

# ZEN-W Series

'True-Hybrid' Waveform Monitor and Rasterizer  
compatible with 4K/HD/SD-SDI and UHD/HD/SD IP signals



# Leader

## Introducing the Leader ZEN-W Series

The ZEN-W Series is comprised of the 'True-Hybrid' LV5600W waveform monitor and LV7600W rasterizer, both compatible with 4K/HD/SD-SDI signals and UHDTV/HD/SD IP signals.

The next generation ZEN-W Series, developed from the established LV5600 and LV7600 instruments, has been developed to help smooth the media industry's multiple ongoing technological migrations - from SDI to IP, HD to UHD and SDR to HDR.

Supporting all of the T&M tools and options of the original ZEN Series – including traditional picture, waveform, vectorscope and ancillary data display, IP traffic analysis and JPEG-XS analysis, plus an all-new Web Real-Time Communication (WebRTC) interface – the ZEN-W Series products provide all of the support required to monitor 4K/UHD/2K/HD/SD SDI, as well as video-over-IP signals, making them ideal for today's increasingly prevalent hybrid facilities.

### Leader LV5600W Waveform Monitor



The LV5600W waveform monitor is compatible with 4K/HD/SD-SDI signals and UHDTV/HD/SD IP signals. The LV5600W features a 7-inch touch screen display in a compact 3RU enclosure with built-in AC power supply, and supports a variety of SDI signals up to 12G-SDI as well as video over IP. The waveform, vector, picture, audio, and eye pattern displays enable simple yet comprehensive measurements and quality control of the widest range of audio and video formats.

With its combination of touch screen, dedicated buttons and knobs, and user-defined screen layouts, the LV5600W allows complex measurement and monitoring tasks to be quickly completed. Designed with the future in mind, the LV5600W addresses your current and evolving video and audio testing needs.

### Leader LV7600W Rasterizer



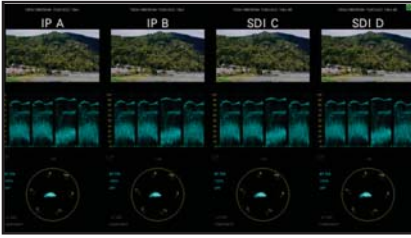
The LV7600W is a 'True-Hybrid' rasterizer compatible with 4K/HD/SD-SDI signals and UHDTV/HD/SD IP signals. The LV7600W offers the same functions as the LV5600W in a 1RU, full-rack enclosure and supports a variety of SDI signals up to 12G-SDI as well as video over IP. The waveform, vector, picture, audio, and eye pattern displays enable simple yet comprehensive measurements and quality control of the widest range of audio and video formats. The status display allows you to assess errors and system stability with both event logs and long-term charts.

### Fully Flexible Configuration Options

Both the LV5600W and LV7600W come as standard with remote control capabilities, advanced signal analysis functions, but require at least one I/O module (e.g., SDI or IP) to be operational.

Optional software toolsets include HDR measurement, SDI Generation, Focus Assist, Customized Layouts, ID, Iris and TALLY Display, 4K Video Signal input, Video Noise Meter, Colorimetry Zone Display, IP Pattern Generation, JPEG-XS and Extended Vectorscope Display.

# Key Features



## 'True-Hybrid' SDI + IP Monitoring

The ZEN-W Series is capable of simultaneously monitoring SDI (SD- SDI, HD- SDI, 3G- SDI, 6G-SDI, 12G- SDI single link, 3G- SDI dual link and quad link, HD- SDI quad link) and video-over-IP (SMPTE ST 2022 & ST 2110), including multi-stream IP, packet jitter, path delay, and buffer analysis. In HD resolution operation, it can display both IP and SDI source simultaneously side-by-side and can act as an IP to SDI gateway for Video, Audio and Ancillary Video Payload ID (VPID) streams.



## WebRTC Remote Control

The ZEN-W Series supports secure Web Real-Time Communication (WebRTC) for remote control and monitoring from any web-connected desktop or laptop computer.



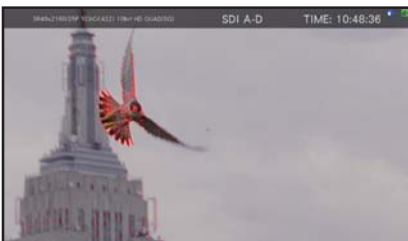
## HDR & Bi-directional HDR/SDR Conversion with user 3D LUT import

The ZEN-W Series provides full HDR monitoring (HLG, PQ, S-Log3, C-Log and Log-C with accompanying HDR scales alongside IRE), plus bidirectional HDR↔SDR conversion for flexible production workflows.



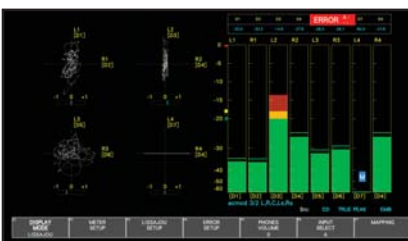
## Customizable Multi-Instrument Display

Both the LV5600W and LV7600W feature a fully user-configurable 100% freeform layout, allowing multiple analysis tools to be displayed and positioned according to the operator's preference. Custom layouts can be quickly saved and recalled as presets for fast, efficient workflow changes. The LV5600W features a 7-inch touchscreen display in addition to physical buttons, while the 1RU rack-mountable LV7600W supports touchscreen operation via a USB-connected, touchscreen-enabled external display.



## Advanced Focus-Assist

The ZEN-W Series supports a realtime false color display, 'Focus Assist' that allows OB engineers to quickly and easily test the zoom lens 'back focus' operation in situ and make the necessary adjustments required to ensure that the lens is focused correctly.



## Audio Decoding & Dolby Support

The ZEN-W Series supports SDI/IP embedded and AES/EBU/analog audio level meters, with loudness, Lissajous with SER03 Analog / Digital Audio I/O option and the decoding and display of Dolby E, Dolby ED2 (detect only), Dolby Digital and Dolby Digital Plus with SER07 Dolby option.

# Applications



## Outside Broadcast

All Mobile Video (AMV) is a premier provider of end-to-end video and audio production services: mobile production units, sound stages, post-production, streaming services, equipment sales and rentals, and centralized master control. AMV installed two Leader LV7600 rasterizers and six LV5600 waveform monitors to its new AMV Eclipse OB truck. "The big thing for us with the new LV5600W is the web access to the unit. You can log in from a laptop on the same network and you can monitor as you're troubleshooting outside. You can see what's happening in the truck while you work to correct an issue in realtime with very little delay."



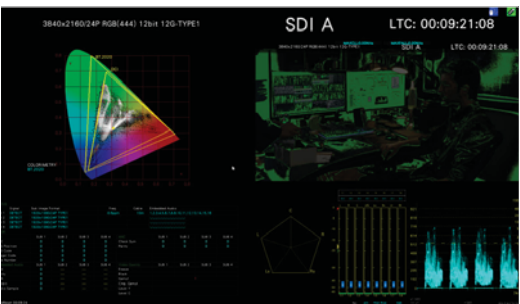
## Live Production

TVN LIVE PRODUCTION, Germany, acquired multiple LV5600W units for its latest outside broadcast truck. Decades of experience in live broadcasting and the in-house development of powerful mobile production units has resulted in the TVN-OB8, which has been designed for UHD, HDR and immersive audio production. The chosen devices had to be capable of measuring IP streams, 12G/3G/HD SDI, HDR/SDR color space and audio, and after a comparison of the available options a Leader solution emerged as the most suitable.



## Broadcast MCR & Studio

TV Osaka, upon relocating to a new building, took a bold step by becoming one of the first broadcasters in Japan to fully transition to an all-IP network. This innovative project includes everything from the master control room to the studio and transmission lines. Leader Electronics' 'True Hybrid' LV5600 waveform monitors and LV7600 rasterizers have been instrumental in supporting the system construction and ensuring smooth, stable live operations.



## Post Production

The Leader ZEN-W Series combines precision, versatility, and ease of use in one compact unit, ideal for post production workflows. It supports a wide range of signal formats, including 4K/UHD, HDR, and SDR and its intuitive touchscreen interface, customizable display layouts, and advanced tools like HDR measurement, CIE color chart, and vector/waveform help colorists, editors, and QC teams ensure accurate signal integrity and color consistency. The instrument's ability to provide detailed, real-time analysis helps streamline post-production processes and maintain high-quality output.



## Remote Production

The Leader ZEN-W Series is designed for hybrid and remote IP production environments. It supports SMPTE ST 2110 and ST 2022-6, enabling realtime analysis of uncompressed IP video and compressed SMPTE 2110-22, audio, and ancillary data. With its web-based GUI and API control, the ZEN-W Series can be fully operated remotely, making it ideal for decentralised and cloud-based production workflows. It provides in-depth signal analysis, including PTP timing, jitter, and network traffic monitoring, ensuring signal integrity across distributed systems. Its flexibility, precision, and hybrid IP/SDI support make it a vital tool for engineering teams in modern remote production setups.

# Unmatched ease of use

## Familiar, versatile front panel

The front panel offers familiar, dedicated physical buttons and knobs for simple operation and training. Additionally, the units can be controlled via a USB mouse. The LV5600W adopts a 7-inch full HD panel with a touchscreen, and the LV7600W can be operated and set intuitively by touch operation by connecting an external touch-enabled LCD monitor with a USB cable.

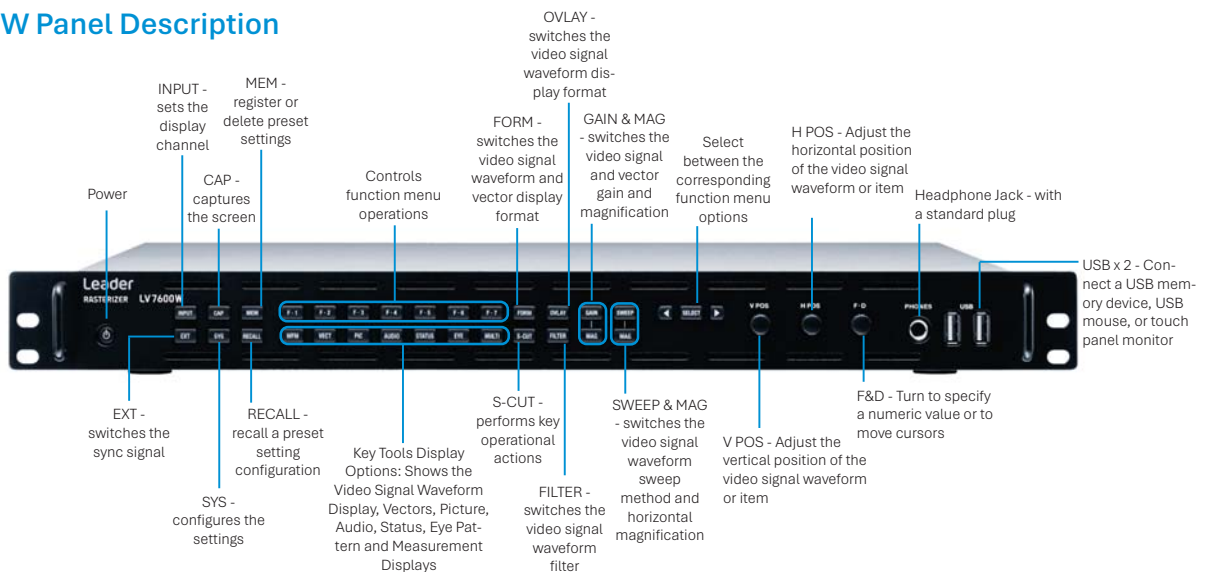
## 100% Free-form customizable layout

Both the LV5600W and LV7600W feature a fully user-configurable 100% freeform layout, allowing multiple analysis tools to be displayed and positioned according to the operator's preference. Custom layouts can be quickly saved and recalled as presets for fast, efficient workflow changes.

## LV5600W Panel Description



## LV7600W Panel Description



# Advanced Creative Picture Monitoring Tools

CINELITE and CINEZONE, available as standard on the Leader ZEN-W Series, are essential exposure and signal measurement tools, used throughout the production chain; from camera setup to live broadcast QC. CINELITE gives precise, reliable pixel-level readings, complementing CINEZONE's broad false-color exposure view. While CINEZONE offers an intuitive, visual "at a glance" overview, CINELITE provides exact numeric validation. Both tools can be used simultaneously to form a complete exposure assessment system.

## CINELITE

CINELITE is a precision exposure analysis tool that comes as standard on the ZEN-W Series. It acts as a built-in light meter, that measures exact light levels recorded by the camera sensor and provides pixel-accurate luminance and RGB level readouts by placing a cursor over any part of the image, helping broadcast professionals make precise lighting and exposure decisions. CINELITE displays;

- Luminance (Y) value in either nits or IRE units
- RGB component levels; for checking white balance or color clipping
- Precise measurements for single pixels or averaged areas of the video image
- Supports SDR and HDR formats (PQ, HLG, Log formats like S-Log3, Log-C, etc.)



### Key Applications

- 1. Camera setup / shading:** Camera shaders and vision engineers use CINELITE to match exposure between cameras, especially in multicam OB or studio setups. It helps to determine middle gray (18%) and reference white levels accurately.
- 2. Lighting & exposure on set:** Cinematographers and DITs use CINELITE for confirming skin tone luminance levels, matching scenes across multiple setups and ensuring legal broadcast levels.
- 3. HDR monitoring:** In HDR workflows, CINELITE can show luminance in nits, allowing teams to ensure highlights don't exceed desired limits and maintain consistent look across PQ and HLG grading curves.
- 4. Live broadcast QC:** Technical teams can inspect any part of the image for overexposure, underexposure, or gamut violations in realtime.

## CINEZONE

CINEZONE a tool included as standard in the ZEN-W Series, allows lighting and exposure settings to be controlled accurately during preshot alignment and in the live shoot itself. Familiar to many camera crews, editors and colorists, CINEZONE offers realtime pixel accuracy across the entire image. It allows quick and easy confirmation of luminance levels without need for time consuming waveform representations.

Levels over a preset or user-adjustable maximum are displayed in white, highlights in red, mid-grays in green, shadows in blue, and levels under the adjustable minimum in black. Unlike traditional waveform monitors that only sample one scan line, CINEZONE analyzes every pixel across the frame in realtime. It supports ARRI Log C-curves, RED and Sony and matches in-camera false-color tools making it familiar to cinematographers.

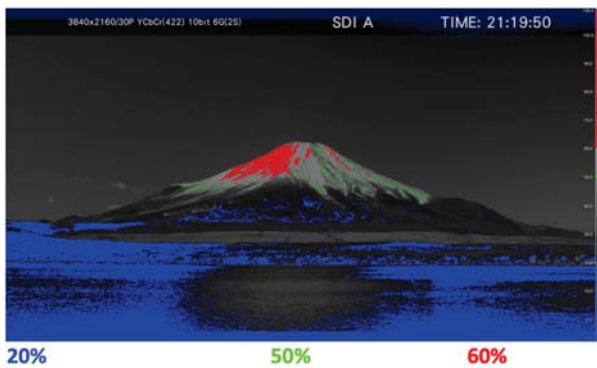


### Key Applications

- 1. Pre-shoot alignment / exposure setup:** Offers an instant, visual check of exposure ranges right before rolling, making it easy to spot blown highlights or crushed shadows.
- 2. Live monitoring:** Shading and exposure adjustments during live camera feeds become simpler and more accurate, with immediate visual feedback.
- 3. Multiscreen workflows:** It can display alongside waveforms, vectorscopes, histograms, and picture, all on one screen. Great for DITs, colorists, and camera teams to supervise signal quality.
- 4. On-set creative collaboration:** Provides a shared reference tool for directors, DPs, DITs, and camera operators to talk about exposure in a common visual language, especially when using Log curves.
- 5. Quality control & post production:** Used as a master reference in grading suites/playout QC to confirm that image levels meet broadcast tolerances and HDR/SDR specs.

## CINEZONE Search Display Mode

Leader's CINEZONE Search Display Mode is a realtime false color exposure analysis tool designed to assist camera operators in achieving accurate exposure and consistent image quality, especially in HDR and SDR workflows. Available as standard, CINEZONE Search overlays false color directly onto the incoming image. This display maps specific exposure levels to color-coded regions, allowing users to visually assess luminance values at a glance, without needing to interpret waveform data.

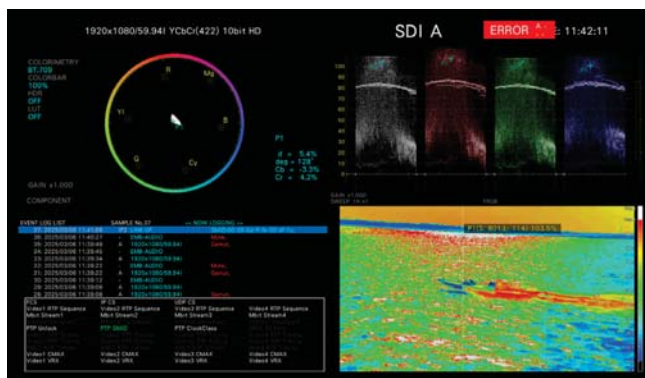


### Key Features

- Realtime feedback during camera setup, live production, or post
- Customisable false color scale aligned to industry standards (e.g., 18% grey, skin tone, clipping points)
- Supports both SDR and HDR formats, including PQ and HLG
- Ideal for use onset or in live broadcast environments where exposure accuracy is critical

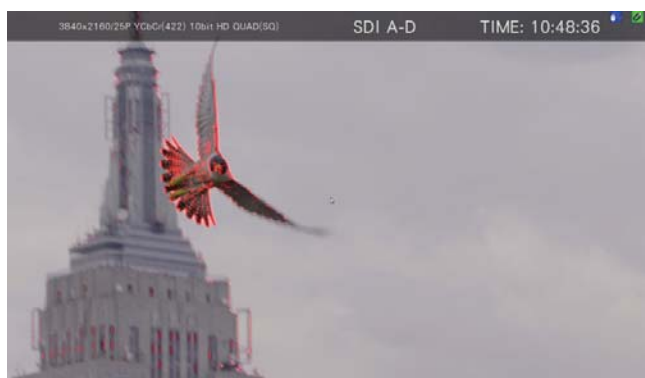
This tool complements traditional waveform monitors by providing an intuitive, image-based representation of exposure, streamlining workflows and reducing setup time.

## CINELITE Advanced



CINELITE Advanced is a sophisticated enhancement to CINELITE, that also comes as standard with the Leader LV5600W/LV7600W waveform monitor and rasterizer. It expands upon the original CINELITE tools to deliver precision pixel-level exposure and color analysis directly on the image and displays them as markers on the waveform display, vector display and CIE Color Chart display.

## Focus Assist [Software option: SER25]



The ZEN-W's Focus Assist function (SER25) is a powerful software licence option designed to simplify and improve focus accuracy during live production workflows. It provides both camera operators and OB engineers with a fast, visual method to confirm critical focus, even in difficult low-contrast environments.

For OB engineers, Focus Assist offers a quick and efficient means of verifying back focus adjustments on zoom lenses directly on-site, helping ensure that every camera is correctly set up before going live. This capability has become increasingly important with the widespread adoption of cinema-style Super 35mm global shutter CMOS sensor cameras, where the inherently shallow depth of field makes focusing errors far more noticeable.

Using advanced non-linear super-resolution algorithms, Focus Assist employs image-based edge detection to identify and highlight areas of highest sharpness in the video image. These areas are overlaid in realtime using a false color display, making it easy to confirm focus even when conventional focus indicators fail or are difficult to interpret. Whether for setup or on-the-fly focus confirmation, Focus Assist provides a reliable, intuitive tool for getting the most out of modern high-resolution optics and shallow Depth of Field camera systems.

## 3D LUT Bidirectional Conversion Tool [requires SER23]

The LV5600W/LV7600W offers direct 3D LUT cube file import and display integration across multiple analysis tools along with a 3D-LUT converted SDI output, allowing HDR content to be viewed in SDR and vice versa, as part of the SER23 HDR Analysis software licence.

Processing is based on the desired 3D color lookup table as Cube file which can be imported via plug-in USB memory. These new 3D LUT capabilities simplify live production workflows by integrating HDR/SDR conversion for applications such as camera shading and HDR supervision. On-set DITs will be able to integrate 3D LUTs instead of relying on external LUT boxes, and Post Production colorists can view the 3D LUTs for OTT and OTA deliverables prior to creating the final master.

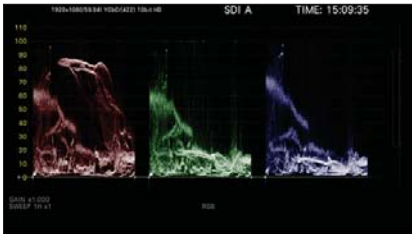


### Key Features

- It supports picture display, waveform display, vector scope, CIE chart, and histogram.
- 2K (HD) supports up to 4 channels and 4K (UHD) supports 1 channel.
- A maximum of 10 Cube files can be registered.
- In HDR/SDR simultaneous production, simplified workflow without external box can be realized.
- Interpolation method uses 33-point tetrahedral interpolation
- SDI output after 3D-LUT conversion
- Input/output conversion Gamma SDR/HDR (HLG, PQ, S-LOG3, LOG-C, C-LOG), Colorimetry BT2020/BT709/DCI compatible
- Full Range/Narrow Range support
- Cube file information, header information display
- 3D-LUT function requires LV5600-SER23/LV7600-SER23 (HDR option).

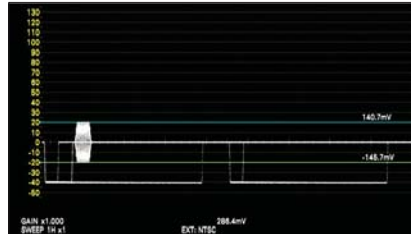
# Standard Toolset

The Leader ZEN-W Series provides a robust standard toolset for professional broadcast and production environments. Out of the box, it includes essential features such as waveform and vectorscope displays, picture monitoring with false color and histograms, embedded audio analysis, SDI test signal generation, and error/status logging. With support for SDI (up to 12G) and IP video (ST 2022-6/7 and ST 2110), the LV5600W and LV7600W also enables true hybrid monitoring and WebRTC-based remote operation. The LV5600W's intuitive touchscreen interface, the series' physical controls, and versatile signal analysis make it a powerful all-in-one solution for both SDI and IP workflows.



## Waveform Monitor

- RGB, YCbCr and Composite display modes
- Overlay: Overlays component signals
- Parade: Displays component signals side by side
- Blanking Interval: H & V blanking periods can be masked
- Line Select: Displays the selected line
- Variable Gain: Gain x1 x0.2 to x2.0, Gain x5 x1.0 to x10.0, Gain x10 x2.0 to x10.0



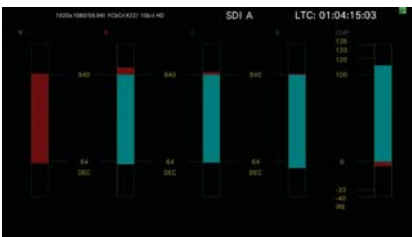
## Analog Reference Signal

- Compatible SDI systems can be displayed for SD, HD, 3G-A and 3G-B-DL



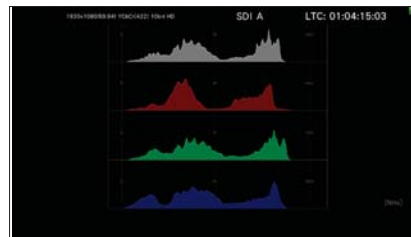
## Vectorscope

- Gain: x1, x5, IQ-MAG
- Scale: Type AUTO, ITU-R BT.709, DCI, ITU-R BT.2020
- Color Bar Saturation: 75%, 100%
- IQ Axis: Show or Hide
- Vector Marker Display



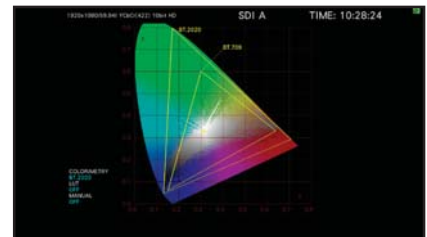
## 5BAR RGB Gamut Error

- Converts an SDI signal into Y, R, G, B and composite values, and then displays the five peak levels
- Error Level: Based on the gamut error, composite gamut error and luminance error thresholds
- On screen error indication - displays markers in the gamut error and level error areas



## Histogram

- The only hardware based waveform / rasterizer to still support Histogram display
- Displays the Y, R, G and B Histogram
- Supports Single, Tile, Align-H and Align-V display
- Supports HDR display [SER23]



## CIE Color Chart

- Display Standard: CIE1931 (xy display), CIE1976 (u'v' display)
- Display Type: Chromaticity diagram display, color temperature display
- Display Mode: Chromaticity diagram display, luminance display, color display
- Color Temperature Display Luminance Display: Colorimetry ITU-R BT.601 (525), ITU-R BT.601 (625), BT.709, DCI, ITU-R BT.2020



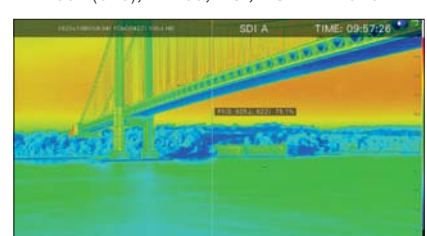
## Picture View

- Level Mapping: Maps the black level to 0 (8bit), SDI code value (when receiving 10-bit RGB) 1024 to 255 (8bit)
- Display sizes: Reduced, actual size, x2 (4K not supported), full frame (4K not supported)
- Quality adjustment and color selection: Brightness, contrast, RGB gain, RGB bias, chroma gain not valid



## SCTE-104

- SCTE-104 message monitoring
- Supported: Standard SMPTE 2010, ANSI/ SCTE-104



## Cinelite/Cinezone

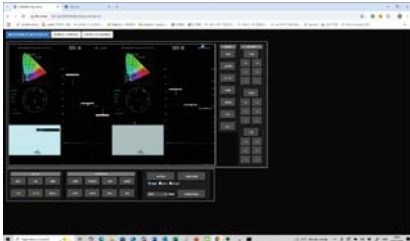
- Video levels are displayed numerically
- f Stop (not supported on SER23): displays f Stop values relative to a reference point
- Set in reference to an object with an 18% reflectance
- f Stop gamma correction
- HDR Display [SER23]



# Realtime Remote Connectivity

Various methods are provided to enable you to establish a remote connection with your LV5600W and LV7600W, depending on your requirements.

## WebRTC



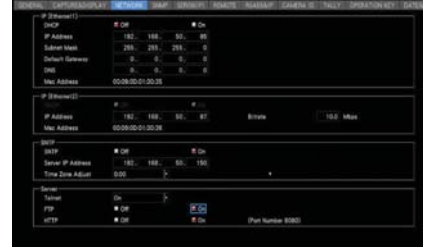
### WebRTC

Built into the ZEN-W Series, WebRTC enables secure, low-latency remote control and live video/audio monitoring from any WebRTC compatible browser on your desktop or laptop. Using its WebRTC you can operate the measurement screen in realtime.



### TELNET

The LV5600W/LV7600W supports automatic and remote control via Telnet over Ethernet. You can establish a Telnet session from any networked PC to issue commands that automate operations, perform measurements, initiate captures, retrieve logs, and more.



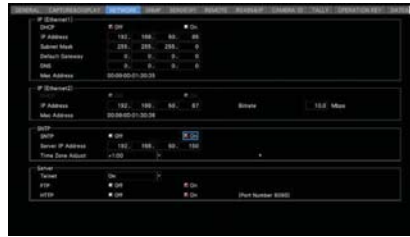
### File Transfer via FTP

Using FTP over the Ethernet port, the LV5600W/LV7600W allows you to remotely transfer a variety of files, including, Screen captures: PNG or JPEG stills from the device's GUI, Frame captures (SDI frame sequences, typically up to 16 frames), Event logs and Configuration files.



### Remote Control & Alarm Generation via SNMP

By using SNMP (Simple Network Management Protocol), you can control the instrument from SNMP managers. Additionally, you can notify the SNMP managers of errors that the instrument generates.



### Internal clock sync via SNTP

The instrument can display time that is synchronized to an NTP server on the network. The date and time exchanged with an NTP (SNTP) are basically Coordinated Universal Time (UTC). Therefore, the time must be adjusted in accordance with the country or region where the device is used in.



### LV7290 Remote Controller (Option)

The remote controller LV7290 is used to remotely control the LV5600W and LV7600W via Ethernet. Used by connecting to the ETHERNET terminal on the rear of the product. One remote controller can be connected up to 8 units of waveform monitor or rasterizer in every combination.

# Hardware Options

The LV5600W and LV7600W are highly modular tools, offering multiple hardware options to suit your input requirements. Each unit must be configured with at least one of SER01, SER02A, SER06 options.

Options SER01 & SER-02A cannot be installed in the instrument at the same time.

## SD, HD, 3G-SDI Input [SER01]

SER01 is a hardware option that enables SDI input functionality, including support for SD, HD and 3G-SDI. It is essential for users who need standard SDI signal monitoring without the advanced capabilities of eye pattern or jitter analysis.



### SDI Signal Data Analysis

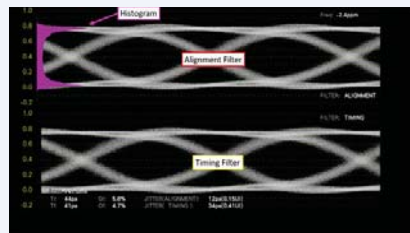
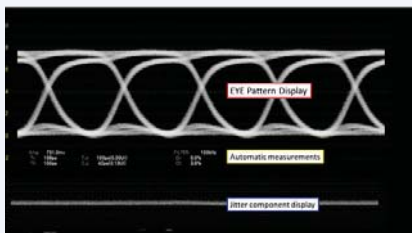
- The status display has an error detection function for :
  - SDI Errors - CRC, TRS Position, TRS Code, Illegal Code, & Line Number
  - Embedded Audio – BCH, Parity, DNB, Inhibit & Audio Sample
  - ANC – Check Sum & Parity
  - Video Quality – Freeze, Black, Gamut, Cmp. Gamut. Level Y & Level C

### Event Log

- Event log records and displays events by the time of their occurrence
- The top half of the display reports the error event, the bottom half reports more detailed information for the entry highlighted in the top half of the display

## SD, HD, 3G-SDI Input and EYE Pattern Display [SER02A]

This function displays SDI signal eye pattern waveforms and jitter waveforms, and parameter measurements. Only SDI input 1 supports the eye pattern display. A histogram view is also available. This function allows the eye pattern obtained with a 100kHz or higher filter (alignment jitter) and the eye pattern obtained with a 10Hz or higher filter (timing jitter) to be displayed together.



### EYE Pattern Display

- The eye pattern waveform, jitter waveform of SDI signal, and the measurement result of each parameter can be displayed.
- Only BNC input 1 supports eye pattern display.

### Dual EYE Pattern

- Simultaneous display of Alignment and Timing

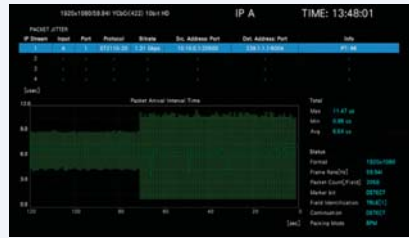
# 10Gb/s, 25Gb/s IP Input [SER06]

SER06 is a factory-installed 10/25 GbE IP input and analysis option, designed for high-bandwidth IP broadcast workflows. It supports both 10 GbE and 25 GbE inputs via SFP+ or SFP28 interfaces and is fully compliant with SMPTE ST 2110, ST 2022-6/7, and PTP standards. SER06 enables real-time analysis of uncompressed 4K IP video, audio, and ancillary data streams, with advanced tools for jitter, packet loss, and sync diagnostics. Ideal for hybrid IP/SDI environments, it also supports IP-to-SDI conversion and unlocks additional IP-based features like JPEG-XS analysis and pattern generation through other Leader options.



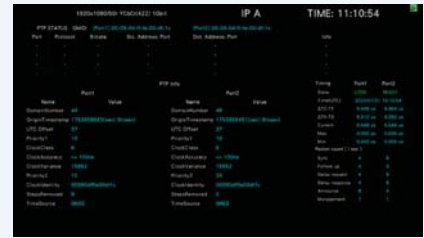
## IP Status

- The apparatus displays information, including source addresses, destination addresses, and protocols for the IP packets
- It displays traffic of 10G/25G Ethernet graphically



## Packet Jitter

- The apparatus measures the arrival intervals of IP stream packets and graphically display temporary fluctuations
- CSV file copy of graph data



## PTP Status Info

- The apparatus graphically displays PTP time information and network delay information
- CSV file copy of graph data
- The grandmaster clock information obtained from the PTP announce message is displayed for both Port 1 and Port 2



## PTP Timing Comparison

- Video timing relative to PTP
- Audio timing relative to PTP
- Ancillary timing relative to PTP
- Graph display of PTP and each phase



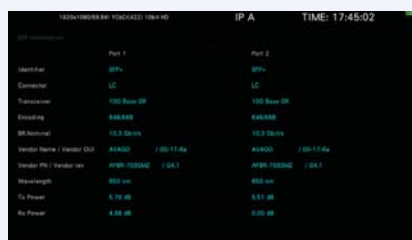
## PTP Phase Measurement

- When the input is an IP signal (ST2110-20), the phase difference between
- PTP and RTP
- PTP and Blackburst
- PTP and First Packet Arrival



## PTP Path Delay

- Measures the time difference between arriving packets between two IP ports



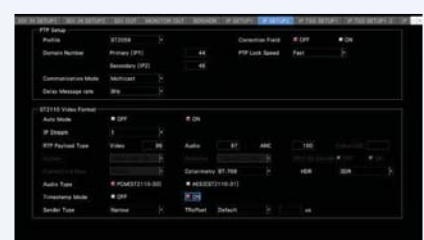
## SFP Information

- SFP transceiver module (IP1 port/OP2 port)



## Packet Header

- Displays the MAC and IP of PACKET HEADER



## Timestamp Mode

- Unique to the LV5600W/LV7600W
- OFF: Reads in order of arrival without using the RTP timestamp of the signal synchronized with PTP.
- ON: Reads using the RTP timestamp synchronization with PTP.
- When the LV5600W or LV7600W is not synchronized with PTP, it automatically operates with Timestamp Mode OFF

# 10Gb/s, 25Gb/s IP Input [SER06]



## NMOS

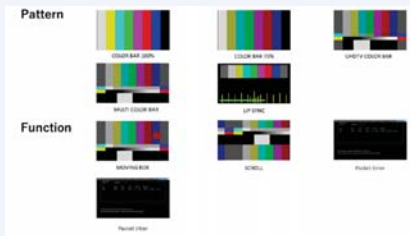
- The apparatus displays information, including source addresses, destination addresses, and protocols for the IP packets
- It displays traffic of 10G/25G Ethernet graphically

## 4 x IP Streams

- When set to 2K operation the apparatus measures the arrival intervals of up to (4) four IP streams packets and graphically displays temporary fluctuations simultaneously
- CSV file copy of graph data

## IP Multi

- When set to 2K operation the apparatus can display Picture, Waveform, Vectorscope, CIE Color Chart and Diamond display simultaneously side-by-side, irrespective of whether the source is IP or SDI
- CSV file copy of graph data



## IP Pattern Generator

[requires SER32]

- IP Format Ready:

## Buffer Measurement

- The apparatus can measure values of CINST, VRX or FPT, when the transmission type of SMPTE ST2110-21 is Narrow, Narrow Linear or Wide
- CSV file copy of graph data

## TSL Protocol

- Supports TALLY TSL UMD Protocol V5.0

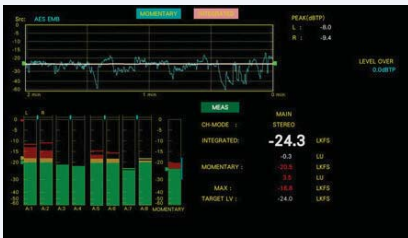


## Event Log

- Displays UDP and RTP of PACKET HEADER

## Digital and Analog Audio I/O and Display [SER03]

The LV5600-SER03 is an optional factory-installed audio module, for enhanced audio monitoring capabilities. It adds up to 16 channels of AES/EBU digital and 8 channels of analog audio I/O, enabling comprehensive audio analysis including loudness metering, surround sound visualization, Lissajous displays, and mute/clip detection. It also provides precise lip sync measurement between SDI video and digital audio. SER03 is essential for users requiring in-depth audio diagnostics and serves as a prerequisite for Dolby audio decoding (via the SER07 option), making it ideal for broadcast, post-production, and quality control environments.



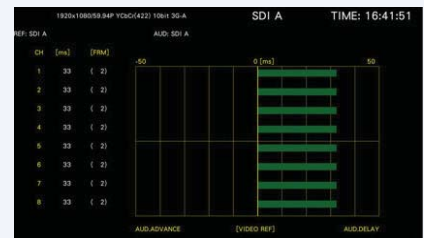
### Loudness Monitoring

- Function: Loudness chart display, numeric display, log, level meter display, peak value display
- Supported: Standard ITU-R BS.1770, ARIB TR-B32, EBU R128, ATSC A/85
- Measurement: Channel simultaneous measurement of two audio sources



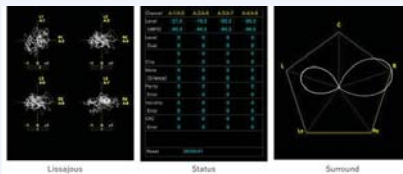
### 16 Channel Audio Display

- 16ch level meter, Lissajous, surround and status can be displayed by adding SER03.



### Lip Sync (AV Delay)

- Measures the time difference between the SDI signal and digital audio signal with a Leader TSG that supports lip syncing. Displays the results numerically and graphically.
- TSG patterns not made by Leader may be supportable by specifying the video signal setting and audio signal setting.



### Multi-lissajous, Status & Surround Display

- Lissajous, Status and Surround Display

## Dolby Digital, Dolby E Decoding Function [SER07]

SER07 is a factory-installed option that enables full Dolby decoding and analysis. The option requires the SER03 audio I/O module to function. Once both modules are installed, the unit can decode and visually analyze Dolby E, Dolby Digital, and Dolby Digital Plus audio formats embedded in SDI or IP streams. It displays decoded audio content, levels, and error conditions, seamlessly integrating with the event logging and analysis tools for precise quality control.



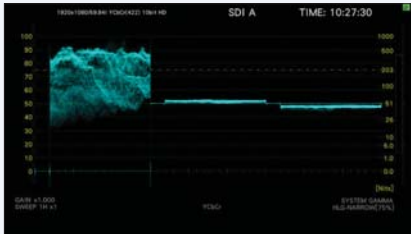
### Dolby Metadata Display

- Decoding display of Dolby E, Dolby Digital, Dolby Digital Plus becomes possible with the addition of the LV5600-SER07 / LV7600-SER07 option.
- Dolby ED2 signal detection
- Metadata of Dolby ED2 signals cannot be displayed

# Optional Software Toolsets

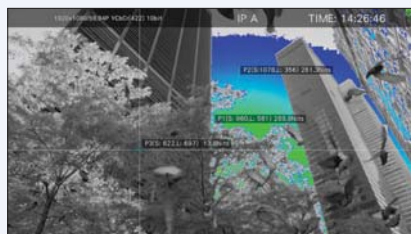
## HDR Measurement [SER23]

In addition to HLG and PQ per ITU-R BT.2100, this HDR software option also supports level monitoring of S-Log3, C-Log and Log-C HDR signals. Level management can be made using the assumed luminance (cd/m2) in a display considering OOTF. The video waveform includes the HDR scale added to the IRE scale. In the CINEZONE™ display, the luminance distribution of the HDR area can be easily confirmed with the SDR area shown in monochrome, and the HDR content with a color according to the brightness.



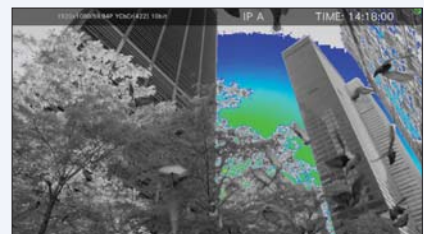
### HDR Waveform Display

- ITU-R BT.2100 (HLG, PQ), SLog-3, C-Log, Log-C. Does not include SD input of SDI.



### HDR CINELITE Display

- The crosshairs can be freely moved
- Up to 3 points can be measured simultaneously

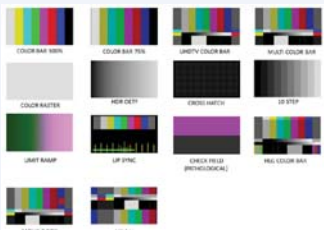


### HDR CINEZONE Display

- The luminance distribution of the HDR area can be easily confirmed by coloring the HDR area with monochrome and the HDR with a color according to brightness
- ITU-R BT.2100 (HLG, PQ), SLog-3, C-Log, Log-C. Does not include SD input of SDI.
- Setting values can be user-defined for easy grading to a particular luminance

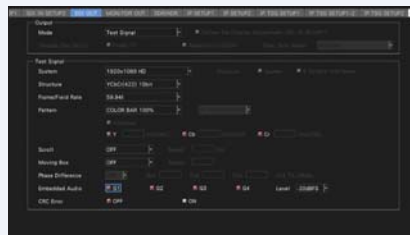
## SDI Generation [SER24]

This optional generation toolset provides SDI test signals, useful for device or network troubleshooting. The generator supports HD-SDI through 12G-SDI with HD multi format color bar and patterns, multiple overlays of moving boxes and embedded audio, flat field at any level, and a 4K multi format color bar. With the 4K pattern of 3G-SDI quad link, the phase of each link can be shifted to confirm the recovery margin of the receiving device.



### SDI Video Generation

- 100% color bar, 75% color bar, HD multiformat color bar \*1, 4K multiformat color bar \*1, color raster, gamma, cross hatch, 10 step, limit lamp, check field, lip sync pattern(LV5600/LV7600-SER03 is required), HDR color bar (LV5600/LV7600-SER23 is required)
- Scrolling Function: On/Off Eight directions (up, down, left, right, and their combinations), Speed: Range and Unit Per frame (field) 4 to 124 dots, in 4 dot steps
- Moving Box: On/Off. White, yellow, cyan, green, magenta, red, blue, black. Speed 1-3



### SDI Audio Generation

- Number of Embedded Channels: 16 channels maximum
- Embedding: On/Off at the audio group level
- Audio Level: -20dBFS, -18dBFS, mute
- Audio Frequency: 1kHz
- CRC Error Addition: An incorrect CRC is inserted into the Y component of the first line

# Optional Software Toolsets

## Focus Assist [SER25]

The ZEN-W's Focus Assist function is a powerful software licence option designed to simplify and improve focus accuracy during live production workflows. It provides both camera operators and OB engineers with a fast, visual method to confirm critical focus, even in difficult low-contrast environments.

For OB engineers, Focus Assist offers a quick and efficient means of verifying back focus adjustments on zoom lenses directly on-site, helping ensure that every camera is correctly set up before going live. This capability has become increasingly important with the widespread adoption of cinema-style Super 35mm global shutter CMOS sensor cameras, where the inherently shallow depth of field makes focusing errors far more noticeable.

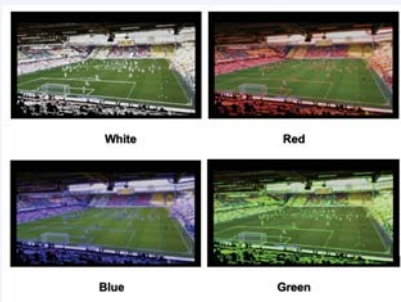
Using advanced non-linear super-resolution algorithms, Focus Assist employs image-based edge detection to identify and highlight areas of highest sharpness in the video image. These areas are overlaid in real time using a false color display, making it easy to confirm focus even when conventional focus indicators fail or are difficult to interpret.

Whether for setup or on-the-fly focus confirmation, Focus Assist provides a reliable, intuitive tool for getting the most out of modern high-resolution optics and shallow Depth of Field camera systems.



### Automated Focus Assist

- This is a focus detection realizing a new algorithm based on nonlinear super resolution technology
- Sensitivity can be selected from 5 levels according to the video scene

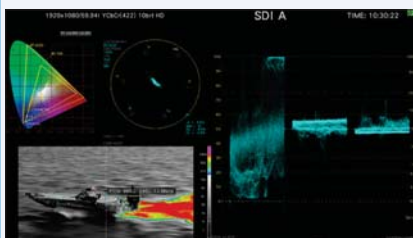


### Sensitive Mode

- The waveform monitor includes a PICTURE MODE that can adjust the image to FIT / REAL / X2
- The waveform monitor includes the ability to adjust the sensitivity of the edge detection and features (5) five different levels of sensitivity
- The waveform monitor also includes the ability to adjust the colour of the false colour display to best suit optimum focus adjustment depending on the picture.

## Customized Layout Function [SER26]

Users can size and position all video displays, waveforms, vectorscopes, gamut views, audio tools, etc. as desired to optimize the screen for any specific workflow or user. Multiple input signals for up to 4 inputs can be displayed simultaneously, or one input signal can be displayed on multiple screens.



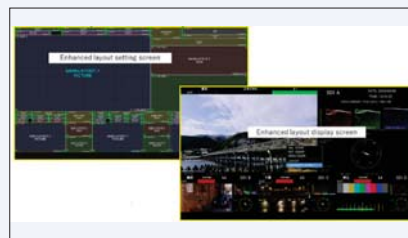
### Customizable Layout

- Various items such as video signal waveforms display, vector display waveforms, and images of input signals can be laid out in any position with your user's preferred size.
- Multiple input signals up to 4 inputs can be displayed simultaneously, or one input signal can be displayed on multiple screens



### Display Assignment

- SDI input signals from the four rear inputs can be assigned to A to D display channels.
- For example, displaying the signal input to SDI input 1 as component video waveform can be displayed on display channel A and the composite video waveform can be displayed on display channel B



### Enhanced Layout

- Enhanced layout is an extended function that enables the measurement screens of up to four channels, to be laid out on a single screen simultaneously in simul mode.

# Optional Software Toolsets

## ID, Iris, TALLY Display Function

[SER27]

Enable remote tally display. In the LV5600W and LV7600W, camera ID, iris and tally are available via RS - 422/485 connectors.



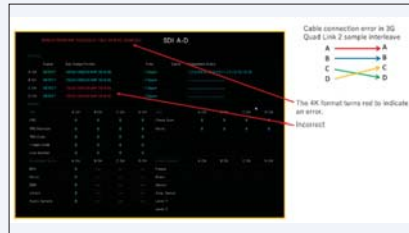
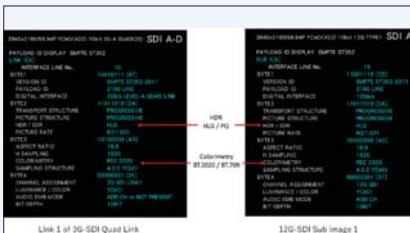
## ID, Iris, TALLY Display Function

- TALLY-EXT (EXTENDED) shows the tally display with a comment of up to eight characters and it's not uncommon for the camera operators names to be entered into this field, so the camera shader knows which camera operator the technical director is speaking to if they are referred to them by their name instead of the camera ID.
- LABEL-1, LABEL-2 & IRIS shows the camera ID set on the RS485 tab, CAMERA ID tab or through RS-422/485. The default values are CAM A to CAM D and vary depending on the channel.
- The SER27 Tally Interface software licence is an invaluable option, that significantly assists in the streamlining of communications in a Live production.

## 4K Video Signal Compatible Function

[SER28 (4K/UHD) & SER29 (6G/12G-SDI)]

LV5600W/LV7600W supports 4K formats of 3G-SDI dual and quad-link, HD-SDI quad link when the LV5600-SER28 or LV7600-SER28 is installed. LV5600-SER29/ LV7600-SER29 is required for 4K 12G-SDI.



### 4K Payload ID

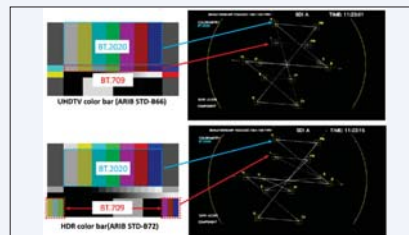
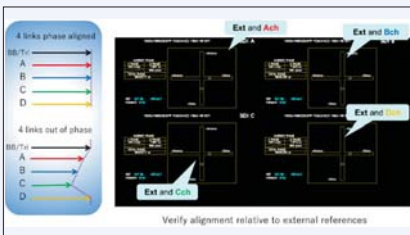
- Display 4K Payload ID status such as 12G/6G/3G

### 4K Status

- 4K Status Mode

### 4K Picture - Dot by Dot

- 4K Real image



### 4K Phase Comparison

- 4K Quad link phase differences between external reference and the links

### BT.2020 Compatible Vectorscope

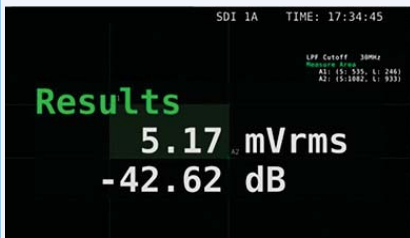
- BT.2020/BT.709 compatible vectorscope scale simultaneous display

# Optional Software Toolsets

## Video Noise Meter

[SER30]

Enables measurement of the video noise included in the intensity or RGB components of SDI signals. A window for measuring noise can be set. Selectable area for measurement to allow for effects of the lens or similar. Supports 4K/ UHDTV/12G/6G/3G/HD/SD cameras to allow for the broadest range of compatible cameras.



## Video Noise Meter

- Support various formats
- Noise measurement frequency band
- Full digital processing
- Measurement window
- Alarm Function

## Colormetry Zone Display

[SER31]

This feature simplifies the task of identifying the reproduction errors which can occur when transmitting video content produced in BT.709, DCI-P3 or BT.2020 wide color gamut or when converting content from BT.2020 to narrow color gamut.

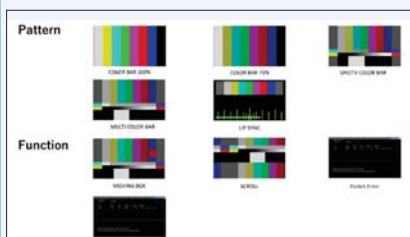


## Colormetry Zone

- Color Gamut selection selects the color gamut inside the colormetry zone display
- Mesh Pattern Size: x1, x2, x4, x6, x8
- Display Selection: Color, monochrome
- Records as the event log when a color outside the ITU-R BT.709 or DCI color gamut exists inside the ITU-R BT.2020 color gamut

## 10G/25Gb/s IP Pattern Generator [SER32]

This is an IP pattern generator option that can generate HD and 4K (3840 x 2160) test patterns in compliance with the IP transmission. The supported output format is SMPTE 2110. (The LV5600-SER06 or LV7600-SER06 must be implemented.)



## IP TSG

- Test pattern signal streams conforming to IP format (SMPTE ST 2110-20/30/40) can be generated
- Video and audio test signals can be generated in synchronization with SMPTE ST 2059 PTP
- Supported Protocol: IPv4, IGMPv2/v3, NMOS IS-04/05



## Character Generator

- It's possible to overlay characters on the signal



## IP Packet Emulation

- Packet Errors can be added to the test signals (ST 2110 only) (Only PORT 1 is supported)
- Packet jitter can be added to the test signals (ST 2110 only) (Only PORT 1 is supported)



# Specifications



LV5600W



LV7600W

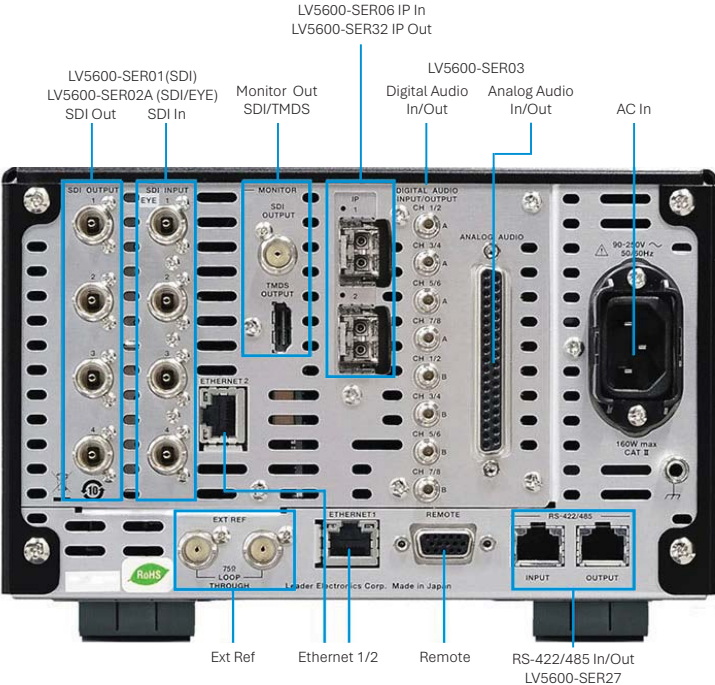
Formats supported (Generation, Analysis & Monitoring)		
ST 2110-20/-30/-31/-40 / 2022-7 / 2022-6 Analysis over 10G/25G Ethernet	<input type="radio"/>	<input type="radio"/>
ST 2110-20/-30/-31/-40 / 2022-7 / 2022-6 Generation	<input type="radio"/>	<input type="radio"/>
JPEG-XS/SMPT ST 2110-22	<input type="radio"/>	<input type="radio"/>
SDI IO	<input type="radio"/>	<input type="radio"/>
270M / 1.5G / 3G-SDI HD / SD Analysis	<input type="radio"/>	<input type="radio"/>
1.5G / 3G-SDI HD Generation	<input type="radio"/>	<input type="radio"/>
IP Generation	<input type="radio"/>	<input type="radio"/>
1.5G / 3G / 6G / 12G-SDI UHD Over SDI	<input type="radio"/>	<input type="radio"/>
Hardware and Software Options Supported		
SDI Input - 3G, HD, 3G-SDI [SER01]	Factory Option	Factory Option
SDI & EYE Input - 3G, HD, 3G-SDI and EYE Pattern Display [SER02A]	Factory Option	Factory Option
Digital/Analog Audio Input and Output Display [SER03]	Factory Option	Factory Option
Dolby Digital, Dolby E Decode and Metadata [SER07] (Requires SER03)	Factory Option	Factory Option
10G/25G IP Input [SER06] (Requires SER28 for 4K)	Factory Option	Factory Option
HDR Measurement [SER23]	<input type="radio"/>	<input type="radio"/>
SDI Signal Generation [SER24] (Requires SER28 for 4K / SER28+SER29 for 12G-SDI)	<input type="radio"/>	<input type="radio"/>
Focus Assist [SER25]	<input type="radio"/>	<input type="radio"/>
Customized Layout/Display Assignment [SER26]	<input type="radio"/>	<input type="radio"/>
TALLY Display [SER27]	<input type="radio"/>	<input type="radio"/>
4K Signal Support (3G-Quad, 3G-Dual, HD-Quad) [SER28]	<input type="radio"/>	<input type="radio"/>
12G-SDI/6G-SDI Support [SER29] (Requires SER28)	<input type="radio"/>	<input type="radio"/>
Video Noise Meter [SER30]	<input type="radio"/>	<input type="radio"/>
Colorimetry Zone [SER31]	<input type="radio"/>	<input type="radio"/>
25G IP Signal Generation [SER32] (Requires SER06. SER28 is required for 4K support)	<input type="radio"/>	<input type="radio"/>
JPEG-XS Analyzer/Decode//PEG XS IP signal generation function [SER33] (Requires SER06. SER28 is required for 4K support. SER32 is required for JPEG-XS TSG).	<input type="radio"/>	<input type="radio"/>
RGB Vector (including Diamond Display), YCbCr Vector (including Lightning Display) [SER40]	<input type="radio"/>	<input type="radio"/>
SDI inputs / outputs		
4 x SDI inputs, SD / HD / 3G / 6G / 12G	Factory Option	Factory Option
4 x SDI outputs, HD / 3G / 6G / 12G	Factory Option	Factory Option
Ethernet inputs / outputs (accepts MSA SFPs and QSFPs)		
2 x QSFP/QSFP28, supporting 10GBASE-SR, 10GBASE-LR, 25GBASE-SR, 25GBASE-LR	Factory Option	Factory Option
Audio inputs / outputs		
2 channel 48 kHz PCM audio on HDMI and SDI Instrument output	<input checked="" type="radio"/>	<input checked="" type="radio"/>
User interface		
Integrated 1920 x 1080 7 inch LCD touchscreen	<input checked="" type="radio"/>	<input checked="" type="radio"/>
HDMI output, 1920 x 1080	<input checked="" type="radio"/>	<input checked="" type="radio"/>
SDI 3Gbit instrument out, 1920 x 1080, 4:2:2 YCbCr*	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Remote Browser GUI access (WebRTC)	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Reference		
1 x 75 ohm BNC reference input, tri-level or B&B with cross lock	<input checked="" type="radio"/>	Standard
Networking & control		
10/100/1000 BASE-T	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Leader Remote Interface (15 pin high-density D-Type socket)	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Monitoring		
Headphone Socket (3.5mm)	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Form factor		
Size (Width x Height x Depth - excluding projections)	215mm x 132mm x 298mm	426mm x 44mm x 300mm
Base Unit Weight	4.6 kg	4.2 kg
Electrical		
Power Requirements	100 to 240 VAC, 50/60Hz, 160W max.	100 to 240 VAC, 50/60Hz, 160W max.
Warranty		
Warranty (1 year)	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Extended Warranty Package (3 - 5 years)	<input type="radio"/>	<input type="radio"/>

● Standard

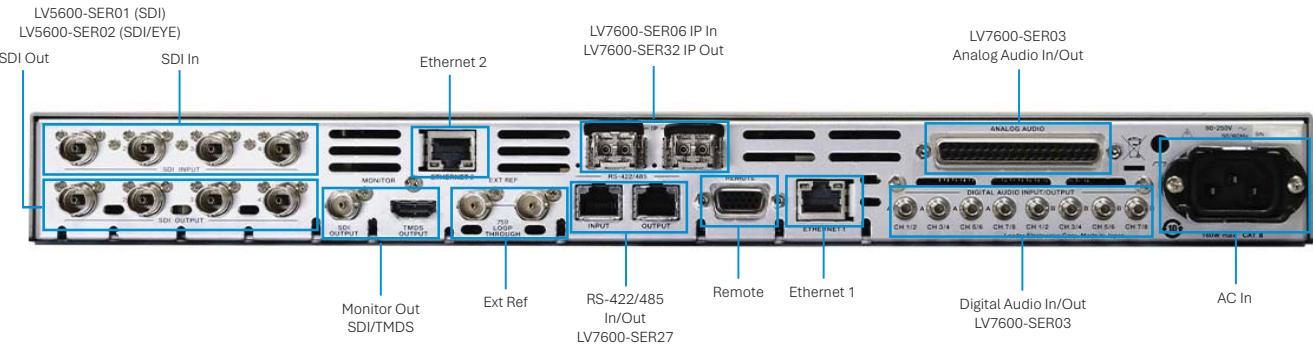
○ Optional

# Rear Panels

## LV5600W



## LV7600W



## Ordering LV5600W

### LV5600W Base Unit

LV5600W	LV5600W Waveform Monitor with WebRTC Requires one or more: SER01, SER02A, SER06. Cannot combine SER01 & SER02A
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### LV5600W Hardware Options

Each unit must be configured with at least one of SER01, SER02A, SER06.  
SER01 & SER-02A cannot be installed in the instrument at the same time.

LV5600-SER01	SDI Input: SD, HD, 3G-SDI input
LV5600-SER02A	SDI Input with EYE: SD, HD, 3G-SDI input with EYE pattern display
LV5600-SER03	Digital and analog audio I/O and displays
LV5600-SER06	10Gb/s, 25Gb/s IP Input
LV5600LV7600-SER07	DOLBY - Dolby Digital, Dolby E decoding SER03 is required for SER07.

### LV5600W Software Options

LV5600-SER23	HDR Measurement
LV5600-SER24	SDI Generator For 4K support, SER28 is also required. For 12G-SDI & 6G-SDI, SER28 & SER29 are required
LV5600-SER25	Focus Assist
LV5600-SER26	Layout - Customized Layout
LV5600-SER27	Tally - ID, iris, tally display
LV5600-SER28	4K Video Signal Compability For 12G-SDI & 6G-SDI, SER28 & SER29 are required
LV5600-SER29	12G-SDI and 6G-SDI Compatibility SER28 is required for SER29
LV5600-SER30	Video Noise Meter
LV5600-SER31	Colorimetry Zone Display
LV5600-SER32	25G IP Test Signal Generator - 10G, 25Gb/s IP Pattern Generator SER28 is required to support 4K SER06 is required for SER32
LV5600-SER33	JPEG-XS Support
LV5600-SER40	Extended Vector - RGB Vector and YCbCr Vector

### LV5600W Accessories

Rack-mount Adapter	LR2561	Two units can be mounted side by side in a 3U space on a 19-inch EIA rack
Blank Panel	LC2566	Blank Panel for Rack-mount adapter
SFP+ Multi-mode	LC2148	For SER06 10GE, 850nm, 10GBASE-LR/LW
SFP+ Single-mode	LC2149	For SER06 10GE, 1310nm, 10GBASE-LR/LW
SFP28 Multi-mode	LC2151	For SER06 25GE, 850nm, 25GBASE-SR
SFP28 Single-mode	LC2152	For SER06 25GE, 1310nm, 25GBASE-LR
Remote Controller	LV7290	Enables long distance operation through Ethernet
Desktop Kit	LC2191	Metal Protective sleeve with carry handle and tilt feet

## Ordering LV7600W

### LV7600W Base Unit

LV7600W	LV7600W Rasterizer with WebRTC Requires one or more: SER01, SER02A, SER06. Cannot combine SER01 & SER02A
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### LV7600W Hardware Options

Each unit must be configured with at least one of SER01, SER02A, SER06.  
SER01 & SER-02A cannot be installed in the instrument at the same time.

LV5600-SER01	SDI Input: SD, HD, 3G-SDI input
LV5600-SER02A	SDI Input with EYE: SD, HD, 3G-SDI input with EYE pattern display
LV7600-SER03	Digital and analog audio I/O and displays
LV7600-SER06	10Gb/s, 25Gb/s IP Input
LV5600/LV7600-SER07	DOLBY - Dolby Digital, Dolby E decoding SER03 is required for SER07.

### LV7600W Software Options

LV7600-SER23	HDR Measurement
LV7600-SER24	SDI Generator For 4K support, SER28 is also required. For 12G-SDI & 6G-SDI, SER28 & SER29 are required
LV7600-SER25	Focus Assist
LV7600-SER26	Layout - Customized Layout
LV7600-SER27	Tally - ID, iris, tally display
LV7600-SER28	4K Video Signal Compability For 12G-SDI & 6G-SDI, SER28 & SER29 are required
LV7600-SER29	12G-SDI and 6G-SDI Compatibility SER28 is required for SER29
LV7600-SER30	Video Noise Meter
LV7600-SER31	Colorimetry Zone Display
LV7600-SER32	25G IP Test Signal Generator - 10G, 25Gb/s IP Pattern Generator SER28 is required to support 4K SER06 is required for SER32
LV7600-SER33	JPEG-XS Support
LV7600-SER40	Extended Vector - RGB Vector and YCbCr Vector

### LV7600W Accessories

SFP+ Multi-mode	LC2148	For SER06 10GE, 850nm, 10GBASE-LR/LW
SFP+ Single-mode	LC2149	For SER06 10GE, 1310nm, 10GBASE-LR/LW
SFP28 Multi-mode	LC2151	For SER06 25GE, 850nm, 25GBASE-SR
SFP28 Single-mode	LC2152	For SER06 25GE, 1310nm, 25GBASE-LR
Remote Controller	LV7290	Enables long distance operation through Ethernet

# Supported SDI Formats and Standards

The following SDI formats are available on the LV5600W/LV7600W with options: [SER01/SER02A/SER28/SER29]

## SD Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Supported Standard
4:2:2 (YCbCr)	10bit	720 x 487	59.94i	ST 259
		720 x 576	50i	

## HD Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Supported Standard
4:2:2 (YCbCr)	10bit	1280 x 720	60p, 59.94p, 50p, 30p, 29.97p, 25p, 24p, 23.98p	ST 292-1 ST 296
		1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30psf, 29.97psf, 25psf, 24psf, 23.98psf	ST 292 ST 274

## 3G-A Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
4:2:2 (YCbCr)	10bit	1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-1
			48/47.95p	-
	12bit	2048 x 1080	60p, 59.94p, 50p, 48p, 47.95p	ST 425-1 ST 2048-2
			60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST 274 ST 425-1
4:4:4 (YCbCr)	10bit	1280 x 720	60p, 59.94p, 50p, 30p, 29.29p, 25p, 24p, 23.98p	ST 296 ST 425-1
		1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST 274 ST 425-1
	12bit	2048 x 1080	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST425-1 ST2048-2
		1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p	ST 274 ST 425-1
4:4:4 (RGB)	10bit	2048 x 1080	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST425-1 ST2048-2
		1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p	ST 274 ST 425-1
	12bit	2048 x 1080	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST425-1 ST2048-2
		2048 x 1080	30p, 25p, 24p 30PsF, 25PsF, 24PsF	ST 425-1 ST 428

## 3G-B-DL, HD(DL) Video Signal Formats and Standards

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
4:2:2 (YCbCr)	10bit	1920 x 1080	60p, 59.94p, 50p	ST 274 ST 372 ST 425-1
			48p, 47.92p	-
		2048 x 1080	60p, 59.94p, 50p, 48p, 47.95p	ST 373 ST 425-1 ST 2048-2
	12bit	1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST 274 ST 372 ST 425-1
			2048 x 1080	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
		10bit	1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
2048 x 1080	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF			ST 372 ST 425-1 ST 2048-2
12bit	1920 x 1080		60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST 274 ST 372 ST 425-1
		2048 x 1080	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST 372 ST 425-1 ST 2048-2
	4:4:4 (XYZ)	12bit	2048 x 1080	30p, 25p, 24p 30PsF, 25PsF, 24PsF
1920 x 1080				60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
			2048 x 1080	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
		10bit		1920 x 1080
2048 x 1080			30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	
12bit			1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
	2048 x 1080	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF		ST 372 ST 425-1 ST 2048-2

## 3G-D DS Video Signal Formats and Standards

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
4:2:2 (YCbCr)	10bit	1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST 274 ST 425-1
		1280 x 720	60p, 59.94p, 50p, 30p, 29.29p, 25p, 24p, 23.98p	ST 296 ST 425-1

## 3G(DL)-2K Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Supported Standard
4:2:2 (YCbCr)	12bit	1920 x 1080	60p, 59.94p, 50p 48p, 47.95p	ST 274 ST 425-3 -
		2048 x 1080	60p, 59.94p, 50p, 48p, 47.95p	ST 2048-2 ST 425-3
		1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-3
4:4:4 (YCbCr)	10bit	1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-3
		2048 x 1080	60p, 59.94p, 50p, 48p, 47.95p	ST 2048-2 ST 425-3
	12bit	1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-3
4:4:4 (RGB)	10bit	1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-3
		2048 x 1080	60p, 59.94p, 50p, 48p, 47.95p	ST 2048-2 ST 425-3
	12bit	1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-3
		1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-3
		2048 x 1080	60p, 59.94p, 50p, 48p, 47.95p	ST 2048-2 ST 425-3
		1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-3
		2048 x 1080	60p, 59.94p, 50p, 48p, 47.95p	ST 2048-2 ST 425-3
		1920 x 1080	60p, 59.94p, 50p	ST 274 ST 425-3
		2048 x 1080	60p, 59.94p, 50p, 48p, 47.95p	ST 2048-2 ST 425-3

- When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67µs) between links are automatically corrected.
- 3G-A and 3G-B-DL links are supported

## 3G(DL)-4K Video Signal Formats and Standards [requires option SER28]

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	4:2:2 (YCbCr)	10bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST 425-3 ST 2036-1 -
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	ST 425-3 ST 2048-1 -
			3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 425-3 ST 2036-1
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 425-3 ST 2048-1

- When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67µs) between links are automatically corrected.
- 3G-B links are supported

## HD(QL) Video Signal Formats and Standards [requires option SER28]

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	4:2:2 (YCbCr)	10bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	- -
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	- -
			3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	-
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	-

- When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67µs) between links are automatically corrected.

## 3G(QL)-2K Video Signal Formats and Standards [requires option SER28]

Division System	Transmission	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	4:2:2 (YCbCr)	10bit	3840 x 2160	60p, 59.94p, 50p	ST 425-5 ST 2036-1	
				48p, 47.95p	-	
			4096 x 2160	60p, 59.94p, 50p, 48p, 47.95p	ST 425-5 ST 2048-1	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
			3840 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2048-1	
		12bit	4096 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
			3840 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2048-1	
			4096 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
	4:4:4 (YCbCr)	10bit	3840 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2048-1	
			4096 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
			3840 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2048-1	
		12bit	4096 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
			3840 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2048-1	
			4096 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-	
				30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
4:4:4 (RGB)	10bit	3840 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2048-1		
		4096 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1		
		3840 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2048-1		
	12bit	4096 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1		
		3840 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2048-1		
		4096 x 2160	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	-		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1		
4:4:4 (XYZ)	10bit	3840 x 2160	30p, 25p, 24p	ST425-5 ST428-1		
			30PsF, 25PsF, 24PsF	-		
		4096 x 2160	60p, 59.94p, 50p	ST 425-5 ST 2036-1		
			48p, 47.95p	-		
		4096 x 2160	60p, 59.94p, 50p, 48p, 47.95p	ST 425-5 ST 2048-1		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1		
	12bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1		
		4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1		
		3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1		
			30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1		
10bit	4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1			
		30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1			
	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1			
		30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1			
	4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1			
		30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1			
2 sample interleave	4:4:4 (YCbCr)	10bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
				30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1	
		12bit	4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
				30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1	
		3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
				30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1	
	4:4:4 (RGB)	10bit	4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
				30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1	
		12bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
				30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1	
		4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	30p, 29.97p, 25p, 24p, 23.98p	ST 425-5 ST 2036-1	
				30p, 29.97p, 25p, 24p, 23.98p	ST425-5 ST2048-1	
4:4:4 (XYZ)	12bit	4096 x 2160	30p, 25p, 24p	ST 425-5 ST 428		
			30PsF, 25PsF, 24PsF	-		

- When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67μs) between links are automatically corrected.
- 3G-A and 3G-B-DL links are supported

## 6G Video Signal Formats and Standards [requires options SER28 & SER29]

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
2 sample interleave	4:2:2 (YCbCr)	10bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2081-10
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2048-1 ST 2081-10

- If you input 6G-SDI signal without the sync bit insertion, the instrument displays "NO SIGNAL" and cannot receive the signal

## 12G Video Signal Formats and Standards [requires options SER28 & SER29]

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
2 sample interleave	4:2:2 (YCbCr)	10bit	3840 x 2160	60p, 59.94p, 50p	ST 2036-1 ST 2082-10
				48p, 47.95p	-
			4096 x 2160	60p, 59.94p, 50p, 48p, 47.95p	ST 2048-1 ST 2082-10
				30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2082-10
		12bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2048-1 ST 2082-10
				4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2082-10
				30p, 29.97p, 25p, 24p, 23.98p	ST 2048-1 ST 2082-10
	4:4:4 (YCbCr)	10bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2082-10
				4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p
			3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2082-10
				4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p
		12bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2082-10
				4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2082-10
				30p, 29.97p, 25p, 24p, 23.98p	ST 2048-1 ST 2082-10
4:4:4 (RGB)	10bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2082-10	
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2048-1 ST 2082-10
	12bit	3840 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2036-1 ST 2082-10	
			4096 x 2160	30p, 29.97p, 25p, 24p, 23.98p	ST 2048-1 ST 2082-10

- If you input 12G-SDI signal without the Sync Bit Insertion, the instrument displays "NO SIGNAL" and cannot receive the signal.

# Supported IP Video Formats and Standards

The following IP formats are available on the LV5600W/LV7600W with options:  
[SER06]

Supported IP Formats	<b>SER06</b> SMPTE ST 2022-6, SMPTE ST 2110-20
Redundant System Supported Standard	SMPTE ST 2022-7
Synchronization Mode	PTP (SMPTE ST 2059-1/2)
Supported Protocol	<b>SER06</b> IPv4 (Internet Protocol version 4) IGMPv2/v3 (Internet Group Management Protocol) NMOS (IS-04 v1.2/v1.3 / IS-05 v1.0)

## 10G IP Video Signal Formats and Standards [requires options SER06]

Link	Compression	Color System	Quantization	Image	Frame (field) Frequency/Scanning
SD ST 2022-6 only	Uncompressed	4:2:2 (YCbCr)	10bit	720 x 487	59.94i
				720 x 576	50i
HD	Uncompressed	4:2:2 (YCbCr)	10bit	1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
				1280 x 720	60p, 59.94p, 50p 30p, 29.97p, 25p, 24p, 23.98p
3G-A	Uncompressed	4:2:2 (YCbCr)	10bit	1920 x 1080	60p, 59.94p, 50p

## 25G IP Video Signal Formats and Standards [SMPTE ST 2022-6 - requires option SER06]

Link	Compression	Color System	Quantization	Image	Frame (field) Frequency/Scanning
SD ST 2022-6 only	Uncompressed	4:2:2 (YCbCr)	10bit	720 x 487	59.94i
				720 x 576	50i
HD	Uncompressed	4:2:2 (YCbCr)	10bit	1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
				1280 x 720	60p, 59.94p, 50p 30p, 29.97p, 25p, 24p, 23.98p
3G-A	Uncompressed	4:2:2 (YCbCr)	10bit	1920 x 1080	60p, 59.94p, 50p

## 25G IP Video Signal Formats and Standards [SMPTE ST 2110-20 - requires option SER06]

Link	Compression	Color System	Quantization	Image	Frame (field) Frequency/Scanning
HD	Uncompressed	4:2:2 (YCbCr)	10bit	1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
				1280 x 720	60p, 59.94p, 50p 30p, 29.97p, 25p, 24p, 23.98p
3G-A	Uncompressed	4:2:2 (YCbCr)	10bit	1920 x 1080	60p, 59.94p, 50p
4K (SER28 must be installed for 4K signal input)	Uncompressed	4:2:2 (YCbCr)	10bit	3840 x 2160	60p, 59.94p, 50p 30p, 29.97p, 25p, 24p, 23.98p

- For NMOS control, the instrument's Ethernet port is used

# Supported JPEG-XS Video Formats and Standards

The following JPEG-XS formats are available on the LV5600W/LV7600W with option: [SER33]

Transmission Standard	SMPTE ST 2110-20
Compression Standard	ISO/IEC 21122, RFC9134
Profile	High Profile 422.12
Packetize	Codestream
Number of Streams	1

## JPEG-XS Input Signal Formats

Link	Compression	Compression Ratio	Color System	Quantization	Image	Frame (Field) Frequency/Scanning
HD	JPEG-XS	40:1 to 2:1 (0.5 to 10.0 bpp)	4:2:2 (YCbCr)	10bit	1280 x 720	60p, 59.94p, 50p 30p, 29.97p, 25p, 24p, 23.98p
		40:1 to 2:5:1 (0.5 to 8.0 bpp)	4:2:2 (YCbCr)	10bit	1920 x 1080	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF
3G-A	JPEG-XS	40:1 to 2:5:1 (0.5 to 8.0 bpp)	4:2:2 (YCbCr)	10bit	1920 x 1080	60p, 59.94p, 50p
4K (SER28 required for 4K signals input)	JPEG-XS	40:1 to 5:1 (0.5 to 4.0 bpp)	4:2:2 (YCbCr)	10bit	3840 x 2160	60p, 59.94p, 50p 30p, 29.97p, 25p, 24p, 23.98p

**Please see separate Specification Document for:**

- SDI Audio Formats and Standards
- IP Audio Formats and Standards
- External Digital I/O Audio Formats and Standards

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August 2025