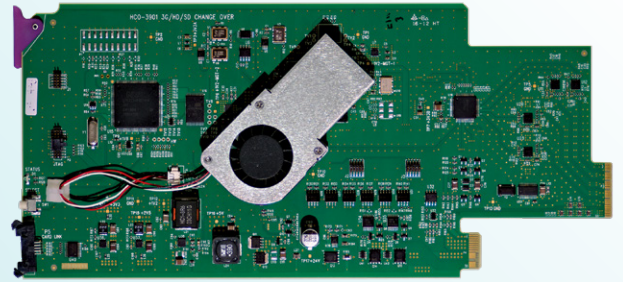


DATASHEET

HCO-3901 & HCO-3901-4K

3G/HD/SD/ASI and 4K UHD Change-Over with Clean Switch and ALC



Space-saving, modular platform for advanced signal processing.

The HCO-3901 from Grass Valley® is a 3x1 3G/HD/SD/ASI change-over which supports 16 channels of embedded audio and metadata. The module can perform a video and audio “Clean and Silent Switch” between sources using the CS option (not available with ASI signals). In the event of a power failure, the PGM signal is protected by relays fitted on the rear module, maintaining the integrity of the selected signal at the output. Relays are fully controllable via GPI. With the addition of the HCO-3901-3DRP-R-EX rear panel, the HCO-3901 now supports paired outputs for 3G/HD/SD SDI (single outputs only for ASI).

Input selection can be performed automatically or manually. In automatic mode, the card will perform input selection between IN 1 and IN 2 based on internal signal analysis with alarm parameters, and the status of the inputs. In manual

mode, any three sources can be selected from the Densité® controller, the GV Orbit® or iControl™ software, or simply by using a GPI (3DRP rear only). A GPI can be connected to an automation system or any simple GPI control panel. The GPI outputs give status of the selected source allowing tallies to be triggered.

The HCO-3901 provides up to eight 3G/HD/SD SDI video outputs (depending on the rear panel in use). The preview outputs are user selectable to follow the main program output, video inputs IN 1, IN 2 or IN 3.

The latest addition, HCO-3901-4K, supports 4K UHD Quad-Link SDI change-over with support for embedded audio and metadata. The additional HCO-3901-X4RP remote control connector supports glitch-free switching of four synchronized 3G-SDI signals or Quad Link 3G-SDI signals.

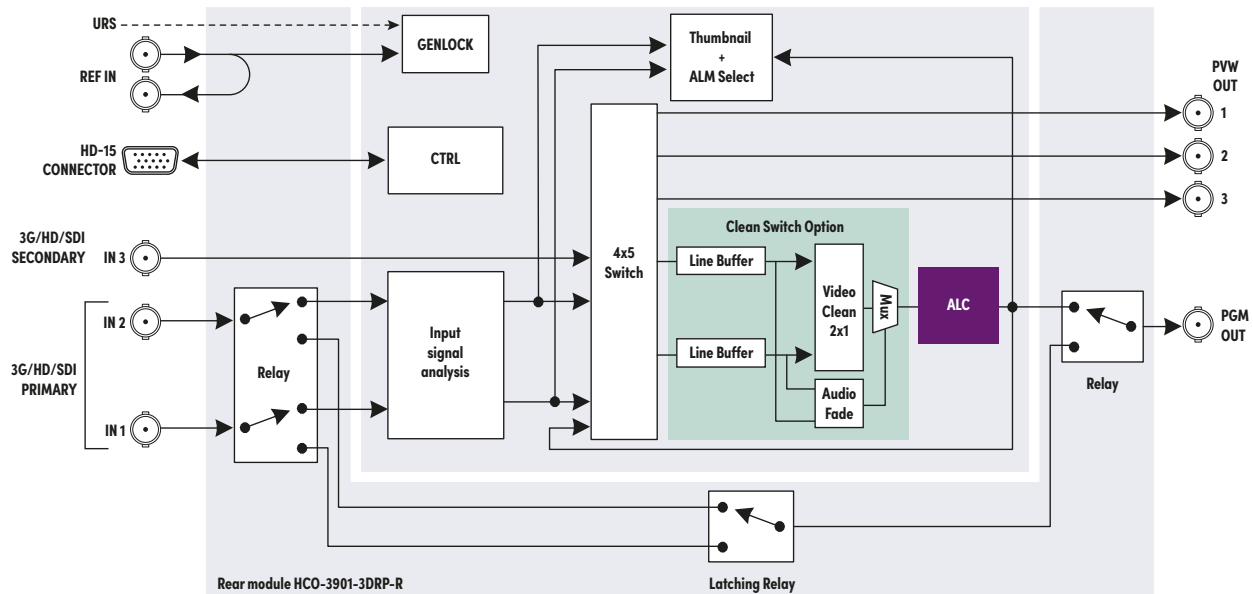
Grass Valley’s automatic loudness control (ALC) option can eliminate objectionable loudness variations between programs and commercials (not available with ASI signals).

The module provides streaming video and audio level metering so an operator can remotely and effectively monitor the signal path using Grass Valley’s GV Orbit facility monitoring and control system.

The HCO-3901 is a 3 RU card and is available with a one or two slot rear module. Up to 20 modules can fit in a 3 RU Densité frame with a 1-slot rear module (or 19 with REF-1801). The HCO-3901-4K kit fits in a 3 RU Densité 3 and Densité 3+ FR4 frame and requires eight slots for an installation.

Key Features

- Two primary inputs: IN 1 and IN 2 plus one secondary: IN 3
- Four outputs: main program and three previews
- Eight outputs (with EX rear): paired outputs for main program and each of the three previews (single outputs only for ASI)
- Supports 3G, HD (1080i50/59.94, 720p50/59.94) and SD (525, 625) or ASI input and output
- Supports 4K UHD Quad-Link 3G-SDI with optional HCO-3901-X4RP remote control panel
- Electronic switching with relay backup (on rear module) maintains selected input with power loss for Primary inputs IN 1 and IN 2
- Automatic mode using internal signal analysis with alarm parameters for IN 1 and IN 2
- Manual change-over by local frame controller, GV Orbit, iControl, iControl Solo or GPI (3DRP rear) for 3 inputs
- Alarm reporting to GV Orbit facility monitoring and control system
- GPI in and out (IN 1, IN 2, IN 3, auto, bypass)
- Optional clean switch function (video and 16 channels of audio) for IN 1 and IN 2 (not available with ASI signals)
- Optional on-board automatic loudness control by Grass Valley (not available with ASI signals)
- Reference input with passive loop through (3DRP rear only)
- Two line timing window with CS option (not available with ASI signals)
- Thumbnail and audio level meter streaming for IN 1, IN 2 and PGM OUT (not available with ASI signals)
- Loudness compliant to EBU R128-2014, ATSC A/85:2013 (FCC CALM compliant) and ARIB TR-B32 (ITU-R BS.1770-3)

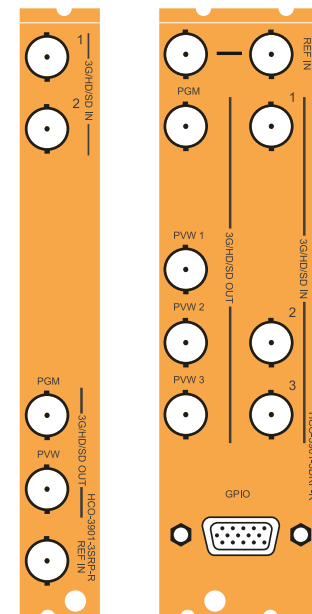


HCO-3901 Functional Block Diagram



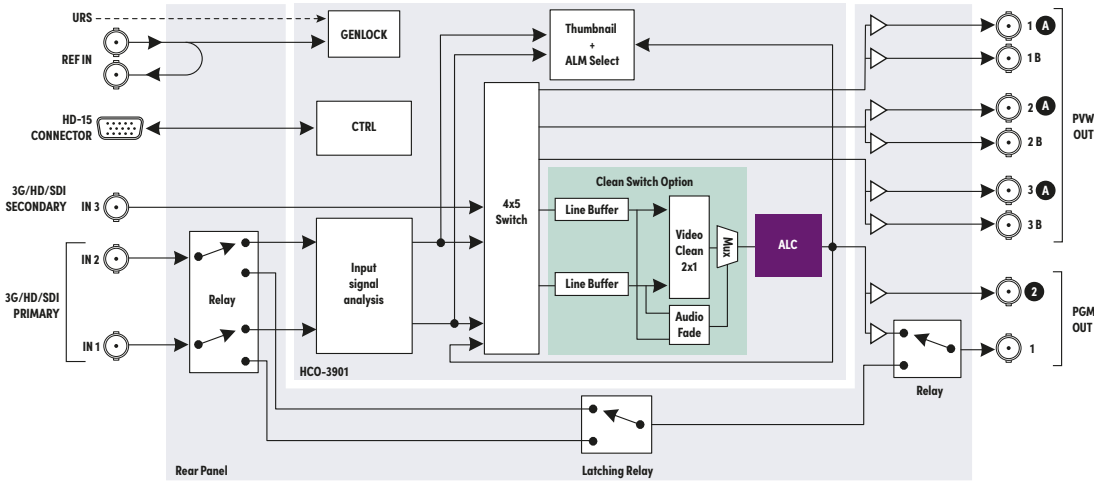
Alarm Parameters

Video	3G	HD	SD	ASI
Loss of video	X	X	X	X
Video error	X	X	X	
Black detect	X	X	X	
Freeze detect	X	X	X	
Video format	X	X	X	
Audio				
Audio presence (per group)	X	X	X	
Silence detect (per channel)	X	X	X	

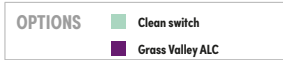


HCO-3901-3SRP-R

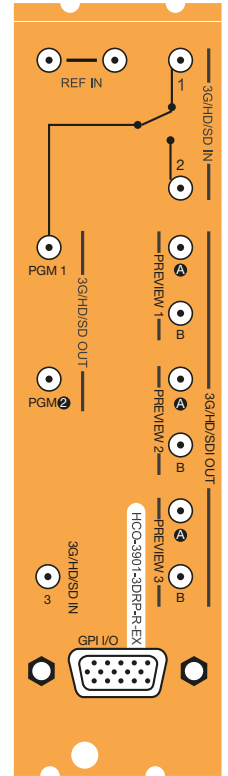
HCO-3901-3DRP-R



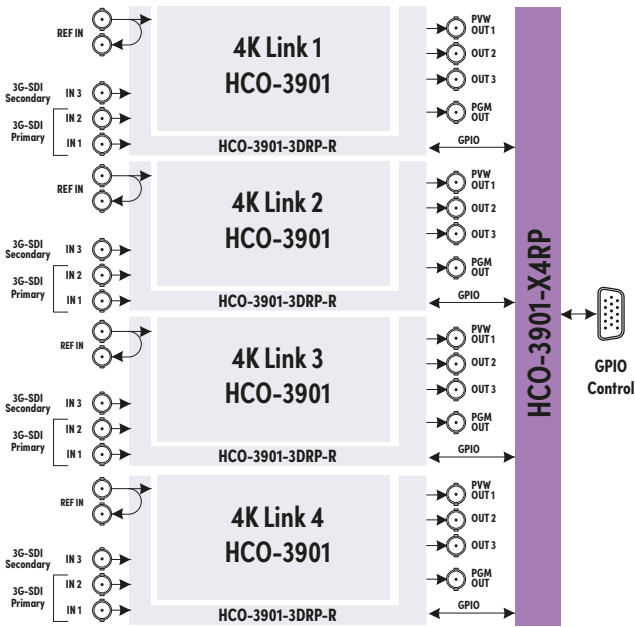
HCO-3901 and the HCO-3901-3DRP-R-EX Rear Panel Functional Block Diagram



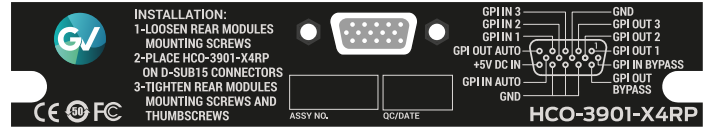
Note: Numbered outputs marked with black circles are not suitable for DVB-ASI distribution.



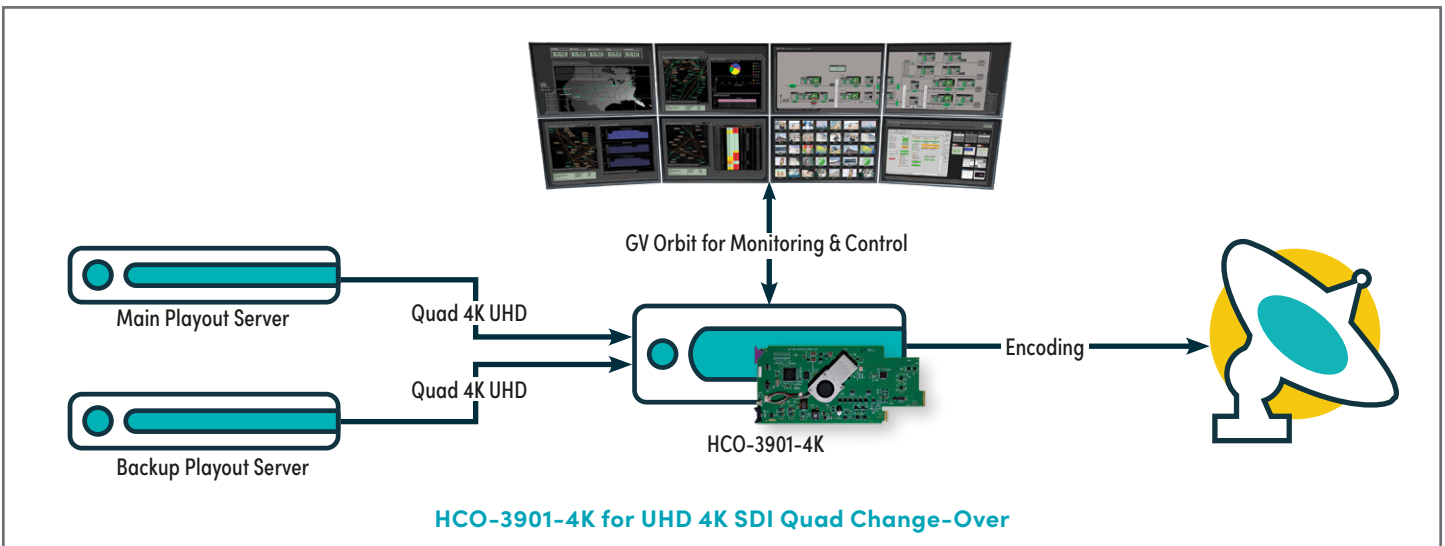
HCO-3901-3DRP-R-EX



HCO-3901-4K Functional Block Diagram



HCO-3901-X4RP



HCO-3901-4K for UHD 4K SDI Quad Change-Over

Specifications

SDI (Inputs/Outputs)

SDI Standards:

- SD: SMPTE ST 259-C (270 Mb/s)
- HD: SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)
- 3G: SMPTE ST 425 (2.970, 2.970/1.001 Gb/s)
- DVB-ASI: EN 50083-9

Supported Formats:

- SD: SMPTE ST 125: 480i59.94, 576i50
- HD: SMPTE ST 274: 1080i59.94, 1080i50
- HD: SMPTE ST 296: 720p59.94, 720p50
- 3G: SMPTE 425 level A (mapping 1): 1080p59.94, 1080p50
- 4K UHD: Quad Link 3 Gb/s SMPTE ST 425-5 (3G-SDI Link 1, Link 2, Link 3 and Link 4): 1080p59.94, 1080p50

Cable Length¹:

- 350m (1,148 ft.) Belden 8281 at 270 Mb/s
- 130m (426 ft.) Belden 1694A at 1.485 Gb/s
- 90m (295 ft.) Belden 1694A at 2.970 Gb/s

Return Loss:

- >15 dB up to 270 MHz (PGM out)³
- >15 dB up to 1.5 GHz (IN 3, PVW out)³
- >12 dB up to 1.5 GHz (PGM out)³
- >10 dB up to 1.5 GHz (IN 1, IN 2)²
- >10 dB up to 3 GHz (IN3, PVW out)³
- >8 dB up to 3 GHz (IN 1, IN 2)²
- >7 dB up to 3 GHz (PGM out)³

Jitter:

- SD/HD <0.2 UI (alignment jitter)
- 3G <0.3 UI (alignment jitter)

Reference Input (1)

Signal:

- SMPTE ST 170/SMPTE ST 318/ITU 624-4/BUT 470-6 or composite sync
- SMPTE ST 274/SMPTE ST 296 tri-level sync

Return loss: >35 dB up to 5.75 MHz

GPI (10)

Connector: HD-15, opto-isolated, common ground

GPI IN (5): Contact closure to ground

GPI OUT (5): Contact closure to ground

External pull up Voltage: 3.3V to 24V max

External GPI power: 5V nominal

Video Processing Performance

Signal path: 10 bits

Latency:

- 0.4 ns without CS option and ALC option
- Maximum of 2 lines with CS or ALC option

Audio Processing Performance

Quantization: 20-24 bits

Sampling: 48 kHz, synchronous

Number of channels: 16, 4 groups

Audio latency:

- 0.4 ns without CS option and without ALC option
- Add 1 ms if CS option is enabled
- Add 1 ms if ALC option is enabled

Electrical

Power: 10W

Note 1: Cable length and return loss specifications will be reduced when using the output protected by the bypass relay, refer to the manual for more details.

Note 2: Input protected by relay.

Note 3: PGM output protected by relay.



Ordering

Densité 3 Frame

HCO-3901	Description
HCO-3901	3G/HD/SD change-over with optional clean switch and ALC
HCO-3901-3SRP-R	Single rear connector with bypass relay
HCO-3901-3DRP-R	Double rear connector panel with bypass relay
HCO-3901-3DRP-R-EX	Double rear connector panel with bypass relays and paired output

Densité 3 and Densité 3+ FR4 Frame

HCO-3901-4K	4K UHD change-over with optional clean switch and ALC <i>HCO-3901-4K consists of:</i> 4x HCO-3901, 4x HCO-3901-3DRP-R, 1x HCO-3901-X4RP
HCO-3901-X4RP	Remote control connector panel for Quad Link 4K UHD

Options (Software)

Options (Software)	Description (Note that all of the following options are not functional with ASI signals)
HCO-3901-OPT-CS	Clean switch option
HCO-3901-OPT-ALC-2	2-channel on-board ALC option
HCO-3901-OPT-ALC-6	6-channel on-board ALC option
HCO-3901-OPT-ALC-8	8-channel on-board ALC option
HCO-3901-OPT-ALC-16	16-channel on-board ALC option

Options (Hardware)

NSH15M	HD-15 to terminal block adapter
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Options for HCO-3901-4K Only

HCO-3901-OPT-CS	Clean switch option (4 licenses required for HCO-3901-4K)
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ALC: Any software option from above is allowed, but only one is required and applies to the first HCO-3901 (Q1) card in the HCO-3901-4K KIT

This product may be protected by one or more patents. For further information, please visit: www.grassvalley.com/patents

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