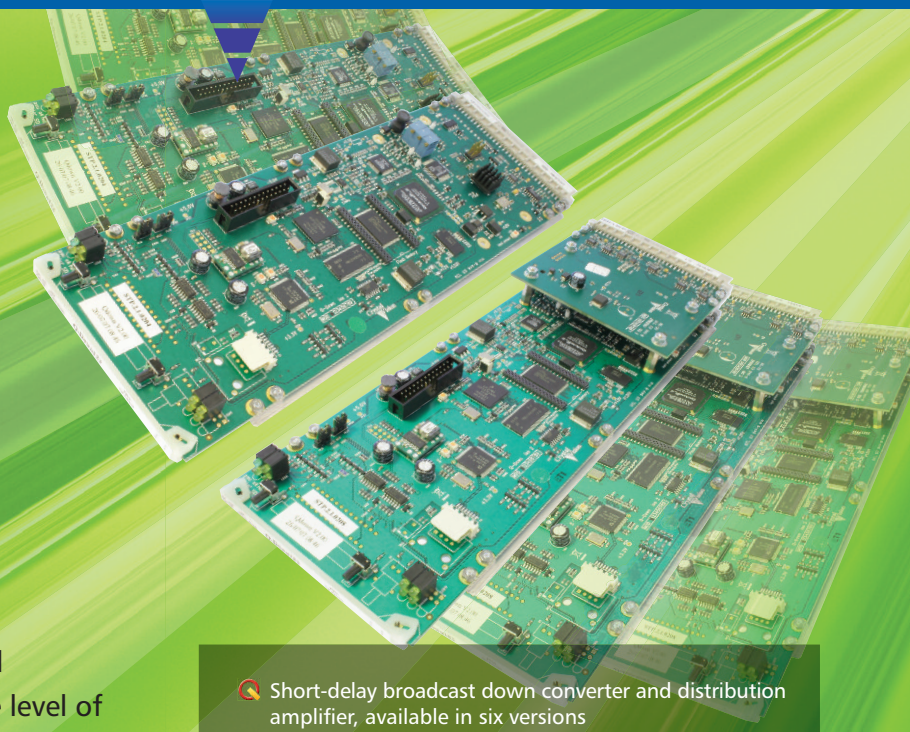
Crystal Vision



Short-delay broadcast down converter and distribution amplifier

Q-Down is a broadcast down converter and distribution amplifier which offers a unique level of image quality in its price range. What's more, it comes in six different versions to suit all sorts of applications.

Q-Down combines its exceptional down conversion and distribution with aspect ratio conversion, delay and audio options. Thanks to the number and flexibility of the output combinations available, Q-Down can be used as an HD distribution amplifier, an SDI distribution amplifier, an HD to digital SD down converter, an HD to analogue SD down converter, or a Standard Definition D to A.

As ever, integration with the full Crystal Vision interface, keying and picture storage range is intentionally easy, with Q-Down housed alongside any other product in the standard frames – available in a size to suit you, from 4U down to desk top box. Control options include board edge (with Q-Down-A and Q-Down-A-AFD including a useful display for easy adjustments), an active front panel on the frame, a remote control panel and the Statesman PC software.

Ideal for use in a mixed High Definition and Standard Definition environment and for any areas being converted to HD, Q-Down is a product you can afford to buy in volumes.

- Short-delay broadcast down converter and distribution amplifier, available in six versions
- Accepts HD or SD input
- Distribution amplifier: provides up to two or eight reclocked input loop-throughs
- Down converter: allows flexible configuration of the three Standard Definition video outputs, with mixtures of SDI, composite, Y/C, YUV and RGB
- Short processing delay of just 16 lines
- Unique level of image quality at this price level
- Sophisticated two dimensional filtering gives broadcast results without the complication of looking at multiple fields or movement detection
- Optimise your performance: select from four different filter characteristics
- Includes aspect ratio converter, with Anamorphic, Letterbox and centre cut conversions available on all versions
- Select your output aspect ratio according to the SMPTE 2016 AFD data embedded in the HD input video (Q-Down-A-AFD)
- Manually insert WSS or set it to automatically follow the incoming AFD data (Q-Down-A-AFD)
- Match other delays in system with adjustable delay of up to one video frame (Q-Down-A and Q-Down-A-AFD)
- Pass two groups of embedded audio with Q-Down-A and Q-Down-A-AFD
- Space-saving: 100mm x 266mm module allows 12 Q-Down123 in 2U (24 in 4U, six in 1U and two in desk top box), while 'double decker' 100mm x 266mm module allows six Q-Down183 in 2U (12 in 4U, three in 1U and one in desk top box)
- Flexible control: board edge, active front panel, remote panel or PC software

FLEXIBLE OUTPUT COMBINATIONS

Q-Down123 gives two reclocked loop-throughs of the HD or SD input using the RM34 rear module, while the 'double decker' Q-Down183 gives eight loop-throughs using two RM34 rear modules together. Both versions additionally provide three Standard Definition outputs individually link selectable between analogue and digital, with the analogue video configurable as composite, Y/C, YUV and RGB. By using an alternative rear module – the RM45 – one of the loop-throughs can be exchanged for a dedicated SDI output, thereby increasing the number of applications.

Q-Down can down convert 720p and 1080i High Definition at both 50Hz and 59.94Hz, while if the input is Standard Definition the down converter is bypassed with Q-Down giving out the three SDI and analogue outputs and the reclocked loop-throughs following the frame rate of the SD input.

EXCEPTIONAL PERFORMANCE

Performance is outstanding. The sophisticated two dimensional filtering gives you broadcast results without the complication of looking at multiple fields or movement detection – resulting in reliable, artefact-free conversion. Then there's the choice of four alternative filter characteristics for those who want to optimise the performance for their material. A short processing delay of just 16 lines means that there is no need to compensate audio or other signals for the video delay, keeping everything in sync and making your system design much simpler. Q-Down will even deal with any HD to SD aspect ratio conversion requirements, with the option of selecting a 16:9 Anamorphic output for 16:9 SD systems and either a 16:9 to 4:3 Letterbox or 16:9 to 4:3 Full Screen with centre cut for 4:3 SD systems.

EMBEDDED AUDIO HANDLING

Q-Down-A and Q-Down-A-AFD are ideal for those working with embedded audio. With an HD input they will de-embed the two groups of audio, converting them to the appropriate format before re-embedding them into the digital SD output. With a Standard Definition input they will pass two groups of embedded audio transparently to the digital SD output. This sophisticated embedded audio handling, along with the high image quality, makes them ideal as a main signal path down converter.

VARIABLE VIDEO DELAY AND SIGNAL PROBING

Q-Down-A and Q-Down-A-AFD provide a variable video delay of up to one video frame, adjustable in one line steps, allowing them to match other equipment delays in the system. They also include signal probe functionality making them useful for flagging up faulty signals, especially in multi-channel applications. The status indications available are video not present, video frozen, video black, audio not present and audio silent, with the boards able to provide warnings of any problems via Statesman alarms.

ACTIVE FORMAT DESCRIPTION AND WIDESCREEN SIGNALLING (Q-DOWN-A-AFD)

Some HD installations use SMPTE 2016 data to describe a source's Active Format Description (AFD) which allows a following down converter to output the Standard Definition with an appropriate aspect ratio conversion. HD programmes are often made of a mixture of true High Definition sources and SD originated sources that have been up converted and have black pillars at the sides.

CHOOSING THE RIGHT Q-DOWN FOR YOU

Feature	Q-Down123	Q-Down183	Q-Down123-A	Q-Down183-A	Q-Down123-A-AFD	Q-Down183-A-AFD
Reclocked HD or SD loop-throughs	2 (1 with RM45)	8 (7 with RM45 + RM34)	2 (1 with RM45)	8 (7 with RM45 + RM34)	2 (1 with RM45)	8 (7 with RM45 + RM34)
Configurable Standard Definition outputs	3	3	3	3	3	3
Outputs configurable as mixture of SDI, composite, Y/C, YUV and RGB	●	●	●	●	●	●
Number of dedicated SDI outputs (RM45 only)	1	1	1	1	1	1
Four filter characteristics	●	●	●	●	●	●
Aspect ratio conversion	●	●	●	●	●	●
Centre cut conversion	●	●	●	●	●	●
AFD code activated aspect ratio conversion (HD sources)					●	●
Manual or auto WSS insertion					●	●
HD input processing delay of 16 SD lines (Anamorphic/Full Screen) or 52 SD lines (Letterbox)	●	●	●	●	●	●
Variable video delay of up to one frame			●	●	●	●
Embedded audio handling			●	●	●	●
Signal probe indications			●	●	●	●
Board edge display			●	●	●	●
Rear modules used	RM34 or RM45	2 x RM34 or RM45 + RM34	RM34 or RM45	2 x RM34 or RM45 + RM34	RM34 or RM45	2 x RM34 or RM45 + RM34
Boards in 2U	12	6	12	6	12	6

When the HD signal is originated from Standard Definition it is necessary for the down converter to behave differently.

There are two stages to ensure that the HD signals are down converted with the correct aspect ratio conversion. Firstly, all signals need to be labelled by inserting SMPTE 2016 data to indicate the Active Format Description. The AFD code gives information about which areas of the screen contain a picture and which areas have black 'padding'. Secondly, the down converter needs to read this signal and select the correct aspect ratio conversion to be used with the down conversion.

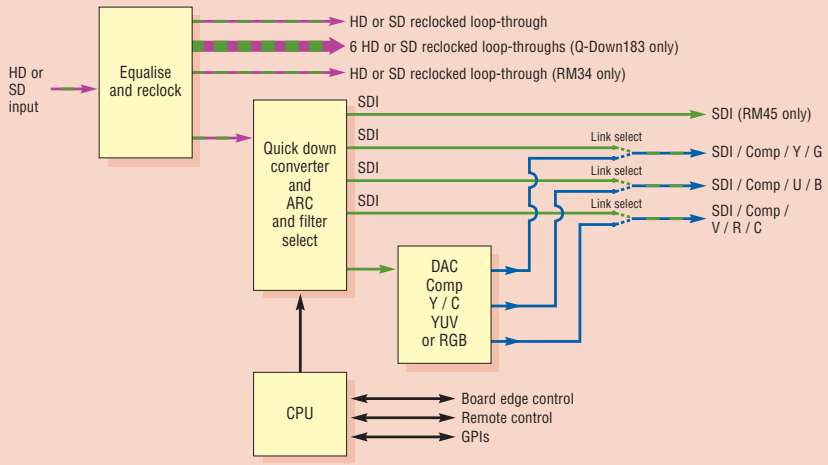
When down converting Q-Down-A-AFD will select its output aspect ratio according to the AFD code embedded in the input video, and offers three options for the SD output. With Auto 16:9 mode the SD output can be set to be always 16:9 and in this case it will do the down conversion without ever changing the aspect ratio. Alternatively the SD output can be set to be always 4:3 (Auto 4:3 mode), in which case it will down convert and perform either a Letterbox or centre cut, depending on the source material. There is also a third, adaptive option: Auto Adaptive mode. Here, if the HD input is 16:9 full frame the picture is down converted with no aspect ratio conversion and is output as 16:9 SD. If the SMPTE 2016 data indicates that the HD input is a 16:9 Pillarbox, however, a centre cut is performed and the output is 4:3 SD.

Widescreen signalling (WSS) can be inserted into the analogue and SDI outputs to indicate the picture format to downstream equipment – either done manually or by automatically following the incoming AFD data.

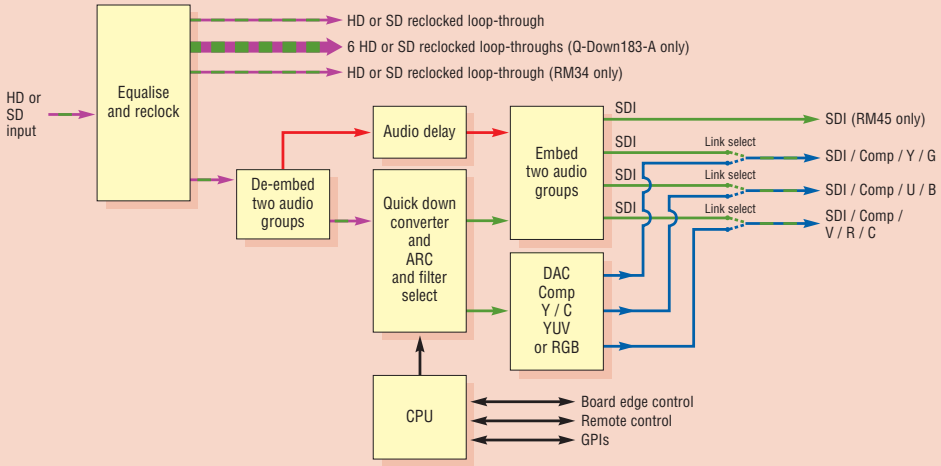
Although it would normally be a requirement for an automatic system to label all the HD video images to show their format and control the down converter, with Q-Down-A-AFD it is only necessary to label those that are not full frame 16:9 images. When the input is not labelled Q-Down-A-AFD uses its default assumption that an HD image is a full frame 16:9. It is therefore possible to have a powerful system with the majority of signals not containing SMPTE 2016 information.

INPUTS AND OUTPUTS

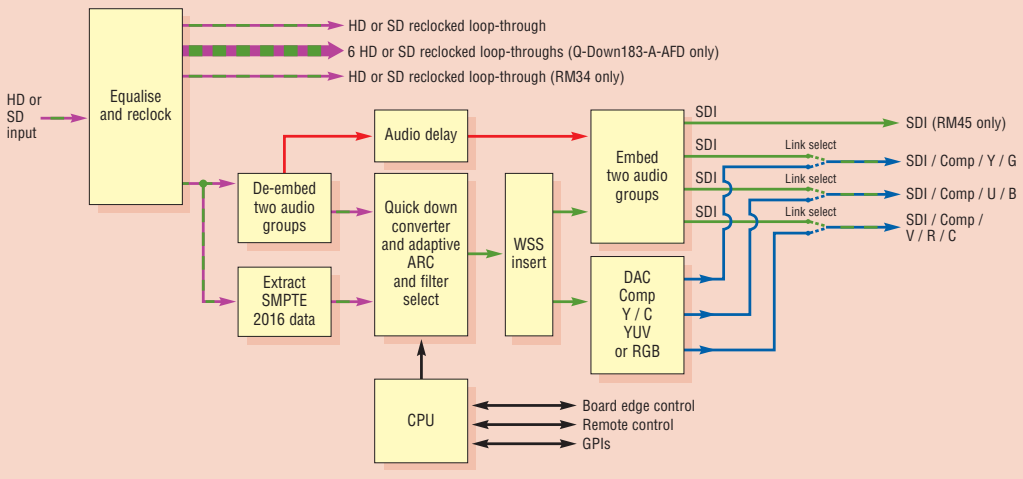
Q-Down123 and Q-Down183



Q-Down123-A and Q-Down183-A



Q-Down123-A-AFD and Q-Down183-A-AFD



SPECIFICATION

MECHANICAL
Q-Down123, Q-Down123-A and Q-Down123-A-AFD: Standard Crystal Vision module 266mm x 100mm
Q-Down183, Q-Down183-A and Q-Down183-A-AFD: 'Double decker' module 266mm x 100mm (uses two frame slots)
Weight: 180g (Q-Down123, Q-Down123-A and Q-Down123-A-AFD); 240g (Q-Down183, Q-Down183-A and Q-Down183-A-AFD)
Power consumption: 10 Watts (Q-Down123, Q-Down123-A and Q-Down123-A-AFD); 12.5 Watts (Q-Down183, Q-Down183-A and Q-Down183-A-AFD)

VIDEO INPUT
One HD or SD input with reclocking
270Mbit or 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). SD cable equalisation >250m Belden 8281 or equivalent
Input return loss: -15dB for 50MHz to 1.5GHz

DOWN CONVERSIONS
720p50 to 625/50
720p59.94 to 525/59.94
1080i50 to 625/50
1080i59.94 to 525/59.94

VIDEO OUTPUTS
Q-Down123, Q-Down123-A and Q-Down123-A-AFD: Two equalised and reclocked loop-throughs of the HD or SD input and three video outputs using RM34 frame rear module, or one loop-through of the HD or SD input, one dedicated SDI output and three video outputs using RM45 rear module
Q-Down183, Q-Down183-A and Q-Down183-A-AFD: Eight equalised and reclocked loop-throughs of the HD or SD input and three video outputs using two RM34 frame rear modules together, or seven loop-throughs of the HD or SD input, one dedicated SDI output and three video outputs using RM45 and RM34 rear modules together
The three video outputs can be a mixture of SDI and analogue (PAL/NTSC, Y/C, YUV and RGB). Outputs configured using on board links
Output frame rate same as input frame rate
Component: YUV and RGB 1 Volt +/- 2% into 75 ohm. Syncs on R, G and B
Composite: 1 Volt +/- 2% with syncs into 75 ohm. Selectable setup and Betacam levels

ANALOGUE PERFORMANCE
COMPONENT:
Sampling: Video input is 10 bit processed for 12 bit output DACs
Frequency response:
Luminance: +/- 0.3dB to 5.5 MHz.
Chrominance: +/- 0.4dB to 2.5 MHz
Noise: <-67dB weighted luminance or chrominance
Gain error: < 1%
COMPOSITE:
Sampling: Video input is 10 bit processed for 12 bit output DACs
Frequency response:
Luminance: +/- 0.3dB to 5.5 MHz.
Chrominance: +/- 0.4dB to 2.5 MHz
Noise: <-67dB weighted luminance or chrominance
Differential gain: < 2% typ
Differential phase: +/- 1 degree typ

PICTURE PROCESSING (HD TO SD)
Sophisticated two dimensional filtering gets broadcast results and avoids the complication of looking at multiple fields or movement detection, resulting in reliable, artefact-free conversion with broadcast filter quality
When down converting the performance can be optimised by choosing one of four alternative filter characteristics
When the input is SD the board processing is bypassed, so that the signal is passed without degradation

ASPECT RATIO CONVERSION
16:9 Anamorphic (for 16:9 SD systems) and either 16:9 to 4:3 Letterbox or 16:9 to 4:3 Full Screen with centre cut (for 4:3 SD systems)

ACTIVE FORMAT DESCRIPTION (Q-DOWN-A-AFD ONLY)
With HD sources Q-Down-A-AFD will select its output aspect ratio according to the SMPTE 2016 AFD data embedded in the input video
Widescreen signalling information can be inserted into the analogue and SDI outputs (625 line applications only). WSS can be inserted manually or be set to automatically follow the incoming AFD data. If WSS data should be present on the input video this can either be passed to the output unchanged or substituted for a user selectable code. WSS data can also set to be blanked
Response to SMPTE 2016 AFD codes:
Auto 16:9 mode: Will give an Anamorphic aspect ratio conversion for all SMPTE 2016 AFD input codes and the output WSS will be set to full format 16:9
Auto 4:3 mode: Output aspect ratio and WSS data will depend on the input AFD code. Undefined/reserved and full frame AFD codes will produce a Letterbox aspect ratio with the output WSS set to box 16:9 centre. The Pillarbox 4:3, Pillarbox 14:9 and Letterbox >16:9 AFD codes will give a centre cut conversion and set the output WSS to full format 4:3
Auto Adaptive mode: Will give an Anamorphic aspect ratio for any full frame input, with the output WSS set to full frame 16:9. The Pillarbox 4:3 code will give a centre cut conversion and set the output WSS to full format 4:3. The undefined/reserved, Pillarbox 14:9 and Letterbox >16:9 codes will make no change and the previous conversion will remain. On power up the default conversion will be Anamorphic

DELAY THROUGH BOARD
Q-Down: With an HD input the video delay is 16 SD lines (Anamorphic or Full Screen) or 52 SD lines (Letterbox). With an SD input the delay is 3.8us
Q-Down-A and Q-Down-A-AFD: With an HD input the minimum video delay is 16 SD lines (Anamorphic or Full Screen) or 52 SD lines (Letterbox). With an SD input the minimum delay is 1us.
Q-Down-A and Q-Down-A-AFD also allow an additional delay of up to one video frame to match other equipment in system, adjustable in one line steps

EMBEDDED AUDIO PASSING (Q-DOWN-A AND Q-DOWN-A-AFD ONLY)
HD to SD: De-embeds and re-embeds the first two numbered audio groups
SD to SD: Audio bypassed in HANC space
With an HD input the minimum audio delay is 2.5ms. The audio delay will be 2.5ms if the video delay is less than 2.5ms – otherwise the audio delay will equal the video delay. With an SD input the video and audio can both be delayed by 1us

SIGNAL CHECKS (Q-DOWN-A AND Q-DOWN-A-AFD ONLY)
Q-Down-A and Q-Down-A-AFD perform checks on the following parameters: video not present, video frozen, video black, audio not present and audio silent. Warnings of any problems can be provided via Statesman alarms

LED INDICATION OF:
Power supplies on board
Input present
Aspect ratio selection
Vertical filter / Analogue output format selected

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

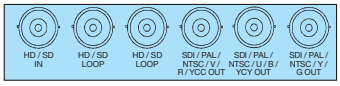
GPI OUTPUT LEVELS
Electrically: Open collector transistors 48V, 270 ohm current limit resistors. Pulled up to +5V through 6800 ohm

GPI INPUTS
Four GPI inputs – no assigned function on Q-Down, while three GPI inputs can be used to recall one of eight presets on Q-Down-A and Q-Down-A-AFD

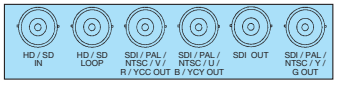
GPI OUTPUTS
Two GPI outputs – one indicating loss of input

LOCAL CONTROL
Q-Down: Board edge control via two push buttons
Q-Down-A and Q-Down-A-AFD: Intuitive board edge interface with two select buttons, shaft encoder and ten character alphanumeric display

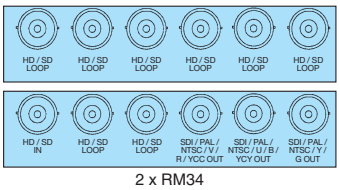
REMOTE CONTROL
RS422/485
19200 baud, 8 bits, 1 stop no parity
Control from frame active front panel and remote panel
Statesman allows control from any PC on a network



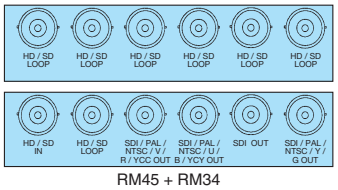
RM34



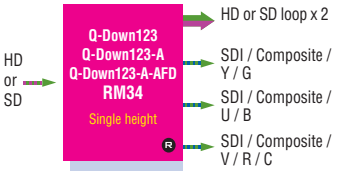
RM45

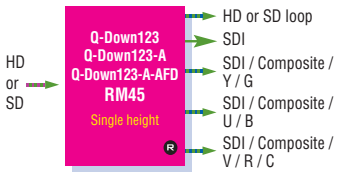


2 x RM34



RM45 + RM34





ORDERING INFORMATION

Q-Down123	Broadcast down converter and distribution amplifier with two reclocked HD or SD input loop-throughs and three Standard Definition video outputs
Q-Down183	Broadcast down converter and distribution amplifier with eight reclocked HD or SD input loop-throughs and three Standard Definition video outputs
Q-Down123-A	Broadcast down converter and distribution amplifier with two reclocked HD or SD input loop-throughs and three Standard Definition video outputs. Can pass embedded audio and includes adjustable delay
Q-Down183-A	Broadcast down converter and distribution amplifier with eight reclocked HD or SD input loop-throughs and three Standard Definition video outputs. Can pass embedded audio and includes adjustable delay
Q-Down123-A-AFD	Broadcast down converter and distribution amplifier with two reclocked HD or SD input loop-throughs and three Standard Definition video outputs. Can pass embedded audio and includes adjustable delay and AFD data reading
Q-Down183-A-AFD	Broadcast down converter and distribution amplifier with eight reclocked HD or SD input loop-throughs and three Standard Definition video outputs. Can pass embedded audio and includes adjustable delay and AFD data reading
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 used for Q-Down123, Q-Down123-A and Q-Down123-A-AFD. Allows maximum number of Q-Down in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Gives access to two reclocked loop-throughs of the HD or SD input and three video outputs (configurable as SDI, PAL/NTSC, Y/C, YUV and RGB)
RM45	Single slot frame rear module used for Q-Down123, Q-Down123-A and Q-Down123-A-AFD. Allows maximum number of Q-Down in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Gives access to one reclocked loop-through of the HD or SD input, one dedicated SDI output and three video outputs (configurable as SDI, PAL/NTSC, Y/C, YUV and RGB)
2 x RM34	Two single slot frame rear modules used together for Q-Down183, Q-Down183-A and Q-Down183-A-AFD. Allows 12 boards in 4U, six in 2U, three in 1U and one in desk top box. Gives access to eight reclocked loop-throughs of the HD or SD input and three video outputs (configurable as SDI, PAL/NTSC, Y/C, YUV and RGB)
RM45 + RM34	Two single slot frame rear modules used together for Q-Down183, Q-Down183-A and Q-Down183-A-AFD. Allows 12 boards in 4U, six in 2U, three in 1U and one in desk top box. Gives access to seven reclocked loop-throughs of the HD or SD input, one dedicated SDI output and three video outputs (configurable as SDI, PAL/NTSC, Y/C, YUV and RGB)
REMIND	19" remote control panel
REMIND-E	19" Ethernet remote control panel
Statesman	PC Control System

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