LDX SERIES

SOFTWARE UPGRADABLE CAMERA SYSTEM

BUSINESS CASE

- **The LDX Series™ of cameras offer a new level of business flexibility by using one hardware platform with a flexible GV-eLicense upgrade model**
- **With the highest sensitivity and image performance across different video formats, there are no extra costs for additional lighting when working to produce 3G (1080p) events and programs**
- **Integrated 3G transmission solutions permit the use any type of camera cable with the full feature set and performance**
- **The use of standard IT interfaces and protocols in combination with the Connect Gateway provides for the best possible integration into external control systems**

Grass Valley® cameras are technology-leading imaging systems with a history of innovative developments and the recipient of six Emmy® Awards. Grass Valley offers a very comprehensive portfolio of live production camera systems that include the latest LDX camera heads, a complete line of 3G Transmission solutions, an extreme powerful camera control solution, and a wide range of dedicated camera accessories such as viewfinders, convertors, and an interface gateway.

The latest high-definition video cameras from Grass Valley—the LDX Series, are a unique line of software-upgradable cameras built around Xensium-FT imagers developed by an experienced engineering team. They are a new generation of camera imagers which combine all the advantages from CMOS imaging technology such as high sensitivity in all video modes, high dynamic range, and low power consumption. They also include global shutter behavior which was before only possible with CCD imagers. Xensium-FT imagers deliver unmatched sensitivity and picture quality even in the most demanding of applications.

Productions need freedom, flexibility, and adaptability. Grass Valley understands the value of being able to choose the right solution to fit specific requirements. The LDX Series includes the unique GV-eLicense program, where users have the choice of upgrading their cameras perpetually or by a 7-day term. A complete line of 3G Transmission solutions are available to fulfill all the requirements which might be found with many different kinds of productions. With the new XCU™ dockable base station, Grass Valley offers a revolutionary concept in camera transmission. XCU is a real game-changer for video production companies such as OB truck operators as it helps to minimize operational costs and streamlines reconfiguration for each production. XCU is made out of two distinct units: the base station and a fixed cradle. The cradle can be mounted and wired into equipment racks, and the base station can be docked into different cradles as needed. All specific settings needed for the production environment are memorized in an EEPROM inside the cradle and will automatically configure the base station when it's powered on.

To control all the cameras in a production environment, a powerful and flexible camera control solution has been developed. C2IP is the first camera control system on the market which uses Ethernet and TCP/IP open IT standards. Even the largest multi-camera systems can be fully controlled over an Ethernet-based networked. With the Connect Gateway, an interface is available which provides integration for the C2IP camera control system into many different kinds of external control systems. An application has been developed where the basic camera settings can be controlled from all the current Grass Valley video production switchers. Now cameras can be an integral part of the total facility control system.

From the RefleX SuperXpander kits for large lenses, high-resolution viewfinders, the ComfortPad shoulder pad with integrated side grip to lighted script boards, rain covers, and universal transport cases, Grass Valley camera accessories are specifically designed to enhance camera operation and make users more efficient and creative.

LDX SERIES

A revolutionary series of cameras built for business flexibility and operational excellence, with superior imaging, processing, and performance.

More than 50 years of imaging innovation has led to a new standard in live broadcast acquisition: the LDX Series of software upgradable cameras. LDX Flex™ is a single-format 1080i or 720p camera, LDX Première™ provides standard multiformat 1080i & 720p acquisition, LDX Elite™ adds 1080PsF, while LDX WorldCam™ rounds out the series with 1080p production. Upgrading to the next level camera can be perpetual or on a 7-day term basis for the ultimate in production flexibility.

The LDX Series cameras are the ultimate achievement based on a proud legacy capturing the world's historic moments. In live television, there are no second chances to make up missing details at the crucial moment of acquisition, and HD broadcasting is all about telling the story through those details.

The introduction of the next-generation Grass Valley LDX Series provides a multitude of capabilities and benefits to users. The camera's reliability has been strenuously tested for the harsh demands of live production; its imaging is beyond imagination; a huge advance has been made in ease of use and special attention paid to the ergonomic design of the camera head.

Stunning Images

The LDX camera models provide stunning images, based upon new, custom-designed Xensium-FT 2/3-inch CMOS imagers. The renowned Grass Valley imaging design team engineered the new Xensium-FT CMOS imagers to make artifact-free capture possible along with a significant improvement in sensitivity.

To make images look their best, LDX incorporates TrueTexture™—a unique feature to preserve texture throughout all processing parameters.

Another imaging innovation is ArtTouch™, an intuitive interface between the operator and hardwired controls, which significantly enhances artistic possibilities within a live broadcast. Looking back at the last five years in broadcasting, a lot has changed with respect to the way productions are being managed from an artistic point of view. To an increasing extent, there is a close collaboration between creative directors and the camera shaders, who adjust each camera feed to perfection.

With the LDX Series, a completely new level of artistic camera control is included, to support today's and tomorrow's requirements for live shading flexibility. By using the full latitude of the custom-designed Xensium-FT CMOS imager, control of every aspect of the image is available, so any degree of creative touch can be applied.

The LDX Series provides enhanced colorimetry, color-matching, and picture performance. Color temperature and tint are just two of the parameters that can be simultaneously adjusted across multiple cameras. Knee saturation control maintains a correct hue by using secondary compression. An advanced chromatic lens aberration correction and sharpness solution (CLASS) is applied (with basic-only system in the LDX Flex), and offers impressive sharpness improvements mainly on the left and right regions of the image. Other features assist in aperture correction, detail preservation, and more.

Designed for the Operator

In addition to establishing a new standard for image acquisition, the design of the LDX Series focuses strongly on operator comfort and usability. Grass Valley proudly introduces the world's first truly ergonomic shoulder pad (LDX Elite & LDX WorldCam). Not only does this shoulder pad provide the ultimate freedom to capture difficult angle shots, but is also the world's first shoulder pad that can compensate for a feature that's different for every operator—the angle of the shoulder.

Until now, most handheld camera operators unconsciously lifted their shoulder to level the shot. This means that they continuously tense their muscles to lift equipment, which regularly is a total weight of about 7 kg (15.4 lbs.). The new shoulder pad can be adjusted to compensate for each individual's shoulder angle—relieving the muscles from actively lifting the weight. The new shoulder pad has been developed in close cooperation with camera operators from around the world along with physiotherapists to alleviate adverse long-term effects.

The LDX Series offers even more operational excellence. Button layouts and control knobs are ergonomically designed to allow the operator to find the right adjustments easily. Full control flexibility is possible thanks to well-dimensioned control knobs. With the easily accessible separated "info" knob, all important information is displayed in the viewfinder instantaneously. The user-friendliness of LDX cameras has been further improved by using a streamlined menu structure that allows operators to access commonly used functions more quickly.

Engineered for the Bottom Line

The problem with buying a camera today is that it is not always clear what will be needed tomorrow. This leads to one of three possibilities: upgrade to new cameras in a few years, pay today for features that hopefully will be used in a few years, or market forces aligned perfectly so that the cameras provide exactly what is needed today and tomorrow.

The LDX Series changes all that. Buy what is needed today, and upgrade to the next level camera or higher as needed later.

With the unique LDX Series GV-eLicense program, users now have the ultimate flexibility in format support and feature set availability. With GV-eLicense, LDX Series users have the choice of upgrading their cameras in two different ways. A perpetual upgrade license provides an upgrade from any lower model of the range to the next higher model of the range. With a 7-day term upgrade license, the same flexibility is available, but for a lower cost. Multiple licenses may be purchased to upgrade cameras by more than one level (e.g., LDX Flex to LDX WorldCam) or to extend 7-day term upgrade licenses.

Each of the four cameras in the LDX Series offers exceptional performance, with increased functionality as you go up the range.

LDX SERIES

LDX Flex is a single-format 1080i or 720p camera, LDX Première provides standard multiformat 1080i & 720p acquisition, LDX Elite adds 1080PsF, while LDX WorldCam incorporates all of the features of the LDX Elite and adds effortless 1080p production as well—with the same sensitivity as shooting 1080i.

With the LDX Series, Grass Valley has paid particular attention to the ongoing costs of operation. LDX cameras fully support Grass Valley's 3G Transmission triax and fiber camera transmission systems, and are fully integrated with our Ethernet-based C2IP camera control system and RefleX SuperXpander. In addition, Connect Gateway is a powerful link to remote production capabilities. This smart addition provides full remote control over all camera controls via any IP-link and includes DigiTally—an all-digital remote tally protocol over IP.

The LDX Series offers the flexibility to adjust capital expenses and operating expenses to match a variety of business goals and factors.

LDX is about more than just pretty pictures—LDX is built to face the realities of live production and broadcast—today and tomorrow.

The LDX Series… It's imaging, beyond imagination.

	LDX Flex can be upgraded to LDX Première*	LDX Première can be upgraded to LDX Elite*	LDX Elite can be upgraded to LDX WorldCam	LDX WorldCam
Imager	Next-generation Xensium-FT			
Sensitivity @ 2000 lux	F12 typical (all 50 Hz modes) / F11 typical (all 59.94 Hz modes)			
S/N ratio	60 dB (typical)			
Increased sensitivity	✔	✔	✔	✔
Improved digital noise reduction	✔	✔	✔	✔
TrueTexture: texture is preserved throughout all processing parameters	✔	✔	✔	✔
Single-format: 1080i50/59.94 or 720p50/59.94	✔			
Switchable video formats: 1080i50/59.94 and 720p50/59.94		✔		
Switchable video formats: 1080PsF25/29.97 (artistic), 1080i50/59.94, 720p50/59.94			✔	
Switchable video formats: 1080p50/59.94 (3G), 1080PsF 25/29.97 (artistic), 1080i50/59.94, 720p50/59.94				✔
Effortless 1080p50/59.94 acquisition with no increased lighting requirement				✔
Suitability for 3D productions		✔	✔	✔
ArtTouch: smart coupling of video control functions	✔	✔	✔	✔
Perfect picture matching across the complete LDX Series as well as the LDK installed base	✔	✔	✔	✔
Ergonomically designed camera head with easy access to control buttons, including the new PickMe button	✔	✔	✔	✔
CLASS: basic electronic lens error correction	✔			
CLASS: advanced electronic lens error correction		✔	✔	✔
Standard secondary color corrector (two-color)	✔	✔		
Advanced secondary color corrector (up to six sets for color hue, saturation, and luminance adjustment)			✔	✔
Fully compatible with 3G fiber/triax transmission systems	✔	✔	✔	✔
Compatible with C2IP control systems and RefleX SuperXpander	✔	✔	✔	✔
Second motorized optical filter wheel with 4P-star and soft focus		✔	✔	✔
Dynamic aperture correction	✔	✔	✔	✔
Dynamic contour equalizer		✔	✔	✔
Power curve gamma control			✔	✔
Depth of field indicator			✔	✔
New ComfortPad shoulder pad			✔	✔
Side grip			✔	✔

* Multiple licenses may be purchased to upgrade more than one level (e.g., LDX Flex to LDX WorldCam), on a perpetual or 7-day term basis.

LDX SERIES SPECIFICATIONS

LDX Flex (Common to all LDX Series Cameras unless otherwise stated)

Camera Head

General:

- Power: 34W
- Temperature range: -20° to +45°C (-4° to 113°F) (operating)
- Weight:
  - — LDX Flex and LDX Première: 2.1 kg (4.6 lbs.) (including handgrip and shoulder pad)
  - — LDX Elite and LDX WorldCam: 2.5 kg (5.5 lbs.) (including handgrip and ComfortPad shoulder pad)
- Dimensions: width: 170 mm, depth: 200 mm, height: 180 mm (6.7 x 7.9 x 7.1 in.)

Camera:

- Pick-up device: 3x2/3" Xensium-FT CMOS
- Picture elements: 1920x1080
- Smear: no vertical smear
- Shutter: no mechanical shutter
- Optical system: F1.4 prism
- Lens mount: 2/3" Bayonet type
- Optical filter wheels: 2x motorized wheels (1x motorized wheel on LDX Flex)
- Optical filters on first wheel: clear, 1/4 ND, 1/16 ND, 1/64 ND
- Optical filters on second wheel (not available on LDX Flex): clear, 4P-star, soft focus
- Electronic color correction: 3200°K, 5600°K, 7500°K, FL, 2 AWB presets, Var, continuous auto white
- Exposure: electronic exposure down to 1/1000 sec

Video modes:

- Single-format: 1080i50/59.94 or 720p50/59.94 (selected at time of purchase)
- Sensitivity at 2000 lux:
  - — F12 (1080i50, 720p50, and 1080p50)
  - — F11 (1080i59.94, 720p59.94, and 1080p59.94)
  - — F18 (1080PsF25)
  - — F16 (1080PsF29.97)
- S/N ratio: 60 dB typical
- Aspect ratio: 16:9
- Modulation depth: 60% (typical) at 800 TV lines (27 MHz) in 1080i50/59.94 & 720p50/59.94 modes
- Gain selection: -6 dB to +30 dB in 3 dB steps (user-definable presets) or continuous master gain

Connectivity:

- Front microphone input: XLR-3 female, balanced, phantom +48V selectable
- USB
- Ethernet RJ-45
- Lens connector: Hirose 12-pin
- Viewfinder connector: 20-pin and HDMI

Control buttons:

- PickMe™
- Info
- Menu control
- Intercom production/engineering
- Filter wheel selection
- Standard file recall
- 4 user assignable

Control switches:

- On/off
- Color bar
- Gain selection
- Color temperature
- Exposure time
- White balance

Accessories

- 2" CRT viewfinder (b/w)
- 2.7" LCD viewfinder
- 7" LCD viewfinder
- 9" LCD viewfinder

Note: LDX Flex can be upgraded to LDX Première. Upgrades of more than one level may be achieved with multiple licenses.

LDX Première

Video Modes

Switchable: 1080i50/59.94 & 720p50/59.94

Note: LDX Première can be upgraded to LDX Elite. Upgrades of more than one level may be achieved with multiple licenses.

LDX Elite

Video Modes

Switchable: 1080PsF25/29.97, 1080i50/59.94 & 720p50/59.94

Note: LDX Elite can be upgraded to LDX WorldCam.

LDX WorldCam

Video Modes

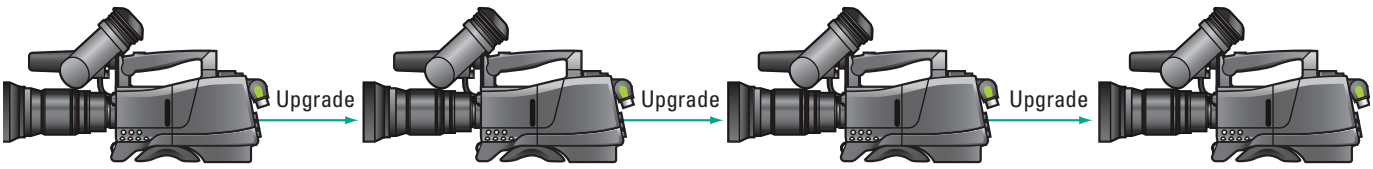
Switchable: 1080p50/59.94, 1080PsF25/29.97, 1080i50/59.94 & 720p50/59.94

GV-eLicense PROGRAM

Perpetual license: Perpetual upgrade to the next camera in the range

7-day term license: 7-day (weekly) term upgrade to the next camera in the range

Multiple licenses may be purchased to upgrade cameras by more than one level (e.g., LDX Flex to LDX WorldCam). Multiple 7-day term licenses may be purchased for extended 7-day term upgrades. No credit is given for the purchase of 7-day term licenses towards the purchase of a perpetual license.



LDX Flex
1080i50/59.94 or 720p50/59.94

LDX Première
1080i50/59.94 & 720p50/59.94

LDX Elite
1080PsF25/29.97 & 1080i50/59.94 & 720p50/59.94

LDX WorldCam
1080p50/59.94 & 1080PsF25/29.97 & 1080i50/59.94 & 720p50/59.94

Note: Multiple licenses may be purchased to upgrade a camera more than one level, on a perpetual or 7-day term basis.

XCU CAMERA TRANSMISSION

The **XCU WorldCam** and **XCU Elite** for LDX Series and many LDK Series camera heads is part of Grass Valley's 3G Transmission series. XCU is a follow up to the world's first transmission system that supports all HD video formats (720p, 1080i, and 1080p) with full performance over triax and fiber cables between the camera heads and the base station. The rack-mounted XCU cradle makes the XCU chassis easily removable.

The Grass Valley XCU WorldCam™ and upgradable XCU Elite™ base stations are members of the 3G Transmission series and work with the LDX 3G Triax (LDX 5419) or Fiber adapter (LDX 5421). XCU WorldCam also works with the LDK 3G Triax (LDK 5418) and Fiber adapter (LDK 5420) to form a 3G capable camera transmission solution for LDX Series and many LDK Series camera heads (see specifications). These third-generation transmission solutions from Grass Valley are no-compromise, fully featured solutions that can cope with the broadcast requirements of today and tomorrow.

The 3G transmission systems are heavy-duty, high-quality, multi-standard transmission systems with new and specially developed advanced technologies. The XCU WorldCam is fully 3G and 3D ready, and support current 1080i50/59.94 and 720p50/59.94 formats as well as 1080p50/59.94 transmission from the LDX WorldCam. The XCU Elite supports current 1080i50/59.94 and 720p50/59.94 formats and is upgradable to full XCU WorldCam specifications for 1080p50/59.94 operation.

Patent pending

KEY FEATURES

- **Unique cradle connectivity to support dockable XCU base stations**
- **Built-in EEPROM in XCU Cradle for production-set storage**
- **XCU WorldCam & XCU Elite are members of the versatile 3G Transmission series**
- **Full support for all HD formats:**
  - **— XCU WorldCam: 720p/1080i/1080p**
  - **— XCU Elite: 720p/1080i**
- **Full support for 3G Transmission converter boxes**
- **Four versions available:**
  - **— Triax only**
  - **— Hybrid fiber only**
  - **— Triax and dark fiber (Twin)**
  - **— Triax and hybrid fiber (Dual)**
- **Video outputs:**
  - **— XCU WorldCam: 6x 3G and 2x 1.5G or 8x 1.5G video outputs**
  - **— XCU Elite: 8x 1.5G video outputs**
- **Extensive (analog/digital) audio connectivity**
- **Embedded audio**
- **3x selectable return inputs:**
  - **— XCU WorldCam: 3G, HD, or SD**
  - **— XCU Elite: HD or SD**
- **Universal 3G power supply**
- **Compact (2 RU), robust base station**
- **XCU Elite fully upgradable to XCU WorldCam**

The Grass Valley 3G Triax system works perfectly with triax cables that are pre-wired in venues as well as users' current cable stock, eliminating the need for expensive new cabling. Compared to conventional HD triax, the maximum cable length has increased by 25% to 1,500m (4,921 feet) while still offering the same robustness and reliability that triax is known for.

The Grass Valley 3G Fiber system works perfectly with SMPTE hybrid fiber cables and offers an increased maximum cable length and the capability to support even the extended bandwidth requirements of a SuperSloMotion camera system. The maximum cable length including power can be up to 3,000m (9,842 feet) and, when powering the camera locally, a maximum cable length of more than 10,000m (42,649 feet) can be achieved.

Available in Twin and Dual configurations, XCU WorldCam and XCU Elite base stations offer the flexibility to use any mix of triax and fiber cables without any compromise in the performance or in the feature set.

The XCU Twin is the ideal solution in combination with a camera using the 3G triax adapter. In addition to interfacing with triax cable it offers the possibility to alternatively use dark fiber cables whenever the maximum cable length of the triax cable is not enough. The maximum distance for the dark fiber cable can be more than 10,000m (42,649 feet). Close to the camera, the 3G converter boxes will convert the dark fiber cable back into triax.

The XCU Dual is the ideal solution in combination with a camera using the 3G fiber adapter. In addition to interfacing with SMPTE hybrid fiber cable, it offers the possibility to alternatively use a triax cable, such as whenever they are found in a pre-wired venue or when a very harsh environment makes their use preferred. Close to the camera the 3G converter boxes will convert the triax cable back into fiber.

XCU CAMERA TRANSMISSION

Unique Cradle Concept

XCU base stations take flexibility even further with their unique cradle connectivity. The XCU cradle (XCUs each come with one cradle—additional cradles are available separately) can be pre-mounted and pre-wired in the rack while the XCU base stations can easily slide in and out whenever needed, making a secure mechanical and electrical connection.

Unique benefits are:

- Significant time saving while configuring and reconfiguring
- Preventing cabling mistakes
- Reducing vehicle or facility costs
- Takes minimal rack space: a compact design of only 2 RU

All of these features combined deliver flexibility between OB trucks and cut the shipping/transport costs of moving XCUs between locations.

XCU base stations offer extended connectivity. The XCU WorldCam is equipped with eight HD outputs, six of which are single-link HD-SDI outputs (1.5 Gb/3 Gb switchable) with the remaining two being 1.5 Gb HD-SDI outputs—which automatically converts the signal in 1080i when the camera head is delivering 1080p. The XCU Elite features eight 1.5 Gb HD-SDI outputs. In addition, three HD return connections are provided, two of which can be selected as a return channel by the camera adapter.

Audio connectivity offers great versatility with two analog outputs and two AES/EBU pair outputs (2x2 channels) which are also embedded in the HD-SDI outputs.

SPECIFICATIONS

XCU Elite & XCU WorldCam (see XCU WorldCam additional specifications)

Video

720p: 50/59.94 Hz

1080i: 50/59.94 Hz

1080PsF (LDX Elite™ or WorldCam required): 25/29.97 Hz

Compatible Cameras

- All LDX Series cameras*
- LDK 8000 Elite Series (LDK 4000 Elite, LDK 8000 Elite Enterprise, and LDK 8000 Elite WorldCam)
- LDK 8000 Series (LDK 4000, LDK 8000 Enterprise, and LDK 8000 WorldCam*)
- LDK 8300 (1X mode only)

General (incl. cradle)

Dimensions XCU + cradle (HxWxL, approx.): 438 x 88 x 510 mm (19" rack, 2U) (17.2x3.5x20.1 in.)

Operating temperature: 0 to +45° C (+32 to +113° F)

Storage temperature: -20 to +70° C (-4 to +158° F)

Operation humidity: Max. 90% (non-condensing)

Shock resistance: Max. 10G (transport, Max. 2G (operating)

Altitude: Max. 15,420m (50,000 ft.)

Weight XCU + cradle: 11.8-12.2 kg (26.0-26.9 lbs.) (depending on version) full-option equipped

Weight XCU: 7.3-7.7 kg (16.1-16.9 lbs.) (depending on version) full-option equipped

Power requirement: AC 100V/240V, 47 to 63 Hz

Power connector: IEC type, 3-pin male

Power consumption: Total power (Cam + XCU) 450W max.

Connectors

Teleprompter in: BNC 1x (loop-through output), (C)VBS, 1.0 Vp-p, 75Ω

Reference in: 1x (loop-through output), 1.0 Vp-p, 75Ω HD tri-level sync or SD black-burst

HD-SDI out: BNC 6x 0.8 Vp-p, 75Ω, SMPTE 292M, 1080i/720p at 50/59.94 Hz

HD-SDI out (live/effect): BNC 2x 0.8 Vp-p, 75Ω, SMPTE 292M, 1080i/720p at 50/59.94 Hz

HD-SDI monitoring out: BNC 1x 0.8 Vp-p, 75Ω, SMPTE 292M, 1080i/720p at 50/59.94 Hz

SD-SDI out: BNC 2x 0.8 Vp-p, 75Ω, SMPTE 259M ITU-R, BT.601

SD-SDI monitoring out: BNC 1x 0.8 Vp-p, 75Ω, SMPTE 259M ITU-R, BT.601

Composite Video monitoring output: BNC 1x 1.0 Vp-p, 75Ω (CVBS text with video, for viewing purposes)

Signaling in/out: D-sub 15-pin, male; preview, green tally (call), dry contact; yellow tally (iso), dry contact; red tally (on air), dry contact; remote audio level control (22-64 dB), DC

Auxiliary in/out: D-sub 9-pin, female; private data in/out; 100 kb TTL (RS-232)

Control data: RJ-45 connector for C2IP (camera control)

Control data: RJ-45 connector for Ethernet (future use)

Fiber (Hybrid) executions: Lemo Hybrid fiber connector acc. SMPTE 304 (other fiber connectors on request)

Fiber (Single Mode) executions: ST/SC fiber connectors

Triax executions: Fischer, ARD, Lemo-4E, Lemo-3T, BBC-Lemo, Trilock

External video in: HD-SDI (1.5 Gb/3.0 Gb) or SD-SDI in 1, (loop-through output), 0.8 Vp-p, 75Ω/HD-SDI (1.5 Gb/3.0 Gb) or SD-SDI in 2, 0.8 Vp-p, 75Ω/HD-SDI (1.5 Gb/3.0 Gb) or SD-SDI in 3, 0.8 Vp-p, 75Ω

2-ch. audio: Audio out, XLR-3 2x ; 0/+6 dBu (±1.5 dB, max. 18 dBu, 600Ω, gain max. 70 dB)

Frequency response: 40 Hz to 15 Hz, (+1/-3 dB, 1 kHz, -10 dBu output level)

Distortion: Less than 0.5% (100 Hz/1 kHz, +6 dBu out, 600Ω)

S/N ratio: 58 dB (unweighted RMS)

AES-EBU 1+2: BNC 75Ω, Dig audio output Audio 1 and 2

AES-EBU 3+4: BNC 75Ω, Dig audio output Audio 3 and 4

Intercom in/out (2/4-wire intercom): D-sub 15-pin, female (program in, production in/out, engineering in/out), in: 0 or 6 dBu; out: 0 or 6 dBu (±2 dB, max. 12 dBu)

Frequency response: 150 Hz to 6 kHz (1 kHz, -10 dBu output level)

Distortion: Less than 2% (1 kHz, +12 dBu level)

XCU WorldCam Additional Specifications

Video

1080p (LDX WorldCam required): 50/59.94 Hz

Compatible Cameras

LDX WorldCam and LDK 8000 WorldCam

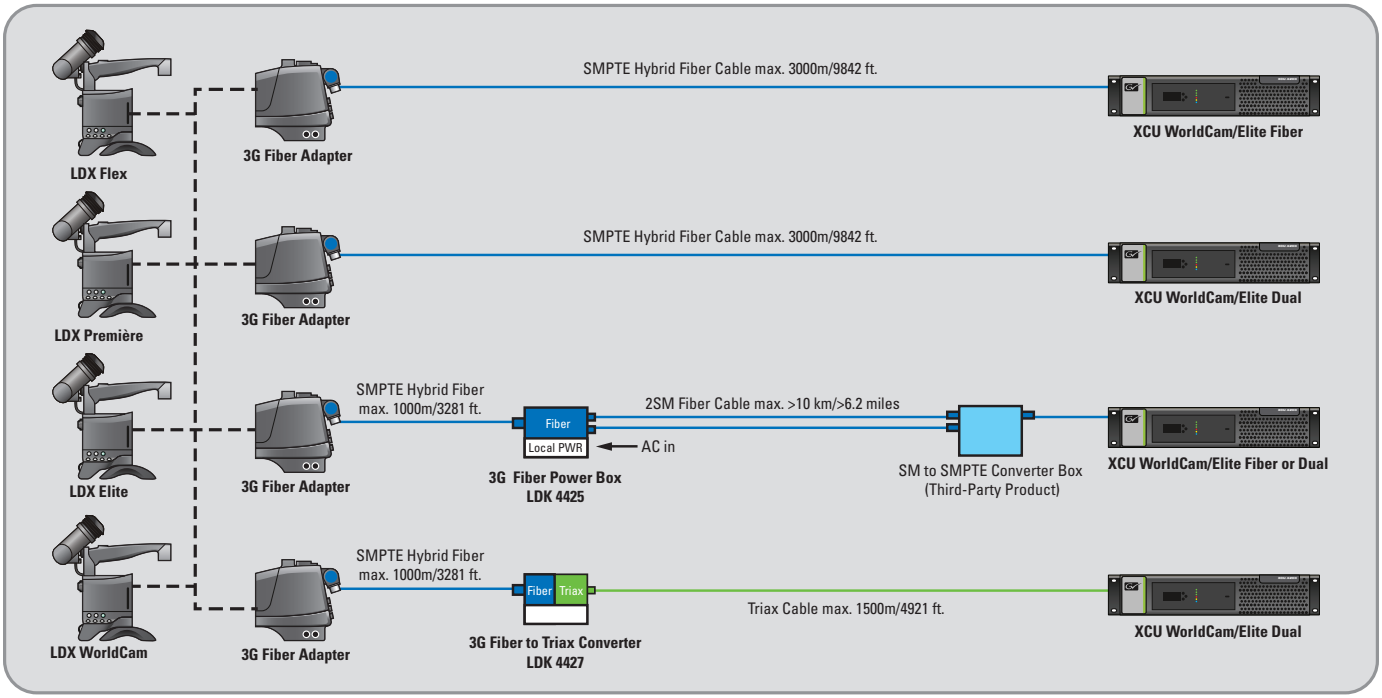
Connectors

HD-SDI out: BNC 6x 0.8 Vp-p, 75Ω, SMPTE 292M, 1080i/720p at 50/59.94 Hz or BNC 6x 0.8 Vp-p, 75Ω, SMPTE 425M-A, 425M-B, 1080p at 50/59.94 Hz

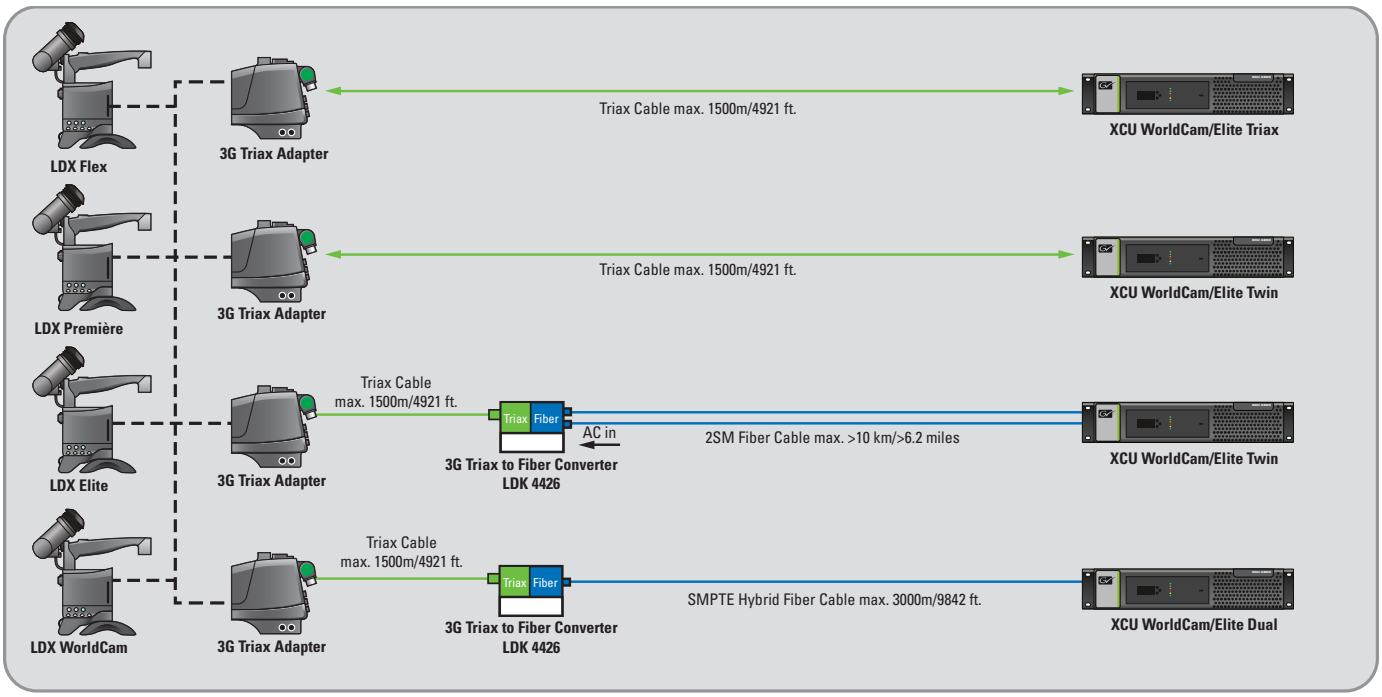
External video in: HD-SDI (1.5 Gb/3.0 Gb) or SD-SDI in 1, (loop-through output), 0.8 Vp-p, 75Ω/HD-SDI (1.5 Gb/3.0 Gb) or SD-SDI in 2, 0.8 Vp-p, 75Ω/HD-SDI (1.5 Gb/3.0 Gb) or SD-SDI in 3, 0.8 Vp-p, 75Ω

* 1.5 Gb modes only

3G FIBER-BASED SYSTEMS



3G TRIAX-BASED SYSTEMS



C2IP CAMERA CONTROL SYSTEM

The **C2IP** camera control system offers Ethernet-based TCP/IP control of up to 99 digital Grass Valley LDX Series or LDK series cameras. It features an operational control panel with features normally found in conventional master control panels, and a master control panel that can dramatically speed camera setup and reconfiguration.

Expanding the capabilities of our Grass Valley camera line is the C2IP (camera control over IP network) Ethernet-based camera control system. Supporting all digital LDX Series and LDK cameras, it offers Ethernet-based control of up to 99 cameras using standard IP networking for live and multi-camera productions.

The C2IP system offers an operational control panel (OCP) and a master control panel (MCP).

KEY FEATURES

- **Ethernet-based camera control system**
  - **— Supports 10/100Base-T networks**
  - **— Uses TCP/IP protocol**
  - **— Uses off-the-shelf standard network infrastructure**
- **Supports all Grass Valley digital LDX Series and LDK series cameras**
- **Camera control:**
  - **— Multi-camera control supports up to 99 cameras**
  - **— Multi-point control supports multiple control points per camera**
- **OCP 400 operational control panel:**
  - **— Features capabilities found in conventional master control panels**
  - **— Comfortable, very compact (82 mm wide) design**
  - **— Intuitive interface**
  - **— Hard-style buttons**
- **MCP 400:**
  - **— Touchscreen interface**
  - **— Automatic data logging of all camera settings**
  - **— Tools for fast reconfiguration/adjustment of camera settings**
  - **— Can save settings to USB memory media**
  - **— Accepts USB input devices**
  - **— Three mounting configurations**
  - **— 4 RU, 19-inch rack mount**
  - **— Desktop mount**
  - **— Swing-arm mount**
- **LDK 4500 SL base station supports C2IP and Series 9000 control systems**
- **Supports Grass Valley NetConfig™ application for fast configuration**
- **Supports remote access via a Web-browser interface**

For comprehensive camera control, the OCP 400 operational control panel of the C2IP system includes capabilities found only in conventional master control panels, such as variable matrix control, fine skin-detail adjustments, and installation adjustments. It is also one of the smallest control panels available, making it a great fit for mobile productions and studio settings with space restrictions.

The OCP 400 features plug-and-play Ethernet connectivity, an intuitive interface for easy operation, and pre-illuminated buttons and text-screenings for dim-light environments. It supports all Grass Valley digital LDX Series and LDK cameras.

The MCP 400 master control panel offers similar high performance, including powerful production features and tools not available with any other camera control system.

For example, instead of laboriously querying each camera on your network to obtain its operational settings, the MCP 400 interprets and logs all network activity between cameras and control panels—automatically.

You can also use the data-gathering capabilities of the MCP 400 to adjust camera parameters on the fly. You can, for instance, use the panel's spreadsheet-like interface to review the paint settings for all cameras in your production, and then adjust them across the board or on a camera-by-camera basis.

For studios that support recurring productions, or mobile trucks that cover similar sporting events at different venues, the MCP 400 can save camera and production settings on standard USB storage media. You can even e-mail the files on this USB storage media from one venue to the next. When you're ready, you just load the settings into the panel using USB media.

CONNECT GATEWAY

Provides a platform for both the current C2IP XML Gateway, LDX Series & LDK camera diagnostics, as well as for future software applications.

At Grass Valley, our commitment to providing tighter integration and control between Grass Valley products continues with the Connect Gateway, opening up camera control in ways you've never thought possible.

Connect Gateway is a dedicated platform that can simultaneously access the C2IP camera control network and a public Ethernet-based network.

The overall scope of Connect Gateway is to provide a platform for both the C2IP XML Gateway, LDX Series and LDK camera diagnostics, as well as for a number of software applications.

The first application available is the integration with the Kayenne® and Karrera® Video Production Centers and the Kayak™ switcher which gives TDs control over multiple cameras directly from the switcher control panel via an Ethernet interface. This includes tally for each camera, with controls that include auto iris, auto black level, filter wheel position, and color bars.

Scene files from multiple cameras can also be recalled quickly and simultaneously. This includes complex setups, such as camera shading, which are created and stored by video engineers on-location or in the studio.

Additional operational applications will follow shortly.

LDX Series & LDK Diagnostics

Connect Gateway also contains a diagnostics tool for LDX Series and LDK cameras which gives an immediate update of the diagnostics data available in the camera components via the C2IP network. Types of cameras, software packages, temperatures, video format, transmission diagnostics, and more are available in user-friendly overviews. Alerts will be generated when discrepancies occur.

Software Development Kit (SDK)

For integration of applications developed by a third-party, a dedicated Software Development Kit is available which also includes a Gateway and camera simulator.

Please go to http://www.grassvalley.com/ad/connect_gateway_sdk for the SDK request form. Submit the form and the SDK will be made available to you at no charge.

KEY FEATURES

- **Gateway between external devices and camera control network**
- **Diagnostic tool for LDX Series and LDK components in the C2IP network**
- **Uses reliable and cost-effective Ethernet network infrastructure**
- **Uses widely accepted XML as its message protocol**
- **Hardware platform is built into a convenient 1 RU rack mounted industrial server**
- **Dual Ethernet port configuration for fully separated public Ethernet and C2IP network operation**
- **Redundant power supply for fail-safe operation**
- **Interfaces for standard VGA monitor and USB devices directly on the server**

SPECIFICATIONS

Processor: Intel Core i3 2.93 GHz

Memory: 2 GB RAM

Drive: 160 GB SATA HDD, hot-pluggable

LCD diagnostics

Connectors front:

- 15-pin VGA for connecting a monitor during setup
- 2 USB 2.0 for keyboard/mouse during setup

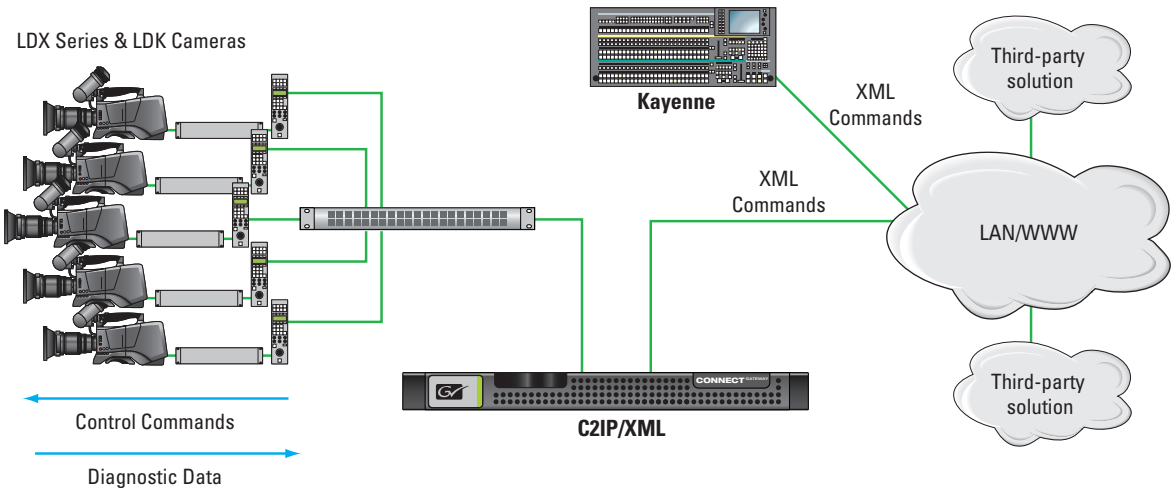
Connectors back:

- NIC-1 RJ-45 1 GB Ethernet for the public network
- NIC-2 RJ-45 1 GB Ethernet for the C2IP network
- 15-pin VGA for connecting a monitor during setup
- 2 USB 2.0 for keyboard/mouse during setup

Two redundant 400 watt power supplies

Dimensions (without bezel) (HxWxD):

- 42.4 x 434.0 x 610 mm (1.67 x 17.10 x 24.00 in.)



REFLEX SUPERXPANDER

The **RefleX SuperXpander** is the perfect match for LDX Series and LDK HD cameras using the unique 3G Transmission system and turns a comfortable shoulder camera quickly and easily into a full-featured studio camera.

Grass Valley broadcast products offer production professionals the most comprehensive multi-format solutions for acquisition, production, storage, and playback, as well as a strong foundation for centralized, proactive status and activity monitoring. The Grass Valley RefleX SuperXpander is such a solution. Compatible with the latest 3G Transmission family, it supports box-type lenses, teleprompters, and high-resolution viewfinders.

For sports and events coverage, the use of large zoom lenses is a common requirement. The RefleX SuperXpander acts as a large lens adapter, rapidly converting a portable camera into a mobile production system.

The lightweight RefleX SuperXpander provides secure mounting and balancing for the largest prompter monitors. For increased simplicity, the camera can remain mounted inside the RefleX SuperXpander housing for transport, saving rigging time and precious space, while ensuring that the camera is aligned and ready to go immediately. Alternatively, the camera can be mounted or released from the housing quickly so it can be switched between pedestal, box lens, and handheld applications working with an EFP style lens—even during a live program.

The RefleX SuperXpander can be used with all Grass Valley viewfinders, providing an unprecedented degree of freedom. The unique design of the RefleX SuperXpander system puts even a large viewfinder close to the optical axis of the camera, making camera movements and positioning more intuitive for the operator to ensure that the shot is right every time.

The new hot shoe connector between the camera and the RefleX SuperXpander provides all power and signal connectivity—making it quick, convenient, and reliable, with no need for extra cabling. The hot shoe connector also makes the RefleX SuperXpander transmission system-agnostic—both 3G Fiber and 3G Triax camera systems can be used with the same SuperXpander without the need of switching modules.

For operator convenience, the RefleX SuperXpander is equipped with a functional control panel placed at the rear of the camera. All camera functions can be selected through this panel with its intuitive button layout, with three of the buttons assignable by the operator. These buttons have a sophisticated backlight to improve readability in all lighting conditions and to indicate the status of the buttons.

Two utility power connectors are provided to drive external equipment. Each connector (XLR-4 female) is rated at 13.8V/8 amps.

SPECIFICATIONS

Dimensions (L x W x H): 526 x 287 x 347 mm (20.7 x 11.3 x 13.7 in.)

Weight (approx.): 8.5 kg (18.7 lbs.)

Operating temperatures: 0°C to +45°C (32°F to +113°F)

Storage temperatures: -20°C to +60°C (-4°F to +140°F)

Power supply: supplied by the base station

Power consumption: 250 VA max. fully equipped (supplied by the base station)

Utility power outputs: 2x 13.8 VDC XLR-4 female connector, 110 W max. (combined)

Lens interface: 36-pin Centronics female connector

KEY FEATURES

- **Supports LDX Series and LDK HD cameras**
- **Transmission system-agnostic**
- **Supports 3G Transmission products**
- **Improved rapid mounting of camera and box lens**
- **Direct connection of viewfinder to the camera**
- **Rock-solid configuration for all sizes of large lenses**
- **Convenient camera control panel at the rear**
- **Three assignable control buttons**
- **Mounting and balancing available for all prompter monitors**
- **Two fixed utility output connectors: total 13.8V@8A**

RefleX SuperXpander – Fast and Easy Docking

EYECATCHER EC 270

The eyes are the most important tools used during a production. Every detail of a shot is important—and the operator must be able to rely on what they are seeing. The **EyeCatcher EC 270** color ocular viewfinder provides users with the confidence to know what they see is what is also being seen in the control room and by viewers.

The Grass Valley EyeCatcher EC 270 is a high performance color LCD ocular viewfinder for the LDX Series and LDK camera heads. It is part of a full line of state-of-the-art color viewfinders and is very feature-rich with an intuitive user interface. The EyeCatcher viewfinder also has a stylish look and compact design.

EyeCatcher EC 270 offers the best possible image performance, high-speed response time, QHD resolution of 960x540 pixels, and a diagonal size of 6.8 cm (2.7 in.). The controls are easy and flexible, similar to the Grass Valley 7-inch and 9-inch color LCD viewfinders. It comes with two (task) assignable user buttons and a -3 to +1 diopter compensation range.

KEY FEATURES

- **Stylish look and compact design**
- **Fully compatible with all LDX Series, LDK 3000+, and LDK 8000 Elite Series cameras**
- **Offers the best possible image performance:**
  - **— High resolution**
  - **— Fast response**
- **High brightness and contrast ratio**
- **Easy and flexible to use**
- **Brightness, contrast, and peaking adjustment with rotary controls**
- **Color/monochrome picture switchable**
- **Tally on-low-off switch**
- **Operator-only tally indicator**
- **Underscan mode for full picture visibility off shoulder**
- **2 (task) assignable buttons**
- **Diopter compensation range**

SPECIFICATIONS

Connectors

Camera connector: 20-pin Hirose

Controls

- 2 assignable user buttons
- Brightness rotary control
- Contrast rotary control
- Combined menu/Peaking rotary control

Indicators

LED indicators inside:

- ISO (yellow)
- On-air (red)
- Call (green)

LED indicators front:

- 1x on-air (red) adjustable

General

Power consumption: 3.5W (supplied by camera head)

Operating temperature: -20°C to +45°C (-4°F to 113°F)

Storage temperature: -25°C to +70°C (-13°F to 158°F)

Weight: 820 grams (1.8 lbs.)

LCD

Diagonal size: 68 mm (2.7")

Resolution: 960x540 pixels (QHD)

Response rate: 14 ms

Performance

- Color depth: 16.7 million colors
- 8-bit color
- Brightness: 300 Cd/m^2
- Contrast ratio: 500:1
- Color temperature: 6500K (adjustable)
- Pixel pitch: 0.0615 mm x 0.0615 mm
- Supported formats: All current HD formats
- Input signals: Y,Pr,Pb

The viewfinder's LCD panel is manufactured using high-precision technology that yields a pixel response of 99.99% or higher.

LDK 5307 VIEWFINDER

The **LDK 5307** viewfinder for the Grass Valley LDX Series, LDK 3000, LDK 4000 mk II, LDK 4000 Elite, LDK 8000, LDK 8000 Elite Series, and LDK 8300 cameras has high brightness and contrast as well as fast refresh rate making it ideal for both indoor and outdoor use.

The LDK 5307 is a compact, high-quality, flat panel color viewfinder designed to work with Grass Valley LDX Series and most current LDK high-definition cameras. The stylish design allows for direct mounting to the mini wedge plate of the camera head in both EFP and SuperXpander configurations.

With high brightness and contrast, and a fast display refresh rate, the LDK 5307 is the perfect color viewfinder for both indoor and outdoor applications.

The LDK 5307 color viewfinder has an intuitive menu structure which not only allows for settings of the viewfinder, but can also be used to call up the camera system menu via the viewfinder controls.

Three rotary controls, for contrast, brightness, and peaking settings, are easily accessible at the front panel. In addition, three user assignable push buttons are located at the front bezel of the viewfinder.

The color temperature of the display can be adjusted to match the operator's personal preference without any affect on the main video signal, allowing the operator to match the display color temperature with the color temperature of the scene.

KEY FEATURES

- **7-inch LCD panel with backlight**
- **16:10 aspect ratio (16:9 active video plus monitor menu)**
- **High brightness and contrast**
- **1:1 pixel zoom function**
- **Adjustable box and markers**
- **Camera menu access**
- **Supports all current HD formats**
- **Fast response time**
- **Compact – LDX Series/LDK matching design**
- **EFP and SuperXpander use**
- **Easy accessible front controls**
- **Robust magnesium housing**
- **Compatible with LDX Series, LDK 3000*, LDK 4000 mk II*, LDK 4000 Elite*, LDK 8000*, LDK 8000 Elite Series*, and LDK 8300***

*** Camera software package must have latest update**

SPECIFICATIONS

Connectors

Camera connector: 20-pin Hirose

Controls

- Menu button
- 3 assignable user buttons
- Brightness rotary control
- Contrast rotary control
- Peaking rotary control

Indicators

- LED indicators front:
  - ISO (yellow)
  - On-air (red)
  - Call (green)
- LED indicators back:
  - 2x on-air (left/right) adjustable

General

- Power consumption: 12W (supplied by camera head)
- Operating temperature: -20°C to +45°C (-4°F to 113°F)
- Storage temperature: -25°C to +70°C (-13°F to 158°F)
- Weight: 1.8 kg (3.97 lbs.)

LCD*

- Diagonal size: 7" (180 mm)
- Total display: 16:10 800 (H) x 480 (V) pixels
- Active video: 16:9 800 (H) x 450 (V) pixels
- Viewing angle: 160° horizontal, 140° vertical
- Response rate: 18 ms

Performance

- Color depth: 16.7 million colors
- 8-bit color
- Brightness: 350 Cd/m^2
- Contrast ratio: 850:1
- Color temperature: 6500K (adjustable)
- Pixel pitch: 0.1905 x 0.1905 mm
- Supported formats: All current HD formats
- Input signals: Y,Pr,Pb

Supplied Accessories

- Complete mounting kit
- Short sunhood
- Cabling
- User's guide

* The viewfinder's LCD panel is manufactured using high-precision technology that yields a pixel response of 99.99% or higher.

LDK 5309/10 VIEWFINDER

The **LDK 5309/10** 9-inch HD color viewfinder is the perfect match for the LDX Series, LDK 3000, LDK 3000+, LDK 4000 mk II, LDK 4000 Elite, LDK 8000, LDK 8000 Elite, and LDK 8300 cameras. Its size and very flexible mounting bracket make it ideal for use with a SuperXpander large lens adapter as well as in EFP configurations.

The LDK 5309/10 is a compact, high-quality, 9-inch flat panel color viewfinder designed to work with Grass Valley LDX Series and most current LDK Series high-definition cameras. The stylish design allows for direct mounting to the mini wedge plate of the camera head in both EFP and SuperXpander configurations. For optimized viewing position, the LDK 5309 has an articulated mounting bracket which allows the operator to move the viewfinder in many positions including straight behind the camera, which avoids blocking the view of the audience positioned behind the camera.

With high brightness and contrast, and a fast display refresh rate, the LDK 5309 is the perfect color viewfinder for both indoor and outdoor applications.

The LDK 5309 has an intuitive menu structure which not only allows operators to change the viewfinder settings, but can also be used to call up the camera system menu via the viewfinder controls.

Three rotary controls—for contrast, brightness, and peaking settings—are easily accessible at the front panel. In addition, three user assignable push buttons are located at the front bezel of the viewfinder.

The color temperature of the display can be adjusted to match the operator's personal preference, without affecting the main video signal, allowing the operator to match the display color temperature with the color temperature of the scene.

KEY FEATURES

- **9-inch LCD panel with backlight**
- **16:10 aspect ratio (16:9 active video plus monitor menu)**
- **High brightness and contrast**
- **Position adjustable 1:1 pixel zoom function**
- **Adjustable box and markers**
- **Camera menu access**
- **Supports all current HD formats**
- **Fast refresh rate**
- **SuperXpander and EFP use**
- **Mounting bracket with extensive pan/tilt functionality**
- **Easy accessible front controls**
- **Robust magnesium housing**
- **Compatible with LDX Series, LDK 3000*, LDK 3000+*, LDK 4000 mk II*, LDK 4000 Elite*, LDK 8000*, LDK 8000 Elite Series*, and LDK 8300***

*** Camera software package must have latest update**

SPECIFICATIONS

Connectors

Camera connector: 20-pin Hirose

Controls

- Menu button
- 3 assignable user buttons
- Brightness rotary control
- Contrast rotary control
- Peaking rotary control

Indicators

LED indicators front:

- ISO (yellow)
- On-air (red)
- Call (green)

LED indicators back: 2x on-air (left/right) adjustable

General

Power consumption: 12W (supplied by camera head)

Operating temperature: -20°C to +45°C (-4°F to 113°F)

Storage temperature: -25°C to +70°C (-13°F to 158°F)

Weight: 3.6 kg (7.9 lbs.)

LCD*

Diagonal size: 9" (180 mm)

Total display: 16:10 800 (H) x 480 (V) pixels

Active video: 16:9 800 (H) x 450 (V) pixels

Viewing angle: 165° horizontal, 140° vertical

Performance

Color depth: 16.7 million colors

8-bit color

Brightness: 800 Cd/m^2

Contrast ratio: 800:1

Color temperature: 6500K (adjustable)

Pixel pitch: 0.246 x 0.246 mm

Supported formats: All current HD formats

Input signals: Y,Pr,Pb

Supplied Accessories

- Extensive pan/tilt mounting bracket
- Short sunhood
- Cabling
- User's guide

* The viewfinder's LCD panel is manufactured using high precision technology that yields a pixel response of 99.99% or higher.

GLOBAL SERVICES

Global Services

The true benefit of a camera solution is achieved through the design and implementation based on customer requirements. The ability to tailor the solution to meet specific operational needs and configure system components accordingly sets Grass Valley camera solutions apart from its competitors. Grass Valley Global Services provides the expertise and experience to help customers define their requirements and set expectations before deploying successful implementations.

Professional Services

System functionality and performance tuning requires understanding user requirements. The ability to specify technical needs, required interfaces, bandwidth, and workflow needs requires an in-depth knowledge of both the technology and the environment. Our Professional Services organization includes systems engineers with the world's highest level of this expertise. However, project success requires more than technical knowledge. To complete the picture, Grass Valley provides the project management expertise to capture specifications and to plan resources, schedule, and budget. With this combination, the Grass Valley Professional Services team has the competencies and experience to insure success.

Commissioning

Grass Valley insures the success of camera solutions by personally handling the initial setup for every camera component of the system. Field engineers have the experience, knowledge, and skills necessary to bring camera systems to life – both as a product set, and in the broader context of a complete solution.

Training

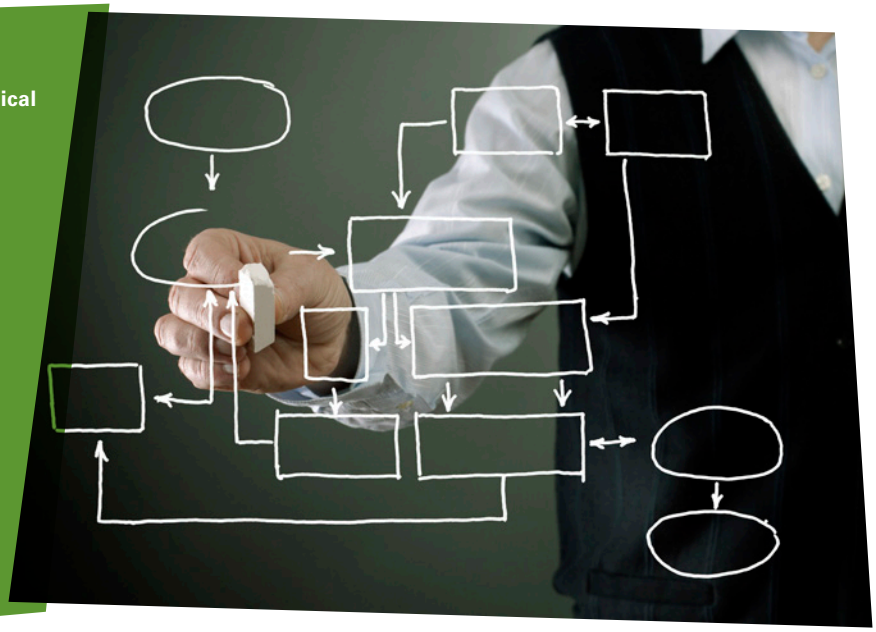
Grass Valley offers a range of professional training programs to help derive maximum value from Grass Valley cameras. Courses are designed for operators and maintenance engineers, with a combination of theoretical learning and hands-on exercises using Grass Valley cameras. Trainers are experienced in broadcast and in the operational and technical nuances of deploying a wide range of camera configurations.

Support Agreements

Uptime, risk, and financial predictability are the hidden variables in total cost of ownership. The ability to manage these is what makes support agreements a cost-effective tool for business optimization. Grass Valley now offers an extended choice of support agreements. CamCare is a preventive maintenance service package based on periodic on-site visits at a pre-agreed schedule. CamCare aims at optimizing the health of camera inventories, minimizing the duration of service interruption, and reducing repair time thanks to precise diagnostics. Elite Support Agreements provide 24x7 technical phone support, call center prioritization, service level objectives, advance parts exchange, software updates and upgrades (GV-eLicenses not included). Pick&Ship is a service included in Elite Support Agreements to simplify sending a camera in for repair for European Union customers. With Pick&Ship, Grass Valley reduces the repair turnaround time by managing the camera shipment logistics end-to-end, from pickup to delivery and back to customer facility. Pick&Ship is currently limited to European Union countries only. Camera support agreements insure that users have both operational efficiency and financial predictability.

GLOBAL SERVICES PROVIDES:

- **Unequalled depth of industry knowledge, and technical expertise**
- **Over 50 years of worldwide experience**
- **Complete set of services:**
  - **— Strategic advice**
  - **— System architecture**
  - **— Workflow analysis and design**
  - **— Project management**
  - **— Integration and implementation**
  - **— Performance optimization**
  - **— Technical and operational training**
  - **— Educational services**
- **Address today's challenges and prepare for tomorrow's opportunities**



ORDERING INFORMATION

Camera Heads

LDX 80 WorldCam

LDX 80 camera head, supporting 1080i, 720p, PsF, and 1080p formats

LDX 80 Elite

LDX 80 camera head, supporting 1080i, 720p, and PsF formats

LDX 80 Première

LDX 80 camera head, supporting 1080i and 720p formats

LDX 80 Flex 1080i

LDX 80 camera head, supporting 1080i format

LDX 80 Flex 720p

LDX 80 camera head, supporting 720p format

Transmission Systems

XCU WorldCam Triax

XCU 3G dockable base station—triax only

XCU WorldCam Fiber

XCU 3G dockable base station—fiber only

XCU WorldCam Twin

XCU 3G dockable base station—triax and single fiber

XCU WorldCam Dual

XCU 3G dockable base station—triax and hybrid fiber

XCU Elite Triax

XCU 1.5G dockable base station—triax only

XCU Elite Fiber

XCU 1.5G dockable base station—fiber only

XCU Elite Twin

XCU 1.5G dockable base station—triax and single fiber

XCU Elite Dual

XCU 1.5G dockable base station—triax and hybrid fiber

XCU Cradle

Additional XCU cradle for all XCU base stations

Camera Control

MCP 400

C2IP camera control system master control panel

OCP 400

C2IP camera control system control panel with joystick

Connect Gateway

C2IP camera control system XML gateway and diagnostics

Accessories

RefleX SuperXpander

Adapter for studio camera use

EyeCatcher 270

2.7-inch LCD color ocular viewfinder

LDK 5307

7-inch LCD color viewfinder

LDK 5309/10

9-inch LCD HD color viewfinder

MAXIMIZE AND OPTIMIZE YOUR INVESTMENT

With program production and distribution becoming ever more complex and affecting business issues on a daily basis, you need a trusted partner that understands those complexities and how to convert them into opportunities. Grass Valley's team of experienced engineers and system integrators can help you turn your challenges into opportunities in the most efficient and cost-effective way possible, from system design all the way through to commissioning. Grass Valley Professional Services helps you to:

Define: We consult with you to help define your business and technology requirements and then design the right solutions to meet them.

Deploy: Our professional service organization, backed by proven project management methodologies, can take you from design through deployment, commissioning, and training.

Support: We offer a complete portfolio of support services to keep your systems running, and help manage your long-term maintenance needs.

For information about Grass Valley, please visit **www.grassvalley.com**.

Join the Conversation at **GrassValleyLive** on Facebook, Twitter, and YouTube.

grass valley