DeltaV™ Virtualization Hardware

- Fully tested and supported hardware for DeltaV™ Virtualization.
- Configurations for both off-line and on-line control systems.
- Powerful, cost-effective, and easy to use.
- Easy control network installation, ready to plug and play.
- Shared storage networks for high availability.
- Supports single, dual and quad monitors.

Introduction

Emerson is committed to providing the same level of performance and reliability for DeltaV™ virtualization environments that we provide in our traditional physical computer architecture. To insure reliability and performance, we have rigorously tested virtual DeltaV systems with specific hardware components and configurations designed for realtime process control applications. With DeltaV Virtualization hardware you can rest assured that your control system is fully tested and supported to meet your process control needs.

DeltaV Virtualization is available for both on-line and off-line applications. For off-line applications, we have software and hardware configurations ideal for development, testing, and training applications. For on-line applications, we provide additional hardware options for high availability servers and thin client networks. Regardless of the application, DeltaV Virtualization Hardware provides the platform you need to deliver the performance required.
Benefits

Fully tested and supported hardware for DeltaV Virtualization. This insures your virtual DeltaV system meets the rigorous requirements for process control applications. No surprises with third-party drivers, compatibility problems, or application performance.

Configurations for both off-line and on-line control systems. From standalone host servers to high availability blade servers with integrated storage, DeltaV Virtualization Hardware has it covered.

Powerful, cost-effective, and easy to use. DeltaV’s integrated virtualization hardware platform, built on Dell’s PowerEdge VRTX, is designed for IT simplicity and delivers powerful performance. Out of box this blade server with integrated storage comes preconfigured for use with DeltaV Virtual Studio. Virtualization doesn’t come easier than this!

Easy control network installation, ready to plug and play. The host servers ship with the appropriate DeltaV control network cards preinstalled. Simply assign host networks using DeltaV Virtual Studio and you’re ready to connect to the DeltaV control network, Plant LAN, or client network.

Shared Storage Networks for high availability. Shared storage in the Dell VRTX, or with a standalone Storage Area Network (SAN) device, provides fault tolerant disk storage and supports automatic failover of virtual machines between host computers. Reliability and high availability is a must have for on-line virtualization solutions.

Supports single, dual and quad monitors. DeltaV thin clients are available for single, dual and quad monitor operations using true multi-monitor communications.

Product Description

DeltaV virtualization requires specific hardware not found in traditional DeltaV systems. Consolidating multiple DeltaV workstations onto a common host means that hosts must have more computing capacity than traditional control system servers; specifically more CPU processing capacity and RAM memory. Client devices (e.g., thin clients) are required to provide a physical interface to the virtual DeltaV workstations.

Virtual environments also benefit from Storage Area Network (SAN) devices to improve productivity in development / training environments and to take advantage of high availability options for on-line production environments. The hardware described in this document addresses these new requirements for DeltaV virtualization solutions.

Virtualization host servers and shared storage are available as individual components, or as part of an integrated blade server and storage solution using the Dell PowerEdge VRTX.

An example of a DeltaV system for on-line virtualization with high availability is shown below.
Resource Planning Guidelines

Virtual machines (VM) require host computer resources and are typically limited by available host processors (CPU) or memory (RAM). Table 1 provides guidelines on how many virtual machines to assign to host computers based on the VM loading and RAM requirements. VM Units (VMUs) are used to estimate relative CPU loading and host limits. These guidelines apply to the host hardware as specified in this document.

Table 1 – Host Resource Planning

<table>
<thead>
<tr>
<th>Host VM Resource Planning</th>
<th>VM Class</th>
<th>VMUs</th>
<th>RAM (MB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workstation OS (e.g., Windows 7)</td>
<td>1</td>
<td>2,048</td>
<td></td>
</tr>
<tr>
<td>Server OS (e.g., Windows Server 2008)</td>
<td>2</td>
<td>4,096</td>
<td></td>
</tr>
<tr>
<td>Virtual Controller (S, M, SZ)</td>
<td>0.4</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>Virtual Ethernet IO Card</td>
<td>0.8</td>
<td>512</td>
<td></td>
</tr>
<tr>
<td>Virtual CHARMS IO Card</td>
<td>0.2</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Virtual CSLS and LSNB</td>
<td>0.5</td>
<td>64</td>
<td></td>
</tr>
</tbody>
</table>

Supported Limits for Host Servers

| On-line Host Server (Normal Operation) | 10 | 24,576 |
| On-line Host Server (Temporary Failover Operation) | 16 | 32,768 |
| Off-line Host Server | 16 | 32,768 |

Integrated Virtualization Hardware*

Designed specifically for virtualization, the integrated hardware platform is a Dell PowerEdge VRTX consisting of blade servers, network storage, and shared switches, preconfigured and tested for use with DeltaV Virtual Studio. The integrated solution is ordered in two parts: 1) network storage and chassis (select one), and 2) individual blade servers (minimum two to maximum four blades per VRTX chassis).

* Important VRTX Requirement. The VRTX is a highly reliable platform with redundant components for network storage, communications, power and cooling. The VRTX does contain some redundant components which are not hot-swappable and require the VRTX be shut down for managed repair. These repairs can be performed with little or no virtual machine downtime provided you have a disaster recovery system available to host the virtual machines during the repair process. To ensure system availability, all VRTX solutions are required to have disaster recovery capabilities to support managed repair. For most systems, the recommended disaster recovery solution is to use two VRTX which distribute virtual machine loading and provide backup via cross VRTX VM replication. For smaller systems, an individual host server (standalone R730) can be used as a replication server for disaster recovery.

Integrated Network Storage and Chassis

1. VRTX Chassis with 2.7 TB RAID 10 Capacity (SE2528V1M99). This VRTX configuration provides 2.7 TB of fully redundant (RAID 10) disk storage with six 900 GB drives. This size will support approximately 20 DeltaV virtual workstations (without VM Replication).

2. VRTX Chassis with 5.4 TB RAID 10 Capacity (SE2528V2M99). This VRTX configuration provides 5.4 TB of fully redundant (RAID 10) disk storage with twelve 900 GB drives. This size will support approximately 40 DeltaV virtual workstations (without VM Replication).

3. VRTX Chassis with 10.8 TB RAID 10 Capacity (SE2528V3M99). This VRTX configuration provides 10.8 TB of fully redundant (RAID 10) disk storage with twenty four 900 GB drives. This size will supports approximately 40 virtual workstations in normal operation plus VM replication for additional 40 virtual machines outside of the VRTX cluster (for disaster recovery scenarios). This VRTX configuration with four host blade servers will support up to 64 VMs running temporarily in a failover scenario.

Integrated Blade Servers

1. Host Blade Server for On-line and Off-line Systems (SE2538V1M99). This host blade server is a Dell M630 series server that comes with dual 8-core CPUs and 64GB RAM. It comes with only a "bare-metal" operating system which means it must be managed by a separate management workstation. An advantage of "bare-metal" servers is that they don't have the overhead of a full server OS which means better performance, and less security vulnerabilities.

2. Host Blade Server for Off-line Development, Test, and Training Systems (SE2538V2M99). This host blade server is a Dell M630 series server that includes a Windows Server 2012 operating system so it can be used without a separate management workstation. This blade server includes dual 8-core CPUs and 64GB RAM.
3. Domain Controller and Host Management Blade Server (SE2539V1M99). This blade server functions as a domain controller and provides host management for the VRTX server cluster. It may also be used to manage DeltaV virtual machines using DeltaV Virtual Studio. This server is a Dell M630 server with Windows Server 2012 operating system. This domain controller is separate from the DeltaV network and is not used to manage a DeltaV domain.

Servers and Storage Devices

Host Servers

Individual host servers offered with DeltaV have different options to meet different on-line and off-line requirements. Below is a summary of the server options. Additional server specifications are shown on the following specification sheets.

1. Host Servers for Off-line Development, Test, and Training Systems (SE2535V1M99 and SE2536V3M99). These servers are Dell 630 and 730 series servers that include Windows Server 2012 operating systems so they can be run as a standalone server, without a separate management workstation. They include dual 8-core CPUs with 48GB RAM. These off-line servers come in both a tower and rack mounted form factor.

2. Host Server for On-line or Off-line Applications without a Storage Area Network (SE2536V1M99). This server is a Dell R730 with dual 8-core CPUs and 48 GB RAM. It comes with only a “bare-metal” operating system which means it must be managed by a separate management workstation. This host server includes a large 2.4 TB RAID 10 hard drive array to provide redundant storage protection for your virtual machines. Because this server’s large storage capacity, it is not intended to be part of a failover cluster using a storage area network (SAN). This server is ideal as a standalone host or VM replication server. This server can be used for both on-line and offline applications using DeltaV Virtual Studio, or for off-line applications using VMware ESXi.

3. Host Server for On-line or Off-line Applications with a Storage Area Network (SE2536V2M99). This server is a Dell R730 with dual 8-core CPUs and 48 GB RAM. It also comes with a “bare-metal” OS which requires a separate management workstation or domain controller server. This host is intended for use with a storage area network (SAN) which is required for automatic failover and high availability. This server can be used for both on-line and off-line applications using DeltaV Virtual Studio, or for offline applications using VMware ESXi.

Domain Controller and Management Server

DeltaV Virtualization Domain Controller and Management Server (SE2518V2M99). This server is used to manage the host server cluster configuration using a shared network storage. It may be used with individual host servers and SAN devices, or with a Dell PowerEdge VRTX as an external domain controller and host management server. It can also be used to manage DeltaV VMs using DeltaV Virtual Studio. This server is a Dell R320 server with Windows Server 2012 operating system. This domain controller is separate from the DeltaV network and is not used to manage a DeltaV domain.

Storage Area Network (SAN)¹

Storage Area Networks (SAN) enable you to easily move DeltaV virtual machines between host computers. They can greatly increase flexibility and productivity for off-line development and training systems, and provide increased availability for online production systems. SANs are required for virtual machine automatic failover and high availability options provided with DeltaV Virtual Studio. The SAN devices are Dell PowerVault MD3220i devices with different capacity options.

1. Storage Area Network (SAN) with 2.7 TB RAID 10 Capacity (SE2520V1M99). This SAN provides 2.7 TB of fully redundant (RAID 10) disk storage with six 900 GB drives. This size will support approximately 20 DeltaV virtual workstations. The Dell MD3220i may be expanded to a maximum 10.8 TB RAID 10 capacity.

2. Storage Area Network (SAN) with 5.4 TB RAID 10 Capacity (SE2520V2M99). This SAN provides 5.4 TB of fully redundant (RAID 10) disk storage with twelve 900 GB drives. This size will support approximately 40 DeltaV virtual workstations. The Dell MD3220i may be expanded to a maximum 10.8 TB RAID 10 capacity for use with VM replication (disaster recovery) which supports up to 64 VMs running temporarily in a failover scenario.

3. Storage Area Network (SAN) with 10.8 TB RAID 10 Capacity (SE2520V3M99). This SAN provides 10.8 TB of fully redundant (RAID 10) disk storage with twenty four 900 GB drives. This size will support approximately 40 DeltaV virtual workstations in normal operation plus VM replication for an additional 40 VMs from outside the SAN cluster (for disaster recovery). This SAN configuration supports up to 64 VMs running temporarily in a failover scenario.

Note 1 – Storage Area Network (SAN) devices are not required with the Dell PowerEdge VRTX which includes shared storage as part of the integrated hardware platform.
Thin Clients

The thin clients used for DeltaV virtualization have been selected to meet the needs of on-line process control, including support for redundant thin client networks. Thin client options are available to support single, dual and quad monitors.

   This thin client is a Dell Wyse Z90DE7 with dual network connections to support redundant thin client networks. This thin client supports single and dual monitors, and comes preloaded with Windows 7 Embedded operating system which is specifically designed for thin clients.

2. Thin Client for Quad Monitors and Redundant Network (SE2519V4M99). This thin client is a Dell Wyse Z90QQ7 which supports Quad Monitors and redundant thin client networks. Windows 7 Embedded for thin clients comes pre-installed.

Switches

DeltaV Switches for Thin Client, Host Management, and Storage Area Networks

High Performance 1GB Network Switches (SE6047V2P1) are used to insure performance and integrity of mission critical communications between thin clients, host servers and storage area networks. These are Dell N3024 managed switches with Layer 2 and Layer 3 feature sets including remote device health monitoring. HIRSCHMANN managed switches (MACH104-20TX-FR) are also supported.

Unmanaged switches are appropriate for less critical operations such as development or training systems. The recommended and supported unmanaged switches for DeltaV virtualization are Netgear Prosafe switches, available in 24, 16, and 8 port configurations (JGS524, JGS516, GS116, GS108).

These switches are intended for 1GB communications for thin client, host management, and Storage Area Networks only. They are not supported for DeltaV primary and secondary ACN networks.
SE2528 – DeltaV Integrated Hardware Platform – Network Storage and Chassis
General Specifications [based on Dell PowerEdge VRTX]

- Optimized chassis to consolidate servers, storage and networking.
- Chassis available in 5U rack-mountable or tower form factors.
  (For rack-mounting, an optional rack mount conversion kit is required. See below).
- Supports up to four blade servers (described below).
- 32 dedicated Ethernet ports (8 per blade server) via 8 4-port NIC cards in PCI slots.
- 8 additional Ethernet ports available per blade server via a shared internal 1GB 8-port switch.
- Each blade server has 16 available Ethernet ports (8 dedicated, 8 shared).
- Redundant, hot-swappable 1100W power supplies (2x2).
- Redundant drive controllers for RAID 10 redundant disk storage.
- Redundant Chassis Management Controller for easy management of all resources (server nodes, storage, networking and power).
- Efficient cooling with 6 hot-swappable, redundant fan modules and 4 blower modules.
- Local power cord option.
- Rack configuration dimensions: 28.7” (73.0cm) D x 19.0” (48.2cm) W x 8.6” (21.9cm) H.
- Rack configuration weight: 151.5 lbs. (68.7 kg), maximum configuration.
- Tower configuration dimensions: 28.7” (73.0cm) D x 12.2” (31.0cm) W x 19.1” (48.4cm) H.
- Tower configuration weight: 164.9 lbs. (74.8 kg), maximum configuration.

For more information about VRTX, see the PowerEdge VRTX Technical Guide on Dell.com.

- Drives: Six 900GB SAS 2.5 hard-drives in a RAID 10 Array, for 2.7 TB redundant disk storage.
- Supports up to 20 virtual DeltaV workstations for on-line systems or 32 VMs for off-line systems.

SE2528V2M99 – DeltaV Integrated Hardware Platform – Network Storage for Large Systems
- Drives: Twelve 900GB SAS 2.5 hard-drives in a RAID 10 Array, for 5.4 TB redundant disk storage.
- Supports up to 40 virtual DeltaV workstations for on-line systems or 64 VMs for off-line systems.

SE2528V3M99 – DeltaV Integrated Hardware – Network Storage for Large Systems with Disaster Recovery
- Drives: Twenty-four 900GB SAS 2.5 hard-drives in a RAID 10 Array, for 10.8 TB redundant disk storage.
- Supports up to 40 virtual DeltaV workstations for on-line systems and VM replication for 40 additional VMs.
  May also be used for off-line systems requiring extra storage.

SE2531V-KIT – DeltaV Integrated Hardware – VRTX Rack-mount Conversion Kit
- PowerEdge VRTX Rack Rails and Tower to Rack Conversion Kit.

*Note – On-line Production systems using the VRTX require disaster recovery capabilities to ensure system availability during upgrades or managed repair.
  – Additional storage may be required for VM replication on SE2528V1M99 and SE2528V2M99.
**SE2538 – DeltaV Integrated Hardware Platform – Host Blade Server General Specifications [based on Dell M630]**

- Blade Server for VRTX Chassis.
- Drives: Two 300GB SAS 2.5in hard-drives.
- Two CPUs - Intel Xeon E5-2630 2.4 GHz 8 cores.
- Memory: 64GB (8 - 8GB RDIMM).
- 16 Ethernet ports available via VRTX Chassis (8 dedicated Ethernet ports via PCI slots plus 8 shared Ethernet ports via shared 1GB internal switch).
- 10Gb Broadcom network card.
- 2 USB ports (via front panel).
- Redundant power and cooling fans supplied by Dell PowerEdge VRTX chassis.

**SE2538V1M99 – Host Blade Server for On-line and Off-line Applications – “Bare-Metal”**

- For use with Windows Hyper-V Server 2012 “Bare-metal” operating system software.
- For use in both on-line and off-line virtual environments.

**SE2538V2M99 – Host Blade Server for Off-line Development, Test, and Training Systems - “Full OS”**

- For use in off-line development, test, and training systems only.

**SE2539V1M99 – DeltaV Integrated Hardware– Domain Controller and Host Management Blade Server General Specifications [based on Dell M630]**

- Blade Server for VRTX Chassis.
- Drives: Two 300GB SAS 2.5in hard-drives.
- Single CPU - Intel Xeon E5-2630 2.4 GHz 8 cores.
- Memory: 16GB (4 - 4GB RDIMM).
- 12 Ethernet ports available via VRTX Chassis (8 dedicated Ethernet ports via PCI slots plus 4 shared Ethernet ports via shared 1GB internal switch).
- 2 USB ports (via front panel).
- Redundant power and cooling fans supplied by Dell PowerEdge VRTX chassis.
Specifications Common to all Host Servers and Storage Units

It is the responsibility of the user to insure their environment is compatible with G1. Due to compliance to RoHS requirements newer computers may not survive in the same environment as older models. If there is any chance of sulfur in the environment computers must be protected in environmental enclosures or relocated to a sulfur free environment.

Temperature: Operating 10° to 35°C (50° to 95°F), Storage –40° to 65°C (–40° to 149°F).
Relative humidity: 20% to 80% (non-condensing).
Altitude: Operating –15.2 to 3048 m (–50 to 10,000 ft.), Storage –15.2 to 10,668 m (–50 to 35,000 ft.).

All computers must be installed in a dust-free, contaminant-free environment. These computers are not suitable for mounting in industrial environments unless they are mounted in enclosures that provide the necessary dust-free and contaminant-free environment. Environment must meet Class G1 level for airborne contaminants per the ISA standard ISA–71.04–1985, Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants.

Tower Chassis General Specifications [based on Dell T630 server]

- Tower Chassis.
- Drives: Six 600GB SAS hard-drives in a RAID 10 Array, for 1.8TB redundant disk storage.
- Two CPUs - Intel Xeon E5-2630 2.4 GHz 8 cores.
- Memory: 48GB.
- Windows Server 2012 Standard Edition is pre-installed for use with DeltaV Virtual Studio v2.3.x. Server CAL licenses not included.
- Hot-swappable drive backplane.
- Redundant, hot-pluggable 750W power supplies.
- 10 Ethernet ports (2 ports on motherboard, plus 8 via add-in NIC cards).
- 8 USB ports (6 on back panel, 2 on front panel).
- DVD-R/W drive.
- USB mouse (2 button w/ scroll).
- Local USB country keyboard and Local power cord option.
- Tower dimensions (without bezel): 443.5mm H w/feet x 304.5mm W x 708.7D with bezel.
- Tower weight 43.3 kg (95 lb.), maximum configuration.
## SE2536 – DeltaV Host Servers, Rack-mount - General Specifications [based on Dell R730 server]

- 2U Rack-mountable chassis with sliding ready rails and cable management arm.
- Two CPUs - Intel Xeon E5-2630 2.4 GHz 8 cores.
- Memory: 48GB.
- 14 Ethernet ports (4 on motherboard plus 10 via add-in NIC cards).
- 4 USB ports – 2 back panel and 2 on front panel.
- Hot-swappable drive backplane.
- Redundant, hot-pluggable 750W power supplies.
- DVD +/- R/W drive.
- USB mouse (2 button w/ scroll).
- Local USB country keyboard.
- Local power cord option.
- Rack Server Dimensions 29.31” (74.4cm) D x 17.5” (44.43cm) W x 3.4” (8.64cm) H with bezel attached.
- Rack Server Weight 50.71 lbs. (23 Kg), maximum configuration.

### Environmental

- Vibration: Operating: 0.26G at 5Hz to 350Hz for 2 minutes, Storage: 1.54Grms Random Vibration at 10Hz to 250Hz for 15 minutes.
- Shock: Operating: 1 shock pulse of 41G for up to 2ms, Storage: 6 shock pulses of 71G for up to 2ms.

## SE2536V3M99 – Host Server for Off-line Development, Test and Training Systems

- Windows Server 2012 Standard Edition is pre-installed for use with DeltaV Virtual Studio v2.3.x. Server CAL licenses not included.
- Drives: Six 600GB SAS hard-drives in a RAID 10 Array, for 1.8TB redundant disk storage.

## SE2536V1M99 – Host Server for On-line and Off-line Applications WITHOUT a Storage Area Network

- For use with Windows Hyper-V Server 2012 “Bare-metal” operating system software and DeltaV Virtual Studio v2.3.x.

## SE2536V2M99 – Host Server for On-line and Off-line Applications WITH a Storage Area Network

- For use with Windows Hyper-V Server 2012 “Bare-metal” operating system software and DeltaV Virtual Studio v2.3.x.
SE2518V2M99 – DeltaV Virtualization Domain Controller and Management Server [based on Dell R320]

- 1U Rack-mountable chassis with sliding ready rails and cable management arm.
- Single CPU - Intel Xeon E5-2403 1.80GHz, 4 cores.
- 4GB Memory.
- 8 Ethernet ports (2 on the motherboard plus 6 via add-in NIC cards).
- 4 USB ports – 2 back panel and 2 on front panel.
- Cabled hard drive backplane.
- Redundant, hot-pluggable 350W power supplies.
- Two 500GB cabled SATA hard-drives in a RAID 1 Array for 500GB redundant disk storage.
- Windows Server 2012 Standard Edition is pre-installed for use with DeltaV Virtual Studio v2.3.x.
- DVD ROM drive.
- USB mouse (2 button w/ scroll).
- Local USB country keyboard.
- Local power cord option.
- Rack Server Dimensions 26.66” (67.7cm) D x 18.99” (48.2cm) W x 1.68” (4.28cm) H with bezel attached.
- Rack Server Weight 42.55 lbs. (19.3 Kg), maximum configuration.

Environmental

- Vibration: Operating: 0.26G at 5Hz to 350Hz for 2 minutes, Storage: 1.87Grms Random Vibration at 10Hz to 250Hz for 15 minutes.
- Shock: Operating: 1 shock pulse of 31G for up to 2.6ms, Storage: 6 shock pulses of 71G for up to 2ms.
## SE2519 – DeltaV Thin Clients [based on Dell Wyse Thin Clients]

Thin clients used for DeltaV virtualization have been selected to meet the needs of on-line process control, including support for single, dual and quad monitors, and support for redundant thin client networks.

### Important Note For Dual and Quad Screen Display

- For DeltaV v13.3, v12.3, v12.3.1, and v11.3.1 virtual workstations, dual and quad screen display is supported using true multi-monitor display mode, including wide screen monitors up to 1680x1050.
- For DeltaV v9.3.1 through v11.3 virtual workstations, dual and quad screen display is supported using a single window in “span mode”, including wide-screen monitors up to 1680x1050 for dual screens and 1280x1024 for quad screens.

## SE2519V3M99 – Thin Client for Single and Dual Monitors and Redundant Network [based on Dell Wyse Z90DE7]

- Dual-core AMD G-T56N 1.65 GH processor with AMD Radeon HD6320 graphics card.
- Single or Dual Monitor Support.
- Memory: 16GB Flash / 4GB RAM.
- 6 USB ports – 4 USB 2.0 (2 back panel and 2 on front panel), 2 USB 3.0 back panel.
- Expansion Card: Single Ethernet port for redundant thin client network support.
- Windows 7 Embedded operating system for thin clients.
- Dimensions: Height 8.46” (215mm), Width 2.72” (69mm), Depth 8.85” (225mm).
- Local power cord option.

*Please refer to Dell product data sheets for environmental and power consumption specifications.*

## SE2519V4M99 – Thin Client for Quad Monitor and Redundant Network [based on Wyse Z90QQ7]

- Quad-core AMD GX-415GA 1.5 GHz with AMD Radeon HD8330E / E6240 graphics card.
- Quad Monitor Support via three display ports and one DVI-I port.
- Memory: 16GB Flash / 4GB RAM.
- 6 USB ports – 4 USB 2.0 (2 back panel and 2 on front panel), 2 USB 3.0 back panel.
- External USB Network Card for redundant thin client network support.
- Windows 7 Embedded operating system for thin clients.
- Dimensions: Height 7.87” (200mm), Width 1.85” (47mm), Depth 8.85” (225mm).
- Local power cord option.

*Please refer to Dell product data sheets for environmental and power consumption specifications.*

## Monitor Specifications for Thin Clients

The DeltaV system supports widescreen monitors with a 16:10 aspect ratio in a 1680x1050 resolution in DeltaV 10.3 or newer systems. [DeltaV does not support 16:9 aspect ratio monitors].

The DeltaV system also supports monitors with a 5:4 aspect ratio 1280x1024 resolution.

*Please refer to the product data sheets for DeltaV Workstation Hardware for currently supported monitors.*
**SE2520 – DeltaV Storage Area Network (SAN) - General Specifications [Dell PowerVault MD3220i]**

- Rack-mountable chassis with sliding ready rails and cable management arm.
- Dual, redundant storage controllers.
- Supports RAID 10 redundant disk storage.
- 2.5 inch 900GB 10K RPM SAS hard drives.
- Expandable up to twenty-four 2.5 inch drives.
- High performance 1GB SAN switches are recommended for all configurations and required for more than four hosts.
- Dual redundant power supply.

**Environmental**

- Temperature Range: 50°F to 95°F (10°C to 35°C) continuous operation.
- Relative Humidity: 10% to 80% continuous operation.

**SE2520V1M99 – DeltaV Storage Area Network (SAN) with 2.7 TB RAID 10 Capacity**

- Six 900GB SAS hard-drives in a RAID10 Array.
- Supports up to 20 virtual DeltaV workstations.

**SE2520V2M99 – DeltaV Storage Area Network (SAN) with 5.4 TB RAID 10 Capacity**

- Twelve 900GB SAS hard-drives in a RAID10 Array.
- Supports up to 40 virtual DeltaV workstations.

**SE2520V3M99 – DeltaV Storage Area Network (SAN) with 10.8 TB RAID 10 Capacity**

- Twenty four 900GB SAS hard-drives in a RAID10 Array.
- Supports up to 40 virtual DeltaV workstations and VM replication for 40 additional VMs.

**SE6047V2P1 – DeltaV Network Switch for SAN, Host Management and Thin Client Networks General Specifications [Dell N3024]**

- 1 Gigabit Ethernet, energy efficient switch.
- 1U Rack-mountable chassis.
- 24 Ethernet ports.
- Supports high density, high-performance stacking and high availability communications.
- Supports redundant iSCSI communications with SAN device.
- Supports redundant host management and thin client networks.
- Dual internal, hot swappable redundant power supplies for high availability.

**Environmental**

- Temperature Range: 32°F to 113°F (0°C to 45°C).
- Operating Relative Humidity: 95%.
- Power Consumption: 53W Max.
DeltaV Virtualization Hardware

VE6051 – DeltaV USB to IP Converter
General Specifications [SEH myUTN-50a USB Device Server]

- USB to IP Converter device for Windows OS.
- Provides virtual machine access to DeltaV System ID USB access key (dongle) or other DeltaV access keys (e.g. Batch Analytics) via Ethernet connection.
- 2 USB 2.0 ports available.
- Dimensions: 98D x 81W x 31H (mm).
- Local power cord options:
  - VE6051P1 – U.S.A.
  - VE6051P2 – European
  - VE6051P3 – U.K.

VE6052 – DeltaV USB to IP Converter – Rack Mount
General Specifications [SEH myUTN-80 USB Device Server]

- USB to IP Converter device for Windows OS.
- Provides virtual machine access to DeltaV System ID USB access key (dongle) or other DeltaV access keys (e.g. Batch Analytics) via Ethernet connection.
- 8 USB 2.0 ports available.
- Dimensions: 215D x 155W x 45H (mm).
- Rack mount kit for 19" server racks.
- Local power cord options:
  - VE6052P1 – U.S.A.
  - VE6052P2 – European
  - VE6052P3 – U.K.
  - VE6052P5 – Australian

Other Supported Switches for Host Management and Thin Client Networks

Managed Gigabit Switch
- HIRSCHMANN MACH104-20TX-FR, 24 port Gigabit Ethernet Managed Switch with redundant power.
  - 24-port 10/100/1000 BASE-TX (RJ-45), Gigabit Ethernet managed rack-mountable switch.

Unmanaged Gigabit Switches
- NETGEAR ProSafe Gigabit Switches.
  - JGS524 – 24-port 10/100/1000BASE-T (RJ-45) Gigabit Ethernet unmanaged desktop or rack mountable switch.
  - JGS516 – 16-port 10/100/1000BASE-T (RJ-45) Gigabit Ethernet unmanaged desktop or rack mountable switch.
  - GS116 – 16-port 10/100/1000 Gigabit Ethernet unmanaged desktop switch.
  - GS108 – 8-port 10/100/1000 Gigabit Ethernet unmanaged desktop switch.