Leader

LV 7390

SDI RASTERIZER

LV 7390SER01	SDI INPUT
	VF SDI INPUT (Option)
LV 7390SER03	DIGITAL AUDIO
	DOLBY (Option)
LV 7390SER20	4K

Specification

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1. GENERAL

The LV 7390 is a rasterizer that can measure up to four SDI signals simultaneously.
It supports 3G, HD, and SD input signals.
The measurement screen can be output at full HD resolution to SDI and DVI-I and supports 3G and HD.
The LV 7390 is equipped with a free layout function that enables the displayed screens to be arranged freely. It can be customized according to your application. Further, the new operation keys allow quick operation.
Adding options makes it possible to expand the functions of LV 7390 according to your application. Such expansions include support for 4K formats, input dedicated to picture display, and audio measurement analysis.

Options

LV 7390SER01: SDI INPUT (*1)
LV 7390SER02: SDI INPUT/EYE (*1, to be supported in the future)
LV 7390SER03: DIGITAL AUDIO
LV 7390SER20: 4K

*1　The LV 7390 requires an LV 7390SER01 or LV 7390SER02 to be installed in the SDI INPUT slot. These units cannot be installed simultaneously.

2. FEATURES

• HD 4-Signal Simultaneous Display

The LV 7390 has four SDI input connectors compatible with 3G, HD, and SD and can display up to four HD video signals simultaneously. Serially reclocked signals of each input signal is output from the four SDI output connectors.

• Variety of 4K Video Formats

4K formats (4096×2160, 3840×2160) can be supported by adding the LV 7390SER20 option.
Video signal formats such as 3G-SDI dual link and quad link as well as HD-SDI quad link are supported. They provide powerful tools for you to manage the high-definition video quality in 4K content production.

• Full HD Display

The measurement screen can be output in SDI or DVI-I from the monitor output connector. The output signal can be displayed on an external LCD in full high definition resolution.

• Free Layout of Measurement Screens

The flexible free layout function not only enables video signal waveforms, vector waveform, pictures, camera ID, tally, and so on of the input SDI signals to be simultaneously displayed but also they can be displayed in the sizes and positions of your liking. Moreover, several SDI input signals can be displayed simultaneously and arranged in a manner that allows them to be compared. Different layout configurations can be achieved simply by using the mouse while viewing the monitor screen.

- Enhanced Free Layout Function

  You can display a specific channel enlarged or arrange all display items freely. In addition, a tool to help you create layouts is included. This function provides a reliable monitoring environment with layouts suitable for different applications.

- Smart Operation Function That Achieve Quick Control

  Dedicated operation keys are available for functions that are used frequently in video content production, providing much improved operability. Moreover, operation keys can be customized to your needs. Camera adjustment and the like can be performed smoothly and quickly.

- Equivalent Cable Length Measurement

  This function displays SDI signal attenuation in terms of a coaxial cable length, which can be used to check the margin that the system has.

- USB Mouse Operation

  A USB mouse can be used to operate the panel. If the measurement screen is displayed on an external monitor in SDI or DVI-I, you can control the LV 7390 by using a USB mouse while viewing the external monitor.

- Status Display

  The status display also has a feature for detecting CRC and other types of errors. It also has event log and phase difference measurement features enabling you to monitor SDI signals in detail.

- CINELITE II

  The CINELITE feature makes it easy to manage the levels of specific points on the picture display. On the video signal waveform or vector waveform, a marker can be displayed at the position corresponding to a point on the picture display. Further, the CINEZONE feature makes it possible to check the luminance distribution of the whole picture display at a glance.

- HDR Display Option

  HDR display becomes available by adding the LV 7390SER20 option.
  On CINEZONE display, the SDR area is displayed in monochrome, while the HDR area is displayed using colors corresponding to the brightness. This makes it easy to view the brightness distribution in the HDR area.
  On video signal waveform display, a scale corresponding to the HDR standard can be shown, making it possible to manage video in Scene linear.

- Picture Display SDI Input Option

  The picture of an SDI signal separate from the measurement system can be displayed by adding the LV 7390SER01 to the VF SDI INPUT slot. Waveforms and vectors of the main signal can be monitored while showing camera operation such as viewfinder out or the operation menu on the picture display.

- SDI Input Eye Pattern Display Option (to be supported in the future)

  This feature can display eye pattern waveforms and jitter waveforms of SDI signals as well as measurement results of various parameters by adding the LV 7390SER02 to the SDI INPUT slot. It can display any of the signals received through the four SDI input connectors.

- Audio Display

  Embedded audio can be separated from the SDI signal and shown in a meter display. It can be used as a simple audio level meter for test tone verification and the like.

  The addition of the LV 7390SER03 option enables the LV 7390 to display not only embedded audio but also external digital audio. Detailed digital audio monitoring is possible with the level meter display expanded to 16 channels, Lissajous display, surround display, loudness display and various analysis displays. DIN 1.0/2.3 I/O connectors can be switched between input and output in groups of four connectors (8 channels). Therefore, the LV 7390 can also be used to extract and transmit the embedded audio's digital audio.

- Screen Capture

  The LV 7390 is equipped with a screen capture feature, which captures the entire display as still-image data. Not only can captured data be displayed by the LV 7390, but it can also be compared with an input signal or saved to a USB memory device as bitmap data for viewing on a PC.

- External Remote Connector

  The remote connector can be used to load presets, switch the input signal, and transmit alarms, and display tallies.

- RS-422/485 Serial Communication

  For serial communication, you can select the Leader’s standard protocol or TSL protocol. When using the Leader’s standard protocol, you can remotely recall presets, switch the display channel, and display the camera ID, iris, and tally by using serial communication. When using the TSL protocol, you can control the camera ID (LABEL-1) and tally (TALLY-1, TALLY-2) displays.

- Ethernet Port, HTTP Server

  By connecting the Ethernet interface to a PC, you can control the LV 7390 remotely over TELNET, transfer files over FTP, and control the LV 7390 remotely and detect errors over SNMP.
  The HTTP server provides comprehensive remote control and monitoring features including picture view, error monitoring with the event log viewer, and log acquisition.

- REMOTE CONTROLLER (LV 7290, sold separately)

  Because the REMOTE CONTROLLER panel has keys similar to those on the LV 7390 panel, you can think of it as an extension of the LV 7390 panel when you use it to remotely control the LV 7390. (You cannot use TELNET while you are using the LV 7290.)

3. SPECIFICATIONS

3.1 SDI Formats and Standards

Table 3-1 SD video signal formats and standards

Color System	Quantization	Image	Field Frequency/Scanning	Corresponding Standard
YC_BC_R 4:2:2	10bit	720×487	59.94/I	SMPTE ST 259
		720×576	50/I	

Table 3-2 HD video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Corresponding Standard
YC_BC_R 4:2:2	10bit	1280×720	60/59.94/50/30/29.97/25/24/23.98/P	SMPTE ST 296
		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	

Table 3-3 3G-A video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Corresponding Standard
YC_BC_R 4:2:2	10bit	1920×1080	60/59.94/50/P	SMPTE ST 274
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2
RGB 4:4:4	10bit	1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
		2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 2048-2
			30/29.97/25/24/23.98/PsF	
	12bit	1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	
		2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 2048-2
			30/29.97/25/24/23.98/PsF	

Table 3-4 3G-B-DL video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Corresponding Standard
YC_BC_R 4:2:2	10bit	1920×1080	60/59.94/50/P	SMPTE ST 274
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2
RGB 4:4:4	10bit	1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
		2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 2048-2
			30/29.97/25/24/23.98/PsF	
	12bit	1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
		2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 2048-2
			30/29.97/25/24/23.98/PsF	

Table 3-5 3G-B-DS video signal formats and standards (*1)

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Corresponding Standard
YC_BC_R 4:2:2	10bit	1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	

* The frame frequency of all input signals must be synchronized.

*1 The VF option takes effect when 3G-B-DS is received through SDI INPUT.

Table 3-6 3G (DL) video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	YC_BC_R 4:2:2	10bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-3 SMPTE ST 2036-1
				30/29.97/25/24/23.98/PsF	-
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-3 SMPTE ST 2048-1
				30/29.97/25/24/23.98/PsF	-
2 sample interleave	YC_BC_R 4:2:2	10bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-3 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-3 SMPTE ST 2048-1

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

* 3G-B-DS links are supported.

Table 3-7 HD (QL) video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	YC_BC_R 4:2:2	10bit	3840×2160	30/29.97/25/24/23.98/P	-
				30/29.97/25/24/23.98/PsF	-
			4096×2160	30/29.97/25/24/23.98/P	-
				30/29.97/25/24/23.98/PsF	-

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

Table 3-8 3G (QL) video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	YC_BC_R 4:2:2	10bit	3840×2160	60/59.94/50/P	SMPTE ST 425-5 SMPTE ST 2036-1
			4096×2160	60/59.94/50/48/47.95/P	SMPTE ST 425-5 SMPTE ST 2048-1
		12bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98/PsF	-
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98/PsF	-
	RGB 4:4:4	10bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98/PsF	-
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98/PsF	-
		12bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98/PsF	-
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98/PsF	-
2 sample interleave	YC_BC_R 4:2:2	10bit	3840×2160	60/59.94/50/P	SMPTE ST 425-5 SMPTE ST 2036-1
			4096×2160	60/59.94/50/48/47.95/P	SMPTE ST 425-5 SMPTE ST 2048-1
		12bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
	RGB 4:4:4	10bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
		12bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1

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

* 3G-A and 3G-B-DL links are supported.

3.2 Embedded Audio Playback Format

Supported Standards	
3G, HD	SMPTE ST 299
SD	SMPTE ST 272
Format	L-PCM, Dolby-E (option), Dolby Digital (option), Dolby Digital Plus (option)
Sampling Frequency	48 kHz
Quantization	24 bit
Clock Generation	Generated from the video clock
Synchronization	Must be synchronized to the video clock. All SDI signals must be synchronized.
Channel Separation	
Simple Level Meter	Separates up to four groups (8 channels) from an SDI input.
SER03	Separates up to four groups (16 channels) from an SDI input.

3.3 SDI I/O Connectors

SDI Input Connectors (SER01)	
Connector Type	BNC
Number of Input Connectors	4 (A, B, C, D)
Input Impedance	75Ω
Input Return Loss	
5 MHz to 1.485 GHz	15 dB or more
1.485 to 2.97 GHz	10 dB or more
Maximum Input Voltage	±1 V (DC + peak AC)
Input Signal Selection	
SD/HD/3G-A/3G-B-DL	Four inputs A, B, C, D
3G-B-DS	One input signal selected from A, B, C, D
3G (DL)	One input signal selected from (A, B) and (C, D)
HD (QL), 3G (QL)	One input signal selected from (A, B, C, D)

SDI Output Connector	
Connector Type	BNC
Number of Output Connectors	4 (A, B, C, D)
Output Impedance	75Ω
Output Return Loss	
5 MHz to 1.485 GHz	15 dB or more
1.485 to 2.97 GHz	10 dB or more
Output Voltage	800 mVp-p ± 10 % (into 75 Ω)
Output Signal	Reclocked signal of SDI input

3.4 External Reference Input

Connector Type	BNC
Number of Input Connectors	1 pair
Input Impedance	15 kΩ passive loop-through
Input Return Loss	≥ 30 dB for 50 kHz to 30 MHz into 75 Ω
Maximum Input Voltage	±5 V (DC + peak AC)
Input Signal	Tri-level sync or NTSC/PAL black burst signal

* The waveform display position based on the external sync signal may vary by ±1 clock depending on the timing when the external sync signal or SDI signal is connected or disconnected or when the device is restarted.
* Waveform display and phase difference display using an external sync signal is not possible for the following formats.
  - 3G's 720/30P, 720/29.97P, 720/25P, 720/24P, 720/23.98P
  - 4K
  - Frame frequency 48P, 47.95P
* Phase difference display using an external sync signal is not possible for the following formats.
  - 3G's 720/30P, 720/29.97P, 720/25P, 720/24P, 720/23.98P
  - Frame frequency 48P, 47.95P

3.5 Audio Input/Output Connectors

Digital Audio I/O Connectors (SER03)

Connector Type	DIN 1.0/2.3
Number of I/O Connectors	
Group A	4 pairs (8 channels)
Group B	4 pairs (8 channels)
I/O Impedance	75 Ω
Maximum Input Voltage	±5 V (DC + peak AC)
Output Voltage	1.0 Vp-p ± 10 % (into 75 Ω)
Input/Output Switching	By group (4 pairs (8 channels))
Supported Standard	AES-3id (DIN 1.0/2.3 connector)
Supported Format	L-PCM, Dolby-E (option), Dolby Digital (option), Dolby Digital Plus (option)
Sampling Frequency	48 kHz
Output Signal	Audio signal displayed on the screen.

Headphone Output

Connector Type	One stereo jack
Output Signal	2 channels from the audio signals that are being displayed on the screen (Downmixed Lt and Rt channel output is also possible with the SER03.)
Sampling Frequency	48kHz
Volume Adjustment	Using the menu
Power Output	100 mW maximum (into 8 Ω load)

3.6 Monitor Output Connector

SDI Output Connector

Connector Type	BNC
Number of Output Connectors	1
Output Impedance	75Ω
Output Return Loss	
5 MHz to 1.485 GHz	15 dB or more
1.485 to 2.97 GHz	10 dB or more
Output Voltage	800 mVp-p ± 10 % (into 75 Ω)
Output Signal	Outputs the display screen
Output Format	
SDI Format	HD, 3G-A, 3G-B-DL
Image Format	1920×1080, YC_BC_R 4:2:2, 10 bit
Frame Frequency	
3G	60P, 59.94P, 50P
HD	60I, 59.94I, 50I
Corresponding Standard	
3G	SMPTE ST 424, SMPTE ST 425
HD	SMPTE ST 292

DVI-I Output

Connector Type	DVI-I Connector
Number of Output Connectors	1
Signal Format	Single Link T.M.D.S, analog RGB (separate sync signal TTL level)
DDC	Not supported
HOT PLUG Detection	Not supported
Output Signal	Outputs the display screen
Image	1920×1080
Frame Frequency	60P, 59.94P, 50P

3.7 Control Connectors

USB Port

Port Type	Standard A
Number of Ports	1
Specifications	USB 2.0
Compatible Devices	USB memory, USB mouse
USB Memory Feature	Saves capture data, preset data, event log data, data dumps, and loudness data (SER03)
USB Mouse Feature	Used to control on the screen

Ethernet Port (*1)

Port Type	RJ-45
Number of Ports	1
Specifications	IEEE802.3
Supported Protocols	TELNET, FTP, SNMP, HTTP, SNTP
Function	Used to monitor the LV 7390 from a PC, retrieve various types of data, and monitor errors or remotely control from the LV 7290
Type	10Base-T, 100Base-TX, 1000Base-T

Remote Connector

Port Type	15-pin D-sub (female)
Locking Screws	Inch screws (No.4-40UNC)
Number of Ports	1
Control Signal	LV-TTL level (low active)
Input Voltage Range	0 to 5 VDC
Function	Used to load preset settings, switch input signals, transmit alarm signals, activate tally displays, and start, stop, and clear the loudness measurement (SER03)
Alarm Output	Outputs signals when format alarms occur, when various type of errors occur, when the fan malfunctions, or when the internal temperature is abnormal

RS-422/485 Connector

Supported Protocols	
Leader	Receives tally, camera ID, and camera iris signals and displays them
TSL UMD Protocol	Tally (TALLY-1, TALLY-2), camera ID (LABEL-1) reception display
Supported Versions	UMD 3.1, UMD 4.0
Port Type	RJ-45
Number of Ports	2 (INPUT and OUTPUT, one of each)
Control Signal	RS-485 level
Communication System	Full duplex
Function	Camera ID display, iris display, and tally display through serial communication

*1 You cannot use TELNET and the LV 7290 at the same time.

3.8 Front Panel

Key LEDs	All the keys are dimly back-lit. The selected key is lit more brightly.
Power Switch	Stores the on/off state
Last Memory	Backs up the panel settings to memory
Key Lock	Prevents erroneous operation

3.9 Screen Capture

Function	Captures the screen
Display	Displays only the captured image or overlays the captured image over the input signal
Media	Internal memory (RAM) and USB memory You can only save one screen capture to the internal memory.
Data Output	Screen captures can be saved as bitmap files to USB memory, or they can be saved in a file format that the LV 7390 can load.
Data Input	Data saved to a USB memory device can be loaded and displayed on the LV 7390.

3.10 Presets

Presets	Saves the panel settings (*1)
Number of Presets	60
Preset Loading Method	Front panel or remote connector (*2)
Recall Mode	Recall menu, function menu
Recall Menu	Displays the recall menu after recalling
Function menu	Displays the function menu that was available when panel settings were stored after recalling
Copying	All preset data can be copied from the LV 7390 to a USB memory device or from a USB memory device to the LV 7390.

*1 The power on/off state, Ethernet settings, remote settings (with exceptions), date and time, and RS-422/485 settings are not saved.

*2 The number of presets loaded from the remote connector can be 8 (6 when loudness measurement is being controlled) or 60.

3.11 Display

Free Layout	
Function	Freely arrange the windows shown with WFM, VECT, PIC, AUDIO, STATUS, and EYE (one of each), and a window consisting of six displays shown with MULTI
Display Format	Displays up to four input signals in tiled, V aligned, or H aligned mode.
Tiled Display	The screen is divided into windows.
V Aligned Display	The windows are arranged top to bottom.
H Aligned Display	The windows are arranged side by side.
Enhanced Layout	
Function	Create measurement screen layouts for up to four inputs on a single screen
Display Format	Displays up to four input signals (in simul mode using multi-screen display with Picture Input Select set to SD INPUT)
Time Display	
Displayed Contents	Current time, time code
Current Time Display	The time based on the internal clock
Time Code Display	LTC, VITC, D-VITC (SD only)
Corresponding Standard	
LTC, VITC	SMPTE ST 12-2
D-VITC	SMPTE ST 266
Alarm Indications	Displayed on the screen when various alarms occur, when various errors occur, when the fan malfunctions, or when the internal temperature is abnormal
Format Alarm	Displays an alarm when a signal in a format other than the specified format is received
Colorimetry Alarm	Displays an alarm when a signal with a colorimetry other than the specified colorimetry is received

3.12 Video Signal Waveform Display

Waveform Control	
Display Mode	
Overlay	Overlays component signals
Parade	Displays component signals side by side
Blanking Interval	H and V blanking periods can be masked.
RGB Conversion	Converts a YC_BC_R signal into an RGB signal and displays the result
Channel Assignment	GBR or RGB order
Pseudo-Composite Display	Artificially converts component signals into composite signals and displays the result
Line Select	Displays the selected line
Sweep Modes	H, V
Color	7 colors to choose from
Vertical Axis	
Gain	×1, ×5
Scale Jump	Sets the scale display position at ×5 gain (*1) 0, +10, +20, +30, +40, +50, +60, +70, +80, +90, CURSOR (sets the display position near the selected cursor)
Variable Gain	×0.2 to ×2.0
Amplitude Accuracy	±0.5 % (single default display)
Frequency Response	
3G (1080/60P, 1080/59.94P, 1080/50P)	
Y Signal	±0.5 % (1 to 60 MHz)
C_BC_R Signal	±0.5 % (0.5 to 30 MHz)
Low-Pass Attenuation	≥ 20 dB (at 40 MHz)
3G, HD (1080/60P, 1080/59.94P, 1080/50P)	
Y Signal	±0.5 % (1 to 30 MHz)
C_BC_R Signal	±0.5 % (0.5 to 15 MHz)
Low-Pass Attenuation	≥ 20 dB (at 20 MHz)
SD	
Y Signal	±0.5 % (1 to 5.75 MHz)
C_BC_R Signal	±0.5 % (0.5 to 2.75 MHz)
Low-Pass Attenuation	≥ 20 dB (at 3.8 MHz)
Horizontal Axis	
Line Display	
Display Format	Overlay (1H, 2H) (*2) Parade (1H, 2H, 3H) 4Y parade (4H)
Magnification	×1, ×10, ×20, ACTIVE, BLANK
Field Display	
Display Format	Overlay (1V, 2V) (*3) Parade (1V, 2V, 3V)
Magnification	×1, ×20, ×40
Time Accuracy	±0.5 % (single default display)

Cursor Measurement	
Composition	
Horizontal Cursors	2 (REF and DELTA)
Vertical Cursors	2 (REF and DELTA)
Amplitude Measurement	mV, %, R%, DEC, HEX, HDR (SER20)
Time Measurement	Second display
Frequency Display	Computes and displays the frequency with the length of one period set to the time between two cursors
Scale	
Type	%, V, decimal, hexadecimal
Color	7 colors to choose from

*1 The jump range varies depending on COLOR MATRIX, SCALE UNIT, and the like.
*2 2H display is not possible when the input signal is 4K.
*3 2V display is not possible when the input signal is progressive.

3.13 Vector Display

Color	7 colors to choose from
Blanking Interval	H and V blanking periods can be masked (according to the video signal waveform display settings).
Pseudo-Composite Display	Artificially converts component signals into composite signals and displays the result
Line Select	Displays the selected line
Gain	×1, ×5, IQ-MAG
Variable Gain	×0.2 to ×2.0
Amplitude Accuracy	±0.5 % (single default display)
Scale	
Type	ITU-R BT.601, ITU-R BT.709, AUTO
Color Bar Saturation	75%, 100%
IQ Axis	Show or hide
Color	7 colors to choose from
Vector Marker Display	Displays a marker and numeric value at the specified location on the vector display
Number of Markers	1
Numeric Display	Displays the marker position numerically
Cb	Displays the CB position as a percentage
Cr	Displays the CR position as a percentage
deg	Displays the hue in degrees.
d	Displays the distance from the center as a percentage

3.14 Picture Screen

Quantization	8bit
Display Sizes	Reduced, actual size, ×2, full frame
Quality Adjustment and Color Selection	
	Brightness, contrast, gain, bias, chroma gain, monochrome display
Frame Rate	Converts to 60P, 59.94P, or 50P
Aspect Marker Display	
3G (17:9 aspect ratio)	16:9, 14:9, 13:9, 4:3, 2.39:1
3G (16:9 aspect ratio), HD	17:9, 14:9, 13:9, 4:3, 2.39:1, AFD (*1)
SD	16:9, 14:9, 13:9, AFD (*1)
Aspect Marker Format	Line, shadow (99 levels), or black
Safety Marker Size	ARIB TR-B4, SMPTE RP-218, or user-defined
Line Select (*2)	Marks the selected line
AFD Display (*1)	Displays abbreviations for SMPTE ST 2016-1-2007 standard AFD codes
Additional Display Features	
Tally Frame Display (*3)	Displays tally 1 and tally 2 on the picture frame
Audio Level Meter Display (*4)	
	Displays an audio level meter next to the picture

* The LV 7390SER01 installed in the VF SDI INPUT slot (VF option) supports only picture display.

*1 Supports only SD or HD.

*2 VF option is not supported.

*3 3G-B-DS is not supported.

*4 Picture with the audio level meter cannot be displayed simultaneously with audio.
3G-B-DS and VF option are not supported.

3.15 CINELITE Display

Function	Measures the luminance on the picture screen
Display Format	f Stop display, percentage display, and gradient display
f Stop Display	Displays f Stop values relative to a reference point
	Set in reference to an object with an 18% reflectance
f Stop Gamma Correction	
Fundamental Gamma	0.45 (ITU-R BT.709)
User Correction Table	3 types (data acquired on the main unit)
External Correction Table	5 types (loaded from USB memory)
% Display	Luminance or RGB components are displayed as percentages.
Gradation Display	RGB components are displayed using an 8-bit, 256-step gradient.
Measured Points	3
Measurement Sizes	1 x 1 pixel, 3 x 3 pixels, and 9 x 9 pixels

* 3G-B-DS and VF option are not supported.

3.16 CINELITE Advanced Display

Display Format	Link marker display, vector marker display
Link Marker Display	CINELITE measurement points are linked to the video signal waveform and vector and displayed with markers.
Number of Link Markers	Up to 4
Vector Marker Display	Displays numerically the active marker position
Cb	Displays the C_B position as a percentage
Cr	Displays the C_R position as a percentage
deg	Displays the hue in degrees.
d	Displays the distance from the center as a percentage

* 3G-B-DS and VF option are not supported.

3.17 CINEZONE Display

Function	Adds colors to the display in accordance with luminance levels
Color	Gradation (1024 colors) and step (12 colors)
Upper Limit	-6.3 to 109.4 % (values equal to or greater than the upper limit are displayed in white)
Lower Limit	-7.3 to 108.4 % (values less than the lower limit are displayed in black)
Level Search Display	
Function	The specified luminance level ±0.5 % is displayed using green on an otherwise monochrome picture display.
Luminance Level	-7.3 to 109.4%

* 3G-B-DS and VF option are not supported.

3.18 Digital Audio Display

Input Signal	SDI embedded audio signal, external audio signal (SER03)
Displayed Channels	
Simple Level Meter	8 channels
SER03	Up to 16 channels
Select the embedded audio channel	
Simple Level Meter	Select up to four groups (8 channels) from the available SDI inputs
SER03	Select up to four groups (16 channels) from the available SDI inputs
Display Types	Level meter, Lissajous (SER03), correlation meter (SER03), surround (SER03), status (SER03), loudness (SER03)
Level Meter Display	
Displayed Channels	8 or 16 (SER03) channels
Dynamic Range	-60 dBFS, -90 dBFS (SER03), reference level±3 dB (SER03)
Meter Response Model	TRUE PEAK, PPM type I (SER03), PPM type II (SER03), VU (SER03)
Peak Hold Response Model (SER03)	TRUE PEAK, PPM type I, PPM type II
Peak Hold Time (SER03)	0.0 to 5.0 s (in 0.5 s steps), HOLD
Level Setting	-40.0 to 0.0 dBFS (reference level, warning level, over level)
Lissajous Display (SER03)	
Displayed Channels	2, 8, or 16 channels
Display Modes	X-Y, MATRIX
Correlation Meter	Displays the correlation between two channels as a value from -1 to 1
Indicator Display	Displays Dolby E frame locations with indicators (option)
Surround Display (SER03)	
Function	Displays a graphical representation of a sound field
Surround Format	5.1
Channel Mapping	L, R, C, LFE, Ls, Rs, Lt, Rt
Center Channel Format	Normal, phantom center
Gain	×1, AUTO
Correlation Display	Detects the case of the channel being 180 ° out of phase with its adjacent channels

Status Display (SER03)	
Level	Audio levels are displayed using numbers (dBFS).
Error Detection	Counts the number of errors that occur for each channel
Level Over	Counts the number of times that the level of the input signal exceeds the set value
Detection Setting	-40.0 to 0.0 dBFS
Clipping	Counts the number of times that a received signal exceeds the maximum signal value for the specified number of consecutive samples
Detection Setting	1 to 100 samples
Mute	Counts the number of times that the length of a received mute signal exceeds the specified period
Detection Setting	1 to 5000 ms
Parity Error	Counts the number of times that the input signal's parity bit and the parity bit recalculated by the LV 7390 differ
Validity Error	Counts the number of times that the input signal's validity bit is 1
CRC Error	Counts the number of times that the CRC of the channel status bits and the calculated CRC are different
Code Violation	Counts the number of times that the state of the input signal's biphase modulation is abnormal
Elapsed Time	Displays the amount of time that has elapsed since the instrument was reset
Channel Status Bits	Dump display, text display
User Data Bits	Dump display
Dolby metadata	Text display (option)
Loudness Display (SER03)	
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
Mode (Main)	Mono, stereo, 5.1, user specified channel
Mode (Sub)	Off, mono, stereo
Channel Selection	User-defined assignment of eight channels
LFE Gain	0 to 10 times
Measurement Trigger	Manual (panel), remote, timecode, mute
Measurement Mode	BS1770, ARIB, EBU, ATSC
Target Level	
BS1770	-24.0 LKFS
ARIB	-24.0 LKFS (±1 LK)
EBU	-23.0 LUFS (±1 LU)
ATSC	-24.0 LKFS (±2 LK)
Average Time	
Momentary Loudness	200 to 10000 ms
Short-term Loudness	200 to 10000 ms

Chart Display
1 During Audio Measurement
Graph display of integrated loudness and momentary or short-term loudness
2 During Audio Measurement
Graph display of integrated, momentary, or short-term loudness
Measurement Time 2min, 10min, 30min, 1hour, 2hour, 6hour, 12hour, 24hour
MAG Zoomed display of the target level from -18 to +9 (LK/LU)
Numeric Display Absolute value and relative value displays of integrated loudness and momentary or short-term loudness
Integrated Loudness (Average Loudness)
Displayed in red when the target level range is exceeded
Momentary, Short-term Loudness
Displayed in red when the target level is exceeded
Log
Log Time Up to 24 hours
File
Log Saves gating block loudness in CSV format
Summary Saves settings and measurement results in text format
Level Meter Display Displays level meters for eight channels
Peak Value Display Displays peak values of a measurement channel numerically

3.19 Status Display

Signal Detection Detects the presence of an SDI signal
Format Display Displays the video signal format
Frequency Deviation Display
Function Displays the sampling frequency deviation
Displays an error if ±10 ppm is exceeded
Measurement Range ±100 ppm
Precision ±2 ppm
Equivalent Cable Length Display
Function Displays SDI signal attenuation in terms of cable length
Displays an error if the specified cable length is exceeded
Supported Cables
3G, HD LS-5CFB, 1694A
SD L-5C2V, 8281
Display Range
3G < 10 m, 10 to 105 m, > 105 m
HD < 5 m, 5 to 130 m, > 130 m
SD < 50 m, 50 to 300 m, > 300 m
Precision ±20m
Resolution 5m

Error Count Display	Up to 999,999 errors for each error type
Count Period	1 second, 1 field (frame)
Embedded Audio Channel Display (*1)	Displays the embedded audio channel numbers

SDI Signal Error Detection

CRC Error	Detects 3G and HD signal transmission errors
EDH Error	Detects SD signal transmission errors
TRS Position Error	Detects TRS embedding position errors
TRS Code Error	Detects TRS protection bit errors
Line Number Error	Detects errors with the line numbers embedded in 3G and HD signals
Illegal Code Error	Detects data within the range of 000 to 003h and 3FC to 3FFh in locations other than TRS and ADF

Ancillary Data Packet Error Detection

Checksum Error	Detects ancillary data transmission errors
Parity Error	Detects ancillary data header parity errors

Embedded Audio Packet Error Detection (*1)

BCH Error	Detects audio packet transmission errors
DBN Error	Detects audio packet continuity errors
Parity Error	Detects audio packet parity errors
Embedded Position Error	Detects the presence of audio in lines where it should not be embedded
Sample Counter Error	Detects asynchronous audio by measuring the number of audio samples

*1 If the input signal is 3G-B, only stream 1 is supported.

3.20 SDI Analysis Features

Event Log Display

Function	Records detected errors, events—such as the LV 7390 switching between input signals, and timestamps.
Log Capacity	Up to 1000 events
Operation	Logs all events from start to finish
Data Output	Text output to USB memory

Data Dump Display

Display Format	
HD, SD, 3G-A, 3G-B-DS	Displays serial data sequence or displays each color component separately
3G-B-DL	PICTURE, stream 1, stream 2
3G (DL)	PICTURE, link 1, link 2
3G (QL), HD (QL)	PICTURE, link 1, link 2, link 3, link 4
Display Format Details	
PICTURE	Streams 1 and 2 are combined and displayed in a picture structure. (displays only the image area for 4K)
Stream 1/2	Displays each stream in a transmission structure
Link 1/2/3/4	Displays the selected link
Line Select	Displays the selected line
Sample Select	Displays from the selected sample
Jump Feature	Jumps to an EAV or SAV (Moves to 0 or 3839/4095 for 4K PICTURE)
Data Output	Text output to USB memory

Phase Difference Display (*1)

Function	Displays the phase difference between a reference signal and an SDI signal numerically and graphically
Reference Signal	
SD, HD, 3G, HD (QL), 3G (QL)	External sync signal, Ach
3G (DL)	External sync signal, Ach, Cch
Display Range	
Vertical	1 frame
Horizontal	±1 line

EDH Display (Only for SD)

Corresponding Standard	SMPTE RP 165
Displayed Contents	Analyzes and displays EDH packets and displays received CRC errors
Display Format	Text, hexadecimal, binary

Payload ID Display

Corresponding Standard	SMPTE ST 352
Displayed Contents	Analyzes and displays payload information
Display Format	Text and binary

Displaying Audio Control Packets

Corresponding Standard	SMPTE ST 299-1, SMPTE ST 272
Displayed Contents	Displays audio control packet analysis
Display Format	Text, hexadecimal, binary
Group Selection	1, 2, 3, 4

Closed Caption Display (*2)

Corresponding Standard	ARIB STD-B37
Displayed Contents	Analysis display of closed caption signals
Display Format	Text, hexadecimal, binary

Inter-Stationary Control Signal (NET-Q) Display (*2)

Corresponding Standard	ARIB STD-B39
Displayed Contents	Analysis display of inter-stationary control signals
Display Format	Text, hexadecimal, binary
Logging Feature	Q-signal logging
Format ID Display	Analysis display of the format ID

Data Broadcast Trigger Signal Display (*2)

Corresponding Standard	ARIB STD-B35
Display Format	Text, hexadecimal, binary

V-ANC User Data Display (*2)

Corresponding Standard	ARIB TR-B23
Display Format	Hexadecimal and binary

AFD Packet Display (*2)

Corresponding Standard	SMPTE ST 2016-3
Display Format	Text, hexadecimal, binary

User-Defined ANC Packet Display

ANC Specification Method	DID, SDID
Displayed Contents	Y, C
Display Format	Hexadecimal and binary

*1 If the reference signal is set to an external sync signal, the measured phase may vary by ±1 clock depending on the timing when the external sync signal or SDI signal is connected or disconnected or when the power is turned on and off.
If the reference signal is set to an SDI signal, the measured phase may vary by ±2 clock depending on the timing when the SDI signal is connected or disconnected or when the power is turned on and off.

*2 This is not supported when the input signal is 3G.

3.21 SDI Ancillary Data List Display

List Display Details	Presence or absence of each ancillary data type, embedded line number, and number of packets per frame
Dump Display	The selected ancillary data is displayed in hexadecimal or binary.

3.22 HDR Display (SER20)

Supported Standards	ARIB STD-B67, ITU-R BT.2100 (HLG; Hybrid Log Gamma) SMPTE ST 2084, ITU-R BT.2100 (PQ curve, Narrow Range only) S-Log3
Supported Formats	All except SD
CINEZONE Display Color	
Upper Limit or Higher	Magenta
HDR area	Coloring according to the brightness
SDR area	Monochrome
Lower Limit or Lower	Black

3.23 Tally Display

Number of Displays	3 (TALLY-1, TALLY-2, TALLY-EXT) (*1)
Color	7 colors to choose from
Control Method	Remote connector, RS-422/485 connector

*1 The number of displays per channel. Arranged using the free layout function.

3.24 Camera ID Display

Number of Displays	2 (LABEL-1, LABEL-2) (*1)
Iris Display	1 (IRIS) (*1)
Control Method	Panel, RS-422/485 Connector

*1 The number of displays per channel. Arranged using the free layout function.

3.25 General Specifications

Environmental Conditions	
Operating Temperature	0 to 40 °C
Operating Humidity Range	85 %RH or less (no condensation)
Optimal Temperature	10 to 30 °C
Operating Environment	Indoors
Elevation	Up to 2,000 m
Overvoltage Category	Ⅱ
Pollution Degree	2
Power Requirements	
Voltage	90 to 250 VAC
Frequency	50/60Hz
Power Consumption	90W max.
Dimensions	482 (W) × 44 (H) × 300 (D) mm (excluding protrusions)
Weight	3.5 kg max. (including options, excluding accessories)
Accessories	Power cord 1
	Cover/Inlet stopper 1
	15-pin D-sub connector 1
	15-pin D-sub connector cover 1
	Instruction manual 1