

Multi-channel Processor

FA-1616 Series

Ver.3.60



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Supporting an array of interfaces, this multi-channel processor series provides essential video production features in a compact 1RU enclosure. Besides offering core 2K/4K frame sync functionality, the FA-1616 series serves as a color corrector, video processing amp, audio remapper, timecode generator, and much more. For an optimal configuration, use optional software to add your preferred functions to both processor blocks. You can also customize your system economically with a range of expansion cards that add audio (including AES/EBU, Dante, and MADI) and GPI interfaces. Add an MoIP card to convert between IP and baseband formats or between IP formats (ST 2022-6 ↔ ST 2110), enabling use as an MoIP/SDI gateway.

Various interfaces



Rich functions

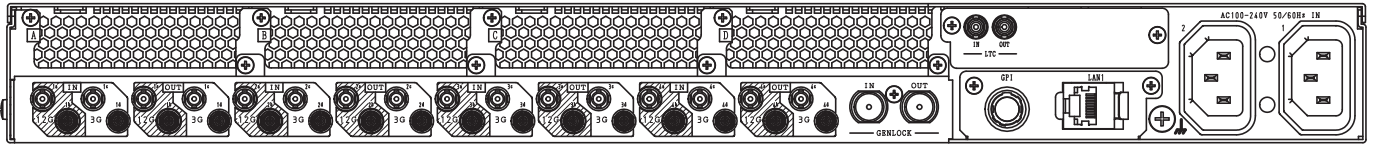
Available functions will be changed depending upon the chosen configuration.

Frame synchronizer	ProcAmp	Clip function	Test signal output	RGB color corrector
HDR/SDR conversion	HDR/SDR conversion 1D LUT	HDR/SDR conversion 3D LUT	Aspect conversion	Resizing/positioning
1080/720 conversion	3G Level-A/B conversion	Gearbox SQD/2SI conversion	2K→4K up conversion	4K→2K down conversion
Frame delay	Basic fram rate ^{*1} converter	JPEG XS ^{*2}		
Audio MUX	Audio DEMUX	Audio SRC	Audio remapping	Audio delay
Audio gain				

^{*1} A basic frame rate converter using the nearest frame approach. ^{*2} Requires FA-16MOIP option.

Product lineup

FA-1616HB-12G



■ 12G-SDI^{*1} supported, 16 inputs/16 outputs model.

■ 32 HD-BNC connectors are mounted.

Input: 75Ω HD-BNC x 16, 12G/6G/3G/HD-SDI x 8, 3G/HD-SDI x 8.

Output: 75Ω HD-BNC x 16, 12G/6G/3G/HD-SDI x 8, 3G/HD-SDI x 8.

■ IP input/output.

Add the option(s)^{*2} to choose any mode^{*3}.

< SMPTE ST 2110 >

- Sender: HD(3G) x 32/4K x 8^{*4}.

- Receive: HD(3G) x 32/4K x 8^{*4}.

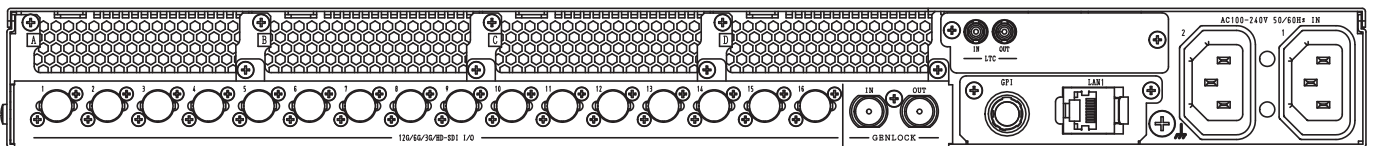
- Sender and Receive: HD(3G) x 16/4K x 8^{*4}.

< SMPTE ST 2022-6 >

- Sender and Receive: 3G x 28/HD x 28^{*4}.

^{*1} 12G compatibility applies to only 8 of the 16 inputs/outputs. ^{*2} FA-16MOIP, FA-16MOIP-EX. ^{*3} Mode can be set per card. Up to 2 MoIP cards can be installed. ^{*4} The number of channels when both FA-16MOIP and FA-16MOIP-EX are installed simultaneously.

FA-1616B-12G



■ 12G-SDI supported, 16 inputs/outputs^{*1} model.

■ All terminals support 12G-SDI.

■ 16 normal HD connectors are mounted.

Input/output^{*2}: 75Ω BNC x 16, 12G/6G/3G/HD-SDI x 16.

■ IP input/output.

Add the IP option(s)^{*3} to choose any mode^{*4}.

< SMPTE ST 2110 >

- Sender: HD(3G) x 32/4K x 8^{*5}.

- Receive: HD(3G) x 32/4K x 8^{*5}.

- Sender and Receive: HD(3G) x 16/4K x 8^{*5}.

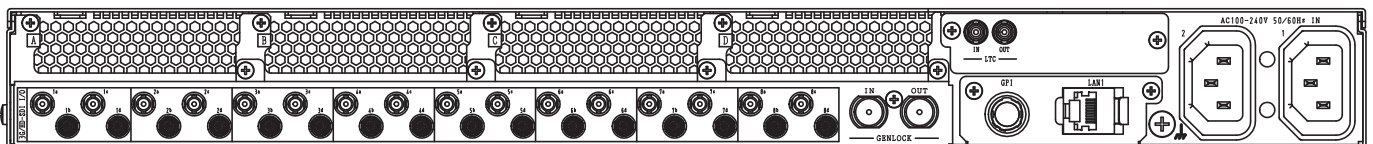
< SMPTE ST 2022-6 >

- Sender and Receive: 3G x 28/HD x 28^{*5}.

^{*1} Input or output is selected in a menu for each channel. ^{*2} Used for both input and output. ^{*3} FA-16MOIP, FA-16MOIP-EX. ^{*4} Mode can be set per card. Up to 2 MoIP cards can be installed.

^{*5} The number of channels when both FA-16MOIP and FA-16MOIP-EX are installed simultaneously.

FA-1616HB-3G



■ 3G-SDI supported, 32 inputs/outputs^{*1} model.

■ 32 HD-BNC^{*2} connectors are mounted.

Input/output^{*3}: 75Ω HD-BNC x 32, 3G/HD-SDI x 32.

■ IP input/output.

SDI to IP encapsulation and IP to SDI de-encapsulation for up to 32 channels.

Add the IP option(s)^{*4} to choose any mode^{*5}.

< SMPTE ST 2110 >

- Sender: HD(3G) x 32/4K x 8^{*6}.

- Receive: HD(3G) x 32/4K x 8^{*6}.

- Sender and Receive: HD(3G) x 16/4K x 8^{*6}.

< SMPTE ST 2022-6 >

- Sender and Receive: 3G x 28/HD x 28^{*6}.

^{*1} Input or output is selected in a menu for each channel. ^{*2} HD-BNC is a trademark of Amphenol Corporation. ^{*3} Used for both input and output. ^{*4} FA-16MOIP, FA-16MOIP-EX.

^{*5} Mode can be set per card. Up to 2 MoIP cards can be installed. ^{*6} The number of channels when both FA-16MOIP and FA-16MOIP-EX are installed simultaneously.

Instantly build the system you need with software-defined architecture

FA-1616 units are equipped with 2 processor blocks. Thanks to the processor's software-defined architecture, each block can be customized enabling the functions and channels you need. By selecting an optimal configuration* from 3 choices, hardware resources are applied more efficiently and flexibly for increasingly diverse video production. Instant reconfigurability also makes it a useful portable processor for events with constantly changing requirements.

* Video processing capacity varies depending on the configuration selected. For details, contact your FOR-A dealer.

Processor block A / Processor block B

2 blocks process video and audio for output via SDI and IP. Equipped with up to 4 processors each, the blocks can be set up in the same or different

Processing available per video processor

■ Video: 1 channel for 4K or 4 channels for 2K. ■ Audio: 4×16 channels.

Video Processing

Apply frame sync, color correction, and video proc amp functions to up to 32 channels of 2K or 8 channels of 4K signals. Processing is flexible, enabling you to assign up/down/cross-conversion, HDR/SDR conversion, or 3D LUT conversion to any of the 4 processor units in blocks A and B (PRU A1–A4 and PRU B1–B4) available for video processing.

Video processor block diagram

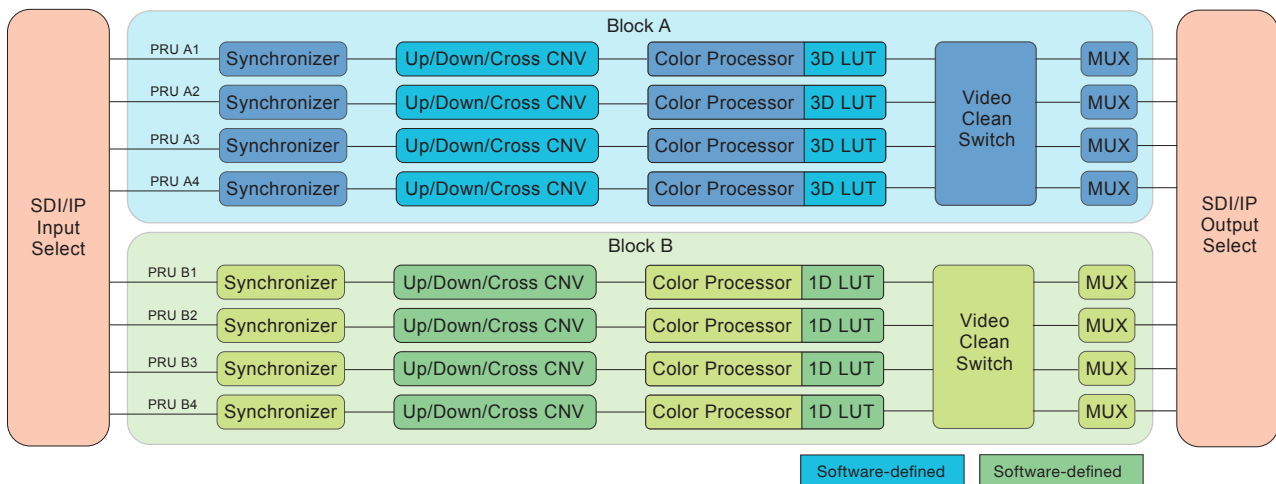


Table of configurable functions for video processor blocks

Frame synchronizer	ProcAmp	Clip function	Test signal output	RGB color corrector
HDR/SDR conversion	HDR/SDR conversion 1D LUT	HDR/SDR conversion 3D LUT	Aspect conversion	Resizing/positioning
1080/720 conversion	3G Level-A/B conversion	Gearbox SQD/2SI conversion	2K→4K up conversion	4K→2K down conversion
Frame delay	Basic fram rate ^{*1} converter	JPEG XS ^{*2}		

option

*1 A basic frame rate converter using the nearest frame approach. *2 Requires FA-16MOIP option.

Software options

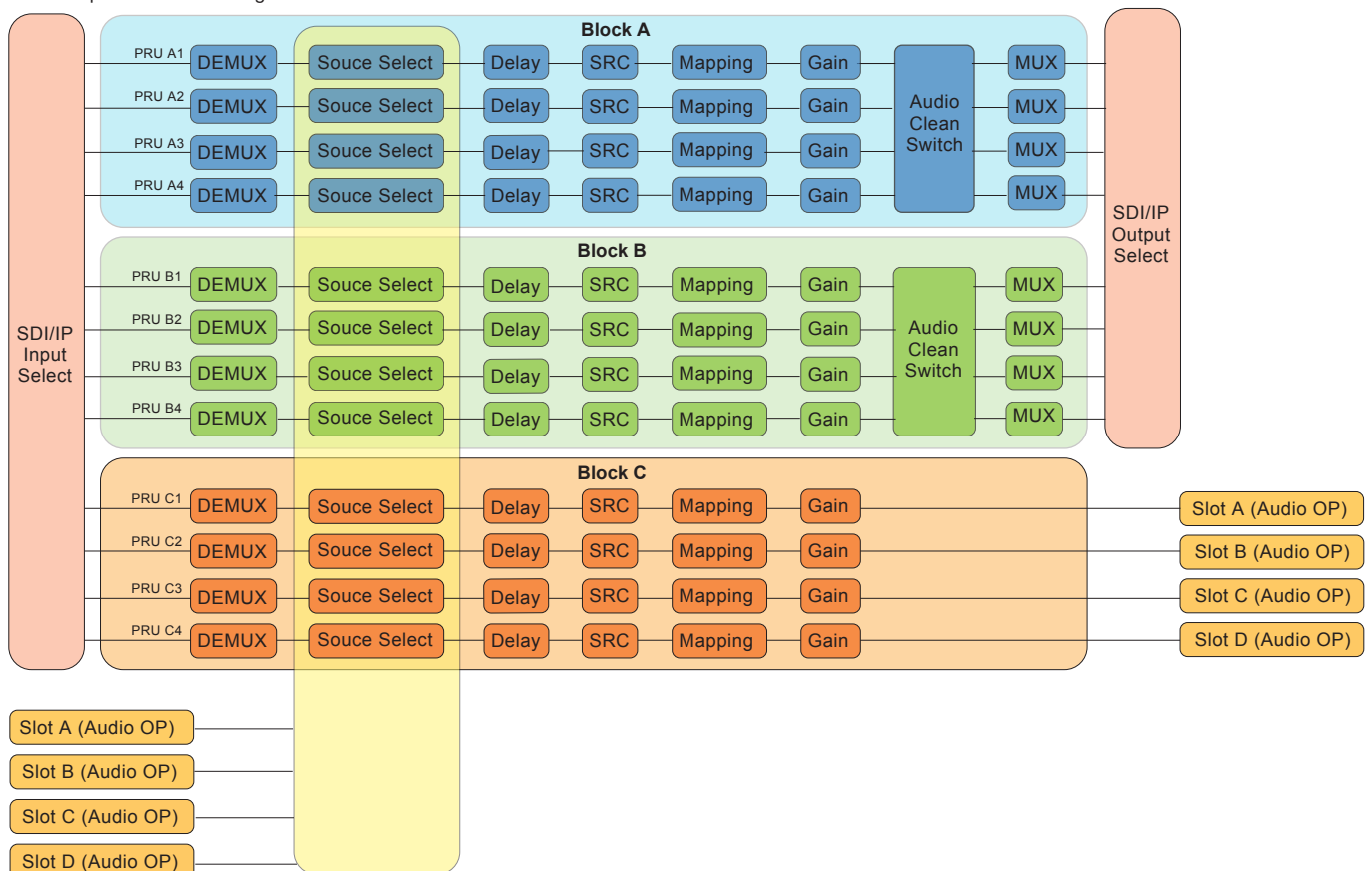
Products	Features	License	
		Units	Maximum Number
FA-164K	Enables 4K signal processing. Added automatically when the following options are purchased.	ALL PRU	1
FA-16JXS-ED-P2 ^{*1}	Use 2 processor units per license for JPEG-XS encoding or decoding.	BlockA PRU1/2 BlockA PRU3/4 BlockB PRU1/2 BlockB PRU3/4	4
FA-16UDC-P2 ^{*2}	Use 2 processor units per license for up/down/cross-conversion.		
FA-16HDR-P2 ^{*3}	Use 2 processor units per license for 1D LUT-based gamut and dynamic range conversion.		
FA-16LUT-P2 ^{*3}	Use 2 processor units per license for 3D LUT-based gamut and dynamic range conversion.		

^{*1} Requires FA-16MOIP option. Not compatible with FA-16UDC-P2, FA-16HDR, or FA-16LUT-P2. ^{*2} Converts 1 channel, consisting of one 2K signal and one 4K signal per PRU. The maximum number of licenses enables conversion of up to 8 channels. ^{*3} FA-16HDR-P2 and FA-16LUT-P2 cannot be assigned to the same block.

Audio Processing

For audio processing, signals in SDI embedded or MoIP audio or from optional Dante, MADI, AES, or analog audio interfaces are supplied to 4 block C processor units (PRU C1–4), where each unit processes up to 64 channels. After processing by PRU C1–4, the audio can be embedded into SDI/IP signals or output to audio cards in option slots A–D. Block C for audio processing is activated by installing audio cards. Processing for optional audio cards in slots A–D, assigned to the 4 units of PRU C1–C4, is performed in this block.

Audio processor block diagram



Audio options

Multiple implementations possible to slot A-D

Expansion card	Outputs • Inputs	Maximum simultaneous implementations
FA-16AES-UBL/FA-16AES-PNL	AES/EBU	2
FA-16DNT	Dante	4
FA-16MADI	MADI	4
FA-16ANA-AUD	Analog audio	4

Table of configurable functions for audio processor blocks

Audio MUX	Audio DEMUX	Audio SRC	Audio remapping	Audio delay
Audio gain				

Configuration lineup selectable according to application

Configuration 1 : Standard configuration

Configuration 1 Features

- 4 video processors used for 2K (× 4 channels) and 4K*(× 1 channel).
- Frame synchronization: up to 16 channels for 2K, 4 channels for 4K*.
- Adding optional MoIP cards enables use as an SDI/IP gateway with FS.
- Audio processing: 256 channels standard. Optional cards enable audio processing for up to 256 additional channels.

*4K resolution requires FA-164K.

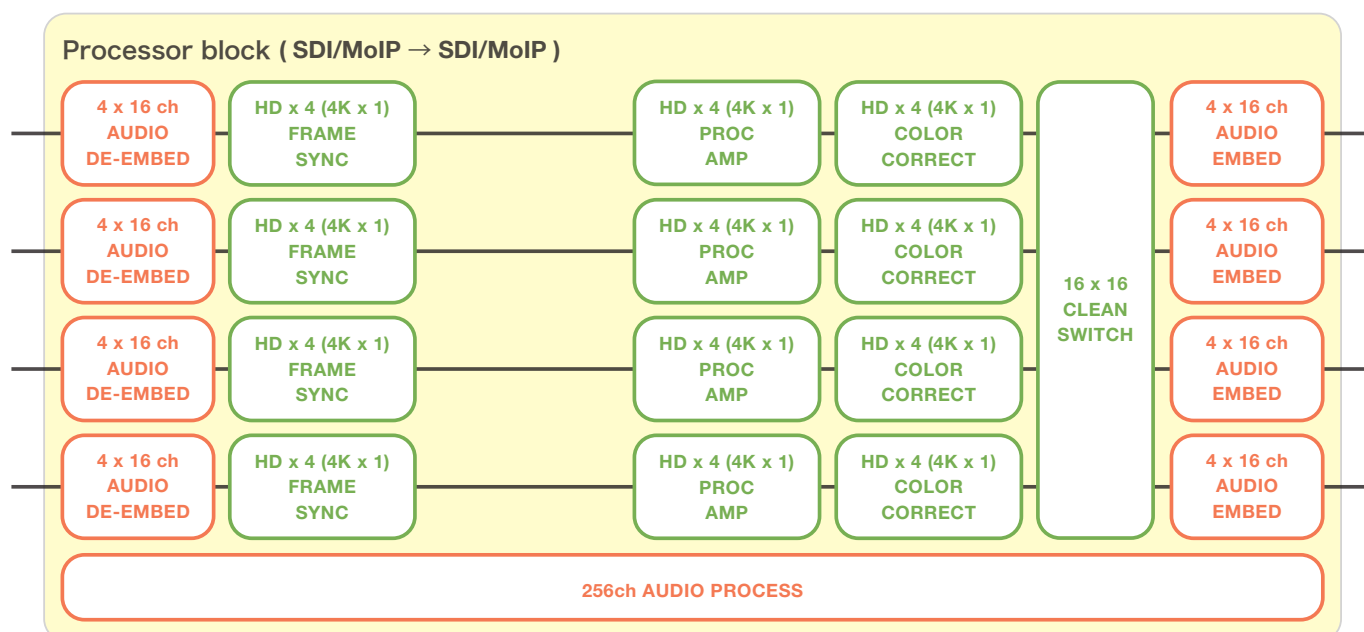


Table of functions available in Configuration 1

Available function is highlighted in yellow.

Frame synchronizer	ProcAmp	Clip function	Test signal output	RGB color corrector
HDR/SDR conversion	HDR/SDR conversion 1D LUT	HDR/SDR conversion 3D LUT	Aspect conversion	Resizing/positioning
1080/720 conversion	3G Level-A/B conversion	Gearbox SQD/2SI conversion	2K→4K up conversion	4K→2K down conversion
Frame delay	Basic frame rate converter	JPEG XS		
Audio MUX	Audio DEMUX	Audio SRC	Audio remapping	Audio delay
Audio gain				

Configuration lineup selectable according to application

Configuration 2 : Optional configuration (Up/down conversion, SDR/HDR conversion)

Configuration 2 required options

FA-16UDC-P2: Up/down/cross conversion functionality

- Enabling this functionality with one 1 allows for up/down/cross conversion with 2 processors
- A maximum of 4 FA-16UDC-P2 units can be installed.

FA-16HDR-P2: SDR/HDR conversion

- Enabling this in 1 unit allows for SDR/HDR conversion using 2 processors
- A maximum of 4 FA-16HDR-P2 units can be installed

If converter functions (up/down/cross/aspect conversion/resize, etc.) are used, including in HD/4K, the number of, 1 channel can be processed by 1 processor. Without converter functions, SDR/HDR conversion of 3G/HD x 4 channels or 4K x 1 channels is possible.

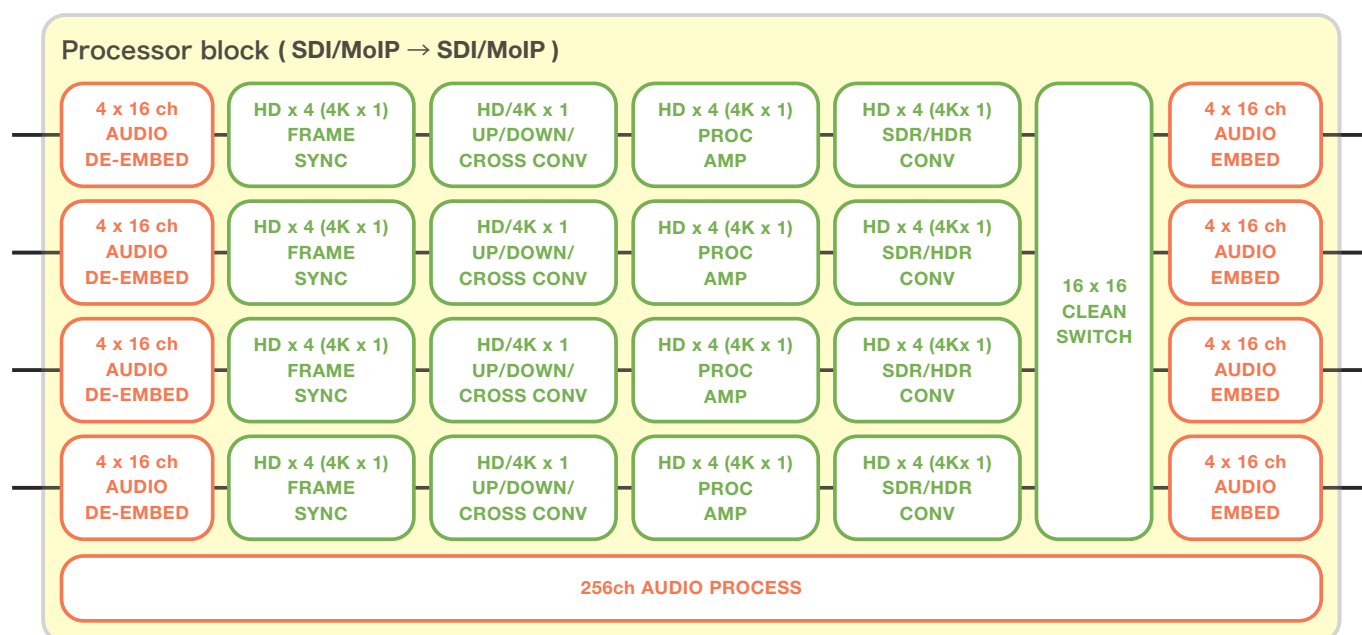


Table of functions available in Configuration 2

Available function is highlighted in yellow.

Frame synchronizer	ProcAmp	Clip function	Test signal output	RGB color corrector
HDR/SDR conversion	HDR/SDR conversion 1D LUT	HDR/SDR conversion 3D LUT	Aspect conversion	Resizing/positioning
1080/720 conversion	3G Level-A/B conversion	Gearbox SQD/2SI conversio	2K→4K up conversion	4K→2K down conversion
Frame delay	Basic fram rate ^{*1} converter	JPEG XS		
Audio MUX	Audio DEMUX	Audio SRC	Audio remapping	Audio delay
Audio gain				

*1 A basic frame rate converter using the nearest frame approach.

Configuration lineup selectable according to application

Configuration 3 : Optional configuration (Up/down conversion, 3D LUT)

Configuration 3 options

FA-16UDC-P2: Up/down/cross conversion

- Enabling this functionality with 1 unit allows for up/down/cross conversion with two processors.
- A maximum of 4 FA-16UDC-P2 units can be installed.

FA-16LUT-P2: 3D LUT conversion

- Enabling this functionality with 1 unit allows for 3D LUT conversion using two processors.
- A maximum of 4 FA-16LUT-P2 units can be installed.

If converter functions (up/down/cross/aspect conversion/resize, etc.) are used, including in HD/4K, the number of channels that can be processed by one processor is limited to one channel.

If converter functions are not used, 3D LUT conversion of 3G/HD x 16 channels or 4K x 4 channels is possible.

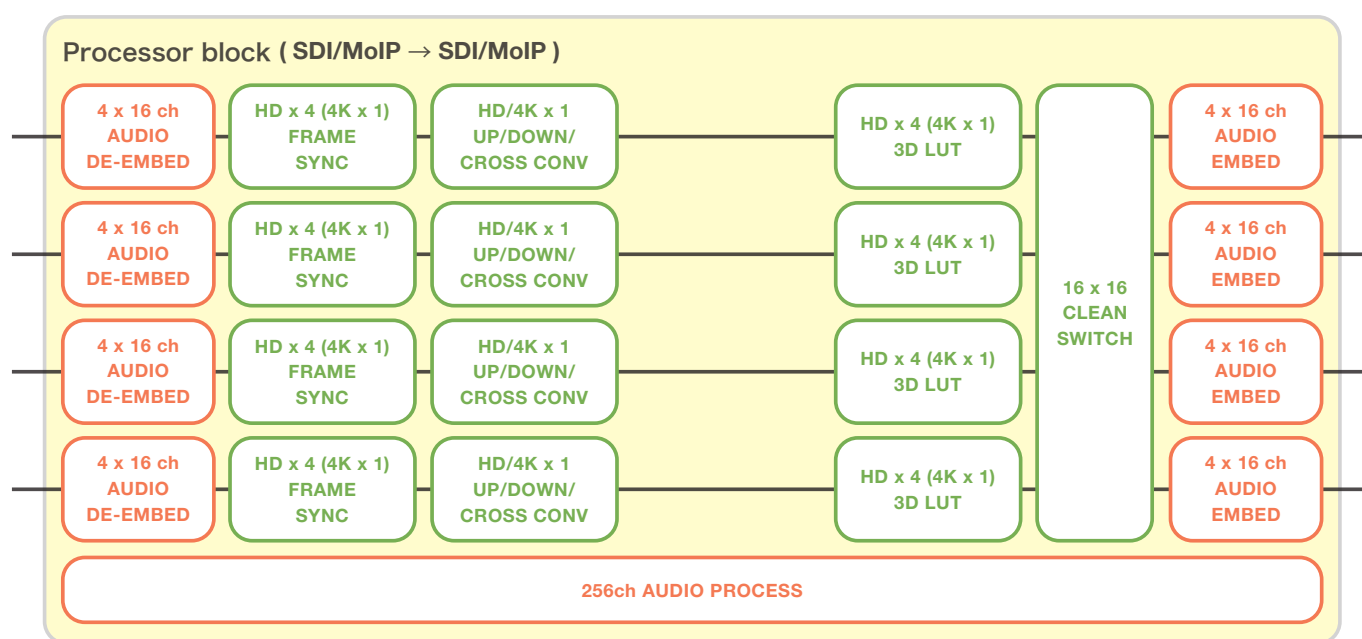


Table of functions available in Configuration 3

Available function is highlighted in yellow.

Frame synchronizer	ProcAmp	Clip function	Test signal output	RGB color corrector
HDR/SDR conversion	HDR/SDR conversion 1D LUT	HDR/SDR conversion 3D LUT	Aspect conversion	Resizing/positioning
1080/720 conversion	3G Level-A/B conversion	Gearbox SQD/2SI conversion	2K→4K up conversion	4K→2K down conversion
Frame delay	Basic frame rate ^{*1} converter	JPEG XS		
Audio MUX	Audio DEMUX	Audio SRC	Audio remapping	Audio delay
Audio gain				

*1 A basic frame rate converter using the nearest frame approach.

Configuration lineup selectable according to application

Configuration 4 : Optional configuration (JPEG XS)

Configuration 4 required options

FA-16JXS-ED-P2 : Enables JPEG XS (ST 2110-22) encoding or decoding.

- One FA-16JXS-ED-P2 enables JPEG XS encoding or decoding with 2 processor units.
- Up to a total of four FA-16JXS-ED-P2 can be installed in processor blocks A and B.

FA-16MOIP

- Enables decoding of IP signals (ST 2110-22) encoded with JPEG XS into SDI signals.
- Enables encoding SDI signals into JPEG XS and outputting them as IP signals (ST 2110-22).

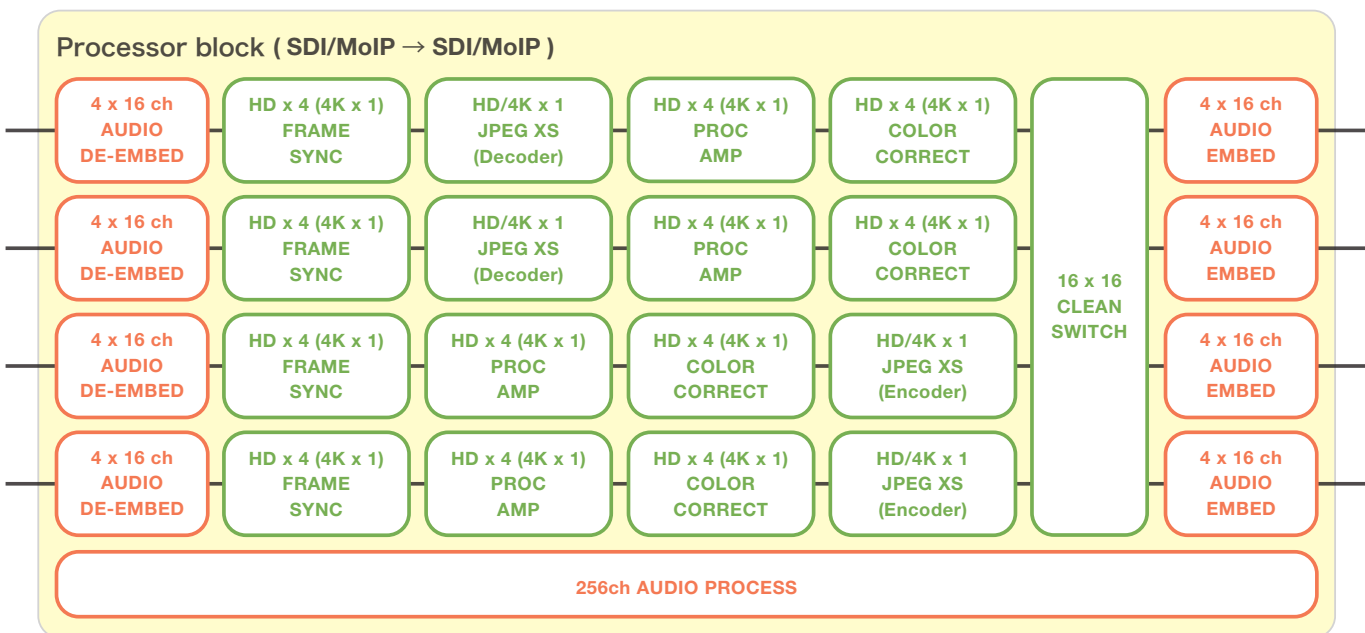


Table of functions available in Configuration 4

Available function is highlighted in yellow.

Frame synchronizer	ProcAmp	Clip function	Test signal output	RGB color corrector
HDR/SDR conversion	HDR/SDR conversion 1D LUT	HDR/SDR conversion 3D LUT	Aspect conversion	Resizing/positioning
1080/720 conversion	3G Level-A/B conversion	Gearbox SQD/2SI conversion	2K→4K up conversion	4K→2K down conversion
Frame delay	Basic frame rate converter	JPEG XS ^{*1}		
Audio MUX	Audio DEMUX	Audio SRC	Audio remapping	Audio delay
Audio gain				

*1.Requires FA-16MOIP option.

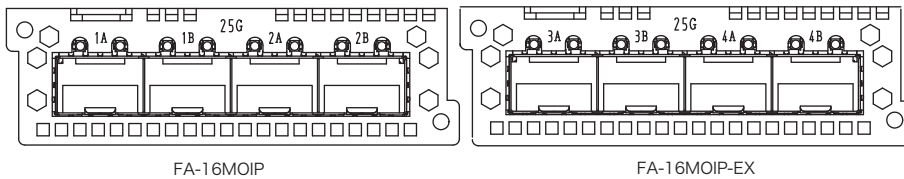
Expansion card options

Expansion cards for Media over IP

FA-16MOIP/FA-16MOIP-EX

- For media over IP (MoIP) support, install an FA-16MOIP card, and to expand this functionality, add an FA-16MOIP-EX card.
- Enables ST 2022-6 or ST 2110 encap/decap.
- Convert between IP and baseband formats or between IP formats* (ST 2022-6 ⇔ ST 2110).
- Enables use of the FA-1616 as an IP gateway, with up to 32-channel (2K) or 8-channel (4K) SDI/MoIP conversion.
- Add up to two MoIP cards with four 25G SFP ports (2 redundant channels).
- A ready-to-use solution where MoIP conversion is currently needed, in mixed MoIP/SDI environments, or where future MoIP migration is planned.
- Install FA-16MOIP in slot A and FA-16MOIP-EX in slot B. (Not designed for slots C or D.)
- FA-16MOIP is required in order to install FA-16MOIP-EX.

*When performing mutual conversion between ST 2110 and ST 2022-6 with the FA-1616, the FA-16MOIP side must be set to ST 2110, and the FA-16MOIP-EX side must be set to ST 2022-6.



FA-16MOIP Stream configuration

Format	MoIP operating mode		
	Sender & Receiver	Sender Only	Receiver Only
2K (ST 2110-20)	8 In/8 Out Stream	16 Out Stream	16 in Stream
4K (ST 2110-20)	4 In/4 Out Stream	4 Out Stream	4 in Stream
2K (ST 2110-22)	4 In/4 Out Stream	8 Out Stream	8 in Stream
4K (ST 2110-22)	4 In/4 Out Stream	4 Out Stream	4 in Stream
2K (ST 2022-6)	14 In/14 Out Stream	-	-

* Mixed operation of 2K, 4K, ST 2110-20, and ST 2110-22 is supported. Please contact your FOR-A dealer for details.

FA-16MOIP + FA-16MOIP-EX Stream configuration

Format	MoIP operating mode		
	Sender & Receiver	Sender Only	Receiver Only
2K (ST 2110-20)	16 in/16 Out stream	32 Out stream	32 In Stream
4K (ST 2110-20)	8 In/8 Out Stream	8 Out stream	8 In Stream
2K (ST 2110-22)	8 In/8 Out Stream	16 Out stream	16 In Stream
4K (ST 2110-22)	8 In/8 Out Stream	8 Out stream	8 In Stream
2K (ST 2022-6)	28 In/28 Out Stream	-	-

* For ST 2110-22, up to 16 streams can be input/output, but internal processing is available for up to 8 streams.

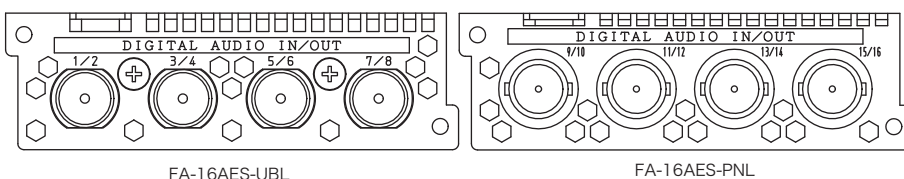
* Supports mixed operation of 2K, 4K, ST 2110-20, and ST 2110-22, as well as interchange between ST 2022-6 and ST 2110-20/22. For details, please contact your FOR-A dealer.

Audio interface cards

FA-16AES-UBL/FA-1616AES-PNL

AES/EBU digital audio interface card and I/O terminal expansion panel

- When exporting embedded audio from video signals, demultiplexing is possible from up to 4 video signals.
- FA-16AES-UBL is required in order to install FA-16AES-PNL.
- Install FA-16AES-PNL immediately to the right of FA-16AES-UBL.
- Install FA-16AES-UBL in slots A-D.
- Install FA-16SED-PNL in slots B-D.



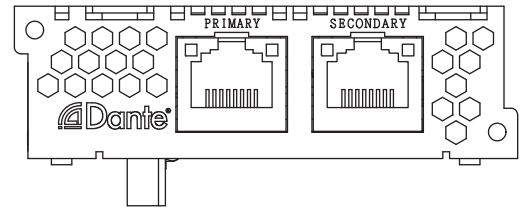
Products	Input / Output	Total channels	Maximum simultaneous implementations
FA -16AES -UBL	Select input or output for groups of 4 channels	8	4
FA-16AES-UBL + FA-16AES-PNL	Select input or output for groups of 4 channels	16	2

Expansion card options

FA-16DNT

Audio interface card for Dante multi-channel IP network transmission

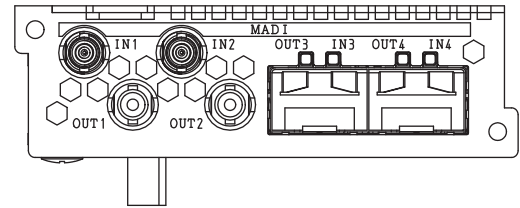
- When exporting embedded audio from video signals, demultiplexing is possible from up to 4 video signals.
- Audio input/output for up to 64 channels per card.
- Includes a primary and secondary port, enabling redundancy or daisy-chaining.
- Install in slots A-D.
- Maximum of 4 simultaneous implementations.



FA-16MADI

MADI (Multi-channel Audio Digital Interface) audio interface card.

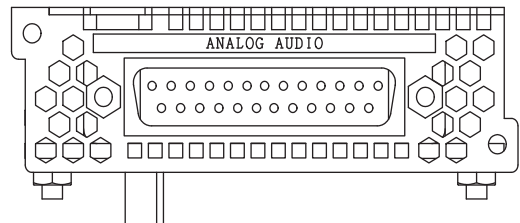
- When exporting embedded audio from video signals, demultiplexing is possible from up to 4 video signals.
- Coaxial (HD-BNC 75Ω) and optical connections (SFP module).
- Maximum of 4 simultaneous implementations.
- Install in slots A-D.
- Maximum of 4 simultaneous implementations.
- IN1/OUT1 and IN2/OUT2 are composed of HD-BNC connectors. IN3/OUT4 and IN4/OUT4 are composed of SFP modules.
- Select source signals from IN 1-4 to process up to 64 channels of audio signals.
- Processed audio signals are sent out from the output interface of the corresponding number (OUT 1-4).



FA-16ANA-AUD

Balanced 4-input, 4-output analog audio interface expansion card.

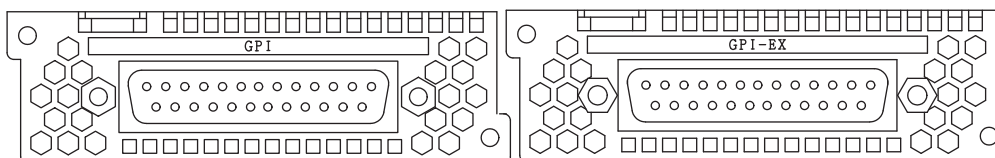
- When exporting embedded audio from video signals, demultiplexing is possible from up to 4 video signals.
- Install in slots A-D.
- Maximum 4 simultaneous implementations.



GPI interface cards

FA-16GPI/FA-16GPI-PNL

- Add FA-16GPI-PNL to expand interfaces to 20 inputs/20 outputs.
- FA-16GPI is required in order to install FA-16GPI-PNL. Be sure to install FA-16AES-PNL to the right of FA-16GPI.
- Used by assigning a function to individual input terminals.
- Install FA-16GPI in slots A-D. Install FA-16GPI-PNL in slots B-D.
- Maximum simultaneous implementations: 4 for FA-16GPI, 2 for FA-16GPI-PNL.



FA-16GPI

FA-16GPI-PNL

Remote control unit / Auxiliary unit

FA-10RU Remote control unit

- Enables remote control of certain FA-1616 functions.
- Control up to 100 units in the FA-1616 series from a single FA-10RU.

FA-10RU-1616 software options are required.



FA-10DCCRU Remote control unit

- Enables remote control of the FA-1616 color corrector function.
- Control up to 100 units in the FA-1616 series from a single FA-10DCCRU.

FA-10DCCRU-1616 software option is required.



FA-AUX30 Auxiliary unit

- Connect to an FA-10RU GPI terminal to enable GPI control.
- For instant recall, assign frequently used functions to the 30 buttons.





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