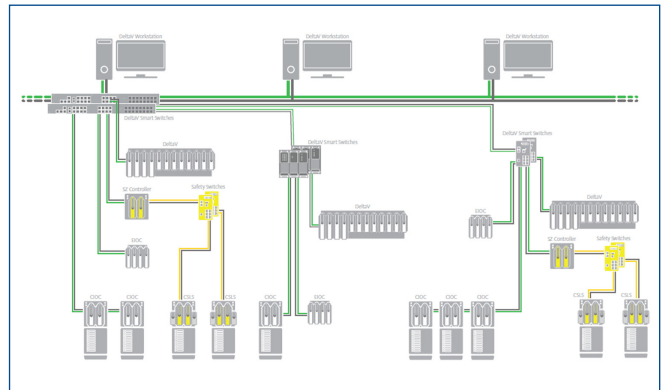


DeltaV™ Control Network Hardware

- Easy to use
- Scalable and cost-effective
- Built-in network diagnostics
- Fully redundant network



The DeltaV Control Network is easy to install and maintain with the DeltaV Smart Switches.

Introduction

Your control network is the backbone of your system. The DeltaV Area Control Network (ACN) is a standard Ethernet network dedicated to the DeltaV system. You connect the DeltaV workstations and the controllers using the Control Network.

The Control Network is a dual speed 10/100BaseT network. CAT 5 screened (ScTP) twisted-pair cable connects each node to switch.

The DeltaV Control Network is an easy-to-design-and-implement dedicated Ethernet network. All DeltaV devices are connected to the same subnet and all of the network addressing (IP addresses) for DeltaV equipment is managed by the DeltaV system. The DeltaV “self-managed network” does not require the user to track network address usage.

The DeltaV system supports a specific set of network switches for the DeltaV ACN and the DeltaV Smart Switches (see the ordering information included in this document for details of the specific control network devices we support and the DeltaV Smart Switches).

Benefits

Easy to design and implement: As a dedicated network with predictable communications traffic, the DeltaV system has done all of the system testing so you only have to plug the components together to create the control network.

Plug-and-play components: You can expand the network easily; just plug in another workstation or controller and it is recognized by the system.

Standards compliance: Network components are compliant with standards such as IEEE, CE and CSA.

Network diagnostics: On the Smart Switches you can use software diagnostics to verify proper communication-line health. The LEDs on each individual switch provide health status information.

Scalable in small increments: The DeltaV system provides a package with very low initial cost. You are able to expand the system readily and economically by adding hardware incrementally to your system.

Redundant: The DeltaV ACN is a fully redundant communication network. Nodes may also be connected using a simplex network, but this is not a recommended practice.

DeltaV Control Network Description and Specification

The DeltaV Control Network can be physically connected as a star or cascade (daisy-chain) topology. Other network configurations are possible, such as a combination of a star and cascade topology. (DeltaV does not support network ring topologies).

Refer to the latest DeltaV system installation and planning manual(s) for details of network layouts and network cable shielding requirements and power and grounding requirements for the overall DeltaV distributed control system (DCS).

The DeltaV Control Network can use one or more Ethernet switches for communication connections. **To be supported by Emerson, the DeltaV Control Network must be installed using the network equipment listed in this document.**

Wiring

The maximum twisted-pair cable length for the DeltaV control network for any Ethernet-connected device is 100 meters (328 feet). If longer cable distances are needed for this workstation-to-switch, controller-to-switch, or switch-to-switch connections, there are various fiberoptic cable and transceiver solutions available from Emerson as a standard supported solution. For special network designs that go beyond the supported diagrams shown in the DeltaV installation and planning manuals, consult with the Emerson services team.

The DeltaV ACN supports the use of auto-negotiated 10-half, 100-half, 10-full, and 100-full duplex communications where the industry standard auto-negotiation process determines the highest speed at which two devices will communicate with each other. The latest DeltaV network products make use of gigabit Ethernet for switch-to-switch communications and can support distances up to 108 Km using standard product fiberoptic communications.

The DeltaV workstations and controllers contain two Ethernet ports to provide the recommended redundant communications. Early models of DeltaV controllers supported 10 megabit Ethernet at half-duplex only. The latest DeltaV controllers auto-negotiate to any speed and duplex from 10-half to 100-full, depending on what the controller is attached to. The workstations do the same: they auto-negotiate to the highest speed and duplex available from their attached device.

Ethernet Cable

The DeltaV system recommends the use of Category 5e screened (ScTP) cable for the 10/100/1000 BaseT/TX control network.

Fiberoptic Wiring

Because fiberoptic cables do not conduct electricity, they should be used in connections between buildings or in plant areas where electromagnetic interference is present.

Fiberoptic cabling should also be used where wire runs are longer than 100 meters (328 feet).

DeltaV Smart Switches

The DeltaV Network “Smart” switches are the next generation in the use of commercial off-the-shelf (COTS) components in control systems. Called “built-for-purpose” COTS these switches combine the lower cost of off-the-shelf components with DeltaV specific software and features to make them more integrated and plug-and-play in the control network.

DeltaV smart switches require no configuration to function in the DeltaV network. Accessing the advanced features takes only minor configuration that is easy to perform using the DeltaV Smart Switch Command Center and secured so you can’t incorrectly configure any switching functions that impact the performance of the DeltaV system.

The built-for-purpose switch also allows the DeltaV system to provide an auto port lockdown advanced security feature that is easy for a control system user to implement: an increasingly important product feature in today’s hostile environment.

The Smart Switch will generate network, device, and security alarms to operator workstations. The built-in network and switch diagnostics provide network and switch diagnostic information to the Smart Switch Command Center without the use of third party SNMP applications.

Please see the PDS “DeltaV Smart Switches” for complete ordering information and detailed specifications of the DeltaV Smart Switches.



The DeltaV Smart Switch provides a full family of built-for-purpose switches that are easy to use and provide advanced security features to help protect your DeltaV network from cyber incidents.

The DeltaV Smart Switches are the preferred switches to be used within the DeltaV networks.

General Specifications for the VE6041 DeltaV Smart Switch

Power Requirements

Operating voltage: 24V DC (18-30V)

Mechanical Construction

Dimensions (W x H x D): 74 x 131 x 111 mm (2.91 x 5.16 x 4.37 in)

Mounting: DIN Rail

Weight: 410g (14.48 oz) – all models

Protection class: IP20

Interfaces

Power supply/signaling contact plug-in terminal block (max. 1 A, 24V DC / 24V AC)

V.24 interface RJ11 socket for serial cable connection for DeltaV Setup Wizard access

USB interface for flash upgrades

Provided in VE#

One VE6041 switch with terminal block



NOTE: These switches are described as supporting local ports and uplink ports. Local ports are connected to a single device such as a controller or workstation. An uplink port is connected to another switch. There is no difference in the way the ports function, and a port designated as an "uplink port" can be used as a local port.

General Specifications for the VE6042 and VE6043 DeltaV Smart Switches

Power Requirements

Operating voltage 24V DC (18-32V)

Mechanical Construction

Dimensions: varies by model (see order information section)

Mounting: DIN Rail

Weight: varies by model (see order information section)

Protection class: IP20

Interfaces

Power supply/signaling contact plug-in terminal block (max. 1 A, 24V DC / 24V AC)

V.24 interface RJ11 socket for serial cable connection for DeltaV Setup Wizard access

USB interface for flash upgrades

Provided in VE#

One VE6042 or one VE6043 switch with terminal block



NOTE: The VE6042 and VE6043 use an active backplane—the switching functions of the switch are contained in the backplane. The switch module contains the power supply and power and serial interface connections. The switch is composed of these two units and is available only as the complete switch unit.

General Specifications for the VE6046, VE6047, and VE6048 DeltaV Smart Switches



Up to 26 ports Fast Ethernet/Gigabit Ethernet Industrial Workgroup Switch.

Ports available:

Base module has 10 ports: two uplink ports (10/100/1000 Mbps copper / SFP ports – VE6050 transceiver modules compatible) and eight 10/100 Mbps copper ports in a fixed configuration.

The VE6048 switch supports expansion media modules (VE6049) that can add up to 16 10/100 Mbps extra ports. Each media module has eight ports including copper, fiber, or SFP ports.

The VE6046 and VE6047 are not modular switches and are fixed at 24 10/100 Mbps copper ports and eight 10/100 Mbps copper ports respectively. Both switches have two additional 10/100/1000 Mbps uplink copper / SFP ports.

Power Requirements

Operating voltage: 100 - 240V AC, 47 - 63Hz

Rated Current 0.2 – 0.4A

Mechanical Construction

Dimensions (W x H x D): 448 x 310 x 44 mm (17.64 x 12.20 x 1.73 in) – without mounting bracket

Mounting: 19" control cabinet

Weight: 3.60kg

Protection class: IP20

Interfaces

Power supply/signaling contact plug-in terminal block (max. 1 A, 24V DC / 24V AC)

V.24 interface RJ11 socket for serial cable connection for DeltaV Setup Wizard access

USB interface for flash upgrades

Provided in VE#

One VE6046 or one VE6047 or one VE6048 switch with terminal block for signal contact, two brackets with fastening screws (pre-assembled), housing feet - stick-on, and power cable

NOTES:

- Expansion modules, Fast Ethernet SFP modules, Gigabit Ethernet SFP modules, and serial cable must be ordered separately
- When rail mounted, these switches require mounting supports in addition to 10" rail mounting brackets
- All copper ports can be connected using twisted pair cables with up to 100 meters of length
- The built-in SFP module ports for these switches support any combination of VE6050 transceiver modules
- The VE6050 gigabit transceiver modules are not compatible with VE6049 expansion modules
- VE6046, VE6047, and VE6048 switches do not support "stacking." To create a central switch of greater than 24 ports, switches should be interconnected using the front panel (built-in) gigabit ports.

General Specifications for the VE6053 DeltaV Smart Switch



24 ports Gigabit Ethernet Industrial Workgroup switch, fan-less design

Ports available: twenty-four ports in total; 20 10/100/1000 Mbps copper ports and four combo ports (10/100/1000 Mbps copper/RJ45 or 100/1000 Mbps SFP) – if the SFP module is installed the RJ45 port is not functional for that port.

This switch is not modular – the VE6049 expansion modules are not used on this switch.

The VE6050 transceivers can be used on this switch.

Power Requirements

Operating voltage: 100 - 240V AC, 47 - 63Hz

Power output: 119BTU (IT) h – without SFP transceiver modules

Power consumption: 35 W – without SFP transceiver modules

Mechanical Construction

Dimensions: 448 x 345 x 44 mm (17.64 x 13.58 x 1.73 in) – without mounting bracket

Mounting: 19" control cabinet

Weight: 4.2kg (148.15 oz)

Protection class: IP20

Interfaces

Power supply/signaling contact plug-in terminal block (max. 1 A, 24V DC / 24V AC)

V.24 interface RJ11 socket for serial cable connection for DeltaV Setup Wizard access

USB interface for flash upgrades

NOTES:

- Expansion modules, Fast Ethernet SFP modules, Gigabit Ethernet SFP modules, and serial cable must be ordered separately
- When rail mounted, these switches require mounting supports in addition to 10" rail mounting brackets
- All copper ports can be connected using twisted pair cables with up to 100 meters of length
- The built-in SFP module ports for these switches support any combination of VE6050 transceiver modules
- This switch does not support "stacking." To create a central switch of greater than 24 ports, switches should be interconnected using any of the available gigabit ports.

Provided in VE#

One VE6053 switch with terminal block for signal contact, two brackets with fastening screws (pre-assembled), housing feet - stick-on, and power cable.

Additional information regarding DeltaV Smart Switches including the Expansion Modules (VE6049), the SFP Transceivers (VE6050), certifications and more, can be found on the dedicated DeltaV Smart Switches product datasheet.

General Specifications for the VE6054 DeltaV SmartSwitch (RM1040 all fiber and all gigabit switch)



Sixteen ports Gigabit Ethernet Industrial Workgroup switch, fan-less design. Ports available: 16ports in total; Sixteen 10/100/1000 Mbps combo ports(10/100/1000 Mbps copper/RJ45 or 100/1000 Mbps SFP) – if the SFP module is installed the RJ45 port is not functional for that port.

This switch is not modular – the **VE6049** expansion modules are not used on this switch.

The **VE6050** transceivers can be used on this switch.

Power requirements

Operating voltage: 90 - 265VAC

Power output:90BTU(IT)h

Power consumption: power supply 1: 110 mA (26 W) max., if all ports are equipped with SFP; power supply 2: 110mA (26 W) max., if all ports are equipped with SFP

Mechanical construction

Dimensions (W x H x D): 445 x 44 x 345 mm (17.52 x 1.73 x 13.58 in) – without mounting bracket

Mounting: 19" control cabinet

Weight: 5.6 kg (197.53 oz)

Protection class:IP30

Interfaces

Power supply/signaling contact plug-interterminal block (max.1A, 24V DC/24V AC)

V.24 interface RJ11 socket for serial cable connection for DeltaV Setup Wizard access USB interface for flash upgrades.

NOTES:

- Expansion modules, Gigabit Ethernet SFP modules and serial cable must be ordered separately.
- When rail mounted, these switches require mounting supports in addition to 10" rail mounting brackets.
- All copper ports can be connected using twisted pair cables with up to 100 meters of length.
- The built-in SFP module ports for these switches support any combination of VE6050 transceiver modules.
- This switch does not support "stacking." To create a central switch of greater than 24 ports, switches should be interconnected using any of the available gigabit ports.

Provided inVE#

One VE6054 switch with terminal block for signal contact, two brackets with fastening screws (pre-assembled) and housing feet-stick-on (the switch is not supplied with power cable which must be built and wired directly to the unit using the provided terminal blocks).

DeltaV Media Converters

The Emerson fiberoptic-to-copper media converters, convert fiberoptic signals to copper-based signals and copper-based signals to fiberoptic signals. VE6060 and VE6061 are suitable for use in Class 1 Div. 2 and Zone 2 areas, while VE6062 does not have any hazardous area certifications and is only suitable for safe area installation.

NOTE: The media converters below are not network switches. A proper combination of approved network switches is still needed for DeltaV control network deployments. DeltaV Smart Switches are required for DeltaV systems employing Electronic Marshalling.



VE6060 Dual Single Mode Media Converter Assembly

Description	Specifications
Power Requirement	+24V DC +/-20% @ 100mA maximum (1-Port version).
Copper-Wire Port	One 10/100 BASE-TX port with RJ45 connector, capable of half- and full-duplex operation
Fiberoptic Ports	<ul style="list-style-type: none"> • One 100 BASE-FX single-mode port with LC connector, configured for full-duplex operation • Power budget: At least 12 dBm on 9/125 micron SMF • Distance range: 15km with proper installation
Front Panel LEDs	Power, port, and link status
Environmental	Operating temp -40 to +70°C Storage Temp -40 to +85°C Relative Humidity: 5 to 95% Non-Condensing. ISA S71.04 G3 Airborne contaminants (conformal coating). Shock: 10g 1/2 sinewave for 11 milliseconds. Vibration: 1mm Peak-to-Peak from 2 to 13.2HZ; 0.7g from 13.2 to 150HZ
Dimensions (HxWxD)	Media Converters: 98 x 25 x 113 mm Dual Media Converter Carrier: 130 x 107 x 47.5 mm
Protection Class	IP20
EMC	Electromagnetic Compatibility: Per EN 61326-3-1 (CE), EN 61326-3-2 NE21 (NAMUR), and IACS E10 (Marine)
Safety	CSA C22.2 No. 61010.1
ATEX	ATEX 3 per IEC 60079-15 (2005), Non-Sparking (Not Energy Limited. Requires System Power to be de-energized for insertion/removal)
FM	FM Approvals 3611 – Class 1 Div 2
NAMUR	NE21
IECEX	IECEX
Marine	Marine Certification per IACS Section E10 pending
Spare Part Information	KL1720X1-BA1: Dual Media Converter Carrier KL1720X1-BB1: 1-port Single Mode Media Converter



VE6061 Dual Multi-Mode Media Converter Assembly

Description	Specifications
Power Requirement	+24V DC +/-20% @ 100mA maximum (1-Port version).
Copper-Wire Port	One 10/100 BASE-TX port with RJ45 connector, capable of half-and full-duplex operation
Fiber optic Ports	<ul style="list-style-type: none"> One 100 BASE-FX multi-mode port module with LC connector, configured for full-duplex operation Power budget: At least 8 dBm on 50/125 micron MMF or 11 dBm on 62.5/125 micron MMF Distance range: 2km with proper installation
Front Panel LEDs	Power, port, and link status
Environmental	Operating temp -40 to +70°C Storage Temp -40 to +85°C Relative Humidity: 5 to 95% Non-Condensing. ISA S71.04 G3 Airborne contaminants (conformal coating). Shock: 10g 1/2 sinewave for 11 milliseconds. Vibration: 1mm Peak-to-Peak from 2 to 13.2HZ; 0.7g from 13.2 to 150HZ
Dimensions (HxWxD)	Media Converters: 98 x 25 x 113 mm Dual Media Converter Carrier: 130 x 107 x 47.5 mm
Protection Class	IP20
EMC	Electromagnetic Compatibility: Per EN 61326-3-1 (CE), EN 61326-3-2 NE21 (NAMUR), and IACS E10 (Marine)
Safety	CSA C22.2 No. 61010.1
ATEX	ATEX 3 per IEC 60079-15 (2005), Non-Sparking (Not Energy Limited. Requires System Power to be de-energized for insertion/removal)
FM	FM Approvals 3611 – Class 1 Div 2
NAMUR	NE21
IECEX	IECEX
Marine	Marine Certification per IACS Section E10 pending
Spare Part Information	KL1720X1-BA1: Dual Media Converter Carrier KL1720X1-BC1: 1-port Multi Mode Media Converter



VE6062 Dual 2-Port SFP Media Converter Assembly


Description	Specifications																								
Power Requirement	+24V DC +/-20% @ 150mA maximum (2-Port version)																								
Copper-Wire Port	One 10/100 BASE-TX port with RJ45 connector, capable of half- and full-duplex operation																								
Fiber optic Ports	Two SFP cages to be used with 100 BASE-FX SFP modules – The following SFPs have been tested and need to be purchased separately. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Type</th> <th>Manufacturer</th> <th>Part Number_</th> </tr> </thead> <tbody> <tr> <td>MM</td> <td>Optixcom</td> <td>SFP-155LX-AT2K-T</td> </tr> <tr> <td>MM</td> <td>Avago</td> <td>HFBR-57E5APZ</td> </tr> <tr> <td>MM</td> <td>IMC</td> <td>808-38102</td> </tr> <tr> <td>MM</td> <td>BLACKBOX</td> <td>LFP402</td> </tr> <tr> <td>SM</td> <td>Optixcom</td> <td>SFP-155LX-AT20K-T</td> </tr> <tr> <td>SM</td> <td>Avago</td> <td>AFCT-5760ATLZ/ATPZ</td> </tr> <tr> <td>SM</td> <td>BLACKBOX</td> <td>LFP403</td> </tr> </tbody> </table>	Type	Manufacturer	Part Number_	MM	Optixcom	SFP-155LX-AT2K-T	MM	Avago	HFBR-57E5APZ	MM	IMC	808-38102	MM	BLACKBOX	LFP402	SM	Optixcom	SFP-155LX-AT20K-T	SM	Avago	AFCT-5760ATLZ/ATPZ	SM	BLACKBOX	LFP403
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Front Panel LEDs	Power, port, and link status																								
Environmental	Operating temp -40 to +70°C Storage Temp -40 to +85°C Relative Humidity: 5 to 95% Non-Condensing. ISA S71.04 G3 Airborne contaminants (conformal coating). Shock: 10g 1/2 sinewave for 11 milliseconds. Vibration: 1mm Peak-to-Peak from 2 to 13.2HZ; 0.7g from 13.2 to 150HZ																								
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Marine	Marine Certification per IACS Section E10 pending																								
Spare Part Information	KL1720X1-BA1: Dual Media Converter Carrier KL1720X1-BD1: 2-Port SFP Media Converter																								


*The switches below are unmanaged switches for use in smaller DeltaV systems where the features of the smart switch may not be required.
NOTE: DeltaV Smart Switches are required for DeltaV systems employing Electronic Marshalling. These unmanaged switches should not be used in Electronic Marshalling based systems.*

Unmanaged DIN Rail Mount Switches

The Emerson Fiberoptic-to-Copper Ethernet switches are suitable for use in Class 1 Div. 2 and Class 1 Zone 2 areas to provide an energy-limited fiberoptic link to IS-classed areas. They can also be used as unmanaged switches on the DeltaV communications network for connections between controllers and DeltaV workstations.

NOTE: These switches should not be used in networks between the controller and CIOC. The DeltaV Smart Switch must be used in the network between the controllers and CIOC.

	VE6019 Fiberoptic-(1) to-Copper (4) Ethernet Switch
Description	Specifications
Ports	4 x 10/100BASE-TX, Twisted-pair ports, RJ45 connector, auto-crossing, auto-negotiation 1 x 100BASE –FX, Multi-mode port, MT-RJ connector
Power	Operating voltage 24V DC (18 to 32V DC) Current consumption 250 mA max @ 24V DC Redundant power connections
Cabling	Twisted pair (TP) 0-100 m Fiber Type: micron multmode fiber (MM) 62.5/125 or 50/125 μm 0-2000m Attenuation: ≤11dB (62.5/125), ≤8 dB (50/125)
Front Panel LEDs	Power, link status, collision/duplex, and speed
Environmental	Operating temp -40 to +70°C Storage Temp -40 to +85°C ISA S71.04 G3 Airborne contaminants
Dimensions (WxHxD)	35mm x 100mm x 114mm Mounting DIN rail 35MM
Weight	206g
Protection Class	IP20
EMC	EN 61326 with Class A emissions, Annex A immunity
Safety	CSA-C22.2 No 1010.1-92
ATEX	EN 60079-15 Zone 2, fiber port IS EEx nA [op is] IIC T4 IEC 60079-28 (Protection of equipment and transmission systems using optical radiation)
FM	3611 Class1 Div2, Class 1 Zone 2
NAMUR	NE21

Description	Specifications
	VE6020 Fiberoptic-(4) to-Copper (1) Ethernet Switch
Ports	4 x 100BASE-FX, Multi-mode ports, MT-RJ connector 1 x 10/100BASE-TX, Twisted-pair port, RJ45 connector, auto-crossing, auto-negotiation
Power	Operating voltage 24V DC (18 to 32V DC) Current consumption 350 mA max @ 24V DC Redundant power connections
Cabling	Twisted pair (TP) 0-100 m Fiber Type: micron multimode fiber (MM) 62.5/125 or 50/125 μm 0-2000m Attenuation: $\leq 11\text{dB}$ (62.5/125), $\leq 8\text{dB}$ (50/125)
Front Panel LEDs	Power, link status, collision/duplex, and speed
Environmental	Operating temp -40 to +70°C Storage Temp -40 to +85°C ISA S71.04 G3 Airborne contaminants
Dimensions (WxHxD)	52.5mm x 100mm x 114mm Mounting DIN rail 35MM
Weight	227g
Protection Class	IP20
EMC	EN 61326 with Class A emissions, Annex A immunity
Safety	CSA-C22.2 No 1010.1-92
ATEX	EN 60079-15 Zone 2, fiber port IS EEx nA [op is] IIC T4 Iec 60079-28 (Protection of equipment and transmission systems using optical radiation)
FM	3611 Class1 Div2, Class 1 Zone 2
NAMUR	NE21

Cisco Switches

With the introduction of the DeltaV Smart Switches, the Emerson branded smart switches are the preferred switch for use in the DeltaV network. As such the Cisco switch information is no longer included in this document as they are no longer quoted on new DeltaV Systems.

Cisco switches continue to be supported for use as spares for existing switches, for system expansion where compatibility with existing switches is desired. Cisco switches and DeltaV Smart Switches can be mixed on a DeltaV system. DeltaV Smart Switch can be used in some cases to replace existing Cisco switches. For further information on this topic please see the whitepaper "Use of Cisco Switches on the DeltaV Area Control Network (ACN)".

Product information on the Cisco Switches available for use in a DeltaV System can be obtained from your local Emerson sales office.

Related Products

PDS DeltaV Smart Switches. For more information on the Smart Switches.

PDS Firewall-IPD. For information on advanced security solutions for DeltaV networks.

DeltaV Security Manual. For information on designing a secure DeltaV network.

White paper Use of Cisco Switches on the DeltaV Area Control Network (ACN). For information on Cisco support.

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