The top half of the page features a complex, abstract background of overlapping, semi-transparent blue triangles and polygons in various shades of blue, creating a dynamic, crystalline effect. This pattern transitions into a white background at the bottom.

Installation and Setup Guide
020-102423-02

Velvet LED Display System

CorePlus Series (Remote Power)

CHRISTIE®

NOTICES

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- a. Problems or damage occurring during shipment, in either direction.
- b. Problems or damage caused by combination of a product with non-Christie equipment, such as distribution systems, cameras, DVD players, etc., or use of a product with any non-Christie interface device.
- c. Problems or damage caused by misuse, improper power source, accident, fire, flood, lightning, earthquake, or other natural disaster.
- d. Problems or damage caused by improper installation/alignment, or by equipment modification, if by other than Christie service personnel or a Christie authorized repair service provider.
- e. Use of third party product enclosures for environmental protection during outside use must be approved by Christie.
- f. Problems or damage caused by use of a product on a motion platform or other movable device where such product has not been designed, modified or approved by Christie for such use.
- g. Except where the product is designed for outdoor use, problems or damage caused by use of the product outdoors unless such product is protected from precipitation or other adverse weather or environmental conditions and the ambient temperature is within the recommended ambient temperature set forth in the specifications for such product.
- h. Defects caused by normal wear and tear or otherwise due to normal aging of a product.

The warranty does not apply to any product where the serial number has been removed or obliterated. The warranty also does not apply to any product sold by a reseller to an end user outside of the country where the reseller is located unless (i) Christie has an office in the country where the end user is located or (ii) the required international warranty fee has been paid.

The warranty does not obligate Christie to provide any on site warranty service at the product site location.

PREVENTATIVE MAINTENANCE

Preventative maintenance is an important part of the continued and proper operation of your product. Failure to perform maintenance as required, and in accordance with the maintenance schedule specified by Christie, will void the warranty.


REGULATORY

The product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the product is operated in a commercial environment. The product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of the product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

CAN ICES-3 (A) / NMB-3 (A)

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ENVIRONMENTAL

The product is designed and manufactured with high-quality materials and components that can be recycled and reused. This symbol  means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from regular waste. Please dispose of the product appropriately and according to local regulations. In the European Union, there are separate collection systems for used electrical and electronic products. Please help us to conserve the environment we live in!

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Product overview

Velvet CorePlus (Remote Power) LED Display System tiles are modular, high-quality image display units that can be configured to achieve an HD display, depending on the pixel pitch of the tile being installed.

Important safeguards

To prevent personal injury and to protect the device from damage, read and follow these safety precautions.

General safety precautions

To prevent personal injury and to protect the device from damage, read and follow these safety precautions.



Warning! If not avoided, the following could result in death or serious injury.

- Observe all electrostatic precautions. Use a grounded wrist strap and insulated tools when handling, servicing, or cleaning electronic assemblies.
- A minimum of two people or appropriately rated lift equipment is required to safely lift, install, or move the product.
- A certified electrician must be present during installation to ensure the installation meets the local electrical code.
- Motors and fans may start without warning.



Caution! If not avoided, the following could result in minor or moderate injury.

- FIRE HAZARD! Always connect the Neutrik PowerCON cable to the device before connecting it to the wall. The PowerCON connector is not intended to be hot pluggable.
- SHOCK HAZARD! Power supply uses double pole/neutral fusing. Disconnect all power sources before opening the product.



Notice. If not avoided, the following could result in property damage.

- Always wear clean, lint-free gloves when handling the product.

Power precautions

Ensure all power precautions are understood before installing the product.



Warning! If not avoided, the following could result in death or serious injury.

- After the replacement of the power supply, hi-pot and ground/earth bond tests must be performed. Only Christie qualified technicians who are familiar with the necessary precautions can perform these tests.
- A certified electrician must be present during installation to ensure the installation meets the local electrical code.
- Always connect the ground or earth first to reduce shock hazard.
- Do not return the current through the ground or earth.
- SHOCK HAZARD! The line cord has a maximum power carrying capability. For the maximum number of tiles that may be connected per daisy chain when connecting to the power supply, refer to the product specifications.
- SHOCK HAZARD! A permanent single-phase connection must be installed between the LED tile system and the AC power supply.
- FIRE AND SHOCK HAZARD! Do not operate the system unless certified power connections, providing the recommended voltage, are used.
- HIGH TOUCH CURRENT HAZARD! To ensure reliable grounding, the power connection must be made by using an industrial plug (pluggable type B), or be provided by a permanent connection.
- A 13-20 A double pole mains circuit breaker, certified for the applicable local regulations, is required. It must be part of the building installation and easily accessible.
- Do not use a wall breaker greater than 20 A. This could result in severe damage to the tile system in the event of a failure.



Caution! If not avoided, the following could result in minor or moderate injury.

- SHOCK HAZARD! The line cord has a maximum power carrying capability. For the maximum number of tiles that may be connected per daisy chain when connecting to the power supply, refer to the product specifications.
- SHOCK HAZARD! Only use the AC power cord provided with the product or recommended by Christie.
- TRIP OR FIRE HAZARD! Position all cables where they cannot contact hot surfaces, be pulled, be tripped over, or damaged by persons walking on or objects rolling over the cables.
- FIRE HAZARD! Do not use a power cord, harness, or cable that appears damaged.
- FIRE OR SHOCK HAZARD! Do not overload power outlets and extension cords.
- Only Christie qualified technicians are permitted to open product enclosures.

Remote Power Supply Rack Shelf safety warnings

To prevent personal injury and to protect the device from damage, read and follow these safety precautions.



Warning! If not avoided, the following could result in death or serious injury.

- Only Christie qualified technicians are permitted to open product enclosures.
- This product must be installed within a restricted access location not accessible by the general public.
- SHOCK HAZARD! Disconnect the product from AC before installing, moving, servicing, cleaning, removing components, or opening any enclosure.
- A minimum of two people or appropriately rated lift equipment is required to safely lift, install, or move the product.
- A certified electrician must be present during installation to ensure the installation meets the local electrical code.
- Install the product near an easily accessible AC receptacle.
- Hazardous voltages are present at power system inputs. The DC output, though not dangerous in voltage, has a high short-circuit current capacity that may cause severe burns and electrical arcing.
- SHOCK HAZARD! Power supply uses double pole/neutral fusing. Disconnect all power sources before opening the product.
- Fuses are present in active and neutral lines of the Remote Power Supply Rack Shelf.
F1—Rated 15 A, 250 VAC
F2—Rated 15 A, 250 VAC
- Before working with live power systems, remove all metallic jewelry (such as watches, rings, metal rimmed glasses, or necklaces) and wear safety glasses with side shields at all times during the installation.
- Motors and fans may start without warning.
- Use insulated hand tools while working on live power systems.

Terminology

Learn about the components of the LED display system.

Term	Definition
Tile	A cabinet that contains several LED modules.
Array	A group of connected tiles that form a larger display.
Controller	Controls the LED display system array and video input source. Sometimes referred to as the control unit.
Pixel	A group of one red, one green, and one blue dot.
Subpixel	A pixel is comprised of three subpixels, one for each color: red, green, and blue. Each subpixel in LED display technology is an LED chip.
Pixel pitch	Specifies the distance from the center of one pixel to the center of the next pixel.

Term	Definition
SMD package size	A technical supplier specification related to the pixel size, and denotes the size of the surface-mounted diode (SMD) itself.
Fill factor	Indicates the ratio between the area covered by pixels and the area not covered by pixels.

Product documentation

For installation, setup, and user information, see the product documentation available on the Christie website. Read all instructions before using or servicing this product.

1. Access the documentation from the Christie website:
 - Go to this URL: <http://bit.ly/2qXBAAdX> or <https://www.christiedigital.com/en-us/digital-signage/products/led-tiles/coreplus-series>.
 - Scan the QR code using a QR code reader app on a smartphone or tablet.



2. On the product page, select the model and switch to the **Downloads** tab.

Related documentation

Additional information on the Velvet CorePlus (Remote Power) LED Display System is available in the following documents.

- *CorePlus (Remote Power) Product Safety Guide (P/N: 020-102591-XX)*
- *CorePlus (Remote Power) Specifications Guide (P/N: 020-102802-XX)*
- *E500 User Guide (P/N: 020-102222-XX)*
- *E600 User Guide (P/N: 020-102717-XX)*
- *E500 LED Display Controller Serial Commands Technical Reference (P/N: 020-102458-XX)*

Technical support

Technical support for Christie products is available at:

- North and South America: +1-800-221-8025 or Support.Americas@christiedigital.com
- Europe, Middle East, and Africa: +44 (0) 1189 778111 or Support.EMEA@christiedigital.com
- Asia Pacific: +65 6877-8737 or Support.APAC@christiedigital.com

Required tools

Make sure the following tools are available during the installation.

Tile installation tools and hardware

- Torque driver
- M6 screwdriver
- 8 mm wrench
- LED module removal tool (P/N: 003-006540-XX)
- Mounting block template (P/N: 003-006560-XX and 003-006563-XX)
- Screws appropriate for the mounting surface. These screws are not provided by Christie.

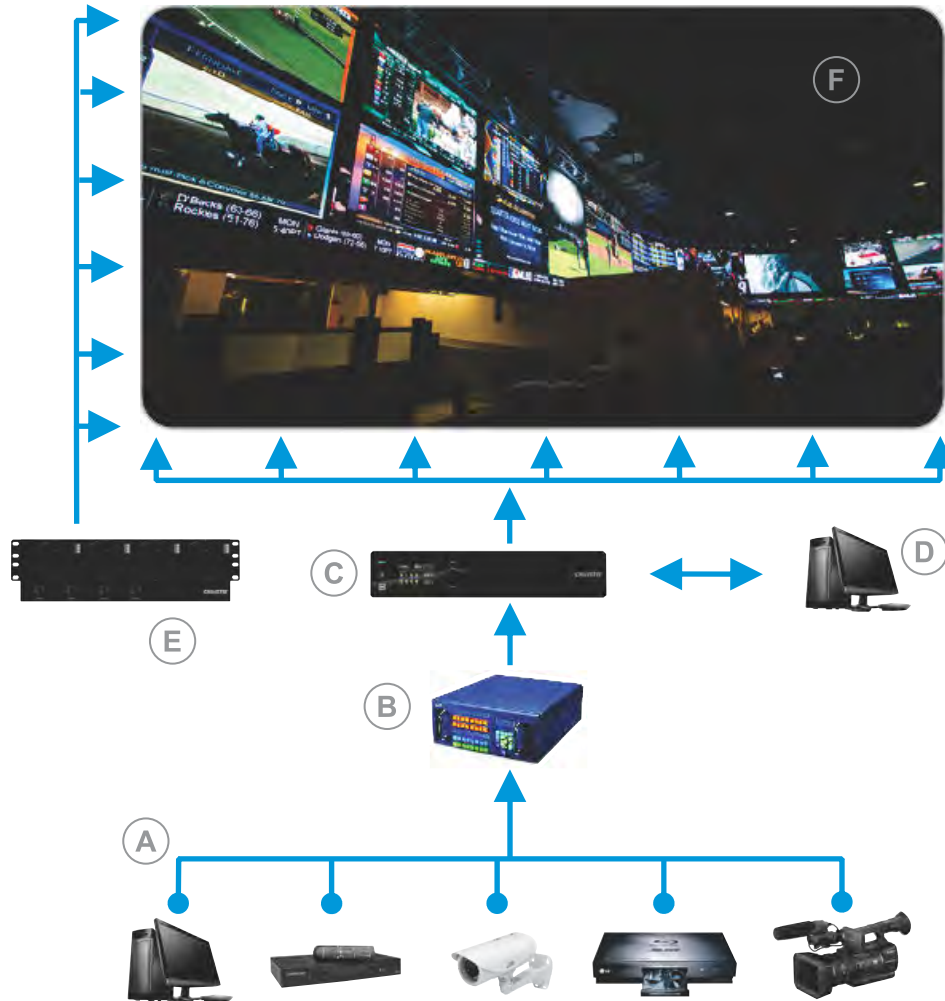
Remote Power Supply Rack Shelf installation tools

- Screwdrivers
- Molex Crimping Tool (P/N: 154-124108-XX)

If the main power cord supplied with your product is not long enough to connect the first display panel in an array to the Remote Power Supply Rack Shelf module, you must purchase a main power cord of an adequate length. Christie recommends one of the pre-terminated power cables offered as Christie accessories, or that you create a custom cable using the Christie Main Power Cable Spool (P/N 154-122106-XX), Connector Kit (P/N 154-125109-XX), and Molex Crimping Tool (P/N 154-124108-XX). For more information on the Molex Crimping Tool, see the Molex documentation.

Typical LED solution

A typical LED display system installation contains a variety of components.



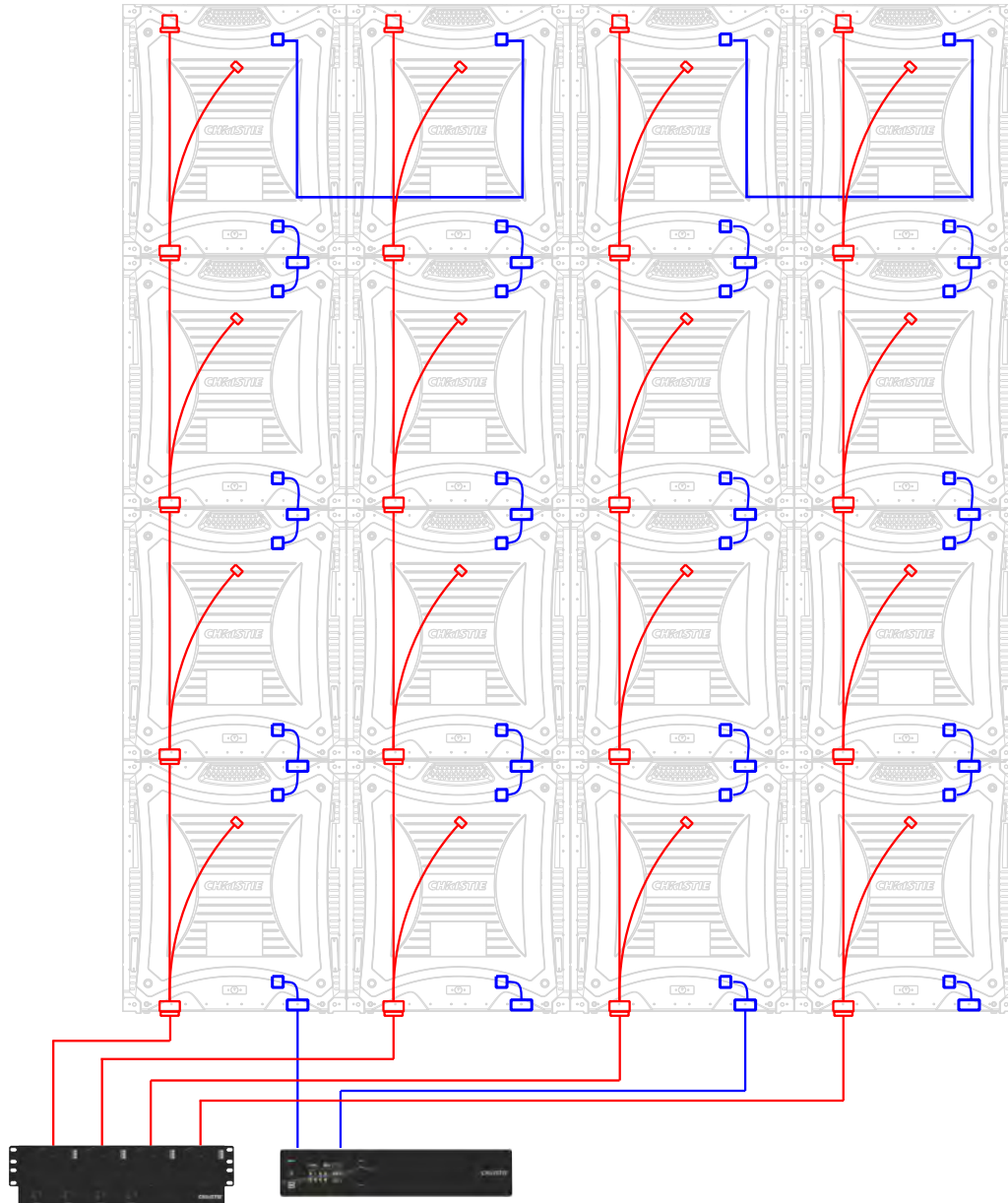
A	Media sources
B	Video matrix switch and splicing video processor
C	E500 controller or E600 controller
D	Control computer
E	Remote Power Supply Rack Shelf
F	LED display

Cable and controller layout and design

Before an array is constructed, you must plan the design layout of the tiles to make sure that the controller placement and the cabling layout support the overall tile design objectives.

The LED display system offers considerable flexibility in terms of the number of media sources that can be displayed and the overall resolution. Color and brightness matching, as well as other functions, may be performed across an entire array.

The video source connections between the cabinets are represented by the blue line. The power connections between the cabinets are represented by the red line.



Related information

Connecting the data source cables (on page 22)
 Connecting the power cables (on page 23)

Controller limitations

Each controller can support a maximum number of tiles, which varies depending on the pixel pitch of the tiles in the array. The configuration to achieve an HD display differs by the pixel pitch of the tile, as outlined in the table below.

Tile	Pixel pitch	2K array size	4K array size	8K array size	Maximum number of tiles per controller
LED012-CP-R	1.2 mm	–	10 x 5	20 x 10	12
LED014-CP-R	1.4 mm	6 x 3	12 x 6	24 x 12	18
LED019-CP-R	1.9 mm	8 x 4	16 x 8	32 x 16	32
LED024-CP-R	2.4 mm	10 x 5	20 x 10	40 x 20	50

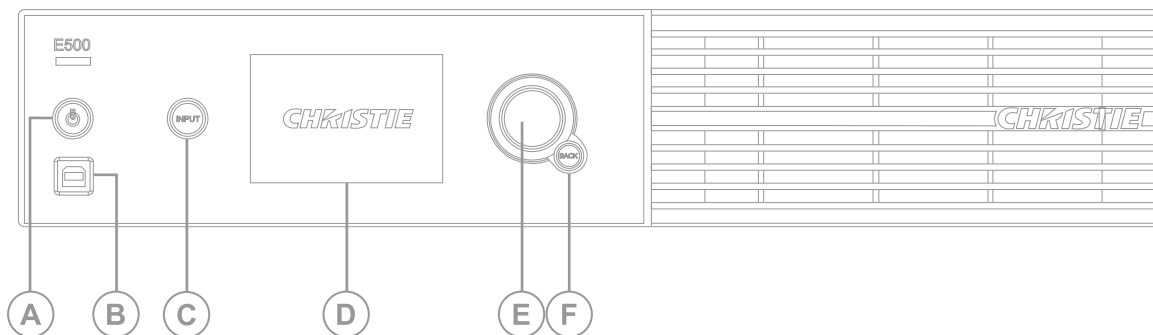
E600 controller

Tile	Pixel pitch	2K array size	4K array size	8K array size	Maximum number of tiles per controller
LED012-CP-R	1.2 mm	–	10 x 5	20 x 10	50
LED014-CP-R	1.4 mm	6 x 3	12 x 6	24 x 12	72
LED019-CP-R	1.9 mm	8 x 4	16 x 8	32 x 16	128
LED024-CP-R	2.4 mm	10 x 5	20 x 10	40 x 20	200

E500 controller interface and ports

Learn about the interface and physical ports on the E500 controller.

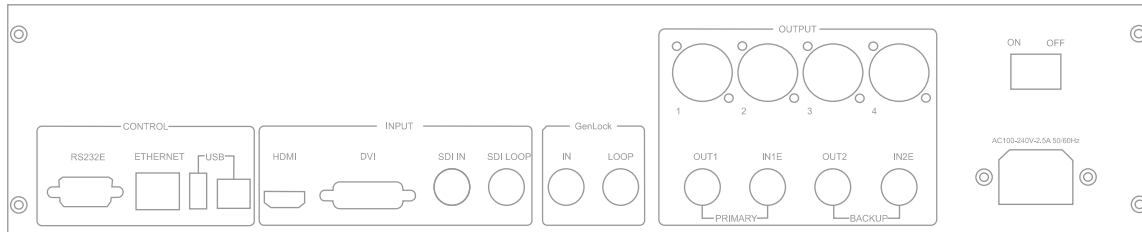
Front



A	Power button
B	USB interface for communication with a computer

C	Input selector
D	LCD screen
E	Menu dial for interacting with the menu
F	Back button for exiting from the current operation or option in the menu

Rear



Inputs/Outputs		Description
Inputs	DVI	Single-link DVI, user-definable resolution <ul style="list-style-type: none"> • Horizontal resolution maximum: 3840 pixels • Vertical resolution maximum 1920 pixels
	HDMI	Standard HDMI 1.3 input Supports 8 bit and 12 bit; for <ul style="list-style-type: none"> • 8 bit—RGB 4:4:4 1080P • 12 bit—YCbCr 4:2:2 1080P
	SDI	Supports 3G-SDI progressive input in standard format
	SDI Loop	
Outputs	BNC (Qty. 4)	Supports 2-channel output and 2-channel input, with each channel supporting up to 3.125G bandwidth. The loading capacity of one channel is up to 1920 x 1080 at 60hz. Of the two output channels, one is primary and the other is secondary. Supports low latency. The maximum transmission distance of coaxial cable is 100m.
	RJ45 (Qty. 4)	4-channel Gigabit Ethernet interface, with each channel supporting up to 1G bandwidth Total loading capacity: 2.3 million pixels Low latency is not supported
Genlock	BNC (Qty. 2)	Support Genlock IN & LOOP
Control		DB9 COM, USB, RJ45 (with SNMP support), USB cascading, and baud rate 115200 bps
Power		Power switch Power supply port: AC 100-240V~ 50/60hz

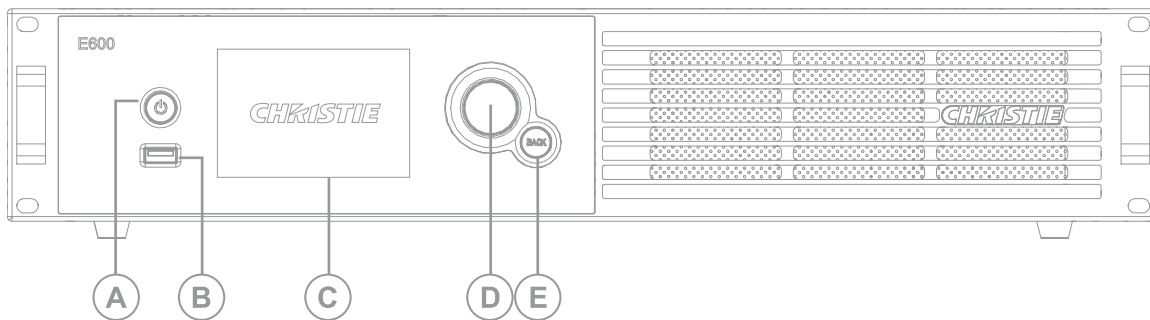
E600 controller interface and ports

Learn about the interface and physical ports on the E600 controller.

The E600 controller behaves as two independent controllers, displaying 3840 x 2160 pixels at 30 Hz with each virtual controller. The images of both DVI1 and DVI2 input sources can be displayed on the tiles simultaneously, but the inputs must be configured independently.

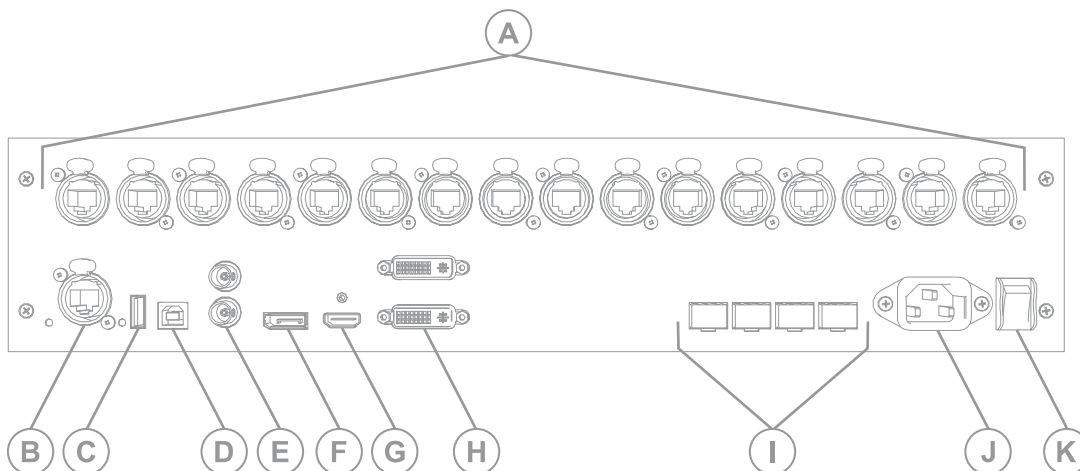
DVI1 corresponds to Ethernet ports 1-8, and DVI2 corresponds to Ethernet ports 9-16.

Front



A	Power button
B	USB interface for communication with a UDISK
C	LCD screen
D	Menu dial for interacting with the menu
E	Back button for exiting from the current operation or option in the menu

Rear



Inputs/Outputs		Description
A	Outputs	RJ45 (Qty. 16) 16-channel Gigabit Ethernet interface, with each channel supporting up to 1G bandwidth

Inputs/Outputs		Description	
			Total loading capacity: 8.8 million pixels Low latency is not supported
B	Control	Ethernet	USB, RJ45 (with SNMP support), and USB cascading
C		USB Out	
D		USB In	
E	Genlock	BNC (Qty. 2)	Support Genlock IN & LOOP
F	Inputs	DisplayPort	Standard DisplayPort 1.2 input The maximum user-definable resolution is 7680 x 1080 @ 60Hz or 1080 x 6000 @ 60Hz.
G		HDMI	Standard HDMI 2.0 input Supports 8 bit, 10 bit, and 12 bit; refer to the table below.
H		DVI (Qty. 2)	Dual-link DVI, user-definable resolution <ul style="list-style-type: none"> • Horizontal resolution maximum: 3840 pixels • Vertical resolution maximum 3840 pixels
I	OPT Output		Fiber optic ports for connecting to the FE600 fiber optic extender
J	Power		Power supply port: AC 100-240V~ 50/60hz
K			Power switch

HDMI 8 bit, 10 bit, and 12 bit support

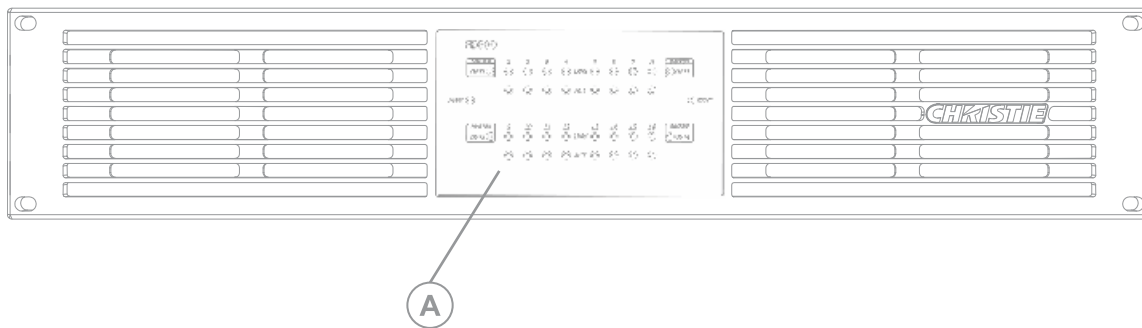
Color depth	Input source	Input source		
		3840 x 2160 @ 60Hz (HDCP)	3840 x 1080 @ 60Hz (HDCP)	1920 x 1080 @ 60Hz (HDCP)
8 bit				
	RGB444	Yes	Yes	Yes
	YCbCr444	Yes	Yes	Yes
	YCbCr422	Yes	Yes	Yes
	YCbCr420	Yes	Yes	Yes
10 bit				
	RGB444	No	Yes	Yes
	YCbCr444	No	Yes	Yes
	YCbCr422	Yes	Yes	Yes
	YCbCr420	Yes	Yes	Yes
12 bit				
	RGB444	No	Yes	Yes
	YCbCr444	No	Yes	Yes

	Color depth	Input source		
		3840 x 2160 @ 60Hz (HDCP)	3840 x 1080 @ 60Hz (HDCP)	1920 x 1080 @ 60Hz (HDCP)
	YCbCr422	Yes	Yes	Yes
	YCbCr420	Yes	Yes	Yes

FE600 controller extender interface and ports

Learn about the interface and physical ports on the E600 controller.

Front



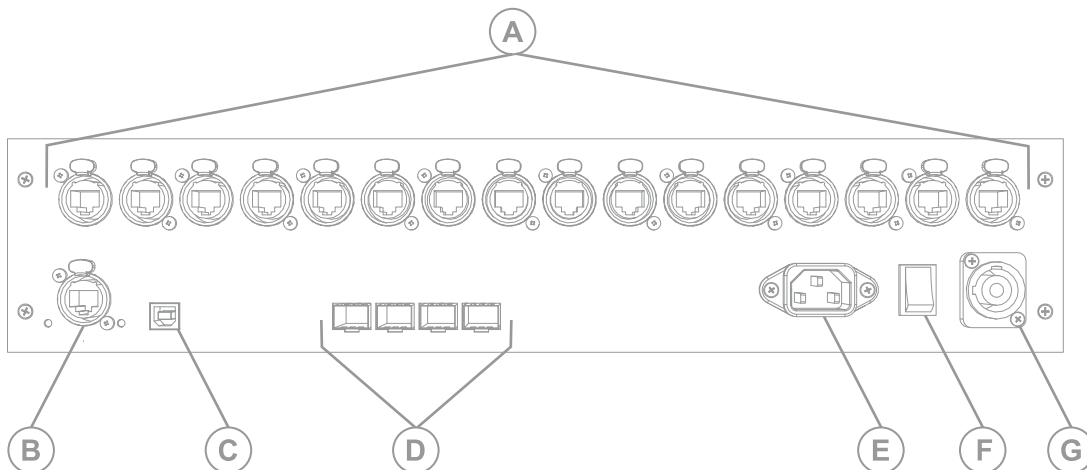
A	Status display
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Rear



Caution! If not avoided, the following could result in minor or moderate injury.

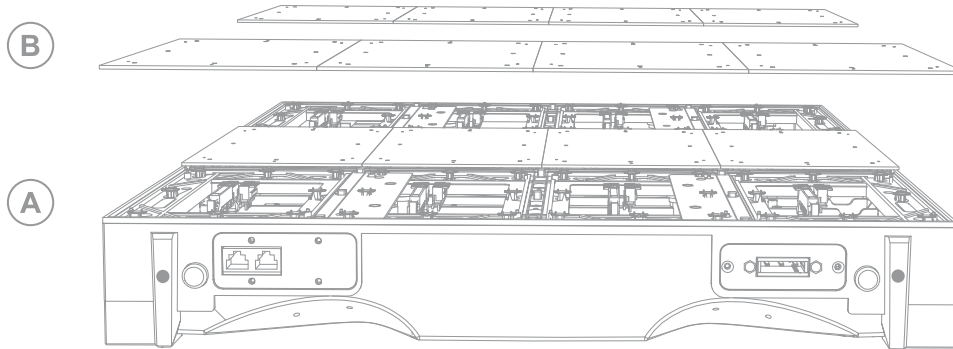
- FIRE HAZARD! Always connect the Neutrik PowerCON cable to the device before connecting it to the wall. The PowerCON connector is not intended to be hot pluggable.
- SHOCK HAZARD! Power supply uses double pole/neutral fusing. Disconnect all power sources before opening the product.



Inputs/Outputs		Description
A	Outputs RJ45 (Qty. 16)	16-channel Gigabit Ethernet interface, with each channel supporting up to 1G bandwidth Total loading capacity: 8.8 million pixels Low latency is not supported
B	Control Ethernet	USB, RJ45 (with SNMP support), and USB cascading
C		
D	OPT Output (Qty. 4)	Fiber optic ports for connecting to the E600 controller <ul style="list-style-type: none"> • OPT1 is used for transferring the data of port 1-8 • OPT2 is used for transferring the data of port 9-16 • OPT3 is the backup channel of OPT1 • OPT4 is the backup channel of OPT2 Either Gigabit Ethernet port or optical fiber port can be used at the same time, but cannot be used to connect devices simultaneously.
E	Power	IEC 60320-C18 power supply port: AC 100-240V~ 50/60hz
F		Power switch
G		Neutrik PowerCON power supply port: AC 100-240V~ 50/60hz

Installation and setup

The configuration of an array depends on the installation. Use the following instructions as a guideline only. Before you install an LED array, you must fully understand all site requirements and characteristics.



A	Chassis
B	LED modules

Installing an LED array from the front

Perform the following steps when you install an LED array while facing the LED modules.

1. *Install the mounting pads* (on page 19).
2. *Mount the tiles (A)* (on page 21).
3. *Connect the data cables* (on page 22).
4. *Connect the power cables between tiles* (on page 23).
5. *Reinstall the LED modules (B)* (on page 24).
6. *Install and configure the Remote Power Supply Rack Shelf* (on page 25).
7. *Connect the tile power cables to the Remote Power Supply Rack Shelf* (on page 25).
8. *Connect the data cables to the video sources* (on page 29).
9. *Power on the array* (on page 30).
10. Install the controller software.
 - *Install the E500 controller software* (on page 31).
 - *Install the E600 controller software* (on page 35).
11. Configure the controller.
 - *Configure the E500 controller* (on page 31).
 - *Configure the E600 controller* (on page 35).

The controller can be configured at any time. Before connecting the controller to the wall, Christie recommends updating the firmware and configuring the controller.

Installing an LED from the rear

Perform the following steps when you install an LED array from the rear of the tile.

1. *Mount the tiles (A)* (on page 21).
2. *Connect the data cables* (on page 22).
3. *Connect the power cables between tiles* (on page 23).
4. *Reinstall the LED modules (B)* (on page 24).
5. *Install and configure the Remote Power Supply Rack Shelf* (on page 25).
6. *Connect the tile power cables to the Remote Power Supply Rack Shelf* (on page 25).
7. *Connect the data cables to the video sources* (on page 29).
8. *Power on the array* (on page 30).
9. Install the controller software.
 - *Install the E500 controller software* (on page 31).
 - *Install the E600 controller software* (on page 35).
10. Configure the controller.
 - *Configure the E500 controller* (on page 31).
 - *Configure the E600 controller* (on page 35).

The controller can be configured at any time. Before connecting the controller to the wall, Christie recommends updating the firmware and configuring the controller.

Installing the mounting pads

If the tiles are being installed onto a flat wall surface, determine where the mounting pads should be installed, and attach them to the support structure.



Warning! If not avoided, the following could result in death or serious injury.

- External support for a display wall must be designed and implemented by a Christie qualified installer and must comply with local area regulations and safety standards.
- All display walls must have permanent external supports. The amount of external support required depends on the size of the display wall.
- A minimum of two people or appropriately rated lift equipment is required to safely lift, install, or move the product.

The mounting pads are available in three different configurations:

Corner pads with one hole

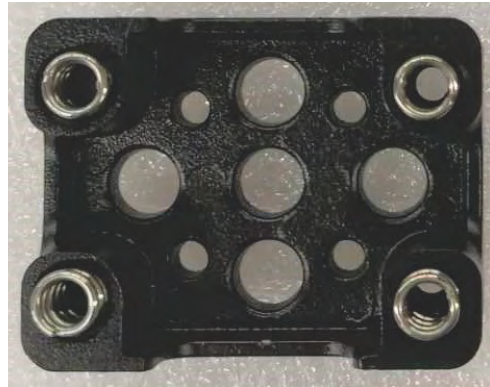
Exterior top or bottom edge pads with two holes



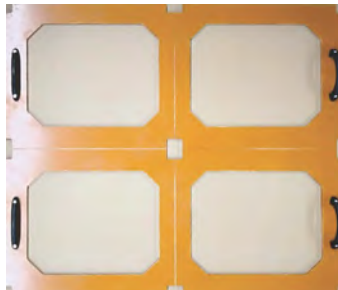
Exterior side pads with two holes



Interior pads with four holes

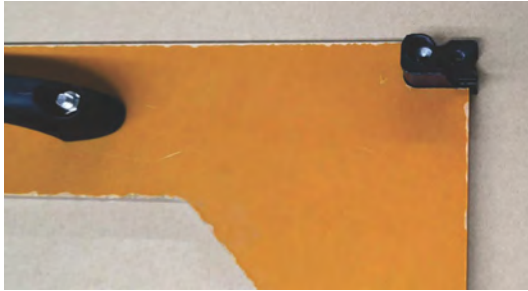


1. If the tiles are being mounted on an external support structure, ensure the external support structure is anchored to the wall and/or to the floor.
The design and anchoring of the LED display structure is not the responsibility of Christie Digital Systems USA Inc. Contact a Christie representative for structure design options.
2. Determine where the mounting pads should be installed.
 - a) Find the center of the bottom of the display area.
 - b) Position the mounting template with the bottom left template hole centered on the point identified in step 2a.
 - c) Level and hang the mounting template on the support structure.



3. Insert the springs into the mounting pads.
4. Install the mounting pads.
 - a) Place the mounting pads inside the template holes, and secure them to the support structure.
For installation onto a steel structure, tighten the M6 screws to a torque of 3.55 Nm (31.42 lbs.in).
For installation onto a wooden surface:
 - M8 wood screws—Tighten to a torque of 11.5 Nm (101.8 lbs.in)

- 5/16-18 wood screws—Tighten to a torque of 10.5 Nm (93 lbs.in)
- b) Install any exterior edge or corner mounting pads in the proper location inside the template holes, pushing the pads as close to the edge of the template holes as possible. For example, install the mounting pads for the top left corner tile in the bottom right corner of the template hole.



The corners and sides of the tiles should line up with the center of the mounting pads.

- c) Slide the spring into the M6 bolt holes.
5. Remove the template from the mounting pads.
 6. To install the remaining mounting pads for the array, place the template over already installed mounting pads so three of the template holes have mounting pads, and the remaining holes are empty. Repeat steps 2 to 4 for all other rows in the array.

Mounting the tiles

Install the tiles in the array row by row. Do not attempt to construct the array column by column.



Warning! If not avoided, the following could result in death or serious injury.

- External support for a display wall must be designed and implemented by a Christie qualified installer and must comply with local area regulations and safety standards.
 - All display walls must have permanent external supports. The amount of external support required depends on the size of the display wall.
 - A minimum of two people or appropriately rated lift equipment is required to safely lift, install, or move the product.
1. If present, remove the metal plates that cover all the external pass-through holes in the tile chassis, including the plate surrounding the power and data ports.
 2. Place the tile face down on a protected surface and remove the rear cover.
 3. Using the LED module removal tool, remove the top and bottom row of LED modules from the tile and set them on a padded surface.
To ensure the LED modules are reinstalled on the same tile and in the same position on the carrier assembly, label the chassis, carrier assembly, and LED modules.
 4. Ensure all adjustment screws are flush with the outside of the tile chassis.
 5. Attach the first tile in the center of the bottom row to the mounting pads in the four mounting points.
Ensure the M6 bolts have at least three full thread engaged into the tile and are torqued to 3.55 Nm (31.42 lb.in).
 6. To install the second tile in the row, repeat steps 1 to 5.

7. Adjust the spacing between the tiles, and ensure there are minimal gaps between the LED modules of each tile.
To determine if adjustments are needed between the chassis, or to see how close the LED modules are, it may be necessary to install and remove the LED modules multiple times.
If the surface edges of the LED modules are not smooth, adjust the tightness of the bolts attaching the chassis to the mounting pads.
8. Repeat steps 1 to 7 for all the remaining tiles in the bottom row.
9. After the bottom row is installed and the gaps are adjusted, repeat steps 1 to 8 for the remaining rows.

Related information

Adjusting the spacing between tiles (on page 22)

Adjusting the spacing between tiles

If there are gaps between the LED modules of different tiles, or the LED modules cannot be reinstalled, adjust the spacing between the tile chassis.

1. Using the LED removal tool, remove the top and bottom row of LED modules from the tile and set them on a padded surface.
To ensure the LED modules are reinstalled on the same tile and in the same position on the carrier assembly, label the chassis, carrier assembly, and LED modules.
2. Ensure there are minimal gaps between the LED modules of each tile.
 - a) To adjust the spacing between the tile chassis, use the connection pins. Ensure there are minimal gaps between the LED modules of each tile.
 - b) To make additional space between the tile chassis, loosen the connection pins and adjust the jack screws to push the tiles apart.
3. If the surface edges of the LED modules are not smooth, adjust the depth of the panel by changing the tightness of the screws attaching the tile to the mounting pads.
4. To test the spacing between tiles, replace the LED modules.

Related information

Mounting the tiles (on page 21)

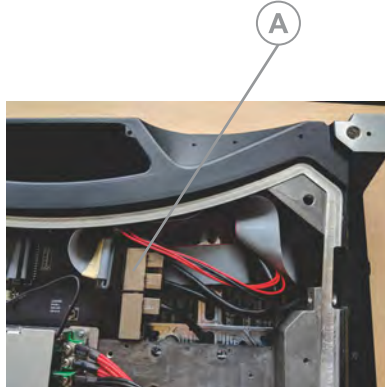
Reinstalling the LED modules (on page 24)

Connecting the data source cables

Connect the data cables between the tiles in the array.

1. Remove the cover from the data port area.
2. Remove the main and redundant data cables from the port inside the tile, and feed the cables through the pass-through hole.
3. Plug the main data cable into the next tile in the column.
The data cables are connected from the main hub board of the tile to the data ports of the next tile in the column.
Consistently use either the left or right ports for all primary data connections, and the other port for all redundant data connections.

4. Pull any excess cable back into the cabinet.
5. Repeat steps 1 to 4 for all tiles in the array.
6. If the data cables need to be connected to the first tile in an adjacent column, follow these steps:
 - a) Ensure the covers for the pass-through holes on the sides of the tiles have been removed.
 - b) Disconnect the short Ethernet cables from the data ports at the top of the hub board (A).



- c) Connect 1.5m Ethernet cables to the main and redundant data ports at the top of the hub board.
 - d) Feed the cables through the interior of the tile and through the pass-through hole into the tile of the adjacent column.
 - e) In the first tile in the new column, connect the Ethernet cables to the data ports at the top of the hub board.
7. Connect an Ethernet cable from the first tile in the array to the controller.

Related information

Cable and controller layout and design (on page 11)

Connecting the power cables

Connect the power cables between the tiles in the array, column by column.



Caution! If not avoided, the following could result in minor or moderate injury.

- SHOCK HAZARD! The line cord has a maximum power carrying capability. For the maximum number of tiles that may be connected per daisy chain when connecting to the power supply, refer to the product specifications.

1. Remove the pass-through hole cover.
2. Feed the power cables through the pass-through holes.
3. Connect the power cable to the next tile in the array.
4. Pull any excess cable back into the cabinet.
5. If the cable needs to be connected to the first tile in an adjacent column, follow these steps:



Connecting cables from one column to the adjacent column can only be completed when accessing the tiles from the front.

- a) On the first tile of the new column, ensure the covers for the pass-through holes on the sides of the tile have been removed.
 - b) Remove the two screws securing the power port to the chassis.
 - c) Move the power port to the empty pass through hole on the left side of the tile, beside the original power port location.
 - d) Secure the port to the chassis.
 - e) Connect the power cable to the first tile in the new column.
6. After the data and power cables have been routed through the array, reinstall the metal plates onto the cable pass-through holes on the exterior sides of the array.
 7. Reinstall the rear covers on each tile.
 8. Connect the cabinet power cable to the Remote Power Supply Rack Shelf.

Related information

Cable and controller layout and design (on page 11)

Connecting the FE600 fiber optic extender to power

Connect the power cable between the wall and the FE600 fiber optic extender.



Caution! If not avoided, the following could result in minor or moderate injury.

- FIRE HAZARD! Always connect the Neutrik PowerCON cable to the device before connecting it to the wall. The PowerCON connector is not intended to be hot pluggable.
 - SHOCK HAZARD! Power supply uses double pole/neutral fusing. Disconnect all power sources before opening the product.
1. Connect the IEC 60320-C18 cable.
 - a) Flip the switch between the two power connectors to the down position.
 - b) Connect the cable to the PowerCON connector on the device.
 - c) Plug the other end of the cable into the wall outlet.
 2. Connect the Neutrik PowerCON cable.
 - a) Flip the switch between the two power connectors to the up position.
 - b) Connect the cable to the PowerCON connector on the device.
 - c) Plug the other end of the cable into the wall outlet.

Reinstalling the LED modules

Replace the LED modules removed while installing the tiles.

1. Connect all the carrier assembly cables onto the LED module.
2. Line up the LED module with the alignment pins in the carrier assembly, ensuring the arrow on the back of the LED module is pointing up.
3. Set the LED module into place on the carrier assembly.

If the LED module does not fit back into place, or there is a gap between the LED modules of two tiles, adjust the spacing between the tiles.

Related information

Adjusting the spacing between tiles (on page 22)

Installing and configuring the Remote Power Supply Rack Shelf

Use the following instructions to install and configure the Remote Power Supply Rack Shelf external power supply.

Mounting the Remote Power Supply Rack Shelf

The power system must be mounted in a clean and dry environment. Sufficient free space must be provided at the front and rear of the power system.



Warning! If not avoided, the following could result in death or serious injury.

- This product must be installed within a restricted access location not accessible by the general public.
1. Find a location in the rack for a 3U device.
 2. Attach the Remote Power Supply Rack Shelf to the rack.
To ensure a proper electrical bond between the system chassis and the relay rack use thread-forming mounting screws and star washers.

Inserting the power modules into the Remote Power Supply Rack Shelf

The power modules, or rectifiers, convert an AC power source into the DC current required by the product.

1. Remove the cover from the rectifier slot.
2. Slide the power module into the front of the chassis until it clicks into place.
3. To lock the power module, lift the handle and snap it into place.
4. Repeat steps 1 to 3 for each rectifier in the Remote Power Supply Rack Shelf.

Connecting the LED tile power cables to the Remote Power Supply Rack Shelf

To power the Velvet CorePlus (Remote Power) LED Display System tiles, connect the cables between the tiles and the Remote Power Supply Rack Shelf.



Warning! If not avoided, the following could result in death or serious injury.

- SHOCK HAZARD! Disconnect the product from AC before installing, moving, servicing, cleaning, removing components, or opening any enclosure.
1. Ensure the Remote Power Supply Rack Shelf breakers are off before connecting any cables to the devices.
 2. Connect the main power cable to the Remote Power Supply Rack Shelf.

3. Connect the cabinet power cable to the main power cable.
If the main power cord supplied with your product is not long enough to connect the first display panel in an array to the Remote Power Supply Rack Shelf module, you must purchase a main power cord of an adequate length. Christie recommends one of the pre-terminated power cables offered as Christie accessories, or that you create a custom cable using the Christie Main Power Cable Spool (P/N 154-122106-XX), Connector Kit (P/N 154-125109-XX), and Molex Crimping Tool (P/N 154-124108-XX). For more information on the Molex Crimping Tool, see the Molex documentation.
4. Plug the Remote Power Supply Rack Shelf into the building outlets in the wall or the floor.
Each Remote Power Supply Rack Shelf AC cable should be protected with its own circuit breaker. The circuit breaker value should not exceed 20A.

Logging in to the Remote Power Supply Rack Shelf web interface

To make changes to the Remote Power Supply Rack Shelf, use Internet Explorer.

1. Connect a computer to the Remote Power Supply Rack Shelf with a network crossover cable.
2. To access the web interface, in the Control Panel, change the IP address and subnet mask of the computer to be on the same subnet as the Remote Power Supply Rack Shelf.

If the IP address and subnet mask on the Remote Power Supply Rack Shelf have not been changed from the default, use the following values on the computer:

- IP address: 10.10.10.202
- Subnet mask: 255.255.255.0

3. Turn off any browser pop-up blockers.
4. In the browser address bar, type the IP address of the Remote Power Supply Rack Shelf device.

The default IP address is 10.10.10.201.

If you have changed the IP address of the Remote Power Supply Rack Shelf, the IP address and subnet mask of the computer must also be changed.

The IP address for the web interface is one digit higher than the IP address of the device. For example, when the IP address of the device is 10.10.10.201, the address of the web interface is 10.10.10.202.

5. If prompted, run the MSXML add-on.
6. Log in to the Remote Power Supply Rack Shelf with your username and password.
The default username is **Admin**, and the default password is **1234**.

Changing the IP address of the Remote Power Supply Rack Shelf

In an environment where there are multiple Remote Power Supply Rack Shelf devices, you must have a unique IP address for each device.

1. Select **Communications > Configure Communication Parameters**.
2. Set the new IP address for the Remote Power Supply Rack Shelf.
3. Click **Submit Changes**.

After the IP address has been changed from the web interface, close the browser window and then open it using the new IP address.

If you have changed the IP address of the Remote Power Supply Rack Shelf, the IP address and subnet mask of the computer must also be changed.

Resetting the Remote Power Supply Rack Shelf IP address

The Remote Power Supply Rack Shelf IP address ensures local access with a laptop and a standard network crossover cable.

Press and hold the front panel reset button (RST) for three seconds.

The Remote Power Supply Rack Shelf beeps three times, the IP address is reset to 10.10.10.201, and DHCP is disabled.

Changing the time on the Remote Power Supply Rack Shelf

Configure the time on the Remote Power Supply Rack Shelf.

The date and time is a dynamic field, and as changes are made to the values on the screen the internal values are also changed. An event is added to the event log detailing the changes made.

1. Log in to the Remote Power Supply Rack Shelf web interface.
2. Select **Controller > Date and Time**.
3. Set the date and time for the Remote Power Supply Rack Shelf.
 - Manually enter the date and time for the Remote Power Supply Rack Shelf to use.
 - Automatically retrieve the date and time from a server.
 - a. Select **Enable SNTP Service**.
 - b. Type the IP address of the SNTP source.
 - c. In the **Time Zone Adjustment** field, select the time zone adjustment for the location of the Remote Power Supply Rack Shelf.
4. Click **Save**.
5. If the time is set by an SNTP service, click **Get Time Now**.

Setting the temperature units

Change the units used when reporting the temperature.

1. Log in to the Remote Power Supply Rack Shelf web interface.
2. Select **Controller > Temperature Units**.
3. Select whether the display units are Celsius or Fahrenheit.
4. Click **Save**.

Changing the voltage of the rectifiers

Change the output voltage to 48 VDC or 52 VDC.

1. *Log in to the Remote Power Supply Rack Shelf web interface (on page 26).*
2. Select **Rectifiers > Configure Rectifiers**.
3. Change the Float Voltage field to the preferred voltage.

4. Ensure the Safe Voltage and Over Voltage Protection (OVP) fields are set properly for the new voltage.

Christie recommends the following settings:

- Float voltage: 54 VDC
- Equalize voltage: 55 VDC
- Safe voltage: 54 VDC
- OVP: 59 VDC
- HVA: 55.5 VDC

5. Click **Submit Changes**.

Resetting the breakers

When too many components are connected or too much power is sent through the Remote Power Supply Rack Shelf, the breakers may interrupt the current flow. Reset the breakers to resume operation.

If the breakers disconnect the current, the On button is released for the affected Output.

1. Reduce the number of panels connected to the input or the amount of power going through the input.
2. Push the **On** button back into place.
The current is reconnected and the output is powered.

Connecting the LED tile power cables to the Remote Power Supply Rack Shelf

To power the Velvet CorePlus (Remote Power) LED Display System tiles, connect the cables between the tiles and the Remote Power Supply Rack Shelf.



Warning! If not avoided, the following could result in death or serious injury.

- **SHOCK HAZARD!** Disconnect the product from AC before installing, moving, servicing, cleaning, removing components, or opening any enclosure.
1. Ensure the Remote Power Supply Rack Shelf breakers are off before connecting any cables to the devices.
 2. Connect the main power cable to the Remote Power Supply Rack Shelf.
 3. Connect the cabinet power cable to the main power cable.

If the main power cord supplied with your product is not long enough to connect the first display panel in an array to the Remote Power Supply Rack Shelf module, you must purchase a main power cord of an adequate length. Christie recommends one of the pre-terminated power cables offered as Christie accessories, or that you create a custom cable using the Christie Main Power Cable Spool (P/N 154-122106-XX), Connector Kit (P/N 154-125109-XX), and Molex Crimping Tool (P/N 154-124108-XX). For more information on the Molex Crimping Tool, see the Molex documentation.

4. Plug the Remote Power Supply Rack Shelf into the building outlets in the wall or the floor.
Each Remote Power Supply Rack Shelf AC cable should be protected with it's own circuit breaker. The circuit breaker value should not exceed 20A.

Connecting to video sources

An LED array requires a controller to display content on the tiles.

1. Connect the data cable from the first tile in the array to the controller.
2. Connect the HDMI or DVI output from the video source (computer or media player) to the appropriate input port on the controller.

The E600 controller behaves as two independent controllers, displaying 3840 x 2160 pixels at 30 Hz with each virtual controller. The images of both DVI1 and DVI2 input sources can be displayed on the tiles simultaneously, but the inputs must be configured independently.

DVI1 corresponds to Ethernet ports 1-8, and DVI2 corresponds to Ethernet ports 9-16.

3. Power on the array.

After the controller is connected and powered up, the video content is available as long as the video source is connected.

Installing the FE600 fiber optic extender

A fiber optic extender increases the available distance between the LED display and the E600 controller.



The FE600 fiber optic extender can only be used with the E600 controller.

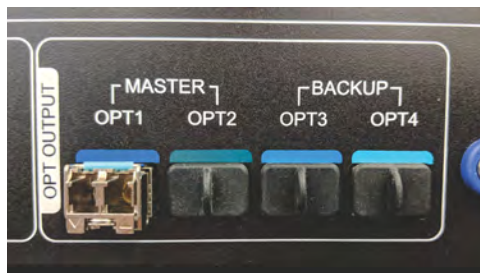
The FE600 fiber extender increases the transmission distance by 10 KM. Multiple extenders can be chained together between the controller and the array to extend the distance even further.



Notice. If not avoided, the following could result in property damage.

- Do not bend the fiber optic cables beyond their minimum bend radius. Sharp bends can damage the cables and cause transmission problems.

1. Connect the power cord to the FE600 fiber extender.
2. Plug the fiber optic cables from the controller into the fiber extender.
 - a) Remove the covers from the fiber optic cable ends.
 - b) Remove the protective plug from the fiber optic ports.
 - c) Connect one fiber optic cable into the Opt1 port on the controller and the extender.
 - d) Connect the other fiber optic cable into the Opt2 port on the controller and the extender.
If the fiber optic cables are not plugged into the same port on each device, the LED panels do not display any content.
 - e) Connect fiber optic cables into the Opt3 and Opt4 ports on the extenders.
The Opt3 port provides redundancy for the Opt1 connection, and Opt4 provides redundancy for Opt2.

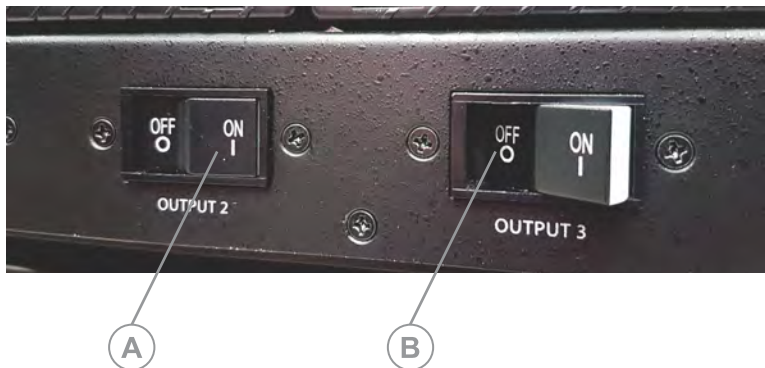


3. Connect the fiber optic cables between the two fiber optic extenders.
4. Plug an Ethernet cable into the last extender in the chain, and connect it to the first panel in the array.
5. Plug the fiber extender power cables into a wall socket.
6. Power on all the components in the tile configuration.

Powering on the array

Turn on each component in the array in the order below.

1. Start the computer that is the video source.
2. Turn on each rectifier in the Remote Power Supply Rack Shelf.
When a rectifier is on, the OFF and ON buttons are flush with the front plate (A). When a rectifier is off, the ON side of the switch extends beyond the front plate (B).



As the wall is powering on, light flickers on the tiles.

3. Wait for 3-5 minutes after powering on the rectifiers.
4. Turn on the controller.
 - a) On the rear of the controller, turn the power switch to **On**.
 - b) On the front of the controller, press the **Power** button.

Powering off the array

Turn off each component in the array in the order below.

1. Turn off the controller.
 - a) On the front of the controller, press the **Power** button.
 - b) On the rear of the controller, turn the power switch to **Off**.
2. Wait for 3-5 minutes after powering off the controller.
3. Turn off each rectifier in the Remote Power Supply Rack Shelf.

Configuring the E500 controller

After installing the tiles and connecting all cables, complete the E500 controller initial configuration. For additional configuration settings, refer to *E500 User Guide (P/N: 020-102222-XX)*.

Installing the E500 controller software

The E500 controller software controls the configuration of the array.

1. On the Christie website, navigate to the *E500 product page*.
2. Switch to the **Downloads** tab and click **Software Downloads**.
3. Download and unzip the Christie LED Control Unit E500 Software zip file.
4. Double-click the *Christie Controller Software Setup <version>.exe* file, and follow the on-screen instructions and install the E500 controller software.

Logging into the controller software

To access the configuration features of the controller software, log in to the system.

1. Ensure the computer running the controller software is on the same network at the controller.
2. Connect a USB cable between the controller and the computer running the controller software.
3. Launch the controller software and log in as the administrator.
 - a) Click **User > Advanced User Login**.
 - b) Login with the password **admin**.

Setting the output mode

Ensure the E500 controller is configured to use the correct output mode.

When the incorrect output mode is selected, the tiles are not recognized by the controller.

1. On the front of the controller, press the menu dial.

When using the menu dial, rotate the dial to move through the items in the menu. To select a menu item or to set a value, push in the menu dial.

To return to the previous menu, press the button to the bottom right of the menu dial.
2. Select **Screen Settings > Output Modes > Ports**.

Use **SerDes** mode when connecting over RS232.

Adjusting the initial picture coordinates

Adjust the initial coordinates of the pictures on the screen.

1. On the front of the controller, press the menu dial.
When using the menu dial, rotate the dial to move through the items in the menu. To select a menu item or to set a value, push in the menu dial.
To return to the previous menu, press the button to the bottom right of the menu dial.
2. Select **Advanced Settings > Image Offset**.
3. Select **Start X** and push the menu dial.
4. Rotate the dial and set the horizontal offset.
5. Select **Start Y** and push the menu dial.
6. Rotate the dial and set the vertical offset.

Testing the communication between the controller and tiles

Verify that the array is connected to and recognized by the E500 controller.

1. Connect the USB cable between the controller and the computer running the E500 controller software.
2. Launch the E500 controller software and log in as the administrator.
 - a) Click **User > Advanced User Login**.
 - b) Login with the password **admin**.
3. To confirm the display is connected to and recognized by the controller, in the Local System Info area, ensure **Control System** has a value of **1**.
If the controller is not recognizing the tiles, select **System > Reconnect**.
4. If the Monitor Information area reports that there is no screen, verify that the output mode is set to Ports and in the E500 controller software select **System > Reconnect**.
5. Switch to the **Screen Control** tab.
6. To confirm the controller is communicating with all tiles, select a color from the Self Test list and click **Send**.
If the controller is communicating with all the tiles, each display changes to the selected color.
7. Reset the Self Test to **Normal** and click **Send**.
8. Close the **Screen Control** dialog.

Reviewing the tile configuration

Review the tile configuration reported in the E500 controller software.

1. In the E500 controller software, click **Screen Configuration**.
2. Select **Configure Screen** and click **Next**.
3. Switch to the **Screen Connection** tab.

4. Click **Read from HW**.
5. Review the configuration of the tiles in the array, and modify as needed.
The cable layout for the tiles in the array is identified with an **S** where the first cable starts, and the green line shows the path of the daisy chain of cables. **E** identifies the end of the daisy chain.

Setting the input resolution

Set the resolution for the home page display of interface, which must be consistent with the output resolution of the video source.

1. Log into the E500 controller software.
2. Click **Screen Configuration**.
3. Select **Configure Screen** and click **Next**.
4. Switch to the **Sending Card** tab.
5. In the Set the Sending Card Display Mode section, select the resolution of the video source from the Resolution list.
6. Click **Save**.

Locking and unlocking the controller

Disable the ability to navigate the menu and modify the settings from the front of the controller.

1. To disable access to the controller menu, press and hold the menu dial and back button until the controller screen flashes.
2. To re-enable access to the controller menu, press and hold the menu dial and back button for approximately 15 seconds.
3. Test if the controller is unlocked by using the menu dial to navigate the menu.
If the controller is still locked, press and hold the menu dial and back button for a longer period of time.

Upgrading the firmware on the E500 controller

When a new version of the software is released, the E500 controller must be upgraded.

1. Download the firmware file to a computer that will be connected to the controller for the upgrade, or to a USB key.
2. Unzip the downloaded firmware file.
3. Connect an HDMI or Ethernet cable between the computer running the controller software and the controller.
4. Launch the E500 controller software and log in as the administrator.
 - a) Click **User > Advanced User Login**.
 - b) Login with the password **admin**.
5. In the blank area beside the Monitoring icon, right-click and type **666888**.

6. In the Program Path area, browse to the location of the unzipped download, and select the firmware upgrade folder.
7. Click **Update**.
8. In the confirmation message, click **Yes**.
As the firmware upgrade is installed, the controller screen and controller software both display a progress indicator.
After the upgrade is complete, the controller reboots.
9. To verify the upgrade was successful, in the top left corner of the controller display verify the version number displayed is 1.0.5.9.

Configuring the E600 controller

After installing the tiles and connecting all cables, complete the E600 controller initial configuration. For additional configuration settings, refer to *E600 User Guide (P/N: 020-102717-XX)*.

Installing/Accessing the E600 controller software

The E600 controller software controls the configuration of the array.

1. On the Christie website, navigate to the *E600 product page*.
2. Switch to the **Downloads** tab and click **Software Downloads**.
3. Download and unzip the Christie LED Control Unit E600 Software zip file.
4. Double-click the *Christie Controller Software Setup <version>.exe* file, and follow the on-screen instructions and install the E600 controller software.

Logging into the controller software

To access the configuration features of the controller software, log in to the system.

1. Ensure the computer running the controller software is on the same network at the controller.
2. Connect a USB cable between the controller and the computer running the controller software.
3. Launch the controller software and log in as the administrator.
 - a) Click **User > Advanced User Login**.
 - b) Login with the password **admin**.

Adjusting the initial picture coordinates

Adjust the initial coordinates of the pictures on the screen.

1. On the front of the controller, press the menu dial.

When using the menu dial, rotate the dial to move through the items in the menu. To select a menu item or to set a value, push in the menu dial.

To return to the previous menu, press the button to the bottom right of the menu dial.
2. Select **Screen Settings > Image Offset**.
3. Select **Start X** and push the menu dial.
4. Rotate the dial and set the horizontal offset.
5. Select **Start Y** and push the menu dial.

6. Rotate the dial and set the vertical offset.

Testing the communication between the controller and tiles

Verify that the array is connected to and recognized by the E600 controller.

1. Connect a USB cable between the controller and the computer running the controller software.
2. Launch the controller software and log in as the administrator.
 - a) Click **User > Advanced User Login**.
 - b) Login with the password **admin**.
3. To confirm the display is connected to and recognized by the controller, in the Local System Info area, ensure **Control System** has a value of **1**.
If the controller is not recognizing the tiles, select **System > Reconnect**.
4. Select **Screen Control**.
5. To confirm the controller is communicating with all tiles, select a color from the Self Test list and click **Send**.
If the controller is communicating with all the tiles, each display changes to the selected color.
6. Reset the Self Test to **Normal** and click **Send**.
7. Click **Close**.

Reviewing the tile configuration

Review the tile configuration reported in the E600 controller software.

1. Connect a USB cable between the controller and the computer running the controller software.
2. Launch the controller software and log in as the administrator.
 - a) Click **User > Advanced User Login**.
 - b) Login with the password **admin**.
3. Click **Screen Configuration**.
4. Select **Configure Screen** and click **Next**.
5. Switch to the **Screen Connection** tab.
6. Click **Read from HW**.
7. Review the configuration of the tiles in the array, and modify as needed.
The cable layout for the tiles in the array is identified with an **S** where the first cable starts, and the green line shows the path of the daisy chain of cables. **E** identifies the end of the daisy chain.

Setting the input resolution

Set the resolution for the home page display of interface, which must be consistent with the output resolution of the video source.

1. Connect a USB cable between the controller and the computer running the controller software.
2. Launch the controller software and log in as the administrator.
 - a) Click **User > Advanced User Login**.
 - b) Login with the password **admin**.
3. Click **Screen Configuration**.
4. Select **Configure Screen** and click **Next**.
5. Switch to the **Sending Card** tab.
6. In the Set the Sending Card Display Mode section, select the resolution of the video source from the Resolution list.

Tile	Native resolution
LED012-CP-R	384 x 432
LED014-CP-R	320 x 360
LED019-CP-R	240 x 270
LED024-CP-R	192 x 216

7. Click **Set**.
8. Click **Save**.

Locking and unlocking the controller

Disable the ability to navigate the menu and modify the settings from the front of the controller.

1. To disable access to the controller menu, press and hold the menu dial and back button until the controller screen flashes.
2. To re-enable access to the controller menu, press and hold the menu dial and back button for approximately 15 seconds.
3. Test if the controller is unlocked by using the menu dial to navigate the menu.
If the controller is still locked, press and hold the menu dial and back button for a longer period of time.

Upgrading the firmware on the E500 controller

When a new version of the software is released, the E500 controller must be upgraded.

1. Download the firmware file to a computer that will be connected to the controller for the upgrade, or to a USB key.
2. Unzip the downloaded firmware file.
3. Connect an HDMI or Ethernet cable between the computer running the controller software and the controller.

4. Launch the E500 controller software and log in as the administrator.
 - a) Click **User > Advanced User Login**.
 - b) Login with the password **admin**.
5. In the blank area beside the Monitoring icon, right-click and type **666888**.
6. In the Program Path area, browse to the location of the unzipped download, and select the firmware upgrade folder.
7. Click **Update**.
8. In the confirmation message, click **Yes**.

As the firmware upgrade is installed, the controller screen and controller software both display a progress indicator.

After the upgrade is complete, the controller reboots.
9. To verify the upgrade was successful, in the top left corner of the controller display verify the version number displayed is 1.0.5.9.

Maintaining the LED panels

Learn the information and procedures for performing maintenance on the Velvet CorePlus (Remote Power) LED Display System.

Cleaning the LED panels

Learn how to clean the Velvet CorePlus (Remote Power) LED Display System panel.



Notice. If not avoided, the following could result in property damage.

- Always wear clean, lint-free gloves when handling the product.

To avoid the risk of damaging the LEDs, clean the panel only if absolutely necessary.

1. To clean the LED panels use a dry, clean, soft cloth with a low lint count or a paint brush to remove any particles.
2. To remove loose particles between the LEDs, use filtered compressed air. Ensure the air compressor does not spray oil or condensation.

Do not use the following products when cleaning the panels:

- Compressed air cans
- Liquids
- Abrasive cloths

Regulatory

This product conforms to the latest regulations and standards related to product safety, environmental, and electromagnetic compatibility (EMC) requirements.

Safety

- ANSI/UL 60950-1 – Information Technology Equipment – Safety – Part 1: General Requirements
- CAN/CSA C22.2 No. 60950-1
- EN 60950-1
- IEC 60950-1 IEC/EN 60950-1 – Information Technology Equipment – Safety – Part 1: General Requirements
- IEC 62471-1 – Photobiological Safety of Lamps and Lamp Systems

Electro-magnetic compatibility

Emissions

- CAN ICES-003 (A)/NMB-003 (A) – Information Technology Equipment (Including Digital Apparatus) – Limits and Methods of Measurement
- CISPR 32/EN 55032, Class A
- FCC CFR47, Part 15, Subpart B, Class A – Unintentional Radiators
- IEC 61000-3-2/EN61000-3-2: Limits for Harmonic Current Emissions

Immunity

- IEC 61000-3-3/EN61000-3-3
- IEC/EN61000
- IEC 61000-4-2/EN61000-4-2
- IEC 61000-4-3/EN61000-4-3
- IEC 61000-4-4/EN61000-4-4
- IEC 61000-4-5/EN61000-4-5
- IEC 61000-4-6/EN61000-4-6
- IEC 61000-4-8/EN61000-4-8
- IEC 61000-4-11/EN61000-4-11

Environmental

- EU Directive (2011/65/EU) on the restriction of the uses of certain hazardous substances (RoHS) in electrical and electronic equipment and the applicable official amendment(s).
- EU Directive (2012/19/EU) on waste and electrical and electronic equipment (WEEE) and the applicable official amendment(s).
- Regulation (EC) No. 1907/2006 on the registration, evaluation, authorization and restriction of chemicals (REACH) and the applicable official amendment(s).

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