

Multi-channel processor

FA-1616 Series



Preliminary

FOR.A®

Multi Channel Processor

FA-1616 Series



Multi-channel processor series with essential video production features in a compact 1 RU enclosure. Besides its core role as a frame synchronizer for up to 32 channels, supporting IP/SDI (12G/6G/3G/HD-SDI) and 4K, the FA-1616 series also serves as a color corrector, video processing amp, and audio remapper. Software-defined architecture enables to choose just the right configuration for your needs. Build an optimal system without unnecessary costs by adding exactly what you need with VoIP cards^{*1} and a range of audio (including Dante and MADI) and GPI^{*2} cards.

^{*1} Optional. ^{*2} Optional, to be supported.

Product lineup → please see page 3 for details.

FA-1616HB-12G 12G^{*1}/6G^{*1}/3G/HD-SDI supported 16 inputs/16 outputs, HD-BNC^{*2} connector model.

FA-1616B-12G^{*3} 12G/6G/3G/HD-SDI supported 16 inputs/outputs^{*4} model.

FA-1616HB-3G^{*3} 3G/HD-SDI supported 32 inputs/outputs^{*4}, HD-BNC^{*2} connector model.

^{*1} 12G/6G compatibility applies to only 8 of the 16 inputs/outputs. ^{*2} HD-BNC is a registered trademark of Amphenol Corporation. ^{*3} To be supported.

^{*4} Input or output is selected in a menu for each channel.

Control and monitoring

- Control from a browser and via Ember+ or NMOS IS-04/05.
- Browser-based control: No need to install a dedicated GUI.
- Ember+ control^{*1}: Enables control GUI development by users^{*1}.
- SNMP monitoring.
- Management/control system redundancy also ensured, with 2 dedicated LAN ports (1000BASE-T).^{*3}

^{*1} Using Lawo VSM. ^{*3} FA-16MOIP is required.

GENLOCK input

Timecode (To be supported)

- LTC, ATC (LTC, VITC) time code generating and offset adjustment.
- Equipped with LTC I/O terminals; supports ancillary time code multiplexing.

Others

- Standard redundant power supply. With the fan, hot-swappable from the front.
- Compact, relatively shallow 1 RU enclosure. 430(W)×500(D)×44(H) mm.

Features → please see page 4 for details.

Audio input/output

- Mux/demux, remap, delay adjustment, and other processing for SDI embedded audio.

Robust frame synchronization

- Synchronization Mode: Selectable from Frame, Line, AVDL, or Line (Min).

Advanced conversion

- Interlace/progressive (from HD to 4K).
- Up/down/cross (from HD to 4K).
- Aspect ratio.
- Resize/repositioning.
- 2SI/SQD/3G-SDI Level-A/B conversion.
- Single Link 12G-SDI/Quad Link 3G-SDI interconversion.

ProcAmp

- Adjustment of video level, chroma level, and hue.

Robust color correction

- 2 color correction modes: Balance (RGB) mode and color difference (YCbCr) mode.
- Supports and converts between the broad ITU-R BT.2020 gamut and the conventional ITU-R BT.709 gamut^{*}.
- Compensates for differences among external devices by using EOTF/OETF corresponding to various HDR or SDR curves^{*}.
- EOTF/OETF log curves and gamut can be registered from a computer^{*}.
- SDR/HDR conversion designed for an array of log curves (including HLG, PQ, and SDR) and reliable round-trip performance^{*}.
- 1D and 3D LUTs supported^{*}.

^{*} To be supported.

Main features available from expansion card → please see page 9 for details.

Video input/output

- SMPTE ST 2022-6^{*1}, SMPTE ST 2110.

Audio input/output

- Dante, MADI, AES/EBU, analog^{*1}.

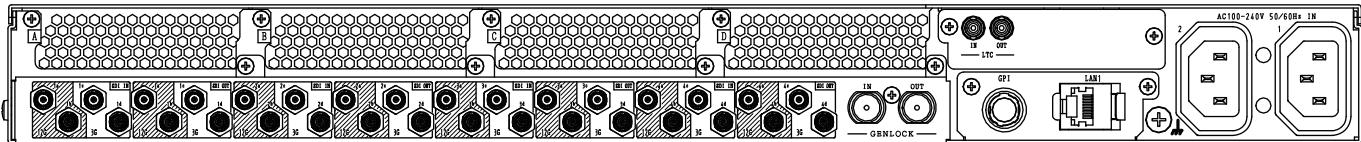
PTP synchronization

- Choose GENLOCK input or PTP for synchronization of each processor installed in processor block^{*2}.

^{*1} To be supported. ^{*2} Please see page 4 for details of processor block.

Product lineup

FA-1616HB-12G

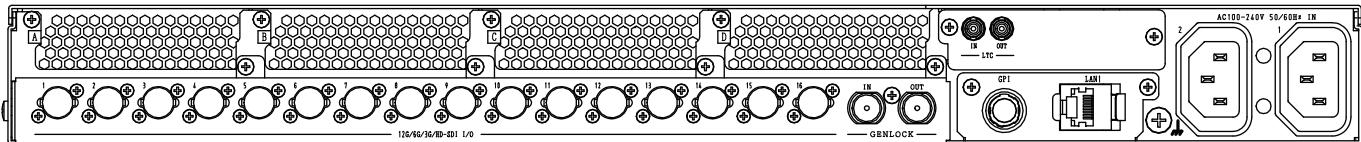


- 12G-SDI¹ supported, 16 inputs/16 outputs model.
- 32 HD-BNC connectors are mounted.
Input: 75Ω HD-BNC ×16, 12G/6G/3G/HD-SDI×8, 3G/HD-SDI×8.
Output: 75Ω HD-BNC ×16, 12G/6G/3G/HD-SDI×8, 3G/HD-SDI×8.

- IP input/output.
Add the option(s)² to choose any mode³.
< SMPTE ST 2110 >
- Transmission only: HD×16/UHD×4.
- Receive only: HD×16/UHD×4.
- Transceiver: HD×8/UHD×4.
< SMPTE ST 2022-6 >⁴ * To be supported
- Transceiver: HD×16/3G×14.

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. Number of channels indicated is for each card.
Note: This external view is a tentative version.

FA-1616B-12G (To be supported)

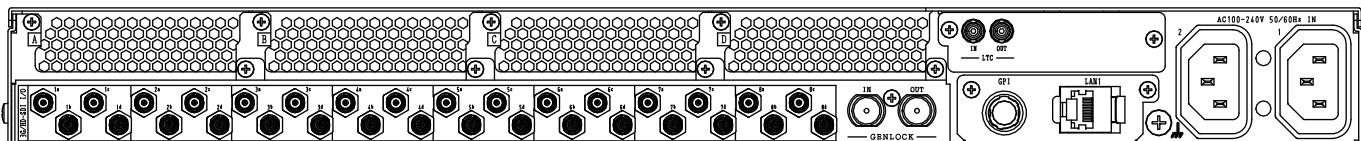


- 12G-SDI supported, 16 inputs/outputs¹ model.
- All terminals support 12G-SDI.
- 16 normal HD connectors are mounted.
Input/output²: 75Ω BNC ×16, 12G/6G/3G/HD-SDI×16.

- IP input/output.
Add the IP option(s)³ to choose any mode⁴.
< SMPTE ST 2110 >
- Transmission only: HD×16/UHD×4.
- Receive only: HD×16/UHD×4.
- Transceiver: HD×8/UHD×4.
< SMPTE ST 2022-6 >⁴ * To be supported
- Transceiver: HD×16/3G×14.

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. Number of channels indicated is for each card.

FA-1616HB-3G (To be supported)



- 3G-SDI supported, 32 inputs/outputs¹ model.
- 32 HD-BNC connectors are mounted.
Input/output²: 75Ω HD-BNC ×32, 3G/HD-SDI×32.
- IP input/output.
SDI to IP encapsulation and IP to SDI de-encapsulation for up to 32 channels.

- Add the IP option(s)³ to choose any mode⁴.
< SMPTE ST 2110 >
- Transmission only : HD×16/UHD×4.
- Receive only : HD×16/UHD×4.
- Transceiver : HD×8/UHD×4.
< SMPTE ST 2022-6 >⁴ * To be supported
- Transceiver : HD×16/3G×14.

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. Number of channels indicated is for each card.
Note: This external view is a tentative version.

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 to get 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.

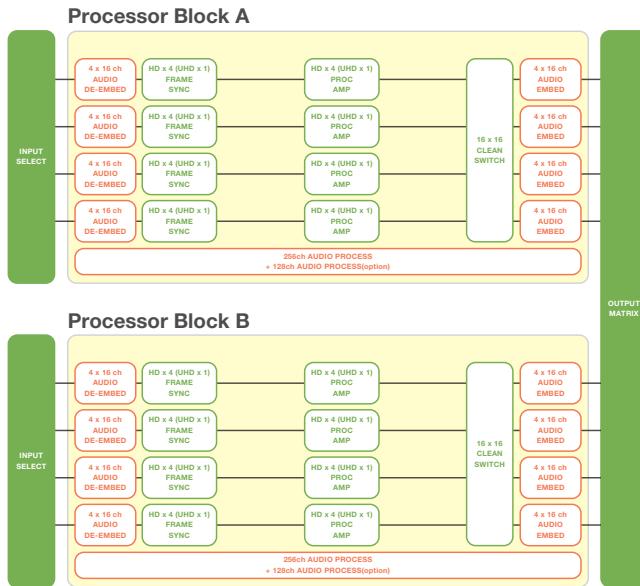
Processor block A / Processor block B

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 configurations, depending on your application.

Processing available per video processor

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

Configuration example: Same configuration



■ Audio: 4x16 channels.

Configuration example: Different configurations

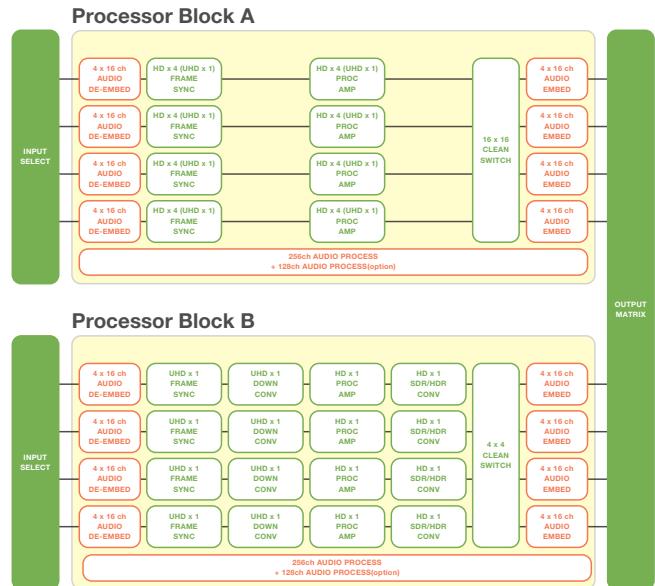


Table of configurable functions for processor blocks

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	Simple frame rate conversion
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 (x4 channels) and UHD (x1 channel). Frame synchronization: up to 16 channels^{*1} for 2K, 4 channels^{*1} for UHD.
- 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 128 additional channels.

^{*1} Configuring both processor blocks (A and B) in this way doubles the number of channels.

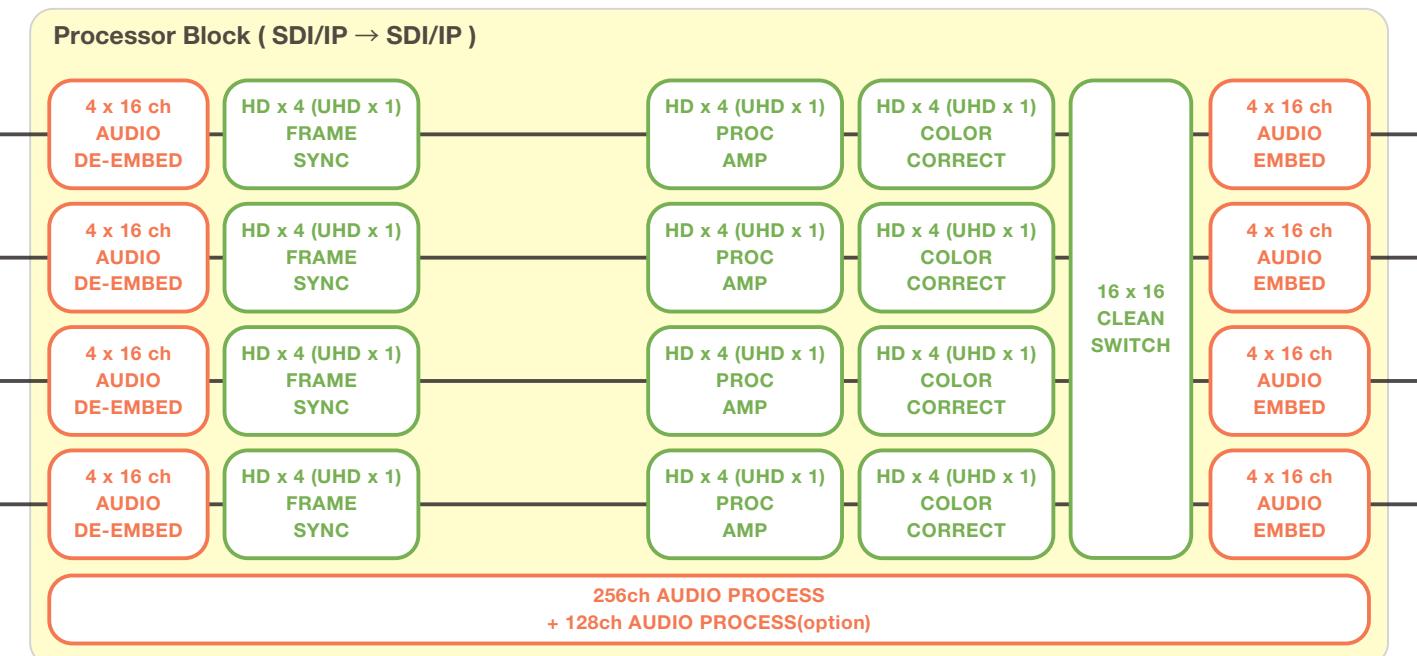


Table of functions available in Configuration 1

* 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	Simple frame rate conversion
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)

* To be supported.

Required options

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

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

FA-16HDR-P2: SDR/HDR conversion

- Enabling this in one unit allows for SDR/HDR conversion using two 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, one channel can be processed by one processor. Without converter functions, SDR/HDR conversion of 3G/HD x 16 channels or 4K x 4 channels is possible.

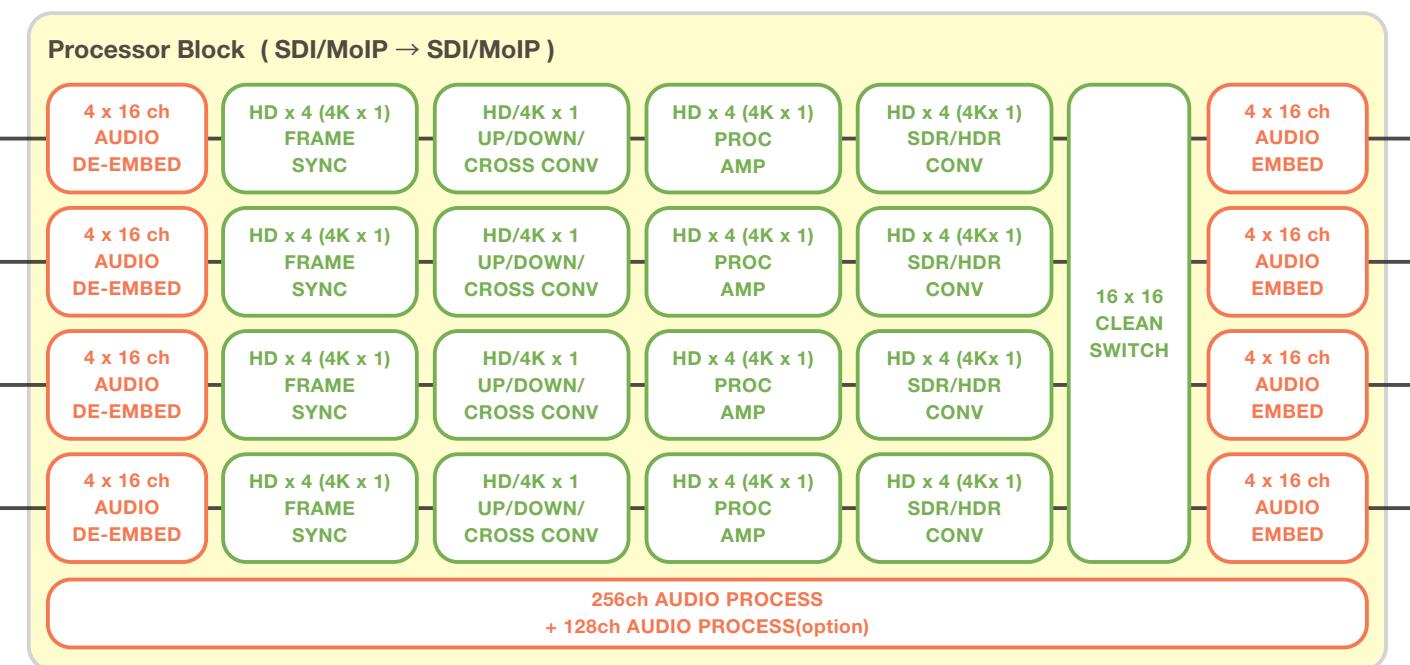


Table of functions available in Configuration 2

* 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 conversion	2K→4K up conversion	4K→2K down conversion	Frame delay	Simple frame rate conversion
Audio MUX	Audio DEMUX	Audio SRC	Audio remapping	Audio delay
Audio gain				

Configuration lineup selectable according to application

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

* To be supported.

options

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

- Enabling this functionality with one 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 one 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.

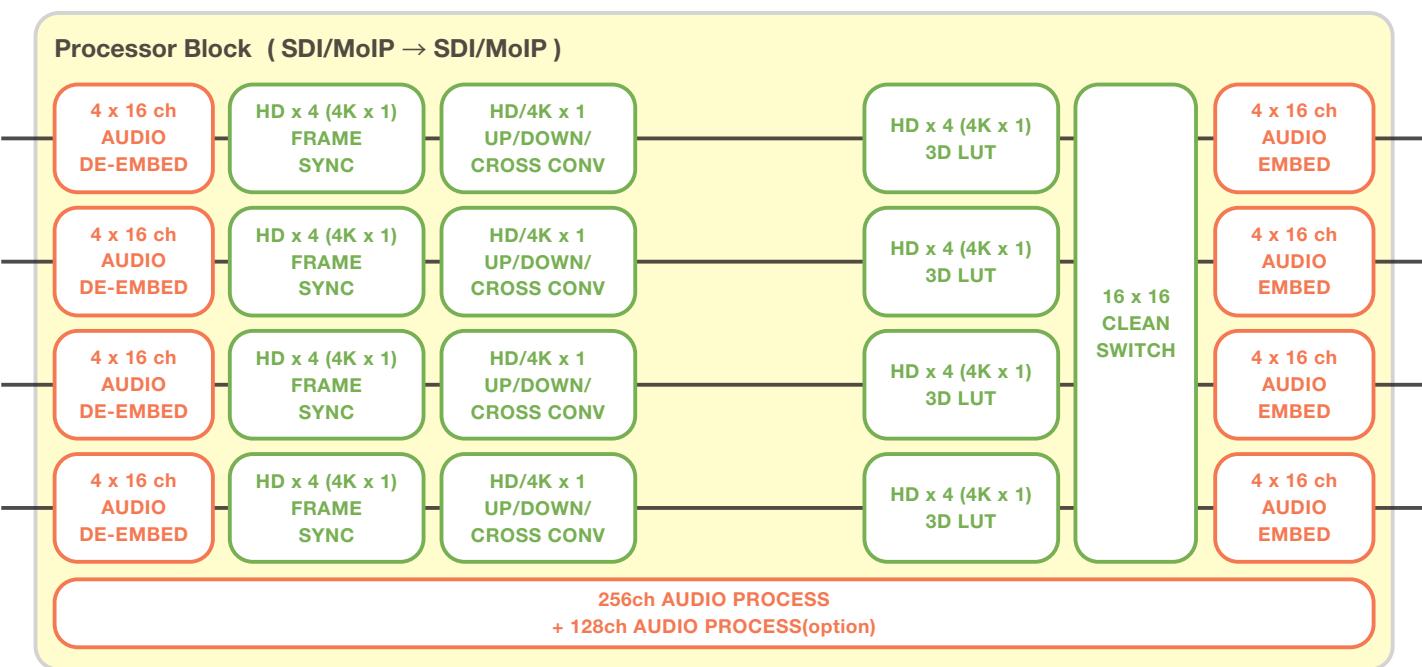


Table of functions available in Configuration 3

* 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	Simple frame rate conversion
Audio MUX	Audio DEMUX	Audio SRC	Audio remapping	Audio delay
Audio gain				

IP Support

FA-1616 supports SMPTE ST 2110/ST 2022-6 encapsulation and de-encapsulation with an optional MoIP card. It can also be used as an IP gateway for up to 32-channel SDI/MoIP conversion. Add as many as 2 MoIP cards with four 25G SFP ports (2 redundant channels). Ready for production where IP is already in use, where a mix of IP and SDI is used, or where future IP migration is planned.

Video

- SMPTE ST 2110/ST 2022-6 encapsulation or de-encapsulation for up to 32 channels.
- Encapsulation/de-encapsulation capacity per MoIP card
For SMPTE ST 2110: 16 channels for HD/3G-SDI or 4 channels for 4K.
For SMPTE ST 2022-6: 16 channels for HD-SDI or 14 channels for 3G-SDI.
- 2 dual 25 GbE (SFP28) port supports hitless operation for redundancy (SMPTE ST 2022-7).
- 2 MoIP cards can be added to expand capacity and enable SMPTE ST 2022-6/ST 2110 transcoding.

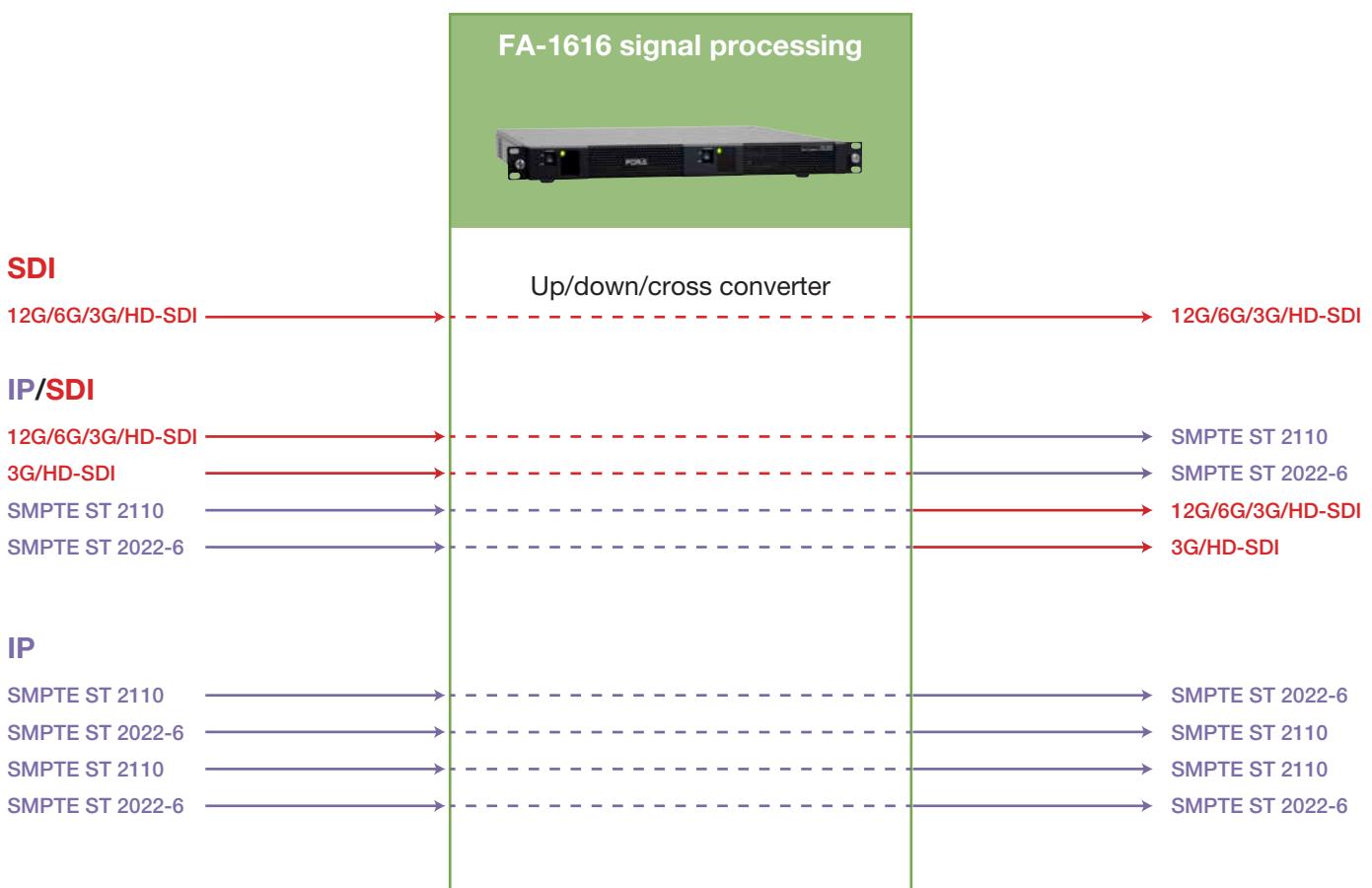
*To be supported

Audio

- Convert various type of audio data to IP audio data. Audio data received over IP can also be output via an array of optional audio interfaces.

FA-1616 signal processing

SDI up/down/cross-conversion is supported as well as conversion between SDI/IP and SMPTE ST 2110/ST 2022-6. Besides the added functionality of software-defined architecture and expansion cards, effective signal processing makes the FA-1616 valuable in many production environments.



Expansion card options

The extensive options available include cards that add IP capabilities and expand audio and GPI interfaces.

Expansion cards for Media over IP

FA-16MOIP: Media over IP card

Enables SMPTE ST 2022-6*/ST 2110 encap/decap and PTP synchronization. Only one card can be installed.

*To be supported

FA-16MOIP-EX: MOIP Expansion card

Expands MoIP functionality. Only one card can be installed.

Note: FA-16MOIP is required.

Expansion cards for audio interface

FA-16DNT: Dante audio card

Enables sending/receiving of Dante audio. Supports RJ45x2, RX/TX 64ch each.

Note: Dante® is a registered trademark of Audinate Pty Ltd.

FA-16AES-PNL¹: AES audio expansion card

Expands I/O channels for AES audio. BNCx4.

Note: FA-16AES-UBL is required.

FA-16MADI: MADI audio card

Enables input/output of MADI audio. Supports HD-BNCx4, SFPx2, RX/TX 64ch each.

FA-16ANA-AUD¹: Balanced analog audio card

Enables input/output of analog audio. DSUB-25 pin x1,

Balanced audio for 4 Rx and 4 Tx channels.

FA-16AES-UBL: Unbalanced AES audio card

Enables input/output of AES audio. BNCx4, Rx/Tx switching supported for 8 channels.

Expansion cards for GPI interface

FA-16GPI¹: General purpose interface card

Adds support for GPI control. DSUB-25 pin x 1, 10 inputs + 10 outputs + power + GND.

FA-16GPI-PNL¹: GPI Extension panel

Expands channel control via GPI. DSUB-25 pin x 1.

Note: FA-16GPI is required.

¹* To be supported.

Examples of applications

Production studios are only the start. Can be set up at live/events, in OB vans, and in many other settings.

Live/Event



In LED wall staging: Color correction

Coordinate the colors of LED walls and floors or projections at event venues to create a unified space.

In LED wall staging: Resizing

In multi-screen staging, resizing function enables 8 video signals to be enlarged, aligned, or otherwise scaled to fit LED displays.

Audio selector applications

With support for SDI embedded audio, SMPTE ST 2110-30, MADI, Dante, AES, and other interface formats, a single FA-1616 unit can integrate the many audio interfaces used at venues. Also useful as an audio selector for remapping, delay or gain adjustment.

OB vans



Up to 16 channels of video signals and embedded audio can be managed from a compact 1 RU processor that offers color correction and frame synchronization. In addition, it is possible to select optimum configuration for the operation. In OB vans with size and weight constraints, the FA-1616 series is an ideal solution.

FA-1616HB-12G / FA-1616B-12G Datasheet

1. Specifications

Basic specifications

Temperature	0°C to 40°C
Humidity	30% to 90% (no condensation)
Power	AC 100 V to 240 V ±10% 50/60 Hz
Consumption	<p>FA-1616HB-12G: 221 VA (219 W) (at AC 100-120 V) 242 VA (225 W) (at AC 220-240 V)</p> <p>Max consumption with options 312 VA (308 W) (at AC 100-120 V) 331 VA (314 W) (at AC 220-240 V)</p> <p>FA-1616B-12G: 250 VA (248 W) (at AC 100-120 V) 242 VA (225 W) (at AC 220-240 V)</p> <p>Max consumption with options 330 VA (327 W) (at AC 100-120 V) 331 VA (314 W) (at AC 220-240 V)</p>
Dimensions	430 (W) x 480 (D) x 44 (H) mm 480 (W) (Including rack mount brackets)
Weight	Approx. 11.5 kg (including FA-16MOIP/16MOIP-EX)
Consumables (at 24-hour operation)	Power unit: Recommended replacement period: 5 years Cooling fan: P-1677 (x6), Recommended replacement period: 6 years

Technical specifications

Video format	2160p / 59.94, 50 (Single-Link, Dual-Link, Quad-Link) 1080p / 59.94, 50 1080i / 59.94, 50 720p / 59.94, 50 * Other formats will be supported later.
Video input/output	
FA-1616HB-12G	<p>Input: 12G/6G/3G/HD-SDI 75 Ω Micro BNC (HD-BNC (*1)) x 8 3G/HD-SDI 75 Ω Micro BNC (HD-BNC (*1)) x 8</p> <p>Output: 12G/6G/3G/HD-SDI 75 Ω Micro BNC (HD-BNC (*1)) x 8 3G/HD-SDI 75 Ω Micro BNC (HD-BNC (*1)) x 8</p>
FA-1616B-12G	Input or output: 12G/6G/3G/HD-SDI 75 Ω BNC x 16
FA-1616HB-3G (*2)	Input or output: 3G/HD-SDI 75 Ω Micro BNC (HD-BNC (*1)) x 32
MoIP input/output (FA-16MOIP)	<p>IP media transmission standard: SMPTE ST 2110, SMPTE ST 2022-6 (*2) SFP28 MSA (25 GbE) x 4 (ST2022-7 route redundancy)</p> <p>< SMPTE ST 2110 Input/Output ></p> <p>Send only: HD x 16 / UHD x 4 Receive only: HD x 16 / UHD x 4 Send and Receive: HD x 8 / UHD x 4</p> <p>Video: ST 2110-20 Audio: ST 2110-30 Level B (16-ch) ANC data: ST 2110-40</p> <p>< SMPTE ST 2022-6 Input/Output (*2) ></p> <p>Send and Receive: HD x 16 / 3G x 14</p>

(FA-16MOIP-EX)	Same as above
Color sampling	YCbCr 4:2:2 10-bit
Genlock	Input: BB (NTSC / PAL) or Tri-level Sync 75 Ω BNC x 1 Output: BB (Input-loop-through or generated from PTP) 75 Ω BNC x 1
Timecode (*2)	Input: LTC (SMPTE 12M) DIN 1.0/2.3 x 1 Output: LTC (SMPTE 12M) DIN 1.0/2.3 x 1
Sync mode	Frame, Line, AVDL, Line (Min)
Converter (*2) (optional)	Up-/Down-converter Color space conversion, Dynamic Range conversion
Color processing	Proc Amp: Video level, Chroma Level, Black level, Hue Color Corrector: Balance (RGB) mode, Differential (YCbCr) mode Video Clip: Knee Clip (RGB), YCbCr Clip
SDI audio	Input: 3G/HD-SDI 16-ch 6G-SDI Dual Link 32-ch 12G-SDI 32-ch 48 kHz 16-24 bit Synchronous/Asynchronous audio Output: 3G/HD-SDI 16-ch 6G-SDI Dual Link 32-ch 12G-SDI 32-ch 48 kHz 16/20/24 bit Synchronous/Asynchronous audio
AES/EBU audio (FA-16AES-UBL)	BNC x 4 (AES/EBU input or output) 8-ch Input: 32/44.1/48 kHz 24 bit 75 Ω 1.0 V(p-p) unbalanced Output: 48 kHz 24 bit 75 Ω 1.0 V(p-p) unbalanced
AES/EBU audio (FA-16AES-PNL) (*2)	BNC x 4 (AES/EBU input or output) 8-ch Input: 32/44.1/48 kHz 24 bit 75 Ω 1.0 V(p-p) unbalanced Output: 48 kHz 24 bit 75 Ω 1.0 V(p-p) unbalanced * FA-16AES-UBL required
Analog audio (FA-16ANA-AUD) (*2)	25-pin D-sub (female) x 1 Input: 4-ch 600 Ω /Hi-Z balanced Output: 4-ch 100 Ω balanced 24 bit 48 kHz (A/D and D/A conversions and internal processing)
MADI audio (FA-16MADI)	Input: 56/64-ch (PCM) 32/44.1/48 kHz 16-24 bit 75 Ω Micro BNC (HD-BNC (*1))x 2 56/64-ch (PCM) 32/44.1/48 kHz 16-24 bit SFP x 2 Only one stream is processed within 4 inputs. Output: 56/64-ch (PCM) 48 kHz 24 bit 75 Ω Micro BNC (HD-BNC (*1))x 2 56/64-ch (PCM) 32/44.1/48 kHz 24 bit SFP x 2 Four ports output the same processed audio streams.
Dante audio (FA-16DNT)	1000BASE-T RJ-45 x 2 (Primary/Secondary) Input: Max. 64-ch 44.1/48 kHz 24 bit Output: Max. 64-ch 48 kHz 24 bit
Audio delay adjust	1ms to 1,000ms
Audio process	Sample rate converter, Gain control, Downmix, Monosum, Remap and Mute
Interfaces	
Ethernet & Control protocols	<LAN 1> Web, Ember+ (*2), SNMP v2c (Monitor only): 100/1000BASE-T RJ-45 x 1 <LAN 2A/2B> (With FA-16MOIP)

	NMOS control: 100/1000BASE-T RJ-45 x 2 (Teaming available)
GPI	Round connector (7 input/output) FA-16GPI (*2) : 25-pin D-sub (female) x 1 (10-input, 10-output) FA-16GPI-PNL (*2) : 25-pin D-sub (female) x 1 (10-input, 10-output) FA-16GPI required
Time	Time accuracy per month: ±10 seconds Time keeping: Approx. 60 hours Time correction with NTP Server

(*1) HD-BNC is a trademark of Amphenol Corporation

(*2) Planned for future support

Software Option

FA-164K	4K (UHD) signal processing expansion The following options can automatically add the FA-164K to the system. FA-16MOIP, FA-16UDC-P2, FA-16HDR-P2*, FA-16LUT-P2*
FA-16UDC-P2	Up-/down-/cross-conversion for 2 processors Version 2.00 supports only one license.
FA-16HDR-P2 *	HDR color corrector for 2 processors
FA-16LUT-P2 *	3D-LUT color processing for 2 processors.

* Planned for future support

Hardware Option (Optional Card and Cable)

FA-16MOIP (*1)	Encapsulation/decapsulation card of ST 2022-6 (*2) / ST 2110 standards
FA-16MOIP-EX (*1)	MoIP input/output expansion card (FA-16MOIP required)
FA-16AES-UBL	Digital audio (unbalanced) card.
FA-16AES-PNL (*2)	Digital audio (unbalanced) expansion panel (FA-16AES-UBL required)
FA-16DNT (*3)	Dante audio card
FA-16MADI (*4)	MADI audio card
FA-16ANA-AUD (*2)	Analog audio (balanced) 4-input / 4-output card
FA-16GPI (*2)	GPI input/output card
FA-16GPI-PNL (*2)	GPI input/output expansion panel (FA-16GPI required)

(*1) Note that SFP transceiver modules are not equipped with the product. Please prepare appropriate SFP modules by the user.

Factory tested SFP module:

nVIDIA(Mellanox) MMA2P00-AS

PB_MMA2P00-AS_MMA2P00-ASHT_25GbE_SFP28_MMF_Transceiver.pdf (nvidia.com)

nVIDIA (Mellanox) MMA2L20-AR

PB_MMA2L20-AR_25GbE_SFP28_LR_Transceiver.pdf (nvidia.com)

(*2) Planned for future support

(*3) Cables are not equipped with the product. Please prepare appropriate cables by the user.

(*4) Note that SFP transceiver modules are not equipped with the product. Please prepare appropriate SFP modules by the user.

Factory tested SFP module:

RME (<https://www.rme-audio.de/home.html>) MADI-SFP-MM, MADI-SFP-SM

APAC Opto Electronics Inc. (<https://www.apacoe.com.tw/ja/>) LM38-A3S-TC-N, LS38-A3S-TC-N

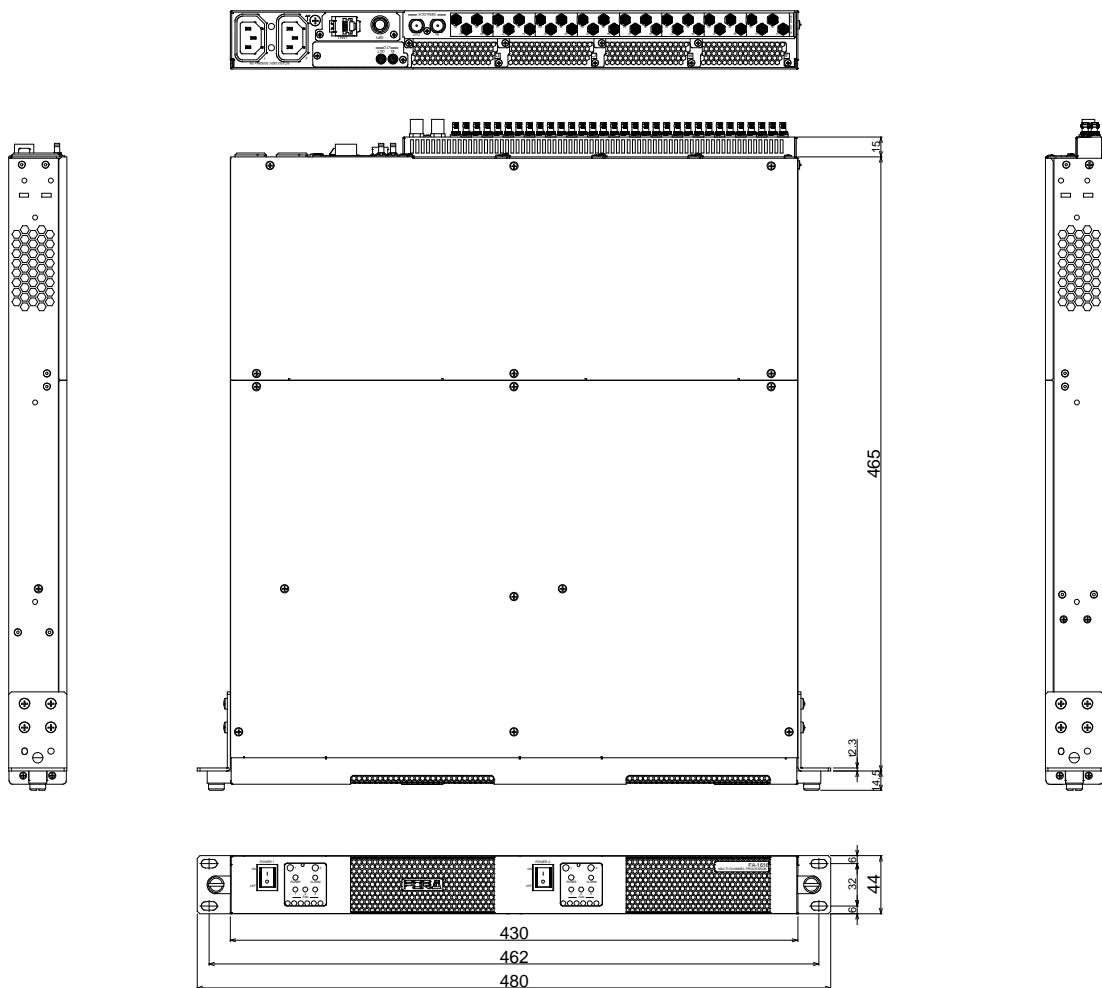
Accessories

AC cord (2 sets), Rubber feet and Packing List sheet

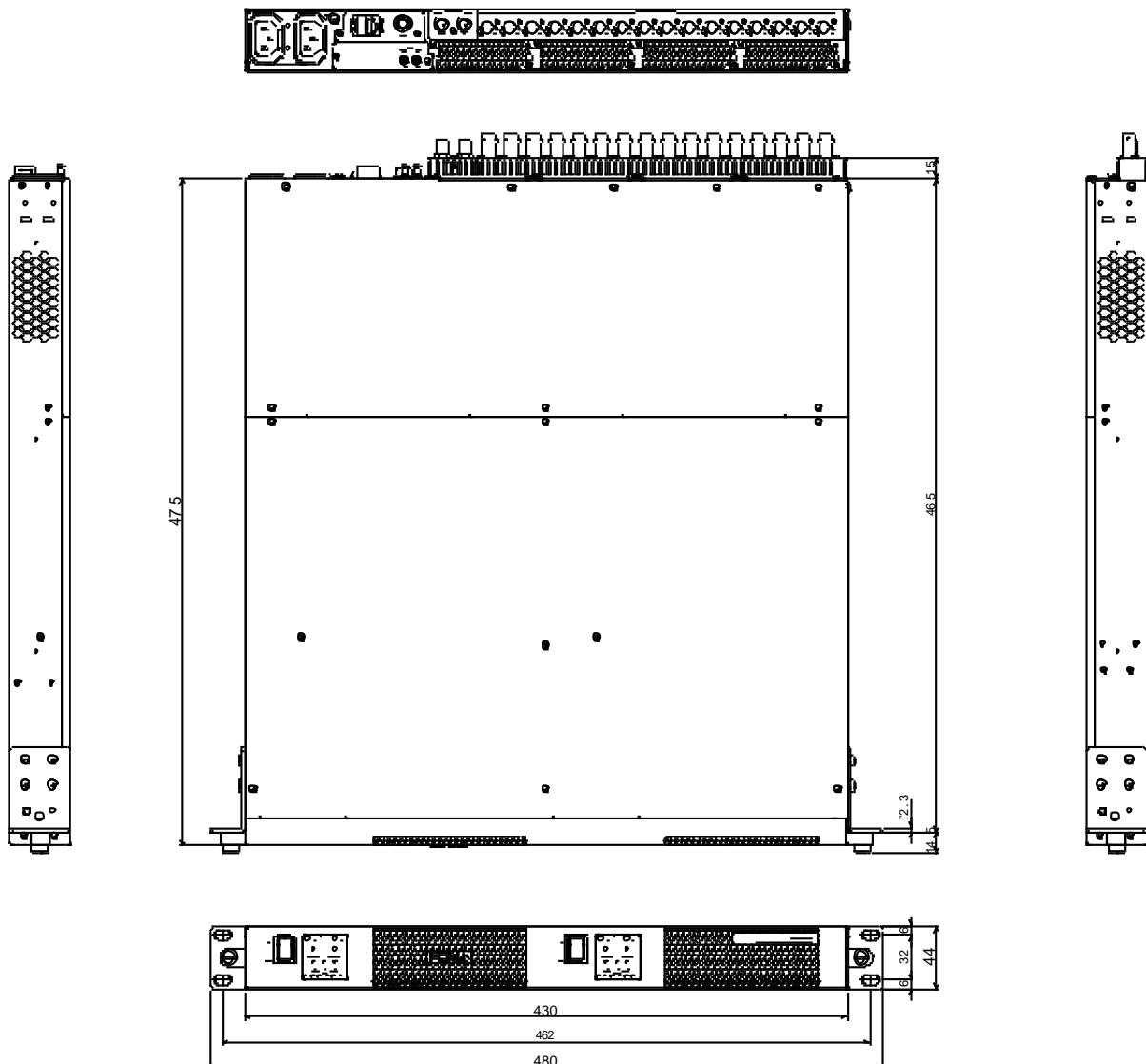
2. External Dimensions

FA-1616HB-12G

(All dimensions in mm.)



FA-1616B-12G





FOR-A COMPANY LIMITED www.for-a.com

ISO 9001 and 14001 certified
(Sakura R&D)

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