![GV Grass Valley — WE LOVE LIVE logo]

LDX 90 SERIES
Superb Image Quality in HD or UHD

LDX 90 SERIES

Hard-working cameras designed for the daily realities of live media production

Adapting to new circumstances is a constant in live production. In addition to the pace of the action in the event, the camera must rapidly adjust to shooting positions, lighting and weather. Just as critical is the ability quickly reconfigure production formats, picture resolution and frame rates with a minimum of effort and downtime. Designed specifically for these demanding conditions, Grass Valley LDX cameras set the standard for combining picture quality with ease of use in capturing live images.

To ensure highest quality image capture, Grass Valley develops camera imagers that specifically meet the requirements of live events. All of the LDX 90 series cameras capture fast-paced action without image smear. The cameras adapt easily to a wide range of lighting conditions across all of the different acquisition speeds. Even for 3X and 6X speed slow-motion under artificial lighting, the LDX 90 series ensures pristine images with the AnyLightXtreme live flicker reduction system.

In addition to the LDX 90 series' high sensitivity for image detail and contrast, many of today's live productions require image capture in High Dynamic Range. Audiences readily appreciate the uniquely differentiated picture when watching in HDR with much greater brightness, contrast, and better color accuracy than was possible in the past. To simplify matching production formats, the LDX 90 series cameras support all three main formats of HDR: HLG, PQ and S-Log3.

Operational excellence

Featuring both standard and compact size camera heads, the LDX 90 camera series includes six models. Their base feature set may be augmented with software options that add just the features you need either perpetually or just for one day by selecting *à la carte* options from a secure web portal.

The LDX 90 series has both standard and compact models to fit a wide variety of applications. Compact models offer an identical image performance and a comparable feature set but in a smaller mechanical package that is ideally suited to remote operation and camera positions that are inaccessible or unsafe for an operator at the camera head. Signal transmission from the camera head can be over 3G Fiber, 3G Triax or XF Fiber connections, depending on connectivity requirements. All cameras offer extensive analog and digital audio connectivity with embedded audio.

DirectIP

In addition to triax or fiber connections with base stations that remember previous settings, LDX 90 series cameras also support DirectIP, a direct interface of the complete transmission protocol between the cameras and XCUs over IP networks.

Easily recognized and managed by network orchestration software, DirectIP is an ideal solution for the most demanding remote camera applications. By connecting the cameras and the XCUs through COTS switches with 10 GbE ports to a high-bandwidth IP network, any camera can be assigned to any XCU via the GV Connect Gateway. In this way, one central command/control center can be used to manage several different production facilities. When a production is finished, the cameras and the XCUs can easily be re-routed for the next production. This saves production costs as control room staff do not have to be on location while still maintaining a high-quality production.

Flexibility across the series

Because the LDX 90 series camera systems use the same high-performance transmission solutions, you can mix and match all the different cameras inside one production environment. The unique and pat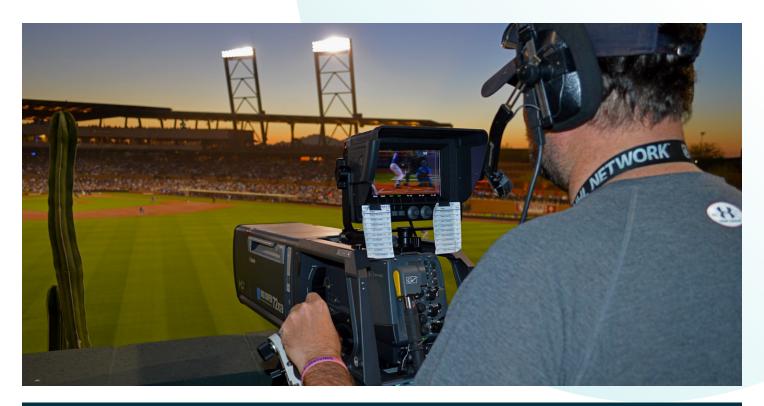ented cradle concept of the XCU lets you relocate camera base stations quickly and safely. The built-in cradle memory ensures that all camera/XCU settings and configurations will be automatically updated for the correct production environment.

All other camera accessories for the LDX 90 series fit any camera in the series. The cameras are also compatible with the LDX 80, 82, 86 and 86^N cameras. This broad compatibility includes full support with the C2IP for the best possible integration into external control systems.

Creative Grading

In a camera system, what happens behind the scenes is just as important as what happens at the camera head. Grass Valley's Creating Grading camera control provides a camera control panel that can be easily adapted to the production requirements with multiple user-definable controls and offers a graphical interface that makes it easy to visualize and share the results of artistic decision-making across multiple cameras. Standardizing the look of a show across multiple cameras using a traditional control system typically takes many hours of configuration time. Creative Grading reduces this setup to minutes, freeing camera shaders to experiment with different looks or store multiple setups so that the same equipment can be rapidly repurposed for pre- and post-event programming.

LDX 90 Series Benefits

- Superb image quality in either HD or UHD
- *À la carte* options optimize utilization with "pay per use"
- High sensitivity and image performance across all of the different acquisition speeds
- AnyLightXtreme flicker reduction system
- Native HDR for PQ/HLG/S-Log3
- Wide Color Gamut supporting the ITU-R BT.2020 standard

- DirectIP complete transmission protocol over IP networks
- Creative Grading
- Extensive (analog/digital) audio connectivity with embedded audio
- Unique cradle connectivity to support dockable XCU (eXchangeable Control Unit)
- XCU cradle stores settings in built-in memory

- Full integration with LDX 80, 82, 86 series cameras allows use of the same camera accessories and control system, including full support with the C2IP for the best possible integration into external control systems memory for easy exchange
- All accessories fit the whole range

LDX 92 or LDX C92

The LDX 92 is the entry-level model for the LDX 90 series. Supporting the features you need for shooting under challenging live conditions, LDX 92 also offers upgrade options for 4K UHD and HDR which allow the camera to add new formats and easily mix with other cameras in the LDX 90 series.

Key features
- 4K upgradable (XF transmission only — not for Compact)

LDX 96 or LDX C96

The LDX 96 offers two software-enabled feature sets: high frame-rate HD/3G cameras or single-speed HD/3G/4K UHD acquisition. This advanced multiformat (HD/3G/4K UHD) and multispeed (1X/3X/6X) content acquisition system is combined with outstanding image performance, excellent light sensitivity and the ability to use standard HD lenses.

Key features
- Native HD and 4K upgradable (XF transmission only — not for Compact)
- 3X and 6X speed option for Super Slo-motion operation
- Standard Native HDR and Wide Color Gamut supporting the ITU-R BT.2020 standard

LDX 98 or LDX C98

The LDX 98 supports even greater image clarity with native support of 4K UHD as well as native 3G/HD image capture. Whether it's HD or 3X super slow-motion today, 3G or 6X super slow-motion tomorrow, or 4K UHD down the road, you'll be ready for whatever your productions demand.
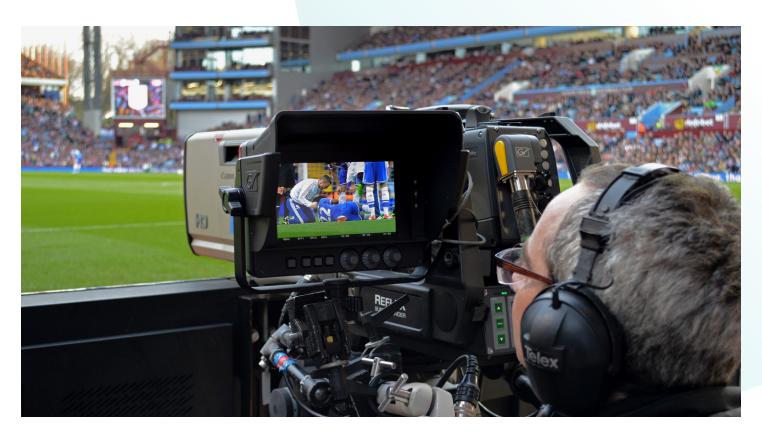
Key features
- Native 4K
- Standard Native HDR and Wide Color Gamut supporting the ITU-R BT.2020 standard
- 3X and 6X speed option for Super Slo-motion operation
- 1X standard-speed live output in addition to the high-speed output

Note: For high-speed UHD capture and native UHD without a rolling shutter, see Grass Valley's LDX 100 series.

	LDX 90 Series		
	LDX 92 / LDX C92	**LDX 96 / LDX C96**	**LDX 98 / LDX C98**
Standard Format Support	720p, 1080i (50 or 59.94 Hz)	720p, 1080i, 1080p (50 or 59.94 Hz)	720p, 1080i, 1080p (50 or 59.94 Hz)
HD Options	1080p (50 or 59.94 Hz), 1080PsF (23.98, 24, 25, 29.97)	1080PsF (23.98, 24, 25, 29.97)	1080PsF (23.98, 24, 25, 29.97)
UHD Options	2160p (upconverted in base station)*	2160p (upconverted in base station)*	2160p Native
Pixel Count	6,220,800	6,220,800	24,883,200 + Dynamic Pixel Management for HD
HDR Standard		HLG, PQ and S-Log3	HLG, PQ and S-Log3
HDR Option	HLG, PQ and S-Log3		
High-speed Options	No	3X 720p, 3X 1080i, 3X 1080p – or – 6X 720p, 6X 1080i, 6X 1080p (UXF Transmission only)	3X 720p, 3X 1080i, 3X 1080p – or – 6X 720p, 6X 1080i, 6X 1080p (UXF Transmission only)
Shutter	Global	Global	Global or Rolling (when UHD)
Imager	3X Xensium^{FT}	3X Xensium^{FT}	3X Xensium^{HAWK} DPM Ultra and Dynamic Pixel Mgt
Sensitivity @2000 lux (59.94 Hz)	F12 @ 62 dB S/N ratio (in 1080p50)	F12 @ 62 dB S/N ratio (in 1080p50)	F7.1 @ 60 dB S/N ratio (in 2160p50)
Connectivity	SDI	SDI	SDI
Support of BT.2020 wide color gamut	✔	✔	✔
Perfect picture matching across the complete LDX Series	✔	✔	✔
Easy access to control buttons, including PickMe button	✔	✔	✔
Zoom control in handgrip	✔	✔	✔
CLASS: advanced electronic lens error correction	✔	✔	✔
Advanced secondary color corrector (up to six sets for color hue, saturation and luminance adjustment)	✔	✔	✔
Fully compatible with 3G fiber/triax transmission systems	✔	✔	✔
Fully compatible with XF fiber transmission systems	✔	✔	✔
Compatible with C2IP control systems and RefleX SuperXpander	✔	✔	✔
Second motorized optical filter wheel with 4P-star and soft focus	✔	✔	✔

* Not available in compact model

Software Options

À la carte Temporary Software Options

The LDX 90 series allows you to upgrade feature by feature, perpetually or just for one day using an *à la carte* model. Daily (or multiple day) options can be created in the customer's secured B.O.W.L. web portal. A section dedicated to the LDX 90 series are available from the portal.

Any available option can be easily activated in the LDX 90 section of the B.O.W.L. web portal using Option Credit Points as described in the table below:

Model						Options			
Requirement	Details	Shutter	LDX 92 & LDX C92	LDX 96 & LDX C96	LDX 98 & LDX C98	Item Number	Commercial Reference	Points	
720p	50, 59.94	Global	✔	✔	✔				
1080i	50, 59.94		✔	✔	✔				
1080PsF	23.98, 24, 24, 29.97		O	O	O	9-0210000120-9	Opt-PsF-LDX 90 Series	1	
1080p	50, 59.94		O	✔	✔	9-0210000121-9	Opt-3G-4-LDX 92	2	
3x Speed	720p, 1080i, 1080p		✘	O	O	9-0210000123-9	Opt-3X-4-LDX 90 Series	4	Sports Bundle 7
6x Speed	720p, 1080i, 1080p		✘	O*1	O*1	9-0210000124-9	Opt-6x-4-LDX 90 Series	6	
4K UHD	Upconverted		O*2	O*2	✘	9-0210000125-9	Opt-UHD-4-LDX 90 Series	4	
4K UHD	Native	Rolling	✘	✘	O				
HDR	PQ, HGL, S-Log3	—	O	✔	✔	9-0210000122-9	Opt-HDR-4-LDX 92	1	
WCG	BT.2020	—	✔	✔	✔				

✔ Standard O Optional ✘ Not supported

*1 Compact cameras support 6x speed in 720p and 1080i   *2 Compact cameras don't support 4K/UHD upconversion

Transmission Options

All LDX 90 series cameras support a variety of transmission options. Each transmission option has applications for which it is best suited. The options and applications are outlined below. *Note:* While all LDX 90 series cameras may be paired with any of the transmission options below, some pairings may limit the abilities of the system. The system's abilities are the common features between camera head and transmission option.

Adapters
3G Triax & Fiber Transmission Adapters
Grass Valley 3G transmission adapters are ready for your evolving business needs with high-utility power outlet, an ergonomic button layout, clear setting indications, low weight, extensive communication possibilities for jib configurations and much more. Choose from 3G Triax and Fiber Adapters. For additional information, see website.

XF Transmission Adapters
XF Fiber adapters support the high bandwidth required by high-speed and 4K cameras with an additional Ethernet trunk channel with up to 1 Gb bandwidth. All other features are identical to the 3G transmission adapters. For additional information, see website.

XCU Base Stations
The XCU (eXchangeable Control Unit) base stations are like no other in the world. The XCU's unique cradle can be pre-mounted and pre-wired in the rack, making a secure mechanical and electrical connection, permitting the XCU base station to easily slide in and out whenever needed. Each XCU comes with one cradle, but additional cradles may be purchased to extend usability across different locations, allowing you to quickly and easily transfer XCUs between OB vans, studios or any place.

XCU WorldCam: HD/3G Single-Speed Baseband

XCU WorldCam fully supports the LDX Series upgradable camera platform, and many LDK Series camera heads, with both triax and fiber solutions for 3G/1.5G operation. For additional information, see website.

XCU Universe XF: HD/3G/4K UHD Single-Speed or High-Speed Baseband

The XCU Universe XF base stations have been developed to support the extended bandwidth requirements of LDX high-speed cameras with up to 6X speed operation, 4K-capable cameras and 15 F-stops of High Dynamic Range (HDR) in 1X speed operation. The optional Direct IP interface enables a complete transmission protocol between the cameras and XCUs over IP networks. For additional information, see website.

XCU Enterprise UXF: HD/3G/4K UHD Single-Speed Baseband or IP

The XCU Enterprise UXF base stations support all single-speed formats supported by the LDX Series cameras with baseband and IP connectivity, including Direct IP. The Direct IP interface enables a complete transmission protocol between the cameras and XCUs over IP networks. In addition to the features offered in other XCU base station, the XCU Enterprise UXF has a backwards-compatible UXF cradle with 4x SFP+ slots for IP connectivity. For additional information, see website.

XCU Universe UXF: HD/3G/4K UHD Single-Speed/High-Speed Baseband or IP

The XCU Universe UXF base stations support both single-speed and high-speed formats supported by the LDX Series cameras with baseband and IP connectivity, including Direct IP. In addition to the features offered in other XCU base station, the XCU Universe UXF has a backwards compatible UXF cradle with 4x SFP+ slots for IP connectivity. For additional information, see website.

Base station	Adapter	HD			UHD	I/Os	
		1.5G	3G	3X/6X	UHD	Baseband	IP
3G Transmission							
XCU WorldCam	3G Triax	Yes	Yes	No	No	Yes	No
XCU WorldCam	3G Fiber	Yes	Yes	No	No	Yes	No
XF Transmission							
XCU Universe XF	XF Fiber	Yes	Yes	Yes	Yes	Yes	No
XCU Enterprise UXF	XF Fiber	Yes	Yes	No	Yes	Yes	Yes
XCU Universe UXF	XF Fiber	Yes	Yes	Yes	Yes	Yes	Yes
DirectIP (Requires any XF Transmission base station + XF Fiber Adapter)							
	DirectIP	Yes	Yes	Yes	Yes	XCU dependent	
	DirectIP+	Yes	Yes	No	No	XCU dependent	

Ordering

3G Triax/3G Fiber (XCU + Adapters)

XCU 4200/00
XCU WorldCam — Triax Fischer — Including XCU Cradle

XCU 4200/50
XCU WorldCam — Triax TriLock — Including XCU Cradle

XCU 4210/10
XCU WorldCam — SMPTE Fiber Lemo — Including XCU Cradle

LDX 5640/00
3G Triax LDX Adapter — Fischer

LDX 5640/50
3G Triax LDX Adapter — TriLock

LDX 5650/10
3G Fiber LDX Adapter — SMPTE Lemo

XF Transmission 10 GbE (XCU + Adapters)*

XCU Universe XF
SMPTE Fiber Lemo — Includes XCU

XCU Enterprise UXF
SMPTE Fiber Lemo — Includes XCU Cradle (4x SFP+ cages)

XCU Universe UXF
SMPTE Fiber Lemo — Includes XCU Cradle (4x SFP+ cages)

Universe Adapter
XF Universe Fiber Adapter — SMPTE Fiber Lemo

* XF Transmission supports DirectIP

12G SDI SFP Module Providing 2x 12G SDI Outputs

5-000000002-00
12G SDI module (for XCU Universe/Enterprise UXF)

Viewfinders and Other Accessories

For additional information on viewfinders, power converters and other accessories, see website.