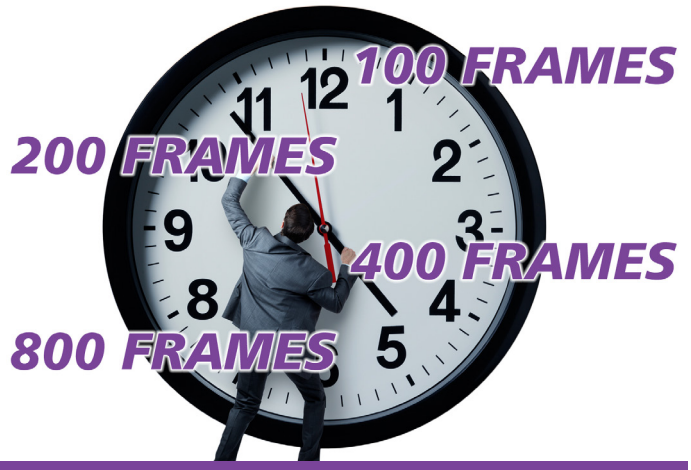
Crystal Vision

M-VIVID SOFTWARE APP

IP/SDI Video Delays



The M-VIVID variable video delays can be used to match any short or long system delays in IP, SDI or mixed installations, such as those caused by virtual studio graphics, MPEG encoders and decoders, audio processing, HD radio links, satellite links and aggregated signal path delays.

The M-VIVID range are software apps that run on the MARBLE-V1 media processor – purpose-built GPU/CPU hardware that fits in the Vision frame. The video delays can be used with IP, with SDI or with both IP and SDI at the same time. Their support for multiple signal formats gives the easiest possible SDI to IP upgrade, while also making them perfect for mixed SDI and IP installations as well as fully IP or fully SDI environments. They support both SMPTE ST 2022 and ST 2110 video over 10GbE IP networks, including ST 2022-7 redundant streaming and the protect equivalent for ST 2110. 31 video formats are supported. When delaying SDI or SMPTE ST 2022 the entire video stream is delayed, with embedded audio and ancillary data staying with the associated video – allowing use in embedded areas. If ST 2110 is used, only the video content is output.

The delay is adjustable in steps of frames, with the length of the delay in seconds dependent on the video standard. The triple channel M-VIVID100-3 provides up to 100 frames of delay per channel, the dual channel M-VIVID200-2 up to 200 frames of delay per channel, the dual channel M-VIVID400-2 up to 400 frames per channel and the single channel M-VIVID800 up to 800 frames.

The four apps all include a framestore synchroniser timed to an external Black and Burst or tri-level syncs analogue reference or PTP (with user configurable options for timing source priority and redundancy) – allowing engineers to delay and synchronise at the same time.

The apps' gateway functionality can be used to integrate SDI into an IP environment or IP into an SDI environment. Their IP to IP translation functionality can be used for network address translation, protocol conversion (between any of the input formats and any of the output formats), unicast to multicast address conversion and the creation of media firewalls. The IP flows can be separated and protected across up to four bi-directional 10GbE SFP+ network interfaces. Other features include full VLAN support, traffic shaping and signal status monitoring. 16 presets can be assigned and recalled, allowing different delay values to be recalled automatically by the studio control system.

Should you want to change the functionality of your product completely, you just need to buy a new app to run on your MARBLE-V1 hardware.

- Software apps that run on the MARBLE-V1 media processor
- Available in four versions to match any video delays in your SDI or IP system: single channel M-VIVID800, dual channel M-VIVID200-2 and M-VIVID400-2 and triple channel M-VIVID100-3
- Use them with SDI, IP or both at the same time: support 31 video formats, SMPTE ST 2022-6 and ST 2022-7 protocols and video within ST 2110 (ST 2110-10, -20 and -21 standards)
- Delay adjustable in steps of frames
- Choose from maximum delay of 800 frames (M-VIVID800), 400 frames per channel (M-VIVID400-2), 200 frames per channel (M-VIVID200-2) or 100 frames per channel (M-VIVID100-3)
- Include synchroniser and choice of multiple timing sources with fail-over (PTP, two analogue Black and Burst or tri-level syncs references via Vision frame, or video input)
- Flexible assignment of the flows allows you to get the configuration you need (such as multiple outputs of one input)
- Support SMPTE ST 2022-7 redundant streaming and ST 2110 protect
- Fitting up to four bi-directional 10GbE network interfaces allows you to separate your IP flows as required
- Include gateway functionality for hybrid systems, encapsulating SDI to IP and de-encapsulating SDI from IP
- Include IP to IP translation functionality, such as network address translation, unicast to multicast address translation, setting firewall restrictions and protocol translation between any of the input formats and any of the output formats
- Tolerant of any input packet distribution, and include output traffic shaping
- Know your signal is present and valid, with SDI and IP flow signal monitoring
- Flexible remote control and monitoring using frame integrated control panel, remote control panels, ASCII and JSON protocols, SNMP and the web browser-based VisionWeb Control
- Save rack space: MARBLE-V1 media processor is a 'double slot' 96mm x 325mm card, with up to ten MARBLE-V1 fitting in 3U

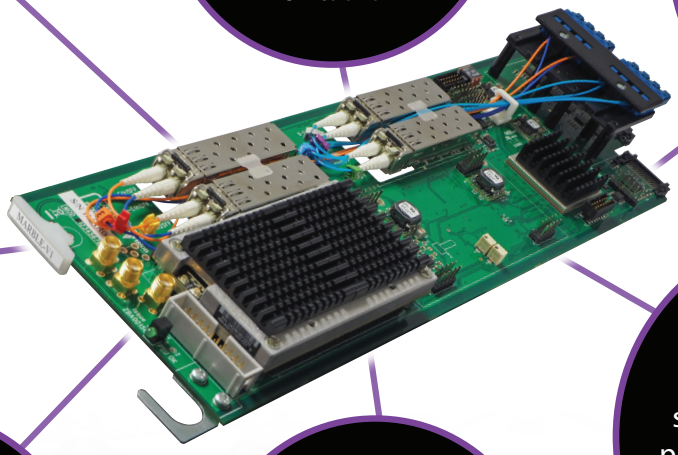
HOW MANY SECONDS OF DELAY DO YOU GET?

The apps support 31 different SDI video standards and full information on all the delay lengths in seconds is available in the Specification on Pages 6 – 8. Here are just a few...

		M-VIVID100-3 (100 frames)	M-VIVID200-2 (200 frames)	M-VIVID400-2 (400 frames)	M-VIVID800 (800 frames)
SD-SDI	625i	4 secs	8 secs	16 secs	32 secs
	525i	3.33 secs	6.67 secs	13.33 secs	26.67 secs
HD	1080i50	4 secs	8 secs	16 secs	32 secs
	1080i59.94	3.33 secs	6.67 secs	13.33 secs	26.67 secs
	720p50	2 secs	4 secs	8 secs	16 secs
	720p59.94	1.66 secs	3.33 secs	6.67 secs	13.33 secs
3Gb/s	1080p50	2 secs	4 secs	8 secs	16 secs
	1080p59.94	1.66 secs	3.33 secs	6.67 secs	13.33 secs

NB. Delay shown is per channel.

THE MARBLE-V1 MEDIA PROCESSOR



Shared hardware platform = many tasks

Powerful CPU/GPU processor = perform any task or combinations of tasks

I/O flexibility = six bi-directional SDI, four 10GbE SFP+ network interface and eight bi-directional discrete AES

Change the functionality completely = install a different app

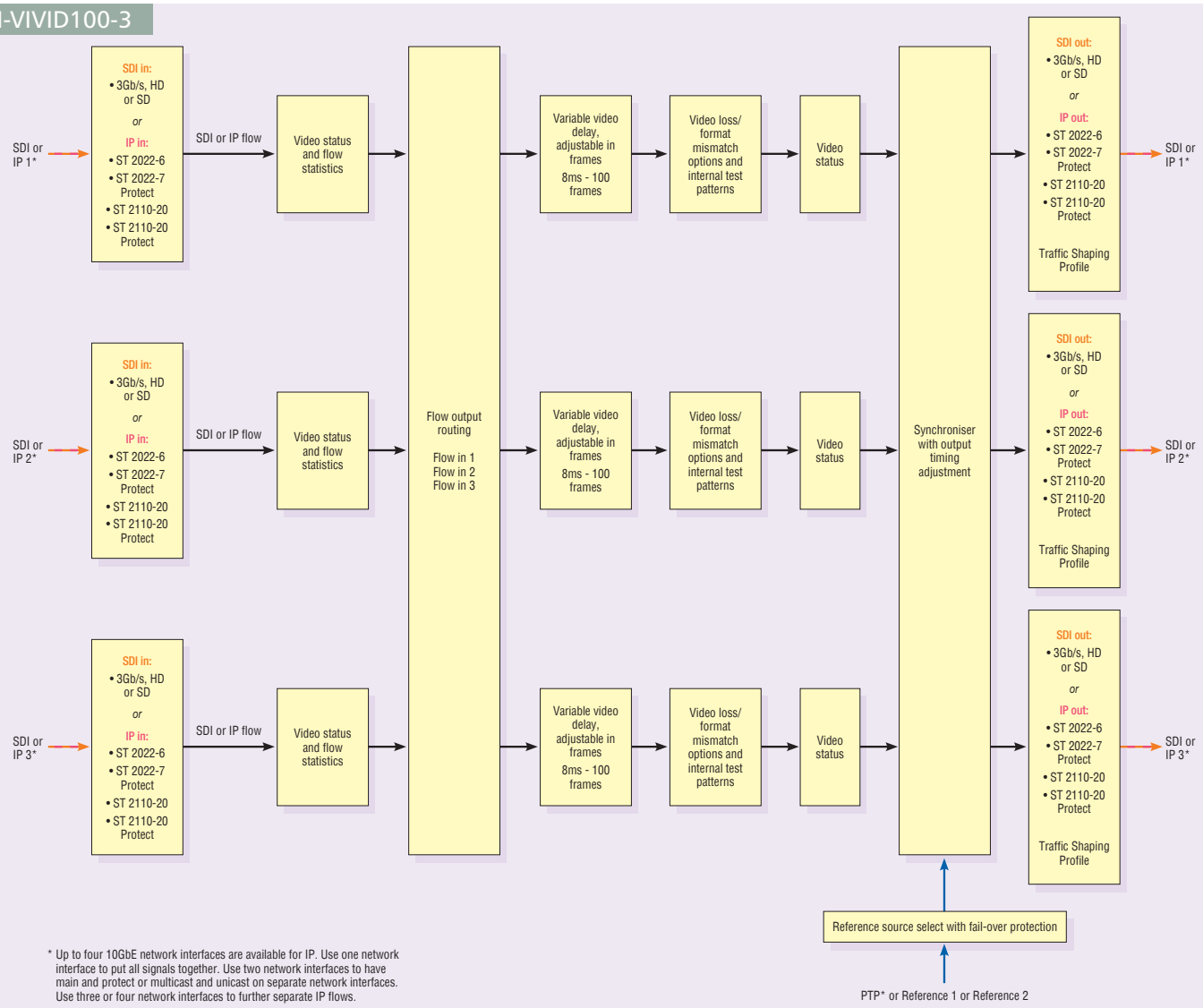
Features to help your systems work = signal monitoring, test patterns, traffic shaping, synchronisation, video delay and more

Software-based platform = easy to create custom products or add features

No need to choose between IP and SDI = apps can work with IP, SDI or both

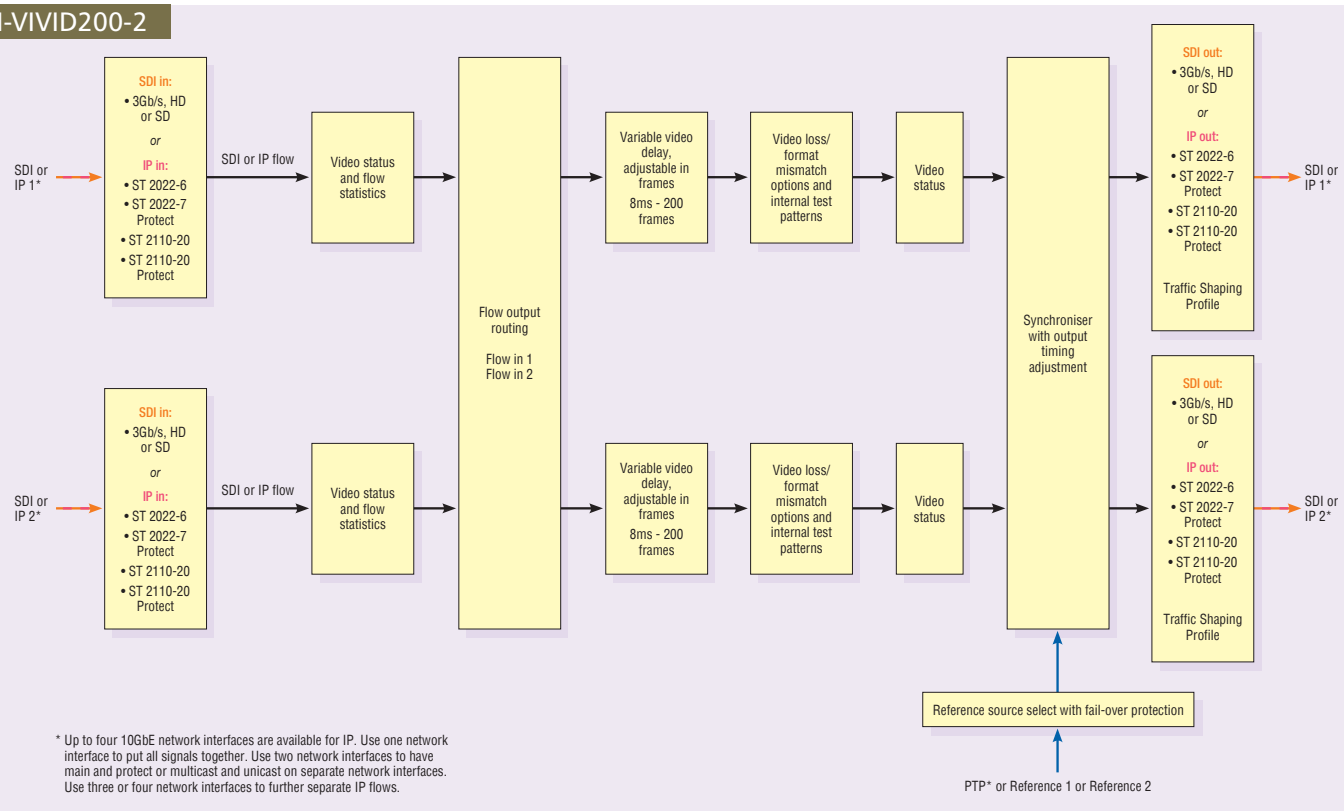
THE INPUTS AND OUTPUTS

M-VIVID100-3



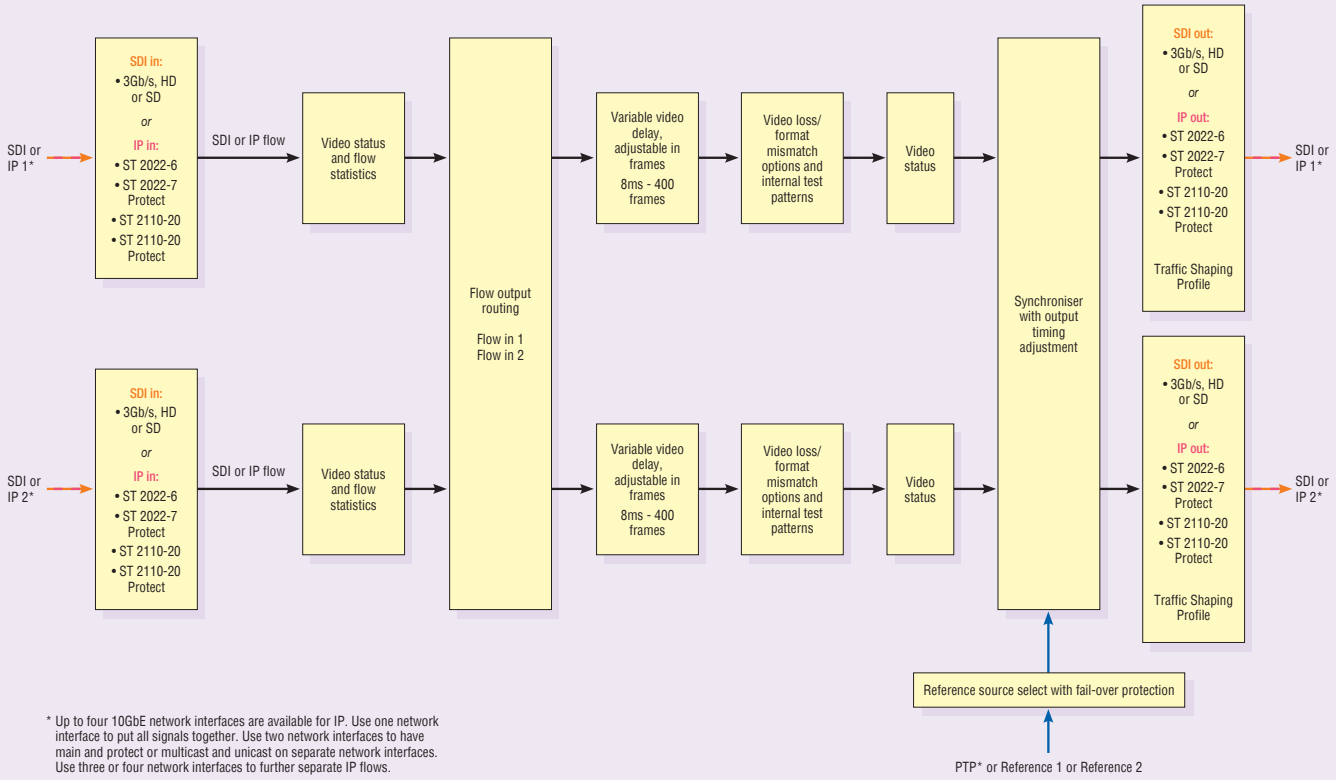
* Up to four 10GbE network interfaces are available for IP. Use one network interface to put all signals together. Use two network interfaces to have main and protect or multicast and unicast on separate network interfaces. Use three or four network interfaces to further separate IP flows.

M-VIVID200-2



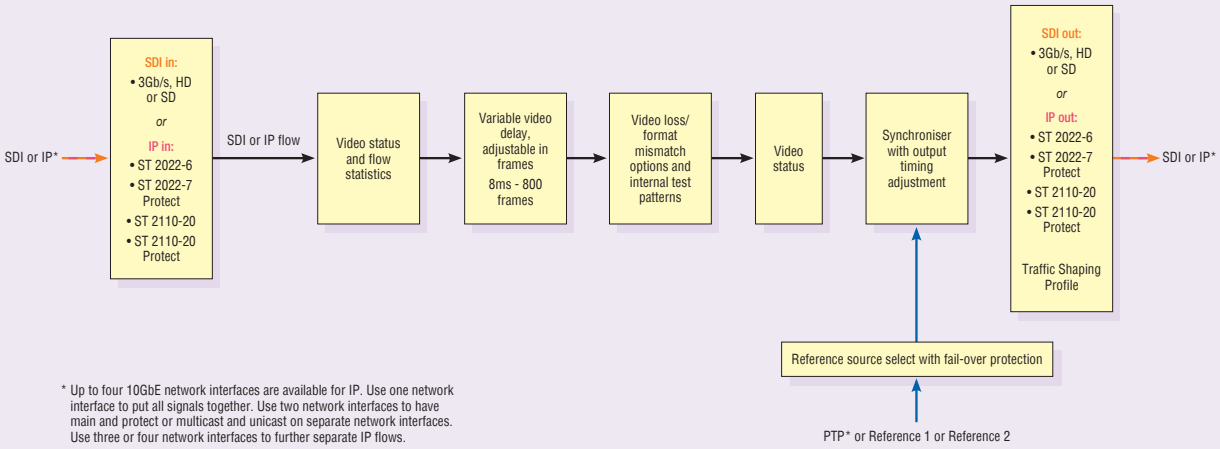
* Up to four 10GbE network interfaces are available for IP. Use one network interface to put all signals together. Use two network interfaces to have main and protect or multicast and unicast on separate network interfaces. Use three or four network interfaces to further separate IP flows.

M-VIVID400-2



* Up to four 10GbE network interfaces are available for IP. Use one network interface to put all signals together. Use two network interfaces to have main and protect or multicast and unicast on separate network interfaces. Use three or four network interfaces to further separate IP flows.

M-VIVID800

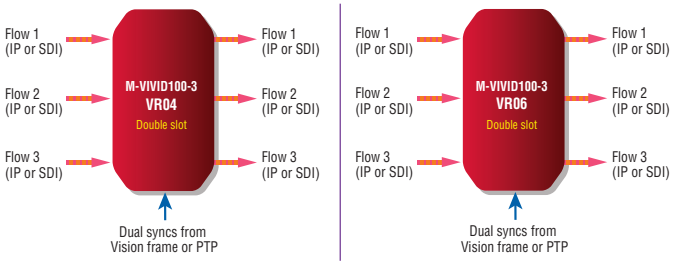


* Up to four 10GbE network interfaces are available for IP. Use one network interface to put all signals together. Use two network interfaces to have main and protect or multicast and unicast on separate network interfaces. Use three or four network interfaces to further separate IP flows.

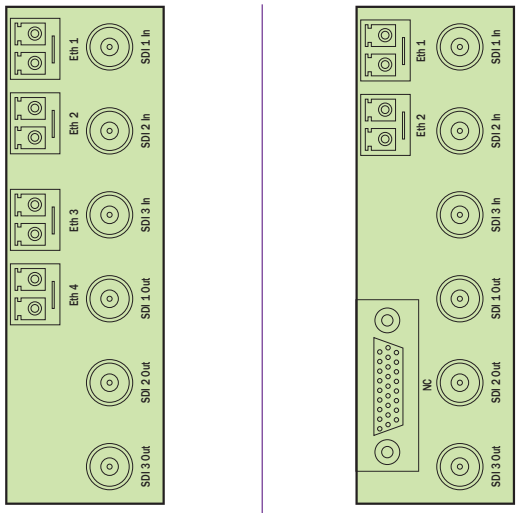
REAR MODULE CONNECTIONS

NB. A generic label will be supplied with purchase of the VR04 and VR06 rear modules. The labels shown below are provided to help you understand the signal connections, such as for wiring purposes.

M-VIVID100-3

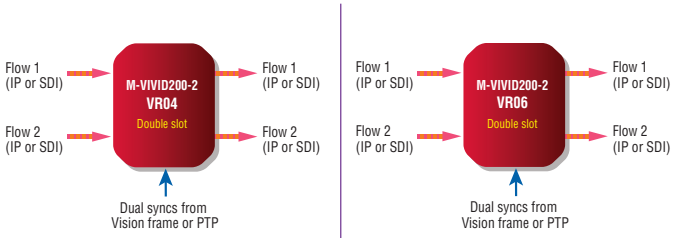


NB. Can be configured so all outputs come from single or dual inputs

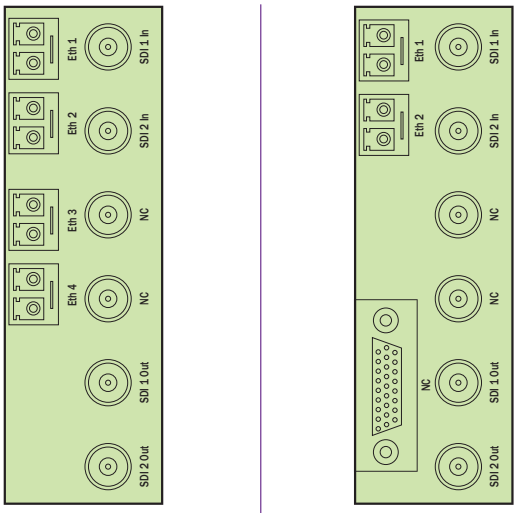


VR04 VR06

M-VIVID200-2

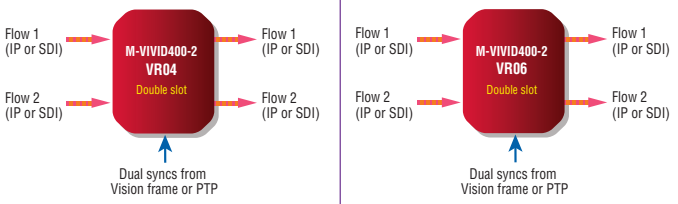


NB. Can be configured so all outputs come from single input

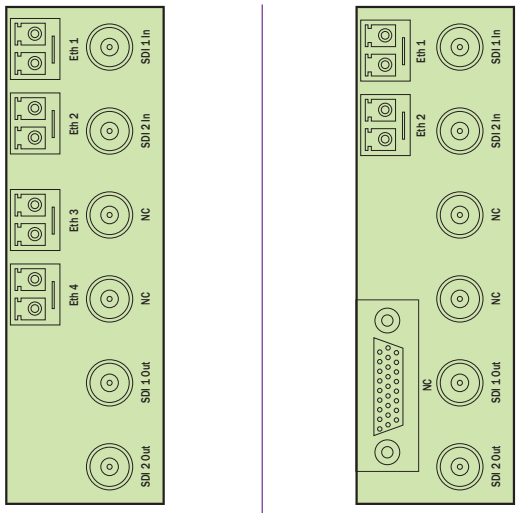


VR04 VR06

M-VIVID400-2

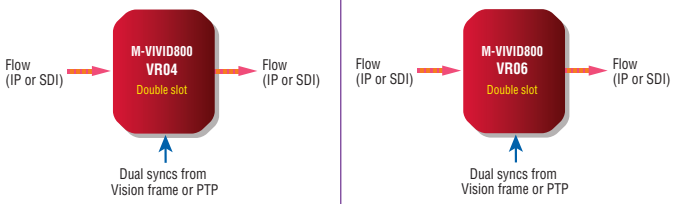


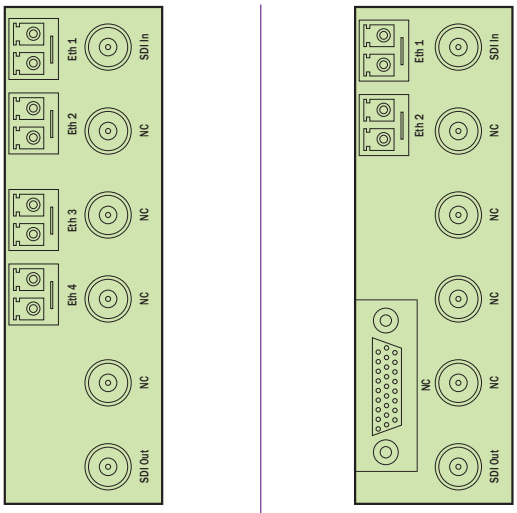
NB. Can be configured so all outputs come from single input



VR04 VR06

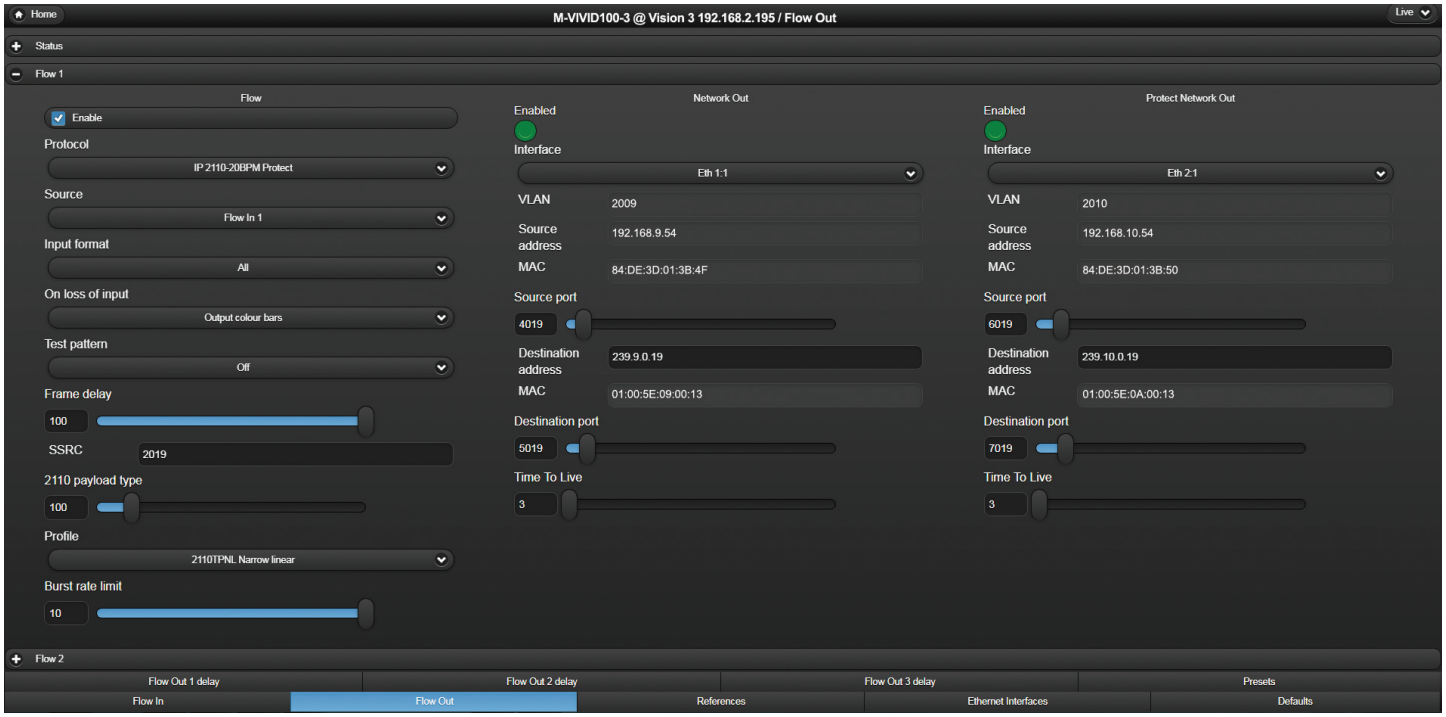
M-VIVID800





VR04 VR06

THE CONTROLS



Example of a VisionWeb Control GUI

SPECIFICATION

M-VIVID100-3, M-VIVID200-2, M-VIVID400-2 AND M-VIVID800 APPS RUNNING ON MARBLE-V1 MEDIA PROCESSOR

MECHANICAL

'Double slot' Vision card 96mm x 303mm (96mm x 325mm including finger pull)

Weight: 355g

Power consumption: 25 Watts, plus 1 Watt for each SFP+ fitted to MARBLE-V1

INPUTS AND OUTPUTS

Inputs can be IP and/or SDI

Outputs can be IP and/or SDI

Up to six BNCs for SDI (depending on version) and up to four fibre SFP+ 10GbE IP network interfaces. Choice of fibre modules: either 850nm multi-mode (for up to 300m) or 1310nm single-mode (for up to 10km)

Inputs and outputs can be mixture of ST 2022 and ST 2110. Video can be passed between ST 2022 and ST 2110, although audio and any other non-video data will be lost

IP only, SDI to IP and IP to SDI applications require at least one SFP+ transceiver option, up to a maximum of four. Use one SFP+ to put all signals together, use two SFP+ to have main and protect or multicast and unicast on separate network interfaces and use three or four SFP+ to further separate flows

SDI only applications do not require any SFP+

All apps use VR04 or VR06 frame rear modules. VR04 must be used when more than two SFP+ are fitted

SDI VIDEO INPUTS

(NB. Some or all of the inputs can be IP instead)

M-VIVID100-3: Up to three 3Gb/s or HD or SD SDI inputs

M-VIVID200-2 and M-VIVID400-2: Up to two 3Gb/s or HD or SD SDI inputs

M-VIVID800: Up to one 3Gb/s or HD or SD SDI input

270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A

3Gb/s cable equalisation up to 100m using Belden 1694A. HD cable equalisation up to 140m with Belden 1694A or equivalent (approx. 100m with Belden 8281). SD cable equalisation >250m Belden 8281 or equivalent

IP FLOW INPUTS

(NB. Some or all of the inputs can be SDI instead)

M-VIVID100-3: Up to three 3Gb/s or HD or SD video over IP inputs

M-VIVID200-2 and M-VIVID400-2: Up to two 3Gb/s or HD or SD video over IP inputs

M-VIVID800: Up to one 3Gb/s or HD or SD video over IP input

Packet distribution is not important as variable input buffer will compensate for any timing irregularities. Any traffic shaping option from ST 2110-21 can be used, or packets can come from a device which does not meet the shaping requirement of ST 2110-21

A protect input for SMPTE ST 2022-7 seamless protection switching or the equivalent protect input in ST 2110-20 can come from any of the 10GbE IP network interfaces. This protects the stream from lost packets by creating two streams of the same data using different routing to the destination. Flow analyser handles the analysis and reconstruction of the protected stream. Any IP input can come from any of the 10GbE IP network interfaces and can either be multicast or unicast

SDI VIDEO OUTPUTS

(NB. Some or all of the outputs can be IP instead)

M-VIVID100-3: Up to three 3Gb/s or HD or SD SDI outputs, one per channel

M-VIVID200-2 and M-VIVID400-2: Up to two 3Gb/s or HD or SD SDI outputs, one per channel

M-VIVID800: Up to one 3Gb/s or HD or SD SDI output

270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A

IP FLOW OUTPUTS

(NB. Some or all of the outputs can be SDI instead)

M-VIVID100-3: Up to three 3Gb/s or HD or SD video over IP outputs, one per channel

M-VIVID200-2 and M-VIVID400-2: Up to two 3Gb/s or HD or SD video over IP outputs, one per channel

continued overleaf...

M-VIVID800: Up to one 3Gb/s or HD or SD video over IP output

Any of the 10GbE IP network interfaces can be used to provide a protected output for SMPTE ST 2022-7 or ST 2110 seamless protection switching, which protects the stream from lost packets by creating two streams of the same data using different routing to the destination

Alternatively it is possible to have a unicast on some network interfaces and a multicast on others

VIDEO FORMATS SUPPORTED

The video formats supported are 625i, 525i, 720p50, 720p59.94, 720p60, 1080i50, 1080i59.94, 1080i60, 1080p23.98, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94, 1080p60, 1080PsF23.98, 1080PsF24, 1080PsF25, 1080PsF29.97, 1080PsF30, 2048x1080p23.98*, 2048x1080p24*, 2048x1080p25*, 2048x1080p29.97*, 2048x1080p30*, 2048x1080PsF23.98*, 2048x1080PsF24*, 2048x1080PsF25*, 2048x1080PsF29.97*, 2048x1080PsF30* (*= YUV 4:2:2 10 bit)

IP PROTOCOLS

Protocols supported on network interfaces: SMPTE ST 2022-6, SMPTE ST 2022-7, SMPTE ST 2110-20 (uncompressed video), SMPTE ST 2110-10 (system architecture and synchronisation), SMPTE ST 2110-21 (traffic shaping), IGMPv3, ARP, ICMP ping, IPv4, IEEE802.1q, VLAN, IEEE802.3-2012 (10G Ethernet)

Packing options of the ST 2110 output are selectable per flow between BPM and GPM (Block Packing Mode or General Packing Mode)

Packet shaping and distribution (compulsory in ST 2110 and optional in ST 2022) is selectable per flow between TPNL and TPN (narrow linear or narrow gapped packet distribution). There is also a mode for burst packet distribution with a control for the burst rate limit. This is for connecting between Crystal Vision and other compatible devices that allow for a reduced transmission delay

SMPTE ST 2022-7 and ST 2110 flow protection facilitates the dual stream output

ROUTING

M-VIVID200-2 and M-VIVID400-2:

There are two clean switches that can select between the two input flows for each of the output video delay function blocks

The default setting – which gives a dual channel video delay – is Flow 1 input to Flow 1 output and Flow 2 input to Flow 2 output

It is also possible to give both video delay function blocks the same input to get multiple outputs. The setting for this – which gives a single channel video delay with two outputs – would be Flow 1 input to both Flow 1 and Flow 2 outputs

An alternative application is to cleanly live switch the input of a single channel video delay without any output signal disturbance. The setting for this would be Flow 1 input to Flow 1 output cleanly followed by Flow 2 input to Flow 1 output. The second video delay function block can be used, but it is limited to using the inputs already reserved for the first video delay function block. This might be useful if it is required to have the same input delayed by different amounts by the two delay functions, in which case the setting would be Flow 1 input to Flow 1 and Flow 2 outputs cleanly followed by Flow 2 input to Flow 1 and Flow 2 outputs

M-VIVID100-3:

There are three clean switches that can be used to select between the three input flows for the three output video delay function blocks

The default setting – which gives a triple channel video delay – is Flow 1 input to Flow 1 output, Flow 2 input to Flow 2 output and Flow 3 input to Flow 3 output

It is also possible to give multiple video delay function blocks the same input to get multiple outputs or different delay settings of the same input. To get a single channel video delay with three outputs the setting would be Flow 1 input to Flow 1, Flow 2 and Flow 3 outputs. To get a dual channel video delay with two outputs of the first channel and one output of another, the setting could be Flow 1 input to Flow 1 and Flow 2 outputs and Flow 3 input to Flow 3 output. An alternative application is to cleanly live switch the input of one or more of the video delays without any signal disturbance. However without spare inputs, clean switching can only be carried out if one or more of the outputs is either not used or is common to one of the other outputs. For example if the first two delays were using the same input the setting for this would be Flow 1 input to Flow 1 and Flow 2 output cleanly followed by Flow 2 input to Flow 1 and Flow 2 output

M-VIVID100-3 DELAY

Delay adjustable in steps of frames

Each channel has its own delay control

Minimum delay: 8ms

Maximum delay: 100 frames per channel, which is:

- 4.16 seconds (1080p23.98, 1080p24, 1080PsF23.98, 1080PsF24, 2048x1080p23.98, 2048x1080p24, 2048x1080PsF23.98, 2048x1080PsF24)
- 4 seconds (625i, 1080i50, 1080p25, 1080PsF25, 2048x1080p25, 2048x1080PsF25)
- 3.33 seconds (525i, 1080i59.94, 1080i60, 1080p29.97, 1080p30, 1080PsF30, 2048x1080p30, 2048x1080PsF30, 2048x1080p29.97, 2048x1080PsF29.97)
- 2 seconds (720p50, 1080p50)
- 1.66 seconds (720p59.94, 720p60, 1080p59.94, 1080p60, 1080PsF29.97)

M-VIVID200-2 DELAY

Delay adjustable in steps of frames

Each channel has its own delay control

Minimum delay: 8ms

Maximum delay: 200 frames per channel, which is:

- 8.33 seconds (1080p23.98, 1080p24, 1080PsF23.98, 1080PsF24, 2048x1080p23.98, 2048x1080p24, 2048x1080PsF23.98, 2048x1080PsF24)
- 8 seconds (625i, 1080i50, 1080p25, 1080PsF25, 2048x1080p25, 2048x1080PsF25)
- 6.67 seconds (525i, 1080i59.94, 1080i60, 1080p29.97, 1080p30, 1080PsF30, 2048x1080p30, 2048x1080PsF30, 2048x1080p29.97, 2048x1080PsF29.97)
- 4 seconds (720p50, 1080p50)
- 3.33 seconds (720p59.94, 720p60, 1080p59.94, 1080p60, 1080PsF29.97)

M-VIVID400-2 DELAY

Delay adjustable in steps of frames

Each channel has its own delay control

Minimum delay: 8ms

Maximum delay: 400 frames per channel, which is:

- 16.67 seconds (1080p23.98, 1080p24, 1080PsF23.98, 1080PsF24, 2048x1080p23.98, 2048x1080p24, 2048x1080PsF23.98, 2048x1080PsF24)
- 16 seconds (625i, 1080i50, 1080p25, 1080PsF25, 2048x1080p25, 2048x1080PsF25)
- 13.33 seconds (525i, 1080i59.94, 1080i60, 1080p29.97, 1080p30, 1080PsF30, 2048x1080p30, 2048x1080PsF30, 2048x1080p29.97, 2048x1080PsF29.97)
- 8 seconds (720p50, 1080p50)
- 6.67 seconds (720p59.94, 720p60, 1080p59.94, 1080p60, 1080PsF29.97)

M-VIVID800 DELAY

Delay adjustable in steps of frames

Minimum delay: 8ms

Maximum delay: 800 frames, which is:

- 33.33 seconds (1080p23.98, 1080p24, 1080PsF23.98, 1080PsF24, 2048x1080p23.98, 2048x1080p24, 2048x1080PsF23.98, 2048x1080PsF24)
- 32 seconds (625i, 1080i50, 1080p25, 1080PsF25, 2048x1080p25, 2048x1080PsF25)
- 26.67 seconds (525i, 1080i59.94, 1080i60, 1080p29.97, 1080p30, 1080PsF30, 2048x1080p30, 2048x1080PsF30, 2048x1080p29.97, 2048x1080PsF29.97)

continued overleaf...

- 16 seconds (720p50, 1080p50)
- 13.33 seconds (720p59.94, 720p60, 1080p59.94, 1080p60, 1080PsF29.97)

LIVE DELAY ADJUSTMENTS

Delay adjustments can be made live. The apps apply the adjustments slowly over time, with small delay adjustments therefore going virtually unnoticed. Increasing the delay slows down the video until the delay is correct, while reducing the delay speeds up the video until the delay is correct

VIDEO LOSS CONTROLS

The video loss/format mismatch controls allow the user to select what will happen to an output flow in the event that the input is lost or the video format does not match the specified format. The user can specify to freeze the last good frame or show a black or blue screen or 100% colour bars (with or without an initial delay of three seconds). No output can also be selected. This is independently adjustable on each flow

TEST PATTERNS

The test pattern controls allow the user to override an input and force the output flow to output a test pattern including Colour Bars, Blue, Black, EqCheck, PllCheck, Pluge, Checkfield, Grey Horizontal Steps, Grey Vertical Steps, Luma Horizontal Ramp, Luma Vertical Ramp, Cycle Colour or Checker Board, or to freeze the picture. This is independently adjustable on each flow

SYNCHRONISER AND TIMING ADJUSTMENTS

Video sources are synchronised to common reference timing source

Choice of timing options:

- PTP (SMPTE ST 2059-2) master and backup, via 10GbE IP network interface
- Two tri-level syncs or analogue Black and Burst references (Reference 1 and Reference 2), connected via the Vision 3 frame
- SDI video input, where available (defaults to SDI 1)

Chosen reference is the global reference source for all inputs and outputs

There are up to ten options for the reference selection, selectable via VisionWeb. The hierarchy runs from left to right – should the timing source at the top of the list become missing or invalid, the app will move down the list until it finds a valid timing reference source. When used with IP inputs, the SDI reference option is not applicable and therefore the reference will move to the next valid timing source:

- PTP>Ref1>Ref2>Hold
- PTP>Ref1>Hold
- PTP>Ref2>Ref1>Hold
- PTP>Ref2>Hold
- PTP>Hold
- PTP>Ref1>Ref2>SDI>Hold
- PTP>Ref1>SDI>Hold
- PTP>Ref2>Ref1>SDI>Hold
- PTP>Ref2>SDI>Hold
- PTP>SDI>Hold

("PTP" means PTP Master>PTP Backup. "SDI" means SDI1>SDI2>SDI3>SDI4>SDI5>SDI6, dependent on number of SDI available. "Hold" means it will hold the timing of the last good reference)

When using video reference, video inputs can be different formats but only inputs with the same frame rate as reference video will be locked to that reference. Input signals of same frame rate as reference will be locked together and locked to external reference. Inputs with a differing frame rate will be locked and maintain timing with no drift, but their sync point will be undefined (all same frame rate signals will, however, be locked to each other)

When using PTP reference, input sources of different format and/or frame rate will all be correctly locked to the PTP reference

PTP timing reference should be used when there is a ST 2110-20 output to ensure the RTP timestamp is related to the time of day. However without a PTP reference, a valid ST 2110-20 signal will still be generated using a free running RTP timestamp

When Auto relock enable is selected, the card will automatically relock when a lost reference is restored. Selecting Force lock (with Auto relock disabled) will force the synchroniser to relock after a reference is restored, and can be activated at a non-critical time to avoid video disturbance

Output timing can be fully adjusted with respect to the reference using three time-based controls: 0 - 42ms adjustable in 0.1ms steps, 0 - 100us adjustable in 1us steps and 0 - 1us adjustable in 5ns steps. Sub frame timing alignment to chosen reference is global to all outputs

ANCILLARY DATA

All ancillary data (including audio) is passed from SDI or ST 2022 input to SDI or ST 2022 output. When ST 2110 input or output is selected, all ancillary data is discarded

LED INDICATION OF:

Power okay

PRESETS

The current app settings can be saved in one of 16 locations to be recalled as required

SIGNAL MONITORING

Comprehensive SDI, IP and PTP monitoring information is available and can be used to generate SNMP traps

Checks can be performed on the following video and audio parameters:

- Video present and time present
- Video format
- Video black
- Video frozen
- Video error
- Audio group 1 present
- Audio group 2 present
- Audio group 3 present
- Audio group 4 present

Black or frozen video will be indicated by an amber LED. This alert can be delayed by 1-120 seconds to prevent false warnings during brief video pauses

The following IP parameters are monitored for input flows:

- Network error
- Packet loss
- Duplicated packets
- Packet delay variation. Shown as the skew (difference in time of packet arrival) between the main and protected input, and also as the min and max nano second gap between the packets on each input

The Ethernet interfaces are monitored for:

- Count of packets ignored by the app (general network traffic non-media packets, which do not require processing by the app). Jumps in 100 step increments indicate network traffic flood
- Ignored multicast packets. LED indicates multicast traffic not requested by the app is present on the Ethernet Interface, indicating incorrectly configured IGMP at the network switch

References are monitored for:

- Reference 1 and 2 present and time present
- Reference 1 and 2 format
- PTP master and backup clock present and time present
- PTP statistics – network delay, delay variation, reference offset and sync period

REMOTE CONTROL

Software:

VisionWeb Control is available via the web server on the frame and allows monitoring using a standard web browser on a PC or tablet

SNMP monitoring and control available as standard

Control using ASCII and JSON protocols

Hardware:

Control from integrated control panel on Vision 3 frame

Control from VisionPanel 3U remote panel

SBB-4 smart button box connects to the frame via Ethernet and provides four programmable LCD switches (which are configured for each order). The SBB-4 uses information from VisionWeb for settings. Uses Power over Ethernet so must be used with PoE enabled switch

ORDERING INFORMATION

M-VIVID100-3	Triple channel IP/SDI variable video delay with up to 100 frames of delay per channel and framestore synchroniser. Supports 3G/HD/SD and ST 2022-6, ST 2022-7 and ST 2110-20 protocols. Software app which runs on the MARBLE-V1 media processor
M-VIVID200-2	Dual channel IP/SDI variable video delay with up to 200 frames of delay per channel and framestore synchroniser. Supports 3G/HD/SD and ST 2022-6, ST 2022-7 and ST 2110-20 protocols. Software app which runs on the MARBLE-V1 media processor
M-VIVID400-2	Dual channel IP/SDI variable video delay with up to 400 frames of delay per channel and framestore synchroniser. Supports 3G/HD/SD and ST 2022-6, ST 2022-7 and ST 2110-20 protocols. Software app which runs on the MARBLE-V1 media processor (larger memory version)
M-VIVID800	Single channel IP/SDI variable video delay with up to 800 frames of delay and framestore synchroniser. Supports 3G/HD/SD and ST 2022-6, ST 2022-7 and ST 2110-20 protocols. Software app which runs on the MARBLE-V1 media processor (larger memory version)
MARBLE-V1	Media processor hardware which runs Crystal Vision's software apps. Housed in the Vision frames, with up to ten MARBLE-V1 in 3U. Requires between one and four 850nm or 1310nm SFP+ transceiver modules when used with M-VIVID app and IP signals
SFP+10G-850MM	Multi-mode 850nm 10GbE SFP+ transceiver module for MARBLE-V1 media processor – fit between one and four when M-VIVID app used with IP signals
SFP+10G-1310SM	Single-mode 1310nm 10GbE SFP+ transceiver module for MARBLE-V1 media processor – fit between one and four when M-VIVID app used with IP signals
App support	Purchase with M-VIVID app to get software upgrades for changes in standards, new features and bug fixes plus telephone and e-mail operational support (with support for the first year included for free)
Vision 3	3U frame with integrated control panel and smart CPU for up to 20 Crystal Vision cards from the Vision range
VR04	Two slot frame rear module. Allows ten M-VIVID in 3U. Inputs and outputs can be any mixture of SDI via BNCs and IP via up to four 10GbE network interfaces and can be changed from the default I/O configuration if required. When used with M-VIVID100-3, gives access to three SDI (3G/HD/SD) or IP inputs and one SDI or IP output per channel. When used with M-VIVID200-2 and M-VIVID400-2, gives access to two SDI (3G/HD/SD) or IP inputs and one SDI or IP output per channel. When used with M-VIVID800, gives access to one SDI (3G/HD/SD) or IP input and one SDI or IP output
VR06	Two slot frame rear module. Allows ten M-VIVID in 3U. Inputs and outputs can be any mixture of SDI via BNCs and IP via up to two 10GbE network interfaces and can be changed from the default I/O configuration if required. When used with M-VIVID100-3, gives access to three SDI (3G/HD/SD) or IP inputs and one SDI or IP output per channel. When used with M-VIVID200-2 and M-VIVID400-2, gives access to two SDI (3G/HD/SD) or IP inputs and one SDI or IP output per channel. When used with M-VIVID800, gives access to one SDI (3G/HD/SD) or IP input and one SDI or IP output
VisionPanel	3U Ethernet remote control panel with touch screen
SBB-4	Smart button box with four programmable LCD switches. It is powered by PoE (Power over Ethernet) and therefore needs to be connected to a PoE enabled switch
VisionWeb Control	VisionWeb web browser control included within frame software
SNMP	SNMP monitoring and control included in frame

Performance and features are subject to change. Figures given are typical measured values. M-VIVIDP0720

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