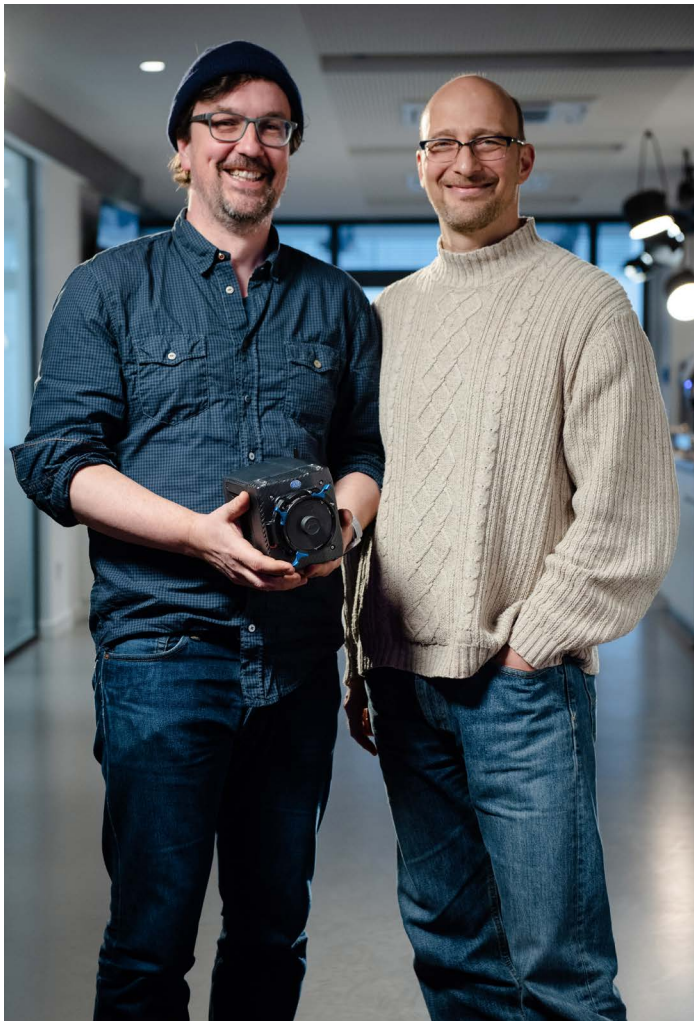
We have. But I would like to keep both feet on the ground. The acceptance of Large Format takes time. We need every DP, Director and Producer to try it, to have experience with the format. We also need more lens choices. But it is coming. Many companies are currently working on new LPL lenses. Also, our range of Signature Primes has significantly increased. We already have over 10 focal lengths by now and it will be 16 by the end of the year.

So, what is next and what about Super35?

At first, the ALEXA Mini LF will have the same recording formats as the ALEXA LF. However, we know that customers also want Super 35 recording formats cropped from the LF frame. We take that seriously and will look into adding such Super 35 recording formats with a future Software Update Package.

I would like to add that we at ARRI still believe in Super 35. Not everybody will shoot Full Frame/Large Format. A large number of productions, in particular in TV, will remain with Super 35 for the foreseeable future, for a variety of reasons. And I say this very openly here: we are also working on a dedicated Super 35 4K camera (not LF) that is planned to be introduced in the first half of 2020. So, the choices for cinematographers will increase again. But for now, I am really looking forward to seeing how and where the creative community will use our LF camera system — with its new member, the ALEXA Mini LF.

Michael Jonas and Marc Shipman-Mueller on ALEXA Mini LF



Michael Jonas (left) and Marc Shipman-Mueller (right), both Product Managers for Camera Systems, with ALEXA Mini LF (center).

JON FAUER: How and when did this new ALEXA Mini LF project begin?

MICHAEL JONAS (MJ): It originally started based on improvements we had planned for the ALEXA Mini. We had been looking, for some time, at how to implement all the user feedback regarding the Mini and then we figured that it might also be possible to include the LF sensor.

What was the mandate and where did it come from?

MJ: The ALEXA Mini is a huge success and basing the ALEXA Mini LF on the same concept was the logical choice.

MARC SHIPMAN-MUELLER (MSM): When we conceived the ARRI large-format camera system, we wanted to have a fully featured high speed camera first and follow up with a more lightweight model. The ALEXA LF was faster to market because we could base it on existing technology, as it is very similar to the ALEXA 65. The Mini LF took longer since we had to work out how to fit that large sensor into such a tiny body, and we did not know if that was possible at all.

The concept, the theme, the main idea?

MSM: It's basically a large-format sensor in a Mini body, with lots of improvements to the camera based on the comments we have received on the Mini.

MJ: Given that we want to achieve uncompromised image quality, the questions were: How much processing power can you stick into such a small camera, and how can it be adequately cooled? What would be the right media? And what are the maximum frame rates?

How did the team manage to squeeze everything into such a small body? What gave way?

MJ: The engineers used magic [laugh]. Fitting the sensor and the internal, motorized large-format FSND filter stage into the tiny Mini body was indeed a big challenge. We also optimized the cooling by using the space that the CFast 2.0 card slot used in the Mini for a larger internal cooling vent. This, in addition to the new media, provided us with greater options. Given how packed the ALEXA Mini already was, it is amazing that we managed to fit all this into the same package. Huge compliments to our engineering team!

How did you reduce power consumption and deal with cooling?

MJ: We had to find a good balance between features, performance and size. We did not want to compromise our core values of mechanical excellence, ruggedness and image quality. It clearly helped to stick to the existing Mini concept as we have thousands of cameras out there. That gave us a good idea of where the issues were and what areas we could focus on for improvements. The defining goal was to address usability issues. We hope that our users will appreciate the new card location, the new viewfinder connection and the additional power outputs—which were the main points of criticism on ALEXA Mini.

MSM: The power consumption of the ALEXA Mini LF is just a little bit more than the original Mini, so you can use regular 12V on-board batteries. What gave way was the number of features in comparison to the ALEXA LF. The Mini LF does not reach the 150 fps of the ALEXA LF, for example, and it does not have the three independent SDI outputs.

What were the challenges on this project?

MJ: Fitting everything into the body and keeping the basic form factor. Ensuring that all the accessories of the original Mini would fit. We achieved that except for two brackets. For rental companies and ACs, it will be an easy transition from rigging an ALEXA Mini to rigging an ALEXA Mini LF.

MSM: It was also a Herculean task in terms of the software that had to be written and ported, and our software developers did unsung heroic deeds to get it all done in time.

What are the main differences (besides sensor size) between this camera and Alexa Mini?

MJ: There are many. Improved cooling with larger fans to keep the camera quiet.

MSM: Updated electronics with more power options. We have an extra 24V and 12V power output.

MJ: New media. And the media goes into a media bay on the camera-left side for easier access.

MSM: An additional WiFi antenna for better WiFi range.

MJ: We have three more user buttons on the camera-left side.

MSM: The camera has two built-in microphones for a scratch track.

MJ: A number of connectors have been moved so you can access them more easily—for example, the VF connector and the TC connector.

MSM: And there is a new SYNC IN connector for black burst and tri-level sync.

MJ: We have a new viewfinder connector (VF), which will be the new standard for ARRI cameras going forward. It is based on the CoaXPress standard.

MSM: Increased VF cable length. The cable is less complex and more cost-effective.

MJ: New, brighter viewfinder (same image as EVF-2) and improved flip-out display.

I think the native flange focal depth is 24mm. Therefore, can you attach a Leica M mount?

MJ: Yes, the Leica M-Mount for ALEXA Mini will fit.

Would you like to mention some of the people on your team?

MSM: Victor Gómez-Hernández, the project leader, has shown great calm in the face of a tough schedule.

David Bermbach, the project lead of the original ALEXA Mini and now responsible for product development, has brought years of experience building cameras and always brings a chipper attitude to the project.

MJ: Lars Hartmann ensured R&D knew exactly what to build.

MSM: We are also thankful to David Zucker, who deals with the ALEXA 65, for all his input and feedback.

MJ: This would not have been possible without all the brilliant engineers in R&D at ARRI, who are a very enthusiastic and creative bunch of people.

I think Mini LF and ALEXA LF will happily coexist side by side. Your thoughts? Which camera do you use when?

MJ: Picking a camera depends on shooting style, workflow, budget and ultimately personal taste.

MSM: Some productions will want to be small and lean with the Mini LF, others prefer to have the fully-featured and larger ALEXA LF with 150 fps and multiple independent SDI outputs. Since they have the same sensor, they complement each other nicely for all kind of scenarios, which makes them a very flexible combination on set.

MJ: With all the hype of cameras getting smaller: some people actually like the weight and form-factor of the original ALEXA.

MSM: The Mini LF will extend the reach of the LF system to smaller productions and lighter grip packages .

MJ: The Mini LF enables the same exciting setups and applications as the ALEXA Mini on drones, gimbals and stabilized heads.

MSM: Essentially, the combination of ALEXA Mini LF, Signature Primes, TRINITY and SRH-3 will raise the bar for moving shots and enable new ways of story-telling with superb image quality. The LF system overall provides the tools for a new visual language.

ALEXA has had an 8-year or more life. What do you expect it to be for this one?

MSM: ALEXA cameras have already sold well for over 8 years, and I think they will be rented for much longer than that.

MJ: We hope we will get the same with the Mini LF, as it is really a universal tool and the image quality speaks for itself.

As with most ARRI cameras, it is really part of a system.

MSM: I think it is important to see this not just as a single new product, but to understand our system approach.

MJ: We are the only manufacturer to provide an almost complete set of tools: cameras, image science, camera accessories, lenses, lens control, lights, matteboxes, filters, TRINITY, SRH-3, you name it.

MSM: Each item is the best we can do in each category, and we make sure they all work well together. So, as a crew member, you will notice that ARRI stuff is very compatible with third party stuff, but when you use an ARRI component with another ARRI component, there is an extra level of precision and fit, there is much less stress and you get extra capabilities.

Wrap-up?

MSM: The ALEXA Mini LF is the newest part of the ARRI large-format camera system, which now consists of ARRI Signature Prime lenses, LPL lens mount, ALEXA LF and ALEXA Mini LF cameras, PL-to-LPL Adapter and Lens Data System LDS-2. Feedback from the many, many productions that have already shot with the ALEXA LF shows that there is a special large-format look that is very much sought after by cinematographers.

MJ: And the ARRI large-format camera system provides it with exceptional image quality.

MSM: Every cinematographer who has shot with the LF wants to continue shooting with the ARRI LF system on their next projects, which is high praise.

MJ: I believe the ALEXA Mini LF will be a big hit and push large format even further into the mainstream.

Tom Faehrmann, BVK on ALEXA Mini LF

"Café Mila" crew, from left to right: Rosi Rothenfusser; Frederic Merten; Tom Faehrmann BVK, Director of Photography, first unit cinematographer; Heiko Knauer, Second Unit DP; Henning Raedlein; Susi Mayer. Photos: Michael Trammer.

Tom Faehrmann BVK was one of the first cinematographers to test the ALEXA Mini LF. He and his crew shot a short film using ALEXA LF and Mini LF. Here is Tom's report.

The ALEXA Mini LF is to Large Format as Alexa Mini is to the Super35 ALEXA family. It is the easy-to-handle, lightweight sister to the ALEXA LF. It provides a similar, suberb image quality in a handy housing. This camera follows the contemporary, vivid handheld style that many cinematographers prefer to give to their digital images.

It is incredible how so much technology, with such a big sensor, can find its place in such a small, but still robust, camera body. We were shooting with the ALEXA Mini LF handheld and on a gimbal (the ARRI TRINITY System) for the ARRI short film "Cafe Mila."

The shoot with the Mini LF camera reminded me of working with a good old Hasselblad 501—just as easy to use with mainly one hand. You can concentrate on what is the most important thing in our work: creating the image.

The Mini LF provides a freedom of shooting that I only experienced when working with the DSLR cameras for additional shots on a feature film. With the Mini LF, we have all that and everything a professional needs as well: Perfect colors, high quality data files, and an easy-to-use, lightweight camera body. That is all I need as a cinematographer.

Now that I have worked with both ALEXA LF and ALEXA Mini LF, you might ask when would I use the all-in-one style of camera and when the modular approach. It is all about the project. If it were a more conventional production on a dolly, tripod or crane, I would still go for the "big boy," because I would have everything that is needed in one body (including higher frame rate). With a dolly, weight is not a big problem. The "B" camera would be, in any case, a Mini LF, to be prepared for anything.

If the story demanded a great deal of versatility and flexibility from the camera, then the Mini LF would be my first choice, even if, with all its convenient accessories, the Mini grew quite large into a serious-sized body not that much smaller than the full ALEXA LF body.

For handheld work, the Mini LF is a wonderful choice—so easy to operate. I see in my commercial work that essentially the Mini is used on a lot of jobs. As long as you do not need high-speed-shots, the Mini LF is a nice camera to have. It is very interesting that with digital sensors the same is happening that we experienced in analog photography and cinematography decades earlier: a larger image area shows more detail, more colors, more gray tones. At the end of the day it is true—size matters.

Heiko Knauer on ALEXA Mini LF

This was a first. Interview by text message. Fauer and Knauer.

JON FAUER: Heiko, can we do a follow-up about the Mini LF?

HEIKO KNAUER: I'm in Austria, late at night, up here on a mountain on a shoot. It's the Kitzsteinhorn Glacier. We're at 2700m and I can feel the altitude. Can't talk but I have my cell phone to write.

First impressions of Mini LF?

During the prep, we didn't even have a chance to get the prototype Mini LF into our hands. The next morning, when we started to shoot, was the first time I picked it up. It felt like the ALEXA Mini except the lens mount was bigger. I was absolutely impressed to be holding a large-format camera this small.

I thought about VistaVision movies that were filmed on motion picture negative and how much work it was to carry all the equipment and magazines around. Now you can fit a camera with that size sensor in a backpack and go shoot wherever you want.

Comments on the ergonomics of Mini LF?

It's comparable to the ALEXA Mini. The shape of the body is almost the same: a carbon cube, which feels super solid. The buttons respond so you get a tactile feel when you press them. Like most ARRI products, it's a camera that is built to work in every condition. And this is how it feels when you hold it in your hands.

How heavy is it and how long can you cradle it handheld?

It's easy to carry around. On the shoot I never really put the camera down. It's nice to look for the right framing with the actual camera you shoot on. I would compare it with a Maß Beer from the Oktoberfest.

Hang on, googling Maß Beer: "1-liter stein of beer, weighs 2.6 kg. Maßkrugstemmen: a Bavarian endurance contest to see who can hold a Maß beer with outstretched arm at shoulder level the longest. World record is 20 minutes and 13 seconds." And you were holding the Mini LF all day.

Comments on new viewfinder?

I already fell in love with the ALEXA Mini viewfinder. That was a big reason why I bought a Mini myself. Especially when going handheld, I prefer to have a proper, sharp viewfinder that I can dive into. The new viewfinder is a little bit bigger. And with that, you get a bigger fold-out monitor screen. Sometimes it's great to have the screen fold out, especially on documentaries where you have to go really fast. Often, you want to get a different point of view but you're not able to look through the actual viewfinder.

The colors are great. The menu layout changed and is very intuitive. There is a wheel on the back of the monitor that has a nice responsive haptic feedback. With your index and middle finger, you can easily scroll through the menu and push it to select. It is quite user-friendly, even in wet or cold situations. This is what I also love about the buttons on the camera. You feel that they're responding when you push them, no matter what the weather conditions are.

Did you have a focus-puller? Do they pull off a monitor?

Yes, my assistant Florian Schuster was on set with us. I don't want to talk for him, but he mostly pulls focus from a monitor or by eye. We had a set of Signature Primes with us which have the LDS-2 information, so you can see the focus distance, iris setting, etc. It's a great help for the focus puller and me.

Please talk about one of my favorite production stills where you are holding the camera like a pencil (above, right).

Yes, I like that. That's the greatest thing about the ergonomics and how the camera midpoint is centered and very nicely balanced. As I said earlier, I'm really used to holding the camera in my hand during the whole shoot. Especially when shooting fashion or documentaries, you have to react quickly. It's all about that little moment where the acting, light and how everything lines up comes together. I always look for various angles to find the sweet spot.

That makes the ALEXA Mini LF so great. It's a compact large-format camera that you can use in every imaginable situation: in car set-ups, small rooms, gimbals, on the TRINITY, underwater or you can put it into your backpack with a couple of lenses and hike up a mountain. So many possibilities to use a 24x36 Camera—which is absolutely insane.

ALEXA Mini LF vs ALEXA Mini

ALEXA Mini LF

- LPL Mount
- 36.70 x 25.54 mm sensor
- (Large Format)
- Wider left side for media
- 2 antennas
- Large-format FSND filter slider

LEMO 4-pin LBUS connector on lens mount for daisy-chainable lens motors

ALEXA Mini

- PL Mount
- 28.25 x 18.17 mm sensor
- (Super35)
- S35-format FSND filter slider

LEMO 4-pin LBUS connector on lens mount for daisy-chainable lens motors

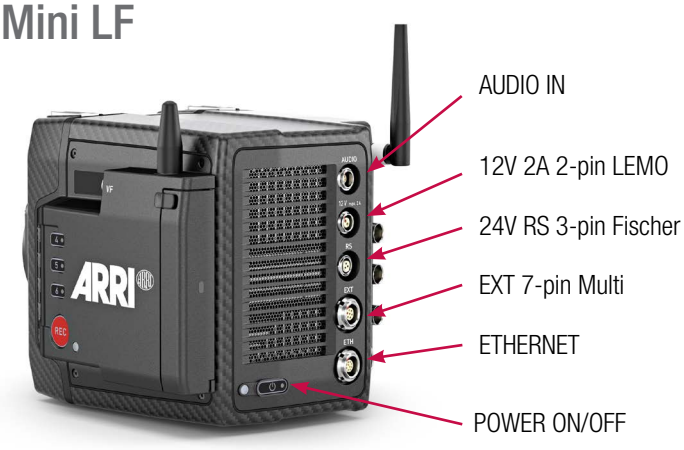
In ALEXA Mini LF, Codex Compact Drive recording media is on the camera left side.

In ALEXA Mini, data is recorded to a CFast 2.0 Card that goes into the right rear.

ALEXA Mini LF
LPL Mount
44mm FFD
62mm I.D.

ALEXA Mini
PL Mount
52mm FFD
54mm I.D.

ALEXA Mini LF



ARRI ALEXA Mini LF

ALEXA Mini LF Configurations

The bare essentials. Camera left. 6 User buttons. REC button. VF connector

Camera right side.

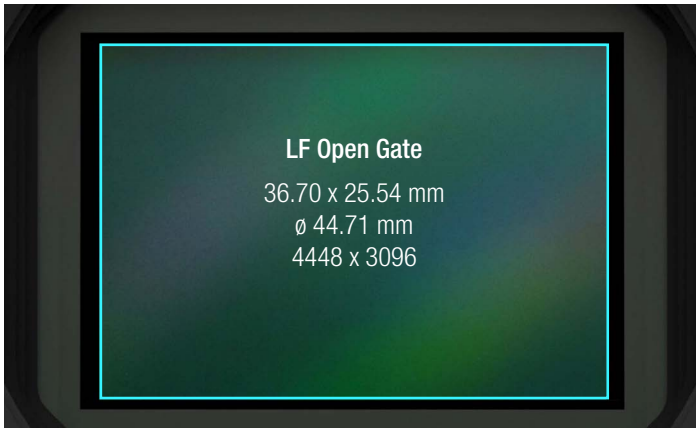
Fully rigged studio and handheld mode

Mounted in a TRiNITY Rig

Mini LF turned 90° on side for vertical portrait mode with Vertical Top Plate.

Gimbal Mode, shown with a MoVi

ALEXA Mini LF Sensor Modes



Just like big sister ALEXA LF, Mini LF has the same 3 Sensor Modes, which is how much of the entire sensor you want the camera to read out. It's similar to a hard matte installed in film camera gates. Remember: the taller the image height, the slower (lower) your maximum frames per second rate will be.

LF Open Gate provides the maximum sensor area, 36.7 by 25.54 mm, and the maximum resolution, 4448 x 3096 photosites.

LF 16:9 meets 4K UHD deliverable standards and it offers surround view. This is also an excellent choice if you want to almost "window" Super35 format lenses and crop the remaining picture area in post.

LF 2.39:1 is for spherical widescreen (non-anamorphic).

ALEXA Mini LF Media

Codex Compact Drive 1TB Media Bay

Codex Compact Drive 1TB

ALEXA Mini LF records internal MXF/Apple ProRes and uncompressed MXF/ARRIRAW. What's this? The camera now uses one wrapper, MXF, for all recorded files. This is where the industry is going; in fact, Apple is supporting MXF in Mac OS X now. Moving forward, Codex media will be more affordable and workflow should be simpler and faster. The new Codex Compact Drives are smaller and very reliable.

Compact Drive Reader (USB-C) for Mac OS or Windows, works without a driver or license. Approx. 8 Gb/s download speed.

The Compact Drive Adapter (above, with Compact Drive inserted) fits into the SXR Capture Drive Dock.

Victor Gómez-Hernández, Project Manager

Victor Gómez-Hernández, at left, is Project Manager of the ALEXA Mini LF.

Florian Lohse, at right, is Project Manager of the new MVF-2 Viewfinder (design plans below and discussed on the next page).

Victor Gómez-Hernández

What were the challenges in manufacturing ALEXA Mini LF?

VICTOR GÓMEZ-HERNÁNDEZ: In addition to what Marc and Michael mentioned (LF sensor, motorized FSND filter stage and additional power outputs), we had to retain the form factor of the original ALEXA Mini. It was important to keep the mounting points the same so that our customers could reuse most of the existing Mini accessories.

The cooling of all components (LF sensor, processor, new recording media) in such a small form factor was really challenging. We did a lot of thermal simulations and optimization of the cooling system. This was tricky, as the Mini is already a pretty good camera in that respect. The Mini LF has a larger cooling channel internally and its fan can go faster, so we have more cooling air volume.

The question of where to place the new recording media gave us a lot of headaches. The Mini is a very tightly integrated camera, there really are no empty spaces inside. Ultimately, the best place was the camera left side, similar to the way it is on an ALEXA. The media can be removed easily, even when the Mini LF is mounted on a drone, gimbal, Steadicam, crane, etc.

How many different departments were involved at ARRI?

It was a great combined effort of many teams: mechanical, electronic, optical, software, image software, image science, embedded firmware, sensor, user experience, requirement engineering, testing, quality management, series production, programmable systems, controlling and purchasing.

I am deeply thankful to work in a great environment and with an amazing team, making all this possible. It is difficult to highlight anyone special, as everyone in the teams worked very hard. A deep thank you for sure goes to my manager David Bermbach who has always supported me in all kind of situations.

Describe a day in the life of a camera project manager.

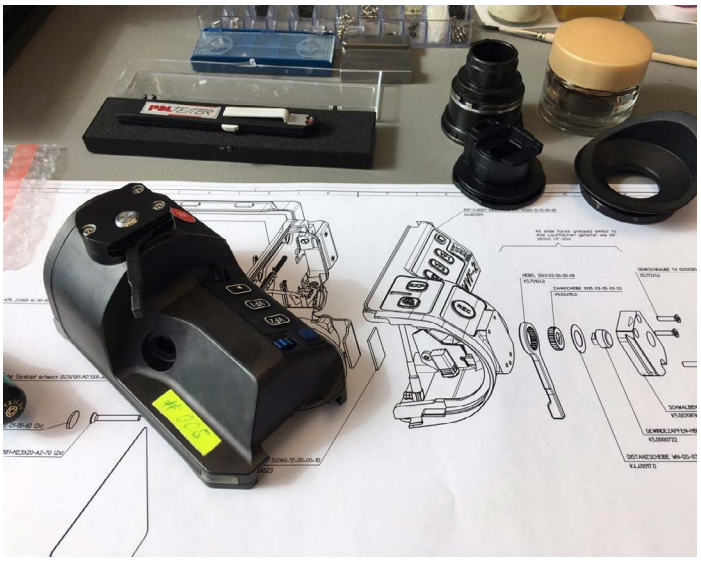
You think that you have planned all the details for anything that could happen in the project but every day you have to face new challenges and try to address them as soon as possible. In the end, we can all be very proud of the developed product and the teams.

How long have you been at ARRI and where were you before?

I started working on this project at ARRI in September 2017. So, you could say that I started just in time. Before that, I worked at BMW and in project management at Turbina, a company in the renewable energy sector.

How did you go from cars and energy to building cameras?

For me, it is extremely important to work in an innovative environment with challenging technologies. This is exactly what you can find at ARRI in camera development. I enjoy driving and managing projects.



Florian Lohse, Project Manager for MVF-2 Viewfinder

Florian Lohse

Describe the new MVF-2 Viewfinder.

FLORIAN LOHSE: The "M" stands for "Multi" Viewfinder because it has a regular viewfinder display with an eyepiece and also a flip-out monitor. The flip-out monitor can display the image or the camera control menu. It can remain closed and flat against the left side, or you can flip it out to see the image. Alternately, you can flip it fully around and rest it against the viewfinder, with the menu or image now visible to the assistant. Compared to the MVF-1, the MVF-2 has a larger flip-out monitor and a new control button concept. The eyepiece also can be removed now and it has a built-in eyepiece heater.

New monitor, new OLED

The flip-out monitor display is larger than the one on the MVF-1. The new display you see through the eyepiece has a native HD OLED display with higher resolution and higher contrast than previous viewfinders. This allows for much better judging of focus, dynamic range and color in the viewfinder. The display is precise, temperature-controlled, individually calibrated. Therefore, it is a great reference for evaluating the image. It has, by the way, the same HD OLED that's in the ALEXA LF EVF-2 viewfinder. So, when using ALEXA LF and ALEXA Mini LF on the same scene, both camera operators will see the same image in the viewfinder.

New cable

The new viewfinder cable (called the "VF cable") is more flexible than the previous model. It has industrial CoaXPress connectors that are easier to plug in and out. Since it is coaxial, it does not have a key, so it plugs in no matter how you have rotated the connector. Also, we will be able to support longer cables up to 10 meters.

Eyepiece heater

The viewfinder has an integrated heater that reduces eyepiece lens fogging in cold and damp conditions. When turned on, the internal heating elements will control the temperature of the eyepiece's front glass and heat it up if needed. While we will not get as much power through the VF cable as we get through the cable of an external eyepiece heater, it is much more efficient because the heating elements are directly on the glass. I think this will be great for most situations where you are dealing with fogging in the eyepiece. However, if you are shooting in the arctic, you may still want to also bring an external eyepiece heater, like the ALEXA heated eyepiece HE-7.

ARRICAM style eyepiece

The eyepiece has the same optical design as on the ARRICAM. At one point, we did a comparison test with all eyepieces we could get our hands on: ALEXA, AMIRA, 235, 435, ARRICAM, and more. We looked through all of them at a number of moving and still images, and we found that the ARRICAM was by far the best. It has very low optical distortion and very minimal chromatic aberrations, which results in a very clear image. It also has a very wide exit pupil, which allows the operator to move their head back and forth a bit more than with other eyepieces before losing the image.

MVF-2 works on both sides of the camera

The MVF-2 was designed to improve the synergy between camera operator and camera assistant. There are two control dials with identical functions. One is located on the backside of the viewfinder, to be used when the display is folded against the viewfinder's side. In this position, the display can be used by the assistant without getting too close to the operator's face. The second control dial is placed on the backside of the monitor display and is intended for a single operator hand-holding the camera.

The design and manufacturing process

Viewfinders are the direct visual interface to the camera operator. We were eager to hear their comments. The manufacturing of the MVF-2 did not change from previous viewfinders: all suppliers are based in Europe and the assembly is done at our headquarters in Munich. This is a huge advantage for bringing quality to mass production, as we have daily conversations between developers, assembly and service.

Slide-In Card

The Slide-In Card is a small new feature based on direct client suggestions and field observations. We realized that many assistants and operators tend to use the free surface on MVF-1 for placing Post-it Notes with camera settings, actors' names, [lunch delivery orders] and other production specific-information. So, we added a slide-in-area hidden behind the foldable monitor to be used for that purpose.

Jeanfre Fachon on ALEXA Mini LF Accessories

Jeanfre Fachon is Product Manager of ARRI Camera Accessories

Please describe your new accessories for the new camera.

Speeding things up on set today is a major concern. Productions often use the same camera shoulder-mounted, handheld, on fluid heads, gear heads, remote heads and various stabilizers. ARRI's new accessory range for ALEXA Mini LF allows quick reconfigurations between set-ups, saving precious time in the process.

How are they different from current accessories for the Super35 format Alexa Mini?

We have optimized and updated our range of support accessories for ALEXA Mini and designed new accessories, such as the Mini Side Bracket MSB-3 and RAB-1 Clamp 2, that adapt to the updated ergonomics of the ALEXA Mini LF. We are emphasizing sturdy, quickly reconfigurable cine set-ups, while keeping available the wide-ranging catalog of support accessories we had for the ALEXA Mini from day one.

How do you go about designing these? Input from DPs and ACs? Your own experience?

We are very fortunate to be in contact with amazing camera people from all over the world. We are close to the rental houses and also to many gifted cinematographers, camera assistants, documentary filmmakers— seasoned and emerging. They share a common drive to move things forward. Their input is invaluable.

Please share with us your opinion about the difference between ALEXA Mini modular style and the SUV style of unibody, all-in-one ALEXA (Classic to SXT W)? For example, in this edition of FDTimes, we have an interview with Ben Richardson in which he says, "By the time you outfit a Mini with all its accessories,

Mini LF System & AKS Exploded View

AKS=All Kinds of Stuff

Mini LF Accessories

it's about the size of an SXT" But then he goes on to explain that a majority of the show was done on gimbals and sliders.

That is an interesting point. The ALEXA, with its larger body, offers a similar scale to traditional film cameras and happily supports many of the required camera accessories. Many disciplines from camera assistants transferred nicely from the analog world to the ALEXA. The ALEXA Mini body can be taken into very tight places, which is a fantastic asset for many filming conditions. However, achieving classic cine-style rigging requires a different approach. Often, support accessories are used as an exoskeleton to support the required devices that improve crew efficiency. Our range of camera accessories has grown and evolved continuously since the launch of the ALEXA Mini in order to address new ideas and challenges, such as when the ARRI Trinity came into the picture.

Do you offer choices of styles?

Definitely. We cannot impose a particular set-up to our users as the scope of applications is constantly broadening. Our experience with the ALEXA Mini ranges from Hollywood blockbusters to documentaries about free-climbing. We currently offer well over a hundred diverse support accessories for ALEXA Mini, most of which will happily outfit the ALEXA Mini LF. All are developed, tested and manufactured in our facilities, here in Munich.

Mini Side Bracket MSB-3

While the MSB-1 and MSB-2 still fit on the ALEXA Mini LF right side, the MSB-3 offers extended mounting options for the left side of the camera. Though it is designed around the updated ergonomics of ALEXA Mini LF, the MSB-3 is also compatible with ALEXA Mini.

Clamp 2 for RAB-1

In addition to updated mechanics and a new safety release, Clamp 2 moves battery adapters a small distance to the left in order to make room for the second row of ALEXA Mini LF connectors. Clamp 2 also works well on ALEXA Mini.

Vertical Top Plate for ALEXA Mini LF

This new top plate is part of the vertical adapter set for ALEXA Mini LF, which allows 9:16 "portrait" filming—a growing demand in the fields of commercials and visual effects. Configurations can be built to allow quick changes between classic landscape and portrait image capture.

ARRI WVR-1s Small Video Receiver

The new WVR-1s from ARRI is a smaller, lighter Wireless Video Receiver. It is the most recent addition to ARRI's WVS family of integrated (in-camera) and standalone transmitters, receivers, monitors and associated accessories. The small WVR-1s coordinates nicely when working with an ALEXA Mini LF—whether attached to the focus puller's WCU-4 and monitor, to the focus puller's big monitor on a C-stand or to the back of the director's handheld monitor.

The WVR-1s body is rugged, milled aluminum. The antennas are protected within a ribbed top cover (shown below). It pairs with ARRI's WVS transmitter. Please note, you must pair ARRI with ARRI. You cannot pair ARRI with Teradek or Teradek with Transvideo. Range is rated up to 150 meters/500 feet.

If you work with wireless video products from ARRI, Teradek, Transvideo and a few other companies, chances are that Amimon proprietary chips and circuits are inside. It's somewhat like computers having the label 'Intel Inside.' And then, in November 2018, Amimon Inc. was acquired by The Vitec Group and integrated into their Creative Solutions division.

In a joint statement recently, ARRI, Vitec Creative Solutions and Teradek confirm their continued commitment to the ARRI WVS product line, which is now being expanded with this latest addition, the ARRI WVR-1s.

ARRI WVR-1s Connectors:
Power IN (10.5-34 V DC) 2-pin Lemo
Power OUT (12 V DC, max 2.0A) 2-pin Lemo
3G-SDI OUT BNC

ALEXA Mini LF Specs

Sensor	Large Format ARRI ALEV III (A2X) CMOS sensor with Bayer pattern color filter array
Sensor Size	36.70 x 25.54 mm / 1.444 x 1.005" Ø 44.71 mm / 1.760"
Photosite Pitch	8.25 µm
Sensor Fr. Rates	0.75 - 90 fps
Exposure Latitude	14+ stops over entire sensitivity range from EI 160 to EI 3200 as measured with the ARRI Dynamic Range Test Chart
Exposure Index	Adjustable EI 160-3200 in 1/3 stops; EI 800 base sensitivity
Shutter	Electronic shutter, 5.0°- 356° or 1s - 1/8000s
Recording Formats	MXF/ARRIRAW MXF/Apple ProRes 4444 XQ MXF/Apple ProRes 4444 MXF/Apple ProRes 422 HQ
Recording Media	Codex Compact Drives
Viewfinder	Multi Viewfinder MVF-2 with 4" flip-out LCD monitor, OLED viewfinder display with 1920 x 1080 resolution; diopter adjustable from -5 to +5
Color Output	Rec 709, Rec 2020, Log C, Custom Look (ARRI ALF-2)
Look Control	Import of custom 3D LUT, ASC CDL parameters (slope, offset, power, saturation)
White Balance	Manual and auto white balance, adjustable from 2,000K to 11,000K in 10K steps Color correction adjustable range from -16 to +16 CC 1 CC = 035 Kodak CC values or 1/8 Rosco values
Filters	Built-in motorized ND filters 0.6, 1.2, 1.8 Fixed optical low pass, UV, IR filter
Image Outputs	1x proprietary signal output for MVF-2 viewfinder 2x SDI Out: 1,5G (SMPTE ST292-1), 3G (SMPTE ST425-1, ST425-3), 6G (SMPTE ST2081-10) uncompressed video with embedded audio and metadata
De-Squeeze	1.25x, 1.30x, 1.50x, 1.65x, 1.80x, 2x Anamoprhic
Focus & Aids	False Color, Zebra, Zoom, Aperture and Color Peaking
Audio Input	1x LEMO 6-pin balanced stereo line in with 12V power output, (Line input max. level +24dBu correlating to 0dBFS)"
Audio Output	SDI (embedded), 3.5mm stereo headphone jack (on MVF-2)
Audio Recording	2 channel linear PCM, 24 bit 48 kHz
Remote Control Options	Web-based remote control from phones, tablets and laptops via WiFi & Ethernet, Access Protocol via Ethernet & WiFi GPIO interface for integration with custom control interfaces WCU-4 hand-unit with control over lens motors and operational parameters via built-in white radio
Connectors	1x LEMO 5-pin LTC Timecode In/Out, 1x BNC Sync In, 1x LEMO 10-pin Ethernet for remote control and service, 1x LEMO 7-pin EXT multi purpose accessory interface with RS pin and 24V power output; 1x LEMO 4-pin LBUS (on lens mount) for lens motors, daisy chainable; 1x USB 2.0 (user setups, look files etc)
Wireless Interface	Built-in WiFi module (IEEE 802.11b/g) Built-in White Radio: ARRI lens and camera remote control
Lens Mounts	LPL mount with LBUS connector PL to LPL adapter Leica M mount from LEITZ, same as for ALEXA Mini
FFD	Flange Focal Depth: LPL mount 44 mm; PL mount 52 mm
Native Depth	24mm depth in air from intermediate mount flange to the image plane

Power Input	11-34 V DC — 1x LEMO 8-pin
Power Draw	Not yet confirmed. Slightly more than the Mini which is around 65W at 24 fps with viewfinder
Power Outputs	1x Fischer 3-pin 24V RS; 1x LEMO 2-pin 12V; 1x LEMO 7-pin EXT 24V
Size (HxWxL)	140 x 143 x 188 mm / 5.5 x 5.6 x 7.4" (body w/ LPL mount)
Weight	2.6 kg / 5.7 lb (camera body with LPL lens mount)
Operating Temperature	-20° C to +45° C / -4° F to +113° F @ 95% relative humidity max; splash and dust proof with sealed electronics
Storage Temp.	-30° C to +70° C / -22° F to +158° F
Sound Level	< 20 dB(A) at 24fps

Recording Frame Rates *(as of printing on March 22, 2019)*
- LF Open Gate ProRes 4.5K: 0.75 - 40 fps
- LF Open Gate ARRIRAW 4.5K: 0.75 - 40 fps
- LF 16:9 ProRes HD: 0.75 - 90 fps
- LF 16:9 ProRes 2K: 0.75 - 90 fps
- LF 16:9 ProRes UHD: 0.75 - 60 fps
- LF 16:9 ARRIRAW UHD: 0.75 - 60 fps
- LF 2.39:1 ProRes 4.5K: 0.75 - 60 fps
- LF 2.39:1 ARRIRAW 4.5K: 0.75 - 60 fps

Sensor Active Image Area Photosites
- LF Open Gate ProRes 4.5K: 4448 x 3096
- LF Open Gate ARRIRAW 4.5K: 4448 x 3096
- LF 16:9 ProRes HD: 3840 x 2160
- LF 16:9 ProRes 2K: 3840 x 2160
- LF 16:9 ProRes UHD: 3840 x 2160
- LF 16:9 ARRIRAW UHD: 3840 x 2160
- LF 2.39:1 ProRes 4.5K: 4448 x 1856
- LF 2.39:1 ARRIRAW 4.5K: 4448 x 1856

Sensor Active Image Area Dimensions
- LF Open Gate ProRes 4.5K: 36.70 x 25.54 mm / 1.445 x 1.006"
- LF Open Gate ARRIRAW 4.5K: 36.70 x 25.54 mm / 1.445 x 1.006"
- LF 16:9 ProRes HD: 31.68 x 17.82 mm / 1.247 x 0.702"
- LF 16:9 ProRes 2K: 31.68 x 17.82 mm / 1.247 x 0.702"
- LF 16:9 ProRes UHD: 31.68 x 17.82 mm / 1.247 x 0.702"
- LF 16:9 ARRIRAW UHD: 31.68 x 17.82 mm / 1.247 x 0.702"
- LF 2.39:1 ProRes 4.5K: 36.70 x 15.31 mm / 1.445 x 0.603"
- LF 2.39:1 ARRIRAW 4.5K: 36.70 x 15.31 mm / 1.445 x 0.603"

Recording File Container Size
- LF Open Gate ProRes 4.5K: 4480 x 3096
- LF Open Gate ARRIRAW 4.5K: 4448 x 3096
- LF 16:9 ProRes HD: 1920 x 1080
- LF 16:9 ProRes 2K: 2048 x 1152
- LF 16:9 ProRes UHD: 3840 x 2160
- LF 16:9 ARRIRAW UHD: 3840 x 2160
- LF 2.39:1 ProRes 4.5K: 4480 x 1856
- LF 2.39:1 ARRIRAW 4.5K: 4448 x 1856

Recording File Image Content
- LF Open Gate ProRes 4.5K: 4448 x 3096
- LF Open Gate ARRIRAW 4.5K: 4448 x 3096
- LF 16:9 ProRes HD: 1920 x 1080
- LF 16:9 ProRes 2K: 2048 x 1152
- LF 16:9 ProRes UHD: 3840 x 2160
- LF 16:9 ARRIRAW UHD: 3840 x 2160
- LF 2.39:1 ProRes 4.5K: 4448 x 1856
- LF 2.39:1 ARRIRAW 4.5K: 4448 x 1856

Specifications may change. For more information, visit:
www.arri.com/alexaminilf

ARRI ALEXA Mini LF

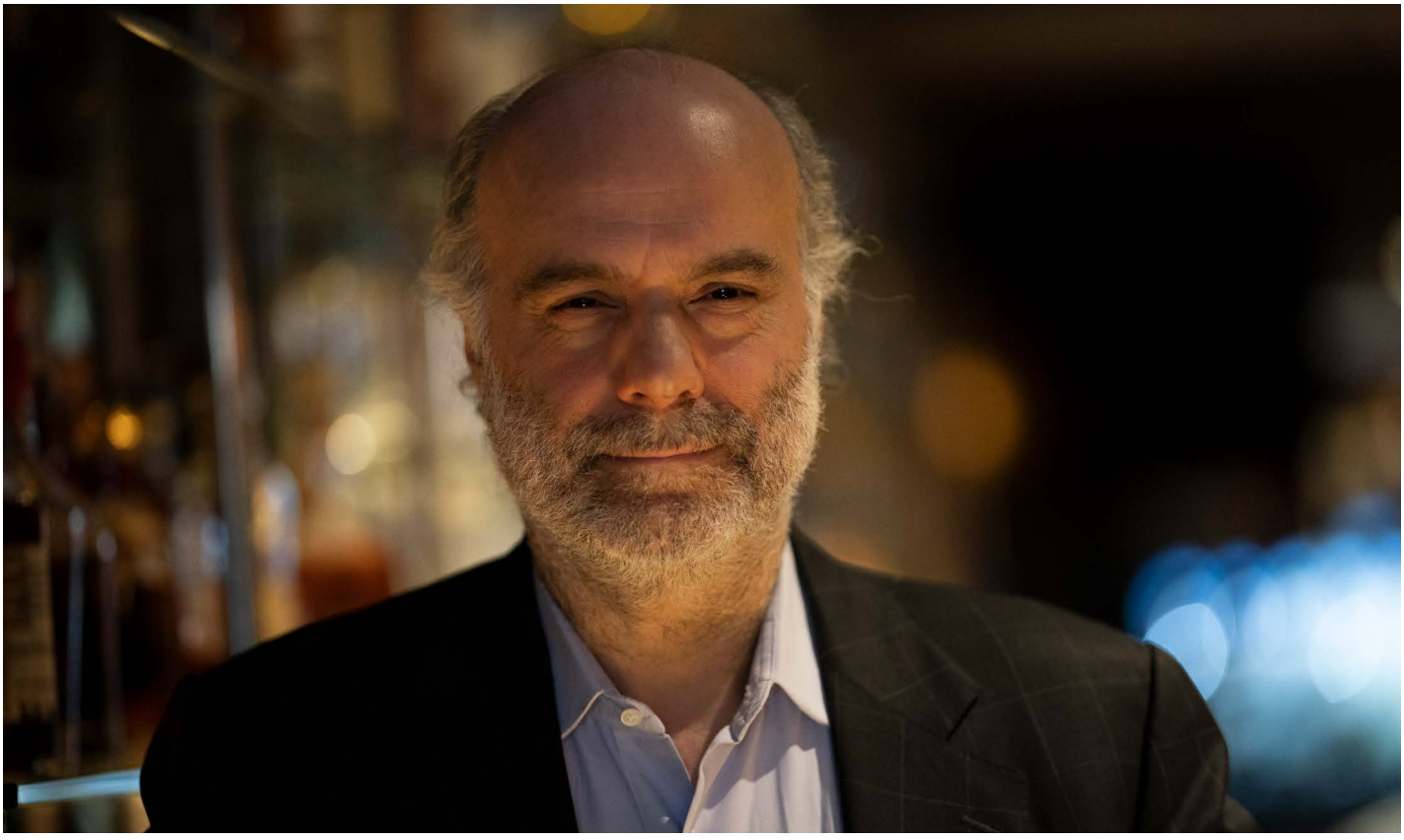
Above: the ARRI ALEXA Mini LF Development team at Tuerkenstrasse in Munich.

Recording Formats, Sensor Modes, Resolution, Maximum FPS, Sensor Photosites, Recorded Pixels

Codec	ALEXA LF LF SUP 4.0			ALEXA Mini LF Mini LF SUP 6.0		Sensor Photosites		Recorded File Pixels	
	Sensor Mode	Recording Resolution	Max. fps [1]	Recording Resolution	Max. fps [2, 3]	h	v	h	v
Apple ProRes	LF Open Gate	4.5K	60	LF Open Gate 4.5K	40	4448	3096	4448	3096
	LF 16:9	UHD	60	LF 16:9 UHD	60	3840	2160	3840	2160
	LF 16:9	2K	60	LF 16:9 2K	90	3840	2160	2048	1152
	LF 16:9	HD	60	LF 16:9 HD	90	3840	2160	1920	1080
	LF 2.39:1	4.5K	100	LF 2.39:1 4.5K	60	4448	1856	4448	1856
ARRI RAW	LF Open Gate	4.5K	90	LF Open Gate 4.5K	40	4448	3096	4448	3096
	LF 16:9	UHD	90	LF 16:9 UHD	60	3840	2160	3840	2160
	LF 2.39:1	4.5K	150	LF 2.39:1 4.5K	60	4448	1856	4448	1856

(1) Max fps is valid for all Apple ProRes flavors except LF Open Gate ProRes 4444 XQ (40 fps) and LF 2.39:1 ProRes 4444 XQ (60 fps).
(2) For ALEXA Mini LF, all Apple ProRes flavors have the same maximum frame rate.
(3) These are preliminary frame rates, specifications can change before shipping.

ARRI 35mm and 125mm T1.8 Signature Primes at Sistina



Having been immersed in the imminent arrival of ARRI Alexa LF, it was time to test the latest arrivals of large format ARRI Signature Prime lenses. Günter Nösner, Senior Technical Sales at ARRI Inc, brought a 135mm and a 35mm Signature Prime. And what better place than the low-light, iris-wide-open-with-a wrench, rich interior of Sistina, one of the best Italian Restaurants in New York? Try the risotto with porcini, zucchini flowers and truffles. The chestnut fettucine is another Sistina signature dish. As for the Signature Primes, they were smooth with silky skin tones, elegant bokeh and painterly backgrounds. This was a working lunch, so no wine today—despite Sistina's award as one of the World's 7 New Best Restaurants for Wine In 2018. Sistina is across the street from the Metropolitan Museum of Art in New York, at 24 E. 81st Street. Above: Giuseppe Bruno, Chef and Owner of Sistina, taken with a Signature Prime 125mm at T1.8. Below, with Signature Prime 35 mm at T1.8.

ARRI ALEXA LF System

Arnold & Richter Cine Technik GmbH & Co. Betriebs KG
Türkenstrasse 89
80799 Munich, Germany
www.arri.com

www.arri.com/alexaminilf

FILM AND DIGITAL TIMES

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