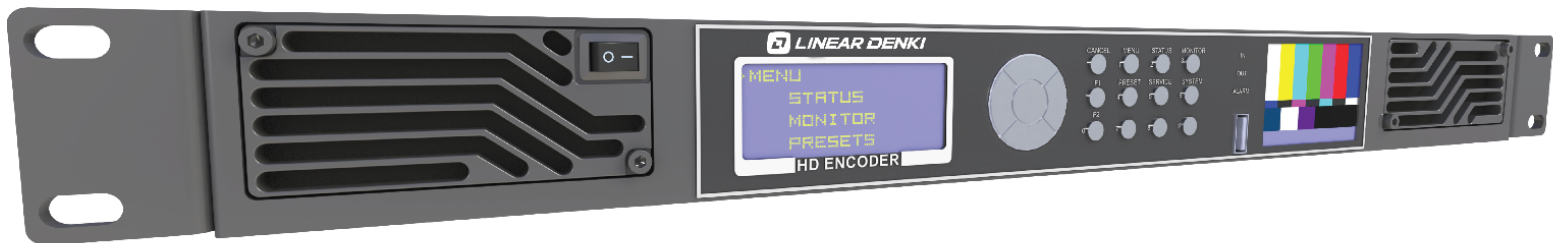


## MD9900e

HD/SD Encoder

H264 / MPEG2

HD / SD / 1-SEG



English

## MD9900e

High quality audio and video H264 and MPEG2 encoder designed to address a broad range of Digital Television applications. Its state of the art encoding core allows bouquet aggregators, broadcasters and video service operators to save bandwidth and reach their audiences with a revolutionized picture quality.

The MD9900e is based on 6th Generation compression engine that delivers the highest video quality at minimum bitrates with ultra-low latency.

The MD9900e comes also natively with advanced audio features (up to 8 stereo pairs per video channel) and optionally Dolby Digital (AC3) / Dolby Digital Plus (AC3+) and Dolby Digital-E support to cover any multi- language needs.

The MD9900e front panel and web based user interface provide quick access to configuration menus and immediate settings ensuring a super-fast boot.

## Key Features

- Programmable with a full set of MPEG-2/MPEG-4 tools and support for video interlacing (MBAFF and PAFF).
- It has advanced audio features (up to 8 stereo pairs) in addition to Dolby Digital (AC3)/Dolby Digital Plus (AC3+) encoding option and Dolby Digital-E support.
- Compression technology capable of delivering excellent HD signals for IPTV, DVB-S, DVB-T, DVB-C and ISDB-T.
- The front panel and WEB interface provide quick access to management and settings menus, ensuring quick start-up.
- SD/HD MPEG2, H264 4:2:0 8-bit
- Full One-SEG support for ISDB-Tb.
- Simultaneous stream broadcast on up to 4 primary + 4 backup destinations over IP.
- Statistical Multiplexing support.
- Confidence Audio / Video input monitoring.
- Ease of use with front panel and web GUI.

## General features

Dual PSU, ensure power redundancy

MPEG-2, H.264/MPEG-4 AVC encoding

Support for Picture-in-Picture.

Processing up to 8 pairs of audio.

High quality HD encoding for distribution.

Support for monitoring and control via SNMP.

Extended support for metadata (VBI, CC, DVB-subtitles).

Compliant with any distribution architecture (DVB-S/S2, DVB-T/T2, DVB-C/C2, ISDB-T, ATSC)

Ability to deliver two services on the same channel (HD 1SEG or SD - 1SEG).

Input for external synchronism (Genlock).

3G/HD/SD-SDI video input, with embedded audio. BNC 75 Ohm connector with loop. Optional 1080p input resolution.

Video input with automatic format detection.

MPEG4/AVC (H.264) video encoding - Video data rate from 1 to 30 Mbps.

Configuration and monitoring of audio and video via web and front panel.

Operation in CBR, VBR and statistical multiplexing support.

Optional dual channel encoder (with independent inputs and outputs).

## Technical Characteristics and Specification

Function	Characteristics	Requires	
<b>Video Input</b>			
<b>Inputs</b>	1 SDI input (per channel)		<b>Available</b>
	8 x 3G SDI inputs	HW: QUAD-3G SDI extension board	<b>Optional</b>
<b>Format</b>	3840x2160p 50fps / 59.94 fps / 60fps	UHD Licenses HW: UHD ready HW	<b>Optional</b>
	1080p 23.97fps / 24 fps / 25fps / 29.97fps / 30fps / 50fps / 59.94 fps / 60fps	1080p License (5)	<b>Optional</b>
	1080psf 23.97fps / 24fps / 25fps	HD License	<b>Available</b>
	1080i 25fps / 29.97fps / 30fps	HD License	<b>Available</b>
	720p 50fps / 59.94fps / 60fps	HD License	<b>Available</b>
	625i 25fps		<b>Available</b>
	525i 29.97fps		<b>Available</b>
<b>Probe</b>	Probe input		<b>Available</b>
<b>Genlock</b>	Blackburst and tri-level support		<b>Available</b>
<b>Emulation</b>	Black		<b>Available</b>
	Pattern / Moving pattern		<b>Available</b>
	Disable		<b>Available</b>
	User defined pattern		<b>Available</b>
	Last picture replay	Default mode	<b>Available</b>
	Force emulation		<b>Available</b>
<b>Audio Input</b>			
<b>Source</b>	SDI embedded (up to 16 per SDI input)		<b>Available</b>
	AES (8 AES pairs per AES board)	AES extension board	<b>Optional</b>
	Analog (4 analog pairs per analog board)	Analog extension board	<b>Optional</b>
	Input level up to 24 dBu		<b>Available</b>
<b>Analog Input Characteristics</b>	Left-Right gain difference < 0.1dB		<b>Available</b>
	Frequency response 20Hz – 20kHz < 0.7dB		<b>Available</b>
	ITU-R weighted noise: Peak < -66.2 dB / Mean < -68.4 dB		<b>Available</b>
	Inter channel crosstalk 20Hz – 20kHz >		<b>Available</b>
	75.9 dB whole band / > 94.5 dB @ 1kHz		<b>Available</b>
	Phase difference between stereo pairs 20Hz – 20kHz < 1°		<b>Available</b>
	Signal-to-noise and distortion ratio (SINAD) =84 dB		<b>Available</b>
	Signal-to-noise ratio (SNR) = 96 dB		<b>Available</b>
	Dynamic Range = 84 dB		<b>Available</b>
	PCM mono / stereo / dual mono / 5.1		<b>Available</b>
<b>Format</b>	Dolby E (decoding and pass-through)	DolbyE License for decode	<b>Optional</b>
	Dolby Digital / Dolby Digital Plus ( <b>pass-through</b> )		<b>Available</b>
	AES3 ( <b>pass-through</b> )		<b>Available</b>
<b>Selection</b>	Group/Pair SDI embedded		<b>Available</b>
	XLR external AES	AES board	<b>Optional</b>
	XLR external analog	Analog board	<b>Optional</b>
<b>Emulation</b>	Silence		<b>Available</b>
	White noise		<b>Available</b>
	Sine 440Hz		<b>Available</b>
	Force the emulation of audio signal		<b>Available</b>

## Data Input

VBI	VITC (IEC-60461), WSS (ITU-R BT.1119-2)	Available
	VPS (ETS 300 231-1998), WST (ITU-R BT.653-3)	Available
	Close Caption (CEA/EIA-608-D)	Available
	Teletext (ETSI EN 300 706)	Available
	Video Index (RP 186)	Available
ANC	ATC (SMPTE 12M-2)	Available
	AFD (SMPTE 2016M-1)	Available
	Close Caption - EIA 608 (SMPTE 334-2), EIA 708 (SMPTE 334-1)	Available
	Teletext - OP47	Available
	Teletext/VPS - SMPTE 2031M	Available
	VANC - SMPTE 2038	Available
	SCTE104 - SMPTE 2010	Available

**OBS:** Black Burst/3Level and ASI Synchronization are not supported.

## Filter

Video filtering	Resize: 4/5, 3/4, 2/3, 1/2, SD, CIF/ SIF, QCIF, SQCIF, crop 704 support	Available
	PIP resize: SD, CIF/SIF, QCIF, SQCIF, 320x180, 192x192, 160x120, 96x96	PIP License PIP SD license
	Denoiser (3 levels : Low, Medium and High)	Available
Audio filtering	Resampling 48kHz	Available
	Gain (+/- 30dB)	Available
	Delay (+/- 500ms)	Available
	PCM downmix/upmix	Available
Teletext filtering	Field line selection	Available

## Video Input

Video Processing	Main (4:2:0) 8-bit	HEVC License	Optional
	Main 10 (4:2:0) 10-bit	HEVC & 10b Licenses	Optional
	Main 12 (4:2:0) 12-bit	HEVC & 12b Licenses	Optional
	Main 422 10 (4:2:2) 10-bit	HEVC & 10b & 422 Licenses	Optional
	Main 422 12 (4:2:2) 12-bit	HEVC & 12b & 422 Licenses	Optional
	Profile MPEG-4 AVC	Baseline 4:2:0 8 bits	MPEG4 License
Main, High 4:2:0 8 bits up to 1080p50/59.94		MPEG4 License	Available
High 4:2:0 10 bits up to 1080i25/29.97		MPEG4 & 10b Licenses	Optional
High 4:2:2 8 bits up to 1080p50/59.94		MPEG4 & 422 Licenses	Optional
High 4:2:2 10 bits up to 1080i25/29.97		MPEG4 & 422 & 10b Licenses	Optional
Frame / Field / PAFF / MBAFF selection			Available
CABAC / CAVLC selection			Available
Profile MPEG-4 AVC-I	High 10 Intra 8/10 bits	AVC-I License	Optional
	High 4:2:2 Intra 8/10 bits	AVC-I License	Optional
Profile MPEG-2	Main, High 4:2:0 8 bits	MPEG2 License	Available
	High 4:2:2 8 bits	MPEG2 License	Available

	CBR		Available
Rate Control	VBR - Quality capped		Available
	VBR - Statmuxed	StatMux License	Optional
	VBR - Rate capped	SCI License	Optional
Bitrate	MPEG-2: up to 100Mbps (420 is limited to 80Mbps)	MPEG2 License	Available
	MPEG-4: 0.8Mbps to 120Mbps (8 bits is limited to 62.5Mbps)	MPEG4 License + Bitrate License	Optional
	AVC-I: up to 150Mbps (8 bits is limited to 115Mbps)	AVC-I License	Optional
	HEVC: up to 120Mbps	HEVC License + Bitrate License	Optional
Gop	0-255		Available
Preset	Custom Adv. & Exp, High Quality, Reduced Latency, Low latency, Ultra Low Latency	Ultra Low Latency License	Optional

OBS: MPEG-4 Minimum bitrate is limited to 3.2Mbps with Low Latency or UltraLow Latency Presets.

PIP Processing			
Profile H.264	Baseline, Main, High 4:2:0 8 bits	PIP & MPEG4 Licenses	Available
	High 4:2:2 8 bits	PIP & MPEG4 & 422 Licenses	Optional
Profile AVC-I	High 10 , High 4:2:2 Intra 8 bits	PIP & AVC-I Licenses	Optional
Profile MPEG2	Main, High 4:2:0 8 bits , High 4:2:2 8 bits	PIP & MPEG2 Licenses	Available
Rate Control	CBR, VBR - Quality capped		Available
	VBR - Statmuxed	StatMux License	Optional
	VBR - Rate capped	SCI License	Optional
Preset	Custom Adv. & Exp., High Quality, Reduced Latency, Low latency, Ultra Low Latency	Ultra Low Latency License	Optional

Audio Processing			
Number of tracks	Up to 36 per video service	Audio Number License	Optional
	MPEG1-LII [32-384kbs]	Default codec	Available
	MPEG2-AAC-LC [16-512kbs]	AAC License	Available
	MPEG4-AAC-LC [16-512kbs]	AAC License	Available
	MPEG4-AAC-HE [16-96kbs]	AAC License	Available
	MPEG4-AAC-HEv2 [8-48kbs]	AACHEv2 License	Available
Codec	DolbyE <b>pass-through</b> (up to 24 bits)		Available
	Dolby Digital / Dolby Digital Plus ( <b>pass-through</b> )		Available
	DolbyE decoding to Dolby Digital / DolbyDigital+	DolbyE & AC3 License	Optional
	Dolby Digital / Dolby Digital+ encoding	AC3 License	Optional
	Dolby DD+ JOC	Dolby Digital Plus with Dolby Atmos encoding license	Optional
ALC	MPEG-H	MPEG-H encoding license	Optional
	EBU R128 Mode / [-40,-10] LUFS / -23 LUFSby default	ALC License	Optional
	ATSC A85 Mode / [-40,-10] LKFS / -23 LKFSby default	ALC License	Optional

Data Processing			
SCTE35	SCTE104 (VANC/SDI) to SCTE35 (TS) <sup>2</sup>		Available
	GPI to SCTE35 (TS)		Available
SCTE35 capacity	Up to 32 messages per video frame		Available
SCTE104 filtering	Using AS index or DPI PID index		Available
	RP 186 to Video ES Aspect ratio		Available
Aspect Ratio	WSS to Video ES Aspect ratio and or to PIDWSS (as WSS pass-through)		Available
	AFD to Video ES Aspect ratio		Available
TimeCode	SMPTE-12M (VANC/SDI) to SMPTE-328M(TS)		Available
	IEC-60461 (VBI/SDI) to SMPTE-328M (TS)		Available

<b>STD-B24</b>	Close Caption to STD-B24 (ABNT NBR 15606)		<b>Available</b>
<b>DVB Subtitles</b>	EN 300-743	Data pass-through License	<b>Optional</b>
	ASI / IP Input support	Data pass-through License	<b>Optional</b>
	Teletext to DVB Subtitles transcoding	Teletext to DVB Subtitles License	<b>Optional</b>
<b>Teletext</b>	VBI and ANC		<b>Available</b>
	ASI / IP Input support	Data pass- through License	<b>Optional</b>
<b>MPE</b>	Multi-Protocol Encapsulation	MPE License	<b>Optional</b>

<b>1+1 Redundancy</b>			
<b>Configuration</b>	No NMS required	1+1 Redundancy License	<b>Optional</b>
	Simple configuration	1+1 Redundancy License	<b>Optional</b>
<b>Monitoring</b>	SDI / AES input	1+1 Redundancy License	<b>Optional</b>
	Coupled unit	1+1 Redundancy License	<b>Optional</b>
	IP output	1+1 Redundancy License	<b>Optional</b>
<b>Delay</b>	Mute time between 500ms to 750ms	1+1 Redundancy License	<b>Optional</b>
	Unmute time between 1s to 1.25s	1+1 Redundancy License	<b>Optional</b>

<b>Remuxer</b>			
<b>Input</b>	2 External ASI Inputs	TS Remux	<b>Available</b>
	2 Internal Inputs: Channel 1 Main or Channel1 PIP	TS Remux	<b>Available</b>

<b>Muxer</b>			
<b>MPEG2-TS</b>	Output mode CBR / VBR		<b>Available</b>
	Packet size 188/204		<b>Available</b>
	PID setting for Video, Audio, Data		<b>Available</b>
	Bitrate up to 210 Mbps		<b>Available</b>
<b>BISS</b>	Biss 0/1/E/ and Biss-2 1/E support	BISS License	<b>Optional</b>
	BISS disabling control at ES level	BISS License	<b>Optional</b>
	BISS-CA support	BISS-CA License	<b>Optional</b>
<b>DVB Carrier ID</b>	Carrier ID descriptor support		<b>Optional</b>
<b>Flexibility</b>	Dynamical change of TS PID		<b>Optional</b>
	Dynamical change of BISS-1/E and BISS2-1/Ekey		<b>Optional</b>
<b>Conformance</b>	MPEG / DVB / ATSC / ISDB / SBTVD		<b>Available</b>

<b>Output</b>			
<b>ASI</b>	<b>Single Channel:</b> 3 Outputs		<b>Available</b>
	<b>Dual Channel:</b> 2 Outputs @Channel-one; 1 Output @Channel-two		<b>Optional</b>
<b>IP</b>	1 MGT interface		<b>Available</b>
	2 Stream interfaces		<b>Available</b>
	Backup stream		<b>Available</b>
	Multi-network (4 target streams)		<b>Available</b>
<b>Network</b>	VLAN TAG		<b>Available</b>
	Route Table Editor		<b>Available</b>
	Multi Gateway		<b>Available</b>
	User defined TOS support		<b>Available</b>
	Source Address Spoofing		<b>Available</b>
<b>Protocol</b>	UDP / RTP		<b>Available</b>
	FEC (SMPT2022) - 1D and 2D FEC support	FEC License for main streams only	<b>Optional</b>

<b>IP Protection ARQ</b>	Zixi feeder	ZIXI License	Optional
	Zixi ABR mode	ZIXI License	Optional
	Zixi AES encryption [Disabled / AES 128 / AES192 / AES 256]	ZIXI License	Optional
	Zixi bonding [Disabled / Shared / Backup]	ZIXI License	Optional
<b>RIST</b>	Multicast data delivery through the unicast RIST tunnel	RIST License	Optional
<b>SRT</b>	SRT streaming		Optional
<b>IP Protection 2022-7</b>	SMPTE-2022 Hitless for RTP backup stream		Optional

### Configuration and management interfaces

<b>SNMP</b>	SNMP (MIB v2c) with remote SNMP supervisor		Available
<b>Web GUI</b>	Embedded web-server configuration		Available
	HTTP logins with read-only guest mode or full access admin mode		Available
<b>Front Panel</b>	Front panel with LCD/alphanumeric keypad/Direct access keys		Available
	USB for configuration import/export		Available
	USB for software update		Available
	Video monitoring on Front panel video display		Available
	Audio monitoring on Front panel video display		Available
	Video monitoring on WebGUI		Available
<b>HTTP</b>	Http commands for file transfer		Available
<b>VPN access</b>	OpenVPN client technology		Available

### System

<b>Time</b>	Manual time update		Available
	GMT offset		Available
	NTP (high precision option)		Available
	PTP		Available
<b>Alarms</b>	Individual trap support		Available
	SNMP trap support		Available
	GPO action on alarm		Available
	Alarm message time filtering		Available
<b>Password</b>	SNMP R & RW, WebGui		Available
<b>Firmware</b>	Firmware update		Optional
	Backup firmware save & restore		Available
	License update		Optional
<b>Front panel</b>	Backlight timeout of LCD & video displays can be configured		Available
<b>MIB</b>	MIB package (including changelog) is embedded		Available
<b>3D &amp; 4K</b>	Video Phase Shift Control	VPSC License	Available
<b>GPIO</b>	2 Inputs, 2 outputs		Available

## Hardware Options

Hardware Versions			Available / Optional
<b>SDI over IP</b>	Additional SMPTE-2110 I/O board 10GbE speed		Optional
<b>AES</b>	Additional digital AES/EBU inputs audio board + audio cable; up 16 audio inputs.		Optional
<b>ANL</b>	Additional analog input audio board+ audio cable; up 8 audio inputs.		Optional
<b>MOD-SATx</b>	Additional modulator option L-Band or IF		Optional

## Physical specifications, Environmental and Power

Dimensions	
<b>Rack 19"</b>	1 RU
<b>(Height x Width x Length.)</b>	44 x 482 x 519 (mm) 1 ¾ x 19 x 20 ½ (in)
<b>Weight</b>	6,2 Kg (13,7 lb) - Max

Environment Features	
<b>Operating altitude</b>	Up to 2500 <sup>3</sup> meters above sea level
<b>Environment temperature range</b>	0 °C a +55 °C
<b>Environment humidity range</b>	5 to 95 % non-condensing

Electrical characteristics	
<b>AC input voltage</b>	100-240 VAC
<b>AC frequency</b>	40 / 60 Hz
<b>AC consumption</b>	90 W (single channel)

**Notes:**

<sup>1</sup> Ethernet is a trademark of Xerox Corporation.

<sup>2</sup> MPEG-4 Maximum bitrate is limited to 100 Mbps on Encoder board type 1.

<sup>3</sup> Above 2500 meters (8200 ft), consult factory.

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