HD-MD-400-C-E

HD Scaling Auto-Switcher & Extender 400

- *3x1+1 high-definition digital AV switcher, scaler, and extender*
- *Fully-automatic operation — no control system, control panel, or programming required!*
- *Easy Web browser setup*
- *Integrates with Crestron Fusion® via the CEN-AVF-HUB[9]*
- *Supports integration with a Crestron® control system for fully programmable functionality*
- *Includes a compact transmitter and receiver*
- *Transmitter includes two HDMI®, one VGA, and one analog audio inputs[2,3,4]*
- *Receiver includes one HDMI input, one HDMI output, and one analog audio output[2,5,6]*
- *A single CATx cable links the transmitter to the receiver[1]*
- *Supports cable lengths up to 230 feet (70 meters) between the transmitter and receiver[1]*
- *Automatically scales input signals to match the native resolution of the room display*
- *Supports a range of display resolutions up to Full HD 1080p and WUXGA*
- *Supports any input resolution up to Full HD 1080p and WUXGA[10]*
- *Performs deinterlacing of NTSC, PAL, and 1080i sources*
- *Handles Dolby Digital® 5.1, DTS® 5.1, and uncompressed 7.1 linear PCM audio*
- *Allows stereo audio extraction[6]*
- *Provides up to 150 ms lip-sync audio delay*
- *QuickSwitch HD™ technology manages HDCP keys for fast, reliable switching*
- *Includes comprehensive built-in EDID configuration tools*
- *Provides a 10/100 Ethernet LAN connection*
- *Enables device control via CEC and RS-232[8]*
- *Compact, low-profile surface mount design*
- *Universal 100-240V external power pack included[12]*

The Crestron® HD-MD-400-C-E delivers an incredibly simple and cost-effective multimedia presentation solution for classrooms and meeting spaces. It allows a laptop or mobile device to be connected to one of three inputs at a table or podium, and routes the signal to a display or projector up to 230 feet (70 meters) away. An additional AV source can be connected at the display device location or through an optional wall plate. Fully automatic operation detects when a source is connected or disconnected at any input and turns the display on and off, alleviating the need for any control panels or remotes. Built-in scaling ensures an optimal video image for SD and HD video signals, as well as for high-res computer signals.

Composed of a compact transmitter and receiver pair, the HD-MD-400-C-E installs in minutes and requires no special programming. The transmitter mounts beneath the table or inside the podium, while the receiver mounts behind the display or above the projector. The only connection required between the transmitter and receiver is a single CAT type twisted pair cable.[1] A LAN port on the receiver allows for connection to an Ethernet network to enable easy setup and configuration via a Web browser. Advanced functionality is enabled through integration with a Crestron control system.

Multimedia Computer/AV Auto-Switcher

The HD-MD-400-C-E handles high-definition video and computer sources with resolutions up to Full HD 1080p60, 1080i30, or WUXGA 1920x1200. Two HDMI® inputs, one VGA input, and one analog audio input are provided on the transmitter to support the connection of computers, mobile devices, and other media sources. An additional HDMI input is provided on the receiver, which may be wired to an optional wall plate or used to connect a Crestron AirMedia® wireless presentation gateway or other multimedia source installed permanently at the display device.

The inputs on each component can be configured to switch automatically or be controlled through a Crestron control system. Auto-detection on each input enables plug-and-play simplicity, supporting HDMI, DVI, or Dual-Mode DisplayPort signals via any HDMI input, and VGA, RGB, or component video via the VGA input.[2,3] The analog audio input works in tandem with the VGA input.[4]

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A single HDMI output if provided on the receiver to feed the display device. This output can support either HDMI or DVI signal types.[5] A stereo analog audio output is also included to feed an optional sound bar or amplifier.[6]

HD Signal Extender

A single CAT type cable (sold separately) links the HD-MD-400-C-E transmitter and receiver together. This cable can be up to 230 feet (70 meters) in length, offering an ideal signal extender solution for virtually any room with a single table or podium and one display device.[1]

HD Scaler

One might assume that any modern display device should support whatever sources you connect to it. In fact, many displays just can't handle all the different formats and resolutions you're likely to encounter day-to-day in a dynamic presentation environment. With its built-in professional scaler, the HD-MD-400-C-E enables support for a complete range of digital and analog signals, ensuring that every source displays reliably and beautifully. Automatic calibration is achieved using the display's EDID [7] — just connect the receiver to the display and it intelligently converts and enhances the signal for optimal appearance on the display screen.

EDID Format Management

To ensure that every source gets displayed at its optimal resolution and format, the HD-MD-400-C-E provides comprehensive management of the EDID information that passes between the display, scaler, and source devices. Most applications require no changes to the default settings. For applications requiring custom configuration, the HD-MD-400-C-E allows for easy assessment of each device's format and resolution capabilities, with the ability to configure signals appropriately for the most desirable and predictable behavior.

QuickSwitch HD™ Technology

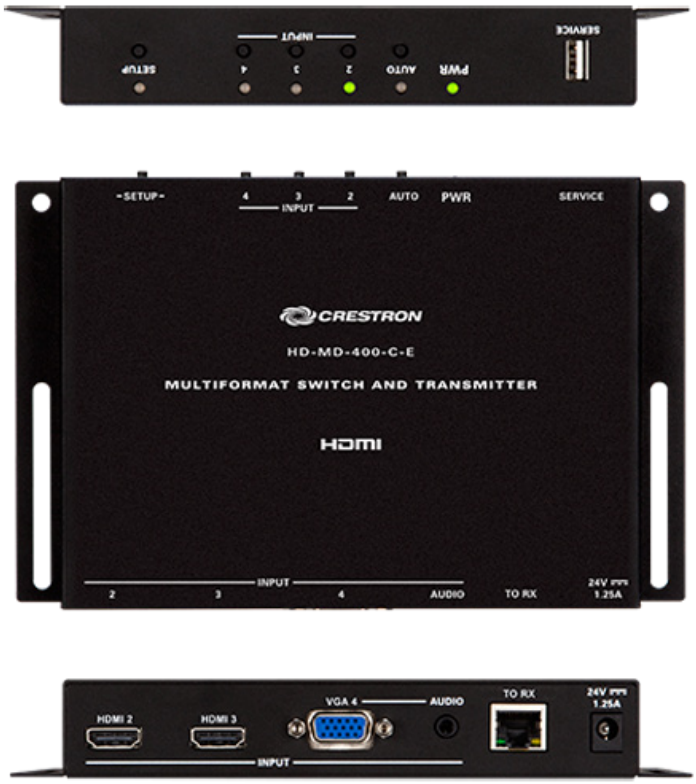
Handling digital media signals means handling HDCP (High-bandwidth Digital Content Protection), the encryption scheme used by content providers to protect their DVDs, Blu-ray™ discs, and broadcast signals against unauthorized copying. Viewing HDCP encrypted content requires a source device to "authenticate" each display and signal processor in the system and issue it a "key" before delivering an output signal. Crestron QuickSwitch HD manages these keys to ensure fast, reliable switching and immunity to "blackouts."

Audio Extracting

Its analog audio output allows the HD-MD-400-C-E to extract the stereo audio signal from digital sources to feed a sound bar, amplified speakers, or a separate sound system.[6]

Embedded Device Control

To deliver fully automatic operation of the complete system, the HD-MD-400-C-E can turn the display device on and off via its HDMI connection using CEC (Consumer Electronics Control) commands, or via the built-in RS-232 port.[8] For advanced applications using a Crestron control system, all of the HD-MD-400-C-E's HDMI and RS-232 ports can be utilized to attain fully-programmable control of the display, sources, and other devices in the room.



HD-MD-400-C-E Transmitter – Top, Front, and Bottom Views

HD-MD-400-C-E Receiver – Top, Front, and Bottom Views

HD-MD-400-C-E HD Scaling Auto-Switcher & Extender 400

Enterprise Management Option

The optional .AV Framework™ Hub (CEN-AVF-HUB [9]) can be added to enable centralized monitoring using Crestron Fusion® Enterprise Management Software. A single "AVF Hub" can support up to 15 HD-MD-400-C-Es connected over an Ethernet LAN. Refer to the CEN-AVF-HUB spec sheet for additional information.

Control System Integration

Fully programmable functionality can be enabled through integration with a Crestron control system.

Low-Profile Installation

The transmitter and receiver components are each designed to be mounted to a flat surface or placed on a shelf. Each component is compact enough to fit discreetly inside a presentation lectern, beneath a table, on a wall behind a flat-panel display, or on the ceiling above a projector. They can even be attached to a single rack rail in the back of an equipment cabinet. Both components are powered together using a single wall mount power pack (included), which may be connected either at the receiver or at the transmitter location. Power is carried between the transmitter and receiver over the signal extension link connection.

Easy Setup

Simplified setup, configuration, and basic operation is provided through a Web browser user interface. Essential controls and status indicators are also provided on each unit for easy testing and troubleshooting without a computer during installation.

SPECIFICATIONS

Video

Switcher: 3x1+1 (3 inputs at transmitter + 1 input at receiver) auto-switching, auto-detecting multi-format digital/analog inputs; Crestron QuickSwitch HD™ technology

Scaler: HD video scaler and deinterlacer, noise reduction, 3:2/2:2 pull-down detection and recovery, aspect ratio selection, VGA phase/clock & H/V position adjustments, picture and RGB color adjustments

Input Signal Types: HDMI® w/Deep Color (DVI & Dual-Mode DisplayPort compatible [2]); VGA/RGB (RGBHV, RGBS, RGsB); component (YPbPr) [3]

Output Signal Types: HDMI w/Deep Color (DVI compatible [5])

Input Resolutions, HDMI, Progressive: 640x480@60/72/75/85Hz, 720x480@60Hz (480p), 720x576@50Hz (576p), 800x600@56/60/72/75/85Hz, 848x480@60Hz, 852x480@60Hz, 854x480@60Hz, 1024x768@60/70/75/85Hz, 1024x852@60Hz, 1024x1024@60Hz, 1280x720@50/60Hz (720p50/60), 1280x768@60Hz, 1280x800@60Hz, 1280x960@60Hz, 1280x1024@60/75/85Hz, 1360x768@60Hz, 1365x1024@60Hz, 1366x768@60Hz, 1400x1050@60Hz, 1440x900@60Hz, 1600x900@60Hz [12], 1600x1200@60Hz, 1680x1050@60Hz, 1920x1080@24/25/50/60Hz (1080p24/25/50/60), 1920x1200@60Hz [12], plus any other resolution up to 165MHz pixel clock

Input Resolutions, HDMI, Interlaced: 720x480@30Hz (480i), 720x576@25Hz (576i), 1920x1080@25/30Hz (1080i25/30), plus any other resolution up to 165MHz pixel clock

Input Resolutions, RGB/VGA, Progressive: 640x480@60/72/75/85Hz, 720x480@60Hz (480p), 720x576@50Hz (576p), 800x600@56/60/72/75/85Hz, 848x480@60Hz, 1024x768@60/70/75/85Hz, 1280x720@50/60Hz (720p50/60), 1280x768@60Hz, 1280x800@60Hz, 1280x960@60Hz, 1280x1024@60/75/85Hz, 1360x768@60Hz, 1366x768@60Hz, 1400x1050@60Hz, 1440x900@60Hz, 1600x1200@60Hz, 1680x1050@50/60Hz, 1920x1080@50/60Hz (1080p50/60), 1920x1200@60Hz [12], plus any other resolution up to 165MHz pixel clock

Input Resolutions, Component, Progressive: 480p, 576p, 720p50, 720p60, 1080p24, 1080p30, 1080p50 (1125 lines), 1080p60

Input Resolutions, Component, Interlaced: 480i, 576i, 1080i25 (1125 lines), 1080i30

Scaler Output Resolutions, HDMI, Progressive: 640x480@60Hz, 720x480@60Hz (480p), 720x576@50Hz (576p), 800x600@60Hz, 840x480@60Hz, 1024x768@60Hz, 1280x720@50/60Hz (720p50/60), 1280x768@60Hz [11], 1280x800@60Hz [11], 1280x960@60Hz, 1280x1024@60Hz, 1360x768@60Hz, 1366x768@60Hz [11], 1400x1050@60Hz [11], 1440x900@60Hz [11], 1600x900@60Hz [12], 1600x1200@60Hz, 1680x1050@60Hz [11], 1920x1080@24/50/60Hz (1080p24/50/60), 1920x1200@60Hz [12]

Scaler Output Resolutions, HDMI, Interlaced: 480i, 576i, 1080i25, 1080i30

Audio

Switcher: 3x1+1 (3 inputs at transmitter + 1 input at receiver) auto-switching

Input Signal Types: HDMI (Dual-Mode DisplayPort compatible), analog stereo

Output Signal Types: HDMI, analog stereo [6]

Digital Formats: Dolby Digital®, Dolby Digital EX, DTS®, DTS-ES, DTS 96/24, LPCM up to 8 channels

Analog Formats: Stereo 2-channel [6]

Analog-To-Digital Conversion: 24-bit 48 kHz

Digital-To-Analog Conversion: 24-bit 48 kHz

Lip-Sync Delay: 0 to 150 ms (maximum delay time is reduced for input signals with sampling rates over 48 kHz)

Analog Output Volume: -80 to +20 dB Level adjustment range, plus Mute

Analog Performance: Frequency Response: 20 Hz to 20 kHz ±0.5 dB;
S/N Ratio: >93 dB, 20 Hz to 20 kHz A-weighted;
THD+N: <0.005% @ 1 kHz;
Stereo Separation: >80 dB

Communications

Ethernet: 10/100 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP, Web browser setup and control, Crestron control system integration

USB: USB Host port for firmware update

RS-232: 2-way device control and monitoring up to 115.2k baud with hardware and software handshaking

IR: (Reserved for future use)

HDMI: HDCP 1.2, EDID, CEC

NOTE: Supports management of HDCP and EDID; supports management of CEC between the connected HDMI devices and a control system

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Connectors – Receiver

HDMI, INPUT 1: (1) 19-pin Type A HDMI female;
HDMI digital video/audio input;
(DVI & Dual-Mode DisplayPort compatible [2])

FROM TX, INPUT 2: (1) 8-pin RJ45 female, shielded;
Signal extension link input port;
Connects to the TO RX port of the companion receiver via CAT5e or Crestron DM-CBL-8G cable [1]

HDMI OUTPUT: (1) 19-pin Type A HDMI female;
HDMI digital video/audio output (DVI compatible [5])

AUDIO L/R: (1) 5-pin 3.5mm detachable terminal block;
Balanced/unbalanced stereo line-level audio output [6];
Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced
Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced

IR: (1) 2-pin 3.5 mm detachable terminal block;
(Reserved for future use)

COM: (1) 5-pin 3.5 mm detachable terminal block;
Bidirectional RS-232 port;
Up to 115.2k baud, hardware and software handshaking support

LAN: (1) 8-pin RJ45 female;
10Base-T/100Base-TX Ethernet port

24VDC 1.25A: (1) 2.1 x 5.5 mm DC power connector;
24 Volt DC power input;
PW-2412WU power pack included [13]

SERVICE: (1) USB Type A female;
For factory use only

Connectors – Transmitter

HDMI, INPUT 2 – 3: (2) 19-pin Type A HDMI female;
HDMI digital video/audio inputs;
(DVI & Dual-Mode DisplayPort compatible [2])

VGA, INPUT 4: (1) HD15 female;
RGB (VGA) or component video input [3];
Formats: RGBHV, RGBS, RGsB, YPbPr

AUDIO, INPUT: (1) 3.5 mm TRS mini phone jack;
Unbalanced stereo line-level audio input [4];
Maximum Input Level: 2 Vrms;
Input Impedance: 44k Ohms

TO RX: (1) 8-pin RJ45 female, shielded;
Signal extension link output port;
Connects to the FROM TX, INPUT 2 port of the companion receiver via CAT5e or Crestron DM-CBL-8G cable [1]

24VDC 1.25A: (1) 2.1 x 5.5 mm DC power connector;
24 Volt DC power input;
PW-2412WU power pack included [13]

SERVICE: (1) USB Type A female;
For factory use only

Controls & Indicators – Receiver

FROM TX, INPUT 2: (2) LEDs, green LED indicates signal extension link status, amber LED indicates video and HDCP signal presence
LAN: (2) LEDs, green LED indicates Ethernet link status, amber LED indicates Ethernet activity
PWR: (1) Bi-color green/amber LED, indicates operating power is supplied from power pack via 24VDC input or link to companion transmitter, turns amber while booting and green when operating
AUTO: (1) Pushbutton to enable/disable auto-switching mode, and (1) green LED to indicate auto-switching mode it enabled
INPUT 1 – 2: (2) Pushbuttons for manual input selection, and (2) bi-color green/amber LEDs to indicate the current active input and signal presence at each corresponding input
SETUP: (1) Red LED and (1) recessed pushbutton for Ethernet setup

Controls & Indicators – Transmitter

TO RX: (2) LEDs, green LED indicates signal extension link status, amber LED indicates video and HDCP signal presence
PWR: (1) Bi-color green/amber LED, indicates operating power is supplied from power pack via 24VDC input or link to companion receiver, turns amber while booting and green when operating
AUTO: (1) Pushbutton to enable/disable auto-switching mode, and (1) green LED to indicate auto-switching mode it enabled
INPUT 2 – 4: (3) Pushbuttons for manual input selection, and (3) bi-color green/amber LEDs to indicate the current active input and signal presence at each corresponding input
SETUP: (1) Red LED and (1) recessed pushbutton for Ethernet setup

Power Requirements

Power Pack: 1.25 Amps @ 24 Volts DC;
100-240 Volts AC, 50/60 Hz power pack, model PW-2412WU included;
NOTE: The power pack connects to either the transmitter or receiver, not both.

Power Consumption: 13 Watts typical

Environmental

Temperature: 32° to 104°F (0° to 40°C)
Humidity: 20% to 90% RH (non-condensing)
Heat Dissipation: 44.3 BTU/hr

Enclosure (x2)

Chassis: Metal, black finish, with (2) integral mounting flanges, vented sides
Mounting: Freestanding, surface mount, or attach to a single rack rail

Dimensions

Receiver: **Height:** 4.94 in (126 mm)
Width: 7.70 in (196 mm)
Depth: 1.11 in (28 mm)

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Transmitter: Height: 5.12 in (130 mm)
Width: 7.70 in (196 mm)
Depth: 1.11 in (28 mm)

Weight

Receiver: 1.30 lb (590 g)
Transmitter: 1.25 lb (567 g)

MODELS & ACCESSORIES

Available Models

HD-MD-400-C-E: HD Scaling Auto-Switcher & Extender 400

Included Accessories

PW-2412WU: Wall Mount Power Pack, 24VDC, 1.25A, 2.1mm, Universal (Qty. 1 included)

Available Accessories

CEN-AVF-HUB: .AV Framework™ Hub
DM-CBL-8G-NP: DigitalMedia 8G™ Cable, non-plenum
DM-CBL-8G-P: DigitalMedia 8G™ Cable, plenum
DM-8G-CONN-WG: Connector with Wire Guide for DM-CBL-8G
DM-8G-CRIMP-WG: Crimping Tool for DM-8G-CONN-WG
DM-8G-CONN: Connector for DM-CBL-8G
DM-8G-CRIMP: Crimping Tool for DM-8G-CONN
CBL Series: Crestron® Certified Interface Cables
MP-WP Series: Media Presentation Wall Plates
MPI-WP Series: Media Presentation Wall Plates - International Version
CNSP-XX: Custom Serial Interface Cable
IRP2: IR Emitter Probe w/Terminal Block Connector
AM-100: AirMedia® Presentation Gateway
CCS-SPK-SB-100: Sound Bar
MP-AMP30: Media Presentation Audio Amplifier

Notes:

1. The maximum cable length for the signal extension link between the transmitter and receiver is 230 feet (70 meters) using Crestron DM-CBL-8G DigitalMedia 8G cable or third-party CAT5e (or better). Shielded cable and connectors are recommended to safeguard against unpredictable environmental electrical noise. All wire and cables are sold separately. The signal extension link is a proprietary interface and is not compatible with HDBaseT®, DigitalMedia™ (DM®), Ethernet, or any other CATx based interface.
2. Each HDMI input requires an appropriate adapter or interface cable to accommodate a DVI or Dual-Mode DisplayPort signal. CBL-HD-DVI interface cables are available separately.
3. The VGA input can accept RGB and component video signals through an appropriate adapter (not included).
4. The analog audio input currently works exclusively with the VGA video input. The ability to pair the analog audio input with an HDMI video input will be enabled through a future firmware update.
5. The HDMI output requires an appropriate adapter or interface cable to accommodate a DVI signal. CBL-HD-DVI interface cables are available separately.
6. The analog stereo audio output is only active when the input is receiving a 2-channel stereo signal via either the analog input or HDMI.
7. EDID (Extended Display Identification Data) is data embedded in an HDMI, DVI, or VGA signal that enables the display device to tell the scaler what resolutions and formats it can support, allowing the scaler to configure itself automatically to feed an optimal output signal to the display.
8. IR control capability will be enabled through a future firmware update.
9. Item(s) sold separately.
10. Supports any input resolution and scan rate that has a pixel clock of 165 MHz or lower.
11. With or without reduced blanking.
12. With reduced blanking only.
13. The transmitter and receiver are powered together by a single wall mount power pack (included), which may be connected to either the transmitter or receiver, not both.

This product may be purchased from an authorized Crestron dealer. To find a dealer, please contact the Crestron sales representative for your area. A list of sales representatives is available online at www.crestron.com/salesreps or by calling 800-237-2041.

The specific patents that cover Crestron products are listed online at: patents.crestron.com.

Certain Crestron products contain open source software. For specific information, please visit www.crestron.com/opensource.

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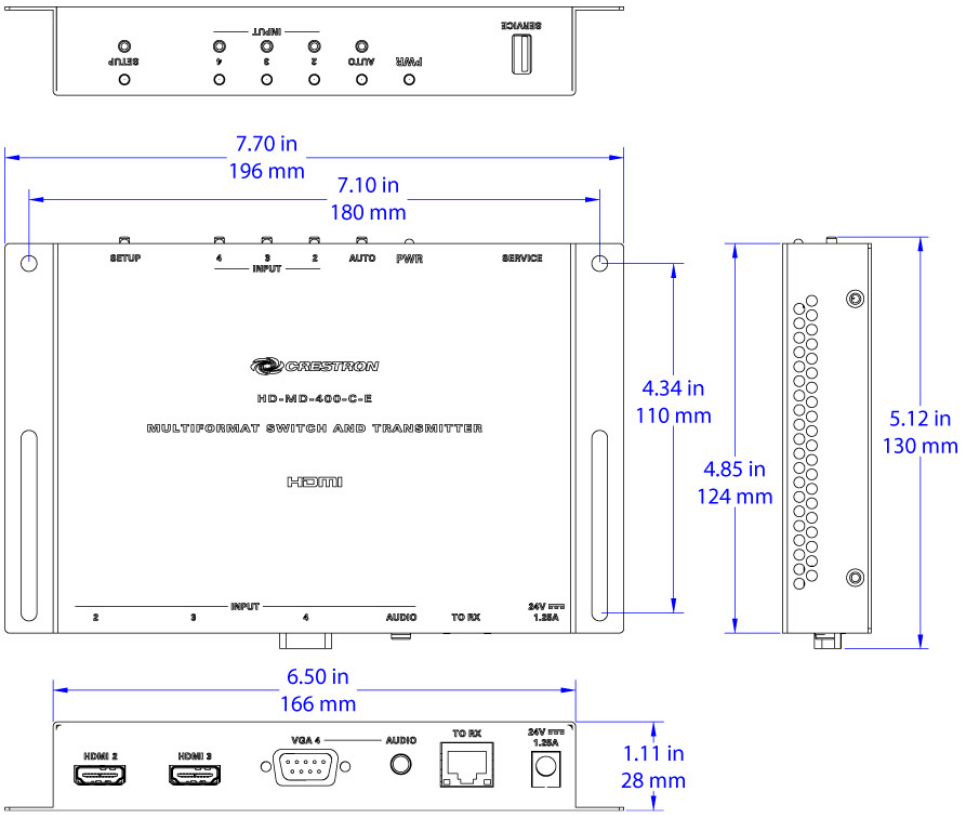

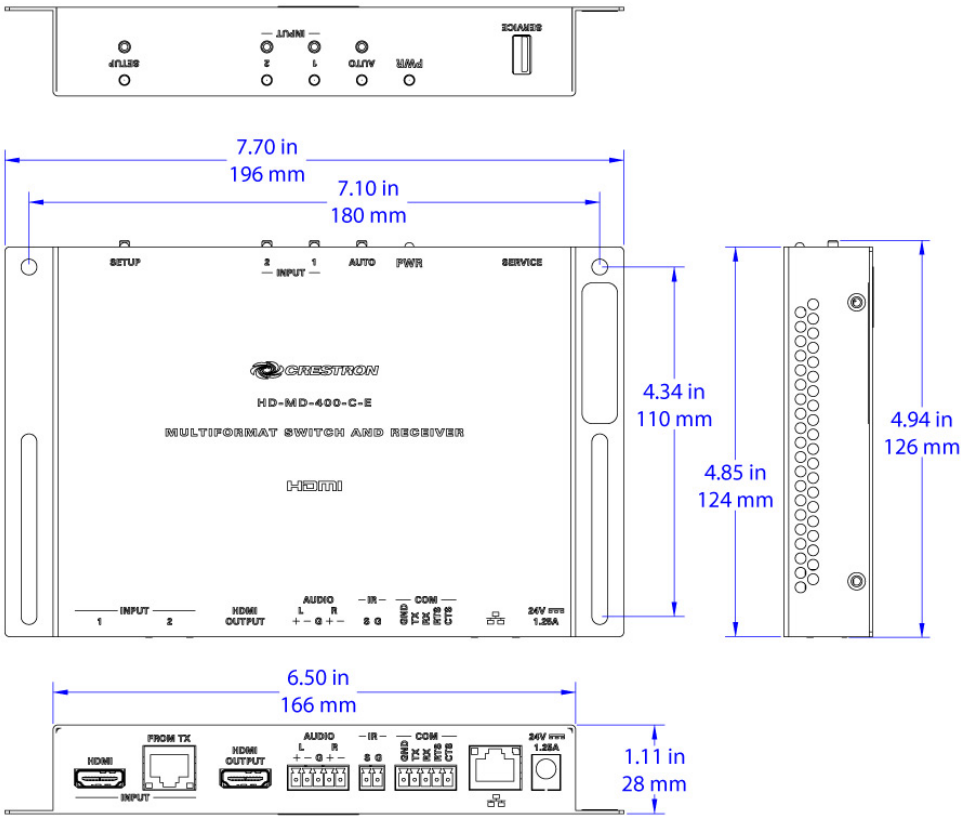

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