THE POWER OF 416

ARRI

35 FORMAT FEATURES IN A SUPER 16 CAMERA

Advances in lenses, film stock and post production technology 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 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 film being the only worldwide 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 introducing a new Super 16 camera, the **ARRIFLEX 416**. Based on years of camera engineering, market research and focus groups with renowned industry professionals, the ARRIFLEX 416 brings features previously only found in high end 35 mm cameras to Super 16 productions.

The ARRIFLEX 416 is a lightweight modern Super 16 film camera with a 35-style viewfinder and an amazingly low sound level similar to that of the ARRICAM. Its speed is variable from 1 to 75 fps, and its mirror shutter can be manually adjusted from 45 to 180 degrees. A completely new lightweight ergonomic design, integrated electronic accessories and compatibility with the same lenses and accessories used by its 35 mm siblings make the 416 the most powerful, flexible and portable Super 16 camera ever built.

- **The Quietest 16 mm Camera**
  - sound less than 20 dbA

16

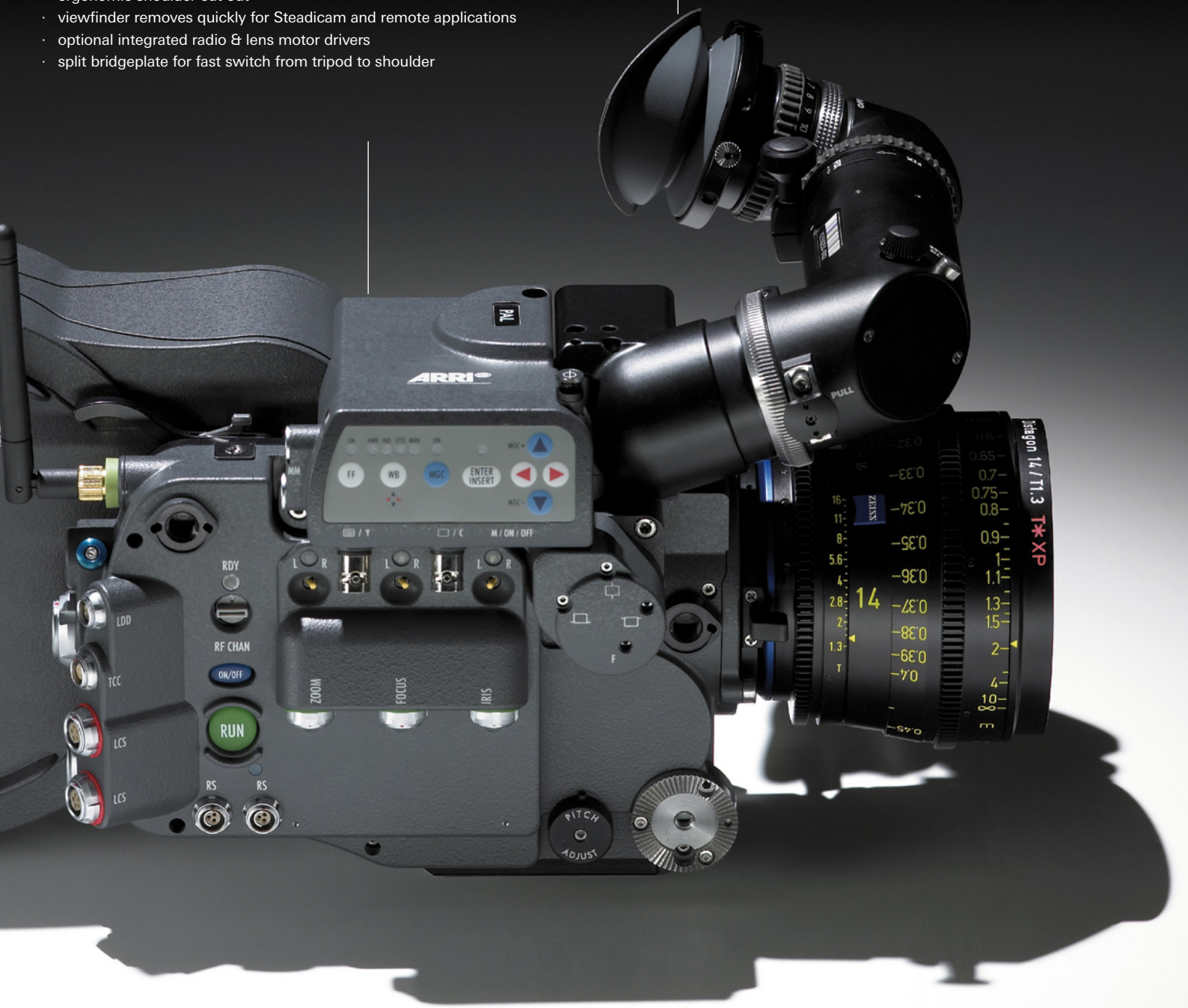
MAIN FEATURES

■ **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

■ **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



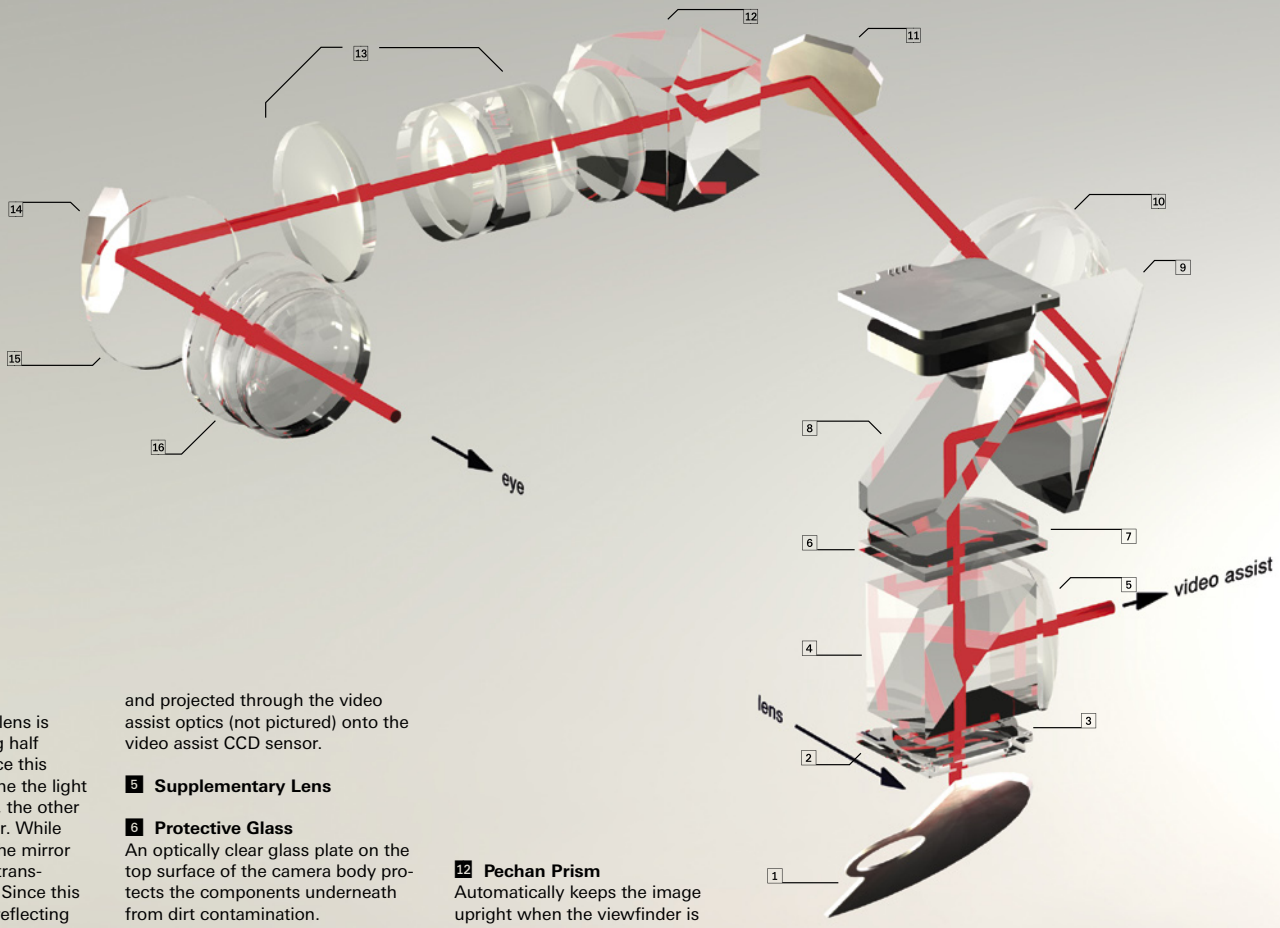
I CAN SEE CLEARLY NOW

To get the images you want, first you have to see them clearly. Especially in 16 mm, the quality of the viewfinder is crucial so the operator can accurately judge the image. The 416 optical viewfinder makes it easy to judge focus, create a precise image composition and work comfortably, accurately and efficiently.

The ARRIFLEX 416 viewfinder optics have been re-designed 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, judging focus on the set has just become a lot easier, and unpleasant surprises during dailies a lot less likely.

The 416 viewfinder ergonomics are based on the ARRIFLEX 235 viewfinder; it has 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 viewfinder has a large exit pupil, the operator has more freedom to move without loosing the image - a great advantage when going hand held or shooting action sequences. In contrast to its predecessor, the 416 accepts large diameter 35 format primes, including the new Master Primes, because its viewfinder is located higher above the lens mount.

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



1 Mirror Shutter
The light from the taking lens is reflected up by a spinning half moon shaped mirror. Since this mirror rotates, half the time the light is projected onto the film, the other half up into the viewfinder. While the light is reflected up, the mirror covers the film, which is transported to the next frame. Since this mirror's function is both reflecting and shuttering light, it is known as a "mirror shutter".

2 Fiber Optic Screen
The light is projected onto a screen (a fiber optic screen, in case of the 416), which acts as a rear projection screen.

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 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.

9 90 Degree Prism

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

11 Mirror

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

13 Secondary Lens
Provides the image for the eyepiece.

14 Mirror

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

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

COMFORTABLE, ACCURATE & EFFICIENT

HOW DOES AN OPTICAL VIEWFINDER WORK?

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 full color image and are able to accurately judge focus. 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, thus minimizing the need for re-takes and saving precious time on the set.

Operators find this extra area around the image also 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 like medium and long eyepiece extensions, eyepiece levelers and heated eyecups.

An optical viewfinder is essentially a small rear projection screen and a magnifying glass. Light from the taking lens forms an image on a screen. For 16 mm cameras, this is usually a fiber optic screen, and for 35 mm cameras it is usually a ground glass. 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. The specific light path pictured here is from the ARRIFLEX 416, but is similar in principal to 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.

INTEGRATED VIDEO ASSIST

The 416 viewfinder is accompanied by a video assist of the same image quality and features 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.

MIX YOUR OWN COLOR

High quality video assist

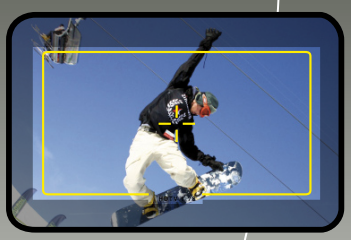
Old 16 mm Camera Viewfinder Image

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



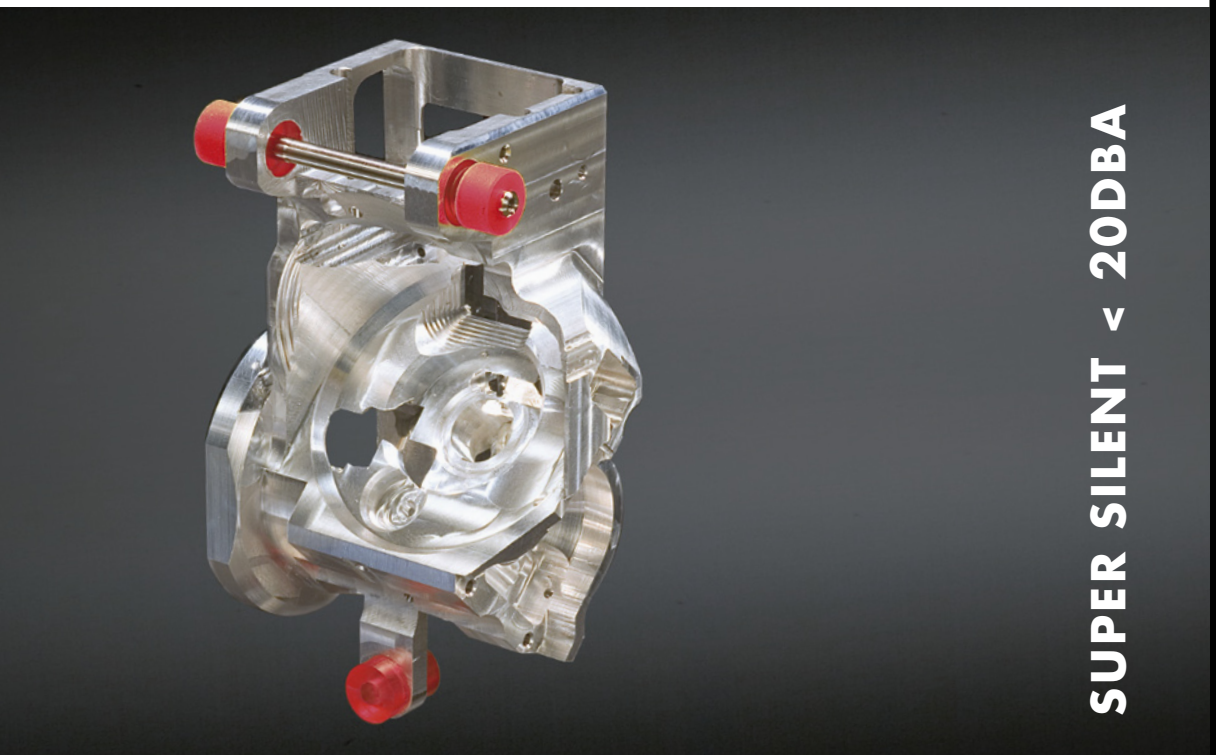
THE SOUND OF SILENCE

The 416 uses a completely new sound insulation design that makes it as quiet as an ARRICAM. An inner skeleton is suspended by symmetrically positioned rubber insulators in the 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 to radiate 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 magazine consist of an inner skeleton and an outer shell separated by rubber insulators, making it the quietest 16 mm magazine ever built.

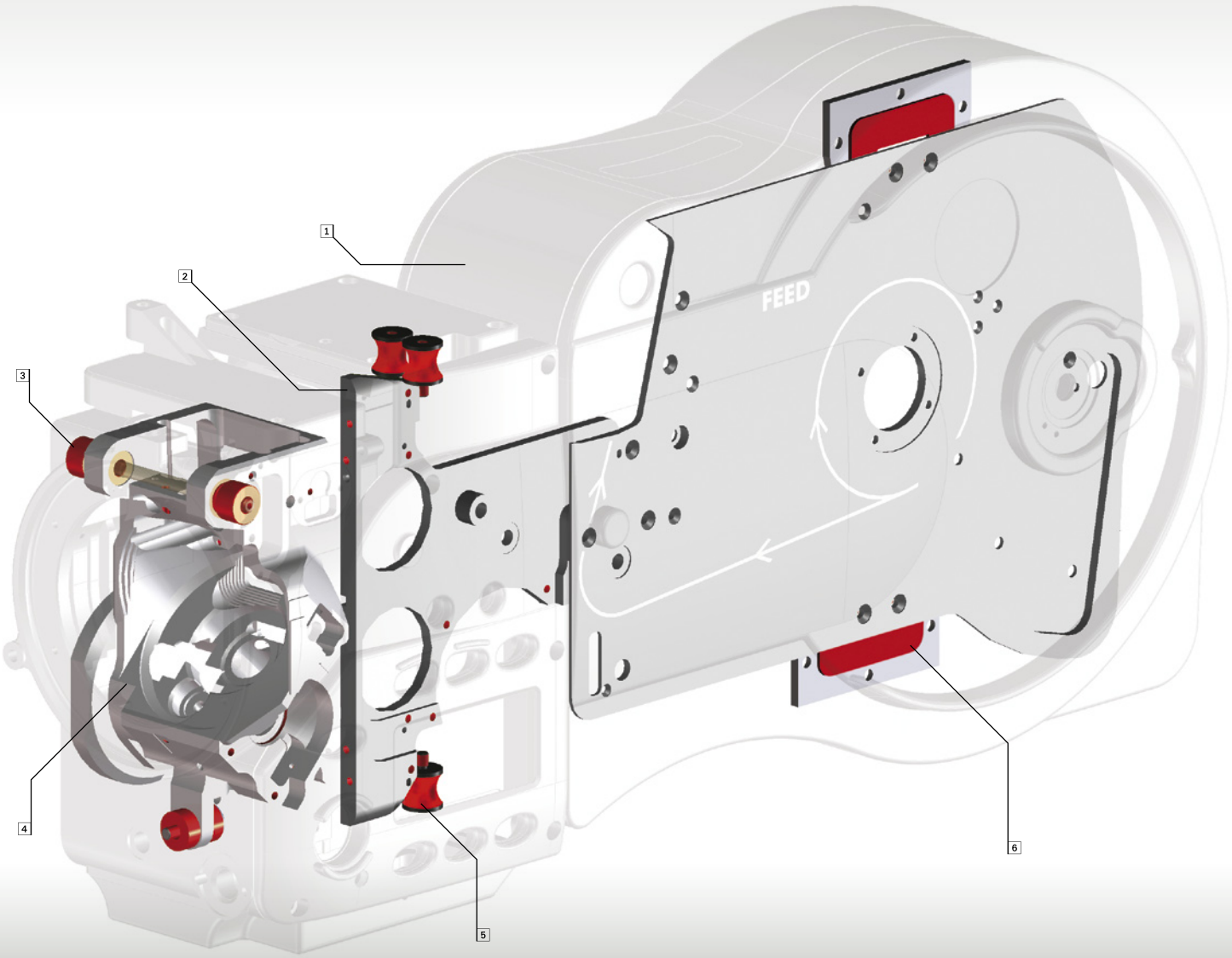
When working with a truly silent sync sound camera, directors and actors can concentrate on the performance and crews can concentrate on the action. How much time has been wasted on sets dealing with camera sound problems? At a sound level less than 20 dbA, the ARRIFLEX 416 is so silent that sound recordists will ask the same question they are asking 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?

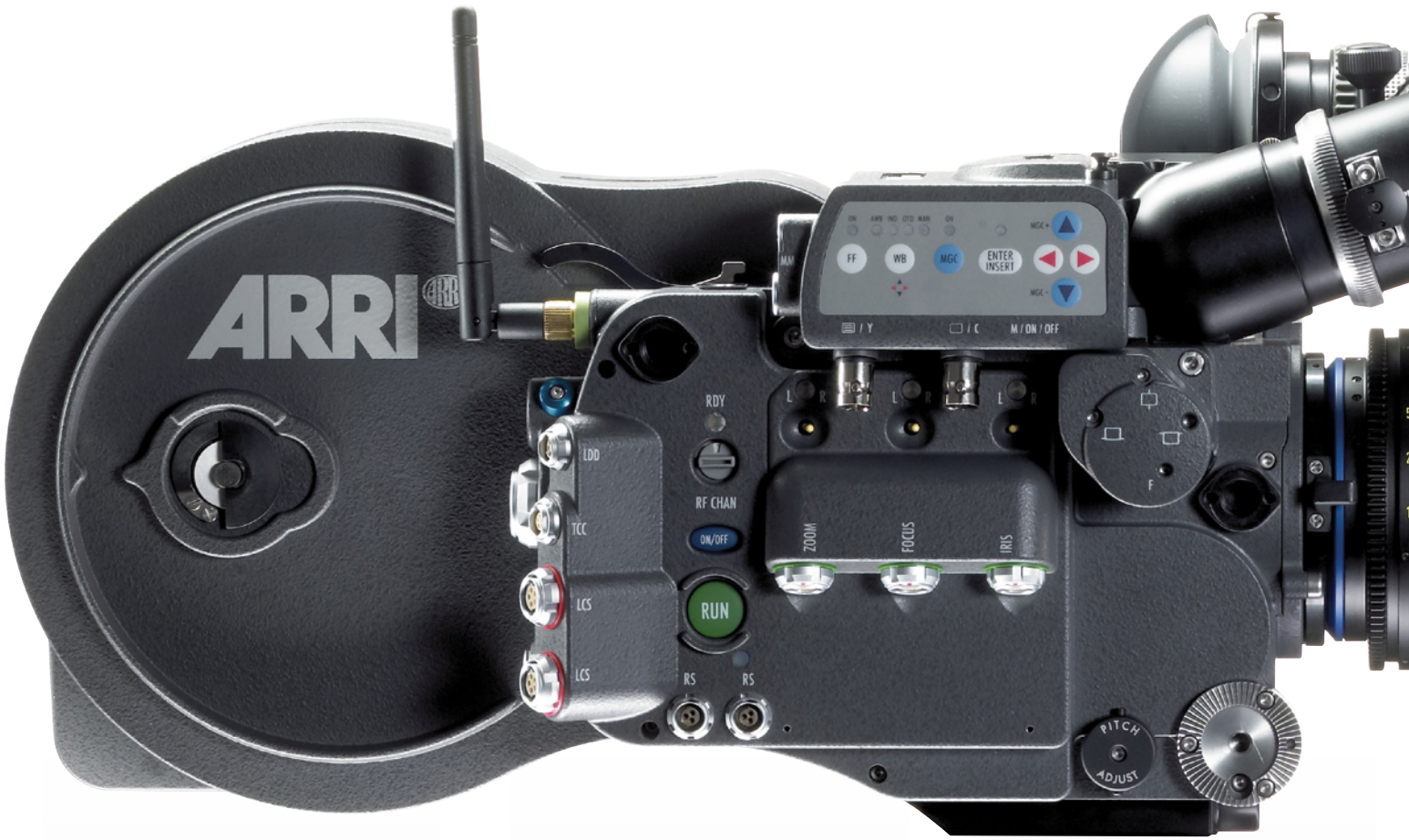
SUPER SILENT < 20DBA



1 magazine outer shell
2 magazine inner skeleton
3 body rubber insulators
4 body inner skeleton
5 magazine rubber insulators
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 quite operation.

SMALL LIGHT & SILENT

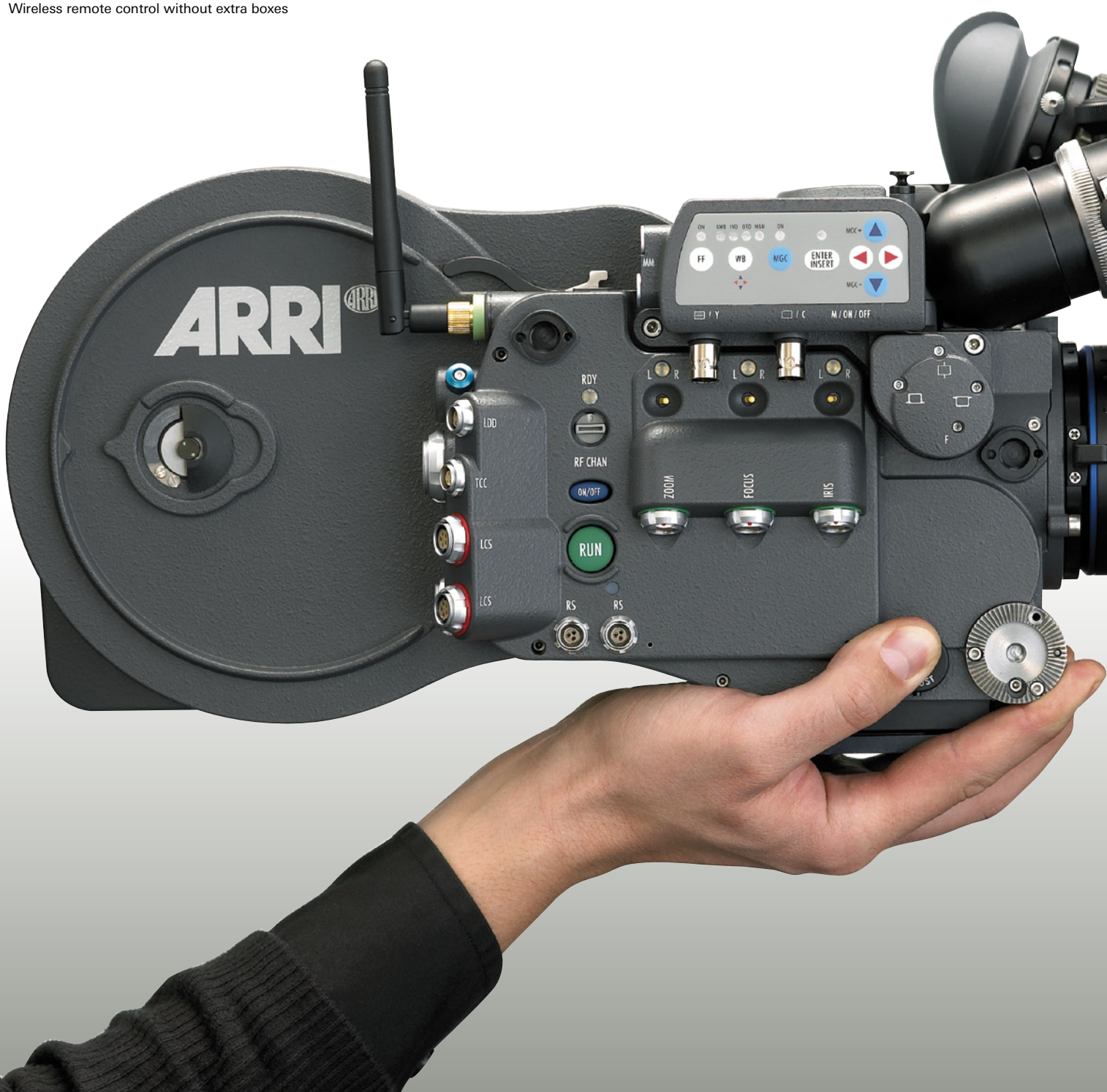


9 16

ARRIFLEX 416 Plus with extended electronics

ARRIFLEX 416 with basic electronics

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



25% LIGHTER THAN SR3

COMPACT, LIGHTWEIGHT & 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 further increases 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 16SR3, when comparing a configuration including body, viewfinder, IVS and magazine. When comparing the 416 Plus to a 16SR3 with UMC-3, the difference is even greater. Its shape has been designed to make it as compact as possible and to give it a low profile. At the same time its shape and weight are balanced perfectly for comfortable shoulder operation.

A lot of thought has been put into the ergonomics of having to work fast and safe on a film set. The new magazines, as well as the new on-board battery, can be quickly removed with one hand. The 416's new front shape makes attaching lens accessories easier and faster. To avoid the clutter of extra boxes and cables, lens motor electronics and a wireless radio can be integrated directly into the camera body, which is then called an ARRIFLEX 416 Plus.

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

416 Split Bridgepalte

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

PL MOUNT & LENSES

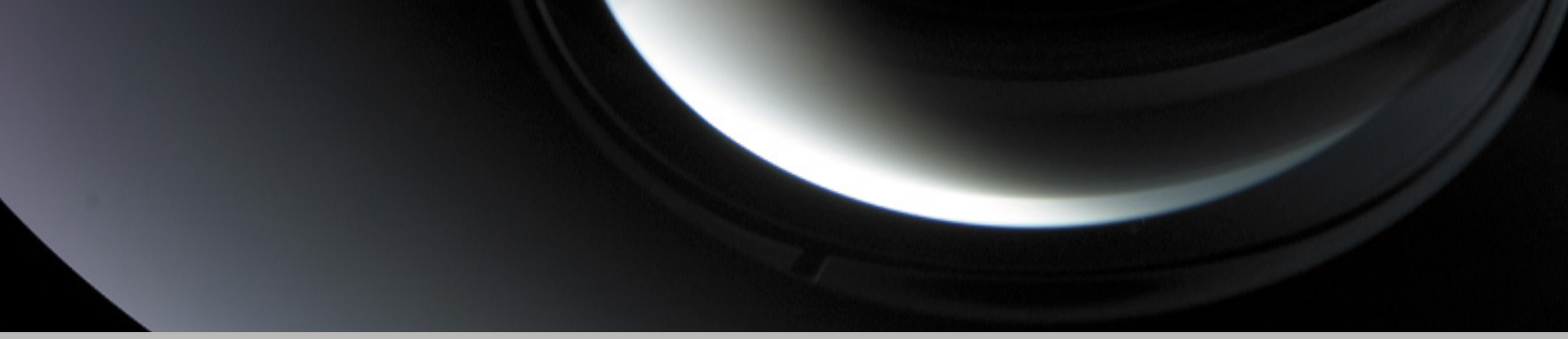
The 416 uses the industry standard 54 mm stainless steel PL mount. The stable backfocus afforded by the PL mount and by the robust camera construction is a hallmark of all ARRI film cameras.

The PL mount makes the vast selection of high quality lenses for the Super 16 and 35 mm formats available to the ARRIFLEX 416. This includes the Master Primes, which combine the highest optical quality with a super fast stop of T1.3. This includes 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, like 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.

Five brand new T1.3 prime lenses have been developed specifically for the Super 16 format: the Ultra 16 lenses. With focal lengths of 6, 8, 9.5, 12 and 14 mm the Ultra 16 lenses extend the Ultra Primes further into the wide end. The Ultra 16 lenses are a perfect match for the 416; they exhibit the same resistance to flare as the Master Primes and give an unprecedented image quality even when opened to their maximum aperture of T1.3. Their high speed allows shooting on tight lighting budgets, shooting under time pressure and creating a shallow depth of field.

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: wide & fast at 6, 8, 9.5, 12 and 14 mm, all T1.3

The Ultra Primes: 8, 10, 12, 14, 16, 20, 24, 28, 32, 40, 50, 65, 85, 100, 135, 180 mm

CONTROL & POWER

The simple to use control panel on the 416 should be familiar to anyone who has ever worked with a modern ARRI camera, since the 416 has inherited the 235's control panel design and illuminated buttons. Thus the 416 can be operated without further training. Setting the camera's operating parameters can be accomplished quickly and intuitively.

The new, powerful and smart Lithium-ion on-board battery OBB-2 can run up to five magazines while keeping camera and video assist in standby for more than 2 hours. With a built-in power gauge the state of an OBB-2 can be quickly determined, and since the OBB-2 communicates with the camera, the 416 can accurately display its current voltage, remaining capacity or how many more magazines the battery's charge can run. A quick change mechanism - that can be easily operated with one hand - is integrated into the camera body, thus reducing total 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 through a new, but backwards compatible power connector.


ARRI
WFU-3


ARRI
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Carl Zeiss
Distagon


ARRI
WFU-3

MODULAR SYSTEM

THE 416 CAMERA SYSTEM

The ARRIFLEX 416 is complemented by a range of new and existing accessories that follow the same design philosophy used in the creation of 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 416 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 has extra 3/8" attachment points with locating pin holes for twist free attachment of accessories or extra secure rigging.

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

PRELIMINARY TECHNICAL DATA

Fps:	1 to 75 fps Speed can be varied while camera runs Ramps possible with Remote Control Unit RCU-1, Wireless Remote Control WRC-1 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 dbA @ 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:	16SR3 fiber optic screens
ARRIGLOW:	RGB ARRIGLOW with custom combination of red, green and blue, separate brightness control on camera left side
Weight:	Camera body, viewfinder, eyepiece, IVS, magazine and film: about 5.5 Kg/12.1 Lbs; that is 25% less than a 16SR3 in a similar configuration
Power input:	24 Vdc nominal, accepts 21 to 35 Vdc
Battery:	Intelligent 29.6V Lithium-ion On Board Battery OBB-2, lasts 5 magazines and about 2 hours in standby 80 Watt/hours at 950 g/2 Lbs with built-in power gauge (comparison: 16SR3 battery had 29 Watt/hours at 870 g/1.9 Lbs) Certified for legal transport in airplanes

Accessory power outputs:	1x 24V RS connector on 416, or 2x 24V RS connector on 416 Plus
	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 16SR3).
	Timecode & Userbits window burn in and VITC on video assist possible.

All data subject to change without notice.

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