ARRIFLEX 416

Quiet, Bright and Light



35 Format Features in a Super 16 Camera

Continuous advances in lenses, film stock and postproduction technologies have elevated the Super 16 film format to new levels of image quality and production efficiency. Super 16 is now routinely used for standard and high definition television productions, feature films, commercials and documentaries, and with stunning results. By shooting Super 16, productions gain many of the advantages of shooting film - the film look, its unsurpassed exposure latitude, natural color reproduction, variable camera speeds, ramps, proven archivability and the fact that film is the only globally accepted standard format - at affordable production costs. The small size and light weight of Super 16 equipment has the extra benefit of easy portability for fast-paced production environments.

In response to market demand, ARRI is offering three new Super 16 cameras: the ARRIFLEX 416, 416 Plus and 416 Plus HS. Based on years of camera engineering, market research and focus groups with renowned industry professionals, the ARRIFLEX 416 cameras make features previously only found in high end 35 mm cameras available to Super 16 productions.

All three ARRIFLEX 416s are lightweight, modern Super 16 film cameras, each with a 35-style viewfinder and a mirror shutter that can be manually adjusted from 45 to 180 degrees. The 416 and 416 Plus have an amazingly low sound level similar to that of the ARRICAM. Their speed range is from 1 to 75 fps, while the 416 Plus HS runs from 1 to 150 fps. A completely new lightweight ergonomic design, integrated electronic accessories in the Plus cameras and compatibility with the same lenses and accessories used by their 35 mm siblings make the 416 cameras the most powerful, flexible and portable Super 16 cameras ever built.

Three Models

- **ARRIFLEX 416**
  basic model
- **ARRIFLEX 416 Plus**
  built-in accessory electronics and radio for wireless remote control
- **ARRIFLEX 416 Plus HS**
  high speed for slow-motion effects with built-in accessory electronics and radio



16

Main Features

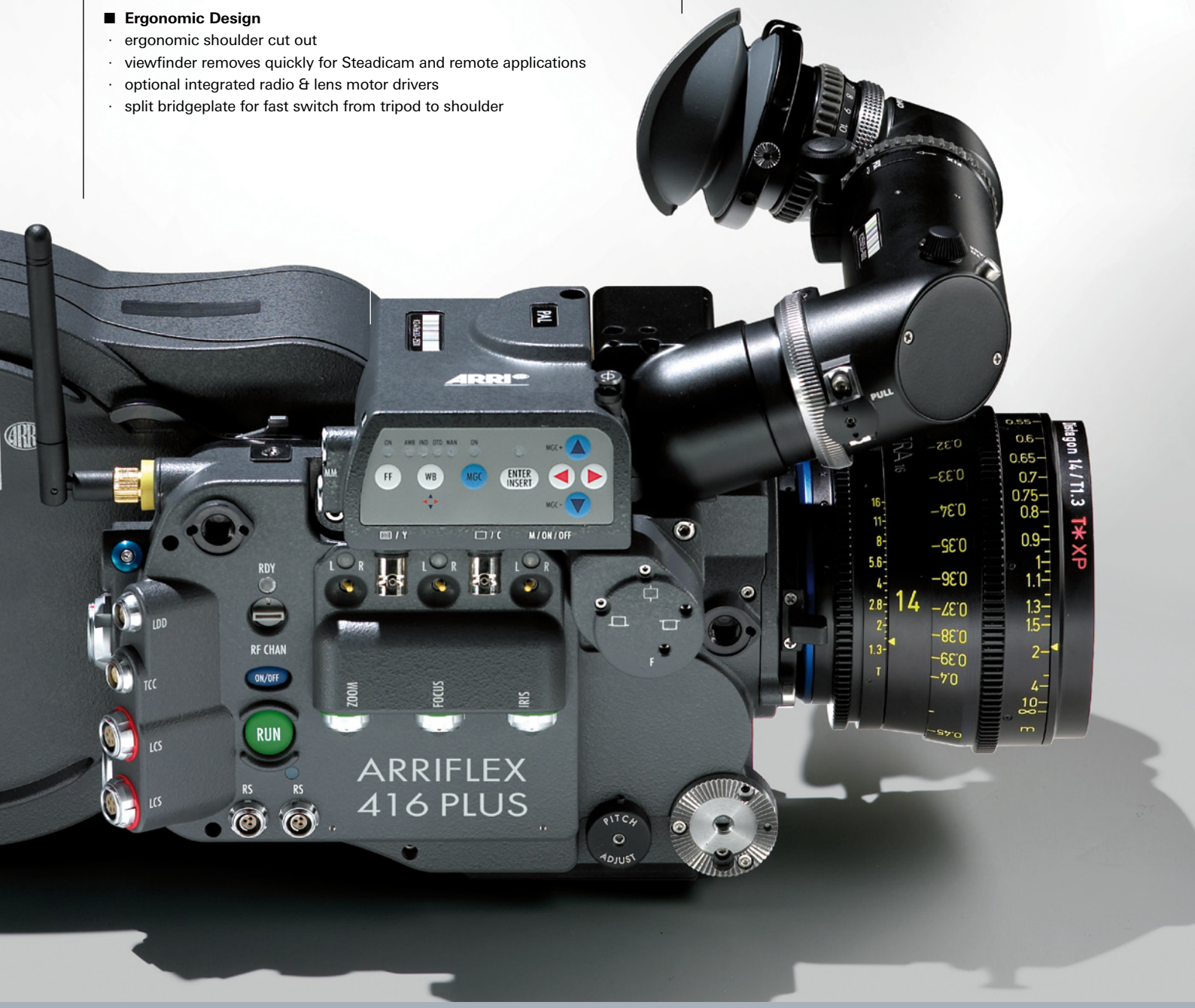
■ **The Quietest 16 mm Camera**
- 416 & 416 Plus: sound less than 20 db(A)

■ **High Quality Video Assist**
- improved image quality
- adjustable image enhancement

■ **35-style Viewfinder**
- brighter, higher contrast, higher resolution
- bigger exit pupil allows more eye movement
- multi-color RGB ARRIGLOW
- accommodates even wide diameter PL mount lenses
- excellent optical quality with eyepiece extension

■ **Compact & Lightweight**
- small camera body
- low profile design
- 25% lighter than 16SR 3

■ **Ergonomic Design**
- ergonomic shoulder cut out
- viewfinder removes quickly for Steadicam and remote applications
- optional integrated radio & lens motor drivers
- split bridgeplate for fast switch from tripod to shoulder



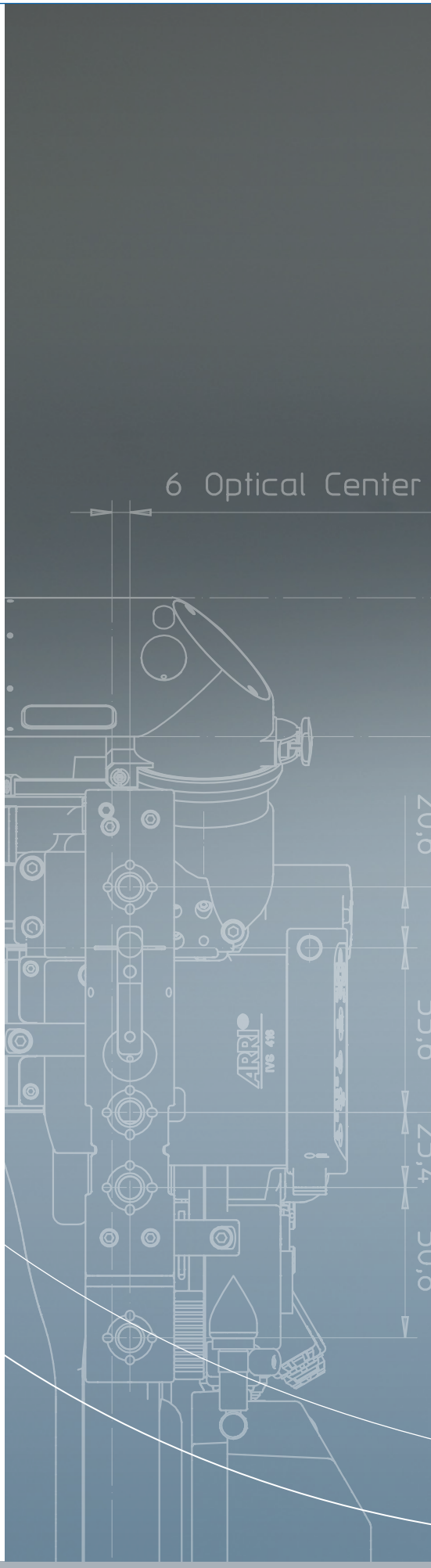
I Can See Clearly Now

To capture the images you want, you have first to see them clearly. So viewfinder quality is crucial if an operator is to accurately appraise images, especially with 16 mm. The optical viewfinder on the 416 cameras makes it easy to judge focus, create a precise image composition, and work comfortably and efficiently.

The viewfinder optics have been redesigned from the ground up, incorporating fewer lens elements of higher quality and a shorter optical path. The results are significantly higher contrast, higher resolution and a brighter image. With the 416 cameras, judging focus on the set becomes a lot easier, and unpleasant surprises during dailies a lot less likely.

The 416 cameras' viewfinder ergonomics are based on the ARRIFLEX 235 viewfinder so they share the same freedom of movement and features. The 416 viewfinder can be freely rotated, extended or flipped to the other camera side for comfortable viewing in any camera position. Image orientation can be set automatically or manually and medium or long eyepiece extensions can be used with no loss in image quality. Since the 416 cameras' viewfinder has a large exit pupil, the operator has more freedom to move without losing the image - a great advantage when going hand held, shooting action sequences or executing complex dolly moves. In contrast to their predecessors, the 416 cameras accept large diameter 35 format primes, including the new Master Primes, because their viewfinder is located higher above the lens mount.





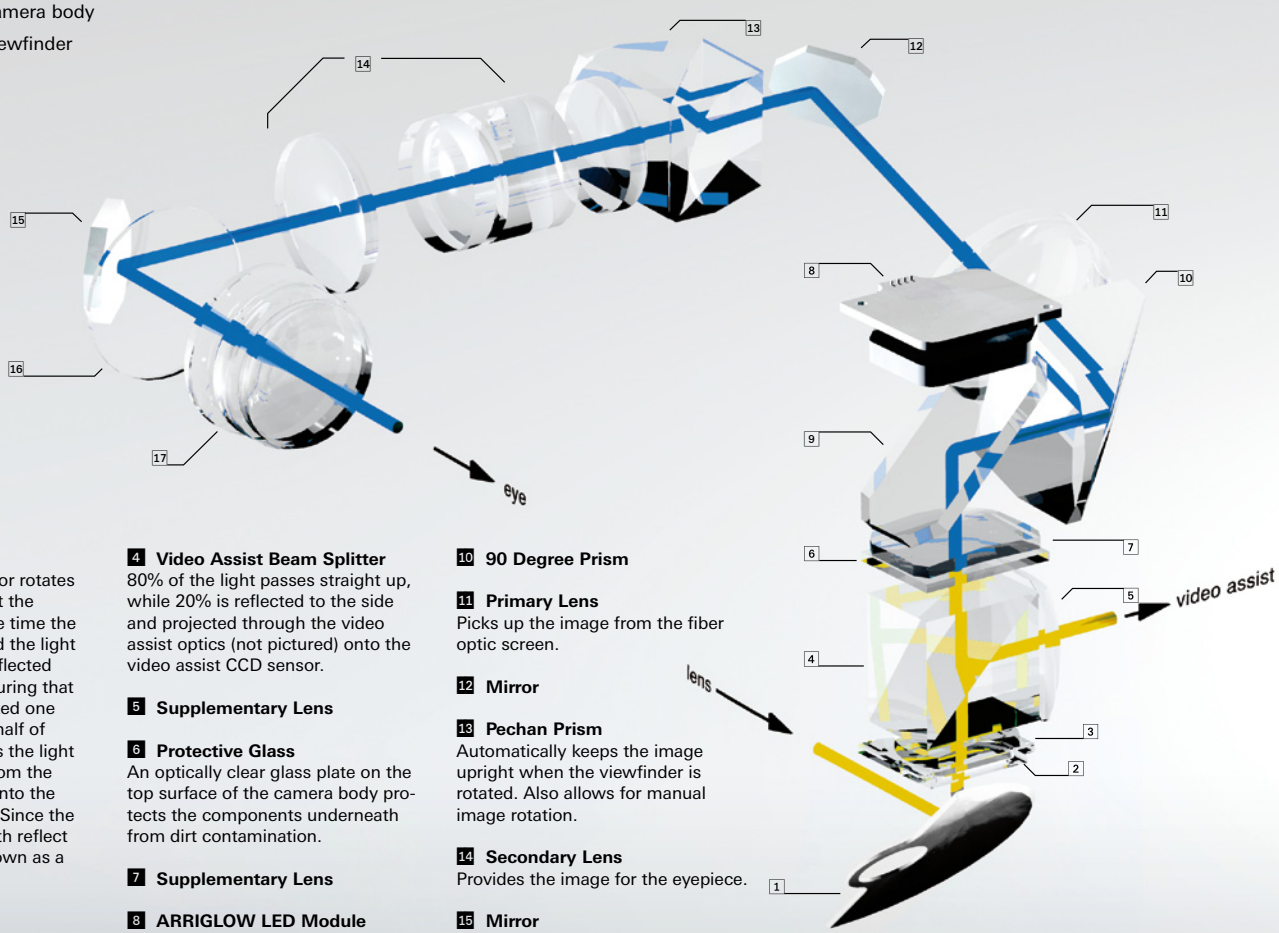


The ARRIFLEX 416 cameras' optical viewfinder uses a completely new optical design, resulting in significantly higher contrast, higher resolution and a brighter image.



light path inside camera body

light path inside viewfinder



1 Mirror Shutter
A half-moon shaped mirror rotates in front of the film gate at the camera speed. Half of the time the mirror covers the film and the light from the taking lens is reflected up into the viewfinder. During that time, the film is transported one frame further. The other half of the time the mirror leaves the light path open, so the light from the taking lens is projected onto the film, exposing an image. Since the mirror's function is to both reflect and shutter light, it is known as a "mirror shutter".

2 Fiber Optic Screen
The light from the lens is projected onto a screen (a fiber optic screen in the 416 cameras), which acts as a rear projection screen. This is where the viewfinder image forms.

3 Field Lens
The field lens (named as such because located close to the image field) refracts the light into the entrance pupil of the primary viewfinder lens and the video assist lens.

4 Video Assist Beam Splitter
80% of the light passes straight up, while 20% is reflected to the side and projected through the video assist optics (not pictured) onto the video assist CCD sensor.

5 Supplementary Lens

6 Protective Glass
An optically clear glass plate on the top surface of the camera body protects the components underneath from dirt contamination.

7 Supplementary Lens

8 ARRIGLOW LED Module
Red green and blue LEDs are situated on an electronics board above the partial mirror.

9 Partial Mirror
The light from the fiber optic screen is reflected into the viewfinder. At the same time, the light from the ARRIGLOW LEDs above is let through. This light is then reflected off the frame line markings on the fiber optic screen, providing illuminated frame lines when needed.

10 90 Degree Prism

11 Primary Lens
Picks up the image from the fiber optic screen.

12 Mirror

13 Pechan Prism
Automatically keeps the image upright when the viewfinder is rotated. Also allows for manual image rotation.

14 Secondary Lens
Provides the image for the eyepiece.

15 Mirror

16 Protective Glass
Located at the mechanical interface to the eyepiece or eyepiece extension, this protective glass prevents dust from getting into the viewfinder optics.

17 Eyepiece
The eyepiece allows the operator to view the image. It also provides a focus adjustment of approximately +/- 3 diopters.



COMFORTABLE, ACCURATE & EFFICIENT

Advantages of Optical Viewfinders

Optical viewfinders, as used in all ARRI cameras, provide by far the most comfortable, accurate and efficient way to work when capturing images. Operators see a bright and sharp, full color image and are able to accurately judge focus. By their very nature, optical viewfinders have zero delay, showing exactly what is happening, right when it is happening.

Optical viewfinders show an area larger than the image recorded on film, ensuring that microphones, light stands and other debris do not make an appearance in frame, thus minimizing the need for re-takes and saving precious time on the set. Operators also find this extra area around the image crucial for precise composition and exacting camera movements.

In addition, optical viewfinders work without power, are less fatiguing to the eye than electronic viewfinders and can be equipped with a range of accessories such as medium and long eyepiece extensions, eyepiece levelers and heated eyecups. A large exit pupil ensures that the operator has more freedom to move without losing the image.

How Does an Optical Viewfinder Work?

An optical viewfinder is essentially a small rear projection screen and a magnifying glass. The taking lens projects light onto a screen; for 16 mm cameras this is usually a fiber optic screen, while for 35 mm cameras it is usually a ground glass. An image is formed on the screen. The screen has a specifically chosen granularity that allows the operator to precisely judge focus and depth of field.

The rest of the viewfinder is a very sophisticated magnification apparatus that allows the operator to view this image properly. Since the image on the screen will be magnified about 8 times by the viewing system before it reaches the human eye, high quality viewfinder optics and precision assembly are crucial. Through the use of mirrors and prisms the viewfinder can be re-oriented freely in space, allowing the operator to see an upright image irrespective of how the viewfinder is positioned.

A small part of the light in the viewfinder is split off and directed to a CCD sensor, which creates a video image - the so called "video assist" - allowing others besides the operator to see the image.

The specific light path pictured here is from the ARRIFLEX 416 cameras, but it is similar in principle to that of all optical viewfinders.

RGB ARRIGLOW

With the new RGB ARRIGLOW, you can choose any color you like. Set evenly illuminated framelines in magenta when shooting green screen, red for jungle or yellow for blue skies. You can, of course, also mix your own ARRIGLOW grey.

MIX YOUR OWN COLOR

Integrated Video Assist

The 416 cameras' viewfinder is accompanied by a video assist with the same features and image quality as the highly praised ARRICAM and 435 integrated video assists (IVS). This video assist is closely integrated into the camera body to keep the overall camera size small and slim. It also features some added benefits like color bars, adjustable electronic image enhancement, manual white balance and a ground fault warning.

Using the same optical layout already proven in the ARRIFLEX 235, viewfinder and video assist are independent of each other. This makes a switch from handheld to Steadicam very fast and eliminates the need for a 100% video top. Additionally, two 12V accessory outputs on the video assist can power an on-board monitor and a video transmitter at the same time.



High quality video assist



Old 16 mm Camera Viewfinder Image



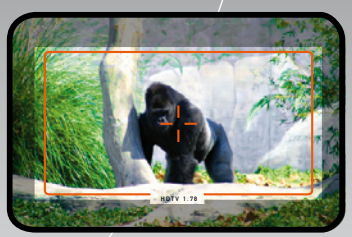
ARRIFLEX 416 Viewfinder Image

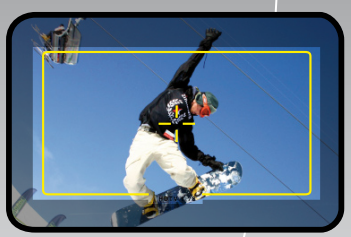
- Higher contrast, higher resolution, brighter image
- Easier to judge focus on the set
- Excellent optical quality with eyepiece extension

Mix Your Own RGB ARRIGLOW Color

- Use magenta for green screen
- Red for jungle
- Yellow for blue skies
- Mix your own grey









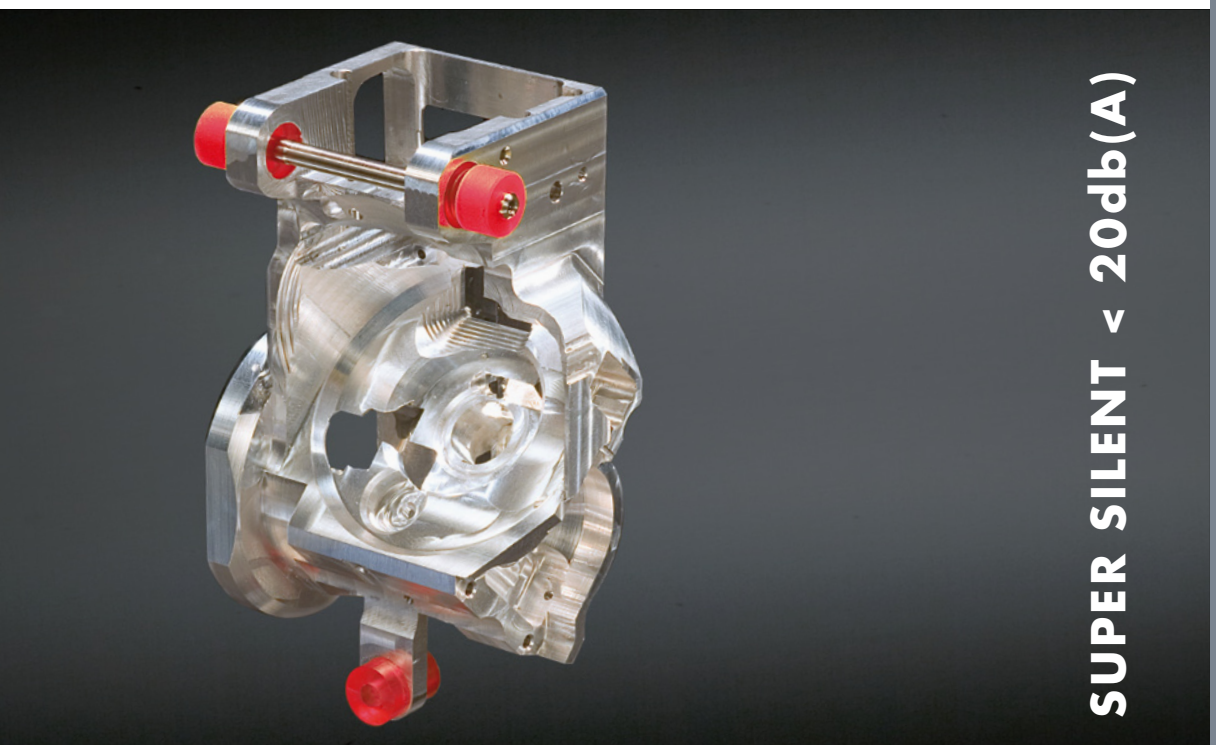
The Sound of Silence

The 416 cameras use a completely new sound insulation design that makes the 416 and 416 Plus as quiet as an ARRICAM and allows the 416 Plus HS to record a very stable image even at higher frame rates. An inner skeleton is suspended by symmetrically positioned rubber insulators in an outer shell. The camera's movement and other parts that create vibrations - and thus unwanted sound - are mounted to the inner skeleton. The insulators prevent any sound from the inner skeleton radiating to the outer shell. The symmetrical positioning of the insulators ensures that the flange focal distance stays constant so there is no change in depth from heat or cold.

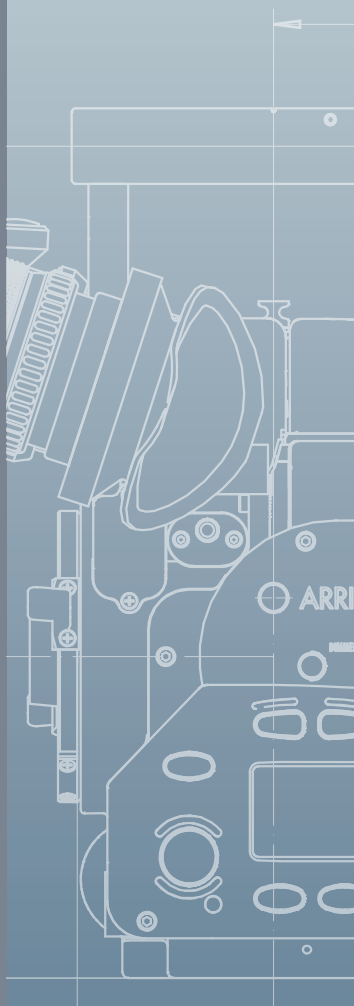
The 416 magazine is powered by a brushless silent torque motor; there is no noisy mechanical linkage between camera and magazine. And just like the camera, the 416 magazine consists of an inner skeleton and an outer shell separated by rubber insulators, making it the quietest 16 mm magazine ever built.

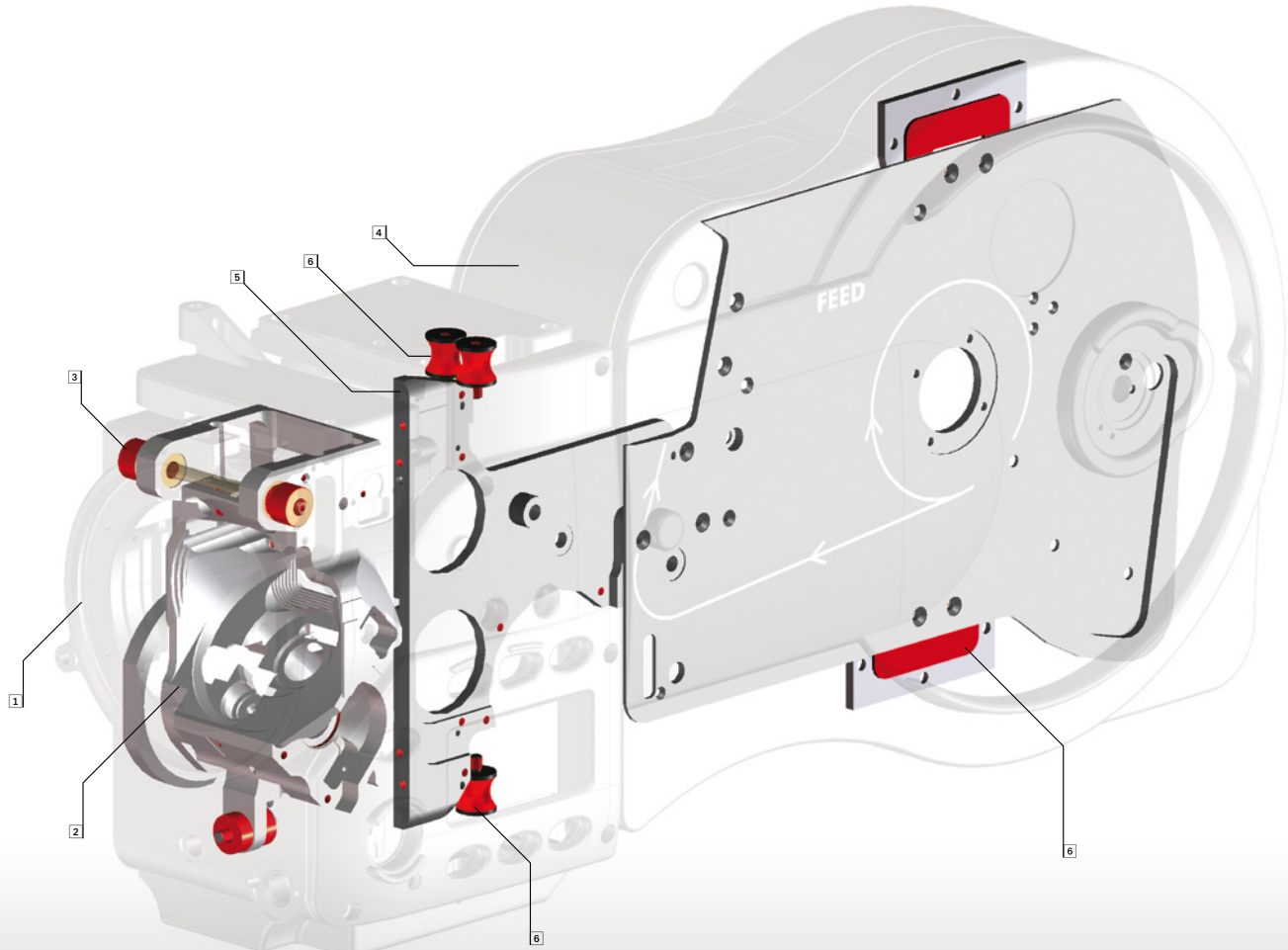
When working with a truly silent sync sound camera, directors and actors can concentrate on the performance and crews can concentrate on the action. How much time has been wasted on sets dealing with camera sound problems? With a sound level of less than 20 db(A), the ARRIFLEX 416 and 416 Plus are so silent that sound recordists will be asking the same question they ask when working with the ARRICAM: is the camera really running?

The camera body's inner skeleton is held by rubber insulators to prevent sound from radiating.



IS THE CAMERA REALLY RUNNING?



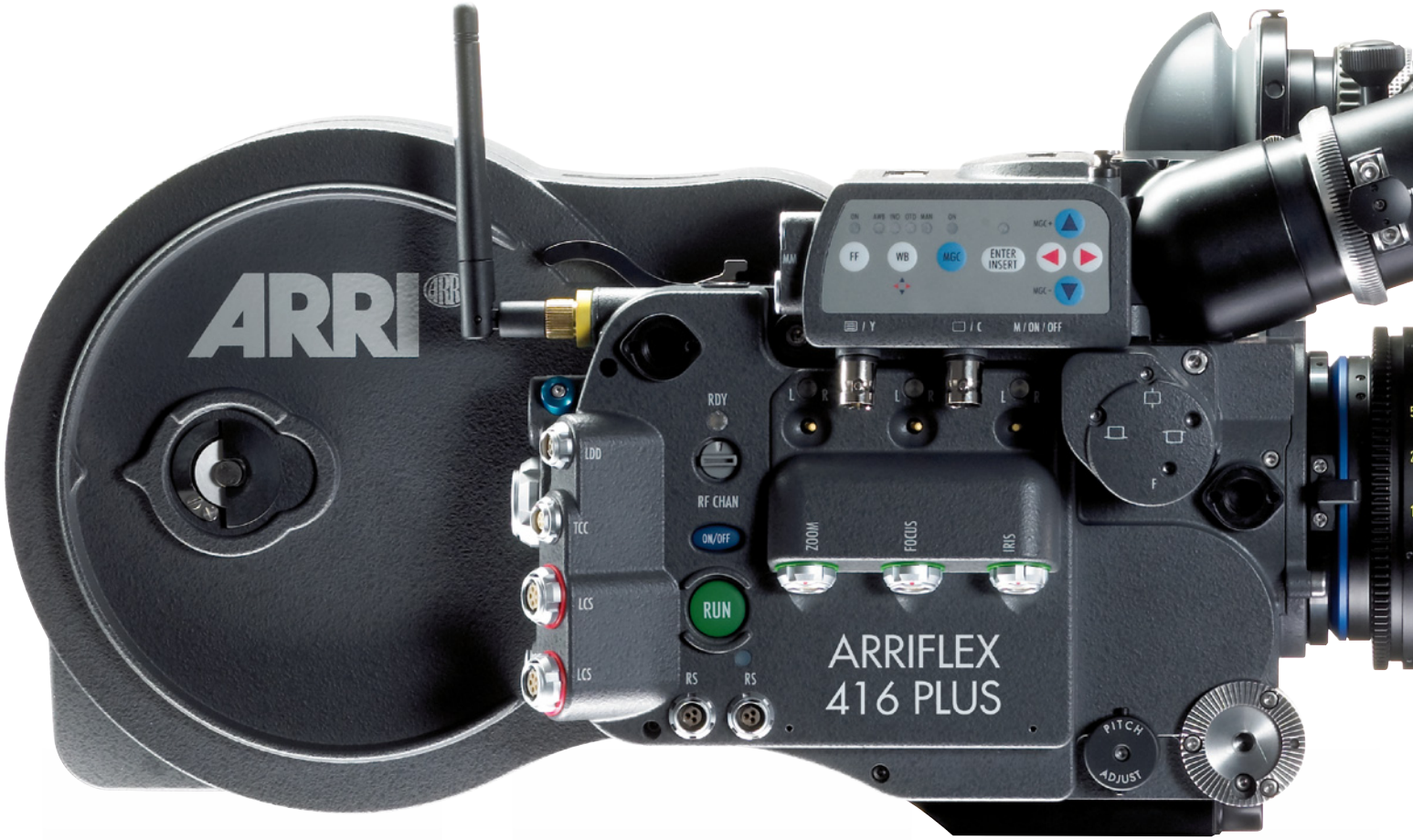


1 body outer shell
2 body inner skeleton
3 body rubber insulators
4 magazine outer shell
5 magazine inner skeleton
6 magazine rubber insulators

The magazine is driven by an internal silent motor and uses the same insulating technique as the camera body, ensuring completely quiet operation.



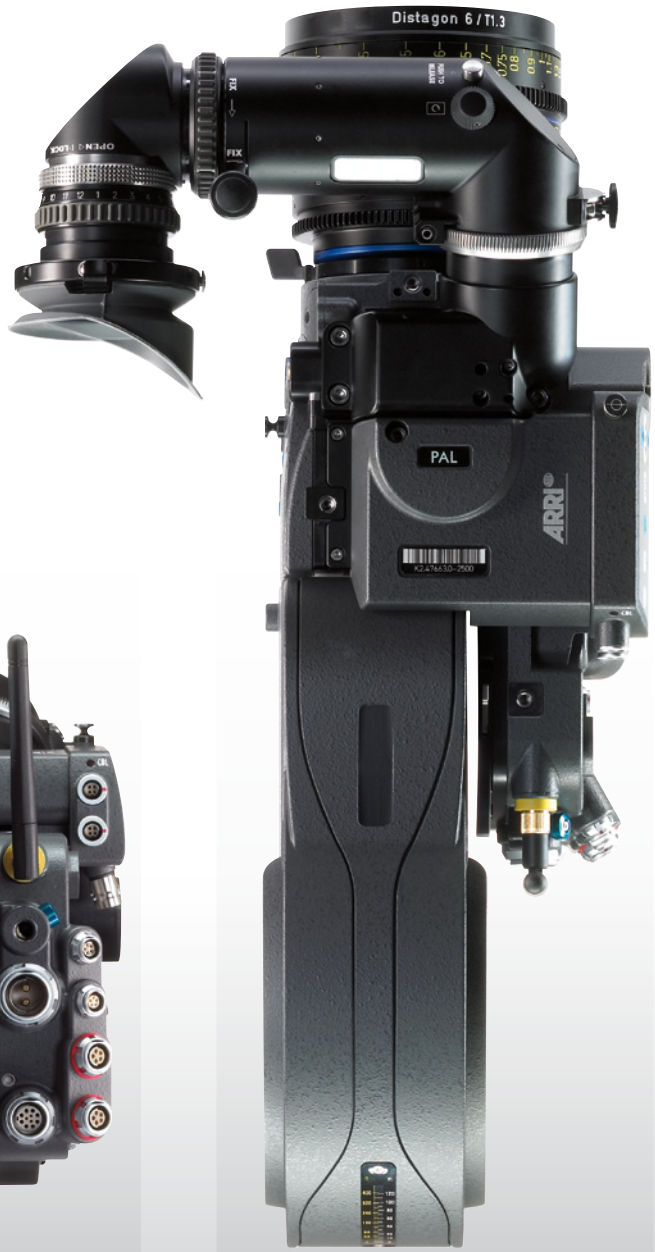
QUIET BRIGHT & LIGHT







T*XP


Distagon 6 / T1.3
PAL
ARRI




ARRI

ARRIFLEX 416 Models







	ARRIFLEX 416 Super silent and equipped with basic electronics	ARRIFLEX 416 Plus Super silent & flexible with built-in accessory electronics and radio for wireless remote control	ARRIFLEX 416 Plus HS Super fast for slow-motion effects with built-in accessory electronics and radio for wireless remote control
Speed Range (fps)	1 - 75	1 - 75	1 - 150
Sound (dbA)	< 20	< 20	< 29
Weight (Kg/Lbs) [1]	5.5/12.1	5.8/12.8	5.8/12.8
Integrated Accessory Electronics	no	yes	yes

[1] Body, viewfinder, loaded magazine, video assist





25% LIGHTER THAN SR 3

Compact, Lightweight and Fast

One of the reasons cinematographers and producers with demanding schedules choose to shoot Super 16 is the faster production pace afforded by smaller and lighter equipment. A Super 16 camera fits into any location, can be mounted to almost anything and can be quickly used on the shoulder. The 416 cameras further increase this portability, while providing many of the features crews have come to expect of 35 mm cameras.

The 416 weight has been reduced by an amazing 25% in comparison to the 16SR 3, when comparing a configuration including body, viewfinder, IVS and magazine. When comparing the 416 Plus to a 16SR 3 with UMC-3, the difference is even greater. The 416 cameras' shape has been designed to make them as compact as possible and to give them a low profile. At the same time shape and weight are perfectly balanced for comfortable shoulder operation.

A lot of thought has been put into the ergonomics of having to work quickly and safely on a film set. The new magazine, as well as the new on-board battery, can be swiftly removed with one hand. The cameras new front shape makes attaching lens accessories easier and faster.

For slow-motion sequences the 416 Plus HS runs up to 150 fps, while still using the same magazines as the 416 and 416 Plus. To avoid the clutter of extra boxes and cables, the 416 Plus and 416 Plus HS have lens motor electronics and a wireless radio directly integrated into the camera body.

Last but not least, there is the new split bridgeplate. The cameras can be removed from a zoom lens/tripod configuration in two quick steps: open the lens mount, split the bridgeplate and the camera slides off. The second assistant can then dismantle the zoom lens while the operator is already shooting handheld.

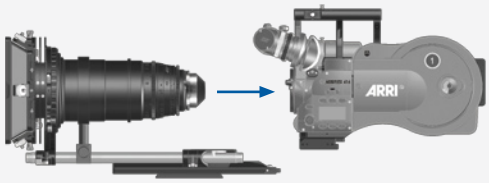
416 Built-In Accessory Electronics

- Reduce clutter through accessory electronics integrated into camera body
- Lens motors plug directly into camera
- Wireless remote control without extra boxes

416 Split Bridgeplate

- Elevates 416 to proper height for accessories
- Fast switch from tripod to shoulder





PL Mount and Lenses

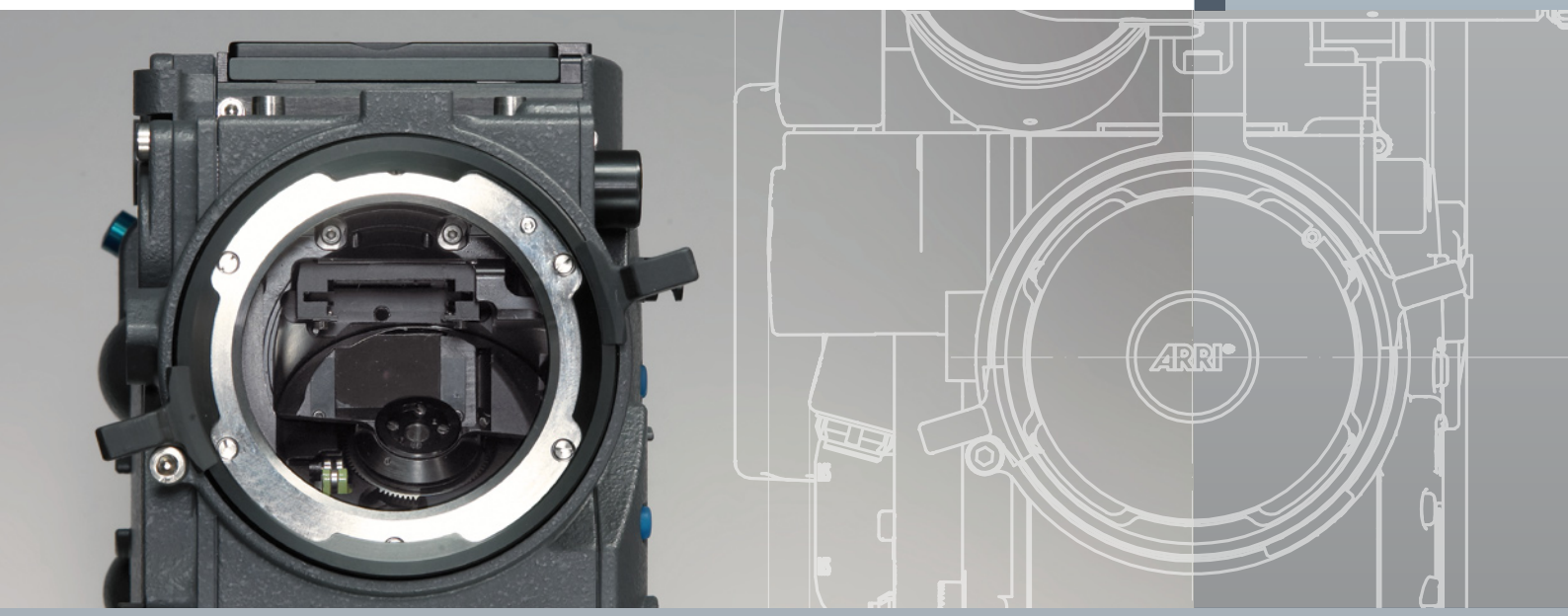
The 416 cameras use the industry standard 54 mm stainless steel PL mount. The stable backfocus afforded by the PL mount and by the robust camera construction is a hallmark of all ARRI film cameras.

The PL mount makes the vast selection of high quality lenses for the Super 16 and 35 mm formats available to the ARRIFLEX 416 cameras. This includes the Master Primes, which combine the highest optical quality with a super fast stop of T1.3, as well as the Ultra Primes, the modern prime lens set with the widest focal range from 8 to 180 mm. It also includes all the specialty lenses available only for film cameras, such as macro lenses, super long telephoto zooms or zooms with a super wide range, fisheyes, extreme telephotos, shift & tilt lenses, tilt focus lenses, reverse perspective lenses, squishy lenses and so on.

A complete set of new T1.3 prime lenses has been developed specifically for the Super 16 format: the Ultra 16 lenses. With focal lengths of 6, 8, 9.5, 12, 14, 18, 25, 35 and 50 mm, the Ultra 16 lenses cover the whole range typically required by a production. They are a perfect match for the 416 cameras, exhibiting the same resistance to flare as the Master Primes and giving unprecedented image quality even when opened to their maximum aperture of T1.3. Their high speed creates shallow depth of field and allows shooting on tight lighting budgets or under severe time pressure.

THE NEW
ULTRA 16 LENSES

The 416 uses the industry standard PL mount.
This affords stable backfocus and an unparalleled selection of lenses.

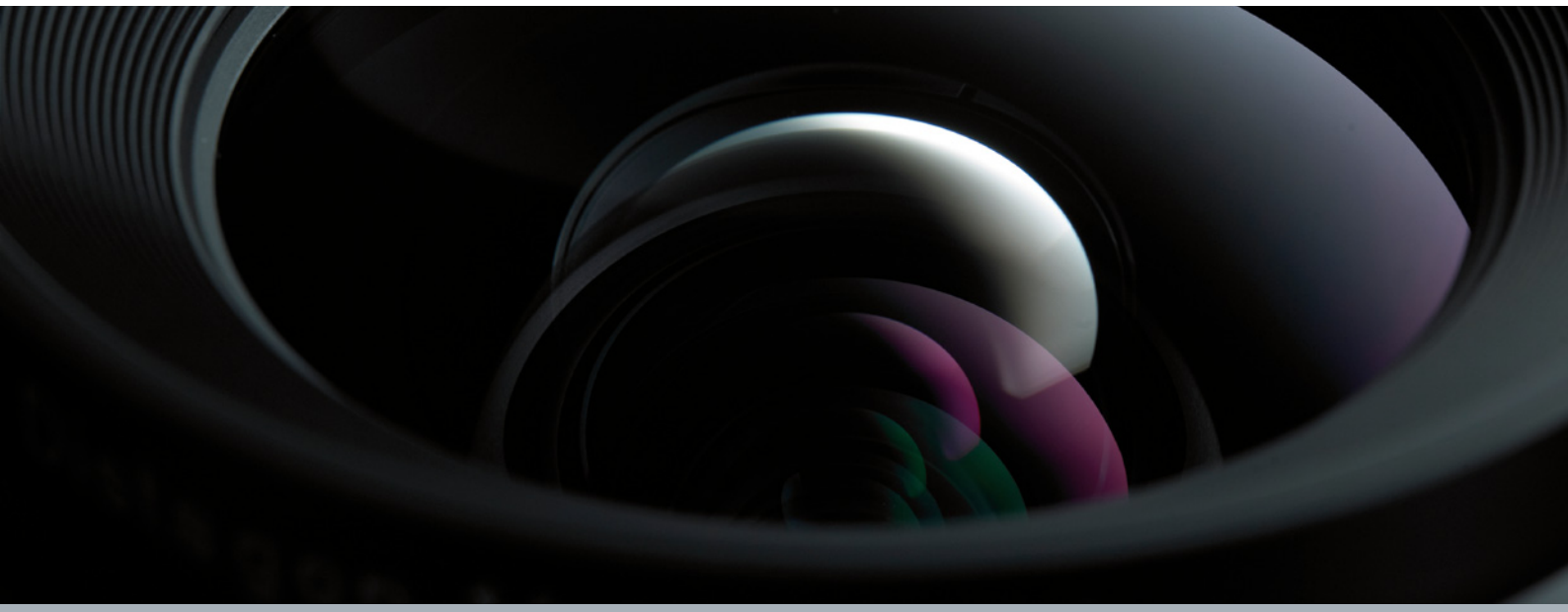




The Ultra 16 lenses: 6, 8, 9.5, 12, 14, 18, 25, 35 and 50 mm, all T1.3



The Ultra Primes: T2.8/8, T2.1/10, T2/12, T1.9/14, T1.9/16, T1.9/20, T1.9/24, T1.9/28, T1.9/32, T1.9/40, T1.9/50, T1.9/65, T1.9/85, T1.9/100, T1.9/135 and T1.9/180 mm



Control and Power

The simple to use control panel on the 416 range should be familiar to anyone who has ever worked with a modern ARRI camera, since the 416 cameras have inherited the 235's control panel design and illuminated buttons. All three 416 cameras can therefore be operated without further training and the setting of any operating parameter can be accomplished quickly and intuitively.

The powerful and smart Lithium-ion OBB-2 on-board battery can run up to five magazines while keeping camera and video assist in standby for more than two hours. With a built-in power gauge the state of an OBB-2 can quickly be determined, and since the OBB-2 communicates with the camera, the 416 cameras can accurately display the battery's current voltage, remaining capacity or how many more magazines the battery's charge will run. A quick change mechanism, which can be easily operated with one hand, is integrated into the cameras' bodies and reduces overall weight.



The same familiar controls found on the 235, 435 and 535 have also been used for the 416.





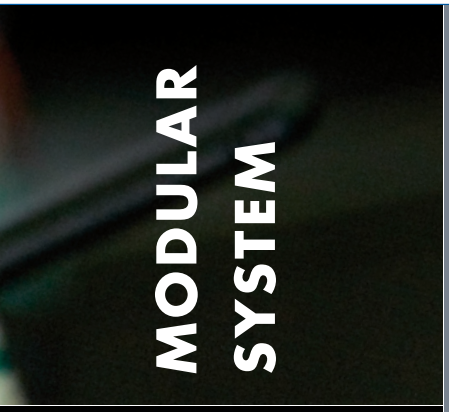




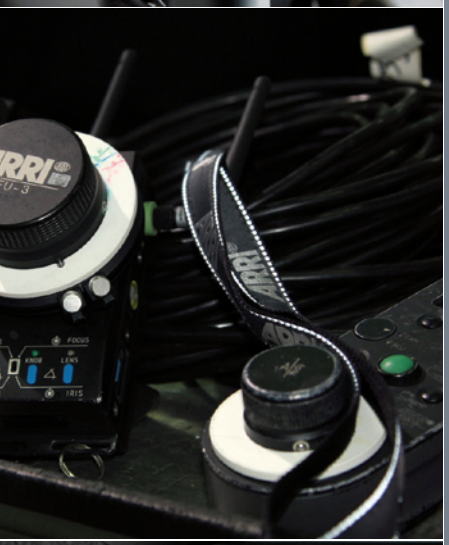
The OBB-2 connects to the 416 cameras through a new, but backwards-compatible power connector.




ARRI
PAL
PUSH TO RELEASE
FIX
OPEN
LOCK
Carl Zeiss
Distagon
RUN









The 416 Camera System

The ARRIFLEX 416 cameras are complemented by a range of new and existing accessories that follow the same design philosophy used in the creation of the 416 body and magazines: increasing efficiency on the set.

Two handles have been designed: one for normal use, one for remote. These include such details as a flip-up tape hook and different height platforms for Steadicam and for under-slinging the camera on a remote head. Lens motors or lightweight follow focus units can be mounted on the camera left side with the help of the Left Rod Bracket LRB-2. Like the 235, the 416 cameras have extra 3/8" attachment points with locating pin holes for twist-free attachment of accessories or extra secure rigging.

The 416 cameras are compatible with most of the accessories used by their 35 mm siblings, including the ARRI Remote Control Unit RCU-1, External Display EXD-1, Wireless Remote System, Wireless Remote Control WRC-1 & WRC-2, Universal Motor Controller UMC-3, Iris Control Unit ICU, Electronic Synchronization Unit ESU, most follow focus units and matte boxes. They have also inspired some new accessories, including the Heated Eyecup HE-5, which automatically closes its iris when the operator is not looking through the viewfinder.



Technical Data

	ARRIFLEX 416	ARRIFLEX 416 Plus	ARRIFLEX 416 Plus HS
Fps	1-75		1-150
	Speed can be varied while camera runs Ramps possible with Remote Control Unit RCU-1, Wireless Remote Control WRC-1, WRC-2 and Iris Control Unit ICU-1		
Shutter	Manually adjustable to: 45, 90, 135, 144, 150, 172.8, 180 degrees		
Film Format	Super 16 mm, conforming to DIN 15602 and ISO-5768-1998		
Film Gate	Super 16 only (12.35 x 7.5 mm, 0.486 x 0.295 inches)		
Lens Mount	54 mm stainless steel PL mount		
Sound	< 20 db(A) @ 24 fps		<29 db(A) @ 24 fps
Flange Focal Distance	52.00 mm -0.01		
Movement	Silent precision movement, single pull down claw, single registration pin. Pull down pitch adjustable		
Viewfinder Eyepiece	Same 8x eyepiece as 235		
Eyepiece Extension	Same short and medium extensions as 235		
Ground Glass	16SR 3 fiber optic screens		
ARRIGLOW	RGB ARRIGLOW with custom combination of red, green and blue, separate brightness control on camera left side		
Weight [1]	5.5 Kg / 12.1 Lbs	5.8 Kg / 12.8 Lbs	
Power Input	24 Vdc nominal, accepts 21 to 35 Vdc		
Battery	Intelligent 29.6V Lithium-ion On Board Battery OBB-2, lasts 5 magazines at 24 fps and about 2 hours in standby 80 Watt/hours at 950 g / 2 Lbs with built-in power gauge (comparison: 16SR 3 battery had 29 Watt/hours at 870 g / 1.9 Lbs)		
Accessory Power Outputs	1x 24V RS connector on 416, or 2x 24V RS connector on 416 Plus & 416 Plus HS 1x 24V REMOTE connector 1x 24V Heated Eyecup connector 2x 12V MINI MONITOR connectors on IVS		
Temperature Range	-20°C to +50°C (+4°F to +122°F)		
Magazine	416 Shoulder Magazine 120/400 (SHM-3), Timecode module optional		
Timecode	Continuous barcode on film edge, 80 bit according to SMPTE RP 114 (same as on 16SR 3) Timecode & Userbits window burn in and VITC on video assist possible		

[1] Camera body, viewfinder, eyepiece, IVS, magazine and film

All data subject to change without notice.


ARRI
NORM
PS/CCU
LOCK
PHASE
MODE
SEL/▽
SEL/△

Germany

Arnold & Richter Cine Technik (Headquarters, Sales & Service)
Türkenstraße 89, D-80799 Munich, Germany
Tel: +49 (0)89 3809 0, Fax: +49 (0)89 3809 1245

Great Britain

ARRI GB Limited (Sales & Service)
2 Highbridge, Oxford Road, Uxbridge, Middlesex, UB8 1LX, Great Britain
Imaging Equipment Sales: Allan Fyfe, afyfe@arri-gb.com
Tel: +44 (0)1895 457 000, Fax: +44 (0)1895 457 001

Italy

ARRI Italia S.r.l. (Sales & Service, Milan)
Viale Edison 318, 20099 Sesto San Giovanni (Milano), Italy
General Manager: Antonio Cazzaniga, acazzaniga@arri.it
Tel: +39 (02)262 271 75, Fax: +39 (02)242 1692

ARRI Italia S.r.l. (Sales & Service, Rome)
Via Placanica 97, 00040 Morena (Roma), Italy
Camera Sales: Mauro Sembroni, msembroni@arri.it
Tel: +39 (06)79 89 021, Fax: +39 (06)79 89 02 206

USA

ARRI Inc. (Sales & Service, East Coast)
617 Route 303, Blauvelt, NY 10913-1109, USA
Vice President: Jürgen Schwinzer, jschwinzer@arri.com
Tel: +1 (845)353 1400, Fax: +1 (845)425 1250

ARRI Inc. (Sales & Service, West Coast)
600 North Victory Blvd., Burbank, CA 91502-1639, USA
Vice President: Bill Russell, brussell@arri.com
Tel: +1 (818)841 7070, Fax: +1 (818)848 4028

Canada

ARRI Canada Limited (Sales & Service)
415 Horner Ave. Unit 11 & 12, Toronto, Ontario M8W 4W3, Canada
Accounts Manager, Camera & Digital Systems:
Sébastien Laffoux, seb@arrican.com
Tel: +1 (416)255 3335, Fax: +1 (416)255 3399

Asia

ARRI Asia Limited
3B, 29/F, The Centrium, 60 Wyndham Street, Central, Hong Kong
General Manager: Paul Ivan, pivan@arriasia.hk
Tel: +852 2571 6288, Fax: +852 2875 9181

Australia

ARRI Australia PTY Limited
Unit 6C, 5 Talavera Road, Macquarie Park NSW 2113, Sydney, Australia
General Manager: Stefan Sedlmeier, ssedlmeier@arri.com.au
Tel: +61 (2)9855 4308, Fax: +61 (2)9855 4301

This ARRIFLEX 416 product brochure (K5.40459.0) is published by Arnold & Richter Cine Technik, September 01, 2008 © ARRI/2008
Technical data and offerings are subject to change without notice. All rights reserved. Without any warranty. Not binding 09/2008. ARRI is a registered trademark of Arnold & Richter Cine Technik GmbH & Co. Betriebs KG.
Arnold & Richter Cine Technik GmbH & Co. Betriebs KG · Türkenstrasse 89 · D-80799 Munich · phone +49 (0)89 3809 0 · fax +49 (0)89 3809 1245 · www.arri.com