

Densité Synchronization & Reference

This lineup offers advanced tools for synchronization, reference signal generation, and frame processing, ensuring precision and reliability in broadcast workflows.

FRS-3901

3G/HD/SD Frame Synchronizer with Embedded Audio Processor

XVP-3901-FS

3G/HD/SD Frame Sync/ARC with Optional Audio Processor

XVP-3901-FS-R

3G/HD/SD Frame Sync Optimized for Rears with Bypass Relay

FRS-1801

HD/SD Frame Synchronizer

XVP-1801-FS

HD/SD Frame Sync and ARC

REF-1801

Reference Module with Optional Sync Pulse Generator

SPG-1801

Sync Pulse Generator

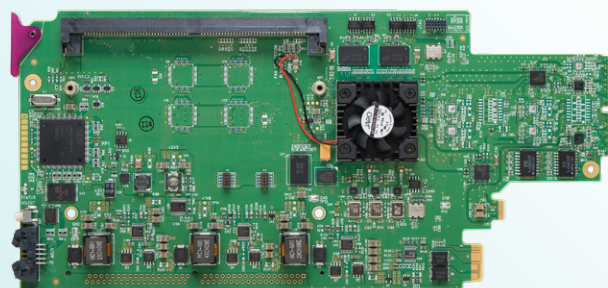
GPI-1501

GPI I/O Module

FRS-3901

3G/HD/SD Frame Synchronizer with Embedded Audio Processor

Space-saving, modular platform for advanced signal processing.



The FRS-3901 from Grass Valley® is a highly integrated module which offers frame synchronization and video/audio processing, including color correction and delay, for 3G, HD and SD signals in 3G/HD/SD hybrid plants. The FRS-3901 features an advanced embedded audio processor which can simultaneously process up to 32 channels of audio (16 channels of embedded audio from the video plus others generated internally). Functions include downmixing, proc amp, channel shuffling and mixing, and loudness measurement.

The loudness measurement function allows the measurement and logging of up to four audio programs with iControl™ loudness monitoring software to analyze and report compliance with respect to various loudness legislations around the world.

The FRS-3901 has one on-board socket for optional modules, including Dolby E and Dolby Digital decoding, upmixing using Linear Acoustic upMAX technology, Dolby E encoding, Dolby Digital and Dolby Digital Plus encoding. In addition

to Grass Valley's own automatic loudness control (ALC) solution for up to eight programs, the AMX-3981 offers ALC using the AEROMAX technology module by Linear Acoustic, capable of maintaining constant loudness across different audio programs.

The card will pass and delay automatically all 32 internal audio channels to preserve lip-sync between the channels. Each channel can be delayed independently to correct any lip-sync issues. All audio channels can be mixed and shuffled to provide 16 channels for embedding in the video output.

An automatic preset recall feature provides basic automation to select user preset based on the status of the incoming audio.

When genlocked to an external reference or to the frame reference using the internal URS signal, the FRS-3901 can handle video hot switches at the input without losing sync at the output. In absence of the video input, the card can freeze the output to the last good frame, field or black.

The card has a frame buffer which allows an increase in the video delay of up to 15 frames to compensate for the long audio processing delay required by some modules.

The FRS-3901 has three GPIOs that can be used as input or output to embed or extract GPI events to/from the timecode user bits in transport applications, or they can be used simultaneously to trigger the card's user presets.

Dolby metadata insertion in the VANC is possible from multiple sources, such as a Dolby E decoder module, an embedded VANC stream, an external RS-422 link, or from the integrated metadata generator. All parameters in the metadata stream can be probed and monitored. Dolby metadata can be used to steer the behavior of the audio downmix and upmix modules.

The FRS-3901-3SRP-R rear module has a bypass relay that can be used to bypass the main input directly to the output in the event of card failure, loss of power or card removal.

The FRS-3901-3SRP-F rear module has a fiber input/output cartridge. Once the cartridge is installed, the inputs or outputs are selectable through the control interface. The input of the card allows you to select between fiber and copper inputs. The outputs are via copper and fiber simultaneously (with appropriate fiber cartridge).

There are many benefits to the FRS-3901's high level of feature integration. A lower purchase cost per channel is obviously highly desirable but there are many other dimensions to cost savings that are readily achievable. These include reduced space and cooling costs, less cabling and a reduced spares inventory. By simplifying video

and audio synchronization, and reducing the number of vendors, the system integration is also simplified significantly.

Key Features

Video

- 3G/HD/SD frame synchronizer, delay and line sync
- Supports 3 Gb/s level A (mapping 1) and level B
- Flexible HD/SD/URS reference input
- Video delay up to 15 frames
- Audio/video de-glitcher to handle video hot switch at the input
- Automatic detection of input video loss and switchover to local grey for continuity of embedded audio
- Built-in proc amp with YUV/RGB color correction
- Bypass relay with FRS-3901-3SRP-R rear module
- Optional optical fiber module I/O with FRS-3901-3SRP-F rear

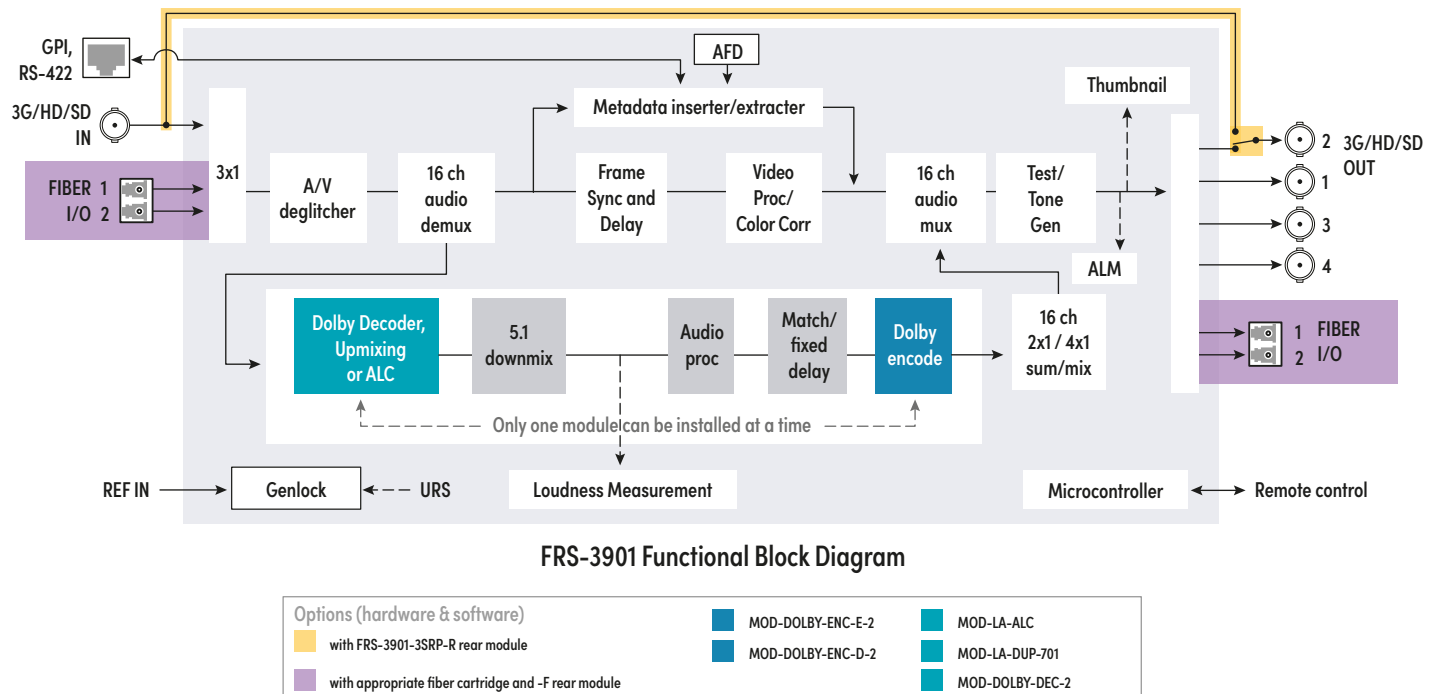
Metadata

- AFD (SMPTE ST 2016), VLI (RP-186) and WSS insertion
- Audio metadata insertion and extraction (SMPTE ST 2020-A)
- RS-422 serial data input and output to carry audio metadata
- 3 GPI inputs and outputs that can be inserted or extracted in the timecode user bits. They can also be used for automation, user preset recall and loudness reset

Audio

- Full audio shuffling and mixing on a channel basis
- 32 channels internal audio processing
- Audio 5.1 surround downmix to Lt/Rt or Lo/Ro

- Loudness measurement of up to four audio programs and logging with iControl loudness monitoring option
- Loudness compliant to EBU R128-2014, ATSC A/85:2013 (FCC CALM compliant) and ARIB TR-B32 (ITU-R BS.1770-3)
- Automation capabilities based on audio signal type detection
- Audio delay adjustments of up to 2 seconds to compensate for lip sync issues
- On-board socket for one optional module expansion:
 - Dolby E and Dolby Digital decoder
 - Dolby Digital and Dolby Digital Plus encoder
 - Dolby E encoder
 - Linear Acoustic upMAX
 - Linear Acoustic AEROMAX automatic loudness control



Specifications

Video Input/Output

Signal (1):

- SMPTE ST 259-C (270 Mb/s)
- SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)
- SMPTE ST 424 (2.970, 2.970/1.001 Gb/s)

Supported formats:

- SD: 480i59.94, 576i50
- HD: SMPTE ST 274: 1080i59.94, 1080i50
- HD: SMPTE ST 296: 720p59.94, 720p50
- 3G: SMPTE ST 425 level A (mapping 1), level B: 1080p59.94, 1080p50

Cable length*:

- 300m (984 ft.) Belden 1694A at 270 Mb/s
- 150m (492 ft.) Belden 1694A at 1.485 Gb/s
- 120m (393 ft.) Belden 1694A at 2.970 Gb/s

Return loss*: >15 dB up to 3 GHz

litter:

- HD/SD: <0.2 UI
- 3G: <0.3 UI

Reference Input

Signal:

- SMPTE ST 170/SMPTE ST 318/ITU 624-4 blackburst
- SMPTE ST 274/SMPTE ST 296 tri-level sync

Return loss: >35 dB up to 5.75 MHz

Optical

Signal: Refer to SFP module specifications

GPIO

Signal (3): Contact closure to ground

Connector: RJ45

Direction: Bidirectional (application specific)

RS-422

Signal (2): RS-422

Input level: 300 mVp-p (min)

Output level: 3 Vp-p (min)

Rate: 115,200 Bd

Video Processing Performance

Signal path: 10 bits

Processing delay: 1 frame

Additional delay: Up to 15 frames upon user selection

Audio Processing Performance

Quantization: 24 bits

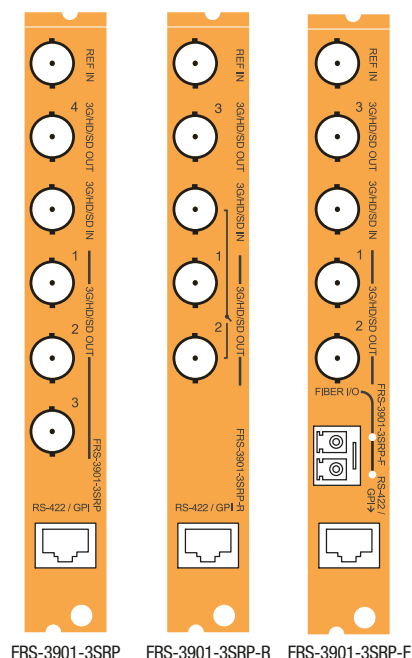
Sampling: 48 kHz, synchronous

Audio delay: Up to 2s (1 ms steps)

Electrical

Power: 12.5W

* Cable length and return loss specifications will be reduced when using the FRS-3901-3SRP-R rear connector. Refer to the manual for more details.



Ordering

Densité 3 frame	Description	MOD-DOLBY-ENC-E-2	Dolby E encoder
FRS-3901	3G/HD/SD frame synchronizer with embedded audio processor	MOD-DOLBY-ENC-D-2	Dolby Digital and Dolby Digital Plus encoder
FRS-3901-3SRP	Single rear connector panel	MOD-DOLBY-DEC-2	Dolby E and Dolby Digital decoder
FRS-3901-3SRP-F	Single rear connector panel with fiber connector	MOD-LA-DUP-701	Upmixing using Linear Acoustic Technology upMAX
FRS-3901-3SRP-R	Single rear connector panel with bypass relay	MOD-LA-ALC-2	2-channel ALC licensed by Linear Acoustic
Options (Hardware)		MOD-LA-ALC-6	6-channel ALC licensed by Linear Acoustic
SFP-RR-LC	Dual fiber Rx (input) cartridge with LC/PC connector	MOD-LA-ALC-8	8-channel ALC licensed by Linear Acoustic
SFP-TT-S13S13-LC	Dual fiber Tx (output) cartridge at 1310 nm with LC/PC connector	MOD-LA-ALC-2-DUP	2-channel ALC and upmix licensed by Linear Acoustic
SFP-R-LC	Single fiber Rx (input) cartridge with LC/PC connector	MOD-LA-ALC-6-DUP	6-channel ALC and upmix licensed by Linear Acoustic
SFP-T-S13-LC	Single fiber Tx (output) cartridge at 1310 nm with LC/PC connector	MOD-LA-ALC-8-DUP	8-channel ALC and upmix licensed by Linear Acoustic
SFP-RT-S13-LC	Single fiber Rx (input) and Tx (output) cartridge at 1310 nm with LC/PC connector	Housing Frame	Densité 3 Frame
		Remote Control	GV Orbit, iControl, iControl Solo

Other types of SFP Optical Plug-In Cartridges may be available for this product

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

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XVP-3901-FS

3G/HD/SD Frame Sync/ARC with Optional Audio Processor

Space-saving, modular platform for advanced signal processing.

The XVP-3901-FS from Grass Valley® is a highly integrated, 3G/HD/SD frame synchronizer/aspect ratio converter and optional video/audio signal processor, which is designed to synchronize and process HD and SD signals for 3G/HD/SD hybrid plants. It is identical to the XVP-3901 except that it does not have up/down/crossconversion capabilities.

It features a dual 3G/HD/SD input selector and provides multiple outputs. Although not up/down/crossconverting the input signal, the -FS model can still perform ARC control on SD signals, useful when converting 16:9 SD signals to 4:3 SD signals and vice-versa.

High-quality aspect ratio conversion is performed at both 50 and 59.94 Hz, based on multiple sophisticated processing technologies. These include detail enhancement, pixel-based deinterlacing, and advanced motion adaptive deinterlacing and antirringing.

To ensure that the signals are delivered in the correct aspect ratio when aired, the XVP-3901-FS fully supports AFD. This provides automatic aspect ratio and video size control using embedded commands, and it prevents on-air aspect ratio

errors such as the postage stamp effect.

A background keying capability allows side panels (or top and bottom panels) to be filled with graphics to improve on-air presentation for promotion and advertising.

A fiber input/output plug-in cartridge option significantly simplifies fiber installation and configuration. When the fiber cartridge is fitted, the card can select between fiber and BNC inputs and can output both electrical and optical signals simultaneously.

The processor's audio capabilities are equally advanced, with processing of up to 32 channels of audio, with automatic delay to keep lip sync. The processor provides shuffling and down-mixing, and options include automatic loudness control (ALC), dynamic processing (limiter, compressor, and expander), loudness metering, and four AES inputs/outputs for additional flexibility.

The XVP-3901-FS has two on-board sockets for optional modules, including Dolby E encoding, Dolby Digital (AC-3) encoding, Dolby E/Dolby Digital (AC-3) decoding, and upmixing using Linear Acoustic

upMAX technology. Grass Valley also offers a module that provide ALC. This module features the award-winning technology of AEROMAX by Linear Acoustic which is capable of maintaining constant loudness across different audio programs (see Automatic Loudness Control (ALC) datasheet).

There are many benefits to the XVP-3901-FS's high level of feature integration. A lower purchase cost per channel is obviously highly desirable but there are many other dimensions to cost savings that are readily achievable. These include reduced space and cooling costs, less cabling, and a reduced spares inventory. By simplifying video and audio synchronization, and reducing the number of vendors, the system integration is also simplified significantly.

The XVP-3901-FS can be upgraded in the field to the full XVP-3901 specification with up/down/crossconversion capability.

A version of the XVP-3901-FS with bypass relay support is available. Please refer to the XVP-3901-FS-R datasheet for more information.

Key Features

Video

- Frame synchronizer and aspect ratio converter (50/59.94 Hz)
- Offers a multirate 3G/HD/SD input and outputs
- Supports 3G level A (mapping 1) and level B
- Flexible HD/SD/URS reference input
- One frame of processing delay for all conversions
- Automatic ARC using AFD (SMPTE ST 2016), video index (SMPTE RP 186) and WSS, with custom and fixed presets
- Keyer option for filling black pillars and letter box
- Built-in proc amp with YUV/RGB color correction and legalizer
- Processes and converts ancillary data such as CC (CEA-608/CEA-708), timecode and teletext/OP-47
- Inserts V-Chip and CGMS in XDS of CC (CEA-608)

- Optional SFP optical plug-in cartridges to select between fiber and BNC inputs and output both electrical and optical signals simultaneously
- Serial and GPIO ports for automation control
- Upgradeable to full XVP-3901 specification

Optional Audio

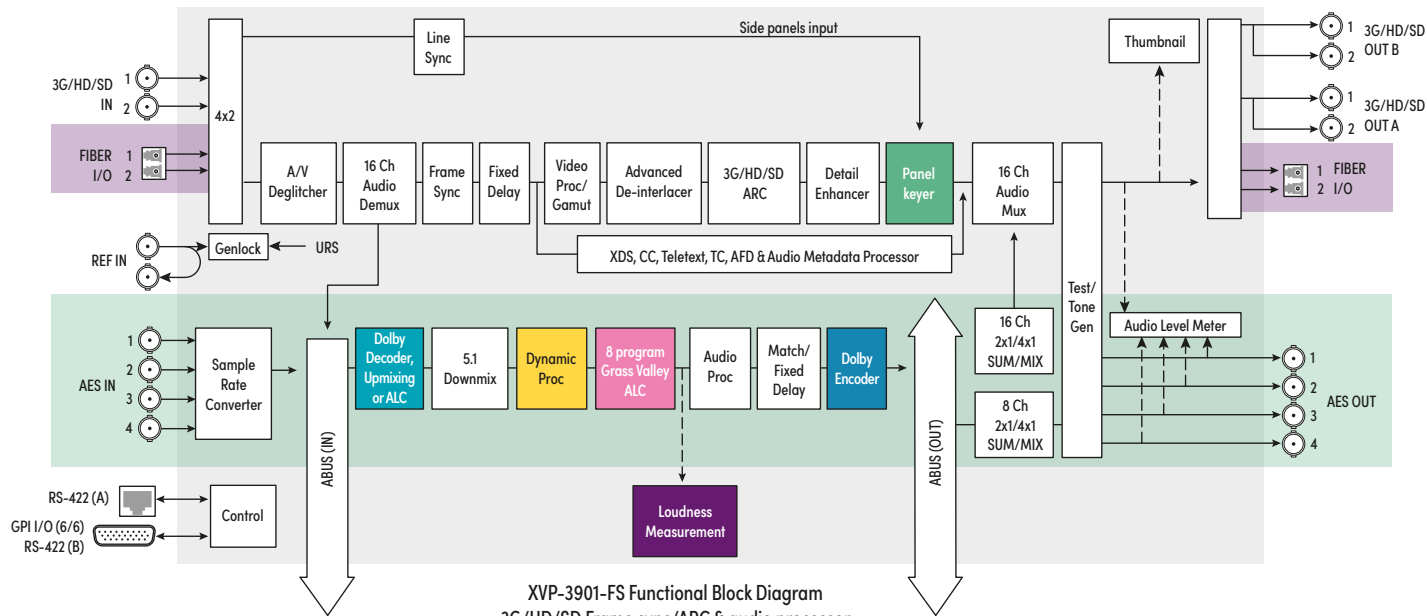
- 16 channels embedded audio processing (32 channels internal)
- 4 AES inputs, 4 AES outputs
- Automation capabilities based on audio signal type detection
- Audio downmix: 5.1 surround to Lt/Rt or Lo/Ro
- Optional audio dynamic processor (compressor/limiter/expander)
- Optional automatic loudness control with Grass Valley wideband processing (on-board)

- Optional loudness measurement of up to four audio programs and logging with iControl™ for end-to-end loudness monitoring solutions
- Loudness solution compliant to EBU R128, A/85 ITU-R BS.1770-3 and ARIB TR-B32
- Dolby E compatible
- Audio metadata processing (SMPTE ST 2020-A)
- Perfect audio/video sync plus additional audio user delay of up to 2 seconds
- Compatible with Grass Valley audio processing cards using ABUS
- On-board socket for two optional modules expansions:
 - Dolby E and Dolby Digital decoder
 - Dolby Digital and Dolby Digital Plus encoder
 - Dolby E encoder
 - Linear Acoustic upMAX
 - Linear Acoustic AEROMAX automatic loudness control

XVP-3901-FS

Input \ Output		SD		HD				3G	
		525	625	720p50	720p59.94	1080i50	1080i59.94	1080p50	1080p59.94
SD	525	X							
	625		X						
HD	720p50			X					
	720p59.94				X				
	1080i50					X			
	1080i59.94						X		
	1080p23.98						X		
	1080pSF23.98						X		
	1080p25					X			
	1080p29.97						X		
3G	1080p50							X	
	1080p59.94								X

Video Formats Supported

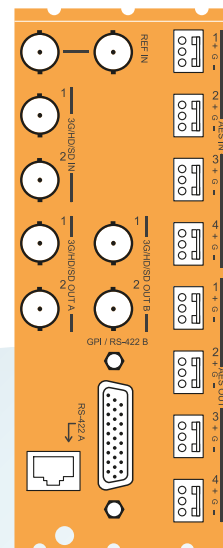
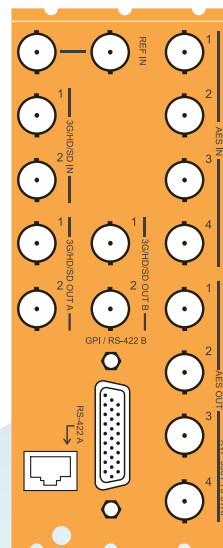
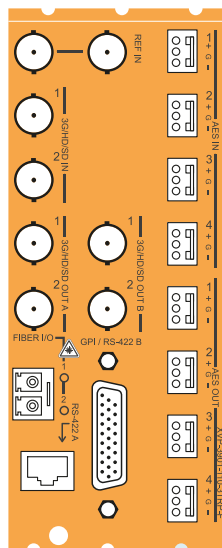
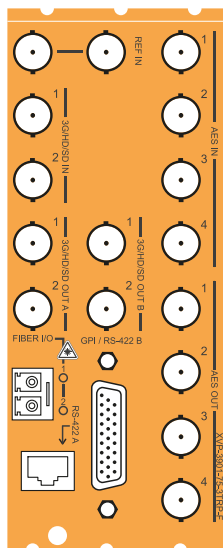
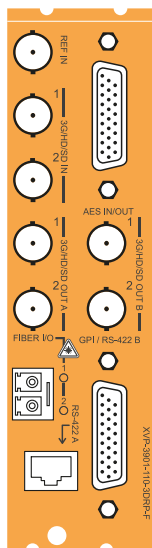
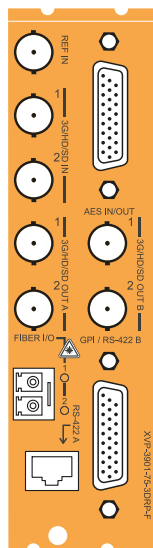


VIDEO OPTIONS

- XVP-3901-110/75-3TRP-F and 3DRP-F (with appropriate fiber cartridge)
- XVP-3901-OPT-K

AUDIO OPTIONS

- XVP-3901-OPT-AUD
- XVP-3901-OPT-DP
- MOD-DOLBY-DEC-2
- MOD-LA-ALC
- XVP-3901-OPT-ALC
- XVP-3901-OPT-LM
- MOD-LA-DUP-701
- MOD-DOLBY-ENC-D-2
- MOD-DOLBY-ENC-E-2



Specifications

Video Input (2) / Output (2)

Signal:

SMPTE ST 259-C (270 Mb/s)

SMPTE ST 292 (1.485, 1.485/ 1.001 Gb/s)

SMPTE ST 424 (2.970, 2.970/ 1.001 Gb/s)

Supported formats:

SD: 480i59.94, 576i50

HD: SMPTE ST 274: 1080i59.94/50

HD: SMPTE ST 296: 720p59.94/50

3G: SMPTE ST 425 level A (mapping 1), level B: 1080p59.94/50

Cable length:

300m (984 ft.) Belden 1694A at 270 Mb/s

150m (492 ft.) Belden 1694A at 1.485 Gb/s

120m (393 ft.) Belden 1694A at 2.970 Gb/s

Return loss: >15 dB up to 3 GHz

Jitter:

HD/SD: <0.2 UI (alignment jitter)

3G: <0.3 UI (alignment jitter)

Reference Input

Signal:

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

SMPTE ST 274/SMPTE ST 296 tri-level sync

Return loss: >35 dB up to 5.75 MHz

Video Processing Performance

Signal path: 10 bits minimum

Latency: 1 frame in all modes

Additional delay: up to 15 frames

Audio Input (4)

Sampling freq.: 32 to 96 kHz

Quantization: up to 24 bits

AES3

Level: 0.2 to 7 Vp-p

Impedance: 110Ω balanced

AES3-id

Level: 0.2 to 2 Vp-p

Impedance: 75Ω

Return loss: 15 dB at 6 MHz

Audio Output (4)

Sampling freq.: 48 kHz

Quantization: 24 bits

AES3

Level: 2.75 Vp-p

Impedance: 110Ω balanced

AES3-id

Level: 1.0 Vp-p

Impedance: 75Ω

Return loss: 15 dB at 6 MHz

Audio Processing Performance

Quantization: 24 bits

Sampling: 48 kHz, synchronous

Number of channels: 16, 8 pairs, 4 groups

Freq. response: ±0.02 dB (20 Hz to 20 kHz)

SNR: 123 dB (A-weighted)

THD-N: -138 dB (20 Hz to 20 kHz)

Miscellaneous

Fixed delay: 0 to 2.0 s

Step: 1 ms (coarse), 1 sample (fine)

GPI

Connector: 26-pin D-Sub, optoisolated

GPI in: Input selection: 1-2

Presets: 1-4

GPI out: Selected input: 1-2

Selected preset: 1-4

RS-422 A (automation)

Connector: RJ-45

Signal: OXTEL series automation protocol

RS-422 B (audio metadata)

Connector: 26-pin D-Sub

Signal: RDD6

ABUS Connector

As per ABUS standard, Grass Valley

Fiber

Full specifications available on SFP optical plug-in cartridges webpage and datasheet.

Test Pattern Generator

Video: Color bars – 100% white bar with 75% color

Audio:

Left channel pulsed 1 kHz tone

Right channel steady 1 kHz tone

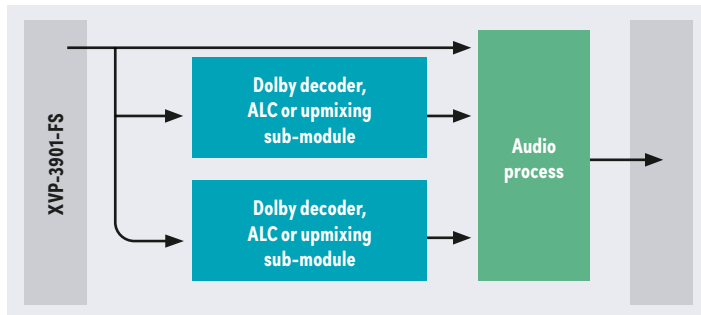
Electrical

Power: 25W

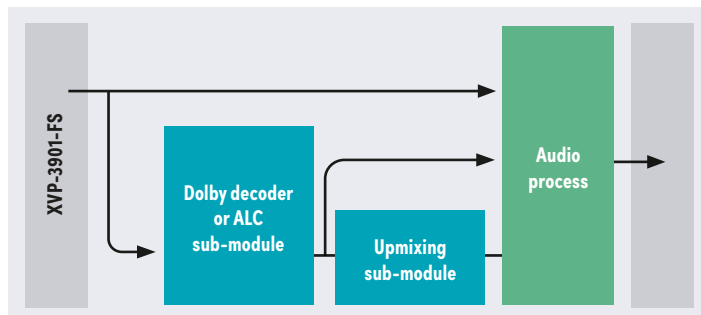


Flexible 5.1 Audio Processing

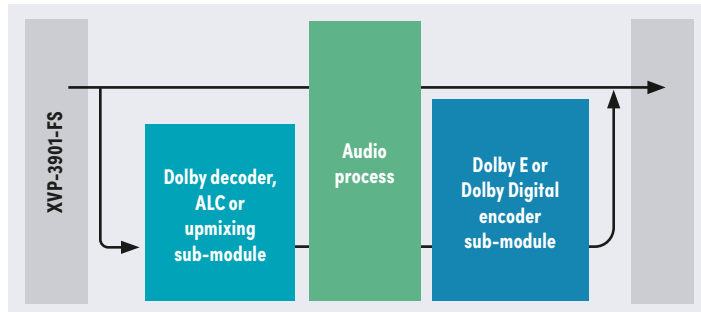
The XVP-3901-FS can provide very versatile audio processing sequences, due to the flexibility of the optional audio sub-modules. The sub-modules include Dolby E decoding, Dolby Digital decoding, Dolby E encoding, Dolby Digital and Dolby Digital Plus encoding, Linear Acoustic upMAX 2.0 to 5.1 upmixing and automatic loudness control (ALC). Two audio sub-modules can be fitted to an XVP-3901-FS processor. All audio channels created by the modules are preserved, and can be selected in the output shufflers and mixers for embedding or discrete AES outputs.



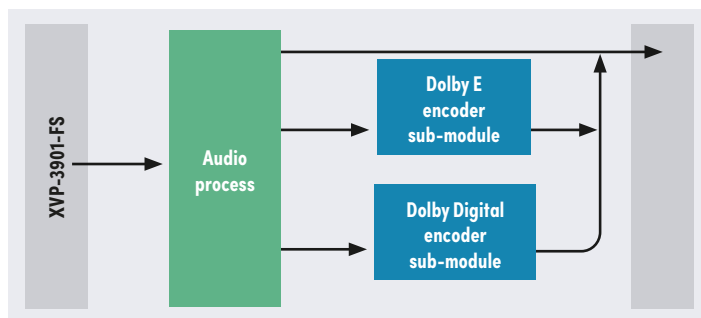
Dolby E / Dolby Digital (AC-3) decoding, automatic loudness control (ALC) or upmixing (or a different combination of these sub-modules) used in parallel ahead of audio processing.



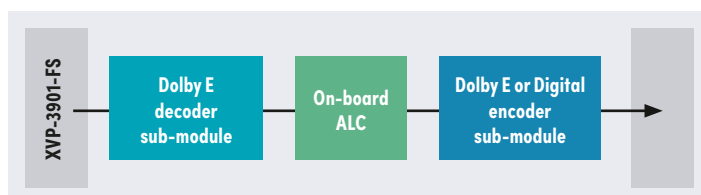
Dolby E / Dolby Digital (AC-3) decoding, ALC or upmixing (or a different combination of these sub-modules) followed by upmixing ahead of audio processing.



Dolby E / Dolby Digital (AC-3) decoding, ALC or upmixing followed by audio processing, and subsequently Dolby E or Dolby Digital (AC-3) encoding.



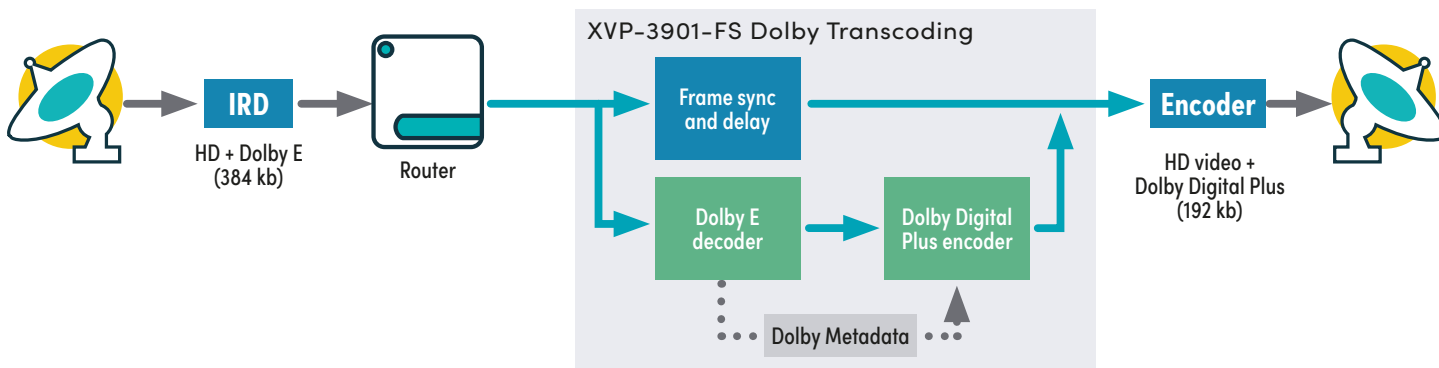
Dolby E and Dolby Digital (AC-3) encoding (or a different combination of these sub-modules) used in parallel after audio processing.



Dolby E decoding, ALC followed by Dolby E or Dolby Digital encoding.

Dolby Digital Plus Transcoding

The addition of Dolby Digital Plus to the Dolby Digital encoder means that Grass Valley's audio processing module will provide the same high-quality audio compression they always have, but at a data rate as much as 50 percent lower than currently required, enabling 5.1 multichannel audio at rates as low as 192 kb/s. When combining Dolby E decoding and Dolby Digital Plus encoding, broadcasters can deliver an efficient multichannel surround sound across multiple platforms and content types.



Ordering

Densité 3 Frame

XVP-3901-FS

3G/HD/SD frame sync/ARC with optional audio processor

XVP-3901-75-3DRP-F

Double rear connector panel, 75Ω and fiber connector

XVP-3901-110-3DRP-F

Double rear connector panel, 110Ω and fiber connector

XVP-3901-75-3TRP-F

Triple rear connector panel, 75Ω and fiber connector

XVP-3901-110-3TRP-F

Triple rear connector panel, 110Ω and fiber connector

XVP-3901-75-3TRP

Triple rear connector panel, 75Ω

XVP-3901-110-3TRP

Triple rear connector panel, 110Ω

Options (software)

XVP-3901-OPT-AUD

AES IO support and 16 channels on-board audio processing option

XVP-3901-OPT-K

Background key input option

XVP-3901-OPT-DP

Dynamic audio processing option

XVP-3901-OPT-LM

Loudness meter option

XVP-3901-UG-FS2XVP

Upgrade from XVP-3901-FS to full XVP

XVP-3901-OPT-ALC-2

2-channel on-board ALC option by Grass Valley

XVP-3901-OPT-ALC-6

6-channel on-board ALC option by Grass Valley

XVP-3901-OPT-ALC-8

8-channel on-board ALC option by Grass Valley

XVP-3901-OPT-ALC-16

16-channel on-board ALC option by Grass Valley

Options (hardware)

SFP-R-LC

Single fiber Rx (input) cartridge with LC/PC connector

SFP-RR-LC

Dual fiber Rx (input) cartridge with LC/PC connector

SFP-T-S13-LC

Single fiber Tx (output) cartridge at 1310 nm with LC/PC connector

SFP-TT-S13S13-LC

Dual fiber Tx (output) cartridge at 1310 nm with LC/PC connector

SFP-RT-S13-LC

Dual fiber Rx/Tx (input/output) cartridge 1310 nm with LC/PC connector

Other types of SFP Optical Plug-In Cartridges may be available for this product.

Please visit www.grassvalley.com for more information.

NSH26M

HD-26 to terminal block adapter

BOC-DA26-8BNC-1

75Ω digital audio breakout cable

MOD-DOLBY-ENC-E-2

Dolby E encoder

MOD-DOLBY-ENC-D-2

Dolby Digital and Dolby Digital Plus encoder

MOD-DOLBY-DEC-2

Dolby E and Dolby Digital decoder

MOD-LA-DUP-701

Upmixing using Linear Acoustic Technology upMAX

MOD-LA-ALC-2

2-channel ALC licensed by Linear Acoustic

MOD-LA-ALC-6

6-channel ALC licensed by Linear Acoustic

MOD-LA-ALC-8

8-channel ALC licensed by Linear Acoustic

MOD-LA-ALC-2-DUP

2-channel ALC and upmix licensed by Linear Acoustic

MOD-LA-ALC-6-DUP

6-channel ALC and upmix licensed by Linear Acoustic

MOD-LA-ALC-8-DUP

8-channel ALC and upmix licensed by Linear Acoustic

Remote Control

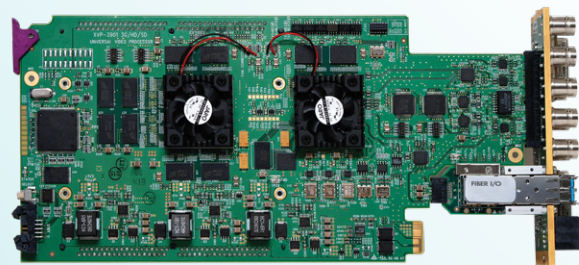
GV Orbit®, iControl, iControl Solo

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XVP-3901-FS-R

3G/HD/SD Frame Sync Optimized for Rears with Bypass Relay

Space-saving, modular platform for advanced signal processing.

The XVP-3901-FS-R from Grass Valley® is a highly integrated, 3G/HD/SD frame synchronizer/aspect ratio converter and optional video/audio signal processor, which is designed to synchronize and process HD and SD signals for 3G/HD/SD hybrid plants. It is identical to the XVP-3901-FS except it supports rears with bypass relay.

It features a dual 3G/HD/SD input selector and provides multiple outputs. Although not up/down/crossconverting the input signal, the -FS-R model can still perform ARC control on SD signals, useful when converting 16:9 SD signals to 4:3 SD signals and vice-versa.

High quality aspect ratio conversion is performed at both 50 and 59.94 Hz, based on multiple sophisticated processing technologies. These include detail enhancement, pixel-based deinterlacing, and advanced motion adaptive deinterlacing and antiringing.

To ensure that the signals are delivered in the correct aspect ratio when aired, the XVP-3901-FS-R fully supports AFD. This provides automatic aspect ratio and video size control using embedded commands,

and it prevents on-air aspect ratio errors such as the postage stamp effect.

A background keying capability allows side panels (or top and bottom panels) to be filled with graphics to improve on-air presentation for promotion and advertising.

A fiber input/output plug-in cartridge option significantly simplifies fiber installation and configuration. When the fiber cartridge is fitted, the card can select between fiber and BNC inputs and can output both electrical and optical signals simultaneously.

The processor's audio capabilities are equally advanced, with processing of up to 32 channels of audio, with automatic delay to keep lip sync. The processor provides shuffling and down-mixing, and options include automatic loudness control (ALC), dynamic processing (limiter, compressor, and expander), loudness metering, and four AES inputs/outputs for additional flexibility.

The XVP-3901-FS-R has two on-board sockets for optional modules, including Dolby E encoding, Dolby Digital (AC-3) encoding, Dolby E/

Dolby Digital (AC-3) decoding, and upmixing using Linear Acoustic upMAX technology. Grass Valley also offers a module that provide ALC. This module features the award-winning technology of AEROMAX by Linear Acoustic which is capable of maintaining constant loudness across different audio programs (see Automatic Loudness Control (ALC) datasheet).

There are many benefits to the XVP-3901-FS-R's high level of feature integration. A lower purchase cost per channel is obviously highly desirable but there are many other dimensions to cost savings that are readily achievable. These include reduced space and cooling costs, less cabling, and a reduced spares inventory. By simplifying video and audio synchronization, and reducing the number of vendors, the system integration is also simplified significantly.

The XVP-3901-FS-R can be upgraded in the field to the full XVP-3901 specification with up/down/crossconversion capability.

Key Features

Video

- Frame synchronizer and aspect ratio converter (50/59.94 Hz)
- Offers a multirate 3G/HD/SD input and outputs
- Supports 3G level A (mapping 1) and level B
- Flexible HD/SD/URS reference input
- One frame of processing delay for all conversions
- Automatic ARC using AFD (SMPTE ST 2016), video index (SMPTE RP 186) and WSS, with custom and fixed presets
- Bypass relay supported
- Keyer option for filling black pillars and letter box
- Built-in proc amp with YUV/RGB color correction and legalizer
- Processes and converts ancillary data such as CC (CEA-608/CEA-708), timecode and teletext/OP-47
- Inserts V-Chip and CGMS in XDS of CC (CEA-608)

- Optional SFP optical plug-in cartridges to select between fiber and BNC inputs and output both electrical and optical signals simultaneously
- Serial and GPIO ports for automation control
- Upgradeable to full XVP-3901 specification

Optional Audio

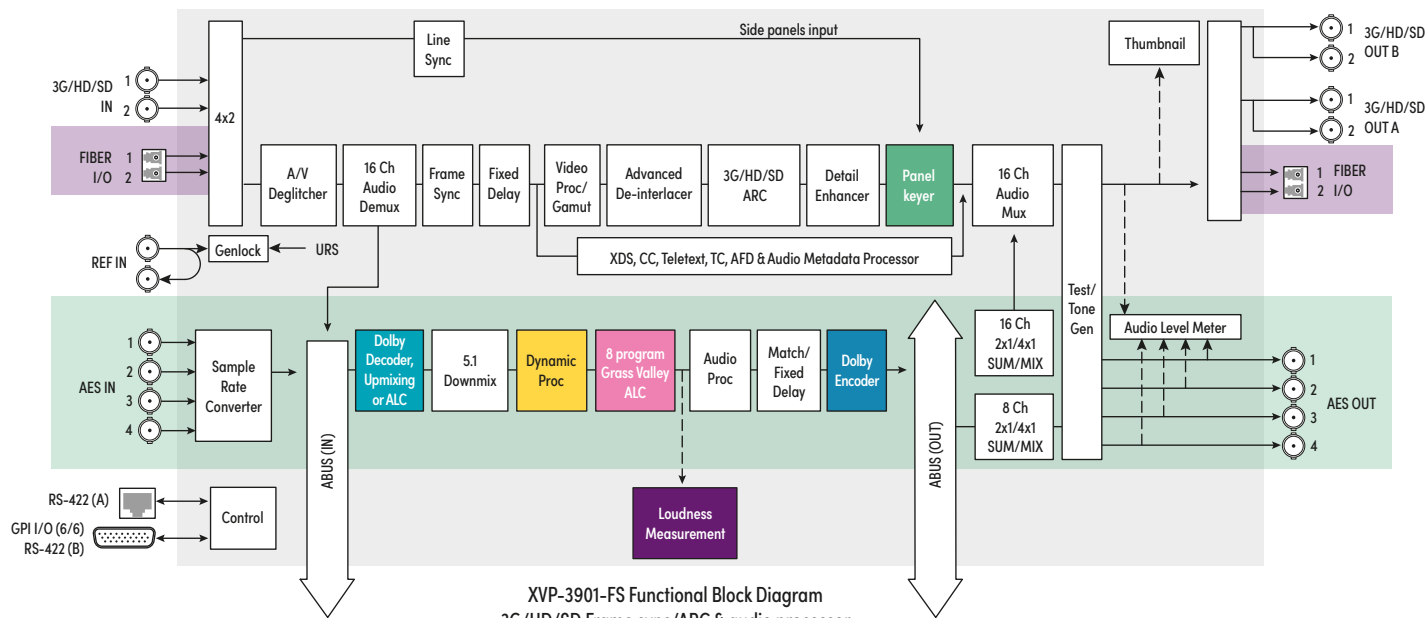
- 16 channels embedded audio processing (32 channels internal)
- 4 AES inputs, 4 AES outputs
- Automation capabilities based on audio signal type detection
- Audio downmix: 5.1 surround to Lt/Rt or Lo/Ro
- Optional audio dynamic processor (compressor/limiter/expander)
- Optional automatic loudness control with Grass Valley wideband processing (on-board)
- Optional loudness measurement of up to 4 audio programs and logging with iControl™ for end-to-end loudness monitoring solutions

- Loudness solution compliant to EBU R128, A/85 ITU-R BS.1770-3 and ARIB TR-B32
- Dolby E compatible
- Audio metadata processing (SMPTE ST 2020-A)
- Perfect audio/video sync plus additional audio user delay of up to 2 seconds
- Compatible with Grass Valley audio processing cards using ABUS
- On-board socket for two optional modules expansions:
 - Dolby E and Dolby Digital decoder
 - Dolby Digital and Dolby Digital Plus encoder
 - Dolby E encoder
 - Linear Acoustic upMAX
 - Linear Acoustic AEROMAX automatic loudness control

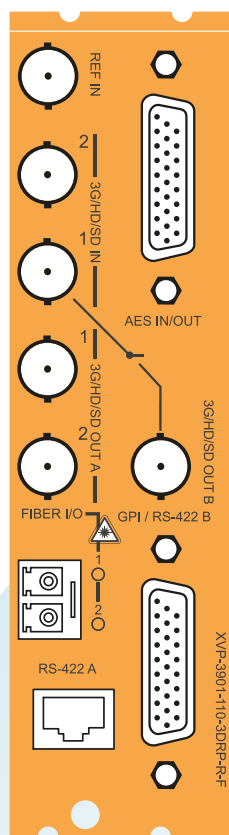
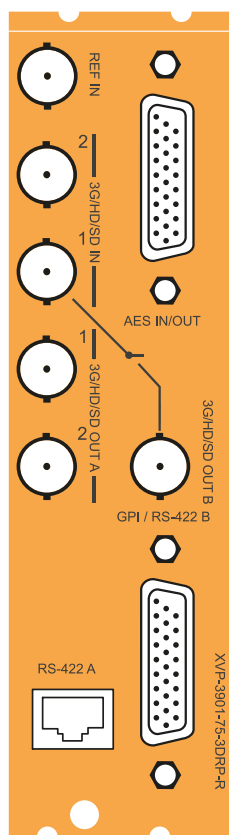
XVP-3901-FS-R

Input \ Output		SD		HD				3G	
		525	625	720p50	720p59.94	1080i50	1080i59.94	1080p50	1080p59.94
SD	525	X							
	625		X						
HD	720p50			X					
	720p59.94				X				
	1080i50					X			
	1080i59.94						X		
	1080p23.98						X		
	1080pSF23.98						X		
	1080p25					X			
	1080p29.97						X		
3G	1080p50							X	
	1080p59.94								X

Video Formats Supported



VIDEO OPTIONS	XVP-3901-110/75-3TRP-F and 3DRP-F (with appropriate fiber cartridge)	AUDIO OPTIONS	XVP-3901-OPT-AUD	XVP-3901-OPT-DP	MOD-DOLBY-DEC-2	MOD-LA-ALC
	XVP-3901-OPT-K		XVP-3901-OPT-ALC	XVP-3901-OPT-LM	MOD-LA-DUP-701	MOD-DOLBY-ENC-D-2
					MOD-DOLBY-ENC-E-2	



Specifications

Video Input (2) / Output (2)

Signal:

SMPTE ST 259-C (270 Mb/s)

SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)

SMPTE ST 424 (2.970, 2.970/1.001 Gb/s)

Supported formats:

SD: 480i59.94, 576i50

HD: SMPTE ST 274: 1080i59.94/50

HD: SMPTE ST 296: 720p59.94/50

3G: SMPTE ST 425 level A (mapping 1), level B: 1080p59.94/50

Cable length:

300m (984 ft.) Belden 1694A at 270 Mb/s

150m (492 ft.) Belden 1694A at 1.485 Gb/s

120m (393 ft.) Belden 1694A at 2.970 Gb/s

Return loss: >15 dB up to 3 GHz

Jitter:

HD/SD: <0.2 UI (alignment jitter)

3G: <0.3 UI (alignment jitter)

Reference Input

Signal:

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

SMPTE ST 274/SMPTE ST 296 tri-level sync

Return loss: >35 dB up to 5.75 MHz

Video Processing Performance

Signal path: 10 bits minimum

Latency: 1 frame in all modes

Additional delay: up to 15 frames

Audio Input (4)

Sampling freq.: 32 to 96 kHz

Quantization: up to 24 bits

AES3

Level: 0.2 to 7 Vp-p

Impedance: 110Ω balanced

AES3-id

Level: 0.2 to 2 Vp-p

Impedance: 75Ω

Return loss: 15 dB at 6 MHz

Audio Output (4)

Sampling freq.: 48 kHz

Quantization: 24 bits

AES3

Level: 2.75 Vp-p

Impedance: 110Ω balanced

AES3-id

Level: 1.0 Vp-p

Impedance: 75Ω

Return loss: 15 dB at 6 MHz

Audio Processing Performance

Quantization: 24 bits

Sampling: 48 kHz, synchronous

Number of channels: 16, 8 pairs, 4 groups

Freq. response: ±0.02 dB (20 Hz to 20 kHz)

SNR: 123 dB (A-weighted)

THD-N: -138 dB (20 Hz to 20 kHz)

Miscellaneous

Fixed delay: 0 to 2.0 s

Step: 1 ms (coarse), 1 sample (fine)

GPI

Connector: 26-pin D-Sub, optoisolated

GPI in: Input selection: 1-2

Presets: 1-4

Selected preset: 1-4

RS-422 A (automation)

Connector: RJ-45

Signal: OXTEL series automation protocol

RS-422 B (audio metadata)

Connector: 26-pin D-Sub

Signal: RDD6

ABUS Connector

As per ABUS standard, Grass Valley

Fiber

Full specifications available on SFP optical plug-in cartridges webpage and datasheet.

Test Pattern Generator

Video: Color bars – 100% white bar with 75% color

Audio:

Left channel pulsed 1 kHz tone

Right channel steady 1 kHz tone

Electrical

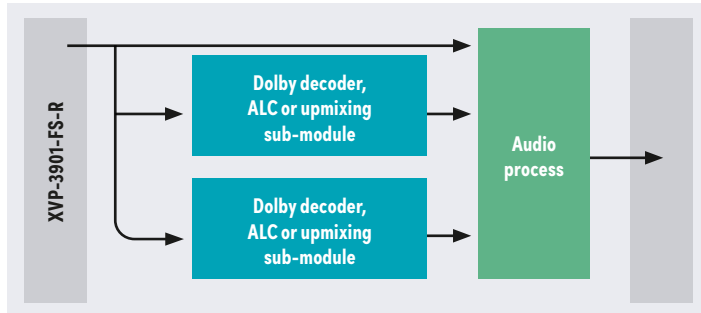
Power: 25W

Note: Cable length and return loss specifications will be reduced when using the output protected by the bypass relay on XVP-3901-110/75-3DRP-R rears.

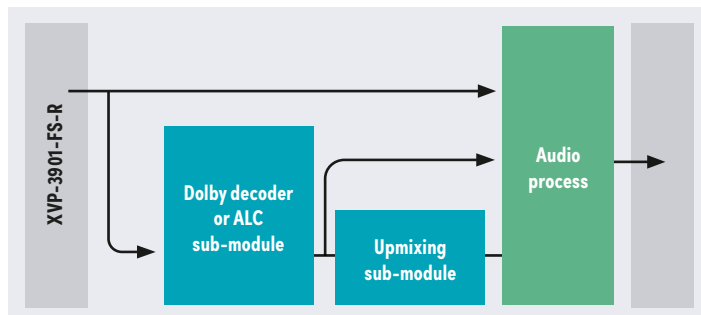


Flexible 5.1 Audio Processing

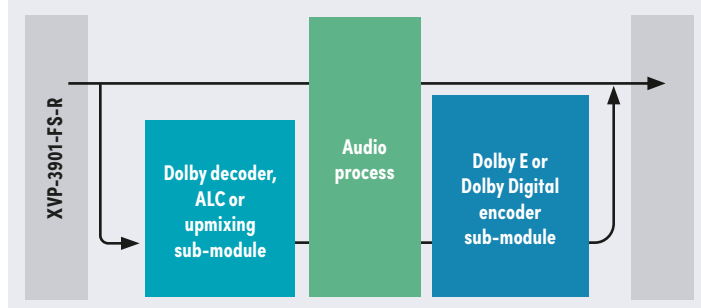
The XVP-3901-FS can provide very versatile audio processing sequences, due to the flexibility of the optional audio sub-modules. The sub-modules include Dolby E decoding, Dolby Digital decoding, Dolby E encoding, Dolby Digital and Dolby Digital Plus encoding, Linear Acoustic upMAX 2.0 to 5.1 upmixing and automatic loudness control (ALC). Two audio sub-modules can be fitted to an XVP-3901-FS processor. All audio channels created by the modules are preserved, and can be selected in the output shufflers and mixers for embedding or discrete AES outputs.



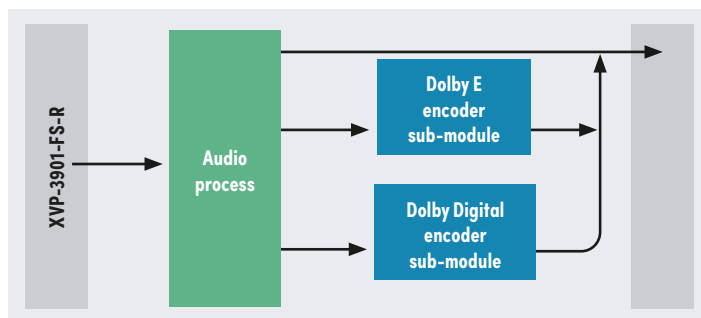
Dolby E / Dolby Digital (AC-3) decoding, automatic loudness control (ALC) or upmixing (or a different combination of these sub-modules) used in parallel ahead of audio processing.



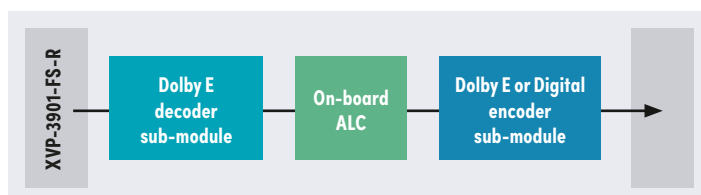
Dolby E / Dolby Digital (AC-3) decoding, ALC or upmixing (or a different combination of these sub-modules) followed by upmixing ahead of audio processing.



Dolby E / Dolby Digital (AC-3) decoding, ALC or upmixing followed by audio processing, and subsequently Dolby E or Dolby Digital (AC-3) encoding.



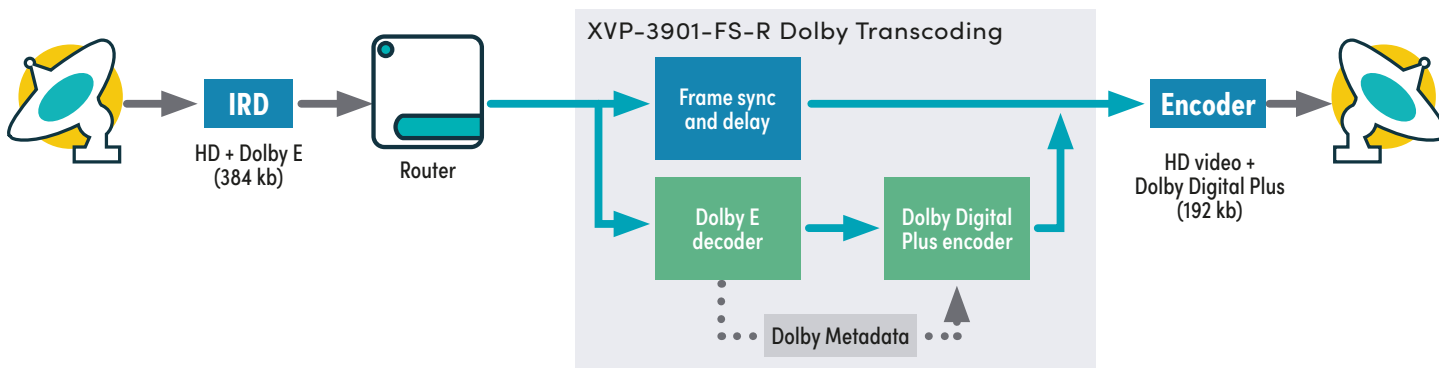
Dolby E and Dolby Digital (AC-3) encoding (or a different combination of these sub-modules) used in parallel after audio processing.



Dolby E decoding, ALC followed by Dolby E or Dolby Digital encoding.

Dolby Digital Plus Transcoding

The addition of Dolby Digital Plus to the Dolby Digital encoder means that Grass Valley's audio processing module will provide the same high-quality audio compression they always have, but at a data rate as much as 50 percent lower than currently required, enabling 5.1 multichannel audio at rates as low as 192 kb/s. When combining Dolby E decoding and Dolby Digital Plus encoding, broadcasters can deliver an efficient multichannel surround sound across multiple platforms and content types.



Ordering

Densité 3 Frame

XVP-3901-FS-R

3G/HD/SD frame sync optimized for rears with bypass relay

XVP-3901-75-3DRP-R

Double rear connector panel, 75Ω and bypass relay (XVP-3901-FS-R required)

XVP-3901-110-3DRP-R-F

Double rear connector panel, 110Ω, bypass relay and fiber connection (XVP-3901-FS-R required)

Options (software)

XVP-3901-OPT-AUD

AES IO support and 16 channels on-board audio processing option

XVP-3901-OPT-K

Background key input option

XVP-3901-OPT-DP

Dynamic audio processing option

XVP-3901-OPT-LM

Loudness meter option

XVP-3901-UG-FS2XVP

Upgrade from XVP-3901-FS to full XVP

XVP-3901-OPT-ALC-2

2-channel on-board ALC option by Grass Valley

XVP-3901-OPT-ALC-6

6-channel on-board ALC option by Grass Valley

XVP-3901-OPT-ALC-8

8-channel on-board ALC option by Grass Valley

XVP-3901-OPT-ALC-16

16-channel on-board ALC option by Grass Valley

Options (hardware)

SFP-R-LC

Single fiber Rx (input) cartridge with LC/PC connector

SFP-RR-LC

Dual fiber Rx (input) cartridge with LC/PC connector

SFP-T-S13-LC

Single fiber Tx (output) cartridge at 1310 nm with LC/PC connector

SFP-TT-S13S13-LC

Dual fiber Tx (output) cartridge at 1310 nm with LC/PC connector

SFP-RT-S13-LC

Dual fiber Rx/Tx (input/output) cartridge 1310 nm with LC/PC connector

Other types of SFP Optical Plug-In Cartridges may be available for this product.

Please visit www.grassvalley.com for more information.

NSH26M

HD-26 to terminal block adapter

BOC-DA26-8BNC-1

75Ω digital audio breakout cable

MOD-DOLBY-ENC-E-2

Dolby E encoder

MOD-DOLBY-ENC-D-2

Dolby Digital and Dolby Digital Plus encoder

MOD-DOLBY-DEC-2

Dolby E and Dolby Digital decoder

MOD-LA-DUP-701

Upmixing using Linear Acoustic Technology upMAX

MOD-LA-ALC-2

2-channel ALC licensed by Linear Acoustic

MOD-LA-ALC-6

6-channel ALC licensed by Linear Acoustic

MOD-LA-ALC-8

8-channel ALC licensed by Linear Acoustic

MOD-LA-ALC-2-DUP

2-channel ALC and upmix licensed by Linear Acoustic

MOD-LA-ALC-6-DUP

6-channel ALC and upmix licensed by Linear Acoustic

MOD-LA-ALC-8-DUP

8-channel ALC and upmix licensed by Linear Acoustic

Remote Control

GV Orbit®, iControl, iControl Solo

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

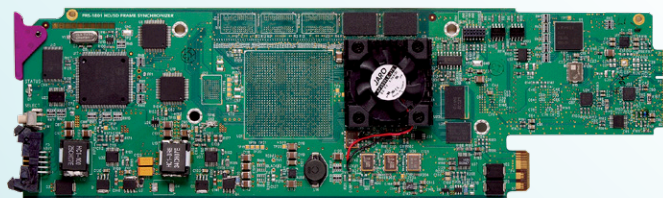
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FRS-1801

HD/SD Frame Synchronizer



Space-saving, modular platform for advanced signal processing.

The FRS-1801 from Grass Valley® is a highly integrated module which offers frame synchronization, and video processing, including color correction and delay, for HD and SD signals in HD/SD hybrid plants. A processing delay of up to 1.3 seconds is available for Dolby E and AC3 encoders/decoders.

With the audio processing option, the card can process up to 16 channels (four groups) of embedded audio or eight channels (two groups) of discrete AES inputs/outputs. The

FRS-1801 can offer shuffling and downmixing, and provides four AES inputs and four AES outputs.

The FRS-1801 can also be associated with a Grass Valley audio processor modules, such as the UAP and DAP, for more advanced audio requirements, such as analog audio processing or Dolby E decoding.

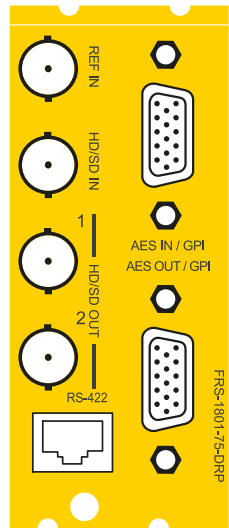
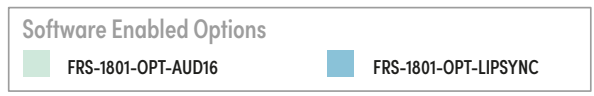
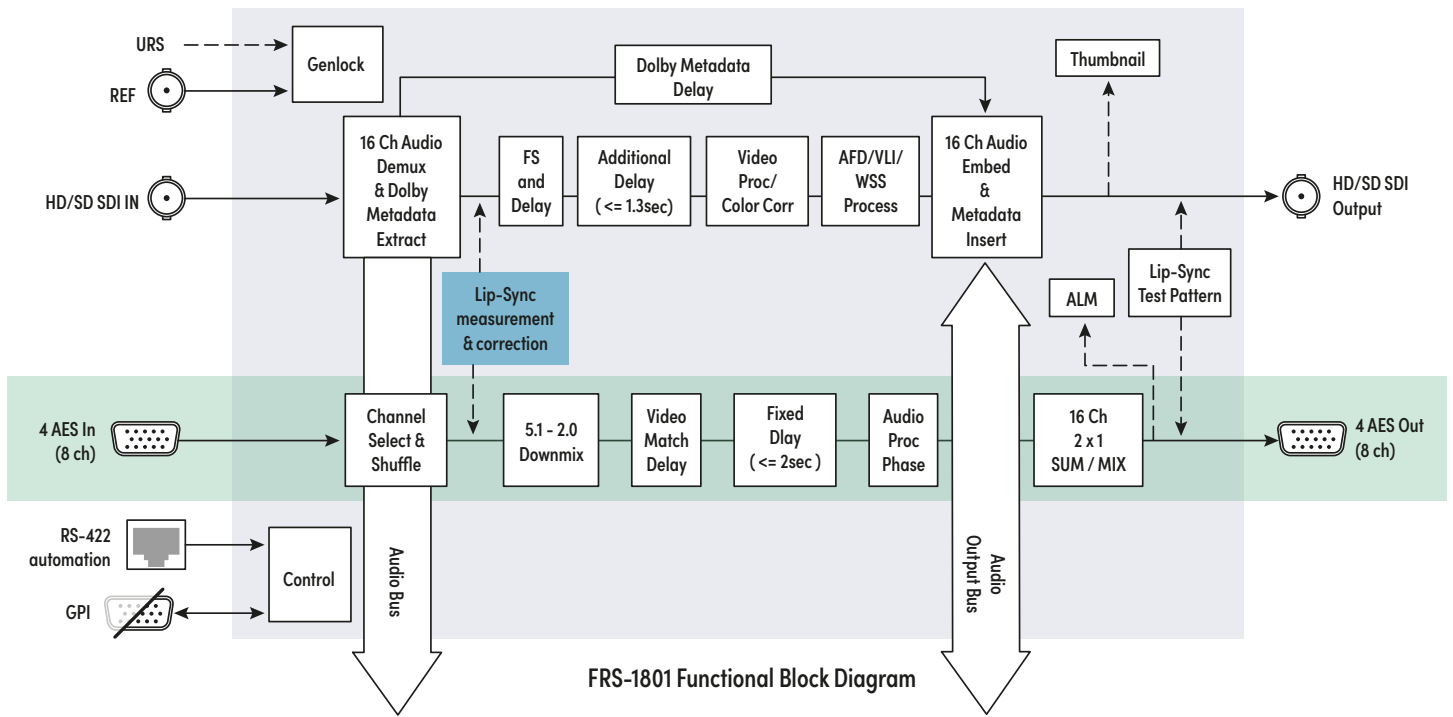
Advanced monitoring and control features include thumbnail and audio level meter (ALM) generation, as well as an optional waveform/

vectorscope over IP of the output signal, which allows the operator to control and see the changes made to the signal.

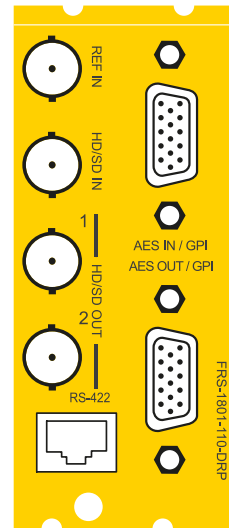
With the Out-of-Service lip-sync measurement and correction option, broadcasters can measure and correct lip-sync problems within their facilities.

Key Features

- HD/SD frame synchronizer, delay and line sync
- Video delay up to 1.3 seconds
- Video proc and color correction
- 16 channels of embedded audio processing
- Out-of-Service lip sync measurement and correction option
 - Able to detect the AV delay using the lip sync test pattern
 - Able to correct automatically or manually the AV delay that is offset by up to 1.3 seconds in HD
 - Supports both embedded audio and AES/EBU audio I/O
- AFD insert
- Downmixing from 5.1 to 2.0
- Flexible HD/SD reference input
- Perfect audio/video synchronization with adjustable fixed delay
- Processes and delays ancillary data such as CC, timecode and audio metadata (SMPTE ST 2020-A)
- Compatible with Grass Valley audio processing cards
- Thumbnail and audio level meter (ALM) generation



FRS-1801-75-DRP



FRS-1801-110-DRP

Specifications

Video Input

Signal:

SD: SMPTE ST 259-C (270 Mb/s)

HD: SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)

Supported formats:

SD: SMPTE ST 125: 480i59.94

SD: EBU: 576i50

HD: SMPTE ST 274: 1080i59.94, 1080i50

HD: SMPTE ST 296: 720p59.94, 720p50

Embedded audio: SMPTE ST 299, SMPTE ST 272

Cable length:

350m (1,148 ft.) Belden 1694A at 270 Mb/s

150m (492 ft.) Belden 1694A at 1.485 Gb/s

Return loss: >15 dB up to 1.5 GHz

Video Output

Signal:

SMPTE ST 259-C (270 Mb/s)

SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)

Supported formats:

SD: 480i59.94, 576i50

HD: SMPTE ST 274: 1080i59.94, 1080i50

HD: SMPTE ST 296: 720p59.94, 720p50

Embedded audio: SMPTE-299M, SMPTE-272

Return loss: >15 dB up to 1.5 GHz

Jitter: HD/SD: <0.2 UI

Reference Input

Signal:

SMPTE ST 170/SMPTE ST 318/ITU 624-4/BUT 470-6 or blackburst

SMPTE ST 274/SMPTE ST 296 tri-level sync (black)

Return loss: >35 dB up to 5.75 MHz

Video Processing Performance

Signal path: 10 bits

Latency: 3 lines minimum

Additional video delay: 1.3s maximum (HD/SD)

Audio Digital Inputs(4)

Sampling freq.: 32 to 96 kHz

Quantization: 16 to 24

Inputs:

AES3

– Level: 0.2 to 7 Vp-p

– Impedance: 110Ω balanced

AES3-id

– Level: 0.2 to 7 Vp-p

– Impedance: 75Ω

– Return loss: 25 dB at 6 MHz

Outputs:

AES3

– Level: 4 Vp-p

– Impedance: 110Ω balanced

AES3-id

– Level: 1 Vp-p

– Impedance: 75Ω

– Return loss: 15 dB at 6 MHz

Audio Processing Performance

Quantization: 20-24 bits

Sampling: 48 kHz, synchronous

Number of channels: 16 (4 groups)

Freq. response: ±0.02 dB (20 Hz to 20 kHz)

SNR: 123 dB (A weighted)

THD+N: -138 dB (20 Hz to 20 kHz)

Miscellaneous

Signal Presence

Threshold: From -72 to -48 dBFS (6 dB steps)

Silence detection delay: From 0 to 255s

Fixed delay: 0 to 2.0s

Step: 1 ms (coarse), 1 sample (fine)

GPI (8)

Connector: 15-pin D-Sub

GPI in: Input selection: 1 or 2

Presets: 1, 2, 3, 4

GPI out: Provides status of selected input: 1 or 2

RS-232/422

Connector: RJ-69 (RJ45 10 contact)

ABUS Connector

As per ABUS standard, Grass Valley

Test Pattern Generator

Video: Color bars - 100% white bar with 75% color

Audio: Left channel pulsed 1 kHz / Right channel steady 1 kHz tone

Electrical

Power: 10W



Ordering

Densité® 2 frame

FRS-1801

FRS-1801-75-DRP

FRS-1801-110-DRP

Options

FRS-1801-OPT-AUD16

FRS-1801-OPT-LIPSYNC

BOC-DE15-4BNC-1

Remote control

Densité 3 frame

FRS-1801-3RU

FRS-1801-75-DRP-3RU

FRS-1801-110-DRP-3RU

Description

16 channel on-board audio processing option

Out-of-Service lip sync measurement and correction option

75Ω digital audio breakout cable

iControl, iControl Solo, RCP-200

Description

HD/SD frame synchronizer

Double rear connector panel, 75Ω

Double rear connector panel, 110Ω

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

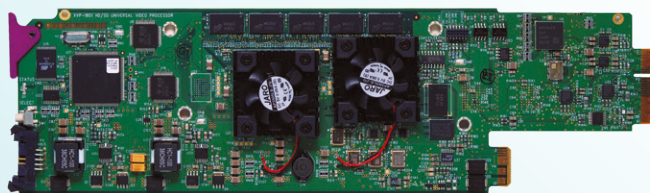
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XVP-1801-FS

HD/SD Frame Sync and ARC



Space-saving, modular platform for advanced signal processing.

The Densité® Series XVP-1801-FS from Grass Valley® offers high quality aspect ratio conversion and frame synchronization. It provides many advanced features, including AFD support and background keying, with optional 16 channel embedded audio processing. The superior conversion quality of the XVP at both 50 and 59.94 Hz stems from multiple technologies, including advanced motion adaptive de-interlacing and anti-ringing.

To ensure that aspect ratio converted television is presented in the correct aspect ratio when aired, the XVP module supports AFD (Active Format Description) SMPTE ST 2016. This provides automatic aspect ratio control using embedded control commands, and this prevents on-air aspect ratio errors such as the postage stamp effect. The ARC function offers fixed presets as well as variable user configurable aspect ratios.

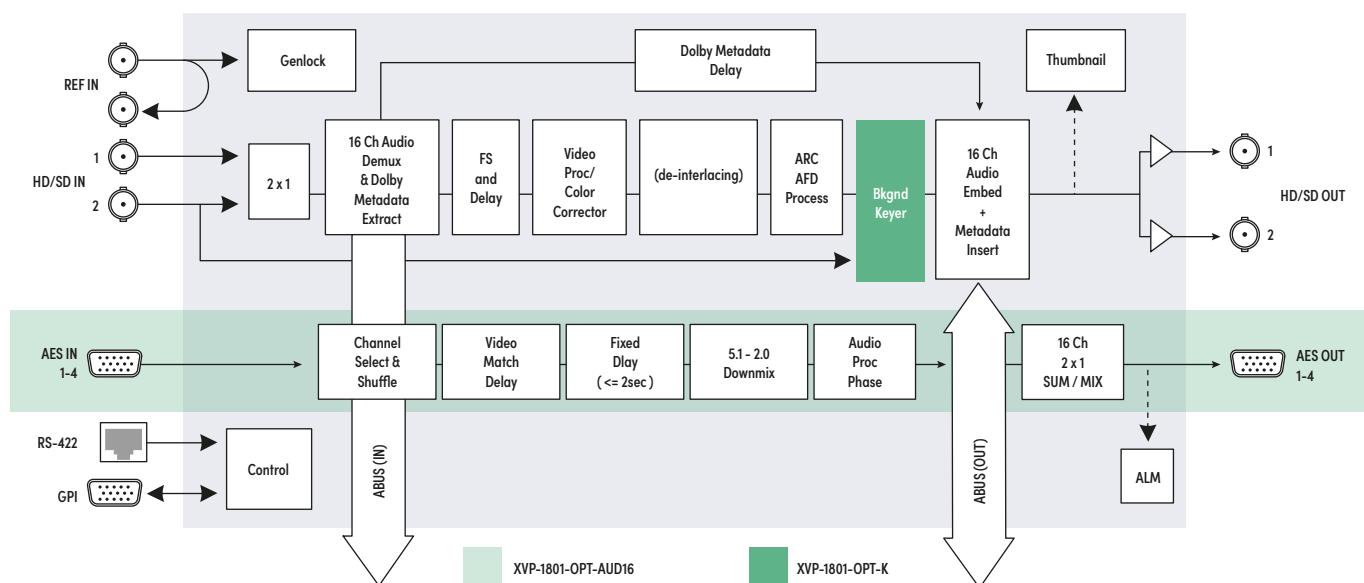
In addition to AFD, the XVP also supports VLI (Video Line Index) RP-186 and WSS, which allows the card to adjust its ARC automatically without any external intervention. The module re-inserts the correct AFD, VLI or WSS on the output, along with other HANC and VANC information. With the integration of a frame sync, incoming feed signals can be synched to house, and video/ audio levels adjusted using a proc and color correction, when entering the facility. An RS-232/422 port is provided for automation control of ARC presets, and GPIs are also available for user presets.

To further improve on-air presentation, the XVP offers a background keying capability which allows side panels or letterbox black bars, introduced by aspect ratio conversion, to be filled with video or graphics.

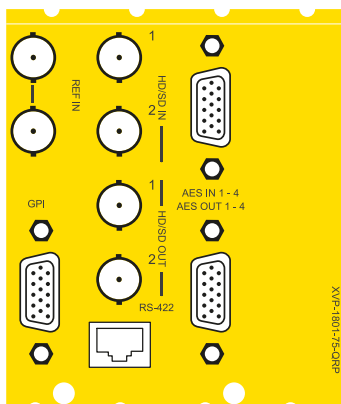
The XVP-1801-FS will pass and delay automatically all 16 channels (four groups) of embedded audio to keep lip sync. Full audio processing, shuffling, downmixing and four AES in and four AES out channels, are available as an option. A higher level of audio capabilities are provided by a range of audio processor companion cards. When connected to a DAP-1781, UAP-1783 or an AAP-1741, the XVP-1801 gains additional AES or analog audio channels while still maintaining lip sync. Depending on the audio processor selected, these boards also offer Dolby E or Dolby Digital (AC-3) for encoding or decoding, upmixing from 2.0 to 5.1, and full dynamic processing (limiter, compressor and expander).

Key Features

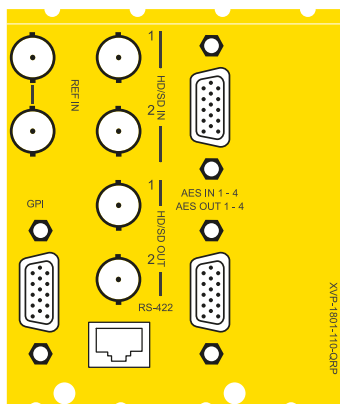
- Frame synchronizer and aspect ratio converter
- Advanced adaptive video de-interlacing for higher image quality
- Automatic detection of film sequences
- Automatic ARC, using AFD (SMPTE ST 2016), VLI (RP-186) and WSS detection and correct re-insertion with the output
- Custom and fixed ARC presets
- Background keying capability during aspect ratio conversion which allows side panels or letterbox black bars to be filled with video or graphics
- Built-in proc amp, color correction and legalizer
- Processes and converts ancillary data such as CC (608/708) and timecode
- Perfect audio/video synchronization plus additional audio fixed delay of up to 2 seconds
- Optional 16 channels of embedded full audio processing, shuffling and downmixing
- Optional 4 AES inputs and 4 AES outputs
- Dolby E compatible
- Audio metadata processing (SMPTE ST 2020-A)
- Compatible with Grass Valley audio processing cards, including the UAP-1783, AAP-1741 and DAP-1781
- Multiple presets for save and recall
- RS-422 Protocol and GPI ports for automation or external device control
- Thumbnail and ALM streaming over IP
- Can be upgraded in the field to the full XVP-1801 up/down/crossconverter specification



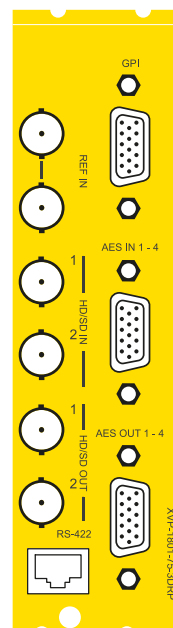
XVP-1801-FS HD/SD Frame Sync /ARC



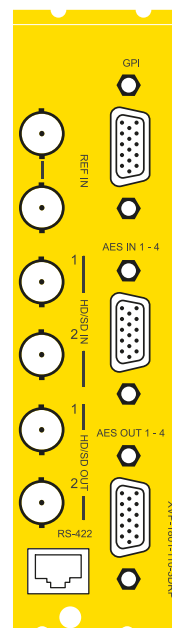
XVP-1801-75-QRP



XVP-1801-110-QRP



XVP-1801-75-3DRP



XVP-1801-110-3DRP

Specifications

Video Inputs (2)

Signal:

SD: SMPTE ST 259-C (270 Mb/s)
HD: SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)

Supported formats:

SD: SMPTE ST 125: 480i59.94
SD: EBU: 576i50
HD: SMPTE ST 274: 1080i59.94/50
HD: SMPTE ST 296: 720p59.94/50

Embedded audio: SMPTE ST 299-272

Cable length:

340m (1,115 ft.) Belden 1694A at 270 Mb/s
150m (492 ft.) Belden 1694A at 1.485 Gb/s

Return loss: >15 dB up to 1.5 GHz

Video Output

Signal:

SMPTE ST 259-C (270 Mb/s)
SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)

Supported formats:

SD: 480i59.94, 576i50
HD: SMPTE ST 274: 1080i59.94/50
HD: SMPTE ST 296: 720p59.94/50

Embedded audio: SMPTE ST 299, SMPTE ST 272

Return loss: >15 dB up to 1.5 GHz

Jitter: HD/SD: <0.2 UI

Reference Input

Signal:

SMPTE ST 170/SMPTE ST 318/ITU 624-4/BUT 470-6 blackburst
SMPTE ST 274/SMPTE ST 296 tri-level sync (black)

Return loss: >35 dB up to 5.75 MHz

Video Processing Performance

Signal path: 10 bits

Latency:

1 frame in all modes
Up to 6 frames of additional delay can be added

Audio Digital Inputs (4)

Sampling freq.: 32 to 96 kHz

Quantization: Up to 24 bits

AES3

Level: 0.2 to 7 Vp-p
Impedance: 110Ω balanced

AES3-id

Level: 0.2 to 2 Vp-p
Impedance: 75Ω

Return loss: 15 dB at 6 MHz

Audio Digital Outputs (4)

Sampling freq.: 48 kHz

Quantization: 24 bits

AES3

Level: 3 Vp-p
Impedance: 110Ω balanced

AES3-id

Level: 1.0 Vp-p
Impedance: 75Ω

Return loss: 15 dB at 6 MHz

Audio Processing Performance

Quantization: 24 bits

Sampling: 48 kHz

Number of channels: 16 (4 groups)

Freq. response: ±0.02 dB (20 Hz to 20 kHz)

SNR: 123 dB (A weighted)

THD+N: -138 dB (20 Hz to 20 kHz)

Miscellaneous

Fixed delay: 0 to 2.0s

Step: 1 ms (coarse), 1 sample (fine)

GPI (8)

Connector: 15-pin D-Sub, opto-isolated

GPI in:

Input selection: 1, 2
Presets: 1, 2, 3, 4

GPI out: Provides status of selected input: 1 or 2

RS-422 (Automation)

Connector: RJ45

Signal: OXTEL Series automation protocol

ABUS Connector

As per ABUS standard, Grass Valley

Test Pattern Generator

Video: Color bars – 100% white bar with 75% color

Audio:

Left channel pulsed 1 kHz tone
Right channel steady 1 kHz tone

Electrical

Power: 17W

XVP-1801-FS

Input \ Output	SD		HD			
	525	625	720p50	720p59.94	1080i50	1080i59.94
SD	525	X				
	625		X			
HD	720p50		X			
	720p59.94			X		
	1080i50				X	
	1080i59.94					X



Ordering

Densité 2 frame	Densité 3 frame	Description	XVP-1801-OPT-K	Background key input option
XVP-1801-FS	XVP-1801-FS-3RU	HD/SD frame sync and ARC	XVP-1801-UG-FS2XVP	Upgrade from XVP-1801-FS to full XVP
	XVP-1801-75-3DRP	Double rear connector panel, 75Ω		
	XVP-1801-110-3DRP	Double rear connector panel, 110Ω		
XVP-1801-75-QRP		Quadruple rear connector panel, 75Ω		
XVP-1801-110-QRP		Quadruple rear connector panel, 110Ω		
Options (software)	Description			
XVP-1801-OPT-AUD16	AES IO support and 16 channels on-board audio processing option			

Options (hardware)

BOC-DE15-4BNC-1 75Ω digital audio breakout cable
NSH15M HD-15 to terminal block adapter
Remote control GV Orbit®, iControl™, iControl Solo

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

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REF-1801

Reference Module with Optional Sync Pulse Generator



Space-saving, modular platform for advanced signal processing.

The REF-1801 from Grass Valley® is a reference module that distributes a universal reference signal (URS) to all the cards within a Densité® frame. It can also optionally generate two selectable reference signals for external use.

The unique URS concept provides significant advantages as it generates a digital reference signal, and also simplifies interformat processing by using a unique reference signal for all video and audio frame rates.

The REF-1801 has the ability to extract timecode from the input as per SMPTE ST 318, which allows for perfect audio/video phasing. Other features include the ability to slave Densité frames, as well as advancing or delaying independently the two reference output signals.

Key Features

- Digitally generated reference for intraframe distribution
- Timecode extraction and embedding
- Supports SMPTE ST 318 for perfect audio/video phasing
- Easy control and monitoring
- URS simplifies interformat processing

Two fully independent sync outputs

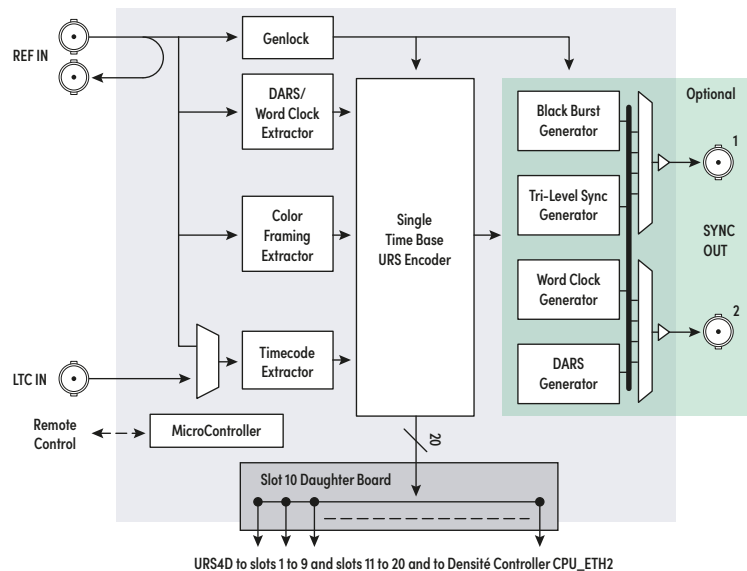
- Audio or video
- Selectable format
- Support for blackburst, tri-level sync, DARS, Word Clock
- Timing adjustment: up to 1 frame, pixel by pixel



All modules identified with this logo are compliant with the REF-1801 Reference Module



REF-1801-SRP



REF-1801 Functional Block Diagram

The REF-1801 has to be installed in slot 10 of the Densité 2 / Densité 3 frame.

Specifications

Reference Input

Load: Passive loop-through
Impedance: 75Ω bridging
Return loss: >30 dB up to 30 MHz
Signal type: Composite NTSC-M, PAL-B blackburst with optional VITC
Standard: SMPTE ST 170, ITU-R BT.1700-1, SMPTE ST 318
Signal level: 1 Vp-p
Signal type: HD tri-level sync
Standard: SMPTE ST 274, SMPTE ST 296
Signal level: 600 mVp-p
Signal type: DARS AES-3id
Standard: SMPTE ST 276

Signal level: 1 Vp-p
Signal type: Word Clock
Standard: AES11-2003
Signal level: 2.3 Vp-p

LTC-IN

Signal type: LTC
Standard: SMPTE ST 12
Signal level: 0.5 Vp-p to 4.5 Vp-p

Analog Reference Output

Signal type: Composite NTSC-M, PAL-B with optional VITC
Standard: SMPTE ST 170, ITU-R BT.1700-1, SMPTE ST 318

Signal level: 1 Vp-p
Signal type: HD tri-level sync
Standard: SMPTE ST 274, SMPTE ST 296
Signal level: 600 mVp-p
Signal type: DARS AES-3id
Standard: SMPTE ST 276
Signal level: 1 Vp-p
Signal type: Word Clock
Standard: AES11-2003
Signal level: 2.3 Vp-p

Electrical

Power: 3.5W

Ordering

Densité 2 Frame	Densité 3 Frame	Description	Options	Description
REF-1801	REF-1801-3RU	Reference module for Densité frame	REF-1801-OPT-SPG	SPG option for REF-1801
REF-1801-SRP	REF-1801-SRP-3RU	Single rear connector panel	Related Products	SPG-1801
			Remote Control	GV Orbit®, iControl™, iControl Solo

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

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SPG-1801

Sync Pulse Generator



Space-saving, modular platform for advanced signal processing.

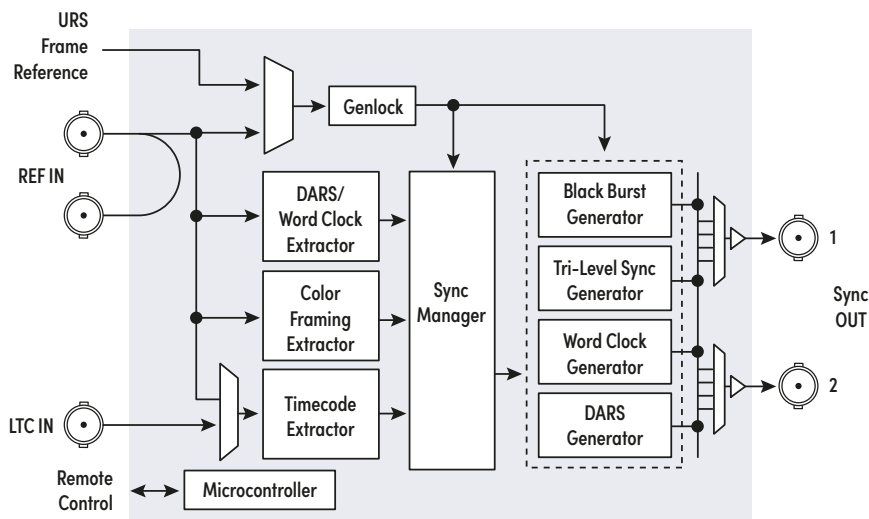
The Densité® Series SPG-1801 from Grass Valley® is a sync pulse generator card. It accepts an external reference input or a digital universal reference signal (URS) from the frame reference module REF-1801, if present. It features two fully independent outputs, with user selectable output format (blackburst, tri-level sync, DARS, Word Clock) and user configurable pixel by pixel output timing adjustment.

The SPG-1801 can lock on a blackburst or a tri-level sync signal. The output signal can be video (blackburst, tri-level sync) or audio (Word Clock, DARS). In the case of an audio output, the SPG-1801 can also lock on an external DARS or Word Clock.

The SPG-1801 is the ideal solution for generating multiformat synchronization signals that can be used in broadcast or production facilities. The combination of several SPG-1801 sync pulse generator cards and one REF-1801 frame reference module can transform the Densité frame into a highly-integrated solution for multisync generation and distribution.

Key Features

- Up to 20 cards per frame
- Reference input
 - External: blackburst, tri-level sync, DARS, Word Clock
 - Internal (with a REF-1801 card): Universal Reference Signal (URS)
- Two fully independent sync outputs
 - Audio or video
 - Selectable format
 - Support for blackburst, tri-level sync, DARS, Word Clock
 - Timing adjustment: up to 1 frame, pixel by pixel
- Easy control and monitoring with GV Orbit®



SPG-1801 Functional Block Diagram



SPG-1801-SRP

Specifications

Genlock Input

Load: Passive loop-through
Impedance: 75Ω bridging
Return loss: >30 dB up to 30 MHz
Signal type: Composite NTSC-M, PAL-B blackburst with optional VITC
Standard: SMPTE ST 170, ITU-R BT.1700-1, SMPTE ST 318
Signal level: 1 Vp-p
Signal type: HD tri-level sync
Standard: SMPTE ST 274, SMPTE ST 296
Signal level: 600 mVp-p
Signal type: DARS AES-3id
Standard: SMPTE ST 276
Signal level: 1 Vp-p
Signal type: Word Clock
Standard: AES11-2003
Signal level: 2.3 Vp-p

URS Input (from REF-1801)

Signal type: URS4D — Universal Reference Signal
Standard: Grass Valley proprietary

LTC-In

Connector: BNC per IEC 60169-8 amendment 2
Signal type: LTC
Standard: SMPTE ST 12
Signal level: 0.5 Vp-p to 4.5 Vp-p

Analog Reference Output

Signal type: Composite NTSC-M, PAL-B with optional VITC
Standard: SMPTE ST 170, ITU-R BT.1700-1, SMPTE ST 318
Signal level: 1 Vp-p
Signal type: HD tri-level sync
Standard: SMPTE ST 274, SMPTE ST 296
Signal level: 600 mVp-p
Signal type: DARS AES-3id

Standard: SMPTE ST 276

Signal level: 1 Vp-p

Signal type: Word Clock

Standard: AES11-2003

Signal level: 2.3 Vp-p

No Reference

Format 525: Min.: 18.296 μs

Adjustment: +2 frames

Format 625: Min.: 18.296 μs

Adjustment: +2 frames

Electrical

Power: 3.5W



Ordering

Densité 2 Frame	Densité 3 Frame	Description
SPG-1801	SPG-1801-3RU	Sync pulse generator
SPG-1801-SRP	SPG-1801-SRP-3RU	Single rear connector panel
Remote Control	GV Orbit, iControl™, iControl Solo	

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

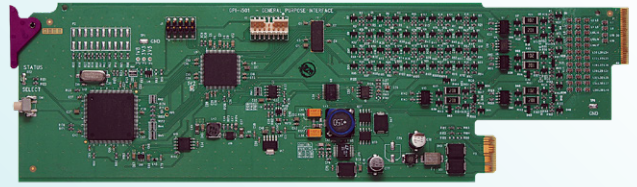
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GPI-1501

GPI I/O Module



Space-saving, modular platform for advanced signal processing.

The GPI-1501 from Grass Valley® is a 2 RU Densité card which provides 20 dedicated general purpose interface (GPI) inputs plus eight terminals that can be individually configured, either as a GPI input or GPI output.

When paired with a GV Orbit® or iControl application server, the GPI-1501 provides alarm aggregation from older devices that do not offer Ethernet port connectivity. The application server can report alarm

status information to operators via GV Orbit, iControl or SNMP. It can also trigger external events, such as selecting an alternate source.

The card can also interface with automation systems via its GPI outputs for the control of legacy devices. Each incoming GPI is time stamped with incoming timecode, or using its own internal clock for accurate logging and report generation.

The GPI-1501 is also very useful in unmanned locations to report environmental anomalies when connected to GPI equipped sensors (intrusion, high humidity, temperature, smoke, etc). Multiple GPI-1501 cards can be ganged together to meet the requirements of larger installations.

Key Features

- Provides GPI alarm aggregation for older devices, bridging the gap to modern IP enabled control systems
- Interfaces seamlessly with most automation systems
- Alarm aggregation of virtually any GPI enabled device
- Scalable to address large systems
- Time stamped events for accurate logging and root cause analysis
- 20 dedicated GPI inputs and 8 individually configurable as GPI I/O per card
- SMPTE ST 12 LTC timecode input
- SNMP support (status reporting) through a GV Orbit or iControl application server
- Accurate internal clock with NTP protocol support

Specifications

GPI In

Connector: DB-44
Number of input: 20 opto-isolated
Pull-up voltage: 2.3V
Source current: 2 mA when input shorted
Low level activation: 0.8V max
Over voltage: 25V max
Pulse duration: 8 ms min

GPI Bidirectional

Connector: DB-44
Number of I/O: 8

Input Mode

Pull-up voltage: 2.3V
Source current: 2 mA when input shorted
Low level activation: 0.8V max
Over voltage: 25V max
Pulse duration: 8 ms min

Output Mode

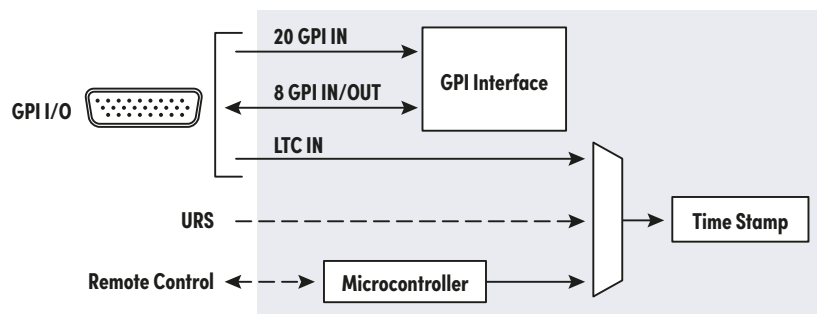
Contact closure current: 50 mA max
Reverse voltage: -15V max
Reverse current: -50 mA max
V out low: 0.6V at 1.5 mA

LTC Signal

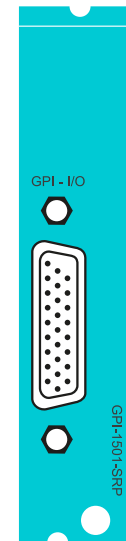
Connector: Sharing input 20 of DB-44 GPI's connector
Signal type: Unbalanced as per SMPTE ST 12 date and time as per SMPTE ST 309

Electrical

Power: 1W



GPI-1501 Functional Block Diagram



GPI-1501-SRP

Ordering

Densité 2 frame

GPI-1501
GPI-1501-SRP

Densité 3 frame

GPI-1501-3RU
GPI-1501-SRP-3RU
GPI-1501-RP-FR1

Description

GPI I/O module
 Single rear connector panel
 Rear panel for the GPI-1501 when use in the Densité 3+ FR1

Option

Remote control

Description

GV Orbit, iControl, iControl Solo

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