Emerald®
KVM over IP

High-Performance KVM Platform

The award-winning Emerald® KVM over IP extension and matrix switching platform, developed and manufactured by Black Box®, ushers in a new era in KVM technology - eliminating sacrificed performance, compromised solutions, and fractured networks. Emerald can be operated as a point-to-point extension or an IP-based KVM matrix switching system that supports pixel-perfect HD and 4K video signals, high-speed USB 2.0, and bidirectional analog audio. It also provides access to both physical and virtual machines via RDP/RemoteFX or PCoIP. With Emerald, you are ready for the future - no matter what form it takes.

Ideal for a Wide Range of Industries
Emerald's flexibility and scalability make it ideal for various industries, including 24/7 command and control rooms, medical imaging, and process monitoring environments.

Command and Control Rooms

Broadcast and Post-Production

Medical

Air Traffic Control and ATM

Public Safety

Industrial

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Emerald Benefits

Point-to-Point Extension or Matrix Switching
Start small with a simple point-to-point extension and grow your system to a high-performance KVM matrix. Combine HD and 4K transmitter and receiver units, connect them to an IP switch, and add the Boxilla® KVM Manager to your system as it grows beyond 32 endpoints.

Pixel-Perfect 4K 60 Hz Video over IP
Extend and switch pixel-perfect HD (DVI), or 4K (DisplayPort™ 1.2) video, high-speed USB 2.0, and bidirectional analog audio. Choose from five video compression settings to balance video quality and bandwidth consumption.

Virtual Machine Access
Provide BIOS-level, high-speed KVM access to virtual machines from all Emerald® receiver models. Emerald supports VMware® and Microsoft® products using RDP/ RemoteFX or PCoIP/PCoIP Ultra without the need for additional receivers. For VM sharing, use the Emerald GE Gateway that allows up to eight Emerald receivers/users to access and collaborate on one virtual machine.

Flexible, Redundant Network Connectivity
Emerald PE and 4K extenders provide redundant network ports that enable signal transmission over CATx, fiber, an IP network, or even the internet. Redundant network ports allow for fast, automated switchover in case one connection is lost.

Award-Winning KVM Management
Centrally manage your complete KVM network through the user-friendly, web-based KVM management platform, Boxilla. Monitor bandwidth consumption, control user access, and receive automated system alerts - all from your preferred web browser.

Remote App and ZeroU Transmitters
The Emerald Remote App turns any Windows® 10 or 11 device into a software KVM receiver, allowing users to monitor devices remotely and without additional hardware. Use the USB-powered ZeroU Transmitters to save valuable rack space.

Rich Set of APIs for Advanced Control
Use ControlBridge®, Lawo VSM, or any third-party control system to switch between sources or to select application presets. This allows simple and flexible operation - even within complex control room settings - and full management of the Emerald system.

Reliable and Interoperable System Components
The Emerald product family consists of a variety of extender models that are fully interoperable with each other, regardless of whether they use HD or 4K video. Other optional components to enhance your KVM system, such as 1, 10, or 100 Gbps IP switches, SFP(+) modules, a switchable USB 2.0 extender, mounting kits, interface adapters, and a central power hub, are also available.
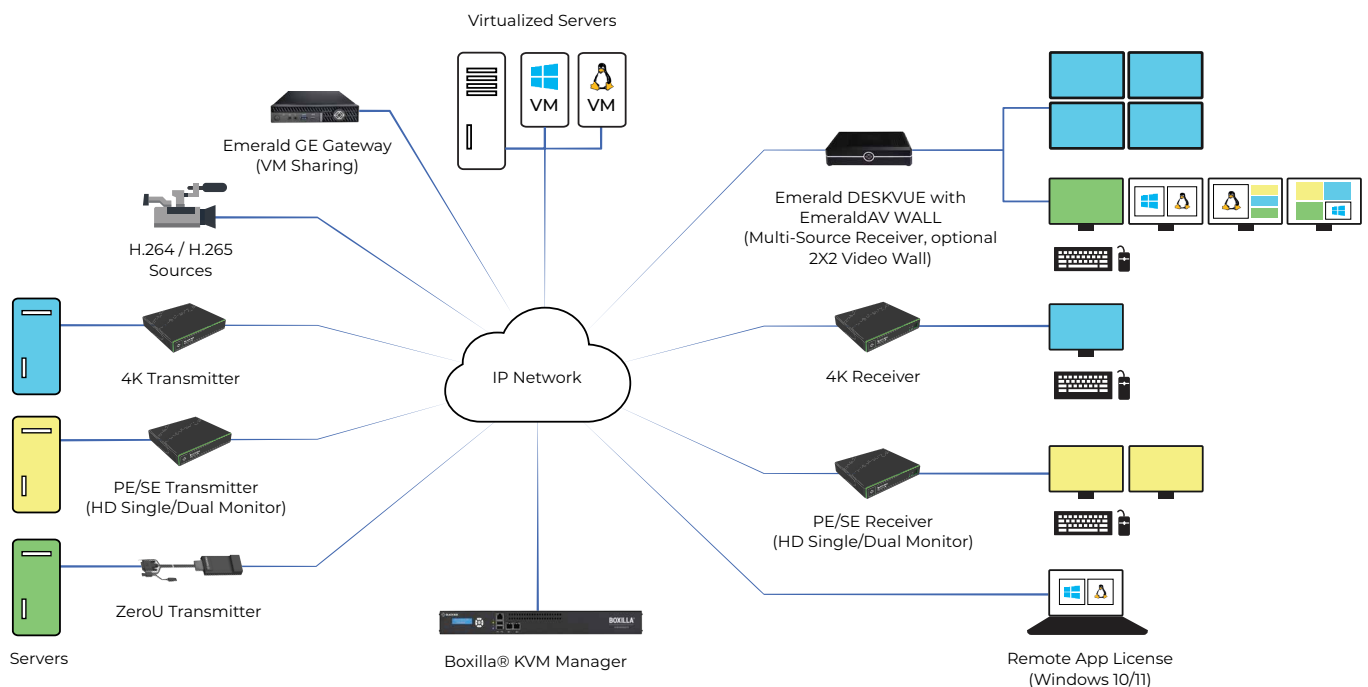

Fig 1.: Emerald matrix switching setup connects multiple source PCs, virtual machines, and user workstations

Emerald System Highlights

High-Quality Video with Low-Bandwidth Consumption

Emerald® receivers and transmitters deliver up to pixel-perfect 4K 60 Hz video resolutions. The management GUI lets you choose from five video compression settings, including highly compressed (35 Mbps, 1080p at 60 fps) and pixel perfect (450 Mbps, 1080p at 60 fps). For pixel-perfect 4K at 60 Hz 4:4:4 video transmission, a 10-Gbps connection is required.

Virtual Machine Connectivity

With Emerald, VM connectivity is brought to a whole new level. Access VMware® and Microsoft® VMs over RDP 8.1/Remote FX or PCoIP/PCoIP Ultra in real time and provide a high-quality user experience across any given distance. By adding the VMs to a matrix setup, multiple users can switch seamlessly between various physical and virtual desktops without noticing the difference. Connecting VMs to the Emerald IP Switch eliminates the need for additional transmitter units. If more advanced collaboration is required, add the Emerald GE Gateway to the Emerald network and allow up to eight users simultaneous access to the same VM.
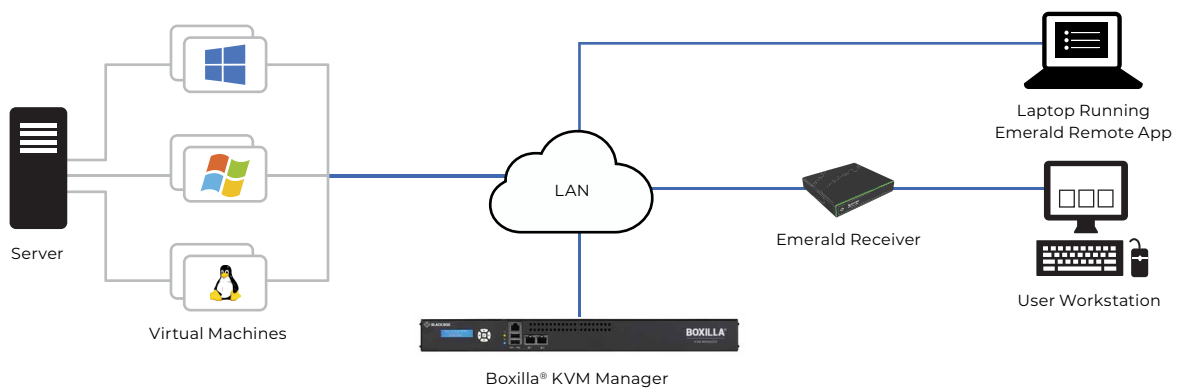
Server

Virtual Machines

LAN

Boxilla® KVM Manager

Emerald Receiver

Laptop Running
Emerald Remote App

User Workstation

Fig.2: Virtual machines connected in an Emerald KVM Matrix

Resilience and Network Management

For fail-safe operation and maximum uptime, Emerald® provides network resiliency at every level — all the way up to complete switchover from one control room to a backup control room location. If your system requires more ports, simply add or cascade IP switches.

- Redundant network connectors (Emerald PE and 4K) feature instant switchover in case one network connection fails.
- Use the central power supply to keep your devices' power status monitored and provide a redundant power supply.
- Emerald PE Extenders support Power over Ethernet (PoE) for additional power redundancy at the extender level.
- Never miss a critical event or run out of bandwidth with Boxilla's extended KVM status dashboard and automated alerts.
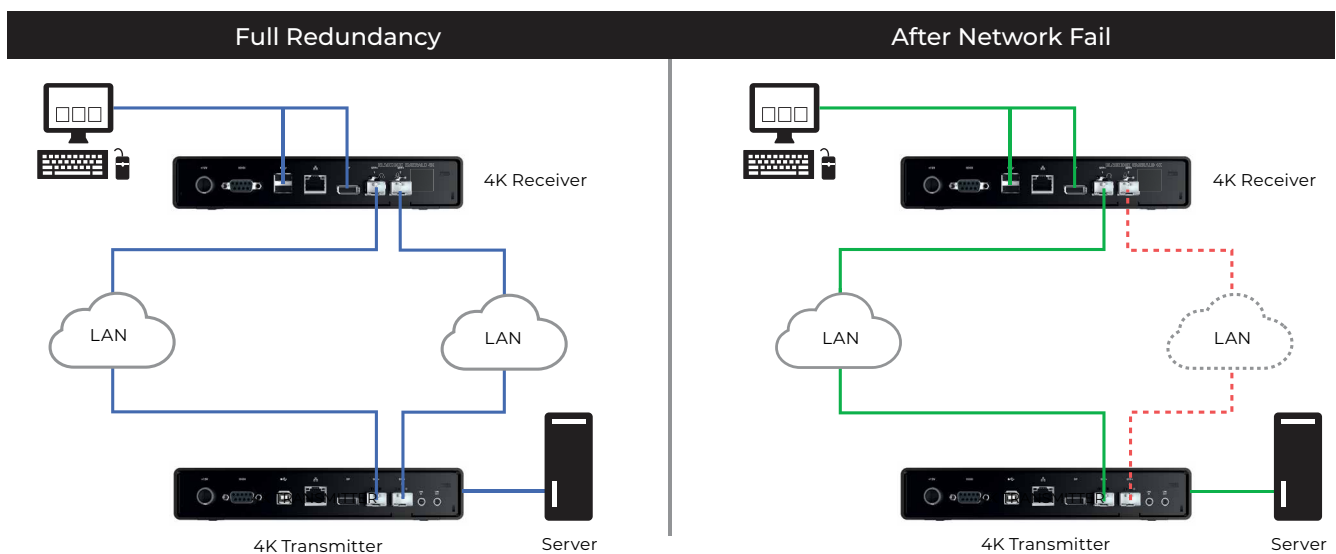

Full Redundancy	After Network Fail

4K Receiver

LAN

LAN

4K Transmitter

Server

Fig. 3: Redundant network paths provide fail-safe operation

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Emerald KVM over IP Product Family

Emerald 4K

Emerald® 4K transmitters and receivers connect users and computers through a point-to-point connection or an IP-based KVM matrix switching network. The 4K KVM units support various video resolutions up to 4K, high-speed USB 2.0 devices, and bidirectional analog stereo audio through redundant SFP+ ports. Emerald enables remote, BIOS-level computer access to both physical and virtual machines.
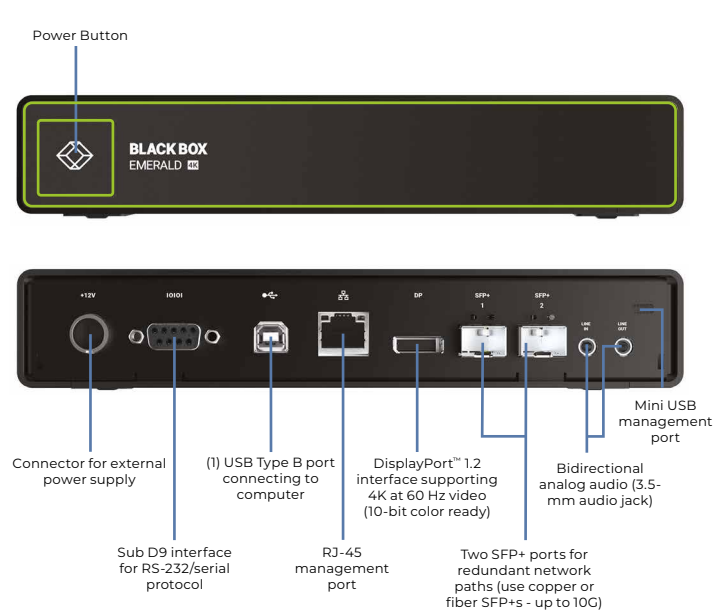
- Switch and extend up to pixel-perfect 4K video (lossless compression, 10-bit color ready); bidirectional analog audio; and up to four USB devices (HID and/or high-speed, transparent USB 2.0), such as keyboards, mice, Wacom® tablets, touch interfaces, and flash drives.

- Connect Emerald 4K Receiver units with any other type of Emerald Transmitter unit (PE, SE, and ZeroU) as well as virtual machines in a single system. All 4K and HD models are fully interoperable with each other.

- EDID pass-through feature supports a wide range of resolutions, ensuring video signals display correctly at all times.

- Build a KVM matrix that supports up to 32 endpoints through the built-in management interface, or use the Boxilla® KVM Manager to create even larger matrices.

- Transmit KVM signals over IP and securely access critical devices over a WAN or the internet.

- Get real-time virtual machine access via RDP 8.1/ RemoteFX or PCoIP.

- OS-agnostic technology allows you to connect any system, including Windows®, Mac OS®, or Linux®.

- Connect via dual network ports for fail-safe operation.

- Provides Active Directory support.

- Supports extension distances of up to 328 feet (100 meters) over CATx, 984 feet (300 meters) over multimode fiber, or 6.2 miles (10 kilometers) over single-mode fiber.

- Combine with Switchable USB Extenders (EMD100USB) to extend and switch USB 2.0 signals up to 480 Mbps.

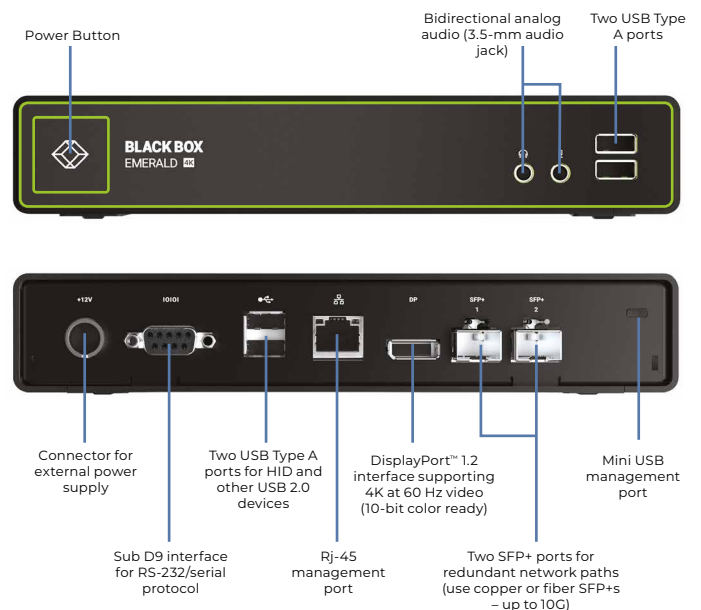- Also available as a TX/RX kit that includes SFP+ modules (EMD4000-KIT)

Emerald 4K Technical Specifications and Interfaces

Product Code	Video Heads	Max Resolution	USB Ports	Network Ports	Serial/Analog Audio	Power Connectors
EMD4000T	(1) DisplayPort™ 1.2	4096 X 2160 at 60 Hz	(1) USB 2.0 Type B	(1) RJ-45, (2) SFP+	(1) DB9, (2) 3.5-mm audio jack	(1) 12-VDC, 3A
EMD4000R	(1) DisplayPort™ 1.2	4096 X 2160 at 60 Hz	(4) USB 2.0 Type A	(1) RJ-45, (2) SFP+	(1) DB9, (2) 3.5-mm audio jack	(1) 12-VDC, 3A

Emerald 4K Transmitter (EMD4000T)

Power Button

Connector for external power supply

Sub D9 interface for RS-232/serial protocol

(1) USB Type B port connecting to computer

RJ-45 management port

DisplayPort™ 1.2 interface supporting 4K at 60 Hz video (10-bit color ready)

Two SFP+ ports for redundant network paths (use copper or fiber SFP+s - up to 10G)

Bidirectional analog audio (3.5-mm audio jack)

Mini USB management port

Emerald 4K Receiver (EMD4000R)

Power Button

Bidirectional analog audio (3.5-mm audio jack)

Two USB Type A ports

Connector for external power supply

Sub D9 interface for RS-232/serial protocol

Two USB Type A ports for HID and other USB 2.0 devices

Rj-45 management port

DisplayPort™ 1.2 interface supporting 4K at 60 Hz video (10-bit color ready)

Two SFP+ ports for redundant network paths (use copper or fiber SFP+s – up to 10G)

Mini USB management port

Emerald PE

Emerald® PE transmitters and receivers are ideal extenders for customers seeking superior KVM performance, system redundancy, and crystal-clear HD video. Extend and switch pixel-perfect DVI or DisplayPort™ video up to 1920 x 1200 at 60 Hz, high-speed USB 2.0 devices, and bidirectional analog stereo audio through redundant network ports. With a similar feature set as Emerald 4K units, these extenders are ideal for critical 24/7 applications including process monitoring, broadcast production, and medical imaging. Emerald PE is available as a single-head or dual-head version.

- Switch and extend up to pixel-perfect HD video (lossless compression), bidirectional analog audio, and up to four USB devices.

- Connect Emerald PE Transmitter units with any type of Emerald Receiver unit (4K and SE) as well as virtual machines in a single system. All 4K and HD models are fully interoperable with each other.
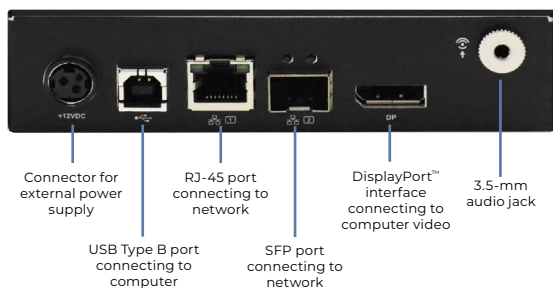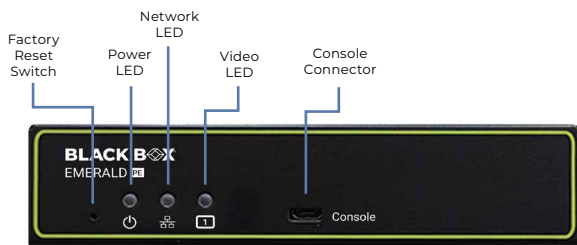
- EDID pass-through feature supports a wide range of resolutions, ensuring video signals display correctly at all times.

- Choose from five video compression settings to balance video quality and bandwidth consumption.

- Transmit KVM signals over IP and securely access critical devices over a WAN or the internet.

- Get real-time virtual machine access via RDP 8.1/ RemoteFX.

- Connect via dual network ports – (1) RJ-45 and (1) SFP – for fail-safe operation.

- Extend KVM signals 328 feet (100 meters) over CATx, 984 feet (300 meters) over multimode fiber, or 6.2 miles (10 kilometers) over single-mode fiber.
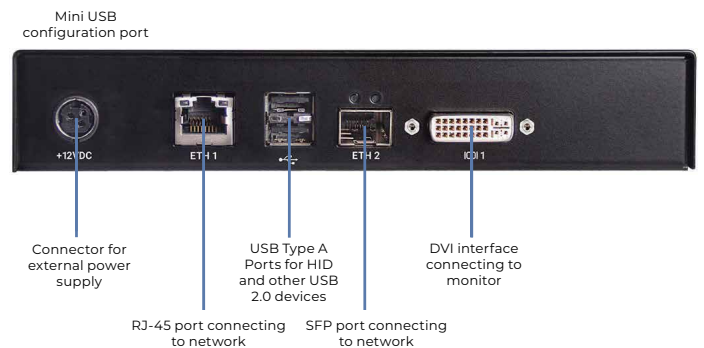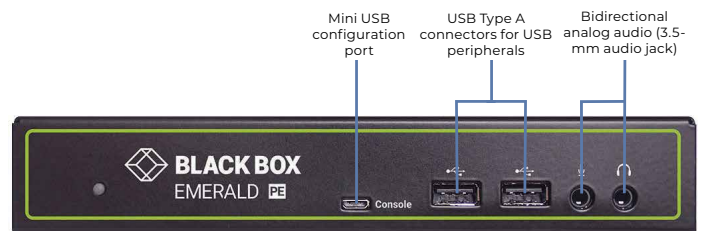
Emerald PE Technical Specifications and Interfaces

Product Code	Video Heads	PoE Support	Max Resolution	USB Ports	Network Ports	Serial/Analog Audio	Power Connectors
EMD2000PE-T-R2	(1) DVI	Yes	1920 X 1200 at 60 Hz	(1) USB 2.0 Type B	(1) RJ-45, (1) SFP	(1) DB9, (2) 3.5-mm audio jack	(1) 12-VDC, 3A
EMD2000PE-R-P	(1) DVI	Yes	1920 X 1200 at 60 Hz	(4) USB 2.0 Type A	(1) RJ-45, (1) SFP	(1) DB9, (2) 3.5-mm audio jack	(1) 12-VDC, 3A
EMD2002PE-T-R2	(2) DVI	Yes	1920 X 1200 at 60 Hz	(4) USB 2.0 Type A	(1) RJ-45, (1) SFP	(1) DB9, (2) 3.5-mm audio jack	(1) 12-VDC, 3A
EMD2002PE-R-P	(2) DVI	Yes	1920 X 1200 at 60 Hz	(4) USB 2.0 Type A	(1) RJ-45, (1) SFP	(1) DB9, (2) 3.5-mm audio jack	(1) 12-VDC, 3A
EMD2000PE-DP-T	(1) DisplayPort™	No	1920 X 1200 at 60 Hz	(1) USB 2.0 Type B	(1) RJ-45, (1) SFP	(1) DB9, (2) 3.5-mm audio jack	(1) 12-VDC, 3A
EMD2002PE-DP-T	(2) DisplayPort	No	1920 X 1200 at 60 Hz	(1) USB 2.0 Type B	(1) RJ-45, (1) SFP	(1) DB9, (2) 3.5-mm audio jack	(1) 12-VDC, 3A

Emerald PE DisplayPort™ Transmitter (EMD2000PE-DP-T)

Factory Reset Switch
Power LED
Network LED
Video LED
Console Connector

Console

Connector for external power supply
USB Type B port connecting to computer
RJ-45 port connecting to network
SFP port connecting to network
DisplayPort™ interface connecting to computer video
3.5-mm audio jack

Emerald PE DVI Receiver (EMD2000PE-R-P)

Mini USB configuration port
USB Type A connectors for USB peripherals
Bidirectional analog audio (3.5-mm audio jack)

Mini USB configuration port

Connector for external power supply
RJ-45 port connecting to network
USB Type A Ports for HID and other USB 2.0 devices
SFP port connecting to network
DVI interface connecting to monitor

Emerald SE

Emerald® SE transmitters and receivers are your entry into the world of KVM over IP. Extend and switch DVI or DisplayPort™ video up to HD resolutions, USB 2.0 devices, and bidirectional analog stereo audio. Pair transmitter and receiver units to create a P2P connection or build an IP-based KVM matrix switching setup. Take advantage of the USB-powered ZeroU Transmitter that saves valuable rack space. Or add licenses for the Emerald Remote App to connect an Emerald SE transmitter directly to any Windows® 10 or 11 device - without the need for an additional hardware receiver unit. Emerald SE is available as a single-head or dual-head version.
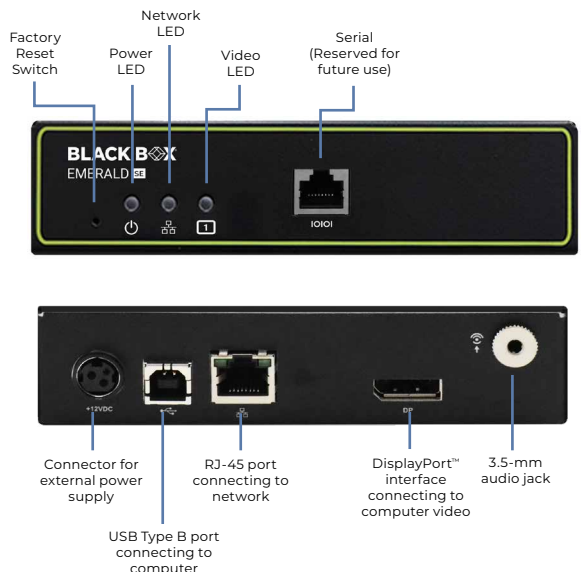
- Switch and extend up to visually lossless HD video and up to four USB devices (HID and/or high-speed, transparent USB 2.0).

- Connect Emerald SE Transmitter units with any other type of Emerald Receiver unit (4K and PE) as well as virtual machines in a single system. All 4K and HD models are fully interoperable with each other.

- Choose from five video compression settings to balance video quality and bandwidth consumption.

- EDID pass-through feature ensures video signals display correctly at all times.

- Build a KVM matrix that supports up to 32 endpoints through the built-in management interface, or use the Boxilla® KVM Manager to create even larger matrices.

- Transmit signals over IP and securely access critical devices over a WAN or the internet at very low bandwidth consumption.

- OS-agnostic technology allows you to connect any system, including Windows, Mac OS®, or Linux®.

- Get real-time virtual machine access via RDP 8.1/RemoteFX.

- Supports Active Directory (Boxilla required).

- Supports point-to-point extension distances of up to 328 feet (100 meters) over CATx.

- Remote App KVM Receiver licenses for one, five, 10, or 20 connections available (Boxilla required).

- USB-powered ZeroU Transmitter unit available that saves rack space.

- Combine with Switchable USB Extenders (EMD100USB) to extend and switch USB 2.0 signals up to 480 Mbps.
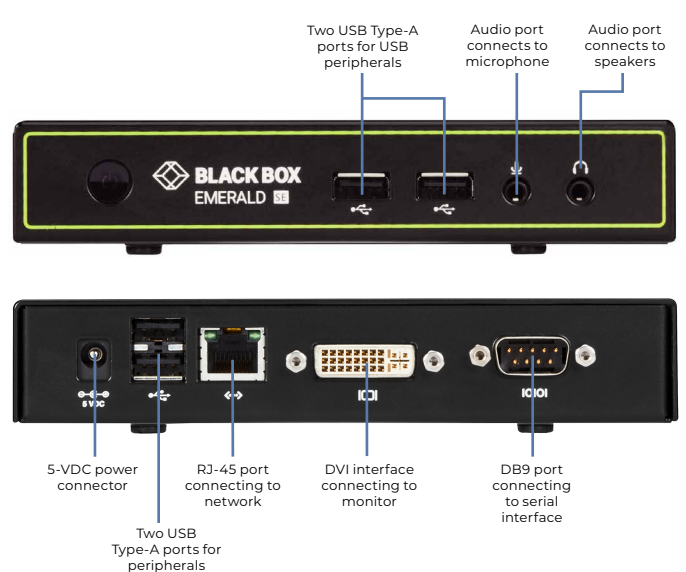
Emerald SE Technical Specifications and Interfaces

Product Code	Video Heads	Max Resolution	USB Ports	Network Ports	Serial/Analog Audio	Power Connectors
EMD2000SE-T-R2	(1) DVI	1920 X 1200 at 60 Hz	(1) USB 2.0 Type B	(1) RJ-45	(1) RJ-45 serial, (2) 3.5-mm audio jacks	(1) 5-VDC, 4A
EMD2000SE-R	(1) DVI	1920 X 1200 at 60 Hz	(4) USB 2.0 Type A	(1) RJ-45	(1) DB9 serial, (2) 3.5-mm audio jacks	(1) 5-VDC, 4A
EMD2002SE-R	(2) DVI	1920 X 1200 at 60 Hz	(4) USB 2.0 Type A	(1) RJ-45	(1) DB9 serial, (2) 3.5-mm audio jacks	(1) 5-VDC, 4A
EMD2000SE-DP-T	(1) DisplayPort™	1920 X 1200 at 60 Hz	(1) USB 2.0 Type B	(1) RJ-45	(1) RJ-45 serial, (2) 3.5-mm audio jacks	(1) 5-VDC, 4A
EMD2002SE-DP-T	(2) DisplayPort	1920 X 1200 at 60 Hz	(1) USB 2.0 Type B	(1) RJ-45	(2) 3.5-mm audio jacks	(1) 5-VDC, 4A

Emerald SE transmitter (EMD2000SE-T-R2)

Factory Reset Switch
Power LED
Network LED
Video LED
Serial (Reserved for future use)

Connector for external power supply
USB Type B port connecting to computer
RJ-45 port connecting to network
DisplayPort™ interface connecting to computer video
3.5-mm audio jack

Emerald SE Receiver (EMD2000SE-R)

Two USB Type-A ports for USB peripherals
Audio port connects to microphone
Audio port connects to speakers

5-VDC power connector
Two USB Type-A ports for peripherals
RJ-45 port connecting to network
DVI interface connecting to monitor
DB9 port connecting to serial interface

Emerald DESKVUE

KVM users today need to view, monitor, and interact with multiple clients that can reside on various networks with different work information like post-production editing, IPTV, live feeds, email, and rendering jobs.

Emerald® DESKVUE KVM over IP enables these users to arrange their individual workspace for optimal simultaneous interaction with up to 16 different systems. It connects to physical systems via Emerald transmitters, Virtual Machines using RDP, PCoIP, PCoIP ultra, standard H.264/265, and Virtual Network Computing (VNC).

The Emerald DESKVUE receiver - as part of the Emerald KVM family and Boxilla® KVM Manager - uniquely allows users to tailor their own workspace by connecting a single keyboard, mouse, audio, and up to four 4K monitors, with one of the four supporting 5K. Each system's information can be positioned across the screens with predefined layouts and freely movable windows. To interact with each system, simply move the mouse over the window. Each operator has situational awareness and control via a personalized workspace.

- Interact with up to 16 systems simultaneously.
- Connect to physical systems via Emerald transmitters, and Virtual Machines using RDP, PCoIP (Ultra), H.264/5, and VNC.
- Freely place and size your your systems across up to four 4K monitors (one monitor can be 5K); view and interact with them in the most efficient way.
- Attach up to four HDMI™ screens with resolutions up to 5120 x 1440, or work with ultra-wide curved monitors.

- Provides highly Secure KVM over IP.
- Fully integrates with Emerald Extenders and the Boxilla KVM manager for device configuration, monitoring, and authentication.

Emerald®AV WALL is a software feature of DESKVUE that displays a single source from an Emerald DESKVUE user station on a 2x2 video wall. Any Emerald user can control the target source and share the result with the group.

- Send content from a single source to a 2x2 video wall.
- Seamlessly integrates with Emerald and Boxilla.
- Expandable, add further video wall displays through additional Emerald DESKVUE/AV WALL units.
- Less complex, video wall processing controlled via Boxilla KVM Manager

Learn more at **blackbox.com/deskvue** ›

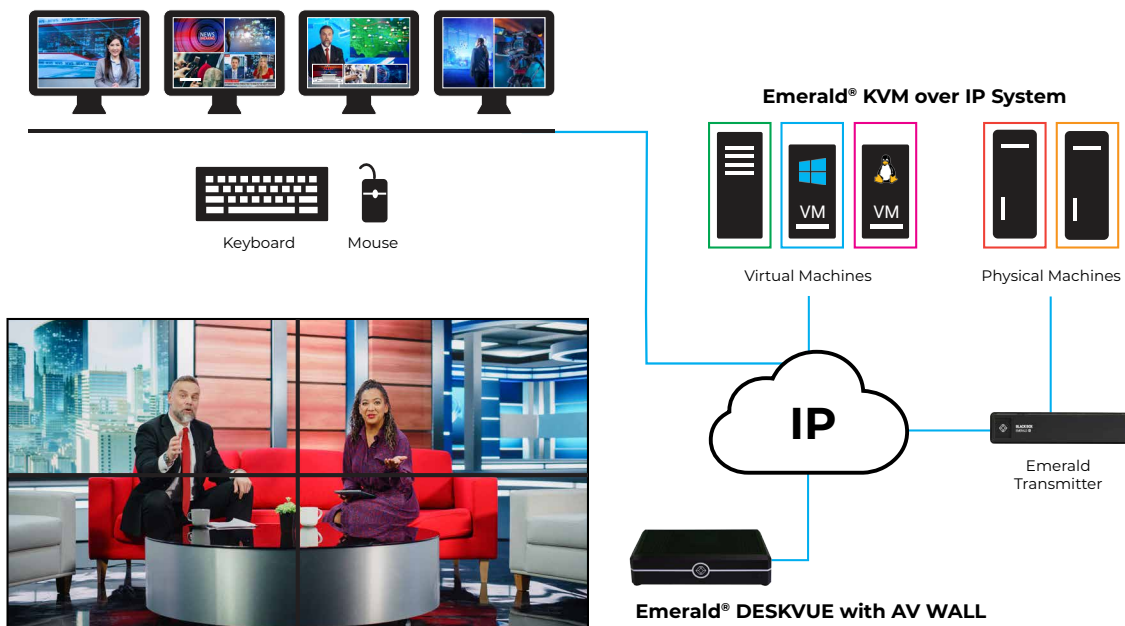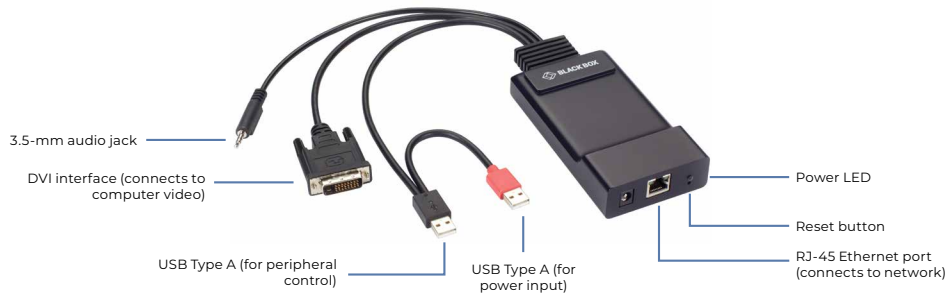| Product Code	Description
EMD5004-R	Emerald DESKVUE Receiver 4K/Quad Monitor

Fig. 5: Concept diagram EmeraldAV WALL combined with Emerald and Emerald DESKVUE

Emerald ZeroU Transmitters

The small form factor Emerald® ZeroU DVI or DisplayPort™ Transmitters consume zero rack space, enabling you to add more critical IT equipment to your data center. These transmitters work with all Emerald receivers to provide a seamless desktop experience anywhere on a TCP/IP network while allowing the actual hardware to be securely housed in a corporate data center. They support visually lossless full HD 1080p video, audio, and USB for HID devices. The DisplayPort™ model supports embedded DisplayPort™ audio.

- Small form factor transmitters are barely bigger than today's average cell phone.
- Connect Emerald ZeroU Transmitters with any type of Emerald Receiver unit (4K, PE, and SE) in a single system. All 4K and HD models are fully interoperable with each other.
- Support HD DVI or DisplayPort™ video up to 1920 x 1200 at 60 Hz.
- Power over USB eliminates the need for extra cables.

Product Code	Video Heads	Max Resolution	USB Ports	Network Ports	Audio	Power Connectors
EMD200DV-T	(1) DVI	1920 X 1200 at 60 Hz	(1) USB HID and (1) USB for power input	(1) RJ-45	(1) 3.5-mm audio jack	(1) 5-VDC, 4A
EMD200DP-T	(1) DisplayPort™	1920 X 1200 at 60 Hz	(1) USB HID and (1) USB for power input	(1) RJ-45	Embedded DisplayPort™ audio	(1) 5-VDC, 4A

Emerald Remote App

The Emerald Remote App is a license-enabled KVM application that allows remote computer access through Emerald PE and Emerald SE transmitters and the use of virtual machines from any Windows® 10 or 11 device in full HD resolution. Through the Remote App, multiple connections can be launched simultaneously, which makes remote monitoring of connected devices even more flexible. Simply add a license for one, five, 10, or 20 connections to your Boxilla® KVM Manager.

- Provides secure software KVM connection from Windows® 10/11-based PCs or laptops.
- Supports video resolutions up to 1920 x 1200, audio, and USB HID.

- Open up to 9 connections simultaneously to manage and view multiple sources.
- Access KVM resources over VPN.
- Save the location and size of connection windows.
- Connect to Emerald PE, SE, and ZeroU Transmitter units as well as virtual machines.
- OS-agnostic technology allows you to connect any system, including Windows, Mac OS®, or Linux®.
- Requires Boxilla KVM Manager for license management.

Download the Remote App Demo for free at
blackbox.com/emerald ›

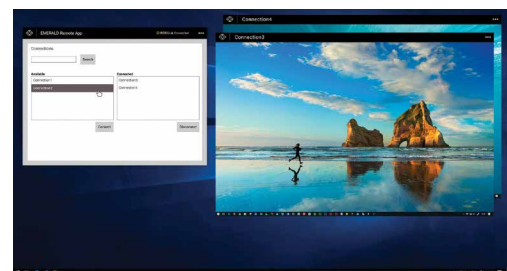| Product Code	Description
EMDRM1-LIC	Emerald Remote App – license for one connection
EMDRM5-LIC	Emerald Remote App – license for five connections
EMDRM10-LIC	Emerald Remote App – license for 10 connections
EMDRM20-LIC	Emerald Remote App – license for 20 connections
EMDRMDEMO-LIC	Emerald Remote App – 30-day demo license for four connections

Fig. 5: Remote App runs multiple KVM connections simultaneously

Boxilla KVM Manager

Boxilla® is a centralized KVM management appliance that enables remote management and monitoring of your complete enterprise KVM network. When connected to an Emerald® KVM Matrix, Boxilla provides a user-friendly web-based GUI that allows users to auto-detect and connect new endpoints, update firmware, adjust bandwidth consumption, set up automated security alerts, and much more. Boxilla comes with multiple license types to accommodate different KVM network sizes.

- Manage deployments and user access rights, monitor KVM status, upgrade firmware, facilitate troubleshooting, and provide network security - all from one central command center dashboard.

- Provides auto device discovery and configuration and advanced user authentication.

- Supports Active Directory for user authentication and mapping to groups.

- Enables connections between multiple Black Box® KVM systems, such as DKM and Emerald.

- Dual network ports allow management of Boxilla via a second network.

- Add redundant Boxilla devices to a KVM matrix for enhanced network security.

- Zoning of receivers and connections allows users to access target computers based on the location they login from.

- Manage Emerald systems over multiple sites (NAT).
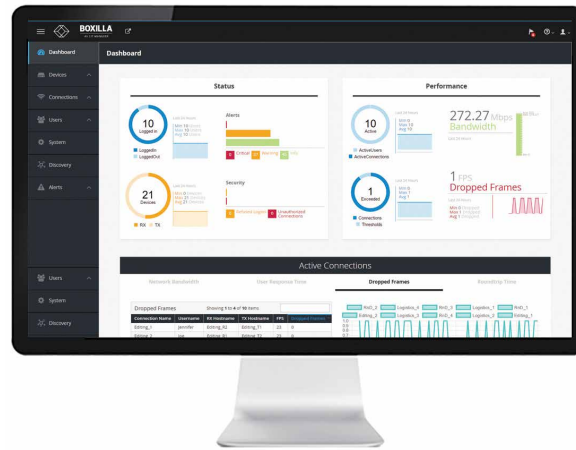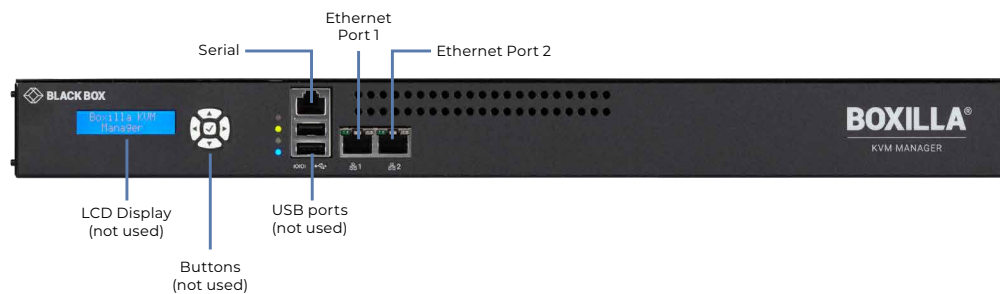
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Fig. 6: Boxilla's web browser-based user interface

Product Code	Description
BXAMGR-R2	KVM management platform that supports 25 end points
BXAMGR-R2-X [1]	KVM management platform that supports 75, 125, 225, 325, or unlimited endpoints
BXAMGR-LIC-X [2]	Licenses for 25, 100, 200, 300, or unlimited additional endpoints on top of what manager already supports
BXAMGR-LICBAK-X [3]	Licenses for 25, 100, 200, or 300 additional active and standby end points on top of what manager already supports

(1) X = 75, 125, 225, 325, ULT
(2) X = 25, 100, 200, 300, ULT
(3) X = 25, 100, 200, 300

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Emerald GE Gateway

Emerald® GE simply connects to the Emerald IP network giving multiple Emerald users enhanced connectivity with Virtual Machine (VM) sharing and physical machine access, saving the costs of PCoIP/PCoIP Ultra clients. Up to eight users can simultaneously access and collaborate on the same virtual machine with a seamless desktop experience, which is no different when compared to connecting to a physical computer. Users obtain low-latency, real-time remote access with lossless pixel-perfect video up to 4K.

• Better collaboration through VM sharing – up to eight users.

• Best remote desktop supporting RDP, PCoIP, and PCoIP Ultra protocols delivering a seamless, secure user experience with up to 4K video.

• Simplified workflows with access to both physical computers and VMs.

• Centralized management and system monitoring through integration with the Boxilla® KVM Manager.

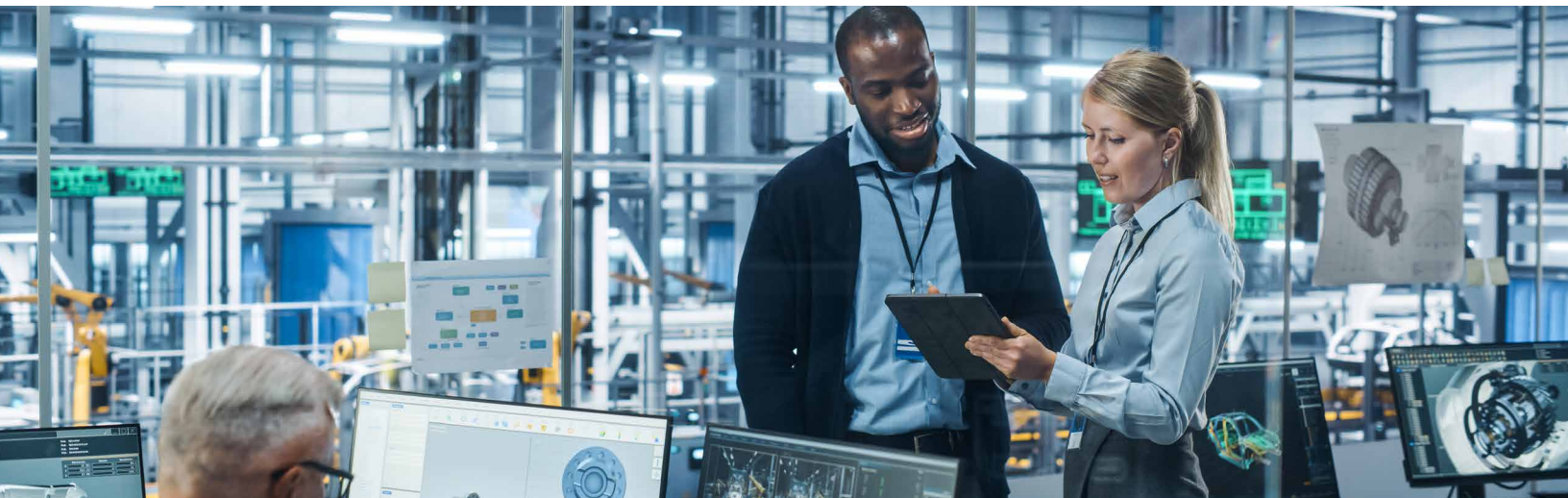• Cost-efficient remote access saving costs on multiple PCoIP clients.

Product Code	Description
EMD3000GE	Emerald GE Gateway

EMD3000GE

Emerald Comparison Chart

Product Code	Emerald Remote App	Emerald ZeroU TX	Emerald SE	Emerald PE	Emerald 4K	Emerald DESKVUE
Max Video Resolution	1920 x 1200 at 60 Hz	1920 x 1200 at 60 Hz (DVI or DisplayPort™)	1920 x 1200 at 60 Hz (DVI or DisplayPort)	1920 x 1200 at 60 Hz (DVI or DisplayPort)	4096 x 2160 at 60 Hz (DisplayPort™ 1.2)	(3) 4096 x 2160 at 60 Hz (HDMI™) and (1) 5120 x 1440 (USB-C)
Video Quality	High quality ~35fps	Visually lossless	Visually lossless	Pixel perfect	Pixel perfect	Visually lossless
Dual-Monitor Version Available	—	—	yes	yes	—	Attach up to 4 monitors
Network Connectors	—	(1) RJ-45	(1) RJ-45	(1) RJ-45, (1) SFP	(2) SFP+	(2) RJ-45: (1) 1-Gbps, (1) 2.5-Gbps
USB Support	USB HID	USB HID	All USB 2.0 devices	All USB 2.0 devices	All USB 2.0 devices	All USB 2.0 devices
Max Extension Distance	Unlimited over IP	• CATx: 328 feet (100 meters) • IP: unlimited	• CATx: 328 feet (100 meters) • IP: unlimited	• CATx: 328 feet (100 meters) • Fiber: up to 6.2 miles (10 kilometers) • IP: unlimited		• CATx: 328 feet (100 meters) • IP: unlimited
VM Support	RDP/Remote FX	—	RDP/RemoteFX	RDP/RemoteFX	PCoIP, RDP/Remote FX	RDP/RemoteFX, PCoIP, PCoIP ultra, and Virtual Network Computing (VNC)
Bidirectional Analog Stereo Audio	—	• DVI: speaker only • DisplayPort: embedded digital audio	yes	yes	yes	Unidirectional stereo audio out (headphones or speakers)
PoE Support	—	—	—	yes	—	—
KVM Setup	Point-to-point KVM extension that is scalable to a matrix switching setup with unlimited endpoints					

Emerald Accessories

Switchable High-Speed USB Extenders

This USB extender adds high-speed USB 2.0 support to your Emerald® KVM system.

- Switch between high-speed USB 2.0 devices over an IP network.

- Supports full-speed USB 2.0 up to 480 Mbps at 4 ports

- Supports simultaneous USB sharing

- Connect to an Emerald KVM system to automatically switch when target changes.

Learn more at **blackbox.com/emd100usb** ▸

Switchable High-Speed USB Extenders (EMD100USB)

Product Code	Description
EMD100USB	Switchable USB Extender

Video Cables and Adapters

Use high-quality Black Box® cables and adapters to connect your Emerald KVM System with computers and user consoles. Choose from an extensive product portfolio that includes the following items:

VGA to DVI-D Video Converter (KVGA-DVID)

Product Code	Description
Video Cables	
VCB-DP2 Series (various lengths)	DisplayPort™ 1.2 (4K60)
EVNDVI02 Series (various lengths)	DVI SL/DL Cable
Video Adapters	
KVGA-DVID	VGA to DVI-D Video Converter, USB Powered (1920 x 1200)
VA-MDP12-DP12	Mini DisplayPort-to-DisplayPort™ Adapter
VA-DP-DVID-A	DisplayPort™ to DVI (1920 x 1200)
VA-DP12-HDMI4K-A	DisplayPort™ to HDMI™ (1920 x 1080)

Emerald Mounting Kits

Use these 19-inch rackmount kits to mount Emerald units on or below tables, behind screens, or in racks. The 1U mounting kits are ideal for space-saving installations because they provide space for up to two extender units. Emerald was designed with optimal airflow in mind, so the units will not overheat when placed alongside other components in the rackmounting shelf.

Learn more at **blackbox.com/emk** ▸

Emerald 4K Rackmount Kit, 2 units (EMD4000-RMK1)

Product Code	Description
EMD4000-RMK1	Emerald 4K Rackmount Kit for (1) or (2) KVM units (1U)
EMD4000-RMK2-SLIM	Spare Rackmount Blanking Plate for EMD4000-RMK1
EMD2000-RMK2	Emerald PE Rackmount Kit for (2) KVM units (1U)
EMD2000-RMK3	Emerald SE/PE DisplayPort™ Rackmount Kit for (3) KVM units (1U)
DTX1000-RMK1	Emerald SE Rackmount Kit for (1) KVM unit (1U)
DTX1000-RMK2	Emerald SE Rackmount Kit for two KVM units (1U)

Central Power Hub

For improved power management and fail-safe operation, use the optional central power hub for 8 or 16 units.

- Central power feed to 5-volt or 12-volt DC devices with up to 30 watts per port.

- Web UI for configuration and monitoring of systempower status.

- Highest resilience when equipped with second, hot-swappable 600-k hours power supply.

Learn more at **blackbox.com/cph** ▸

Central Power Hub, 16 units (ACR1000-CPH16R-R2)

Product Code	Description
ACR1000-CPH16R-R2	Central Power Hub, 16 Ports
ACR1000-CPH8R-R2	Central Power Hub, 8 Ports
ACR1000-CPH-PS-R2	Central Power Hub Redundant Power Supply
ACR1000-12V5-CBL3M	Central Power Hub Power Converter Cable - 12 VDC to 5 VDC, 3-m

Emerald Network Components

Emerald IP Switches

Emerald® was designed with the needs of IT planners and integrators in mind. To build an Emerald KVM matrix, choose from a variety of our tested 1-, 10-, and 100-Gbps switches. Or use your preferred third-party IP switches. Make sure to use managed IP switches that support IP multicast and IGMP at full-wire speed and ensure sufficient bandwidth for the required video quality, resolutions, and USB devices.

10G 28-Port IP Switch (EMS10G28)

Learn more at **blackbox.com/ems**

Product Code	EMS1G48	EMS1G24F	EMS10G12	EMS10G28	EMS100G32-R2
Speed	1 Gbps	1 Gbps	10 Gbps	10 Gbps	100 Gbps
Ports	(48) 10/100/1000BT RJ-45, 1.25 Gbps	(24) 1-GbE SFP	(12) 10-GbE SFP+	(28) 10-GbE SFP+	(32) 100-GbE SFP+ or (128) 10-GbE SFP+
Cascade Ports	(4) 10G SFP+	(2) 10-GbE SFP+	(3) 100G QSFP28	(2) 100G QSFP28	—
Capacity	260 Gbps	260 Gbps	840 Gbps	960 Gbps	6.4 Tbps
Dimensions	4.4 (1 RU) x 43.4 x 32 cm (HxWxD)	4.4 (1 RU) X 43.4 X 41 cm (HxWxD)	4.4 (1 RU) x 45 x 20.9 cm (HxWxD)	4.4 (1 RU) x 43.1 x 45.7 cm (HxWxD)	4.4 (1 RU) x 43.4 x 46 cm (HxWxD)
Max Power Consumption	87 W	63 W	180 W	290 W	605 W
Power Input	(2) 90–264 VAC, 50/60 Hz	100–240 VAC 50/60 Hz	(2) 100–240 VAC, 50/60 Hz	(2) 100–240 VAC, 50/60 Hz	(2) 100–240 VAC, 50/60 Hz

SFP Modules

Emerald 4K and PE Extenders as well as Emerald IP Switches provide a high level of flexibility by offering SFP (1-Gbps), SFP+ (10-Gbps), and QSFP28 (100-Gbps) ports (depends on the type of extender and system application). Use SFPs for HD signal transmissions. Use SFP+ or QSFP28 modules to transmit 4K 60 signals and aggregate multiple connections through a 100-Gbps IP switch. Emerald Extenders and Switches support connectivity through copper, fiber multimode, or fiber singlemode cables using a variety of Black Box® and third-party SFP modules.

Various SFP modules

Learn more at **blackbox.com/sfp** ▸

Product Code	Description	Supported Distance
1-Gbps Connections		
LFP441	SFP, 1250-Mbps, 850-nm Multimode Fiber, LC	1804 feet (550 m)
LFP413	SFP, 1250-Mbps, 1310-nm Single-Mode Fiber, LC	6.2 miles (10 km)
LFP442	SFP, 1250-Mbps, 1310-nm Single-Mode Fiber, LC	12.4 miles (20 km)
LFP415	SFP, 1000-Mbps, SGMII Interface, RJ-45	328 feet (100 m)
LFP443	SFP, 1250-Mbps, SGMII Interface, RJ-45	328 feet (100 m)
10-Gbps Connections		
LSP441	SFP+ 10-Gbps, 850-nm Multimode Fiber, LC	984 feet (300 m)
LSP442	SFP+ 10-Gbps, 1310-nm Single-Mode Fiber, LC	12.4 miles (20 km)
LSP443	SFP+ 10-Gbps, RJ-45	98 feet (30m)
40-Gbps Connections		
QSFP541	QSFP+ 40-Gbps, 850-nm Multimode Fiber, MPO	492 feet (150 m)
100-Gbps Connections		
QSFP441-R2	QSFP28 100-Gbps, 850-nm Multimode Fiber, MPO	328 feet (100 m)
QSFP442	QSFP28 100-Gbps, WDM Single-Mode Fiber, LC	6.2 miles (10 km)

Notes: (1) All Black Box SFP Modules feature Extended Diagnostics; (2) Black Box Switches also support generic SFP(+) modules.

Emerald Network Components

Active Optical and Direct Attach Cables

Black Box® Active Optical Cables (AOCs) and Direct Attach Cables (DACs) provide an all-in-one, easy-to-install, and cost-effective solution for connecting Emerald® 4K Extender units to a network switch or interconnecting switches through their SFP+ or QSFP network ports.

Learn more at **blackbox.com/sfpaoc** ›

SFP-10G-AOC2M-BB

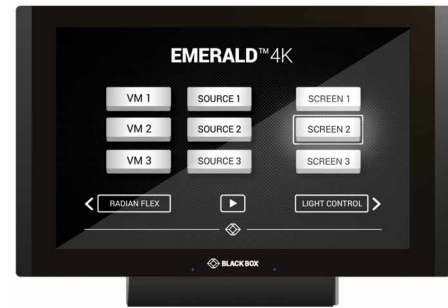| Product Code	Description
AOC	
SFP-10G-AOCxM-BB	AOC, SFP+ 10-Gbps, various lengths (in meters); x = 1, 2, 3, 5, 7, or 10
QSFP-100G-AOCxM-BB	AOC, QSFP 100-Gbps, various lengths (in meters); x = 3, 5, 7, 10, 15, or 30
DAC	
SFP-H10GB-CUxxxx-BB	DAC, SFP+ 10-Gbps, various lengths; xxxx = 50CM, 1M5, 1M, 2M, 3M, or 5M

Additional Products

ControlBridge Control Processor and Touchscreen

ControlBridge® is a versatile control processor and touchscreen-based appliance for room automation and intuitive operations control. It allows you to control all aspects of your workspace or control room, including KVM switching, lighting, window shutters, automated furniture position, and video walls.

- Multiple control processors and touchscreen devices (7" and 12") available.

- Bidirectional control of any IP-enabled or I/O device.

- Active matrix touchscreen display offers resolutions of 1280 x 800, 32-bit (true color) images, and full-motion streaming video preview.

- Includes built-in microphone, speakers, and light and motion sensors.

- Set up through a standard web browser.

- Mobile device support through optional app license.

- Black Box will help you to design a custom interface for your specific requirements.

Learn more at **blackbox.com/controlbridge** ›

ControlBridge 12" touchscreen

Product Code	Description
CB-TOUCH7-T	ControlBridge Touch Panel, 7"
CB-TOUCH12-T	ControlBridge Touch Panel, 12"
CB-CP100	Control Processor for Small-Sized Applications
CB-APP-LIC	ControlBridge Single-Seat Mobile Device License

Freedom II KM Switches

Freedom KM Switches support the powerful Glide and Switch technology that allows operators to switch between up to eight computers by moving a mouse from one screen to another - without pressing hotkeys or additional buttons. Share a single keyboard and mouse, two USB 2.0 devices, and analog audio between all connected systems. Add the monitor identification kit to indicate the active system and monitor through screen-mounted LEDs.

Learn more at **blackbox.com/freedom** ▸

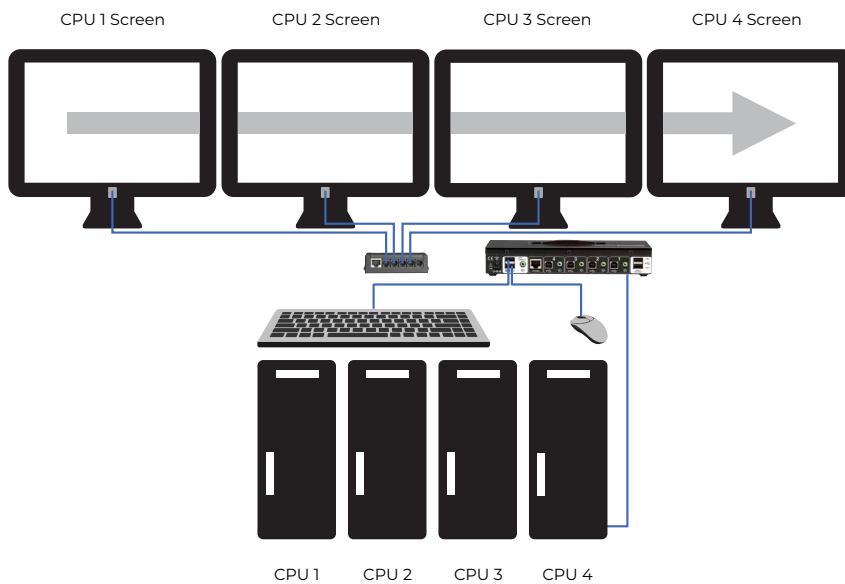| Product Code	Description
KV0004A-R2	Freedom II KM Switch, 4 Ports
KV0008A-R2	Freedom II KM Switch, 8 Ports
KV0004A-LED	Freedom LED Monitor Identification Kit

Fig. 7: Freedom II Glide and Switch application

Notes

Notes

Why Black Box

Expertise
Black Box® project engineers can assist with system assessment, design, deployment, and training.

Breadth
Black Box offers the most comprehensive suite of engineered KVM, AV, and infrastructure solutions in the industry.

Support
Reflecting our commitment to complete satisfaction, our dedicated team of highly trained support technicians is available by phone free of charge, every day of the year.

Service Level Agreements
Our service level agreements give customers access to technical support, product training, dedicated application engineers, and more.

Experience
Providing leading technology solutions since 1976, Black Box helps more than 175,000 customers in 150 countries build, manage, optimize, and secure IT infrastructures.

Warranties
Multi-year warranties with multi-year extensions and replacement options are available.

Center of Excellence
Black Box offers a Center of Excellence, featuring professional services and support agreements that help optimize customers' systems and maximize uptime.

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