All new, no-compromise 4K UHD/HD IP and SDI switcher.

Introduction

Today, producing premium 4K content frequently requires bandwidth and processing capacity that can only be achieved by combining traditional resources. This complexity makes production difficult and at times limits the creative effects that are available in HD productions. The new GV K-Frame XP from Grass Valley is a no-compromise 4K UHD/HD, IP and SDI video processing engine that alleviates these limitations.

The GV K-Frame XP – Compact video production center is the next entry to Grass Valley’s K-Frame X line of production switchers. The XP introduces a new generation of single-raster 4K UHD products for live production. Paired with any of Grass Valley’s Kayenne, Karrera, Korona or KSP panels, GV K-Frame XP provides unsurpassed 4K UHD connectivity with every input and output supporting 4K UHD 2160p signals.

Switching in 4K Feels the Same as Switching in HD

Unlike competitive switchers claiming to support 4K UHD, Grass Valley’s new GV K-Frame XP production switcher does not internally break down a 12G input into smaller streams or only allow connection to a subset of available I/O connectors. Whether you are producing content in HD, 3G or 4K UHD, there is no reduction in physical I/O count or processing capability resulting in maximum signal density and complete utilization of all available resources.

When you walk into a control room on a mobile truck or studio outfitted with GV K-Frame XP, switching a show in 4K UHD feels the same as switching in HD. It’s the same workflow for the operator. Creative limitations vanish with smooth “full-raster” effects available on every keyer.

Multiformat production in a hybrid environment has never been easier. No re-cabling or external equipment is required to alternate between HD and 4K UHD. Internal conversion provides simple utilization of existing HD, SDQS or 2SI resources, while new 12G sources can be used directly in either IP with single-stream 4K UHD on 25 GbE SFPs or SDI.

Expanded Production Capability

This next-generation production switcher is built on an all-new hardware platform that is not only ready for future production requests, it provides expanded capability for today’s productions as well. GV K-Frame XP – Compact supports up to 6 M/Es, every M/E has six keyers with all keyers supported by a full raster 2D DPM with perspective and optional chromakey capability. An additional option is Grass Valley’s unique floating pool of up to 16 iDPMs usable in either HD or 4K UHD without losing resources by coupling or pairing. With an eight-channel built-in ImageStore for stills and movies with audio — including HDR support — the replay storage capacity of 128 GB (over 1 minute of 4K UHD) assures your confidence that you are prepared for any event.

Undiminished I/O Count in Any Format

The GV K-Frame XP – Compact provides more 4K UHD processing per RU than any other competitor, while providing all the features and functions you’ve come to expect in a Grass Valley switcher. A maximum I/O footprint of 80x40 connections remains the same in HD and 4K UHD 2160p. The undiminished I/O count is the same regardless of whether you are producing in all IP, all SDI, or any combination of I/O boards. And to keep it simple, the I/O boards for the GV K-Frame XP are the same as the current GV K-Frame X.
KEY FEATURES

- GV K-Frame XP – Compact video production center: 8 RU frame (with internal power supplies)
- 80x40 I/O footprint supports both IP and SDI offerings:
  - IP I/O boards come in two bi-directional configurations:
    o 16x8 and 8x4 IP boards, both accept either 10 GbE or 25 GbE SFPs
    o IP boards accept standard SMPTE ST 2110-20/30/40, TICO for SMPTE ST 2022-6, and SMPTE ST 2022-7 for redundancy
  - SDI I/O boards come in three offerings: 16x8, 16x8 with “gearbox” functionality, and 8x4 with conversion
  o 8x4 conversion board for frame sync and format conversion, up/down/cross converts with direct connection (HD→4K and 4K→HD)
  o MatchSync functionality is found on both the 16x8 with “gearbox” and the 8x4 with conversion
- 4K UHD 2160p sources can be handled in a variety of ways:
  Two (2) single streams on a 25 GbE SFP, one on (1) 12G-SDI link, one (1) on a 10 GbE SFP with TICO compression, 2SI or SDQS quad link on four (4) 3G-SDI or IP
- Conversion modules enable conversion to/from HD and 4K UHD 2160p (2SI or SDQS) on inputs and outputs and between 2SI and SDQS. Both SDI “gearbox” and conversion boards support 12G-SDI single link sources as well as quad link 4K UHD
- Maintain the same functionality and feature DNA as the current K-Frame X: Up to 6 M/Es, spread over two new VPE (Video Processing Engine) boards
- Six (6) full function keyers per M/E with 2D DPMs with perspective per keyer
- Up to 16 optional 3D DPMs, spread over two new DPM (Digital Picture Manipulation) boards
- Supports HD, 1080p 3G, 12G, 4K UHD and HDR (HLG and PQ) with ability to set HDR (HLG and PQ) payload ID on each output
- Internal 8-channel ImageStore for stills and movies with video, key and audio (up to 128 GB of storage)
- E-MEMs, Macros and show files are fully compatible with K-Frame and K-Frame X
- Multiviewers (up to 4, licensable)
- Compatible with all Kayenne, Karrera, Korona and KSP panels
- Rugged modular design on both control surface and chassis for field reconfiguration and serviceability
- Four (4) independent suites capability in both HD or 4K UHD
- MatchSync aligns incoming SDI signals with IP inputs in a mixed format environment
- Automation application control under GV Ignite and GV Pace, or other third-party applications
- On-panel triggered integration with graphics devices: ChyronHego LyricX or PRIME, and Ross Video XPression (via Ross Talk)

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<th>Feature/Function</th>
<th>GV K-Frame XP – Compact</th>
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<td>Frame Processing</td>
<td>4K UHD 2160p (full-raster), 1080p, 1080i, 720p</td>
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<td>Video frame</td>
<td>8 RU frame (with internal power supplies)</td>
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<td>4K UHD 2160p single-stream IP</td>
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<td>I/O type</td>
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<td>IP connector type</td>
<td>SFPs: 10 GbE or 25 GbE</td>
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<tr>
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<td>Up to 6 M/Es each with six (6) full keyers with 2D DPMs</td>
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<td>Internal ImageStore</td>
<td>8-channel (video+key) — stills or movies with audio, maximum storage up to 128 GB (Licensable as 32 GB, 64 GB, or 128 GB)</td>
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<td>Conversion</td>
<td>Optional inputs: up to 16 SDI with frame syncs and format converters / Outputs: up to 8 SDI format converters</td>
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<td>2D DPMs</td>
<td>2D DPM with perspective associated with every keyer</td>
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<td>3D DPMs</td>
<td>Up to 16 floating 3D DPMs with effects</td>
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<tr>
<td>Control surface</td>
<td>Any Kayenne, Karrera, KSP, and Korona control surface runs on any K-Frame video processing engine. (Available in multiple configurations)</td>
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<td>Software panel option</td>
<td>KSP touchscreen GUI software available with optional tactile custom keyboard</td>
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**SPECIFICATIONS**

**GV K-Frame XP Compact Video Production Center**

The initial release will support 12 Frame Operating Modes (FOMs):

- 2160p 59.94 Hz
- 2160p 50 Hz
- 2160p 29.97 Hz
- 2160p 23.98 Hz
- 1080p 59.94 Hz – Level A
- 1080p 50 Hz – Level A
- 1080p 29.97 Hz
- 1080p 23.98 Hz
- 1080i 59.94 Hz
- 1080i 50 Hz
- 720p 59.94 Hz
- 720p 50 Hz

**Mechanical Specification**

- **Frame:** Compact frame
- **Depth:** 63.2 cm (24.90 in.)
- **Width:** 44.7 cm (17.60 in.)
- **Height:** 34.5 cm (13.97 in.)
- **Weight:** 59.7 kg (125 lbs.)*
- **RU:** 8 RU

**Inputs**

- 80 inputs with the optional capability of converting 4K 2SI inputs into a single internal 12G input

**Outputs**

- 40 outputs with the optional capability of converting a single internal 12G output into a 4K 2SI or SDQS quad link output

**GPI+Tally I/O**

- 16x GPl + 16x GPO + 64x Tally

**Audio Standards**

Audio will be passed as:

- SDI: Embedded
- SMPTE ST 2022-6
- Embedded (Transport SMPTE ST 2110-30 AES67 at 48 kHz, Level A and B)

* Frame weight is with three power supplies. A single supply weighs 2.5 kg (5.4 lbs.).

**Video Standards**

**IP Video Standards:**

- SMPTE ST 2110-20/30/40
- SMPTE ST 2022-6 with TICO

**4K UHD Mode:**

- SMPTE ST 2082-10 (12G SDI)
- SMPTE ST 425-5:2014 Quad Link 2-Sample-Interleave (2SI)
- SMPTE ST 425-5:2014 Quad Link Square Division Quad Split (SDQS)
- SMPTE ST 2110-20/30/40
- SMPTE ST 2022-6 with TICO

**3G Mode:**

- SMPTE ST 424 section 4 – Level A – 1080p 50/59.94/60 Hz

**HD Mode:**

- SMPTE ST 292-1 1080i 25/29.97/30/50/60 Hz ±5%
- SMPTE ST 292-1 720p 50/59.94/60 Hz

**Serial Digital Video Inputs**

**Interface:**

- 4K 12G video format SMPTE ST 2082
- 3G video formats SMPTE ST 424-2006
- HD video formats SMPTE ST 292-1998
- SD video formats SMPTE ST 259-1997 ITU-R BT.656 (requires K-FRM-IO-CONV-X module)

**Return loss:**

- ≥ 4 dB, 6.0 GHz to 12 GHz
- ≥ 15 dB, 5 MHz to 1.5 GHz
- ≥ 10 dB, 1.5 GHz to 3.0 GHz

**Type of connector:** 75Ω BNC (SMPTE ST 259)

**Nominal amplitude:** 800 mVp-p across 75Ω

**Serial Digital Video Outputs**

**Interface:**

- 4K 12G video format SMPTE ST 2082
- 3G video formats SMPTE ST 424-2006
- HD video formats SMPTE ST 292-1998
- SD video formats SMPTE ST 259-1997 ITU-R BT.656 (requires K-FRM-IO-CONV-X module)

**Return loss:**

- ≥ 4 dB, 6.0 GHz to 12 GHz
- ≥ 15 dB, 5 MHz to 1.5 GHz
- ≥ 10 dB, 1.5 GHz to 3.0 GHz

**Type of connector:** 75Ω BNC (SMPTE ST 259)

**Nominal amplitude:** 800 mVp-p across 75Ω

**Rise and fall times:**

- 4K 12G: ≤ 45 ps between 20% and 80% amplitude
- 3G & HD video formats: ≤ 135 ps between 20% and 80% amplitude
- SD video formats: 400 to 1400 ps between 20% and 80% amplitude

**Timing jitter:**

- 4K 12G video format: ≤ 0.2 UI
- 3G video formats: ≤ 0.2 UI
- HD video formats: ≤ 0.1 UI
- SD video formats: ≤ 0.2 UI

**Alignment jitter:**

- 4K 12G video format: ≤ 0.3 UI
- 3G video formats: ≤ 0.3 UI
- HD video formats: ≤ 0.2 UI
- SD video formats: ≤ 0.2 UI

**Output impedance:** 75Ω

**DC offset:** <500 mV with 75Ω termination

**Ancillary and embedded data:** Blanked or passed (user selectable)

**EDH:** Blanked

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**Four Suites with K-Frame XP – Compact**

**Suite 1**

One or two GV Korona Control Surfaces

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**Suite 2**

One or two GV Korona Control Surfaces

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**Suite 3**

Karrera and GV Korona Control Surfaces

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**Suite 4**

Kayenne Control Surface and KSP Soft Panel

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Reference Input

Analog: Black or Tri-level sync
Digital: SDI – SMPTE ST 425-1
PTP: IEEE 1588-2008 Precision Time Protocol with SMPTE ST 2059-2 PTP Profile, out of band

Analog Reference Input

Video standard: Analog black or Tri-level sync
Return loss: >40 dB, up to 5 MHz
Connectors: 2 BNC loop-through
Impedance: 75Ω external termination

Communications

Connections:
- PCU to video frame: LAN cable 100m (328 ft.) max. length
- Control panel to PCU: dedicated cables, choice of 7.5m or 15m
- Menu panel to PCU: dedicated cables, choice of 7.5m or 15m
- Audio AES67: 2x SFP for AES67 (SFP may be Fiber or RJ-45)
- Machine control: 8x RS-422
- PTP: 2x SFP

Interoperability:
The Video Production Centers are interoperable with the GV Orbit, GV Convergent, Sirius, IQ Edge, Encore, Jupiter, SMS-7000 and NV9000 routing control systems; LDK Series and LDX Series cameras using Connect Gateway, VISCA controlled PTZ systems; and with the K2 Summit, sQ servers, legacy Profile servers, and T2 IDDRs

Supported Control Protocols
The Video Production Centers support Ethernet and serial AMP protocol (standard in all systems), serial BVW and Odetics protocols, as well as controlling devices using PBUs II and GPUs

Serial BVW-75 for VTR control
AMP (advanced media protocol) for Profile PVS, Profile XP Media Platform, K2, M-Series, Turbo IDDR and T2 IDDR systems over Ethernet and serial
Grass Valley native protocol for routers/routing control systems (Trinix/Trinix NXT, Venus, NVISION and third-party routers: Jupiter, Encore and NV9000 router control systems)
Grass Valley Sirius
NVISION Native Router Control Protocol NP0017
Ethernet tally
Grass Valley remote Aux Panels via Ethernet
Grass Valley editor protocol for edit controllers and external control
VCP Serial and Ethernet
RossTalk protocol support for direct control of XPression graphics engine
Single-point-of-control integration for graphics with ChyronHego Click Effects PRIME
iControl
NMOS IS-04 and IS-05

Power

Video Processing Frame 8 RU:
- Line voltage: 100V-240V ±10% power factor corrected
- Automatic line-voltage sensing for 120V and 240V sources
- Line frequency: 50/60 Hz ±5%

Kayenne Control Panel:
- Line voltage: 100V-240V ±10% power factor corrected
- Automatic line-voltage sensing for 120V and 240V sources
- Line frequency: 50/60 Hz ±5%
- Power consumption: max. panel configuration 600W
- Leakage current: <2.5 mA

Karrera Control Panel:
- Line voltage: 100V-240V ±10% power factor corrected
- Automatic line-voltage sensing for 120V and 240V sources
- Line frequency: 50/60 Hz ±5%
- Power consumption: max. 200W
- Leakage current: <2.5 mA

GV Korona Control Panel:
- Line voltage: 100-240V ±10% power factor corrected
- Automatic line-voltage sensing for 120V and 240V sources
- Line frequency: 50/60 Hz ±5%
- Power consumption: max. 60W
- Leakage current: <2.5 mA

Environmental Conditions

Storage temperature: -20 to 70ºC (-4 to 158ºF)
Operating temperature: 0 to 40ºC (32 to 104ºF)
Relative humidity: 0-95% (non-condensing)
Electromagnetic environment: E2 (according to EN55103-1, -2)
Look for the system nomenclature that includes panel type/size and video processing frame size, then add your options; or build your system à la carte.

- SDI I/O boards come in three types: 16x8, 16x8 with "gearbox" functionality, and 8x4 conversion
- IP I/O boards come in two configurations: 16x8 and 8x4
- 8x4 conversion board for frame sync and format conversion, up/down/cross converts with direct connection

### K-FRM-100CX-P
GV K-Frame XP, Compact SDI-based 8 RU Frame
GV K-Frame X Compact SDI-based (8 RU) frame including two PS, standard controller processor module with built-in ImageStore, 32 SDI inputs/16 SDI dual-channel outputs comprised of two (2) K-FRM-IO-FULL-X-GB modules capable of 4K UHD, 3G and/or 12G with "gearbox" functionality, one (1) K-FRM-VPE-XP module capable of licensing three (3) M/E, 8 GPI inputs and 8 GPI outputs, 32 tally, AMP, 999 macros, and 1,000 E-MEMs. Frame has a 6 M/E maximum with 6 keyers per M/E; 80 inputs/40 outputs maximum.

### K-FRM-CXP-I
GV K-Frame XP, Compact IP-based 8 RU Frame
GV K-Frame X Compact IP-based (8 RU) frame including two PS, standard controller processor module with built-in ImageStore, IP bidirectional I/O, 32 inputs/16 outputs comprised of two (2) K-FRM-IO-FULL-X-I modules, one (1) K-FRM-VPE-XP module capable of licensing three (3) M/E, 8 GPI inputs, 8 GPI outputs, 32 tally, AMP, 999 macros, and 1,000 E-MEMs. Frame has a 6 M/E maximum with 6 keyers per M/E; 80 inputs/40 outputs maximum.

### K-FRM-IO-FULL-X-I
GV K-Frame X IP Input/Output Module (16x8 IP I/O)
Bidirectional I/O adds 8 IP inputs & 4 IP outputs, SFP connector cages can be stuffed for either 10 GbE or 25 GbE (SFPs must be ordered separately*), one board per slot. Board can also be licensed for SMPTE ST 2022-7 redundancy by utilizing option: K-FRM-IO-RDND-X.

### K-FRM-PVE-XP
GV K-Frame XP Video Processing Engine Module
Video Processing Engine module has three (3) VPEs each can be licensed as M/Es, multiviewers, and/or eDPM (Licenses required). Processing is done in full-raster 4K 2160p, 1080p, 1080i or 720p. Each M/E includes: 6 full function keyers (each keyer includes: video and key inputs, 2D DPM with perspective, Wipe Mask generator, Key Store and Chroma Keyer (license required)); Cut/Mix/Wipe Transitions; 2 full Wipe Generators; 4 background and 2 utility inputs; 1 Program, 4 Program/Cleanfeed, 3 Preview, 1 M/E View (license required) outputs; supports DoubleTake (license required).

### K-FRM-PSU-XP
GV K-Frame XP power supply
GV RAP-100 & GV RAP-200 Remote Aux panel options

**NOTE:** GV K-Frame X based “System” part numbers as well as “License option” part numbers will be added to this document at a later date. For additional information, please ask your sales representative or the appropriate switcher product manager.

* Note: Item SFP-ETH10G-RT-M85-LC is the 10 GbE SFP and K-FRM-IO-SFP10-25G is the 25 GbE SFP validated by Grass Valley. Both are orderable as an option for the GV K-Frame X IP I/O boards:
- K-FRM-IO-FULL-X-I
- K-FRM-IO-X-I