

4K modular multi-window video processor



OVERVIEW

C3-540 CORIOmaster is a powerful, efficient approach to building large video display systems. Multiple video windows can be positioned on LED, display based videowalls or projector edge blends, displaying any of the sources connected to CORIOmaster. Windows can be visually “transitioned” into position, resized or rotated to any proportion allowing designers to achieve striking visual effects. Each system can support up to 4 separate video canvasses.

CORIOgrapher v2, the control software for the CORIOmaster series of processors, is a simple, easy to use design interface that enables window and source positioning and transition effects. This dynamic feature is easily managed through presets in CORIOgrapher or by simple commands executed by third party control systems. 50 presets can be saved permanently in the system.

NEW FEATURES

- ◆ Secure command interface
- ◆ REST API
- ◆ Real-time status feedback through events
- ◆ H.265 4K/30 Streaming Media & 4K Playback Input Module
- ◆ IP decoding Low latency mode (<250 ms) using the Magenta-100 Encoder
- ◆ Audio support
- ◆ Audio module

KEY FEATURES

- ◆ Patented CORIO®3 videowall processing technology
- ◆ Manage up to 4 videowalls
- ◆ Uses CORIOgrapher v2; simple powerful software interface
- ◆ Live dashboard to switch presets and window sources
- ◆ 4K input & output modules
- ◆ Create custom output resolutions
- ◆ Automatically discover devices on the network
- ◆ Outputs rotated in 1° increments
- ◆ Combination of different size and resolution of displays can be used
- ◆ Customizable bezel compensation
- ◆ Multi-Edge blending of projectors
- ◆ Versatile DVI Inputs: (HDMI/DVI/CV/YC/RGB/YPbPr)
- ◆ DVI-I Outputs: (HDMI/DVI/RGB/YPbPr)
- ◆ 4K HDBaseT inputs
- ◆ HDBaseT outputs
- ◆ SDI inputs and outputs: SD/HD-SDI/3G-SDI to 1080p60
- ◆ High resolution analog inputs/outputs
- ◆ DVI/HDMI: PC to 1920x1200, HDTV to 1080p/60 w/ EDID
- ◆ HDMI input & output with HDCP handling
- ◆ Up-down-cross conversion
- ◆ Custom resolution editor with resolutions automatically detected on inputs & selectable on the outputs
- ◆ Simple serial control protocol
- ◆ Command Line Interface – Third party control
- ◆ AMX & Crestron modules available
- ◆ 4RU frame size
- ◆ Modularity provides flexible I/O

OPTIONS

- ◆ Redundant hot-swappable power supplies
- ◆ Universal DVI adapters
- ◆ Onsite system commissioning

Part Numbers

C3-540	4RU CORIOmaster with 16 slots available for video I/O modules. Interfaces for R2-232 & IP. Single power supply
CM-HDMI-4K-2IN	Dual 4K HDMI input module
CM-AVIP-IN-1USB-1ETH	Dual 4K Streaming & Media input module
CM-HDBT-2IN-1ETH	Dual 4K HDBaseT input module
CM-DVIU-2IN	Dual DVI-U input module
CM-3GSDI-2IN	3G-SDI input module
CM-HDSI-4IN	HD-SDI input module
CM-HDMI-4K-SC-1OUT	4K HDMI scaled output module
CM-HDMI-2K-SC-4OUT	Quad HDMI scaled output module
CM-HDBT-SC-2OUT	Dual HDBaseT output module
CM-DVI-I-SC-2OUT	Dual DVI Scaled output module
CM-3GSDI-SC-2OUT	Dual 3G-SDI output module
CM-AUD-2IN-4OUT	S/PDIF and Analog Audio module (C3-540/C3-510 only)
CM-HDMI-SC-4OUT	Quad HDMI scaled output module (C3-540 only)

CM-C3-540-CPU-HTTPS	Secure communications CPU module
ZDH2050	Composite video adaptor DVI-I
ZDB2048	YC (S-Video) adapter DVI-I male to 2-BNC female
ZDS2046	YC (S-Video) adapter DVI-I male to 4-Pin mini-din female
ZDH2040	Analog PC adapter DVI-I male to HD-15 female
ZDB2038	1.5' (0.5m) analog RGBHV adapter Cable DVI-I male to 5-BNC female
ZDB2044	1.5' (0.5m) YPbPr/YUV adapter cable DVI-I male to 3-BNC female
ZDB2042	YPbPr/YUV adapter DVI-I male to 3-RCA female
CMD1941	HDMI adapter DVI-I male to HDMI female
Magenta Encoder-100	Single channel IP encoder
CM-4RPS	Optional dual redundant, hot swappable power supply (C3-540 only)
FE-1	Onsite system commissioning

Modular Flexibility

CORIOmaster can accommodate numerous I/O configurations in the 16 universal video slots available; when inserted, the modules are automatically recognized & configured. This flexibility allows end user configurations to be based on their own needs.



Redundant PSU



S/PDIF and Analog Audio (C-540/C3-510 only)



DVI-I Output with scaling



3G/HD/SD-SDI Input



DVI-U Input



HDBaseT Output with Scaling



3G/HD/SD-SDI Output



4K Streaming Media



HDBaseT Input



4K Output with Scaling



Quad HDMI scaled output



HD/SD-SDI Input



4K Input

NEW FEATURES

Secure Command Interface

Secure Communication mode – The latest CORIO**master** release provides a mode to encrypt all networked based communication through AES128 encryption to provide private communication in mission critical applications where network security and authentication is essential.

REST API / WebSocket - Based on industry standard schema, CORIO**master** supports REST API providing multi-user communication to device. Integrators can now subscribe to a growing range of events to provide real time feedback from CORIO**master** (such as: HDMI handshake, lost source, USB stick removed, etc). These events can be used by a control system to automatically monitor the performance and events of the videowall and respond accordingly.

Control

Multiple control points - Using our REST API up to four users can now control a single CORIO**master** chassis simultaneously making programming, control and fault finding a dream. In addition to control via CORIO**grapher**, simultaneous control is possible using the CORIO**master** app (IOS and Android) and by a third-party control system using our real-time API interface.

CORIO**grapher** login profiles – System administrators can set different levels of control for up to four user profiles for Power User and User access control.

Emergency cut/mute features – Cut individual canvasses to black and mute audio or cut all outputs to black and mute.

Audio management

Audio can be passed through the system from source to display. Alternatively, audio can be de-embedded, cross converted and re-embedded on another source for each of your four canvasses. Input and output volume control together with audio mute gives full control.

New Modules

Quad HDMI output module -The Quad HDMI scaled output module allows you to produce up to 56 1080p outputs with your CORIO**master** C3-540. Now, you can create enormous video walls, projector edge-blends, and LED installations.

S/PDIF and analog audio module - This module slots into a data slot (Slot 18) on the rear of the CORIO**master** and accepts discrete analog and digital inputs and embeds them into all audio supporting video outputs (HDMI/SDI/HDBaseT/DVI-I) or routed to the discrete analog or digital outputs in this module.

Streaming Media & 4K Playback Module

Higher bandwidth support – A doubling of the module bandwidth to 100mbs means you can de-encode two network streams up to 4k 30 @ 50mbs in to just 1 slot. Increased bandwidth is also available for media playback up to 80mbs on a single channel for increased quality content and interoperability.

H.265 Support – H.265 streams offer higher quality with file sizes of around half that of a H.264 stream.

Low Latency Mode - Low latency mode delivers less than 300ms (glass to glass) video latency for most demanding applications in conjunction with the Magenta Encoder-100.

SPECIFICATIONS

Video Processing Power	
Parallel Processing	Yes
Architecture	Yes
CORIO3 Video Processing	Yes
Real Time Video Quality	Yes
Up/Down/Cross Conversion	Yes
Number of Video walls	4 (C3-503, 2 Video Walls)
Display Size Compensation	Yes, different sizes in video walls
Output Rotation	Yes for any outputs and windows
Projector Edge Blending	Yes
HDCP Key Handling	Yes
Computer Input (C3-540)	
Digital DVI	Up to 28 via Universal DVI (HDMI & HDCP compatible)
Analog	Up to 28 via Universal DVI
Analog Format	RGBHV, RGBS, RGsB, YPbPr
Analog Sync	TTL Level, 10KΩ, Pos or Neg
RGB Level Range	0.5-2.0 Vp-p
Scan Rate Detection	Automatic
Analog Signals	PC to 1920x1080, HD to 1080p60
DVI Signals	PC to 1920x1200, HD to 1080p60
Max Horizontal Scan Rate	Yes
Computer Outputs (C3-540)	
DVI Signals	Up to 28 via DVI-I (HDMI & HDCP compatible)
Analog	Up to 28 via DVI-I
Analog format	RGBHV, RGBS, RGsB, YPbPr
R-G-B Level	0.7 Vp-p
DVI Signals w/EDID	PC to 1920x1200, HD to 1080p60
Analog Signals	PC to 1920x1080, HD to 1080p60
Vertical Refresh Rate	Any to 250Hz
Size and Positionz	User Adjustable
Settings Memory	Non-Volatile
Conversion Technology	Proprietary – CORIO®3
Color	RGB/DVI/HDMI/YPbPr 24-bit 4:4:4, SDI 20-bit 4:2:2
Max. Sampling Rate	162MHz
Firmware Memory	Flash, Upgradeable via download
Video Comb Filter	Adaptive
Video Adjustments	Contrast, Brightness, RGB Gamma
HD Video Resolutions supported (HDMI, DVI, YPbPr, SDI, & HDBaseT)	
720p (1280x720) *	23.98, 24, 25, 29.97, 30, 50, 59.94, 60Hz
1035i (1920x1035)	59.94, 60Hz
1080i (1920x1080)	50, 59.94, 60Hz
1080p (1920x1080)	23.98, 24, 25, 29.97, 30Hz, 50, 59.94, 60Hz
4K Video Input Resolutions supported (via HDMI & HDBaseT)	
3840x2160: 4:4:4	23.98/24/25/29.97/30Hz 8-bit
3840x2160: 4:2:0	50/59.94/60Hz 8-bit
4096x2160: 4:2:0	50/59.94/60Hz 8-bit
4K Video Output Resolutions supported (via HDMI)	
3840x2160: 4:4:4	23.98/24/25/29.97/30Hz 8-bit
Video Inputs (C3-540)	
Television Standards	NTSC, PAL
Composite Video	Up to 28 via DVI
YC (S-Video)	Up to 28 via DVI
YUV /YPbPr	Up to 28 via DVI
SD/HD-SDI	Up to 56 via BNC
SD/HD/3G-SDI	Up to 28 via BNC
4K/30	Up to 28 via HDMI & HDBaseT

AV over IP (up to 4 module cards)	
Interface	Up to 4x 1 GbE Ethernet Port
IP Video Decoding	H.264 (CBP, Main, High), H.265/HEVC1 (Main)
IP Bit Rates	Up to 8x streams up to 25Mbps per stream
Colour Depth	4:2:0, 4:2:2
Supported IP Resolutions	Configurable to 1920x1080p60
Unicast Streams	RTSP, RTMP, HTTP, MPEG-TS
Multicast Streams	RTSP, MPEG-TS
Media/Images	
Interfaces	Up to 4x USB3.0, Internal Storage, Network
Video Codecs	H.264 (CBP, Main, High), H.265/HEVC1 (Main)
Video Formats	mp4, .mov, .mkv, .m4v, .ts, .mts, .m2ts, .mt2
Playback Bit Rates	Single stream to 100Mbps (per module), Dual Streams to 40Mbps (per module)
File Playback Resolutions Supported	
Up to 3480x2160@30fps	Up to 4
Up to 1080p60@60fps	Up to 8
Up to 7680 x 4320	Still images2
Media Handling	
External	Up to 4x USB 3.0 interface
Supported devices	Flash file systems FAT, FAT32, ext3, ext4, NTFS
Internal	High-speed storage up 128GB per module
Remote	File transfer supported3
Video Outputs (C3-540)	
YUV /YPbPr	Up to 28 via DVI
SD/HD/3G-SDI	Up to 28 via BNC
HDBaseT	Up to 28 via RJ45
4K	Up to 14 via HDMI
3G/HD/SD-SDI	
SMPTE259M-C (SD-SDI Video)	270Mbps < 0.1UI jitter 525/625Line
SMPTE292M (HD-SDI Video)	1.485/1.4835Gbps < 0.2 UI jitter 720p, 1035i, 1080i, 1080p
SMPTE424M (3G-SDI Video)	2.97/2.967Gbps < 0.3 UI jitter 1080p 60/59.94
Control Methods	
RS-232	via D9 Female Connector
IP Interface	RJ45 Connector for both HTTP(s)
Warranty	
Limited Warranty	5 Years Parts and Labor
Regulatory Compliance	
Main unit	FCC, CE, RoHS, ULc
Mechanical (C3-540)	
Size (H x W x D)	7.0" x 19.0" x 13.1" 178 x 482 x 334mm
Weight (Net)	Approx. 15Kg (33 lbs) (with redundant PSU option)
Environmental (C3-540)	
Operating Temperature	0° to +40°C (+32° to +104°F)
Operating Humidity	10% to 85%, Non-condensing
Storage Temperature	-10° to +70° C (+14° to +158° F)
Storage Humidity	10% to 85%, Non-condensing
MTBF	Approximately 50,000 hours
BTU	1024 BTU/hr
Fan Noise	0-35°C = 37.7dB(A) Min / 40°C = 50.6dB(A) Max
Power (C3-540 & C3-510)	
Internal Power Supply	110v to 240v auto-detecting

Specifications subject to change

²Images will be rendered to 4K

³Future release – not fully visible

* DVI Input module only supports 720p frame rates 50,59.94, & 60Hz

¹ HDCP protected sources are not allowed to be converted in this way.

Secure Communication

CORIOmaster can now support secure communications** for protocols to provide an encrypted connection for controlling CORIOmaster. By default, the CORIOmaster communication is unsecure and needs to be enabled through CORIOgrapher. Whilst unsecured API control can be accessed via REST API (port 80) or CLI (port 10001). When secure communication is enabled port 10001 is disabled. Events can be used to monitor unsanctioned activity (connections to device for example)

TLS/SSL	TLS 1.2 protocol
Cipher suite	MBEDTLS_TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA & MBEDTLS_TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 SECP256R1 curve is used for the ECDHE
Key exchange	Elliptic curve key exchange with AES128 encryption and SHA256 for message authentication
HTTPS certificate	Default certificate is dynamically generated. It is valid for 2 years and 1 day and is re-created on every boot
Custom certificate	User can upload, view details of active and user certificate in CORIOgrapher It must be in a PKCS12 format and contain a certificate and a private key (can also have a CA certificate)

REST Interface

Will support secure or unsecure communication between client and CORIOmaster, facilitating multiple connections to CORIOmaster.

HTTP version	HTTP/1.1
HTTP version	http(s)://{Host}/api/v1
Documented using	Swagger 3.0 specification
Content type	application/json
Detailed REST spec	www.api.tvone.com
Number connections	3 (in addition to CORIOgrapher)

Websockets

Websockets can be used to subscribe to events

Base path	ws(s)://{Host}/ws/v1/
Number connections	3 (in addition to CORIOgrapher)
Detailed events spec	www.api.tvone.com

Real Time Clock

- ◆ User can now set the correct time which will persist over reboot
- ◆ It may lose time if device is turned off for extended periods of time
- ◆ An NTP service is now available to keep the clock up to date