



Kaleido-Modular-X

High Picture Count, Ultra-Flexible and Scalable Multiviewer (up to 64x4)

A clear view for any of your monitoring requirements.

Kaleido-Modular-X from Grass Valley is a flexible and scalable 4K-ready multiviewer perfectly suited for applications covering everything from TV production to playout. These adaptable multiviewers are optimized for the space, power and weight considerations found in studios, outside broadcast trucks and playout facilities.

Modular design allows for easy configuration to desired I/O size. Unique FlexBridge coax cable bridging between the input and output modules allows for the installation of the input stage next to the router or sources — and the output stage next to displays — for simpler, cost-effective cabling installation with none of the risk associated with HDMI extenders.

Split input and output modular system offers scalability both on the input and output side for future-proofing your investment as production to playout monitoring needs increase.

With space at a premium in both production and playout facilities and the ever-present need to reduce overall weight in your production trucks, Kaleido-Modular-X offers the ideal multiviewer solution.

With advanced probing features, which rapidly and clearly alert operators to on-air problems, the Kaleido-Modular-X is perfect for ensuring a high quality of broadcast for master control layout.

The Kaleido-Modular-X is ready for 4K. Quad-link 4K UHD inputs are “stitched” back together into a pixel perfect image for monitoring HD as well as 4K cameras on the same display. With quad output capability, Kaleido-Modular-X is ready to drive 4K UHD displays.

With the addition of the KMX-3901-IN-IP input card, the Kaleido-Modular-X accepts SMPTE ST 2022-6 to simplify the migration to IP while providing simultaneous SDI and IP sources monitoring on the same multiviewer.



KEY FEATURES

Space-efficient modular design

- Modular design offers wide range of input/output configurations, with optional separation of input and output stages for streamlined, cost-saving cabling and optimization of space usage
- Standard Densité frame housings enables “mix-and-match” capability of multiviewers with signal processing modules, URS frame reference and GPI I/O via GPI-1501 cards for best use of your frames to reduce rack space

Unique FlexBridge technology

- Flexible coax cable bridging between input modules and to the output modules
- Expand multiviewer beyond the number of slots within a single frame by bridging additional input or output modules housed in a different frame
- Install input stage next to the router and the output stage next to the displays to eliminate the HDMI extenders
- More robust than cascading with bypass relay protection to remain on-air even when removing a module

Unmatched image quality

- Unmatched multiviewer picture quality, and superior on-screen graphics, for the most critical monitoring applications and high-end TV production requirements
- Simultaneous HDMI and SDI outputs at full 1080p50/60 resolution on up to four multiviewer displays
- Input signal processing up to 3 Gb/s signal formats
- Capable of handling 4K quad-link sources seamlessly recombining them into a pixel perfect image

Robust and serviceable design

- Hot swappable cards with unique Auto-Recovery feature provides fast automated recovery after a “cold” spare insertion into the frame
- 1 RU and 3 RU Densité frame housings with redundant power supplies and quiet cooling

Multiroom, multiuser oriented

- A single Kaleido-Modular-X multiviewer can be used to share sources across multiple rooms or operator positions, with fully independent displays, audio monitoring and control panels dedicated to each operator

Seamless control across multiple multiviewers

- Kaleido multiviewers can be “mixed-and-matched” with others to create a seamless monitoring system across a facility
- Choice of multiple control options such as standalone RCP-2/RCP-200 panels, integrated with router control systems and panels, iControl and third-party control systems

Superior layout flexibility

- Ultimate level of layout flexibility, with unlimited signal repetition and sizing across all displays, without blocking, grouping restrictions or bandwidth restrictions

Router and switcher integration

- Kaleido-Modular-X offers rich integration with the Sirius router family, and third-party routers and production switchers for tally and label/alias source management
- Multiple multiviewers can be controlled from a single control panel

Scalable for the largest systems

- Virtually limitless multiviewer system expansion with upstream Sirius router
- Can create combined multiviewer/router system with 1,152 video inputs, 288 multiviewer outputs

Advanced probing and alarming

- Closed captioning and teletext subtitling display and alarming to ensure compliance with regulation, includes XDS and AFD
- Software licensable Dolby E metadata extraction for metering and content alarming without the need of expensive hardware decoders
- Sophisticated on-screen alarm displays for clear operator alerts. Supports multicolor and blinking statuses based on severity, latching and status message

SPECIFICATIONS

KMX-3901 Input Card (8 or 16)

Connector: DIN 1.0/2.3

SD-SDI

Signal: 4:2:2 SMPTE ST 259-C (270 Mb/s), SMPTE ST 272

Formats: 525 and 625

Audio: SMPTE ST 274

Return loss: >15 dB up to 270 MHz

Jitter: <0.2 UI

Cable length:

250m (820 ft.) (Belden 1694A)

150m (492 ft.) (Belden 1855A)

HD-SDI

Signal: 4:2:2 SMPTE ST 292-1 (1.485, 1.485/1.001 Gb/s)

Formats: 720p24/25/29.97/50/59.94, 1080PsF23.98p/24p/25i/29.97i, 1080i50/59.94, 1080p23.98/24/25/29.97

Audio: SMPTE ST 299

Return loss: >15 dB up to 1.5 GHz

Jitter: <0.2 UI

Cable length:

100m (328 ft.) (Belden 1694A)

45m (148 ft.) (Belden 1855A)

3G-SDI

Signal: SMPTE ST 424 (2.97, 2.97/1.001 Gb/s) Level A and B-DL

Formats: 1920x1080p60, 1920x1080p59.94, 1920x1080p50

Audio: SMPTE ST 299

Return loss:

>15 dB up to 1.5 GHz

>10 dB from 1.5 GHz to 3 GHz

Jitter: <0.3 UI

Cable length:

100m (328 ft.) (Belden 1694A)

45m (148 ft.) (Belden 1855A)

UHD 4K Inputs

Signal: SMPTE ST 425-5 12 G over 4x 3G links, square division quad split

Formats: 2160p59.94, 2160p50, 2160p29.97, 2160p25

LTC Inputs

Signal: SMPTE ST 12-1995 (EBU-3259-E), SMPTE ST 309-1999

DVI / HDMI / VGA Inputs (Optional)

Device: Grass Valley ADVC G1 converter

Discrete Audio Inputs

MADI: Connector: DIN 1.0/2.3

Analog Audio (optional): ABT-64A or ABT-128A

Digital Audio (optional):

AES 110Ω: ABT-64D-110 and ABT-128D-110

AES 75Ω: ABT-64D-75 and ABT-128D-75

Reference

External:

SMPTE ST 170 / SMPTE ST 318 / ITU 624-4 blackburst

SMPTE ST 274 / SMPTE ST 296 tri-level sync

Connector: DIN 1.0/2.3

Internal: Universal reference from the Densité frame via REF-1801

FlexBridge Coaxial I/O

KMX-3901-IN-8-D: 2 FlexBridge outputs

KMX-3901-IN-16-D: 2 FlexBridge outputs

KMX-3901-IN-16-Q: 4 FlexBridge outputs

KMX-3901-OUT-D: 2 FlexBridge inputs

Format: 3 Gb/s

Cable length between two input cards:

10m (33 ft.) (Belden 1694A)

6m (20 ft.) (Belden 1855A)

Cable length from input card to output card:

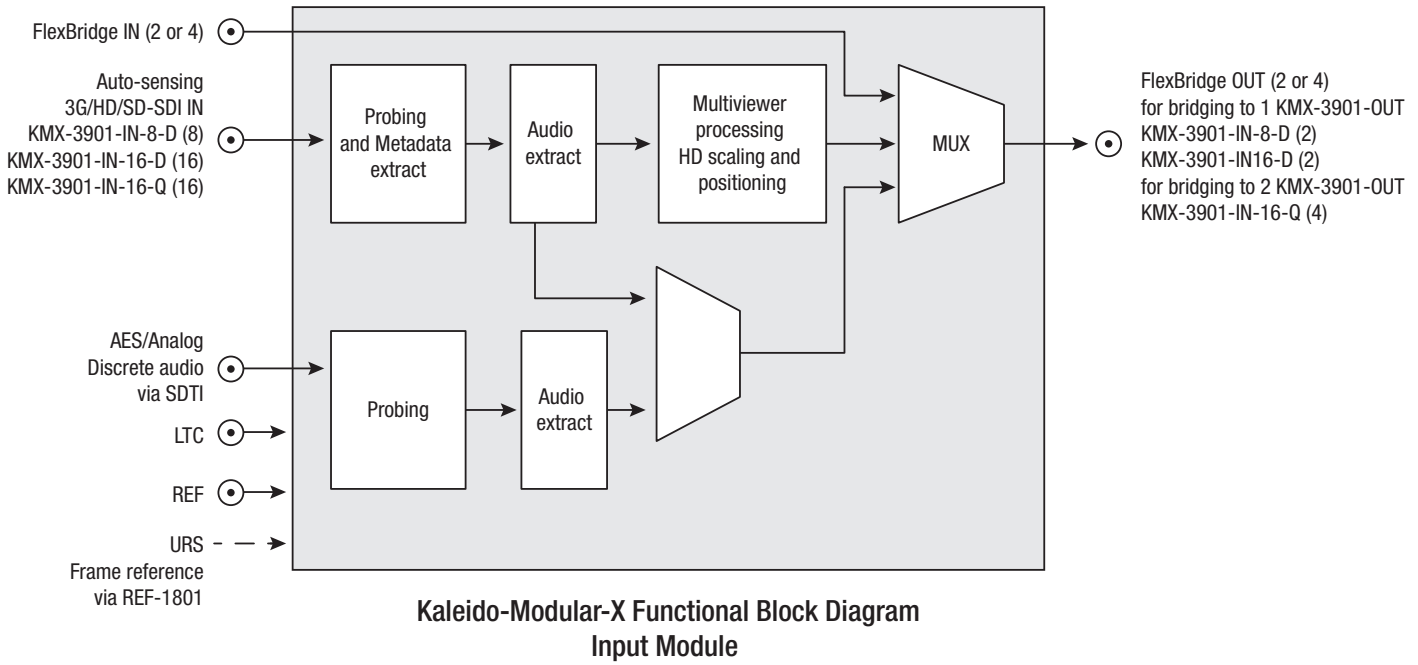
50m (164 ft.) (Belden 1694A)

35m (115 ft.) (Belden 1855A)

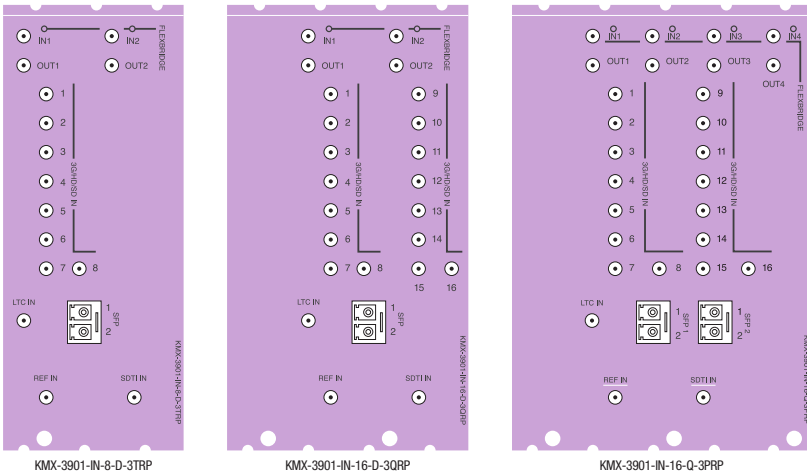
Connector: DIN 1.0/2.3

Functional Block Diagram and Rear Panel Views

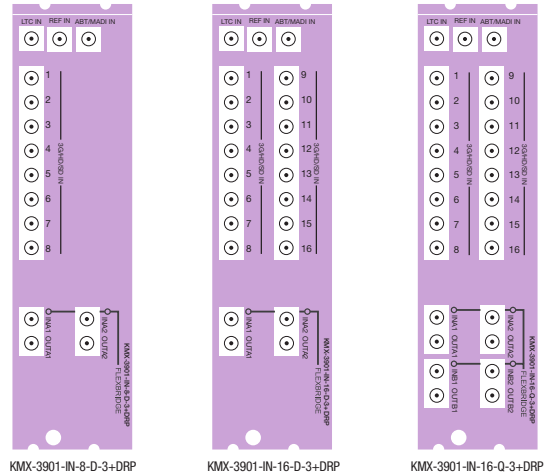
KMX-3901-IN Input Modules — KMX-3901-IN-8-D, KMX-3901-IN-16-D and KMX-3901-IN-16-Q



KMX-3901-IN Rear Panels Compatible with Densité 3



KMX-3901-IN Rear Panels Compatible with Densité 3+ FR1 & FR4



SPECIFICATIONS (CONT.)

KMX-3901 Output Card

HDMI (1 or 2)

Signal: HDMI V1.3

Format:

1280x1024 up to 1920x1200p configurable
Refresh rate supported (50 Hz and 59.94 Hz)

Cable length: 4.57m (15 ft.)

Connector: HDMI

HD-SDI (1 or 2)

Signal:

3G/HD-SDI SMPTE ST 424 and 292 compliant
Supports data rates of 1483.5, 1485, 2967, 2970 Mb/s

Return loss:

>15 dB up to 1.5 GHz
>10 dB from 1.5 GHz to 3 GHz

Jitter (wideband):

HD: <0.2 UI
3 Gb/s: <0.3 UI

Cable length:

100m (328 ft.) (Belden 1694A)
45m (148 ft.) (Belden 1855A)

Connector: DIN 1.0/2.3

Analog Audio Monitoring (1 or 2)

Signals (2): Unbalanced analog stereo

Impedance: 10 kΩ

Level: 2 V_{p-p}

Connector: WECO

Communication

Ethernet (1):

Signal: 10/100 BASE-T
Connector: RJ45

Serial Port (1):

Signal: RS-422 (SMPTE ST 207, EBU-3245)
Connector: RJ45

GPI I/O (Optional):

Device: Densité GPI-1501

Audio Processing Performance

Quantization: 20-24 bits

Sampling: 48 kHz

THD+N: 80 dB

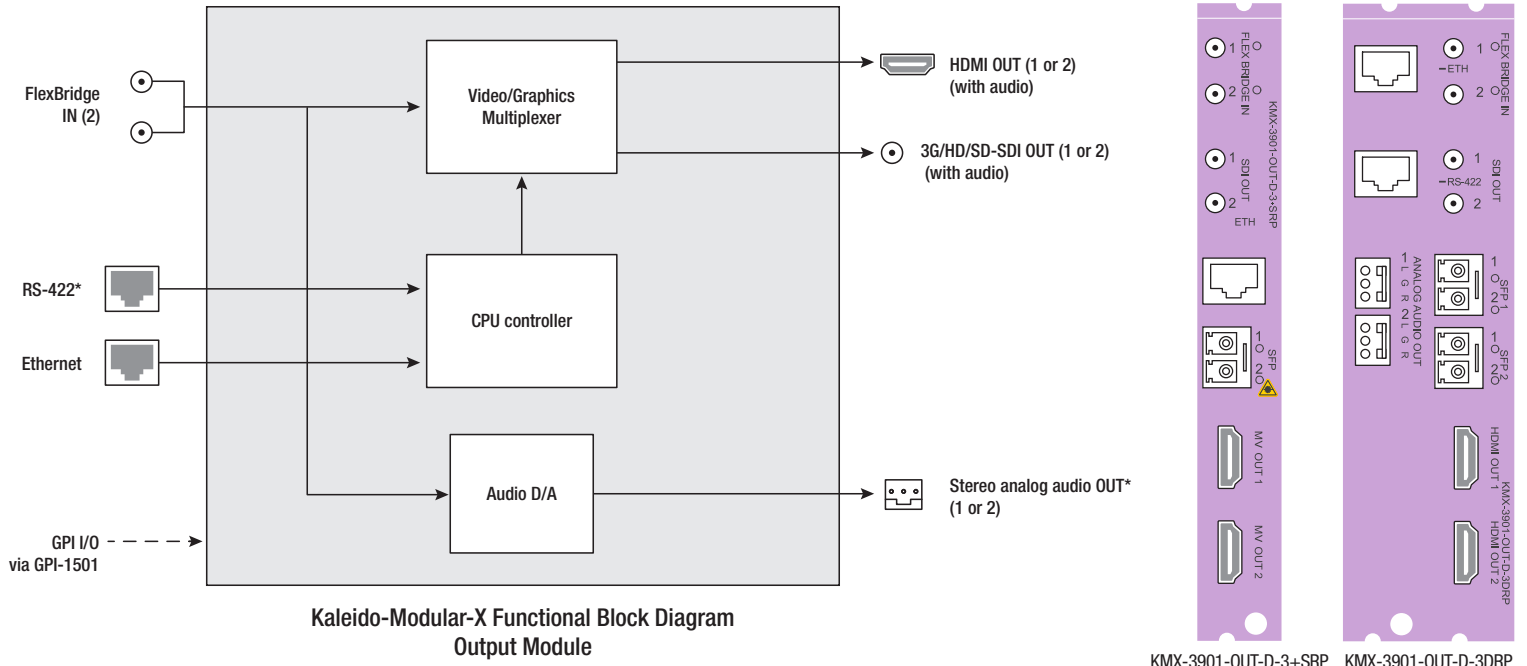
SNR: 98 dB

Video Processing Performance

Processing delay: 1 frame in genlock mode, 1-2 frame in non-genlock mode

Functional Block Diagram and Rear Panel Views

KMX-3901-OUT Output Modules — KMX-3901-OUT-D and KMX-3901-OUT-S



* Not available on KMX-3901-OUT-D-3+SRP

ORDERING

KMX-3901-IN-8-D

8 input HD/SD-SDI and 3 Gb/s input module with dual FlexBridge outputs (3 Gb/s license required)

KMX-3901-IN-8-D-3TRP

Triple rear connector panel with bypass relay

KMX-3901-IN-8-D-3+DRP

Dual rear connector panel with bypass relay. Compatible with Densité 3+ FR1 and Densité 3+ FR4

KMX-3901-IN-16-D

16 input HD/SD-SDI and 3 Gb/s input module with dual FlexBridge outputs (3 Gb/s license required)

KMX-3901-IN-16-D-3QRP

Quadruple rear connector panel with bypass relay

KMX-3901-IN-16-D-3+DRP

Dual rear connector panel with bypass relay. Compatible with Densité 3+ FR1 and FR4

KMX-3901-IN-16-Q

16 input HD/SD-SDI and 3 Gb/s input module with quad Flex-Bridge outputs (3 Gb/s license required)

KMX-3901-IN-16-Q-3PRP

Quintuple rear connector panel with bypass relay

KMX-3901-IN-16-Q-3+DRP

Dual rear connector panel with bypass relay. Compatible with Densité 3+ FR1 and Densité 3+ FR4

KMX-3901-OUT-S

Single head output module, upgradeable to dual head outputs

KMX-3901-OUT-D

Dual head output module

KMX-3901-OUT-D-3DRP

Double rear connector panel

KMX-3901-OUT-D-3+SRP

Single rear panel for installation in Densité 3+ FR1 and Densité 3+ FR4

KMX-3901-OUT Options

KMX-OUT-OPT-OP2

Head output two enable license for KMX-3901-OUT-S

KMX-OUT-OPT-ROT-S

Single head rotation license for KMX-3901-OUT-S

KMX-OUT-OPT-ROT-D

Dual head rotation license for KMX-3901-OUT-D

KMX-3901-IN Options

KMX-IN-8-OPT-3GBPS

3 Gb/s signal format option (8 inputs) for KMX-3901-IN-8-D

KMX-IN-16-OPT-3GBPS

3 Gb/s signal format option (16 inputs) for KMX-3901-IN-16-D and KMX-3901-IN-16-Q

KMX-IN-8-OPT-CSX

CC/Subtitling and XDS data license (8 inputs) for KMX-3901-IN-8-D

KMX-IN-16-OPT-CSX

CS/Subtitling and XDS data license (16 inputs) for KMX-3901-IN-16-D and KMX-3901-IN-16-Q

KMX-IN-8-OPT-DOLBY

License for extraction of Dolby Metadata (8 inputs) for KMX-3901-IN-8-D

KMX-IN-16-OPT-DOLBY

License for extraction of Dolby Metadata (16 inputs) for KMX-3901-IN-16-D and KMX-3901-IN-16-Q

Audio Input Modules

ABT-64A

64 channel analog audio bridge terminal

ABT-64D-110

64 channel 110 ohm AES audio bridge terminal

ABT-64D-75

64 channel 75 ohm AES audio bridge terminal

ABT-128A

128 channel analog audio bridge terminal

ABT-128D-110

128 channel 110 ohm AES audio bridge terminal

ABT-128D-75

128 channel 75 ohm AES audio bridge terminal

Housing Frames and Options

DENSITÉ 3 FRAME

3 RU housing frame with (1) PSU (AC-IN) and 1 Ethernet controller

DENSITÉ 3-PSU-AC

Redundant PSU for Densité 3

DENSITÉ 3+ FR-1

1 RU housing frame with (1) PSU (AC-IN) and 1 Ethernet controller

DENSITÉ 3+ FR1-PSU-AC

Optional redundant power supply for Kaleido-MX 1 RU models

GPI-1501-3RU

GPI I/O module for Densité

GPI-1501-SRP-3RU

Single rear connector panel

GPI-1501-TBA

GPI terminal block adapter

REF-1801-3RU

Reference card for Densité 3 frame

REF-1801-SRP-3RU

Single rear connector panel

Accessories

ADVC G1

Any In to SDI Multifunctional Converter

DXF-200-B

Optical extension system with/HDMI+L-HDMI cable

DXF-200-PSU

DXF-200 power supply (1X sub-module)

KALEIDO-RCP2

Ethernet remote control panel and KM Gateway

KRCP-RK2

Kaleido-RCP2 rack mount bracket

GPI-1501-TBA

GPI I/O terminal block adapter

Router Interface Options

KMX-OPT-RT-JUPITER

Control and UMD support for Grass Valley Jupiter routers

KMX-OPT-RT-GVG7000

Control and UMD support for Grass Valley 7000 routers

KMX-OPT-RT-ENCORE

Control and UMD support for Encore controllers

KMX-OPT-RT-DATATEK

Control and UMD support for Datatek routers

KMX-OPT-RT-EVERTZ

Control and UMD support for Evertz routers

KMX-OPT-RT-HARRIS

Control and UMD support for Harris/Imagine Communications routers

KMX-OPT-RT-NETWORK

Control and UMD support for Network routers

KMX-OPT-RT-SNELL

Control and UMD support for Snell routers

KMX-OPT-RT-PESA

Control and UMD support for PESA routers

KMX-OPT-RT-UTAH

Control and UMD support for Utah routers

Tally Interface Options

KMX-OPT-TLY-KARRERA

Tally interface for Grass Valley Karrera switchers

KMX-OPT-TLY-KAYENNE

Tally interface for Grass Valley Kayenne switchers

KMX-OPT-TLY-KALYPSO

Tally interface for Grass Valley Kalypso switchers

KMX-OPT-TLY-KAYAK

Tally interface for Grass Valley Kayak switchers

KMX-OPT-TLY-ZODIAK

Tally interface for Grass Valley Zodiac switchers

KMX-OPT-TLY-KAHUNA

Tally interface for Snell and Wilcox Kahuna switchers

KMX-OPT-TLY-SONY

Tally interface for Sony switchers (serial protocol)

KMX-OPT-TLY-SYNERGY

Tally interface for Ross Synergy switchers

KMX-OPT-TLY-ACUITY

Tally interface for Ross Acuity switchers

KMX-OPT-DAKTRONICS

Daktronics scoreboard text and clock interface

FlexBridge Provides a Flexible Interconnection Solution Between the Input and Output Modules

Kaleido-Modular-X modules are interconnected using standard coax cables. FlexBridge connections are used to connect the input card to the output card, or to another input card as shown in the 32 x 4 configuration below. Up to four input and two output modules can be combined for multiviewer sizes of up to 64x4.

KMX-3901-IN modules are available with two or four FlexBridge connectors for bridging to one or two KMX-3901-OUT output modules: two FlexBridge connections per KMX-3901-OUT are required. Kaleido-Modular-X input and output modules can be housed in the same physical Densité frame or multiple frames allowing expansion beyond the number of slots available within a single frame.

SAMPLE KALEIDO-MODULAR-X CONFIGURATIONS

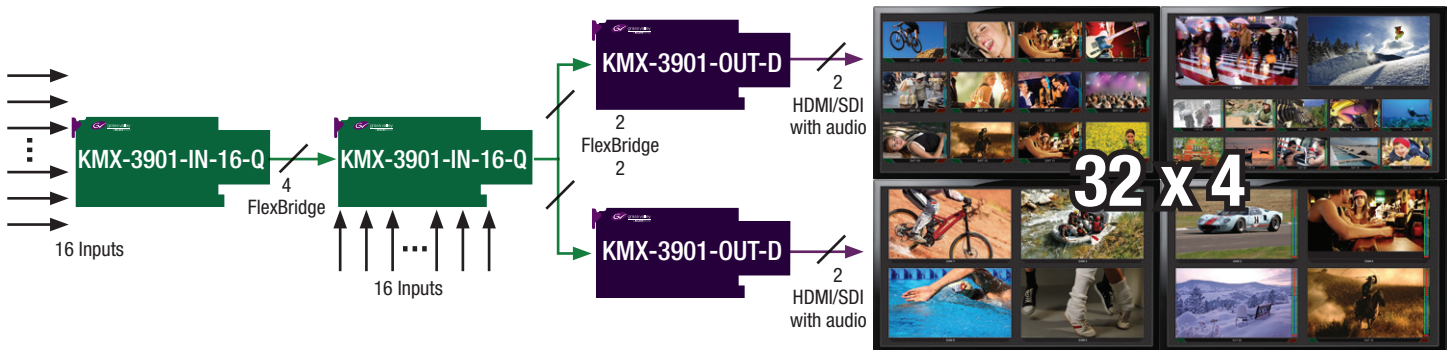
8 x 2 configuration using one KMX-3901-IN-8-D and one KMX-3901-OUT-D



16 x 2 configuration using one KMX-3901-IN-16-D and one KMX-3901-OUT-D



32 x 4 configuration using two KMX-3901-IN-16-Q and two KMX-3901-OUT-D



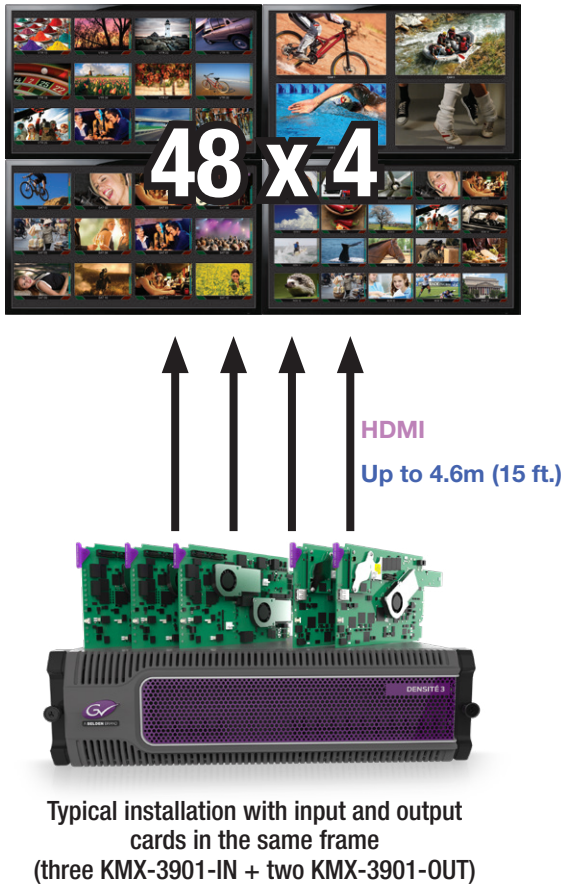
Using FlexBridge for Optimized Cable Management with Distributed I/O

FlexBridge coax I/O provides flexibility in multiviewer configurations for best optimization of cabling. For example, the first diagram below illustrates a typical 48x4 multiviewer configuration within a single Densité 3 frame. The second diagram highlights how the input modules can be installed in a

location next to the sources and the output modules in a different location next to the displays up to 50m (164 ft.) away. This configuration eliminates the risk associated with HDMI extenders and minimizes expensive HDMI cables.

COMPARISON OF INSTALLATIONS TO OPTIMIZE CABLE MANAGEMENT

Case #1: without using FlexBridge



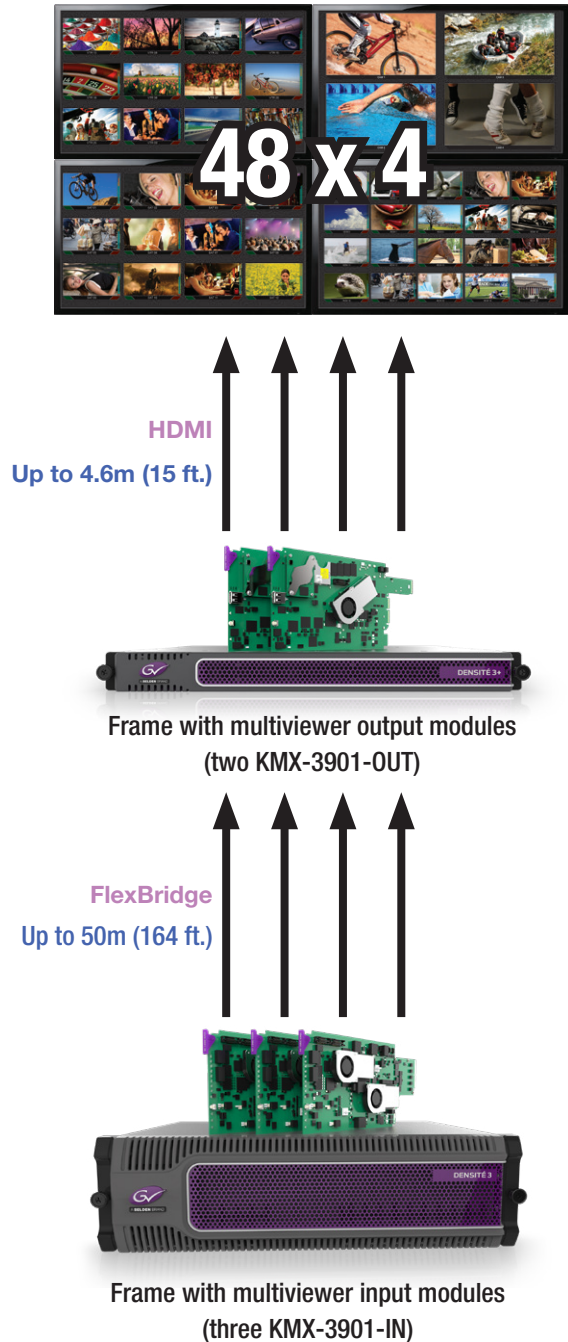
Case #1: Typical configuration with input and output modules in the same frame

The complete frame needs to be installed close to the displays because of restriction on HDMI cable lengths. This requires longer wiring to bring the sources inputs to the frame, or HDMI extenders need to be used.

Case #2: Unique FlexBridge configuration separating the input and output modules

This configuration allows minimizing source input wiring by installing the input modules close to the sources (ex: routing switcher), and minimize HDMI cable length by installing output modules close to the displays, all of this without the need for any HDMI extenders.

Case #2: using FlexBridge



Production Truck Application

With space at a premium and the ever-present need to reduce overall weight in your production truck, Kaleido-Modular-X offers the ideal multiviewer solution.

In the truck application shown, a 48x4 multiviewer is used to drive the wall displays without any limitations on the number of sources per display. For the desktop displays, a 16x4 multiviewer configuration is used offering flexible

quad-splits with the ability to display all 16 sources on any screen. The complete installation requires a total of 5 RUs and provides 8 multiviewer displays with unique layout flexibility and best space usage. The Densité 3+ FR1 single RU frame are designed for quiet operations so that they can be installed close to people working in the truck.

Kaleido-Modular-X Truck Application (Inside View)

- Simplify design and improve reliability by eliminating HDMI extenders
- Save space by regaining rack space under the console



Unmatched Picture Quality and Display Elements

Picture Quality

The Kaleido multiviewers system offers unmatched picture quality — irrespective of picture size — using Grass Valley's polyphase scaling technology. Windows can be resized all the way from very small windows up to full screen display, without the loss of definition that is commonly associated with multiviewers. This high performance, combined with superior on-screen graphics, makes Kaleido ideal for the most critical monitoring applications.



Audio Meters

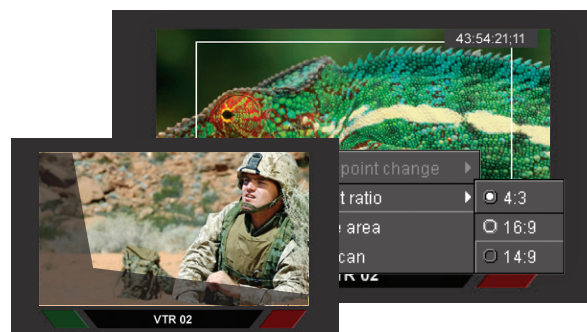
Kaleido multiviewers can display four group, 16 channels, multichannel audio for multilingual and 5.1 applications. Audio level meters are extracted from analog, AES or embedded signals, and can be positioned inside the video window in transparency or outside. Ballistics and scales are configurable, and a phase correlation meter can be displayed with each pair. Dolby E audio can be extracted from an embedded audio signal for on-screen metering. An audio meter can readjust itself based on inserted Program Configuration metadata.



Automatic Aspect Ratio Control and Safe Areas

Aspect ratio and safe area markers can be positioned over video windows to simplify multiformat monitoring. Free form safe area markers, based on a user's bitmap, can be overlaid on top of each video window. This feature is useful to protect graphical content or branding that will be applied downstream after production.

The processor can automatically change a signal's aspect ratio between 16:9 and 4:3, based on the Active Format Description (AFD), Wide Screen Signaling (WSS) or source resolution. Image formatting rules are followed during conversion, including letter/pillar boxing and resizing/cropping.



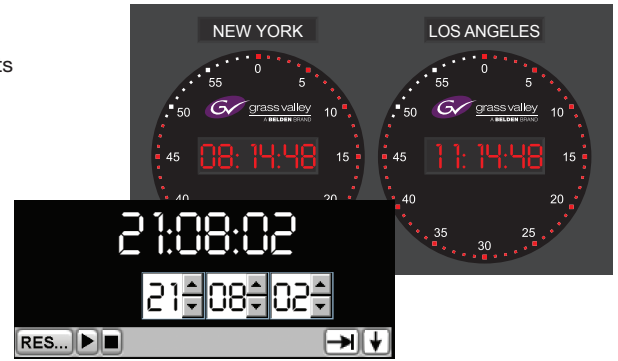
Dynamically Updated UMDs

Text labels (UMDs) can be displayed inside or outside windows, and updated by a UMD controller. Dynamic text can be driven by Sirius and many third-party routers, and by some automation vendors. Kaleido multiviewers also offer a serial interface for leading production switchers, which provides tally updates as well as sources and destination labels. Text fonts are flexible and support UNICODE for multilingual text.



Clocks and Timers

Multiple analog and digital clocks/timers (with date) can be displayed with programmable offsets and configurable colors. The clocks/timers can be driven by LTC, referenced internally, or to an NTP server. Each input module features one LTC input.



Signal Validity Monitoring

The following parameters can be detected and presented on-screen, or reported to SNMP-based signal and facility monitoring systems, including Grass Valley's iControl systems:

Video Probing

- Video black
- Video frozen
- Video level too high
- Loss of video
- EAV SAV error

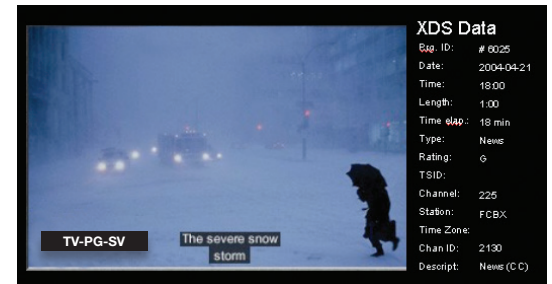
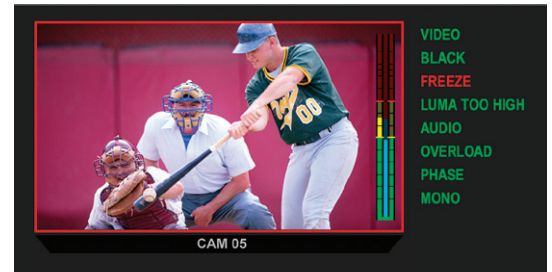
Audio Probing

- Audio silence
- Audio overload
- Audio mono
- Audio OUT of phase

Metadata Monitoring

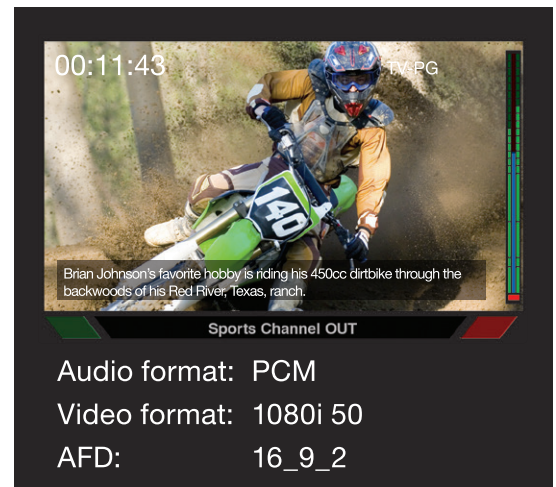
- XDS data including V-Chip rating
- Closed captioning and teletext (608, 708 and WST 42 and 47) is presented in the format seen by television viewers in their homes

Probing points can be configured with different thresholds, and a specific probing zone within the video can be configured for the freeze and black detection.



Display of Closed Captions, Subtitles, XDS and Dolby E Metadata

Closed captions and subtitles are presented in the format seen by television viewers in their homes. XDS data, including V-Chip information, can also be overlaid in each video window, along with the Dolby E metadata, AFD/WSS formats, and audio/video signal format.



Superior Display Flexibility with Kaleido-Modular-X

Kaleido-Modular-X offers superior signal flexibility due to the system's high bandwidth performance. This allows an operator to focus on the ideal monitoring configuration, without worrying about system limitations.

ANY SOURCE



ANY RESOLUTION



Projection cubes

Simultaneously display across monitors of different resolutions up to 1920 x 1200, and display across flat panels and projection cubes.

ANY SIZE



Signals can be displayed at any size up to full screen at full HD resolution.

ANY REPETITION



Sources can be repeated across multiple displays.

ANY POSITION



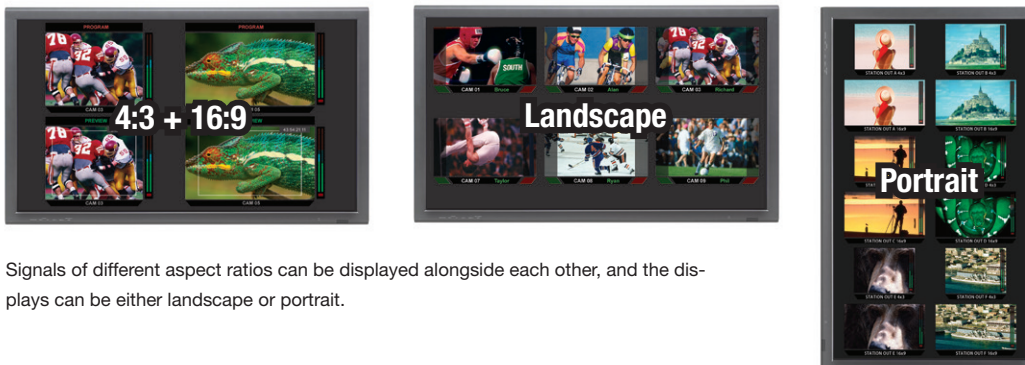
Signals can be positioned anywhere across displays.

ANY SPAN



Signals can span across multiple displays.

ANY FORMAT

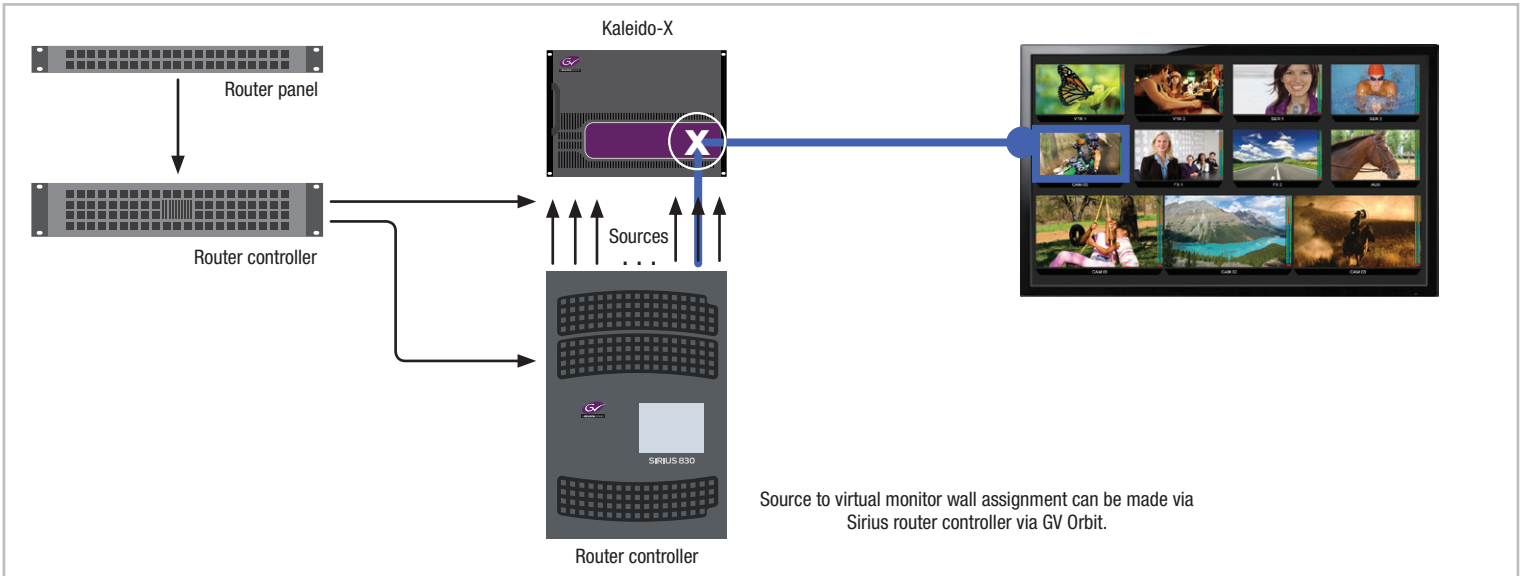


Signals of different aspect ratios can be displayed alongside each other, and the displays can be either landscape or portrait.

Remote Control of Integrated Routing and Multiviewer Systems

Integrated multiviewer and routing systems can be controlled using a choice of remote control panels. One simple option is to use a traditional router control panel to assign any source, anywhere, any number of times on the monitor wall. This mimics what the router would do to a traditional monitor wall, by

allowing the user to assign any source to any destination. This type of control is available with the Sirius control panels (shown below), as well as third-party router control panels from Nevion.



RCP-200

The highly graphical RCP-200 touchscreen remote panel offers more advanced control of combined multiviewer and routing systems. The panel provides multiviewer layout pre-set selection, and quick router source assignment control via a category/index graphical interface. The RCP-200 is a multifunctional panel, and can also be used for control of Densité Series interfaces.



Intuitive Control Across Multiviewers

Kaleido multiviewer systems can be easily controlled by one or more dedicated remote control panels, or by an on-screen mouse control.

Simple to use, on-screen mouse operated drop-down menus are contextual to speed operations, and offer numerous functions, such as changing aspect ratios, checking the safe area, assigning an input, and changing text in a UMD.

Users can also instantly change layout configurations, and dynamically zoom one source larger for quality control, or audio monitoring of an on-screen source.

The Kaleido-RCP2 remote panel exemplifies this simplicity, and provides easy multiroom, multioperator control over Ethernet, with local connections for a mouse and keyboard.

