

SONY



XVS Series Production Switcher

Technical Guide

Introduction

Sony has been manufacturing exceptional production switchers for decades. Known for their reliability, Sony switchers have participated in some of the world's most prestigious live broadcast events including national and international sporting productions, state events, and music production. They are also in daily use across a spectrum of applications from small studios and flight packs to large multi-panel installations for international sports, light entertainment and news programming.

The **MVS-8000** production switcher quickly became a standard in broadcast and live event production following its introduction in 2001. Over the following years, the MVS series expanded into a family of products offering high quality features and sharing a very successful modular panel design from entry level to high-end models.

In 2015 Sony introduced the new XVS series Production Switchers, specifically developed to accommodate technological advances such as UHD (4K) resolution and IP interfaces, whilst further developing the proven concept of a modular control panel, with new features and workflows for improved efficiency.

The XVS series now covers the full range of broadcast requirements for both HD and UHD live production.

The entry-level switcher is the **XVS-6000**, a 2M/E configuration with a host of features and operational benefits common to the XVS-series. Next up is the 3 M/E **XVS-7000**, followed by the powerful 5M/E capable **XVS-8000**. Top of the range is the **XVS-9000**, introduced in autumn 2018 to cater for the biggest UHD productions. The whole XVS series shares the same features of parallel HD/UHD production, built-in format conversion, high-speed internal frame memory, flexible IP or SDI interfaces, and a versatile series of modular control panel options.

		XVS-9000		XVS-8000		XVS-7000		XVS-6000	
Frame Size		15RU		10 RU		8RU		6RU	
Operating Format		UHD	HD	UHD	HD	UHD	HD	UHD	HD
No of M/E busses	Standard	5	5	5	5	3	3	2	2
	Split Mode	N/A	10	N/A	10	N/A	6	N/A	4
Keyers per M/E	Standard	2 Full + 2 Sub	8	2 Full + 2 Sub	8	2 Full + 2 Sub	8	2 Full + 2 Sub	8
	Split Mode	N/A	4	N/A	4	N/A	4	N/A	4
Max I/P	12G SDI	80	160	40	160	28	112	16	64
	SDI 3G (UHD x 4)	40	160	40	160	28	112	16	64
Assign O/P	12G SDI	40	80	12	48	12	48	6	24
	SDI 3G (UHD x 4)	20	80	12	48	12	48	6	24
Multiviewer		4 ch	4 ch	2 ch	2 ch	2 ch	2 ch	2 ch	2 ch
3D DME (max)		4 ch	4 ch	2 ch	4 ch	2 ch	4 ch	1 ch	2 ch

Comparison chart for XVS processors - (with full options installed). I/O capability when using IP boards is the same as for 12G SDI.

Processor

The processor supports native HD operation in both 1080/50i and 50P formats. An additional software licence is necessary to enable UHD (4K) operation on a per M/E basis. In UHD mode the XVS can operate in either 2SI or SQD standard at 3840 x 2160/50P resolution. Each M/E processor board provides 8 full-function keyers, and can be configured in either normal or split mode, i.e. one M/E with 8 keyers or 2 M/Es each with 4 keyers (HD only), this is user selectable on a pgm by pgm basis. Redundant power supplies are also fitted as standard.

Each processor can also be configured with the following options:

- Up to 2 (XVS-6000), 3 (XVS-7000) or 5 (XVS-8000 & 9000) M/E processor boards
- Mix & match choice of IP, SDI (3G) or SDI (12G) interfacing, configurable slot by slot
- Up to 64 (XVS-6000), 112 (XVS-7000) or 160 (XVS-8000 & 9000) physical inputs, input expansion in groups of 16 (HD mode)
- Up to 24 (XVS-6000), 48 (XVS-7000 & 8000), or 80 (XVS-9000) physical outputs (HD mode)
- Two multiviewer outputs (XVS-6000, 7000 & 8000). Four multiviewer outputs (XVS-9000) with 4, 10, 13 or 16 pane display
- Frame memory system with onboard storage of approximately 55,000 images, 20 output channels (HD mode)
- 3D effects processor (DME) – up to 4 channels in HD (all models). In UHD 1 channel (XVS-6000), 2 channels (XVS-7000 & 8000) or 4 channels (XVS-9000)
- Format conversion and/or colour correction available on designated inputs (XVS-6000, 7000 & 8000)
- Alternatively, input/output format conversion can be achieved via an internally routable board (XVS-6000, 7000 & 8000)
- Input and Output format conversion available on all Inputs and Outputs on XVS-9000 (SDI mode)
- Colour correction on all Aux bus outputs
- Multi-Program 2 Software option to further split each M/E to provide dual bank operation from single M/E (HD mode)

Input/Output Options

The XVS series switchers have extremely flexible I/O options; each slot can be configured independently with SDI (3G / 12G) or IP interfaces. SDI options are shown first – for IP options go to page 5.

SDI Input Boards for XVS-6000, 7000 & 8000

XKS-S8110

The XKS-S8110 is a simple SDI input board having BNC connectors with no additional pre-processing capabilities.



- HD: The board provides 16 HD inputs



- UHD: The board supports 4 (quad) inputs

XKS-S8111

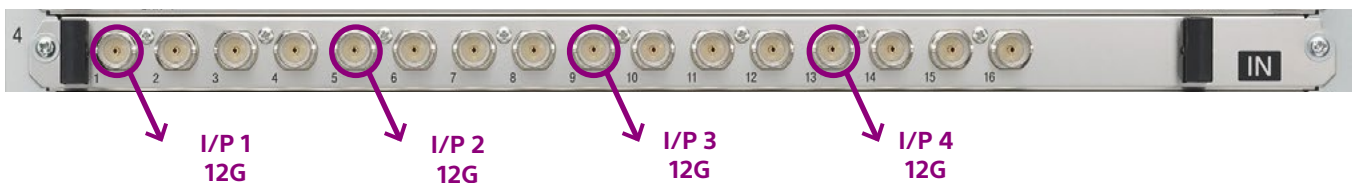
The XKS-S8111 input board is an SDI input board with pre-processing capabilities, physically identical to the XKS-S8110. Pre-processing features include format conversion, frame synchronisation, full colour correction and frame delay (adjustable from 1 to 8 frames).



- HD: provides 16 inputs, all of which support pre-processing
- UHD: 4 (quad) inputs all of which support pre-processing. When up-converting an HD input to UHD, only the signals connected to I/Ps 1, 5, 9 & 13 can be up-converted

XKS-S8112

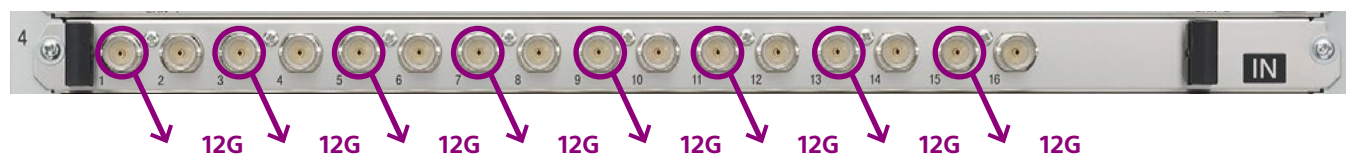
The XKS-S8112 is a 12G SDI input board with pre-processing capabilities including include format conversion, frame synchronisation, colour correction and frame delay. It will also accept a 12G UHD SDI signal on I/Ps 1, 5, 9 & 13.



- HD: provides 16 inputs, all of which support pre-processing
- UHD: 4 x 12G inputs all of which support pre-processing
- When up-converting an HD input to UHD, only the signals connected to I/Ps 1, 5, 9 & 13 can be up-converted

SDI Input Board for XVS-9000 XKS-S9112

The XKS-S9112 input board is the only SDI input board option for the XVS-9000 switcher. It provides 8 x 12G inputs, pre-processing capabilities including include format conversion, frame synchronisation, colour correction and frame delay (adjustable from 1-8 frames).



- HD: provides 16 inputs, all of which support pre-processing
- UHD: 8 inputs on odd-numbered I/Ps, all of which support pre-processing
- When up-converting an HD input to UHD, only the signals connected an odd-numbered I/Ps can be up-converted

SDI Output Boards for XVS-6000, 7000 & 8000 XKS-S8165

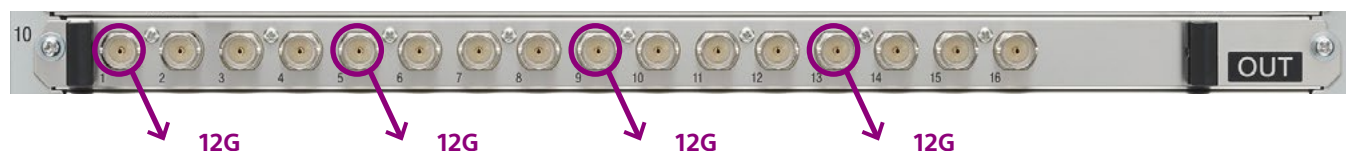
The XKS-S8165 is a simple SDI output board with 16 BNC connectors.



- HD: 16 outputs
- UHD: 4 x quad outputs

XKS-S8167

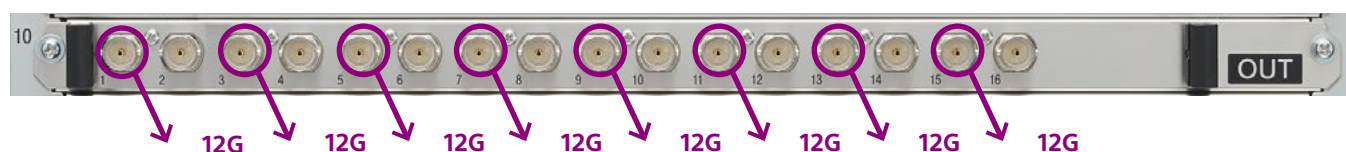
The XKS-S8167 is a 12G SDI output board with 16 BNC connectors.



- HD: 16 outputs
- UHD: 4 x 12G outputs

SDI Output Board for XVS-9000 XKS-S9167

The XKS-S9167 is the only SDI output board option for the XVS-9000 switcher. It's physically identical to the XKS-S8167, but it provides 8 x 12G outputs. Output format conversion is additionally supported.



In addition when working in UHD mode the even numbered connectors provide an HD down converted version of the UHD signal

IP Input Board for XVS-6000, 7000 & 8000 XKS-C8111

The XKS-C8111 IP input board supports SMPTE standard ST 2110-20. It utilises two QSFP28 connectors to provide 100Gb/sec capability, with 100% redundancy and hitless failover.



- HD: 16 inputs, all of which will support pre-processing. This capability will be outlined in future software releases
- UHD: 4 inputs, all of which will support pre-processing. This capability will be outlined in future software releases

IP Input Board for XVS-9000 XKS-C9111

The XKS-C9111 IP input board utilises four QSFP28 connectors to provide 100Gb/sec capability, and supports SMPTE standard ST 2110-20. This double-height board has four connectors to allow 8 UHD inputs with 100% redundancy and hitless failover.



- HD: 16 inputs, all of which will support pre-processing. This capability will be outlined in future software releases
- UHD: 8 inputs, all of which will support pre-processing. This capability will be outlined in future software releases

IP Output Board for XVS-6000, 7000 & 8000 XKS-C8166

The XKS-C8166 IP output board supports SMPTE standard ST 2110-20. It utilises two QSFP28 connectors to provide 100Gb/sec capability, dual outputs for destination hitless failover connectivity.



- HD: 16 outputs
- UHD: 4 outputs

Bidirectional IP Input/Output Board for XVS-9000 XKS-C9121

There is not a stand-alone IP output card for the XVS-9000 switcher. Instead, the XKS-C9121 bidirectional IP input/output board utilises four QSFP28 connectors to provide 100Gb/sec capability, and supports SMPTE standard ST 2110-20. This double-height board has four connectors to allow 8 UHD inputs and 8 UHD outputs with dual outputs for destination hitless failover connectivity.



- HD: 16 simultaneous input and output streams all of which will support pre-processing. This capability will be outlined in future software releases
- UHD: 8 simultaneous input and output streams all of which will support pre-processing. This capability will be outlined in future software releases

Format Conversion Options

XVS series processors work natively in HD or UHD formats, from 720P to 4K resolution. This internal System Format is determined during switcher setup. In order to activate UHD modes, a software licence will be necessary.

Format converters are used to convert signals to/from the internal System Format, e.g. an SD source can be up-converted to HD, and a down-converted output can be produced (SD is not supported as an internal System Format). Similarly, HD signals can be up-converted when the system is running in UHD mode. Format conversion capabilities allow for:

- The inclusion of input sources in a format different from the System Format
- The ability to produce alternate outputs for distribution

The XVS series switchers offer two choices of format conversion:

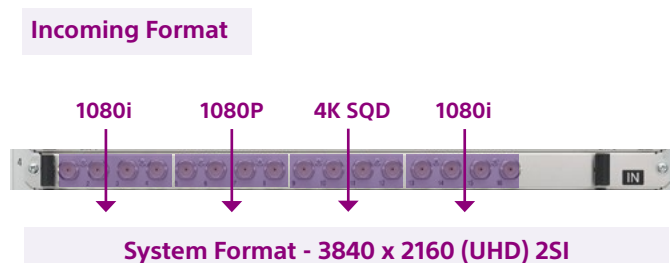
- **Input format conversion (all models)** – Where an external source is converted to the system format directly using the input board of the switcher
- **Assignable format convertor board (XVS-6000, 7000 & 8000 only)** – Where a signal (either an external input or a switcher internal source) can be routed internally to the assignable format converter board, for use as either an internal source or an additional output

On **XVS-6000, 7000 & 8000** switchers, either or both of the input and the assignable boards may be fitted.

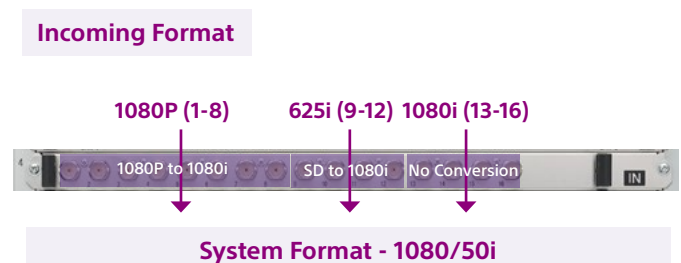
On the **XVS-9000**, input and output conversion is possible with the relevant I/O cards

Input format Conversion

The XKS-S8111 input board provides conversion as shown below:



Example of I/P convertor card working in UHD mode:



Example of I/P convertor card working in 1080i mode:

XKS-8460 Internal assignable convertor board (XVS-6000, 7000 & 8000 only)

The XKS-8460 Internal Format Converter board provides format conversion for 16 assignable channels in 1080/50i or 50P mode and 4 channels in UHD. It can be assigned in four groups of four signals for either Input or Output conversion. Internally generated signals such as M/E outputs can be converted as well as primary inputs. This board can be used with or without the input format converter boards, i.e. XKS-S8111 etc.

Note that this board cannot be fitted in the XVS-9000 processor.

- Input conversion – In this mode the Format Convertor will cross convert an Input signal to the switcher operating format
- Output conversion – In this mode an internal bus signal (e.g. an M/E output) can be converted to a different O/P format. These O/P signals are then presented on the dedicated FC O/P connectors

2SI and SQD Operations

The XVS-processors support UHD operation in both 2SI level-A and SQD level-A natively. Level-B formats can be accommodated via the format converters.

We recommend operating in 2SI mode in order to fully realise the switcher's resources.

Operating in SQD Level-A natively will result in the following operational restrictions:

- Only standard and enhanced wipe patterns available
- Only 4 screen layout available in Multi Viewer in 1080P
- No grid on output signals
- No 3D DME effects although key resizers are supported

Colour Correction

To harmonise incoming signals and correct AUX outputs for on-set monitors, venue displays and other destinations, Proc Amp, Primary and full RGB colour correction are available for both inputs and outputs on the XVS processor.

Output CCR for any AUX output is provided as a standard feature with all XVS series processors. With the exception of the simple input board, XKS-S8110, all input boards can also provide CCR for inputs. Colour correction adjustments include: Black, White, Gamma and Knee and independent Red, Green and Blue channels on both darks and whites. The values of input colour correction can be saved in setup files, whilst output colour correction adjustments are saved in snapshot files. A CCR Aux Bus Link feature provides copy and link functions for duplicating and/or locking CCR values between multiple AUX busses for fast setup and modification.



Colour correction menu control

Multi Viewer Outputs

The XVS processor provides two channels (XVS-6000, 7000 & 8000) or four channels (XVS-9000) of multi viewer output available via one of the primary output boards. Each multiviewer can be independently configured. Any internal or external source can be routed to the multi viewers which support 4, 10, 13 or 16 pane view modes. Multiviewers are available in HD or UHD and can also display source names and tally for each source.



Multi viewers in 4, 10, 13 and 16 panel display modes

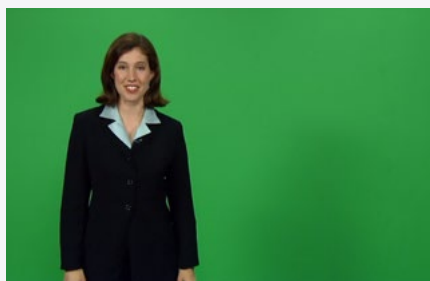


ME resources

Each ME board provides the following features:

HD operation (1080/50i or 1080/50P)

- Configurable as one single M/E with 8 keyers or two independent M/E banks with 4 keyers per ME (selectable in the set-up menu)
- Every keyer includes chroma, luma, linear, pattern and colour vector keying
- Every keyer has inbuilt 2.5D resizer for size, position and X or Y rotation and perspective
- Borders, drop shadows, defocus and further effects are also available on the resizers



Chroma keying is standard on every full keyer



Using the resizer in each keyer, a chromakey can be resized and positioned to produce the required image effect.



Each keyer includes a 2.5D resizer with rotation and border, useful for picture-in-picture images. Defocus and mosaic effects can also be used for identity concealment.

3D DME effects

There are two 3D DME boards available for the XVS series switchers:

XKS-8470 provides 2 channels of 3D effects in HD

XKS-8475 provides 1 channel of 3D effects in UHD or 4 channels in HD

The boards can be mixed and matched in the processors as follows:

- XVS-6000 maximum 1 board can be fitted
- XVS-7000 & 8000 maximum 2 boards can be fitted
- XVS-9000 maximum 4 boards can be fitted
- Regardless of the chosen board configuration, the XVS can control a maximum of 4 channels of DME

The **3D DME** options offer all the resize, position and rotation abilities of the inbuilt 2.5D key resizers, plus powerful additional effects such as: slide, squeeze, flip and tumble effects, corner pinning, enhanced lighting and borders. Also available are a wide range of "sparkle"



effects such as, page turns, cylinders, ripple, broken glass, trails, sphere, kaleidoscope, sketch, draw, various "texture" effects as well as strobe and film-like effects.

The DME channels "float" inside the processor and can be assigned to any keyer or to the output of an M/E bus. (note - Not all HD effects are currently available on the XKS-8475 UHD DME card)

XKS-8440 Frame Memory board

All XVS series processors can be fitted with the XKS-8440, a high-capacity frame memory board that handles both still images and video clips.

Approximately 4,600 frames (HD) can be stored in the on-board working memory and recalled instantly to 20 frame memory outputs.

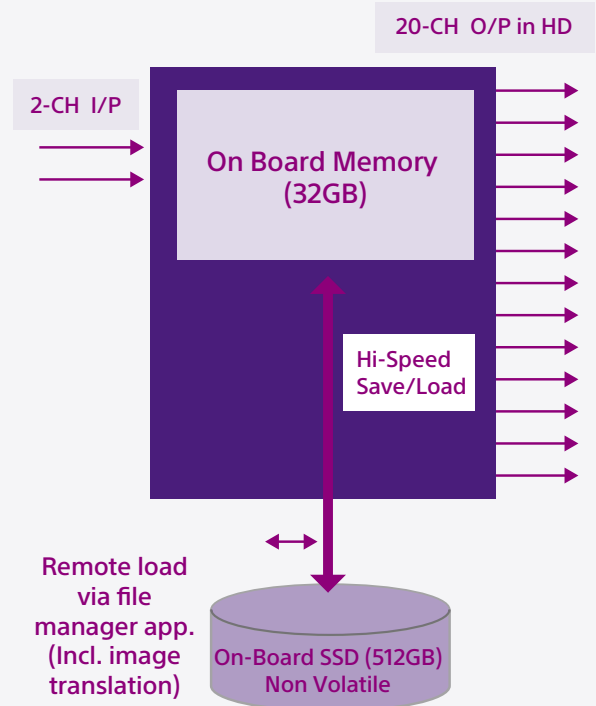
Any image in the on board memory can be instantly sent to air by recalling a snapshot, macro or other type of memory file.

Approximately 55,000 (HD) frames (36 minutes) can be stored in the on-board SSD for extremely high speed transfer of image data to and from the on-board working memory.

In UHD operation, the frame memory accommodates 1,380 frames of working memory with an additional 16,000 frames on the SSD (5 minutes). Images can be recalled to 4 output channels. Clip transitions can easily be set up, memorised and recalled in both HD and UHD modes.

Images can be stored in the frame memory via network connection using the supplied File Manager software or may be imported directly via a USB stick.

In addition to storing imported frames, the XKS-8440 can also freeze and store live video with audio recorded from any switcher input source in either HD or UHD.



Frame memory recall menu with instant access to any stored image



Frame memory clip transition menu



Example of clip transition

XVS-9000

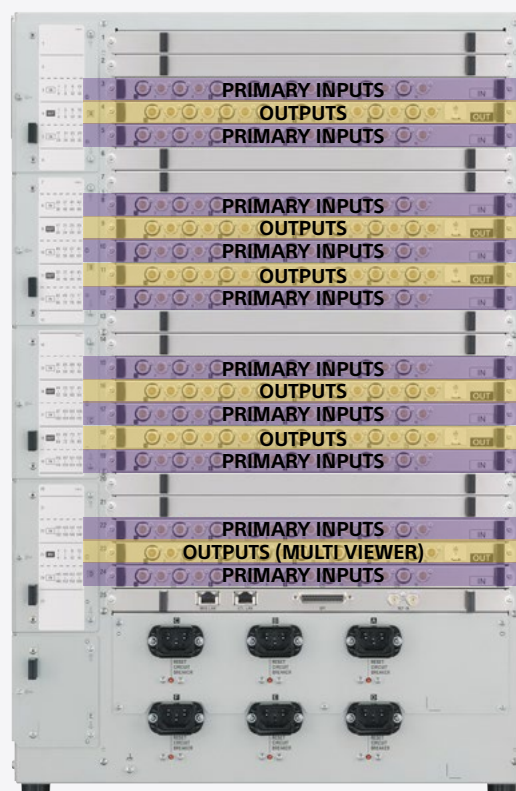
The **XVS-9000** can be configured as follows:

- Up to 10 I/P boards – max 160 (HD) or 80 (UHD) inputs
- Up to 6 O/P boards – max 80 (HD) or 40 (UHD) outputs
- The final board provides four multiviewer outputs in HD or UHD

IP Mode

- Up to four ST 2110 IP cards
- Up to six ST2110 Bi directional IP cards

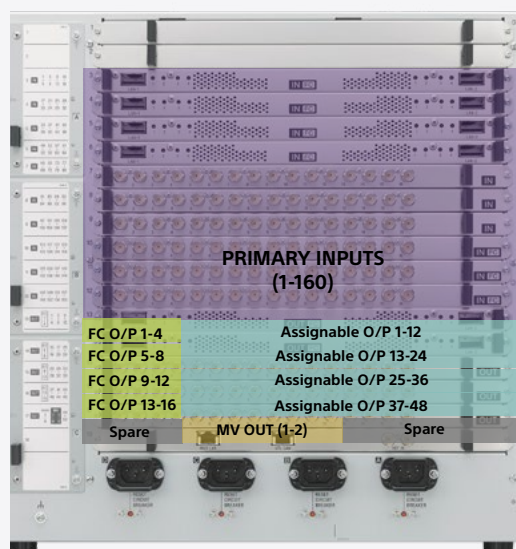
When configuring XVS-9000 I/O please refer to your local Sony product specialist.



XVS-8000

The **XVS-8000** can be configured as follows:

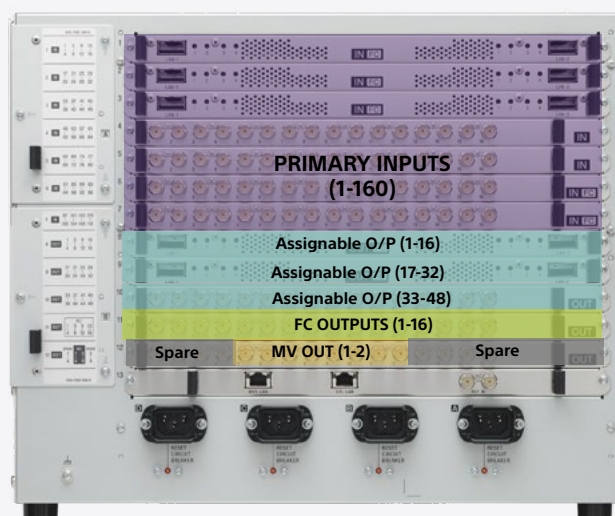
- Up to 10 I/P boards – max 160 (HD) or 40 (UHD) inputs
- Up to 5 O/P boards – max 48 (HD) or 12 (UHD) outputs
- In addition to the boards above, the two dedicated I/O slots at the top of the frame allow 4 UHD direct inputs to the M/E subkeyers, plus 4 UHD dedicated outputs for internally generated M/E output signals
- Each of the four O/P cards provides 12 (HD) or 3 (UHD) outputs plus 4 (HD) or 1 (UHD) format convertor outputs
- The final board provides two multiviewer outputs in HD or UHD



XVS-7000

The **XVS-7000** can be configured as follows:

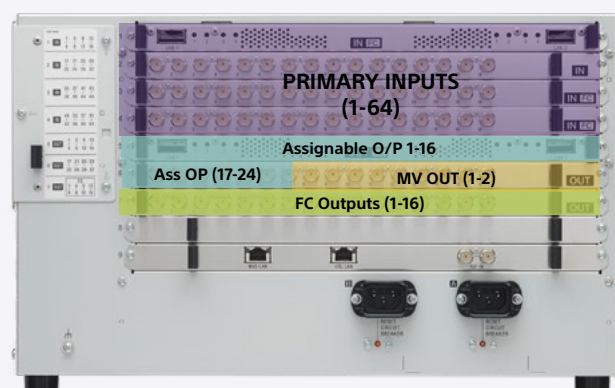
- Up to 7 I/P boards – max 112 (HD) or 28 (UHD) inputs
- Up to 5 O/P boards – max 48 (HD) or 12 (UHD) outputs
- Each of the first three output boards provides 16 (HD) or 4 (UHD) assignable outputs
- The fourth output board provides dedicated outputs from the internal format converter board (XKS-8460)
- The final board provides two multiviewer outputs in HD or UHD



XVS-6000

The **XVS-6000** can be configured as follows:

- Up to 4 I/P boards – max 64 (HD) or 16 (UHD) inputs
- Up to 3 O/P boards – max 24 (HD) or 6 (UHD) outputs
- The outputs are arranged as follows: on the first board are assignable outputs 1-16, on the second board are assignable outputs 17-24 plus multiviewer outputs, on the third board are dedicated outputs from the internal format converter board (XKS-8460)



XVS Processor configuration options

Model Code	Model Name	XVS-9000 ¹	XVS-8000	XVS-7000	XVS-6000	Notes
XKS-S8110	SDI Input Connector Board (16 x BNCs)		0-10	0-7	0-4	Total number of I/P cards: XVS-8000 – 10 XVS-7000 – 7 XVS-6000 – 4
XKS-S8111	SDI Input with format conversion (16 x BNCs)		0-10	0-7	0-4	
XKS-S8112	12G SDI Input card with format conversion (16 x BNCs – 4 x 12G BNCs)		0-10	0-7	0-4	
XKS-Q8111	QSFP IP Input card		0-10	0-7	0-4	
XKS-C8111	100G IP input card with format conversion		0-10	0-7	0-4	
XKS-S9112	XVS-9000 12G SDI Input card with format conversion	0-10				
XKS-C9111	XVS-9000 100G IP Input card	0-6				
XKS-8160	Output Proc Board (internal card for O/Ps above 24)		0,1	0,1		
XKS-S8165	SDI Output Connector Board		0-5	0-5	0-3	Total number of O/P cards: XVS-7 / 8000 – 5 XVS-6000 – 3
XKS-S8167	12G SDI Output connector card		0-5	0-5	0-3	
XKS-Q8166	QSFP IP Output Connector Board		0-5	0-5	0-3	
XKS-S9167	XVS-9000 12G SDI Output card	0-6				
XKS-C9121	XVS-9000 100G IP Input and Output card	0-6				
XKS-8210	Mix Effect Board	1-5	1-5			
XKS-7210	Mix Effect Board			1-3	0,1	(Note XVS-6000 comes with 1ME card as standard)
XKS-8440	Frame Memory Board	0,1	0,1	0,1	0,1	
XKS-8460	Format Converter Board		0,1	0,1	0,1	
XKS-8470	4 Ch HD DME Board	0-4	0-2	0-2	0,1	
XKS-8475	2 Ch UHD DME board	0-4	0-2	0-2	0,1	
Switcher Upgrade Software ME1 (UHD)		XZS-9510	XZS-8510	XZS-7510	XZS-6510	
Switcher Upgrade Software ME2 (UHD)		XZS-9520	XZS-8520	XZS-7520	XZS-6520	
Switcher Upgrade Software ME3 (UHD)		XZS-9530	XZS-8530	XZS-7530	N/A	
Switcher Upgrade Software ME4 (UHD)		XZS-9540	XZS-8540	N/A	N/A	
Switcher Upgrade Software ME5 (UHD)		XZS-9550	XZS-8550	N/A	N/A	
Multi Program 2 Software		XZS-9200	XZS-8200	XZS-7200	XZS-6200	
Automation Interface software		BZPS-7700	BZPS-7700	BZPS-7700	BZPS-7700	

¹ When configuring XVS-9000 I/O please refer to your local Sony product specialist

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