Crystal Vision

Up/Down/Cross Converters

Crystal Vision offers three boards to up convert, down convert or cross convert a variety of different sources. Whether you're working in 720p or 1080i, 50Hz or 59.94Hz, these combined up/down/cross converters have all the features you need to be able to work at the highest possible level in any definition.

If you're dealing with video only applications where your signals are timed, you'll choose Up-and-down. If you need to both time and convert your signals, Up-and-down-S is the product for you. Finally, if you're converting embedded audio sources or you're in need of a fully flexible SD to SD aspect ratio converter, Up-and-down-A is the one to choose.

The three Up-and-downs incorporate a number of processing features to ensure that their performance is so outstanding that many broadcasters have declared it to be the best they have ever seen. Scaling a picture up or down can be complex with the best results generally obtained by using different techniques depending on whether the video contains slow or fast moving images. Thanks to motion adaptive video de-interlacing which maximises the picture's vertical resolution, the Up-and-downs will handle anything – choosing the best processing method based on the video content with the result that the output picture always appears smooth and natural-looking. Up converting from SD to HD will give an apparently softer picture, therefore the adjustable detail enhancement feature allows the image to be sharpened. As well as the required colour space conversion from SD to HD, there is full RGB adjustment of contrast and brightness. Furthermore, to maintain the best picture quality the boards will automatically enter bypass mode when the input is the same as the selected output standard.

High Definition is always 16:9 but Standard Definition can be 16:9 or 4:3, and the Up-and-downs will look after any aspect ratio conversion requirements when up or down converting. When converting from HD to 4:3 SD or from 4:3 SD to HD, the final aspect ratio can be selected from four preset formats: Full image (the full source with black bands), Compromise (a 14:9 compromise), Fill screen (a centre cut) or Anamorphic. Up-and-down-A additionally includes a fully flexible aspect ratio converter for SD to SD applications.

Intuitive to set up and operate, the Up-and-down modules all offer the full range of control options – with the choice of Crystal Vision's intuitive board edge interface, an active front panel on the frame, a remote control panel or the Statesman PC software. Features are incorporated to help make your life easier, including auto detection of input standard which will ensure the output is always in the desired format, whatever the input. Time can also be saved using the eight set ups which can be stored for later recall.

Interfacing between the HD and SD worlds couldn't be easier. Fitting in the standard frames alongside any other product from the range, these 100mm x 266mm modules use minimum rack space leaving plenty of room for all the other equipment you need. Two HD or SD outputs along with two reclocked input loop-throughs are available by using the RM34 rear module.

Read on to find out which product is ideal for your application!

- Combined up, down and cross converter available in three versions
- Exceptional performance thanks to motion adaptive video de-interlacing and detail enhancement processing
- Up conversions: Standard Definition to 720p and 1080i at 50Hz and 59.94Hz
- Down conversions: 720p and 1080i to Standard Definition at 50Hz and 59.94Hz
- Cross conversions: 720p to 1080i and 1080i to 720p at 50Hz and 59.94Hz
- All boards include HD to 4:3 SD or 4:3 SD to HD aspect ratio conversion
- Two scaled outputs and two input loop-throughs
- Fit in standard frames alongside HD and SD modules
- House 12 Up-and-down in 2U (24 in 4U, six in 1U and two in desk top box)
- House nine Up-and-down-S in 2U (18 in 4U, five in 1U and one in desk top box)
- House ten Up-and-down-A in 2U (20 in 4U, five in 1U and one in desk top box)
- Easy to use, with flexible control including PC software

Additional features on Up-and-down-S:

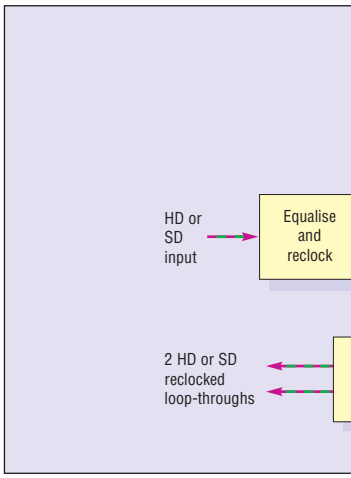
- Includes frame or line synchroniser or use as a fixed delay line
- Cross-locking: HD or SD source can be referenced to either HD tri-level syncs or SD Black and Burst
- Full vertical and horizontal timing adjustment (0-1 frame)
- Selectable blue, black or freeze on input failure
- Fast locking after upstream switch
- Audio follow output

Additional features on Up-and-down-A:

- Passes embedded audio (with same delay as picture)
- Doubles as fully flexible SD to SD aspect ratio converter
- Presets for six most popular aspect ratio conversions
- Create custom aspect ratios with continuous vertical and horizontal compression and expansion
- Vertical and horizontal offsets of picture and cropping

Up-and-down

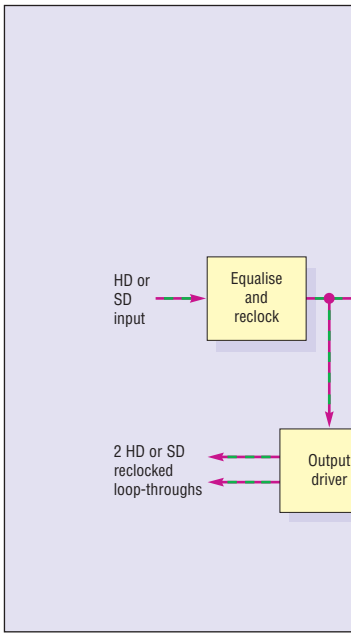
Up-and-down is the cost-effective option for video only applications using synchronous sources or where there is a synchroniser elsewhere in the system. This broadcast up/down/cross converter benefits from the motion adaptive video de-interlacing, detail enhancement processing and the other excellent features guaranteed to give you that incomparable performance. Whether you're converting a Standard Definition area to HD, passing signals between HD and SD areas, using SD equipment within an HD area or creating a version of a programme in a different definition, Up-and-down is exactly what you need.



Choose Up-and-down when... you need a superb up/down/cross converter and you're not working with embedded or incorrectly timed sources.

Up-and-down-S

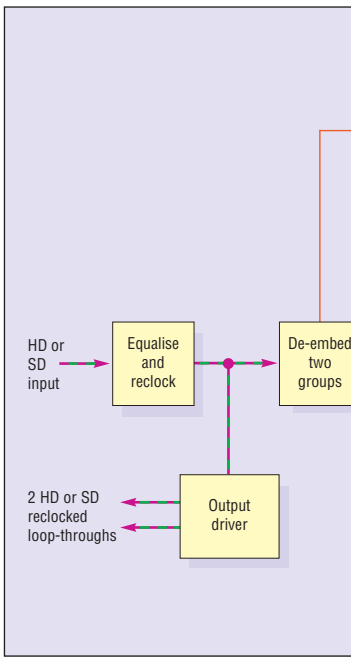
At the point of entry or exit to a system you often need to up or down convert a source and sort out the timing too. For this task Up-and-down-S is definitely the product to choose. Connect any SD, 720p HD or 1080i HD signal to Up-and-down-S and it will emerge in the correct format and with the correct timing for you to use. The inclusion of an on-board synchroniser allows it to synchronise incoming video signals which are not locked to the local reference and additionally compensate for timing delays within the video system. Taking its timing from an external analogue reference, Up-and-down-S will automatically synchronise sources between 0 and 1 frame, fixing any incorrect frame rates plus any delays. The ability to cross-lock allows it to be referenced to either HD tri-level syncs or SD Black and Burst, whatever the signal output. The output timing relative to the reference can be adjusted through an entire frame using horizontal and vertical settings. When used without a reference, a fixed delay can be added of between 2us and one frame. Up-and-down-S synchronises at three separate points, allowing it to avoid picture disturbances for switches on the input that are between mistimed sources and that occur in the vertical blanking. There is both manual and automatic freeze, while a TTL level pulse allows an external audio delay to track the video delay through the board.



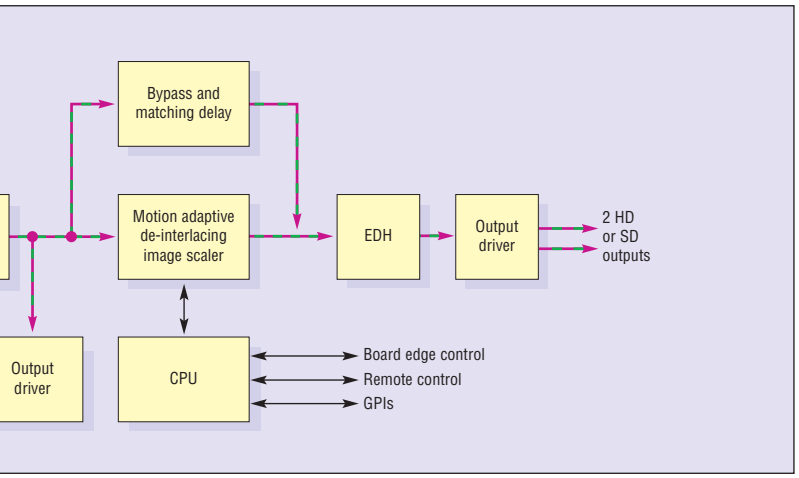
Choose Up-and-down-S when... you need an up/down/cross converter that can retime your source – either because it's from a difference reference or because you need to correct processing delays.

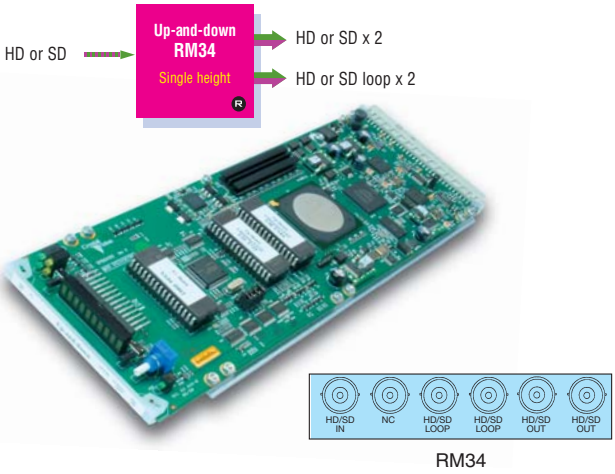
Up-and-down-A

Up-and-down-A is for anyone working with embedded audio sources. Ideal for studio or transmission applications, it will pass two groups of embedded audio, de-embedding the two lowest numbered groups and converting them to the appropriate format before re-embedding them on groups 1 and 2 of the output. Four audio groups can be passed in bypass mode. In addition to the HD to SD and SD to HD aspect ratio conversions available across the range, what makes Up-and-down-A additionally special is that it can be used as a fully flexible SD to SD 10 bit aspect ratio converter. Featuring presets for the six standard conversions to show a 16:9 source on a 4:3 monitor (16:9 to 4:3 Letterbox, 16:9 to 14:9 Letterbox and 16:9 to 4:3 Full Screen) and a 4:3 source on a 16:9 monitor (4:3 to 16:9 Pillarbox, 4:3 to 14:9 Pillarbox and 4:3 to 16:9 Full Screen), it also allows the creation of custom aspect ratios with continuous picture compression or expansion in line and pixel increments up to plus or minus 100 lines and pixels. Vertical and horizontal offsets of the picture bring extra flexibility and allow the easy addition of subtitles, while vertical and horizontal cropping of up to 31 lines and 31 pixels is ideal for removing unwanted material from the edges of the picture. When working with an SD input and output, Up-and-down-A can pass closed captions on line 21 in 525 line applications and can either pass or blank widescreen signalling on line 23 in 625 line.

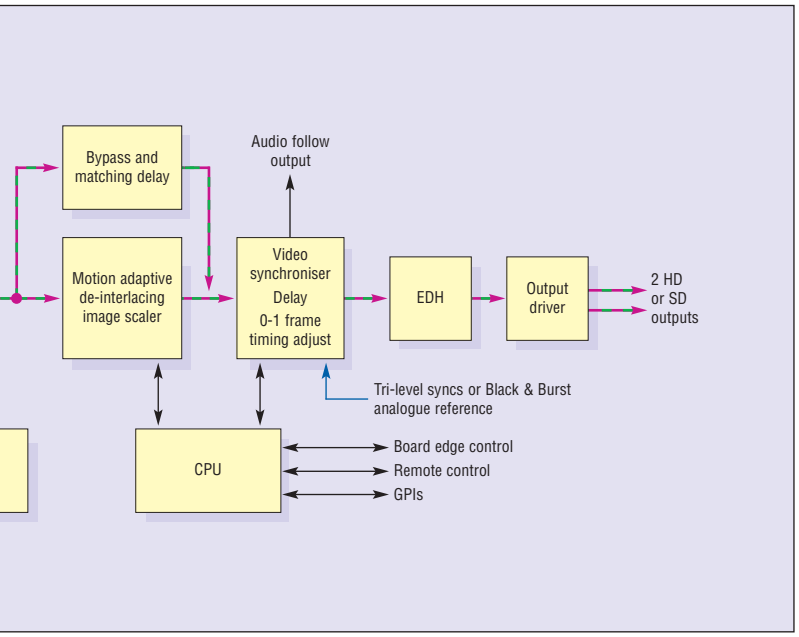


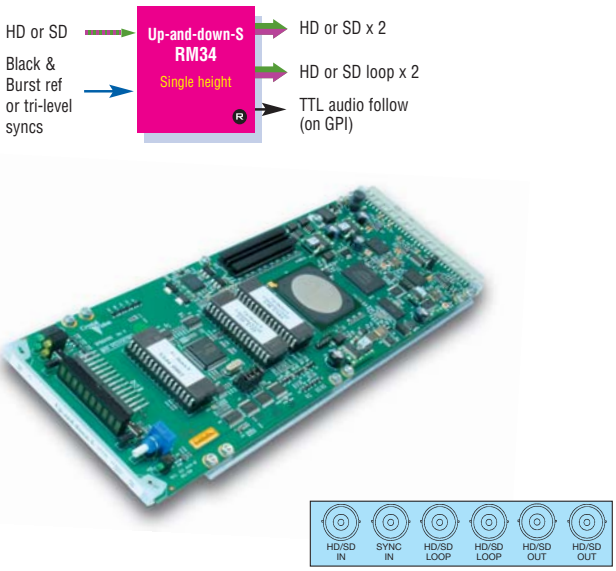
Choose Up-and-down-A when... you want a convenient one board solution for up, down or cross converting your embedded audio sources, or your SD installation needs an ARC and you're planning for the future now.



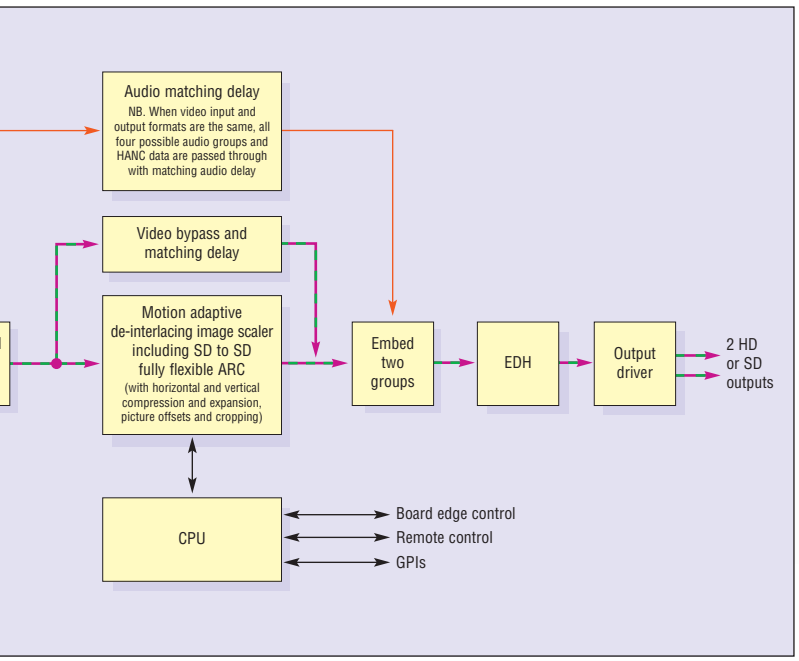


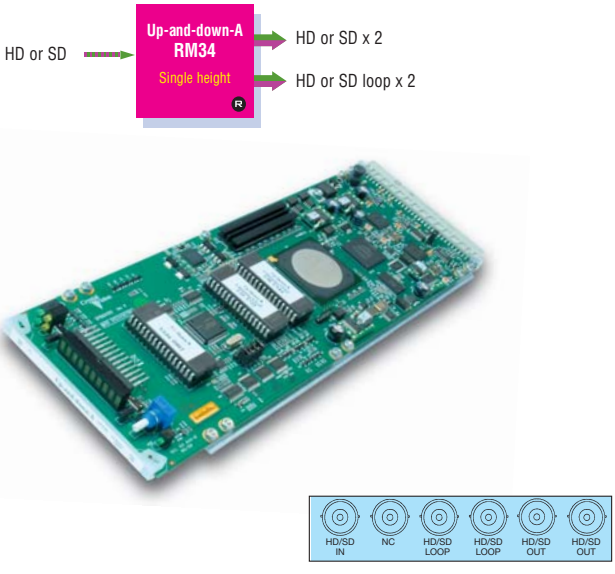
RM34





RM34





RM34

SPECIFICATION

MECHANICAL
Standard Crystal Vision modules 266mm x 100mm
Weight: 225g
Power consumption: 12 Watts (Up-and-down); 16 Watts (Up-and-down-S); 14.5 Watts (Up-and-down-A)
Please be aware that power restrictions will not allow you to fill a frame to full capacity with Up-and-down-S or Up-and-down-A. If you wish to use all frame slots, please mix them in a frame with lower-powered boards

VIDEO INPUT
One HD or SD input with reclocking
270Mbit to 1.485Gbit serial compliant to EBU 3267-E, SMPTE 259M and SMPTE 292M
HD cable equalisation up to 140m with Belden 1694 or equivalent (approx. 100m with Belden 8281). Cable lengths are for new HD version of frames. SD cable equalisation >250m Belden 8281 or equivalent
Input return loss: -15dB for 50MHz to 1.5GHz

VIDEO OUTPUTS
Two HD or SD scaled outputs using RM34 frame rear module
Two equalised and reclocked input loop-throughs
Auto detection of input standard will ensure the output is always in the desired format, whatever the input

ANALOGUE REFERENCE (UP-AND-DOWN-S ONLY)
Tri-level syncs or analogue Black and Burst or video
HD or SD source can use either type of reference
When cross-locking it is necessary for both the video input and reference to share the same frame rate
Amplitude of syncs 150mV to 600mV
Link on PCB selects 75 ohm termination or high impedance

INPUT TO OUTPUT CONVERSIONS
Up conversions:
625/50 to 720p50
525/59.94 to 720p59.94
625/50 to 1080i50
525/59.94 to 1080i59.94
Down conversions:
720p50 to 625/50
720p59.94 to 525/59.94
1080i50 to 625/50
1080i59.94 to 525/59.94
Cross conversions:
720p50 to 1080i50
720p59.94 to 1080i59.94
1080i50 to 720p50
1080i59.94 to 720p59.94

PICTURE PROCESSING
Pixel based motion adaptive de-interlacing means that the Up-and-downs will automatically choose the best processing method based on the video content. In video containing significant movement the output picture will look natural and smooth
Adjustable detail enhancement allows the user to sharpen the edges in the image, reducing the perceived softness of an up converted image
Colour space conversion from SD Rec. 601 to HD BT. 709
RGB gain and dc offset adjustments allow control of the image brightness, contrast and colour

ASPECT RATIO CONVERSION
HD is always 16:9. SD may be 16:9 or 4:3. When converting up or down the aspect ratio of the picture may therefore need to be changed

The available aspect ratio conversions for HD to 4:3 SD are:
Full image: 16:9 to 4:3 Letterbox (the full 16:9 source with horizontal black bands)
Fill screen: 16:9 to 4:3 Full Screen (a centre cut with left and right of the picture lost)
Compromise: 16:9 to 14:9 Letterbox (slight picture loss on left and right and thin horizontal black bands)
Anamorphic: the whole input picture fills the whole output image and is distorted

The available aspect ratio conversions for 4:3 SD to HD are:
Full image: 4:3 to 16:9 Pillarbox (the full 4:3 source with vertical black bands)
Fill screen: 4:3 to 16:9 Full Screen (a centre cut with top and bottom of the picture lost)
Compromise: 4:3 to 14:9 Pillarbox (slight picture loss on top and bottom and thin vertical black bands)
Anamorphic: the whole input picture fills the whole output image and is distorted

ADVANCED ASPECT RATIO CONVERSION (UP-AND-DOWN-A ONLY)
When the input and output are both SD, Up-and-down-A can be used as a fully flexible 10 bit aspect ratio converter
Has presets for the six standard conversions to put a 16:9 source on a 4:3 monitor, or a 4:3 source on a 16:9 monitor. The available presets are: 16:9 to 4:3 Letterbox, 16:9 to 14:9 Letterbox, 16:9 to 4:3 Full Screen, 4:3 to 16:9 Pillarbox, 4:3 to 14:9 Pillarbox and 4:3 to 16:9 Full Screen. It is also possible to select no conversion with the same delay
Custom aspect ratios can be created with vertical and horizontal picture size adjust of + or - 100 lines and pixels and vertical and horizontal picture offset of + or - 100 lines and pixels
Vertical and horizontal cropping allows up to 31 lines to be cropped from the top and bottom of the picture and up to 31 pixels from the left and right
Closed captions on line 21 in 525 line can be passed
Widescreen signaling on line 23 in 625 line can be passed or blanked

BYPASS MODE
To maintain the best picture quality the Up-and-downs will automatically enter a bypass mode when the input is the same as the selected output standard, bypassing the major processing blocks and adding a matching delay

TIMING ADJUSTMENTS (UP-AND-DOWN-S ONLY)
Up-and-down-S synchronises at three separate points within each field or frame: at the start of the field/frame, just after the switching point and at the start of the active field/frame
In synchroniser mode Up-and-down-S takes its timing from the analogue external reference and will automatically synchronise sources between 0 and 1 frame. Should the reference be removed, Up-and-down-S will free run at the previous received line rate
In delay mode timing is derived from the HD or SD input
The timing can be fully adjusted using horizontal and vertical settings. Increasing the vertical setting will delay the output relative to the reference in increments of one line. Increasing the horizontal setting will increase this delay in increments of approx. 74ns for SD and 13.5ns for HD. The maximum setting of both controls will provide a delay of one frame plus approx. 2us

DELAY THROUGH BOARD
One video frame (Up-and-down and Up-and-down-A)
1 video frame min - 2 video frames max (Up-and-down-S)

FREEZE FUNCTIONS (UP-AND-DOWN-S ONLY)
Manual freeze allows Up-and-down-S to be used as a simple still store. Selecting single field output can counteract any flicker caused by the interlacing of the two fields on a picture with significant movement. Either field can be selected. The single field is output only when the picture is frozen. Automatic freeze is available when input fails through loss of signal. The user can specify to show the whole frame in which failure happened, field 1 or 2 of the last frame or alternatively a black or blue screen (with or without an initial delay)

EDH
EDH insertion to SMPTE RP165 and SMPTE 292M

AUDIO FOLLOW OUTPUT (UP-AND-DOWN-S ONLY)
TTL output on GPI
Pulse length shows delay through store
Can provide control signal for audio delay systems

EMBEDDED AUDIO HANDLING (UP-AND-DOWN-A ONLY)
Four audio groups can be detected in the video input
The two lowest numbered audio groups are de-embedded then re-embedded on the output

LED INDICATION OF:
SD/HD input or input not present
Power supplies on board

GPI INPUT LEVELS
Active pull to ground, pulled up to +5V through 10 kohm

GPI OUTPUT LEVELS
Electrically: Open collector transistors 30V, 270 ohm current limit resistors. Pulled up to +5V through 7 kohm

GPI INPUTS
Four GPI inputs can recall one of 16 presets (Up-and-down)
Three GPI inputs can recall one of eight presets (Up-and-down-S and Up-and-down-A)

GPI OUTPUTS
Up-and-down-S: External reference missing and audio tracking pulse
Up-and-down-A: Input missing
(Up-and-down has no GPO functionality)

LOCAL CONTROL
Intuitive board edge interface with two select buttons, shaft encoder and 10 character alphanumeric display

REMOTE CONTROL
RS422/485
19200 baud, 8 bits, 1 stop no parity
Control from frame active front panel and remote panel
Statesman allows control from any PC on a network

ORDERING INFORMATION

Up-and-down	Up/down/cross converter with motion adaptive video de-interlacing
Up-and-down-S	Up/down/cross converter with motion adaptive video de-interlacing and synchroniser
Up-and-down-A	Up/down/cross converter with motion adaptive video de-interlacing and embedded audio handling
Indigo 4	4U frame with passive front panel for up to 24 Crystal Vision modules
Indigo 4SE	4U frame with passive front panel fitted with Statesman CPU for up to 24 Crystal Vision modules
Indigo 2	2U frame with passive front panel for up to 12 Crystal Vision modules
Indigo 2AE	2U frame with active front panel for up to 12 Crystal Vision modules
Indigo 2SE	2U frame with passive front panel fitted with Statesman CPU for up to 12 Crystal Vision modules
Indigo 1	1U frame with passive front panel for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1-DP
Indigo 1AE	1U frame with active front panel for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1AE-DP
Indigo 1SE	1U frame with passive front panel fitted with Statesman CPU for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1SE-DP
Indigo DT	Desk top box with passive front panel for up to two Crystal Vision modules
Indigo DTAE	Desk top box with active front panel for up to two Crystal Vision modules
Indigo DTSE	Desk top box with passive front panel fitted with Statesman CPU for up to two Crystal Vision modules
RM34	Single slot frame rear module. Allows maximum number of Up-and-down in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Allows 18 Up-and-down-S in 4U, nine in 2U, five in 1U and one in desk top box. Allows 20 Up-and-down-A in 4U, ten in 2U, five in 1U and one in desk top box. Gives access to two HD or SD scaled outputs and two reclocked input loop-throughs
REMIND	19” remote control panel
REMIND-E	19” Ethernet remote control panel
Statesman	PC Control System

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